

East Midlands Route Study

March 2016



We are delighted to present the East Midlands Route Study, a document which sets out the building blocks of our strategic vision for delivering rail growth throughout the East Midlands over the next 30 years.

The East Midlands route serves many different rail markets, long distance and commuting services operate regularly into London St Pancras International. Strong links between urban centres, such as Nottingham, Leicester and Derby, help people travel for work, education and leisure. Being located at the heart of Britain's rail network means the Route forms a key part of major cross country and freight journeys.

Over recent years, the rail industry has seen consistent growth in demand and this is forecast to continue. Network Rail faces the challenge, along with the rest of the rail industry, of delivering the capacity to enable this growth to occur. This firstly requires us to ensure we are making best use of the assets already available, before identifying needs for more seats, more trains, and the potential for new technology to improve the efficiency of the industry.

Network Rail is already committed to delivering major changes to the service we deliver. By 2023 the route will have: more seats on commuter services in to London, an additional long distance service operating from London St Pancras International, more regular, fast, journey times for long distance services from London to Nottingham and Sheffield and removed a major bottleneck on the route through remodelling of the Derby area. Alongside this, electrification of the Midland Main Line will enable a fully electric long distance service, reducing the operating and environmental costs of the industry.

Looking to the longer term, High Speed Two and the Digital Railway have the potential to have a transformational effect on journey times and the capability of the rail network to meet growth in demand.

The work carried out within this Route Study enables us to identify any gaps between the planned capability of the network in 2023, and the capability required to meet forecast growth for passenger and freight demand. By also looking ahead over the longer term to 2043, we can build our understanding of capacity needs in the future, making plans to deliver those in the most efficient manner.

Network Rail has led the development of the East Midlands Route Study which was published as a Draft for Consultation in January 2015, and was open for consultation until April 2015. The study has been developed using a collaborative approach with input from the rail industry, local authorities, users and developers from the freight industry, the Department for Transport and **Rail Delivery Group**.

We would like to take the opportunity to thank those who provided input into the consultation process for their considered responses. This final version of the East Midlands Route Study has been refreshed to reflect changes in Network Rail's Enhancement Delivery Plan and to provide clarity and further information to areas where a need for this was identified through the consultation responses.



London St Pancras Railway Station (Upper Level) 2014

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Introduction

The railway network is an important economic and social asset for the East Midlands; this is demonstrated by a 40 per cent increase in its use by passengers over the last ten years, along with freight growth of 2.5 per cent per annum across the national network since the mid 1990s¹.

Looking to the future, significant growth in passenger numbers is forecast to continue – up by 31 – 40 per cent by 2023, and between 53 – 114 per cent by 2043. Freight tonne kilometres are predicted to increase 65 per cent by 2023 and 350 per cent by 2043².

Over the next 10 years, significant enhancements in the capability of the rail network will be completed in the East Midlands, not least through the electrification of the Midland Main Line to Corby, Nottingham, Derby and Sheffield. Further details of Network Rail's plans for this period are contained in the [Enhancements Delivery Plan Update](#), published after the review into the affordability and deliverability of Network Rail's Enhancement Delivery Plan by the Chairman of Network Rail, Sir Peter Hendy.

This Route Study considers the further development of the route beyond these committed improvements. It has been created in the context of an industry where Network Rail are working collaboratively as part of the Midlands Connect partnership and with operators, HS2 Ltd and other stakeholders to identify ongoing priorities and opportunities for delivering growth.

As part of the rail industry's [Long Term Planning Process](#) this Route Study builds upon the findings of four national [Market Studies](#). The Market Studies identified opportunities for rail to play its part in delivering the four strategic goals of the transport sector:

1. Enabling economic growth
2. Reducing carbon emissions and impact on the environment of the transport sector
3. Improving the quality of life for communities and individuals
4. Improving affordability and value for money

The studies identified conditional outputs which set out the potential for investment in the railway to meet these goals. It is important to state that the conditional outputs identified are conditional on both affordability and a value for money business case being made for any interventions required to deliver them. Equally, the conditional outputs will need to be deliverable; technologically, operationally and physically.

The rail industry has developed an aspirational train service for 2043. This Indicative Train Service Specification (ITSS) reflects the opportunities which could be achieved if the conditional outputs from the four established Market Studies are met within the East Midlands.

The ITSS for 2043 has been reviewed against the network as it is planned to be following the completion of currently programmed enhancement schemes. This activity identified 14 specific areas where interventions are required to allow that level of train service to operate. These are shown in [Figure 1](#). Additionally, further options may be identified as priorities for funders through completion of the Midlands Connect Work Packages.

This Route Study presents a long term strategy by looking forward to 2043; and, in this context, it provides evidence for choices for funders for the period 2019 – 2024 ([Chapter 5](#)). The study prioritises schemes that:

- are required to accommodate passenger and freight demand forecast to 2023
- can be delivered on the back of a planned asset renewal
- provide access to HS2 stations
- are specific priorities identified by funders
- can reduce whole industry costs.

A number of infrastructure enhancements were identified, in the Draft for Consultation version of this document, as meeting the criteria for prioritising choices for funders for 2023. Since publication of that document in January 2015, further development work has been carried out on those enhancement schemes. The schemes being proposed as choices for funders for CP6 are outlined following [Figure 1](#), with a brief summary of the latest development position reflecting the Enhancement Delivery Plan Update.

¹Office of Rail Regulation (ORR)[now the Office of Rail and Road] Regional Passenger Usage Profiles 2012/13

²Freight Market Study, Network Rail, 2013. National tonne kilometres used as tonnage per Route Study area is not collected

Figure 1 Interventions required to operate the Indicative Train Service for 2043

Key

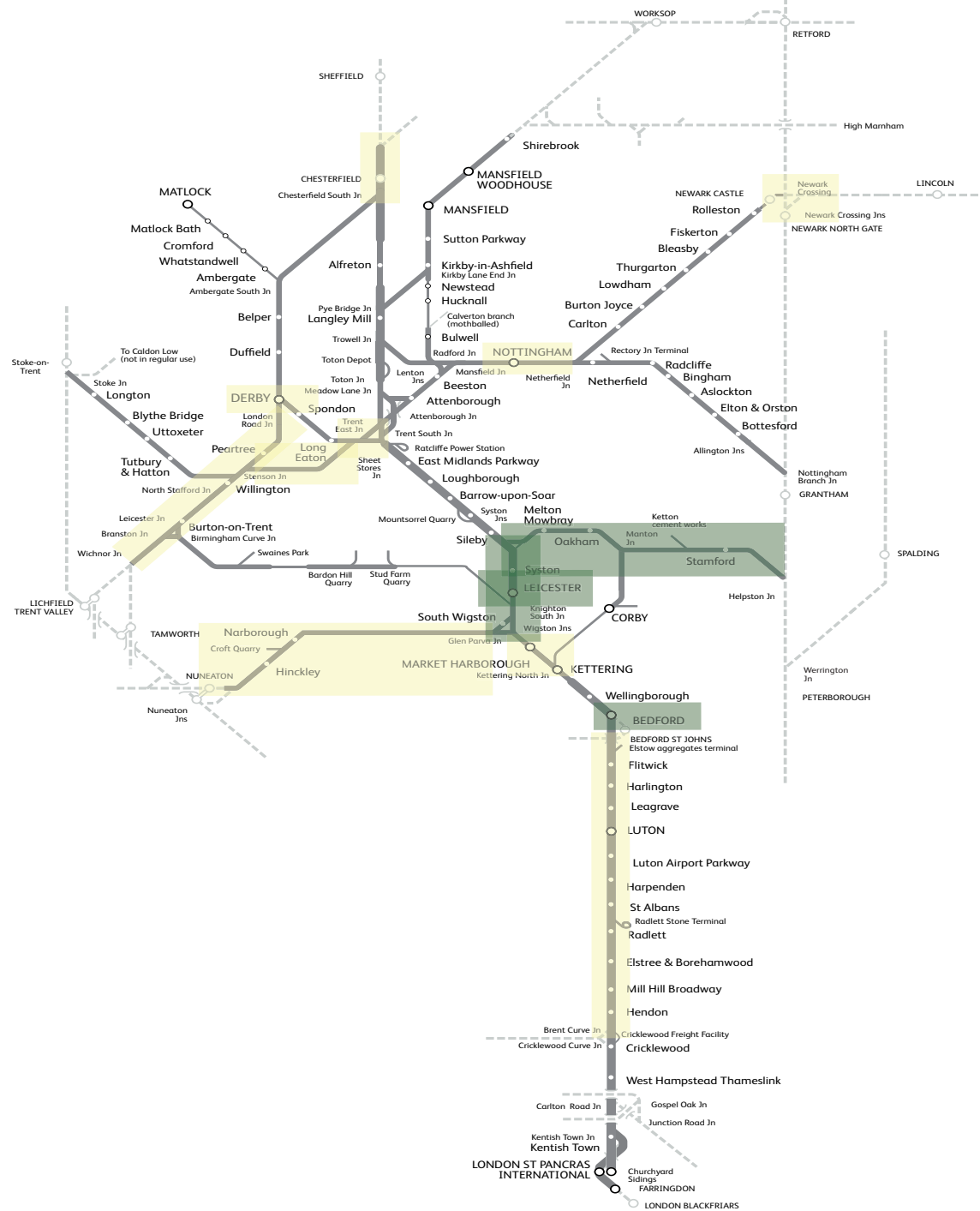
Analysis Areas

CP6 Choices for Funders:

- Leicester Station
- Bedford Midland station area
- Wigston North Jn - Syston East Jn
- Syston Jn - Manton Jn - Peterborough area

Towards a Railway for 2043:

- Trent Junctions
- Derby station
- Chesterfield area (Tapton Jn - Clay Cross Jn)
- Derby - Birmingham area
- Nottingham station
- Stenson Jn - Sheet Stores Jn
- Nuneaton - Leicester area
- Newark area
- South of Bedford area
- Kettering to Kilby Bridge jn
- Midlands Connect Journey Time Improvements*
*not highlighted





- Leicester Capacity – this caters for growth of freight and passenger capacity requirements along three different corridors, primarily delivering growth for Felixstowe to West Midlands freight services to 2023. Interventions identified to improve capacity consist of: additional platforms at Leicester Station, more running lines between Syston and Kilby Bridge Junction, grade separation of Wigston Junction and improvements to the Syston North and South Chords.
- Syston-Peterborough resignalling – to allow for freight growth by improving train planning rules. Analysis has shown a signalling solution will cater for expected growth, allowing trains to run closer together and so increasing the number of trains able to run on the line each hour.

Additionally, the Route Study has identified a value for money case for the lengthening of trains on the corridors listed below. In some cases, the lengthening is specific to trains at certain times during the day, or on specific sections of the route:

- Birmingham – Leicester – Stansted Airport/Cambridge
- Norwich – Nottingham – Sheffield – Liverpool
- Southampton/Reading – Newcastle via Derby
- Plymouth – Edinburgh/Glasgow via Derby

On a number of routes, a specific need for lengthening of individual trains to meet forecast demand has been identified, but a value for money case has not yet been made. In consultation with potential funders, the Route Study identifies potential next steps for these situations.

These intervention options will be required to provide the capacity to accommodate forecast growth, and are consistent with the long term strategy to 2043.

In addition, funders have asked that Network Rail develop the case for the extension of the East West Rail link from the East Midlands area to Cambridge, and to work with the Midlands Connect partnership to identify and develop options for improvements in connectivity and journey time across East-West Midlands corridors. Network Rail are also continuing to work closely with HS2 Ltd, Midlands Connect, and local councils and Enterprise Partnerships, to develop plans for enabling the planned arrival of HS2 at Toton, in 2033, to maximise the wider benefits of HS2 and to deliver the highest growth possible to the region.

This Route Study has been developed collaboratively with the rail industry, funders and stakeholders. A Draft for Consultation version was published in January 2015 with a consultation period open to all which ended in April 2015. Work on the Route Study was then paused awaiting completion of the [review into the affordability and deliverability of Network Rail's Enhancement Delivery Plan](#) by Sir Peter Hendy. The outputs from this review, along with recognition of the 75 consultation responses received, have been incorporated into this final document.

Network Rail would like to take the opportunity to thank all those involved in the process of creating this Route Study and looks forward to continuing industry collaboration in delivering the outputs identified.

01: The Long Term Planning Process

Chapter 1 explains

- how the rail industry's Long Term Planning Process is developed
- how investment in rail to meet the needs of the East Midlands is targeted through choices for funders
- how those choices are developed collaboratively by the rail industry with its wider stakeholders

Background to the development of the Long Term Planning Process (LTPP)

This Route Study is a key output of the rail industry's **Long Term Planning Process** (LTPP). Developed following the success of an earlier strategic review – the Route Utilisation Strategy programme – the LTPP is designed to consider the role of the railway in supporting the UK economy over the next 30 years. It comprises a set of activities and documents that:

- address the demands that are likely to be placed on Britain's rail network over the next 30 years
- capture stakeholder aspirations to develop new train services in light of continuing rail investments
- present investment choices for funders to accommodate demand and future aspirations.

The LTPP proposes ways in which train services and infrastructure enhancement could develop over the longer term to 2043, and provides an evidence base for near-term investment in the next Control Period, Control Period 6 (CP6) 2019 – 2024.

Due to the uncertainties of a 30-year horizon, the LTPP is an iterative process. Future planning cycles will enable an updated view to take into account the changing context and requirements of the industry and economy. This Route Study, and the Long Term Planning Process more generally, are a key input into the industry's ongoing discussions with funders concerning the future outputs, investment choices and funding requirements for the railway. Future iterations of the LTPP will evolve, identifying requirements for future Control Periods as part of this on-going process.

Further detail of the LTPP is contained within **Appendix A1**.

Structure

The LTPP consists of a number of different elements which seek to define the future capability of the rail network.

Market Studies, which forecast future rail demand, and develop conditional outputs for future rail services. These outputs are based on stakeholders' views of how rail services can support delivery of the industry's strategic goals

Route Studies, strategic documents which develop options for future services and identify options for investment in the rail network for each of Network Rail's devolved routes. Options are based on the conditional outputs and demand forecasts from the Market Studies, and are assessed against industry appraisal criteria to provide choices for funders.

Cross-Boundary Analysis, which considers options for services that run across multiple routes, providing consistent assumptions across Route Studies.

In addition to these studies, Network Rail facilitates the production of Network Studies and Route Utilisation Strategies. These documents look at network-wide issues, for example freight strategy, and address the future capacity and technology-related issues for the railway.

The East Midlands Route Study

The East Midlands Route Study has been developed through a joint working group that is made up of stakeholders from across the rail industry. The documentation and analysis that support the study have been produced by Network Rail on behalf of the Route Study Working Group.

The Draft for Consultation issue of the East Midlands Route Study was published in January 2015, with a consultation period ending in April 2015. In June 2015, work on Network Rail's CP5 electrification schemes, including the planned electrification of the Midland Main Line, was paused as part of a review of the affordability and deliverability of major schemes, undertaken by Sir Peter Hendy, the Chairman of Network Rail on behalf of the Secretary of State for Transport. As this had the potential to impact on the findings of the East Midlands Route Study, the decision was taken to defer completion of this, final, version of the Route Study until after the publication of **Sir Peter Hendy's report**. This action has allowed us to complete the final version of the Route Study with the confidence that it is consistent with Network Rail's updated **Enhancement Delivery Plan**.

The East Midlands Route Study Draft for Consultation took as its starting point the railway as it was planned to be following the completion of schemes identified in the [Enhancements Delivery Plan for Control Period 5](#) (2014-2019). Following the realignment of delivery plans following the Hendy Review, this investment programme now extends beyond CP5, with development and completion of some schemes now planned for CP6. Although the baseline for the end of CP5 that was used in the Draft for Consultation has now changed, the forecast gap in the capability of the network at the end of CP6 remains the same. As such, no material changes to the outputs of the East Midlands Route Study have been made. Details of the changes which will result from the updated investment programme are articulated in [Chapter 2](#).

In developing the investment choices for funders detailed in [Chapter 5](#), the Route Study has taken into account key issues that shape the way the UK railway will develop. These are: safety, performance, the impact of High Speed 2 (HS2), resilience of the network, moving towards a Digital Railway and congested infrastructure on the Route Study area.

Consultation

Throughout the activities undertaken as part of this Route Study, the rail industry and wider stakeholders' have been involved through various working groups, with progress validated through a Route Study Board. Additionally, the publication of a Draft for Consultation provided the opportunity for any interested party to highlight opportunities they felt should be acknowledged by the final document.

The Draft for Consultation received 75 responses from a range of sources including: the transport industry, local authorities and Local Enterprise Partnerships, MPs, rail user groups and unaffiliated members of the public. All responses were considered, with the following key themes identified, which have led to further analysis and comment where appropriate:

- freight growth forecasts
- passenger demand levels, particularly crowding issues on local East Midlands corridors and into London St Pancras
- recognition of the development of the Midlands Connect Partnership and their strategy for growth to support the Midlands Engine
- development of schemes to improve east-west journey time alongside connectivity outputs

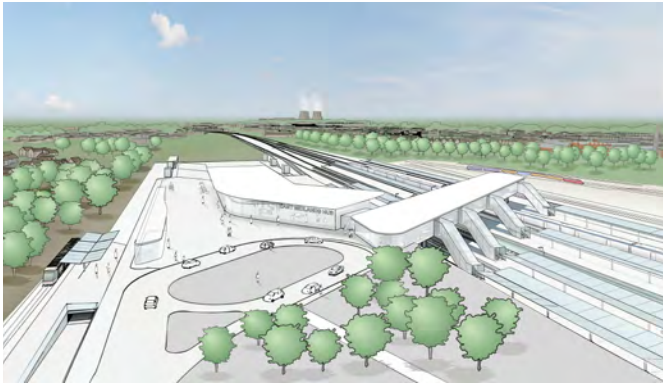
A full record of all [consultation responses](#) received is available through the Network Rail website. Further detail is included in [Chapter 6](#).

The Route Study has also worked closely with other Route Studies, particularly the West Midlands and Chiltern Route Study (publishing a Draft for Consultation version concurrently with this document) to ensure consistency in specifications and options across the network.

Safety

Network Rail set out a vision for safety in its 'Transforming Safety and Wellbeing' report which takes a view through to 2024. Many of the choices for funders set out later in this document are at an early stage of maturity, and safety considerations and requirements will be embedded from the outset of their development. By their very nature, proposals to remove junction conflicts eliminate crossing movements. Schemes which ease the flow of passengers at stations will improve the safe operation of trains. Additionally, some investment proposals have the potential to eliminate level crossings; where this is the case, these opportunities have been identified and costed, and will be progressed if the schemes are developed further.

¹ See Appendix A1 for further information on governance arrangements



HS2 artist's impression of a potential design for the EM Hub station at Toton

Performance

In developing the schemes set out in this Route Study, the rail industry has principally considered how the conditional outputs identified in the Market Studies could be met, both for CP6, and in the longer term to 2043. More immediately, Network Rail has been set targets to improve performance by 2019. Monitored through the Public Performance Measure (PPM); the target is a PPM of 92.5 per cent for England, Wales and Scotland by the end of Control Period 5.

The performance objectives for the rail industry in CP6 are not yet established. However, the trend is likely to be one of continuous improvement across the industry. As the choices for investment in CP6 (set out in [Chapter 5](#)) are developed further, emerging opportunities for performance improvement can be considered in more depth.

High Speed 2

The HS2 Ltd proposals for a Y-shaped network linking London with Birmingham, Manchester, the East Midlands and South and West Yorkshire have major implications for travel patterns in the Route Study area. This significant investment provides the opportunity for a step change in available capacity and journey time between many of the towns and cities both within the East Midlands and beyond. It is currently anticipated that HS2 Phase 2 will begin operation of services of the eastern leg of the Y-network in 2033².

Toton has now been confirmed as the preferred location for the HS2 East Midlands Hub station. Network Rail continues to work with HS2 Ltd, and local stakeholders, investigating how to make best use of the introduction of HS2 and developing plans for how the rail network can maximise potential benefits.

Midlands Connect

The Midlands Connect Partnership was formed in 2014 and is responsible for transport strategy as part of the Midlands Engine. It is a collaboration of 11 Local Enterprise Partnerships, Network Rail, Highways England, central government, 28 local authorities, East Midlands and Birmingham airports and the business community. It will use an evidence based approach to identify a strategic programme of transport interventions that maximise the potential for economic growth across the whole of the Midlands.

Network Rail is committed to working as part of the Midlands Connect partnership to further understand the role that rail can have in driving growth throughout the Midlands. This work will be formed around a series of Work Packages which focus on:

- HS2 Readiness
- Hubs and Corridors
- Freight and International Gateways
- Smart Connectivity

The Digital Railway

The Digital Railway is an industry-wide programme designed to benefit Britain's economy by accelerating the use of digital technology in several key areas, namely:

- train operation – transforming the rolling stock landscape; tariff management; journey sales and settlement; and potentially even the franchise operating model. This tranche of the programme is termed the 'Digital Train Operator'
- capacity allocation – long-term network planning through to sale of access; managing capacity in real-time. This is termed the 'Digital System Operator'
- passenger experience – simplifying journeys, from planning and advanced purchase to on-the-day travel. This is referred to as the 'Digital Passenger'
- infrastructure – digitally-enabled assets that monitor their status in real time; a digitally-supported workforce carrying out digitally-managed asset operations. This area is called the 'Digital Asset Manager'
- stations and interchanges – enhanced retail and transport hubs with key interconnects to other modes of transport including driverless electric cars. This is the 'Digital Station'.

² <https://www.gov.uk/government/collections/hs2-phase-two-from-the-west-midlands-to-leeds-and-manchester>

In most areas, work to develop technical capability is already underway. However, as these proposals are still at an early stage of development, for the purposes of the East Midlands Route Study, no assumptions have been made on any changes arising from the Digital Railway. Currently, proposals for the introduction of the European Rail Traffic Management System (ERTMS) throughout the rail network are being refined. The emerging Digital Railway strategy, priorities and timescales, and their potential to impact on the capability of the rail network, will need to be considered accordingly as intervention options identified in the Route Study are developed further.

Resilience

The resilience of transport networks was severely affected by the winter storms of 2013/2014. These events have brought into sharp focus the vulnerability of parts of the network to changes in climate, and the increasing incidence of extreme weather events. Whilst the immediate response to address these challenges has been well received, there is also a need to consider resilience broadly, as a strategic issue for the railway.

To this end, the London North Eastern and East Midlands Route has developed a **Weather Resilience and Climate Change Adaptation Plan (WRCCA)** which was published at the end of September 2014. This document sets out a management plan for weather and climate change resilience, it is supported by an evaluation of the effects of historical weather events on infrastructure, and an awareness of potential future impacts based on regional climate change projections.

Congested Infrastructure

The Route Study recognises that in some instances there are already areas of the network where capacity is constrained or crowding issues occur. Network Rail has been unable to satisfy all existing capacity requests on the Midland Main Line therefore, under the 2005 Access and Management Regulations, the line from Leicester to Cricklewood has been declared as '**Congested Infrastructure**'. Network Rail has utilised its existing processes to satisfy these regulations. This Route Study articulates potential solutions to relieve the capacity constraints, alongside the enhancement plan published as required by the regulations.

Industry Reviews

Alongside the Hendy Review, the review carried out by Dame Colette Bowe into the planning of the **CP5 enhancements programme**, and a report by Nicola Shaw into the **longer term future shape and financing of Network Rail** are recognised as potentially impacting the planning framework.

The rest of this document is structured as follows:

Chapter 2: The Starting Point summarises the characteristics of the railway in the East Midlands Route area following the delivery of the current enhancements plan.

Chapter 3: A Strategy for Growth Conditional Outputs details future aspirations for the railway in the East Midlands Route and a service specification that can meet forecast growth to 2043.

Chapter 4: Towards A Railway for 2043 develops the long term growth strategy for the railway in the East Midlands Route and identifies those locations where enhancements are likely to be required.

Chapter 5: Delivering CP6 Choices for Funders details outputs for CP6 in terms of investment options on the East Midlands Route that can be considered by funders.

Chapter 6: Consultation explains how responses to the Draft for Consultation have informed the final version of the East Midlands Route Study.

Chapter 2 explains:

- how the East Midlands network will develop through significant enhancements already programmed through CP5 and CP6 following the Hendy Review
- the development of additional services alongside franchise specifications
- the importance of the East Midlands route as a freight artery

This chapter begins with a summary of the East Midlands rail network which forms the baseline against which the strategy was developed: it sets out infrastructure capabilities – the characteristics of the railway, and what it can accommodate. This picture was used to model future demand, and to test investment choices – choices that can account for demand and promote economic growth. A future baseline was chosen for this strategic outlook because it represents a point at which important enhancements will be in place for the railway of the East Midlands.

The baseline is formed of the present infrastructure and programmed enhancements planned throughout CP5 and CP6 as proposed by the Hendy Review, including the completion of the electrification of the Midland Main Line (MML) from Bedford to Kettering and Corby and Nottingham and Sheffield via Derby. It includes improvements that Network Rail has planned to deliver, or enhancements that other industry groups are funding. The schemes that Network Rail has programmed to deliver in CP5 and CP6 are detailed in its [Enhancements Delivery Plan](#).

The Route Study has assessed the baseline capability enabled by schemes due for completion by the end of CP6 and identify where gaps exist to required capability in 2043 and at the end of CP6. These assessments will help to develop an idea of how the network will need to look in 2043 ([Chapter 6](#)) and Choices for Funders in CP6 ([Chapter 5](#)).

Geographic Scope

The extent of the East Midlands Route Study area is shown in [Figure 2.1](#). It comprises the MML out of London St Pancras International together with local routes that radiate out of Derby, Leicester and Nottingham.

The MML connects the East Midlands with London, and carries Thameslink services from the capital as far as Bedford. It is a route that supports intensive inner and outer suburban services in addition to long distance high speed (LDHS) trains proceeding to Leicester, Derby, Nottingham and Sheffield. By the end of 2019 the MML will be electrified from London to Kettering and Corby. Electrification to Nottingham and Sheffield via Derby is due for completion by the end of 2023.

Along the east-west axis, the route provides connectivity for passengers and freight between the East and West Midlands along corridors which have been identified as of strategic importance to local growth by the Midlands Connect partnership. The cross-country part of the route north of Derby also provides a key section of the north east – south west corridor, giving access from Scotland, the North East and Yorkshire to Birmingham and the South West. Services also operate through the East Midlands from Birmingham and the North West to Anglia. There is also a service operating between Nottingham and Yorkshire via the Erewash Valley.

The MML together with the Derby to Birmingham line contain a mixture of two, three and four track railway. The remaining lines within the East Midlands Route Study area are typically double track secondary or freight-only routes, whilst the Nottingham – Grantham and Ambergate – Matlock lines are designated as rural routes; the latter is single track throughout.

There are a number of freight terminals located within the East Midlands Route Study area. These provide facilities for a number of freight commodities. These are primarily, but not exclusively: aggregates and construction materials, intermodal containers and flows associated with the power station at Ratcliffe and cement works at Ketton. Substantial freight traffic is generated by these terminals whilst the East Midlands' geographical position means that many flows also traverse the region, to and from terminals outside the Route Study area. [Figure 2.2](#) shows the East Midlands freight terminals.

The Network Specification for the London North Eastern and East Midlands Route describes the geographical context of the route in more detail – its markets and services, and infrastructure capabilities. Network Specifications are supported by Route Specifications that cover specific sections of the route in more depth. Both documents can be found on [Network Rail's website](#).

Route Characteristics

[Figures 2.3](#) and [2.4](#) show the gauge and electrification capability of the infrastructure on the Route Study area following planned enhancements.



Figure 2.1 East Midlands Route Study Geographic Scope

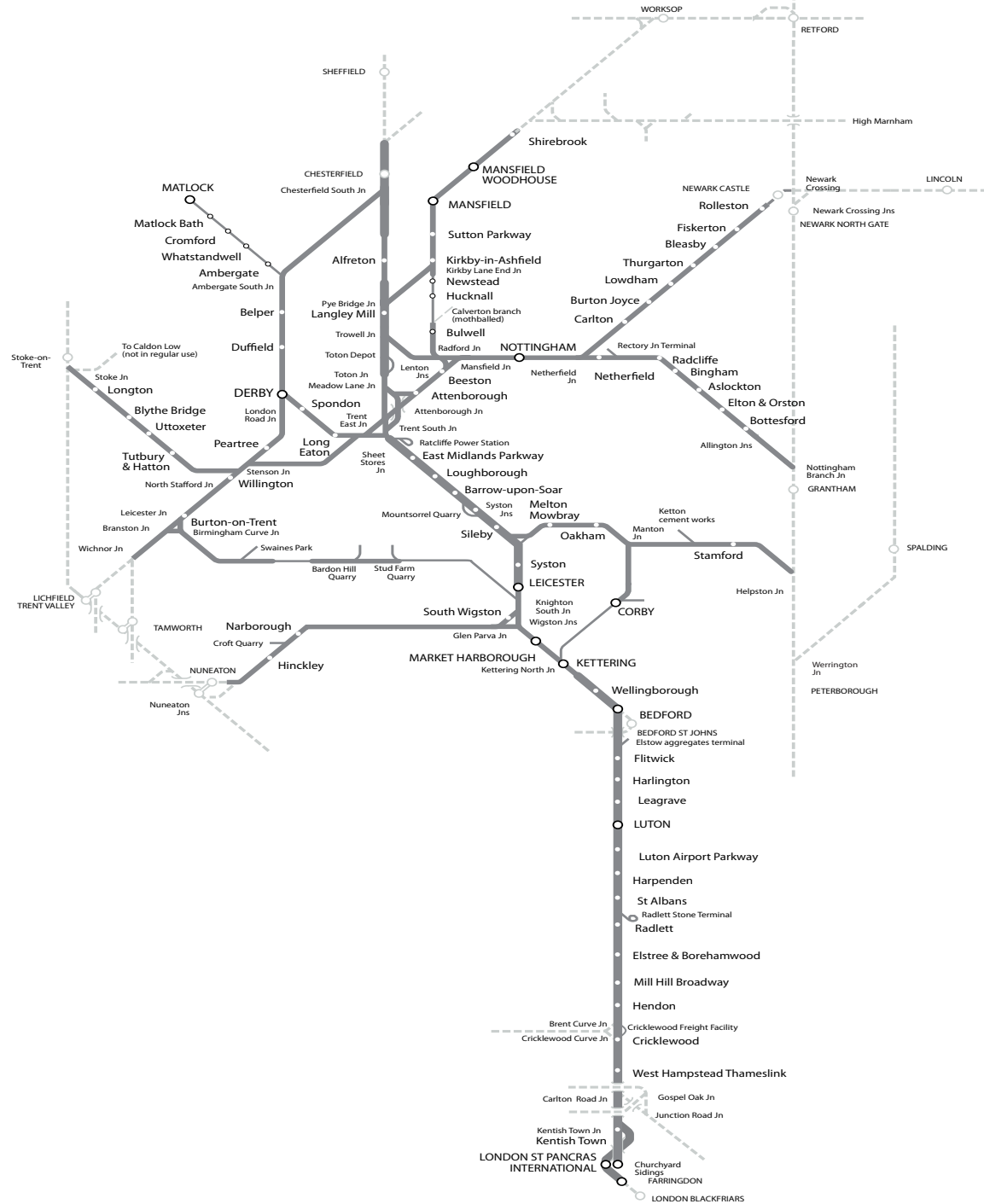


Figure 2.2 East Midlands Route Study Freight Terminals

Key

- A** Bardon Hill Quarry
- B** Stud Farm Quarry
- C** Croft Quarry
- D** Ratcliffe Power Station
- E** Mountsorrel Quarry
- F** East Leake
- G** Ketton Cement Works
- H** Elstow
- I** Radlett
- J** Churchyard Terminal
- K** Colwick
- L** Beeston
- M** Corby
- N** Sinfin
- O** Wellingborough
- P** Limbury Road
- Q** Luton Crescent Road

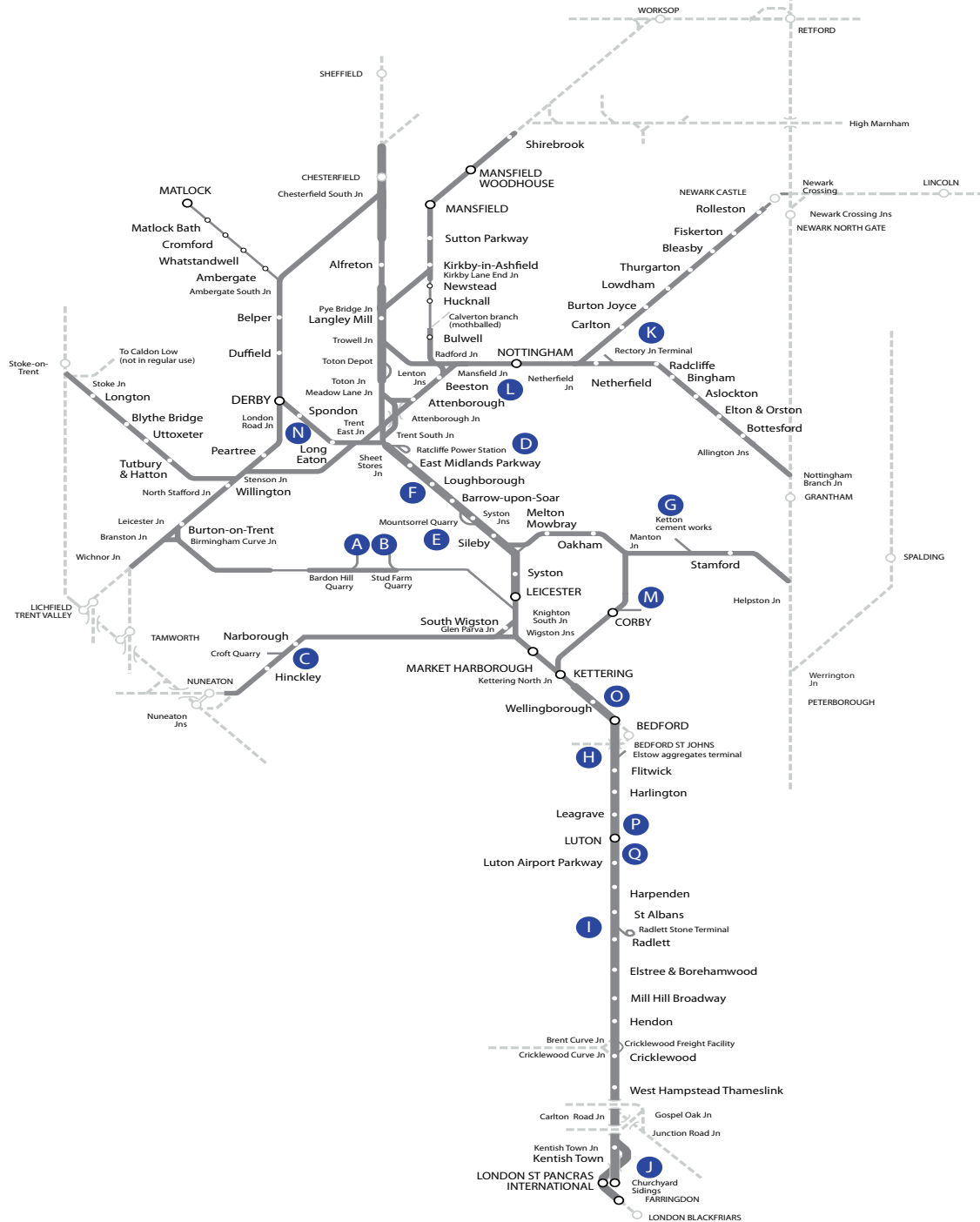


Figure 2.3 East Midlands Route Study Gauge (planned end of 2023)

- Key
- W6
 - W7
 - W8
 - W9
 - W10
 - W12

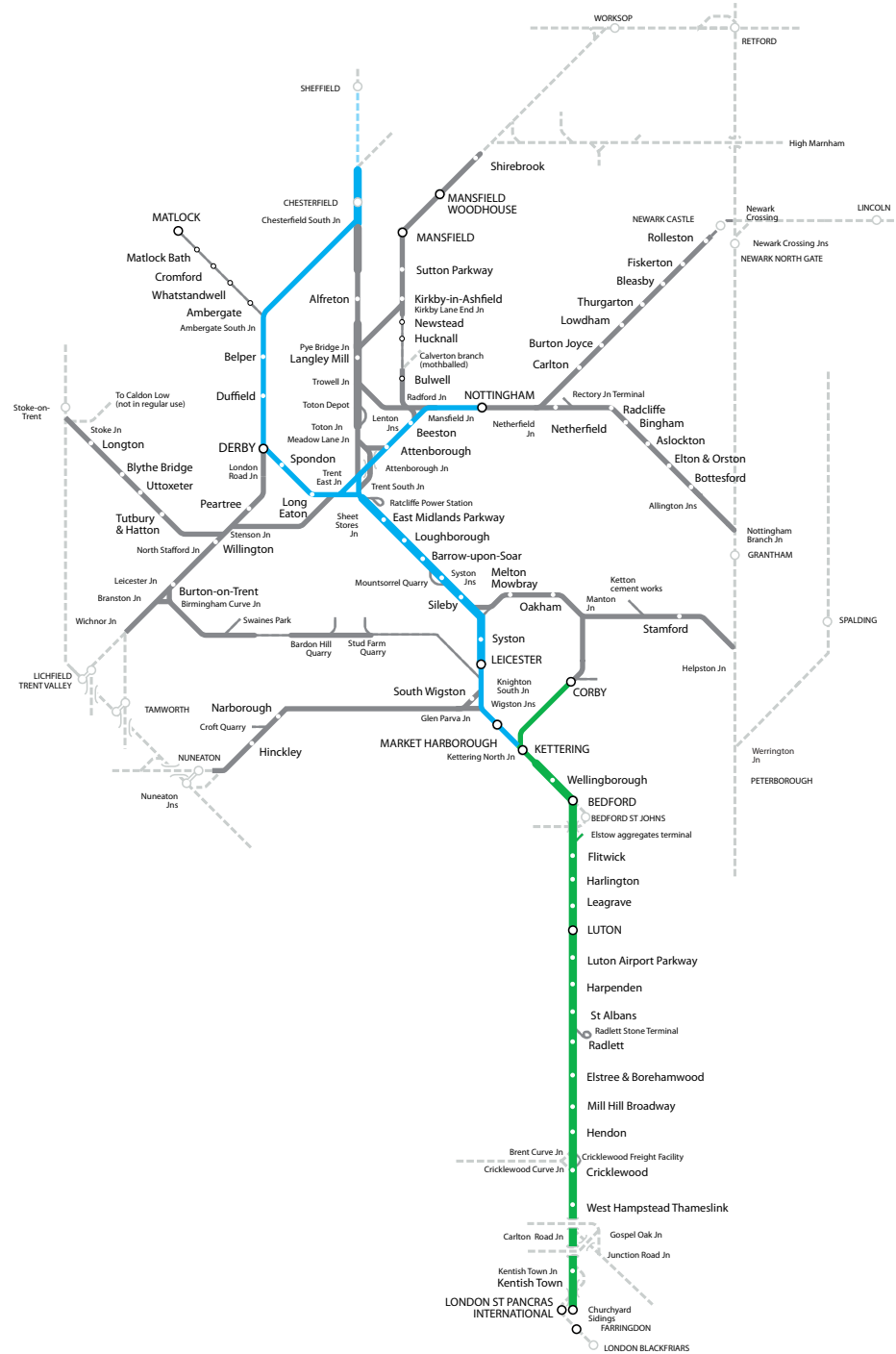


This diagram is for indication only. Please refer to Sectional Appendix for Gauge Clearance.

