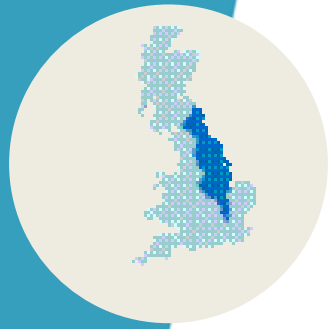
London North Eastern & East Midlands Route


Route Strategic Plan

January 2018



Introduction from the Route Managing Director

CP5 has been a challenging time for Network Rail. However as we begin the process of exiting CP5 and preparing for CP6 our LNE & EM Route is creating real momentum towards maximising the transformative opportunities that CP6 presents us. We are delivering our maintenance more efficiently than ever before, train delay minutes attributed to the route and number of performance affecting incidents are lower than they have ever been and we must continue to improve the safety of our railway as the traffic and passenger numbers grow. Our approach to developing major enhancements such as Trans-Pennine Route Upgrade is being applauded by funders and stakeholders, and we have commenced our once in a generation opportunity to realise a digital railway on ECML and Moorgate with all the sustained and transformative cross industry opportunities it creates.

CP6 will see unprecedented levels of change to the LNE & EM route with the realisation of multi-million pound investments on the MML, Transpennine and ECML corridors – it will be transformational for passengers with a 15% growth in train services and the corresponding increase in passengers these will bring. LNE&EM Route has worked very hard to close the gap between our train performance trajectories and the franchise commitments of the TOC. We have however been unable to close this gap and have built performance trajectories based on our knowledge of current performance, infrastructure plans, new fleet introduction and the very significant timetable changes.

Whilst also growing our railway we will improve infrastructure reliability and train performance by reducing the number of service affecting failures by 9.9%, improve our workforce safety by 75%, and improve level crossing safety by 14% before the impact of increased traffic is taken into consideration. Our role as the LNE & EM Route is straightforward, we simply need to ensure that our railway meets the needs of the communities and economies that it serves. It is this straightforward aim which underpins our vision and mission for CP6, which is to achieve: ***'Efficient delivery which is responsive to customer and stakeholder priorities'.***

We will do this by ensuring our delivery, whether it be operations, maintenance or renewals is both efficient and effective. Efficiency has not had sufficient focus in CP5 and we are changing this now with an initial objective for renewals of returning to CP4 levels of efficiency.

The Network Rail devolution agenda rightly pushes us towards our stakeholders and in doing so brings track and train closer together for the benefit of passengers, communities and economies. This allows us to ensure that our investment decisions are focused towards those who matter most, and in doing so are better placed to realise the opportunity of third party investment on our railway. Investing money in and around the LNE & EM route will become easier, faster and much more customer focused. I am determined that CP6 will be the true dawn of a new era on the UK rail network with the deployment of Digital Railway with the conversion of the ECML to Digital Rail. This will not only transform the passenger experience but also bring the industry ever closer due to the nature of this technology, and greatly reduce the tax payer's burden for the operation, maintenance and renewal of this railway for generations to come.

The most important transformation of all in CP6 will be that of our people. Too long have the basic needs of our frontline people been overlooked. We will provide our staff with the facilities they rightly deserve and our main safety objective will be to eliminate manual handling injuries on our route, the single biggest cause of accidents. With 45% of the workforce becoming eligible for retirement over the next two control periods, we have to put in place now a strategic workforce plan that responds to the future needs both of the business and the people we want to attract and retain. We will exit CP6 with a more diverse, inclusive and empowered leadership within the Route that will carry on the pace of transformation.

Rob McIntosh
Route Managing Director

Contents

1 Foreword and summary

1.1 Background to LNE & EM

The LNE & EM Route is a strategically important national asset which connects the length and breadth of the country. LNE & EM encompasses three of the country's most important strategic rail corridors: the East Coast Main Line (ECML); the Midland Main Line (MML) and the Transpennine Route.

Figure 1: The LNE & EM Route Map

Geographically it is the biggest Network Rail Route, with 4,600 miles of track spanning the length of the country from Scotland to London via Leeds and Sheffield. LNE & EM directly connects seven of Great Britain's eleven regions, and provides fast inter-city connections between four of the five biggest cities in the UK, as shown in Figure 1 Eight franchised operators and two open access operators (to become three in CP6) serve the route's 414 stations, catering for the full range of inter-city, inter-urban, regional and commuter markets.

In addition the Route is one of the UK's strategic freight corridors, providing vital supply lines for some of the UK's most important power stations (biomass and coal), the steel industry in the Scunthorpe, South Yorkshire and Tees area, aviation fuel for major International airports including Stansted, Luton and Leeds-Bradford, and freight haulage for key ports such as Immingham and Tyne.

Figure 2: LNE & EM facts and statistics

Figure 2 highlights the Route's importance to its communities and the UK economy as a whole. This serves to emphasise the need for our best use of the plans for CP6 to make available funding so that the railway can continue to support a growing economy and expanding population.

During CP5, LNE & EM has delivered more efficient and effective Operations and Maintenance performance. As

Figure 3 shows, during CP5 output and efficiency has increased. More train miles are being operated, our O&M teams are completing more maintenance tasks, whilst the number and length of delays attributed to LNE & EM has fallen significantly. This has been achieved with no overall increases in headcount.

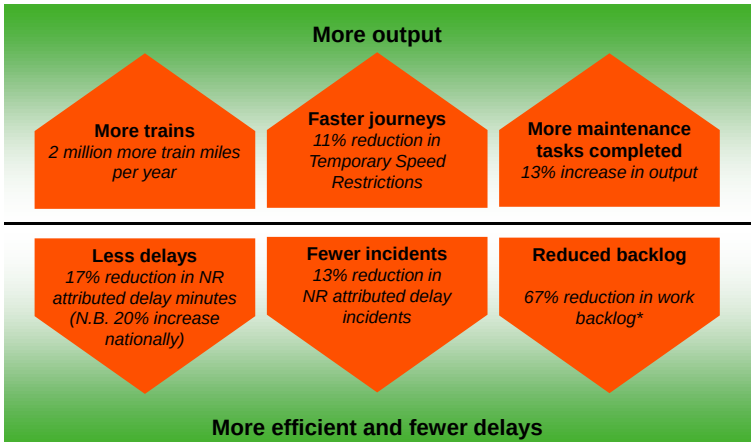


Figure 3: LNE & EM O&M CP5 performance improvements (2014/15-2016/17)

However, in line with the national picture, our delivery of Renewals has seen cost escalation leading to our renewals portfolio being less efficient than CP4. In forming our CP6 strategy we have learned lessons from these shortcomings and have sought to develop a realistic plan underpinned by robust efficiencies and effective delivery.

1.2 CP6 strategic context challenges and opportunities

LNE & EM will see a substantial increase in service levels during CP6

Taking into account all known franchise commitments and planned service changes, we will see a circa 15% increase in the number of train services operating on LNE & EM, and a significantly greater increase in vehicle miles through rolling stock and train lengthening initiatives. The net effect will be a 15% increase in workload on our asset base. This expanded capacity and volume is a challenge and an opportunity for the Route.

The increased volume of services operating on our routes will present a challenge in the context of the restricted funding levels available during CP6, which will limit our ability to meet the performance targets and commitments of our customers. On the other hand, the enhancement programmes summarised in Figure 4 will upgrade some of the assets on the route, which we have explicitly allowed for in our CP6 renewals plans. Additionally, it will provide opportunities for more efficient delivery of renewals through effective joint access planning, as we set out in Section 7.2.

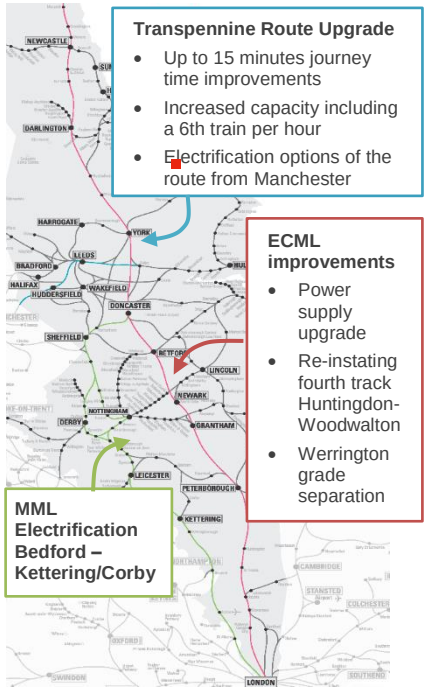


Figure 4: Key committed and planned enhancements on LNE & EM routes

LNE & EM is busier than ever and patronage continues to grow

Between 2010/11-2016/17 patronage across LNE & EM has grown by 30% compared with 27% nationally. As set out in section 6.2, demand is expected to continue to grow throughout CP6, driven by economic and demographic factors as well as the expansion of services outlined above.

In order to cater for an increasing number of services and passengers whilst maintaning performance and safety, we need to become

significantly more efficient and effective in the delivery of maintenance and renewals in CP6.

Funding constraints will make it more challenging to maintain, operate and renew the route

Our plan is constrained to a post efficient settlement of CP5+7% (with an additional required £378m for Digital Railway, which currently is unfunded), a substantial real-terms increase in funding. However, as Figure 5 shows despite the ECML's strategic national importance, many of its assets are amongst the oldest on the network and are being pushed to the limits of their design life. This, combined with the projected growth in train services and passengers using the Route means that this is a challenging funding settlement which requires us to robustly prioritise our activities and drive efficient and effective delivery.

Our customers want to see significant performance improvements

Many of our TOC customers have franchise commitments to deliver significant improvements in performance. As we set out in section 2, in a constrained funding environment it will be extremely challenging to facilitate all of these performance improvements at the same time as accommodating plans to expand service levels and introduce new rolling stock. It has therefore been necessary to prioritise our activities in a way which will broadly maintain performance levels against a backdrop of increasing usage, for example through refurbishment and life extension of assets rather than full renewals.

Benefits of CP5 and CP6 investments on ECML are at risk of not being realised due to the age of existing infrastructure

Much of the ECML is nearing the end of its design life. The last ECML upgrade began in the early 1970s and concluded in 1991 with the last stage of electrification to Edinburgh. Figure 5 illustrates that this will have implications in terms of fully realising the benefits of the introduction of the new IEP fleet and the planned capacity upgrades on the route.

Delivering the performance improvements desired by our ECML customers and stakeholders (e.g. 90% PPM on VTEC) would require a significant programme of renewals beyond baseline funding. In response to this challenge, we have produced a supplementary plan and investment opitons (see Appendix D) with various funding scenarios to drive incremental performance improvements on the route.

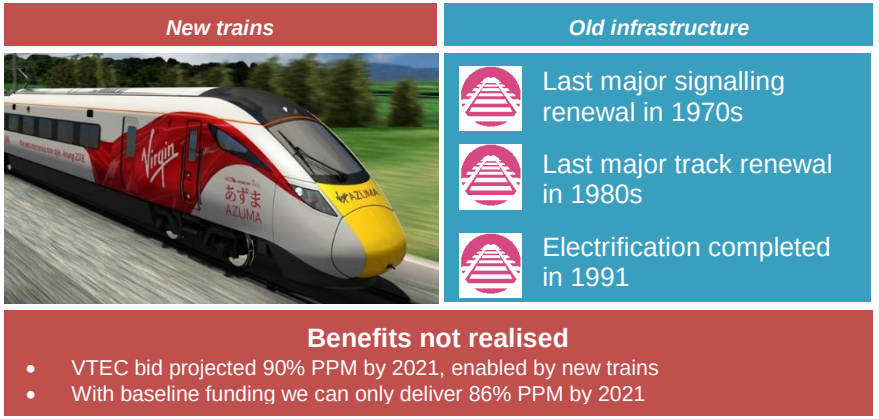


Figure 5: Benefits at risk of not being realised on ECML

1.3 Railway vision and strategic objectives for CP6

The strategic challenges and opportunities set out in 1.2 mean that during CP6 we will be challenged to deliver on a busier railway within a constrained funding envelope, whilst maintaining safety and operating performance at acceptable levels – Effectively delivering 'more for less'. With this in mind, our vision and mission for CP6 is to achieve:

'Efficient delivery which is responsive to customer and stakeholder priorities

Our 'strategy-on-a-page' overleaf, summarises our strategic **vision and objectives,** how our **Transforming Asset Management** approach will target efficient operations, maintenance, renewals and enhancements against these objectives by improving our overall capability to enable efficient and effective delivery, and the **outcomes** we are targeting.

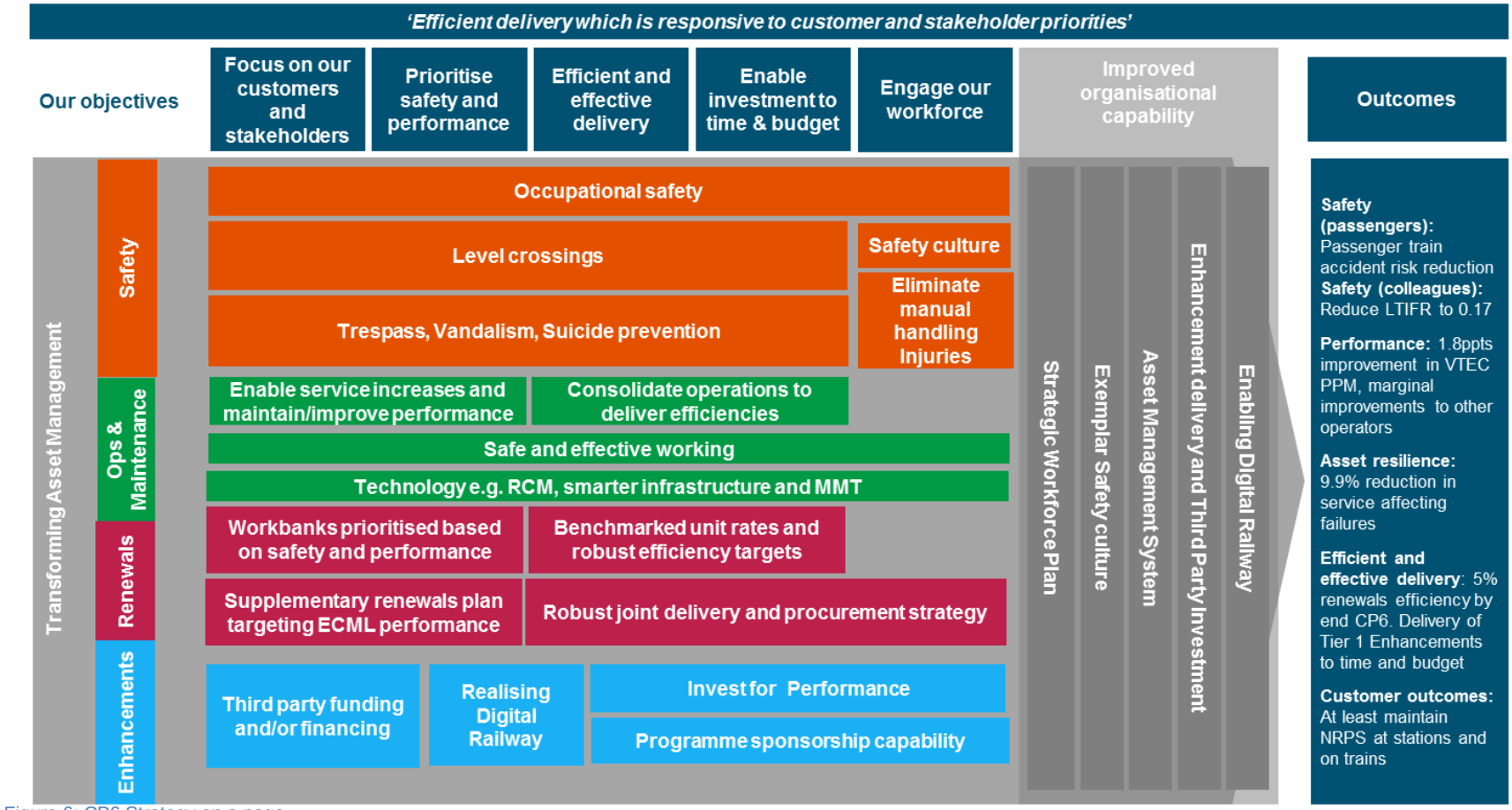


Figure 6: CP6 Strategy on a page

1.3.1 Vision and objectives

Our **vision and objectives** for CP6 reflect the key themes we have identified in our 2017 Business Plan: **Safety and Performance; Engaging our People; Focus on our Stakeholders and Enabling investment**. For CP6 we have added a specific objective of '**Efficient and Effective delivery**' as we fully recognise the need as a devolved Route to give funders, customers and stakeholders confidence that we can spend taxpayer's money in the most efficient way. In order to do this we will continue with our strategy of **Transforming Asset Management** across all elements of our business as described below.

1.3.2 Transforming Asset Management

We will build on the foundations laid in CP5 in areas such as performance improvement, improved maintenance execution, remote condition monitoring, mobile maintenance, risk management and data analytics, and drawing upon the lessons learned from shortcomings in our delivery of renewals and enhancements.

The aim in CP6 will be to maximise the effectiveness of our interventions by optimising our enhancements/renewals and maintenance to achieve maximum value as well providing value for money via efficient delivery. We will do this by moving to a more integrated approach to asset management across our operations, maintenance, renewals and enhancement activities:

- Our **safety strategy** (section 8.1) will deliver significant reductions in workplace accidents and improvements in the safety of our passengers, those working on the railway and the wider public that interacts with the railway.
- Our **operations and performance** strategy (detailed in section 5.4) aims to accommodate the significant increases in train services that will be delivered during CP6. We will leverage our Alliances and joint working arrangements with our customers to develop precision timetables which support the delivery of a right time railway. By consolidating control into the Derby and York ROCs we will provide more efficient and effective operational control to improve performance.
- Our **maintenance strategy** (section 7.3) is underpinned by a detailed bottom-up activity based planning exercise for CP6. This provides the baseline for our strategy to improve the efficiency and effectiveness of our maintenance delivery through our ***Safe and Effective Working*** programme to implement structured maintenance regimes with improved logistics, supervision and organisation. In addition we will extend asset life and reduce maintenance cost through further investment in ***Intelligent Infrastructure*** including remote condition monitoring, extension of smarter infrastructure on our network & the use of risk based data analytics.
- Our **Renewals strategy** (section 5.1) is built upon detailed workbanks which seek to prioritise funding towards activities which minimise safety risks and improve performance taking into account the intensity of use of each asset and utilising the local knowledge of our Asset Managers. Where appropriate we have adopted a policy of refurbishment, life extension and 'lowest initial cost' rather than full renewal in order to maintain overall safety and performance within a constrained funding environment. We have also minimised abortive signalling renewals south of Peterborough given that we are seeking to deliver Digital Railway on this corridor by the end of CP6. We will seek to over-deliver on our baseline efficiency targets of 5% by setting ourselves a 'stretch target' of substantially improving the unit cost of delivering asset renewals by increasing productivity, lean thinking and commercial optimisation.
- In order to enable the delivery of our **enhancements** (section 5.1) to time and budget, we will strengthen the programme sponsorship capability without our Route. We will seek to ensure that enhancement programmes are designed to budget recognising the issues that have occurred nationally with significant cost overruns on CP5 enhancement programmes. Where possible we will explore opportunities to deliver enhancements (including Digital Railway) through third party funding and financing.

This core strategy is supported by various enabling strategies to **improve the overall capability of our devolved Route organisation.** These include:

- **Asset Management System** – We will improve our processes which coordinate and control our asset management activities. Our first priority will be to establish Route Asset Management Plans (RAMPS) and effective processes to deliver a stable workbank in terms of both cost and volume. We will review our processes and arrangements with the ultimate aim of achieving accreditation to BS55001.
- **Efficient and optimal access planning** on the Route, working in partnership with our TOC and FOC customers (section 7.2). We will have fixed maintenance windows and renewals access that is optimised between passenger disruption and efficiency.
- **A workforce strategy** investing in the skills and knowledge of our workforce to ensure our organisation has the capability to deliver on our promises (section 8.3)
- **Enabling Digital Railway –** we aim to enable DR on the ECML south

of Peterborough by the end of CP6. We will seek external sources of funding and financing to accelerate delivery (section 6.3)

1.3.3 Outcomes

Our RSP will aim to improve safety scorecard measures and deliver targeted improvements in PPM. We will enable delivery of Tier 1 enhancement schemes to time and budget. We will deliver our annually agreed customer scorecard measures and support our customers' transformation agenda through delivery of our enhancement programme and through seeking supplementary ECML funding.

1.4 Summary of our proposed distribution of funding and efficiencies to deliver our strategy

Our baseline plan is predicated on a funding settlement of CP5+7% in real terms, plus an option of £378m for implementation of Digital Rail on ECML

Our CP6 Operations, Maintenance and Renewals and Digital Railway submission is £5.1bn inclusive of identified headwinds and efficiencies, as shown in.

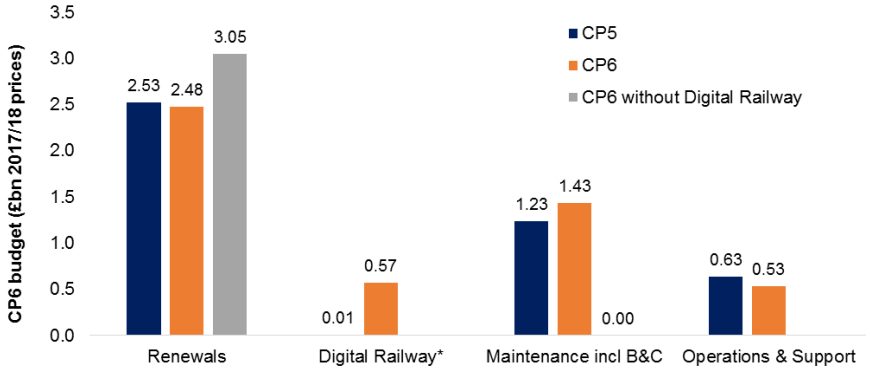


Figure 7: LNE & EM CP6 funding allocation between O&M and Renewals

We have allocated our Renewals budget between the various asset disciplines based upon each asset's bottom-up assessment of their workbanks, combined with a top-down assessment of the safety and performance risks across each asset discipline, and relevant changes of scope relating to factors such as the size of each asset base (e.g. increased electrification), legislative compliance and policy, and increased weather resilience requirements. Figure 8 shows our anticipated allocation of the renewals budget based on our submission.

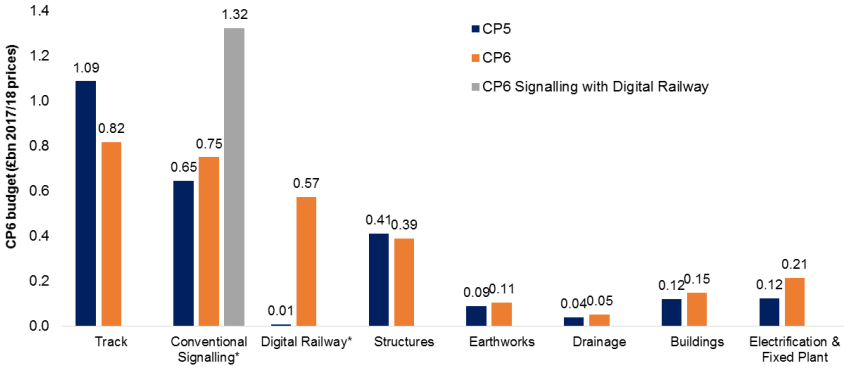


Figure 8: LNE & EM CP6 Renewals funding by asset.

** In total the Route will fund £194m of the Digital Railway programme from its workbank in CP6 with the balance of £378m currently being unfunded.*

Figure 8 shows that we have allocated £572 million of capital work within CP6 to progress the delivery of Digital Railway between King's Cross and Peterborough, based upon assumptions agreed with the Centre's Digital Rail Business Case team. This is partially funded by a £194 million which is transferred from the Conventional Signalling workbank. This is work which would still need to be delivered in CP6 in the event that Digital Railway does not go ahead in these timeframes.

At this stage the funding and financing arrangements surrounding Digital Railway have not been confirmed. As we set out in section 6.3 our strategy is to enable the delivery of Digital Railway in CP6 whether this is through Central Government funding and financing, or potentially through alternative arrangements including private finance.

Our baseline plan includes 6.1% renewals and maintenance efficiencies

Figure 9 sets out the key scope changes plus cost headwinds our baseline plan includes plus cost headwinds and efficiencies that drive changes between our CP5 and post-efficient CP6 funding position. A more detailed breakdown of these impacts is set out in Chapter 7.

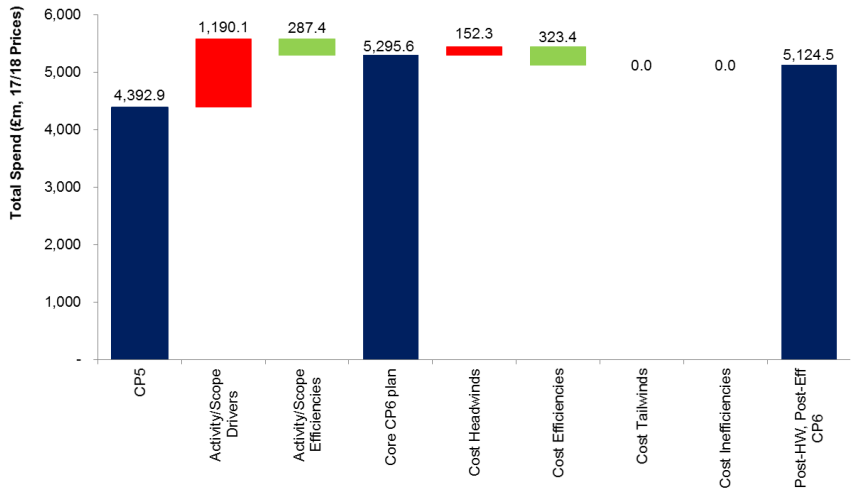


Figure 9: Scope drivers and efficiencies / cost headwinds and efficiencies bridge CP5-CP6. NB Activity/Scope Drivers include a currently unfunded £378m for Digital Railway

As we set out in section 7.7 we will deliver these efficiencies primarily through better workbank planning and coordination, commercial efficiencies and more efficient maintenance activities driven by Safe and Effective working and better use of technology.

Our renewals plans will benefit the whole route

Figure 10 illustrates the proposed geographic distribution of spend across the LNE & EM route.

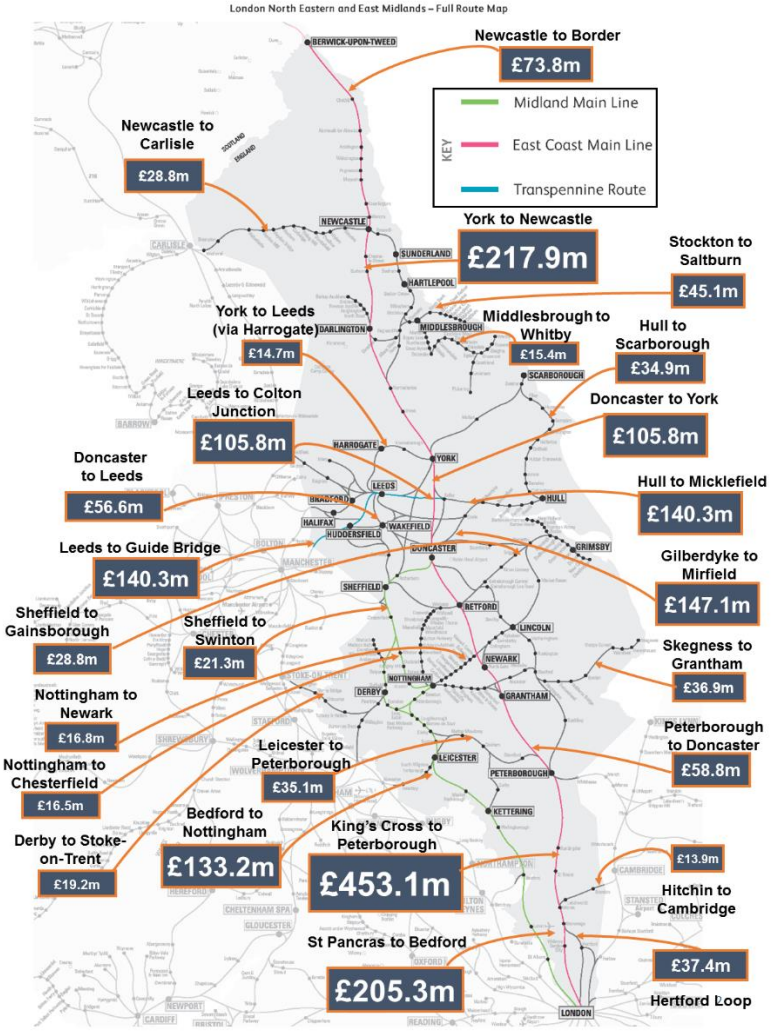


Figure 10: Overview of planned renewals spending in CP6 on the LNE & EM Route. Figures are indicative based on RF6 submission.

Our ECML supplementary plan proposes incremental funding for the ECML, with a VfM case for up to £1.4bn

We set out our proposed supplementary programme of asset renewals in the **East Coast Supplementary Plan**, summarised in Appendix D of this document, which includes an indicative 'menu' of potential renewals which have been optimised on the basis of indicative analysis of Value for Money (VfM).

This suggests there is a VfM case (BCR over 1.4) for investing an additional £0.5bn-£1.4bn in ECML renewals over and above our baseline submission to drive performance improvements and allow us to support the benefits of industry investment in IEP and route capacity upgrades. This 'menu' of potential investment options is also summarised in Appendix D.

1.5 Summary of the remainder of our RSP

Chapter 2 – Stakeholder priorities demonstrates that our geographical scope means that we have a wide range of customers and stakeholders whose requirements need to be balanced. We engage with our customers on an ongoing basis and have undertaken specific customer workshops to get a better understanding of their priorities in developing our strategy for CP6. We demonstrate that our plans are in many areas aligned with our customer and stakeholder priorities, and set out how we will continue to engage as we refine our strategy.

Chapter 3 – Route objectives sets out a summary of the outcomes we are targeting for the strategic planning period in the form of a scorecard table and accompanying narrative setting out how these link back to our objectives and approach.

Chapter 4 – Activity prioritisation on a page shows how our objectives are aligned with our assessment of the risks, opportunities and constraints relating to the delivery of each of our scorecard measures.

Chapter 5 – Activities and expenditure provides a summary of the renewals costs and volumes, and OPEX associated with our baseline plan, along with our assumptions on enhancements expenditure for the Transpennine Route and MML upgrades, along with ECML enhancements. It also sets out our prioritised asset intervention strategy alongside strategies for weather resilience and operational planning.

Chapter 6 – Customer focus & capacity strategy provides a summary level view of the customer and capacity themed strategies that will be employed to deliver the route plan. This highlights the potential issues arising with accommodating our various customer priorities for timetable improvements which have been agreed through franchising, and how our strategy will seek to address this.

Chapter 7 – Cost competitiveness & delivery strategy provides a summary of the strategies that will be employed to ensure efficient and effective delivery. It also includes a description of the head winds and efficiency plans accounted for in our plan.

Chapter 8 – Culture strategy sets out how we propose to continue to change the culture of the organisation to realise the benefits of devolution.

Chapter 9 – Strategy for commercial focus sets out how our organisation is geared up for developing third party funding and financing opportunities with our customers and stakeholders, the successes we have had to date and our strategy for leveraging opportunities during CP6.

Chapter 10 – CP6 regulatory framework sets out the funding and financing implications of our plan for Control Period 6 (CP6)

2 Stakeholder priorities

2.1 Our customers and stakeholders

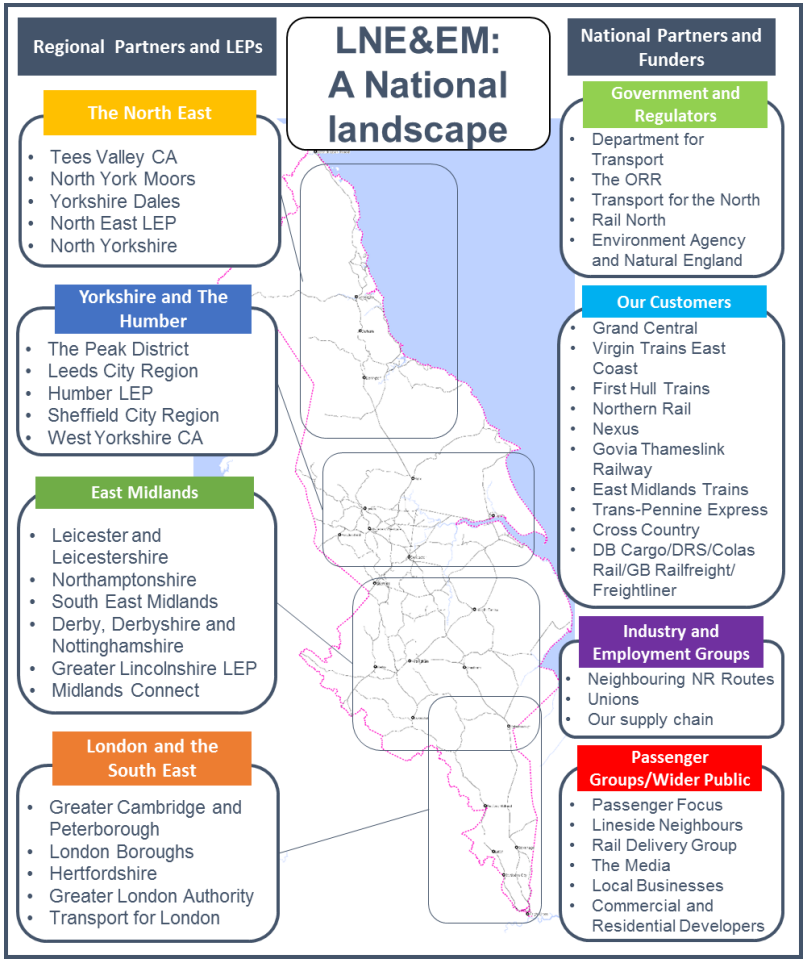


Figure 11: A selection of our diverse range of customers and stakeholders

Focus on our customers and stakeholders

In line with our Vision and Objectives, LNE & EM's strategy for CP6 seeks to be responsive to the priorities of a wide and diverse range of customers and stakeholders covering a substantial geographic area, as represented in Figure 11. This includes the largest number of TOCs and FOCs operating on any single NR route.

2.2 Customer and stakeholder engagement

In developing our RSP for CP6 we have leveraged our ongoing process of formal and informal customer and stakeholder engagement, and have also run CP6 stakeholder workshops to inform our submission.

Ongoing customer and stakeholder engagement

LNE & EM maintains relationships with each of our customers and stakeholders both formally and informally. We currently have Alliance Agreements with VTEC, TPE and Northern. We also have a joint business plan with Grand Central and are in the process of developing a joint plan with First Hull Trains. Table 1 sets out how we engage with our customers and stakeholders on an ongoing basis.

Table 1: Ongoing customer and stakeholder engagement

Forum (Frequency)	Objectives and key subjects discussed
Bi-lateral Alliance Board/Level 1 meetings (4 weekly)	• Monitoring of key joint scorecard objectives including safety, performance, investment milestones • Alignment of KPIs • Business critical decisions • Discussion of strategic priorities to address emerging risks, issues and opportunities
Programme Delivery Group (4 weekly)	• To monitor delivery of agreed programmes of work and identity and manage associated risks

Forum (Frequency)	Objectives and key subjects discussed
Programme Boards for major projects (4 weekly)	• To ensure the programmes are prioritised and sequenced in line with business requirements and our capacity to deliver
Event Steering Groups (Quarterly)	• To consider capacity for future timetable changes, particularly in relation to major timetable recasts after new assets available
Timetable Change and Risk Assessment Group (Twice a year)	• To ensure all operational and safety risk is identified and mitigated in advance of timetable changes
Alliance events (As required)	• Discuss new ways of working and collaboration on a day-to-day working level • Discuss strategic risks, issues and opportunities and escalate to Alliance Boards
Our approach to engaging with wider stakeholders including regional partners and LEPs is set out in Section 9 of this document.	

These formal and informal contacts, in particular our working Alliances and joint Business Planning with our operators have enabled us to develop a deeper understanding of our customers' requirements and priorities, reflected in our assessment of priorities in section 2.3 below.

Development of Route and Customer Scorecards

A key feature of our drive to become more customer focused is in our adoption of a route scorecard, as part of Network Rail's overall 'Delivering for our customers' strategy. Recognising that we have a number of customers with different business needs and requirements, we have developed, agreed and implemented seven bespoke annual customer scorecards that we have agreed our eight primary TOC and Open Access customers. These scorecards are discussed at Level 1/Alliance Board meetings, and it is our intention to align objectives to underpin delivery of these KPIs both at an organisational level and cascaded out to colleagues responsible for delivery.

Formal engagement during the CP6 process

In developing our submission we have undertaken six workshops covering each of our routes: ECML (March. July); MML (April, June) and TPE (March, July). In order to ensure that the workshops were strategic and customer-focused we limited invitees to our TOC and FOC customers, Transport Focus as passenger representative, DfT as our key funder and specifier, Rail North, RDG and ORR. These are summarised in Table 2.

Table 2: CP6 customer workshop attendees

ECML Workshop	MML	TPE
GTR; ORR; Grand Central; Nexus; RDG; CrossCountry; Northern; FTPE; EMT; Hull Trains; Rail North; Freightliner; VTEC	EMT; CrossCountry; RDG; Transport Focus; Freightliner	GB Railfreight; Freightliner; Transport Focus; Rail North; RDG; FTPE; Nexus; Northern; DfT; ORR

We have also held a number of bi-lateral meetings with our TOC and FOC customers and will continue this programme as we prepare for CP6 delivery.

2.3 Our customers' priorities

The engagement activities outlined above have enabled us to develop a view of our customers' priorities during CP5 and CP6.

As summarised in Table 3, our customers' priorities are aligned around safety and performance, whilst Transformation and growth are overriding themes. This transformation agenda sits in the broader context of the ongoing programme of investment across the North of England's rail routes. All of the operators that have recently completed re-franchising processes have committed to significant rolling stock replacement programmes, more services, new journey opportunities, faster journey times, investment in stations. Each operator has also committed to challenging performance targets and in some cases National Rail Passenger Survey (NRPS) targets which are directly affected by performance outcomes.

Table 3: CP6 customer priorities

Priority area	Examples of our customer's priorities and commitments	Examples of feedback received during CP6 stakeholder engagement
Safety and Level Crossings	All of our customers are committed to the safety of passengers and other members of the public using our infrastructure, the safety of railway employees and safety in our partnerships are our customers' priorities	• *Plans should focus on passenger safety – including reductions in SPADs - as well as workforce safety* • *Need for clarity on plans for level crossing renewal/removal*
Performance	Several of our customers are committed to ambitious PPM targets within their franchises, for example VTEC targeting 90% PPM in CP6 and Northern targeting 93.5% PPM in CP6 Several operators are moving towards 'right time' as a key measure of performance, reflected in many of our existing CP5 customer scorecards.	• *Plans presented don't support TOC performance targets in franchises* • *'Reduction in infrastructure failures' was highlighted as a priority by ECML operators in particular* • *More focus on 'getting the timetable right/running on time'* • *Autumn performance and Weather resilience are key areas for improvement*
Introduction of new services	Our TOC customers are committed to a number of timetable improvements which will see train services operated on LNE & EM increase by c. 15% by the end of CP6. This includes major timetable changes to be delivered by VTEC, GTR on completion of the Thameslink Programme, FTPE, Northern, Grand Central and an additional ECML Open Access operator.	• *Operations, Maintenance and Renewals plans need to support the planned timetable changes, along with on-time delivery of the Enhancements Programme*
Introduction of new rolling stock	Many of our TOC customers are committed to significant rolling stock replacements: Full introduction of Cl700s on GTR; VTEC introduction of full 'Azuma' fleet by May 2021; FTPE 44 new 5-car 125mph capable inter-city trains; Northern 500 new carriages by 2020; Grand Central operating full Cl180 fleet from 2019; Hull Trains bi-mode Hitachi fleet by Dec 2021	• *Need to facilitate and support TOC requirement around introduction of new rolling stock*
Access/ Unplanned disruption	Access Strategy was a topic discussed widely at the workshops. Unplanned disruption caused by overrunning works is a key priority of our TOC and FOC customers highlighted in our customer scorecards	• *An optimised access strategy is needed. The Route needs to work more closely with operators to develop access plans*
Freight and National Passenger Operators (FNPO)	Primarily covered in FNPO CP6 RSP. Key priorities for LNE & EM Route include: Facilitating continued growth in freight volumes (e.g. Aggregates, Intermodal, other key commodities); Ensuring that FNPO do not lose out in decisions about capacity/additional paths; Capitalising on opportunities arising from enhancements and ensuring integration with the Freight Network (e.g. East West Rail and Digital Railway) and taking account of FNPO requirements as part of Access Planning	• *See FNPO CP6 RSP and Appendix H*
Vegetation management	Some of our operators wish to see an improved focus on Vegetation management, including compliance with the latest standards requiring a 6m clearance strip plus an assessment of vegetation beyond that at a 45 degree profile	*One of our operators said they would like to see a strategy associated with vegetation management, particularly on low line-speed, local routes.*
Customer and locally driven initiatives and Third party funding	Our TOC customers have franchise commitments relating to delivering improvements in customer perceptions of the railway measured through NRPS, they also want to see us get better at our it manages and attracts Third Party Funding	• *Would like to see more focus small scale customer facing interventions as well as big infrastructure interventions and journey time improvements'* • *Opportunity for NR to improve how it achieves further third party funding*

2.4 How we have addressed our customers priorities

Based on the engagement with our customers and other specific forums described in the above section, we have responded to the issues our customers and stakeholders face where possible. In a number of instances we have modified our operations, maintenance and asset renewal plans, and in some specific areas (e.g. Third Party funding) we have adapted our processes and governance. A summary of specific examples where we have incorporated customer and stakeholder feedback in our plans can be found in the "You said, we did" section within Appendix I of this RSP. This not only highlights where our CP6 plans specifically address customer feedback, but also where initiatives are already in place to address specific issues.

Figure 12: Appendix I details some specific examples where we have incorporated customer feedback into our plans

The particular challenge that we face is that all of our customers are looking to expand their services, introduce new trains and technology, and significantly improve performance, which cannot all easily be achieved at the same time without significant increases in funding. In addition, because we have so many TOC customers each of whom provides vital local, regional and national connections there is no straightforward way of prioritising one route section or asset type over another when it comes to balancing a constrained funding envelope.

Within our CP6 strategy (see section 1.3) we have therefore had to make difficult decisions about how to balance sometimes competing and conflicting priorities within a constrained funding envelope. Table 4 below captures how our objectives are aligned with those of our customers and how we have prioritised our activities in response to this

Table 4: How we have considered our customers' priorities in our CP6 plan

Priority area	Alignment with our objectives	How does our CP6 strategy address our customer's priorities and commitments	Limitations of our strategy against our customer's priorities and commitments
Safety and Level Crossings	Prioritise safety and performance	Our OMR strategy and distribution of funding across assets is based upon an assessment of risk outcomes in terms of Safety, Performance and Reputation, with a view to broadly maintaining safety performance throughout CP6. The Route will perform 136 level crossing interventions in CP6.	Although the Route has no specific Level crossing enhancement workbank in CP6, we will be performing other enhancements/renewals when opportunity arises when there are interlockings renewals taking place nearby.
Performance	Prioritise safety and performance	Our maintenance and renewals strategies target maintaining performance and making targeted improvements where possible within funding constraints. Our Operations strategy aims to ensure capacity is used effectively in the context of increased service levels, working with our customers through joint Control and development of 'precision timetables' (section 5.3). Our Supplementary Plan for ECML targets delivery of significant performance improvements for all operators using the route (See Appendix D) Our Weather Resilience strategy (5.2.2) including the creation of a new Drainage division with dedicated budget seeks to address seasonal performance concerns.	Our baseline constrained plan does not enable us to meet TOC franchise performance targets alongside accommodating planned increases in service levels during CP6.
Introduction of	Prioritise safety	Our Operational Plan aims to work with our customers and stakeholders	Our baseline constrained plan does not enable us to

Priority area	Alignment with our objectives	How does our CP6 strategy address our customer's priorities and commitments	Limitations of our strategy against our customer's priorities and commitments
new services	and performance Enable investment to time and budget	accommodate the expected timetable improvements, subject to the detailed industry timetable planning processes (section 5.3). Efficient delivery of Tier 1 Enhancement Schemes to time and budget – which will enable key aspects of timetable improvements - is one of the key objectives of our RSP (section 5.1).	meet TOC franchise performance targets alongside accommodating these planned increases in service levels
Introduction of new rolling stock	Efficient and effective delivery Enable investment to time and budget	Efficient delivery of Tier 1 Enhancement Schemes to time and budget – which will enable some of the benefits of new rolling stock - is one of the key objectives of our RSP. We will work with the relevant TOCs through our Alliances and joint working arrangements to facilitate the safe and effective introduction of the new trains onto the network.	Our baseline constrained plan does not enable us to meet TOC franchise performance targets alongside accommodating planned increases in service levels during CP6.
Access/ Unplanned disruption	Efficient and effective delivery	Our Access Strategy (section 7.2) sets out our plans for working with our customers and industry partners to develop a long term access strategy for CP6 to enable more efficient and effective delivery of maintenance, renewals and enhancements.	Trade-offs will be required to enable efficient and effective delivery, for example longer night-time access windows may need to be negotiated.
Freight and National Passenger Operators (FNPO)	Focus on our customers and stakeholders	*See FNPO CP6 RSP and Appendix H*. Our plans include exploring opportunities for longer and heavier trains maximising loco capability; exploring opportunities for new freight routes; facilitating plans for new terminal developments; seeking to retain adequate capacity, capability and flexibility for existing and forecast freight.	Performance trade-offs with capacity, as indicated above.
Vegetation management	Prioritise safety and performance	Vegetation will see some additional spend within CP6 to move towards compliance with updated standards.	Full compliance with standards will not be achieved within CP6 due to budget constraints.
Customer and locally driven initiatives, attracting more third party investment	Focus on our customers and stakeholders, Enable investment to time and budget	Our Buildings asset plans (section 5.3.1) are targeted at stations – including our managed stations at King's Cross, and Leeds, which are key passenger interfaces with the network We have sought to engage with local stakeholders when forming our workbank, examples include renewals at Newcastle, York, Middlesbrough, Peterborough and Doncaster. Our Third Party strategy (Section 9) seeks to leverage local relationships and national, regional and local funding sources to jointly fund and deliver improvements in the railway.	Overall funding constraints mean that not all local stakeholder requirements can be addressed during CP6. Plans will need to be refined through the remainder of CP5 and into CP6 to reflect changing local priorities.

2.5 How these priorities link to short and long term route objectives

The short-term and long-term scorecards set out in Section 3 reflect our realistic assessment of the likely Scorecard outcomes that can be delivered within the assumed funding settlement. We recognise that the performance forecasts in particular do not fully align with the objectives of our TOC customers, however the projections within our Scorecard reflect the trade-offs we will have to make to accommodate the planned circa 15% increase in train services operating across the Route by the end of CP6.

We will continue to engage with our operators to develop our Route and Customer scorecards to reflect their requirements and priorities where this is feasible within budgetary constraints. Continued feedback and implementing lessons learnt will enable the Route to continually improve the effectiveness of the scorecards and embed them across our teams.
The continued development of our scorecards will allow us to work with our customers to identify and focus on the objectives critical to the delivery of sustainable plan that considers the sustainability of the Route to ensure the delivery of safe, reliable, affordable infrastructure to deliver the capacity requirement for the future.

2.6 Regulatory floors

In order to give greater clarity on the minimum levels of performance and sustainability expected by the regulator (ORR), our plan includes regulatory floors for the key metrics in these areas. These floors, set out in the following table, will act as a level below which ORR would consider undertaking formal investigation for licence breach. Further information on the methodology used to calculate these regulatory floors is explained below.

Network Sustainability: The Sustainability assurance has identified a small part of the overall plan that can be deferred and remain deliverable in future control periods. The regulatory floor for sustainability is therefore set at this level which has been assessed to be limited to a 10% loss in proposed plan activity across the control period.

Routes will therefore be required to demonstrate that delivery is kept to a level to perform above the 90% threshold and demonstrate that forward plans will allow this to remain the case at the end of the control period.

In addition to the regulatory floor, Network Rail internal assurance and review will monitor route delivery through an annual route specific threshold. Where a single year's delivery falls to <85% of the plan a route specific improvement plan will be required for Executive approval & monitoring. This measure of sustainability reflects a balance which, whilst allowing a certain amount of re-phasing, also requires a retained margin within the overall control period headroom, supporting remedy ahead of any regulatory breach.

