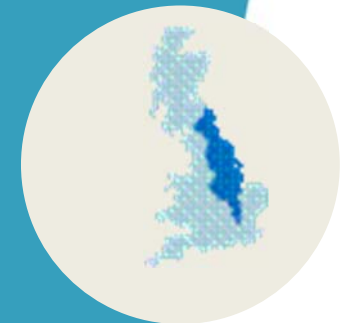


London North Eastern & East Midlands Route



Route Strategic Plan

March 2019



Introduction from the Route Managing Director

During CP6 we will focus on ensuring that our railway meets the needs of the passengers and customers that it serves. It is this straightforward aim which underpins our vision and mission for CP6, which is to achieve: ***'Efficient and effective 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 objective for renewals of returning to CP4 levels of efficiency.

During CP6 we will deliver unprecedented levels of change to the LNE & EM route with the realisation of multi-million pound investments on the MML, ECML and Transpennine corridors. This will be transformational for passengers with a 15% growth in train services across our Route.

Whilst growing our railway we will also improve underlying infrastructure reliability and sustainability, reducing the number of service affecting failures by 9.9% through targeted renewals and a significant investment in our maintenance capability. This will support an ongoing drive to improve operating performance in the face of the headwinds of additional intensity of usage of our network on an aging asset base.

The safety of our passengers, the wider public and those that work on the railway is and always has been our top priority. During CP6 we will target a 65% reduction in working time lost to injuries. This will be underpinned by our main safety objective of eliminating manual handling injuries, our single biggest cause of accidents.

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 will allow 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. With 45% of the workforce becoming eligible for retirement over the next two control periods, we will put in place now a strategic workforce plan that responds to the future needs of our 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	5
1.1	Background to LNE & EM	5
1.2	CP6 strategic context challenges and opportunities	6
1.3	Railway vision, objectives and commitments for CP6	7
1.4	What we will deliver.....	9
1.5	Summary of our proposed distribution of funding and efficiencies to deliver our plan	10
1.6	Summary of the remainder of our RSP	11
1.7	Output summary	12
2	Route objectives.....	14
2.1	Long term scorecard	14
2.2	Key drivers of long-term performance	17
2.3	Regulatory floors	19
3	Safety.....	20
3.1	Safety.....	20
3.2	Safety activity prioritisation and risk outcome	21
3.3	Safety strategy	22
3.4	Occupational Health & Wellbeing strategy	26
3.5	Security strategy	26
4	Performance, Customers and People	28
4.1	Performance, Customers and People objectives	28
4.2	Activity prioritisation and risk outcome	30
4.3	Train Performance Strategy	33

4.4	Operational Performance strategy.....	34
4.5	Capacity and timetabling strategy	35
4.6	Organisational capability	37
5	Sustainability & asset management capability.....	39
5.1	Sustainability & asset management capability objectives.....	39
5.2	Sustainability & asset management capability activity prioritisation	40
5.3	Asset by asset key outputs.....	41
5.4	Long run forecast	51
5.5	Sustainable Development strategy.....	52
5.6	Research, Development and Technology (R, D&T)	52
5.7	Innovation strategy	53
5.8	Asset management capability.....	53
5.9	Specific Sustainability Targeted Investment.....	54
6	Financial performance	56
6.1	Financial performance objectives	56
6.2	Financial performance activity prioritisation.....	57
6.3	Financial Sustainability strategy	58
7	Activities & expenditure	61
7.1	Cost and volume summary.....	61
7.2	Enhancements	65
7.3	Digital Railway.....	67
7.4	Telecoms strategy	71
7.5	Property strategy	73
8	Delivery strategy.....	77
8.1	Summary route deliverability statement.....	77

LNE & EM Route Strategic plan

8.2	Planning a Better Network strategy.....	78
8.3	Project Delivery (IP) strategy	79
8.4	Costing approach	80
8.5	Maintenance strategy.....	83
8.6	Communications	87
8.7	Change	88
8.8	Social & environmental performance	89
8.9	Diversity & inclusion	89
8.10	Quality.....	90
8.11	Information Technology and Information Management.....	90
9	Headwinds and efficiency	92
9.1	Capex fishbone	93
9.2	Opex fishbone	94
9.3	Cost drivers, headwinds and efficiency	96
10	Risk and uncertainty in the plan	98
11	CP6 regulatory framework	102
12	Sign-off.....	104
Appendix A	Stakeholder Engagement	105
Appendix B	Key assumptions	116
Appendix C	Route context	118
Appendix D	Scenario planning	119
Appendix E	Asset by asset long term forecast.....	131
Appendix F	Freight and National Passenger Ops Plan.....	136

Appendix G	List of supporting annexes	151
Appendix H	Glossary of terms.....	152

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. It 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.