Figure 2.4 East Midlands Route Study Electrification (CP5/CP6)

Key

- end of 2023
- end of 2019





The Electric Spine Development Programme

This programme is planned to create, over a number of control periods, a high-capability 25kV electrified passenger and freight route from the South Coast via Oxford and the Midlands to South Yorkshire. Works will be undertaken over a number of control periods. This will improve regional and national connectivity and links to ports and airports for both passengers and freight, supporting economic development.

Except for work to deliver specific infrastructure required to facilitate a new hourly service to Kenilworth station this programme in its entirety is now planned either for delivery or development in CP6. Enhancements related to Leicester Capacity form part of this programme.

More detail on The Electric Spine Development Programme can be found in the Network Rail [Enhancements Delivery Plan Update](#).

Felixstowe to the West Midlands

The cross-country rail route from Felixstowe to the West Midlands via Leicester is being upgraded over several control periods. This will allow the introduction of more freight trains, and the transit of the larger containers increasingly used by shipping companies. The programme started in Control Period 4 (CP4), 2009 – 2014 with the completion of gauge enhancements between Peterborough and Nuneaton, and the first elements of capacity upgrades.

Midland Main Line Programme

As part of the Enhancement Delivery Plan Update, the package of works planned for delivery on the MML has been combined under a single programme, aiming, over CP5 and CP6, to improve the links between core centre of population and economic activity in the East Midlands and Yorkshire.

The individually named schemes which together constitute the programme are:

- Midland Main Line Electrification
- Kettering to Corby Capacity
- Bedford to Kettering Capacity

- Derby Station Area Remodelling
- Linespeed improvements at Market Harborough, Leicester South Junction and between Derby and Sheffield
- a package of platform extensions has been developed for the MML to allow the operation of longer trains into London St Pancras International (phased throughout CP5 and CP6 to align with electrification works where possible).

Further details of the MML Programme including the planned phased delivery for December 2019 and December 2023 timetable changes can be found in the Network Rail Enhancements Delivery Plan Update

Other schemes

With third party support, a new station is being built in CP5 between Nottingham and Chesterfield at Ilkeston. Development of potential new stations is ongoing with local funders at other locations.

Service characteristics

With the opportunities presented by electrification schemes during CP5 and CP6, the characteristics of a number of train services are proposed to alter.

Long Distance High Speed (LDHS) services

These services include high speed trains into London St Pancras International, and non-London long distance services that travel through the Route Study area connecting destinations across the country.

The rail industry is exploring the opportunities provided by electrification to improve journey time and further reduce industry operational costs on the MML. The introduction of an additional outer suburban service to serve the North Northamptonshire commuter market will support reduced journey time on long distance services. This will be developed as part of the franchise specification process to increase the overall number of long distance trains from London St Pancras International from five per hour to six per hour in the peak and off-peak along with improvements to the regularity of service timings.

As a result of the introduction of electric rolling stock, it is anticipated that additional depot and stabling facilities will also be required. As operational plans and the procurement of rolling stock become clearer, further work will be required by the industry to finalise these requirements.

For the non-London long distance market, hourly services operate between Plymouth and Edinburgh (via Birmingham and Leeds), and Reading and Newcastle (via Birmingham and Doncaster).

Inner and outer London suburban services

These services primarily connect the London area and Bedford to Kent and Sussex, including Brighton and Gatwick Airport, with a range of stopping and semi-fast services.

The **Thameslink programme** will culminate in 2018 with the introduction of a new timetable which will see 16 trains per hour operating from the London core onto the MML at peak times. This timetable change will also see the full deployment of a new fleet of trains of 8-car and 12-car fixed formations.

Interurban services

There are a number of interurban services operating in the East Midlands Route Study area. These are:

- Norwich – Nottingham – Sheffield – Liverpool
- Cardiff – Birmingham – Derby – Nottingham
- Nottingham – Leeds
- Birmingham – Leicester – Cambridge – Stansted Airport.

Local services

Local services operate on the following corridors:

- Leicester – Nottingham – Lincoln
- Nottingham – Grantham – Skegness
- Nottingham – Worksop
- Derby – Stoke-on-Trent – Crewe
- Newark Castle – Nottingham – Derby – Matlock

Freight

Freight traffic falls into a number of different categories across the East Midlands, including:

- intermodal traffic using the Felixstowe – West Midlands corridor (intermodal trains are typically Class 4 services able to operate at speeds of up to 75mph)
- construction materials from aggregates quarries on the route and from the Peak District and Leicestershire to East Anglia, the South East and London
- coal traffic from the loading points on and across the route to the power station at Ratcliffe
- services carrying steel and other metals that use corridors that cross the Route Study area via Chesterfield, Derby and the Erewash Valley Line, through Langley Mill
- oil traffic from the Humber ports to destinations including Kingsbury near Birmingham, via Newark and Nottingham.



03: A Strategy for Growth – Conditional Outputs

This chapter identifies

- Forecast passenger growth of 31 to 40 per cent by 2023; 53 to 114 per cent by 2043 ¹
- forecast increased freight tonne kilometres of 65 per cent by 2023 and 350 per cent by 2043
- connectivity opportunities that
 - facilitate economic growth
 - provide access to airports and high speed rail
 - improve the quality of life for communities and individuals

In collaboration with the rail industry, funders, local authorities and other interested parties, Network Rail published a series of **Market Studies** to understand the demand for rail over a 30-year horizon. The studies were established in 2013 with the aim of showing how the rail industry could contribute to delivering a series of outcomes important to the prosperity of the United Kingdom. These outcomes are described in terms of four strategic goals:

Enabling economic growth

- by providing sufficient capacity for people travelling to take part in economically productive activities
- by improving business to business connectivity
- by improving connectivity to/from the retail, tourism and leisure sectors of the economy.

Reducing carbon and the transport sectors impact on the environment

- by directly reducing the environmental impact of rail
- by reducing the use of less carbon efficient modes of transport.
- Improving the quality of life for communities and individuals
- by connecting communities
- by providing access to social infrastructure such as educational establishments and major leisure venues
- by reducing road congestion.

Improving the quality of life for communities and individuals

- by connecting communities
- by providing access to social infrastructure such as educational establishments and major leisure venues
- by reducing road congestion.

Improving affordability value for money (to funders)

- by meeting other outputs in an affordable way
- by directly reducing whole industry subsidy.

The studies were designed to provide a strategic view of key market sectors:

- London and the South East
- Long Distance
- Regional Urban
- Freight

To understand demand, a range of economic scenarios for 2023 and 2043 were tested. Each scenario reflects possible alternative futures for the UK economy, taking into account factors which influence the demand for travel such as macro and micro economics, demographic trends, consumer tastes, and the supply of travel opportunities. The scenarios ranged from a UK economy that was 'struggling in isolation', to one where it was 'prospering in global stability'. The 'prospering in global stability' scenario represents the high end of the demand spectrum, and of the demand analysis carried out. This scenario was favoured as a credible best case that could define the railway development of the future. To provide a balance to this assumption, a 'low growth sensitivity test' has been applied to the value for money assessments carried out in this Route Study.

Having put in place a picture of demand through to 2043, the Market Studies developed strategic solutions that could accommodate for growth known as 'conditional outputs'. Conditional outputs are the rail industry's long term aspirations for the levels of service to be provided. They are used to inform future investment decisions, and so it is important to note that they are conditional on being deliverable in a manner which represents both value for money and is affordable to funders. Conditional outputs also need to be deliverable - technologically, operationally and physically.

¹ Passenger growth from Office of Rail Regulation [now the Office of Rail and Road] (ORR)

At a high level, the conditional outputs describe the rail industry aspirations over the longer term and can be categorised as:

- the level of rail capacity required to accommodate the demand for passenger journeys, taking into account forecast weekday growth
- the level of rail connectivity between large towns and cities across the country (for example, the frequency of train services, journey time, and the provision of direct journeys which do not require an interchange)
- the level of freight demand forecast between pairs of locations in terms of the tonnes for a given commodity
- the level of capacity required at stations for better passenger circulation, especially during the peaks (to be developed by route studies in conjunction with stakeholders)
- the level of capacity for leisure travel at evenings and weekends specified in the London and South East Market Study
- the level of connectivity required to airports, ports, higher education establishments and the planned high speed rail network (HS2)
- improved rail connectivity for weekend leisure travel
- improved local access to the rail network
- improved passenger satisfaction.

Here, the conditional outputs identified through Market Studies are put in the specific context of the East Midlands Route Study area. The choice of a 30-year planning horizon reflects the longevity of rail infrastructure assets and investments. It also enables the industry to plan the network in the context of major schemes, some of which will take decades to deliver, for example HS2. For the purposes of assessing conditional outputs, the Route Study assumes that HS2 will be delivered as outlined in the HS2 consultation programme as published on the HS2 Ltd website.



In this chapter, in addition to summarising the conditional outputs identified for the East Midlands, the Route Study working group has included an Indicative Train Service Specification (ITSS) that identifies the type and number of train services needed to deliver the conditional outputs.

The capacity challenge – meeting demand

The links between a growing economy and growth in rail services are well established. Increased demand for rail services is an expression of economic growth, and in turn, better rail services facilitate growth. Over the past 30 years demand for rail in the UK has doubled, and is forecast to do so again over the next 30 years. How to meet increased demand in the form of additional capacity across the East Midlands is the challenge addressed here.

Passenger demand in 2023 and 2043

The effect of growth on the different passenger services across the East Midlands varies across long distance and inter-urban passenger markets. For services into London, the outlook is relatively balanced, with growth and capacity fairly well aligned. For other long distance and inter regional services, the picture is more variable depending on the specific nature of routes and locations, and the development of the network through to 2043.

Based on the 'Prospering in global stability' scenario, the following growth rates have been identified for the region:²

- 2013 – 2023 Suburban peak growth into London 36 per cent
- 2013 – 2023 All other routes and markets 31 – 40 per cent
- 2013 – 2043 Suburban peak growth into London 53 per cent
- 2013 – 2043 All other routes and markets 91 – 114 per cent

In terms of peak-level demand, the pattern for the East Midlands is largely driven by commuting habits to and from London. Rail already accounts for a large share of the commuting market into London. As a result, additional growth will be driven by employment growth rather than people transferring to rail from other modes of transport.

² These growth rates include the effects of committed schemes, but exclude the effect of HS2

For a number of services in the ‘East Midlands’, the shape of demand between 2023 and 2043 will also be impacted by the arrival of HS2, which is expected to drive some level of reduction in long distance passenger numbers as people move from conventional services to high speed. However, considering the effect of forecast growth between now and 2043, in addition to the effect of HS2, some long distance services will experience a net decrease in demand over certain route sections, while other sections will show a net increase. The effects of HS2 on demand are explained in more detail in [Appendix A3](#).

Conditional Outputs

[Table 3.1](#) shows the full range of conditional outputs identified for passenger capacity, for both 2023 and 2043.

Passenger peak capacity at London St Pancras International

Capacity into London is currently provided by a combination of

Long Distance High Speed (LDHS) and suburban services. The long distance services serve cities such as Leicester, Derby, Sheffield and Nottingham; they also serve commuter markets from Market Harborough, Corby, Kettering, Wellingborough, Bedford and Luton into London. The suburban services provide a predominantly commuter market south of Bedford.

At London St Pancras International, the morning hour from 08.00 to 08.59 is the busiest, with the arrival of some 20 trains; this equates to over 13,000 passenger arrivals.³

The graphs in [Figures 3.1](#) and [3.2](#) show the total available capacity (both seated and standing) and the forecast demand into London St Pancras International in the high-peak hour. The graphs also include a third line showing required capacity. Required capacity needs to be higher than the actual demand in order to cater for variability in loads between services.

Table 3.1 Conditional outputs identified for passenger capacity for 2023 and 2043

	Reference	Conditional Output
2043	C01	To provide sufficient capacity for passengers travelling into central London during peak hours on the long distance and suburban services in 2043
	C02	To provide sufficient capacity throughout the day for passengers travelling on long distance high speed services between Nottingham, Sheffield and Corby and London in 2043
	C03	To provide sufficient capacity over the day for passengers travelling on the East Midlands section of the long distance high speed Plymouth – Edinburgh/Glasgow and Southampton/Reading to Newcastle services in 2043
	C04	To provide sufficient capacity for passengers travelling on the East Midlands section of interurban services including Birmingham – Leicester – Stansted Airport, Nottingham – Cardiff and Norwich to Liverpool services in 2043
	C05	To provide sufficient peak and all day capacity for passengers travelling on local services in the East Midlands in 2043
2023	C06	To provide sufficient capacity for passengers travelling into central London during peak hours on the long distance high speed and suburban services in 2023
	C07	To provide sufficient capacity throughout the day for passengers travelling on long distance high speed services between Nottingham, Sheffield and Corby and London in 2023
	C08	To provide sufficient capacity over the day for passengers travelling on the East Midlands section of the long distance high speed Plymouth – Edinburgh/Glasgow and Southampton/Reading to Newcastle services in 2023
	C09	To provide sufficient capacity for passengers travelling on the East Midlands section of interurban services including Birmingham – Leicester – Stansted Airport, Nottingham – Cardiff and Norwich to Liverpool services in 2023
	C010	To provide sufficient peak and all day capacity for passengers travelling on local services in the East Midlands in 2023

³ Based on 2013 week day count data; includes Thameslink passengers travelling beyond London St Pancras International.

Figure 3.1 Annual forecast demand and assumed total capacity (seating and standing) for suburban services on arrival at London St Pancras International in the morning high peak hour (08.00 to 08.59)

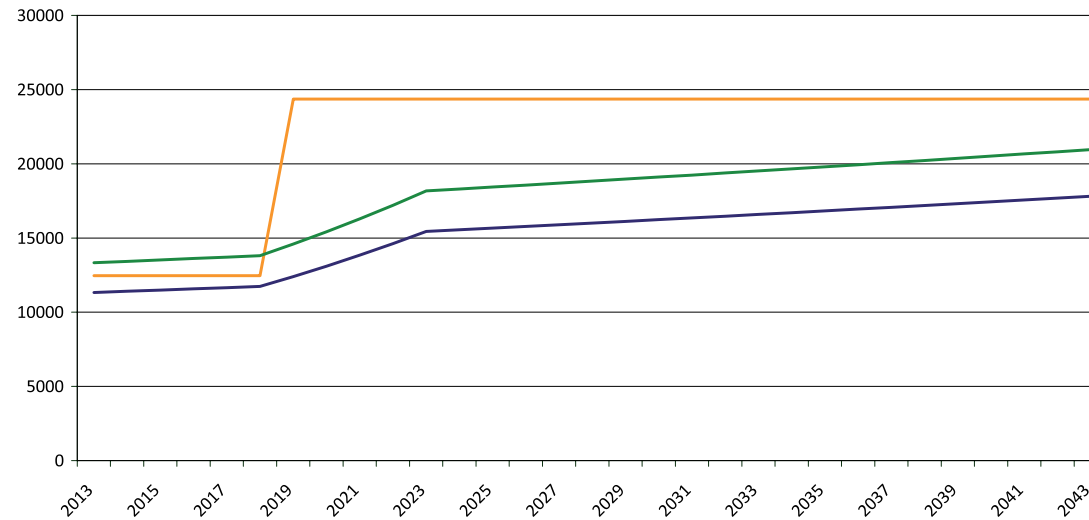
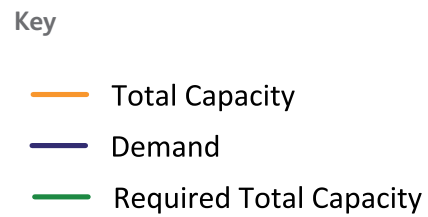
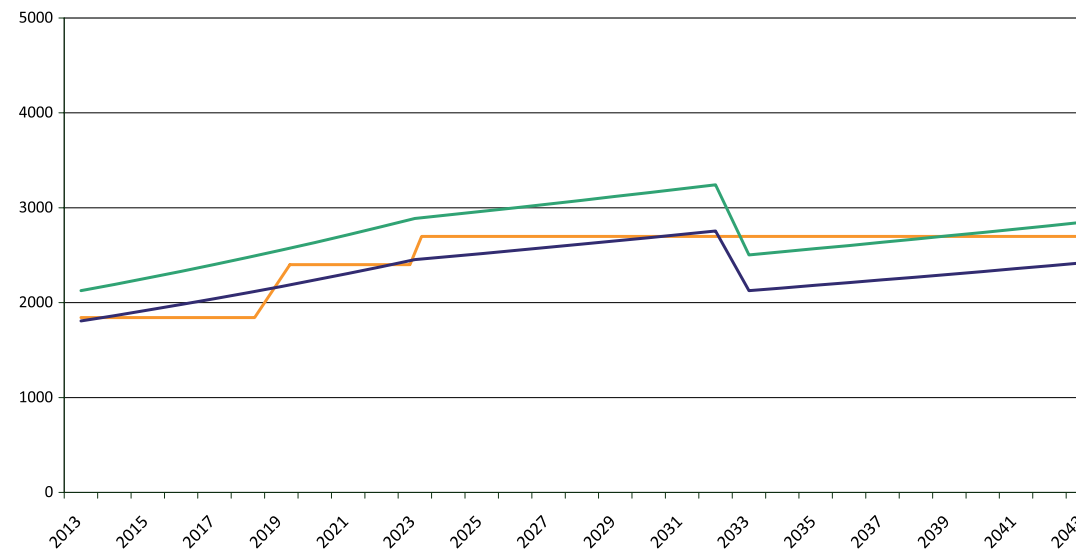
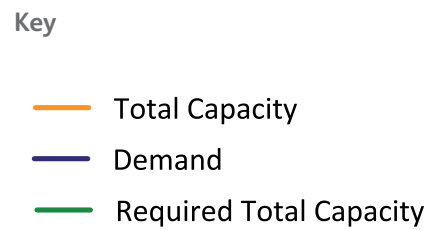


Figure 3.2 Annual forecast demand and assumed capacity (seated) for long distance high speed services on arrival at London St Pancras International in the morning high-peak hour (08.00 to 08.59) updated to show steps in LDHS capacity



Note: Required capacity is higher than total demand to allow for variability in demand between trains

Figure 3.1 focuses on total capacity on suburban trains into London. The graph shows a step increase in capacity in December 2018 which reflects the provision of more, longer and higher capacity trains delivered through the Thameslink programme. This will allow sufficient capacity to account for demand through to 2043.

Figure 3.2 shows a reduction in demand for LDHS services in 2033. This is in recognition of the impact of HS2 phase 2: a large number of passengers travelling between Sheffield, Nottingham and Derby and London are expected to switch to the high speed line. However, demand to London from Leicester and stations further south is relatively unaffected by HS2. Given the overall forecast growth in all these markets, demand for LDHS services arriving at London St Pancras International in the morning high-peak hour in 2043 is still forecast to be significantly higher than today.

Assumed capacity for LDHS services into London will increase in 2019 (with the introduction of the sixth service from London St Pancras International to North Northamptonshire) and is assumed to rise again in 2023 with the introduction of a new fleet of trains to operate on long distance services. The exact impact of these changes is currently unknown, with the DfT working with Network Rail and the current franchise holder to develop a rolling stock strategy for the route. The assumed capacity from 2023 was agreed with stakeholders through the Route Study Working Groups.

The analysis also shows that there is expected to be sufficient capacity immediately after the introduction of a sixth LDHS service in 2019. However, there will be pressure on capacity soon afterward. How far this can be mitigated will depend on the exact specification of rolling stock on newly-electrified services from Nottingham and Sheffield into London. This decision is expected to be made within CP5.

Combining both suburban and LDHS capacities, subject to the specification of new rolling stock, there is forecast to be sufficient total capacity for all services arriving at London St Pancras International in the high-peak hour in 2023 and 2043.

Seated capacity

As well as considering total capacity in the high-peak, the Route Study has considered whether there is sufficient seated capacity to accommodate all passengers on longer journeys into London in the high-peak hour. Based on relevant Department for Transport and franchising guidance, the planning assumption is that passengers should not be expected to have to stand for more than 20 minutes.

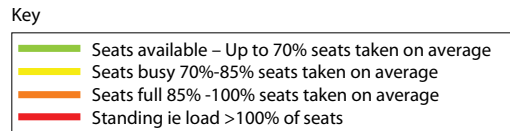
The picture in 2023

Figure 3.3 shows the overall average load factor in the high-peak hour for three service groups south of Leicester and Corby:

- long distance services from Sheffield, Nottingham and Corby
- outer suburban services originating from Bedford and running non-stop from St Albans to London St Pancras International
- inner suburban services originating at Luton or St Albans stopping at stations between St Albans and London St Pancras International.

The load factors shown are the standard class loads as a percentage of the baseline standard class seats in 2023.

Figure 3.3 Midland Main Line load factors into London St Pancras International am high-peak hour (arriving 08.00 – 08.59) 2023



● Indicates a location where some (or all) services stop in the baseline. (Stopping patterns may change in in future)



Long distance services include services from Nottingham and Sheffield
 Current capacities assumed for Sheffield and Nottingham services.
 Baseline capacities assumed for other services.
 Load factors are based on seating capacity only.

Figure 3.3 shows that there will be more passengers than seats from St Albans on the outer-suburban services and from Mill Hill Broadway on the inner-suburban services in the high-peak hour. There may also be some standing on sections where the average load factors are below 100 per cent, as the loads will vary between services, and will vary from day to day. Analysis suggests that there is a significant risk of standing on some services where the average load factor is over 85 per cent. This is the case from Luton on the long distance services, from Harpenden on the outer-suburban services and from Elstree & Borehamwood on the inner-suburban services, all of which will have journey time slightly greater than 20 minutes.

Although there should be sufficient total capacity to accommodate demand into London up to 2023, there is a risk of some passengers having to stand for slightly over 20 minutes. This analysis is based on one scenario of stopping patterns for long distance services; the potential impacts of changing stopping patterns on loadings are considered through industry processes when changes are proposed.

The analysis carried out for this Route Study has shown that there is forecast to be sufficient total capacity to accommodate demand into London up to 2023, albeit with the potential risk of some passengers having to stand for slightly over 20 minutes. Balancing this finding with the costs of further capacity interventions, it is suggested that further interventions are not appropriate before 2023.

The picture in 2043

The loads on peak suburban services are forecast to grow between 2023 and 2043. The load factors from Harpenden and Elstree & Borehamwood will increase (see Figure 3.4), and as a consequence there is a much greater risk of passengers having to stand for more than 20 minutes. If this forecast demand is realised, it will strengthen the case to provide more seating capacity before 2043.

Providing sufficient capacity into London for 2023 and 2043 meets the conditional outputs for the route and sector (CO1, CO2, CO6 and CO7). However, it is important to note that this level of capacity is predicated on proposed interventions already planned in CP5 and CP6, and accounted for within the baseline, to provide:

- additional services (increasing from 15 suburban trains per hour to 16 in the high-peak hour, as well as an additional hourly long distance service from north Northamptonshire commuter towns throughout the day)
- longer trains (12-car suburban services for 10 of the 16 high-peak services with higher standing capacity; in addition, new rolling stock on long distance services with the potential for higher capacity)

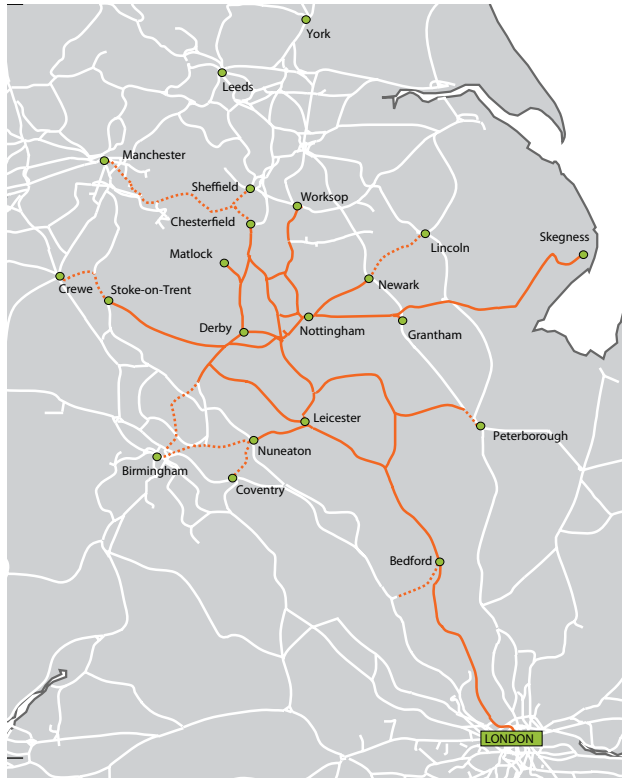
As these proposed interventions will affect demand and loading; and given that there is a risk of crowding on some services, the need for additional capacity beyond CP6 should be considered once the effects of planned enhancements are better understood.

Figure 3.4 Midland Main Line load factors into London St Pancras International am high-peak hour (arriving 08.00 – 08.59) 2043



Long distance services include services from Nottingham and Sheffield
 Current capacities assumed for Sheffield and Nottingham services.
 Baseline capacities assumed for other services.
 Load factors are based on seating capacity only.

Figure 3.5 Connectivity across the East Midlands



Key

- East Midlands Route Study scope
- ⋯ Links with other cities

Peak capacity at Leicester, Nottingham and Derby

High levels of demand are anticipated during peak periods across the routes linking key East Midlands cities, with growth to 2023 expected to be in the range of 30 to 40 per cent. For these urban centres outside the capital, the evening peak is often the busiest.

Given the forecasts for continued high growth in peak demand for Leicester, Derby and Nottingham, all three cities are expected to see significant overcrowding in the direction of peak flows by 2043, with many routes to and from those centres also experiencing capacity constraints by 2023.

Detailed analysis for demand forecasts for each city in 2023 and 2043, including loading graphs, are contained in [Appendix A4](#). A summary for each location is shown below.

Leicester

- By 2023 there remains the potential for some passengers having to stand on some services, over all corridors; the Derby corridor is likely to experience the most crowding.
- By 2043, the profile changes considerably with additional seating released by HS2. Routes to Peterborough and Birmingham are set to experience significant crowding.

Nottingham

- By 2023, all corridors are forecast to have potential crowding issues with the exception of the Nottingham to Grantham corridor.
- By 2043:
 - HS2 relieves crowding in the Leicester direction
 - the route to Grantham is busy but has sufficient capacity
 - all other routes are significantly overloaded.

Derby

- There remains the potential for some passengers having to stand on some services on the Stoke-on-Trent corridor, additionally there is some loading concern on the Nottingham and Matlock corridors by 2023.
- By 2043:
 - HS2 relieves pressure on most corridors
 - but Matlock and Stoke-on-Trent routes are forecast to have crowding problems.

Overall, the rate of growth for regional services serving key city locations is such that the conditional outputs identified for capacity in 2023 (CO9 and CO10) are unlikely to be met without intervention. Schemes that could account for these conditional outputs before 2023 are detailed in [Chapter 5](#).



The East Midlands Route Study area is currently served by a number of non-London long distance services.

The high speed services are:

1. Plymouth – Edinburgh/Glasgow
2. Southampton/Reading – Newcastle via Birmingham and Derby

The inter-urban services are:

3. Norwich – Liverpool via Nottingham, Sheffield and Manchester
4. Birmingham – Stansted Airport/Cambridge via Leicester
5. Nottingham – Cardiff via Birmingham

All of these services start or end beyond the East Midlands, and many encounter high loads outside the Route Study area. In order to assess the capacity requirements for these services it is necessary to consider the loads throughout the whole of a train's journey. As part of the East Midlands demand analysis the fuller routes have been included. This analysis shown in Appendix A5, shows loadings across the individual services that use the long distance routes forecast in 2023 and 2043. A summary by route corridor is provided below.

South West and South to North East and Scotland routes (1 & 2)

On these routes, the heaviest loadings are widely spread both between services and across the route. Crowding on these services is not exclusively within the peaks, with several non-peak services at risk of crowding. By 2023, the forecast growth would present significant crowding problems on both the Plymouth to Edinburgh/Glasgow and the Southampton/Reading to Newcastle services. The implementation of HS2 alters the picture in 2043: loading is reduced on the East Midlands section of these routes, but services south of Birmingham and north of Sheffield continue to face overcrowding.

East Anglia to the North West (3)

On this route, Norwich to Liverpool via Nottingham, Sheffield and Manchester, services are most heavily loaded in the north between Sheffield and Liverpool. The current services seek to account for these heavier loads: longer trains operate between Nottingham and Liverpool than between Norwich and Nottingham. However, the increase in loads to 2023 will require further capacity on the East Midlands portion of the route between Nottingham and Sheffield; by 2043, crowding will worsen significantly.

Midlands to Stansted Airport (4)

This route is currently served by an hourly service from Birmingham to Stansted Airport/Cambridge, and an hourly service from Birmingham to Leicester. Load factors are generally at their highest into Birmingham in the morning peak and out of Birmingham in the evening peak. However on Birmingham – Stansted Airport services there are forecast to be high load factors on other sections of the route and on some off-peak services.

The Route Study forecast to 2023 indicates that additional capacity will be needed into Birmingham in the morning peak and out of Birmingham in the evening peak. There are also a number of services which will be overcrowded between Leicester and Peterborough. This is a trend that continues to 2043 with crowding worsening on a number of individual services.

As a result of growing demand on the non-London long distance services, to meet capacity-focussed conditional outputs for 2023 (CO8 and CO9), train lengthening interventions should be considered as intervention choices in Control Period 6 (CP6). See Chapter 5 of this document for details. For outputs in 2043 (CO3 and CO4), an ITSS has been developed which shows the numbers and types of trains needed on East Midlands routes in order to account for all conditional outputs. This is discussed in more detail later in this chapter.

Cardiff Central to Nottingham service group (5)

The 2019 baseline assumes an hourly service from Birmingham New Street to Nottingham (with a Birmingham New Street to Derby service running in the afternoon high peak), an hourly service from Nottingham to Cardiff Central and an hourly service from Birmingham New Street to Cardiff Central. Train lengths, and the frequency of services, are expected to remain the same as in 2013. The busiest point on the route is usually at Birmingham New Street in the peak periods. Services departing Birmingham New Street towards Nottingham, in the afternoon peak period tend to experience the highest loadings.

The Route Study's assessment is that, by 2023, additional capacity will be needed on services, both in the peak and off peak periods. The Route Study recommends that train lengthening should be considered in order to meet demand by 2023. To provide sufficient capacity on all services throughout the day, 14 extra vehicles are required in 2023.

The introduction of HS2 Phase 2 is expected to provide new opportunities to travel for passengers. Some passengers travelling between Birmingham and Nottingham/Derby are forecast to switch onto HS2 services via the new station at Toton. However, crowding is likely to persist between Cardiff Central and Tamworth, and as such, the Route Study forecasts around eight extra vehicles (compared with the 2019 baseline) will be required in 2043.

Connecting people: passenger connectivity for 2043

Connectivity is an output that covers several aspects of passenger rail travel, including:

- train service frequency between stations
- timetabled journey time
- the provision of direct journeys which do not require an interchange

Connectivity conditional outputs on the East Midlands area have been interpreted for individual flows. A flow is a specific pair of locations between which a rail journey may take place; see the Leicester to Cardiff example below. The conditional output is then specified as the journey speed and frequency aspiration for that flow.

An example of a connectivity conditional output flow:

Table 3.2 – Example Conditional Output				
Reference	Origin to destination (flow)	Journey speed (mph)	Equivalent journey time (minutes)	Frequency (trains per hour)
CO38	Leicester – Cardiff	80	110	1 or 2

Journey speed is the aspiration for the average speed of a train over that flow. Average journey speed may be significantly lower than the maximum speed of the train as it will reflect dwell times at station stops along with time lost when decelerating and accelerating.

Conditional outputs also include a value for equivalent journey time. In the example above, with an average journey speed of 80mph, the journey from Leicester to Cardiff would take approximately 110 minutes

Throughout the analysis carried out for the Route Study, the connectivity conditional outputs have been considered as a combination of journey time, service frequency and the provision of through journey opportunities. The overall connectivity output could potentially be met by improvements to any one of these three elements, or through a combination of improvements to two or three of them. It has been acknowledged that the strategy for 2043 as set out in the Route Study Draft for Consultation largely met these outputs through schemes which enable an increase in service frequency rather than schemes which improve station to station journey time.

A complete table of connectivity conditional outputs is contained in [Appendix A6](#); a summary of them broken down by market sector is shown below.

Long distance connectivity for 2043

For the long distance market, many of the conditional output flows affecting the East Midlands fall partly outside the Route Study area: for example Leicester to Birmingham. These conditional outputs were analysed by a ‘Cross-Boundary’ Working Group which developed a service specification and map which aimed to meet all of the cross-boundary conditional outputs. This activity and its relationship with this study is described in more detail in [Appendix A2](#), Cross-Boundary Analysis.

For the long distance sector in the East Midlands, the vision for 2043 is of decreasing journey time, and more opportunities to travel on key routes. These aspirations are detailed in [Appendix A6](#), and also set out in the [Long Distance Market Study](#).

During the period since the publication of the Route Study Draft for Consultation, a combined Network Rail team, from the East Midlands, West Midlands and Chilterns Route Studies has been working with the Midlands Connect Partnership to analyse whole route opportunities for improving journey time between urban centres in the East and West Midlands (e.g. Birmingham-Nottingham). Development work for this is ongoing, with results to be included in the final version of the West Midlands and Chilterns Route Study. [Chapter 5](#) of this document will outline the options under consideration.

Regional urban connectivity for 2043

The desired outputs for this sector for 2043 are to strengthen urban connectivity to and from key East Midlands’ centres, providing significant improvements in line speeds, journey time and opportunities to travel for:

- Nottingham from Mansfield, Lincoln, Loughborough, Long Eaton, Derby, Chesterfield, Wellingborough
- Leicester from Nuneaton, Melton Mowbray, Barrow-upon-Soar
- between Loughborough to Derby

London and South East connectivity for 2043

For the London and South East Market Study outputs were considered at the level of key markets rather than at an individual flow level. Placing these in terms of the East Midlands Route Study area provides the following conditional outputs.

