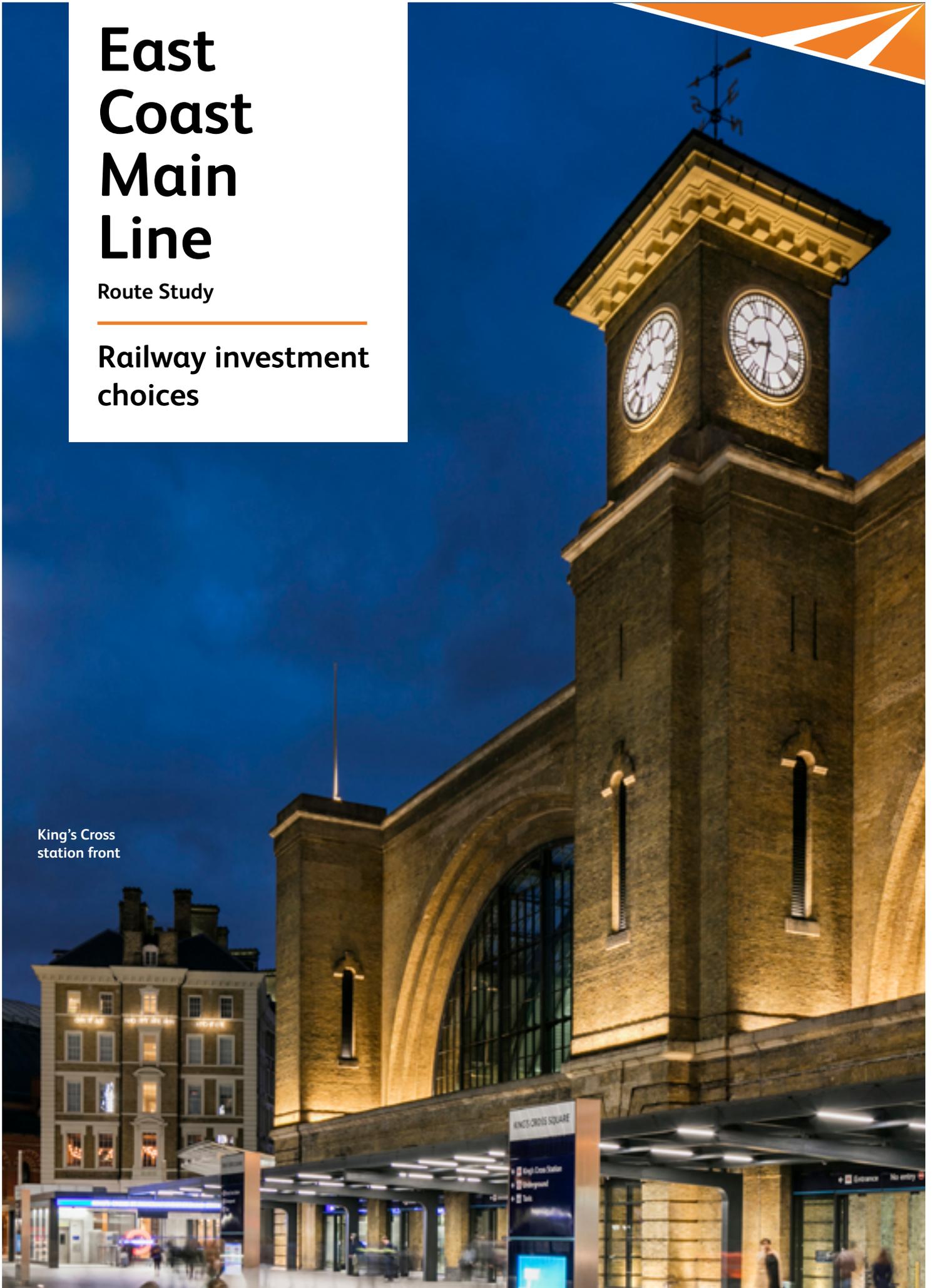


East Coast Main Line

Route Study

Railway investment choices

King's Cross station front



Foreword

We're pleased to present these Railway Investment Choices for the East Coast Main Line railway. The ECML, as we call it, is a great British railway – at the cutting edge of new rail technologies and steeped in tradition. It's a national asset vital to the economy of the UK, and investing in its growth is the same as investing in that economy.

From small but effective changes to the current network, to large-scale new developments, the improvements to the rail service set out in this study are all designed to facilitate economic growth. We plan for the long term, and you'll find large-scale investment options in this document that can keep the ECML growing to the 2040s and beyond. But in a world where public money is in short supply, we also need to be able to draw on a range of different funding approaches, and target investment in the near term to set us on the right path for long term growth. That's why the options we've developed here are investment choices.

Rob McIntosh

Managing Director, Network Rail London North East and East Midlands Route

Jo Kaye

*Managing Director, System Operator
Network Rail*

We've worked with colleagues from across the transport industry and also the wider infrastructure planning world – with devolved transport bodies, local and combined authorities, and local enterprise partnerships – to shape a range of railway improvements that support the communities and economies along the length of the ECML route. These are choices designed to meet the expected growth in demand for rail services, and which promote economic growth – we know that the ECML has untapped potential.

It's a virtuous circle where the ultimate beneficiary is the UK. So we'd encourage all those who want to see an improved railway to review these choices and find out more about the improvements that benefit them and the UK.

This document will be available for public consultation for 3 months: we'd welcome your comments and will use them to shape the final publication.

Exec summary

**41% UK
GPD:
£570bn**



A third of the UK population lives less than 20 miles from an ECML station and together they produce almost half of the UK's GDP

The East Coast Main Line – ECML – is a fast, high yield route connecting London with the North and Scotland. A third of the UK population lives within 20 minutes of an ECML station; together they produce 41% of the UK's GDP.¹ This sort of reach and economic value means that train operators and local stakeholders are keen to increase journey opportunities and improve journey experience for their customers. Network Rail economic forecasts also show that this trend for increased demand on the ECML will continue through to the 2040s.²

In parallel with the need for growth requirements, the ECML infrastructure is ageing, and much of it is at, or near capacity (in terms of the number of trains per hour able to use it). Investment is needed to create a resilient ECML that can grow in line with the demands of its customers. And the range of rail customers

is growing, with an increasing number of devolved transport bodies being established to specify rail services and commission improvements at a local level.

So it is in response to changing railway landscape that the ECML Route Study has been developed, in consultation with the rail industry and wider infrastructure planning stakeholders.

It builds on the Route Studies previously published as part of the established Long Term Planning Process, but the objective here is to provide a simpler summary of investment choices that a wider range of potential funders and promoters can use to shape how the railway supports their growth objectives. This document provides a 'menu' of enhancement options that have a strategic fit with the national network, and can be progressed for further development.

It is supported by more detailed analysis that can be accessed via links in the pages that follow.

The options presented range in scope from relatively small changes to current train services, through to proposals for new, large scale civil infrastructure that can enable new services. The key option types are:

- making the best use of the current system through changes to existing train services;
- recommendations that show the need to complete enhancement schemes already in development;
- near term solutions supporting passenger demand and better journeys through digital train control technology and the provision of more reliable infrastructure;
- longer term infrastructure options that can unlock unexploited opportunities, new markets and provide a step change in service levels.

To shape the investment landscape and provide a strategic direction to guide the rail industry and local investment community, the ECML Route Study highlights key strategic themes that need to be addressed on the route.

Chief among these are the need for resilient infrastructure that is reliable, and the use of digital technology to unlock capacity and improve customer experience.

These are components of a wider strategy that has been developed as part of the consultation process. The need for the ECML to respond to growth and demand for improvements has been considered in the light of the constraints of the current rail network. Then, by applying the strategy, a range of investment options have been identified that provide a good strategic fit.

¹ Office of National Statistics Gross Value Added

² Link to Network Rail Market Studies

The Department for Transport, as part of the 2017 HLOS, has published its expectations for passenger growth over the period 2019-2024 and beyond. These forecasts differ from those used for this route study, but also show continuing growth in passenger numbers across the whole network throughout the period. The rail industry will continue to review growth forecasts and incorporate revised data into the strategic planning processes.

³ Click for more information on the Long Term Planning Process

Summary of choices

The strategy for the ECML can be summarised as follows:

1. Evaluate demand and define options to meet it
2. Respond to a full range of customer and funder needs
3. Invest in a safe and resilient railway
4. Consider affordability; define improvements in steps
5. Apply digital technologies including train control
6. Remove bottlenecks and the constraints of mixed traffic
7. Enable higher more uniform speeds
8. Broaden funding opportunities, including private sector



Over the coming years, in addition to the ‘internal’ challenge of providing reliable infrastructure and timetables in the face of an ever-growing railway, the ECML will have to respond to two main ‘external’ factors that define the investment choices presented in this study.

The first is a steady and constant growth in passengers wanting to commute into major urban centres by rail. The second is the introduction of high speed rail connections between London and the North, with the advent of HS2 phase 2 from the 2030s.

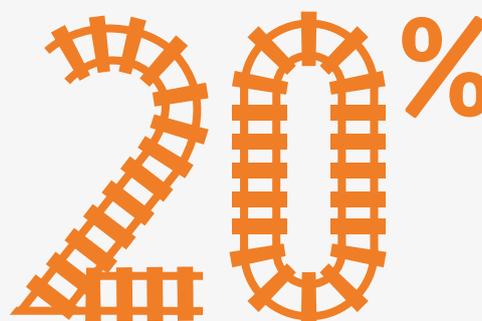
The first forms a challenge that will require near-term action in order to meet demand. Options to increase suburban passenger numbers into London are presented below. These include using long distance services to help with peak demand, and options to provide additional trains on the Hertford and Moorgate suburban branches.

New forms of digital train control technology will be key to enabling these additional trains to fit on the network while maintaining timetable reliability.

On the other hand, the introduction of HS2 presents long-term opportunities. By providing fast regular travel from London to Leeds, York and beyond, HS2 will free up significant overall capacity. That means that the ECML route can be used to drive better connections and more journey opportunities. Here, the focus will be on identifying how those opportunities can be developed to encourage economic growth.

The role of devolved transport bodies will be important in this respect: Transport for the North, Midlands Connect, and the combined local authorities whose communities use the ECML all have visions for how best to promote transport improvements to shape growth in their regions.

And to support such aspirations, a range of options that promote economic growth through better connections are presented in the study:



London Suburban Passenger Growth 2012 to 2023

- fast suburban services that exploit the speed of the ECML to link people to jobs and links between business;
- improvements at hub stations along the route to make the most of the ECML links with the wider network, and to allow better interaction between local and mainline services;
- a package of major infrastructure investments that can unlock:
 - a step change in service provision across the North, linking the trans-Pennine route with York, the Tees Valley, Durham and Newcastle
 - journey time savings of over 10 minutes between London and Scotland.

Also presented for consideration are proposals for new and improved stations that could unlock new markets and drive growth in revenue.

These sorts of enhancements get to the heart of the need to align railway improvements with a broader range of funding streams. Whether it is in the form of housing development contributions and commercial returns, or through devolved government bodies unlocking the benefits of growth on local economies – investment in rail needs to evolve as part of an innovative future that targets increased productivity and growth.

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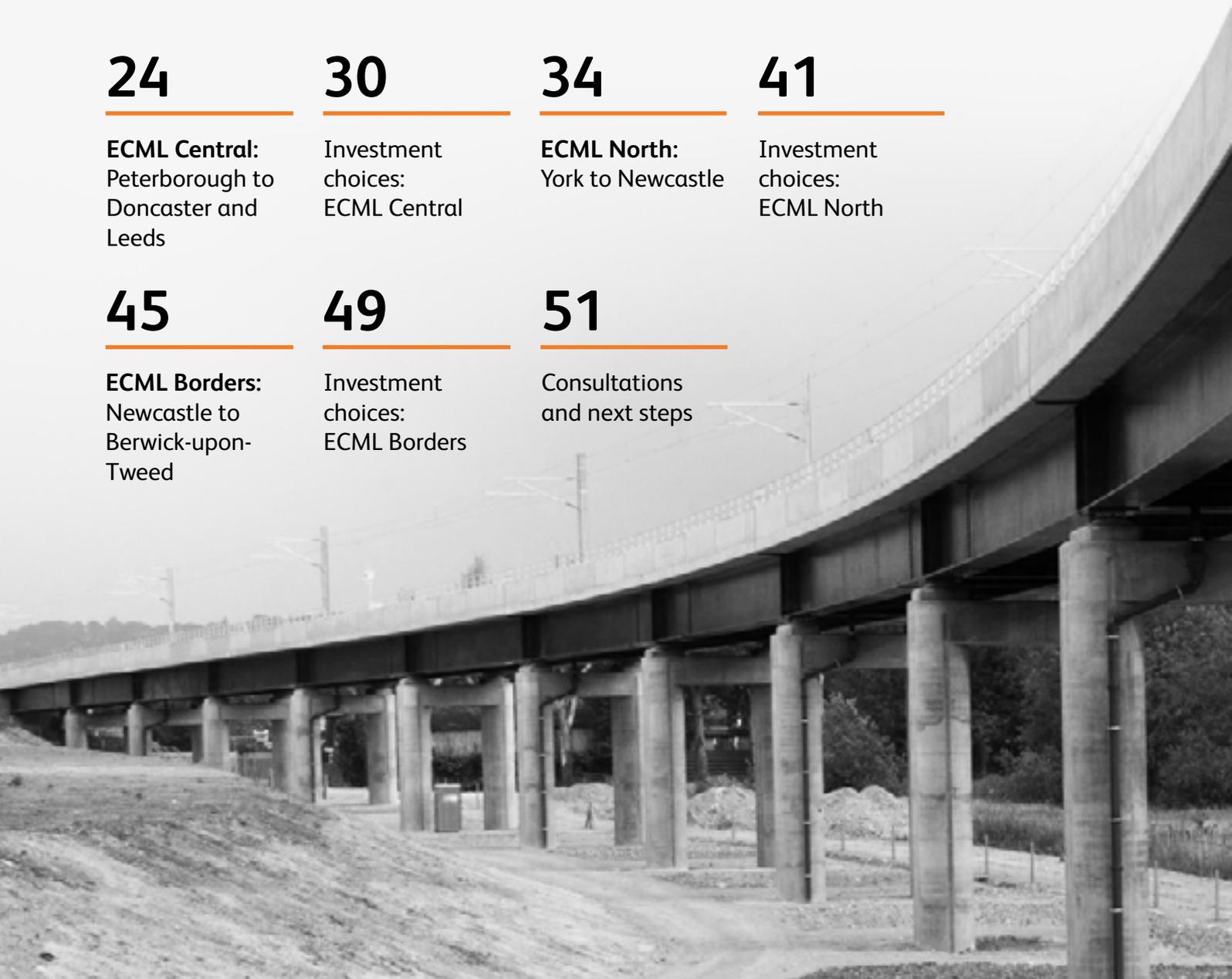
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Introduction

This document is designed to offer an investment strategy for the East Coast Main Line (ECML).