Geographically it is the biggest Network Rail (NR) 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. Eight franchised operators and two open access operators (to become three in Control Period 6) serve the Route's 414 stations, catering for the full range of inter-city, inter-urban, regional and commuter markets.



Figure 2: The LNE & EM Route Map

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 1 highlights the Route's importance to its communities and the UK economy as a whole. This serves to emphasise the need for our plans for Control Period 6 (CP6) to make best use of the available funding so that the railway can continue to support a growing economy and expanding population.

Control Period 5 (CP5) was a challenging time for the Route and the industry as a whole. Delivery of our ambitious renewals programme was compromised by under-preparation coming into the Control Period, which contributed to missed targets and cost escalation with our renewals portfolio being delivered less efficiently than in Control Period 4 (CP4). More recently, our passengers have had to endure significant disruption in the wake of planned timetable changes in May 2018 alongside a series of extreme weather events, which we are currently working hard with our TOC customers to resolve.

Despite this, there are many aspects of our delivery which have seen improvements in CP5 which we will build upon in CP6. In 2018/19 year to date, our maintenance organisation is delivering 13% more output in terms of maintenance tasks completed than at the start of CP5. This has been achieved through the implementation of Safe and Effective Working and the fitment of a large amount of remote condition monitoring equipment to points, track circuits and a number of other different asset types which means that average time on tools has increased over the same period. Our consolidated Rail Operating Centres (ROCs) at York and Derby have improved the efficiency of our operations organisation and are enabling 2 million more train miles to operate each year on our network than at the start of CP5.



Figure 1: LNE & EM facts and statistics

During CP6 we will build upon this momentum and the lessons learned from CP5 in delivering our ambitious yet realistic and plan. We have invested significant resources in preparing for its implementation to enable us to hit the ground running at the start of CP6.

1.2 CP6 strategic context challenges and opportunities

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

The recent issues surrounding the May 2018 timetable change serve to highlight the performance risks associated with major timetable change. Further major changes will be delivered during CP6, with a 15% increase in the number of train services due to operate on our Route by the end of CP6. This increased intensity of usage will place additional strain on our asset based and make it more challenging to deliver improvements in performance. This is one of the key reasons why we will increase maintenance expenditure by 15% to support delivery of these service improvements. We will also continue to work closely with our TOC customers to learn the lessons from May 2018 to ensure that there is no repeat of these problems in the delivery of these future changes.

Our funding settlement will broadly enable us to maintain an ageing asset

Our CP6 settlement of £5.45bn for Operations, Maintenance and Renewals represents an increase in real terms of funding relative to CP5. However, the underlying position is that many of LNE & EM's assets are amongst the oldest on the network and are being pushed to the limits of their design life. For example the last ECML upgrade began in the 1970s and concluded in 1991 with the last stage of electrification to Edinburgh. Our delivery plans are therefore focused towards broadly maintaining the underlying condition of our assets and supporting delivery of targeted incremental performance improvements, which will be achieved through more efficient and effective delivery.

Significant opportunities to modernise how we deliver the railway

During CP6 we will build upon our investment in technology and better ways of working to enable more effective delivery. For example, much of our infrastructure is now fitted with Remote Condition Monitoring (RCM) equipment which allows us to better monitor asset condition and more effectively plan maintenance and renewals. Programmes such as Safe and Effective Working (SEW) are already starting to bear fruit in delivering both safety improvements and maintenance efficiencies. Further investments in 'Intelligent Infrastructure' including RCM will enable us to embrace an asset management approach based upon real-time information on asset condition.

We are planning for the roll-out of Digital Railway on the ECML during CP6, which will enable a transformational change in the way the railway is delivered, providing full technological alignment between track and train.