Table 3.3 – London and south east connectivity conditional outputs interpreted for the East Midlands Route Study area			
Reference	Key Market	Journey time	Peak Frequency (trains per hour)
C056	Suburban journeys from stations as far as Bedford to London St Pancras International, and London Blackfriars, Farringdon, City Thameslink	To provide incremental improvements in journey time	minimum 3 – 4
C057	Market Harborough, Kettering and Wellingborough to London	Good outer suburban speed (at least semi-fast)	4
C058	Corby to London	Good outer suburban speed (at least semi-fast)	2
C059	Luton/Bedford and Leicester and the north of the Midland Main Line		2

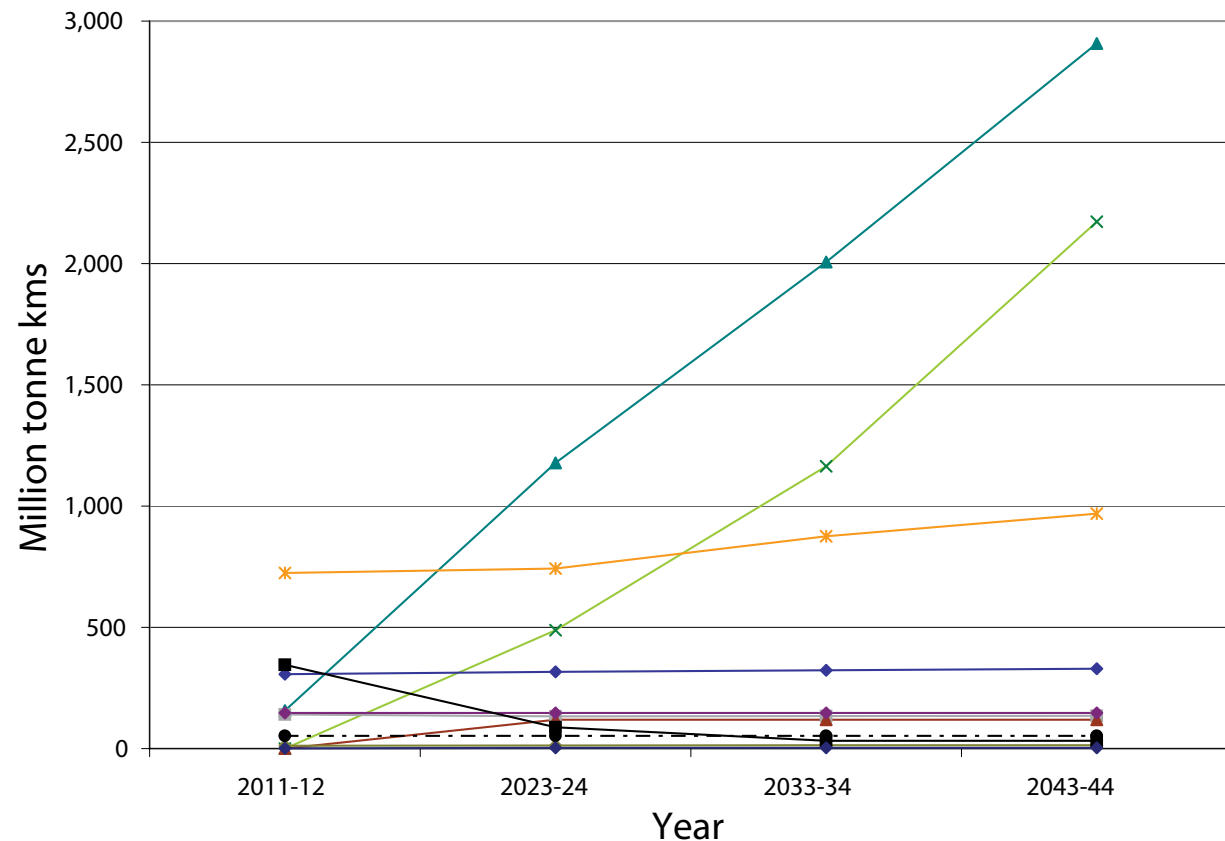
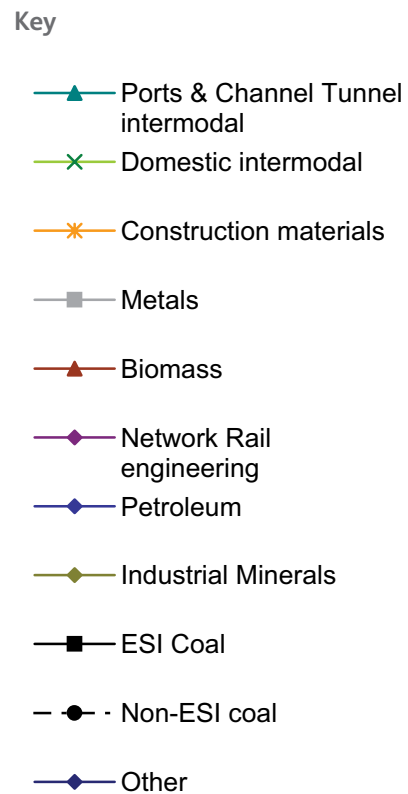


Accommodating freight demand

Rail freight generates more than £1.5 billion a year in economic benefits for the United Kingdom through improved productivity and reduced congestion. The overall forecast freight growth across Great Britain is for an increase in total tonne kilometres of 2.9 per cent annually to 2043; this compares to about 2.5 per cent per year since the mid-1990s. In terms of total tonnes lifted, the forecast is for 2.0 per cent per year growth to 2043, compared with the recent trend of broadly stable tonnage.

The East Midlands Route Study area forms an important part of the national freight network, carrying nine per cent of current national tonne kilometres; this figure is forecast to rise to 13 per cent by 2043. The East Midlands' increase in the proportion of national freight traffic is principally due to a large forecast growth in the intermodal sector. The comparable figure across all commodities is for annual growth of 4.3 per cent; this compares with a national rate of 3.1 per cent per year. The forecast growth by commodity across the East Midlands Route Study area is shown in Figure 3.6 below.

Figure 3.6 forecast changes in tonne Kilometres by commodity across the East Midlands Route Study area from 2012 to 2043



Conditional Outputs

To meet the forecast demand in freight, four overarching conditional outputs have been identified:

Table 3.4 – Freight Conditional Outputs	
Reference	Conditional output
CO60	To provide capacity to accommodate forecast growth in intermodal container freight tonnes in the East Midlands in 2023
CO61	To provide capacity to accommodate forecast growth in all other commodities freight tonnes in the East Midlands in 2023
CO62	To provide capacity to accommodate forecast growth in intermodal container freight tonnes in the East Midlands in 2043
CO63	To provide capacity to accommodate forecast growth in all other commodities freight tonnes in the East Midlands in 2043

To understand freight demand in the East Midlands, national freight flows have been aligned with freight corridors that cross the Route Study area. This allows an understanding of the service levels, based on unconstrained forecasts, required of each corridor for 2023 and 2043. More detail on how this process was developed can be found in the Freight Market Study.

A table showing key freight flows is contained in [Appendix A7 \(Tables 1 and 2\)](#). The analysis also provides detailed maps that show freight flows by corridor in terms of the numbers of trains per hour needed to meet the freight conditional outputs in 2023 and 2043. Both maps are shown in [Figures 3.7 and 3.8](#).

The location of intermodal distribution centres can have a big impact on freight routeing options and traffic levels. But uncertainty over the exact level of commercial development of distribution centres means that no assumptions as to the specific locations of terminals have been made. Instead, regional ‘clusters’ have been used to approximate locations and understand freight flows. More detail is contained in [Appendix A7](#).

By 2043, the corridors forecast to see the highest level of freight growth are:

Felixstowe – West Midlands: five paths per hour will be required over most of the route by 2043. This increases to six paths per hour between Syston South Junction and Leicester, and seven paths per hour between Leicester and Wigston North Junction, where the Felixstowe to West Midlands services are joined by freight running on the Midland Main Line.

Wigston South Junction – Kettering North Junction: growth to five paths per hour

Kettering – Bedford: six freight paths per hour are anticipated. Of these, four are 75mph Class 4.

Syston North Junction – Mountsorrel Sidings: four paths per hour are forecast for 2043 of which two are Class 4; these will include a large proportion of services terminating in the Midland Mainline northern cluster.

Engineering traffic: this relates to operations servicing Network Rail worksites and routine network monitoring. There is not forecast to be a significant growth in this traffic, which impacts on required paths during a standard off-peak hour, but it should be noted that capacity is required in the Derby area for moves from sidings to any corridor.

Figure 3.7 Forecast freight capacity required in 2023

Freight Train Service Specification

1 tph	Number of train paths per hour
1	Number of paths: Class 4
1	Number of paths: Class 6
1	Number of paths: Class 4/6
E	Some engineering traffic

tph represents the number of trains per hour in each direction per corridor.

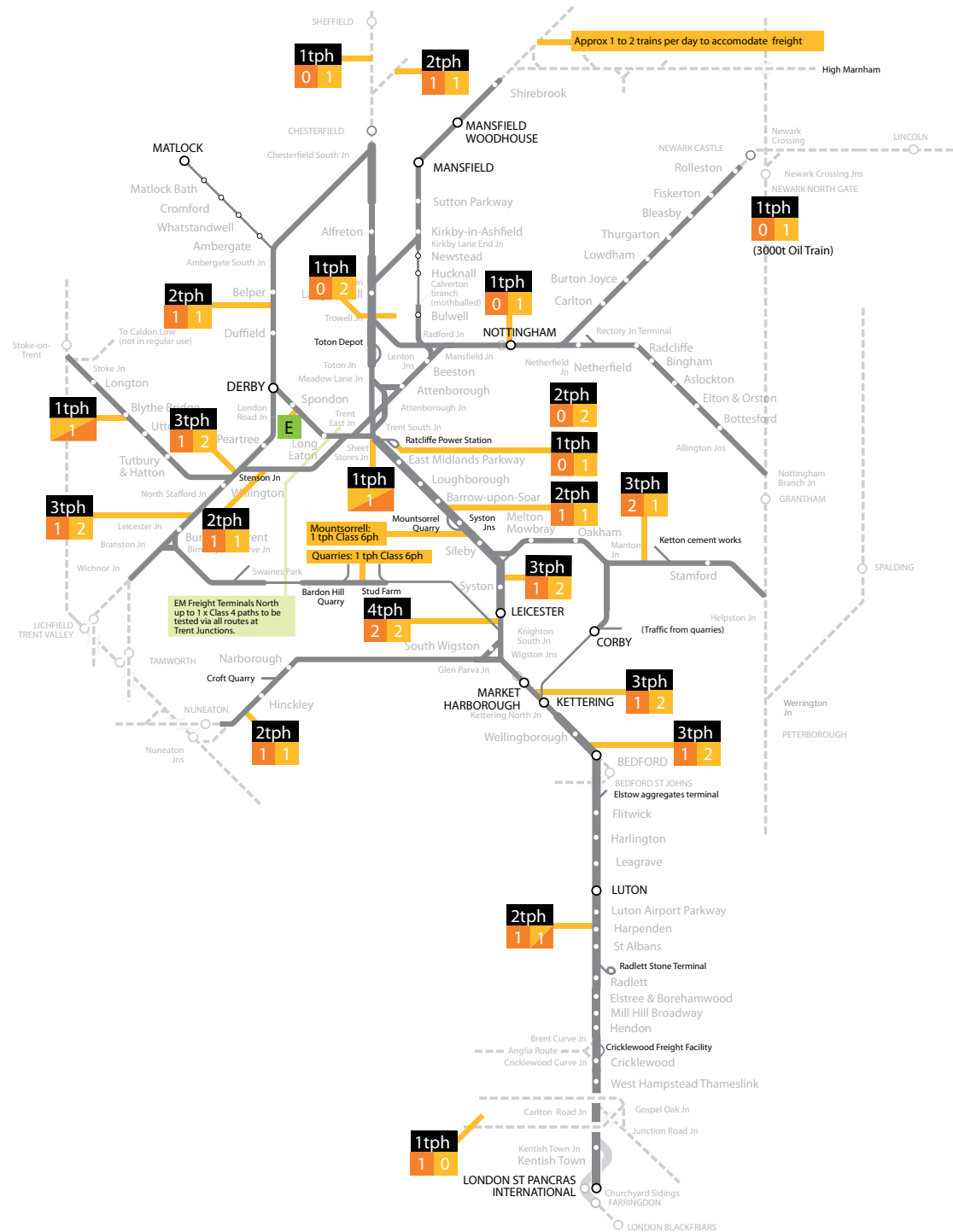
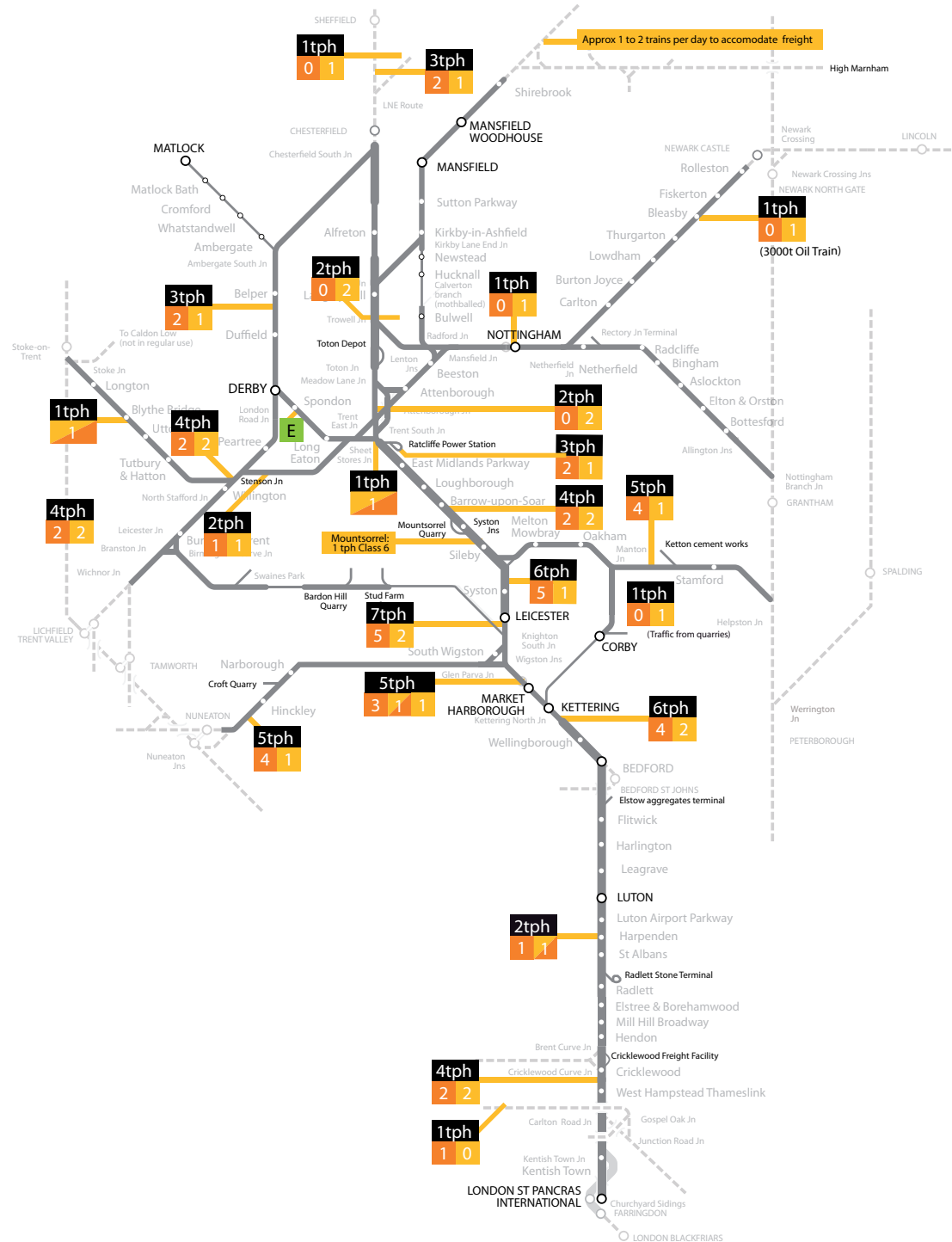


Figure 3.8 Forecast freight capacity required in 2043

Freight Train Service Specification

1 tph	Number of train paths per hour
1	Number of paths: Class 4
1	Number of paths: Class 6
1	Number of paths: Class 4/6
E	Some engineering traffic

tph represents the number of trains per hour in each direction per corridor.





Passenger circulation capacity at stations

CO64 – Provide capacity within stations (bridges, underpasses, entrances, platforms, escalators, parking etc.) which facilitate the circulation of passengers within the station and can accommodate future growth

It is recognised that an important part of increasing capacity on the East Midland Route Study area is addressing any current or future station congestion. Providing sufficient space at the stations themselves is a crucial enabler to achieving higher frequency services and running longer and higher capacity trains without compromising passenger safety or comfort.

Many of the railway stations in the East Midland Route Study area have not changed substantially for many decades, while stations within commuting range of central London have seen steep increases in passenger numbers over the last decade. As a result of this and the predicted growth in the market, it is anticipated that some stations on the Route Study area may require investment to mitigate against increasing levels of congestion. More detail on these stations is contained in [Appendix A8](#).

Access to international gateways

In addition to capacity and connectivity, specific conditional outputs were identified that addressed the importance of high speed rail and air travel to Britain's economic growth.

Airports

CO65 – Improve Access to Airports

Supporting connectivity between rail and air transport is a key objective of the Route Study. Rail services need to be able to account for the demand for people to be able to access airports, and increase provision of opportunities for fast and convenient connections are an important enabler of growth.

In determining conditional outputs in this area, the Route Study working group felt that it was important to capture the strategic goals for each of the airports on the route; and the airport industry has been consulted to understand these. A fuller assessment of how the airports that serve the East Midlands can be supported by the rail industry can be found in [Appendix A9](#).

HS2

CO66 – Improve Rail Access to HS2

HS2 Ltd published its latest update to proposals for Phase 2 beyond Birmingham in November 2015⁴. This includes confirmation of Toton as a preferred location for the East Midlands Hub station. HS2 Ltd has proposed a number of potential options for connecting the proposed High Speed East Midlands Hub station to the existing stations at Nottingham, Derby and Leicester. Network Rail continues to work with HS2 Ltd and local stakeholders to investigate and develop these options further.

This Route Study viewed the option of shuttle services from Leicester, Derby and Nottingham to an East Midlands Hub to be the most challenging to baseline infrastructure in terms of capacity. The option consulted upon assumes that there would be two shuttles per hour between Leicester and the Hub, four per hour serving Derby, and four per hour serving Nottingham. Whilst the East Midlands Route Study took these service patterns into account, there is no intention to pre-empt the outcomes of the HS2 consultation process.

Outputs to promote quality of life

The benefits of improved rail travel cannot be expressed solely in terms of improving opportunities for work and business travel. Central to a flourishing economy are those enterprises that enable passengers to prosper in the fullest range of activities. To capture how rail can contribute to the key industry goal of connecting communities and individuals, a range of qualitative conditional outputs have been developed.

⁴ <https://www.gov.uk/government/collections/hs2-phase-two-from-the-west-midlands-to-leeds-and-manchester>

Education and social infrastructure

CO67 – *Improve access to further and higher education establishments and social infrastructure*

Access to further and higher education establishments and social infrastructure is an important part of the bigger picture that describes the vision of a stable, growing economy: a mobile, healthy, motivated and highly-skilled population is fundamental to achieving the globally prosperous future that has been anticipated in the Market Studies.

Locations across the East Midlands where these sectors are focussed include Leicester, Nottingham, Loughborough and Derby – all of which have thriving educational and healthcare and sporting institutions. With a trend for many students choosing to study at establishments closer to home, there is a shift in rail use patterns. The historic picture of demand concentrated around weekends is giving way to a model where students ‘commuting’ to and from home is more prevalent.

Weekend and evening leisure travel

CO68 – *Provide capacity for passengers travelling in the evenings and at weekends for the leisure market in London and the South East.*

CO69 – *Better connectivity at weekends for the long distance leisure market and appropriate connectivity for tourist attractions (London and South East Market Study)*

The connectivity and capacity conditional outputs in [Chapter 3](#) relate principally to weekdays including providing sufficient capacity during the peaks. If sufficient rolling stock and infrastructure is available to provide a good peak service then this will generally be enough to provide a good evening and weekend service. Another element of providing a good evening and weekend service is the planning of engineering work. Engineering possessions should be planned in such a way as to balance the desire to run good weekend and evening services with the efficient undertaking of necessary maintenance and renewal work.

Improved local access to the rail network

CO70 – *Improved local access to the rail network to cater for demand*

Improved access to the rail network includes the ability to interchange easily with other modes, in particular through good road access and car parking and good bus connections. This output also covers Access for All accessibility to the network, both to stations and trains. These issues are not specifically addressed through the route studies, but are dealt with through the way that franchises are specified and managed.

Improving passenger satisfaction

CO71 – *Improved passenger satisfaction*

Improved passenger satisfaction can only be delivered by successfully delivering all aspects of a good train service. Some of these outputs are already picked up through other conditional outputs including:

- improved connectivity (faster and more frequent trains)
- providing the required capacity to avoid crowding
- providing access to the network

However some aspects of a good train service are not picked up in the previous outputs. These include the punctuality of services, comfort, quality and cleanliness of rolling stock and the quality of the station environment. These outputs will be a key focus of the industry’s franchise specification and management process.

Midlands Connect Conditional Outputs

The conditional outputs identified in the Market Studies were used as the basis for analysis within the Route Study. Beyond this, we are working as part of the Midlands Connect partnership, which is developing its conditional outputs and carrying out analysis through the work package programme to identify a programme of infrastructure works to support the economic objectives of the Midlands region as a whole.

Due to the timeframe of this work, Midlands Connect conditional outputs are not used when identifying choices for funders or longer term options within this study. The developing work carried out within the partnership will help to identify opportunities for funders to further develop or deliver interventions to encourage growth across the Midlands. It is expected that Midlands Connect will produce its final report in March 2017.

A strategy for the future: accommodating conditional outputs

The Route Study Working Group have consulted widely with industry stakeholders to identify how the conditional outputs could be delivered: this takes the form of a 2043 Indicative Train Service Specification for the East Midlands (ITSS).

The ITSS identifies the number and type of train services over each section of the Route Study area that are required to meet the conditional outputs in 2043. The approach has been to create an ITSS that can meet the desired outputs, and then use it to test whether the baseline infrastructure that forms the starting point for the study is capable of supporting those services. The outcome of this process is an understanding of the locations on the network where interventions will be needed to accommodate outputs. These interventions are then presented as choices for funders.

Chapter 4 details where interventions are likely to be needed to accommodate conditional outputs; Chapter 5 focuses on those interventions that are presented as choices for funders to prioritise for delivery in the next control period.

The ITSS accounts for the following:

- cross-boundary connectivity conditional outputs that impact the Route Study area
- connectivity conditional outputs within the East Midlands Route Study area
- freight conditional outputs
- passenger capacity.

The ITSS is best understood in terms of a map of the East Midlands which shows the rail network, the services using it, the numbers, types and frequency of trains needed to deliver the conditional outputs. The full map is shown in Figure 3.9. More detail on the approach to assessing cross-boundary services can be found in Appendix A2.

Figure 3.9 2043 Indicative Train Service Specification

Key

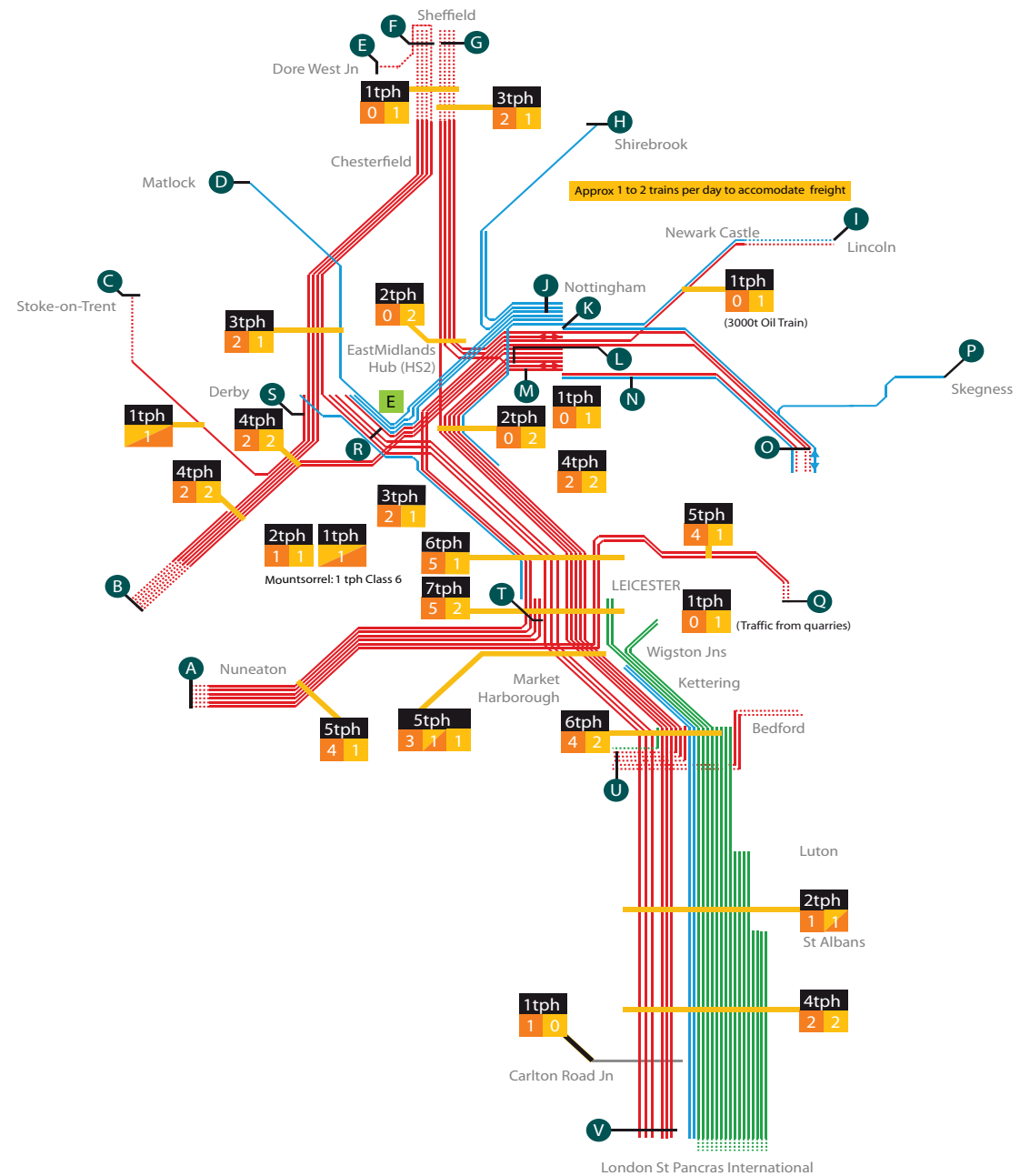
A	XB133 Leeds to Coventry XB35 Lincoln to Cardiff XB78 Birmingham to Leicester XB79 Birmingham to Leicester XB64 Birmingham to Norwich XB60 Birmingham to Stansted
B	XB77 Birmingham to Burton-on-Trent XB34 Cardiff to Bradford XB14 Hull to Reading/Southampton XB01 Plymouth to Edinburgh/Glasgow XB80 Walsall/Wolverhampton to Nottingham XB81 Walsall/Wolverhampton to Nottingham
C	XB88 Derby to Manchester Airport
D	Nottingham to Matlock
E	XB49 London to Liverpool/Manchester
F	XB34 Cardiff to Bradford XB14 Hull to Reading/Southampton XB01 Plymouth to Edinburgh/Glasgow
G	XB48 & XB50 London to Sheffield XB28 Leeds to Bristol XB133 Leeds to Coventry XB63 Liverpool to Norwich/Ipswich
H	Nottingham to Worksop
I	XB35 Nottingham to Lincoln
J	Nottingham to Mansfield Nottingham to Worksop Nottingham to Matlock
K	Nottingham to Skegness
L	XB80 Walsall/Wolverhampton to Nottingham XB81 Walsall/Wolverhampton to Nottingham LD32 London to Nottingham LD32 London to Nottingham
M	XB84 Reading to Nottingham
N	Nottingham to Grantham PEAK ONLY ADDITIONAL
O	XB63 Liverpool to Norwich/Ipswich XB62 Derby to Cambridge/Norwich Option 2 to run Nottingham to London via ECML Nottingham to Grantham PEAK ONLY ADDITIONAL
P	Nottingham to Skegness
Q	XB64 Birmingham to Norwich XB60 Birmingham to Stansted
R	XB320/522 Derby to Cambridge/Norwich LD50 London to Derby LD50 London to Derby
S	XB520 Derby to Manchester Airport
T	XB78 Birmingham to Leicester XB79 Birmingham to Leicester
U	XB28 Leeds to Bristol XB84 Reading to Nottingham XB68 Bedford to Milton Keynes XB39 Oxford to Cambridge XB40 Oxford to Cambridge
V	XB49 London to Liverpool/Manchester LD50 London to Derby LD50 London to Derby XB48 & XB50 London to Sheffield LD32 London to Nottingham LD32 London to Nottingham

Passenger Train Service Specification

	Long Distance Market Study (LD) & Cross Boundary (XB)
	Regional Urban Market Study
	London & South East Market Study
	Freight Market Study
	Service continues off East Midlands Route Study area

Freight Train Service Specification

1 tph	Number of train paths per hour
1	Number of paths: Class 4
1	Number of paths: Class 6
1	Number of paths: Class 4/6
E	Some engineering traffic



04: Towards A Railway for 2043

This chapter shows:

- The infrastructure interventions needed to deliver the Indicative Train Service Specification (ITSS) for 2043
- Options for future enhancement of the network which are not required to deliver capacity outputs

The ITSS is a specification that has been designed by the rail industry to account for the conditional outputs identified through the long term economic view developed in the Market Studies. The next step is to understand if the baseline infrastructure which formed the starting point can accommodate that ITSS: where the ITSS service level is greater than the infrastructure capability, then the Route Study can identify a gap and define options to close it.

Having reviewed the 2043 ITSS against the baseline infrastructure, the working group identified 14 intervention areas where some level of enhancement will be required to accommodate the ITSS. These areas are highlighted as an overlay on the 2043 ITSS map (see [Figure 4.1](#)).

Intervention Areas

1. South of Bedford area
2. Bedford Midland station area
3. Kettering – Kilby Bridge Junction
4. Wigston North Junction – Syston East Junction
5. Leicester station
6. Nuneaton – Leicester area
7. Syston East Junction – Manton Junction – Peterborough area
8. Trent Junctions
9. Stenson Junction – Sheet Stores Junction
10. Derby station
11. Birmingham – Derby area
12. Chesterfield area (Tapton Junction to Clay Cross Junction)
13. Nottingham station
14. Newark area

To achieve the 2043 growth levels identified in the Market Studies, the capability of the network will need to be enhanced in these areas through infrastructure interventions.

Following extensive consultation through the Route Study working groups, credible infrastructure solutions have been identified.

The solutions put forward below are a starting point for future development to take place. This would be as, and when, either an intervention becomes necessary to meet an emerging constraint to growth, or a funder wishes to propose funding a scheme as an opportunity to drive growth in an area.

Of the fourteen areas identified, three have been assessed as suitable for consideration as choices to be delivered in CP6:

Option 4 – Wigston North Junction – Syston East Junction

Option 5 – Leicester station

Options 4 and 5 have been taken forward for further development under the title “Leicester Capacity”

Option 7 – Syston East Junction – Manton Junction – Peterborough area

These are detailed in [Chapter 5](#) of this study and have been updated since publication of the Draft for Consultation to account for further development work which has been carried out.

In addition, funders have asked that Network Rail develop the case for the extension of the East West Rail link from the East Midlands area to Cambridge, and work with the Midlands Connect partnership to deliver options for improvements in connectivity and journey time across East-West Midlands corridors. Network Rail are also continuing to work closely with HS2 Ltd, Midlands Connect, and local councils and Enterprise Partnerships, to develop plans for enabling the planned arrival of HS2 at Toton, in 2033, to deliver the highest growth possible to the region.

The delivery timeframe for the remaining schemes has been assumed to be beyond CP6 (2024) but prior to 2043. Each proposed 2043 solution is detailed on the next page, illustrating the nature of the intervention, the conditional outputs it addresses, its scale and cost range. This chapter contains the options as developed and proposed within the Route Study Draft for Consultation, further development work was only carried out on those options identified by the industry through the Route Study Working Groups as being CP6 Choices for Funders.

In parallel with the East Midlands Route Study, a refresh of the national electrification strategy is being undertaken as part of the Network Route Utilisation Strategy (RUS) workstream. This strategy, to be published in the Network RUS: Electrification, will consider the case for further electrification of the East Midlands route.

Midlands Connect Journey Time Improvements

During the period since the publication of the Route Study Draft for Consultation, Network Rail has been developing a piece of work to analyse opportunities for incrementally improving journey time between urban centres in the East and West Midlands (e.g. Birmingham-Nottingham). This work has been designed to assess the potential capability of routes from end-to-end, across Route Study boundaries. Development work on this is ongoing, with results to be included in the final version of the West Midlands and Chilterns Route Study.

The Midlands Connect strategy identifies corridors where journey time improvements are seen as having the potential to drive growth in the region. Three corridors are currently being investigated by Network Rail, Birmingham-Leicester, Coventry-Leicester and Birmingham-Nottingham.

This work is aiming to understand:

- The potential impact of infrastructure options identified in the Route Studies on journey time
- Areas where desktop track assessments indicate higher line speeds may be feasible
- Areas where rolling stock could potentially operate faster with changes to line speed
- Alternative routings and service pattern options which could deliver improved journey time

Figure 4.2 highlights the routes being investigated and Route Study options which could impact journey time.

This piece of work is being produced ahead of further work on the full Midlands Connect work packages which focus on:

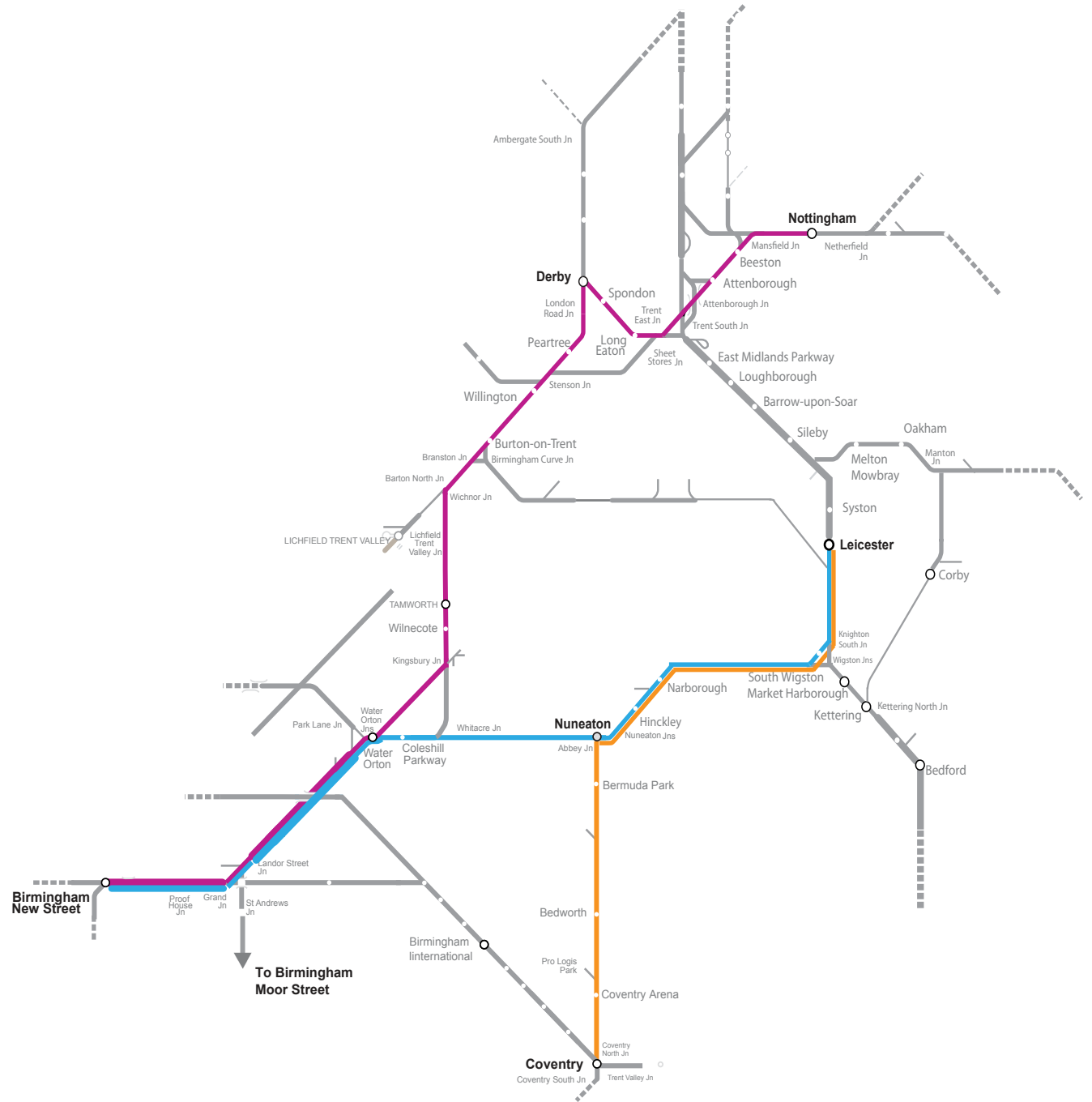
- HS2 Readiness
- Hubs
- Corridors
- Freight and International Gateways
- Smart Connectivity

The Midlands Connect workstream is designed to be complementary to the HS2 phase 2 scheme. It is developing a strategy making best use of the conventional network, with a focus on train services serving commuters and centre to centre business trips which have the greatest potential to drive economic growth throughout the region. The analysis will provide an indication of areas further development work that could be taken forward, where funding can be identified, either through Rail Industry processes or third party funding.