CRM- P: The CRM-P floor has been set using a consistent, simple to understand, methodology across all routes to derive a floor which should only be breached when a route is displaying signs of being in systematic failure. The floor has been set on the basis that ORR will first investigate a breach of the floor and check whether the route is doing everything reasonably practicable to manage the relevant issues before taking regulatory action. This recognises that CRM-P can be impacted by extreme events outside the direct control of the railway (including weather) and potentially by major changes in the reliability of TOC operations.

FDM – R: The regulatory floor is calculated following the same methodology as is used for the FDM-R target. Using a two year average of historical data the FDM-R methodology establishes, by route, the number of allowed delay failures each route should contribute in order to achieve the national FDM target of 94%. The regulatory floor calculation adds 30% to these allowed delay failures.

Regulatory floors	19/20	20/21	21/22	22/23	23/24
Network performance – passenger (CRM-P)	1.70	1.69	1.66	1.64	1.63
Freight Delivery Metric (FDM-R)	93.9%	93.9%	93.9%	93.9%	93.9%
Network Sustainability	90%	90%	90%	90%	90%

Table 5: Regulatory floor measures

3 Route objectives

This plan is predicated on the key assumptions laid out in Appendix B and will be impacted as these assumptions change

3.1 Scorecard for 17/18

The table below sets out our targets for the remainder of CP5. In summary the key drivers of this performance are as follows:

- **Safety**: In line with our objectives we anticipate that our ongoing focus on safety improvement, including targeted training and education programmes and the creation of a small safety delivery team will result in a 10% annual improvement in safety outcomes as measured by LTIFR
- **Financial performance**: The scorecard forecast of £0m financial performance for each of the remaining years of CP5 reflects an on target and to scope delivery of our maintenance, operations and renewals activities. A key risk to delivery of FPM in the remaining 2 years is the efficiency over plan in our renewals portfolio. Whilst we have plans to deliver this, are over planning by 100% and have mitigating plans on a cash basis, should it not be delivered there will be a FPM impact.
- **Investment**: Milestones are aligned with our corporate Enhancement Delivery Plan (EDP) and reflect our committed projects outputs as agreed and monitored with the DfT and associated industry stakeholders at the relevant Programme board
- **Asset management**: In line with our objective 'Delivery of a safe, resilient, reliable railway' our approach of targeted maintenance and tactical intervention will enable a marginal reduction in service affecting failures by 2018/19. However the base resilience of the overall asset will not improve
- **Train performance:** We anticipate that marginal PPM improvements through to the end of CP5, reflecting an upward underlying trend caused in part by better resilience against OHL failures and more visible patrols and fencing which continues to reduce risk of trespass and fatalities.
- **Passenger satisfaction** across our operators is anticipated to remain relatively consistent reflecting underlying performance trends, with some potential upside from improvements driven by recently re-franchised operators investing in customer facing improvements

Safety	17/18			18/19		
	WORSE THAN TARGET	TARGET	BETTER THAN TARGET	WORSE THAN TARGET	TARGET	BETTER THAN TARGET
LTIFR	0.732	0.658	0.592	0.682	0.62	0.558

Financial performance	17/18			18/19		
	WORSE THAN TARGET	TARGET	BETTER THAN TARGET	WORSE THAN TARGET	TARGET	BETTER THAN TARGET
Financial Performance Measure – excl. enhancements (£m)	-38	0	38	-40	0	40
Financial Performance Measure – gross enhancements only (£m)	-43	0	43	-48	0	48
Cash compliance – income & expenditure	-10.8	0	54	12	0	-62
Investment	**17/18**			**18/19**		
	WORSE THAN TARGET	TARGET	BETTER THAN TARGET	WORSE THAN TARGET	TARGET	BETTER THAN TARGET
Top Investment Milestones	60%	80%	100%	60%	80%	100%
Asset Management	**17/18**			**18/19**		
	WORSE THAN TARGET	TARGET	BETTER THAN TARGET	WORSE THAN TARGET	TARGET	BETTER THAN TARGET
Reduction in service affecting failures	6,311	6,643	6,975	6,251	6,580	6,909
Train Performance	**17/18**			**18/19**		
	WORSE THAN TARGET	TARGET	BETTER THAN TARGET	WORSE THAN TARGET	TARGET	BETTER THAN TARGET
Northern PPM MAA	89.1	89.2	89.3	88.8	89.0	89.2
Virgin Trains East Coast PPM MAA	84.3	84.5	84.6	83.5	83.8	84.0
East Midlands Trains PPM MAA	92.5	92.7	92.8	91.4	91.7	91.9

Freight Delivery Metric (FDM)	95.3%	95.7%	95.7%	94.9%	95.7%	95.8%
Grand Central PPM MAA	85.5	85.8	86.1	89.1	89.2	89.3
Hull Trains PPM MAA	79.5	79.8	80.0	81.6	82.3	82.8
Locally Driven Customer Measures	**17/18**			**18/19**		
	WORSE THAN TARGET	**TARGET**	**BETTER THAN TARGET**	**WORSE THAN TARGET**	**TARGET**	**BETTER THAN TARGET**
Passenger Satisfaction	81	84	85	82	84	85
Passenger Satisfaction (King Cross/Leeds)	90	91	92	90.5	91.5	93

3.2 Long-term scorecard

The table overleaf sets out our long-term targets for CP6. In summary the key drivers of this performance are as follows:

3.2.1 Safety

Efficient and effective delivery

During CP6 in line with our objectives we will continue to focus on improving occupational safety. Our goal is to deliver industry benchmarked LTIFR of 0.17. The LTIFR target is set to reflect Network Rail's national aspiration to benchmark ourselves against other industries who lead on safety. However, the criteria that other such industries use varies from how Network Rail currently measures LTIFR. As a result it is recognised that there will need to be a level playing field with which to compare NR's LTIFR, which will require changes to the definition of what incidents are counted as LTIs in Network Rail".

3.2.2 Financial performance

The scorecard forecast of £0m financial performance for each year of CP6 reflects an on target and to scope delivery of our maintenance, operations and renewals activities. By the time CP6 begins we will have restored focus on disciplined cost control and returned to efficient and effective delivery of our renewals activities which have been a key driver of negative financial performance in CP5.

3.2.3 Investment

In CP6 the strategy and milestones remains unchanged.

3.2.4 Asset management

Prioritise safety and performance

In line with our objective of 'Prioritise safety and performance' our approach of targeted maintenance and tactical intervention will hold asset condition in the control period and will deliver marginal improvements in service affecting incidents, but is likely to reduce overall asset sustainability in the longer term. However early in CP6 we expect a detrimental impact on incident count associated with the traffic growth on ECML and Transpennine Routes. ECML overhead line resilience remains a concern and this cost constrained submission relies heavily on well targeted maintenance and refurbishment to sustain performance. The base resilience of the overall asset will not improve with baseline investment.

3.2.5 Train performance

Prioritise safety and performance

Our baseline constrained strategy will broadly maintain performance across the Route against a backdrop of capacity increases and introduction of new rolling stock. Overall we anticipate that new rolling stock will deliver performance benefits to the network, however this is balanced by the potential risks of widespread introduction of new trains whose operational capabilities and reliability have yet to be tested on the network. This together with new service patterns, new destinations served and increased traffic frequency introduces risk to future forecasts. However we plan to deliver a series of operational and train performance initiatives which will help mitigate some of these performance risks (see sections 4 and 5), especially given the larger impact any incident has on DPI as more trains run on the network. Commentary on some of our customers' performance forecasts in CP6 as presented in our LT scorecards is provided below.

Commentary on some of our customers' performance forecasts in CP6 as presented in our Long Term scorecard is provided below with a full breakdown of performance waterfall charts for each of the TOCs reported on our scorecard provided in Appendix J. Some of our forecasts are reliant on the delivery TOC-controllable KPIs. The contribution of these components, which have been subject to consultation with TOCs and estimated by the Route, is stated at the bottom of each of the individual TOC commentary below. TPE has not been stated as this is reported within the London North-Western route RSP.

Northern

The Northern franchise sees the most extensive overhaul of its timetable in May 2018 and the introduction of new Northern Connect services in 2019. This is a transformation of the Northern timetable, coupled with significant infrastructure change and diversion of services around the Manchester Hub. The current franchise commitment for PPM MAA for 2023/24 is 93.50%. Network Rail's forecast for PPM MAA for 2023/24 is 91.1% - a continuation of the gap that has opened up since the start of the new franchise in 2016/17 as performance in the West of the franchise has not risen as was expected by the original franchise assumptions. Work continues to improve the underlying base timetable and reliability of the fleet and infrastructure asset, but we do not anticipate being able to close the gap between the franchise expectation and our own forecast given the scale of timetable change and increase in number of services. **2.0% of the projected increase for Northern is estimated to come from Operator KPIs.**

Transpennine Express

Our short term and long-term scorecards do not carry performance forecasts for TPE as these are contained within the LNW Route plan as lead route for this customer. The TPE franchise sees an extensive overhaul of its timetable in May 2018, the most significant since May 2014 with the extension of services to East Coast destinations. CP6 sees further fundamental change with the extension of services to Edinburgh via the ECML. The Manchester Hub infrastructure sees significant change and diversion of services from Piccadilly to Victoria. The current franchise commitment for PPM MAA for 2023/24 is 91.70%.

Virgin Trains East Coast

The 2020 timetable brings about transformational change to the ECML timetable. In addition to more trains and new destinations, the operator will be sharing its long distance route with more open access operators and more services operating on the ECML run by franchise TOCs such as TPE. That, coupled with the opening of the connection to the Thameslink core in 2018 brings significant risk. The current franchise commitment for 2023/24 for the VTEC franchise is 90%. During tender evaluation, Network Rail expressed significant reservation about such a high output given that levels of performance had historically been much lower than that and achieving such levels for a sustained period had not been possible. This had previously been acknowledged by ORR during the CP5 Business Planning cycle when this operation was exempted from the ORR's HLOS specifying a minimum 90% PPM threshold for all TOCs through CP5. Network Rail's projection is PPM MAA of 85.6% and is based on the very significant change that is coming to the ECML during CP6. **1.3% of the projected increase for VTEC is estimated to come from Operator KPIs**

East Midlands Trains

The franchise has yet to be specified and let, and is therefore more challenging to reliably forecast future performance. The current assessment is based on known impact of the 2018 Thameslink timetable introduction. The current DfT proposal for the 'non-electrification' option is a possible target of 94.0% by 2023/24. Our own projection for 2023/24 is 91.3% based on the current franchise map, train services and risk associated with the 2018 Thameslink timetable introduction. **0.17% of CP6 improvement for EMT is estimated to come from Operator KPIs.**

Grand Central/Hull Trains

The open access operators will encounter the same performance effecting factors on the ECML as VTEC. The major impact being the implementation of the Thameslink timetable. Both will also experience changes to their fleet. 0.07% of CP6 improvement for Grand Central is estimated to come from Operator KPIs. **0.51% of the projected increase for Hull Trains is estimated to come from Operator KPIs .**

3.2.6 Passenger satisfaction

Focus on our customers and stakeholders

Across our operators is anticipated to remain relatively consistent reflecting underlying performance trends, with some potential upside from improvements driven by recently re-franchised operators investing in customer facing improvements. No major investments planned at either Leeds or King's Cross throughout the next Control Period so the expectation is that satisfaction will plateau. However there are potential upsides due to the fact that Leeds station has recently seen the introduction of the Southern entrance which allows a better flow of passengers to the south of the city, whilst Alliance Agreements with Northern Rail, FTPE and VTEC to create a 'one team' approach at Leeds station will seek to improve the customer experience and subsequent NPS scores

Safety		18/19	19/20	20/21	21/22	22/23	23/24	24/25	Achiev-ability	Definition
Lost Time Injury Frequency Rate (LTIFR)	**Worse than Target**	TBC	TBC	TBC	TBC	TBC	0.19	0.19		The number of injuries leading to absence from work among staff and contractors per 100,000 hours worked.
	Target	TBC	TBC	TBC	TBC	TBC	0.17	0.17		
	Better than Target	TBC	TBC	TBC	TBC	TBC	0.15	0.15		
Train Accident Risk Reduction Measures	**Worse than Target**	60%	60%	60%	60%	60%	60%	60%		Measures our achievement of the key milestones and metrics to reduce train accident risk. This will be reported at route level as well as national, providing greater visibility and accountability in delivering a safer railway.
	Target	80%	80%	80%	80%	80%	80%	80%		
	Better than Target	100%	100%	100%	100%	100%	100%	100%		
Top 10 Milestones to reduce level crossing risk	**Worse than Target**	6	6	6	6	6	6	6		Measures our achievement of the Top-10 milestones to reduce level crossing risk.
	Target	8	8	8	8	8	8	8		
	Better than Target	10	10	10	10	10	10	10		
RM3	**Worse than**	TBC	TBC	TBC	TBC	TBC	TBC	TBC		Measures our achievement of

	Target									milestones for health and safety risk management.
	Target	TBC	TBC	TBC	TBC	TBC	TBC	TBC		
	Better than Target	TBC	TBC	TBC	TBC	TBC	TBC	TBC		
Train Performance		**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**Achiev-ability**	**Definition**
Consistent Route Measure - Performance	**Worse than Target**	1.36	1.40	1.39	1.37	1.36	1.35	TBC		Network Rail caused delay minutes to all train operators from incidents occurring in the route, normalised by train kilometres travelled on the route.
	Target	1.32	1.34	1.33	1.30	1.28	1.27	TBC		
	Better than Target	1.28	1.30	1.28	1.25	1.23	1.21	TBC		
Freight Delivery Metric (FDM-R)	**Worse than Target**	94.9%	93.4%	93.4%	93.4%	93.4%	93.4%	93.4%		FDM is our indicator of how many freight services have arrived at their destination on time.
	Target	95.7%	93.9%	93.9%	93.9%	93.9%	93.9%	93.9%		
	Better than Target	95.8%	94.4%	94.4%	94.4%	94.4%	94.4%	94.4%		
PPM Northern PPM MAA	**Worse than Target**	88.8%	88.9%	89.0%	89.3%	89.8%	90.2%	90.2%		The percentage of trains arriving at terminus within a 5 minute punctuality threshold.
	Target	89.0%	89.2%	89.4%	89.8%	90.5%	91.1%	91.1%		
	Better than Target	89.2%	89.5%	89.8%	90.3%	91.2%	92.0%	92.0%		
Virgin Trains East Coast PPM MAA	**Worse than Target**	83.5%	82.0%	82.5%	83.3%	84.0%	83.8%	83.8%		The percentage of trains arriving at terminus within a 10 minute punctuality threshold.
	Target	83.8%	82.5%	83.2%	84.4%	85.4%	85.6%	85.6%		
	Better than Target	84.0%	82.7%	83.5%	84.9%	86.1%	86.4%	86.4%		
East Midlands Trains PPM MMA	**Worse than Target**	91.4%	90.6%	90.1%	89.9%	89.7%	89.5%	89.5%		The percentage of trains arriving at terminus within a 10 minute punctuality threshold.
	Target	91.7%	91.1%	90.8%	91.0%	91.2%	91.3%	91.3%		
	Better than Target	91.9%	91.4%	91.2%	91.5%	91.9%	92.2%	92.2%		
Grand Central PPM MAA	**Worse than Target**	84.7%	82.5%	83.6%	83.0%	82.3%	81.6%	81.6%		The percentage of trains arriving at terminus within a 10 minute punctuality threshold.
	Target	85.4%	83.5%	85.0%	85.0%	85.0%	85.0%	85.0%		
	Better than Target	85.9%	84.3%	86.0%	86.5%	87.0%	87.6%	87.6%		

Hull Trains PPM MAA	**Worse than Target**	81.6%	83.5%	83.6%	83.0%	82.3%	81.6%	81.6%		The percentage of trains arriving at terminus within a 10 minute punctuality threshold.
	Target	82.3%	84.5%	85.0%	85.0%	85.0%	85.0%	85.0%		
	Better than Target	82.8%	85.3%	86.0%	86.5%	87.0%	87.6%	87.6%		
Average Passenger Lateness - Northern	**Worse than Target**	2.22	2.20	2.18	2.14	2.06	1.99	1.99		An estimate of how late every passenger reaches their destination station.
	Target	2.19	2.15	2.12	2.05	1.93	1.83	1.83		
	Better than Target	2.16	2.11	2.06	1.96	1.81	1.68	1.68		
Average Passenger Lateness - Virgin Trains East Coast	**Worse than Target**	7.36	8.07	7.84	7.42	7.08	7.18	7.18		An estimate of how late every passenger reaches their destination station.
	Target	7.20	7.83	7.51	6.93	6.42	6.34	6.34		
	Better than Target	7.11	7.71	7.35	6.68	6.08	5.93	5.93		
Average Passenger Lateness - East Midlands	**Worse than Target**	3.31	3.56	3.72	3.77	3.83	3.91	3.91		An estimate of how late every passenger reaches their destination station.
	Target	3.19	3.39	3.48	3.42	3.36	3.32	3.32		
	Better than Target	3.13	3.30	3.37	3.24	3.12	3.03	3.03		
Average Passenger Lateness - Grand Central	**Worse than Target**	6.17	7.03	6.59	6.85	7.11	7.37	7.37		An estimate of how late every passenger reaches their destination station.
	Target	5.90	6.64	6.06	6.06	6.06	6.06	6.06		
	Better than Target	5.71	6.35	5.67	5.47	5.27	5.07	5.07		
Average Passenger Lateness - Hull Train	**Worse than Target**	7.35	6.72	6.67	6.90	7.13	7.36	7.36		An estimate of how late every passenger reaches their destination station.
	Target	7.13	6.37	6.20	6.20	6.20	6.20	6.20		
	Better than Target	6.96	6.11	5.85	5.68	5.50	5.33	5.33		
NR caused Delay Minutes by the route - Northern	**Worse than Target**	339,300	341,000	342,600	341,900	341,200	340,600	340,600		Network Rail caused delay minutes to the train operator.
	Target	340,000	342,000	344,000	344,000	344,000	344,000	344,000		
	Better than Target	340,700	343,000	345,400	346,100	346,800	347,400	347,400		
NR caused Delay Minutes by the route - Virgin Trains East Coast	**Worse than Target**	213,300	228,400	223,400	214,600	207,400	209,400	209,400		Network Rail caused delay minutes to the train operator.
	Target	209,800	223,300	216,500	204,100	193,200	191,600	191,600		

	Better than Target	208,100	220,700	213,100	198,800	186,100	182,800	182,800		
NR caused Delay Minutes by the route -East Midlands Trains	**Worse than Target**	232,000	257,000	272,000	277,200	282,400	290,700	290,700		Network Rail caused delay minutes to the train operator.
	Target	220,500	239,900	249,300	243,000	236,800	233,600	233,600		
	Better than Target	214,800	231,300	237,900	225,900	213,900	205,100	205,100		
NR caused Delay Minutes by the route - Freight Delivery Metric	**Worse than Target**	TBC	TBC	TBC	TBC	TBC	TBC	TBC		Network Rail caused delay minutes to the train operator.
	Target	TBC	TBC	TBC	TBC	TBC	TBC	TBC		
	Better than Target	TBC	TBC	TBC	TBC	TBC	TBC	TBC		
NR caused Delay Minutes by the route - Grand Central	**Worse than Target**	29,600	31,600	30,600	31,200	31,800	32,300	32,300		Network Rail caused delay minutes to the train operator.
	Target	29,000	30,700	29,400	29,400	29,400	29,400	29,400		
	Better than Target	28,600	30,000	28,500	28,100	27,600	27,200	27,200		
NR caused Delay Minutes by the route - Hull Trains	**Worse than Target**	18,600	17,800	17,700	18,000	18,300	18,600	18,600		Network Rail caused delay minutes to the train operator.
	Target	18,300	17,300	17,100	17,100	17,100	17,100	17,100		
	Better than Target	18,100	17,000	16,600	16,400	16,200	16,000	16,000		
On Time at all recorded stations - Northern	**Worse than Target**	60.3%	60.4%	60.7%	60.9%	61.3%	61.8%	61.8%		Percentage of Recorded Station Stops called at on time or early.
	Target	60.4%	60.6%	60.9%	61.3%	61.8%	62.4%	62.4%		
	Better than Target	60.5%	60.8%	61.1%	61.7%	62.3%	63.0%	63.0%		
On Time at all recorded stations - Virgin Trains East Coast	**Worse than Target**	49.2%	47.9%	48.3%	49.1%	49.6%	49.5%	49.5%		Percentage of Recorded Station Stops called at on time or early.
	Target	49.4%	48.3%	48.9%	49.9%	50.8%	50.9%	50.9%		
	Better than Target	49.6%	48.5%	49.2%	50.3%	51.4%	51.7%	51.7%		
On Time at all recorded stations - East Midlands Trains	**Worse than Target**	61.0%	59.5%	58.6%	58.3%	58.0%	57.5%	57.5%		Percentage of Recorded Station Stops called at on time or early.
	Target	61.6%	60.5%	59.9%	60.3%	60.7%	60.9%	60.9%		
	Better than Target	62.0%	61.0%	60.6%	61.3%	62.0%	62.5%	62.5%		
On Time at all recorded stations - Freight Delivery	**Worse than Target**	TBC	N/A	N/A	N/A	N/A	N/A	N/A		Percentage of Recorded Station Stops called at on time or early.

Metric	**Target**	TBC	N/A	N/A	N/A	N/A	N/A	N/A		
	Better than Target	TBC	N/A	N/A	N/A	N/A	N/A	N/A		
On Time at all recorded stations - Grand Central	**Worse than Target**	53.3%	52.4%	52.9%	52.6%	52.3%	52.0%	52.0%		Percentage of Recorded Station Stops called at on time or early.
	Target	53.6%	52.8%	53.4%	53.4%	53.4%	53.4%	53.4%		
	Better than Target	53.8%	53.1%	53.9%	54.1%	54.3%	54.5%	54.5%		
On Time at all recorded stations - Hull Trains	**Worse than Target**	44.0%	47.2%	47.5%	46.3%	45.1%	44.0%	44.0%		Percentage of Recorded Station Stops called at on time or early.
	Target	45.2%	49.0%	49.8%	49.8%	49.8%	49.8%	49.8%		
	Better than Target	46.0%	50.3%	51.6%	52.5%	53.4%	54.3%	54.3%		
Level of Cancellations - Northern	**Worse than Target**	2.28%	2.25%	2.22%	2.16%	2.01%	1.90%	1.90%		The percentage of planned trains which either did not run their full planned journey or did not call at all their planned station stops.
	Target	2.23%	2.17%	2.12%	2.01%	1.81%	1.64%	1.64%		
	Better than Target	2.18%	2.10%	2.02%	1.85%	1.61%	1.38%	1.38%		
Level of Cancellations - Virgin Trains East Coast	**Worse than Target**	3.0%	3.4%	3.2%	3.0%	2.8%	2.9%	2.9%		
	Target	2.9%	3.2%	3.1%	2.7%	2.5%	2.4%	2.4%		
	Better than Target	2.8%	3.2%	3.0%	2.6%	2.3%	2.2%	2.2%		
Level of Cancellations - East Midlands Trains	**Worse than Target**	2.0%	2.2%	2.3%	2.3%	2.4%	2.4%	2.4%		
	Target	1.9%	2.0%	2.1%	2.0%	2.0%	2.0%	2.0%		
	Better than Target	1.8%	2.0%	2.0%	1.9%	1.8%	1.8%	1.8%		
Level of Cancellations - Freight Delivery Metric	**Worse than Target**	TBC	N/A	N/A	N/A	N/A	N/A	N/A		
	Target	TBC	N/A	N/A	N/A	N/A	N/A	N/A		
	Better than Target	TBC	N/A	N/A	N/A	N/A	N/A	N/A		
Level of Cancellations - Grand Central	**Worse than Target**	3.1%	3.7%	3.4%	3.6%	3.8%	4.0%	4.0%		
	Target	2.9%	3.4%	3.0%	3.0%	3.0%	3.0%	3.0%		
	Better than Target	2.8%	3.2%	2.8%	2.6%	2.5%	2.4%	2.4%		

Level of Cancellations - Hull Trains	**Worse than Target**	4.1%	3.8%	3.7%	3.9%	4.0%	4.1%	4.1%		
	Target	4.0%	3.6%	3.5%	3.5%	3.5%	3.5%	3.5%		
	Better than Target	3.9%	3.4%	3.3%	3.2%	3.1%	3.0%	3.0%		
Customer		**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**Achiev-ability**	**Definition**
Passenger Satisfaction	**Worse than Target**	82.0%	81.0%	81.0%	82.0%	82.0%	82.0%	82.0%		Percentage of overall satisfaction for TOCs who operate on the Route.
	Target	84.0%	85.0%	85.0%	85.0%	85.0%	85.0%	85.0%		
	Better than Target	85.0%	87.0%	87.0%	87.0%	87.0%	87.0%	87.0%		
Passenger Satisfaction (Kings Cross/Leeds)	**Worse than Target**	90.5%	90.5%	90.5%	90.5%	90.5%	90.5%	90.5%		Percentage of overall satisfaction for Kings Cross and Leeds.
	Target	91.5%	91.5%	91.5%	91.5%	91.5%	91.5%	91.5%		
	Better than Target	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%	93.0%		
East Midlands Trains (EMT) Roll up of customer scorecard	**Worse than Target**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		Delivery against customer specific measures.
	Target	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%		
	Better than Target	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		
Grand Central (CG) Roll up of customer scorecard	**Worse than Target**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		Delivery against customer specific measures.
	Target	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%		
	Better than Target	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		
Hull Trains Roll up of customer scorecard	**Worse than Target**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		Delivery against customer specific measures.
	Target	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%		
	Better than Target	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		
Northern Roll up of customer scorecard	**Worse than Target**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		Delivery against customer specific measures.
	Target	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%		
	Better than Target	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		
Virgin Trains East Coast (VTEC) Roll up of customer	**Worse than Target**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		Delivery against customer specific measures.

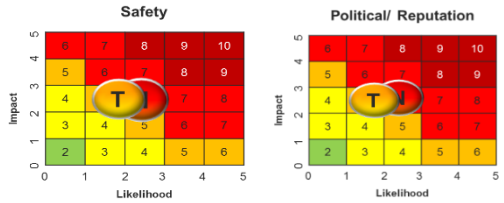
scorecard	**Target**	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%		
	Better than Target	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		
Sustainability / Asset Management		**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**Achievability**	**Definition**
Service affecting failures (SAF)	**Worse than Target**	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	TBC		Measures the impact of asset failures on train performance
	Target	0.5%	0.5%	3.0%	3.2%	1.5%	1.7%	TBC		
	Better than Target	1.0%	1.0%	6.0%	6.4%	3.0%	3.4%	TBC		
CRI	**Worse than Target**	25.5%	0.0%	0.0%	0.0%	0.0%	0.0%	TBC		This is a measure of the short-term condition and performance of our assets including track, signalling, points, electrification, telecoms, buildings, structures and earthworks.
	Target	25.8%	0.5%	3.2%	6.1%	7.4%	8.9%	TBC		
	Better than Target	26.2%	0.9%	6.5%	12.0%	14.4%	17.1%	TBC		
7 Key Volumes	**Worse than Target**	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%		Measures delivery against budget of the seven key renewals volumes
	Target	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%	95.0%		
	Better than Target	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		
Top Investment Passenger Milestones	**Worse than Target**	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%	60.0%		These milestones measure our achievement of interim milestones of our top-10 renewals and enhancement projects.
	Target	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%	80.0%		
	Better than Target	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%		
Network Sustainability - CSI	**Worse than Target**	TBC	TBC	TBC	TBC	TBC	TBC	TBC		Residual life of asset type - TBC
	Target	TBC	TBC	TBC	TBC	TBC	2%	TBC		
	Better than Target	TBC	TBC	TBC	TBC	TBC	TBC	TBC		
Financial Performance		**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**Achievability**	**Definition**
Financial Performance Measure (FPM) - Gross Excl. Enhancements (£m)	**Worse than Target**	-40	-54	-54	-55	-44	-43	-43		Measures how we are performing against our Income, Opex and Renewals budget.
	Target	0	0	0	0	0	0	0		
	Better than	40	54	54	55	44	43	43		

	Target									
Financial Performance Measure (FPM) - Gross Enhancements only (£m)	**Worse than Target**	-48	-73	-56	-45	-40	-40	-40		Enhancement expenditure measures how we are performing against our Enhancement expenditure budget.
	Target	0	0	0	0	0	0	0		
	Better than Target	48	73	56	45	40	40	40		
Cash Compliance – Income & Expenditure	**Worse than Target**	-12	-19	-16	-15	-12	-12	-12		This is a measure of how well we have remained within our funding envelope in total.
	Target	0	0	0	0	0	0	0		
	Better than Target	62	96	82	74	60	60	60		

Achievability definitions (applies to "target" value)	
RED	Very challenging, likely to require substantial organisational and cultural change to achieve and/or highly dependent on third party involvement
AMBER	Challenging, likely to require moderate organisational and cultural change to achieve and/or dependent on third party involvement
GREEN	Achievable, builds on existing organisational and cultural capabilities and little or no dependency on third parties for delivery

4 Safety (activity prioritisation on a page)

Summary of objectives	In line with our strategic objective to **'prioritise safety and performance'**, we will target a reduction of LTIFR to 0.17 over CP6. This will be done by implementing our safety plan which targeting areas of lost time injury and improving the safety culture throughout the Route. This will help achieve the Route and Network Rail's vision of getting "everyone home safe everyday".			
No.	**Key constraints, risks and opportunities**	**What we plan to do**	**Owner**	**Timescale (start/ finish)**
1	R - Workforce Safety: Our plans do not deliver the required safety culture change in the Route and we continue to have directly employed staff and contractors incurring personal injuries at unacceptable levels. R – Workforce Safety: Our plans do not deliver the required safety culture change in the Route and we continue to have directly employed staff and contractors incurring personal injuries at unacceptable levels.	A programme based on a "CP6 Safety Plan" has been developed to target key areas causing LTIFR. Key areas of focus will centre around improving leadership of safety, increasing employee engagement and accountability and further investment in training and development. Activities will include: upskilling staff on the correct methods of manual handling of the plant and equipment that they use during their normal duties, holding workshops to focus on asses risks and how we control them with particular attention to personal accountability, Highway vehicle drivers will be subject to constant education through the MORR programme which will potentially reduce road traffic collisions which cause staff to lose time from work due to injuries incurred. We will start a programme of maintenance depot upgrades which provide the environment for a cultural change helping them approach their work in safe and professional manner.	DRSAM/RMD	In progress/End CP6
2	O – Workforce Safety: Manual handling is the biggest cause of lost time injuries.	Eliminate manual handling injuries by the end of CP6 through investment in plant and materials handling and improved planning and logistics through Safe and Effective Working which will limit the need for manual handling.		
3	R – Level Crossings: An increase in services increases the risk to public & passenger safety at level crossings. C: LX upgrades are costly, requiring third party agreement and relevant consents	LNE & EM plans to perform over 136 level crossing interventions in CP6, varying in scale and complexity. These will include over 47 interventions to fully renew and automate level crossing operations, 29 interventions to prevent barriers being lowered onto vehicles on the level crossing and 25 barrier renewals/life extension works. Further Route closures are unfunded, a detailed breakdown of how the Route plans to deliver additional level crossings, based on receiving further funding, is detailed in our ECML Supplementary Plan and in Appendix D.	DRSAM/RMD	In progress/End CP6
3	R – Public Safety: Increase in public deaths through increasing trespass and suicide attempts R – Public Safety: Increase in public deaths through increasing trespass and suicide attempts	Ongoing investment in infrastructure to limit access to the railway and reduce the potential of trespass and suicide through interventions including fencing, ticketing controls. We will continue to work with stakeholders such as BTP and Samaritans to target known hotspot areas and increase surveillance resource and education through schools.	DRSAM/RMD	End CP6



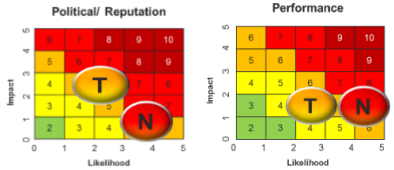
Summary of risk outcome

Workforce safety and level crossings are our key areas of focus. We will continue to manage and improve our train accident risk and will continue to build on the good work from CP5. Level crossing risk is a challenge due to the change in risk profile from the forecast increases in traffic. We believe we have good plans to achieve our forecast workforce safety improvements. The key challenge in this area is to change the culture in the Route to achieve this.

4.1 Train performance (activity prioritisation on a page)

Summary of objectives	In line with our strategic objective '**prioritise safety and performance**, we will seek to maintain or marginally improve operating performance at the same time as accommodating our customers' substantial commitments to timetable and rolling stock changes. We plan to do this through precision timetables, improved business continuity and recovery plans, improvements to "start of day" performance, better response and repair times, enhanced maintenance, and reducing trespass and route crime.

	Key constraints, risks and opportunities	What we plan to do	Owner	Customers impacted	Timescale
1	R: The allowance in the forecast for the performance impact of multiple timetable changes and increased service levels is not sufficient because the performance modelling and impact analysis is not yet fully understood.	We plan to develop a 'precision timetable' towards the end of CP5 to ensure existing capacity is used most efficiently, and will work with our customers through our Alliances and other joint working arrangements to refine timetable changes prior to implementation. We are centralising signalling operations and creating joint operations teams with customers to ensure a more co-ordinated response to service disruption. We will also improve business recovery teams and response teams with more training to ensure they are as effective as possible when responding to events to minimise reactionary delay.	COO	All	End CP6
2	R: Seasonal factors and increased occurrence of extreme weather events in the future.	We have created a new Drainage RAM role in preparation for CP6, with the specific responsibility of improving the resilience of Track and Earthworks assets by ensuring drainage systems work effectively and are properly maintained – reducing occurrences of failure of these assets, particularly during extreme weather events. We plan to increase vegetation budgets to better manage trackside vegetation.	HOO	All	End CP6
3	O: Traffic Management Systems	Traffic Management systems offer the potential to improve performance on the network by reducing the reactionary delay to an original incident. However, traffic management systems in combination with train operator investment in crew & stock systems and connected driver advisory systems can leverage significantly greater performance. This is because the management of staff and rolling stock can be included and drivers can be given real-time information about how to respond to delays.	ADs	All	End CP6
4	O/R: New Rolling Stock (New Thameslink Class 700 and IEP Class 800 trains)	These create the opportunity to improve train performance by being less prone to failures which cause delay but could have teething problems when introduced on full timetables. LNE & EM will work closely with the TOCs to ensure that sufficient mitigations are in place to manage all potential performance risks.	DRAM	All	End CP6
5	O: Better asset performance data	New technologies such as Eddy Current, PLPR, RCM and ORBIS allow us to have better insight into how assets are performing. This will enable us to perform more targeted renewals and predict asset failure more often before it occurs. We plan to ensure maintenance teams are adequately trained to handle, manage and understand this data.	ADs	All	End CP6
6	C: Infrastructure Capacity Constraints (ECML and Moorgate lines) could limit the extent to which we can deliver customer franchise commitments.	Continue to develop Digital Railway and traffic management solutions for the ECML, aiming for deployment on the southern section of the ECML towards the end of CP6. We plan to develop a 'precision timetable' towards the end of CP5 to ensure existing capacity is used most efficiently.	ADs	All	CP5 & CP6
7	O: Joint Operations will help us work more collaboratively with our customers.	Centralising control of our operations at the York and Derby ROC with a continuous presence of our TOCs/FOCs to ensure issues and delays are collectively handled and managed by ourselves and our customers.	RPM/DRAM	All	CP5 & CP6
8	O: Improve train performance by deploying ETCS on the Moorgate Lines and then the Southern section of the ECML, with a forecast 2% improvement in PPM[1].	We have appointed a Digital Railway head for the Route and plan to fully develop the business case, create partnerships with technology providers and better develop the commercial model to ensure ETCS is deployed in CP6.	RPM/DRAM	All	CP5 & CP6



Summary of risk outcome

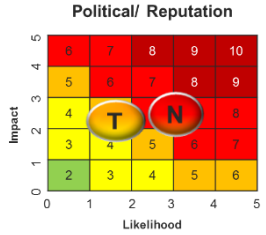
We are managing train performance risk within risk appetite; however, managing within reputation appetite is more challenging. The most significant risk is that is exceptionally difficult to accurately forecast train performance trajectories given the scale of timetable change that will occur through the Control Period, much of which isn't yet available to assess in detail, other than as a quantum of trains, some of which isn't yet specified. The residual risks and opportunities that remain are balancing the challenge to reduce delay per incident through a more 'aggressive' service recovery approach and the differing needs of multiple passenger operators on a shared network.

[1] East Coast Digital Programme – Strategic Outline Business Case

4.2 Locally driven measures (activity prioritisation on a page)

Summary of objectives	In line with our strategic objective **'Focus on our customers and stakeholders'** we will aim to increase passenger satisfaction across our network including at the two managed stations on the LNE & EM Route. This will be achieved through a range of initiatives to ease overcrowding and improve quality of journey experience. We are also proposing multi-operator engagement at managed stations with a one team approach.

No.	Key constraints, risks and opportunities	What we plan to do	Owner	Customers impacted	Timescale
1	O: Improve passenger satisfaction through new initiatives.	Successfully help our customers deploy new rolling stock, and deliver 'precision' timetables with more frequent services and time 'start of day' performance as a result of more efficient and effective maintenance .We will ensure better connectivity by delivering Transpennine Route Upgrade and the Thameslink Programme on the Route.	COO	FTPE, Northern Rail, VTEC, Hull Trains, Grand Central, EMT	Year 3 CP6 (2021)
2	R: Risks to passenger Satisfaction measures – delay in rolling stock being introduced onto the network	NR will work closely with the TOCs to ensure that the rolling stock is introduced in the planned timescales. Network Rail will be responsible for ensuring that gauge clearance/route acceptance and any platform lengthening obligations.	DoS	FTPE, Northern Rail, VTEC, Hull Trains, GTR	Year 3 CP6 (2021)
3	R: Risks to passenger Satisfaction measures – reliability of new rolling stock and subsequent performance risk	NR will support TOCs to ensure that sufficient mitigations are in place to manage all potential performance risks including putting in place robust business continuity and business recovery plans to ensure a return to operations in the event of a disruption	COO	FTPE, Northern Rail, VTEC, Hull Trains, GTR	Year 3 CP6 (2021)
4	R: Passenger Satisfaction at main stations as a result of major renewals projects such as King's Cross Re-modelling	We will work collaboratively with all of our customers to ensure works are clearly communicated through stakeholder workshops and joint working at Railway Operating Centres.	HoCR	FTPE, Northern Rail, VTEC, Hull Trains, Grand Central, GTR	Year 1 CP6 (2019)
5	C: Geography of the Route with LNE & EM encompassing nine different TOCs and five different FOCs.	We plan to hold regular customer engagement events and workshops throughout CP6 to ensure we discuss issues, work more collaboratively together and reflect/monitor our progress through our long term scorecards.	HoCR	FTPE, Northern Rail, VTEC, Hull Trains	Year 1 CP6 (2019)



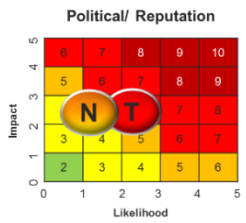
Summary of risk outcome

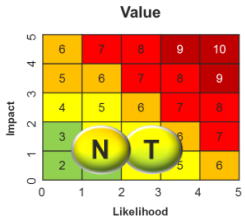
The risk to passenger satisfaction will be fairly significant if new rolling stock is not introduced within the timescales. Network Rail will work together with all relevant TOCs to ensure the compatibility between the rolling stock and infrastructure.

Both managed stations have had investment over the last few years and this has resulted in high levels of satisfaction. The key is to maintain these levels of satisfaction and therefore the risk is less significant for this measure.

4.3 Sustainability & asset management capability (activity prioritisation on a page)

Summary of objectives	Optimise Asset Management Plans to reduce risk, maintain Passenger and Workforce Safety, and underpin Performance, within an affordable cost. This will be achieved through both development of our people and improvement in our asset knowledge. Specific objectives include utilisation of qualitative inspection/monitoring technologies and decision support tools, predict and prevent interventions, correct balance of Opex and Capex delivery including maximising synergies and value from enhancements, and stable and efficient delivery plans.			
No.	**Key constraints, risks and opportunities**	**What we plan to do**	**Owner**	**Timescale**
1	R: A constrained plan means asset performance may deteriorate in CP6 leading to a bow-wave of renewals in CP7 and CP8 and negatively impacting asset sustainability. RAMs have not been able to take a whole life costing approach in some areas	We have prioritised risks as part of forming our CP6 work banks (see section 5) and have targeted renewals based on safety and the performance impact asset failures have on services. Technologies such as RCM and using improved risk and reliability approach to maintenance will ensure maintenance is targeted at assets most likely to fail to prevent asset related disruption occurring.	DRSAM/HOM	Ongoing
2	O: Clear identification of critical assets and better management of asset risk	Strategic review of asset resilience, critical performance nodes and key locations. A key enabler of this activity is an investment in improved identification and analysis processes, investment in new technology and building organisational capability where required.	DRSAM	Yr1 of CP6
3	O: Improve knowledge of Assets	Increased use of RCM, qualitative inspection technologies (especially in civils assets) and decision support tools (ORBIS) all produce better asset knowledge and develop optimised delivery and maintenance plans of critical assets to prevent failure. The work we are doing to implement quality systems (see section 8.6) and achieve ISO55001 compliance will help us improve the way we manage our assets on an ongoing basis.	DRSAMHOM	Ongoing
4	R: Organisational and supply chain capability insufficient to deliver plans	We intend to manage our Asset Management Improvement programme with a dedicated programme team. We will continue to invest in developing our organisational capability in asset management. This will include additional recruitment in critical areas and investing in training in key areas such as asset management, financial management and project management. A stable plan and early engagement with the supply chain (note that the year 1 increase in renewals excluding KX re-modelling has a modest increase of 8%)	DRSAMHOM	Ongoing
5	O: Developing firmer work banks ahead of CP6	Learning from CP5 experience, we are currently conducting deliverability workshops with IP to ensure estimated costs are more reliable and scope is well defined ahead of project delivery.	DRAM	End CP6
6	O: Project cost control (Enhancements/Renewals)	Enable good cost control of Enhancements/Renewals through better management control processes and collective working between Route and delivery engineers. Get earlier visibility of project options to ensure choices are made that maximise value at minimum cost within funds available.	DRAM/RPM/PPS	Dec 2017
7	C: A busier railway potentially means more limited access opportunities	Share engineering delivery plan with TOCs and FOCs at earliest opportunity and work more collaboratively to negotiate access windows. Use 'safe and effective' working initiatives to reduce risks of maintenance works overrunning.	RPM	Dec 2017
8	R: Weather resilience: More extreme weather events can accelerate asset degradation	We plan to reduce the risk to assets of extreme weather by building organisational capability in CP6 in the area of Drainage. This will increase our knowledge of weather risks and enable more effective interventions in drainage renewals and maintenance to improve our resilience.	DRAM/HOM	Dec 2017





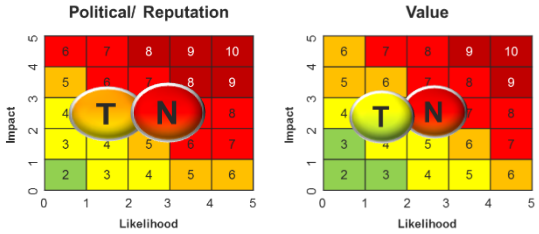
Summary of risk outcome

Plans for asset renewal interventions have been determined using the risk based criteria of safety, performance and reputation. Reputation is highly influenced by criticality of sections. Maintenance and Renewal plans have been formulated to address this, but the funding level will restrict our ability to meet the performance aspirations of our customers. Sustainability and value are affected by the movement from strategic renewals to tactical geographic interventions as a result of restricted funding. The impact of this results in reduced network resilience and therefore increased medium/long term performance and safety risk. Funding has been allocated across assets to balance risks. Losing line of route renewal strategies removes the opportunity to maximise on the benefit of these interventions.

4.4 Financial performance (activity prioritisation on a page)

Summary of objectives	In line with our strategic objective of **'efficient and effective delivery'**, our key aim is to restore focus on disciplined cost control and return to efficient and effective delivery of our renewals activities by the start of CP6. We will continue to effectively and efficiently deliver our Maintenance & Operations activities.

No.	Key constraints, risks and opportunities	What we plan to do	Owner	Customers impacted	Timescale (start/ finish)
1	R: A culture of design to cost and deliver to scope is not embedded before the start of CP6 and projects are not delivered on time or on budget	Continue with unit rate challenge to return to CP4 rates by CP6 year 3 Continue to challenge on this principle and only authorise efficient projects at Route Investment panel	All Route Exec	All	Now to CP6 year 3
2	R: Efficiency plans are not delivered resulting in required work bank and strategy changes based on affordability	A project team will be created post SBP submission to focus on the detailed planning and tracking of efficiency plans Over planning for efficiencies will be in place so that if an initiative does not deliver the planned benefit there is capacity to compensate Headroom has been allocated by Route from the SOFA (£132m) although this is a last resort and the preference would be to invest this if unused in our additional options on Level Crossings and the ECML	RFD	All	Now to CP6 start
3	O: Outperformance of re-control efficiencies	Deliver the signalling plan for the budgeted unit rates securing a stable work ban with minimal change (see 2 above)	DRSAM	All	Now until the end of CP6
4	C: Non-compulsory redundancy agreement within maintenance	Actively manage natural attrition in line with planned efficiencies	Head of HR	NA	Now until the end of CP6
5	R: Further standards and legislative change drives increased activity in Maintenance and Operations that is not currently allowed for in the headwinds	Plan to outperform efficiencies and effectively manage other headwinds	Now until the end of CP6	All	Now until the end of CP6



Summary of risk outcome

The net risk reflects the current position in relation to financial performance where unit rates have continued to escalate. The risk of not addressing the current culture towards cost control in renewals is significant and would have a substantial financial and reputational impact in CP6.

5 Activities & expenditure

5.1 Cost and volume summary

This plan is predicated on the key assumptions laid out in Appendix B and will be impacted as these assumptions change.
RENEWALS COSTS (post headwinds and efficiencies in 17/18 prices)

	Unit of Measure	Funded by	CP5 (£m)						CP6 (£m)						CP7 (£m)
			14/15	15/16	16/17	17/18	18/19	CP5	19/20	20/21	21/22	22/23	23/24	CP6	24/25
Track	£m	Renewals	261	265	228	174	158	1,086	169	167	151	163	167	816	119
Conventional Signalling	£m	Renewals	114	145	94	138	154	645	159	132	164	141	152	749	396
Structures	£m	Renewals	84	122	92	57	57	412	58	103	92	72	64	390	74
Earthworks	£m	Renewals	12	13	29	23	12	89	18	24	22	14	26	105	67
Drainage	£m	Renewals	10	10	9	6	5	40	11	12	11	11	8	52	11
Buildings	£m	Renewals	38	31	7	21	24	121	48	32	31	24	12	149	84
Electrification & Fixed Plant	£m	Renewals	20	17	35	26	26	124	26	50	59	48	32	214	32
Other	£m	Renewals													
Total Renewals	**£m**	**Renewals**	**539**	**603**	**494**	**445**	**436**	**2,517**	**490**	**520**	**531**	**474**	**460**	**2,475**	**782**
Digital Railway*	£m	DR Programme			0	2	6	8	91	119	121	123	118	572	103
Total Renewals + Digital Railway	**£m**	**All**	**539**	**603**	**494**	**447**	**442**	**2,525**	**581**	**639**	**652**	**597**	**578**	**3,047**	**885**

*DR programme signalling costs of £572m in CP6 will be funded from different sources in CP6. £194m will be a contribution from the LNE Signalling workbank whilst the source of the remaining funding of £378m is not currently confirmed. See the “Digital Railway” section for a further breakdown of costs and funding sources and section 6.3 for LNE&EM’s strategy for delivery of Digital Railway in CP6.

KEY VOLUMES

	Unit of Measure	Funded by	CP5 (Volume)						CP6 (Volume)						CP7 (Volume)
			14/15	15/16	16/17	17/18	18/19	CP5	19/20	20/21	21/22	22/23	23/24	CP6	24/25
Plain Line	Linear track Km	Renewals	402	433	285	204	104	1,428	357	352	336	275	315	1,634[2]	201
S&C	No. of S&C units	Renewals	267	332	366	240	211	1,415	129	135	80	230	207	781	42
Conventional Signalling	SEU	Renewals	88	209	73	9	491	870	353	98	535	142	139	1,267	987
Digital Railway	SEU	DR Programme						0	0	0	368	179	281[3]	828	
Embank/Soil Cut/Rock Cut	No. of	Renewals	100	486	792	1,000	10	2,388	557	460	524	386	531	2,458	859
Underbridges	Number of assets intervened on	Renewals	30	63	54	18	26	191	36	59	45	43	24	207	46
Underbridges	m2 plan deck area worked on	Renewals	6,077	29,239	37,515	15,992	7,993	96,816	18,231	22,957	21,771	14,116	10,536	87,611	16,243
Wire runs	No. of	Renewals	5	17	20	21	19	82	0	0	0	0	0	0	0
Conductor Rail renewal	Km	Renewals	0	0	0	0	0	0	0	0	0	0	0	0	0

[2] Track volumes increase in CP6 partly as a result of the inclusion of fencing and rail milling in volumes reporting
[3] Phasing as a result of reporting at completion of schemes, works will begin with Moorgate lines in Year 1 CP6.