Its starting point is an understanding that growth in the provision of railway transport is closely linked to economic growth. Railways move large numbers of people and goods safely, quickly and efficiently; they allow millions people to get to and from work; they enable businesses to connect and grow; they support leisure and social activities – skills and learning.

Together, these activities form the economic engine that powers the UK economy, and investing in rail to promote growth forms an opportunity that an increasingly wide range of businesses and organisations show an interest in taking.⁴

This document is strategic in that it looks at the railway as it is now, yet also considers the challenges and opportunities that are likely to occur over the next 30 or so years. The aim of doing this is to understand how the railway needs to adapt and be improved in the near future, and to do so in such a way that long term growth is encouraged. The railway is a complex system with infrastructure that lasts for many decades, and we need to be sure that the changes we make now will be relevant over the lifetime of the trains, track and technology that support it.

To further these goals, Network Rail has developed a Long Term Planning Process (LTPP).⁵ This allows us to consult colleagues in the rail industry and those who would like to promote the benefits of investment in rail transport, and to develop evidenced answers to some of the questions that will be asked of the railway over coming years.

As part of the LTPP, the consultation that has been carried out in developing this investment strategy has included train and freight operators – they're the voice of customers of the railway – passengers and freight end-users; we've also come together with central and local government and newly-devolved transport bodies such as

Transport for the North, the rail regulator, the end users of rail services such as ports and airports, local enterprise partnerships and chambers of commerce. And now we are seeking wider public feedback on this strategy: public consultation will be open through to March 2018.⁶

The breadth of this engagement aims to capture the widest range of voices with an interest in developing the service that rail offers. So, in the following pages, you'll find a summary of the East Coast Main Line route and of the challenges that the railway faces now and in the future. We'll also present a review of practical changes that could be made to the railway to meet those challenges, alongside major upgrades that could drive opportunities to grow the economies of the communities served by the ECML.

Together, these form investment choices: choices offered to a range of funders and investors, choices that are grounded in an understanding of how the railway works now and in future – and of how the users of rail want it to support their businesses and economies.

⁴ www.investineastcoast.co.uk

⁵ www.networkrail.co.uk/running-the-railway/long-term-planning/

⁶ [Link to consultation details](#)
This is a public document designed to be read by a wide range of people. In producing it, efforts have been made to use plain English, even when describing technical railway issues.

The East Coast Main Line route

As part of the rail industry strategic planning, the scope of the railway covered in this document has been defined according to the geography shown in the map below. It represents a network that supports passengers and freight end users, and which contributes to a large part of the UK economy.

The ECML route aligns to the organisational geography of the rail industry, and the different rail service sectors that operate on the route. Where there are ‘boundaries’ – with Scotland or West Yorkshire – these are conceptual not physical. In looking at demand and the needs of the people that use the railway, analysis has taken account of the whole journey that trains make. In this way, the investment focus remains on services, and remains fully aligned to analysis in neighbouring areas. This alignment is managed nationally through the LTPP; rail studies that cover adjacent routes in Scotland and England can be found on the Network Rail website.⁷

The ECML – runs on an alignment that dates back to its construction in the

1850s. Over the years, improvements have resulted in significant sections of four-track railway being added, along with overhead electrification, and the route can support fast trains up to 125 mph over much of its length, from King’s Cross in London to Leeds and Edinburgh.

Adjacent routes that offer connections to destinations in London, Hertfordshire, East Anglia, Lincolnshire, the East Midlands, Yorkshire, and the North East.

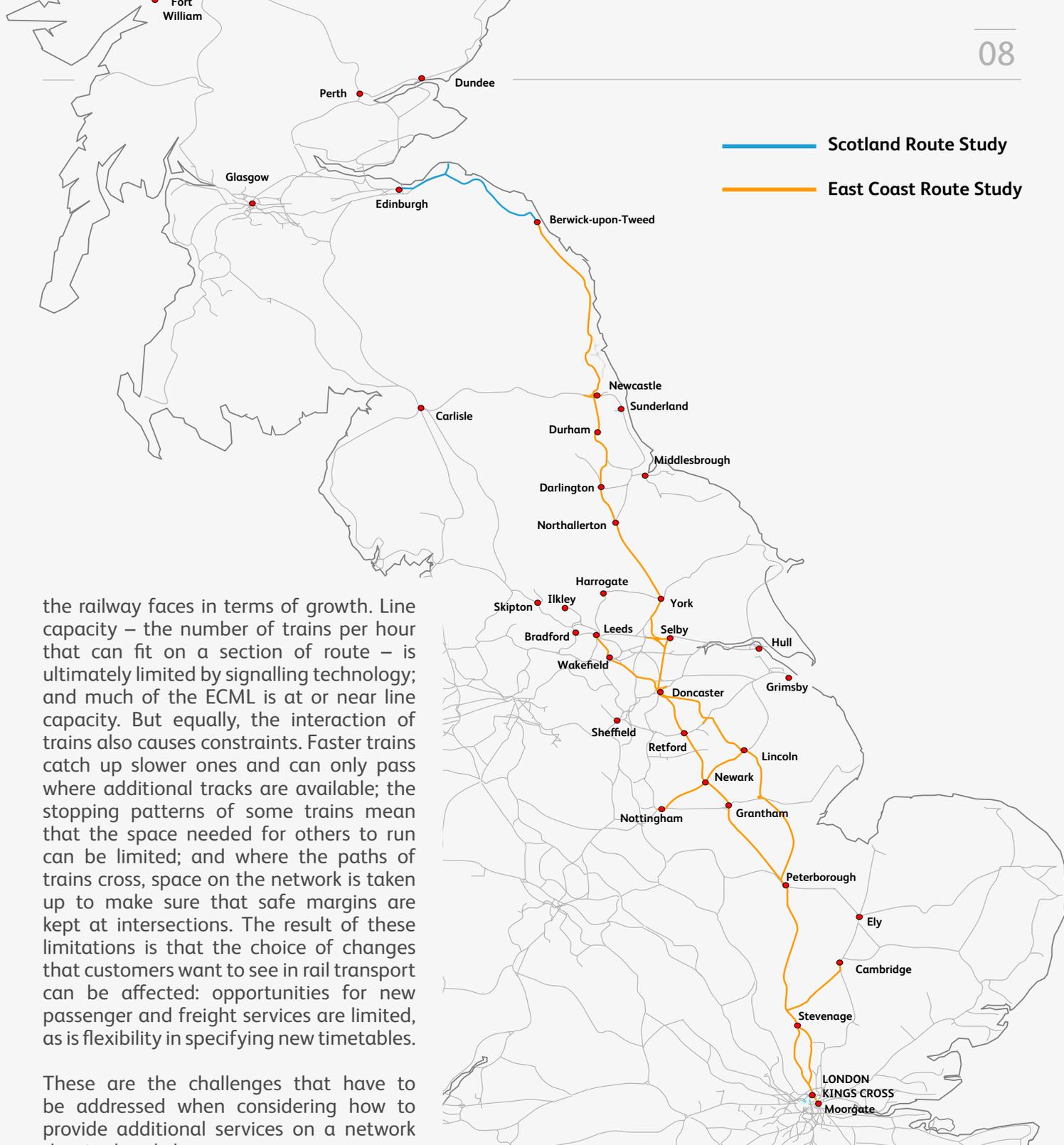
An important consideration in understanding the nature of this railway is the diversity of train services that it supports. 125mph passenger trains share the infrastructure with freight services that carry millions of tonnes of goods and commodities to and from ports and terminals across the national network; urban and inter-urban services also use the same network to transport millions of passengers into London, Leeds, Newcastle and the other urban centres across the route. Direct cross-country trains use the route to link destinations in southern and southwest England and the Midlands with Yorkshire, the North East and Scotland. At the southern end of the route, the Moorgate and Hertford loop branches accommodate frequent metro-type services into London, while ‘outer suburban’ services allow travellers to commute into London daily from Stevenage, Cambridge, Peterborough and beyond. A portion of the route links the east coast ports and Peterborough to Doncaster via Lincoln – this forms part of a national strategic freight corridor as well providing local passenger services.

These services enable connections to be made not just to London, but between those destinations, linking towns and cities along the east of the UK that account for a third of the UK population, and almost half of its economic output.⁸

In the diversity of services using the infrastructure lie some of the key challenges

⁷ <https://www.networkrail.co.uk/running-the-railway/long-term-planning/>

⁸ Office of National Statistics Gross Value Added



Context and challenges

Demand and growth

As a whole, the ECML enables in excess of 80 million passenger journeys per year, covering some 8.3 billion passenger kilometres. In 2014-2015, the East Coast franchise delivered £233m in franchise payments to government.

ECML enables in excess of 80 million passenger journeys per year, covering some 8.3 billion passenger kilometres.

To understand what changes may be required of the railway, economic analysis has been carried out as part of the planning process. This allows demand to be forecast: demand for increased use of existing services (more seats needed on current journeys), and demand for new services that increase opportunities to travel between places (better connectivity).⁹

Both types of demand effect economic growth: if there aren't enough seats or competitive freight paths to meet demand, the economy will be slowed; equally, providing better connectivity will unlock opportunities to drive further growth. So the two investment themes that are addressed in this document are firstly to prevent rail travel restricting growth, and also to promote opportunities to allow rail to facilitate economic growth.

Increases in existing demand present a challenge to the industry that can either be met by providing more seats or wagons (usually this means longer trains or new rolling stock), or by providing an increased frequency of service – more trains. Promoting growth through better connectivity often requires more train services.

In this document, passenger demand will be summarised for each of the route sections within the geographic scope.

Freight services are often long distance, covering more than one section of the ECML – indeed of the national network. To avoid diluting the importance of freight across the whole geography, a separate ECML freight demand and context 'chapter' has been produced to read alongside this document.¹⁰

Then, based on both passenger and freight demand, a range of changes and upgrades will be considered that can respond to demand, and drive growth.

The starting point

When creating demand forecasts and modelling the proposed changes to railway services and infrastructure, it is necessary to have a 'baseline' against which comparisons can be made. To do this, assumptions need to be made; these include the characteristics of the rolling stock using and planned to use the railway, and also assumptions around what infrastructure will be available.

On the ECML, a fleet of new Intercity Express Trains will be introduced from 2018 to the early 2020s. These new trains will be enabled by a series of infrastructure enhancements that have been targeted for delivery: they include additional tracks, loops that allow overtaking, and a separated junction that allows trains to cross the ECML without conflicting with through services.¹¹ With this infrastructure in place, the timetable can be recast to optimise the operation of the new faster trains. This will result in better journey times, more frequent services, and more seats. The demand forecasting has been carried out with this in mind.

Some assumptions also have to be made about what the longer term future holds for the railway. The UK government is supporting a long term national strategy that sees new high speed railway as a key to unlocking more capacity and supporting growth through better, faster connections, especially between the south of the country and the Midlands and the North.

Through rail industry Market Studies, improvements in connectivity have been expressed as 'conditional outputs'. These describe improvements in service frequency and journey time. Conditional outputs are aspirational targets that illustrate how the railway can respond to and drive growth. With conditional outputs, it is possible to test different service levels and to understand what changes need to be made to accommodate additional services. Those pairs of towns or cities which are set the fastest and most frequent conditional outputs are those which are expected to drive the most benefit in terms of the economy, benefits to individuals and the environment.