Figure 4.2 Journey time improvement corridors

Key

- Birmingham - Nottingham
- Birmingham - Leicester
- Coventry - Leicester



Option 1 South of Bedford area	
Description	This option considers the requirement to introduce grade separation near both Leagrave and Harpenden Junctions.
Conditional Output	Capacity, journey time, freight
Purpose	The number of crossing moves required for both north and southbound services travelling between London and Bedford creates a significant capacity constraint south of Bedford. Removing the requirements for these conflicting moves would increase capacity to accommodate additional services between Leicester and London. Leagrave and Harpenden Junctions present operational constraints due to slow exit and entry linespeeds, which impact both capacity and performance due to the time that it takes for services to safely clear the infrastructure before other services can use it. This option would remove these constraints, and allow the required level of capacity needed to support the forecast passenger and freight growth in 2043 on this section of route.
Intervention details	This option consists of grade separation for services travelling south in the Leagrave Junction area, and grade separation for services travelling north in the Harpenden Junction area.
Indicative cost	£75 million – £175 million (grade separation near Leagrave Junction); £75 million – £175 million (grade separation near Harpenden Junction)
Relates to other options	Bedford area
Notes	Statutory powers for the compulsory purchase of land are likely to be required

Option 2 Bedford Midland station area	
Description	In the Draft for Consultation this option included investigation of a potential requirement for a new platform on the west side of Bedford Midland station, improved infrastructure for the use of the existing Platform 3, and the provision of a new turnback facility outside of Bedford Midland station to the south. Further development work identified no enhancement work is required to provide for 2023 capacity, however it is recognised that the introduction of East West Rail Central section could impact on the requirements of this station. Requirements for interventions will therefore be identified alongside the continuing East West Rail Central Section development work.
Conditional Output	Capacity, journey time, direct journey opportunities, freight
Purpose	In the Draft for Consultation this was to accommodate the additional services required to increase capacity and match forecast demand, given the interaction between different types of service (LDHS, Thameslink and East West Rail).
Intervention details	This option consisted of the provision of a new platform on the west side of Bedford Midland station, for the use of long distance high speed services calling at Bedford The option also included the provision of an additional terminating platform outside of Bedford Midland station to the south. Legrave station had been identified as a possible location for this facility, utilising the existing sidings on the east side of the station. Alternative locations were also considered
Indicative cost	£5 million – £15 million (new platform on west side of the station), less than £10 million (new crossover to Platform 3), £5 million – £15 million (turnback at Legrave station)
Relates to other options	South of Bedford area; East West Rail Central Section
Notes	This option is closely linked to the ongoing development work on the East West Rail Central Section. As such, the nature of any potential enhancement will be dependant on requirements identified by that work. Changes to passenger flows need to be assessed as part of the development of this scheme. This may result in additional infrastructure requirements for the station There would be an impact on the existing car parking at Legrave station as a result of this option An alternative provision for on-track machinery, which is currently stabled in the sidings at Legrave station

Option 3 Kettering – Kilby Bridge Junction	
Description	This option considers the requirement to introduce four tracks between Kettering North Junction and Kilby Bridge Junction, with the ability to cross from one line to another at high speed near Kilby Bridge Junction.
Conditional Output	Capacity, journey time, direct journey opportunities, freight
Purpose	To provide the required level of capacity to support the forecast passenger and freight growth in 2043 on this section of route There is insufficient capacity on the existing two track section to accommodate the quantum of trains (eight long distance high speed, two regional urban, five freight services) as identified in the 2043 ITSS. This is due to the current mix of speeds achieved by different services
Intervention details	This option proposes to increase the existing two track railway to four tracks between Kettering North Junction and Kilby Bridge Junction, with a high speed flat junction at Kilby Bridge Junction to facilitate the crossing of services from the Leicester and Hitchin Line to the South Leicestershire Line and vice versa
Indicative cost	£875 million – £1.875 billion
Relates to other options	Wigston North Junction – Syston East Junction
Notes	There are a number of level crossings on this section of route and the opportunity to close them as part of these options will be pursued. Provision for bridging has been included in the cost range Statutory powers for the compulsory purchase of land are likely to be required Although not required to meet 2023 conditional outputs, the two-track layout and services with different speeds, limit capacity and available train paths.



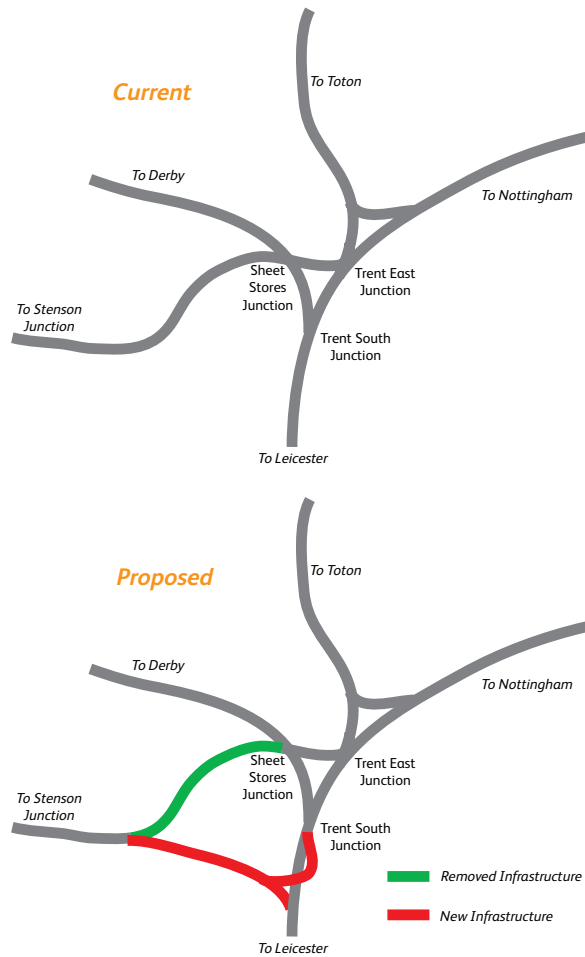
Option 4 Wigston North Junction – Syston East Junction	
Description	This is the original option as identified in the Draft for Consultation. Further development on this option under the Leicester Capacity scheme is detailed in Chapter 5 This option proposes: a grade separation at Wigston North Junction, improved segregation of train services at Leicester station, improvements between the existing Syston East Junction and Syston South and North Junctions.
Conditional Output	Capacity, journey time, freight
Purpose	To accommodate the quantum of services forecast to be needed by 2043.
Intervention details	This option proposes the provision of two additional tracks of approximately 8.5 miles in length between Wigston North Junction and Syston East Junction as well as the introduction of grade separation at Wigston North Junction.
Indicative cost	£600 million – £1 billion for Leicester Area Capacity Scheme
Relates to other options	Kettering – Wigston North Junction; Leicester Station; Syston East Junction – Manton Junction – Peterborough area; Nuneaton-Leicester
Notes	This option forms part of the Felixstowe to West Midlands capacity route upgrade and Electric Spine Development Programme The Leicester Area capacity scheme, which is being developed over CP5 and CP6, is looking at options that support capacity growth forecasts for both 2023 and 2043 – this may include some of the scope of this option and therefore provides the opportunity for early delivery of some of this functionality This option supports the introduction of possible shuttle services operating between Leicester station and the proposed new East Midlands Hub HS2 station at Toton Statutory powers for the compulsory purchase of land are likely to be required for these options

Option 5 Leicester station	
Description	This is the original option as identified in the Draft for Consultation. Further development on this option under the Leicester Capacity scheme is detailed in Chapter 5 This option entails the introduction of new platforms at Leicester station.
Conditional Output	Capacity, journey time, direct journey opportunities, freight.
Purpose	To support additional services required to provide sufficient capacity in 2043 Leicester station is currently a key constraint in terms of providing capacity as it only has four platforms, and all are heavily utilised. The additional platforms would allow the segregation of long distance high speed services and other trains. It would also support the more effective operational use of the station area to facilitate the quantum of trains required in 2043
Intervention details	This option consists of the creation of a new bay Platform 5 and a new through Platform 6, both of which would be used to accommodate traffic from the north, including reversing and stopping services. The bay platform could accommodate shuttle services between Leicester station and the proposed East Midlands Hub HS2 station at Toton
Indicative cost	£5 million – £15 million (through platform), less than £10 million (bay platform)
Relates to other options	Wigston North Junction to Syston East Junction; Nuneaton – Leicester area
Notes	This option forms part of the Felixstowe to West Midlands capacity route upgrade and Electric Spine Development Programme Requirements for intervention to enable connectivity to HS2 will undergo continuing analysis as part of Midlands Connect and HS2 workstreams

Option 6 Nuneaton – Leicester area	
Description	This option considers the requirement for the improvement of signalling and implementation of additional tracks in the Croft area
Conditional Output	Capacity, direct journey opportunities, freight.
Purpose	To accommodate the additional services required to increase capacity and match forecast demand This option is required because there is insufficient capacity to meet the 2043 ITSS on the baseline infrastructure: 11 trains per hour are required to meet the conditional outputs (six passenger and five freight services). Through improved signalling and additional track, it is proposed to achieve a standard margin of time between services travelling to/from Nuneaton and Leicester, allowing the required quantum of services to be accommodated
Intervention details	This option looks to standardise signalling along this section of route, through either a conventional or Digital Railway solution, and to introduce two new passing loops, one in each direction, in the Croft area.
Indicative cost	£15 million – £35 million (signalling), £50 million – £100 million (additional track)
Relates to other options	Leicester station; Wigston North Junction to Syston East Junction
Notes	This option forms part of the Felixstowe to West Midlands capacity route upgrade Statutory powers for the compulsory purchase of land are likely to be required for these options There are a number of level crossings on this section of route and the opportunity to close them as part of these options should be considered. Provision for bridging has been included in the cost ranges

Option 7 Syston East Junction – Manton Junction – Peterborough area	
Description	This option proposes the improvement of signalling on this section of route, and the introduction of additional tracks between Langham Junction Level Crossing and Melton Mowbray station To meet 2023 conditional outputs, the resignalling element of this scheme has been proposed as a CP6 choice for funders.
Conditional Output	Capacity, direct journey opportunities, freight.
Purpose	To deliver the quantum of passenger and freight services required to achieve the 2043 conditional outputs.
Intervention details	This option includes signalling and track enhancements The signalling enhancement elements of the scheme are required to increase the number of trains able to use the section of route each hour The provision of four tracks between the existing freight loops near Melton Mowbray and Oakham stations, a distance of approximately 12 miles. These new sections of track would have the same linespeed as existing infrastructure and would be suitable for utilisation by both passenger and freight services. This additional track is required due to the speed differentials between passenger and heavy freight services This option also includes the installation of a new chord at Manton Junction to enable freight services from Peterborough to access Corby and Kettering (and vice versa). The need for this chord is subject to the development of new freight terminals
Indicative cost	Signalling incremental enhancement: between £50 million and £100 million; third and fourth tracks £100 million – £250 million; chord £20 million – £50 million.
Relates to other options	Wigston North Junction to Syston East Junction
Notes	This scheme forms part of the Felixstowe to West Midlands route upgrade accommodating capacity for intermodal freight growth to and from the Port of Felixstowe The line north of Corby to Manton Junction should also be considered for gauge clearance to W12 due to the diversionary options required for the MML Electrification of this line could be considered as a high priority candidate for electrification for use as a diversionary route off the MML and to create an electrified freight corridor. There are a number of level crossings on this section of route and the opportunity to close them as part of these options should be considered. Provision for bridging has been included in the cost ranges

Figure 4.3 Option 8 Trent Jn



Option 8 Trent Junctions	
Description	This option proposes the building of a new line linking Stenson Junction directly to the MML
Conditional Output	Capacity, journey time
Purpose	To deliver the quantum of passenger and freight services required to achieve the 2043 conditional outputs Insufficient capacity exists in the section between Sheet Stores Junction and Trent South and East Junctions due to the convergence of multiple routes
Intervention details	This option proposes the provision of a new two track section of railway to create a direct connection between Stenson Junction and the Midland Main Line. The new route section would separate on the approach towards East Midlands Parkway station to create a single connection-point via a grade separated junction (to the north) and a single connection point at grade to the south
Indicative cost	£175 million – £375 million
Relates to other options	Stenson Junction to Sheet Stores Junction; Derby station
Notes	As part of options for delivering the HS2 route through Toton, Attenborough Flyover and the High Level Line are proposed to be upgraded for passenger services plus additional infrastructure will be introduced between Trent East and West Junctions This option supports the introduction of a possible shuttle service operating between Derby/Nottingham stations and the proposed new East Midlands Hub HS2 station at Toton. Construction of the HS2 route through the area may provide opportunities for alignment of construction schedules Requirements for intervention to enable connectivity to HS2 will undergo continuing analysis as part of Midlands Connect and HS2 workstreams Statutory powers for the compulsory purchase of land are likely to be required The future of Ratcliffe Power Station is not known at this time. Any changes to the use of this power station in the future may result in these options having to be reviewed The recent granting of planning permission to the East Midlands Gateway will need to be taken into consideration when developing options for this scheme

Option 9 Stenson Junction – Sheet Stores Junction	
Description	This option considers the requirements to achieve an increased linespeed between Stenson Junction and Sheet Stores Junction
Conditional Output	Capacity, journey time, freight.
Purpose	To provide for the predicted level of freight growth expected in this area By 2043 there is forecast requirement to accommodate 12 trains per hour over the eastern section of this line (Sheet Stores Junction), which is not achievable on the baseline infrastructure
Intervention details	This option proposes to increase linespeed which will have the effect of allowing trains to clear signal block sections more quickly and so reduce headways. It will also enable long distance high speed services to utilise this section of route in a timetabled capacity rather than only as a diversionary route during timetable disruptions This option would comprise of the upgrading of the existing route to increase linespeed from 50mph to 75mph, enabling the route to be utilised by both passenger and freight services. The existing signalling system is suitable for use by both passenger and freight traffic but would need to be reviewed in relation to being able to support the linespeed increase proposed
Indicative cost	£100 million – £250 million
Relates to other options	Trent Junctions; Birmingham - Derby
Notes	There are a number of level crossings on this section of route and the opportunity to close them as part of these options will be pursued. Provision for bridging has been included in the cost range Signalling renewals in the Derby area planned in CP6 and CP7 will improve the signalling at Stenson Junction This intervention could also provide an alternative routing option offering improved journey time for Birmingham to Nottingham services The recent granting of planning permission to the East Midlands Gateway will need to be taken into consideration when developing options for this scheme

Option 10 Derby station	
Description	This option considers the requirement for an additional turnback facility at Derby station
Conditional Output	Capacity, direct journey opportunities
Purpose	To provide the required level of capacity to meet the forecast passenger and freight growth in 2043 In 2043, Derby station would need to accommodate a net increase of nine trains per hour above the current service levels of ten trains per hour. The majority of these will be terminating services from the Leicester/Nottingham area and shuttle services to the East Midlands Hub HS2 station at Toton
Intervention details	This option would consist of the provision of a new platform at Derby station that would enable the proposed shuttle services serving the East Midlands Hub HS2 station at Toton to terminate in Derby station and depart towards Toton
Indicative cost	£5 million – £15 million
Relates to other options	Trent Junctions; Birmingham – Derby
Notes	The introduction of shuttle services will need to be sensitivity-tested to confirm that a single additional turnback platform is sufficient to accommodate these services and that further infrastructure (e.g. more than one turnback platforms) is not required The potential change in passenger flows at Derby Station which may result in the requirement for additional station infrastructure Requirements for intervention to enable connectivity to HS2 will undergo continuing analysis as part of Midlands Connect and HS2 workstreams



Option 11 Birmingham – Derby area	
Description	This option considers the requirement for grade separation and the introduction of four tracking between Burton-on-Trent station and Barton North Junction
Conditional Output	Capacity, journey time, freight
Purpose	To accommodate the mixture of long distance, regional and freight services forecast to operate in 2043 on the baseline infrastructure Several services require conflicting crossing moves at Stenson Junction and North Stafford Junction which impacts on the capacity available on this section of route Stenson Junction has existing capacity constraints, and North Stafford Junction is potentially a constraint to achieving the 2043 conditional outputs; the introduction of the additional services in the ITSS exacerbates these issues
Intervention details	This option consists of the provision of a grade separated junction between North Stafford Junction and Stenson Junction that would entail a double track flyover of approximately 3.5 miles in length. The option also proposes the installation of a new fourth track from Barton North Junction to Leicester North Junction with a further extension from Branston Junction to Barton North Junction for services travelling in the Derby direction
Indicative cost	£175 million – £375 million (grade separation), £75 million – £175 million (fourth track)
Relates to other options	Derby station
Notes	Electrification between Derby St Andrews and Wichnor Junction could be considered as a high priority candidate for electrification to enable an electrified south west to north east cross country corridor. Passive provision could be included in this scheme for these options Statutory powers for the compulsory purchase of land are likely to be required for these options There is the potential to improve journey time by reducing waiting time for services crossing at junctions

Option 12 Chesterfield area (Tapton Junction to Clay Cross Junction)	
Description	This option considers the requirement for the implementation of a new through platform at Chesterfield Station, and for grade separation between Chesterfield South Junction and Clay Cross Junction
Conditional Output	Capacity, journey time, direct journey opportunities
Purpose	To release capacity by improving segregation of services between Derby station and Chesterfield station and between Trent East Junction and Chesterfield station The quantum of services required in the 2043 ITSS increases the number of instances of: northbound non-stop services following stopping services through Chesterfield station on the same track conflicting moves between services at Clay Cross Junction services performing a turnround in platforms at Chesterfield from the north
Intervention details	This option would consist of the provision of a new fourth platform at Chesterfield Station with associated track and signalling works to enable the new platform to be used for trains travelling south from Chesterfield Station along the Erewash Valley Line. This would allow passenger trains from the north, routed via the Erewash Valley Line south of Chesterfield, to cross at Tapton Junction rather than at Chesterfield South Junction, removing the constraint caused by stopping and non-stop services passing through Chesterfield on the same line This option also proposes the introduction of grade separation between Chesterfield South Junction and Clay Cross Junction. This would consist of a single line flyover between the northbound Erewash Valley Line and the northbound Midland Main Line to remove conflicting moves between services in opposite directions
Indicative cost	£10 million – £20 million (new platform), £75 million – £175 million (grade separation)
Relates to other options	n/a
Notes	It is anticipated that statutory consents would not be required for the compulsory purchase of land for these options Electrification is planned on this section of route in CP6 between Sheffield and Derby and passive provision could be included for these options as part of those enhancement works

Option 13 Nottingham station	
Description	This option proposes the installation of a new platform at Nottingham station, as well as associated track and signalling works
Conditional Output	Capacity, direct journey opportunities
Purpose	To provide for additional services required by 2043 by providing additional platform capacity and by removing conflicting crossing moves which would increase in number as a result of the additional services
Intervention details	The option would provide an additional through platform on the south side of the station to the rear of the existing Platform 7, with bi-directional capacity and equipped to accommodate terminating trains from both the east and the west
Indicative cost	£5 million – £15 million
Relates to other options	n/a
Notes	This option does not include any analysis of the potential change in passenger flows at Nottingham Station, which may arise from the introduction of the proposed shuttle services to the proposed East Midlands Hub HS2 station at Toton, or the through the interaction between passengers using the Nottingham Express Transit Tram services and train services The remodelling of Nottingham station in CP4, notably the multi-storey car park and southern concourse, provided passive provision for an additional through platform at the south side of the station Requirements for intervention to enable connectivity to HS2 will undergo continuing analysis as part of Midlands Connect and HS2 workstreams



Option 14 Newark area	
Description	This option considers the requirement for the segregation of the Nottingham – Newark line from the East Coast Main Line.
Conditional Output	Capacity, journey time
Purpose	To provide the capacity required to achieve the conditional outputs for 2043. Currently, one passenger train and one freight train per hour can be accommodated over Newark Crossing and this is proposed to be increased to two passenger and one freight service per hour.
Intervention details	This option proposes a new double tracked grade separation to take the lines running from Nottingham to Lincoln over the East Coast Main Line, thus removing the conflict with services on the flat crossing to the north of Newark North Gate station. It would also remove the requirement for the existing Permanent Speed Restriction on the East Coast Main Line, enabling the East Coast Main Line linespeed to be raised to a continuous 125mph through the area. The route between Lincoln and Newark North Gate station, via the bi-directional Newark Crossing Curve, and associated existing infrastructure, would be retained. Given its impact on the East Coast Main Line, this scheme will be considered for further development via the East Coast Main Line Route Study.
Indicative cost	£100 million – £250 million
Relates to other options	East Coast Route Study
Notes	There is a level crossing on this section of route and the opportunity to close it as part of these options will be pursued. Provision for bridging has been included in the cost range. Statutory powers for the compulsory purchase of land are likely to be required for this option

05: Delivering CP6 – Choices for Funders

This chapter

- discusses whether the conditional outputs for CP6 can be met based on existing enhancement plans
- updates the priority interventions that were proposed in the Draft for Consultation as funding choices for CP6. These include:
 - Plymouth – Edinburgh/Glasgow via Derby
 - Southampton/Reading – Newcastle via Derby
 - Birmingham – Leicester – Stansted Airport/Cambridge
 - Norwich – Nottingham – Sheffield – Liverpool
- Grade separation at Wigston Junction and the introduction of a four track railway to Syston Junction
- Additional platforms at Leicester station
- Signalling upgrades between Syston Junction and Peterborough to improve capacity
- Developing plans for a ‘central section’ extension to East West Rail between the East Midlands area and Cambridge

This chapter highlights the priority interventions that are proposed as choices for funders for Network Rail’s next five-year control period, Control Period 6 (CP6), which starts in April 2019.

These interventions can take two forms:

1. Those enhancements that can be put in place on the existing infrastructure. These are typically train lengthening schemes, or adaptations to service schedules that add additional trains, or manage demand by varying stopping patterns. Each of these proposals has been considered in terms of its value for money through an outline business case
2. Infrastructure enhancements: - changes to the physical network to enable conditional outputs to be accommodated. These schemes have continued to be developed since publication of the East Midlands Route Study Draft for Consultation. An update on each of these projects is provided in this chapter.

Making best use of the infrastructure through train lengthening

To enable choices that offer good value for money, where it was determined that future capacity requirements could not be met on the network, as currently envisioned given planned enhancements and service changes, a two stage approach was taken. Initial analysis was aimed at establishing whether conditional outputs can be met through making best use of the existing capability of the network through changes to the level and specification of services. Where a capacity gap still existed, further investment-based strategies to accommodate growth were considered.

Capability analysis showed that many sections of the East Midlands network are already close to capacity and so, to accommodate more trains, enhanced infrastructure will be required. For this reason, although a small number of options consider the introduction of additional services, the main focus is on providing additional seating capacity in 2023 by other means. Typically, this is through train lengthening schemes.

As demand for passenger and freight services continues to grow, so too will the pressure on the network. In some circumstances, making best use of the existing network will require informed trade-offs to be made between outputs; the Route Study identifies where these choices exist.

Midland Main Line: London long distance high speed, outer and inner suburban services

Corresponding conditional output:

CO6 – *To provide sufficient capacity for passengers travelling into central London during peak hours on the long distance high speed and suburban services in 2023.*

This includes services on the Midland Main Line including Long Distance High Speed services from London to Nottingham, Sheffield, and Corby, as well as suburban services from London to Bedford, Luton, and St Albans. As set out in [Chapter 2](#), and in Network Rail’s [Enhancement Delivery Plan Update](#), considerable improvements are already planned on the Midland Main Line over Control Periods 5 and 6.

In [Chapter 3](#), demand analysis indicates that there will be sufficient total capacity (seating and standing) on the route to accommodate demand in the morning high-peak hour. On some services in the high-peak hour the increase in passenger loads towards London means that some passengers may be required to stand for up to 25 minutes: slightly longer than the recommended 20 minute maximum.

The infrastructure and service changes planned on the Midland Main Line in CP5 and CP6, particularly in relation to electrification and the associated introduction of new rolling stock, mean that the exact capacity to be provided following completion of these changes is not confirmed. Industry discussion as to the specification of new rolling stock is ongoing and will form part of the new franchise for long distance services in the East Midlands planned to be awarded in 2017.

Non-London long distance high speed services (Plymouth to Edinburgh/Glasgow and Southampton/Reading to Newcastle services)

Corresponding conditional output:

C08 – *To provide sufficient capacity over the day for passengers travelling on the East Midlands section of the long distance high speed Plymouth to Edinburgh/Glasgow and Southampton/Reading to Newcastle services in 2023*

In order to assess meeting the conditional outputs for the East Midlands, passenger loads were considered across the whole of a train's journey, including where this is outside of the East Midlands Route Study scope area. In many instances, the most significant levels of crowding were found to be on sections of route outside of the East Midlands Route Study area. Any proposals to resolve crowding issues were communicated to other relevant Route Study teams affected through the cross boundary process so that issues local to that route could be identified and to ensure that consistency between studies is achieved.

These two routes are currently each served by an hourly high-speed service. The Plymouth service is based on a mixture of four-car and five-car high speed diesel multiple units, and seven-car High Speed Trains (HSTs); the Southampton route uses four-car high speed diesel multiple units (DMU).

To meet conditional outputs for 2023, both service groups will be required to operate longer formation DMU trains. This will lead to an overall increase in the number of carriages used to deliver the service: an additional 18 carriages will be needed for the Plymouth service, with 15 extra required on the Southampton route. To achieve this, most four-car and five-car services would need to be lengthened to five-car or six-car, with one specific service needing to be lengthened to a seven-car formation to meet forecast demand.

No platform lengthening would be required to accommodate the longer trains in the Route Study area, as all relevant platforms are already long enough for the additional vehicles proposed. Appraisal work has been undertaken on the assumption that train lengthening would not require any platform lengthening outside the East Midlands Route Study area. This assumption will be confirmed within the appropriate route studies.

Value for money assessment has been carried out against different options that could provide the increase in vehicles required. Providing an additional 18 vehicles on the Plymouth services has a value for money rating which is borderline between Low and Medium value for money.

On the Southampton/Reading – Newcastle route, delivering the required 15 additional carriages shows a Poor value for money case.

For both groups of services further analysis suggests that a trade-off between meeting crowding standards and providing higher value for money business cases exists. For instance providing eight extra vehicles on the Plymouth services has been assessed as Very High value for money, while providing four extra vehicles on the Southampton services has been assessed as Medium value for money. While these lower capacity options provide improved value for money they cannot fully mitigate all crowding issues¹

More detail of each option and the considerations needed to assess them is contained in the [Appendix A.10](#) under options EM020.1, EM020.2, EM021.1 and EM021.2.

¹ HS2 Phase 2 is expected to significantly reduce loads north of Birmingham from 2033. For this reason, appraisal work has been undertaken over a shorter, 10-year time period. As this is less than the life of a new vehicle, the high value for money business case will only be valid if an appropriate redeployment of the new vehicles can be found beyond 2033.

Long distance interurban

Corresponding conditional outputs:

CO9 (and **CO4**) – *To provide sufficient capacity for passengers travelling on the East Midlands section of interurban services including Birmingham – Leicester – Stansted Airport, Nottingham – Cardiff and Norwich – Liverpool services in 2023 (and 2043).*

Birmingham and Leicester – Stansted Airport

Two groups of passenger services are considered in this section. An hourly interurban service operates between Birmingham, Leicester, Cambridge and Stansted Airport and an hourly local stopping service operates between Birmingham and Leicester.

Currently the route is served by a mixture of two-car and three-car DMUs. These vehicles are fitted with selective door opening capability (SDO).

By 2023 the most acute crowding is likely to be experienced on peak services at Birmingham, with some issues across the rest of the route on specific services. In order to meet the crowding standards in 2023, a number of services would need to be lengthened to three-car, four-car or five-car formations.

Options have been considered that provide up to 10 additional carriages on this route. Taken as a single enhancement, providing 10 extra vehicles will solve almost all crowding breaches, but offers a Low value for money business case (see option EM022.1), albeit close to the Medium value for money threshold. An alternative more affordable option to introduce fewer additional vehicles is shown to be Very High value for money (see EM022.2). This gives an opportunity to consider a trade-off between meeting crowding standards and providing a more affordable solution.

Other options include extending the existing Birmingham – Leicester services to operate to Cambridge (EM022.3), or to run an additional service between Leicester and Birmingham (EM022.4). Both of these options require additional infrastructure work, some of which will fall within the East Midlands route for instance between Peterborough and Syston.

In reviewing these options, decision makers should consider the best alternative use of future capacity, as additional freight demand is also forecast over this route.

Nottingham – Cardiff

This service group provides an interurban service between the cities of Nottingham, Birmingham and Cardiff, as well as providing for more local journeys. There is an hourly service between Cardiff and Birmingham and a twice hourly service between Birmingham and Nottingham. The service is operated by a mixture of two-car, three-car and four-car DMUs.

Increased demand, particularly on services arriving (am) or departing (pm) Birmingham during peak periods, means that in order to meet the crowding standards in 2023 many services would need to be lengthened to three-car, four-car or five-car formations. An option to lengthen services to do this has been considered. This option (EM023.1) has a poor value for money business case. Given that the focus of crowding is around the Birmingham area, a value for money solution is being developed by the West Midlands and Chilterns Route Study.

A potential alternative option of running of additional all day services out of Birmingham towards Burton-on-Trent has been identified. This option has been considered within the West Midlands and Chiltern Route Study.





Nottingham – Leeds services

On this route, analysis suggests that demand levels are higher in Yorkshire at peak times than into or out of Nottingham. For these reasons, the capacity of these services will be considered within the North of England Route Study.

East Anglia to the North West

This service serves interurban journeys between East Anglia, Nottingham, Sheffield and the North West as well as local journeys. Passenger loads are particularly high in the North West between Stockport, Manchester, Warrington and Liverpool. The service is currently hourly, and is operated by two-car and four-car DMUs. Generally, two-car DMUs operate between Norwich and Nottingham. Several services are then strengthened to four cars (two, two-car units) for the busier section between Nottingham and Liverpool.

In order to meet crowding standards in 2023, assuming the current service pattern, significant train lengthening would be required between Nottingham and Liverpool. Two services have been identified as requiring lengthening to eight carriages.

Substantial changes on the northern section of this route are expected as a result of both the Northern Powerhouse programme and the award of new **Northern and TransPennine franchises** for which the outcomes have recently been announced. Ongoing testing will analyse the impact of proposed service changes which, for those due to the franchise changes, will occur in early CP6.

In light of these developments, it is suggested that the capacity required on these services is reconsidered alongside the other changes to services within the North of England Route Study. The work done to understand demand around Nottingham in this study will be fed into the North of England work.

East Midlands Local Services

Corresponding conditional outputs:

CO10 – *to provide sufficient peak and all day capacity for passengers travelling on local services in the East Midlands in 2023*

Leicester – Nottingham – Newark – Lincoln services

There is an hourly service between Leicester and Lincoln via Nottingham and Newark and, since the publication of the Draft for Consultation, extension of the Matlock to Nottingham service to Newark Castle. The corridor is operated predominantly by two-car DMUs.

When initial analysis on this route was carried out it was determined that, to address forecast crowding levels, train lengthening on peak services would be required (EM025.1). This returned a poor value for money business case, either with longer services operating under SDO or with platform lengthening carried out. Since this analysis was completed the existing Matlock to Nottingham service has been extended to Newark Castle (examined under option EM025.2), providing an additional opportunity to travel for passengers and so seating capacity, removing the need for a significant proportion of the train lengthening identified in the train lengthening option (EM025.1).

A further option is to run an additional service between Nottingham and Lincoln. This is consistent with the 2043 Indicative Train Service Specification (ITSS) and will provide further additional capacity on the most crowded section of the route between Nottingham and Newark. However, the additional service would necessitate an infrastructure intervention at Newark, where the flat crossing on the East Coast Main Line poses a constraint. Therefore this enhancement will be assessed via the East Coast Route Study, including appraisal work that considers any potential benefits of increasing capacity on the Nottingham – Newark – Lincoln corridor.

Nottingham – Mansfield Woodhouse/Worksop services

This service provides for journeys into and out of Nottingham from the north. The baseline service is two trains per hour between Nottingham and Mansfield Woodhouse, with one of the two continuing to Worksop.

The service is currently operated largely by two-car DMUs, with some services operating a three-car formation.

To accommodate forecast loads for 2023 within the crowding standards, several services would need to be lengthened from two to three carriages, while one morning service into Nottingham would require a four-car formation, and one in the evening a five-car formation. An option for doing this is shown in [Appendix A10](#) as option EM026.1.

At this stage of development, it has not been possible to establish a value for money business case for train lengthening on this section of route, although it is acknowledged that the crowding issue still remains EM026.3. This is a situation where other rail industry stakeholders may wish to consider undertaking further development work on alternative solutions.

It should be noted that train lengthening options will require Selective Door Opening (SDO). If such options are to be progressed, then the cascade of SDO-enabled rolling stock will need to be considered.

Matlock – Derby – Nottingham – Newark Castle services

This hourly service is currently operated largely by two-car DMUs, with a small number of single unit services. To meet crowding standards in 2023, lengthening to three-car or four-car formations would be required for a small number of peak services into and out of Nottingham and Derby. Lengthening trains to four-car length would require platform extensions or the use of SDO at Whatstandwell and Spondon stations.

An option has been considered to extend a number of services to three-car or four-car formations (EM027.1). Socio-economic appraisal has shown this option to be poor value for money. After further analysis it was determined that a medium value for money, or better, business case could not be found for lengthening any individual service.



It should be noted that growth on this corridor has been approximately 7 per cent per annum over the 2 years from 2012/13 to 2014/15 which is significantly higher than the Market Study growth forecasts. As such, crowding issues which are seen on some services today could be expected to worsen earlier than expected.

Derby – Stoke-on-Trent – Crewe services

This service is currently hourly and is operated mostly by one-car DMUs with a small number of two-car units. The heaviest loadings are between Derby and Stoke-on-Trent in the peak periods.

Forecast loadings for 2023 suggest that a number of the one-car services would need lengthening to two-car operation to meet crowding standards (option EM028.1). Although this option would not require any platform lengthening, analysis has shown it to represent poor value for money.

Since analysis was originally carried out as part of this process, crowding issues on this corridor have emerged. A stakeholder board has been formed with representatives from East Midlands Trains, local stakeholders and Network Rail to examine capacity and connectivity issues.

Nottingham – Skegness services

This is currently an hourly service operated by two, three or four car DMUs. Although there are not forecast to be any crowding problems with peak load factors in 2023, there may be some crowding on specific off-peak services during the summer holiday season. The current franchisee already runs special services to manage seasonal variations therefore future crowding problems could be mitigated by lengthening these services. As these will not operate at the height of the peak, in the short term, the necessary stock should be available without the need to lease additional vehicles.

The summer special services are currently operated by High Speed Trains (HSTs) which are expected to be replaced by electric rolling stock with the introduction of electric services on the MML by 2023. As a result, the industry will need to seek alternative solutions for the provision of additional summer trains on this non-electrified route.



Low growth sensitivity test

High growth scenario forecasts from the passenger Market Studies were assumed for all Route Study appraisals. As a sensitivity test, the appraisals were repeated with the low growth forecasts from the passenger Market Studies. In all cases, the low growth appraisals show low or poor value for money business cases for train lengthening options.

Increasing the capability of the network

Having examined choices which make best use of existing network capability, the Route Study identified a number of infrastructure investment priorities for CP6. These were developed by evaluating the infrastructure enhancements needed to deliver the ITSS for 2043 (outlined in Chapter 4) against a number of prioritisation criteria designed to identify options suitable for delivery in CP6. These are:

- investments which reduce rail industry costs (for example, further network electrification or the provision of a new turnback capability)
- investments required to provide sufficient capacity for the anticipated level of passenger and freight demand at the end of CP6
- ‘once in a generation’ opportunities where conditional outputs (or some part of the capital works necessary to enable conditional outputs over a longer period of time) can be delivered efficiently during CP6 – for example, in conjunction with the planned renewal of life-expired assets
- investments which deliver funders’ priorities for the route in CP6
- investments which enable improved access to HS2 stations and the proposed High Speed Rail network.