LNE & EM Renewals cost profile

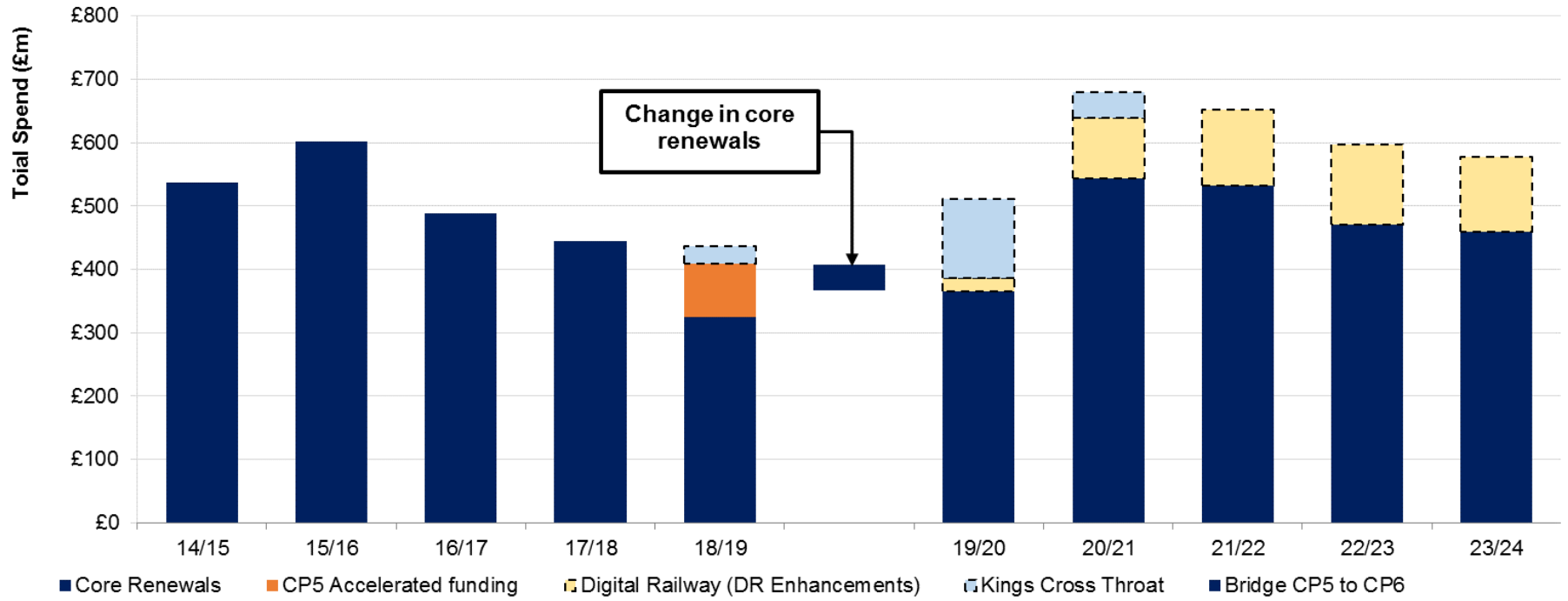


Figure 13: LNE & EM Renewals profile with bridge from CP5 exit to CP6 year one

Our Renewals profile is shown in Figure 13 above. This shows the step up between CP5 exit and CP6 year one. When normalising for the King's Cross Remodelling and Digital Railway projects, the route's core renewals will see a slight change between the two years. King's Cross Remodelling is a substantial project mainly effecting the Track and Signalling RAM teams in year 1 of CP6. The project is being managed by a dedicated Infrastructure Project team to ensure successful delivery and to minimise disruption on other core renewals taking place across the route. Following completion of the Kings Cross Remodelling project in year 2 the Digital Railway programme ramps up throughout the remaining Control Period.

OPEX COSTS (post headwinds and efficiencies in 17/18 prices)

	CP5 (£m)						CP6 (£m)						CP7 (£m)
	14/15	15/16	16/17	17/18	18/19	CP5	19/20	20/21	21/22	22/23	23/24	CP6	24/25
Track							111	108	106	105	103	533	100
Off track							20	26	32	32	32	141	31
S&T							41	41	40	39	39	201	39
E&P							23	24	24	25	24	120	24
DU HQ							16	16	16	16	16	80	16
DU/WD Maintenance excl. B&C	161	176	185	180	95	796	212	215	218	217	214	1,076	210
Non DU Maintenance	37	41	55	59	142	334	42	39	39	37	36	193	36
Civils: Buildings Maintenance	0	0	15	15	12	41	13	13	13	13	13	66	13
Civils: Structures Maintenance	0	0	24	20	18	62	21	21	21	21	21	105	21
Civils: Earthworks Maintenance	0	0	1	0	-2	0	5	5	5	5	5	27	5
Total Maintenance Costs	**198**	**218**	**280**	**273**	**264**	**1,234**	**293**	**294**	**297**	**293**	**290**	**1,467**	**285**
Operations	123	123	119	119	120	604	104	104	103	101	100	511	100
Support	7	6	3	11	3	30	20	20	20	20	20	100	20
Operations & Support Costs	**129**	**129**	**123**	**130**	**123**	**634**	**124**	**124**	**123**	**121**	**120**	**611**	**120**
Total Controllable Costs	**328**	**347**	**403**	**403**	**387**	**1,867**	**417**	**417**	**419**	**414**	**410**	**2,077**	**405**
Non-Controllable Costs													
Headcount													
Permanent	5,476	5,474	5,603	5,694	5,772	5,772	5,866	5,820	5,753	5,693	5,625	5,625	5,625
Agency	35	30	9	3	0	0	0	0	0	0	0	0	0

Headroom

We do not want to be in a position where we have to re-plan our activity every time a risk materialises in CP6 as this would be very inefficient. Therefore, our strategic plan includes £132m of route headroom, which has been created by holding back some SoFA funding from Network Rail's overall CP6 plan. This route headroom is particularly for the business performance risk we face in the control period.

Ideally, actual results will be in line with our CP6 plan and we will be able to release our route headroom to invest it in improving the railway – this headroom can be considered as contingent investment. If needed, we will also have the opportunity to access portfolio headroom in CP6, particularly for inflation risk. Again, we will ideally spend this on further investment to improve the railway. Portfolio headroom will be controlled through our corporate business planning process. Increased investment will depend on successful delivery of the company's plans and good business cases.

Enable investment to time & budget **Programme sponsorship capability**

ENHANCEMENTS

As we set out in our Railway vision and strategic objectives (1.3), LNE & EM is focused on ensuring further improvements to the management of the various Enhancement Programmes across the Route. In addition to ensuring full compliance to corporate governance and assurance requirements, LNE & EM have implemented additional principles and activities to ensure more robust programme sponsorship. Examples of such improvements include:

- **Early engagement -** Ensuring early industry and Network Rail wide involvement in single option development and selection
- **Maintaining stakeholder buy-in** – Introducing the advancement of industry Network Change to end of Development (GRIP3 AiP) phase to ensure full stakeholder acceptance of proposed option(s) in advance of moving into Design phase
- **Improving change control** - Change control and impact assessments of client remit changes
- **Independent assurance** - Independent industry resource involvement in key stage gate reviews
- **Deliverability reviews** – The Route will conduct reviews by experienced independent management who have delivered similar complex projects on critical projects
- **Stage gate reviews** - Introduction of 6 monthly stage gate requirements on Programmes with individual projects at differing stages of design and delivery to ensure appropriate integration and risk management
- **Better integration with IP** – Through the development of joint Route & IP Programme risk registers and mitigation controls
- **"Develop to budget"** – Developing scope of projects to suit budgets of funders including offering options that may offer various levels of clients' outputs but remain within available funding
- **Introduction of "Client Bid" principles** - to ensure appropriate corporate review and approval of major client development submissions
- **Better integration with Renewals and Maintenance**- Coordinating to make better use our the access windows we obtain for enhancements to enhance the efficiency and effectiveness of Maintenance and Renewals works (see section 7)

The table and narrative below provides an overview of each of our three upgrade programmes (East Coast, Midland Main Line and Transpennine) and their current scope, status and cost profile. It should be noted that this information is based on the current scope in development or delivery, and includes those that have not yet passed final investment decision. Schemes that have not past final investment decision have been included for information and context, to demonstrate the potential scale of investment on our Route in CP6. Any pre-final investment decision schemes are formally held within the System Operator strategic plan. More detail on the status of each programme is included in the respective programme line below. Note that the route plan only includes OMR for those items that are post FID and that the plan will require change control as new projects are agreed at FID.

Summary of Enhancement Costs

Spend profiles are indicative for all pre FID schemes and are subject to further funding decisions, viability and affordability.

Programme Name	CP5 £m (17/18 Prices)						CP6 £m (17/18 Prices)[4]					
	14/15	15/16	16/17	17/18	18/19	Total	19/20	20/21	21/22	22/23	23/24	Total
MML Programme	74.7	90.7	125.6	282.3	447.6	**1,020.8**	357.4	108.4	111.6	106.1	2.7	**686.1**
Transpennine Route Upgrade (incl intermediate interventions)	16.4	12.8	44.7	79.0	119.0	**271.9**	530.7	621.8	570.5	565.7	611.3	**2,900.0**
East Coast Programme	65.7	50.2	50.1	75.5	164.7	**406.2**	305.3	322.6	160.5	34.4	0.0	**822.8**
Total	**156.8**	**153.6**	**220.4**	**436.8**	**731.3**	**1,698.9**	**1,193.4**	**1,052.7**	**842.6**	**706.2**	**614.0**	**4,408.9**

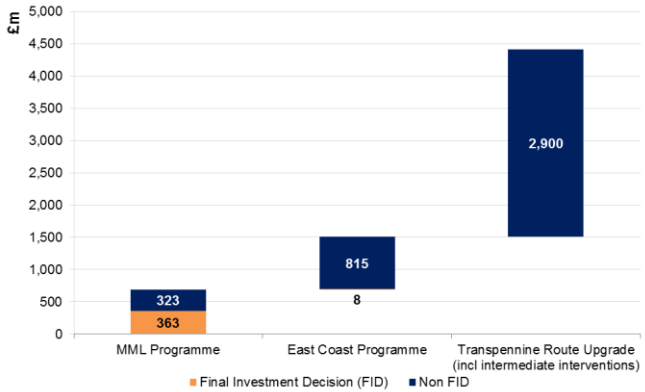


Figure 14: LNE & EM enhancement investment decision status

[4] This table does not reconcile to the enhancements line within the table in section 10 of this document. The table in section 10.1 only reflects items which have passed final investment decision.

East Coast Programme

The East Coast Programme contains a number of schemes which are at various stages of development. However, the only schemes which are post final investment decision are those that have started in the current control period (CP5). Others schemes are still subject to a final investment decision by the funder and are held in the System Operator plan. Provision has been made within the SOFA for these.

In April 2017, DfT established the ECML Enhancement Programme that brings together the existing East Coast Connectivity Fund schemes, the IEP enabling projects on the ECML and two other schemes covering power supplies north of Bawtry and Stevenage station.

Current projects to be delivered as part of the programme include:

- King's Cross station throat enhancements (contribution to a renewal-funded remodelling project)
- Werrington – grade separated access to the GN/GE line (**Error! Reference source not found.**)
- Huntingdon-Woodwalton Four Tracking – restoring the fourth line
- Peterborough – upgrade the Down Slow line between Fletton to Peterborough
- Doncaster Station area enhancements, including an additional platform
- Northallerton to Newcastle – additional freight loops
- IEP enabling projects covering gauging in England and Scotland, platform extensions and PSU1 related power infrastructure upgrades (see below)
- Power Supply Upgrade Phase 1 Wood Green to Bawtry (PSU1)
- Power Supply Upgrade Phase 2 Bawtry to Edinburgh (PSU2)
- Stevenage station

Figure 15: Grade separation works at Werrington

The programme will deliver the following benefits to passengers:

- Increase capacity from 6 to 8 LDHS tph between King's Cross and Doncaster and
- Increase capacity from 5 to 6 LDHS tph from Doncaster to Newcastle;
- Maintain 2 freight paths per hour on specific sections of the ECML
- Reduce journey time to 4 hours between London and Edinburgh, and 2 hours between London and Leeds.

Transpennine Route Upgrade (TRU)

TRU is still in development. Design and delivery is not funded in this plan as we expect a separate funding discussion on this during the second half of 2018. The System Operator formally holds the funding in their plan; provision has been made in the SOFA.

TRU will deliver faster and more frequent rail services with space for more passengers by improving connections between key towns and cities across the north of England. The Transpennine Route Upgrade (TRU) is currently developing options for the DFT for conclusion in December 2017 with detailed designs to increase benefit to passengers over time and also take into the account the best methods for delivery whilst keeping the railway operational. It is to be

noted as context that the TRU scheme forms a core part of the Department for Transport's strategy for the North of England, which aims to transform travel on this route within the next decade. As part of the development of the Trans Pennine Programme digital railway options are being assessed to contribute to delivering the objectives of funders

Current projects to be delivered as part of the programme include:

- Capacity and journey time improvements between Stalybridge and Leeds and on to York and Selby
- Leeds Station capacity improvements
- Micklefield Junction and Church Fenton line speed improvements (Figure 16) and Garforth area line speed enhancements

Following detailed work with DfT through an agreed client remit, we are now working in accordance with the principles and timescales to develop a strategy formed around four key outputs which include:

- Improved Journey times – specifically a reduction in journey time of up to 15 minutes between Manchester Victoria and York compared with the current journey time of 75 minutes,
- Additional capacity to support additional services and longer trains and
- Improved performance of passenger train services
- Electrification options of the route from Manchester Victoria to Leeds and on to York and Selby

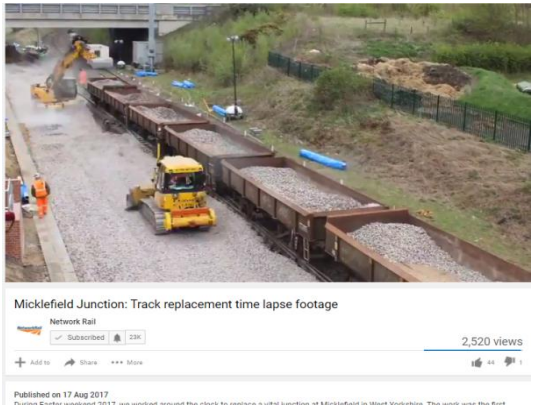


Figure 16: The Trans-Pennine Route Upgrade works at Micklefield

These desired outputs outlined above have now been translated into the unchanged commitment to provide to the DfT in December 2017 a documented suite of options with a range of choices to deliver the specified outputs. This will therefore enable DfT to complete their assessment of the Outline Business Case and confirm their decision to progress from Development Phase to Design Phase during 2018. TRU enjoys a high level of stakeholder support, which is a reflection of Programme Team's very transparent and inclusive approach to the development phase; involving DfT, Rail North and Train / Freight Operators in every step of the development process.

Midland Mainline Improvement Programme

The KO1 element of the Midland Mainline Enhancements programme is fully funded for delivery in CP6. KO1a has not passed final investment decision and is held in the System Operator submission, with provision being made in the SOFA.

The wider MML programme will enable electric trains to operate between Bedford to Kettering and Corby (the section between London St Pancras to Bedford was electrified in the 1980s) and will deliver numerous benefits including improving journey times, making journeys smoother and more comfortable, and cleaner quitter for people living near the railway. Current projects to be delivered as part of the programme include:

- **London to Corby Electrification and Capacity Upgrade (L2C) -** Provision on an additional 4th line between Sharnbrook and Kettering, Installation of 25Kv Overhead Line between Bedford, Kettering and Corby, provision of an electric stabling facility at Kettering and provision of W6A to W12 gauge clearance between Bedford, Kettering and Corby (Figure 17).

- **Kettering to Corby Capacity:** installation of an additional track between Kettering and Corby and giving provision of axle weight clearances between Kettering and Corby of RA10 at 60mph and RA8 at 90mph.
- **Market Harborough Line Speed Improvements (LSI):** Realignment of the track and associated infrastructure through the Market Harborough Station area with significant station alterations.
- **Leicester Line Speed Improvement:** Replacement of S&C at Leicester London Road Junction and raising of Permanent Speed Restriction through the junction.
- **Derby Re-Modelling:** Signalling and track remodelling in the Derby station area, construction of a new station platform and alterations to the station footbridge, alterations to existing station platforms, renewal of simplified level crossing at Spondon and alterations to Etches Park depot entrance and Chaddesden Sidings.
- **Derby to Sheffield Journey Time Improvement (JTI):** selected infrastructure interventions to improve line speed
- **Midland Main Line Programme KO1a -** Providing traction power upgrades and extension of platforms at key stations north of Leicester

Figure 17: Works between Kettering and Corby as part of the MML programme

The Leicester Grade separation, referred in the above table as Leicester Capacity, is a Hendy rollover scheme that is still being progressed. The DfT are starting the process of preparing an SOBC and that will determine the option taken forward. The programme will deliver the following benefits to passengers:

- Providing the means to run longer trains between Bedford, Kettering and Corby
- Delivering an increase in capacity to a maximum of five train paths per hour in each direction between Kettering and Corby from December 2019
- Increasing the line speed between Derby and Sheffield to create Journey time improvements
- Enabling 6 LDHS Services to use electric traction between Market Harborough/Kettering to London
- Increasing the permissible speed for electric trains on the existing fast line infrastructure south of Bedford
  Increasing the line speeds to 90mph between Kettering and Corby

DIGITAL RAILWAY

Realising Digital Railway

As we set out in our Vision and Objectives (1.3), Enabling Digital Railway is a key component of our long-term strategy to improve the overall capability of our devolved Route organisation. LNE&EM has a once in a generation alignment of opportunities to improve performance for users of the railway by deploying transformative digital technology for train control and traffic management. Digital railway will bring about a new era in sustainable high performance, efficiency, skill development, and cross industry collaboration.

Section 6.3 of this document presents a detailed strategy of how the Route plans to begin delivering Digital Railway in CP6. Below we represent the overall costs of the scheme and outline funding sources, building on the cost projections presented in section 5.1. The Digital Railway Programme (DRP) has developed five SOBCs (with certain Routes and other stakeholders) for digital upgrade schemes. These SOBCs represent an early stage of the investment decision framework (HMT's 'Green Book') as required in the memorandum of understanding agreed between Network Rail and the DfT signed on 23 March 2016.

The SOBC has therefore been recognised in this Strategic Plan, reflecting the decision of ExCom Plus on 4 July 2017 that the company's CP6 plans should present its commitment to digital railway. Where appropriate, the net funding amounts correspond to the digital railway elements of the RSP ie represent the additional funding required above that needed to fund conventional renewals that were planned prior to integration of DR in addition to committed supporting enhancements.

It is planned that the DR programme's development funding in CP5 for progression of digital upgrades, in order to deliver them within CP6/7 will come from the NPIF funds. DfT funding via the CP6 determination or NPIF is the preferred capital funding source, however where government funding is not available, additional private financing/commercial models would have to be found to provide the capital required.

East Coast Digital Programme (option 3a)	Development stage:	SOBC	BCR	4.3
	Expected delivery year	"ETCS 2021-2026 TM 2022-2026 "	Appraisal period	60 years

The Problem: In the final years of CP5 and in early CP6 there will be a significant step changes in timetables as a result of the completion of the Thameslink Programme and additional long distance high speed services (see section 6.1). These new services are likely to lead to congestion, particularly at two-track section of the railway at Welwyn. The Route have estimated this will reduce PPM for long distance services by between 1-2%. For suburban services, including the Moorgate branch, demand is forecast to increase by 62% from 2012 to 2043, worsening crowding. Finally the signalling on the south of the ECML is due for renewal in CP6, presenting the opportunity to renew with digital technologies, enabling a sustained transformation in performance.

The Digital Solution: The proposed scheme is for ETCS Level 2 no signals and interfaced Traffic Management between London King's Cross and Stoke Tunnel including the Moorgate branch and Hertford loop and option for C-DAS. This will significantly enhance in train capacity on the Southern section of the ECML, allowing the forecast increases in services to be accommodated.

Implementation cost (£m, 17/18 Prices)					Assumed funding source (£m, 17/18 Prices)				
	CP5	CP6	CP7 & beyond	Total (£m)		CP5	CP6	CP7 & beyond	Total
Digital Infrastructure	7.0	552.0	584.7	1,143.7	Core Route Budget (OMR)	40.8	194.2	436.9	672.0
Business Change	1.2	20.0	2.4	23.6	National Productivity Investment Fund	0.0	0.0	-	0.0
Freight National Passenger Operator	0.0	271.0	68.2	339.3					
OTMs in-cab fitment	14.2	69.1	2.7	86.0	**Sub-Total (assumed core NR funded)**	**40.8**	**194.2**	**436.9**	**672.0**
Sub-Total (assumed core NR funded)	**22.4**	**912.1**	**658.0**	**1,592.6**	Franchise in-cab fitment	26.3	141.4	6.8	174.5
Passenger in-cab fitment	26.3	141.4	6.8	174.5	Enhancements (MoU)	0.0	0.0	0.0	0.0
Civil Engineering Enhancements	0.0	0.0	0.0	0.0	**TOTAL**	**67.1**	**335.6**	**443.7**	**846.4**
TOTAL	**48.6**	**1,053.5**	**664.8**	**1,767.1**	Funding requirement above Route Core Target	18.5	-776.1	-163.8	-921.4

Scheme benefits[5]

Quantified output benefits
Capacity - an additional 4 tph in the three hour peak on the Moorgate branch
Performance- avoids a 1.5% PPM loss on long distance high speed services (ETCS) reduction of delay minutes in the TM geographic scope by up to 5%

Financial benefits (£m CP6) (Socio economic benefits in 2010 prices present value)	Financial benefits (£m NPV over 60 years (Socio economic benefits in 2010 prices present value)
TOC revenue benefits: £14.0m Reductions in NR OMR: 0.0 Net benefits to consumers and private sector: £13.7bn **Total: £29.7m**	TOC revenue benefits: £552bn Reductions in NR OMR: 0.0 Net benefits to consumers and private sector: £1,000m **Total: £1,552m**

Funding position
The funding sources of the Digital Railway (DR) programme are still being confirmed. The LNE & EM Route will fund £194m of DR signalling works from the LNE Signalling workbank in CP6. This is the value of renewals avoided in CP6 as a result of the DR programme. The sources of the £378m required to fund the remainder of the DR programme works on the southern section of the ECML in CP6 are yet to be confirmed. Figure 17 below indicates the cost of the programme and the current sources of funding.

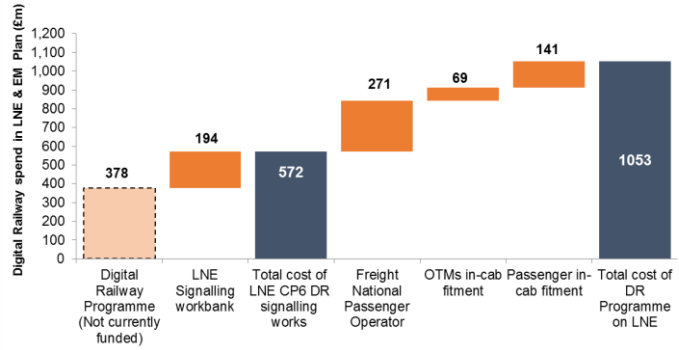


Figure 18: Funding position of Digital Railway in the LNE & EM Route's CP6 plans with DR programme costs shown as blue bars and funding sources shown in Orange.

Other qualitative benefits
Safety - ETCS offers enhanced train protection reducing the risk of SPADs. DR technologies enable the Safer Trackside Working strategy, reducing the risks to track side workers. This aligns with the Route's objective to significantly reduce or eliminate manual handling injuries in CP6.
Journey time - potential for journey time opportunities where speed restrictions are in place due to signal sighting and through changes to operational rules
Reputational – The ability to offer improvements in performance and recovery of services in the event of disruption are likely to improve passenger perceptions of the network
Other opportunities - improved customer information, energy savings

Other dependencies

[5] Benefits quoted for schemes may be subject to delivery of other enhancement schemes not yet integrated into this plan

East Coast Connectivity enhancements
Thameslink programme

Digital Railway ready specifications

Network Rail re-signalling schemes will be implemented in a way that allows the later introduction of Digital Railway components with minimum alterations, so that the signalling system will become 'Digital Railway Ready'. A specification has been produced which sets out the parameters for signalling renewals to be Digital Railway Ready.

Passive provision

For like-for-like renewal (e.g. no capacity enhancement), provision for DR Ready specifications is termed **passive provision.** For these schemes, a DR Ready specification is assumed not to add material cost. This is based on the following assumptions:

1 No change to train detection and therefore no need to design a separate ETCS compliant option

2 Competitive procurement arrangements embedding the DR Ready Specification from inception of the scheme

3 Support is given to the Routes by a core team (DR, STED and IP) to ensure a consistent interpretation of the specifications.

Where applicable, this passive provision specification will be applied to the LNE/EM Route signalling workbank in CP6.

Active Provision

Where signalling renewals coincide with the need for an increase in capacity, based on a need identified in the Route Studies, there would be an increase in project scope to comply with the digital ready specification. This scope is termed active provision and is driven by additional train detection requirements. Following review by the LNE/EM Route and the Digital Railway Programme no schemes have been identified in Control Period 6 which meet the criteria for active provision.

5.2 Asset intervention strategy

5.2.1 Summary Route asset strategy

Focus on our customers and stakeholders

Prioritise Safety and Performance

The balance of funding across Assets is supported by the Enterprise risk management approach whereby we have sought to minimise Safety, Performance and Reputational risks across the asset portfolio within funding constraints, in line with our Vision and Objectives (1.3). This process began in May 2016 for an 'unconstrained' plan, and has been iterated throughout the submission in line with the prescribed funding scenarios. The Route has also taken into consideration the Assurance work undertaken by Safety, Technical and Engineering in refining final allocations of budget. We have sought to mitigate funding constraints through our robust process of benchmarking and challenging unit rates as described in section 7.6. However the overall upward trajectory in unit rates seen in CP5, as well as revisions to unit rates during the CP6 planning process have meant that volume has been removed from the plan as the funding envelope has been reduced, and this has consequently increased risk to the business.

In finding the appropriate balance of risk within the funding envelope trade-offs have had to be made within and between asset types. A selection of some of trade-offs in terms of the high level risks and mitigations we have had to consider during this budget allocation process are demonstrated in **Table 6** below.

Asset	Risks	Decisions to Mitigate/Manage Risk
Track	pre-1978 con-cast rail creates risk of contact fatigue and more prone to failure	Renewals of this rail will occur but only in areas of high criticality and where likely to impact performance.
	Track failure resulting from weather related incidents	Reallocating drainage budget to a dedicated RAM (Drainage and Off-Track) with a workbank of interventions to reduce risk.
Structures	Significantly aged assets could pose a performance and safety risk	Risks managed by doing a greater volume of lowest initial cost life-extension related works will take place in CP6 to reduce risk over greater proportion of the asset base. Minor works budgets increased to cater for expected reactive works.
Buildings	Risks to passengers from slips, trips and falls at stations due to uneven platform surfaces	Full renewals of platform surfaces at major stations such as Leeds and King's Cross.
Earthworks	Risks to performance and safety as a result of extreme weather and deterioration of ageing assets	Develop better understanding of the risks from the aging asset base using current and new technology and tools. Improvement in drainage system management.
Signalling	Significantly aged cabling types pose risks to signalling systems	Increased volumes of life extension work types (WT52s) as opposed to full renewals (WT3s)
E&P	Significantly aged wires pose a risk to performance, particularly given planned service increases and new rolling stock	Wire runs renewal volumes have been removed from our plans but corresponding increases in heavy maintenance OLE works have been added to increase asset resilience.

Table 6: A selection of risks and trade offs considered during the CP6 budget constraining process

As the table above shows, there has been a significant shift of activity from Renewals to Life Extension and refurbishment within this constrained plan. Overall, a 10% base increase (pre-efficient) in Maintenance spend has been provided. Within this increase, specific funding has been set aside for off-track, within Vegetation seeing a significant spend within CP6 to start the Route's journey to compliance with current standards and reduce the chance of vegetation related systems failures. The increase in spend on the drainage systems in CP6 will improve resilience to flooding affecting our track assets and our lineside neighbours. It will also reduce the likelihood of water related earthwork failures. For Track and Signalling S&C, point care teams will be provided at each DU to improve asset reliability, and additional maintenance resources will specifically be deployed for compliance with new signalling power testing standards.

Compared to CP5 Track has had the biggest net cost reduction, as it was considered technology was best developed in this area to manage risk. Structures have also been uplifted during the planning process after assessment of risk. Signalling are above CP5 cost levels but still have a sub-optimal plan as the Route's signalling equipment is aged and requires significant investment. The funding released from Track has been spent across the E&P, Structures, Buildings and Geotechnical assets to assist in managing the associated risks. An overview of current asset performance, principles followed in forming individual CP6 workbanks, performance outputs and emerging views on delivery have been set out for each asset overleaf.

Track

Track has seen an overall improvement in performance in CP5, this has been observed through a reduction in TSRs as well as increases in volumes of targeted track renewals. Given the funding constraints we will experience in CP6 we have planned our workbank based on maintaining the safety of the network throughout CP6.

Intervention strategy drivers

Workbanks prioritised based on safety and performance

In order to meet the needs of the greatest numbers of customers, we have primarily based our workbank around the criticality of routes, reflecting the impact of track failures on certain parts of the route. Due to the constrained budget, the reduced refurbishment and renewal volumes are being targeted at those areas which have the greatest effect on safety and performance, in line with our strategic objectives (1.3). We have targeted our LNE workbank on known problem areas, for example, the two track sections of the ECML. For East Midlands we have prioritised the workbank on intensively used parts of the Midland Mainline, for example, London to Bedford.

Intervention types and activities in CP6

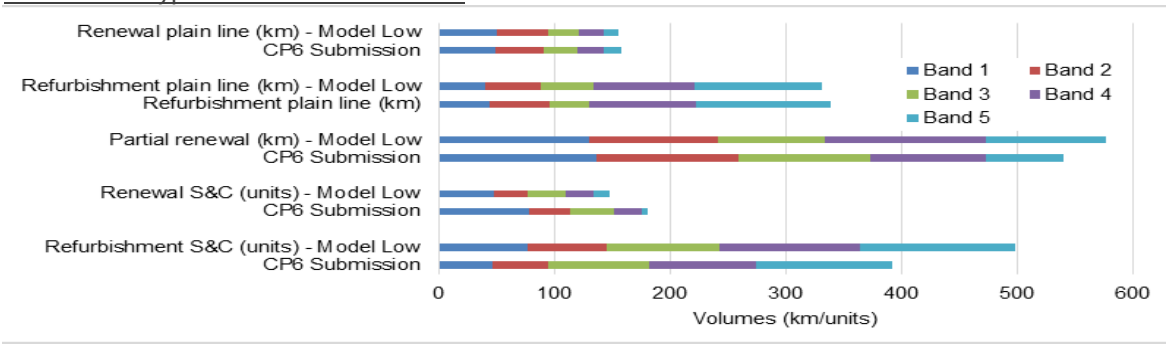


Figure 20: A comparison of STE modelled volumes and our CP6 submission showing criticality bands for LNE Track

Key Elements of Plan - LNE	Cost (£m)		Volume	
	CP5*	CP6	CP5	CP6
Renewal plain line (km)	195.2	171.4	139.8	121.5
Partial renewal (km)	375.9	185.0	891.1	486.9
Refurbishment plain line (km)	61.2	41.1	396.2	2147.7
Renewal S&C (units)	223.5	121.0	296.0	180.0
Refurbishment S&C (units)	70.5	24.3	1042.0	349.0
Abandon S&C (units)	7.6	3.9	77.0	43.0
Fencing (km)	26.8	25.0	865.3	807.8
Off track other	45.0	11.3	-	-
Other	37.8	10.0	-	-
Total	**1043.5**	**607.0**		
***Reporting differences mean CP5 totals include both LNE & EM**				

Figure 19: LNE (top) and EM Track CP6 Costs and Volumes (pre-efficient)

Key Elements of Plan - EM	Cost (£m)		Volume	
	CP5*	CP6	CP5	CP6
Renewal plain line (km)	195.2	86.8	139.8	69.0
Partial renewal (km)	375.9	76.7	891.1	166.5
Refurbishment plain line (km)	61.2	27.7	396.2	141.0
Renewal S&C (units)	223.5	35.9	296	209
Refurbishment S&C (units)	70.5	11.7	1042	148
Fencing (km)	7.6	14.0	77.0	352.0
Off track other	26.8	8.2	865.3	-
Other	45.0	12.3	-	-
Total	**37.8**	**283.2**	**-**	

Key elements of the workbank in CP6 will include:

- Rail renewal: Due to the large population of pre 1978 rail, an increasing trend in Rolling Contact Fatigue and an increase in rail breaks due to foot corrosion, increased volumes of renewal will be required in CP6. Rail milling, which is a new technology, offers the potential to improve the management of RCF and extend rail life.
- Plain Line refurbishment and renewal: Volumes have been reduced as will be directed specifically at TSR prevention, reducing cyclic top trends and preventing Wrong Side Failures. Historically LNE have the highest trend of rail breaks nationally.

	CP5 exit			CP6 exit		
Key Elements of plan: LNE	**S**	**P**	**R**	**S**	**P**	**R**
Plain Line Rail	5	4	4	6	6	6
Plain Line Sleepers	2	2	2	3	3	3
Plain Line Ballast	3	5	2	4	6	4
Switch & Crossings	5	4	4	5	6	5
Track Drainage	5	5	6	4	4	5
Total	**4**	**4**	**4**	**4**	**5**	**5**

	CP5 exit			CP6 exit		
Key Elements of plan: EM	**S**	**P**	**R**	**S**	**P**	**R**
Plain Line Rail	5	3	4	5	6	6
Plain Line Sleepers	2	2	2	3	3	3
Plain Line Ballast	3	5	2	4	6	3
Switch & Crossings	5	3	4	5	6	5
Track Drainage	5	5	6	4	4	5
Total	**4**	**4**	**4**	**4**	**5**	**4**

Figure 21: Our Track risk outcomes in terms of Safety (S), Performance (P) and Reputation (R) from CP5 exit to CP6 exit for LNE & EM.

- High Output Renewal: Reliance on High Output renewal has been reduced from CP5 but it is still critical to sustain key lines such as Bedford to London and key freight / diversionary routes.
- Switch and Crossing refurbishment and renewal: Kings Cross Renewal (32 of 180 point ends) will be aimed specifically at enhancing performance. We are down on the STE Model Baseline numbers for CP6 which will have an impact on reducing the current trend of points failures, asset related failures (053/054 defects) and premature failure of concrete S&C layouts. Maintenance of S&C generally proves to be very difficult with very little impact so targeted refurbishment will help this but again reduced volumes will mean more ineffective maintenance.
- Renewals and heavy maintenance works will be sustained by better targeting maintenance work in line with the Route's broader strategy. This will be supported through the deployment of new technologies such as ORBIS Decision Support Tool, rough ride analysis, eddy current technology, rail milling and plain line pattern recognition to monitor asset condition and improve effectiveness of works.

CP6 Asset Performance Outputs

The increase in scores for Track and S&C between Control Periods reflect the downturn in volume but impact remains the same as we target more at risk sites. The overall results of these interventions will be to maintain compliance but with additional risks to performance and reputation in the event of a failure. Asset Sustainability overall is anticipated to decline in CP6 as a result of movements towards partial renewals and refurbishment, rather than full renewals, for both Plain Line and S&C assets. This is likely to lead to a bow wave of renewals in CP7 and CP8 and further access challenges.

Emerging delivery plans

LNE's delivery schedule will be relatively consistent throughout CP6, with slightly higher volumes at the beginning of CP6 due to larger schemes occurring at this time such as the King's Cross throat remodelling scheme. A more even delivery profile in CP6 is supported by our experience in CP5, where front loading of a large volume of works has led to delivery issues. EM's plan is relatively consistent throughout CP6, with marginally larger volumes of renewal in Year 1 due to risk arising from deferred renewals from Year 5 of CP5.

Signalling

Signalling is critical in CP6 and will allow us to get more trains on a congested network, helping to deliver better performance outcomes for our customers given the forecast increased usage on the route. Our signalling plans in CP6 have therefore been developed in conjunction with plans to roll out Digital Railway on the southern section of the ECML. Our programme of works is compatible with Digital Railway, with all our renewals specifically chosen to complement this scheme when it gets implemented towards the end of CP6.

Intervention strategy drivers

Workbanks prioritised based on safety and performance

Our workbank has been built considering the need to extend the life of assets in preparation for Digital Railway being installed across the whole route in future Control Periods. Our workbank has been built bottom up using local asset knowledge, STE guidance and SADs modelled volumes as well as the likely impact of signalling failures on performance, safety and reputation in line with our strategic objectives (1.3). These include areas such as King's Cross and West Hampstead in the South as well as Goole and Wakefield. In line with affordability constraints we have de-scoped some interventions to lower cost renewal work types and removed others. Our current workbank assumes that planned enhancements are delivered in CP6, including Digital Railway on the south of the ECML.

Case Study: King's Cross Throat

The King's Cross throat is a major re-signalling and Track renewals scheme, to improve the approaches to Kings Cross Station. As part of the project the Route will renew 198 SEUs and 32 S&C units. This scheme will deliver improved asset reliability and enable a more efficient timetable to be run through this area.

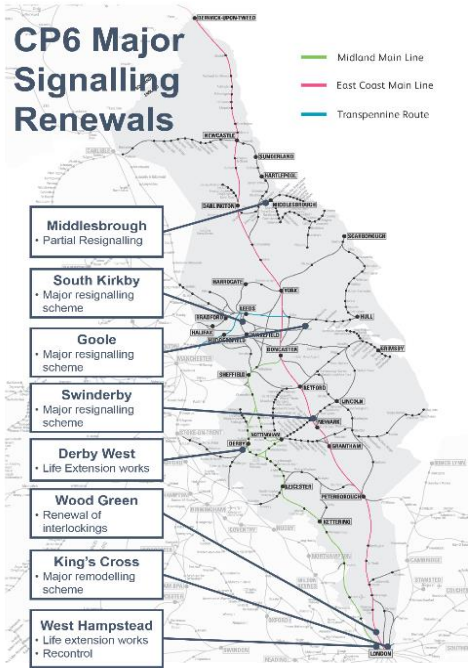


Figure 22: Top nine areas we plan to spend on renewing signalling as part of our CP6 plans

Level Crossings renewals have been planned on the same condition assessment basis as signalling (SSADs system), however whilst interlocking renewals are being undertaken, the opportunity will be taken to renew any level crossings within the geographic area covered. This has been driven from lessons learned in CP5 where stand-alone Level Crossing renewals have proven difficult and expensive to deliver.

Intervention types and activities in CP6

Our activities focus on interventions based on life extension and partial resignalling work types, rather than full scale resignalling works. Where resignalling works are taking place these are on areas where asset condition, reliability and safety are of greatest concern such as at King's Cross, Middlesbrough Whitehouse and Swinderby as Figure 20 shows. In our constrained submission the Route will allocate a larger proportion of our workbank to unallocated minor works, in anticipation of renewing components of older assets as part of life extension works, rather than full-scale renewals. Therefore our workbank does not consider the whole life costing implications and will create a bow wave of renewals to be required in CP7 and CP8.

Our maintenance strategy for CP6 will involve increasing use of predictive technologies to ensure we target signalling maintenance works on assets more likely to fail based on RCM equipment and performance data. An essential part of our operational and maintenance strategy for CP6 will involve continuing the centralisation of the control of signalling functions and upgrading signalling control points to modern technology.

LNE & EM plans to perform over 136 level crossing interventions in CP6, varying in scale and complexity. These will include over 47 interventions to fully renew and automate level crossing operations, 29 interventions to prevent barriers being lowered onto vehicles on the level crossing and 25 barrier renewals/life extension works. Upgrades to level crossings (LCs) were removed from the baseline plan except where required to maintain the current levels of safety, however some level crossing enhancements remain in the baseline plan where there is a 'reasonable opportunity' as part of a scheme to protect user worked crossings (UWCs) with miniature stop lights (MSLs) or alternative signalled solution for user protection. The Route continue to work alongside local stakeholders to replace level crossings with road bridges where the opportunity arises.

Key Elements of Plan - LNE	Cost (£m)		Volumes	
	CP5*	CP6	CP5	CP6
Resignalling	301.0	531.1	734.0	1269.0
Partial resignalling	39.9	119.8	43.0	351.0
Refurbishment	41.5	185.3	93.0	233.0
Other Major Works	-	63.6	-	-
Signalling Minor Works and other costs	164.1	146.1	-	-
Total level crossings (inc minor works)	72.1	116.6	60.0	114.0
Total	**618.6**	**1162.4**		
*Of which DR Programme***	-	*572*	-	-

*Reporting differences mean CP5 totals include both LNE & EM

** £194m funded from the LNE Signalling workbank, £378m is currently unfunded

Key Elements of Plan - EM	Cost (£m)		Volumes	
	CP5*	CP6	CP5	CP6
Resignalling	301.0	15.5	734.0	19.0
Partial resignalling	39.9	36.2	43.0	96.0
Refurbishment	41.5	56.7	93.0	128.0
Signalling Minor Works and other costs	164.1	40.3	-	-
Total level crossings (inc minor works)	72.1	29.9	60.0	22.0
Total	**618.6**	**178.5**		

Figure 24: CP6 Costs and Volumes for LNE and EM signalling (pre-efficient)

CP6 Asset Performance Outputs and emerging delivery plans

The outcomes of our CP6 workbank is to maintain a stable performance at CP6 exit. Resignalling works will maintain performance given increased usage. For areas that are only partially resignalled, performance and reputation will be impacted owing to possible implementation of operational constraints.

Additional refurbishment and life extension of signalling assets will maintain safety, but will compromise long term asset sustainability and performance with higher risks of failure and obsolescence. There is a potential impact on level crossing reliability due to a reduction in full renewals. Increased rail traffic and conversions to MCB-OD increase barrier down-time, which is likely to adversely affect reputation. Overall, level crossing safety risk will be maintained.

The main risk with trackside equipment is insulation degradation where a wrong side failure would have high impact. As wiring ages, the likelihood of this occurrence increases, therefore life extension activity will be focused on the areas in the poorest condition – particularly West Hampstead. Further development activity is required to establish the precise asset condition and determine the appropriate intervention at each site. Full renewal of the affected areas was removed because of affordability and deliverability constraints. The proposed costs of this work are an estimate at this stage given the minimal experience of this type of intervention nationally. Risk scores shown are therefore conservative to reflect the uncertain nature of the intervention strategy and associated risks.

	CP5 exit			CP6 exit		
Key Elements of plan: LNE	**S**	**P**	**R**	**S**	**P**	**R**
Signalling Control	3	5	4	3	3	3
Interlockings	4	4	4	4	4	3
Lineside equipment	5	6	6	5	6	5
Level Crossings	3	5	6	3	5	5
Total	**4**	**5**	**5**	**4**	**5**	**4**

	CP5 exit			CP6 exit		
Key Elements of plan: EM	**S**	**P**	**R**	**S**	**P**	**R**
Signalling Control	3	4	4	3	3	3
Interlockings	4	3	2	4	4	3
Lineside equipment	5	6	6	6	6	6
Level Crossings	3	5	7	3	5	5
Total	**4**	**5**	**5**	**4**	**5**	**4**

Figure 23: Signalling risk outcomes in terms of Safety (S), Performance (P) and Reputation (R) from CP5 exit to CP6 exit for

LNE's delivery schedule will have slightly higher volumes at the beginning of CP6 due to the King's Cross throat remodelling scheme. EM's plan is front loaded and with greater volumes of spend occurring in CP6 on life-extension works, particularly at West Hampstead.

Structures

Efficient and effective delivery

The CP6 Structures policy is based upon an asset life extension programme rather than renewal. This is reflected within the workbank as a 'Lowest Initial Cost' approach, resulting in a high number of individual assets receiving targeted limited interventions. This is in contrast to CP5 where assets typically received thorough interventions based upon a 'Whole Life Cost' approach. A 'Lowest Initial Cost' policy is dependent upon the following:

- A greater reliance upon asset condition data gathering and engineering evaluation, to enable more informed decision making to appropriately manage the assets closer to their basic safety limits. The launch of Network Rail's CSAMS system (Civil Strategic Asset Management Solution) will support this. Opportunities to deliver qualitative routine examinations in house are also being considered.
- Comprehensive involvement into each scheme's delivery by the Asset Management Department to ensure the proposed solutions are appropriate, safe and are of best value. This will be complemented by a restructuring of the Asset management team.
- Operating the assets closer to the basic safety limit will require a higher volume of reactive Operational Maintenance Expenditure (OPEX). These works are fundamental for ensuring that structural defects are mitigated before they develop into a potential safety and performance risk.

Intervention strategy drivers

The selection criteria for creating the Structures capital workbank was undertaken through a 'bottom-up' methodology of evaluating asset condition, capability, strategic importance. The Structures capital workbank will consist of 'Lowest Initial Cost' Strengthening and/or Repair interventions to Underline and Overline Bridges in accordance with STE Policy Activity Level 1 and Network Rail Standards, as shown in Figure 23. The workbank does include some full renewals, primarily where current condition approaching is a level that no longer complies with the required capability output and may be at risk of not meeting the requirements of Network Rail's operating license conditions. As part of Train Accident Risk Reduction (TARR) initiatives, by 2020 the Route will also perform a significant volume of Hidden Shaft Investigation works planned for a high number of Tunnel assets within Year 1 of Control Period 6. These will be aligned to STE Policy Activity Level 1.

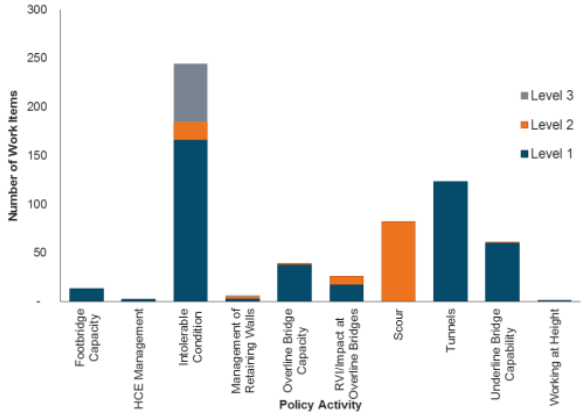


Figure 25: Prioritisation of activities and types of intervention in our CP6 workbank

Case Study: Agar Grove

Agar Grove is a particularly challenging structure within our overline bridge portfolio. Constructed in the 1860s, it is located on the Midland Mainline within the London Borough of Camden. The asset is life expired and requires renewal in CP6 due to the significant levels of corrosion.

Specific constraints include: A Central London location above two high usage routes (MML and Thameslink), electrified OHL, dense urban area with limited space, a road junction and significant 3rd party utilities supported by the structure, as well a building containing signalling equipment.

Engagement has begun with deliverers and local stakeholders, London Bridges Engineering Group (LOBEG) at an early stage to develop a comprehensive strategy for these works and have budgeted £14m for this project in our CP6 plan. The assessment is currently being progressed which will enable an appropriate solution to be developed at an early GRIP stage.

Intervention types and activities in CP6

71% of the Structures capital workbank is formed of items which align to STE Policy Activity Level 1. These are works which maintain asset safety within tolerable limits in addition to complying with both legislation and asset capability. We also plan to do significant volumes of refurbishment work on our ageing major structures. Within the workbank are also a limited number of schemes aligned to STE Policy Activity Level 2, which better the minimum requirements of Network Rail Standards to further reduce safety and performance risk. Specific programmes will include improving the route's risk profile relating to Scour (Erosion or Under-Mining) on Underline Bridges which carry high criticality routes over watercourses and further reduce the risk of Road Vehicle Incursion (RVI) (train striking errant 3rd party vehicle).

Figure 26: LNE & EM Structures CP6 Costs and Volumes (pre-efficient) and risk outputs in terms of Performance (P), Safety (S) and Reputation (R)

Work Type	Cost (£m)		Volumes (m²)	
	CP5	CP6	CP5	CP6
C&E Defences	0.0	0.0	180	-
Tunnels	18.6	24.1	41,042	55,708
Overbridges	77.6	82.7	14,450	19,546
Underbridges	183.4	197.1	96,816	87,611
Footbridges	12.5	13.9	2,925	1,527
Retaining Walls	16.7	4.8	12,337	701
Culverts	11.6	14.6	5,984	3,243
Major Structures	14.6	33.8	-	-
Minor Works	70.4	39.6	-	-
Total	**405.4**	**410.9**		

CP6 Asset Performance Outputs

A constrained plan will mean the overall condition of the structures portfolio is likely to deteriorate in CP6 with structures being managed closer to their basic safety limit. Although this may not impact the short-term performance of an asset it will reduce the amount of obtainable inherent asset redundancy. Therefore there is a risk that performance and reputation will be affected through a need to impose operational restrictions (Temporary Speed Restrictions (TSRs) & Heavy Axle Weight Restrictions (HAWRs)) as assets decline in an effort to maintain current safety levels.