⁹ Rail Long Distance Market Study

¹⁰ Link to Freight Demand and Context document

¹¹ Details of the schemes planned for delivery can be found in the Network Rail Enhancements Delivery Plan

Plans to deliver HS2 are already in an advanced state, and in developing this strategy it is assumed that HS2 will connect with the ECML in the York area by the 2030s. This will allow new services to continue from the HS2 line onto the national network serving York, Darlington, Durham and Newcastle. HS2 provides a once in a generation opportunity to see a step-change in the provision of rail; it's an opportunity that the ECML services and infrastructure will need to respond to in coming years.

HS2 also presents opportunities south of York. Many of the passengers currently using the southern end of the ECML who are travelling between London and York, Newcastle, Leeds and Edinburgh will be able to use HS2 when Phase 2b is delivered. This presents an opportunity to use the ECML to offer other services that make use of the capacity released.

Funding environment

Historically, railway infrastructure improvements in the UK have been funded centrally, via national governments and Network Rail raising capital against its asset base. Where external, 'third party' investment has occurred, it has typically been for smaller-scale improvements.

Recent rail industry developments have seen a shift in that model. Network Rail has been reclassified as a publicly-funded body without the ability to finance enhancements through financial markets. Alongside this shift, a move to devolving decisions and spending on transport infrastructure to a more local level has seen the creation of Combined Authorities and Sub-National Transport Bodies, as well other organisations with a wider brief such as Local Enterprise Partnerships (LEPs). These groups are able to define the railway needs in their area, and apply for government funding – or attract or provide third party investment – to meet those needs.

Overall, this means that improvements in rail infrastructure should not be seen as an automatic pipeline of upgrades awaiting delivery; rather, they are choices that may or may not be taken forward depending on whether they meet the needs of rail users, provide a value for money investment, and are affordable.

To respond to such a funding environment, this document seeks to emphasise that rail improvements are choices, and to present a range of strategically-aligned choices to a broad range of funders and investors.

New ways of attracting funding and generating revenue

Network Rail and the wider industry have recognised the need to respond to the challenges of demonstrating affordability and efficiency for railway enhancements. The recent report by Professor Peter Hansford provides strategic direction in this area.¹²

Where faster journey times or new journey opportunities and the opening of new markets are made possible, increased revenue becomes possible. This will, and always has, aided the affordability of schemes, as the funder can recover much of the increased revenue through increases in franchise payments or reductions in subsidy. However, in many cases this will not be sufficient to give a funder an adequate financial return on the full investment. In these cases, the challenge becomes one of identifying what additional benefits are made possible by investment, and then finding ways for investors to see a return on their outlay. (Many funders may not seek a direct financial return as these other benefits may justify their investment.)

Later in this document, investment options are presented that offer a mixture of improved reliability, additional service opportunities, new travel markets, property development, faster journey times, heightened safety and better socio-economic and environmental outcomes (for example, urban regeneration or cleaner air through less traffic waiting at level crossings).

These benefits would accrue to a range of organisations:

- existing franchise operators and their shareholders;
- national governments through the payment of franchise premiums and the profitability of Network Rail;
- open access and freight operators and their shareholders;
- businesses in towns and cities served by the railway;
- developers wishing to build and sell property that benefits from rail links;
- planning authorities who will see their regional economies and rates revenue grow;
- owners of land and property (individuals and businesses) who see an increase in the value of their land and property as a result of the rail investment.

Realising a return on rail investment across such a broad range of stakeholders is not straightforward, and innovative ways of benefits sharing and financing need to be explored. Network Rail, on behalf of the rail industry, encourages public consultation on this document to further the debate in this area, and to find ways to make innovative investment models a reality.



¹²www.thehansfordreview.co.uk

Defining a strategy for growth

One of the aims of this document is to provide a strategic view of the direction that the ECML should take. In identifying the strategy, the rail industry Long Term Planning Process has been used to consult a wide range of stakeholders. In this way, the needs of passengers and freight users and their advocates – the operating companies – have come to the fore. These needs have then been looked at in terms of the current and future transport environment, and railway operational and asset management strategies.

The result shows that the already-busy ECML railway, is going to need to respond to the demands of growth, from a broad range of stakeholders; it will do so against a background of rapid developments in transport technology, pressing environmental concerns, and competing claims for funding resources. This picture contains both challenges and opportunities that need to be addressed by a strategy that can be used to inform investment choices that meet and promote demand, and to shape how the London North East and East Midlands (LNE & EM) Route includes those aspirations as part of its business model.

Overall, the strategy for the ECML can be captured in eight steps:

1. Evaluate demand and define options to meet it.
2. Respond to a full range of customer and funder needs.
3. Invest in a safe and resilient railway.
4. Consider affordability; define improvements in steps.
5. Apply digital technologies including train control.
6. Remove bottlenecks and the constraints of mixed traffic.
7. Enable higher more uniform speeds.
8. Broaden funding opportunities.

1. Evaluate demand and define options to meet it



A key purpose of the strategy is to define options that respond to immediate and near term increases in demand. These could range from options that enable

trade-offs between the different services that use the network, through to affordable improvements in infrastructure and using planned renewal and maintenance work to enable the network to deliver more.

Trade-offs and choices to respond to increases in demand can include:

- Making changes to timetables (for instance stopping patterns).
- Rolling stock changes like high-performing commuter trains or more powerful freight locomotives.
- Technological interventions like digital signalling and traffic management solutions.
- Physical civil engineering infrastructure improvements like additional tracks.

Looking ahead over the next 5 to 10 years and defining how demand for existing services is likely to grow will enable an understanding of whether extra capacity is required. Once an understanding of additional capacity has been formed, ways to meet demand will be identified. Longer term forecasts will also be made; this will guide a more strategic understanding of how the railway needs to change, and how near-term changes can be integrated into a longer-term vision.



¹³ Recent research by Transport Focus shows reliability-related improvements form 4 out of the top 10 priorities for rail passengers in 2017. Rail passengers' priorities for improvements 2017.

2. Respond to a full range of funder and customer needs



The aim here is to acknowledge that the range of organisations interested in investing in rail transport schemes has broadened, and will grow further.

Commercial organisations may look to rail to provide direct financial returns, or to unlock the benefits of improved business to business links; local authorities will want to use rail transport to drive wider economic benefits for whole communities. That means that rail investment strategies will need to canvas a range of stakeholders and understand the outputs that they require: it is the approach that has been used in preparing this study. To meet such requirements, a range of strategically viable solutions need to be developed and offered as choices.

3. Invest in a safe and resilient railway



The ECML strategy will seek to put in place safer, more resilient systems: that means designing infrastructure that poses less risk to those who use it or repair it; it means designing

systems better able to withstand environmental conditions and physical wear, and also managing recovery from asset failures better with less impact on rail users. Resilience is closely associated with the performance of the railway: reliability allows punctuality. It is the strategic 'lever' best able to influence day-to-day performance.

Resilience and safety can be difficult ideas to capture in terms of rail enhancements. The railway is a safe system because it is already designed and operated to strict standards and processes. And changes to the railway system have to conform to these rules. But, by being explicit about promoting improved safety when specifying changes and upgrades, it is possible to go beyond mandatory specifications and drive improvements in what is already a very safe way to travel. So, as part of this strategic theme, specifying and designing enhancements with safety in mind will be promoted.

Resilience and safety are intrinsically linked. Resilience means that the railway system should be resistant to the things that cause disruption to the service it provides: for example, extreme weather conditions or trespass onto railway lines.

It also encapsulates the ability of the rail system to recover when things do go wrong. Preventing loss of service and recovering from it better are rail performance areas that offer enormous opportunities in terms of improving passenger experience and realising financial benefits.¹² Driving improvements in resilience is expected to drive reductions in safety risk because, the less remedial activity that has to take place, the safer passengers, rail workers and members of the public will be.

When specifying enhancements to the railway, building-in resilience, and designing-for resilience will be key considerations.

4. Consider affordability; define improvements in steps



Affordability is a factor that the strategy must also address. The railway must compete for scarce funding and resources. To address these issues, this strategy seeks to promote an

incremental approach to enhancements.

In presenting investment choices, there is a danger that a perception emerges that only long term, high impact railway enhancements are desirable. The aim of this theme is firstly to show where lower cost choices exist, and secondly to illustrate how long term service aspirations might be delivered through a series of individual affordable steps, with each stage contributing incremental benefits while still contributing to an overall strategic set of outputs that can drive real economic change.

5. Apply digital technologies including train control



Bringing new digital technology to bear on the issues that limit growth is a pillar that supports this strategy. New approaches to train control offer ways to increase line capacity on existing track layouts. By linking to new approaches to traffic

management, this also has the potential to make the timetable more reliable by providing smart ways to avoid and recover from disruption, and to improve safety through enhanced train protection.

Digital technology should allow us to optimise the need for conventional civil engineering. Significant opportunities exist to integrate operations with train and freight companies in order to manage rolling stock and crew, and to improve customer experience – especially through improved information flows; these opportunities should be pursued alongside train control.

6. Remove bottlenecks and the constraints of mixed traffic



Where infrastructure improvements are an option, consideration will be given to the root causes of capacity limitations – for instance how fast and slow services

can run on the same route without getting in each other's way.

For the ECML this theme is an overriding concern when attempting to manage demand and promote growth. Railway upgrades should seek to address these issues.

7. Enable higher more uniform speeds



One of the main selling points of rail travel over other modes is speed: journey time improvements are a key way in which economic benefits are realised through train travel. 'Train time' – the ability to work or do other things while travelling

– is currently an important differentiator between train travel and car travel. But with autonomous vehicle technology moving at pace, over the longer term, rail will increasingly rely on reducing journey times in order to remain competitive. Enabling trains to run faster will be central to this goal.

8. Broaden funding opportunities



The ability to deliver enhancements flexibility, in steps, should also be matched by a broader, more flexible approach to funding and financing railway enhancements.

- More of the beneficiaries of rail improvements should be encouraged to invest: for example housing, land and commercial property developers.
- Opportunities to employ pooled and shared funding models should be sought.
- Rail improvements should be aligned with local planning strategic priorities and funding.
- Innovative ways of financing and leveraging the returns made possible by rail should be explored.

Broadening funding is a strategic theme that goes hand-in-hand with responding to a greater range of potential investors. Opportunities need to be presented in such a way that potential investors can understand a clear route to benefits; and more, innovative ways of bringing investment into the railway need to be considered.

The remainder of this document has been organised according to geographic sections of the ECML route that correspond to service patterns, local strategic plans, and railway geography. Each section will provide an overview of:

- The Trains: current services and sectors.
- The Region: the local economy that the railway serves.
- Growth: medium and long term demand and the service outputs needed to meet it.
- Strategic Highlights: how the themes that underpin the ECML strategy shape change.

Railway sections covered

1. London King's Cross to Peterborough
2. Peterborough to Doncaster and Leeds
3. Doncaster to York and Newcastle
4. Newcastle to Berwick-upon-Tweed

The ECML also stretches some 54 miles from Berwick-upon-Tweed to Edinburgh. The strategic investments for this section of the route are contained in the Scotland Route Study, available on the Network Rail website.¹⁴

¹⁴ www.networkrail.co.uk/wp-content/uploads/2016/11/Scotland-Route-Study.pdf

With its London home in one of the country's great stations – King's Cross – this southern portion of the ECML runs 76 miles to Peterborough. Along with the Hertford Loops and Moorgate branch, the railway here provides for millions of daily journeys into and out of the capital.

The trains

Currently, up to 6 long distance high speed trains leave London King's Cross each hour, with franchised and open access operators serving destinations in Lincolnshire, Yorkshire, the North East and Scotland.

Outer suburban services link London with Stevenage, Cambridge, King's Lynn and Peterborough, and a metro-style commuter services links Hertfordshire with central London via the Moorgate branch.

From 2018, with the introduction of the Thameslink timetable, the ECML will be linked with the railway network south of London, and services will run from Sussex and south London, through central London to Stevenage, Peterborough, Cambridge and King's Lynn. The inner suburban services that link Moorgate with the Hertford loop will also increase in frequency. A mix of new 8 and 12 car trains will be used, offering an increase in passenger capacity to serve the capital.

Freight traffic on this section of the route is typified by container services from the deep water London ports, along with aggregates trains. Freight using the north London line joins the ECML in the Finsbury Park area for destinations in the Midlands and North¹⁵.

The region

This section of the ECML runs through London, Hertfordshire and Cambridgeshire. With a gateway to London, the region is a strong wealth creator.¹⁶ The newly developed area around King's Cross station is a testament to London's international role as a driver of growth, evidenced by Google's decision to place its London headquarters next to the station. Increasing demand for daily travel into London is a feature of the strategic outlook for this railway.

Hertfordshire and Cambridgeshire are significant economic engines in their own right generating over £60bn in economic output. Hertfordshire boasts a high level entrepreneurial endeavour and is also home to a highly-skilled workforce. This is a fact reflected in the clustering of high tech industry along the ECML route. With major sites at Stevenage and Ware, GlaxoSmithKline has invested significantly in the county, while Airbus have recently underwritten the importance of a knowledge-based economy through the opening of a new education centre at its space research site in Stevenage.