Applying these criteria resulted in the identification of five priorities for infrastructure investment that can be considered as choices for funders for CP6:

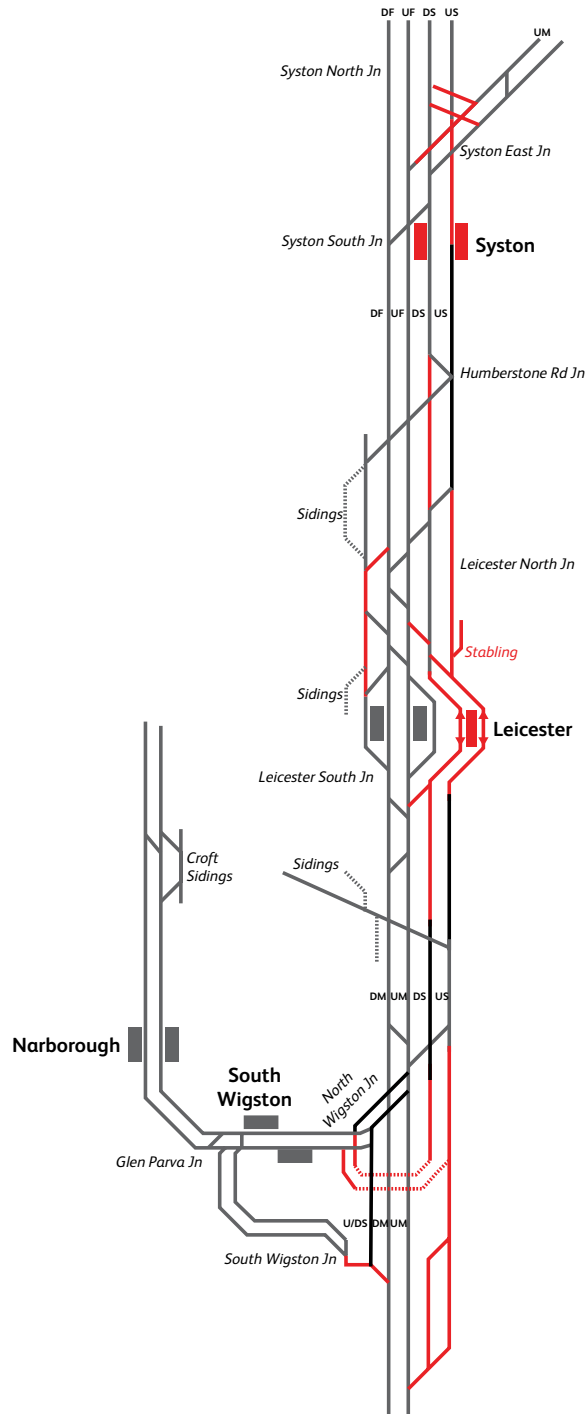
- Wigston North Junction – Syston East Junction
- Leicester station
- Syston East Junction – Manton Junction – Peterborough
- East West Rail Central Section development

For improved efficiency of delivery and due to the interrelated nature of outputs, the Wigston North Junction – Syston East Junction and Leicester station options have undergone development as a combined project called Leicester Capacity.

Additionally, the Midlands Connect partnership will work to identify opportunities where earlier development of interventions or alternative options may have a strong case for funding.

Development work on the prioritised schemes has continued since publication of the Route Study Draft for Consultation. The latest information is given in the remainder of this chapter.

It should be noted that the Draft for Consultation version of this study identified options for interventions at Bedford Midlands station in CP6. Further analysis determined this was not required to deliver conditional outputs in CP6 and so further development has been stopped. The East West Rail Central Section will continue to analyse the requirements for Bedford Midland station and will identify if there is any need for intervention to deliver its outputs.



Leicester Capacity	
Option as identified in the Draft for Consultation	This option proposes: a grade separation at Wigston North Junction, a four-track railway between Wigston North Junction and Syston East Junction, improved segregation of train services at Leicester station, improvements between the existing Syston East Junction and Syston South and North Junctions, the introduction of new platforms at Leicester station and a second platform at Syston station
Conditional Output	Capacity, journey time, direct journey opportunities, freight
Purpose	To accommodate the quantum of services forecast to be operating in 2023 as part of the Felixstowe to West Midlands freight corridor capacity upgrades and provide for further growth to 2043
Development since Draft for Consultation	<p>This scheme is currently coming towards the end of GRIP 2 development. Following the Hendy review this scheme is now programmed to be paused at the end of GRIP 2 and we will seek funding to recommence with development of GRIP 3 at the start of CP6.</p> <p>The project has taken into account forecast growth over the whole route and the impact that timetabling services through Leicester has on the wider network. The scheme has identified the option below as providing capacity for growth without compromising performance by reducing conflicting crossing moves and allowing for freight regulation. The option includes:</p> <ul style="list-style-type: none"> • Additional slow line for freight regulation and run-round moves between Kilby Bridge Junction and Wigston North Junction • Grade separation (dive-under) between Wigston North Junction and Glen Parva Junction to remove conflict between east-west and north-south flows • 2 additional through platforms at Leicester station with associated track and points to reduce crossing moves and conflict between different routes • 4 tracking between Wigston North Junction and Syston South Junction to increase plain-line capacity and segregate flows • Doubling of Syston South chord to remove the single-line constraint • Doubling and remodelling of Syston North chord to remove the single-lie constraint and allow regulation of freight services without blocking the junction to all traffic

Leicester Capacity (Cont.)	
Indicative cost	£600 million - £1 billion
Relates to deliverables	Forecast Felixstowe to West Midlands freight flows, North – South freight flows and passenger growth
Prioritisation assessment	As a key element in releasing capacity for freight growth, along with supporting passenger growth and improved performance on multiple corridors this scheme is proposed for continuing development and delivery
Notes	<p>This option forms part of the Felixstowe to West Midlands capacity route upgrade and Electric Spine Programme.</p> <p>This option contributes to supporting the introduction of possible shuttle services operating between Leicester station and the proposed new East Midlands Hub HS2 station at Toton. Further development on the service specification to be operated following the introduction of HS2 may lead to the need for additional enhancement in this area. Network Rail are working with HS2 Ltd, DfT and East Midlands Councils to ensure risks and requirements of any service changes are understood.</p> <p>A Transport and Works Act order is required for delivery of the grade separated dive under at Wigston. A separate Transport and Works Act order may be required to support remodelling of Syston North Chord.</p> <p>Electrification through this area is due to be delivered during CP6. It is expected that the Leicester Capacity and MML Electrification projects will liaise to ensure efficient delivery where possible.</p>

Syston East Junction – Manton Junction – Peterborough area	
Option as identified in the Draft for Consultation	This option proposes the improvement of signalling on this section of route, and the introduction of additional tracks between Langham Junction Level Crossing and Melton Mowbray station
Conditional Output	Capacity, direct journey opportunities, freight.
Purpose	To accommodate the quantum of services forecast to be operating in 2023 as part of the Felixstowe to West Midlands freight corridor capacity upgrades and provide for further growth to 2043
Development since Draft for Consultation	<p>Analysis associated with this option has highlighted the opportunity to phase interventions to deliver capacity as required in CP6 and then by 2043.</p> <ul style="list-style-type: none"> Capacity requirements for 2023 can be met through a resignalling solution Capacity for 2043 is likely to require additional track to remove the constraint on capacity imposed by heavy freight travelling uphill and the speed differential with other services which this introduces <p>The project has proposed a plan to restart development with a refresh of the GRIP 3 work carried out to date at the start of CP6,. Before this date the project is seeking to proceed with work regarding identifying opportunities related to the upgrading or closing of level crossings. The project would seek to deliver the scheme towards the end of CP6.</p> <p>The introduction timescales for ETCS will greatly impact the nature of intervention on this corridor and so the development of these plans is being closely monitored by the project to determine whether a signalling solution would be best delivered by conventional lineside signals or a Digital Railway solution.</p>
Indicative cost	<p>£50 million - £100 million</p> <p>This estimate will be reviewed when the project restarts development using more up to date unit estimates and contingency allowances and with a greater understanding of the requirements of the project.</p>
Relates to deliverables	Felixstowe to West Midlands freight growth, inter-regional passenger connectivity
Prioritisation assessment	To meet forecast demand to 2023 this scheme is proposed as a choice for funders in CP6
Notes	<p>This scheme forms part of the Felixstowe to West Midlands route upgrade accommodating capacity for intermodal freight growth to and from the Port of Felixstowe</p> <p>The line north of Corby to Manton Junction should also be considered for gauge clearance to W12 due to the diversionary options required for the MML</p> <p>Electrification of this line is not currently committed although it was considered as a high priority candidate for the next tranche of electrification schemes as part of the previous Network RUS: Electrification. This would help provide an electric freight corridor from Felixstowe to the West Midlands and enable an electrified diversionary route between Syston and Kettering via Corby for services from the MML</p> <p>There are a number of level crossings on this section of route and the opportunity to close them as part of these options should be considered to improve the safety profile of the route. Provision for bridging has been included in the cost ranges</p>

East West Rail Central Section	
Description	East West Rail seeks to provide a strategic rail link between East Anglia and Central, Southern and Western England. The 'Western Section' is a committed scheme to re-introduce passenger and freight services between Bedford and Oxford, Milton Keynes and Aylesbury with delivery of a core timetable on all routes by the end of CP6. This next phase of development seeks to define options for a rail link between Cambridge and the eastern end of the committed East West Rail infrastructure around the Bedfordshire/Buckinghamshire border.
Conditional Output	Capacity, connectivity, freight, local access
Purpose	By providing more direct links and better connectivity between East Anglia and the South East, and the Midlands and South West, East West Rail Central Section will unlock the economic potential of communities across the UK. Areas of high economic output will be joined by faster, more frequent connections, and opportunities for people to travel to jobs and for business to link to each other will proliferate.
Intervention details	<p>The project has been working with the East West Rail Consortium, DfT, local stakeholders and train and freight operators to identify the best routing option for the Central Section. At this stage the project has narrowed potential options to two corridors between the Bedford and Cambridge areas, these are routed via either Sandy or Hitchin:</p> <p>Work is ongoing to identify a single preferred route for the East West Rail Central Section within one of these two broad corridors.</p> <ul style="list-style-type: none"> Bedford to Cambridge via Sandy Bedford to Cambridge via Hitchin

East West Rail Central Section (Cont.)	
Intervention details	The next stage of development will focus on specifying more detailed conditional outputs which the project is required to meet to best provide economic benefits, leading to identification of a single route within the preferred corridor and infrastructure design to support the required consents associated with building new infrastructure that will be required
Indicative cost	To be determined through the development process
Relates to deliverables	Driving economic growth
Prioritisation assessment	Based on its potential to further the strategic aims of the transport industry, developing options for an East West Rail Central Section during CP6 is a choice that has been identified as a priority for funders

06: Consultation and Next Steps

This chapter describes:

- how stakeholders have been consulted to develop the East Midlands Route Study through the Draft for Consultation to the Final document
- the key themes identified within the consultation responses

Management and Consultation process

Network Rail is taking a collaborative approach to the development of the Long Term Planning Process. The East Midlands Route Study is a key part of this process. Development of the Route Studies follows publication of the four Market Studies at the end of 2013 which set out the direction of travel for demand on the rail network in Great Britain over the next 30 years.

The suite of Route Studies is a key next step in the process to develop the case for investment in the rail network in Control Period 6 and beyond.

The East Midlands Route Study has been developed with the close involvement of a wide range of stakeholders. This has ensured that the work has been subject to comment and guidance as it has been developed.

As ideas and interventions have been developed they have been challenged by an audience of key stakeholders.

Stakeholder Groups

The Long Term Planning Process and the Route Studies developed within it are driven by the groups set out in Appendix A1. These groups have been complemented by one to one discussions with individual stakeholders during the development of this Route Study to discuss specific areas as required as work has developed.

Consultation Process

The East Midlands Route Study Draft for Consultation was published on the Network Rail website at the end of January 2015. A 90-day consultation period on the document closed at the end of April 2015. In June 2015, work on Network Rail's CP5 electrification schemes, including the planned electrification of the Midland Main Line, was paused as part of a review of the affordability and deliverability of major schemes, being undertaken by Sir Peter Hendy, the Chairman of Network Rail on behalf of the Secretary of State for Transport. As this had the potential to impact on the findings of the East Midlands Route Study, the decision was taken to defer completion of this final version of the Route Study until after the publication of Sir Peter Hendy's report. This action has allowed us to complete the final version of the Route Study with the confidence that it is consistent with Network Rail's current Enhancement Delivery Plan.

Following resumption of work to produce this final version of the East Midlands Route Study, this document has been refreshed to reflect changes in the Enhancement Delivery Plan and to provide clarity and further information to areas where a need for this was identified through the consultation responses.

Consultation Responses

In total, 75 responses were received from stakeholders, and these have been categorised as shown in Table 6.1. The consultation responses are published on the Network Rail website alongside this study.

Table 6.1 Count of Responses	
Responder Type	Number of Responses
Business	3
Local Enterprise Partnership	5
Local Authority/Council	20
MP	1
Rail Group	9
Transport Group	7
Private Individual	24
Train or Freight Operator	6
Total	75



Key themes in the consultation responses

The responses Network Rail received were well considered and, in many cases, comprehensive. As a result, it is difficult to provide a summary of, and respond to all points raised within this document. Inevitably in a consultation process, it can be the case that individual suggestions are potentially helpful but then also contradict other responses. It is also important to note the framework of the Long Term Planning Process which leads to a number of responses being outside of the remit of either Network Rail or the Route Study to resolve.

Below is a summary of the key themes identified within the set of responses as a whole, along with guidance as to how the final version of the Route Study meets the issues raised.

Freight growth levels

Following work on the East Midlands Route Study Draft for Consultation, freight growth forecasts, particularly relating to aggregates traffic were updated and showed an increase in future tonnage estimates.

Network Rail's Economic Analysis team carried out a sensitivity test on higher growth forecasts. When extrapolated it was determined that this increase did not lead to a significant enough change in train paths required to change the infrastructure options identified as being required either by 2023 or 2043. The central guidance to the Route Studies was to continue to use the original forecasts in analysis.

It is understood that the freight business is highly dynamic and as such it is important that Network Rail continues to work with freight operators and the rest of the freight industry to understand and account for changes to commodity flows as they are identified. The Freight Network Study will identify any long term strategic freight growth corridors requiring further development.

Over future control periods, the East Midlands Route already has a number of key improvements programmed for freight traffic, with schemes in development to increase gauge clearance and provide a step change in capacity on the Felixstowe to West Midlands corridor.

Demand forecasts into London

Since publication of the Market Studies a new version of **Railplan**, a strategic public transport model for London and its surrounding area has been released. TfL responded to the East Midlands Route Study Draft for Consultation and highlighted the use of the previous version of Railplan as an issue as the new version suggests an uplift of 20% on the growth forecasts from 2011/12 to 2022/23.

It is the view of Network Rail that the Thameslink programme constitutes a considerable change in service, in terms of both connectivity and capacity, with the full service of 24 trains per hour through the central London core section due to begin operation in December 2018. The high growth into St Pancras over this period is largely due to how passengers will react to these changes in their choice of route.

As such, the recommended approach from Network Rail is for the Route Study to not base its conclusions on the revised forecasts alone. We will continue to use the forecasts from the previous Route Study as the central case to understand the central capacity gap in CP6 and over the 30 year period while highlighting the risk of a larger increase in the number of passengers in response to the changes in service and that this will be understood in future Long Term Planning cycles after the introduction of the full Thameslink service.

Recognition of Midlands Connect strategy development

Multiple respondents commented on the risk that the East Midlands Route Study was not aligned at boundary points with neighbouring Route Studies (e.g. the West Midlands and Chiltern Route Study), particularly regarding East-West flows across the Midlands and increasing the speed and capacity of these journeys as per the developing strategy of the Midlands Connect partnership.

During the period since the publication of the Route Study Draft for Consultation, Network Rail has been developing a piece of work to analyse opportunities for incrementally improving journey time between urban centres in the East and West Midlands (e.g. Birmingham-Nottingham). This work has been designed to assess the potential capability of routes from end-to-end, across Route Study boundaries. Development work on this is ongoing, with results to be included in the final version of the West Midlands and Chilterns Route Study **Chapter 4** of this document provides more detail and outlines the methodology being undertaken.

Journey time improvements

Concern was raised that intervention options did not seem to focus on aiming to improve journey time throughout the study area.

In response to this we have provided additional detail on work being carried out through the Midlands Connect workstream (as highlighted above) as well as providing clarity on the use of Generalised Journey Time as a measure and the impact of increasing service frequency. We have also sought to clarify which elements of connectivity each option is seeking to address.

European Train Control System (ETCS) timescales

In the Draft for Consultation multiple intervention options specified dates when ETCS was expected to be implemented in that area and proposed that this could offer an alternative solution to those given. Since publication of the Draft for Consultation, the Digital Railway team within Network Rail have continued to refine the business case and plans for the rollout of ETCS (and the other elements that make up the European Rail Traffic Management System).

Timescales for the introduction of ETCS on different routes are still being considered and, as such, the use of ERTMS as a solution to an infrastructure constraint can only currently be highlighted as a possibility, although it is expected to be a viable option to improve network capability and reduce network costs. As options are taken forward for development in the future, this will happen against a confirmed rollout plan for ERTMS, at which point the use of Digital Railway interventions as a solution can be progressed at option selection stages throughout the GRIP process.

Infrastructure appraisal/business case results

Business case results would only normally be developed for CP6 choices for funders. In the East Midlands Route Study the priority interventions identified for CP6 all exist either as enabling schemes within existing projects/funding streams, or as schemes which are already under development. As such, business cases would already exist either within the larger projects or for the individual scheme at a more mature level than would normally be required within a Route Study. [Chapter 5](#) has been updated to indicate what level of development the identified priority schemes have currently reached. At the end of each GRIP stage the business case is reappraised to ensure only schemes with a positive business case are progressed.

Readability of document

A number of responses were received which related to the difficulty that readers had identifying the key themes and recommendations of the Route Study, given the length of the document and the use, in places, of technical and specialist language.

This has been a comment made of the suite of documents which make up the Long Term Planning Process. Consequently, the East Midlands Route Study is following the example set by the Route Studies for Wales and Scotland in producing a summary document to accompany this study to be published at the same time as the full document. This document can be found on the same page of the Network Rail [website](#) as the full Route Study.

Emerging local growth issues

During consultation some stakeholders have identified capacity issues which have emerged for specific trains at specific locations since the Market Study loading analysis was published in October 2013; an example of this is the corridor between Derby, Stoke-on-Trent and Crewe, where certain of the hourly one-car services are regularly experiencing high levels of crowding, due to increasing demand from students travelling to/from places of education following changes to alternative local transport options, combined with use of services for local shopping and leisure trips.

It is understandable that, as time passes since the analysis was undertaken, some differences will appear between actual loads and forecasts, both in terms of loads being higher, and lower, than forecast. Due to the need to provide a consistent approach across the tranche of Route Studies, it is not practical to continually revisit the forecasts for a Route Study.

Stakeholders have made it clear that they understand that the Market and Route Studies reflect a point in time, and the reasoning behind this. But wanted recognition in the text of the fact that there are continuous workstreams and stakeholder boards on which Network Rail sits which seek to resolve emerging issues.

The Long Term Planning Process is cyclical, so issues can be addressed through the next planning cycle. There may also be opportunities for operators to allocate rolling stock to address emerging changes in priorities for train capacity, provided the overall rolling stock provision is sufficient. There is also the opportunity for issues to be raised through the tender process for the new East Midlands franchise which is due to be awarded during 2017.

Local aspirations for new services, lines and stations

Throughout consultation, stakeholders have identified a number of local priorities, which include:

- Aspirations for new services – for example between Leicester and Manchester, as raised by Leicester City Council
- Opening (or reopening) of lines for passenger services – for example, local councils along the route of the National Forest Line between Burton-on-Trent and Leicester have indicated a desire to explore options for passenger operation along this line, improving the connectivity of local towns
- Opening of new stations – multiple locations were suggested for the opening of new stations to improve local connectivity

Analysis carried out within the Market Studies focused on applying growth forecasts to existing journeys. As such, this does not directly identify the need for new services. The Long Distance Market Study produced growth forecasts and connectivity conditional outputs for travel between major towns and cities, not all of which are currently served by direct services. For certain pairs of locations, connectivity conditional outputs may have identified a requirement for a level of service which would be most easily met through a new direct service. Within this Route Study, an example is the extension through the Cross Boundary workstream of a MML long distance service to Manchester to provide connectivity between the East Midlands and North West.

The competition for the new East Midlands franchise, due to be awarded in 2017, offers the opportunity for changes to operations throughout the East Midlands to offer new journeys. Local stakeholders can also work with Network Rail to develop third-party funded schemes to meet local needs. Guidance on working with Network Rail can be found on the Network Rail [website](#).

The Long Term Planning Process

Background to the development of the Long Term Planning Process

In June 2005 the Office of Rail Regulation (ORR) [now the Office of Rail and Road] modified Network Rail's network licence to require the establishment and maintenance of Route Utilisation Strategies (RUSs), for the use and development of the network consistent with the funding that is, or is likely to become, available.

This modification to the Network Rail network licence followed the rail review in 2004 and the Railways Act 2005.

The RUS programme, led by Network Rail on behalf of the industry, started in late 2004 and culminated with the publication of the establishment of the West Coast Main Line RUS in August 2011. As the network licence requires the maintenance of RUSs, the completion of the initial programme of geographic RUSs gave the opportunity to review how best to discharge this requirement in the future.

The review took into account:

- changes in administrations in England, Wales, and Scotland, together with very significant changes in planning policy
- long term strategic investments in the rail network, examples include the development of a high speed line between London and Birmingham and beyond to Leeds and Manchester (HS2)
- decisions to install electrification on significant route mileage of the rail network
- changes to signalling technology through deployment of the European Rail Traffic Management System (ERTMS) and progression of the Network Rail Operating Strategy
- a need to inform maintenance and renewal strategies for the rail network
- changes to funders' objectives in the light of the significantly tighter fiscal environment, including a clear policy shift towards revenue generation and making best use of the existing railway.
- the conclusions from the 'Rail Value for Money' report by Sir Roy McNulty in May 2011.

The need was clear for the industry to consider network-wide long term infrastructure development, rather than 'as now plus isolated enhancements', to the rail network. Network Rail and the industry worked together to develop a revised methodology to the RUS process to take the changes set out above into account, to continue to develop the long term strategic direction of the rail network.

This successor programme, the 'Long Term Planning Process' (LTPP) was endorsed by the ORR in April 2012.

The LTPP will consider such changes and is designed to enable the industry to take account, and advantage, of long term strategic investment being made in Great Britain's rail network. The planning horizon for the LTPP is over a 30-year context; planning over 30 years clearly involves uncertainties, however, the approach is intended to adapt to potential structural changes in the economy, and the approach to social and environmental responsibility, so that the rail industry can respond to change over the long-term life of the assets used to operate the rail network.

Due to the uncertainties of a 30-year horizon, the LTPP will be iterative; future planning cycles will enable an updated view to take into account the changing context and requirements of the industry and economy. An objective of the LTPP is to understand the longer-term context whilst creating a prioritised view of requirements for the next Control Period (Control Period 6 (2019-2024)), in order to present a clear strategy for funding as part of the industry process. This commences with the submission of the Initial Industry Plan in September 2016. Future iterations of the LTPP will evolve, identifying requirements for future Control Periods as part of this on-going process.

LTPP Governance Arrangements (RIPG)

The Long Term Planning Process is designed to be as inclusive as possible with contributions encouraged both from the rail industry and wider stakeholders. Overall governance responsibility for the process lies with the Rail Industry Planning Group (RIPG) whose membership comprises:

- Department for Transport
- Freight Operators
- London Travel Watch
- Network Rail
- ORR
- Passenger Focus
- Passenger Transport Executive Group (PTEG)
- Rail Delivery Group
- Rail Freight Group
- Railway Industry Association
- Rail Freight Operators Association
- Rolling Stock Leasing Companies
- Transport for London
- Transport Scotland
- Welsh Government

RIPG meets once every two months and provides strategic direction and endorsement of the constituent publications of the LTPP process.

As detailed in [Chapter 1](#) the LTPP consists of a number of different elements, which, when taken together, seek to define the future capability of the rail network. These elements include the Market Studies, the Route Studies, Cross-Boundary Analysis and the Network Studies.

Market Studies

In October 2013, Network Rail published four Market Studies: Long Distance passenger, London & South East passenger, Regional Urban passenger and Freight. All four have been established by the Office of Rail Regulation and are available on the Network Rail website.

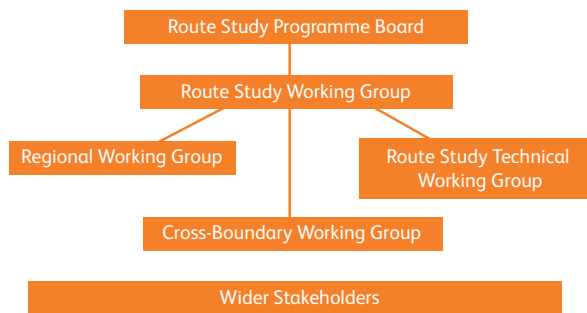
The three passenger Market Studies have clear connections to the three ‘sectors’ in which passenger train services are often divided. It is important to emphasise that each Market Study considers a particular market, rather than a particular set of train services.

The passenger Market Studies have three key outputs:

- identification of the long term strategic goals which define the successful provision of rail services to each of the three market sectors. These are based on the aspirations of current and likely future industry funders
- Demand forecasts for the sector, over a 10 and 30-year planning horizon. Scenarios are used to reflect key uncertainties, where appropriate
- “conditional outputs” for the sector. The conditional outputs are aspirational levels of service (in terms of, for example, frequency journey time and/or passenger capacity on key flows in the sector). The conditional outputs reflect stakeholder views of how rail can support delivery of their strategic goals, and opportunities created by planned investments, as well as reflecting current service levels and forecast future demand. The aim of the Market Studies is to provide demand forecasts, and conditional outputs, that are consistent across the Route Studies.

For freight, the conditional outputs are intended to meet the forecast level of growth set out in the Freight Market Study in 2023 and 2043. The Freight Market Study produced demand forecasts over a 10 and 30 year planning horizon, with preferred routeing of services and the implied requirements in terms of network capacity and capability. Scenarios were used to reflect key uncertainties in particular markets. Further details on freight growth nationally, and within the East Midlands, are included within Chapter 3 (Future Demand). of the Freight Market Study.

Figure A1.1 Route Study Governance Arrangements



Conditional outputs should be viewed as aspirations for the future rather than recommended investment decisions.

It is also important to state that the conditional outputs shown are dependent on affordability, fundability, and a value for money business case for current and potential future rail industry funders being made for any interventions that this, and subsequent Route Studies, in the LTPP may consider as a way to deliver them. Equally the conditional outputs will need to be deliverable technologically, operationally and physically.

Route Studies

There is generally one Route Study for each of Network Rail's devolved routes. The full Route Study programme can be found on the Network Rail website [here](#):

In a few cases, a devolved route may be covered by more than one Route Study, where part of the route is largely self-contained. For example, this document is the East Midlands Route Study and is one of the studies covering Network Rail's London North Eastern and East Midlands Route. Equally, where the likely service pattern to address a particular market need covers more than one Route to a significant degree, a Route Study may consider these services as a whole, irrespective of Route boundaries. For example, the North of England Route Study covering large parts of both the London and North East and the London and North West Routes will consider all services operating across the North of England.

A Route Study develops and assesses choices for the long term use and development of the network. Its starting point is to determine whether the conditional outputs from the relevant Market Studies can be accommodated on the existing network, with committed enhancements. It then develops train service options, corresponding to different uses of the network, (and hence to different trade-offs between stakeholders strategic goals. Only then will consideration be given to choices involving infrastructure investment. These choices were assessed against funders' decision making criteria. This includes quantitative assessment as in the previous RUS process. It will also, where appropriate, include a wider assessment against factors such as strategic fit, wider economic impacts and affordability.

'Choices for Funders' identified within this, and other route studies, are intended to inform the development of proposals to consider within rail industry funding discussions for Control Period 6. Equally, other potential rail industry funders, for instance Local Authorities or Local Enterprise Partnerships, may wish to consider the information this Route Study contains, when taking forward their own plans and proposals which may impact upon the rail network.

Route Study Governance Arrangements

A three tier structure for rail industry and wider stakeholder dialogue has been established to oversee and help produce this East Midlands Route Study (Figure A1.1)

First, a Programme Board, chaired by Network Rail with senior level representation from passenger and freight train operating companies, South Yorkshire Passenger Transport Executive, Rail Delivery Group, DfT and the ORR provides high level review and a forum to resolve any significant issues which the Working Group wish to remit to the board for decision.

Second, a Working Group, chaired by Network Rail has a mandate to discuss the study on behalf of the rail industry with other stakeholders and a review of the ongoing work to develop them. The Working Group is where stakeholders meet to determine how the conditional outputs from the Market Studies can be accommodated, including identification of service specifications and options with the aim of developing choices to funders for Control Period 6 and for 2043 through publication of a Route Study Draft for Consultation and Final Study.

The Working Group comprises representatives from the current Train Operating Companies (both passenger and freight) who operate on the route, Rail Delivery Group, Department for Transport, South Yorkshire Passenger Transport Executive, Network Rail, and the Office of Rail Regulation (ORR) as an observer.

Thirdly, a ‘Regional’ group, convened and chaired by Network Rail, provides location specific oversight as well as an opportunity to collaborate in the production of the Route Study with the rail industry. The Regional group membership comprises Local Authorities, Local Enterprise Partnerships, Department for Transport, Airports and Freight stakeholders on the route.

Network Rail has managed the development of the work through an internal ‘Technical Working Group’ to deliver the information necessary to support the deliberations of the Working Group. Where industry input has been required, this has been augmented by attendance or discussions with rail industry stakeholders.

Additionally, a number of one to one meetings with stakeholders have been held to shape the proposals contained within this East Midlands Route Study.

Cross-Boundary Analysis

Services that run across more than one Route Study area are considered in a separate “cross-boundary” workstream. This workstream led by a cross-boundary working group has developed and assessed options for cross-boundary services (passenger and freight) to deliver the connectivity conditional outputs articulated in the Market Studies. The output from the cross-boundary analysis is a cross-boundary indicative train service specification which provides a set of common assumptions that Route Studies should adopt regarding cross-boundary services. See [Appendix A2](#) for more details.

Network Studies

In addition Network Rail facilitates the production of Network Studies. These strategies look at network-wide issues and look to future capacity and technology related issues for the railway. Current studies being undertaken under the auspices of the Network Study include:-

Network RUS: Electrification: The Electrification RUS was established in 2009 and a number of the electrification schemes proposed within it have been funded for delivery.

In preparation for the submission of the Initial Industry Plan to funders, Network Rail is currently undertaking a refresh of the Network RUS: Electrification strategy to consider future options for electrification in the longer term following the completion of publicly committed schemes. The Network RUS: Electrification will look at the case for further opportunities to develop the electrified network in Control Period 6 and beyond.

Examples of scheme that have been identified for potential further development as part of the Electrification Strategy relevant to this Route Study include:

- a ‘Cross Country’ option comprising Birmingham to Derby with the diversionary route to Lichfield and to Sheffield and Masborough Junction via Woodhouse
- Ambergate to Matlock
- routes through the Erewash Valley linking Clay Cross Junction with Nottingham and Trent Junctions
- Nottingham to Lincoln
- a ‘Midlands to Anglia’ package of options comprising:
 - Felixstowe to Whitacre Junction via Nuneaton including Corby to Manton Junction
 - Nottingham to Grantham

The Network RUS: Electrification is currently in the process of being updated.

Freight Network Study: The Freight RUS was established in 2007 and a number of its recommendations to develop the Strategic Freight Network have been implemented. The Freight Network Study is looking at the future capability requirements of the network to accommodate freight growth and will consider:

- longer and heavier trains
- efficient operating characteristics and freight network performance
- 7-day and 24-hour capability – including diversionary routes and resilience
- loading gauge
- strategic rail freight interchanges and terminals
- axle load
- freight train journey time and maximum speed.

When considering capacity the Freight Network Study will primarily focus on capacity for cross-boundary freight flows. Where different commodities on a corridor have specific requirements this will be identified. It will bring together Route Study strategies on major cross-boundary freight programmes, for example:

- Felixstowe to West Midlands
- Southampton to the West Coast Main Line
- Northern Ports and Trans Pennine Freight Study
- South West and Wales to the Midlands
- Anglo-Scottish traffic.

Route specific capacity issues are being considered by the individual Route Studies.

Interoperability Network Study: the Department for Transport (DfT) has requested Network Rail to lead a cross-industry review of Interoperability on the UK rail network. The outcome of this review is expected to be the publication of the Interoperability Network Study.

The aim is to establish this RUS in sufficient time to inform the next Initial Industry Plan in September 2016. The content of the RUS will complement the East Midlands and other Route Studies.

The Railways (Interoperability) Regulations 2011 and associated Technical Specifications for Interoperability (TSI) apply to the entire UK rail network with the exception of the exclusions defined on the DfT web-site¹.

Network Rail, along with other Infrastructure Managers in the UK, is legally obliged to comply with the Interoperability Regulations when the nature of the works being undertaken so requires.

European and UK legislation defining objectives for Interoperability and the Trans European Transport Network (TEN-T) will be taken into account in the development of this Route Study. Network Rail and the wider rail industry have sound practical experience in applying the respective Regulations and associated Technical Specification for Interoperability (TSI). The experience has been used to good effect to:

- demonstrate legal compliance with the requirements and provide feed-back to government and the European Railway Agency on practical issues of application
- leveraging the benefits associated with the Interoperability principles
- developing plans to assess the full potential of an interoperable network, including connectivity with continental Europe.

¹ <https://www.gov.uk/government/publications/exclusions-from-the-railways-interoperability-regulations-2011>

For works being carried out on the UK component of the TEN-T network, EU funding support is available for qualifying projects. Network Rail will work with the DfT to ensure that the UK takes maximum benefit from this opportunity.

There are a number of established Network RUSs that are considered as part of the development of this Route Study, these include:

Network RUS: Passenger Rolling Stock: This strategy explores the potential for greater efficiency in the purchase of new rolling stock to replace the existing fleet and accommodate growth in demand. The RUS identified the potential for significant economies of scale through procuring a smaller, standardised range of stock types targeted at specific market sectors.

Network RUS: Stations: This strategy provides guidance about potential interventions to relieve congestion at stations.

Network RUS: Alternative Solutions: This strategy describes the circumstances in which it may be appropriate to consider the operation of alternative forms of public transport than conventional diesel or electric heavy rail. This includes the use of tram trains, the conversion of sections of the network for use by trams, the use of battery powered vehicles, hybrid light vehicles, personal rapid transit (such as the pods which serve business car parks from Terminal 5 at Heathrow), bus rapid transit and guided bus. It also considers the circumstances in which discontinuous electrification and 'coasting' could reduce the cost of electrification schemes, and when the designation of a route or service to 'community rail status' could increase patronage on the railway in a cost effective manner.

Further information on the Long Term Planning Process, can be found on Network Rail's [website](#).

Cross-Boundary Analysis

This section outlines the approach that has been taken when considering passenger and freight services which cross the boundary of the East Midlands Route Study area. It details those services that will operate on the baseline infrastructure, before going on to describe the process for identifying cross-boundary services which can meet the conditional outputs. Finally, it provides a number of examples of how the conditional outputs relevant to these services have been interpreted to develop the East Midlands Indicative Train Service Specification (ITSS) detailed in [Chapter 3](#).

The Route Study boundaries broadly follow those of the Network Rail devolved Routes. Due to this division of rail network geography, it is necessary to co-ordinate the treatment of passenger and freight trains which traverse Route Study boundaries, hence the cross-boundary process.

The East Midlands Route Study area has boundaries with other route study areas at London St Pancras International Station, Carlton Road Junction, Brent Curve Junction, Cricklewood Curve Junction, Bedford station, Nuneaton station, Helpston Junction, Wichnor Junction, Stoke-on-Trent station, Grantham station, Newark Castle station, Worksop station and Tapton Junction. These are shown in the map in [Chapter 2](#).

For the baseline infrastructure, those services that operate across the Route Study boundaries can be broadly summarised as follows:

Passenger

- long distance high speed services from London St Pancras International to Sheffield crossing the East Midlands Route Study boundary at Tapton Junction, South of Sheffield
- long distance high speed services from Scotland and the North East to Birmingham, the South West and South Coast crossing the boundary at Tapton and Wichnor Junction
- inner and outer suburban services at the south end of the Midland Main Line, crossing through central London to destinations in Kent, Surrey and Sussex crossing the boundary at London St Pancras International Station

- regional urban services between Cardiff, Birmingham and Nottingham crossing the boundary at Wichnor Junction
- regional urban services between Birmingham and Leicester and East Anglia crossing the boundaries at Nuneaton station and Helpston Junction
- regional urban services between Leeds and Nottingham and between Liverpool, Sheffield, Nottingham and East Anglia crossing the boundary at Tapton Junction and in the case of services continuing to East Anglia at Grantham station
- regional services between the East Midlands and Lincolnshire towns such as Lincoln, at Newark Castle station
- regional services from the North terminating at Chesterfield
- regional services from Oxford, Aylesbury and Bletchley to Bedford and potentially destinations north thereof crossing the boundary at Bedford.



Freight

Construction Materials

- Peak Forest to Peterborough aggregates (Class 6). This flow is principally carrying construction materials from the north of Derbyshire to East Anglia or Greater London. The flow joins the route at Dore Junction, is routed down the Midland Main Line as far as Syston Junctions where it joins the Felixstowe to Nuneaton route travelling eastbound and leaves the route at Helpston Junction or continues south to leave the route at Carlton Road
- Croft to Brent Curve aggregates (Class 6). This flow is taking construction materials from the Leicestershire quarries to the south east of England. The route joins the Midland Main Line at Croft, and leaves the Midland Main Line and the East Midlands Route Study area at Brent Curve.
- East Midlands Quarries to Carlton Road aggregate (Class 6). This flow is taking construction materials from the Leicestershire quarries to the south East of England. The route joins the Midland Main Line at Leicester, and leaves the Midland Main Line and the East Midlands Route Study area at Carlton Road Junction or Brent Curve Junction.