Greater expenditure is likely to be required in future Control Periods to recover this position and improve the condition of the portfolio with a number of major renewal interventions and capital investment required; without such investment there is a likely risk of notable performance impacts throughout the Route.

Emerging delivery plans

The LNE & EM Structures team have already begun conducting deliverability workshops with our Delivery Partners and Asset Management Department on some of our more complex schemes – more detail of what these have involved is provided in section 7.4.2. Engagement with these teams will continue further throughout all GRIP stages to safeguard value management and meet our efficiency targets. The Works Delivery, Buildings & Civils organisation will be utilised to deliver additional volume where they offer best value; smaller interventions and high volume, low complexity refurbishments.

A number of assets in our workbank are located in dense urban areas such as Farringdon, Kentish Town & Harringay. It is very difficult to undertake heavy Civil Engineering works in these locations, as such both scheme development and interaction with key stakeholders is being undertaken within Control Period 5 due to the expected prolonged delivery lead-times and the novel methodologies which will likely be required to deliver these works.

	CP5 Exit			CP6 Exit		
	S	P	R	S	P	R
CERDs	0	0	0	0	0	0
Tunnels	4	4	3	5	5	3
Overbridges	6	4	5	5	4	4
Underbridges	5	4	4	5	5	4
Footbridges	4	3	3	4	3	3
Retaining Walls	4	5	3	5	5	3
Culverts	5	5	4	5	5	4
Major Structures	4	5	3	4	4	3
Minor Works (CAPEX)	5	5	4	4	5	4
Total	**5**	**4**	**4**	**5**	**5**	**4**

Case Study: Browney Curve (Burnigill Bank)

Located on the East Coast Main Line just south of Durham, there is a long history of track problems here due to movement of the hillside underlying the railway embankment.

The ongoing movement in the hillside has resulted in movement of the track as well as the OHL structures, some of which will require to be rebuilt within the next two years as there is a risk of rough rides and dewirements on this critical part of the Route. The work we are proposing here is the largest single intervention in our CP6 workbank where we plan to spend £15m upgrading this asset which is likely to include piling the hillside and installing scour protection alongside the River Browney.

Earthworks

We have prioritised our Earthworks workbank in terms of safety and asset condition with a view to maintaining or improving the performance of Earthworks assets, in line with our strategic objectives (1.3). Performance in CP5 has been stable with the overall Earthworks Condition Banding ranging between 1.49 and 1.53 for LNE and 1.35 and 1.36 for East Midlands since it started being measured in Period 1 year 2 of CP5. Our Earthworks strategy in CP6 will be to work closely with the new RAM (Drainage and Off-Track) asset team to improve resilience of earthworks assets during periods of high rainfall by focussing on managing drainage systems as a whole through regular maintenance and capital investment where required.

Intervention strategy drivers

Workbanks prioritised based on safety and performance

Decisions about what type of intervention is appropriate are based on a number of assessments including earthworks condition and criticality scores, desk study information and comments from examinations and evaluations. The Network Rail Asset Engineer will identify the most appropriate intervention type (renewal, refurbishment or maintenance) using the Earthworks Policy guidance as a starting point and refining it based on their knowledge of the history of the site, the anticipated geotechnical failure modes and the perceived risk to the railway or public. The level of policy compliance can be seen from Figure 25 where we target spending per scheme towards sites which received the highest risk scores (E category and D category).

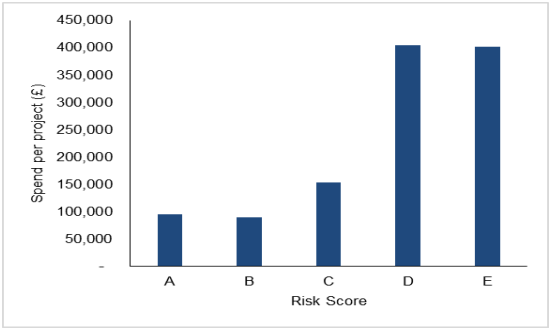


Figure 27: The risk scores of projects in our Earthworks workbank and CP6 spending per project assessed with these scores.

Intervention types and activities in CP6

Many of our decisions about interventions in CP6 involve deploying the technology already available which assesses and monitors the condition of our earthworks, drainage, and track assets. This involves decision support tools, monitoring/alarm systems, using satellite and aerial surveys, rough ride analysis as well as previous failure data to build up site specific information and predict future incidences of asset failure.

Modelled volumes of maintenance, refurbishment and renewals to keep the asset portfolio in a steady state have been provided by STE and have provided the starting point for the development of our CP6 submission. However, due to funding constraints we are doing fewer interventions than recommended through that modelling.

Key Elements of Plan*	Costs (£m)		Volumes	
	CP5	CP6	CP5	CP6
Embankments	50.0	34.3	527	1,100
Soil cutting	21.7	39.8	1,719	1,147
Rock cutting	4.7	4.6	142	211
Mining	2.5	6.1	-	301
Earthworks Drainage (m)	7.6	24.3	29,759	41,109
Total	**86.5**	**109.1**		

*Major Earthworks of £14.4m are included in the CP6 total

Figure 28: Earthworks CP6 Costs and Volumes (pre-efficient)

We have proportionally kept more of the higher value interventions (renewals and refurbishments) and are targeting these at the known highest risk locations. We have reduced the numbers of purely earthworks maintenance schemes and are instead focussing more on drainage maintenance schemes noting that by working closely with the new RAM (Drainage and Off-Track) team, we will be able to more accurately identify and fix the root cause of problems and proactively maintain earthworks drainage to prevent failures.

CP6 Asset Performance Outputs

The safety of the overall asset portfolio is expected to remain stable during CP6 while performance is expected to improve, as shown in Figure 29b. This is as a result of better understanding of our assets, targeted interventions, monitoring at identified high risk earthworks sites, and improvements in drainage and operational response during adverse weather. The "Earthworks Condition Banding" portfolio score for both LNE and East Midlands indicates that our route has the best condition earthworks portfolio with figures of typically around 1.53 for LNE and 1.35 for EM with the national figure being 1.75. Although the figures for LNE and EM are expected to deteriorate we believe that we can manage the safety risk and even reduce the performance risk as outlined above.

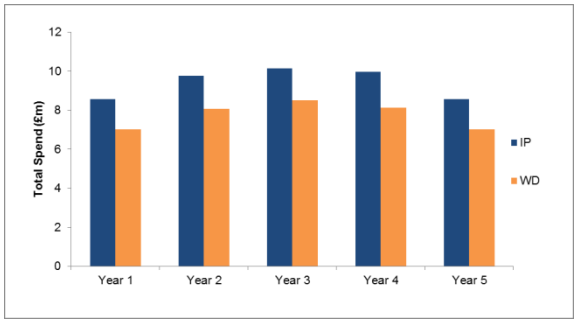


Figure 30a: Earthworks emerging delivery plans

	CP5 Exit			CP6 Exit		
Key Elements of Plan	**S**	**P**	**R**	**S**	**P**	**R**
Embankments	4	7	5	4	6	4
Soil cutting	5	7	5	5	6	5
Rock cutting	5	6	5	5	5	4
Major Earthworks	4	6	5	3	4	4
Mining	5	4	3	5	4	3
Earthworks Drainage	5	7	5	5	6	5
Total	**5**	**6**	**5**	**5**	**5**	**4**

Figure 30b: Our Earthworks risk outcomes in terms of Safety (S), Performance (P) and Reputation (R) from CP5 exit to CP6 exit

Emerging delivery plans

The complexity of earthworks interventions mean that we have already begun engagement with deliverers (both IP and WD) on some of our schemes planned for CP6 including works at Horbury embankment, Ben Rhydding, Springs Tunnel, and Chathill. This will help with planning land and track access and design remits.

Drainage

Our newly created RAM (Drainage and Off-Track) will be responsible for delivering drainage maintenance and renewal in CP6. This was identified as an issue in CP5 that affected the asset condition of Track and Earthworks assets. New allocation of budget and responsibility to a new drainage RAM working alongside both teams will help improve the resilience of track and earthworks assets and the mapping and improvement of knowledge of our drainage assets will allow us to improve the general weather resilience of the route as a whole.

Intervention strategy drivers

Workbanks prioritised based on safety and performance

The drainage workbank will retrofit all of our work from the earthworks and track teams into a consolidated workbank towards the end of CP5. We have developed our work bank by assessing drainage risks across the routes. This has involved detailed surveys across strategic route sections to assess the condition and quality of drainage assets. These have been risk-scored using a variety of criteria including TSR risk, flood risk, susceptibility to adverse weather, route criticality as well as previous risk scores. We plan to target spend at our highest risk areas and develop specific interventions based on specific projects already within Earthworks and Track plans, as well as other interventions to generally improve weather resilience in these areas to prevent incidences of wider asset failure in the future.

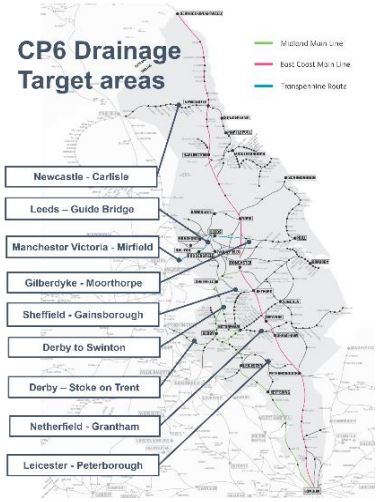


Figure 31: Our Drainage target areas in CP6

Intervention types and activities in CP6

We continue to build up detailed drainage Asset Management Plans for each area to help quantify and manage water-related risk. Drainage work including inspection, maintenance, refurbishment and renewal. We plan to undertake this in a systems-based manner to take into account the wider assets our drainage systems support. To do this we plan to use new technologies to help us predict and prevent water-related disruption, inspect asset condition and maintain system health. The newly formed Water Management Delivery Team under the direction of the RAM (DOT) will be used to identify and develop solutions for the root cause of problems. Looking ahead this will involve working collaboratively with our colleagues in maintenance and asset management to ensure effective and efficient water management is considered in all interventions.

	CP5 Exit			CP6 Exit		
Key Elements of Plan	**S**	**P**	**R**	**S**	**P**	**R**
Drainage (track)	5	6	6	4	5	4
Drainage (resilience)	5	6	7	4	4	5
Drainage (earthworks)	5	7	5	5	6	5
Total	**5**	**6**	**6**	**4**	**5**	**5**

Figure 32: Our Drainage CP6 costs and volumes (pre-efficient) and risk outputs

Key Elements of Plan	£(m)		Volume	
	CP5	CP6	CP5	CP6
Drainage (track)	39.5	38.8	220.4	102.0
Drainage (resilience)	0.0	16.2	177.4	51.3
Drainage (earthworks)	7.6	19.9	29.8	45.1
Total	**47.1**	**74.9**	**427.6**	**198.6**

CP6 Asset Performance Outputs and emerging delivery plans

We expect a marked improvement in risk metrics as a result of the creation of the new drainage team as we address problems in the route that have been looked over in the past due to inadequate ownership of drainage assets.It is envisaged that the majority of our Drainage workbank will be delivered using Works Delivery due to the relative size of drainage works. We plan to work alongside Track and Earthworks to share access windows during other interventions and minimise disruption.

Buildings

Buildings have been increasingly challenging to manage in CP5 as a result of the increasing age of assets. Additional compliance requirements have meant costs have been increasing in CP5.

Intervention strategy drivers

Our buildings workbank has prioritised those assets which require essential works. In moving from an unconstrained workbank to a constrained workbank we have considered interventions that are only essential and removed from our workbank those that are customer imperative or good for long term asset sustainability. In subsequent constraining of budgets we have challenged asset policy, using performance data and local knowledge to determine where asset failures are occurring most to try to defer renewals of assets which are fit for purpose.

Intervention types and activities in CP6

Focus on our customers and stakeholders

In line with our strategic objective 'Focus on our customers and stakeholders' (1.3) we are targeting the majority of our spend in CP6 at our stations, particularly our managed stations at King's Cross and Leeds as well as our franchised stations such as Middlesbrough, Newcastle, York. Our managed stations are the places where passengers quality of experience during their journey is impacted the most and our major activities in CP6 will include platform resurfacings at stations such as Leeds as well as refurbishment of footbridges. We have also planned interventions at our MDUs and LMDs to repair buildings as well as improve staff welfare facilities. We have sought to engage with local stakeholders when forming our workbank, examples in our workbank include renewals at Middlesbrough, Peterborough and Doncaster. All plans have been consulted with the TOCs and incorporated into an integrated station plan with the TOCs commitments to ensure the plans are aligned

Our maintenance regime will move towards reactive maintenance to address unforeseen issues as well deploying the latest technologies to target our maintenance works as part of our wider 'predict and prevent' strategy. Some elements of the workbank have been costed at lowest initial cost, but for other interventions this has not been possible due to the complexity of the interventions required and compliance with legislation such as working at height make it more economical to undertake other renewals at the same time at certain locations.

CP6 Asset Performance Outputs

The results of the CP6 plan will be to improve the condition of some of our buildings assets across the Control Period, making them more compliant with policy as well as improving safety and reputation. Positive reputation impacts are likely to occur at stations, where resurfacing works are likely to lead to decreased incidents of closure due to platform defects, this will particularly be the case at major stations such as Leeds and York.

Case Study: Peterborough MDU

The NR Property team are looking to make an application for £10m from the Council/LEP fund towards a brand new DU at Peterborough North which will in turn release the existing Midland Road site for housing. This is part of a much larger overall strategy, involving NR, VTEC and the Council for the redevelopment of the station area at Peterborough which would see a new multi-storey car park built and the existing carparks released for housing and retail development.

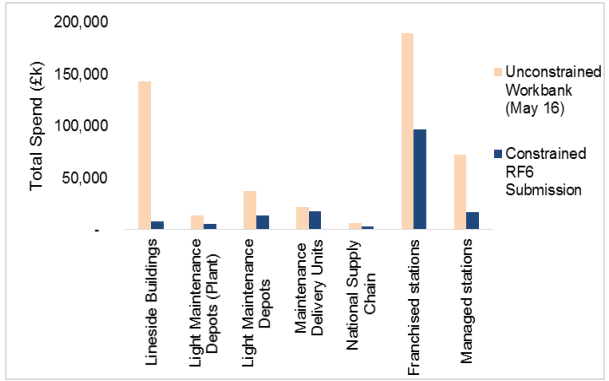


Figure 33: Comparison of spending areas in our unconstrained workbank (May 2016) and our constrained workbank (CP6 submission)

Emerging delivery plans

We plan to use a variety of delivery mechanisms throughout CP6 due to the bespoke nature of the assets. The majority of our delivery schedule will be front loaded in line with the majority of works being delivered by IP. Where possible, we plan to consult with local authorities in areas to obtain additional third party funding for improvements to stations which benefit local communities in conjunction with local council and LEP plans.

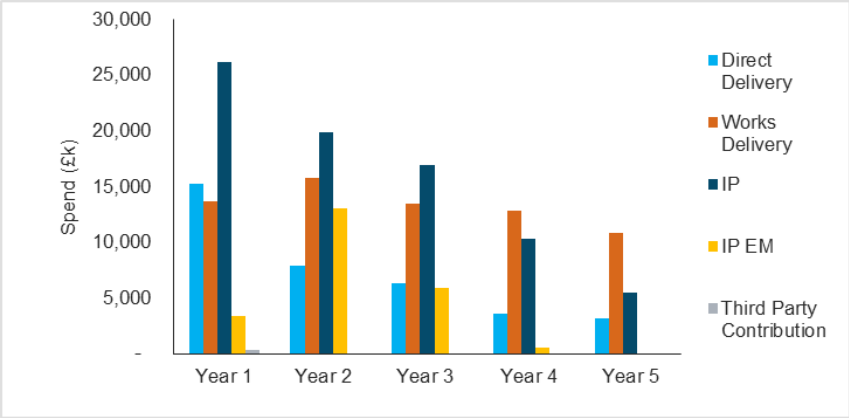


Figure 36: Emerging Delivery Schedule

Building Type	Cost (£m)		Volumes (M2)	
	CP5	CP6	CP5	CP6
Managed Stations	-10.7	12.9		122,680
Franchised Stations	63.8	102.8		146,466
Light Maintenance Depots	10.7	9.1		116,251
Depot plant	1.3	5.0		131
Maintenance Delivery Units	43.0	21.5		52,219
Lineside Buildings	9.2	4.5		69,120
NSC Buildings	2.0	2.8		5,313
Total	119.3	158.6		

Figure 34: Buildings Costs and Volumes

Figure 35: Our Buildings risk outcomes in terms of Safety (S), Performance (P) and Reputation (R) from CP5 exit to CP6 exit

	CP5 Exit			CP6 Exit		
Key Elements of Plan	**S**	**P**	**R**	**S**	**P**	**R**
Managed Stations	4	5	7	5	5	5
Franchised Stations	6	6	5	5	5	5
Light Maintenance Depots	5	5	6	5	4	5
Depot Plant				5	5	5
Maintenance Delivery Units	4	4	5	3	4	5
National Supply Chain	4	5	5	4	4	3
Lineside	5	4	5	5	5	5
Total	**5**	**5**	**6**	**5**	**5**	**5**

Electrical and Power (E&P)

Electrical power assets have received minimal interventions on the route since the 1980s when the East Coast Main Line (ECML) and Midland Main Line (MML) were first electrified. As a result of affordability considerations and the alterations to the enhancements programme in CP5 the work bank has been scaled down to take into account the changing asset base.

Intervention strategy drivers

The work bank has prioritised heavy maintenance and life extensions rather than renewal to improve resilience, meet worsening asset condition and prevent predicted asset failure. The constrained budget has meant we have had to significantly reduce renewals volumes in areas such as Contact Systems and

achieving policy compliance. Heavy maintenance activity will concentrate on the known issues and will target common areas of failure (e.g. Campaign Changes, Section Insulators, Neutral Sections and Converging Wires). There will be an increased intensity of intrusive inspections of the system and equipment weaknesses. Contact Systems wire renewals volumes have been reduced based upon the condition indicators of wire wear, however this will be reviewed in CP6 based on the introduction of new rolling stock and increases in usage.

Intervention types and activities in CP6

Contact Systems works will include Structure renewals on the Hertford Loop due to the level of risk that the moving structures currently present. There is also plan to renew degraded and ageing fuse / switchgear. Alongside insulation resistance monitoring this will improve the reliability, performance and safety. On the MML the work bank includes Cable Route Remedial Works between Elstree to Borehamwood, which will ensure the railway is able to cater for a higher intensity of services as part of the Thameslink Programme.

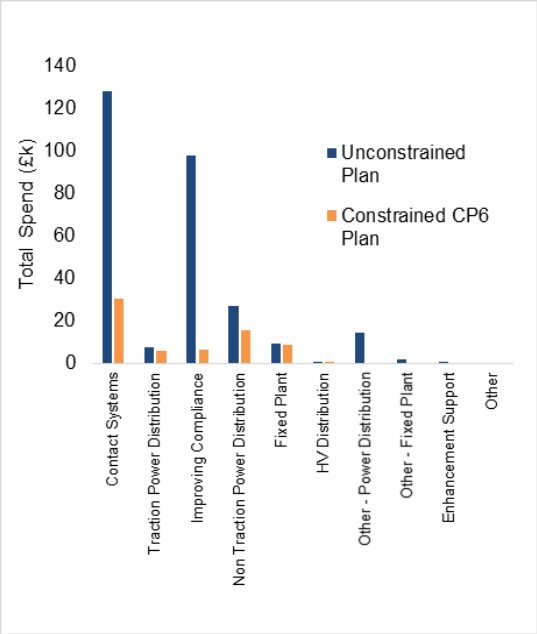


Figure 38: Movements in the EM E&P workbank between the unconstrained submission and constrained

Key Elements of Plan - LNE	Costs (£m)		Volumes	
	CP5*	CP6	CP5	CP6
AC Traction Power System	2.6	32.4	72.0	328.0
DC Traction Power System	4.2	7.1	25.0	48.0
AC Contact Systems	51.4	49.5	104.0	256.0
Improving compliance	-	3.8	-	20.0
Signalling Power Supplies	-	46.9	82.0	127.0
HV Distribution	3.7	2.0	-	-
Fixed Plant	57.3	18.8	100.0	-
Total	**119.2**	**160.5**		
*Reporting differences mean CP5 totals include both LNE & EM				

Figure 37: E&P CP6 Costs and Volumes for LNE (left) and EM

Key Elements of Plan - EM	Costs (£m)		Volumes	
	CP5*	CP6	CP5	CP6
AC Traction Power distribution	2.6	5.8	72.0	0.0
DC Traction Power System	4.2		25.0	
AC Contact systems	51.4	25.7	104.0	150.0
Improving compliance	-	4.6	-	5.0
Signalling Power Supplies	-	10.3	82.0	149.0
National SCADA Programmes	-	0.5	-	
HV distribution	3.7	0.3	-	-
Fixed plant	57.3	6.4	100.0	20.0
Total	**119.2**	**53.6**		

Power distribution works will include the replacement of aged and performance critical Principle Supply Point's (PSP) and roll out of upgraded equipment at key locations. The Route also plans to replace signalling power distribution cables in key locations that are unaffected by enhancement schemes. Other activities will include the refurbishment of AC circuit breakers, improving the environment in Sub Stations north of Doncaster to limit further degradation of assets, renewal of AC Protection Relays on the Leeds North West Route (OPTIMHO analogue relays life expired) and the upgrading of protection on the Sunderland 1,500V DC overhead electrification system.

These activities will be complemented by the maintenance strategy which involves using new technology such as the ORBIS OLE Decision Support Tool (OLE DST) to provide detailed, real time asset condition information that will support renewal plans for future Control Periods. Other new technology such as Unattended Overhead Measurement System (UOMS), pantograph monitoring systems and the use of intelligent electronic devices at traction sites will provide us with improved asset condition data (including Contact System hard spots, asset degradation and real-time asset performance data), notice of potential de-wirements and OLE Short Circuit Operation hot-spots.

CP6 Asset Performance Outputs and emerging delivery plans

	CP5 Exit			CP6 Exit		
Key Elements of Plan (LNE)	**S**	**P**	**R**	**S**	**P**	**R**
AC Traction Power System	5	6	5	5	6	5
DC Traction Power System	0	0	0	5	6	5
AC Contact Systems	5	6	6	5	6	5
DC Contact Systems	0	0	0	0	0	0
Signalling Power Supplies	5	6	5	5	7	8
Non-traction power distribution	4	4	4	0	0	0
Fixed Plant	6	6	6	3	6	5
Total	**5**	**6**	**5**	**5**	**6**	6

	CP5 Exit			CP6 Exit		
Key Elements of Plan (EM)	**S**	**P**	**R**	**S**	**P**	**R**
AC Traction Power distibution	5	6	5	3	5	3
AC Contact systems	5	6	6	5	5	5
Non-traction power distribution	5	6	5	5	6	5
HV distribution	4	4	4	3	3	3
Fixed plant	6	6	6	5	6	5
Total	**5**	**6**	**5**	**4**	**5**	**4**

Figure 40: Our E&P risk outcomes in terms of Safety (S), Performance (P) and Reputation (R) from CP5 exit to CP6 exit for LNE (right) and EM (above)

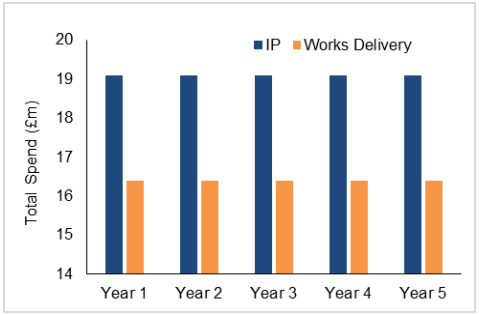


Figure 39: LNE & EM E&P emerging delivery plans for CP6

The outcomes of our CP6 workbank will be to reduce key metrics within tolerable safety limits. However signalling power supplies on the ECML and areas not impacted by the IEP programme will become a critical issue towards CP6 exit as these assets approach the end of their useful design lives. Our CP6 delivery plans assume a constant profile of delivery with overhead line works primarily envisaged to be delivered by IP and fixed plant and distribution works conducted by specialised works delivery teams.

Telecoms

LNE & EM's Route asset plans for telecoms in CP6 has been generated in line with the national strategy to build a telecommunications capability that allows for a safe, reliable and efficient operation of the Railway. The plan is detailed and costed in the national telecoms submission and will include the following:

- A budget concentrated on to address concerns with aging telecoms equipment and power supplies support assets
- Targeting level crossing improvements (including migrations to Network Rail services to aid performance), telephone concentrators and voice recorders
- Budget allocated across all of the SISS assets on LNE Route and a reactive minor works budget allowance included for cable and route renewals etc

NRT CP6 National Themes	Drivers
Transition to a single IP telecommunications network	Improve availability, performance, scalability and security of national connectivity and assets Remove non-maintainable and end-of-life assets and spares Reduce cost and complexity i.e. improve sustainability Exploit new technology and extend use of assets for passengers and lineside neighbours
Improve network management, monitoring and orchestration capabilities	Deliver better business knowledge enabling better business decisions

Standardise assets and services	Deliver open architecture enabling secure 'plug and play' Improve delivery lead times Reduce cost and complexity Simplify training and competency requirements Move towards an end-to-end SLA-focused delivery
Mature our business operations	Develop processes Deliver Operations Support Services (OSS) platform Ensure the right people have the right competencies for their role Develop self-service opportunities
Mitigate decline of asset sustainability level	Rectify underinvestment in assets from previous Control Periods
Extend the use of assets and infrastructure	Underpin the digital railway Satisfy government desire (from DfT & DCMS) for mobile connectivity on trains and digital inclusion for lineside neighbours Shape industrial strategy and policies

5.2.2 Research & development

LNE & EM Route has a track record of being flexible to new technologies and early adopters of change. In CP5 developments have included the roll out of a tunnel cleaning machine, widespread and early adoption of PLPR and pantograph cameras and being the trial route for the initial planning and delivering safe standards. The Route will continue with this approach into CP6, for example adopting rail milling, and using drones more widely to inform asset knowledge on items such as building rooves. The Route is engaged with Intelligent Infrastructure and will support the Centre in the successful roll-out of these items.

5.2.3 Weather resilience

LNE & EM is committed to responding to the challenges of climate change to improve long-term asset resilience and sustainability. We developed a Weather Resilience and Climate Change Plan in CP5 targeting highest risk sites. Resilience schemes which have been identified as priority in CP6 are summarised in the table below with an indication of what has and has not been included in the core business plan for CP6.

Table 7: Weather Resilience schemes included in our submissions

Weather resilience scheme included in core plan		**Weather resilience scheme NOT included in plan**	
Scheme	£m	Scheme	£m
• **40 % embankment renew and refurbishment schemes will include an element of weather resilience work.**	£21.7m	• Renewal of 14 Embankment assets (Earthworks)	£1.5m
• **75 % of soil and rock cutting renew and**	£47.2m	• Renewal of 447 rock cutting assets on high risk sites	£45.0m

refurbishment schemes will include an element of weather resilience work.		(Earthworks)	
• Scour schemes on Underline Bridges which carry high criticality routes over watercourses	£28.6m	• Renewal of 414 high risk soil cutting assets (Earthworks)	£87.7m
		• Provision of safe and compliant access to install and maintain drainage to the rear of tunnel portals.	£29.0m
Total	**£87.5m**	**Total**	**£164.2m**

The Route has created a new RAM (Drainage and Off Track) to give these assets stronger focus as part of our focus on reducing the likelihood of incident during extreme weather events. The drainage management strategy will change in CP6 seeing an increase in focus of detailed inspection, cyclical jetting and increased volume of refurbishment and renewal. This will be for both track and off track assets and will concentrate on historic flooding/wash out sites known vulnerable earthworks and the delivery of systems based drainage management.

A proactive regime of tree felling and vegetation management will also form part of our route strategy with particular focus on Dead Diseased and Dying trees identified as high risk through our surveys. This will reduce the likelihood of rolling stock coming into contact with encroaching vegetation and reduce risk of OLE failure through fallen trees or debris fouling running lines or potentially pulling down OLE. This will also drive down the likelihood of wrong side failure due to vegetation obscuring signalling equipment or reducing sighting at level crossings.

Improvements in weather monitoring and understanding of asset condition through enhanced risk assessment and remote condition monitoring will allow us to more easily predict incidents and apply control measures where required, for example by improving OHL resilience through seeking to enhance our wind monitoring capability.. Activities such as scour protection, tunnel portal drainage improvements, equipment housing temperature control and improved seasonal preparedness are all included our plans. We will also continue to develop Key Route Strategies with the train and freight operating companies that reflect the changing trends in weather.

5.3 Operational plan

5.3.1 Train performance strategy

Enable service increases and maintain/improve performance

As summarised in our 'CP6 Strategy on a Page' (1.3) we will work with our customers to develop and deliver a precision timetable, supported by high performing assets and professional operations. Our initiatives target reductions in primary, operational and reactionary PPM loss, as shown in Figure 41. They include the following:

- **Precision timetables –** as detailed in section 6.1
- **Improved business continuity and recovery plans** – We will collaborate with our customers to update plans to cover all major service disruptions, including updates to service recovery plans and Standard Operating procedures (SOPs) to ensure incident response is structured and effective.
- **On time "start of day" performance** – As part of our Access Strategy (7.2) we will continue to bear down on possession overruns. Asset failures that are likely to have severe impact on services will be repaired overnight to limit delays and TSRs that slow down services. We will continue to work with TOCs and FOCs to fleets are in optimal condition to start services.
- **Improved response and repair times** – We will put in place qualified response teams, able to respond to all locations within a 30 minute window (15 minutes at critical locations). These teams will undergo routine rehearsals to maintain their skills and will be equipped with 'grab bags' of emergency tools to get the railway back to regular service as quickly as possible.
- **Reducing trespass and route crime** – Using new technology, renewal of lineside fencing and training staff that come into contact with vulnerable people, we plan to reduce levels of suicide and unauthorised access. We will continue to support Joint Patrol Units and Emergency Response units alongside the British Transport Police to reduce incidents of crime on the line

We will continue working with all of our operators through Right Time Railway Groups and Alliances to eliminate small minutes delay both at

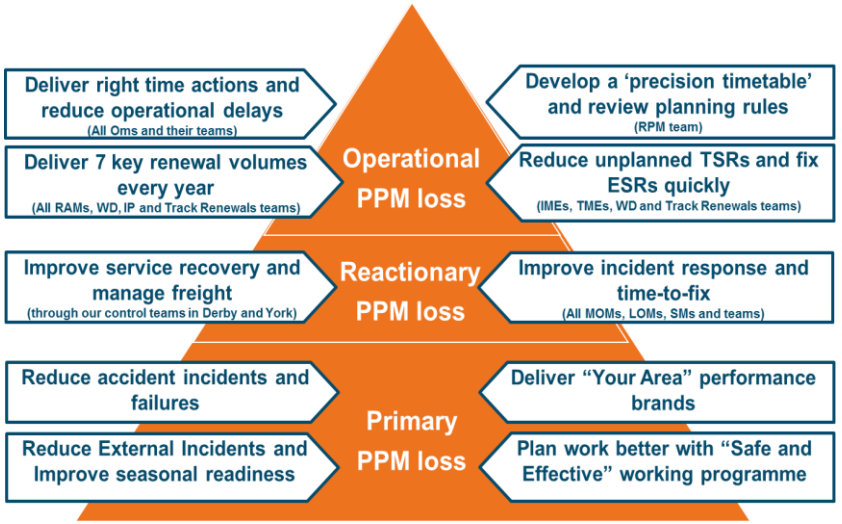


Figure 41: Our Train Performance and Operations initiatives will target PPM loss.

stations and in time loss running. We will also improve service recovery with the introduction of Incident Officers in the Route Operations Centre led by the Senior Incident Officer. They will be responsible for managing severely disruptive incidents and allow Controllers to maintain and manage the less disruptive incidents.

We will focus on reducing external incidents with the introduction of further patrols/inspections at 'hot spots' and targeted fencing projects to reduce the risk of trespass and fatalities. Additionally we will implement vegetation clearance to sites with historic issues with safety as well as autumn performance risk.

5.3.2 Route operations strategy

With over nine different TOCs and three FOCs using different parts of the LNE & EM Route, efficient operations in the way we operate, maintain and renew the railway are critical to the safety and performance of our customers. Over CP6 we plan to improve the operational capabilities on

the route by transforming maintenance and centralising our operations, enabling us to work more closely and collaboratively with our TOCs when issues arise.

Consolidate operations to deliver efficiencies

In CP6 main signalling operations will continue to be centralised to our York (LNE) and Derby (EM) ROCs. Management of signallers will be more coordinated whilst Controllers will work alongside our TOCs to ensure delays are managed collaboratively and that communications between us and our customers are more effective. Occasions of signal boxes being closed due to rostering errors or signallers late on duty will also be reduced through the consolidation of operations.

Digital Railway will transform signalling of the southern section of the ECML in CP6. Alongside installation of DR ready infrastructure on some parts of the route, we will also begin making our Operations DR ready. This will start with the expansion of Automatic route setting software and continue as Traffic Management systems (TMS) are deployed. This will support the optimisation of services by reducing reactionary PPM loss and improving recovery of services in the event of disruption.

Incident Management Software (IMS) and the introduction of new technology such as delay reporting apps for drivers, will allow us to identify and respond to delays in real time and conduct better analysis of the underlying causes of incidents. These can be reviewed with all TOCs and FOCs to continuously revise service recovery and regulating strategies.

Operations will work to deliver our precision timetables and effectively recover services in incidences of disruption. This will include maximising the PPM/FPM of all TOCs and FOCs and ensuring that long distance services are returned to their Working Time Table path at each regulating opportunity or recovered / cancelled where general principles of service recovery cannot be met. In order to achieve this we will seek to develop and agree operating principles with our TOCs, FOCs and other routes, including:

- No non-passenger train to start early from a point of origin or intermediate yard / loop / siding.
- Service recovery protocols to be in place with all Route operators to ensure pre-agreed recovery plans are enacted for all late running services, the aim being to restore right time from origin at the first opportunity.
- To achieve right time starts, inbound trains running with delays will be made to skip stops or terminate early to recover lost time In line with the agreed service recovery protocols.
- Services that will be exiting or entering the LNE&EM Route out of path will have an agreed recovery plan in place with the TOC and adjoining NR Route control, the objective being to minimise overall network delay. Priority will generally be applied to services that originate right time from origin. Late running trains will be regulated such that minimal reactionary delay is suffered by other on time services.
- The network to be “reset” between am and pm peaks to deliver on time starts for the evening peak – defined as 15.00-19.30 hours. Any train running late on the network between peaks that will compromise the evening peak to be removed from the network at the first suitable station. This will include services coming from other routes and networks e.g. Thameslink Core.

5.3.3 Approach to resilience

Across CP5, DPI has fallen across the Route, with LNE & EM achieving its lowest total delay minutes for a period for over eight years in Period 4 of 2017[6]. In CP6 LNE & EM intends to build on this success, continuing to develop robust business recovery and business continuity plans to ensure the Route can promptly recover services and minimise impacts on railway users in the event of an incident on the network.

The Route aims to become a professional and competent response organisation, with qualified response teams located efficiently so that all points on the Route can be reached within a 30 minute response time - with 15 minutes at critical locations. This will involve the implementation of a number of initiatives to improve the skills of our response teams (e.g. live response rehearsals for our most common causes of service affecting failures), the equipment they are using (e.g. ‘grab bags’ at strategically

[6] https://www.networkrailmediacentre.co.uk/news/lne-em-hits-new-record-for-performance

critical locations to ensure that tools and equipment to repair and resume services are easily available), and the processes they follow Standard Operating Procedures (SOPs) to provide a structured approach to reacting to incidents as well as accountabilities, contact information and target times for treating certain types of incident

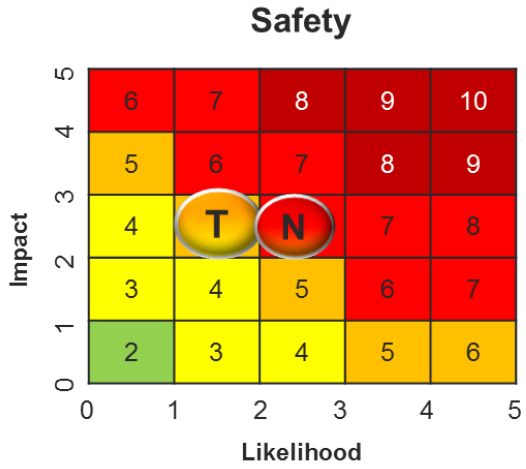
To recover the Network more quickly, the Route will work with our TOCs to revise and refresh service recovery plans to ensure the best interests of moving the greatest number of passengers, we will also work with Freight Operators to consistently implement the management of Freight services during disruption to ensure late-running Freight Trains do not disrupt other rail services.

We will also ensure that front line teams are well trained to ensure accurate, real-time information can be provided to customers, alongside structured communications in line with Passenger Information During Disruption (PIDD) protocols.

5.4 Output summary

Our risk output scores have been derived based on the aggregation of risk scores across all asset disciplines, other areas of the Route's operations and consideration of other external influences (e.g. TOC and FOC performance), with discussion and input by CP6 leads, the Route DRSAM and Finance team. Scores have been based on "N" (Now, our risk score in CP5) and T (Target, our risk at the end of CP6 based on the plans we present).

5.4.1 Risk

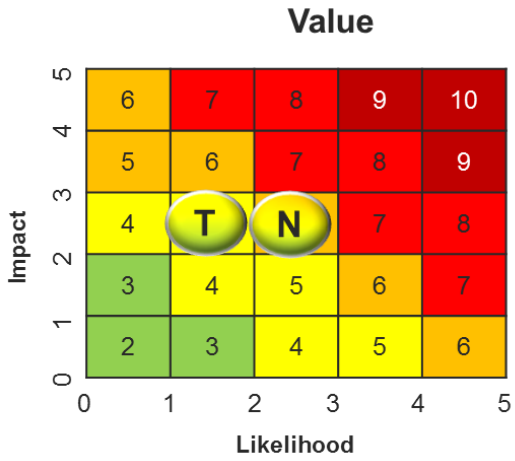


Summary of risk outcome

Occupational safety performance will substantially improve during the control period as a result of an intensive focus on safety leadership, accountability, key hazards, employee engagement and improvements in the working environment. The impact of this will be to improve the Route safety performance to 0.17 LTIFR.

System safety risk will continue to be a key area of focus to manage risks within acceptable levels. The use of improved condition monitoring and a risked based approach to investment decisions will result in improved performance in areas such as Drainage, Earthworks and E&FP.

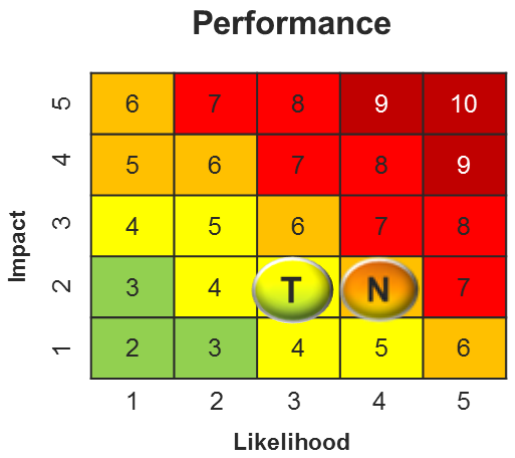
The control period will see improvements in areas of public safety such as suicide prevention and level crossing risk reduction. This will be achieved through a continuation of the suicide prevention programme and level crossing risks reduced through targeted renewals. Areas of increased risk included signalling lineside equipment degradation, risk of rail failure due to corrosion pits.



Summary of risk outcome

Value is currently poor and just better than appetite as renewals unit rates have increased through the control period, resulting in volume reductions that have impacted sustainability.

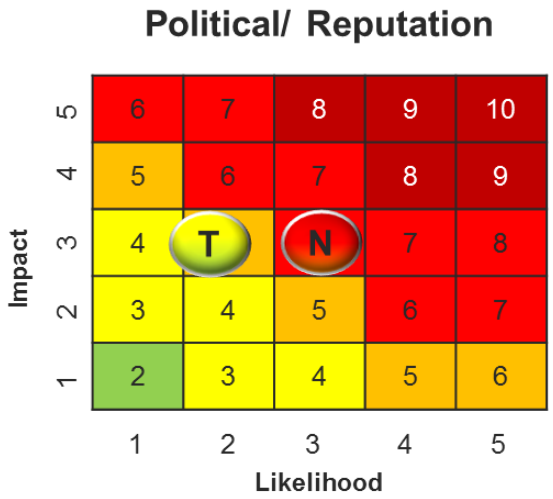
Significant focus has gone into assuring the rates used for planning CP6 including the forecasting of headwinds. Through the process that has been adopted there is a low likelihood of recurrence of the CP5 rate volatility in CP6.



Summary of risk outcome

The funding level will restrict our ability to meet our customers and key stakeholders performance targets. However through targeted focus in key areas such as operational management, performance management, remote condition monitoring and risk based maintenance improvements will result in reductions in service effecting delays and improvements in train performance. In addition, key enhancements such as TRU, Kings Cross Remodelling and introduction of IEP trains and MMLE will result in improved journey times and fleet performance.

Network resilience and asset health will however further deteriorate as a result of constrained funding across an aging network and significant growth in train miles and a more challenging timetable.

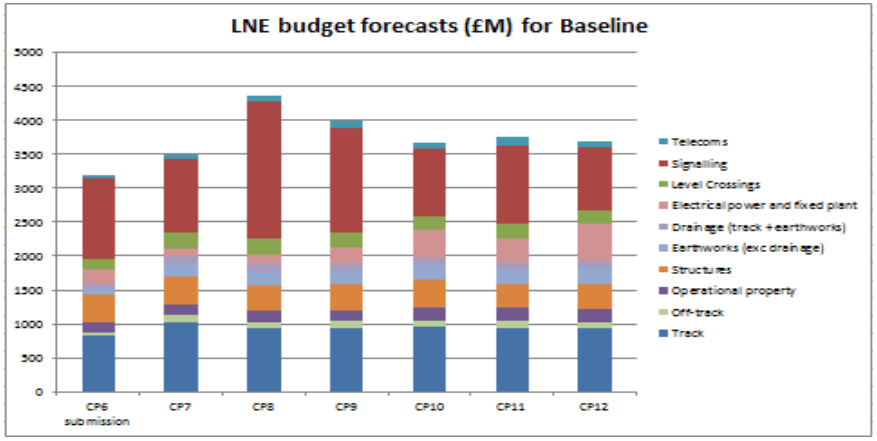


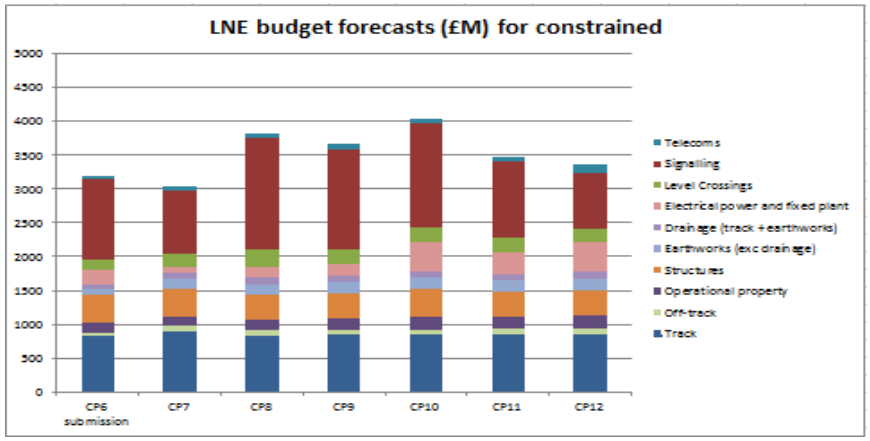
Summary of risk outcome

Reputation and customer service levels are expected to improve as a result of the introduction of the Route Advisory Boards, maturing of the TOC and FOC alliances and the ongoing work of our operations organisation. Continued engagement with our lineside neighbours will result in improved performance and reduce stakeholder complains.

We will continue to work closely with local MPs, councils and regional agencies to support their aspirations for local growth.

5.4.2 Long run forecast





LNE & EM Forecast (£m)	CP6 submission	CP7	CP8	CP9	CP10	CP11	CP12
Track	762	1,015	954	960	969	960	953
Signalling	1,169	1,000	1,871	1,459	724	745	670
Level Crossings	159	293	271	189	38	68	168
Operational property	145	137	142	144	171	172	172
Structures	386	381	422	367	363	376	402
Earthworks (exc drainage)	82	197	208	215	224	232	240
Electrical power and fixed plant	192	129	308	342	543	385	243
Off-track	52	97	97	97	97	97	97
Drainage (track + earthworks)	78	131	131	115	115	115	115
All assets	3,025	3,381	4,404	3,887	3,244	3,149	3,059

Figure 42: LNE & EM Budget forecasts

Scenario	Expenditure	Average remaining life	Long term consequences
1: no constraints on affordability/ deliverabilit y post CP (Baseline)	The baseline budget sees a peak in spend in CP8 and 9 and this is wholly driven by the Digital Railway programme on LNE. After that spend diminishes through to CP12.	Track – for both routes the asset deteriorates gradually initially through CP6 but steadily increases through to CP12. The baseline forecast allowed a slight improvement in performance through to CP12. Signalling – the baseline on LNE sees a decline in condition up to CP8 and then a sharp rise in CP9 before declining again. This is reflective of the work associated with the Digital Railway. On EM the baseline sees a decline up to CP7 through to CP11 and then a further decline. Plans for DR rollout in CP8/CP9 will be subject to business case analysis and integrated deliverability assessment for network wide rollout. Property – the baseline sees an initial decline but then holds steady from CP7 onward. Telecoms – for both routes shows the baseline seeing a substantial deterioration from CP5 through to CP9 then it sees a substantial improvement up to CP11, then begins decline into CP12. The spike in CP9 is also indicative of the work associated with the Digital Railway Programme. Structures – for structures the baseline allows the condition of over bridges to remain steady and improves the percentage of underbridges. Earthworks – the baseline forecast sees a gradual deterioration and increase in the risk score. E&P – on LNE the baseline forecasts an improvement in the life of the asset. On EM the forecast is for steady state for OLE before a substantial improvement from CP7 up to CP9 and 10 before it	

2: equivalent CP6 expenditure for future Control Periods (Constrained)	The bid also includes Digital Railway spend but shows a general reduction in spend across all assets. CP7 sees a particular dip against baseline and reflects a substantial reduction for Signalling.	Track – for both routes the asset deteriorates but at a much faster rate especially so for sleepers. The constrained bid would see deterioration in the performance of the asset. Signalling – the pattern on the constrained forecast is the same but the decline on LNE is steeper and on EM is continuous. Property – the constrained forecast sees a continuous deterioration. Telecoms – the constrained forecast sees the same shape as the baseline but the dip in CP10 is much deeper but sees the same recovery beyond. Structures – the constrained forecast sees a deterioration in condition for both over bridges and underbridges. Earthworks – the constrained forecast sees a steeper deterioration, substantially so for the risk score. E&P – the constrained forecast on LNE sees a slight deterioration for OLE and a significant deterioration for power supply. ON EM the electrification programme sees the same spike in asset condition but the decline post works is steeper. For power supply the forecast is for deterioration.	The implications would be deterioration in performance. For track a decline in track geometry and an increase in TSRs. The implications of this constrained scenario would be mitigated by the Route Supplementary Plan for the ECML (see Appendix D).

6 Customer focus & capacity strategy

6.1 Capacity & timetabling

A resilient and deliverable timetable is a core part of the route's vision for CP6. This will be enabled by designing a precision timetable and a renewals and maintenance strategy that allows trains to start on time, every day.

6.1.1 Moving towards a precision timetable

Prioritise Safety and Performance

In CP6 we will support the system operator in their production timetables that that maximises the number of services we can run on busiest sections of the route. Using information gathered from GPS analysis of section running times, we plan to reduce inefficiency in the timetable. We will also continue to work with the system operator to review existing train planning rules including dwell times and headways.

These will combine with new traffic management systems implemented in the most congested parts of the route such as ECML and Thameslink, allowing pathing and performance allowances to be removed from the schedule. Our aim is that by the end of CP6 all allowances that are no longer relevant to rail operations are removed from the timetable.

Our Performance Team will support the development of major timetable changes and continually review the emerging plans focused on eliminating any performance impacting errors. 6 Further our teams will support the System Operator in improving the current working timetables by using performance data to suggest where alterations are required.