With a world class university at its core, promoting the links between education, skills, research and innovation characterise Cambridgeshire's economic strategy. As a result, the demands for a highly skilled workforce have contributed to Cambridge having the fifth fastest growing population in the UK. And linking skills, innovation and a qualified workforce is reflected in the importance of the rail corridor from the ECML up to Cambridge which will see 6 off peak services per hour to London King's Cross from 2018.

Peterborough is a key hub on the ECML. It forms the northern end of the London suburban network, and also links services from east Anglia with the North and East Midlands. With a main line journey time of 50 minutes to London, and relatively low property and land costs, Peterborough is an attractive location for business, and for people wishing to travel to London for work. This is reflected in high levels of business creation in the town.

It is both through providing better links between enterprises, and getting the right workers to the right jobs that rail transport best supports economic growth. And by removing distance as a barrier to travel, fast rail services create the sort of linkages that accelerate that process and add real value. For instance, using mainline rail, Stevenage is only 23 minutes from central London; the same journey time would allow a traveller to cover less than 10 'as the crow flies' miles from south London into Victoria station. That is why exploiting the speed of rail transport to improve journey times is a key priority for this section of the ECML route.

¹⁵[Link to Freight Demand and Context document](#)



Adjusting the stopping patterns of long distance services to support outer suburban markets is therefore a cost effective way of remedying possible overcrowding on those services, albeit with a potential impact on journey times.

Although long distance seating capacity is forecast to keep ahead of demand, continued economic growth will require an increase in journey opportunities for passengers. This can be seen in terms of a demand for better connectivity – more opportunities to travel between more destinations.¹⁹

The introduction of HS2 will have a significant impact on the ECML over the coming decades, and will offer opportunities to respond to demand for better connectivity. HS2 is expected to serve Leeds and destinations on the north of the ECML by 2033. The immediate impact of HS2 will be a significant transfer of passengers from existing long distance services to high speed. This released capacity can be used to provide the better connectivity demanded by a growing economy. As mentioned, the growth in outer suburban demand could be catered for with more long distance trains stopping at intermediate locations. Opportunities will also be available for opening up new or under-served markets: better links between Cambridge and East Anglia, and Yorkshire and the East Midlands would be attractive.

Growth

Rail industry economic analysis forecasts that demand for daily overland rail travel in and out of London grows constantly. By 2030 over 7,000 additional seats will be required into London from the ECML in the morning rush hour.¹⁷ And while peak hour commuter traffic will continue to be critically important, passengers will expect regular ‘turn up and go’ services to be the norm throughout the day; this will be the case not just on the inner-suburban routes, but also for the outer suburban markets serving, Stevenage, Peterborough, Cambridge and beyond.

The continued growth in these outer-suburban journeys means that by the mid 2020s there is the likelihood that peak hour services will be crowded, with some passengers having to stand for longer than 20 minutes.¹⁸

For the long distance services that use this part of the route, demand is forecast to stay within the available seating capacity; this is a reflection of a large increase in capacity brought in by the new intercity express fleet in the early 2020s.

¹⁶ [Link to Office of National Statistics Gross Value Added tables.](#)

¹⁷ The potential introduction of Crossrail2 from the 2030s could help manage growth in these markets, but the scheme has not been used as a factor in demand projections to 2030.

¹⁸ [Link to ECML Demand and Capacity.](#)

¹⁹ [Long Distance Market Study](#)

Strategic highlights

Thinking about the London to Peterborough route section in terms of the overall strategic themes presented earlier leads to the following key considerations.

Providing the services that passengers need

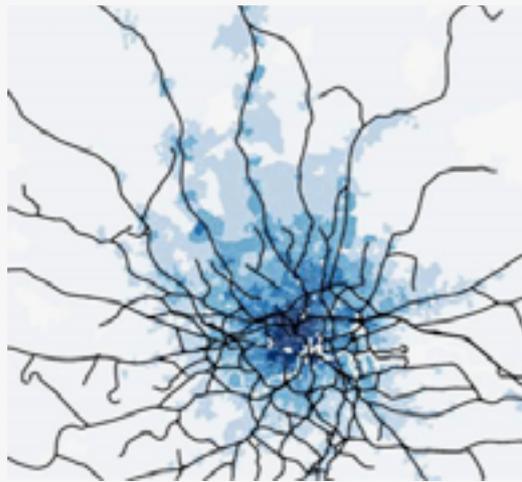
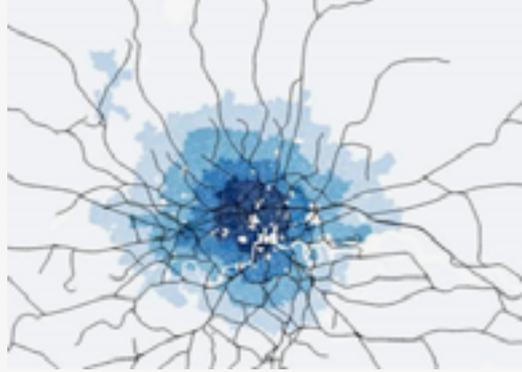
There are two strategic priorities on this section of route:

1. Providing enough suburban passenger capacity into and out of London.
2. Supporting growth in the long distance market by enabling better connectivity, and more opportunities to travel.

For the inner-suburban market, the challenge is to keep up with a fast increase in demand. Current franchise operators are already committed to providing an increased frequency of service, along with new trains that can carry more passengers. For services using the Moorgate branch, the most cost-effective way to provide more passenger capacity will be to increase the frequency of trains.

Electing to provide more services rather than longer trains is driven by the fact that the Moorgate branch operates in tunnels, with key stations being underground. As a result, providing the longer platforms needed by longer trains, is a complex and expensive undertaking.²⁰ To provide sufficient passenger capacity through to 2030, the rail industry predicts that 2 additional peak services will be required in and out of Moorgate, with a third soon after. To enable these trains, upgrades to the rail infrastructure are required, based around signalling and the control of trains which can be a cost-effective solution. Providing the capability for suburban trains to turn around at Stevenage is also a priority for managing growth in this market. The current station layout sees trains from the Hertford Loop having to share track space with mainline trains. This causes a conflict which reduces available line capacity. By building a separate platform for suburban services, this conflict will be removed, increasing capacity and reducing the potential for train delay.

Outer suburban and long distance trains both share the same core ECML infrastructure, and the challenges for these markets are intertwined. To enable more seating capacity for outer-suburban passengers, changing the stopping patterns of some long distance services is the simplest solution. With many outer suburban services already running 12 car trains, the next step to significant growth for both markets is to increase journey opportunities and the number of services running each hour.



The time contour maps above show the time it takes travellers to reach London King's Cross in the morning peak. Less than 20 minutes (darkest) 20 to 30 minutes, 30 to 40 minutes, 40 to 50 minutes (lightest). The map at the top shows car travel; the one on the bottom shows the much greater distances achievable by rail.

To do this, we will need to overcome the physical limitations of the remaining two-track sections of the route section. The railway through the Welwyn area – over the Victorian Digswell viaduct and through tunnels – forms a pinch point hampering growth, as does the section of two-track railway over Stilton Fen, south of Peterborough.

Of the two, Welwyn is the most pressing as it controls the route north and to Cambridgeshire; building infrastructure solutions to fix this constraint is an extremely costly undertaking. However, by employing digital signalling, headways – the safe distance between trains – could be reduced, allowing more trains to run through the section in a given hour. Freeing up additional line capacity also provides the option of reducing the risk to timetables caused by and train delay (extra line capacity makes recovery from timetable disruptions easier).

²⁰ Options that use selective door opening – where those parts of the train that extend beyond the platform have their doors locked out of use, and passengers have to move to an adjacent carriage to alight – are possible, but are not recommended as strategic solutions.

Alongside this technological intervention, it would also be possible to unlock line capacity by changing the stopping patterns at intermediate stations like Welwyn North. The time it takes trains to slow down, stop, and accelerate again uses up a good deal of available line capacity. Trade-offs between the convenience of regular suburban stops and longer distance line capacity need to be taken into consideration when specifying future service patterns.

Journey times

As new signalling technology is put in place, opportunities exist to improve linespeeds up to 140mph and drive down journey times. Making these improvements can be costly as infrastructure including overhead line equipment and bridges may need to be upgraded, and level crossings replaced by bridges. But putting in place these improvements enables other significant benefits like improved reliability and reduced delay, and better safety; taken as a whole, linespeed and reliability improvements represent an attractive form of infrastructure investment. A package of such improvements has been identified, and could offer journey time reductions of a minute on Stevenage journeys to London, and 2.5 minutes saved between London and Peterborough (see the 'Investment Choices' section of this document below).

Technology

The two-track sections of railway at Welwyn and south of Peterborough impose limitations on line capacity. By replacing conventional signalling with in-cab digital technology, headways – the safe distance between trains – could be reduced significantly. This provides some additional line capacity which could be used to fit more trains on the network; additional capacity could also be used to reduce the risk of delay (by reducing headways but not using all available line capacity, the risk of delay is reduced because it is easier for the timetable to recover from any delay-causing incidents). With new technology comes the need to agree the best balance of potential benefits that it can enable.

Digital signalling technology also enables smarter traffic management, which means that trains can be managed more flexibly in relation to each other. This results in better reaction to any unexpected incidents, and smoother pathing for freight services, so that they have to give way to faster services less often.

With a main London terminal station and a large number of commuter journeys, passenger information and ticketing technology is important for the strategic growth of this railway route. Smart ticketing and barrier-less stations will offer very significant improvements in door-to-door journey times and travel experience. Options to put in place such technology are being developed at an industry-wide level, and are implemented through the franchising process.

Safety and resilience

In common with other sections of the ECML route, infrastructure reliability has not been as required on this section of the route in recent times. This is because it is a network that gets busier each day, but which contains infrastructure and equipment that is working beyond its expected life span. Such infrastructure is expensive to maintain and prone to failure; and when it does fail, its ageing design means that it can take a long time to fix.

If we add to this situation the fact that the route is forecast to get busier with the advent of Thameslink, and will be linked to the timetable south of London, then the potential for an increased risk of delay is significant between London and Peterborough.

The rail industry will mitigate this kind of risk through the focussed renewal of the existing infrastructure, and through developing robust timetables and operating practices.

And by placing safety and resilience at the heart of our enhancement plans, it will be possible to bake reliability into the designs of the future. There is a virtuous relationship between new replacement equipment, improved safety, faster journey times and a more reliable network system.

Investment choices: ECML South

The immediate investment priorities on this part of the ECML are to increase asset reliability and implement those upgrades already planned or underway. These schemes are required to meet immediate

demand and franchise commitments. Items marked * are detailed in Network Rail's current delivery plan. Items marked † cover the whole ECML route, not only this section.

Growth package	Benefits	Cost ²²
Stevenage turn back platform	Enables capacity for 2 additional hourly services between London and Stevenage; reduces delay risk by separating commuter and mainline services.	Med
Huntingdon to Woodwalton four-tracking scheme *	Allows fast and slow trains to be separated which provides more line capacity. Along with the Werrington grade separation north of Peterborough, this scheme is required to enable an increase from 6 to 8 long distance services out of King's Cross. The schemes also allow journey times to be improved through a recasting of the ECML timetable and the use of new 'Azuma' intercity express trains.	Med
Peterborough down slow speed improvement *	Increases the linespeed on the approaches to Peterborough station, allowing trains to access and clear the station more quickly.	Low
King's Cross station remodelling *	Renewal of King's Cross track layout with modern equipment; enhanced layout allowing trains to clear the station approaches faster.	Med
Power Supply Upgrade*†	Upgrades the power supply for electric trains on the Moorgate and Hertford Loop branches.	High
Supplementary Renewals Programme †	A programme of additional renewals to replace life-expired infrastructure and improve reliability.	Very High

²¹ Network Rail Enhancements Delivery Plan

²² Low: up to £20m
 Medium: £20m to £200m
 High: £200m to £1000m
 Very high: >£1000m

Upgrades to deliver medium term demand

This package of upgrades puts in place the changes needed to meet demand through to the mid-2020s.

Medium term recommendations	Benefits	Cost ²³
<p>Moorgate Capacity. Enable more suburban journeys for passengers into London.</p>	<p>This intervention will allow up to 3 additional peak hour Moorgate trains to operate, providing the passenger capacity needed to meet demand to the mid-2020s (2 additional services), and the 2030s (3 additional). The intervention reduces signalling headways (safe distance between trains) and releases line capacity. Depending on the stopping patterns of proposed services, improved platforms or turnback facilities may also be desirable at Harringay, Hornsey and Bowes Park.</p> <p>The technology used would also allow further linespeed improvements to be added if required, and increase timetable robustness by enabling trains to be controlled more efficiently.</p>	<p>Med</p>
<p>Digital Signalling for the ECML. Increase line capacity and improve performance.</p>	<p>By replacing signals with digital technology, more trains can be safely controlled through two-track sections in the Welwyn area. This allows more flexibility in responding to any perturbations in the timetable, improving performance.</p>	<p>High</p>

Investment package that drives further economic growth

This package of investment is designed to exploit the possibilities of digital signalling technology, and use it to increase line capacity, improve reliability and reduce journey times. These are the sorts of improvements that can promote economic growth, and increases in revenue for the rail industry.