Intermodal

- Felixstowe to Nuneaton intermodal (Class 4) freight. This flow enters the route study area at Helpston Junction and is routed west via Leicester to the west midlands and West Coast Main Line. The market is for intermodal traffic arriving at Felixstowe port which is then carried on to destinations in the midlands, the north west of England or Scotland
- Southampton to Yorkshire and Humber region intermodal (class 4) freight. This flow enters the route study area at Wichnor Junction (between Birmingham and Derby) and leaves the route at Beighton Junction north or Tipton Junction. There is an optional routeing for this flow via East West Rail. If this route was shown to be advantageous this flow enters the route study area at Bedford and leaves the route at Beighton Junction north

- there are a number of proposed intermodal terminals in the East Midlands Route. The flows to these terminals have been clustered in the north of the route to Trent South Junction and in the south to Bedford. These new terminals have forecast cross-boundary flows from Essex Thameside which either enter the route at Carlton Road Junction or at Helpston Junction

Electricity Supply Industry Coal

- coal traffic to Ratcliffe-on-Soar (Class 6) power station originates from a number of ports outside the route study area, principally Liverpool, Immingham and Bristol.

Petroleum

- there are a number of petroleum flows (Class 6) from Immingham to the West Midlands which cross the route between Nottingham and Stenson Junction.

Steel

- steel traffic (Class 6) from South Wales, West Midlands, Humberside and North East transits the Midland Main Line. Much of this traffic enters the route at Wichnor Junction then either via Derby or the Erewash Valley goes north east to Beighton Junction. There is also a steel terminal at Corby which serves trains from South Wales.

The cross-boundary process

The cross-boundary process has been developed by the Route Study working group. The working group developed an Indicative Train Service Specification for passenger services which cross any route study boundary. This specification is an interpretation of how the connectivity conditional outputs could be delivered.

The conditional outputs could be expressed in a number of ways, and the Cross-Boundary ITSS sought to minimise the number of train movements over any given corridor by linking conditional outputs together, and where possible, by enabling a number of them to be delivered by the same train service.

The Cross-Boundary ITSS does not seek to consider every passenger service that crosses a route study boundary – rather it looks at changes to the baseline service pattern where change may be required to deliver the conditional outputs.

The services contained in the Cross-Boundary ITSS have been incorporated into the East Midlands Route Study ITSS detailed in [Chapter 3](#).

For freight services, information for the East Midlands Route Study has been derived from the Freight Market Study, including the preferred routing of these services. However, freight services operate to a different timetable according to the needs of their customers and are often irregular, or operate on specific days of the week. To cater for this variation, the Working Group reviewed the exact disaggregated number of freight services, and produced a consistent figure that allows the analysis of forecast freight flows alongside passenger. The information has then been rounded within the relevant route study area to the nearest whole number, but remains the precise figure at the route study boundary. This ensures that Route Studies, that are adjacent to the East Midlands Route Study area, do not incrementally round up, and result in over provision of paths for freight services.

The Cross-Boundary Working Group continues to meet to receive and approve proposals from the Route Studies to amend the cross-boundary specification (for either passenger or freight trains), and to advise on resolving capacity issues affecting more than one Route Study.

The Route Studies do not all run in parallel, so the cross-boundary process is a continuous one throughout the Long Term Planning Process programme.

Consultation responses to the East Midlands Route Study Draft for Consultation identified concern that conditional outputs, particularly those relating to connectivity improvements for east-west flows, could be managed better. Taking this into account, and driven by the emerging work of the Midlands Connect Partnership, a joint Network Rail team from the East Midlands and West Midlands and Chiltern Route Studies has been working together to develop options for corridors identified through the Midlands Connect strategy:

- Birmingham-Nottingham-Lincoln (as identified in [Chapter 4](#), options for the Nottingham-Lincoln section will be developed by the East Coast Route Study involving consultation with this joint team)
- Birmingham-Leicester
- Coventry-Leicester

A summary of the ongoing work is given in [Chapter 4](#) and results will be incorporated into the final version of the West Midlands and Chiltern Route Study.

The cross-boundary process

The cross-boundary process has been developed by the Route Study working group. The working group developed an Indicative Train Service Specification for passenger services which cross any route study boundary. This specification is an interpretation of how the connectivity conditional outputs could be delivered.

The conditional outputs could be expressed in a number of ways, and the Cross-Boundary ITSS sought to minimise the number of train movements over any given corridor by linking conditional outputs together, and where possible, by enabling a number of them to be delivered by the same train service.

The Cross-Boundary ITSS does not seek to consider every passenger service that crosses a route study boundary – rather it looks at changes to the baseline service pattern where change may be required to deliver the conditional outputs.

The services contained in the Cross-Boundary ITSS have been incorporated into the East Midlands Route Study ITSS detailed in [Chapter 3](#).

For freight services, information for the East Midlands Route Study has been derived from the Freight Market Study, including the preferred routing of these services. However, freight services operate to a different timetable according to the needs of their customers and are often irregular, or operate on specific days of the week. To cater for this variation, the Working Group reviewed the exact disaggregated number of freight services, and produced a consistent figure that allows the analysis of forecast freight flows alongside passenger. The information has then been rounded within the relevant route study area to the nearest whole number, but remains the precise figure at the route study boundary. This ensures that Route Studies, that are adjacent to the East Midlands Route Study area, do not incrementally round up, and result in over provision of paths for freight services.

The Cross-Boundary Working Group continues to meet to receive and approve proposals from the Route Studies to amend the cross-boundary specification (for either passenger or freight trains), and to advise on resolving capacity issues affecting more than one Route Study.

The Route Studies do not all run in parallel, so the cross-boundary process is a continuous one throughout the Long Term Planning Process programme.

Consultation responses to the East Midlands Route Study Draft for Consultation identified concern that conditional outputs, particularly those relating to connectivity improvements for east-west flows, could be managed better. Taking this into account, and driven by the emerging work of the Midlands Connect Partnership, a joint Network Rail team from the East Midlands and West Midlands and Chiltern Route Studies has been working together to develop options for corridors identified through the Midlands Connect strategy:

- Birmingham-Nottingham-Lincoln (as identified in [Chapter 4](#), options for the Nottingham-Lincoln section will be developed by the East Coast Route Study involving consultation with this joint team)
- Birmingham-Leicester
- Coventry-Leicester

A summary of the ongoing work is given in [Chapter 4](#) and results will be incorporated into the final version of the West Midlands and Chiltern Route Study.

Cross-boundary services in 2043

The East Midlands ITSS includes broad groups of services serving a number of different markets, as set out below. At the end of this section, a number of worked examples are provided to show how the conditional outputs have been interpreted in practice, and how the train services shown in the 2043 ITSS to accommodate them, have been derived.

- inner and outer suburban services operating at the southern end of the Midland Main Line from stations in Kent, Surrey and Sussex, some of which are extended through to serve locations in the north Northamptonshire commuter belt
- services operating across between Oxford and south and west thereof, running onto the Midland Main Line at Bedford and running further north to serve the East Midlands or West Yorkshire from the Thames Valley or South West, as well as a service from Buckinghamshire to Bedfordshire
- increased regional services linking a number of towns and cities in the East Midlands and West Midlands as well as further afield to Wales and East Anglia
- services from the East Midlands to a wider range of destinations in the West Midlands than is the case at the time of publication, to Walsall and Wolverhampton
- services from Wales via the East Midlands to West Yorkshire
- services crossing the East Midlands including services from Scotland and the north east of England with the south west of England, from Hull to the south coast
- High Speed 2 phase 2 will connect the Derby Nottingham area with Yorkshire and London
- Sheffield to London services on the Midland Main Line
- East West Rail: potentially, this could include a number of services enabled by the building of the 'Central Section' between the Buckinghamshire/Bedfordshire border and Cambridge.

Worked Examples

Sheffield – Nottingham

Alongside the Leeds – Nottingham conditional output, there is a conditional output for Sheffield – Nottingham at level 'E' (three to four trains per hour at 60mph), but there are only two trains per hour in the base year. This implies at least one-two additional Sheffield – Nottingham services are required each hour. Also, it should be noted that, in the longer term, HS2 will also deliver a number of additional trains between the proposed station nominally known as the East Midlands Hub (for Nottingham), Meadowhall (for Sheffield), and Leeds.

Nottingham – Leeds

If the Study were to assume that Nottingham – Leeds, and Sheffield – Leeds cannot be served by the same trains, this would equate to between five and eight trains on sections towards Leeds. The extra three to four trains per hour would clearly be impractical and uneconomic from a service provision perspective, even before network capacity constraints are taken into account.

Therefore, a combination of the conditional outputs onto a number of services allows the diverse markets to be met by a lower net number of trains overall.

Table A2.1 Nottingham – Leeds, Nottingham – Sheffield conditional outputs

Flow	Long Distance Market Study conditional output	Indicative Train Service Specification
Nottingham – Leeds	2 – 3, or 3 – 4 trains per hour, 100 or 60mph	2 trains per hour direct via Chesterfield, and HS2 connections via East Midlands Hub and new HS2 station in Leeds
Nottingham – Sheffield	3 – 4 trains per hour	3 trains per hour direct via Chesterfield, and HS2 connections via East Midlands Hub and new HS2 station at Sheffield Meadowhall

Impact of High Speed Rail on demand across the East Midlands area

The East Midlands Route Study area is expected to be affected by the delivery of High Speed 2 (HS2) Phase 2 in the early 2030s, which will provide a direct fast link from London, Birmingham, Sheffield and Leeds to the East Midlands via a hub station near Toton. Rates from HS2 Ltd's modelling which predict the proportions of passengers who will switch to High Speed 2 have been applied to the 2043 forecasts in the Market Studies to understand the level of rail demand remaining on the existing network in 2043. The analysis found that the majority of the passengers travelling between London and Sheffield, Derby and Nottingham were expected to choose High Speed 2 in preference to the existing network.

(The HS2 figures used were taken from the latest economic case ([Economic Case for HS2](#)) from October 2013. The HS2 network assumed was the one used for the Phase 2 consultation process which ran from July 2013 to January 2014.)

[Figures A3.1](#) and [A3.2](#) show the percentage change in existing network loads forecast for 2043 from a "non-HS2" scenario to a scenario with the HS2 Phase 2.

[Figure A3.1](#) shows the demand reduction on the Midland Main Line long distance high speed services. The percentage reductions are shown separately for London – Sheffield services (in orange) and for the London – Nottingham services (in blue). For example, the effect of HS2 Phase 2 on passenger loads on London – Sheffield services in both directions between Leicester and Loughborough is to reduce the load by 55 per cent. This includes the effect on all passengers on these services between these locations, including Sheffield to London passengers, Loughborough to Leicester passengers and so on. The load reductions are lower south of Leicester because a large proportion of this demand will be travel into London from outer suburban locations and Leicester itself. This demand will not be significantly affected by HS2.

The data presented in [Figures A3.1](#) and [A3.2](#) do not reflect market growth. They only represent the effect of HS2 on the existing network, including both the positive effect of HS2 on the overall rail market and the reduction in passengers on the existing network due to them switching to HS2. The loads in 2043 are forecast using both sets of figures. As an example, it is worthwhile considering the loads on Nottingham – London trains between Nottingham and Beeston. The growth rate assumed to 2043, excluding the effect of HS2, is 108 per cent between Nottingham and Beeston on these services. The loss of demand from the existing network as a result of HS2 from [Figure 1](#) is 48 per cent. The combined effect of growth of 108 per cent followed by a reduction of 48 per cent is a net increase of 8 per cent. Therefore loads between Nottingham and Beeston in 2043 are expected to be 8 per cent higher than today.

[Figure A3.2](#) shows reductions in loads for services operating between Plymouth and Edinburgh Waverley/Glasgow Central (in orange) and between Southampton/Reading and Newcastle (in blue). For example, the reduction in load as a result of HS2 Phase 2 between Derby and Sheffield on the Plymouth to Edinburgh Waverley/Glasgow Central services is 52 per cent. Again this applies to all passengers on those trains over this section, including passengers travelling between Birmingham New Street and Newcastle and Bristol Temple Meads and Sheffield and so on.

The biggest reduction in loads will be between Birmingham New Street and Leeds for the Plymouth to Edinburgh Waverley/Glasgow Central services and between Birmingham New Street and Sheffield for the Southampton Central/Reading to Newcastle services. This is where HS2 Phase 2 will provide a faster alternative. Between Birmingham New Street and stations in the south west, the effect on loads is expected to be much less.

The results presented in [Figure A3.2](#) are based on figures taken from the HS2 Ltd October 2013 Economic case.

Figure A3.1 Reduction in loads on London St Pancras International to Sheffield and Nottingham services as a result of HS2 Phase 2



Figure A3.2 Reduction in loads on Plymouth to Edinburgh Waverley/ Glasgow Central and Southampton/Reading to Newcastle services as a result of HS2 Phase 2



Forecast peak demand from key urban centres in the East Midlands in 2023 and 2043

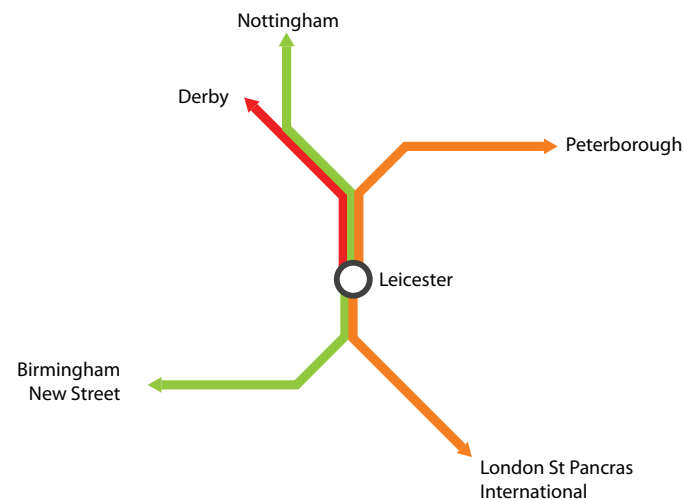
Demand forecasts from the Market Studies were applied to the baseline service level for Nottingham, Leicester and Derby to assess the likelihood of crowding on peak services along each corridor from these cities. The results were used to help identify routes where interventions would be required.

Leicester

Figures A4.1 and A4.2 show the expected future level of crowding for passengers in the three hour evening peak (16.00 to 18.59) from Leicester along all corridors in 2023 and 2043 respectively. Figure A4.2 shows that, assuming baseline capacity, the services with the highest average load factor departing Leicester in the evening peak are expected to be those going to Derby.

There is, however, significant variability in load factors between individual services on the same corridor.

Figure A4.1 Load factors departing Leicester in the 3-hour evening peak (16.00-18.59) in 2023



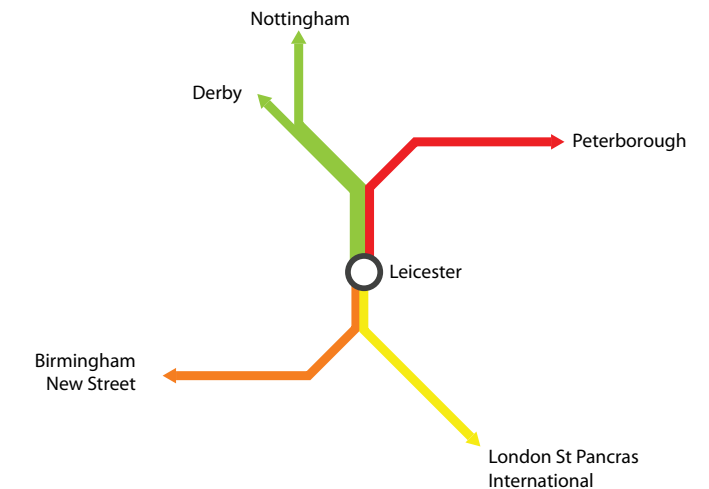
When loads on individual services are considered, the analysis suggests that there would be

some passengers having to stand on certain specific services on all corridors from Leicester. On the Leicester to Nottingham corridor for example, the long distance high speed services would be relatively lightly loaded, while the local services would be more crowded.

By 2043 the crowding profile from Leicester changes considerably with the corridors to Derby, Nottingham and London having more spare capacity. This is due to the released capacity assumed on the Midland Main Line following abstraction of passengers to HS2.

The Birmingham New Street – Leicester – Peterborough services are forecast to see levels of crowding increase, with average loads towards Birmingham of 92 per cent and towards Peterborough of 125 per cent across the three hour evening peak.

Figure A4.2 Load factors departing Leicester in the 3-hour evening peak (16.00-18.59) in 2043



Key

- █ Seats available – Up to 70% seats taken on average
- █ Seats busy 70%-85% seats taken on average
- █ Seats full 85% -100% seats taken on average
- █ Standing ie load >100% of seats

Notes:

Current seating capacities assumed for London services

Baseline seating capacities assumed for other services

The load factors illustrated here are the forecast load factors departing Leicester, and do not reflect any changes in loads at subsequent stations.

Nottingham

Crowding from Nottingham is shown in Figures A4.3 and A4.4 for the three hour evening peak periods (16.00 to 18.59) in 2023 and 2043 respectively.

Figure A4.3 shows the potential for significant crowding problems on the corridors to Newark and Mansfield over the three hour peak, with some very high load factors on individual services. The Nottingham to Sheffield corridor also has a high average load factor with standing on several services. The Derby and Leicester corridors also have some standing on individual services. Only the Nottingham to Grantham corridor has no crowding issues.

The crowding profile in 2023 is amplified in 2043, as shown in Figure A4.4, with the corridors towards Mansfield and Newark having average load factors over the three hour peak far above the total train capacity of the current rolling stock. The services on the corridor towards Grantham continue to have sufficient capacity, while spare capacity in the Leicester direction increases as a result of long distance passengers switching to High Speed 2.

Figure A4.3 Load factors departing Nottingham in the 3-hour evening peak (16.00-18.59) in 2023

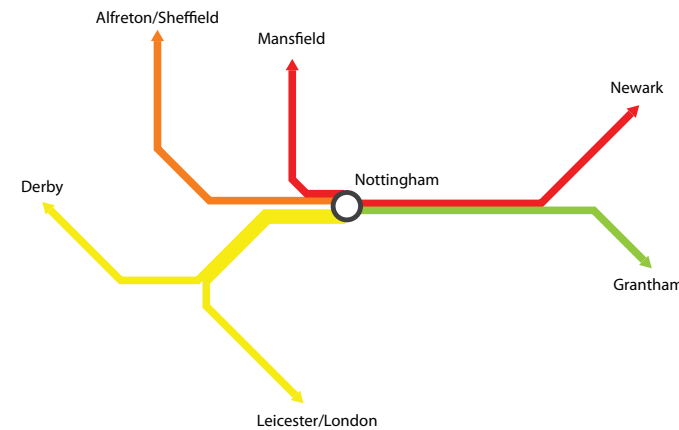
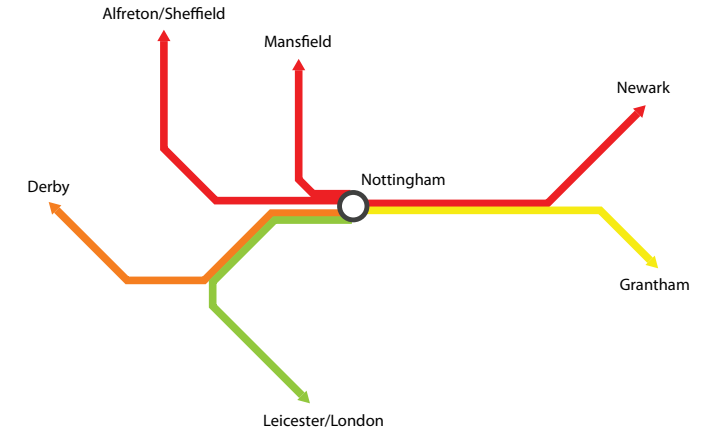


Figure A4.4 Load factors departing Nottingham in the 3-hour evening peak (16.00-18.59) in 2043



Key

- █ Seats available – Up to 70% seats taken on average
- █ Seats busy 70%-85% seats taken on average
- █ Seats full 85% -100% seats taken on average
- █ Standing ie load >100% of seats

Notes:

Current seating capacities assumed for London services

Baseline seating capacities assumed for other services

The load factors illustrated here are the forecast load factors departing Nottingham, and do not reflect any changes in loads at subsequent stations.

Derby

Crowding from Derby is shown in Figures A4.5 and A4.6 for the three hour evening peak periods (16.00 to 18.59) in 2023 and 2043 respectively. Crowding from Derby in 2023 is not expected to be as problematic as from Leicester and Nottingham.

The load factors towards Sheffield and Matlock are forecast to be high over the three hour peak with standing on several services on these corridors. There is also forecast to be standing on two other individual services, one towards Stoke-on-Trent and one towards Nottingham.

By 2043, only the corridors to Stoke-on-Trent and Matlock are forecast to have crowding problems. This is because on the other four corridors passengers are expected to switch onto HS2 services

Figure A4.5 Load factors departing Derby in the 3-hour evening peak (16.00-18.59) in 2023

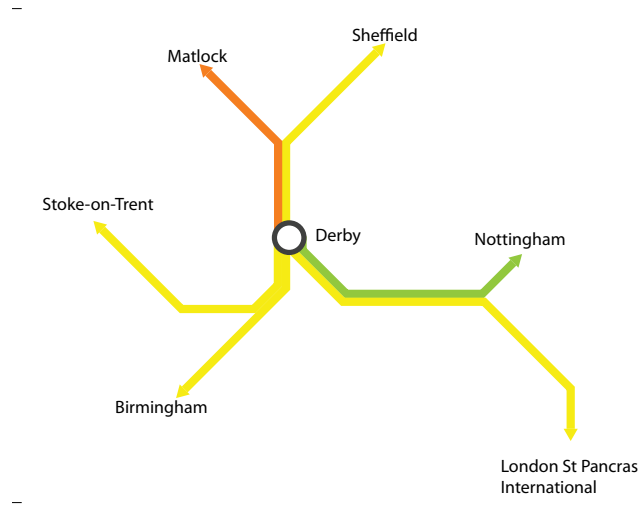
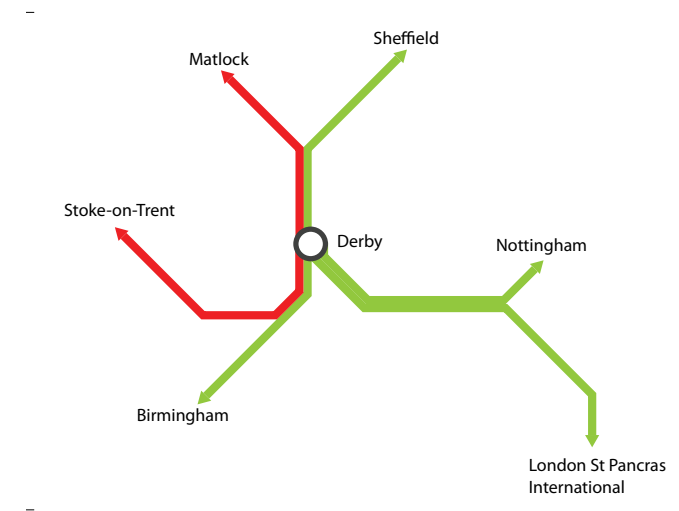


Figure A4.6 Load factors departing Derby in the 3-hour evening peak (16.00-18.59) in 2043



Key

- █ Seats available – Up to 70% seats taken on average
- █ Seats busy 70%-85% seats taken on average
- █ Seats full 85% -100% seats taken on average
- █ Standing ie load >100% of seats

Notes:

Current seating capacities assumed for London services

Baseline seating capacities assumed for other services

The load factors illustrated here are the forecast load factors departing Derby, and do not reflect any changes in loads at subsequent stations.

Forecast demand on non-London long distance

Figures A5.1 to A5.6 show forecast loads in 2023 and 2043 for individual cross boundary trains at different locations along the route. On these graphs each horizontal line represents a service, with the colour of the line identifying an average load factor. For reasons of brevity graphs are not presented for all routes in all directions. They are only presented for a number of routes where they have been thought to be most informative, and have only been presented in the most heavily loaded direction.

In many instances, the most significant levels of crowding are seen on sections of route outside of the East Midlands Route Study area. The loads were considered across the whole of a train's journey when developing proposals for train lengthening. Any such proposals were communicated to other route studies affected through the cross boundary process so that any issues local to that route could be identified and so that consistency is achieved.

Plymouth to Edinburgh Waverley/Glasgow Central and Southampton Central/Reading to Newcastle services via Birmingham New Street and Derby

The heaviest loads are widely spread both between services and across the route. Crowding on these services is not exclusively within the peak periods, with several non-peak services at risk of crowding. The forecast growth would present significant crowding problems in 2023 with baseline capacity on both the Plymouth to Edinburgh Waverley/Glasgow Central and the Southampton Central/Reading to Newcastle services.

Forecast loads on services from Plymouth to Edinburgh Waverley and Glasgow Central northbound in 2023 are illustrated in Figure 1. The red lines show where train loading is forecast to be in excess of baseline seating capacity.

Figure A5.1 Plymouth to Edinburgh/Glasgow forecast load factors by train 2023



Notes: Baseline seating capacities assumed

Key

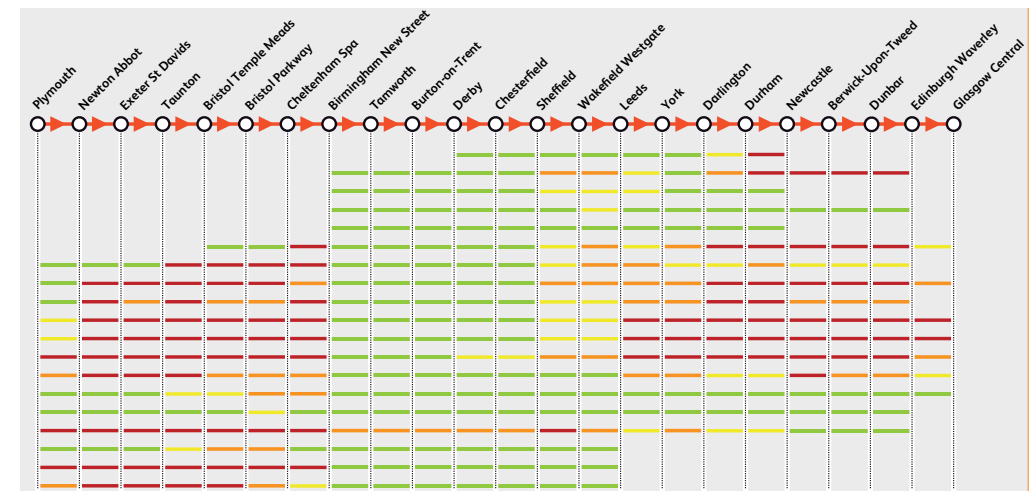
- Seats available – Up to 70% seats taken on average
- Seats busy 70%-85% seats taken on average
- Seats full 85% -100% seats taken on average
- Standing ie load >100% of seats

The heaviest levels of crowding are shown to be outside of this Route Study area, between Bristol and Birmingham and in Yorkshire, however, two specific services are showing loads in excess of seating capacity between Derby and Chesterfield.

By 2043 crowding south of Birmingham would become even more acute in the absence of additional capacity as illustrated in Figure 2. Current capacity will be sufficient between Birmingham and Yorkshire, because significant demand is forecast to switch from this section of the route onto HS2 once HS2 Phase 2 is opened in the early 2030s.

A similar pattern is shown for the Southampton Central/Reading to Newcastle services with crowding widely spread across the route, and with many services having loads in excess of baseline seating capacity in 2023. In 2043, in the absence of more capacity, crowding south of Birmingham is expected to be even more acute. North of Birmingham the loads are expected to be significantly affected by the opening of HS2 in the early 2030s, with many passengers expected to switch to HS2.

Figure A5.2 Plymouth to Edinburgh/Glasgow services forecast load factors by train 2043



Norwich – Nottingham – Sheffield – Liverpool Lime Street services.

The Norwich to Liverpool Lime Street via Nottingham and Sheffield services are far more heavily loaded in the north between Sheffield and Liverpool Lime Street. Current services already provide for these heavier loads with longer services operating between Nottingham and Liverpool Lime Street than between Norwich and Nottingham.

The increase in loads to 2023 will require further capacity between Nottingham and Liverpool Lime Street. This is illustrated by Figure A5.3 which shows the forecast loads on individual services in the northbound direction. While two services are forecast to have average loads in excess of seating capacity departing Nottingham in 2023, seven services are forecast to have average loads in excess of seating capacity either between Manchester Piccadilly and Manchester Oxford Road or between Manchester Oxford Road and Warrington Central.

Figure A5.3 Norwich - Nottingham - Sheffield - Liverpool Lime Street services forecast load factors by train 2023



Notes: Baseline seating capacities assumed

Key

- Seats available – Up to 70% seats taken on average
- Seats busy 70%-85% seats taken on average
- Seats full 85% -100% seats taken on average
- Standing ie load >100% of seats

There are several other services currently operating between Sheffield and Manchester and Manchester and Liverpool. Substantial additional capacity is also proposed between these cities through the committed Northern Hub scheme (including a new Leicester – Liverpool Lime Street service), the new Northern and Trans Pennine franchises and the developing Northern Powerhouse Rail strategy. While the forecast crowding issues could be dealt with by lengthening the Nottingham to Liverpool portion of Norwich to Liverpool Lime Street services, it is suggested that capacity on the relevant services is considered through the North of England Route Study. Crowding is forecast to be substantially worse by 2043 as shown in Figure A5.4.

Figure A5.4 Norwich - Nottingham - Sheffield - Liverpool Lime Street services forecast load factors by train 2043



Birmingham New Street – Leicester – Cambridge/Stansted Airport

This route is currently served by an hourly service from Birmingham New Street to Cambridge/Stansted Airport and an hourly service from Birmingham New Street to Leicester. Load factors are generally at their highest into Birmingham New Street in the morning peak and out of Birmingham New Street in the evening peak. However on Birmingham New Street – Stansted Airport services there are forecast to be high load factors on other sections of the route and on some off-peak services.

Applying forecast growth to 2023 suggests that additional capacity will be needed into Birmingham New Street in the morning peak and out of Birmingham New Street in the evening peak. There are also a number of services which will be overcrowded between Leicester and Peterborough. This is illustrated in Figure A5.5 which shows the loads for individual services from Birmingham New Street to Stansted Airport/Cambridge in the eastbound direction.

The crowding is forecast to be substantially worse by 2043 as illustrated in Figure A5.6

Figure A5.5 Birmingham New Street - Leicester - Stansted Airport/Cambridge services forecast load factors by train 2023

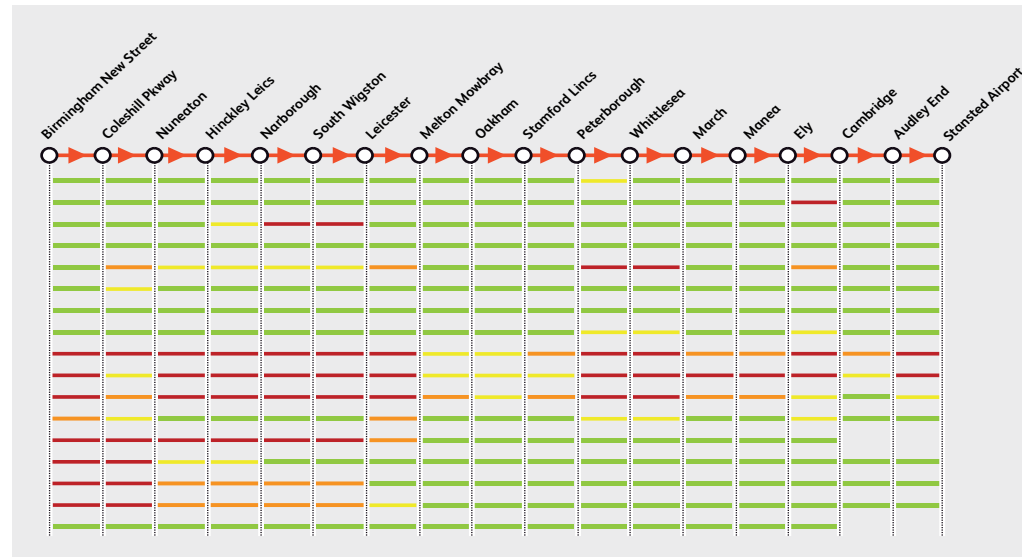
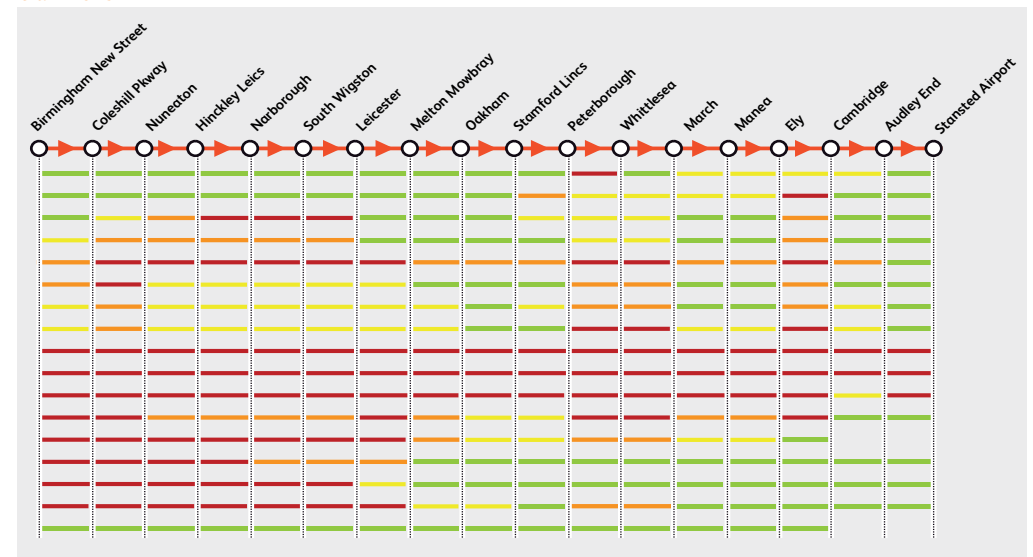


Figure A5.6 Birmingham New Street - Leicester - Stansted Airport/Cambridge services forecast load factors by train 2043



Notes: Baseline seating capacities assumed

Key

- Seats available – Up to 70% seats taken on average
- Seats busy 70%-85% seats taken on average
- Seats full 85% -100% seats taken on average
- Standing ie load >100% of seats

Nottingham – Birmingham New Street – Cardiff Central

This route is served by an hourly Nottingham – Birmingham New Street service and an hourly Nottingham – Cardiff Central service via Birmingham New Street. The main issues for crowding on this route are forecast to be into and out of Birmingham in the peak periods. Additional capacity will be required by 2023 on these peak period services.

The loadings on these services would be expected to fall between Birmingham and Nottingham after the opening of HS2 Phase 2 in the early 2030s. This is because Birmingham to Nottingham passengers are expected to switch to HS2 services. Loads south of Birmingham will continue to grow up to 2043. Changes to these services would probably be required, so that more capacity is provided between Cardiff Central and Birmingham New Street compared with Birmingham New Street and Nottingham.