In addition, we will work with FNPO in a review of the timetable to look at opportunities to improve average speed origin-destination, review suitability of current systems to capture network constrains and traction capability.

Whilst these changes will lead to operational benefits, significant service increases during CP6 (see below) will put additional pressure on our assets with consequent impacts on performance. This serves to emphasise the case for additional investment on some of the busiest sections of the network as set out in our ECML Supplementary Plan (Appendix D).

6.1.2 Major timetable changes between now and CP6

Focus on our customers and stakeholders

Table 8 below details the planned changes to timetables expected in CP6, which will result in a c. 15% increase in train services operating on LNE&EM. These have been outlined in the franchise commitments of our customers and consultation, however the detailed implementation of these changes remains subject to industry planning processes.

Table 8: Planned timetable changes affecting CP6 based on current franchise commitments

Customer	Planned timetable changes affecting CP6	Year
Virgin Trains East Coast	• Extensions of services to Bradford, Harrogate, Lincoln, Skipton and more Sunday services • Additional 6 paths per day to Middlesbrough • New Class 800 IEP rolling stock	2019 2021
First TransPennine	• Seven-day timetable including earlier/later trains and more trains on Saturday. • Extension of Newcastle services to Edinburgh - 14 Mon-Sat and 11 Sunday services[7]	2018 2019
Northern	• 2000 extra services per week (12% increase), with 400 additional Sunday services • New cascaded rolling stock.	2019

[7] Network Rail has not yet sold the rights for the additional train paths between Newcastle and Edinburgh

Customer	Planned timetable changes affecting CP6	Year
East Midlands	• Consultation open on new franchise. Baseline assumptions include delivery of over 1000 additional seats (50% increase)[8] • New bi-Mode rolling stock	TBC
East Coast Trains Ltd	• Up to 35 new services each week between London and Edinburgh	2021
GTR	• Although changes will take place in CP5, the main effect of these timetable changes will be experienced in CP6 with plans to run an additional 10 trains per hour in peak times	2018

These significant timetable interventions will be delivered in partnership with the National System Operator, funders and the operating community. We will utilise industry forums such as Event Steering Groups to manage these changes. Our approach will be flexible, customer-minded, and grounded in the principles of the Network Code. During CP6 there will be an opportunity to work more closely with the new East Midlands franchisee.

With support from NSO, we plan to avoid the shortcomings of the more recent franchise changes to make certain that funders understand the capability of the network and specify the franchise service requirements appropriately.

6.2 Future capacity & growth

Enable investment to time & budget

During CP6 we will work with the NSO to support and shape the plans for CP7 and into the future. The Long Term Planning Process (LTPP) delivered by the NSO considers options to accommodate future capacity and growth on the Route for the medium and long term, based on the output from the relevant Market Studies.

The Route expects growth in several of its markets over CP6 and over the longer term. This is in line with wider economic modelling conducted by the System Operator provided in Table 10 below. Table 10 presents recent forecasts of longer term growth published by STE.

Sector	LNE & EM Markets impacted	2016/17 - 2023/24 Growth (Passenger km, % change)
London and South East Sector	TSGN (London to Cambridge, Peterborough and London to Bedford), Moorgate lines	21%
Regional Sector	Northern, Newcastle Suburban	24%
Long Distance Sector	East Coast Mainline, East Midlands, Open Access Operators, Transpennine	21%

Table 9: Forecast % increase in passenger km from 2016/17 on major markets on the LNE&EM route based on modelling by NSO[9]

Route segment	Market	2016/17 - 2042/43 Growth (train km, % change)
Leeds – Halifax via Bradford	Northern	47%
Moorgate lines	ECML	50%
York - Scarborough	Northern	94%
Bedford – Corby/Nottingham	East Midlands	14%
Hertford Loop	ECML	41%
Doncaster - Leeds	ECML	55%
Newcastle - Carlisle	Northern	77%
Leeds – York (via Harrogate)	Northern	70%
Hull - Micklefield	Northern	47%
King's Cross - Peterborough	ECML	23%

[8] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/630614/east-midlands-rail-franchise-public-consultation.pdf

[9] Forecasting is consistent with the Rail Industry's forecasting framework (the Passenger Demand forecasting framework, version 5.1) and recent (November 2017) macro-economic forecasts by the OBR.

Route segment	Market	2016/17 - 2042/43 Growth (train km, % change)
St Pancras - Bedford	East Midlands	13%

Table 10: Forecast % increase in train kilometres from 2016/17 to 2042/43 based on forecasts from STE based on route data.

The East Coast Mainline Route Study was published in December 2017[10], whilst the East Midlands Study was published in 2016[11]. These are used to inform choices for funders, in terms of interventions for the future, via the Initial Industry Advice. These have included market studies which have forecast demand for services on major markets on the LNE&EM Route[12].

Interventions being considered within the Route Study include proposals relating to train lengthening, additional infrastructure, Digital Railway solutions, operational trade-offs, journey time and line-speed improvements.

The enhancement schemes considered as part of the completed EM Route Study and Draft East Coast Route Study for CP6 include:

- East Coast – Doncaster to Leeds capacity, Newcastle station capacity, Stevenage turn back, and further funding for the East Coast Power Supply Upgrade
- TransPennine – Sheffield area capacity and train lengthening in the North of England
- East Midlands – further funding for Leicester area capacity, St Albans station pedestrian flow and Syston to Peterborough capacity
- East West Rail Central Section development
- Northern Powerhouse Rail development
- Rail North proposals, including journey time improvements.

In line with FNPO analysis, Volume growth is expected for our freight customers from the Peak District, Leicestershire and Yorkshire which may present risk in capacity and capability of infrastructure to cope with demand. To address this we plan to explore opportunities for longer and heavier trains to maximise loco capability, and for new capacity, e.g. Hope Valley and MML South. We will also support introduction of new wagons that maximise payload/length ratio, terminal yard developments e.g. York and Newcastle areas, and 'pop-up' terminals that bring out of use infrastructure back into use.

10 East Coast Mainline Route Study
11 East Midlands Route Study
12 East Coast Mainline Route study technical appendix

6.3 Digital Railway

Realising Digital Railway

6.3.1 The CP6 Opportunity

LNE&EM has a once in a generation alignment of opportunities to transform the performance of its railway by deploying transformative digital technology for train control and traffic management.

This digital railway will bring about a new era in sustainable high performance, efficiency, skill development, and cross industry collaboration. The nature of this technology will create new conditions that enable deeper devolution and proximity to our customers, creating a step change in train performance, and will necessitate longer term relationships with technology suppliers which will unlock innovation and efficiency.

6.3.2 Why LNE&EM?

The Route has a pressing need for investment in its train control system assets. In particular, on the southern portion of the East Coast Main Line (ECML) where current assets are life expired and in need of renewal, as detailed in our East Coast Supplementary plan and Appendix D of this plan.

In addition, there is a need for additional capacity to meet the demand projections illustrated in 6.2, additional resilience during disruptions and improvements in overall train performance to facilitate additional track access rights for both franchised and open access services from May 2021. With this, all new train fleets including IEP and Thameslink are being specified and procured ready for digital train control.

The level of service increases planned for the route are not sustainable

without digital interventions due to structural constraints in the current infrastructure and the age and capability of the current train control system. As a result, there is a high degree of urgency to commence undertaking digital conversion from the start of CP6.

6.3.3 Specification and Benefits

The Digital plan for ECML South has been developed and endorsed at Strategic Outline Business Case.

The outline proposition is to deploy ETCS Level 2 from Kings Cross to Peterborough, including the Herford loop and the Northern City Line that will enable the significant expansion of infrastructure capacity and performance.

The Traffic Management system will be deployed from Kings Cross to Fletton Junction, with other options also being assessed. This will coincide with other Traffic Management interventions providing substantial coverage across the route and allow for dynamic planning and timetable amendments during normal operations and recovery when delays occur.

Other benefits will include a reduction in vulnerable lineside assets, better safety as a result of a reduction in staff exposure to the railway, and a reduction in asset maintenance.

6.3.4 LNE&EM Digital Railway Delivery Strategy

The Route will create partnerships with technology suppliers for the start of CP6 to align with asset plans in the new Control Period, and to undertake deployment throughout CP6 with completion of the target area by the end of the Period.

Given the nature of digital technology, the transformation strategy must be established on a long term whole life commercial basis with technology partners and on an outcome/output based commercial model that aligns to operational and asset management requirements. This will require early market engagement to contract on an outcomes/output basis and create an optimised whole life design solution. This partnership approach will maximise innovation and efficiency in the supply chain, and enable greater collaboration and alignment within the industry.

The plan to get to partnership for the start of CP6 is focused on achieving an industry endorsed output specification, an optimised procurement plan and a determined investment business case that provides conclusive industry funding provision which allows for confident market engagement and to commence deployment.

This plan is challenging and requires strong cross-industry and governmental support to achieve it. There are a number of immediate challenges to achieving this plan and the Route has identified the following immediate priorities in order to overcome them:

- Progression of the DR investment plan in alignment with the urgent renewal need. Without this the conventional renewals will be urgently required reducing the ability to carry out a coherent DR investment plan
- Integration of DR deployment with industry train fitment and readiness plans, primarily for national operators and freight
- An optimal procurement plan is deployed that capitalises on supplier expertise and capability in the UK while it exists by achieving early investment business case endorsement

The LNE&EM Route DR plan is built on the experience gained through earlier developments and continues with close engagement with the DR programme, and other Network Rail and industry functions.

6.3.5 The Moorgate Plan

As part of the ECML plan, an early opportunity has been identified for Digital deployment on the Northern and City Line between Finsbury Park and Moorgate. This line is in urgent need for renewal due to the life expired and novel signalling assets. This coincides with the roll out of the new Thameslink Class 717 trains on this line with no other trains. This provides the greatest opportunity for a digital railway anywhere on the network.

The route team has developed a plan to renew this line as a Digital Railway with an ETCS no signals solution based on a thin client/outputs relationship to enable market innovation, efficiency and sustained long term performance.

This plan has been supported by the DfT with provision of NPIF budget to complete this scheme. This will be the first high capacity no signals railway in the UK and will provide the benchmark for how digital schemes are delivered across the network.

6.4 Communications

Focus on our customers and stakeholders

The LNE&EM Route Communications Strategy is focused on improving the perceptions held by our stakeholders, promoting the benefits delivered by our investment in the railway for customers and passengers, and with colleague engagement focused on safety and performance.

The strategy is integrated at Route and national level to deliver against communication KPIs and manage reputational risk, with a devolved Communications team providing professional communications for the Route and Projects. The increasing importance of engaging with stakeholders – from lineside neighbours to local authorities to MPs – is reflected in the strategy and will support the work of the investment and sponsorship teams in encouraging third party investment in the railway.

The fundamental messaging for communications for the LNE&EM strategy is in line with the corporate messaging framework, based on the company mission statement of 'A better railway for a better Britain'. The strategy will:

- Demonstrate that we are doing more to maintain and invest further in the railway by showcasing our investments, setting out the improvements to passengers, local economies and communities
- Demonstrate that we care about our passengers, neighbours and community by being open and transparent about disruption, developing public behavioural choice campaigns and focusing on local benefits

Measurement of the strategy and plans will be in line with the corporate framework for devolved route communications, whilst also focusing on LNE&EM Route specific targets.

6.5 Property

Third party funding and/or financing

The Route Property team has a proven track record of working with TOCs, Councils and developers to achieve a range of financial and strategic outcomes. These include attracting and facilitating investment into the rail sector, the generation of income through the rental portfolio (Commercial Estate, Retail, Freight and Easements) and capital receipts through development, shared value (e.g. Doncaster, Wakefield and Brough), and the sale of non-operational assets that have released surplus land for residential development to assist with the housing target. Working with the Sponsor teams there has also been success in attracting third party funding which has secured the redevelopment and enhancement of existing stations, for example at Newcastle, Wakefield Kirkgate, Hartlepool and Barnsley, or new stations and facilities such as Wakefield Westgate, and for MDU. for example Doncaster.

Our planning and surveying teams working with the Project teams have also been successful in delivering rail projects including Leeds Southern entrance, Hitchin loop, Doncaster loop, Werrington grade separation and level crossing closures/improvements, for example at Ellistown No.2 (closure) and Sleaford West/Methley North (improvements).

The Route Property team will continue to play an important role in providing strategic and town planning advice, property acquisitions and transaction support to the delivery of operations, maintenance, renewals and enhancements on the Route.

A strategy of early stage planning of projects, and engagement with Property will be an ongoing focus to ensure delivery strategies can be developed that deliver efficiently and allow third party contributions where possible. Joint planning of project delivery via Transport & Works Act Orders or Development Consent Orders where appropriate will be possible through early engagement.

Our office accommodation will become more aligned with Government Property Unit targets in CP6. This applies to the corporate estate but does not extend to Control centres or Depots. By driving towards these targets, Network Rail will work its corporate estate more efficiently and should therefore realise OPEX savings as a result. The Route will also adhere to Network Rail's separate Property's CP6 plan.

The Route Property team will strive to meet Government Workplace Management efficiencies and targets. In particular we will focus on our

Derby and Doncaster offices as prospects for uncovering where efficiencies can be achieved to reach Government Occupancy targets.

6.5.1 Disposals and Income Generation

The Route Property team will help to fund Network Rail's Railway Upgrade Plan by selling non-core operations assets, and releasing surplus land for housing to achieve government targets. Over 30 sites within the LNE Route have been identified with potential for circa 6,000 homes, including Cricklewood Goods Yard (2,000 homes) and York Central and Queens Street (1,350 homes). Clearance is required for a number of these sites and Property acknowledges that future operational requirement is the key objective for the Route.

In addition, the disposals programme may be supplemented by identifying surplus freight sites, for instance Leeds Stourton, or New Holland Bulk Terminal. It will be ensured however that the value release proposal protects current traffic generating operations, and does so in a way that uses land strategy to optimise freight operations in the Route.

The Route Property team have ambition to work more collaboratively with the Train Operator to look at joint disposals where benefits to the industry can be realised, eg reducing costs or enhancing passengers experience (existing projects include the station masterplans aforementioned).

6.5.2 Retail Income

Our retail income strategy will target continued growth in retail sales at stations, as footfall maintains a strong upward trajectory. To achieve this we will focus on the retail strategic priorities of:

1. **Asset Management Excellence**: Enhance the operational use of stations with commercial offers which meet the highest expectations of customers whilst creating a sense of place by celebrating the unique architecture, location and heritage of our buildings.
2. **Customer Focus**: for our station users: deliver retail environments and overall station experience that exceed customer expectations and for our Business partners: work in partnership, to be flexible and responsive putting great customer service at the heart of everything we do.
3. **Digital**: use leading edge technology and digital platforms to unlock new revenue streams and enhance the experience of our consumers and business partners.
4. **People**: Attract, motivate and retain a diverse high performing team to support the future direction of our business.

For Kings Cross the strategy for CP6 is to the refresh the tenant mix across the concourse and mezzanine level during 2018 – 2021, as the majority of leases expire during this period. For Leeds, the strategy over CP6 is to progress the work that is part of the masterplan and station extension, and to progress Dark Arches improvements (subject to masterplan).

6.5.3 Protection of our Infrastructure

The Route Property team (through the town planning team) also plays an important role in scrutinising third party planning applications and development where development is adjacent to the railway, impact on our infrastructure, where local authorities attempt to limit the use of our land.. This is vital in protecting our infrastructure from the impacts of adjacent developments and can often lead to securing small scale improvements to stations (e.g. additional cycle facilities at Cross gates station). The Route Property team will continue to review the Strategic Freight Site portfolio to identify surplus and redundant historic designations and agree with FOCs their de-listing (Wakefield Belle Vue). This will facilitate alternative uses such as redevelopment and rail projects as well as identification of new Strategic Freight Site locations such as South Tyne Yard.

6.5.4 Land Strategies

Third party funding and/or financing

Land strategies will be developed that optimize land use and unlock other benefits, such as improved operating facilities where land will be released. Taking advantage of third party investment will be an additional goal. The Route will continue to develop the strength of its name in the market to attract inward investment (such as through Section 106 contributions), working with the System Operator, Investment Director, Route Enhancement Manager and Sponsor teams. For example:

- Leeds Integrated Station Masterplan to redevelop the existing station, integrate the new HS2 station and catalyse regeneration of the South Bank
- York Central development that will provide over 40 acres of public spaces, housing and commercial use. Collaboration with the Council, NRM and the HC
- Newcastle Central Gateway – See inset
- Peterborough Land Strategy where we are working with the route, Council, VTEC and LEP to secure station enhancements including a multistory car park andnew MDU thereby releasing land for housing development.
- Station Strategy for specific train operators (VTEC) with masterplans for each station to enhance the station facilities and provide the release of land for development where appropriate.
- New stations at Elland, Horden, White Rose and Thorpe Park
- Sleaford – opportunity for rationalisation of existing maintenance depot and allowing surplus land for re-development.

Newcastle Central Gateway

The Newcastle Central Gateway Development is being delivered in 2 phases. Both phases are delivering in direct collaboration with the City Council, VTEC, and NR.

The First phase has delivered creation of c990sqm of retail space at the station, c500sqm public space at the station frontage, and significant space for pavement cafes. The second phase will deliver a 1,000 MSCP development & facilitation of the potential for some 3,500 homes, 81,000 sq m of mixed use development and a new primary school.

7 Cost competiveness & delivery strategy

7.1 Summary route deliverability statement

Efficient and effective delivery

In developing our CP6 strategy we have undertaken a wide range of activities to determine forecasts of maintenance and renewals volumes and costs, plan for how our activities will be resourced and delivered, and develop realistic and deliverable efficiency targets. These activities are designed to minimise risks around deliverability and cost, learning lessons from CP5, as set out in Table 11 below.

Delivery/ cost risk	How we are mitigating this risk through appropriate forward planning during CP5
Unit cost starting position higher than expected	• **Detailed unit cost benchmarking**, working with our deliverers to determine the most appropriate rates to use for the key work types in our Signalling, Track, E&P and Earthworks renewals workbanks (see section 7.6) • **Peer reviews** of the costing of the most significant projects within our Civils (Buildings, Structures) workbanks, involving experts from across the business, our deliverers, and where possible benchmarking against other delivered projects on our Route and other Routes (see section 7.6)
Under-delivery in early stages of Control Period due to lack of forward planning and under-developed scopes	• **Deliverability Workshops** with our deliverers IP and Works Delivery to provide early sight of our CP6 workbanks, identify key risks to delivery and potential efficiencies including alignment with enhancements, to consider appropriate profiling of work and appropriate split of work between deliverers and ultimately facilitate agreement and sign up to the delivery strategy (see section 7.4)
Sub-optimal access to deliver work efficiently due to lack of joined up strategic planning	• **Strategic access planning** for CP6, working with our TOC and FOC customers to agree the principles that will enable more efficient and effective access planning and delivery during CP6, particularly for the most significant disruptive possession requirements, including longer access windows for High Output (see section 7.2)
Maintenance deliverability and cost risks	• **Development of a detailed maintenance strategy** underpinned by bottom-up calculations of maintenance volumes using the Activity Based Planning Tool devised by our central ORBIS team, whilst leveraging the various management activities that are already underway to deliver more efficient and effective maintenance (e.g. Safe and Effective Working) (see section 7.3)
Poor visibility of Enhancements projects occurring on the Route	• **Introduction of 6 monthly stage gate requirements** on Programmes with individual projects at differing stages of design and delivery to ensure appropriate integration with other renewals and maintenance activities to optimise access windows.

Table 11: Activities to identify and evaluate cost and delivery risk in forming our CP6 plans

These activities have enabled us to improve confidence in the delivery of our CP6 volumes to time and budget and provide the basis for further detailed planning throughout the rest of CP5 which will enable us to 'hit the ground running' in CP6.

Our preparatory work on cost competitiveness and delivery gives us confidence that our efficiency targets can be delivered. However, we intend to set ourselves internal targets to over-deliver against the efficiency targets within our submission with a view to reaching CP4 levels of renewals efficiency during CP6. This will enable us to re-invest any additional efficiencies in additional volume, and will mitigate against the various cost and delivery risks which could unfold during the remainder of CP5 and CP6.

7.2 Access

Efficient and optimal access planning

We have some significant access challenges to deliver our CP6 commitments. Therefore we will be working collaboratively with our customers, delivery functions, train and freight operating colleagues to maximise the efficient use of access with minimum disruption to the rail industries customers and end users.

We have completed planning Access for Year 1 of CP6 within the existing industry processes. Our vision for the remainder of CP6 is to adopt a different approach which will give full visibility of planned Maintenance, Renewal and Enhancement access through CP6 years 2-5, as opposed to the established process of year on year requirements.

The process will involve all relevant stakeholders within the Rail Industry, with Operators playing a pivotal role agreeing the principles of the Control Period's strategic track access.

7.2.1 Maintenance access will provide the baseline

Our Safe and Effective Working programme (see 7.3.2) will be a key pillar of our CP6 plan. This has been used on some of areas of the LNE&EM route since 2016 and involves the detailed planning of access across all maintenance disciplines to maximise the use of the 'no trains' period. A benefit of this approach is to reduce the level of red-zone working for routine maintenance through improved integration and planning of booked access windows. This has led to a reduction of outstanding work hours at several sites since 2016. The implementation of this strategy will maximise existing Rules of the Route access opportunities to deliver maintenance activities, with the result being maintenance that is less frequent but more effective.

Our maintenance strategy will provide the baseline plan which will then have our Renewal and Enhancement project portfolios integrated and managed into and around the base line plan. Given the criticality and number of projects occurring on the ECML in CP6, we also plan to establish a specific ECML South area access strategy to deliver several major projects and key renewal programmes.

7.2.2 Agreeing high Output track renewal access is critical

High Output track renewal is a key pillar of our track asset strategy in CP6, particularly on areas of high criticality on the MML and ECML. Therefore, we have started the process of working with our TOC customers on determining the principles that we will follow during CP6, particularly with respect to the longer access windows that may be required to deliver the works efficiently, and how we will manage risks around hand back time should the system incur a serious failure, where the performance impact could be significant. Building up such plans at an early stage will help ensure operational risk, particularly for Mid-week night works on two-track sections of the route, is properly communicated and accepted.

Our customers recognise the importance of delivering this work and have committed in the stakeholder workshops to working collaboratively to approach the access required from an industry perspective.

7.2.3 Access through early planning and technology

Whilst working in partnership with our customers will be the cornerstone of our Access Strategy in CP6, we will also follow several other principles to ensure productive conversations with customers can take place, these include:

- **Earlier engagement with RAMs:** Confirming workbanks earlier to allow better aligning of projects across asset disciplines and gain economies in areas e.g. shared site compound areas
- **New technology:** Using mapping software (Figure 43) and sharing details of workbanks across teams to allow for better alignment of works.

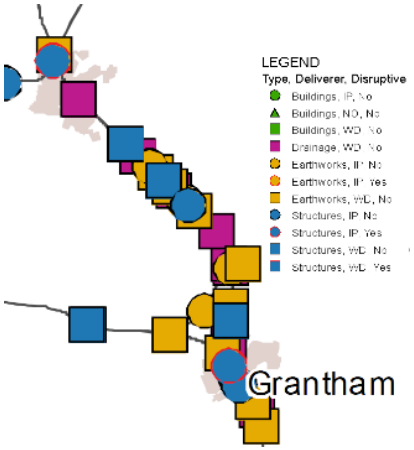


Figure 43: Electronic layered mapping tools will be deployed allowing different teams to coordinate access to maximise efficiency of delivery

- **Alignment with Enhancements:** Co-ordinating with enhancements programmes occurring in CP6 such as Thameslink, TPU, King's Cross

remodelling and Huntingdon four-tracking to optimise their access windows.

7.2.4 Timescales

Our intention is to produce a pre-Engineering Access Strategy enabling earlier engagement with Operators and maximising our Schedule 4 discounts by the end of 2018, following the submission of CP6 renewal and enhancement workbanks.

7.3 Maintenance delivery

7.3.1 Improving maintenance for a changing Route

Through CP5 the Route has made real improvements in delivering maintenance work. Backlog has reduced by 50%, the number of TSRs has been reducing at around 15% per year and the number of asset related failures has also reduced by around 15% during the first three years of CP5.

Engage our workforce

As set out in section 1.2 CP6 will see major enhancements and a circa 15% increase in services operating across the Route. This creates the challenge of delivering more efficient and effective maintenance on an increasingly busy network, which coincides with opportunities created by improved maintenance techniques, and initiatives under the Intelligent Infrastructure programme, which we can bring to bear in CP6. This alignment of challenges and opportunities has caused us to review every aspect of our maintenance activities and identify for more effective and efficient ways of delivering works.

In addition to these strategic issues the Route also needs to resource a number of additional core activities in CP6 relative to CP5:

- Signalling Power Supply Testing – new legislation means that we are required to implement a safety testing and maintenance regime on our signalling power supplies and its associated cabling
- Vegetation work – Over CP6 and CP7 we plan to work towards compliance with Vegetation standards, which will include clearing 800 miles of vegetation, and maintaining and controlling vegetation on another 1600 miles
- New drainage activities to improve the resilience of our Track and Earthworks assets.

7.3.2 Maintenance strategy in CP6

Our strategy to address the challenges and opportunities set out in 7.3.1 revolves around two core initiatives to significantly improve delivery of maintenance on the LNE&EM Route in CP6:

- Safe and Effective Working
- Extending the use of Remote Condition Monitoring (RCM) and other Intelligent Infrastructure initiatives

'Safe & Effective Working' (SEW)

Safe and effective working

SEW has already been implemented in certain parts of the Route in CP5 and has led to decreases in backlog and increased work done. SEW incorporates many of the planning initiatives under the Intelligent Infrastructure programme, helping us plan maintenance work more effectivity around available access windows. This will be rolled out across the remainder of the Route throughout the rest of CP5 into CP6, and will comprise the following elements:

47.5%

Figure 44: The Non-Time on Tools (NTOT) percentage at the Doncaster DU as a result of implementing the Route's "Safe and Effective working" Initiative. A reduction of 6ppts over a year.

- **Structured Maintenance Regimes** are a core element of this initiative, with the aim of moving as much maintenance work we can into the possession access available as set out in 7.2.1. This will reduce the risk of work being cancelled or not completed, improving overall productivity
- **Smarter Rostering** – We will design a roster that fits the Access opportunities that exist, thereby minimising late applications for access and failed worksites that have historically driven up premium hours and impacted other planned work.
- **Professional Logistics** – Improved logistics will allow us to deliver materials and plant to site in advance of the work taking place with waste carried away once jobs are complete. This will replace a more

ad-hoc approach of maintenance staff themselves transporting materials and waste, which can lead to workplace injuries and inefficient fleet usage

- **Improved Worksite Supervision** – better supervision and performance management will reduce the risk of unacceptable standards of work
- **Improved Access Points** - we will work with Safety teams to upgrade our access points to include additional facilities and safety features depending upon the type of access that is required (see section 8.1).
- **Re-Aligning and Combining Resources** - In CP6 we will look to combine the S&T and OHLE staff from the Works Delivery Organisation and the Maintenance Organisation to improve efficiency.

Extending the use of Intelligent Infrastructure including RCM

Intelligent Infrastructure

In CP5 the Route has benefitted from the fitment of a large amount of remote condition monitoring (RCM) equipment to points, track circuits and a number of other different asset types. The number of Service Affecting Failures has reduced because we have improved our maintenance as we learn from the information it gives us.

During CP6 we will also embrace the further rollout of other new Intelligent Infrastructure technologies e.g: Plain Line Pattern Recognition (PLPR), Location Earth Busbar Monitoring, Eddy current testing and 'Pan cams'.

We will maximise the opportunities to improve our usage of this equipment through 'Predict and prevent' and to embrace other new technology to improve efficiency during CP6. This will be in line with the monitoring and analytics initiatives of the Intelligent Infrastructure programme.

The 'Predict and Prevent' programme is made up of three work-streams:

- **The development of a Delivery Unit 'dashboard'** to centralise all the information from our RCM equipment in one place. The ability to provide a 'helicopter' view of the Delivery Unit on one screen, with a traffic light health check of our all our RCM fitted assets across a DU
- **The rollout of further RCM fitment to all our 'Critical' assets**, and to use existing RCM equipment for other previously unmonitored high risk assets e.g. relay room temperature monitoring.
- **Training & Support** –Larger volumes of asset data from new technology will require competent teams who are able to process, manage and interpret it. In CP6 we will use our own specialist staff to deliver training on site where teams can see how new technology works in context, giving them a better understanding of how to optimise its use. In CP6 we will also ensure that our front line staff receive the relevant training needed to take advantage of these new technologies will help us reduce the frequency of patrols, the need regularly inspect certain types of equipment and perform certain types of testing.

By extending the use and impact of Intelligent Infrastructure in CP6 we will be in a position to restructure our maintenance regime from a preventative one to a more risk-based approach. This will help us eliminate non-essential maintenance activities and deliver essential activities at a frequency that is more appropriate to asset condition.

7.3.3 CP6 Maintenance submission and Outcomes

The maintenance volumes submitted in our plan have been derived using the Activity Based Planning Tool devised by our central ORBIS team. This has been used to forecast the cost required within each year of CP6 to deliver planned volumes. Our submission has been built upon volume of work each Maintenance delivery unit (DU) would need to perform in CP6 in each of the four main areas (PWay, Off-Track, S&C and E&P), taking into consideration increased scope drivers and scope efficiencies. These were submitted by each of the Route's eight DUs and consolidated.

These volumes were then priced at standard rates and along with OTM costs and other costs, and are reflected in our Opex submission (see section 5.1). In order to calculate how this will flow through to actual headcount we have applied the following overlays:

- The additional headcount required to cover volumes driven by new core activities set out in 7.3.1 (Signalling Power Supply testing, Vegetation and Drainage)
- Estimated efficiency improvements resulting from the above initiatives, which will mean that non-time on tools is reduced over time, whilst initiatives such as PLPR and other initiatives included under the

Intelligent Infrastructure programme will reduce the volumes of work required as activities become more targeted.

Figure 45 illustrates the expected impact on overall hours worked (broken down by time on tools, capex work and non-time on tools) and the projected headcount resulting from this.

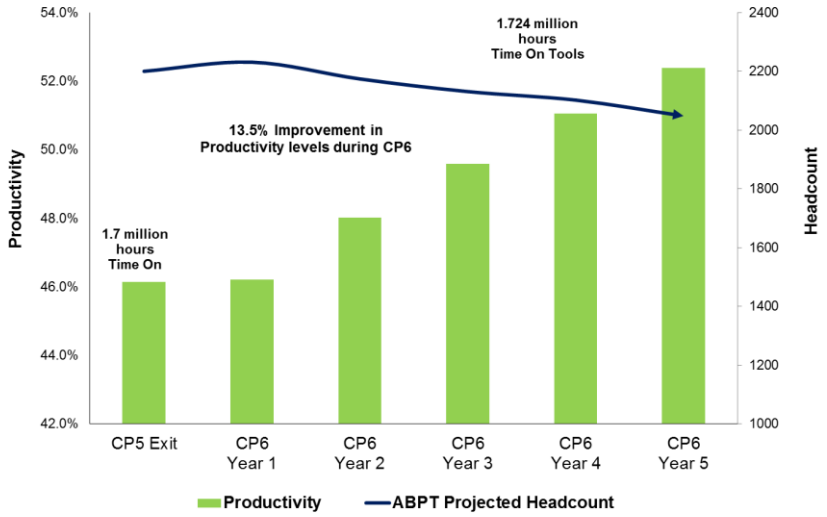


Figure 45: Projected hours worked and headcount during CP6 as a result of our Maintenance strategy

The key drivers of change within this chart are as follows:

- By the end of CP6 a 'steady state' 186 additional heads will be required for scope changes – 102 for Signalling Power Supply testing and 84 for vegetation and drainage activities. These additional heads will be recruited between years 1-4 of CP6
- **Reductions in non-time on tools** realised through full implementation of SEW across the route. We anticipate that this will drive an improvement in non-time on tools of between 1-2 percentage points per annum, which will vary by location based on current productivity levels. Overall we expect this to drive a reduction in the proportion non time on tools from 54% at CP5 exit to 47.5% at CP6 exit, based upon our experience of SEW productivity improvements at Doncaster and Peterborough. This productivity improvement will be further supported by our 'Extending the use of RCM and Intelligent Infrastructure' initiatives
- **Reductions in time-on-tools** of around 2% by the end of CP6 due to technology based initiatives such as PLPR and other initiatives under the Intelligent Infrastructure programme will reduce the volumes of work required as activities become more targeted

We will realise the headcount savings set out here through natural attrition as colleagues retire or leave the Route. In addition to the improvements in efficiency set out above, our strategy will deliver the following wider benefits for the industry:

- Capacity will be created to do more value added activities such as performance improvement works and direct delivery of renewals work
- Improved Safety for our frontline staff through less use of Red Zone Working, designated access points and by removing unnecessary site visits when information can be viewed remotely
- Improved asset performance brought about from fewer failures and better quality rectification.
- Reduced backlog due to better usage of maintenance access windows
- A reduction in premium hours brought about by smarter rostering and the need for less reactive working
- The opportunity to reduce and change our vehicle fleet as the way we deliver our work changes.
- The data insights further extension of RCM and other intelligent infrastructure will give us will allow the LNE & EM Route to continually monitor and understand the condition of its assets, providing efficiencies through more targeted maintenance and renewals into CP7 and beyond.

7.4 Project delivery

Robust joint delivery and procurement strategy

Our strategy for efficient and effective delivery during CP6 is built upon **robust early planning** involving our delivery partners. This early preparation is integral to our plans for creating a more open, transparent and **integrated approach to delivery** which will bring together the various disparate organisations that currently exist into a single, cohesive unit which is closer to its supply chain.

7.4.1 Robust early planning

One of the key lessons learned from CP5 was that a lack of integrated early planning meant that we were unable to 'hit the ground running' from Day 1 of CP5, with projects due to be delivered early in CP5 insufficiently scoped and costed to enable them to be rolled out to the costs and timescales assumed within the regulatory settlement.

In order to mitigate this we have already begun the process of detailed joint planning with our deliverers to ensure a smooth transition into CP6 activities, as summarised below.

7.4.2 Deliverability workshops

We have held multiple deliverability workshops across our asset disciplines during 2017. Each workshop was attended by relevant members of our Route Asset Management directorate including our SRAMs, individual asset RAM teams, alongside our deliverers IP and Works Delivery to jointly discuss the key deliverability issues and make plans for addressing these in advance of CP6. Key items covered by these workshops include:

- Sharing of developing CP6 workbanks
- Identification of key opportunities for alignment of works within and across asset disciplines, and alignment with enhancements
- Identification of key risks to delivery including cost and scope risks, along with actions to address these risks
- Consideration of appropriate profiling of work and appropriate split of work between deliverers

Further Deliverability Workshops are planned to continue to work up plans in more detail to facilitate agreement and sign up a joint business plan between the Route and the deliverers. Within structures for example, a series of Deliverability Reviews are currently being held between the Asset Management Department and our various Delivery Partners to derive and refine final cost estimates and obtain high level agreements. Various schemes have been reviewed in detail which has involved: benchmarking against historic Control Period 4 & 5 schemes, highlighting potential innovation applications, project benchmarking, identifying potential efficiencies and opportunities for third party funding.

7.4.3 Early project development

Building on the Deliverability Workshops, we will work closely with our deliverers through the remainder of CP5 to robustly develop the early projects in our CP6 workbanks as part of the joint business planning described in 7.4.2 above. This greater emphasis on the early GRIP stages will provide clarity on the outputs required, greater certainty on scope, cost and timescales for the works, as well as any associated risks and opportunities. In order to facilitate this Route IP will make their project management, planning, engineering and commercial functions available from the outset to fully develop specifications and budgets prior to going out to the supply chain and in conjunction with RAM teams.

7.4.4 Integrated approach to delivery

The joint planning process described above provides a practical example of how we are seeking to become more integrated in our approach to Delivery. Figure 46 illustrates how the Route and IP are seeking to build on this process towards an Alliancing relationship with the Route DRSAM which will provide efficiencies through greater integration in planning and delivery of works.

During the next stage of planning for CP6, a robust joint business plan will be jointly developed and agreed. Not only will this enable us to develop an effective procurement strategy and improve cost certainty, it will also enable us to accurately plan against our CP6 funding settlement. Furthermore this will form an accurate baseline against which delivery can

be benchmarked throughout CP6. As part of this, the practical steps we will take with LNE&EM IP to deliver benefits from this Alliancing relationship include:

- Using the current CP6 identified workbank we will seek to create a collectively understood work programme which treats the entire enhancement and renewal work bank as a portfolio with discreet programmes managed as part of a single, integrated plan
- Working against this plan, we will continue to conduct joint planning exercises which bring together resource and expertise from across the Route and deliverers to plan works based on industry / route based priorities as opposed to silo based project drivers.
- In line with our Access Strategy (7.2) we will identify the best access availability and make maximum use of this by understanding all works required in the area and either defer or bring forward activities to go in once in a longer block, ultimately we want to avoid short overnight windows where possible.

Having early joint visibility of the requirements through the span of CP6 will provide us with the ability to deliver efficiencies and increase effectiveness, for example through:

- Improved unit cost rates of key material requirements through bulk buying and control of materials to avoid shortage at key times
- Identify and purchase long lead items to protect programmes and avoid market saturation
- Integrate possession planning opportunities
- Value engineering to drive significant savings to the projects at specification stage and avoid any over engineered solutions reaching the detailed GRIP 4 & 5 stages
- Implementation of a procurement model (see 7.5) that allows for a greater level of flexibility in terms of early contractor involvement, allowing the expertise of the supply chain to input to the feasibility.

7.5 Supply chain

Robust joint delivery and procurement strategy

In order to ensure continuity of delivery throughout the remainder of CP5 and into the early stages of CP6 we will continue to utilise the existing supply chain through our IP and Works Delivery managed frameworks, as well as local frameworks where relevant. Route C&P teams maintain a programme of Framework contracts that are currently being utilised and a detailed schedule of the expiry of these contracts is held and reviewed at local commercial panel on a fortnightly basis.

In line with our Delivery Strategy, for our locally delivered projects (i.e. those not delivered by National IP Track and Signalling) we will seek to transition to a 'closer to fewer' procurement model. This means being closer as a Route to our deliverers and our supply chain. In order to do this we will seek to implement a procurement model that:

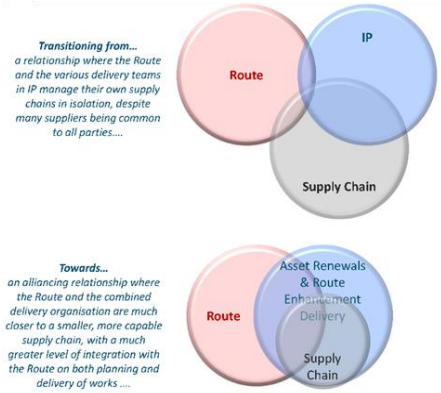


Figure 46: LNE&EM plans to ensure better alignment between ourselves, IP and our

- Drives efficiencies through a better understanding of the forward programme of works throughout CP6, and significantly improved project scoping which will result from our delivery strategy (7.4)
- Allocates works to a more select group of appropriate delivery partners, selected from a pool of multi-disciplinary suppliers with proven delivery records. An example of which is the delivery model adopted for the Thameslink Resilience Programme where the works are being delivered and procured using the most appropriate route, direct delivery, frameworks and competitive tender.
- Leverages the expertise of the supply chain to input to the feasibility, option selection and value engineering process thus supporting the accuracy of project lifecycle costs.
- Exploits the removal of geographic constraints in contracting models to utilise cross-boundary delivery where demonstrably more efficient.
- Develops a transparent cost and value reconciliation process with the supply chain to identify lessons learned and improve our estimating and forecasting of works.

- Incorporates appropriate incentives and measurement of contractor performance, reducing risk of poor delivery performance.
- Incorporates safety performance as a key award criteria.

On the larger enhancement schemes such as TPU, MML electrification and Kings Cross remodelling the Route plans to use both IP and Network Rail Works delivery teams to provide more effective use of resources and help drive efficiencies into the large schemes.

LNE & EM, over the last three years, have run a trial of an alternative to established delivery methods. Direct Delivery is a small lean team that are located within the DRSAM team. To date they have delivered £15m of Buildings works achieving up to 40% savings compared with the conventional delivery routes. Projects are typically non-complex and in a high street environment. Cost reductions have been achieved through intelligent use of contractors (including using contractors who are new to rail), avoidance of frameworks and a high level of up front specification. Locating the delivery team within the client organisation has also achieved considerable savings in terms of interfaces.

7.6 Costing approach

Benchmarked unit rates

We have undertaken a detailed assessment to provide assurance that the unit costs and volumes set out in our financial submission are deliverable. This process was developed to provide challenge to the rates being proposed by deliverers and to ensure our estimated renewals costs for CP6 are as accurate as possible, thereby providing confidence in our ability to deliver the required volumes in CP6.

7.6.1 Summary of approach

The key principles used within this methodology are outlined below, however at a high level the assurance route chosen for each asset class depended on whether CP6 forecasts are based on either a benchmarked unit costing approach, a peer review of bottom-up forecasting, or a combination of the two.

Both of these review processes were performed on Key Cost Lines, which were ranked in order of the total spend that they drive to provide most coverage through our assurance work.

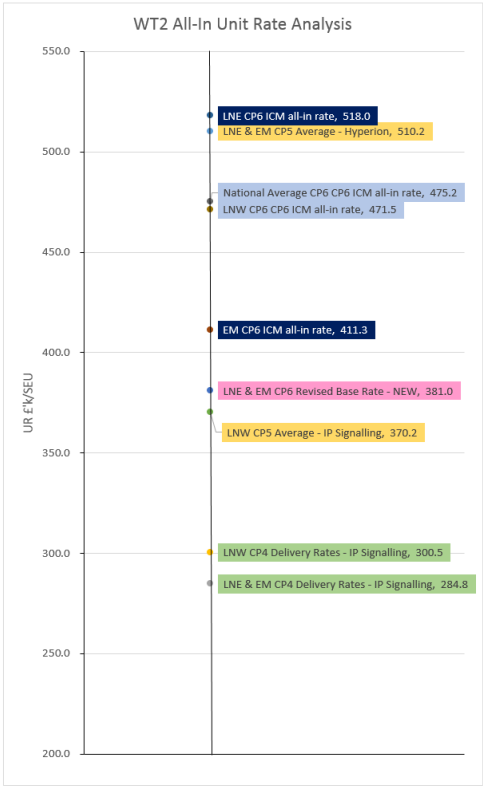


Figure 47: Example benchmarking output

7.6.2 Unit cost benchmarking approach

Unit cost benchmarking has primarily applied to signalling, track, earthworks and elements of E&P where work types are comparable at a route-wide and national basis. Within each asset type we performed unit cost benchmarking Key Cost Lines to cover a high proportion of the total value of works within our submission. For example our signalling benchmarking covered Work Types 2, 3, 12, 41, 54, 57 and 58, as well as LX Full Renewals (Figure 47).

For each Key Cost Line within each asset discipline we collated at least four appropriate unit cost benchmarks to build a range. Depending on the asset type, these data points included:

- National "Book" Rates – the rates provided by Infrastructure Projects (IP) or Business Review Team (BRT) that Routes have been advised nationally to use for the CP6 submission;
- CP5 Actual Rates – calculation based on actual spend and volume delivered on LNE&EM projects completed within the first 3 years of CP5;
- CP4 Actual Rates – calculation based on actual spend and volume

delivered on projects completed within LNE & EM Route in CP4;
- Other comparable routes e.g. LNW – calculation based on actual spend and volume delivered on projects within other routes in the first 3 years of CP5,
- CP6 RAM forecast – rates forecast by the LNE & EM Route RAM team using models and/or engineering expertise and experience of similar projects delivered in the past.

The unit rates developed have been:

- Calculated using all available information and expertise appropriate for the job type's stage of development;
- Referenced back to a range of unit rates including actual costs incurred by LNE & EM route for equivalent job types, actual unit rates incurred by other routes and national unit rates with reasons for variances demonstrated; and
- Clearly documented including supporting information, assumptions and justifications to provide a robust audit trail.

Having this range of unit costs has allowed the output unit rate to be benchmarked against a range of data points and to identify and provide justification for the most appropriate unit rate to use in the submission.

7.6.3 Bottom-up costing peer review approach

Asset types such as Structures and Buildings, exhibit more variability in historic costings and many of the assets have unique characteristics, therefore a unit cost benchmarking approach was not deemed to be appropriate. Instead, a peer review of bottom-up costings has been used to provide assurance over the cost forecasts. These peer reviews have been undertaken through a combination of expertise within the existing RAM team, and also by the works delivery team who will ultimately be responsible for delivering the project. In most cases these peer reviews have been completed as part of a deliverability workshop.

The terms of reference that were given for this peer review process focussed on three elements:

- Is the project included within the workbank on an appropriate basis, and justifiable based on underlying risk assumptions and deliverable 'balanced scorecard' outcomes;
- Is the proposed intervention appropriate and where applicable, what alternatives could be considered; and
- Is the project robustly costed and in the correct price base?

In line with the benchmarking process, the peer reviews have been documented to provide a robust audit trail, capable of standing up to external scrutiny, and providing confidence that ultimately the projects will be deliverable within the costs set out.

7.6.4 Summary of costing approach for each asset type

Table 12 below summarises the basis of costing that has been used for each asset type.

Asset	Supplier of cost	Basis of cost	% of asset covered
Track	IP Track	Benchmarked and validated by RAM using current and historic delivered costs	71%
	Works delivery	Current delivery rates	26%
	RAM	Historic delivered rate along with engineers' estimates (other costs)	3%
Signalling	RAM / IP Signalling	Bottom up estimate based on RAM analysis of historic core unit costs and 'additional factors'/LDRs (Local Delivery Rates), with input from IP Signalling	75%
	IP Signalling (ICM)	Refurbishment WT54-59 – engineers' estimate of anticipated costs presented as a proportion of full renewal	9%
	Works Delivery & Maintenance	Current delivery rates and engineers' estimates (including minor works)	16%

E&P	STED RAM IP	STED book rates LDRs based on engineering estimates and dialogue with deliverers Bottom up engineering estimates along with historical cost data	16% 76% 8%
Off Track	RAM	Average contracted rate	100%
Drainage	RAM / Works Delivery	Historic delivered rate	100%
Geotech	IP Works Delivery	Benchmarked historic delivered rate, including an uplift for known scope changes (RAM/IP/Works Delivery) Historic delivered rate along with engineers' estimates	78% 22%
Structures	IP Works Delivery	Bottom-up cost forecast of project workbank based on engineers' estimates of similar projects, and subject to peer/deliverer review	62% 38%
Buildings	IP Works Delivery / Maintenance Direct Delivery / Other	Bottom-up cost forecast of project workbank based on engineers' estimates of similar projects, and subject to peer/deliverer review	52% 44% 4%

Table 12: Costing Basis for each asset type

7.6.5 Approach to operations and maintenance cost forecasting

Maintenance costs have been developed using the Activity Based Planning Tool v3.1. There are eight of these ABPTs, one for each of the Route Delivery Units. The maintenance volumes in these ABPTs have been generated following extensive consultation with the local Delivery Unit Maintenance Engineers, IME's, and their supporting RAM teams.

The numbers are based on local engineering knowledge, current trends, resource capability, traffic patterns and an understanding of the impact of forthcoming renewal or enhancement schemes. On top of baseline volumes we have added the volumes for our additional work streams that focus on Signalling Power Compliance, Vegetation Compliance and the increase in Drainage Work we plan to do to extend the life of our track assets.

The Route has then overlaid its efficiency initiative, 'Safe & Effective Working' calculating that the rollout of this initiative will reduce the proportion of Non Time On tools by over 6 percentage points based on a trial at the Doncaster DU in 2016. Intelligent Infrastructure Programme initiatives have also been considered in the Safe and Effective working efficiency overlay. This will deliver the additional volumes we have committed to and reduce number of heads required to deliver this work by over 120. We expect to achieve this reduction through natural attrition over the course of CP6.

7.7 Cost drivers, headwinds and efficiency

7.7.1 Summary of cost changes between CP5 and CP6

Figure 48 provides a summary of the impact of scope drivers (including Digital Railway) and efficiencies, and cost headwinds and efficiencies which drive the overall Operations, Maintenance, Renewals and Digital Railway budget requirements for CP6 compared to CP5.