Growth package	Benefits	Cost ²³
<p>ECML South: journey time and reliability improvements.</p> <p>Linespeeds increased up to 140 mph by upgrading infrastructure; safety improvements are made by closing level crossings; the reliability of the railway is improved with upgraded infrastructure.</p>	<p>By upgrading the infrastructure between King’s Cross and Peterborough, linespeeds can be improved and journey times reduced: by 2.5 minutes between Peterborough and London King’s Cross; by 1 minute between London King’s Cross and Stevenage.</p> <p>The improvements would see a step-change in the reliability of overhead line electrification equipment, where the equivalent of thousands of working days in delay could be avoided each year.</p> <p>This scheme could be delivered in incremental steps: London King’s Cross to Welwyn; Welwyn to Offord; Offord to Peterborough.</p> <p>In order to achieve high 140mph linespeeds, it will be necessary to close level crossings and improve lineside fencing. This will drive an increase in safety on the route, and some reduction in delay.</p> <p>The proposals contained within this option include the closing of 10 level crossings between London and Peterborough. Closing level crossings is costly, and often suppresses the value for money assessment of this type of scheme. And to date, it hasn’t been possible to find a value for money business case to support this option.</p> <p>However, the need to close crossings is triggered by a risk assessment based on rail industry safety policy. Identifying opportunities to close level crossings and so reduce the risk that the railway presents is the right thing to do strategically. As an industry, finding better ways of valuing the benefits of closing level crossings could drive more positive business cases.</p>	<p>Very High</p> <p>(The scope of this package could overlaps with a Supplementary Renewals Programme for the ECML (see the base level options table above). Cost efficiencies could be expected if both options were implemented.)</p>

²³ Low: up to £20m
 Medium: £20m to £200m
 High: £200m to £1000m
 Very high: >£1000m

Revenue generation opportunities

The growth package outlined above offers opportunities to drive tangible revenue returns through faster journeys, improved connections and the opening of new markets. Apportioning these benefits across different funding contributors across government and commercial sectors will be necessary; here, risk and benefit sharing mechanisms across a range of investors could be explored further.

Additionally for this section of the ECML route, a rail-enabled housing development opportunity has been identified at Alconbury in Huntingdonshire.

Here, developers are working with Network Rail and train operators to look at the viability of a new mainline station to serve a major housing development of 7,000 new homes. Such a prominent rail connection would offer a major boost to housing values; in turn, this would provide significant opportunity to shape investment in any new rail facilities needed to support the community without impacting existing mainline services.

East West Rail

Reconnecting the communities and businesses along a transport corridor linking Oxford, Milton Keynes and Cambridge is an aspiration that has taken significant steps forward in recent months. In November 2016 the National Infrastructure Commission published a report highlighting the opportunities that could be realised by developing the corridor; and following announcements in the 2016 Autumn Statement, a new rail industry organisation is being set up to progress plans for rail options in this area.

A new railway here would intersect the ECML; as a longer term strategy, this offers exciting opportunities for improving connections and journey opportunities between the Southwest, East Midlands and East Anglia and the north-south corridor of the ECML. As a brand new railway linked to the wider network, East West Rail presents exciting opportunities to drive innovative ways of investing-in and building railway developments.

²⁴ [Link to Network Rail Level Crossings Policies](#)

²⁵ [NIC Interim Report into Cambridge – Milton Keynes – Oxford corridor](#)

²⁶ [East West Rail link](#)

ECML Central: Peterborough to Doncaster and Leeds

North of Peterborough, the ECML links the rural heartlands of Lincolnshire and Nottinghamshire with the conurbations of the North. Doncaster serves as a rail hub where 5 railways converge, including the electrified route through to Leeds. The GN GE joint line is a loop from Peterborough through to Doncaster via Lincoln, roughly parallel to the mainline; this is an important freight route, allowing freight trains to operate independently of the ECML.

The trains

The core long distance services that use this section of the route connect London with Grantham, Newark, Retford and Doncaster on the main line; trains turn off the main line at Newark to serve Lincoln, and in the Doncaster area to serve Hull. An electrified section of the ECML between Doncaster and Leeds also serves Wakefield, with some services extending to Bradford, Skipton and Harrogate

A number of inter-regional and local services connect with stations on this section. East Anglia and the North West are connected by an hourly Norwich to Liverpool service which calls at Grantham; Grantham also forms a stop on the Skegness to Nottingham route. At Newark, a rare at-grade crossing exists to allow east-west trains to cross the mainline at the same level. This is used by freight trains and a passenger service linking the Midlands with the city of Lincoln and rural Lincolnshire.

Doncaster station is a major hub for local, long distance and freight trains. Cross-country services from the south and Midlands connect at Doncaster en-route to Newcastle, while local services from all Yorkshire regions, Lincolnshire and the East Midlands converge on Doncaster.

This section of the ECML route is crucial for most types of freight traffic – from bio-mass trains feeding Yorkshire power stations, to time-critical container traffic from the east coast ports to terminals inland. Doncaster is an important freight hub, and the GN-GE route provides a strategic freight artery for north-south services.

The region

The ECML central section of the route runs through the transition between the north and south of the UK – and the east and the west. This is reflected in the diversity of the region and its economy.

Greater Lincolnshire is a major contributor to the nation's food manufacturing output, but also hosts thriving chemical, tourism and energy industries. The Port of Grimsby and Immingham is the largest port by tonnage handling over 59m tonnes of goods per year. Rail traffic to and from the ports connects the major energy and manufacturing providers in the North and Midlands, and accounts for over 25% of UK rail freight.

Growth in housing is also a priority for Greater Lincolnshire, with plans for the delivery of 100,000 homes before 2031. Linking this sort of population growth to jobs and businesses is a strategic priority for the region, and one where rail transport can play a pivotal role.

To encourage the sort of growth potential that better transport promotes, Midlands Connect has developed a strategy to shape transport development. The route linking Birmingham, Nottingham, Newark and Lincoln is seen as an 'intensive growth corridor'.

²⁷ [Link to Freight Demand and Context document](#)

²⁸ Midlands Connect is a pan-Midlands partnership of 23 Local Authorities, nine Local Enterprise Partnerships, the Chambers of Commerce, Highways England, HS2 Ltd, Network Rail and our Sponsor the Department for Transport. It aims to deliver the enhanced connectivity required to power the Midlands Engine, maximising the Midlands' position as a hub of the national transport network; driving economic growth, trade and productivity. [From the Midlands Connect Strategy](#)



To maximise the potential of the region, Midlands Connect have identified an increase in journey opportunities along with reduction in journey times as an important rail strategy for that corridor.

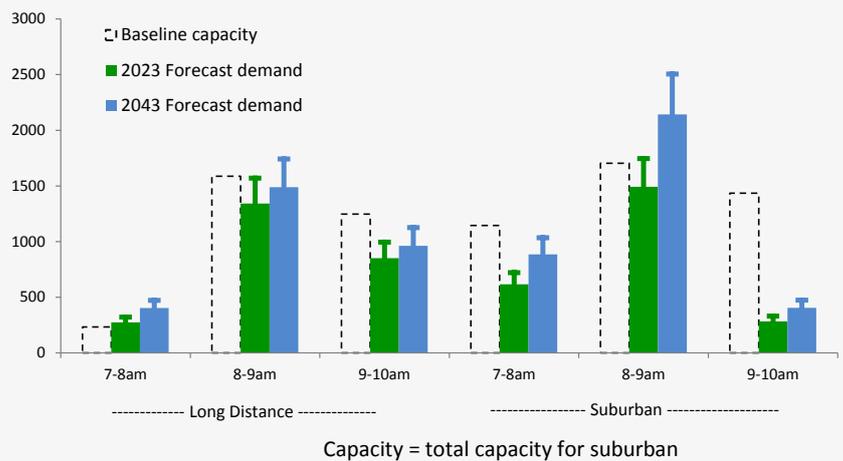
With a population in excess of 3 million and the city of Leeds at its centre, the towns and cities of the Leeds City Region area are hugely important destinations for the ECML. It is the biggest City Region outside the South East, responsible for 5% of England’s economic output. With annual output of £60.5bn, it is an economy of international significance and home to 119,000 businesses.

Although the region is still a manufacturing centre with over 140,000 people employed in the sector – the largest in the UK – economic growth is spread across a diversity of activity; this includes the financial and business service sectors centred around Leeds, and one of the largest higher education clusters in Europe. Challenges for the region include increasing productivity to drive a higher wage, lower welfare economy.

To achieve these goals, priorities for rail transport include ECML links to London, and inter-regional connections. Maintaining existing fast London services while increasing journey opportunities between the capital and centres such as Bradford, Wakefield, Harrogate and Huddersfield is desirable, as are the development of better east west connections between Leeds and West Yorkshire and the growth centres of Cambridge and East Anglia. Capacity for commuting journeys into Leeds along the Wakefield Doncaster Sheffield corridor will continue to be a rail priority.



Forecast demand and capacity to Leeds from Wakefield Westgate 2023 & 2024



Economic forecasts show that facilitating further growth through rail will require an increase in connectivity – more journey opportunities to more places served by the ECML. Using the capacity released by HS2 to provide this connectivity is the proposed strategic direction for the ECML.

Attractive options for how released capacity could benefit this region include:

- Cambridge to Leeds and West Yorkshire services
- London to Nottingham and the East Midlands
- Additional London services to:
 - Lincoln & Lincolnshire
 - Hull and East Yorkshire
 - Wakefield, Bradford, Huddersfield

²⁹ Leeds City Region Strategic Economic Plan

³⁰ Link to demand analysis

- More connections between intermediate ECML locations served less frequently now: Peterborough – Stevenage – Grantham – Newark – Retford – Doncaster

An area where capacity is likely to lag behind demand is on commuter journeys into Leeds. Here, demand levels are forecast to outstrip capacity in the longer term prior to 2043; these are journeys where HS2 is not expected to have an impact on demand.

Strategic highlights

Thinking about the Peterborough to Doncaster and Leeds route section in terms of the overall strategic themes presented earlier leads to the following key considerations.

Providing the services that passengers need

Passenger growth on existing services is forecast to be catered for by the new train services to be introduced on the ECML in the 2020s, and ultimately by the additional capacity enabled by HS2. Nevertheless, this central section of the route would need to be improved to enable the sort of economic growth that is associated with more and faster journey opportunities, and in terms of offering a more reliable service to passengers.

Where additional passenger capacity will be needed in the long term – on the route into Leeds, two broad options exist: one, to make changes to the railway infrastructure to allow more trains to run, the other to adjust the mix, type, length and stopping patterns of trains in order to allow more people to travel at the times that they need to. In terms of infrastructure upgrades between Doncaster and Leeds, analysis has shown that the mix of fast and slow passenger services and freight trains means that providing more line capacity will require large scale civil engineering upgrades. These upgrades would include stretches of additional track to make four-track railway which allows trains to pass each other.

Although they could not provide the increased capacity of a physical intervention, changes in train operations on the existing layout should be looked at; for instance the use of high performing rolling stock to minimise the speed difference between trains, and also to explore if changes to stopping patterns could provide a more optimal use of the available capacity through the different demand periods of the day. Over the strategic time period that this study has considered, it will be desirable to enable more frequent, faster journey opportunities in order to promote economic growth in the regions served by the ECML. On this central section of the route, some locations would need improvement in order to offer additional journey opportunities.

Grantham station. Situated at the junction between the ECML and Norwich to Liverpool route, Grantham station has a mix of fast through lines and slow platform lines, with the potential to become a greater capacity pinch point in time. If an increase in north-south mainline services were required (beyond the eight per hour enabled by the current planned infrastructure improvements), or if more east west traffic was added, then conflicts between these service flows would require some platform and other interventions at the station.

Lincoln station. In future, an increase in the service levels between London and Lincoln will be desirable and would drive positive economic growth. Accommodating these services at the station would require some infrastructure improvement work. Options exist to reinstate and upgrade out of use platforms, or to make better use of sidings.

Nottingham – Newark – Lincoln. This route is a key economic corridor for Lincoln and the Midlands, and the people in those regions want to see faster more frequent services using the line. At the moment, any increase in east-west train services is limited by the physical at-grade crossing with the ECML, which means that trains have to wait for each other, using up available capacity. This crossing is an outdated piece of infrastructure; but doing away with it is a complex engineering task that would require a fly-over – very costly on a mainline railway. However, the removal of Newark crossing would offer a range of potential benefits:

- Lincoln would not be ‘locked in’ for rail growth: passenger and freight service levels to the midlands could increase. Journey times could also be reduced.
- Long distance train operators could travel faster through the section, reducing journey times.
- An adjacent level crossing could be closed, further reducing safety risk and delay for road traffic.
- Network rail would save money on maintaining a bespoke asset, and reduce risk to the service it provides.

While, individually, these benefits are unlikely to provide a return sufficient to produce a value-for-money business case for replacing the crossing with a flyover, taken as a whole and as part of a broader economic case encompassing the ECML and the Lincoln – Nottingham corridor, they may have merit; and if a fuller range of potential funders were involved, then the proposal could have a better chance of being affordable.