Complete list of conditional outputs identified for the East Midlands Route Study

Table A6.1 East Midlands passenger capacity conditional outputs for 2023 and 2043		
	Reference	Conditional Output
2043	C01	To provide sufficient capacity for passengers travelling into central London during peak hours on the long distance and suburban services in 2043
	C02	To provide sufficient capacity throughout the day for passengers travelling on long distance high speed services between Nottingham, Sheffield and Corby and London in 2043
	C03	To provide sufficient capacity over the day for passengers travelling on the East Midlands section of the long distance high speed Plymouth to Edinburgh/Glasgow and Southampton/Reading to Newcastle services in 2043
	C04	To provide sufficient capacity for passengers travelling on the East Midlands section of interurban services including Birmingham – Leicester – Stansted Airport, Nottingham to Cardiff and Norwich to Liverpool services in 2043
	C05	To provide sufficient peak and all day capacity for passengers travelling on local services in the East Midlands in 2043
2023	C06	To provide sufficient capacity for passengers travelling into central London during peak hours on the long distance high speed and suburban services in 2023
	C07	To provide sufficient capacity throughout the day for passengers travelling on long distance high speed services between Nottingham, Sheffield and Corby and London in 2023
	C08	To provide sufficient capacity over the day for passengers travelling on the East Midlands section of the long distance high speed Plymouth to Edinburgh/Glasgow and Southampton/Reading to Newcastle services in 2023
	C09	To provide sufficient capacity for passengers travelling on the East Midlands section of interurban services including Birmingham – Leicester – Stansted Airport, Nottingham to Cardiff and Norwich to Liverpool services in 2023
	C010	To provide sufficient peak and all day capacity for passengers travelling on local services in the East Midlands in 2023

Table A6.2 East Midlands long distance connectivity conditional outputs				
Reference	Origin to destination (flow)	Journey speed (mph)	Equivalent journey time (minutes)	Opportunities to travel, per hour
C011	Derby – Cambridge	80	80	1 or 2
	Derby – Norwich	80	110	1 or 2
C012	Derby – Peterborough	45 – 80	90 – 50	1 or 2
C013	Derby – Leeds	45 – 80	100 – 60	1 or 2
C014	Derby – Manchester	45 – 80	120 – 70	1 or 2
C015	Derby – Birmingham	60	40	3 or 4
C016	Derby – London	100	80	2 or 3
C017	Nottingham – Norwich	80	100	1 or 2
C018	Nottingham – Cambridge	45 – 80	130 – 70	1 or 2
C019	Nottingham – Leeds	60 – 100	80 – 50	2 to 4
C020	Nottingham – Peterborough	45 – 80	60 – 30	1 or 2
C021	Nottingham – Sheffield	60	40	3 or 4
C022	Nottingham – Birmingham	60 – 160	60 – 20	3 to 6
C023	Nottingham – Liverpool	80	90	1 or 2
C024	Nottingham – Manchester	45 – 80	110 – 60	1 or 2
C025	Nottingham – London	160	50	3 or 4
C026	Nottingham – Ipswich	80	100	1 or 2

Table A6.2 East Midlands long distance connectivity conditional outputs (continued)				
Reference	Origin to destination (flow)	Journey speed (mph)	Equivalent journey time (minutes)	Opportunities to travel per hour
C027	Nottingham – Reading	80	120	1 or 2
	Nottingham – Swindon	80	120	1 or 2
	Nottingham – Oxford	80	120	1 or 2
C028	Nottingham – Coventry	45 – 80	70 – 40	1 or 2
	Nottingham – Walsall	45 – 80	90 – 50	1 or 2
	Nottingham – Wolverhampton	45 – 80	90 – 50	1 or 2
C029	Leicester – Norwich	80	100	1 or 2
C030	Leicester – Nottingham	60	30	3 or 4
C031	Leicester – Leeds	60 – 100	110 – 60	2 to 4
C032	Leicester – Peterborough	45 – 80	70 – 40	1 or 2
C033	Leicester – Sheffield	45 – 80	90 – 50	1 or 2
C034	Leicester – Liverpool	80	120	1 or 2
C035	Leicester – Manchester	45 – 80	160 – 90	1 or 2
C036	Leicester – Birmingham	At least 60	40 or less	5 or 6
C037	Leicester – London	60 – 160	100 – 40	3 to 6
C038	Leicester – Cardiff	80	110	1 or 2
C039	Leicester – Reading	80	80	1 or 2
C040	Leicester – Coventry	45	40	1 or 2
C041	Leicester – Doncaster	45 – 80	110 – 60	1 or 2
C042	Luton – Birmingham	80	80	1 or 2
C043	Luton – Manchester	80	140	1 or 2

Table A6.3 East Midlands regional urban connectivity conditional outputs					
Reference	Origin to destination (flow)	Journey speed (mph)	journey time flow	Equivalent journey time (minutes)	Opportunities to travel per hour
C044	Mansfield Woodhouse, Mansfield Town, Sutton Parkway, Kirkby-in-Ashfield and Hucknall to/from Nottingham	40	Mansfield Woodhouse – Nottingham	28	2
C045	Lincoln and Newark Castle to Nottingham	40	Newark Castle – Nottingham	26	2
C046	Grantham to/from Nottingham	60	Grantham – Nottingham	22	2
C047	Loughborough and East Midlands Parkway to Nottingham	60	Loughborough – Nottingham	15	2
C048	Long Eaton to Nottingham (also Attenborough to Nottingham improve form current)	40	Long Eaton – Nottingham	12	3
C049	Nottingham to Derby	60	Nottingham – Derby	16	3 to 4
C050	Chesterfield, Alfreton and Langley Mill to Nottingham	Improve			Improve
C051	Wellingborough, Kettering, Market Harborough to/from Leicester	Maintain			2
C052	Nuneaton, Hinckley and Narborough to/from Leicester	Incremental improvements			2
C053	Melton Mowbray, Oakham and Stamford to/from Leicester	60	Melton Mowbray – Leicester 15mins		2
C054	Barrow-upon-Soar, Sileby and Syston to Leicester	40			2
C055	Loughborough to Derby	Maintain			2

Table A6.4 London and south east connectivity conditional outputs interpreted for the East Midlands Route Study area			
Reference	Origin to destination (flow)	Journey time	Opportunities to travel per hour
C056	Suburban journeys from stations as far as Bedford to London St Pancras International and Thameslink central stations (Blackfriars, Farringdon, City Thameslink)	To provide incremental improvements in journey time	minimum 3 – 4
C057	Market Harborough, Kettering and Wellingborough to London	Good outer suburban speed (at least semi-fast)	4
C058	Corby to London	Good outer suburban speed (at least semi-fast)	2
C059	Luton/Bedford and Leicester and the north of the Midland Main Line route		2

Table A6.5 Freight conditional outputs	
Reference	Conditional output
C060	To provide capacity to accommodate forecast growth in intermodal container freight tonnes in the East Midlands in 2023
C061	To provide capacity to accommodate forecast growth in other commodities freight tonnes in the East Midlands in 2023
C062	To provide capacity to accommodate forecast growth in intermodal container freight tonnes in the East Midlands in 2043
C063	To provide capacity to accommodate forecast growth in other commodities freight tonnes in the East Midlands in 2043

Table A6.6 Other conditional outputs	
Passenger circulation capacity at stations	
Reference	Conditional output
C064	Provide capacity within stations (bridges, underpasses, entrances, platforms, escalators etc.) which facilitate the circulation of passengers within the station and can accommodate future growth
Rail connectivity to airports	
Reference	Conditional output
C065	Improve access to airports
Rail connectivity with HS2	
Reference	Conditional output
C066	Improve rail access to HS2
Access to higher education and social infrastructure	
Reference	Conditional output
C067	Improve access to further and higher education establishments and social infrastructure
Required connectivity and capacity for weekend and evening leisure travel	
Reference	Conditional output
C068	Provide capacity for passengers travelling in the evenings and at weekends for the leisure market in London and the South East.
C069	Better connectivity at weekends for the long distance leisure market and appropriate connectivity for tourist attractions (London and South East Market Study)
Improved local access to the rail network to cater for demand	
Reference	Conditional output
C070	Improved local access to the rail network to cater for demand
Improving passenger satisfaction	
Reference	Conditional output
C071	Improved passenger satisfaction

Developing freight conditional outputs

Intermodal

The intermodal sector covers three sub-sectors: containerised traffic to and from ports (ports intermodal), traffic between inland terminals (domestic intermodal) and traffic through the Channel Tunnel.

Currently intermodal traffic comprises around 41 per cent of tonne kilometres nationally. This is forecast to grow to an 80 per cent share of total tonne kilometres by 2043 as a result of strong forecast growth in intermodal traffic. Forecasts for Great Britain show average annual growth in intermodal to 2043 of approximately six per cent, in terms of tonne kilometres. This reflects growth of about five per cent per annum for the ports and Channel Tunnel sub-sectors, and 10 per cent per annum for the domestic sub-sector. The overall growth reflects forecast trade growth and an improvement in the competitiveness of the rail industry. This improvement in competitiveness reflects the forecast growth in fuel and labour costs which affects road freight proportionally more than rail.

Within the East Midlands Route Study area, intermodal currently comprises around eight per cent of total tonne kilometres. This is forecast to rise to around 74 per cent by 2043. The annual growth rate is even higher than the national figure at around 12 per cent. Two contributory factors to the strong forecast growth in intermodal traffic in the East Midlands Route Study area are:

- the forecast growth in traffic on the Felixstowe to Nuneaton route (F2N) which brings freight from the fast developing port of Felixstowe to the Midlands
- plans for a number of new freight distribution centres to be established within the East Midlands Route Study area.

To take account of the fact that it is difficult to predict which of the individual distribution centres will come to fruition, that other centres not yet planned may open by 2043, and to avoid seeming to endorse particular proposals, the distribution centres in the Freight Market Study forecast were clustered into geographical areas.

The clusters reflect a combination of statistical regions and railway geography. The choice of cluster location can have substantial impacts upon routeing of freight trains and therefore the numbers of paths on a given section of network. Within the East Midlands Route Study area these clusters are:

Midland Main Line southern area at Bedford: Corby, Luton, Radlett

Midland Main Line northern area at Trent South Junction:
Burnaston Cross & Etwall, Kegworth, Castle Donington

All forecast traffic which was either from, or to, a new intermodal terminal has been mapped to a regional cluster rather than a specific terminal. While it would be possible to map the traffic to a specific terminal, such detail would be spurious in the light of the uncertainty around the location of individual distribution centres. This reflects uncertainty about the development of individual sites and avoids endorsing particular sites. Traffic travelling to other regions has also been clustered, further details of all cluster locations are set out within the Freight Market Study.

The forecasts as shown should not be used to:

- assess the demand to serve specific inland terminals development
- make assumptions about which terminals are strategically favoured.



Construction materials

Nationally, the forecasts for the construction materials indicate much less change than for the intermodal, power station coal and biomass sectors. For the construction materials sector, growth of approximately one per cent per annum to 2043 in tonne kilometres is forecast. This reflects growth in the total (road and rail) market for construction materials and an improvement in the competitiveness of the rail industry. This improvement in competitiveness reflects the forecast growth in fuel and labour costs which affects road freight proportionally more than rail.

Construction materials are a very important sector within the East Midlands Route Study area, currently comprising around 38 per cent of total tonne kilometres on the route compared with 14 per cent nationally. The forecast growth rate for the East Midlands Route Study area is similar to the national rate at around one per cent per annum. In particular there is expected to be growth in stone traffic from Mountsorrel Quarry which has plans to expand over the next few years.

The planning assumptions taken in the Freight Market Study are now considered to be somewhat conservative for construction materials. The forecasts are scheduled to be reviewed as part of the Freight Network Study. For the current tranche of Route Studies the existing forecast will be maintained as it is not expected to be significantly enough different to lead to a change in the number of paths required during a standard hour by the end of CP6.

Construction of HS2 may generate additional demand up to the early 2030s.

Electricity Supply Industry Coal and Biomass

The Electricity Supply Industry (ESI) coal sector covers coal used by power stations. The forecasts in the Freight Market Study are based on the Department of Energy and Climate Change (DECC) projections of energy use, which were published in October 2012.

They show a projected decline in coal and a rise in gas, renewables and nuclear, between 2011 and 2030. The projected fall in coal, relative to a 2011 base, is 74 per cent by 2023 and 90 per cent by 2030. The forecasts for rail traffic related to ESI coal reflect these projections. The biomass sector also covers fuel used by power stations.

The biomass sector has only emerged as being potentially significant for rail over the last four years. Biomass has enormous potential to grow as a rail market and major investment is already taking place in rail based supply chains. However, there is considerable uncertainty around the volume of biomass likely to move on rail to fuel power stations and a number of generators are still developing their strategy for this sector. Working planning assumptions for the forecasts are based on electricity industry announcements to date and an assessment of Government policy. A central estimate of 14 million tonnes or 2.3 billion tonne kilometres is presented for 2023, as a working assumption. To reflect uncertainties, higher and lower scenarios for 2023 were also presented in the Freight Market Study. The 2023 forecasts are assumed to apply to 2033 and 2043.

Since publication of the Freight Market Study, the view within the industry has changed somewhat. Decline in coal is expected to accelerate, with an announcement by Government that coal fired power stations will be closed by 2025¹. These scenarios will be reviewed as part of developing the Freight Network Study in order to refine planning assumptions, currently Ratcliffe is expected to be one of the last facilities to close, along with Drax, Cottam and West Burton.

¹ <https://www.gov.uk/government/news/government-announces-plans-to-close-coal-power-stations-by-2025>

Within the East Midlands Route Study area ESI coal currently makes up around 18 per cent of total tonne kilometres on the route compared to around 30 per cent nationally. The decline in ESI coal and forecast growth in biomass within the route mirrors the national picture described above. The main destination for Electricity Supply Industry Coal within the East Midlands Route Study area is Ratcliffe-on-Soar power station, although coal does also cross the route destined for power stations outside the East Midlands Route Study area.

Other Market Sectors

The main commodities covered here are metals, petroleum, chemicals, industrial minerals and automotive. The forecasts indicate much less change than for the intermodal, power station coal and biomass sectors. Growth of between about 0.5 and 1 per cent per annum to 2043 in tonne kilometres is forecast, reflecting improvements in the competitiveness of rail. No change in the total market is forecast for these sectors.

For the other commodities: iron ore, non-power station coal and domestic waste, changes to markets may take place but the volume of business carried on rail is not expected to vary significantly.

Within the East Midlands the commodities which comprise the largest proportion of the current rail freight traffic are petroleum at 16 per cent of tonne kilometres within the route, metals at seven per cent and non-ESI coal at 3 per cent. For petroleum this is much higher than the corresponding national figure of six per cent. There is forecast to be little change in tonne kilometres for these commodities in the East Midlands Route Study area by 2043.

The bulk of the petroleum traffic is from the port and oil refinery at Immingham and is destined for locations across the midlands, southern and western England and Wales. Most of the Metals traffic is to or from south Wales.

Further detail on each of these market sectors is set out in the Freight Market Study which includes commentary on the characteristics of each market sector, significant recent changes and expected change in future years.

Major freight flows on the East Midlands Route Study area in 2043

The principal flows on the route in 2043 are summarised in [Tables A7.1](#) and [A7.2](#). The first table is for Class 6 freight flows which are heavier commodities – i.e. aggregates such as coal, construction materials and petroleum. The second table is for Class 4 freight which is generally lighter intermodal container freight.

Each row in each table is a summary flow representing many individual flows which take the same route across the East Midlands Route Study area. The first two columns identify the geographical areas where the individual flows start and finish. In some cases, significant loaded traffic travels in both directions of the summary flow.

The final column identifies the location where the summary flow enters the East Midlands Route Study area, where it leaves the route study area and intermediate locations where appropriate.

Table A7.1 Major forecast Class 6 freight flows in 2043 in the East Midlands Route Study Area

From	To	Commodities	Route
North East, Yorkshire & Humber	South West, West Midlands and South Wales	Metals and coal	Beighton Junction to Wichnor Junction via Derby
Immingham	South West, West Midlands, South Wales	Petroleum, Coal, Biomass and Metals	West Holmes Junction and Wichnor
Hope and Peak Forest (Derbyshire)	London and South East	Construction Materials	Dore South Junction to Carlton Road
Leicestershire Quarries	North West, West Midlands and South of England	Engineering and Construction Materials	Leicester area to Nuneaton
Leicestershire Quarries	South East and East Anglia	Construction Materials	Leicester area to Helpston Junction via Stamford
Leicestershire Quarries	London and South East	Construction Materials	Leicester area to Brent Curve Junction via Midland Main Line (MML)
Liverpool	Ratcliffe Power Station	Biomass	Stoke-on-Trent to Ratcliffe Power Station

Table A7.2 Major forecast Class 4 freight flows in 2043 in the East Midlands Route Study Area			
From	To	Commodities	Route
Felixstowe and Bathside Bay Ports	North West and West Midlands	Ports Intermodal	Helpston Junction to Nuneaton via Leicester
Wales, South West, Midlands, South East & Southampton Port	Yorkshire, Humber and North East	Domestic and Ports Intermodal	Wichnor Junction to Beighton Junction via Derby
Freight terminals (South)	Scotland, North West and West Midlands	Domestic and Ports Intermodal	Freight terminals (South) to Nuneaton
Felixstowe, Bathside Bay, London Gateway, Tilbury Ports	Freight terminals (South)	Ports Intermodal	Helpston Junction to freight terminals (South) via F2N
London Gateway, Tilbury Ports	Freight terminals (South)	Ports Intermodal	Carlton Road Junction to freight terminals (South) via MML
South West, South, South East and Southampton Port	Freight terminals (South)	Domestic and Ports Intermodal	Freight terminals (South) on to East West Rail (Western section)
Felixstowe Bathside Bay, London Gateway and Tilbury Ports	Freight terminals (North)	Ports Intermodal	Helpston Junction to freight terminals north via Stamford
Freight terminals (South)	Yorkshire, Humber and North East	Domestic Intermodal	Freight terminals (South) to Beighton Junction via Trowell Junction



Routing

The forecast changes in freight market demand have been mapped onto the rail network in Great Britain using routeing assumptions which were developed through extensive collaboration and one to one discussion with the Freight Market Study Working Group.

In summary, three steps were used to allocate freight flows to the network:

Flows whose routeing assumptions are articulated within existing Route Utilisation Strategies (RUS) and other freight forecasting work

Where assumptions developed in previous generations of Route Utilisation Strategies have not altered, these routeings were used in the Freight Market Study and are carried forward into this East Midlands Route Study.

Key assumptions relevant to the East Midlands Route Study were

- where it is the shortest route, by 2043 it is assumed that all freight from Felixstowe port to the midlands, north west and Scotland, is routed via the Felixstowe to West Midlands route rather than via London. In 2023 it is assumed that 50 per cent of the existing traffic for which Felixstowe to West Midlands is the shortest route will have transferred to this route.
- freight from Essex Thameside¹ to the Midland Main Line southern freight terminal cluster was assumed to be routed 66 per cent via Gospel Oak to Barking and MML – 33 per cent East Coast Main Line (ECML then from Peterborough to Syston Junction (option for 100 per cent of traffic to go via the MML)
- freight from Essex Thameside to the MML northern freight terminal cluster was assumed to be routed 40 per cent via Gospel Oak to Barking then north up the MML – 60 per cent via the East Coast Main Line then from Peterborough to Syston Junction and north on the Midland Main Line to Trent Junctions
- construction materials from Peak Forest to the south, were assumed to be routed via Corby

¹ Essex Thameside is the name given to a group of intermodal freight origins and destinations on the north side of the Thames including: Barking (Ripple Lane), Dagenham, Purfleet, Tilbury and London Gateway.

Flows which could or can take into account revised routeing assumptions

There have been some specific changes either in the form of new infrastructure schemes or to routeing policy since the RUSs were established. Where this has occurred the Freight Market Study considered possible routeing options and proposed either a preferred routeing or options to be tested. These have also been carried forward into this East Midlands Route Study, for instance in consideration of flows which could use East West Rail.

New flows which need to be mapped to the network

For new flows the Freight Market Study assumed that services will be routed via the shortest distance unless there is a strong logic to do otherwise. The routeing recognises that freight operators will have a desire to use particular routes, but that operational issues, such as time awaiting a suitable path, could mean that it is more efficient for the service to operate via an alternative. These alternatives may offer a higher average speed, and therefore shorter journey time even with a greater distance travelled. The needs of differing types of freight services, for example fast intermodal or heavy coal traffic, have also been considered. For intermodal freight it was assumed that a gauge cleared route would be the preferred route.

These routeing assumptions were then used to calculate the number of paths per hour across all route sections within the East Midlands Route Study area. The paths per hour assumptions were developed by taking the forecast demand in tonnes per annum, applying the routeing assumptions set out above, then demand was converted to paths per hour based on a number of assumptions set out in the Freight Market Study. This includes assumptions that in future freight trains will be longer and heavier than at present and will operate for more days in the week. For the purposes of the analysis, these have been rounded up within the East Midlands Route Study to the next whole number, with the exact number used at boundaries. This ensures that as Route Studies take place across the country, cumulative rounding of freight flows does not take place.

The conditional output from the Freight Market Study is for the demand to be accommodated subject to affordability and value for money.

Figures A7.1 and A7.2 show the 2023 and 2043 forecast number of freight paths per hour on the East Midlands Route Study area. These paths have been discussed and agreed with freight operating companies on the Working Group, and with all of the Working Group members. They have then been included within the 2043 Indicative Train Service Specification and have been used to assess interventions prioritised for 2023, and whether these meet the longer term strategy for the East Midlands Route Study area as set out in Chapters 4 and 5.

The corridors which see the highest level of forecast freight demand in 2043 are:

- between Felixstowe and the West Midlands which is forecast to require five paths per hour over most of the route by 2043. The required paths increases to six paths per hour between Syston Junction and Leicester and seven paths per hour between Leicester and Wigston Junction where the Felixstowe to West Midlands services are joined by freight running north/south or south/north on the Midland Main Line
- the corridors which see the highest level of forecast freight demand in 2043 are:
- between Felixstowe and the West Midlands which is forecast to require five paths per hour over most of the route by 2043. The required paths increases to six paths per hour between Syston Junction and Leicester and seven paths per hour between Leicester and Wigston Junction where the Felixstowe to West Midlands services are joined by freight running north/south or south/north on the Midland Main Line

Figure A7.1 Forecast freight capacity required in 2023

Freight Train Service Specification

1 tph	Number of train paths per hour
1	Number of paths: Class 4
1	Number of paths: Class 6
1	Number of paths: Class 4/6
E	Some engineering traffic

tph represents the number of trains per hour in each direction per corridor.

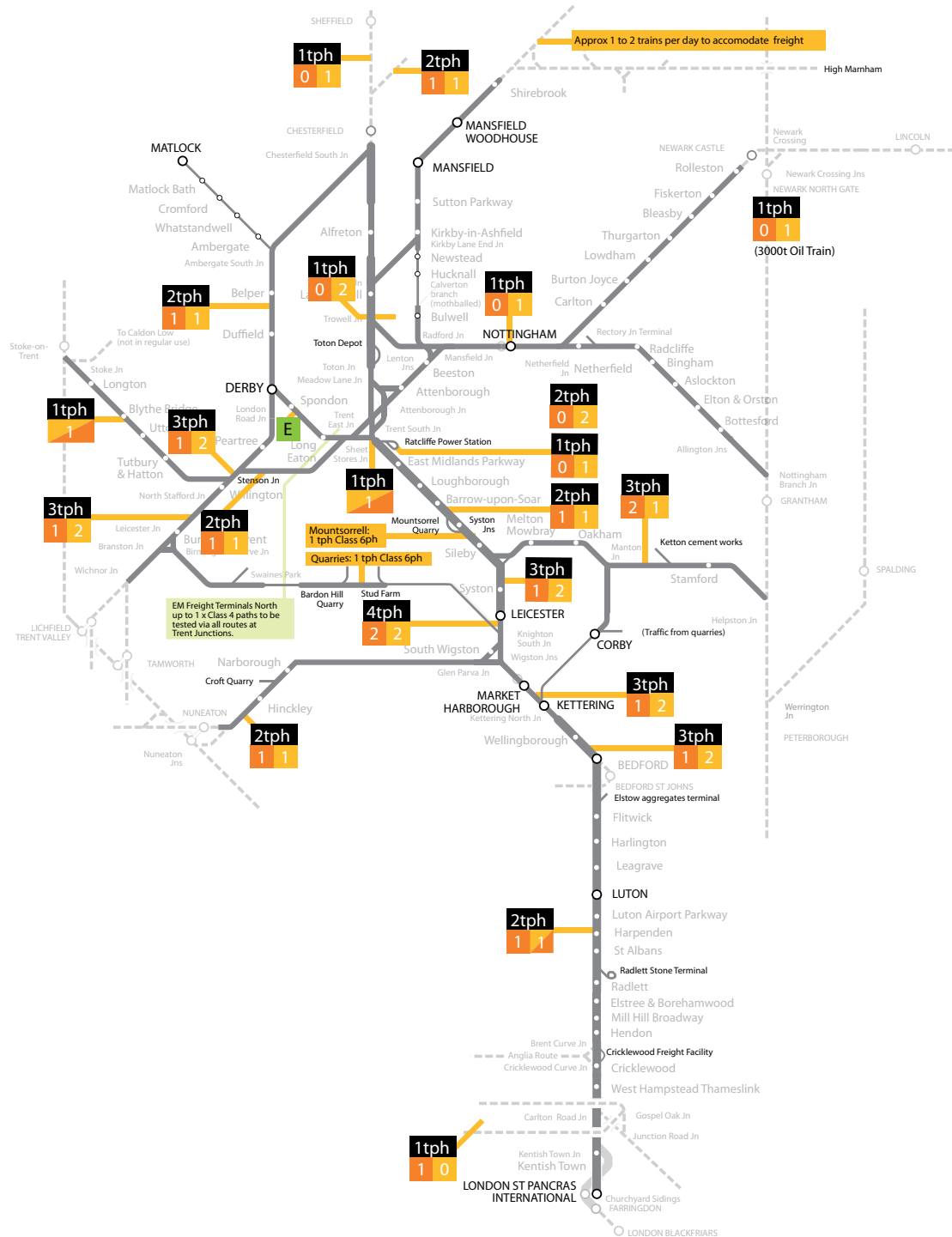
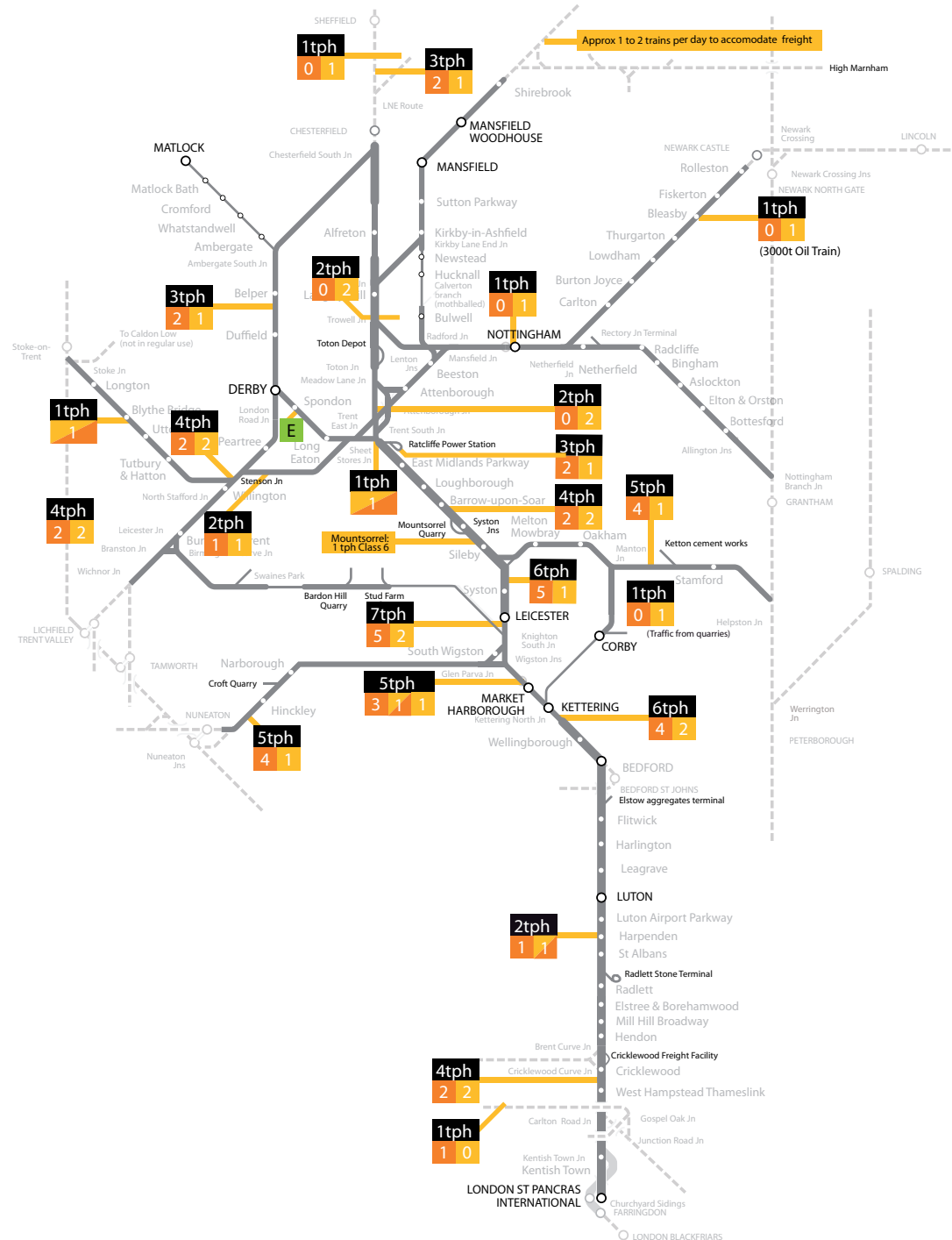


Figure A7.2 Forecast freight capacity required in 2043

Freight Train Service Specification

- 1 tph** Number of train paths per hour
- 1** Number of paths: Class 4
- 1** Number of paths: Class 6
- 1** Number of paths: Class 4/6
- E** Some engineering traffic

tph represents the number of trains per hour in each direction per corridor.



Passenger circulation at stations

Passenger circulation capacity at stations

Table A8.1 Stations and potential interventions		
Station	Possible interventions	Other schemes and proposed interventions
London St Pancras International (Low Level and High Level platforms)	Station and platform access enhancements.	
St Albans	Station and platform access enhancements.	
Harpenden	Station and platform access enhancements.	
Bedford	Station and platform access enhancements.	Infrastructure intervention in the Bedford Area is included as one of the 'choices for funders' for Control Period 6. There is a potential for this scheme to address the station capacity issues at Bedford station.
Wellingborough	Station and platform access enhancements.	Proposed and consented off-site developments in the area are likely to increase station footfall.
Kentish Town	Station and platform access enhancements.	
Mill Hill Broadway	Station and platform access enhancements.	
Flitwick	Station and platform access enhancements.	
Leagrave	Station and platform access enhancements.	

It is recognised that an important part of increasing capacity on the East Midlands Route Study area is addressing any current, or future, station congestion. Providing sufficient space for the forecast levels of growth within the stations is a crucial enabler to achieving higher frequency services, maintaining dwell times, running longer and higher capacity trains without compromising passenger safety and maintaining desired levels of passenger comfort.

The East Midlands Route Study has highlighted congestion at the stations outlined in the table below based on a review of passenger count data for the current year and the high growth scenario forecast in the Market Study. These stations are likely to present a constraint to growth on the network and interventions up to 2023 need to be considered regardless of any other choices made to improve infrastructure. Table A8.1 shows the identified stations.

West Hampstead Thameslink and Elstree & Borehamwood stations were also identified as busy stations but are not included in this table because the new footbridge and staircases that have been installed as part of Access for All schemes have resulted in increased circulation capacity at both stations. There are plans for interventions at Derby station in CP5 as part of the track remodelling in the area, and there have been recent refurbishments at Nottingham station. Therefore, it is assumed that no further capacity enhancements will be necessary at these stations during CP6.

When the revised timetable is introduced in 2018, following completion of the infrastructure enhancements being progressed by the Thameslink Programme, and the planned 24 trains per hour run through the Thameslink core stations, station congestion issues, that currently arise from the concentration of boarding and alighting loads on current services may be resolved because passenger loads in 2018 could be spread across increased number of train services.

If so, the requirement for infrastructure interventions at these specific stations may be delayed, as appropriate, pending more detailed station capacity analysis due to be carried out in 2018/19 once the Thameslink Programme is complete.

Station performance will be reviewed by Network Rail and Train Operators during CP5 and CP6 to identify capacity issues that have not been highlighted in the table above. This includes stations where passenger demand is expected to exceed the Market Study high growth forecasts. For example, committed off-site development near Wellingborough station has the potential to increase station footfall beyond what has been forecast by the Market Study. Such impacts from change in land-use on station capacity will be reviewed on a station by station basis during CP5 in order to identify any station interventions that are required in CP6.

The East Midlands Route Study has, therefore, identified a range of between £20 million and £50 million of investment that is required to provide the necessary station capacity identified to successfully deliver conditional output CO64. At this early stage of development, this figure is based upon typical costs for similar schemes at other stations.

In addition to those stations with congestion issues identified in the table above, there are a number of stations that, depending on the infrastructure choices selected, may be directly affected. Proposed interventions at these stations may, therefore, be necessary to support the growth in passenger numbers in 2023.

Conditional outputs focussed on supporting Airport use

For airports in the south east, fast, convenient and reliable rail access to central London is a priority, but direct access to other non-London core economic centres is increasingly important for all airports.

Airport passenger and employee travel demand is also quite different to commuting and leisure flows with peak periods occurring at different periods of the day and night. Earlier morning and later evening rail services should be considered, subject to value for money and affordability. As with other services in this study, key metrics are capacity, frequency, journey time and ease of transfer.

A minimum long-term service level aspiration for rail connectivity to airports in the south east is specified in the London and South East Market Study. It is as follows:

- frequent opportunities to travel
- sufficient capacity for the needs of passengers (including non-air passengers that use the airport as a transport hub)
- a minimum frequency of two trains per hour during airport peak operation (which may be at different times from the general commuting peak periods)
- high levels of reliability and punctuality
- generalised journey speed of circa 50 – 60mph
- direct services (i.e. minimal interchange)
- a total journey time of less than 60 minutes to/from key airport catchments within London and the South East
- a total journey time of less than 100 minutes to/from key airports catchments within long distance airport catchments beyond London and the South East.

Airports served by rail services in the East Midlands Route Study area

The main airports served by stations within the East Midlands Route Study are Luton and East Midlands airports. As part of the Route Study, meetings were held with both airports.

Based on these meetings, this section sets out the potential future markets and catchments for the airports and the airports' aspirations for future services to provide for this demand.

In addition a number of airports outside the East Midlands Route Study area are also served directly from the East Midlands

- Gatwick Airport is currently served by four trains per hour from Bedford.
- Stansted Airport is currently served by one train per hour from Birmingham New Street via Leicester. The 2043 strategy increases this to 2 trains per hour.
- Southampton Airport is currently has a direct train service every two hours from Derby. At least one interchange is required from most other stations in the East Midlands Route Study area.
- Other airports are also served by rail, but do not currently have a direct service:
- Manchester Airport currently requires at least one interchange from Leicester, Nottingham or Derby. A direct Derby to Manchester Airport service via Crewe is included in the 2043 strategy.
- Birmingham International Airport is currently accessible by rail from Nottingham, Derby and Leicester with an interchange at Birmingham New Street.

London Luton Airport

Airport catchment

Around 85 per cent of Luton Airport passengers who arrive by rail come from south of the airport. Understandably the airport's focus is to improve services coming from the south, in particular from London.

Airport demand and rail market share

Airport demand was circa 10.2 million passengers in 2013. The rail market share in the same year was 16 per cent (Civil Aviation Authority (CAA) 2013 data). This market share would be expected to increase to circa 18.7 per cent as a result of the improved overnight rail services.

Growth in airport demand as published in London Luton Airport's master plan forecasts 17.8 million passengers per annum by 2028.

This implies a strong annual growth rate of 3.8 per cent per annum. If this were reflected in growth in rail journeys to the airport, this would mean growth higher than the forecast rate of 3.1 per cent per annum taken from the high growth scenario in the London and South East Market Study.

Connectivity aspirations

As mentioned earlier, the majority of rail demand to the Airport comes from the south. The current daytime service from London St Pancras International is four outer suburban trains per hour (tph) with a journey time of approximately 32 minutes (with six tph in the peak), two slower inner suburban trains plus typically one fast long distance service running non stop to Luton Airport in around 20 minutes.

The baseline service includes one or two stops per hour at Luton Airport in the long distance services. This includes one stop per hour in a Corby service plus a stop in a long distance Nottingham service in some hours.

This baseline service meets the conditional output specified at the start of this section for a Generalised Journey Time of circa 50 – 60mph to London.

This baseline service meets the conditional output specified at the start of this section for a Generalised Journey Time of circa 50 – 60mph to London.

The airports aspirations for improved rail connections are focussed on improving the offering from the north and south with an emphasis on London:

- to improve frequency of services before 07.00 to serve the peak demand for airport departures
- to increase the number of fast non-stop journey opportunities from London St Pancras International to Luton Airport Parkway
- to significantly upgrade Luton Airport Parkway to become more air passenger friendly; in particular to improve on the current arrangement of one low capacity lift and four escalators or flights of stairs
- to collaborate with the rail industry and other stakeholders to fully integrate Luton Airport Parkway station with the airport's main terminal building through a fixed link, similar to the people mover between Gatwick Rail station and Gatwick North Terminal.

Progress has already been made towards meeting the first of these aspirations, with an increase in the frequency of overnight services to two trains per hour from 2015 included in the recently awarded Thameslink Southern Great Northern franchise specification.

East Midlands Airport

Airport catchment

The catchment for East Midlands Airport is rural and disparate, but mainly from the West, North and East rather than the South. The airport's focus for the future will be to increase its market share in this catchment, rather than to increase the size of the catchment.



Airport demand and rail market share

Airport demand has recovered from a significant dip following the 2008 recession to around 5 million passengers per annum. No specific forecasts are available for demand growth, but the site does have the ability to grow to accommodate 10 million passengers, which it is anticipated will be reached around 2030 to 2040.

Rail passengers to the airport need to interchange to reach the airport.

- passengers from the north will often change to a bus at Derby which will take them to the airport. Around one per cent of all airport passengers change from rail to bus at Derby station.
- passengers who take the train to East Midlands Parkway will need to take a taxi to the airport.

Connectivity aspirations

The current and baseline train service at East Midlands Parkway is typically one train per hour (tph) London St Pancras International – Nottingham, one tph London St Pancras International – Sheffield and one tph Leicester – Lincoln.

A study was commissioned in 2008 by a partnership of East Midlands Airport, the East Midlands Development Agency, the East Midlands Regional Assembly and the Highways Agency to investigate the future need for a fixed rail link to the airport. The study demonstrated that there was no economic case for building a fixed rail link at current or foreseeable levels of demand. (This conclusion is set out in the Economy and Surface Access section of [East Midlands Airport's Sustainable Development Plan](#)).

This means that rail passengers will continue to need to interchange either onto a bus or a taxi. The airport's aspirations would be for:

- more station calls at East Midlands Parkway. This would be conditional upon the airport successfully implementing a connecting bus service to the airport. It is noted that more frequent stops are likely to be more viable once HS2 Phase 2 is implemented. The high speed route will then provide very fast journeys for passengers travelling from Nottingham and Derby (via the East Midlands Hub) and Sheffield to London. This will allow services remaining on the Midland Main Line to stop more often at smaller stations such as East Midlands Parkway. A further consideration would be that, to serve passengers from Derby and the north, the option of changing from rail to a bus at East Midlands Parkway would need to be better than the alternative of changing onto the bus at Derby.
- a more even spread of rail services across the hour. Departures are clustered together in the current timetable.