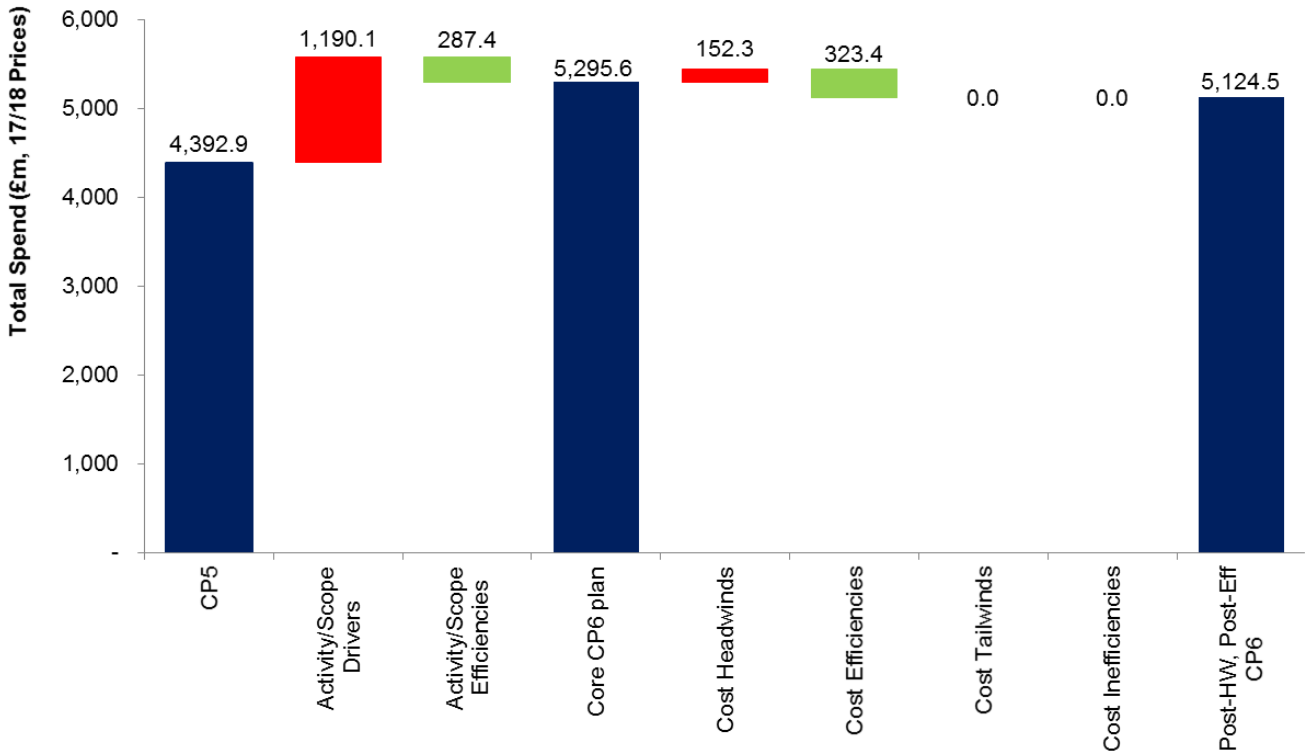


Figure 48: Waterfall chart showing the drivers of cost changes between CP5 and CP6

Table 13 below sets out how this translates into headwinds and efficiencies for each year relative to our pre-efficient plan.

Table 13: Summary of Route efficiency

Totex (O,M,R)	Year 16/17	17/18	18/19	Year 19/20	20/21	21/22	22/23	23/24	CP6 total
Pre-efficient plan[1] (£m)	**-**	**-**	**-**	**968.6**	**1,031.1**	**1,050.4**	**988.1**	**970.1**	**5,008.3**
Activity/scope efficiencies (%)	0.0%	0.0%	0.0%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%	-5.7%
Core plan (£m)	**897.0**	**850.0**	**828.9**	**1,024.2**	**1,090.2**	**1,110.6**	**1,044.8**	**1,025.7**	**5,295.6**
Head winds (%)	0.0%	0.0%	0.0%	3.0%	3.0%	2.9%	2.7%	2.8%	2.9%
Efficiency (%)	0.0%	0.0%	0.0%	-5.5%	-6.1%	-6.4%	-6.0%	-6.5%	-6.1%
Post-HW, post-Eff spend (£m)	**897.0**	**850.0**	**828.9**	**998.0**	**1,056.3**	**1,071.6**	**1,011.2**	**987.5**	**5,124.5**

7.7.2 Summary of approach to determining headwinds and efficiencies

Robust efficiency targets

The following is a summary of the systematic approach that has been undertaken to identify the headwinds and efficiencies that will be realised across each asset class, and how they have been quantified.

In conjunction with the generation of their workbank, each RAM provided an initial description of potential headwinds and efficiencies expected to materialise in CP6 together with a qualification statement setting out why each was expected. At this stage RAMs were asked to identify **all potential** headwinds and efficiencies, based on emerging trends in CP5, information from deliverers and national working groups.

This initial list of headwinds and efficiencies were compiled and compared across assets classes within the route, and also with submissions from other routes. This allowed us to judge whether the initial list identified was complete, and helped assess quantification.

Following collation of this list of headwinds and efficiencies, a standard template was issued to RAMs to enable the capture of supporting information that was required to fully evaluate the potential headwinds and efficiencies and to enable them to be calculated.

The standard template used a series of filtering questions which were designed to funnel down into the impacts that each efficiency or headwind would potentially have across the following areas:

- Financial impact (Key KCLs impacted, type of spend, % workbank affected);
- Other cost areas;
- Initial assumptions around CP6 glide path;
- Efficiencies: Inputs and other dependencies;
- Headwinds: Identification of possible mitigations; and
- Likelihood of realisation.

A series of workshops was then held to challenge each RAM on the rationale for including each headwind and efficiency, together with the underlying assumptions provided in the standard templates.

This process has resulted in a final set of headwinds and efficiencies to be included in our submission, together with a documented audit trail setting out how these have been concluded, together with a robust supporting calculation basis.

Route headwinds and efficiency by theme

The table below summarises the position of the net change across each of the key themes resulting from the headwinds and efficiencies identified in our submission. More detail of each of the headwinds and efficiencies by asset type are included within the cost and volume template submissions.

Table 14: LNE & EM Route Headwinds and Efficiencies

Theme	Area	Description	Headwind / Efficiency £'m	Net % change*
Access (3)	Efficiency (3a)	- **Track:** IP Track High Output improved planning leading to 17%-26% reductions in volume loss in CP6, and optimisation of access strategy. - **Structures:** Sharing compounds and land access, coordinating with other disciplines reducing de/mobilisation costs. - **Multi-discipline:** Optimisation of access plan with more efficient use of possessions, reducing overall project times. - **E&P:** Combining similar located renewals / refurbishment work streams with Enhancement schemes where possible. Further integration with IP Central once 125mph OLE scheme is further developed. OLE schemes with similar mileages will also be combined.	-7.8 -0.9 -0.7 -3.1	0.9%
	Headwind (3d)	- **Track**: failure to fully utilise High Output midweek capability (5 shifts per wk.); Potential access constraints south of Doncaster leading to increased mobilisations. - **Other:** Rising trend in land access costs, particularly driven by major investment projects. Also, reduced durations of RotR access and the electrification of TRU & MML (L2C) decreasing working time.	25.2 15.4	
Workbank planning (4)	Efficiency (4a)	- **Track:** Development of Right First Time (DWWP planning, early development & GRIP4 Track compliance), alone with better planning leading to reduction in sunk costs over 16/17. - **Signalling:** Improvement workbank planning, early pre GRIP management, and strategic focus on workbank stability - **Structures:** Robust and stable workbank to minimise changes/deferring schemes and reduce sunk costs. - **Multi-discipline:** Early development of CP6 schemes to facilitate surety, planned start dates and accurate work scope to enable most efficient delivery profile.	-31.1 -7.3 -4.2 -1.9	-1.4%

	Headwind (4d)	- No headwinds	-	
Technology (5)	Efficiency (5a)	- **Signalling**: Improved engineering approach, for example, Frauscher comms via FTNx, reducing apparatus cases, possessions, and other cost drivers. - **Other:** includes Innovation and technology from IP Track e.g. Skeletal Stressing with Induction Welding / FBWs decreasing follow-up/Higher Speed Handback technology, resulting in 2% decrease in costs. Also incorporates ESD benefits.	-9.2 -5.8	-0.4%
	Headwind (5d)	- **Track:** Cost element of High Output addition of Under Sleeper Pads to scope (overall net benefit)	3.0	
Delivery (6)	Efficiency (6a)	**- Track:** IP Track High Output improved planning leading to 17%-26% reductions in volume loss in CP6. - **Signalling:** reduced missed commissionings, decreasing re-work items; innovative delivery techniques such as lightweight troughing; and optimising GRIP process including contracting across GRIP stages - - **E&P:** Improved IP renewals Project Management team performance, including improved CRT development and improved proactive supplier management through design development and delivery phase. Also, improved site management of Signalling power projects to secure the required quality system installation first time and reduce unit rate from £240k to £225k. - **Other:** includes RAM restructuring, further adoption of LEAN methodologies, and changing deliverers from IP to WD to reduce cost while maintaining quality.	-13.2 -17.6 -3.2 -8.0	-1.3%
	Headwind (6d)	- **Track:** Additional DTS requirement over and above the 16/17 higher speed handback specifications.	0.6	
Design (7)	Efficiency (7a)	- **Buildings:** Minimise changes to CP6 schemes to enable surety, avoiding work on abortive schemes and accurate work scope. Also, reducing deferrals to avoid developing schemes which are not progressed. **-Track:** IP Track efficiency - reduction in scope of CP6 workbank remitted, along with use of NTC in 17/18 - **Structures:** Early development and delivery of GRIP 1 remits preventing "cold starts", including early engagement with properties and liabilities. - **Signalling:** Minimising specification solutions, including reduced design life due to DR. - **Other:** Including reduced scope complexity, earlier scope definition and contractor involvement.	-15.1 -10.6 -5.3 -2.1 -2.7	-1.0%
	Headwind (7d)	- **Signalling**: new legislative design constraints driving up complexity/costs.	4.6	

Commercial (8)	Efficiency (8a)	- **Track:** IP Track High Output Plant Reliability improvement (12% to 8%, leading to reduced volume loss) and Re-structure (fixed cost reduction - 6 to 4 system transformation). Improved IP Track CP6 contracting strategy, re-tendering of SCO contracts, and better supply chain stability. **- Structures:** includes changing supplier to IP SNE. - **Signalling**: including improved use of framework contracts and driving down deliverer rates. - **Other:** includes alliancing and improved geographical and worktype packaging.	**-49.9** **-10.9** **-4.1** **-5.2**	**-1.2%**
	Headwind (8d)	- **Track:** Increases in High Output fixed allocation due to falling national volumes, especially in BCS. Also SCO materials, OTP and haulage price changes since 16/17 - **E&P:** anticipated increase in market rates for E&FP resource due to the volume of Electrification nationally. - **Multi-discipline:** Increase in exogenous market pressures driving up contract rates.	**15.3** **6.8** **8.5**	
Other (9)	Efficiency (9a)	- No efficiencies	**-**	**0.2%**
	Headwind (9d)	- **Signalling**: Changes in fatigue management policy	**7.2**	

* Net % of pre-efficient pre-headwind total renewals.
Note: £(xx)m / (xx)% negative numbers; £xxm / xx% positive numbers.
Above table relates to renewals costs only.

7.8 Risk and uncertainty in the CP6 plan

This section provides an explanation of the how we have built up our overall plan and sets out our estimate of the degree of financial uncertainty within this plan

Pre-efficient costs in our plan are based on ‘current rates’ but include any additional scope needed to deliver the outputs in the plan. We have used 2016/17 unit rates to develop our capital expenditure forecasts and CP5 exit rates for support, operations and maintenance expenditure forecasts. Drivers of rate increases (headwinds/inefficiencies), or rate reductions (efficiencies/tailwinds), where there is a reasonable expectation they will occur, have been identified separately from the core CP6 plan.

The combination of our core CP6 plan, headwinds/tailwinds and efficiencies/inefficiencies is our ‘submission’ and represents the ‘most likely outcome’ for CP6. The content of our plans reflect the funding that we understand to be available in CP6. We consider this plan to be realistic and, therefore, deliverable in CP6.

Current unit rates are likely to include some risks that were not originally included in CP5 plans but that have materialised during the current Control Period.

As a result of this approach, it is likely that some risk and uncertainty is already be included in our core CP6 plan, as we have not sought to remove the impact of these unplanned events from our unit rate estimates.

Whilst it is difficult to precisely estimate the likelihood of delivering our plan in CP6, it seems reasonable to suggest that, overall, there is a 45% to 55% likelihood of the outputs in the plan being delivered for the forecast cost in our CP6 plan. This means that there approximately half of the time, we will be able to deliver our plan for the forecast cost. However, this uncertainty varies between expenditure categories. For example, we consider that there is significantly more uncertainty in our renewals plan than in the support, operations and maintenance plans in CP6. The main drivers of uncertainty in our plan are identified in the table below.

Digital Railway

The Digital Railway SOBC for East Coast Main Line (South London to Stoke Tunnel) is an early stage estimate and therefore there is uncertainty around the cost and scope. The SOBC tested scenarios where the capital cost was increased by 30% and the value for money remained high. However, there are risks for use of the SOBC numbers for SBP budgeting purposes. The key risks are as follows:

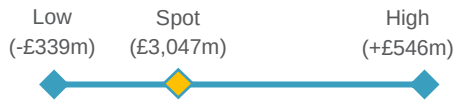
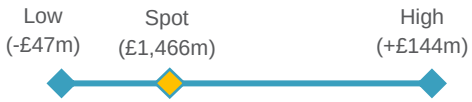
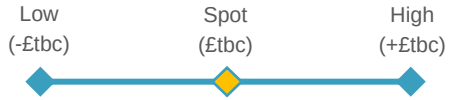
- Efficiency is assumed based on a contracting approach discussed with suppliers. If this approach is not taken then the capital cost would be substantially higher (around 30% higher, as modelled in the sensitivity tests)
- The business case process is an incremental approach to decision making and the Outline and Final Business Cases are yet to be developed.

A change control mechanism will therefore be implemented to manage any subsequent changes to either cost, programme for delivery and integration, and benefit realisation. This will manage the multiple parties involved in the delivery of the scheme.

Uncertainty ranges for CP6

Table 15 below presents our estimate of the overall range of uncertainty across our expenditure and income for CP6. We have also identified the main drivers of the uncertainty ranges. The information in this table is based on the detailed inputs provided in our opex, renewals and income submissions. Headwinds/tailwinds and efficiencies/inefficiencies are included in the spot estimates.

Table 15: Uncertainty ranges for CP6

Area (S, O, M, R, Income)	Potential range (low – spot – high)	Summary of key drivers of the uncertainty range	
		Driver of range	**% of range**
Renewals		Potential under delivery of efficiencies by up to 50%	13%
		Headwinds range of uncertainty	7%
		DR costs have been included as per the current forecast rates but as this has not been deployed on large scale there is uncertainty around these rates included up to 30%.	15%
		Track rates have historically been volatile so historic variations have been used to calculate a potential high end of +10% to +15%.	17%
Maintenance		Potential under delivery of efficiencies by up to 50%	26%
		Headwinds range of uncertainty	25%
Support and Operations		Potential under delivery of efficiencies by up to 50%	57%
		Headwinds range of uncertainty	43%
Total expenditure			
Income		To be populated once section 10 provided post submission	

8 Culture Strategy

8.1 Safety

8.1.1 Workforce Safety

Principles for Safety at LNE&EM

Prioritise Safety and Performance

"Everyone home safe every day" is the vision of Network Rail and the LNE&EM Route. This includes our passengers, staff, contractors and everyone who comes into contact with our railway. To achieve this, LNE & EM has set itself a world class LTIFR safety target for CP6 exit of 0.17. This is based on an international standard definition which will require Network Rail to validate its recording methodology best practice and when confirmed we shall provide our trajectory accordingly. This will be delivered through the Route's safety plan which is based on three key pillars:

Figure 49: The Workforce 'Safety Wheel'

- **Creating the Environment** – Creating the right environment for our people to behave safely
- **Leadership** – Putting in place the right safety leadership across the Route
- **Accountability** – Holding everyone to account for their safety performance and rewarding good safety behaviours

The workforce safety plan has been developed at COO level, and is split into both a leadership plan and practical safety activities. These will be adapted by local teams to include core content and local safety initiatives. The Route will review and update these on a quarterly basis.

Building a strong health and safety culture

Improving health and safety culture, and ensuring people are considering the implications of their day to day activities, is essential in securing a reduction in LTIFR. Therefore our plan has a strong safety communications element to ensure the promotion of good health and safety behaviours throughout the Route. Through focused leadership the plan will be communicated effectively to create a safety orientated environment and hold everyone accountable for their safety in the organisation. Initiatives we plan in CP6 to enhance the safety culture within the Route include:

- Adding safety-related signage at access points to the network so that colleagues consider safety from the moment they enter a worksite at the start of a shift.
- Safety leadership training aimed at management staff to ensure managers within teams are accountable for the occupational safety of colleagues under their management.
- Better recording of safety performance of individuals and teams within the Route with the sharing of this information within the Route to ensure good safety behaviours are spread.
- Integrating safety into performance assessment and progression as well as giving our most promising staff additional safety training to allow them to influence the way teams work and consider safety.

Responding to LTIFR

The Route has analysed the underlying causes of LTIFR and found that **66%** of all lost time injuries are caused by Slips, Trips and Falls; being struck by poorly secured objects; and by manual handling injuries. Therefore we have responded with practical initiatives to target these key drivers of lost time injury to reduce LTIFR. These initiatives include:

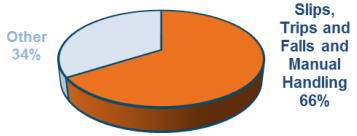


Figure 50: Causes of LTIFR at LNE & EM

- Identifying activities where it is reasonably practicable to eliminate manual handling injuries entirely or reduce the instances of manual handling in an overall process to minimise the likelihood of injuries being incurred as a result.
- Delivering bespoke manual handling training, with practical training on site; this will incorporate refresher courses for staff who are involved in manual handling on a regular basis. This will include deployment of MAC planning tools when planning the moving of track components and lineside furniture.
- Additional training for drivers and monitoring devices fitted to vehicles to prevent lost time injuries related to vehicle accidents.
- Levelling surfaces and providing additional welfare facilities at key access points to reduce likelihood of Slips, Trips and Falls.
- We will introduce new tools and ban the use of hammers during track works to prevent pandrol clips from releasing and hitting our staff.

Many of the above initiatives have already started in CP5 or are being developed further with a view to being embedded into the Route organisation by the end of CP6. The Route has allocated £5m to fund these important initiatives in CP6.

Wellbeing and occupational health

In CP5 we commenced training our people in mental health first aid which we will continue to roll out in CP6. This training will be delivered to key personnel strategically located throughout the business allowing them to recognise staff who may be suffering mental illness and providing appropriate support. This will reduce the likelihood of staff being involved in injuries as a result of slips or lapses in concentration. Attendees of the courses will be recorded in Oracle and the process will be managed by the competence management specialists.

Safer Trackside Working (STW)

In CP5 the route health safety and environment team have worked with the STW team to adopt and trial the ZKL 3000 remote control track circuit operating devices (TCODs). We will continue to embed the use of the remote control TCODs sharing best practice and identifying further locations for fitment.

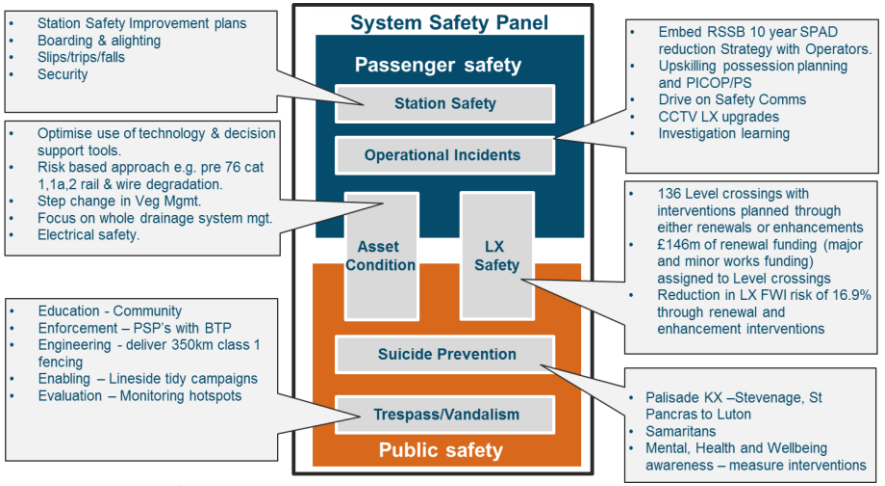
In addition we will explore the use of all newly designed and approved equipment to make the taking and giving up of lineside line blockages more effective and efficient. This will include devices which all any qualified member of staff to take a prescribed line blockage using technology built into the railway signalling system e.g. LEWIS which is integrated into solid state interlocking equipment.

Fatigue Risk Management for our workforce and contractors.

We will continue to explore innovative ideas which positively impact on staff's fatigue. This will include complying with the 14 hour door to door guidance and having regular suitable and sufficient risk assessments to mitigate risks when individuals are requested to work excessive hours due to emergency situations emerging which require urgent attention.

8.1.2 System Safety

Figure 51: LNE & EM's System Safety Panel



Passenger Safety

We will continue to focus on reducing the risk of train accidents by reducing the number of operational incidents, maintaining asset integrity and reducing the number of accidents at our stations.

Reducing Operational Incidents

We will continue to invest in modern signalling technology to improve operational controls and reduce risks. We will continue to migrate the current signal boxes and signal centres into the route operating Control (ROC). This will include enhanced training for the signalling controllers being deployed in the ROC.

LNE & EM route along with its TOC and FOC customers is supporting the RSSB 10 year SPAD reduction strategy. The route Train Operations Sub Group will continue to focus on Category A SPADs and serious Operating Incidents and will discuss current trends, look for opportunities to amend working arrangements and promote best practice.

In CP6 the route intends to focus on safety critical communications through:

- Joint Communications Review Groups with Train and Freight Operators
- Monitoring safety critical communications with the aim of promoting best practice and highlighting and addressing deficiencies
- Improved CCTV cameras with larger colour screen giving greater clarity are being installed in our signalling centres
- The potential trial of video analytics to reduce the risk of pedestrians getting trapped in CCTV monitored crossings.

Accident investigation will remain a key instrument for learning and preventing recurrence. The route will focus on sharing information relating to recommendations via safety hour discussions and safety bulletins to prevent repeat occurrences.

Asset Integrity

Our Renewals and Maintenance strategies set out how we will continue to prioritise safety critical assets as part of our overall asset management strategy. Further adoption of risk based techniques including the use of Intelligent Infrastructure and Decision Support tools

We will continue to maintain and improve (where possible) our asset integrity through the adoption of best practices in asset management including the further adoption of risk based techniques (in both maintenance and renewals) including the use of decision support tools will support reductions in the likelihood and impact of equipment failures. Examples include further role out of monitoring and analytics in key areas such as track circuits, switches and crossings and Level Crossings monitoring..

Station Safety

Improvements in health and safety at Kings Cross and Leeds will be delivered by the management teams who will develop and embed initiatives that will deliver a lower number of slips, trips, and falls, and incidents at the platform-train-interface. The teams will focus on 3 key areas:

- **Platform Train Interface** risk, where the station management teams will proactively monitor and manage the many changes to the rolling stock during CP6, along with platform infrastructure, processes and procedures maximising safety benefit through careful consideration, robust risk assessment, implementation and review
- **Station development** given the changes to the layout and working of Kings Cross and Leeds which will occur during CP6. Increasing passenger numbers will put a further strain on the stairs, escalators and lifts. Further use of pedestrian flow monitoring will be embraced, whilst our close working relationships with train operators at each of our stations will be essential when planning and implementing changes.
- **Station management capability** will be developed to manage the increased demands on stations effectively. Station managers will develop their teams to maintain high levels of competence, including non-technical skills, to be able to effectively manage increasingly complex operational interfaces.

8.1.3 Public Safety

Level Crossings

We will continue to reduce the risks associated with level crossings as part of our renewals and enhancement investments through the installation of modern technology. 136 level crossing interventions are planned during CP6 at a cost of £146m with an anticipated FWI benefit of 0.33. However, increased traffic on the Network in CP6 (see section 6) will increase level

crossing FWI by 1.13 by the end of CP6. The net effect of this will be an increase in level crossing risk of 0.80, a 31% increase. Appendix D proposes a series of additional unfunded level crossing investments which will reduce level crossing risk. If all of these are implemented FWI will decrease by a further 0.22.

Suicide & Trespass

Suicide and Trespass continue to be a highly significant societal issue which impacts on LNE & EM significantly. The biggest at risk group for suicidal people on the railway is men between the ages of 30-55 although tragically we are seeing more young people committing suicide than ever before.

Our route strategy aims to tackle the suicide on the railway but also within the communities through flagship partnership work with Samaritans, BTP and local authorities and charities. We wish to help disrupt the issues at source in this way, rather than by fighting a losing battle, in addition to taking responsibility for what we can do on railway land.

We continue to work with the Samaritans and are working hard to provide the best trauma support we can to the staff across the route who are exposed to rail suicide with specialist training for frontline managers to assist staff through witnessing and responding to incidents. We also we promote the free Samaritans service and Railway Chaplains support.

LNE & EM as a route invest time and resources to tackle this issue. For example we have already lineside fenced many kilometres specifically to prevent suicide, installed the most advanced smart cameras available at critical access points, platform end gated 106 stations (with over 20 more in delivery), and have developed highly effective patrolling projects to tackle suicide.

A summary of our key CP6 suicide and trespass prevention strategies are shown below.

Suicide Prevention:

- £1.5m fencing spend per year specifically for suicide prevention
- A target of 10% increase in lifesaving interventions per year
- £1.4m station mitigations
- Samaritans partnership plan for community outreach
- BTP partnership operations outline plan developed
- Flagship roving suicide prevention patrols to continue

Trespass:

- £2m+ fencing budget allocated to route trespass hotspots
- Community engagement and outreach programme
- Joint BTP operations targeting seasonal peaks and hotspot location

8.2 Change

Engage our workforce

In CP6 we will build upon devolution to support the transformation of the Route to operate as an autonomous business, which is customer focused, cost competitive, attracts private capital and has a safe, caring and diverse culture in line with Network Rail's Organisation Transformational Themes and our Team Behaviours: customer driven, accountable, collaborative and challenging.

We will do this through a number of transformative strategies. This includes a route wide strategy for skills and diversity, alliancing programmes across our investments, the creation of Business Development capability to seek new commercial opportunities, transitioning from a fixed culture to a learning culture through structured continuous improvement, and by harnessing the industry transformational opportunities of digital railway

Enabling Digital Railway

The Digital Railway opportunity will transform the way we conduct our operations from CP6. It will transform the relationships we have with our customers by allowing us to create a step-change in sustainable train performance and create greater proximity between trains and infrastructure. It will improve the efficiency of our operations by changing the way we manage a busier railway and react to disruption, and enable sustained performance through long term technology partnerships It will also reduce the need for current signalling assets, and its associated maintenance, improving safety by reductions in lineside working.

Efficient and effective delivery

Our cultural transformation journey is based on further embedding Lean methodology across the route, This includes knowledge sharing, benefits tracking/management, regular and business function oriented maturity assessments and the development of Lean leadership using a systemic approach to the use of technology (including ORBIS), validated data and "Go, Look, See" to help improve performance, efficiency (removal of waste), effectiveness (focus on outcomes) and make what should be easy, easy. Lean is at the core of route capability with dedicated Lean coaches across the route. Each business area will have its dedicated lean plan based on a business area maturity assessment.

The heart of our long term cultural change plan is our Skills and Diversity strategy which is a direct response to our significant risk in lost capability over the coming decade with half of the workforce eligible for retirement and the once in a generation opportunity to reshape the culture of the industry as a result. This programme has brought about a network of colleagues from across the route working in collaboration to use lean methodology to solve the diversity of problems. In a matter of 6 months this plan has unlocked companywide issues affecting gender equality, attraction and recruitment, and corporate culture.

Improved organisational capability

This will be supported by the implementation of the National Change Portfolio and Locally Assured Change Programmes including Planning & Delivering Safe Work, Intelligent Infrastructure and Safe & Effective Working, which will provide a step change in the way work is planned and executed efficiently

Project Management skills and competencies of our people will be fundamental in achieving implementation and sustaining the above changes in CP6. These programmes will be implemented through a de-centralised change organisation which brings closer ownership and more effective implementation of change to those affected and affecting it. With this a route wide governance structure is implemented to achieve assurance, reporting, risk management, coordination and embedment of benefits though a route wide Change Management Office.

8.3 Organisational capability

Engage our workforce

We have developed a people strategy to ensure that the Route has the right people in the right place with the right skills, capability and capacity to support the delivery of our CP6 Plan

Our Performance Management Strategy will support the transition to a High Performance culture by driving clear accountability. Performance ratings, based on both the "what" and the "how" (our winning Team Behaviours) will be calibrated bi-annually for all levels of the organisation and align to a normal distribution. We will manage underperformers fairly and effectively using the Network Rail Employee Relations Advice & Guidance HR Direct service and our Managing Underperformance Policies and Procedures.

Figure 52: LNE & EM Attraction Strategy

We will implement our Attraction Strategy (Figure 52) to recruit/promote the brightest and best and mitigate the talent risk posed by the retirement of an ageing workforce. This will be delivered through a partnership approach (building relationships with schools, colleges and universities), the use of ambassadors (our existing graduates and apprentices), by creating an employee value proposition (use of social media, external headhunting and talent pools) and finally with recruitment using strengths based selection interviews which focus on safety leadership and continuous improvement.

Our internal Talent & Succession Management Programme will continue to provide coaching/mentorship, training and development opportunities for our people, aligned to Network Rail's Talent Map. We have now extended the programme beyond management grades and currently 925 employees are enrolled in the Route's talent programme.

The Route will develop its Line Manager capability in line with the full

rollout of our Management Development Programme. This has been designed with front line managers as a result of our Your Voice Employee Engagement Survey and delivered by the Route HR Team. To date 35% of Line Managers have attended which has resulted in improvements across a range of employee relations KPIs.

We will also implement our Agility Strategy to create a more flexible workforce and make better use of technology. This will be supported by the implementation of Strategic Workforce Planning to identify where critical resources will be needed and provide a platform for scenario testing e.g. business continuity planning.

Recognising safely culture is critical to ensuring a decrease in our LTIFR (8.1) we are also modifying our performance and appraisal processes to ensure good safety behaviours are monitored and fed back to staff in the feedback and promotion process to ensure these spread throughout the organisation. Safety leadership training aimed at managers will ensure managers within teams are accountable for the safety of their staff.

8.4 Social & environmental performance

Sustainable business ethics are essential for the delivery of our organisation to ensure a safe operational railway with potential environmental and social impacts effectively managed.

Our CP6 plan will deliver proactive sustainable management under five key themes:

- Environmental and sustainable development frameworks and assurance,
- Carbon and energy management,
- Waste and resource efficiency,
- Biodiversity management, and
- Social performance

We will develop further the mechanisms for identifying and reviewing significant business risks and opportunities to ensure legal compliance, improve performance and deliver efficiencies.

To date carbon and energy management has focused on defining the baseline data. We will deliver an internal campaign to encourage changes in behaviour to reduce energy consumption, which in turn reduces carbon emissions, air pollution, costs and supports the government to achieve their obligations under the Climate Change Act 2008.

Waste and resource efficiency has performed well in the Route having achieved a 67% recycling rate in 2016/17. The CP6 plan will focus on improving behavioural change and working with our waste contractor to achieve the 90% re-use and recycling target for CP6. The Route will aim to deliver a 25% reduction in energy consumption, which in turn reduces carbon emissions, air pollution, costs and supports the government to achieve their obligations under the Climate Change Act 2008.

Establishing environmental and energy management systems to the ISO14001 and ISO50001 standards will provide the mechanisms for identifying and reviewing significant business risks and opportunities as well as demonstrating the gaps to achieving compliance and improving performance. The LNE & EM Route has a desire to implement such systems subject to funding obtained in CP6.

As owner of a significant number of Sites of Special Scientific Interest (SSSIs), we will seek to improve those which are poor performing and look to improve biodiversity on the line and within our community areas. Encouraging staff volunteer days to contribute to these projects will inspire and engage our workforce as well as help to meet our legal obligations and improve relationships with environmental regulators and local communities.

Our lineside neighbours receive communications on the work we are doing thorough the route's Communications and Contact & Communities team. The increasing importance of engaging with stakeholders – from lineside neighbours to local authorities to MPs – is reflected in the route communications strategy (see section 6.4).

8.5 Diversity & inclusion

Engage our workforce

We are pro-actively working to become a more open, safe, caring and diverse organisation providing a working environment where people can perform at their best and recognises that people from different backgrounds, with a range of experiences and abilities, can bring new approaches and innovative ideas to improve our business. As mentioned in the Change heading of this section, the Route needs to address issues of diversity as a result of an ageing workforce, new technology and changing organisational needs.

We will deliver the Network Rail Everyone Strategy and proactively exploit the predicted employee attrition (45% of workforce over next 15 years) to attract, select and retain a diverse employee demographic including 20% female employees, with a large focus on social mobility through leveraging and extending our apprenticeship programme offerings. This will be achieved through our Attraction Strategy as outlined in Organisational Capability (Section 8.3) and supplemented by our targeted route initiative with Executive sponsorship

8.6 Quality

The LNE & EM route recognises the Network Rail corporate strategy for Quality and is engaged in delivering the objectives of the strategy under the headings of Governance, Assurance and Improvement.

8.6.1 Governance

The Integrated Management Systems (IMS) programme is a companywide programme to deliver a single management system for Network Rail. It is based on an agreed process architecture and ownership and accountabilities. The IMS will make it easier for employees to find and understand what is expected of them, and ensure that content is current, well managed and compliant with the applicable standards and legislation. The delivery of an IMS is recognised as a significant enabler for improving compliance, driving safety performance and delivering business improvement.

The current scope of registration on the LNE & EM Route includes George Stephenson House (York), Kings Cross Station (London), Leeds Station, and Holbeck (Leeds) Maintenance Delivery Unit, including its satellite depots. The Route is also considering how the requirements of BS ISO 22301:2012 “Business Continuity Management Systems” can be built into the Integrated Management System.

Improved organisational capability

The LNE & EM route is engaged and supportive of the IMS programme, and acknowledges that delivery of the IMS will ensure that the route achieves compliance with ISO9001 (Quality), ISO14001 (Environment), OHSAS18001 (Safety) and ISO55001 (Asset Management) standards – achieving standards or performance for a management system. A key objective for the LNE & EM Route is by CP6 year 2, the scope of registration, indicating compliance with the Standards stated above, will have been fully extended to include all areas of the LNE&EM Route, however this will require additional resource to enable this to happen.

8.6.2 Assurance

The LNE & EM route will use the RM3 model to define what excellence in risk management looks like and allow us to assure ourselves that our risk management approach is operating to an adequate standard. The Route will deliver RM3 self-assessments as a basis of benchmarking maturity both within Network Rail and in wider industry, and will use the results of the self-assessment as the basis for improvement.

Network Rail operates a 3 level model for Assurance, where First Line or Supervisory assurance focusses on management of day to day operational risk and control activities (or self-assurance), Second Line focuses on overall effectiveness of individual policy and controls, and Third Line is fully independent assurance of the overall control frameworks. With increasing levels of devolution, the LNE & EM route will review and enhance the governance arrangements in the route, so that the Route Leadership are assured that the 3 levels are operating, and the results of the assurance activity are properly considered and acted upon.

8.6.3 Improvement

Efficient and effective delivery

The LNE & EM route has a clear vision for improvement that is in line with the Network Rail Better Every Day programme. The LNE & EM route improvement programme has committed to the company wide objective of training 50% of its staff with business improvement skills, and this training is underpinned by improvement frameworks that will capture improvement ideas and initiatives, prioritise and select them, and then manage the delivery and benefits in a structured way. This is detailed in the Change section of this document in section 8.2.

8.6.4 Asset Management Quality and ISO55001

Over CP6, we will improve our asset management processes to bring them into line with relevant asset management quality standards. Our first priority will be to establish Route Asset Management Plans (RAMPs) and effective processes to deliver a reliable work bank (cost & volume). We will review our processes and arrangements and compare them with the international asset management standard ISO BS 55001 with the ultimate aim of achieving accreditation to BS55001.

8.7 Information Technology

The Centre's IT strategy is going through a major refresh cycle in parallel with the PR18 processes. This is led by Route Services IT in collaboration with central (incl. Safety Technical & Engineering, Group Digital Railway, Infrastructure Projects) and route businesses (incl. Asset Data Governance CoP). This version will be refreshed

Key initiatives the LNE&EM Route will support the centre in delivering in CP6 will include:

- **Business Led Schemes:** Specific schemes underpinning declared Route benefits and national change schemes in areas such as Predictive Maintenance, Whole System Modelling, Improved Delay Attribution and Ordering & Inventory.
- **Business Transformation:** providing the support and integration to business transformation programmes including Digital Railway, Enabling Better Asset Knowledge, Ellipse Exploitation and more, as they become defined.
- **Innovation:** Exploratory investment for risk/value from emerging technologies across cloud, big data, mobile, social & internet of things.
- **Strategic Change:** IT enablers to support NR strategy including application development, business intelligence, information governance, identity and access management, agile data centre, spatial data management, integration framework, operational technology bridge, cloud broker, information service management and next generation mobile.
- **Run, Renewals and Enhancements:** Running, upgrading technology, standardising, retiring and modernising IT for CP6 and 7.

9 Strategy for commercial focus: Third party cash funded contributions

The potential schemes in this section would require third party investment to proceed. No government funding can be assumed to be available.

9.1 Current and planned third party funding

Third party funding and / or financing

The LNE&EM route has a proven record of attracting and delivering regional funded projects and is currently supporting nearly 80 schemes, which are in various stages of development, design and delivery, with a combined value in excess of £2.0bn. These schemes range from new footbridges to the significant projects such as the complete redevelopment of the existing Leeds Station integrating the new HS2 station into a wider Leeds city regeneration including the South Bank project. Historically the Route has had success in attracting third party funding for new stations, including James Cook, Wakefield Westgate, Low Moor, Kirkstall Forge, Apperley Bridge and Ilkeston. The Route has also secured funds to redevelop and enhance existing stations including Newcastle, Wakefield Kirkgate, Nottingham and Leeds station southern entrance.

Our team is also working closely with our property professionals to enhance rail investment profiles in CIL/S106 and property shared value negotiations (e.g. Grantham, Doncaster, Luton) and housing development schemes (e.g. Wixams and Stanton Cross stations) where we have negotiated the provision of funding for new stations &/or closure of level crossings at the cost of developers. Harrogate Station is an example where we're working to unlock a combined station and adjacent residential scheme with a regional developer adjacent to the station, which is projected to provide Network Rail not only with a new station building but also a cash receipt reflecting Network Rail's land contribution.

The Route has created a database of identified third party funding schemes that are various stages of feasibility, development, design or delivery. An extract of this has been included in Section A of Appendix H, reflecting a range of projects demonstrating their value and diversity. Table 16 summarises the balance.

Type of Project	Example Locations	Total AFC (£m)
Stations	Leeds, York, Harrogate, Bradford, Sunderland, Luton Airport Parkway, Stevenage, Northallerton	1,239
Capacity Improvements	Darlington, Middlesbrough, Harrogate Line, Ashington Blyth and Tyne, Rossington	401
New Stations	Brent Cross, Stanton Cross, Wixiams, Leeds (Thorpe Park), Horden (Peterlee), Doncaster (Robin Hood Airport)	352
Depots	York	7

Table 16: Summary of projects in development with third party involvement in CP6

9.2 Capability & business development

The LNE&EM Route Sponsorship organisation was restructured during 2017 into three geographical groups, ECML, TPE and MML each with a Principal Programme Sponsor focussed on the delivery of remitted investment projects from all funders & clients including the DfT, and the regional public & private sector. This enabled the Route Enhancements Manager (REM) to focus on the initial planning phase of business development to understand route client requirements, funding opportunities and associated priorities. Our initial activities have focused on:

- **Market research** of regional public sector transport priorities and associated funding
- **Expanding our network and relationships** with local councils,

combined authorities, LEPs and the HCA

- **Identifying any existing private sector funding** opportunities across the route generally linked to adjacent property development
- **Commencing initial discussions with industry parties** on criteria that would identify projects as potential candidates for private financing

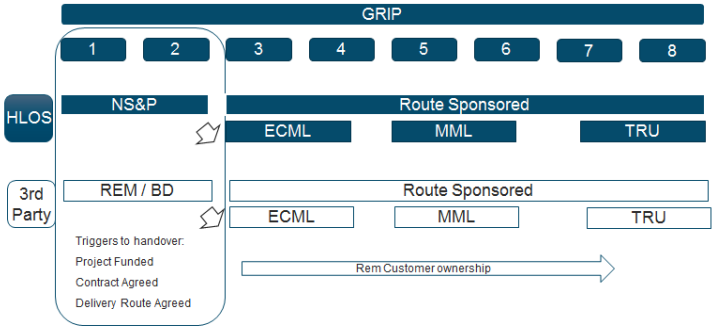


Figure 53: Illustrates how new projects transition from System Operator or Business Development to Sponsorship

A proposed structure and remit for a new Business Development team has been created which would follow the project life cycle as defined in Figure 53 with the REM focusing on securing of third party funding for the development phase, supported by two new Business Development Managers. The new team will identify and attract third party funding to facilitate projects whether they are from councils, combined authorities, LEPs or private entities, and will also focus on funding for bespoke projects or support HLOS projects through a portion of regional funding where these projects drive local needs.

9.3 Focus for third party involvement

Our vision is to change stakeholder perceptions of Network Rail to an organisation which attracts and facilitates investment into the rail sector, whilst becoming more proactive in influencing investment in regional and local plans. In doing this we will provide alternative options to our clients in the development, design and delivery phases of projects, challenge existing practices and innovate to simplify the rail investment cycle.

The route has a set an ambition to create a step change in the level of devolved funding for future Control Periods, working closely with devolved authorities, councils, LEP's and local businesses. For example, on HLOS schemes there are likely to be opportunities where third parties can purchase additional scope that would not be delivered by the base scheme.

In order to maximise the benefit to the Route from both existing and new regional bodies, we will track and respond to regional policies and interventions. In doing this we will:

- Be positively engaged at senior levels with the sub National Transport Bodies and be able to influence their programmes. The Leeds Station master plan for HS2 and NPR and its subsequence governance structure gives a blueprint to use when engaging with sub national bodies;
- Align our plans with devolved public sector infrastructure funding objectives. Regional Growth Funding that is already devolved to the LEPS, CAs and Local Authorities will be a prioritised target
- Target Strategic Economic Plans of LEPS to influence future funding and ensure alignment with regional rail enhancements. Relevant Strategic Economic Plans priorities are outlined in Section C of Appendix H
- Develop and implement a Key Account Management approach (KAM) of key external stakeholders.

In order to support this approach, we have commissioned market research to support our emerging funding business development plan to obtain market intelligence initially focusing on our regional public sector stakeholders. The remit was to identify the business plan objectives of LNE&EM's 13 LEPs (see Section B of Appendix K) and 5 Combined Authorities (see Section C of Appendix K) relating to transportation investment prioritises. A key finding of this is that given the ongoing austerity measures, the major City Councils along the route do not have major capital investment programmes that are independent of the CA and LEP agendas. The significant exception to this is Leeds City Council where the failure to deliver Supertram and its successor proposal NGT has meant that Central Government has allowed the retention of the £173 million Department of Transport (DfT) grant by the City Council. However, this funding has to be spent in the current Parliament. Current scheme priorities for this funding are believed to be a station at Thorpe Park/East Leeds Parkway; a new station at the White Rose Development; and the rail/road linkage to Leeds Bradford Airport.

Through industry discussions, we have also identified some initial projects that we intend to explore, in conjunction with group treasury, the feasibility of private investment facilitating the delivery of these projects which are currently unfunded by the DfT, Network Rail or regional public sector stakeholders.

10 CP6 regulatory framework

This chapter sets out the funding implications of our plan for Control Period 6 (CP6), which runs from 1 April 2019 to 31 March 2024.

10.1 Expenditure forecast

Table 10.1, below, sets out our forecast of CP6 route expenditure. It includes all costs that are directly incurred by the route and those that are allocated / attributed to the route.

Table 10.1: CP6 forecast of route expenditure

£m in 2017/18 prices	18/19	19/20	20/21	21/22	22/23	23/24	CP6
Route expenditure							
Support	3	20	20	20	20	20	**100**
Operations	120	104	104	103	101	100	**511**
Maintenance	264	293	294	297	293	290	**1,467**
Renewals*	372	561	567	581	498	463	**2,669**
Enhancements	952	226	52	4	3	1	**286**
Schedule 4 & 8	48	83	37	46	33	33	**232**
Allocated / attributed expenditure							
Traction electricity	61	63	74	91	99	116	**444**
Industry costs and rates	59	61	61	61	83	82	**347**
System Operator	0	12	13	15	13	12	**65**
Support and operations	85	106	107	101	102	102	**517**
Schedule 4 & 8	13	11	11	11	11	11	**55**
Renewals	207	139	156	163	124	97	**680**
Group Portfolio Fund	0	63	79	120	120	149	**530**
Non-SoFA expenditure							
BT Police costs	18	20	20	20	20	20	**101**
Financing costs	338	303	254	216	177	152	**1,101**
Corporation tax	1	94	111	92	68	103	**468**
Total expenditure	**2,542**	**2,158**	**1,960**	**1,939**	**1,765**	**1,751**	**9,572**

** Excludes £378m of Digital Railway spend, which is in our plan but not funded by the SoFA.*

10.2 Income forecast

The expenditure set out in Table 10.1 needs to be paid for. In Table 10.2, below, we provide a breakdown of the income that we expect to receive during CP6 from access charges, commercial income and grants from governments to cover the expenditure in our plan. Breakdowns of access charges and other single till income are provided in Appendix E.

Table 10.2: Total CP6 income

£m in 2017/18 prices	18/19	19/20	20/21	21/22	22/23	23/24	CP6
Variable and station charges	(200)	(67)	(69)	(73)	(74)	(76)	(359)
EC4T	(62)	(63)	(74)	(91)	(99)	(116)	(443)
Schedule 4 ACS	(58)	(92)	(45)	(55)	(42)	(41)	(275)
FTAC / Network Grant (SOMR)	(775)	(833)	(856)	(918)	(845)	(803)	(4,255)
Grant for tax, financing and BTP	(357)	(418)	(385)	(328)	(265)	(275)	(1,670)
Income from FNPO	0	(371)	(389)	(384)	(348)	(350)	(1,843)
Other single till income	(111)	(88)	(88)	(87)	(88)	(89)	(440)
Subtotal (gross revenue requirement)	**(1,564)**	**(1,932)**	**(1,908)**	**(1,936)**	**(1,761)**	**(1,750)**	**(9,286)**
Capital grant for enhancements	(161)	(226)	(52)	(4)	(3)	(1)	(286)
Total income	**(1,725)**	**(2,158)**	**(1,960)**	**(1,939)**	**(1,765)**	**(1,751)**	**(9,572)**

***Please note**: Government grants for corporation tax, financing costs, BT Police costs and enhancements will be agreed outside of the periodic review but we have included them in our forecast of income for completeness.*

Network Rail continues to be a corporate entity. Therefore, whilst our funding arrangements will change for CP6, we think that it is important to keep the key elements of the regulatory framework to maintain transparency of our performance and to retain flexibility for the future. This

includes keeping the regulatory building blocks approach to calculating our CP6 revenue requirement.

We have calculated the CP6 route revenue requirement in Table 10.3, below, using a similar approach to CP5 (i.e. similar to the adjusted WACC approach), which focuses on the funding we need to pay for expenditure during the control period (excluding funding for enhancements). The net revenue requirement in Table 10.3 is the amount of income that we need to recover from regulated access charges, and government grants, in lieu of fixed charges in CP6. This presentation of CP6 funding also supports our calculation of the appropriate amount of fixed costs to recover through Fixed Track Access Charges (FTACs) paid by train operators.

Table 10.3: CP6 route revenue requirement

£m in 2017/18 prices	19/20	20/21	21/22	22/23	23/24	CP6
Route support, operations and maintenance	417	417	419	414	410	**2,077**
Allocated support and operations	106	107	101	102	102	**517**
Traction electricity, industry costs and rates (including BTP)	144	155	172	202	219	**892**
Schedule 4 & 8	94	48	57	44	44	**287**
System Operator	12	13	15	13	12	**65**
Group Portfolio Fund	63	79	120	120	149	**530**
Allowed return	303	254	216	177	152	**1,101**
Amortisation	699	724	744	621	560	**3,349**
Tax	94	111	92	68	103	**468**
Gross revenue requirement	**1,932**	**1,908**	**1,936**	**1,761**	**1,750**	**9,286**
Other single till income	(88)	(88)	(87)	(88)	(89)	**(440)**
Income from FNPO route	(371)	(389)	(384)	(348)	(350)	**(1,843)**
Net revenue requirement	**1,472**	**1,430**	**1,464**	**1,325**	**1,311**	**7,003**

Please note: *Following the creation of the Freight and National Passenger Operator (FNPO) route in April 2017, Network Rail's CP6 plan separately identifies the fully allocated costs of the FNPO route (i.e. including costs from central functions and geographic routes). In Table 10.3, above, we show the amount of income we expect our route to receive from the FNPO route. This 'Income from FNPO route' is based on the share of our costs that are allocated to freight and national passenger operators on our route. The allocation reflects where, and how much, freight and national passenger operators use our route infrastructure.*

10.3 CP6 financial information

The changes to our CP6 funding arrangements will address our concerns about unsustainable increases in our debt – our debt will fall over CP6 as new enhancements are grant funded, or funded/financed by third-parties, and maturing debt is paid down. As a consequence, the value of our RAB will not increase (in real terms).