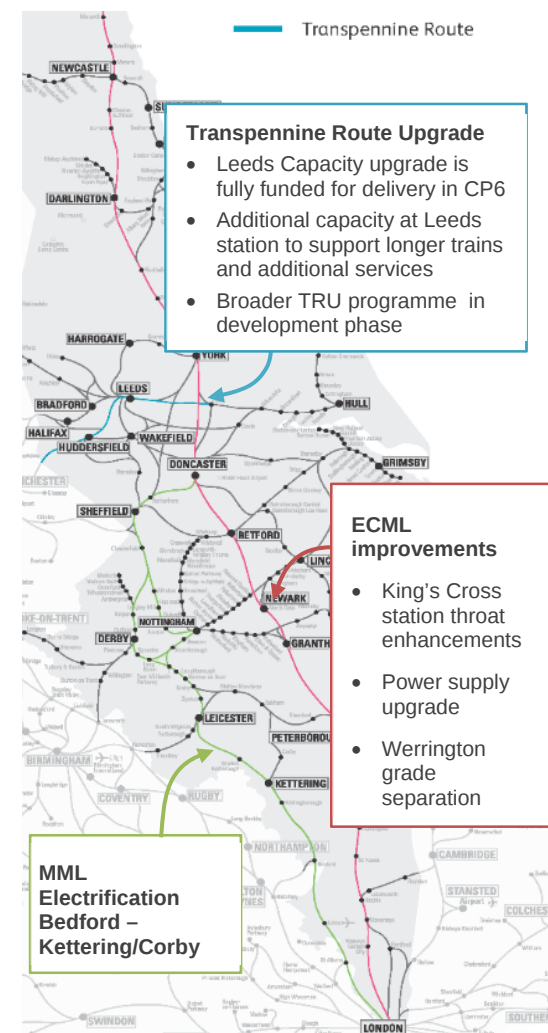


Figure 3: Key planned and potential enhancements across LNE & EM routes during CP6

1.3 Railway vision, objectives and commitments for CP6

1.3.1 Vision and objectives

Our vision and mission for CP6 is to achieve: ***‘Efficient and effective delivery which is responsive to customer and stakeholder priorities’***

Our ‘strategy-on-a-page’ below summarises how our **Transforming Asset Management** approach will improve our overall capability to enable efficient and effective delivery, and the **outcomes** we are targeting.