Appraisal results

The choices identified for the next Control Period (CP6, commencing April 2019) have been categorised from a financial and socio-economic perspective.

From a financial perspective, CP6 choices have been categorised into those that:

- worsen the rail industry's net operating position (in other words, the additional operating costs exceed the value of revenue generated)
- choices which improve the industry's net operating position. For these schemes, the Route Study also indicates the extent to which this improvement is able to cover the capital cost of the initial investment.

The choices have also been appraised from a wider 'socio-economic' perspective, which compares the value of benefits to users and non-users to the net financial cost to funders. The appraisals have been conducted in line with funders' guidelines, in particular WebTag; the Department for Transport's appraisal guidelines. Further details of appraisals including assumptions will be provided to the Office of Rail and Road.

It should be noted that the appraisals have been revised during the Consultation period, and so the results differ from those in the Draft for Consultation.



Option EM020.1: Train lengthening for Plymouth to Edinburgh/Glasgow services (additional 18 vehicle option)	
Option	EM020.1 Train lengthening for Plymouth to Edinburgh/Glasgow services (additional 18 vehicle option)
Conditional Output	CO8 - to provide sufficient capacity over the day for passengers travelling on the East Midlands section of Plymouth – Edinburgh/Glasgow and Southampton/Reading to Newcastle long distance high speed services in 2023 (Where appropriate this option also addresses some requirements for additional capacity outside the East Midlands Route Study area.)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on these services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on many services running from Plymouth to Edinburgh and Glasgow. The crowding is not focussed on any single area, but occurs at a variety of locations along the route.
Description	To meet crowding standards on nearly all services with 18 additional vehicles
Infrastructure requirement	No infrastructure work required within the East Midlands Route Study area. None expected outside East Midlands Route Study area - subject to confirmation from other route studies
Operational requirement	18 additional vehicles to lengthen services. Most 4 and 5 car sets to be lengthened to 5 or 6 cars with one service requiring 7 cars.
Passenger impact	To accommodate forecast growth with less crowding. Crowding standard met except where there is local crowding which is better met by strengthening local services.
Freight impact	None
Relates to other options	
Socio-economic value for money categorisation	Low/Medium
Rail industry financial categorisation	Scheme increases operating subsidies
Note	<p>These services will be significantly affected by HS2 phase 2 causing a reduction in demand north of Birmingham New Street in 2033. For this reason the appraisal has been conducted over a 10 year appraisal period only. The high value for money business case is only valid if funders consider an appropriate re-deployment of the additional vehicles can be found from 2033.</p> <p>The 2012 Department for Transport High Level Output Specification mentions the electrification of sections of this route. If this was delivered, this would present an opportunity for running electric services over part of this route. The issues outlined above, relating to rolling stock deployment, would then need to be considered for high-speed electric multiple units rather than diesel units.</p>

Option EM020.1: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VFM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Low/Medium	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case ($> 100\%$)	<input type="checkbox"/>		

Option EM020.1: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	90.9
Revenue	-55.5
Other Government Impacts (road infrastructure costs)	-0.1
Total costs	35.3
Benefits (Present Value)	
Rail user benefits	49.1
Non user benefits	13.1
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-10.8
Total Quantified Benefits	51.5
NPV	16.2
Quantified BCR	1.5

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM020.2: Train lengthening for Plymouth to Edinburgh/Glasgow (additional 8 vehicle option)	
Option	EM020.2 Train lengthening for Plymouth to Edinburgh/Glasgow (additional 8 vehicle option)
Conditional Output	CO8 - to provide sufficient capacity over the day for passengers travelling on the East Midlands section of Plymouth – Edinburgh/Glasgow and Southampton/Reading to Newcastle long distance high speed services in 2023 (Where appropriate this option also addresses some requirements for additional capacity outside the East Midlands Route Study area.)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on these services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on many services running from Plymouth to Edinburgh and Glasgow. The crowding is not focussed on any single area, but occurs at a variety of locations along the route.
Description	Only those additional vehicles with a medium, high or very high value for money business case are included. This option will not fully meet the crowding standards.
Infrastructure requirement	No infrastructure work required within the East Midlands Route Study area. None expected outside East Midlands Route Study area - subject to confirmation from other route studies
Operational requirement	8 additional vehicles to lengthen services.
Passenger impact	To accommodate forecast growth with less crowding. This option will not fully meet the crowding standards.
Freight impact	None
Relates to other options	
Socio-economic value for money categorisation	Very high
Rail industry financial categorisation	Scheme increases operating subsidies
Note	<p>These services will be significantly affected by HS2 phase 2 causing a reduction in demand north of Birmingham New Street in 2033. For this reason the appraisal has been conducted over a 10 year appraisal period only. The very high value for money business case is only valid if funders consider an appropriate re-deployment of the additional vehicles can be found from 2033.</p> <p>The 2012 Department for Transport High Level Output Specification mentions the electrification of sections of this route. If this was delivered, this would present an opportunity for running electric services over part of this route. The issues outlined above, relating to rolling stock deployment, would then need to be considered for high-speed electric multiple units rather than diesel units.</p>

Option EM020.2: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VfM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. R - O < 0)	<input checked="" type="checkbox"/>	Very High	
Scheme decreases operating subsidies (i.e. R - O > 0)	Low capital cost coverage (i.e. (R - O) / C < 33%)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case (> 100%)	<input type="checkbox"/>		

Option EM020.2: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	39.2
Revenue	-36
Other Government Impacts (road infrastructure costs)	-0.1
Total costs	3.1
Benefits (Present Value)	
Rail user benefits	31.7
Non user benefits	9.3
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-7.7
Total Quantified Benefits	33.3
NPV	30.2
Quantified BCR	10.7

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM021.1: Train lengthening for Southampton/Reading to Newcastle services (additional 15 vehicle option)	
Option	EM021.1 Train lengthening for Southampton/Reading to Newcastle services (additional 15 vehicle option)
Conditional Output	CO8 - to provide sufficient capacity over the day for passengers travelling on the East Midlands section of Plymouth – Edinburgh/Glasgow and Southampton/Reading to Newcastle long distance high speed services in 2023
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on these services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on many services running from Southampton and Reading to Newcastle. The crowding is not focussed on any single area, but occurs at a variety of locations along the route.
Description	To meet crowding standards on nearly all services with 15 additional vehicles.
Infrastructure requirement	No infrastructure work required within the East Midlands Route Study area. None expected outside East Midlands Route Study area - subject to confirmation from other route studies.
Operational requirement	15 additional vehicles to lengthen services. Most 4-car sets to be lengthened to 5 cars with a few being lengthened to 6 cars.
Passenger impact	To accommodate forecast growth with less crowding. This option will not fully meet the crowding standards.
Freight impact	None
Relates to other options	
Socio-economic value for money categorisation	Poor
Rail industry financial categorisation	Scheme increases operating subsidies
Note	<p>These services will be significantly affected by HS2 phase 2 causing a reduction in demand north of Birmingham New Street in 2033. For this reason the appraisal has been conducted over a 10 year appraisal period only. The business case is only valid if funders consider an appropriate re-deployment of the additional vehicles can be found from 2033.</p> <p>The 2012 Department for Transport High Level Output Specification mentions the electrification of sections of this route. If this was delivered, this would present an opportunity for running electric services over part of this route. The issues outlined above, relating to rolling stock deployment, would then need to be considered for high-speed electric multiple units rather than diesel units.</p>

Option EM021.1: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VFM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Poor	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case ($> 100\%$)	<input type="checkbox"/>		

Option EM021.1: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	66.6
Revenue	-26.3
Other Government Impacts (road infrastructure costs)	0.0
Total costs	40.3
Benefits (Present Value)	
Rail user benefits	22.7
Non user benefits	6.2
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-4.6
Total Quantified Benefits	24.3
NPV	-16.0
Quantified BCR	0.6

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM021.2: Train lengthening for Southampton/Reading to Newcastle services (additional 4 vehicle option)	
Option	EM021.2 Train lengthening for Southampton/Reading to Newcastle services (additional 4 vehicle option)
Conditional Output	CO8 - to provide sufficient capacity over the day for passengers travelling on the East Midlands section of Plymouth – Edinburgh/Glasgow and Southampton/Reading to Newcastle long distance high speed services in 2023 (Where appropriate this option also addresses some requirements for additional capacity outside the East Midlands Route Study area.)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on these services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on many services running from Southampton and Reading to Newcastle. The crowding is not focussed on any single area, but occurs at a variety of locations along the route.
Description	Only those additional vehicles with a medium, high or very high value for money business case are included. This option will not fully meet the crowding standards.
Infrastructure requirement	No infrastructure work required within the East Midlands Route Study area. None expected outside East Midlands Route Study area - subject to confirmation from other route studies.
Operational requirement	4 additional vehicles to lengthen services. 4 car sets to be lengthened to 5 cars in each case.
Passenger impact	To accommodate forecast growth with less crowding. This option will not fully meet the crowding standards.
Freight impact	None
Relates to other options	
Socio-economic value for money categorisation	Medium
Rail industry financial categorisation	Scheme increases operating subsidies
Note	<p>These services will be significantly affected by HS2 phase 2 causing a reduction in demand north of Birmingham New Street in 2033. For this reason the appraisal has been conducted over a 10 year appraisal period only. The high value for money business case is only valid if funders consider an appropriate re-deployment of the additional vehicles can be found from 2033.</p> <p>The 2012 Department for Transport High Level Output Specification mentions the electrification of sections of this route. If this was delivered, this would present an opportunity for running electric services over part of this route. The issues outlined above, relating to rolling stock deployment, would then need to be considered for high-speed electric multiple units rather than diesel units.</p>

Option EM021.2: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VFM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Medium	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case ($> 100\%$)	<input type="checkbox"/>		

Option EM021.2: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	16.3
Revenue	-10.6
Other Government Impacts (road infrastructure costs)	0.0
Total costs	5.7
Benefits (Present Value)	
Rail user benefits	9.0
Non user benefits	2.9
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-2.2
Total Quantified Benefits	9.8
NPV	4.0
Quantified BCR	1.7

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM022.1: Train lengthening for Birmingham New Street – Leicester – Stansted Airport services (additional 10 vehicle option)	
Option	EM022.1 Train lengthening for Birmingham New Street – Leicester – Stansted Airport services (additional 10 vehicle option).
Conditional Output	CO9 (and CO4) - to provide sufficient capacity over the day for passengers travelling on the East Midlands section of Interurban services in 2023 (and 2043)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on these services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on many services running between Birmingham and Leicester and Birmingham and Stansted Airport via Leicester. The crowding is heaviest into/out of Birmingham New Street in the peaks, but is also expected to affect other sections of the route and some off peak services.
Description	To meet crowding standards on nearly all services with 10 additional vehicles.
Infrastructure requirement	No infrastructure work required within the East Midlands Route Study area. None expected outside East Midlands Route Study area - subject to confirmation from other route studies.
Operational requirement	10 additional vehicles to lengthen services. Some two and three car units to be lengthened to three or four cars. Some platform lengths would be exceeded within and outside the East Midlands Route study area, but Selective Door Opening (SDO) is assumed to be used. (SDO is fitted on the current stock on the route.)
Passenger impact	To accommodate forecast growth with less crowding. This would eliminate the majority of the breaches in crowding standards. However, it is possible that all of the breaches could be eliminated through changes to the allocation of rolling stock and adjustments to stopping patterns to best match the additional capacity with the highest loads.
Freight impact	None
Relates to other options	-
Socio-economic value for money categorisation	Low
Rail industry financial categorisation	Scheme increases operating subsidies
Note	-

Option EM022.1: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VfM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Low	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case ($> 100\%$)	<input type="checkbox"/>		

Option EM022.1: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	65.0
Revenue	-33.97
Other Government Impacts (road infrastructure costs)	-0.1
Total costs	31.0
Benefits (Present Value)	
Rail user benefits	42.8
Non user benefits	6.1
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-6.7
Total Quantified Benefits	42.2
NPV	11.2
Quantified BCR	1.4

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM022.2: Train lengthening for Birmingham New Street – Leicester – Stansted Airport services (3 additional vehicle option)	
Option	EM022.2 Train lengthening for Birmingham New Street – Leicester – Stansted Airport services (3 additional vehicle option)
Conditional Output	CO9 (and CO4) - to provide sufficient capacity over the day for passengers travelling on the East Midlands section of Interurban services in 2023 (and 2043) (Where appropriate this option also addresses some requirements for additional capacity outside the East Midlands Route Study area.)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on these services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on many services running between Birmingham and Leicester and Birmingham and Stansted Airport via Leicester. The crowding is heaviest into/out of Birmingham New Street in the peaks, but is also expected to affect other sections of the route and some off peak services.
Description	Only those additional vehicles with a medium, high or very high value for money business case are included. This option will not fully meet the crowding standards.
Infrastructure requirement	No infrastructure work required within or outside the East Midlands Route Study area.
Operational requirement	3 additional vehicles to lengthen services to lengthen two car units to three cars in each case.
Passenger impact	Will reduce crowding levels in 2023, but will not fully meet crowding standards.
Freight impact	None
Relates to other options	
Socio-economic value for money categorisation	Very high
Rail industry financial categorisation	Scheme increases operating subsidies
Note	

Option EM022.2: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VFM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Very High	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case ($> 100\%$)		<input type="checkbox"/>	

Option EM022.2: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	23.9
Revenue	-19.9
Other Government Impacts (road infrastructure costs)	0.0
Total costs	3.9
Benefits (Present Value)	
Rail user benefits	24.1
Non user benefits	4.1
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-4.2
Total Quantified Benefits	24.04
NPV	20.1
Quantified BCR	6.2

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM023.1: Train lengthening for Cardiff – Birmingham New Street – Nottingham services	
Option	EM023.1 Train lengthening for Cardiff – Birmingham New Street – Nottingham services
Conditional Output	CO9 - to provide sufficient capacity over the day for passengers travelling on the East Midlands section of Interurban services in 2023 (Where appropriate this option also addresses some requirements for additional capacity outside the East Midlands Route Study area.)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on these services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on a number of services running between Cardiff Birmingham new Street and Nottingham. The crowding is heaviest into/out of Birmingham New Street in the peaks.
Description	To meet crowding standards on nearly all services with 14 additional vehicles.
Infrastructure requirement	No infrastructure work required within the East Midlands Route Study area. None expected outside East Midlands Route Study area.
Operational requirement	14 additional vehicles to lengthen services. Some services would need to be lengthened to three, four and even five vehicles. No platform lengths would be exceeded within the East Midlands Route study area. Outside the East Midlands Route Study area Selective Door Opening (SDO) is assumed to be available. (SDO is fitted on the current stock on the route.)
Passenger impact	To accommodate forecast growth with less crowding. This would eliminate the nearly all breaches in crowding standards.
Freight impact	None
Relates to other options	-
Socio-economic value for money categorisation	Poor
Rail industry financial categorisation	Scheme increases operating subsidies
Note	These services will be significantly affected by HS2 phase 2 causing a reduction in demand north of Birmingham New Street in 2033. For this reason the appraisal has been conducted over a 10 year appraisal period only. The business case is only valid if funders consider an appropriate re-deployment of the additional vehicles can be found from 2033.

Option EM023.1: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VFM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Poor	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case ($> 100\%$)		<input type="checkbox"/>	

Option EM023.1: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	47.2
Revenue	-6.6
Other Government Impacts (road infrastructure costs)	0.0
Total costs	40.6
Benefits (Present Value)	
Rail user benefits	6.6
Non user benefits	0.8
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-0.3
Total Quantified Benefits	7.1
NPV	-33.5
Quantified BCR	0.2

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.



Option EM024.1: Train lengthening for Norwich – Nottingham – Sheffield – Liverpool Lime Street services (15 additional vehicle option)	
Option	EM024.1 Train lengthening for Norwich – Nottingham – Sheffield – Liverpool Lime Street services (15 additional vehicle option)
Conditional Output	CO9 (and CO4) - to provide sufficient capacity over the day for passengers travelling on the East Midlands section of Interurban services in 2023 (and 2043) (Where appropriate this option also addresses some requirements for additional capacity outside the East Midlands Route Study area.)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on these services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on many Norwich – Nottingham – Liverpool services, mostly between Sheffield and Liverpool.
Description	To meet crowding standards on nearly all services with 15 additional vehicles.
Infrastructure requirement	No infrastructure work required within the East Midlands Route Study area. Requirements outside the East Midlands Route Study area would be subject to confirmation from other route studies.
Operational requirement	15 additional vehicles to lengthen services. Many services are already strengthened from 2 to 4 cars between Nottingham and Liverpool. These services would be lengthened further between Nottingham and Liverpool in this option, to up to eight cars in one case.
Passenger impact	To accommodate forecast growth with less crowding. This would meet the crowding standards.
Freight impact	None
Relates to other options	-
Socio-economic value for money categorisation	Low
Rail industry financial categorisation	Scheme increases operating subsidies
Note	Substantial improvements to related services are already planned in the North West as a result of the Northern Hub proposals (as outlined in the Network Rail CP5 Enhancement Delivery Plan). A further change is that consideration is being given to splitting the Liverpool – Norwich service to operate as separate Liverpool – Nottingham and Nottingham – Norwich services. Given these developments, changes to these services will be reconsidered alongside the other changes to services within the North of England Route Study.

Option EM024.1: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VfM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Low	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case ($> 100\%$)	<input type="checkbox"/>		

Option EM024.1: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	97.5
Revenue	-47.3
Other Government Impacts (road infrastructure costs)	-0.1
Total costs	50.1
Benefits (Present Value)	
Rail user benefits	65.2
Non user benefits	15.7
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-9.8
Total Quantified Benefits	71.2
NPV	21.1
Quantified BCR	1.4

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM024.2: Train lengthening for Norwich – Nottingham – Sheffield – Manchester – Liverpool Lime Street services (5 additional vehicle option)	
Option	EM024.2 Train lengthening for Norwich – Nottingham – Sheffield – Manchester – Liverpool Lime Street services (5 additional vehicle option)
Conditional Output	CO9 (and CO4) - to provide sufficient capacity over the day for passengers travelling on the East Midlands section of Interurban services in 2023 (and 2043) (Where appropriate this option also addresses some requirements for additional capacity outside the East Midlands Route Study area)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on these services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on many Norwich – Nottingham – Liverpool services, mostly between Sheffield and Liverpool.
Description	Only those additional vehicles with a medium, high or very high value for money business case are included. This option will not fully meet the crowding standards.
Infrastructure requirement	No infrastructure work required within the East Midlands Route Study area. Requirements outside the East Midlands Route Study area would be subject to confirmation from other route studies.
Operational requirement	5 additional vehicles to lengthen services. These vehicles would be used to further strengthen services between Nottingham and Liverpool.
Passenger impact	Will reduce crowding levels in 2023, but will not fully meet crowding standards.
Freight impact	None
Relates to other options	
Socio-economic value for money categorisation	Very high
Rail industry financial categorisation	Scheme decreases operating subsidies Positive financial case
Note	Substantial improvements to related services are already planned in the North West as a result of the Northern Hub proposals (as outlined in the Network Rail CP5 Enhancement Delivery Plan). A further change is that consideration is being given to splitting the Liverpool – Norwich service to operate as separate Liverpool – Nottingham and Nottingham – Norwich services. Given these developments, changes to these services will be reconsidered alongside the other changes to services within the North of England Route Study.

Option EM024.2: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VFM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. R - O < 0)	<input type="checkbox"/>	Very High	
Scheme decreases operating subsidies (i.e. R - O > 0)	Low capital cost coverage (i.e. (R - O) / C < 33%)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case (> 100%)	<input checked="" type="checkbox"/>		

Option EM024.2: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	33.4
Revenue	-34.9
Other Government Impacts (road infrastructure costs)	-0.1
Total costs	-1.5
Benefits (Present Value)	
Rail user benefits	47.7
Non user benefits	13.5
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-8.2
Total Quantified Benefits	52.9
NPV	54.5
Quantified BCR	Financially positive

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM025.1: Train lengthening for Leicester – Nottingham – Newark – Lincoln services	
Option	EM025.1 Train lengthening for Leicester – Nottingham – Newark – Lincoln services
Conditional Output	CO10 (and CO5) - to provide sufficient peak and all day capacity for passengers travelling on local services in the East Midlands in 2023 (and 2043)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on Leicester – Nottingham – Newark – Lincoln services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on a small number of specific peak services in particular between Nottingham and Newark.
Description	To meet crowding standards on nearly all services with 6 additional vehicles.
Infrastructure requirement	No infrastructure work required within the East Midlands Route Study area. None expected outside East Midlands Route Study area.
Operational requirement	6 additional vehicles to lengthen a small number of 2 car services to 3 or 4 cars. Some services would exceed platform lengths at a number of locations, so to avoid the need for platform lengthening, SDO would be required. It is assumed that the current stock, which is not fitted with SDO, would be replaced with either new, or cascaded rolling stock which is already fitted with SDO.
Passenger impact	To accommodate forecast growth with less crowding. This would eliminate the nearly all breaches in crowding standards.
Freight impact	None
Relates to other options	
Socio-economic value for money categorisation	Poor
Rail industry financial categorisation	Scheme increases operating subsidies
Note	-

Option EM025.1: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VfM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Poor	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case (> 100%)	<input type="checkbox"/>		

Option EM025.1: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	41.0
Revenue	-6.5
Other Government Impacts (road infrastructure costs)	0.0
Total costs	34.4
Benefits (Present Value)	
Rail user benefits	12.8
Non user benefits	-0.6
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-0.5
Total Quantified Benefits	11.8
NPV	-22.6
Quantified BCR	0.3

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM026.1: Train lengthening for Nottingham – Mansfield – Worksop services	
Option	EM026.1 Train lengthening for Nottingham – Mansfield – Worksop services
Conditional Output	CO10 (and CO5) - to provide sufficient peak and all day capacity for passengers travelling on local services in the East Midlands in 2023 (and 2043)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on Nottingham – Mansfield – Worksop services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on a small number of peak services into and out of Nottingham
Description	To meet crowding standards on nearly all services with 6 additional vehicles.
Infrastructure requirement	No infrastructure work required.
Operational requirement	6 additional vehicles to lengthen a small number of 2 and 3 car services to 3, 4 or 5 cars. Some services would exceed platform lengths at a number of locations, so to avoid the need for platform lengthening, SDO would be required. It is assumed that the current stock, which is not fitted with SDO, would be replaced with either new, or cascaded rolling stock which is already fitted with SDO.
Passenger impact	To accommodate forecast growth with less crowding. This would meet the crowding standards.
Freight impact	None
Relates to other options	
Socio-economic value for money categorisation	Poor
Rail industry financial categorisation	Scheme increases operating subsidies
Note	-

Option EM026.1: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VfM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Poor	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case ($> 100\%$)	<input type="checkbox"/>		

Option EM026.1: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	37.1
Revenue	-4.1
Other Government Impacts (road infrastructure costs)	0.0
Total costs	33.0
Benefits (Present Value)	
Rail user benefits	11.9
Non user benefits	-0.7
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-0.2
Total Quantified Benefits	11.0
NPV	-22.0
Quantified BCR	0.3

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM026.2: Train lengthening for Nottingham – Mansfield – Worksop services (1 car peak only)	
Option	EM026.2 Train lengthening for Nottingham – Mansfield – Worksop services (1 car peak only)
Conditional Output	CO10 (and CO5) - to provide sufficient peak and all day capacity for passengers travelling on local services in the East Midlands in 2023 (and 2043)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on Nottingham – Mansfield – Worksop services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on a small number of peak services into and out of Nottingham
Description	This option is to strengthen the busiest morning and evening peak service with one additional vehicle. The option reduces crowding on the most crowded services, but is significantly short of meeting the crowding standards.
Infrastructure requirement	No infrastructure work required.
Operational requirement	<p>The option is to lengthen the most crowded service in each of the peaks by one vehicle. The additional vehicle is to do one round trip between Nottingham and Worksop in each peak. The additional vehicle is assumed to be uncoupled in the off peak, and so would need somewhere to be stabled.</p> <p>The morning service would be lengthened to 4 cars, which exceeds the platform lengths at a number of locations. To avoid the need for platform lengthening, SDO would be required. It is assumed that the current stock, which is not fitted with SDO, would be replaced with either new, or cascaded rolling stock which is already fitted with SDO.</p>
Passenger impact	Will reduce crowding levels in 2023, but will not fully meet crowding standards.
Freight impact	None
Relates to other options	
Socio-economic value for money categorisation	Low
Rail industry financial categorisation	Scheme increases operating subsidies
Note	

Option EM026.2: Financial and socio-economic categorisation			
Rail industry financial impact <small>(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)</small>		Socio-economic impact <small>(WebTAG VFM category, see summary TEE table for further details)</small>	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Low	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case ($> 100\%$)	<input type="checkbox"/>		

Option EM026.2: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	4.3
Revenue	-1.3
Other Government Impacts (road infrastructure costs)	0.0
Total costs	3.1
Benefits (Present Value)	
Rail user benefits	3.9
Non user benefits	0.2
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-0.3
Total Quantified Benefits	3.9
NPV	0.8
Quantified BCR	1.3

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.



Option EM027.1: Train lengthening for Matlock – Derby – Nottingham services	
Option	EM027.1 Train lengthening for Matlock – Derby – Nottingham services
Conditional Output	C010 (and C05) - to provide sufficient peak and all day capacity for passengers travelling on local services in the East Midlands in 2023 (and 2043)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on Matlock – Derby – Nottingham services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest significant overcrowding on a small number of peak services into and out of Nottingham and Derby.
Description	To meet crowding standards on nearly all services with 5 additional vehicles.
Infrastructure requirement	No infrastructure work required.
Operational requirement	Five additional vehicles to lengthen a small number of two car services to three or four cars. Some services would exceed the useable platform length at two locations, so to avoid the need for platform lengthening, SDO would be required. It is assumed that the current stock, which is not fitted with SDO, would be replaced with either new, or cascaded rolling stock which is already fitted with SDO.
Passenger impact	To accommodate forecast growth with less crowding. This would meet the crowding standards.
Freight impact	None
Relates to other options	
Socio-economic value for money categorisation	Poor
Rail industry financial categorisation	Scheme increases operating subsidies
Note	-

Option EM027.1: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VfM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Poor	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case (> 100%)	<input type="checkbox"/>		

Option EM027.1: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	24.5
Revenue	-2.4
Other Government Impacts (road infrastructure costs)	0.0
Total costs	22.1
Benefits (Present Value)	
Rail user benefits	6.5
Non user benefits	-0.2
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-0.2
Total Quantified Benefits	6.1
NPV	-18.0
Quantified BCR	0.3

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Option EM028.1: Train lengthening for Derby – Stoke-on-Trent – Crewe services	
Option	EM028.1 Train lengthening for Derby – Stoke-on-Trent – Crewe services
Conditional Output	C010 (and C05) - to provide sufficient peak and all day capacity for passengers travelling on local services in the East Midlands in 2023 (and 2043)
Timeframe	CP6 (specifically 2023)
Purpose	The purpose of this scheme is to reduce crowding on Derby – Stoke-on-Trent – Crewe services from 2023 through train lengthening. High growth scenario forecasts from the passenger Market Studies suggest overcrowding on a small number of peak services into and out of Derby and Stoke-on-Trent.
Description	To meet crowding standards on nearly all services with three additional vehicles.
Infrastructure requirement	No infrastructure work required.
Operational requirement	Three additional vehicles to lengthen a small number of one car services to two cars.
Passenger impact	To accommodate forecast growth with less crowding. This would meet the crowding standards.
Freight impact	None
Relates to other options	-
Socio-economic value for money categorisation	Poor
Rail industry financial categorisation	Scheme increases operating subsidies
Note	-

Option EM028.1: Financial and socio-economic categorisation			
Rail industry financial impact		Socio-economic impact	
(Categorisation of Revenue, Operating costs, and Capital costs over appraisal period)		(WebTAG VFM category, see summary TEE table for further details)	
Scheme increases operating subsidies (i.e. $R - O < 0$)	<input checked="" type="checkbox"/>	Poor	
Scheme decreases operating subsidies (i.e. $R - O > 0$)	Low capital cost coverage (i.e. $(R - O) / C < 33\%$)		N/A
	Medium capital cost coverage (33 – 66%)		N/A
	High capital cost coverage (66 – 100%)		N/A
Positive financial case ($> 100\%$)	<input type="checkbox"/>		

Option EM028.1: Summary TEE (Transport Economic Efficiency) table	
30 year appraisal	£m (2010 PV)
Costs (Present Value)	
Investment Cost	0.0
Operating Cost	20.5
Revenue	-3.9
Other Government Impacts (road infrastructure costs)	0.0
Total costs	16.5
Benefits (Present Value)	
Rail user benefits	7.7
Non user benefits	0.0
Rail user & non user disruption disbenefits	0.0
Current TOCs revenue	0.0
Current TOCs/ NR opex	0.0
Other Government Impacts (indirect taxation)	-0.4
Total Quantified Benefits	7.3
NPV	-9.2
Quantified BCR	0.4

* Note that, due to rounding, the numbers in the tables may not add up precisely to the total figure presented.

Glossary	
Term	Meaning
Access for All	The Access for All programme is part of Department for Transport's (DfT) Railways for All Strategy and is designed to address the issues faced by disabled passengers using railway stations in Great Britain. As a part of this programme new footbridges have been installed at some stations with new stairs and lift access between station entrance and platforms.
Baseline	Infrastructure, timetable and rolling stock which is assumed to be in place, as a starting point for the route study. This is detailed in Chapter 2 of this document.
BCR	Benefit to Cost Ratio, a measure of the value for money presented by an option.
Classic Line	The term that describes the existing UK rail network (excluding HS1). Can also be referred to as a 'conventional line'.
Class 4	A classification of freight train timetabled to operate at up to 75mph, typically carrying intermodal containers or automotive traffic.
Class 6	A classification of freight train timetabled to operate at up to 60mph, typically heavier than a Class 4 train due to the goods carried.
Committed Enhancement	Infrastructure investment schemes which have been identified for funding in from the Government's High Level Output Specification (HLOS) or are third party funded.
Conditional Outputs	Aspirations for the industry to provide, subject to feasibility, value for money and affordability etc.
Control Period 4 (CP4)	Network Rail is funded in five yearly periods. Control Period 4 is the funding period between 2009 – 2014.
Control Period 5 (CP5)	Network Rail is funded in five yearly periods. Control Period 5 is the funding period between 2014 – 2019.
Control Period 6 (CP6)	Network Rail is funded in five yearly periods. Control Period 6 is the funding period between 2019 – 2024.
Control Period 7 (CP7)	Network Rail is funded in five yearly periods. Control Period 7 is the funding period between 2024 – 2029.
Crowding Standards	These specify threshold levels above which crowding is not acceptable, and which would trigger the need for measures to mitigate the crowding. The standards used in the East Midlands Route Study are that passengers are not required to stand for more than 20 minutes, and that all loads should fall within the specified total capacity of the vehicle. The standards are based on relevant DfT and franchising guidance and documentation.

Glossary	
Term	Meaning
Devolved Route	Network Rail has devolved the day-to-day running of Britain's railway infrastructure to 10 strategic routes to work more effectively with passenger and freight operators. Each route operates as a separate business unit with its own accounts allowing greater benchmarking of financial performance and efficiency between the routes and sharing best practice, they also have their own management team to operate, maintain and renew the infrastructure.
DfT	Department for Transport, a Government department
DfC	Draft for Consultation. The previous version of the East Midlands Route Study, issued for public consultation as part of the process towards creation of this final version
Digital Railway	Digital Railway is a rail industry-wide programme designed to benefit Great Britain's economy by accelerating the digital-enablement of the railway
Down line	Historically the line away from the larger conurbation at either end of a train line when constructed. Usually the line away from London
East Midlands Hub	Station proposed as part of High Speed 2 Phase 2 to be located between Derby and Nottingham.
ECML	East Coast Main Line
EMT	East Midlands Trains
ETCS	European Train Control System. A new signalling control and train protection system.
ERTMS	European Rail Traffic Management System. A system for managing train movements using ETCS to signal trains and GSMR to communicate with trains.
Fast line	Predominantly used by trains with limited stops on the line
FOC	Freight Operating Company
Generalised Journey Time	A measure of the rail service offer that takes account of in vehicles time, service frequency and interchange penalty.
GRIP	"Governance for Railway Investment Projects", a Network Rail standard for project managing changes to the infrastructure.
HLOS	High Level Output Specification, the Government's statement of what it wishes to buy from the industry over a Control Period.
HS1	The High Speed link between London St Pancras International and the Channel Tunnel
HS2	Proposed High Speed link between London, Birmingham, and beyond to Manchester and Leeds
HS2 Phase 1	First phase of High Speed 2 to provide a high speed line from London to Birmingham.

Glossary	
Term	Meaning
HS2 Phase 2	Extension of High Speed 2 Phase 1 network proposed for the early 2030s. It includes a high speed line from Birmingham to Manchester and from Birmingham to the East Midlands, Sheffield and Leeds.
IECC	Integrated Electronic Control Centre
2043 ITSS	Indicative Train Service Specification for 2043. This specification was developed within the East Midlands Route Study to meet all of the passenger connectivity and freight conditional outputs within and across the East Midlands Route Study area. These services are still subject to affordability and value for money.
Cross-Boundary ITSS	Indicative Train Service Specification, also for 2043, was developed for the whole country as part of the cross-boundary work stream to meet all of the passenger and freight conditional outputs which cross route study boundaries.
LEP	Local Enterprise Partnership
LTPP	Long Term Planning Process, the programme of Market and Route Studies which together define the capacity and capability required of the Great Britain railway network over a 30-year time horizon.
Midlands Connect	Midlands Connect is a partnership of 11 LEPs and 26 transport authorities, representing the interests of a population of 11 million and 14 cities from across the Midlands. These bodies have come together to develop a strategic transport strategy that will deliver economic growth by: capitalising on HS2 opportunities, addressing east-west Midlands connections, and considering connectivity via the region's airports and ports.
MML	Midland Main Line
MPH	Miles Per Hour
Newark Crossing	The flat crossing between the East Coast Main Line and the line between Nottingham and Lincoln.
Northern Hub	Committed scheme to improve infrastructure capacity in the Manchester area, enabling faster journey time and higher frequencies between a number of cities in northern England.
Opportunities to travel	This is the number of opportunities a passenger has to travel between two specified locations, including the number of direct services between those places which do not require a change of trains, as well as journey opportunities where a passenger is required to change trains.
ORR	Now the Office of Rail and Road, the safety and economic regulator for the rail and road industries in Great Britain. Many references throughout the text relate to publications under the ORR's previous name of the Office of Rail Regulation.
Periodic Review	The process which establishes Network Rail's outputs and funding for the following Control Period

Glossary	
Term	Meaning
RDG	Rail Delivery Group, a cross-industry body which exists to promote greater co-operation between train operators and Network Rail through leadership in the industry and by working together with Government, the supply chain and stakeholders.
RIPG	Rail Industry Planning Group, a cross-industry body whose purpose is to provide railway industry input into the structure and development of the national railway strategic planning processes. Its members are drawn from railway funders, operators and users.
ROC	Rail Operations Centre
RUS	Route Utilisation Strategy, a report which considers the future development of the railway in a particular area (geographic RUS), or one aspect of its development in depth (Network RUS). Geographic RUSs are being superseded by Market Studies and Route Studies in the Long Term Planning Process.
SDO	Selective Door Operation, used to open certain train doors only, where the whole of the train does not fit into a station platform
Slow line	Predominantly used by stopping trains or slower freight trains.
Socio-economic Appraisal	“socioeconomic” costs and benefits are those which are not monetised, e.g. improved journey time for existing passengers. Socioeconomic appraisals include socioeconomic costs and benefits as well as financial costs and benefits such as changes to industry revenues or operating costs.
SFN	Strategic Freight Network
TEN-T	Trans-European Network – Transport. This is a strategy to develop a trans-European network in the transport sector, adopted by the European Parliament and the Council in 1996, to establish a ‘master plan’ connecting national networks of all transport modes.
Thameslink Key Output 2	The principle objective of Thameslink Programme is to increase accessibility to, from and through the heart of London by improving and expanding the existing Thameslink service. Key Output 2 will deliver increased capacity with up to 24 trains per hour (in each direction) through the core route during peak periods and will include delivery of 12 car services rather than the present eight.
Thameslink Programme	Scheme to increase accessibility to, from and through the heart of London by improving and expanding the existing Thameslink service.
TfL	Transport for London
TPD	Trains per Day
TOC	Train Operating Company
TPH	Trains Per Hour

Glossary	
Term	Meaning
Turnback	A bay platform that provides the functionality for terminating services to turn round ready to depart from the platform
Up line	Historically the line towards the larger conurbation at either end of a train line when constructed. Usually the line towards London
W10	The loading gauge which enables 9' 6" containers to be conveyed on conventional wagons.
W12	Allows a 9'6 high container to be carried on a standard container wagon, including refrigerated containers up to 2,600mm wide. This is the recommended height for renewed structures
WCML	West Coast Main Line
WTT	Working Timetable