Table 10.4 sets out the impact of our CP6 funding approach and forecast expenditure on key financial metrics.

Our CP6 plan includes funding for risk and uncertainty (the 'Group Portfolio Fund'). Ideally, actual results will be in line with our CP6 plan and this funding will be gradually released to invest in improving the railway. In CP6, some of this funding will be held at a route-level, with the remainder held at a portfolio-level. There is no 'central' route in our SBP submission so we have allocated all funding for risk and uncertainty to routes and System Operator. Table 10.4, below, includes our allocation of the Group Portfolio Fund for CP6.

Table 10.4: Financial metrics

£m in 2017/18 prices	18/19	19/20	20/21	21/22	22/23	23/24	CP6
Closing net debt	(10,674)	(8,487)	(7,202)	(5,790)	(5,198)	(4,624)	**(4,624)**
Closing RAB	14,213	14,178	14,178	14,178	14,178	14,178	**14,178**
Average net debt / RAB	75%	60%	51%	41%	37%	33%	**33%**
Group Portfolio Fund		63	79	119	119	149	**530**
Route		26	26	26	26	26	**132**
Portfolio		37	53	93	93	123	**398**
Maturing debt		2,016	1,186	1,309	550	543	**5,604**
Working capital		100	(61)	(15)	(16)	(16)	**(8)**
Cash requirement (incl. working capital and external debt repayment)		2,313	2,126	1,973	1,768	1,941	**10,121**

** This excludes £5,047m of DfT loan, allocated to the route, which matures in CP6.*

11 Sign-off

This document and accompanying templates are owned by the Route/Alliance Managing Director (A/RMD).

Submission of this document indicates confirmation that:

- All appropriate level 1 assurance activities have been undertaken (see separate advice on definition of level 1 assurance);
- The A/RMD is satisfied with the quality, currency and appropriateness of the content of this document as well as the cost, volume and activity projections to which it refers;
- The signatories are satisfied that the plan has been assessed as deliverable, subject to the assumptions articulated in Appendix B.

Authorised by:

Signed		Dated
	Rob McIntosh Route/Alliance Managing Director	17/01/2018
A.W Murray.	**Andrew Murray** Director, Route Safety & Asset Management	17/01/2018.
K. [illegible]	**Keith Moss** Route Finance Director	17/1/2018
[illegible]	**Karl Budge** IP Regional Delivery Director	17/01/2018.

Appendix A Joint performance activity prioritisation

Joint performance activity prioritisation by lead route TOC

This plan is predicated on the key assumptions laid out in Appendix B and will be impacted as these assumptions change

Train Performance	Route	Current		Lower	Expected	Upper	Achievability	Timeframe
Northern East PPM MAA	LNE&EM	**90.6%**		90.2%	91.1%	92.0%	Amber	CP5 – CP6
Northern East Level of Cancellations	LNE&EM	**2.2%**		1.4%	1.6%	1.9%	Amber	CP5 – CP6

No.	Key constraints, risks and opportunities	What we plan to do	Owner	Timescale
1	Increased traffic growth	• Review contingency plans • Review regulating policy • Understand impact on performance regimes	Northern & LNE & EM Route	Dec 2019 to 2021
2	New rolling stock	• Gauge clearance and Route acceptance (Statement of Compatibility) • Platform requirements e.g. stepping distances, platform lengths • Impact on assets: track, structures, signals • Sectional running times • Train crew resource, rolling stock compatibility and restrictions	Northern & LNE & EM Route	Dec 2019 to 2021
3	CP6 Major Projects	Governance of the GRIP process for: • TransPennine Route Upgrade	Principal Sponsor LNE & EM Route	Throughout CP6

TOC sign off:

NR sign off:

Joint performance activity prioritisation with Virgin Trains East Coast

This plan is predicated on the key assumptions laid out in Appendix B and will be impacted as these assumptions change

Train Performance	Route	Current		Lower	Expected	Upper	Achievability	Timeframe
Virgin Trains East Coast PPM MAA	**LN&EM**	**84.8%**		83.8%	85.6%	86.4%	Red	CP5 – CP6
Virgin Trains East Coast Level of Cancellations	**LN&EM**	**2.7%**		2.2%	2.4%	2.9%	Red	CP5 – CP6

No.	Key constraints, risks and opportunities	What we plan to do	Owner	Timescale
1	Increased traffic growth	• Review contingency plans • Review regulating policy • Understand impact on performance regimes	VTEC & LNE & EM Route	Dec 2019 to 2021
2	New rolling stock	• Gauge clearance and Route acceptance (Statement of Compatibility) • Platform requirements e.g. stepping distances, platform lengths • Impact on assets: track, structures, signals • Sectional running times • Train crew resource	VTEC & LNE & EM Route	Dec 2019 to 2021
3	CP6 Major Projects	Governance of the GRIP process for: • Connectivity and power supply	Principal Sponsor LNE & EM Route	Throughout CP6

TOC sign off:

NR sign off:

Joint performance activity prioritisation with Grand Central

This plan is predicated on the key assumptions laid out in Appendix B and will be impacted as these assumptions change

Train Performance	Route	Current		Lower	Expected	Upper	Achievability	Timeframe
Grand Central PPM MAA	**LNE&EM**	**85.9%**		81.6%	85.0%	87.6%	Amber	CP5 – CP6
Grand Central level of cancellations	**LNE&EM**	**2.8%**		2.8%	2.4%	2.2%	Amber	CP5 – CP6

No.	Key constraints, risks and opportunities	What we plan to do	Owner	Timescale
1	Increased traffic growth	• Review contingency plans • Review regulating policy • Understand impact on performance regimes	Grand Central & LNE & EM Route	Dec 2019 to 2021
2	New rolling stock	• Gauge clearance and Route acceptance (Statement of Compatibility) • Platform requirements e.g. stepping distances, platform lengths • Impact on assets: track, structures, signals • Sectional running times • Train crew resource	Grand Central & LNE & EM Route	Dec 2019 to 2021
3	CP6 Major Projects	Governance of the GRIP process for: • Connectivity and power supply	Principal Sponsor LNE & EM Route	Throughout CP6

TOC sign off:

NR sign off:

Joint performance activity prioritisation with Hull Trains

This plan is predicated on the key assumptions laid out in Appendix B and will be impacted as these assumptions change

Train Performance	Route	Current		Lower	Expected	Upper	Achievability	Timeframe
Hull Trains PPM MAA	**LNE&EM**	**80.4%**		81.6%	85.0%	87.6%	Red	CP5 – CP6
Hull Trains level of cancellations	**LNE&EM**	**4.4%**		4.1%	3.5%	3.0%	Red	CP5 – CP6

No.	Key constraints, risks and opportunities	What we plan to do	Owner	Timescale
1	Increased traffic growth	• Review contingency plans • Review regulating policy • Understand impact on performance regimes	Hull Trains & LNE & EM Route	Dec 2019 to 2021
2	New rolling stock	• Gauge clearance and Route acceptance (Statement of Compatibility) • Platform requirements e.g. stepping distances, platform lengths • Impact on assets: track, structures, signals • Sectional running times • Train crew resource	Hull Trains & LNE & EM Route	Dec 2019 to 2021
3	CP6 Major Projects	Governance of the GRIP process for: • Connectivity and power supply	Principal Sponsor LNE & EM Route	Throughout CP6

First Hull Trains **TOC sign off:**

NetworkRail **NR sign off:**

Joint performance activity prioritisation with East Midlands Trains

This plan is predicated on the key assumptions laid out in Appendix B and will be impacted as these assumptions change

Train Performance	Route	Current		Lower	Expected	Upper	Achievability	Timeframe
East Midlands Trains PPM MAA	**LNE&EM**	92.6%		89.5%	91.3%	92.2%	Amber	CP5 – CP6
East Midlands Trains level of cancellations	**LNE&EM**	1.6%		2.4%	2.0%	1.8%	Amber	CP5 – CP6

No.	Key constraints, risks and opportunities	What we plan to do	Owner	Timescale
1	Increased traffic growth	• Review contingency plans • Review regulating policy • Understand impact on performance regimes	EMT & LNE & EM Route	Dec 2019 to 2021
2	New rolling stock The East Midlands Trains franchise will be awarded in 2018 therefore we do not have certainty on any rolling stock details at present.	• Gauge clearance and Route acceptance (Statement of Compatibility) • Platform requirements e.g. stepping distances, platform lengths • Impact on assets: track, structures, signals • Sectional running times • Train crew resource	EMT & LNE & EM Route	Dec 2019 to 2021
3	CP6 Major Projects	Governance of the GRIP process for: • Remainder of Key Output 1 London to Corby Project (first 6 months of the Control Period). Capacity works, platforms extensions and electrification. Commissions Dec 2019. • Key output 2 Electrification Kettering – Nottingham – Sheffield. • Remainder of Derby – Sheffield journey time improvement. • OLE improvement works south of Bedford.	Principal Sponsor LNE & EM Route	Throughout CP6

EAST MIDLANDS TRAINS **TOC sign off:**

NetworkRail **NR sign off:**

Appendix B Key assumptions

Ref no.	Topic (e.g. access, deliverability, climate etc.)	Assumption	Areas of spend impacted (e.g. all opex, track renewals, all spend etc.)
LNE & EM 01	**Digital Railway**	ECML SOBC included in this submission but non Route costs have been budgeted for by DR. Non-Route costs are held by the FNPO, TOCs and other parties outlined in the Digital Railway funding breakdown in the table in section 5.1.	Signalling renewals
LNE & EM 02	**MML Programme**	The submission now reflects the cancellation of Key Output 2	OPEX E&P
LNE & EM 03	**Delivery**	CP6 Plan assumes successful completion of current forecast CP5 exit position for renewals, enhancement, maintenance delivery and train performance	All Renewal and Maintenance
LNE & EM 04	**Access**	This submission assumes that appropriate access will be secured and optimised in CP6	All Renewal and Maintenance
LNE & EM 05	**Unit Rates**	Cost and volumes have been developed using current emerging unit rates which are assumed to be achievable.	All Renewals and Refurbishment
LNE & EM 06	**Deliverability**	The supply chain has the capacity to deliver the volume of work that is in the current plan	All Renewals and Refurbishment
LNE & EM 07	**Weather**	This submission assumes that the impact of severe weather events will be in line with that experienced in CP5	Performance and Reactive Renewals
LNE & EM 08	**Organisational Capability**	This submission assumes that the Route attracts and retains the required engineering competence to manage and deliver the required outputs.	All Renewal and Maintenance
LNE & EM 09	**Enhancement Deliverability**	It is assumed that the current Tier 1 and Tier 2 CP6 proposed enhancement schemes receive the appropriate funding to go ahead	All Renewal and Maintenance

Ref no.	Topic (e.g. access, deliverability, climate etc.)	Assumption	Areas of spend impacted (e.g. all opex, track renewals, all spend etc.)
LNE & EM 10	**Traffic Growth**	Route plan assumes midpoint forecast of 15% growth in train miles versus the System Operator forecast of 30% used for revenue forecasting	All Renewal and Maintenance
LNE & EM 11	**Central Service Provision**	Central services will continue to provide the same services as currently such as NMT	All Renewal and Maintenance
LNE & EM 12	**Telecoms**	Renewals activities will be undertaken by NRT. The maintenance is owned by the route as is the subsequent operational activity required.	Signalling and Telecoms Renewal and Maintenance
LNE & EM 13	**Intelligent Infrastructure**	The Route supports this programme, although the benefits are currently being fully developed and quantified, many initiatives are considered in the Route's "Safe and Effective" working initiatives.	All Renewal and Maintenance
LNE & EM 14	**East Coast Partnership (2020)**	The proposed East Coast Partnership has not been considered when developing this plan due to the timing of the announcement and lack of detail on what impact this might have. Performance forecasts referred to in our East Coast supplementary plan (Appendix D) are compared against VTECs original franchise agreement with the DfT published on 27 November 2014.	All Renewal and Maintenance

Appendix C Route context

Context for LNE&EM in CP6

2019 2020 2021 2022 2023 2024

Transpennine Route Upgrade

TRANSPENNINE INVESTMENT

Midland Mainline Programme

IEP New Fleet
2018 - 2020

MIDLAND MAINLINE
INVESTMENT

East Coast Mainline – Capacity Increase, Power Supply Upgrades & Kings Cross Remodelling

LEAN LEAN LEAN LEAN LEAN LEAN LEAN LEAN LEAN

PREDICT **&** **PREVENT**

- Optimise use of technology such as PLPR, Eddy Current and Remote Condition Monitoring
- Use of decision support tools to better target maintenance interventions.

- Use of Standardised Tasks and best practice repair methods.
- Integrated approach to deploying resource

London North Eastern & East Midlands 1

Appendix D Scenario planning

Part (1): Tactical scenario planning for CP5

Provide information on the impacts on CP5 of each of the following scenarios:

- Scenario 1: 20% increase in total remaining expenditure

Asset	Yr 4-5 outstanding spend	Potential investment increase	Benefits of increased expenditure			Comment on benefits
			Performance	Sustainability	Reputation	
Structures	£158m	£32m	G+	G+	G	Improve asset capability, safety and condition.
Track	£346.5m	£69m	G+	G	G	Preventing TSRs and reducing cyclic top trend.
Buildings	£33m	£6.6m	G	G+	G+	Improved MDU facilities improving LTFR. Reduced accidents on platforms.
Earthworks	£34.2m	£6.8m	G+	G+	G+	Accelerate earthwork management plans realising better asset knowledge and efficiencies in CP6.
Drainage	£28.6m	£5.7m	G	G+	G+	Reduce flood risks across drainage systems mitigating TSRs.
Electrification & Plant	£50.1m	£10m	G+	G	G	Significant asset reliability and performance with OLE and signalling power risks quickly mitigated by a number of achievable delivery strategies.
Signalling	£386.3m	£77m	G	G	G	Benefits from resuming previously deferred schemes.
Total	**£1,036.7m**	**£207.3m**	**G+**	**G+**	**G**	

Key to risk colours
A: no additional benefit

G: some additional benefit

G+: considerable additional benefit

- Scenario 2: 20% decrease in total remaining expenditure

Asset	Yr 4-5 outstanding spend	Maximum potential saving	Risk of curtailing expenditure			Comment on impacts/issues
			Performance	Sustainability	Reputation	
Structures	£158m	-£32m	R	R	A	Deferral of schemes would result in operational restrictions.
Track	£346.5m	-£69m	R	R	R	Deferral of schemes resulting in deteriorating asset which would not be recoverable in CP6. Introduction of TSRs would be required to manage the asset.
Buildings	£33m	-£6.6m	A	A	R	Deferral of MDU programme resulting in H&S non-compliance.
Earthworks	£34.2m	-£6.8m	A	R	A	Deferral of 23 renewals and 79 refurbishments leading to a deterioration of the asset and increased risk of asset failure.
Drainage	£28.6m	-£5.7m	A	A	R	Reduction in drainage resilience works effecting safety and performance.
Electrification & Plant	£50.1m	-£10m	R	R	R	Reduction in funding will affect the availability of a skilled workforce in the future in addition to further asset failures.
Signalling	£386.3m	-£77m	R	R	R	Impact on performance targets and ability to develop schemes for deliverability in CP6.
Total	**£1,036.7m**	**-£207.3m**	**R**	**R**	**R**	

Key to risk colours
G: no additional risk

A: some additional risk

R: considerable additional risk

Part 2: CP6 strategic investment options

This sub-section describes the benefits of additional investment in the route, over an appraisal period of 60 years. This covers two strategic packages investment options – The East Coast Supplementary Plan, and a package of Level Crossing measures.

i) Level Crossings

Level Crossing Safety Improvements	CP6 total: (£m)	£66m	CP6 capex: (£m)	£66m	CP6 opex: (£m)	£0	Total BCR		Appraisal period	

Description	Qualitative benefits	Quantitative benefits
The Route, in adopting the intent of the National Level Crossing Policy has developed a focussed level crossing intervention programme to maximise risk reduction at optimum cost. The plan has taken into account risk reduction and deliverability to develop focussed packages of work and complements the East Coast Mainline level crossings closures set out in part ii of this subsection. The Level Crossings programme is divided into seven packages as follows: **Package 1 (£22m)** – Replacing seven high risk crossings with bridges in order to completely eliminate the risk and also address local stakeholder aspirations at these particular sites (taking a more strategic view of LC management in a specific geographical area in conjunction with the road rail partnerships) (Crowle, Kiveton Park, Nature Reserve, Cottingham Foot, Bridlington, Sherburn in Elmet & Claymills) **Package 2 (£3.5m)** – Removal / Upgrade of station pedestrian crossings. This package will close the 6 highest risk crossings in this control period **Package 3 (£4m)** – Closure of approx. 70 level crossings where closure is considered the feasible/achievable – (closures via negotiation or low cost diversion) **Package 4 (£14.5m)** – Installation of 20 MSLs – provision of MSLs at unprotected crossings where sighting is an issue. **Package 5 (£12m)** – Upgrade 6 AHBs based upon risk rather than asset condition. **Package 6 (£5m)** – 5 asset improvements including use of technology /interventions to identify user behaviours across the entire level crossing estate also trials of technology that will deliver small increases in risk reduction i.e. prevention of entrapment incidents at CCTV level crossings. **Package 7 (£6m)** – Removal of TSRs where implemented due to level crossing risk	• Reduction of risk at crossings • Improved public & passenger safety • Reduction in operational incidents due to inadvertent misuse of crossings • Reduced maintenance costs Reduction of un-modelled risk	**Package 1: Total Cost £22m** FWI benefit = 0.07980 **Package 2: Total Cost £3.5m** FWI benefit = 0.00047 **Package 3: Total Cost £4m** FWI benefit = 0.05949 **Package 4: Total Cost £14.5m** FWI benefit = 0.01680 **Package 5: Total Cost £12m** FWI benefit = 0.05848 **Package 6: Total Cost £5m** FWI benefit = TBC **Package 7: Total Cost £6m** FWI benefit = TBC **Overall Cost 66m**

ii) East Coast Supplementary Plan Investment Options

The East Coast Supplementary Plan is a series of additional interventions aimed at improving performance on the East Coast Mainline. The Route has undertaken a significant optioneering and appraisal exercise to determine the best value for money interventions to drive performance improvement, which has shown that there is a potential Value for Money Case for additional investment of up to £1.4-£1.5 billion. Supporting information on the strategy behind these investment options is set out below the tables. Below we set out the four incremental packages of investment up to £1.5 billion that have been developed to date.

The East Coast Supplementary Plan is a series of additional interventions aimed at improving performance on the East Coast Mainline. All BCRs below are based on the optimistic levels, ('B' scenarios), of incident reduction.

East Coast Supplementary Plan (Package 1)	**CP6 total: (£m)**	**£0.5bn**		**CP6 capex: (£m)**	**£0.5bn**	**CP6 opex: (£m)**		**Total BCR (without HS2)**	**Financially positive**	**Appraisal period**	**60 years**
Description			**Qualitative benefits**						**Quantitative benefits**		
Track renewals Kings Cross to Newcastle **Lineside fencing** Kings Cross to Border **Bridge strike prevention** and **signalling power supplies** Kings Cross to York **LC closures** KX to PBro	Track £186m Fencing £45m Bridge strike prevention £57m Signalling power supplies £115m Level crossing closures £92m **Total: £495m**		The provision of lineside fencing is high value for money and is projected to result in a 40% reduction in trespass, cable theft, and suicide incidents which in combination are the greatest cause of delay on ECML. A 50% reduction in track related faults including in two-track sections where recovery from failures is more prolonged due to the lack of alternative tracks. The prevention of bridge strikes and renewal of signalling power supplies also returned high value for money Whilst LCs failures are rare, the closure of all level crossings between Kings Cross and Peterborough will contribute towards the reduction in trespass, cable theft and suicide incidents. In addition they will also remove significant causes of road traffic delays; remove the need for them to be controlled as part of any Digital Railway solution; and also facilitate the future potential for 140mph train speeds. Closures are achieved through a mix of outright closure of little used crossings, diversion to other crossing points or the provision of foot, bridle, or road bridges.			• BCR with HS2 is 2.75 • Forecast VTEC/Grand Central/Hull Trains PPM increase of 1.5% • **Forecast VTEC PPM year 3 CP6 of 88%** • Forecast increase in GTR PPM during CP6 of 0.9%		

East Coast Supplementary Plan (Package 2)	CP6 total: (£m)	£0.7bn		CP6 capex: (£m)	£0.7bn	CP6 opex: (£m)		Total BCR (without HS2)	4.81	Appraisal period	60 years
Description			**Qualitative benefits**				**Quantitative benefits**				
As per the £0.5bn package with the addition of **overhead line works** between Peterborough and Doncaster.	Track: £186m Fencing: £45m Bridge strike prevention: £57m Overhead line: £185m Signalling power supplies: £115m Level crossing closures: £92m **Total: £742m**		In addition to the benefits in the £0.5bn package, this package delivers improved reliability of the OHL between PBro and Doncaster and includes portalisation and wind resistance measures. This location has recently suffered from a number of significant OHL dewirements resulting in prolonged periods of disruption exacerbated by the challenge of maintaining services particularly on the 2-track section between Stoke Tunnel and Doncaster where the diversion route via Gainsborough is long and available to diesel traction only. Portalisation allows each line to be mechanically independently registered to reduce the severity of an incident and enabling adjacent lines to remain open to electric traction during recovery operations. There is a negligible positive impact on GTR performance arising from infrastructure improvements other than those delivered between KX and PBro, hence the GTR PPM improvement remains the same.			• BCR with HS2 is 1.10 • Forecast VTEC/Grand Central/Hull Trains PPM increase of 1.8% • **Forecast VTEC PPM year 3 CP6 of 88.3%** • Forecast increase in GTR PPM during CP6 of 0.9%		

East Coast Supplementary Plan (Package 3)	CP6 total: (£m)	£1.0bn		CP6 capex: (£m)	£1.0bn	CP6 opex: (£m)		Total BCR (without HS2)	2.12	Appraisal period	60 years
Description			**Qualitative benefits**				**Quantitative benefits**				
As per the £0.7bn package with the addition of signalling power supplies and track renewals north of Newcastle, bridge strike prevention between York & Newcastle,and level crossing closures between PBro and Doncaster	Track: £198m Fencing: £45m Bridge strike prevention: £77m Overhead line: £185m Signalling power supplies: £195m Level crossing closures: £340m **Total: £1,040m**		In addition to the benefits in the £0.7bn package, this package extends improved reliability of track and signalling power supplies to the remainder of the ECML north of Newcastle, the reduction of delays from bridge strikes between York and Newcastle, and the closure of level crossings between PBro and Doncaster and thus further enabling Digital Railway, 140mph running, and elimination of level crossing risk. There is a negligible positive impact on GTR performance arising from infrastructure improvements other than those delivered between KX and PBro hence the GTR PPM improvement remains the same.			• BCR with HS2 is 0.74 • Forecast VTEC/Grand Central/Hull Trains PPM increase of 2.0% • **Forecast VTEC PPM year 3 CP6 of 88.5%** • Forecast increase in GTR PPM during CP6 of 0.9%		

East Coast Supplementary Plan (Package 4)	CP6 total: (£m)	£1.5bn		CP6 capex: (£m)	£1.5bn	CP6 opex: (£m)		Total BCR (without HS2)	1.01	Appraisal period	60 years
Description			**Qualitative benefits**				**Quantitative benefits**				
As per the £1.0 bn package with the addition of a more robust earthworks solution for Browney Curve, extending OHL works between Doncaster and Leeds/York, civils/structures works between Peterborough and Leeds/York,and extending level crossing closures north from Doncaster to Newcastle	Track: £198m Fencing: £45m Earthworks: £20m Civils/Structures: £33m Bridge strike prevention: £77m Overhead line: £354m Signalling power supplies: £195m Level crossing closures: £524m **Total: £1,446m**	In addition to the benefits in the £1.0bn package, this package extends improved reliability of OHL assets also between Doncaster and Leeds/York; the reduction of delays from bridge scour and road vehicle incursion incidents, waybeam bridges and water/ice effects in tunnels between PBro and Leeds/York; and the extension of level crossings closure to between Doncaster and Newcastle thus further enabling Digital Railway, 140mph running, and elimination of level crossing risk almost along the whole of the route. There is a negligible positive impact on GTR performance arising from infrastructure improvements other than those delivered between KX and PBro hence the GTR PPM improvement remains the same.				• BCR with HS2 is 0.46 • Forecast VTEC/Grand Central/Hull Trains PPM increase of 2.1% • **Forecast VTEC PPM year 3 CP6 of 88.6%** • Forecast increase in GTR PPM during CP6 of 0.9%			

East Coast Supplementary Plan Supporting Strategy

Supplementary renewals plan targeting ECML performance

The East Coast Mainline (ECML) connects several major economic centres which combined contribute over £300 billion to the UK's total Gross Value Added (GVA). The railway has and continues to serve as a key artery between England and Scotland but despite its strategic importance, the majority of the asset base on the line has not been renewed since the late 1980s. The ECML has experienced high growth in recent years. In the last 10 years the ECML's growth has outstripped that of the UK rail network as a whole with the number of passengers using the ECML increasing around 80% to circa 90 million. Nationally, the number of passengers using the UKs railways overall has increased around 72% over the same period.

Since electrification there has also been significant growth in train services using the route. With the number of long distance trains using Kings Cross has increasing from 96 trains per day (tpd) up to183 trains per day, GTR(N) Services have increased from 230 tpd up to 299 tpd. Overall ECML passenger journeys are expected to grow from the current 90 million per year to around 105 million by 2023 and 130 million by 2043, increases of around 15% and 44% respectively. Already committed increases to services include:

- Introduction of the new IEP fleet – Potentially increasing the number of Virgin Trains East Coast (VTEC) long distance trains by up to 50 tpd.
- New Thameslink services – these will significantly increase the number trains using the southern end of the ECML. During peak times, it is proposed to

run up to an additional 18 trains per hour through Finsbury Park.

- A third 'Open Access' operator – With an application, pending approval, for access rights to run 5 trains per day each way between Edinburgh and London Kings Cross.

This forecast growth means that on the busiest sections of the ECML, passenger services will increase by 45% from around 28tph to around 41tph between now and 2021 through our current franchised customers (VTEC/TP/XC/Northern), and existing open access operators (HT and GC).

Asset performance on the ECML has been improving steadily over the last eight years, but not as quickly as other parts of the Route. The total number of asset failures annually has reduced by 20% on the ECML in the last 8 years. However for the rest of the LNE&EM Route this has been 33%.

There have been recent increases in incidence of failure amongst certain assets. This has been as a result of increasing asset age, with the expected lives of certain assets having already been exceeded, the railway faces a large volume of asset renewals becoming due in both CP7 and CP8. This is particularly the case with Track and signalling power assets.

Figure 54: Decreases in total number of service affecting failures.

As a result of a constrained submission proposed in this plan, different asset classes will experience varying levels of performance in CP6 with Track and Electrical power assets forecast to see deteriorations in performance This is likely to mean a decrease in system resilience, something exacerbated by the fact that most aged assets are on two-track sections where there is limited operational flexibility to recover from incidents.

Many of the interventions proposed in section five of this plan involve improving the resilience of current asset stock rather than performing renewals to improve the performance of assets. This is likely to restrict the overall improvement in PPM that can be achieved on the ECML, as evidenced by long term scorecards presented in chapter 3. Modelling the constrained submission suggests a weak PPM performance compared with both VTEC's 2014 franchise proposal and other UK inter-city operators' current PPM performances (Figure 55)

LNE & EM therefore sought to identify asset interventions on each geographic section of the ECML that would improve asset resilience and reliability, in order to close the performance gap between our constrained submission and our customers' PPM targets.

To achieve this a PPM model was developed using CP5 performance data for the Route (DPI and Incident count) for each asset and taking into account committed VTEC & GTR train service increases. This identified how VTEC and GTR PPM could be affected by reductions in incident count. Various scenarios with differing combinations of asset intervention, location and degree of incident count reduction, were modelled to determine which Scenarios led to the largest PPM improvement.

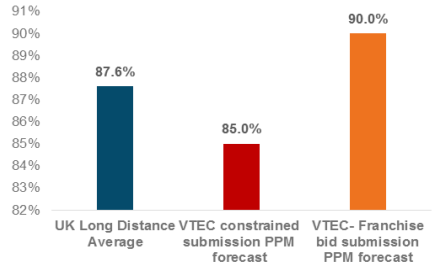


Figure 55: Comparison of PPM MMA for UK intercity operators at Q4 2017, average PPM forecast performance for VTEC under the current constrained submission (red) and the its 2014

These PPM improvements were then converted into monetised economic benefits and operator revenue improvements by the Centre's economics team, which has allowed us to build up a 'Value for Money (VfM) ranking' of different asset interventions at each geographic section of the ECML. This has allowed us to determine – at an indicative level – a 'VfM curve'. This illustrates the potential Benefit Cost Ratio (BCR) of different levels of incremental renewals investment on the ECML, assuming that the first £100m of incremental capex is spent on the best VfM projects, the next £100m is spent on the next best VfM projects and so on. This is set out in Figure 54 overleaf; the following should be noted:

- The curves have been extrapolated from a smaller number of results provided by the Centre's economics team, however they provide a reasonable basis

for drawing high level conclusions

- A key assumption is whether HS2 Phase 2b is included as a baseline assumption. This has a significant impact on assumed future patronage on the ECML, as modelling suggests many long distance passengers would switch to HS2 from the ECML, therefore reducing the future benefits of investment in the ECML. We have presented the 'without' HS2 Phase 2b as a sensitivity on this baseline assumption
- The BCR analysis is based upon performance improvements only, largely driven by time savings from fewer delays and incremental revenue benefits from additional passengers using the railway because of performance improvements. There are also several other areas of potential benefits excluded from this analysis including whole life cost savings from assets being fully renewed rather than continually refurbished and maintained, road network journey time savings from level crossing closures, safety benefits from level crossing closures, safety benefits from better lineside fencing.

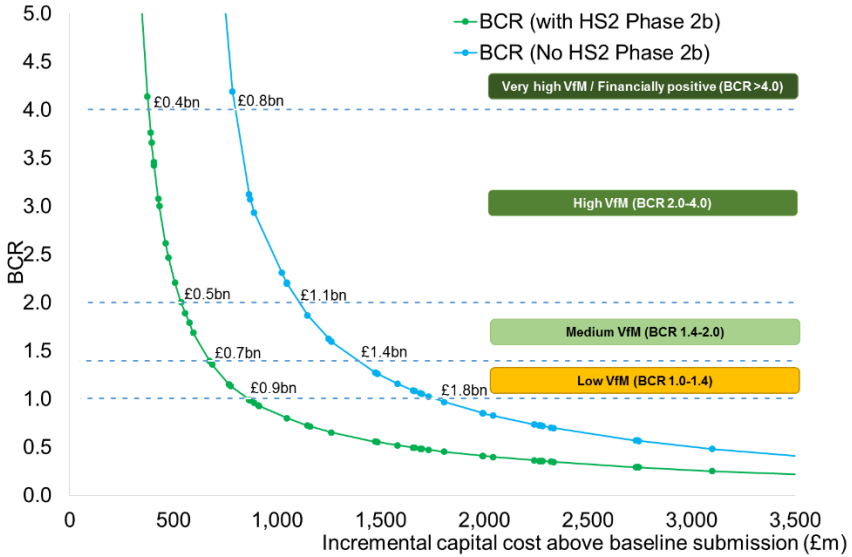


Figure 56: Indicative BCR analysis performed by the Route on the East Coast Investment Option

Our indicative analysis suggests that there is a VfM case (BCR >1.4) for investing an additional £0.7bn-£1.4bn in the ECML renewals to drive performance improvements, depending on the extent to which the impact of HS2 Phase 2b is taken into consideration. There here is a strong VfM case (BCR>2.0) for investing up to additional £0.5bn in ECML renewals to drive performance improvements, irrespective of whether HS2 Phase 2b is taken into consideration. If HS2 Phase 2b is discounted from the analysis, this figure rises to £1.1bn

There is a legitimate case to at least partially discount HS2 Phase 2b from this particular analysis, given the assumptions surrounding HS2 Phase 2b suggest that ECML paths will be under-utilised once HS2 is operational. This is unlikely to be the case, given that HS2 Phase 2b does not directly benefit passenger markets south of Doncaster, nor does it benefit Freight. Overall it is highly likely that a strategic asset such as the ECML will continue to be fully utilised once HS2 Phase 2b is operational, and its asset condition needs to be maintained and improved in line with this.

In addition, whilst HS2 Phase 2b is assumed to happen within appraisal assumptions, there is in reality some uncertainty around the scope, timing and cost of HS2 Phase 2b. Given the fundamental impact this assumption has on the investment case for ECML renewals, both the with/without HS2 Phase 2b sensitivities should be considered in any investment investment decisions.

Five incremental packages of investment have been developed and refined according to local asset knowledge provided by RAMs about the underlying causes of delays and the severity of an asset failure's impact on train performance. These were then modelled to find their PPM benefit and then subsequently modelled by the Group Strategy team. Incremental packages above £1.5bn were not taken forward due to low expected BCRs as a result of the analysis set out in 8.5.1. Below we present three incremental packages at steps of £0.5bn, a package of £742m that lies on the threshold of a BCR greater than 1.0 (without HS2), and the full ECML supplementary plan of £4.6bn. Figure 51 details specific interventions for each asset and are summarised in the packages described overleaf.

The four investment options presented in section ii above will deliver improved PPM through increased asset availability and improved overall system

resilience, and reductions in trespass, vandalism and suicide. The PPM benefits of each of the packages described above are shown below for VTEC and GTR but will also effect other TOCs who use the ECML such as Northern and open access operators such as Grand Central and Hull Trains.

The supplementary plan will also have additional benefits beyond PPM as well as improved safety and wider reputational benefits for Network Rail. The works proposed also complement and enable full realisation of benefits for interventions such as Digital Railway and will enable any future aspirations for 140mph running at specific locations between London and Doncaster. The full scale of works and benefits are detailed in Appendix D part 2b and in our accompanying submission.

PPM increases which drive benefits come from a variety of areas but mainly from a reduction in external influences in the railway e.g. from trespass, vandalism and suicide as well as track, OHL and signalling power supply improvements as shown in Figure 58. The key benefit of achieving such an increase in PPM will be to increase the connectivity impact of the railway on the economic centres the ECML serves but there are also several non-monetised benefits of these interventions, these include:

- **Weather resilience** – Reduces impacts of extreme winds on OHL assets and vegetation
- **Suicide prevention** – Prevents trespass by strengthening lineside fencing and closing level crossings
- **Safety** – Reduces risk of serious collisions at level crossings, derailments, passengers being struck by debris and wrong side signalling failures.
- **Wider reputational benefits** – As a result of better performance and safety from TOCs, FOCs, industry bodies, motorists, passengers and other stakeholders.

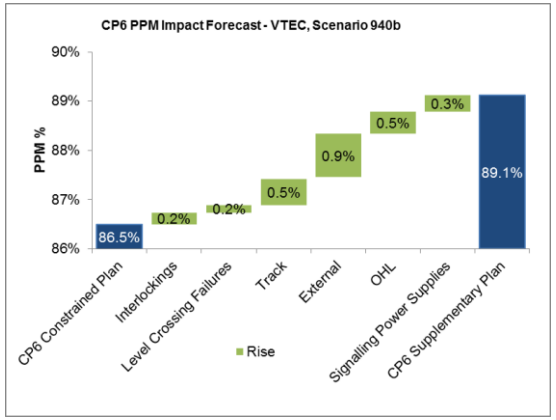


Figure 58: Modelling results of Package 5 showing areas of PPM improvement in the upper bound scenario for VTEC. Indicative analysis suggests the same improvements in performance will be realised for Hull Trains and Grand Central

		PPM Improvement (ppts)		BCR (60 Year)	
Supplementary plan investment	**Cost (£m)**	**Virgin Trains East Coast**	**GTR (Great Northern)**	**With HS2**	**Without HS2**
Package 1	495	1.5	0.9	2.75	Financially Positive
Package 2	742	1.8	0.9	1.10	4.81
Package 3	1,040	2.0	0.9	0.74	2.12
Package 4	1,446	2.1	0.9	0.48	1.01
Package 5	4,672	2.6	1.1	0.14	0.24

Table 17: Results of PPM and Business Case modelling of East Coast Supplementary Plan packages

Efficient delivery of any additional investment is a key area that needs to be addressed. It must be noted the majority of the interventions are renewals classed work interventions which have a much lower certainty of delivery risk profile than enhancement or transformational investment. The LNE&EM Route is working closely with IP SNE to establish a CP6 renewals delivery model improving value and milestone adherence by earlier identification of the right and affordable solution through more collaborative working between the Route and IP, and using internal resources and frameworks in a more efficient manner

Where interventions are proposed to be made the availability of development and delivery resources; possession/isolation availability; and the granting of external approvals (particularly LC closures which are subject to extended consultation, negotiation, examination & approval processes – usually by way of

Transport and Works Act Orders) will have a significant impact on delivery timescales. There will no doubt be increased access requirements to deliver these additional renewals volumes and associated increased schedule 4 costs which have not been taken into account at this stage.

Work is continuing to refine our investment scenarios to reduce the costs and maximise the performance impacts of potential packages of investment. This work includes:

- Refining costs to reflect the different GRIP stages the various interventions are at, for example Track interventions are based on standard solutions based on more defined unit rates whereas some OHL interventions, e.g. portalisation, are not. Setting out different stages of development maturity and GRIP stage will have impacts on optimism bias. We will also conduct value engineering of interventions to focus on costs and impacts on incident count reductions of specific interventions within asset groups.
- Working with our customers to ensure that the investment scenarios cater for their operational priorities, we continue to consult out customers on the East Coast supplementary plan at Stakeholder workshops to develop more suitable asset interventions.
- Further development of performance models to include more historic data of train performance to ensure asset interventions target areas which have the great impact on train performance and are most likely to affect PPM.
- Further developing the economic modelling to include impacts on all operators using the route and to capture a wider range of impacts (e.g. safety, impacts on the wider economy and impacts to local communities and highways)

Appendix E CP6 regulatory framework – Other Single Till Income

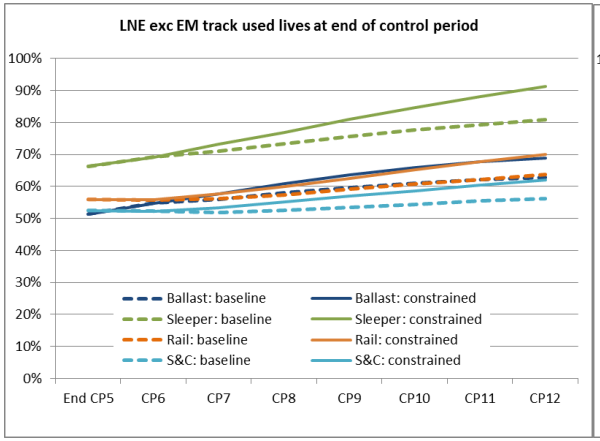
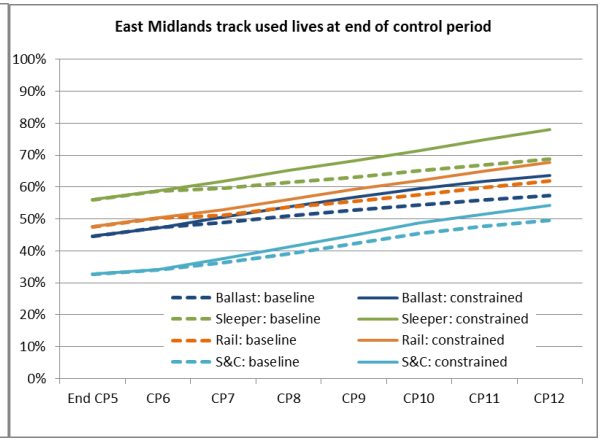
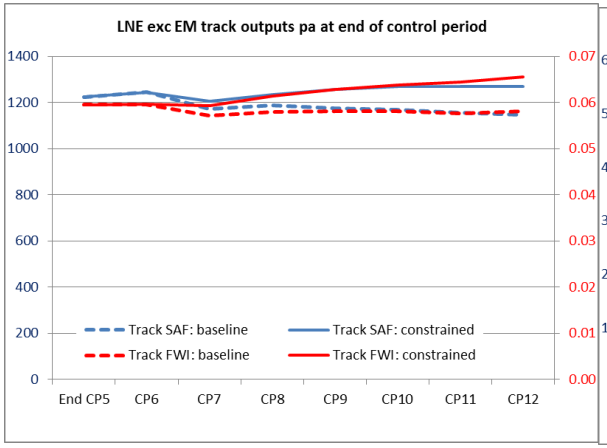
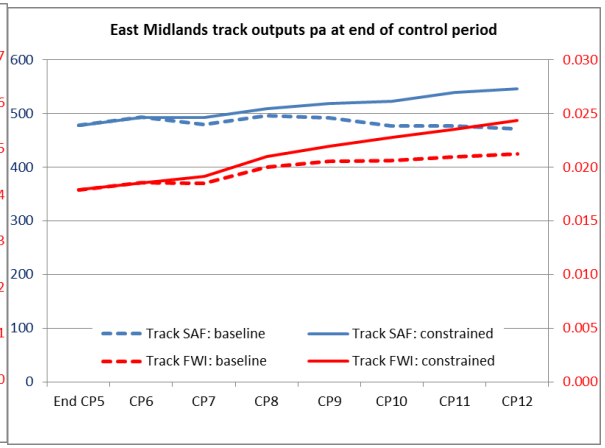
This appendix provides the breakdown of forecast other single till income for CP6, which is included in Table 10.2, above. This represents Network Rail income that is received from sources other than access charges and network grants. Total other single till income for the route matches the values shown in the CP6 revenue requirement calculation.

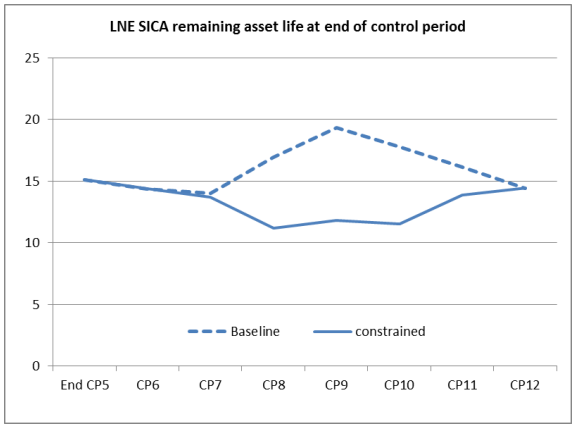
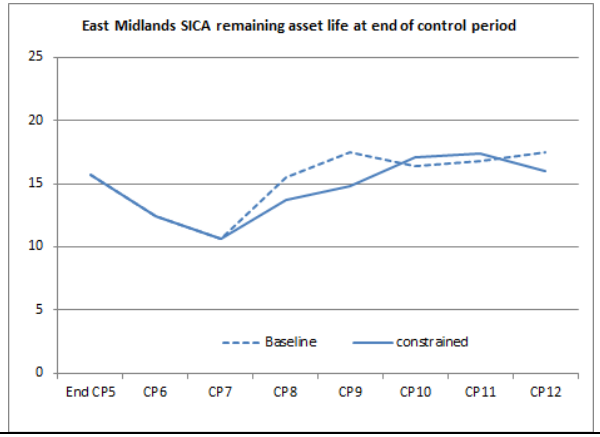
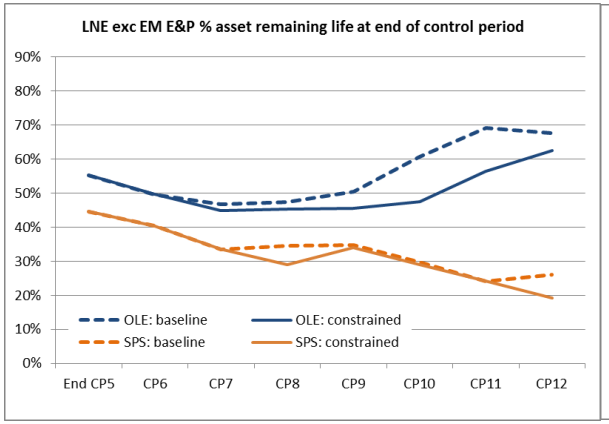
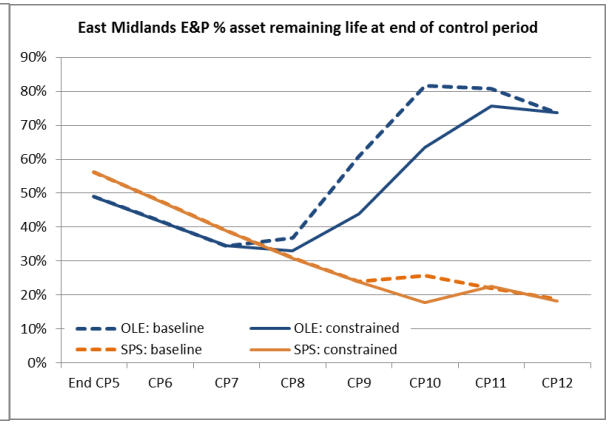
Table 18: CP6 forecast of other single till income

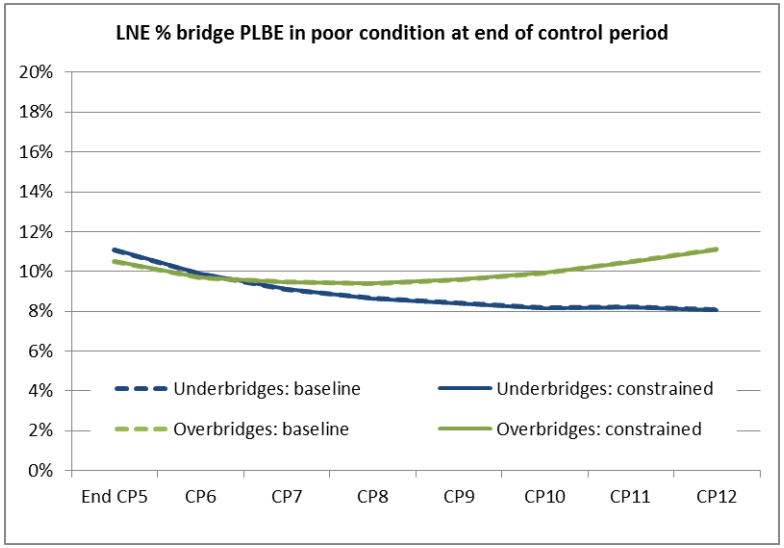
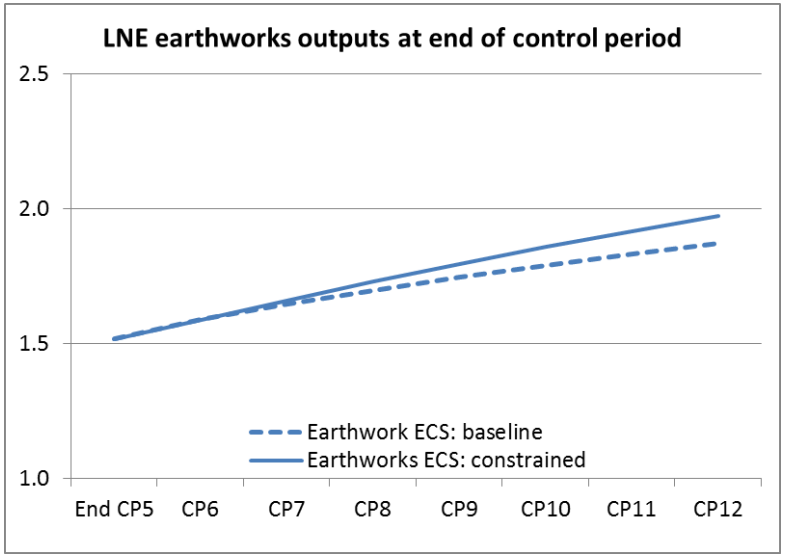
£m in 2017/18 prices	18/19	19/20	20/21	21/22	22/23	23/24	CP6
Route income							
Managed station Qx	(9)	(8)	(8)	(8)	(8)	(8)	**(41)**
Franchised station lease income	(12)	(12)	(12)	(12)	(12)	(12)	**(59)**
Open access fixed contractual contribution	(9)	(9)	(9)	(9)	(9)	(9)	**(44)**
Depots	(18)	(19)	(19)	(19)	(19)	(19)	**(97)**
Finance charges (e.g. Crossrail)	0	0	0	0	0	0	**0**
Facility charges	(3)	(8)	(8)	(8)	(7)	(7)	**(39)**
Other route income	(17)	(1)	(1)	(1)	(1)	(1)	**(5)**
Income allocated to routes	**(68)**	**(57)**	**(57)**	**(57)**	**(57)**	**(57)**	**(284)**
Property rental	(54)	(47)	(48)	(48)	(49)	(50)	**(242)**
Property sales	(23)	(3)	(3)	(2)	(2)	(3)	**(14)**
Total other single till income	**(145)**	**(107)**	**(108)**	**(107)**	**(108)**	**(109)**	**(539)**

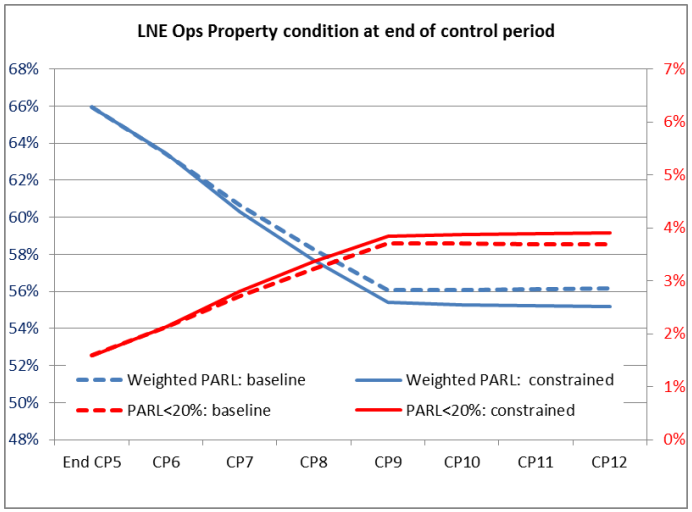
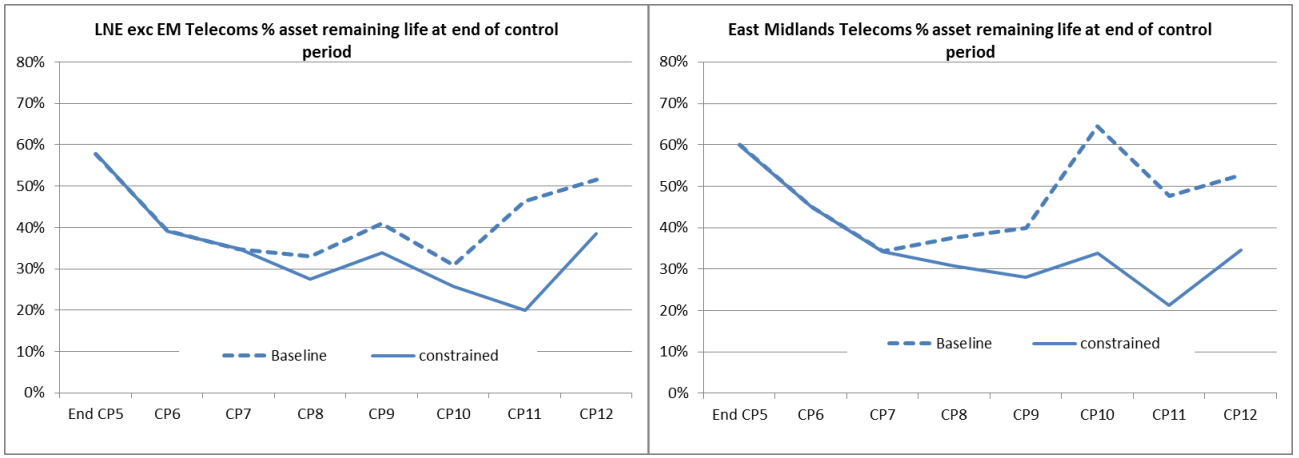
Please note: We no longer include stations long term charge income, open access income (with the exception of the open access fixed contractual contribution) or freight income in other single till income (OSTI).