Doncaster station. As we have seen, Doncaster station is a key hub on the mainline. But because it is so well connected, growth in the number of services that feed into it could be limited by platform availability or the capacity to cross the mainline. Some inter-regional services are already regulated in the Doncaster area leading to frustrating waiting times for passengers just outside the station. This is a current issue that is already being addressed by Network Rail and train operators through changes to timetabling and operations.

Over the long term, increased services into the west side of Doncaster station will need to be supported with additional platforms that allow more capacity and greater operational flexibility. Improving track layout and linespeeds through the station will also help the flow of traffic.

Whilst ultimately, a grade separation such as a flyover would offer the greatest freedom for growth (east west services would not conflict with mainline traffic), this represents a very significant infrastructure upgrade that would be difficult to justify in terms of value for money. Another option for enabling more journey opportunities through the station is for connecting services to stop at Doncaster and for passengers to change trains across the station. This sort of solution inevitably causes some inconvenience for passengers, but with improved customer information systems, passenger interchange could be made more seamless and become a viable alternative to costly and intrusive infrastructure upgrades.

Journey times

For the mainline on this central section, there are significant opportunities to drive reductions in journey time through improving linespeeds up to 140mph. Running at such speeds requires level crossings to be closed, and for overhead line and signalling equipment to be upgraded. This results in a package of improvements that provides better journey times and better infrastructure reliability, but at a high cost. To deliver such a package efficiently, it is recommended that linespeed improvements are aligned to the delivery of upgrades in signalling technology that are the strategic aim for the ECML. Around 4.5 minutes and many thousands of hours of passenger delay could be saved on journeys between Peterborough and York with such a package of investment.

³¹ Long Distance Market Study

For the local, freight and inter-regional services that intersect with the mainline, journey time reductions are also desirable. On the Nottingham Lincoln line, opportunities for journey-time improvements do exist: upgrading linespeeds through signalling and track improvements here needs to be aligned to rolling stock and stopping pattern choices, which affect journey times.

Journey speeds on the Sheffield route into Doncaster are too low, and although not covered by this study, improvements there are an industry priority. Between Doncaster and Leeds journey time improvements are constrained by the mix of fast and slow traffic.

For the competitive freight services that use the route, reliable, predictable journey times that allow operators to deliver and return within a set time scale are crucial. The use of the GN-GE joint line to provide uninterrupted paths off the ECML between Peterborough and Doncaster will continue to be a strategic priority; this is a goal that will be strengthened through the delivery of the planned junction separation at Werrington on the south end of the route. The industry will also look to the introduction of better signalling technology to provide more efficient traffic management that will benefit end-to-end freight journeys.

Technology

As discussed elsewhere in this document, moving to digital signalling technologies is a fundamental strategic technological advance for the rail industry.

The ECML is at the forefront of the introduction of this technology, which forms a major infrastructure investment for the railway. Implementation is planned to begin at the southern end of the ECML and then be rolled out where it offers the most benefit over coming years.

For the central section of the ECML route, digital technology offers better train performance and delay recovery through better traffic management. For instance, it could take the whole of a freight train's journey into account, in order to optimise its running time. The technology, allows trains to know where they are in relation to each other as well as the infrastructure; replacing conventional signalling with digital technology can also enable higher linespeeds to be achieved more safely.

Technology should also be used to create smoother, easier passenger interchanges. If passengers have electronic tickets linked to information systems that show exactly where they need to alight and embark, changing trains to cover longer journeys need not be such a drawback. This kind of approach will be highly relevant to stations such as Doncaster where connections are so important.

Safety and resilience

The reliability of the railway infrastructure plays a big part in the punctuality of train services, and the people who rely on them to get themselves or their goods to chosen destinations. The currently-planned upgrades to the ECML will enable a new timetable and a new fleet of intercity express trains to come into service in the early 2020s, improving the service to passengers. However, some of the ECML infrastructure is close to, or at the end of its predicted life – 'life-expired' in railway jargon. That means that it can be prone to more frequent failure, and that failures can be costly to remedy in time and money. It also means that the sort of performance levels that train operators need for their customers is harder to guarantee.

Given this situation, improving reliability is a key tenet of the ECML strategy. Making the infrastructure more reliable ultimately relies on replacing it: as with a family car, maintaining and repairing is not an indefinite or optimum option – eventually a new car is required.

Based on Network Rail’s asset management strategies, an approach which replaces ageing infrastructure and seeks to use those renewals to drive higher levels of service and a lower safety risk, is preferable. (To stretch the car analogy, it is the equivalent of replacing an older model with a new one that is safer and more economical.)

On this section of route, that equates to investment in signalling and overhead line infrastructure along with the closing of level crossings, and the removal of the obsolete crossing at Newark. This approach offsets the cost of renewal with the benefits of a higher level of service in terms of journey times, line capacity and reliability.

Investment Choices: ECML Central

Base level scenarios that address demand on current services

Demand due to growth on existing services will be catered for with the planned introduction of new LDHS trains, and with the advent of HS2.

Making the current infrastructure more reliable, to meet planned increases in

service levels while also safeguarding target train performance levels, is a priority now and in the near future. A supplementary renewals programme which covers the whole of the ECML has been developed to address this.

The immediate priorities shown below and marked * are already part of the Network Rail enhancements delivery plan, and are needed to meet service increases set out in franchise commitments. Items marked † cover the whole ECML route, not only this section.

Immediate investment priorities	Benefits	Cost ³²
Provide reliable power supply sufficient for planned additional services to run.* †	Upgrades the power supply for electric trains on the ECML between Doncaster and York.*	Med
Werrington Grade Separation	This scheme, along with the four-tracking scheme south of Peterborough is required to enable an increase from 6 to 8 long distance services out of London King’s Cross. They also allow journey times to be improved through a recasting of the ECML timetable and the use of new Azuma express trains. The grade separated junction allows freight traffic to use the GNGE joint line without conflicting with mainline services, which provides more line capacity.	Med
Supplementary Renewals Programme. ††	A programme of additional renewals to replace life-expired infrastructure and improve infrastructure reliability.	Very High

³² Low: up to £20m
 Medium: £20m to £200m
 High: £200m to £1000m
 Very high: >£1000m

Upgrades to deliver medium-term demand

One area has been identified where additional passenger capacity will be needed by the mid 2020s; this is to provide for additional peak hours commuter journeys into Leeds. Here, the options include civil engineering

interventions that provide a longer term solution, and shorter term operational fixes. Infrastructure interventions could provide additional tracks between Doncaster and Leeds that will allow services to overtake, increasing line capacity; operational solutions include specifying longer, higher performing rolling stock and flexing stopping patterns during peak demand. These could be specified through future franchising processes.

Medium term recommendations	Scope and benefits	Cost ³⁴
Doncaster Leeds operational changes	To allow more passenger capacity into Leeds in times of peak demand, a mixture of high performing rolling stock and different stopping patterns could be adopted. If trains were to accelerate and decelerate more efficiently between stops, line capacity could be increased. Optimising stopping patterns could also provide more space on trains when and where it is most needed.	TBC
Alternative option: Doncaster to Leeds additional tracks.	<p>The operational solutions outlined above require trade-offs between different journey priorities. To provide a more strategic solution to increased line capacity, it would be necessary to build additional tracks between Doncaster and Leeds.</p> <p>While this option provides a more flexible solution to the requirements for additional line capacity, it represents a significant outlay that will need to be tested with further business case modelling.</p>	Med

Investment options that support economic growth

The investment choices set out below include options designed to exploit the

possibilities of digital signalling technology, and use it to improve reliability and reduce journey times. Also illustrated are options to make Doncaster and Lincoln stations better able to handle growth in the number of services stopping there.

Growth package	Benefits	Cost ³⁴
<p>Reduce journey time and improve reliability. Linespeeds can increase up to 140 mph by upgrading infrastructure; safety improvements are made by closing level crossings; the reliability of the railway is improved with upgraded infrastructure.</p>	<p>By upgrading the infrastructure between Peterborough and York, linespeeds can be improved and journey times reduced by 4.5 minutes between Peterborough and York.</p> <p>The improvements would see a step-change in the reliability of overhead line electrification equipment, where the equivalent of thousands of working days in delay could be avoided each year. Providing 140mph running would require the removal of the at-grade crossing at Newark. Replacing this with a fly-over would unlock capacity for additional hourly services linking Lincoln to Nottingham and the Midlands.</p> <p>This package would rely on the introduction of digital signalling technology which would also bring improvements in headways (safe space between trains) and junction margins (amount of time between trains using a junction), making the operation of trains at Doncaster and York stations more efficient.</p> <p><i>(The scope of this package overlaps with the ECML Supplementary Renewals Programme outlined above: cost efficiencies could be expected if both options were implemented.)</i></p>	Very High
<p>Doncaster west side linespeed improvements and platforms.</p>	<p>Adding additional platforms on the west of Doncaster station would allow more capacity for connecting trains from the Leeds and Sheffield directions. Services that are regulated outside the station could be accommodated in the station improving journey times and travel experience for passengers.</p> <p>Linespeeds on the route used through the station by Leeds to London trains would be improved, providing greater operational flexibility and some improvement in journey times.</p>	Med
<p>Additional platform at Lincoln</p>	<p>This would allow more trains to terminate at Lincoln station, allowing an improvement in the number of services between King's Cross and London.</p>	Med
<p>Additional platform and junction lead at Grantham</p>	<p>These improvements would provide more capacity and remove conflicts with the ECML. This would be needed for growth in services using the ECML.</p>	Med

³³ Network Rail Enhancements Delivery Plan

³⁴ Low: up to £20m
 Medium: £20m to £200m
 High: £200m to £1000m
 Very high: >£1000m

Revenue generation opportunities

These are choices that could provide a return on investment but don't specifically address demand or economic growth outputs identified by conventional rail market studies.

Doncaster Sheffield Airport Connection

Recent work by Doncaster Borough Council and Sheffield City Region in association with the owners of Doncaster Sheffield Airport is illustrating how connecting international air travel with mainline railway connections could drive a reorientation of the UK's airport provision. The idea – to link the ECML to the Doncaster Sheffield Airport with a station – represents an aspiration to use rail

investment to drive commercial and wider economic returns. As part of a wider business and residential district within 5 miles of the airport, thousands of planned new homes and millions of sq. feet of commercial property could benefit from a rail connection.

Under this approach, travellers living up and down the ECML may prefer to travel quickly by train for direct flights from Doncaster, rather than to long-haul airports further away, or to local airports closer, but with indirect connections.

Any ECML connection would have to be designed so as not to conflict with existing mainline services. Mainline capacity would need to be targeted on the airport: the capacity released following the opening of HS2 could be used for this purpose.

ECML North: York to Newcastle



With a mix of two and four-track railway carrying passenger and freight services to mainline stations and destinations in the Tees Valley and Durham coast, the East Coast Main Line between York and Newcastle is diverse, both in terms of the rail services it supports, and the infrastructure that enables those services.

The trains

The route carries long distance high speed trains from London and the North West to destinations in the North East and Scotland alongside freight traffic, inter-urban, and cross-country services; local passenger

services connect at York, Northallerton, Darlington and Newcastle. Freight services are focussed on the thriving ports on Teesside, Sunderland, Tyneside and Blyth, alongside Anglo-Scottish flows. While a recent fall in demand for coal has resulted in fewer trains serving the power stations of Yorkshire, strong growth is forecast for the intermodal market – domestic and international container services.

Long distance passenger services on the route are made up of trains that link London with destinations along the ECML through to Scotland, and cross-country services that provide direct trains from the south and south west of England to the north and Scotland. Both franchise and open access operators serve these markets, providing a range of ticket options for passengers.

The inter-urban market between York and Newcastle links destinations across the Pennines with York, Scarborough, Middlesbrough, Newcastle and places in between; while local services connect destinations along the ECML with town and cities in Yorkshire, Durham, and Northumberland.

The region

The area of Yorkshire and the North East that this route supports hosts a wealth of economic activity that is supported by rail. Its story is one of innovative new industries filling the place of legacy sectors that have declined in previous decades. This transition will present a breadth of new employment opportunities for communities that may have felt the brunt of decline in the past. Providing excellent travel opportunities to support growth in business and employment opportunities is a priority for the rail service that this part of the route provides.

Key growth sectors here include energy, tourism, automotive and advanced manufacturing, while education and universities provide a strong skills-based focus to regional growth strategies. The Science Central project in Newcastle is an example of housing, business, skills and innovation coming together through economic development. Newcastle also hosts a growing financial and business services sector, alongside fast growing creative and digital industries, while

Sunderland and the Tees Valley are home to a mix of vital heavy industries and ports, off-shore energy and newer high-tech manufacturing businesses. Nissan's commitment to its automotive facility in Washington has recently been renewed, while a new train-building facility at Newton Aycliffe continues Darlington's historic links with the rail industry; it will be used to build the new high-speed train fleet that will serve the east coast from the 2020s.

York forms a railway hub for the north part of the ECML, and its enviable rail connections support a thriving tourism sector as part of a high-skill economy built upon its world-class universities.