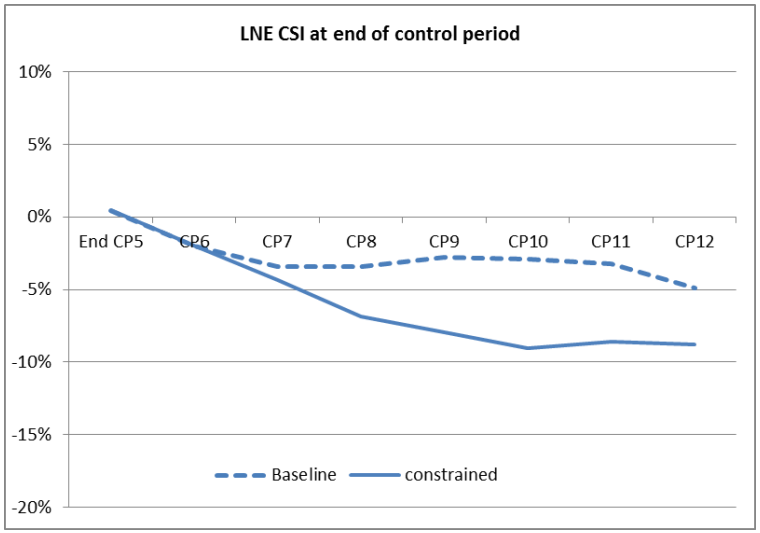
Appendix F Long term forecast

Asset	Condition trajectory	Comment
Track	   	

Asset	Condition trajectory	Comment
Signalling	 	
E&P	 	

Asset	Condition trajectory	Comment
Structures		
Earthworks		

Asset	Condition trajectory	Comment
Operational Property		
Telecoms		

Asset	Condition trajectory	Comment
CSI		

Appendix G Glossary of terms

LNE&EM	London North Eastern and East Midlands
HOO	Head of Operations
C&V	Costs and Volumes
CA	Combined Authority
CP	Control Period
CRI	Composite Reliability Index
DfT	Department for Transport
DR	Digital Railway
DRSAM	Director of Route Safety and Asset Management
DU	Delivery Unit
E&P	Electrical and Power
ECML	East Coast Mainline
EDP	Enhancements Delivery Plan
EMT	East Midlands Trains
ETCS	European Train Control System
FDM	Freight Delivery Metric
FOC	Freight Operating Company
FPM	Financial Performance Measure
FTPE	First TransPennine Express
GRIP	Governance of Rail Industry Projects
GTR	Govia Thameslink Railway
HoRSHE	Head of Route Safety, Health and Environment
IEP	Intercity Express Programme
IP	Infrastructure Projects
JTI	Journey Time Improvements
KO2	Key Output Two
LEP	Local Enterprise Partnership
LMD	Light Maintenance Depot
LSI	Line Speed Improvements
LTIFR	Lost Time Injury Frequency Rate
MAA	Moving Annual Average
MML	Midland Mainline
MMLE	Midland Mainline Electrification
NPV	Net Present Value
NR	Network Rail
NRPS	National Rail Passenger Survey
NS	Neutral Section
NSC	National Supply Chain
NSO	National System Operator
O&M	Operations and Maintenance
OHL	Overhead Line
OLE	Overhead Line Equipment
OMR	Operations, Maintenance and Renewals
ORR	Office for Rail and Road
PLPR	Plain Line Pattern Recognition
PPM	Public Performance Measure
PPS	Principal Programme Sponsor
PSU	Power Supply Unit
RAM	Route Asset Manager
RCF	Rolling Contact Fatigue
RDG	Rail Delivery Group
RMD	Route Managing Director
ROC	Route Operations Centre
RPM	Route Performance Manager
RSP	Route Strategic Plan
S&C	Switches and Crossings
S&T	Signalling and Telecoms
SEU	Signalling Equivalent Units
SME	Small to Medium sized Enterprise
SOBC	Strategic Outline Business Case
SOP	Standard Operating Procedures
SPADs	Signals Passed at Danger
SSSI	Sites of Special Scientific Interest
STE	Safety, Technical and Engineering
TMS	Traffic Management Systems
TOC	Train Operating Company
TPE	TransPennine Express
TPH	Trains Per Hour
TPU	TransPennine Upgrade
TSR	Temporary Speed Restriction
UWC	User Worked Crossings
VTEC	Virgin Trains East Coast
WRCC	Weather Resilience and Climate Change
FWI	Fatality Weighted Index
RDG	Rail Delivery Group
LDHS	Long Distance High Speed
FNPO	Freight National Passenger Operator

Appendix H LNE&EM Route & FNPO

This summary sets out how the LNE&EM and FNPO routes will work together to deliver the Route Strategic Plan for LNE&EM. It outlines existing FNPO activity, and then describes the impact of the plans and aspirations of FNPO customers to grow and develop their businesses. It summarises what Network Rail needs to do to deliver these strategies and how, in doing so, efficiencies can be identified and realised.

LNE&EM Route & Freight & National Passenger Operators (FNPO) Route

This summary sets out how the LNE&EM and FNPO routes will work together to deliver the Route Strategic Plan for LNE&EM. It outlines existing FNPO activity, and then describes the impact of the plans and aspirations of FNPO customers to grow and develop their businesses. It summarises what Network Rail needs to do to deliver these strategies and how, in doing so, efficiencies can be identified and realised.

National Passenger Operators:
CrossCountry is an extensive user of LNE&EM route and key issues include boundary handover of services, as well as the management of fatalities and trespass incidents. The access strategies on LNE&EM for CP6 are key as well as TOC mutually agreed and balanced service recovery plans during times of perturbation, with the aim of reducing overall industry

Caledonian Sleeper operates on the East Coast Main Line into Kings Cross, when diverted away from the West Coast Main Line due to engineering possessions

Charter trains also operate across LNE&EM Route, especially at weekends, to a variety of leisure destinations being hauled by both standard and heritage steam and diesel locomotives. This leisure market is expected to grow during CP6.

Challenges and Opportunities

No	Key Challenges, Risks and Opportunities	What we plan to do
1	**Aggregate Growth** O: Volume growth from Peak District, Leicestershire and Yorkshire R: Capacity and capability (e.g. MML South currently congested infrastructure), infrastructure not able to cope with traffic demand	• Explore opportunities for longer and heavier trains maximising loco capability • Support introduction of new wagons that maximise payload/length ratio • Support Terminal and Yard developments – e.g. York and Newcastle areas. • Support introduction of 'pop-up' terminals, bringing out of use infrastructure back into use and increased use of lineside loading • Explore opportunities for new capacity – e.g. Hope Valley and MML south

2	**Domestic & Deep Sea Intermodal Growth** O: Volume growth from Ports / Terminals (e.g. Felixstowe, London Gateway, Teesport, Immingham, Hull) R: Train paths and SRT discrepancies with longer, heavier trains R: Capacity and capability, including gauge clearance and diversionary capability	• Work with customers to maximise opportunities to increase length of trains • Increase Average Journey Speed origin to destination • Explore provision of recognised diversionary routes with adequate capability • Facilitate new terminal developments – e.g. Rossington, Radlett and East Midlands Gateway • Explore opportunities for new capacity – e.g. F2N schemes, Leicester and Trans-Pennine

No	Key Challenges, Risks and Opportunities	What we plan to do
3	**Gauge establishment** C: Establishment of gauge (e.g. Immingham to Doncaster and Trans-Pennine) and recognised diversionary routes for gauge critical traffic R: Exclusion from major programmes (e.g. Trans Pennine Route Upgrade), and funding	• Explore gauge clearance on key corridors, e.g. Trans-Pennine and Northallerton to Tees via Yarm, and provision of diversionary capability • Explore funding opportunities, including Third Party • Documented diversionary routes for core intermodal flows • Review of RT3973 provision to more closely align with traffic flows – reduced duplication
4	**Other Commodity Traffic Growth** O: Coal O: Steel R: Biomass O: Automotive O: Forest Products O: Bulk R: Capacity and capability on certain routes	• Work with customers to maximise opportunities for longer and heavier trains maximising loco capability • Support Terminal / Yard developments to facilitate growth • Support introduction of ‘pop-up’ terminals, bringing out of use infrastructure back into use and increased use of lineside loading • Work with FOCs and Freight End Users to deliver new network connections and necessary capacity and capability, or bring out of use infrastructure back into use
5	**Logistics and Mail Opportunity** O: Potential mail growth on main corridors and premium logistics developments	• Explore opportunities for business growth with existing and potential new customers
6	**Franchise changes** R: Refranchising of TOCs in Route seeks greater capacity on shared lines	• Retain adequate capacity, capability and flexibility for existing and forecast freight • Review Impact on possession strategy from new flows • Review stabling plans for new rolling stock / change of locations

7	**Infrastructure enhancements / electrification** O: Greater capacity/opportunity following enhancement (e.g. East West Rail on LNE&EM) R: MML Electrification to Kettering – risk to freight capacity O/R: Current enhancement proposals (e.g. ECML loops) may not be delivered due to affordability. Potential Third Party funding to secure delivery	• East/West Rail provision for gauge and freight diversions • Trans-Pennine provision for gauge and freight growth including diversionary capability • MML Electrification • Support Route forums (RSPG etc.) to influence scope and secure freight benefit following scheme delivery • FNPO, FOCs and Freight End Users to provide appropriate input into the decision making process • Work with Route Business development team to identify potential Third Party funding sources
8	**Construction projects / HS2** O: Opportunity for spoil and waste out and aggregate and other commodities (e.g. Tunnel segments) in to support construction R: HS2 routing requires the removal and re-location of existing freight facilities (e.g. Toton, Leeds Freightliner Terminal, Leeds Midland Road and Leeds Stourton Aggregates)	• Work with DfT, HS2 Ltd, FOCs and End-customers to offer solutions to demands of major projects • Work with customers to manage the impact of major projects on their business (HS2) • Terminal / Yard developments ('pop-up' terminals / lineside loading potential) • Work with FOCs and Freight End Users to resolve conflicts with existing freight facilities (e.g. Toton, Leeds Freightliner Terminal, Leeds Midland Road and Leeds Stourton Aggregates) • Work with FOCs and Freight End Users to deliver new network connections and necessary capacity, or bring out of use infrastructure back into use
9	**SRFI Terminal Development** O: SRFI terminal development supports intermodal growth especially addressing demand for inland terminals C: Securing of sufficient capacity to support SRFI developments through planning and into use	• Work with Developers to understand SRFI proposals progression through planning • Offer NR support to proposals when adequate strategic fit and capacity • Work with System Operator to support funded early stage timetable work for SRFI developers

No	Key Challenges, Risks and Opportunities	What we plan to do
10	**End User-customer service** O: Closer working with FEU's enables greater understanding of customer priorities for future (e.g. Tarmac)	• Work with end-customers to develop business growth and support modal shift to rail • Work with end-customers to strengthen service delivery and support
11	**Review of redundant and unused assets:** O: Following traffic changes in CP5 and structural change in energy market, opportunity exists to review size and organisation of non-passenger network R: FOC objection to supporting Network Changes	• Identify opportunities to reduce maintenance costs and remove unneeded infrastructure • Regularise the status of freight assets and other assets including gauge, S&C (actual v published capability) • Explore potential to transfer ownership of redundant lines / assets to secure better opportunities for redevelopment

12	**Yards and sidings infrastructure** R: Yard and Siding Infrastructure asset condition is critical to avoid derailment events and customer LTI's	• Working with Routes and customers to review asset condition on regular basis • Working with Routes and customers to establish and benchmark walking route use and condition
13	**Timetable Review** O/R: Timetable Improvements to closely reflect capability of trains and capacity of network required on busier network	• Continuation of CP5 work to review path usage and remove unused paths and agree strategic capacity • Work with FOC's to more closely align Train Slots in the Timetable with Access Rights in the TAC, and remove unused rights where there is no corresponding Train Slot • Work with the Route, System Operator and FOC's/TOCs where in upcoming major timetable re-casts the available capacity may be less than contracted rights, e.g. ECML December 2019 timetable change • Work with System Operator and customers to review opportunities to improve average speed origin-destination • Review with System Operator and customers suitability of current systems to capture network constraints and traction capability (Loads Book, Timing Loads, Lengths)
14	**Digital Railway** O: Successful introduction of Digital Railway offers potential for growth on busiest corridors	• Act as internal client on behalf of Freight to build sympathetic capability for freight traffic needs
15	**Upgrades and Disruptive Possessions** R: Major upgrade programmes such as MML, ECML and TRU will require significant disruptive access	• Champion requirements of FOCs and Freight End Users so that services can operate as required during disruptive possessions including availability of diversionary routes and timely provision of capacity studies to identify train service capability

CP6 Plan

Section	Key Themes	Strategy	Specifics	Owner	Timescale
Safety	Lost Time Incidents	Reduce LTIs by concentrating on Network Rail yard infrastructure, connecting sidings and walking routes conditions	• Published rolling programme of joint health and safety visits with customers (FOCs/TOCs) to agreed sites • Complete review of activities undertaken at Network Rail locations for each customer (FOCs/TOCs) and including authorised walking routes/crew change locations etc • Subject to funding, a programme of improvements will be specified and implemented • 'Go Look See' with customers within two weeks of any reportable customer LTI event on network infrastructure	FNPO Operations and Safety Manager/ SRFM	Initial Programme to be published March 2018 then annually during CP6
	Freight Train derailments	Reduce freight train derailments by concentrating on Network Rail yard and sidings infrastructure	• Published rolling programme of joint health and safety visits with customers to agreed sites • End Customer Forum to be established to share issues of concern around connection points and maintenance either side of boundary point • Subject to funding, a programme of improvements will be specified and implemented	FNPO Operations and Safety Manager/ SRFM	Initial Programme to be published March 2018 then annually during CP6
	SPADs	Reduce freight SPADS by collaborative working	• SPAD Forum to be established with FOCs to share learning and best practice	FNPO Operations and Safety Manager	Creation of Forum by April 2018. Meeting regularity proposed quarterly.
Performance	Right time performance at key hubs and terminals	Use Strategic Freight Corridors to focus delivery Measuring Right Time Departures from terminals at the start of the journey	• Use of joint Control Rooms and visualisation at major sites (e.g. Immingham and Drax) • Local workings groups to be established where appropriate, e.g. Mountsorrel and Doncaster area • Re-brief of Freight Strategy – 'Freight Delivery Matters' and linkage between RTD and FDM delivery	SRFM/ FNPO Performance Manager	Existing Working Groups to continue into CP6. Quarterly FNPO review of terminal engagement arrangements.

	Measuring FDM and FDM-R	Focus on key defined routes – e.g. ECML, MML, TransPennine corridor and Immingham to Doncaster: Asset Performance Asset Resilience Effective contingency plans	• Target FDM-R LNE&EM target for end CP6 of 95.3% • Input to Route Contingency Plans for consistent application of freight contingency arrangements • FSDM input to incident recovery real-time to build consistency • Asset reviews with Route Asset teams to share traffic forecasts and asset challenges • Influence at RSPG to define future asset strategy in terms of renewals to support freight growth	SRFM/FNPO Performance Manager	Annual target setting during CP6. Periodic review of FDM-R delivery and key influencers
	Joint Freight Performance Improvement Strategies	Agreed joint strategies with each FOC including details of plans to reduce each delay area	• Complete plan annually with each FOC concentrating on primary delay categories • Agreed industry information share • Regular reviews against plan with each Route and FOC customer	FNPO Performance Manager/CRE	Joint Strategy Plan per Operator to be published annually during CP6 and reviewed quarterly

Section	Key Themes	Strategy	Specifics	Owner	Timescale
Capacity & Capability	Identifying future capacity needs.	Bring together all freight capacity plans: • Route Studies • SFN • Customer specific	• All future project specifications to include a specific output level for freight services, reflecting the SFN specifications and forecast future traffic requirements • Capability constraints review – RA, gauge, HAW and other. Reconcile published versus actual infrastructure. Future plans for improvement to meet capacity requirements • Interactive maps for gauge, RA to be created and maintained • Continued support for longer, heavier trains programme	Project Sponsor/SRFM. SRFM/ FNPO Head of Strategic Capability/ FNPO Head of Network Management	Future capability programme definition by April 2018 and delivery by strategic route
	Review capability constraints	Undertake Capability Review	• Improved gauge and operational flexibility on the key freight corridors • Robust gauge cleared diversionary routes • Transparent network capability for each route	SRFM/ FNPO Head of Strategic Capability/ FNPO Head of Network Management	Existing capability constraints review definition by April 2018 and delivery per strategic route

	Freight Train Average Speed	Undertake Average Speed Review	• Establish framework for average speed measurement and improvement • Work with Stakeholders to target specific flows and services • Annual plan in connection with annual timetable change	FNPO Head of Performance/ FNPO Head of Strategic Capability/ FNPO Head of Network Management	Measurement framework to be agreed by industry May 2018. Flows to be agreed for Dec 2018 TT change and annually thereafter
	Connections to new terminals	Facilitate connections to the network and associated capacity	• Work with FOC's, Freight End Users and Developers to identify potential new connections, including development of SRFI's • Information share of prospective sites via RSPG • Facilitate new network connections e.g. Radlett and East Midlands Gateway • Identify potential sites (new connections, bringing out of use infrastructure back into use and increased use of lineside loading) to facilitate growth, e.g. York and Newcastle area for aggregates • Advice to System Operator of future sites and flows to understand timetable and capacity impact • Timetable studies for major terminal developments, e.g. SRFI's	SRFM/ FNPO Business Development Managers	Forward programme of FEU and Developer engagement to be agreed annually during CP6. Freight Developments Register to be held by SRFM for review at RSPG quarterly.
	Delivery of agreed CP6 freight enhancement programme	Continuation of Strategic Freight Network funding and industry governance group	• Promotion of potential freight projects and enhancement schemes • Prioritise funding to best meet demand and facilitate growth • Align SFN proposals with Route and National proposals to deliver a coherent forward strategy which best meets overall requirements	FNPO Head of Freight Development/ NSO	Ongoing
	Consideration of incremental freight improvements in all schemes	Structured review process with Route planners and Sponsors	• Work with FOC's and System Operator to identify opportunities for incremental freight enhancements as part of the development of enhancement and renewals proposals, e.g. faster entrance/exit speeds into loops and through crossovers	SRFM/ System Operator	Defined engagement process and inputs in place with Route Strategy by April 18

Section	Key Themes	Strategy	Specifics	Owner	Timescale

Network Availability	Engineering plans that meet both FNPO customer and Route needs.	Co-ordinated freight input into
		• Engineering Access Statements
		• Access Planning Requests
			• Engineering plans that are;
			  • Transparent
			  • co-ordinated
			  • consistent across Routes
			  • planned well in advance and
			  • take into consideration contingency arrangements for long distance services
				SRFM/ FNPO Capability and Planning Manager	Annual review of process/requirements between FNPO and Access Planning from March 2018 incorporating end to end Access process

Freight Asset Management Plans	Effective asset management arrangements for yards and sidings infrastructure	Create a joint understanding of maintenance responsibility, traffic level changes and asset condition	• Enable Asset Management and Engineering teams to plan the targeted maintenance and renewals requirement of each site • Ensure appropriate standards in use at each location.	SRFM/ Route COO/ RAM	Biannual review of yard and sidings maintenance priorities / traffic flows commencing 2018
	Review of Locomotive and Heavy Axle Weight (HAW) track and structure restrictions	Establish potential/cost for removal of restrictions	• Input into track/structures renewals and maintenance plans	SRFM/ Route COO/ RAM	Review definition and programme issued by April 2018. Delivery per strategic route to be programmed.
	Review Freight Only lines and other infrastructure	Understand the potential to reduce Operations, Maintenance & Renewals costs	• based on existing & reasonable future use • Input into track/structures/maintenance plans	SRFM/ Route COO/ RAM	Definition of Review by Dec 2017. Delivery of initial opportunities report by July 2018. Agreed Action Plan through CP6 per Route.
	Removal of TSRs / PSRs in timely fashion	Establish removal plan recognising freight impact	• Work with the Route teams to identify the impact of speed restrictions on freight services and work collaboratively to remove them	SRFM/ Route COO/ RAM	Ongoing periodic review of performance impact of TSRs to be agreed per Route

Appendix I Customer engagement and response to our plan

The Route has held various workshops and engagement sessions with representatives from its customers and other stakeholders throughout the CP6 planning process as detailed in section 2 of this plan. This appendix details some of the specific ways we have responded to customer feedback or have incorporated the issues they have raised within our plans.

You said Examples of issues raised at sessions	Workshop	We did What we have put in our CP6 plans
"We would like to see the Route's plans for investment in the North?"	ECML	We'll be spending over £30m on our stations in the North over CP6 with large scale projects occurring at Gainsborough, Middlesbrough and Leeds
"We don't encourage enough Third Party Funding" *"There are processes and governance within network rail which disincentivise third parties. There is also a lack of stakeholder ownership"*	ECML/ Northern	We restructured our Route Sponsorship team in 2017 to create more focus on our three principal geographies with an aim to improve co-ordination, delivery of projects and communication with stakeholders to improve the way we manage and attract funding from local, regional and national third parties
"No right time metrics are considered as part of plans"	ECML	Since RF6 we have added Right Time Measures as part of our Long Term Scorecard
"We'd like to see plans on how increases are being spent on buildings"	ECML	Our CP6 Buildings plans include substantial increases in spend at our franchised and managed stations (around £60m more compared to CP5), with substantial renewals at places like Leeds, King's Cross, Eaglescliffe, York, Kettering and Middlesbrough
"We'd like to see plans which put more focus on drainage"	ECML	In CP5 we have created of a new dedicated Drainage and Off-Track RAM and with a specific asset plan in CP6 we plan to improve our focus on drainage systems which in turn will improve the resilience and performance of our Earthworks and Track assets.
"There is a lack of focus on the Northern City Line as a result of Thameslink"	ECML	Acknowledging the capacity constraints on the Moorgate lines, we plan to successfully deliver innovative digital signalling on the Moorgate lines towards the end of CP6 to deliver an additional 4tph during peak hours and prepare infrastructure on the Hertford Loop for the rollout of new class 700 rolling stock.
"JTI is valued too much with not enough focus on right time service"	TPE	We have added Right Time Measures as part of our Long Term Scorecard and have incorporated initiatives to improve on time "start of day" performance in our Train Performance and Operational Plan.
"Where is the adoption of technology to address level crossing issues?"	TPE	As a result we have developed and set out a level crossings plan that specifically addresses TSRs in Appendix D of our plan.

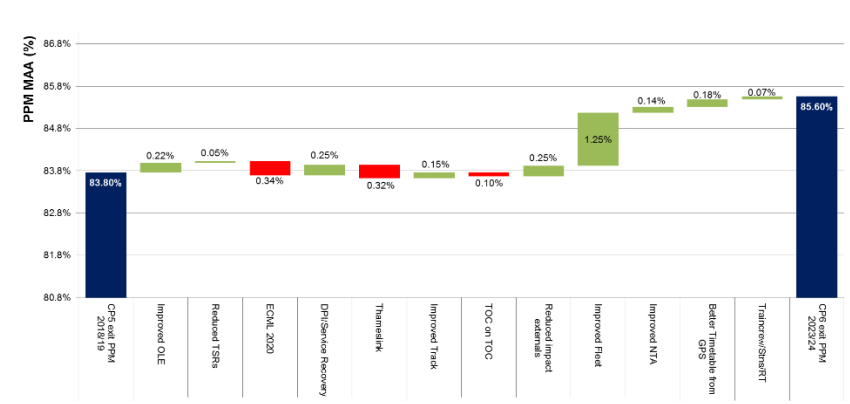
"What is being done at train depots? Where and what?"	TPE	We've allocated over £14.5m to improve Maintenance Depots and plant in CP6, with schemes in places such as Neville Hill seeing substantial renewals of train sheds and drainage, as well as internal building systems
"The MML is still considered congested infrastructure, what is being done about this issue?"	MML	Our new MML sponsor team are working to deliver the Kettering to Corby upgrade and JTI improvements across the Midland Mainline.
"We need plans to be more upfront about investment taking place in readiness for Thameslink Programme"	MML	The Route plans to target its CP6 investment into stations such as Hendon, Mill Hill and Welwyn in line with the capacity growth the Thameslink Programme will deliver. We're also targeting signalling interventions at key signal boxes like West Hampstead to pro-actively prevent service affecting asset failures
"Our plans do not discuss freight planning"	FNPO	During the planning process we've increased engagement with the FNPO, incorporating their plans for the Route into our own (see *Appendix H*)
"CP6 Level Crossing plans are not clear enough in the plan"	ECML	We have added an additional level crossings plan for ECML as well as developed and proposed an additional seven packages of discrete level crossing interventions in Appendix D of our plan
"We need to be more bullish on future plans and growth on the ECML"	ECML	As a result we have developed and put forward to funders a Supplementary plan for the East Coast Mainline which responds to the high growth and additional services expect on this section of the Route
"We would like to understand how technology is going to help drive efficiencies in the plan"	Northern	We have integrated the efficiency impact of new technology and Intelligent Infrastructure such as PLPR, Rail Milling and Eddy Current technology into our maintenance plans. These, combined with our Safe & Effective working and other planning initiatives are expected to lead to a 13.5% increase in time on tools and a decrease in non-time on tools over the whole of CP6.
"The discontinuation of the level crossing risk reduction fund does not make a lot of sense"	Northern	As a result of concern over the operational impact of level crossing risk, we've proposed a package of Level Crossing interventions that specifically target TSRs in Appendix D of our plan (package 7)
"We would like to see a strategy associated with Vegetation Management"	Northern	The Route has put significant investment in vegetation management in its CP6 plan to start becoming more compliant with a proposed change in standards. The focus our new vegetation strategy is expected to bring about a decrease in the risk of large trees fouling the line, reducing incidence of vegetation related disruption.
"In the absence of a bottom up Performance plan it is difficult to validate the assertions made about the levels of Performance that are forecast"	Grand Central	We have shared details of how we have developed our TOC forecasts and refined our projections of their PPM MAA over the business planning process. We have also added Appendix K to this RSP to make transparent the movement from CP5 exit to CP6 exit for each of our reportable customers.
"The safety vision needs to encompass Operators' staff too."	Grand Central	We've added reference to Operator's safety in our safety strategy as well as added detail to our system safety strategy the network on which they operate is safe by setting out measures for station safety, suicide prevention and reducing operational incidents
"We'd like to see more detail on the Leicester Grade separation enhancement, which is a key enhancement affecting our business"	Freight-liner	The LNE&EM route continues to engage with the DfT which is progressing the Strategic Outline Business Case for the Leicester grade separation as part of the Leicester Capacity programme.

"There is insufficient detail provided on work delivery efficiency improvements aimed at improving frontline productivity and reduce waste – SEW is outlined but it seems to be an incomplete picture of areas where waste has previously been identified."	Grand Central	We have refined our maintenance plans further by specifying the efficiency improvements we can obtain from new initiatives like SEW and intelligent infrastructure – as well quantifying the productivity improvement we expect from this in terms of increases in time and tools and decreases in non-time on tools over CP6
"We would like to see more on the following: *•Performance improvement.* *•Weather resilience.* *•TSR removal strategy.* *•On time strategy; how you are readying for the changes to performance metrics in CP6."*	Cross Country	Our operational plan has been further developed to set out specific initiatives we will be implementing in CP6 to improve train performance. These include precision timetables, improved business continuity and recovery plans, on time 'start of day' performance, and reducing trespass and route crime. We have looked through workbanks and identified £87.5m of weather resilience related spend in our Structures, Earthworks and Drainage workbanks. This will be supplemented by additional focus on managing vegetation and our drainage systems in CP6 which will assist the weather resilience of our assets. We have added detail to our operational strategy specifically targeting unplanned asset failures that are likely to have severe impact on services and performing overnight repairs to limit delays and TSRs that slow down services. We have added reference in our plans to our initiatives around right-time performance in CP6 to prepare us for new focus on right time measures. This will include ensure putting more emphasis on on-time 'start of day' performance by limiting TSRs and doing emergency asset repair works overnight as well as improving our business continuity and recovery plan in the event of disruptions.
"We appreciate the opportunity to engage with the plan and would like to see it continue beyond CP6 submission deadlines"	Northern	We plan to continue consulting on and developing our CP6 plans with our Customers through Alliance Board Meetings and Level One meetings between Heads of Operations and representatives from our customers. Level one meetings have been put in the calendar for 2018 and will occur eight-weekly with Hull Trains, Grand Central, EMT and Nexus whilst Alliance board meetings will occur four-weekly with GTR and VTEC throughout 2018. We will continue our Right Time Railway control meetings in CP6 with national operators such as CrossCountry and our FOCs.
"You have included a statement that no cross-boundary operator running more than 30 minutes late will be permitted to cross the Route boundary and will be expected to terminate the service instead." – This is highly disruptive to our business operations	Cross Country	We have removed references to this in our operational strategy (section 5) but reiterate that it will become increasingly challenging to manage delayed services on an increasingly busy network in CP6. Priority will generally be applied to services that originate right time from origin. Late running trains will be regulated such that minimal reactionary delay is suffered by other on time services as per the regulation policy and service recovery plans.

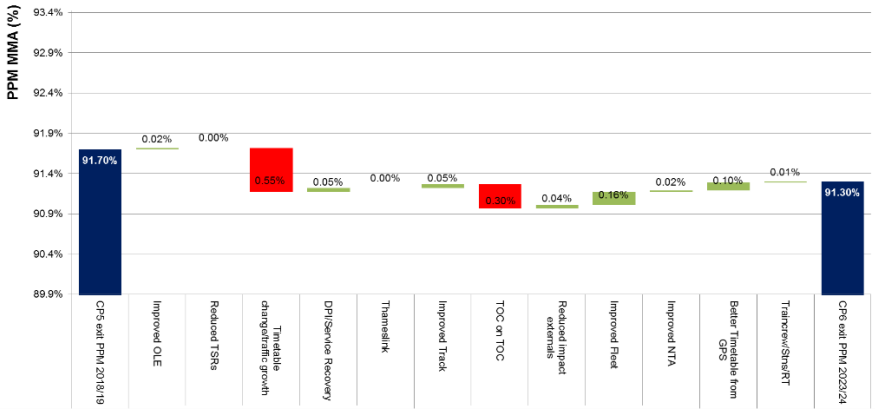
Appendix J Performance Trajectories

Our CP6 train performance forecasts have been developed through a high-level, bottom-up analysis using historical incident and delay information for each TOC. Incident projections were gathered by our RAMs on a per-asset basis and this was combined with DPI numbers to develop delay minutes forecasts. This information was then considered against the total estimated impact of the asset-related CP6 interventions. In addition the estimated impact for non-asset KPIs (e.g. external) was also considered on top of these asset-related performance forecasts to provide an estimate of the CP6 PPM target profile for each TOC. We have recently undertaken a consultation process with each of our TOCs seeking their views on performance through CP6. The charts below are a reflection of these discussions and our own estimates.

Virgin Trains East Coast

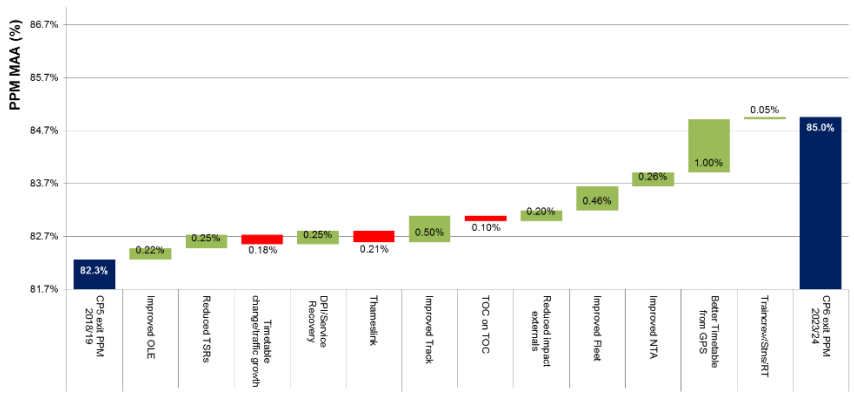


East Midlands Trains

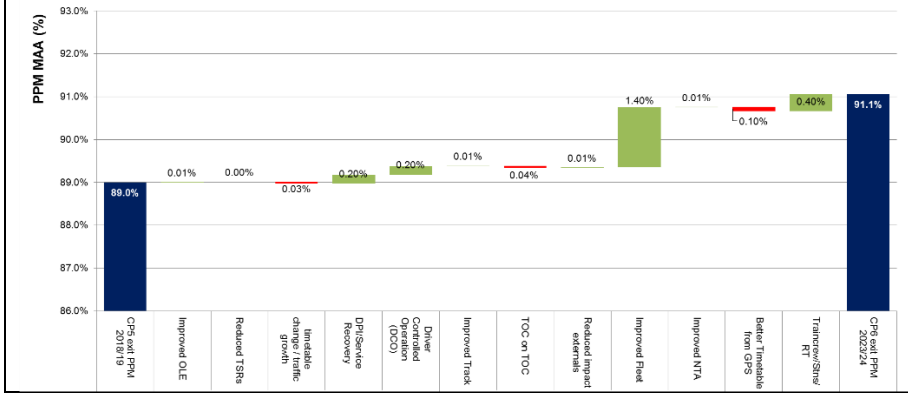


Grand Central

Hull Trains



Northern



Appendix K Further information on third party cash funding contributions

Section A – Extract of non DfT funded Enhancements

Type of Project	CA/LEP Area	Location	AFC (£'m)
Stations	WYCA	Leeds	1,000
Stations	NNYER, WYCA	York	10
Stations	NNYER, WYCA	Harrogate	5
Stations	WYCA	Halifax Master-plan	42
Stations	WYCA	Bradford Master-plan	40
Stations	North Eastern	Sunderland	11
Capacity Improvements	North Eastern	Darlington	50
Stations	SEMLEP	Luton Airport Parkway	149
Stations	NNYER, WYCA	Northallerton	3
New Stations	London	Brent Cross	270
New Stations		Stanton Cross	15
New Stations	Bedford	Wixiams	26
New Stations	WYCA	Leeds – Thorpe Park	20
New Stations	North Eastern	Horden – Peterlee	10
New Stations	WYCA	White Rose – Leeds	11
Stations	North Eastern	Middlesbrough	7
Capacity Improvements	North Eastern	Middlesbrough	3
Depots	NNYER, WYCA	York TPE New Depot	7
Capacity Improvements	NNYER, WYCA	Harrogate Line	12.3
Capacity Improvements	North Eastern	Ashington Blyth and Tyne	150
Capacity Improvements	D2N2	Newark Flat Crossing	140
Development	NNYER, WYCA	York Central	80

Type of Project	CA/LEP Area	Location	AFC (£'m)
Station	Hertfordshire	Stevenage Masterplan	5
Stations	WYCA	WY Car Park Extensions	9
Capacity Improvements	SCR	Rossington	5

Section B – LEPs and associated transport requirements

There are 13 LEPs within the LNE&EM Route and they are as follows:

- North Eastern
- Tees Valley
- York and North Yorkshire
- Leeds City Region
- Humber
- Sheffield
- Greater Lincolnshire
- Derby Derbyshire Nottingham and Nottinghamshire
- Leicester and Leicestershire
- Greater Cambridge and Greater Peterborough
- South East Midlands
- Hertfordshire
- London

Section C – Details of the Strategic Economic Plans (SEP) of the LEPs on the route.

North Eastern SEP

The following SEP priorities are outlined that involve rail:

- A new Horden Railway Station (this is a devolved DfT majors project);
- Investment in the Central Station at Newcastle and the South Shields Transport Hub;
- A comprehensive integrated smart ticketing approach;
- A continuous 75mph route for rail freight between Newcastle and Northallerton (possibly involving the reinstatement of the Leamside line);
- Better local rail services into Newcastle from Northumberland, County Durham and Teesside;
- Improvements to the Durham Coast Line; and
- The reinstatement of the Ashington, Blyth and Tyne line for passenger services.

Further to the SEP, the latest priority focus of relevant activity has been presented by the LEP as being the following:

- Reopening the Ashington, Blyth and Tyne line to passenger services;
- Improvements at Newcastle Central Station to make it HS2 ready;
- New station at Horden (Peterlee) on the Durham Coast Line;
- Sunderland Rail Station Gateway;
- Capacity improvements on the ECML including freight loops Northallerton-Newcastle and the Leamside line;
- Metro and local rail extensions;
- Other Durham coast line improvements including Boldon & Tilesheds level crossings;
- Tyne Valley line improvements including Gilsland station; and
- Development of Strategic Rail Freight Interchange.

Tees Valley SEP

The following SEP priorities are outlined that involve rail:

- Track, signalling and platform improvements at Darlington Station to reduce conflict between main line and local services. Improvements will also ensure that Darlington station is ‘High Speed 2’ ready -16/17-20/21;
- Electrification of the Northallerton – Middlesbrough – Tees Dock rail line to link in with wider TransPennine electrification proposals and the UK rail container network;
- Full programme of rail loading gauge improvements to allow transport of largest containers by rail to and from Tees Dock;
- Freight capacity improvements by road, rail, sea and air, particularly focussed upon Teesport and Durham Tees Valley Airport, and the

potential growth in the container, energy from waste and bio industries markets; and
- Increase frequencies, reduce journey times, enhance station facilities, and provide improved rolling stock on the local Tees Valley Rail network

York, North Yorks and East Riding SEP

The following SEP priorities are outlined that involve rail:

- Improve East West connectivity, particularly between towns and their neighbouring cities. It is paramount to improve East-West transport connections across the entirety of the LEP area, with the primary focus on routes between towns and cities: specifically the Leeds-Harrogate-York, York-Scarborough and Leeds-Selby-Hull rail corridors;
- Maximise high-speed rail investment through station improvements and better access. Get York Station high speed ready and as multi-modal sustainable transport hub for the area. Station improvements at Harrogate, Thirsk, Selby and Seamer. Improve access to rail stations across the area; and
- Alongside our £9.6m investment in the rail line between York and Harrogate, which is crucial to electrification plans, improvements we have secured include:
- Four trains per hour between Harrogate and Leeds
- Twice as many trains between York and Scarborough
- Increased frequency between York and Hull
- Newer, better trains and investment in station facilities.

Leeds SEP

The following SEP priorities are outlined that involve rail:

- Deliver the package of 31 strategic projects prioritised within the £1 billion West Yorkshire plus Transport Fund;
- Identify, prioritise and deliver schemes within a second and further rounds of West Yorkshire plus Transport Fund;
- Maximise opportunities and improvements through investment across modes beyond the Transport Fund, e.g. HS2, Northern Powerhouse Rail, Transport for the North, smart ticketing, improved rail franchises; and
- Deliver sustainable and affordable travel services and initiatives to promote access to employment, education and training.

Humber SEP

The following SEP priorities are outlined that involve rail:

- The South Humber Rail Gauge Enhancement project – Network Rail is the delivery partner and is in the process of resolving the cost increase it has experienced;
- The LEP is awaiting a decision from the Department for Transport on the Hull-Selby Rail Electrification project. This remains a strategic priority for the area for ensuring continued and more efficient direct connectivity to London and Leeds/Manchester;
- Network Rail has been upgrading level crossings, stations and bridges, replacing track and updating 60 miles of signalling between Immingham, Scunthorpe and Cleethorpes as part of a £100m investment in Greater Lincolnshire;
- Network Rail are undertaking a £50m+ re-signalling project from Hull to Gilberdyke which will be completed by 2018; and
- TransPennine Express will also deliver an investment of £1.4 million in Hull Paragon Station this year in advance of the City of Culture year.

Sheffield SEP

The following SEP priorities are outlined that involve rail:

- To develop a bold master plan which will seek to maximise job growth in the immediate vicinity of the new HS2 station and form an important part of the Sheffield City Region (SCR) Integrated Infrastructure Investment Plan;
- Local partners have committed to investing collective resources up to

a value of c£500,000 in the development of a targeted and co-ordinated intervention package which will underpin plans for a world class connectivity to the HS2 network from across SCR, as well as support the vision to connect key urban centres and employment sites to a range of sustainable transport options;

- The SCR will continue to work as part of Rail North to develop the case for the devolution of the next Northern and TransPennine Franchises;
- Implementation of the Long Term Rail Strategy, developed by Rail North; and
- In support of a shared priority for SCR, D2N2, LLEP and SEMLEP up to £5 million contribution from Government for line speed improvements on the MML to build resilience into the proposed electrification work.

Greater Lincolnshire SEP

The following SEP priorities are outlined that involve rail:

- Lincoln Central Transport Hub – A new bus station, pedestrian footbridge and car park, integrated with the train station and connecting to the Science and Innovation Park, improving transport linkages to attract new investment;
- Lincoln to Nottingham Train Enhancements – A proposal has been drawn up by lead partners to enhance service and capacity between Lincoln and Nottingham for a three-year period; and
- Rail Strategy for investment in the Greater Lincolnshire rail infrastructure is a priority to:
- Be a lobbying tool for investment in the revised East Midlands Train Franchise renewal
- Influence the development of the Long Term Rail Strategy for the North of England
- Lobby for enhancements to connectivity where the Greater Lincolnshire rail services terminate in a TfN city
- Lobby Midlands Connect for service enhancements
- Continue to work with Virgin Trains to ensure the enhanced offer of the direct rail service Lincoln to London is delivered
- Act as a catalyst to discuss the rail offer in more rural areas suffering rural transport deprivation
- Collectively lobby for additional investment in Greater Lincolnshire rail infrastructure.

Derby, Derbyshire, Nottingham, Nottinghamshire (D2N2) SEP

The following SEP priorities are outlined that involve rail:

- Lincoln – Newark – Nottingham rail corridor: working with East Midlands Trains (and Greater Lincolnshire LEP) to increase train frequencies on this corridor, improving connectivity and supporting a shift to travel by train on this key regional corridor;
- We will work with Network Rail, LLEP and SCR to develop business case for realignment of track at Market Harborough, before electrification of the Midland Main Line, and to ensure that connectivity benefits to the wider MML corridor have been fully captured. We will proactively support the delivery of the line speed improvement, including consideration of potential contribution of LGF funding to support the project;
- Development of East Midlands HS2 connectivity package, including options for through connections to classic lines, heavy rail connections to the proposed station; and
- Development of mass transit options, together with master planning within wider Broxtowe and Erewash area.

Leicester and Leicestershire SEP

The following SEP priorities are outlined that involve rail:

- East Midlands Gateway Strategic Rail Freight Interchange – A unique 250 acre distribution and logistics development alongside East Midlands Airport and the M1 with a rail terminal providing up to 6 million sq. ft. of large scale warehousing to establish the UK's largest multi modal hub creating over 7,000 new jobs.

South East Midlands SEP

The following SEP priorities are outlined that involve rail:

- Key planned projects are the western section of East West Rail from Oxford to Bedford. It will be essential to ensure that there is no loss of momentum as the focus moves to the central section of the East West Rail project from Bedford to Cambridge;
- The planned route for HS2 will pass through the south west of the South East Midlands and cross the East West Rail route north of Aylesbury at Calvert. SEMLEP is working with Network Rail to ensure that any additional capacity released on the West Coast Main Line as a result of HS2 is used to enhance journey times to Milton Keynes and Northampton; and
- With regard to the second section of HS2 north of Birmingham to Leeds, it will be important to ensure that the planned electrification of MML proceeds north of Bedford and that Kettering benefits from an enhanced service both south to London and north to Derby and Sheffield.

Greater Cambridgeshire and Peterborough SEP

The following SEP priorities are outlined that involve rail:

- A new station to serve the new communities of Hampton and Great Haddon in south Peterborough;
- Improved frequency between Cambridge and Peterborough and London; and
- Improved frequencies on rural and cross country routes:
- Peterborough to Ipswich
- Peterborough to Lincoln.

Further views from the LEP have included the following as current priorities:

- Support for existing planned Network Rail upgrades (e.g. north of Peterborough);
- Supportive of the new station (and turn back facility) at Alconbury Weald new settlement, north of Huntingdon;
- Importance of Peterborough Station as a key node (not just north/south, but connecting East of England to Midlands);
- Ensuring the impacts of HS2 on the ECML capacity/services is positive for the GCGP economy; and
- East/West Rail route (would need to interact with EMCL).

Hertfordshire SEP

The following SEP priorities are outlined that involve rail:

- Stevenage Urban Futures (housing joint venture and delivery vehicle) and A1(m) Growth Area Forum (£2m from 2015/16 LGF; and £10m in later years) – Project to accelerate the regeneration of Stevenage town centre, including provision for some acquisitions and site assembly, and also to advance major schemes across the A1(m) Growth Area; and
- Station Gateway Project, Stevenage (£800k from LGF) – Project to provide access to the town centre from the station via an uncovered link bridge.

London SEP

The Growth Deal for London priorities around transport and connectivity are extremely detailed across the enormous economic footprint of the capital. The Route area of activity is limited in comparison and as such it is difficult to apply the SEP priorities to this, in comparison, small area. However, when approaching the possibility of a Business Development project in this part of the Route, it is important to consult the London Enterprise Panel.