The Tyne and Wear region is unique among the communities the ECML serves in that it has an established Metro system – 20km of which operates across Network Rail infrastructure. Following forthcoming investment in a new, dual voltage fleet, Nexus, the Tyne and Wear Passenger Transport Executive, has aspirations to expand this network over existing rail infrastructure, and is looking at the potential in reinstating disused rail alignments to promote growth.

³⁵[Link to Freight Demand and Context document](#)

Growth

Between York and Newcastle, journeys are enabled by a timetable which delivers 5 passenger trains per hour for most of the day, alongside one or two hourly freight services.

Looking forward, market analysis forecasts that passenger demand on long distance services from London on the York - Newcastle corridor will increase from 2017 levels by 27% by 2023 and 107% by 2043. Similarly strong growth is forecast to the 2040s for cross-country travel (81%), trans-Pennine (72%), and suburban passenger journeys into Newcastle (72%). These growth rates were forecast excluding the impact of HS2.

A decline in the number of freight trains carrying coal is forecast to be offset by increases in demand for intermodal (container) trains. The overall picture for freight on this route section is for a continued level of train paths, with an increasing emphasis on freight journey times and reliability in the availability of paths; these are priorities so that freight companies can respond to the needs of their customers for timely, predictable delivery of a wide range of goods.

To accommodate this level of demand, and to meet the economic growth predicted for this part of the route, additional seating capacity and more opportunities to travel quickly between key destinations will be required above today's levels. In the medium term through to 2023, train operators have responded to these demands with significant improvements in service offerings: proposals as part of the East Coast and Trans Pennine Express franchises will deliver new high performing rolling stock, additional seats and more opportunities to travel to a wider range of destinations. These enhancements will be supplemented by new open access services offering direct links between London, Newcastle and Edinburgh. In total, these increases in train services will meet the forecast demand for destinations served by the York - Newcastle corridor.

Strategic highlights

Thinking about the York to Newcastle route section in terms of the overall strategic themes presented earlier leads to the following key considerations.

³⁶ [Link to Newcastle Science Central](#)

³⁷ [Rail Industry Long Distance Market study \(2013\), high growth, no HS2 scenario. Link to demand analysis.](#)

Providing the services that customers need

To accommodate additional train services planned as part of upcoming franchises commitments, a significant programme of enhancement schemes is underway on the ECML. Passing loops between York and Newcastle will enable extra passenger services to operate on the north of the route alongside freight trains. The track layout at the north of York station is also being reviewed as part of this programme, with the aim of allowing more trains to enter and exit the station at the same time.

In terms of meeting long distance seating capacity, the improvements in rolling stock and train service frequency promised as part of current proposed franchise arrangements will enable sufficient passenger capacity through to the 2040s.

However, meeting and driving the potential for economic growth in the regions served by the ECML would require a step change in the service that rail provides. This is particularly true across the

north of England where great potential exists to rebalance the national economy by enabling the north and north east to generate economic outputs that can rival London and the south east. At the heart of this vision is the introduction of HS2 services beyond the Midlands and west Yorkshire to York, Darlington, Durham and Newcastle. HS2 will deliver additional long distance capacity along with the sort of journey time reduction that drives economic growth.

To complement the long distance improvements offered by HS2, Transport for the North is developing a vision for rail travel that will link the towns and cities of the north and north east of England with faster more frequent rail services. As part of this Northern Powerhouse Rail programme, the destinations on the ECML would be better connected to Leeds, Manchester, Sheffield, Liverpool, Hull and places in between.

In order to understand how such a step change could be accommodated on the rail network, a range of service specifications have been modelled.

³⁸[Link to Freight Demand and Context document](#)

³⁹[Network Rail Enhancements Delivery Plan](#)

⁴⁰[Link to ECML Demand and Capacity](#)



The modelling allows different hourly service patterns to be compared to the baseline infrastructure capability, and shows where constraints – pinch points, bottlenecks or conflicts between different service flows – could occur.

To deliver the sort of step change in journey opportunities needed to support economic growth on this section of the ECML, a service specification has been tested that increases passenger service levels from the current 5 per hour between York and Newcastle, to 9 per hour. In this scenario, freight levels have been modelled as constant – on average, 2 per hour as now; this reflects a picture of reduced demand in some freight sectors being balanced by increased demand in others.

A 9-trains-per-hour service specification on this section of the route would easily meet forecast demand for seating through to the 2040s. The main driver for such an increase in provision is to promote economic growth through providing better passenger connections and more journey opportunities for activities such as business, leisure and skills.

The 9-services-per-hour scenario was arrived at through consultation with rail industry stakeholders including Transport For The North: while such a service level does not meet the sum total of aspirations identified across HS2, Northern Powerhouse Rail and the rail market studies, it does form an achievable step change in passenger connectivity needed to support economic growth.

As will be seen later in this document, enabling such an increase in train numbers on this portion of the route will require very significant additional railway infrastructure to be built. To supplement this ‘step change’ scenario, other options have been considered. These include a ‘base level’ scenario where options that seek to meet forecast demand are presented; an ‘incremental growth’ scenario where investment choices that offer incremental

service increases beyond base demand are considered; and a ‘revenue generation’ scenario which illustrates choices that show how investment in rail could drive financial and other benefits.

Delivering the strategic rail transport vision for the North in steps is advantageous in that it addresses issues of affordability while still providing a way of delivering tangible benefits for the communities along the railway. Also, a large programme of rail investment takes time to put in place. To make the most the introduction of high speed services and better connections across the North, the stepped delivery of improvements can be seen in terms of an HS2/ Northern Powerhouse Rail readiness programme.

A good example of the sort of improvement that fits this model is a station improvement master plan for Darlington station. Darlington is a hub on the ECML, and trains from the Tees Valley have to cross the mainline to stop at the station. This uses up line capacity, and as a result, the train service between Middlesbrough and Darlington cannot grow alongside the mainline service levels. Recent increases in franchise services on the main line and Tees Valley routes make this a pressing issue.

By adding platforms on the east side of the ECML, the Tees Valley train service could be more frequent, attracting more travellers currently using cars, and driving growth through better connections for business, leisure and skills. It would also pave the way for any future increase in ECML traffic.

Putting in new platforms would also provide a spur to redeveloping the station building and its surroundings, making Darlington a key part of the national and high speed networks. This sort of improvement would drive growth further, and align with the strategic economic plans for the Tees Valley.

The Tyne and Wear region is unique to the communities the East Coast Mainline serves, as it has an established Metro system, 20km of which operate to across Network Rail infrastructure. After forthcoming investment in a new, dual voltage, fleet which will bring positive benefits in terms of track capacity and resilience between

⁴¹Link to Transport For The North

Newcastle and Sunderland, Nexus, the Tyne and Wear Passenger Transport Executive, has aspirations to expand this network over existing rail infrastructure as well as to reinvigorate mothballed and disused rail alignments with an aim to growing both the local economy and in turn allowing the region to contribute to national economic success.

Journey times

Opportunities exist between York and Darlington to improve linespeeds up to 140mph and drive down journey times. Due to the linear nature of the ECML route, journey time improvements on one section of the route benefit destinations across the whole; so, while packages of improvements can be implemented individually on different sections, benefits become much more significant if the route is treated as a whole.

Technology

The two-track sections of railway in this section combined with the wide mix of traffic types mean that on its own, digital signalling technology would not offer significant increases in capacity along this corridor. If civil infrastructure improvements were carried out with the aim of separating fast and slow traffic, digital signalling could potentially offer increases in line capacity.

Digital signalling is also an effective enabler of higher linespeeds; without it, the capabilities of existing technologies need to be stretched, which can lead to costly upgrades to legacy systems.

Safety and resilience

Due to ageing overhead line equipment, infrastructure reliability issues have had an impact on performance on this corridor in recent months. Addressing overhead line resilience as part of an investment package that could enable higher linespeeds offers an attractive potential way forward.

Where increases in linespeed or train frequency are planned, level crossing risk needs to be assessed and mitigated.

The strategic approach we have taken is that level crossing risk must not be increased and could be reduced as a result of railway upgrades; options to close crossings are always preferable and should be looked at as part of potential risk mitigation measures.

Power supply for electric traction is a known issue on this corridor. Development work carried out as part of power supply improvements on the southern end of the ECML has indicated that a modular approach to power supply could offer a scalable way of meeting power needs in the short term.

⁴² Tees Valley Strategic Economic Plan



Investment Choices: ECML North

Base level scenarios that address demand on current services

Assuming today's infrastructure, no increases in the number of services would be possible on this section of railway. Changes to service levels would have to be made using trade-offs between trains in different service sectors, and/or by adjusting stopping patterns and the destinations served.

The immediate priorities shown below and marked* are already part of the Network Rail enhancements delivery plan, and are needed to meet service increases set out in franchise commitments.

A supplementary renewals programme is also needed to meet planned increases in service levels while also safeguarding target train performance levels (this will be achieved through better infrastructure reliability). This programme covers the whole ECML route, not only this section, so is marked with †.

Immediate investment priorities	Scope and benefits	Cost ⁴³
Provide reliable power supply sufficient for planned additional services to run.* †	Upgrades the power supply for electric trains on the ECML between York and Newcastle.	TBC
Passing loops between Northallerton and Newcastle.	By allowing faster services to overtake, an additional hourly passenger service will be able to run between York and Newcastle.	Med
Supplementary Renewals Programme. †	A programme of additional renewals to replace life-expired infrastructure and improve infrastructure reliability.	Very High

⁴³ Low: up to £20m
 Medium: £20m to £200m
 High: £200m to £1000m
 Very high: >£1000m

Upgrades to deliver medium-term demand

This package of enhancements puts in place the changes needed to meet passenger demand through to the mid-2020s.

Medium term recommendations	Benefits	Cost ⁴³
Newcastle platform capacity. Reduce crowding on inter-regional services by enabling longer trains to terminate at Newcastle station.	Investment here would provide 1 or 2, longer, terminating platforms at Newcastle station. These would be able to handle longer trains; longer trains would reduce crowding on the full route of cross country services that terminate at Newcastle. Longer trains are also an aspiration for inter-regional services linking Lancashire and the Northwest with Newcastle.	TBC

Step change scenario driving economic growth

In this scenario, infrastructure works would be undertaken to enable up to 9 passenger trains per hour plus current freight levels to operate between York and Newcastle. This is considered a step change scenario in that it could drive significant growth in the economies of the towns and cities across the North and North East.

The full package of investment outlined below would be necessary to enable 9 services per hour. However, significant benefits could be derived from implementing individual options as part of an incremental approach. These options are marked ‡.

Analysis carried out by the East Coast Mainline Authorities (ECMA) group suggests that high value for money could be achieved from investments on the ECML, even with costs in the region of £3 billion.

⁴⁴ www.investineastcoast.co.uk

⁴⁵ Network Rail Enhancements Delivery Plan

Growth package	Scope and benefits	Cost ⁴⁷
<p>Reduce journey time and improve reliability.</p> <p>Linespeeds can increase up to 140 mph by upgrading infrastructure; safety improvements are made by closing level crossings; the reliability of the railway is improved with upgraded infrastructure. ‡</p>	<p>By upgrading the infrastructure between York and Newcastle, linespeeds can be improved and journey times reduced by 1.5 minutes between the two cities. The linespeed increases would affect stations along the route: this option could provide opportunities for making beneficial changes to the station layouts at Thirsk and Northallerton.</p> <p>The improvements would also see a step-change in the reliability of overhead line electrification equipment, saving thousands of hours in passenger delay per year.</p> <p>This package would be supported by the introduction of digital signalling technology, which would also offer improvements in headways (safe space between trains) and junction margins (amount of time between trains using a junction), making the operation of trains at stations more efficient.</p> <p><i>(The scope of this package overlaps with the ECML Supplementary Renewals Programme outlined above: cost efficiencies could be expected if both options were implemented.)</i></p>	High
<p>York. Optimise York station for HS2 services and allow an extra hourly service along the Harrogate line. ‡</p>	<p>This option remodels the layout on the southern approaches to York station in order to maximise the line capacity available when HS2 services are introduced onto the classic network south of York.</p> <p>Alongside the southern approaches, the option would also add an additional 12th platform at the station for the use of trains to and from Harrogate. The scheme would also provide an additional track north to Skelton junction to increase capacity.</p>	TBC depending on HS2 connection options.
<p>Increase line capacity through York station to Northallerton.</p>	<p>To enable 9 passenger services per hour, it will be necessary to allow more line capacity through York station, and to optimise how fast and slow lines work together on the route through Thirsk and at Northallerton.</p> <p>The remodelling work required on this stretch of route would also offer opportunities to re-configure the station layouts at Thirsk and Northallerton, which could drive safety, journey time and connectivity benefits.</p>	High

Growth package	Scope and benefits	Cost ⁴⁷
Increase line capacity through York station to Northallerton.	<p>To enable 9 passenger services per hour, it will be necessary to allow more line capacity through York station, and to optimise how fast and slow lines work together on the route through Thirsk and at Northallerton.</p> <p>The remodelling work required on this stretch of route would also offer opportunities to re-configure the station layouts at Thirsk and Northallerton, which could drive safety, journey time and connectivity benefits.</p>	High
Darlington. Make Tees Valley services independent of the ECML. †	Tees Valley trains between Darlington and Middlesbrough currently have to cross the mainline, which is a significant constraint to ECML line capacity. This option would put platforms on the west side of the mainline at Darlington station. This would increase line capacity and operational flexibility at Darlington station, and also allow the increases in Tees Valley services needed to drive growth.	Med
Create an additional rail route parallel to the ECML, utilising the Leamside branch, a disused rail alignment.	<p>Driving a step change in growth ultimately needs a step change in the capacity of the railway. This option reinstates an old freight route called the Leamside branch which runs parallel to the ECML from Ferryhill north of Darlington, to Pelaw near Newcastle. Re-opening it would allow fast and slow services to be separated and allow the capacity needed for 9 passenger trains per hour. This option includes upgrades to the Stillington branch to make a continuous parallel route between Northallerton and Newcastle. Also included are works to accommodate the additional services at Newcastle, and in the Pelaw area where passenger, freight and Metro trains share the infrastructure.</p> <p>This proposal also has the potential to open up access to suburban rail services, for up to 1 million residents in Country Durham and Tyne and Wear, connecting them to jobs, commerce and the wider transport network. Further potential for Park and Ride sites would allow rail to offer an attractive alternative to the congested road network south of Newcastle.</p>	Very High

⁴⁶ Low: up to £20m
Medium: £20m to £200m
High: £200m to £1000m
Very high: >£1000m

ECML Borders: Newcastle to Berwick-upon-Tweed

The northern most section of the English portion of the ECML, this 70 mile section of the route runs through rural Northumberland to the borders region at Berwick-upon-Tweed. The ECML continues beyond Berwick to Edinburgh: long term plans for that section of the route are detailed in the Scotland Route Study.

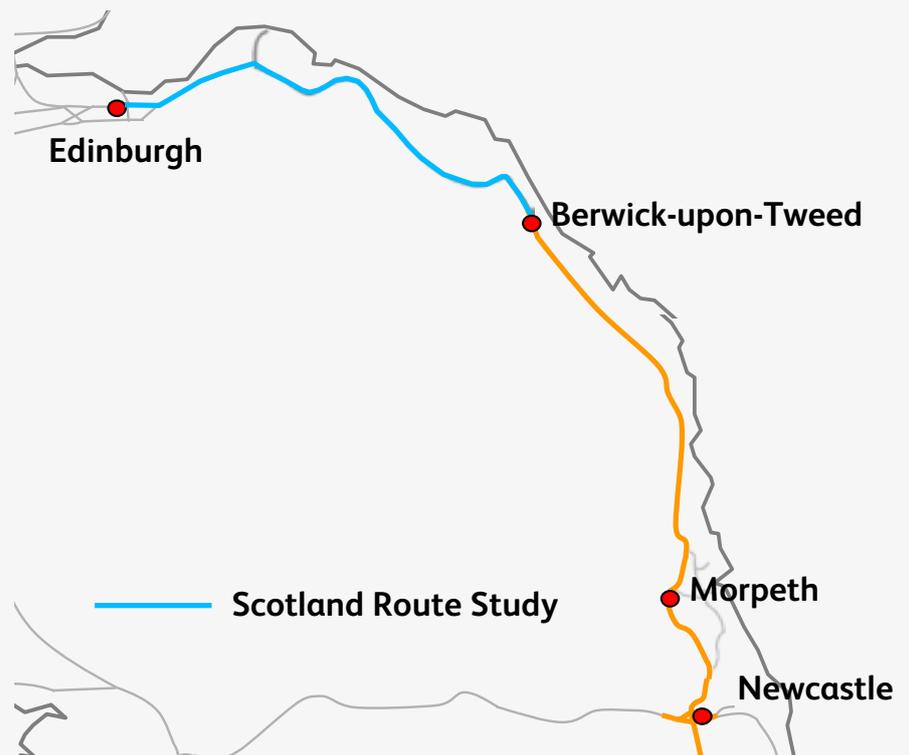
The trains

Long distance services from London, and the northwest and the southwest of England use this section of the ECML on route to Scotland, with Morpeth, Alnmouth and Berwick-upon-Tweed able to accommodate long trains; local services link Newcastle with stations in Northumberland as far as Chathill. Anglo-Scottish freight flows – a mix of container traffic, cement and nuclear cargos – also use the route.

The region

This route linking Newcastle to Scotland is the least populous area served by the ECML. As the route runs north, the suburban towns north of Newcastle give way to rural coastland through to the limit of this study at Berwick-upon-Tweed.

Northeast of Newcastle, the historic port of Blyth still handles up to 2 million tonnes of cargo per year including container freight and pulp paper products from northern Europe; however, the scale of industry in the area saw a steep decline in the latter half of the 20th century. In recent years, the area has attracted investment in renewable energy production, but not on the same scale as the coal power of earlier times. One of the legacies of this industrial heritage is an extensive freight network in the Blyth area that links to the ECML.



⁴⁷ Scotland Route Study



Growth

Demand for long distance train services to Edinburgh is set to grow steadily. For example, London to Edinburgh demand is forecast to grow by around 175% of 2012 levels by the early 2040s. Seating capacity is forecast to keep up with this growing demand; this is made possible by the additional services and new trains due to come into service in the early 2020s.

As with services from the South into Newcastle, demand for peak-time passenger travel into Newcastle from the Morpeth direction is forecast to grow throughout the period through to the 2040s. While this may lead to a shortfall in capacity on local commuter trains into Newcastle from the mid 2020s, spare seats on long distance trains could be used to supplement overall capacity.

Strategic highlights

Applying the overall strategic themes presented earlier to the Newcastle to Berwick-upon-Tweed route section, leads to the following key considerations.

Providing the services that customers need

For this section of the ECML route, the priority for managing passenger demand will be to enable sufficient capacity for commuter journeys to and from Newcastle. To do this, a range of service options would be possible, including using long distance trains, adding extra capacity to existing local services, or by introducing new services.

The ability to use long distance trains to serve peak commuter markets is constrained by platform lengths on the stations north of Newcastle: only Morpeth has both platform capacity and the sort of population catchment that can support long trains serving jobs growth with Newcastle.

It may be advantageous to look at the growing population centres in the Cramlington and Morpeth areas and consider if mainline station facilities should be consolidated to provide efficient road/rail interchange targeting commuter journeys to Newcastle.

Other options are available to increase the frequency of local peak services. A proposal by Northumberland County Council to introduce passenger services to the Ashington Blyth and Tyne freight railway system is already well advanced, and offers a clear way to link the population centres north of the Tyne with the commercial opportunities of Newcastle. There is currently line capacity on the ECML to support an increase in service levels into Newcastle.

Making sure that the rail infrastructure can support growth in freight traffic is also a consideration for this section of the route. The industry strategy for freight services is to move toward train lengths of 775m. To accommodate trains of this length some of the existing passing loops on the ECML will need to be upgraded.

Journey times

Opportunities exist between Newcastle and Berwick-upon-Tweed to improve linespeeds up to 140mph and drive down journey times. Approximately 1.5 minutes could be saved on this route section.

Technology

Throughout the ECML, conversion to digital signalling technologies is a strategic aim, and it has the potential to increase line capacity, performance and enable of higher linespeeds; without it, the capabilities of existing technologies need to be stretched, which can lead to costly upgrades to legacy systems. On this part of the ECML route with long stretches of two-track railway, opportunities to leverage extra line capacity from digital signalling are limited, due to the different speeds and stopping patterns of trains. But digital technologies to enable higher linespeeds, and to provide better traffic management is a possibility.

Safety and resilience

With long sections of railway running through remote countryside, maintainability and weather resilience are key issues for this section of the route. By using a risk-based approach, the Network Rail asset management strategy is to identify and monitor potential failure points in the railway system, and to target maintenance and renewals activity proportionately.

At the heart of this approach is an efficient use of asset condition monitoring: the strategy here is to use technology to allow the remote monitoring of assets so that the workforce is kept safer, and a 'predict' (deterioration) and 'prevent' (failures) maintenance regime is made possible.

One area of particular concern on this section of railway is traction power (electricity) supply for trains. Here the physical challenges of connecting into suitable power supplies at remote locations, and tackling the effects of extreme weather events (especially high winds) on overhead lines, are considerable. A mix of strategies is required to allow for growth in demand while minimising the risk to service; these include new power supply technologies, risk-based asset management, and upgrading ageing infrastructure.

⁴⁸[Link to long distance market study](#)

Investment Choices: ECML Borders

Base level scenarios that address demand on current services

The immediate priorities shown below and marked * are already part of the Network Rail enhancements delivery plan, and are

needed to meet service increases set out in franchise commitments. A supplementary renewals programme is also needed to meet planned increases in service levels while also safeguarding target train performance levels (this will be achieved through better infrastructure reliability).

Immediate investment priorities	Benefits	Cost ⁵⁰
Provide reliable power supply sufficient for planned additional services to run.*	Upgrades the power supply for electric trains on the ECML between Newcastle and Berwick-upon-Tweed.	Med
Supplementary Renewals Programme. †	A programme of additional renewals to replace life-expired infrastructure and improve infrastructure reliability.	Very High

† This renewals programme and its business case will be assessed over the whole ECML route, not just this section.

Investment options that support economic growth

The investment choices set out below are the sorts of railway enhancement that should be considered to drive growth over the medium to long term on this section of railway.

Immediate investment priorities	Scope and Benefits	Cost ⁵⁰
<p>Link more people to jobs by reinstating passenger services on the Ashington Blyth and Tyne railway.</p>	<p>This option would see the reintroduction of passenger services into Newcastle from the north of the city. Some railway infrastructure improvements would be needed to upgrade the line from freight-only use.</p> <p>By reinstating direct services into central Newcastle and other destinations in the wider Tyne and Wear Region, the 85,000 inhabitants of Blyth, Ashington and Bedlington would be given better access to jobs and commercial opportunities. Connecting to the East Coast Mainline, and with Metro services north of the River Tyne, the package would be a stimulus to the growth of South East Northumberland, encouraging housing and economic growth, as well as providing a credible alternative to the car.</p>	Med
<p>Allow current infrastructure to use industry standard 775m freight trains, enabling operational efficiencies.</p>	<p>The aim here is to lengthen existing freight passing loops to accommodate the longer modern trains required by freight businesses. Longer trains offer increased environmental benefits, and more operationally efficient.</p>	TBC
<p>Reduce journey time and improve reliability. Linespeeds can increase up to 140 mph by upgrading infrastructure; safety improvements are made by closing level crossings; the reliability of the railway is improved with upgraded infrastructure.</p>	<p>By upgrading the infrastructure north of Newcastle, linespeeds can be improved and journey times reduced by 1.5 minutes between Newcastle and Berwick-upon-Tweed.</p> <p>The improvements would see a step-change in the reliability of overhead line electrification equipment.</p> <p>(The scope of this package overlaps with the ECML Supplementary Renewals Programme outlined above: cost efficiencies could be expected if both options were implemented.)</p>	High

⁴⁹ Network Rail Enhancements Delivery Plan

⁵⁰ Low: up to £20m
 Medium: £20m to £200m
 High: £200m to £1000m
 Very high: >£1000m

Consultation and next steps

This section of the document sets out how the East Coast Main Line Route Study Draft for Consultation has been managed, how stakeholders have been consulted to date, and how interested parties can respond to this Consultation.

Management and consultation process

Network Rail has taken an open, collaborative and consultative approach to the development of the Long Term Planning Process. This process is a way of planning the future of the rail network, and this Route Study is a key part of this. Development of the Route Studies followed the 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 future rail network.

Close collaborative working by a wide range of stakeholders from within and outside the industry has meant that the work has been subject to comment and guidance to ensure that, as options have been developed, they have been tested and challenged. Further to this, comments are welcomed on this document from any interested party who may wish to respond.

How you can contribute

A wide range of views will help to develop and complete the East Coast Main Line (ECML) Route Study. If you wish to respond to any of the ideas and interventions set out within this Draft for Consultation document, please email your comments to the following email address:

ECMLRouteStudy@networkrail.co.uk

Or by post to the address below:

**LNE & EM Route:
ECML Route Study Consultation,
Senior Strategic Planner (ECML),
Network Rail,
George Stephenson House,
Toft Green,
York YO16JT**

This Route Study is only being published on the Network Rail website. If you would like a printed copy please contact the address above.

Privacy statement

Respondents should indicate clearly if they wish all or part of their response to be published on the Network Rail website. Otherwise, responses or parts thereof will remain confidential and only a summary of all responses will be published, with this summary being used to inform the final Route Study publication. Where consultation responses are published on the Network Rail website, personal details will be redacted.

The ECML Route Study will have a formal consultation period of 90 days, with the final date for receiving responses being 16th March 2018. Earlier responses would be very much appreciated in order to maximise the time available to respond in the final study.

Next steps

After the conclusion of the formal consultation phase, the Route Study Working Group will consider further work that may be required to conclude the study, prior to the publication of the final document.

Further details of the Long Term Planning Process, including an overview of the work, frequently asked questions and contact details for preceding work, including Market Studies, and other Route Studies can be found on the [Network Rail website](#).