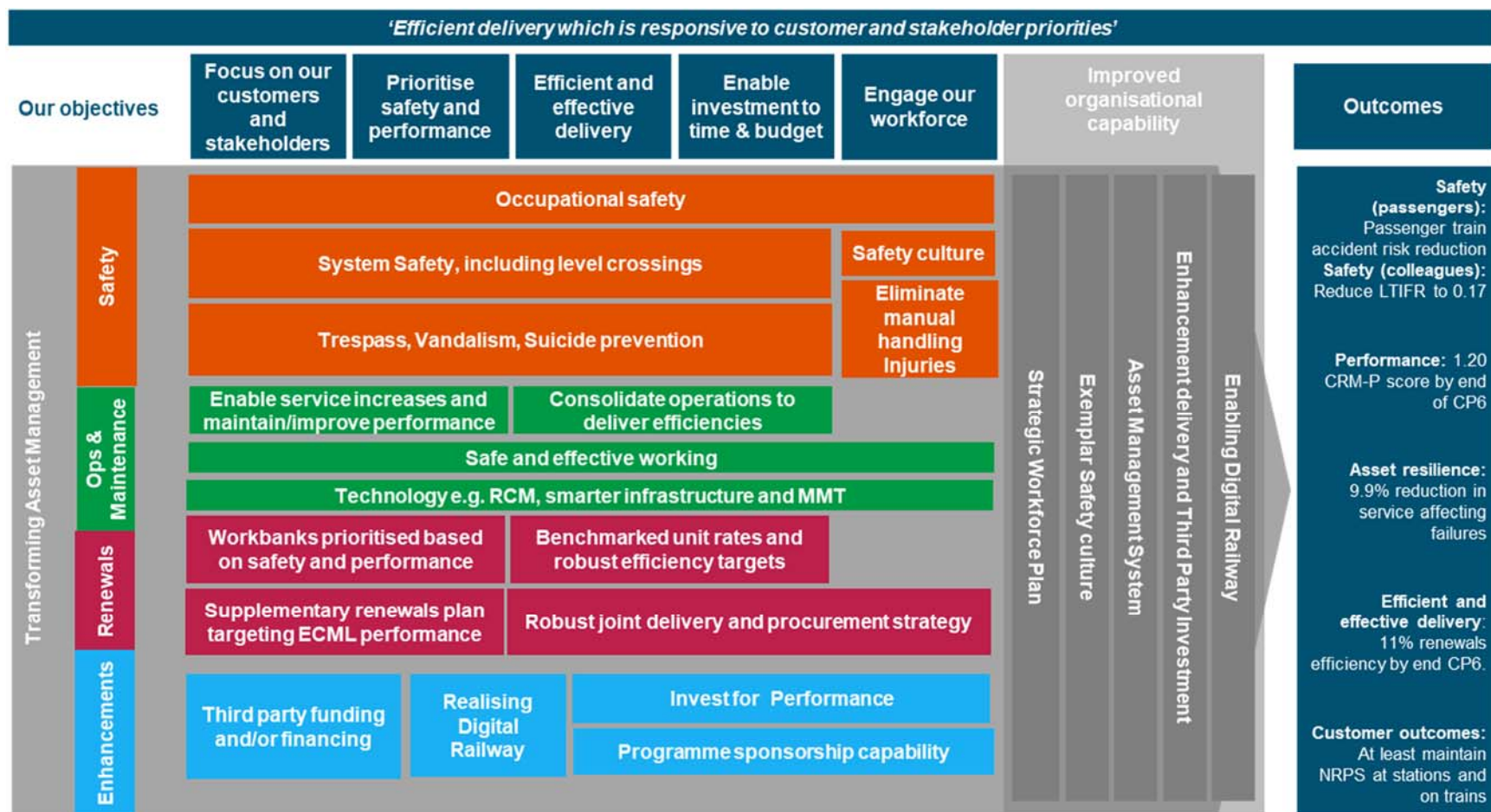


Figure 4: CP6 Strategy on a page

1.3.2 Transforming Asset Management

We will improve efficiency and effectiveness of delivery across all core asset management activities in CP6 through the following key strategies:

- Our **safety strategy** (section 3.3) 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 4.4) is designed to accommodate the significant increases in train services that will be delivered during CP6. We are working closely with the NR System Operator and our customers to learn the lessons from the May-18 timetable implementation so that the significant planned timetable changes in CP6 are delivered effectively. By consolidating control into the Derby and York ROCs we will provide more efficient and effective operational control to improve performance for our passengers
- Our **maintenance strategy** (section 8.5) is underpinned by a detailed bottom-up activity based planning exercise. In CP6 we will 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. 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 5.3) will prioritise funding towards activities which minimise safety risks and improve performance utilising the local knowledge of our Asset Managers. Where appropriate we will refurbish and life extend assets at 'lowest initial cost' in order to maintain safety and performance within budget. We will minimise abortive signalling renewals south of Peterborough given that we are seeking to deliver Digital Railway on this corridor by the end of CP6 once funding is confirmed.
- To enable the efficient and effective delivery of our **enhancements** (section 7.2) we have invested in programme sponsorship capability within our Route organisation to ensure continued focus on delivery of the benefits of each programme within the defined budget.

This core strategy will be 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. We will establish consolidated 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 aim of achieving accreditation to BS55001
- **Efficient and optimal access planning** on the Route, working in partnership with our TOC and FOC customers (section 8.3). 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 4.6)
- **Enabling Digital Railway** – we aim to enable Digital Railway on the ECML south of Peterborough by the end of CP6, and have instigated tender processes to identify and appoint delivery partners for Train Control, Railway Systems Integration and Traffic Management. In addition to traditional government funding, we will seek external sources of funding and financing to accelerate delivery (section 7.3).

1.4 What we will deliver

Core commitment	What we will deliver	How we will deliver it
Ensure we are operating in a <u>safe environment</u>	Reduction in LTIFR to 0.17	- Deliver IOSH training to Maintenance and Works Delivery staff, based on requirements of Delivery Unit safety plans, to support the identification and assessment of risk, and implementation of controls. - Improve conditions and facilities to reduce Slips, Trips and Falls by upgrading all 'Golden Access Points' across the Route during CP6, in line with the Safe and Effective Working access print. - Deliver training to all MOMs, level crossing managers and Maintenance and Works Delivery staff to reduce the risk of road traffic accidents involving employees.
	Elimination of manual handling injuries	- Deliver training on the correct manual handling methods to all Maintenance and Works Delivery staff across the Route during CP6, based on requirements of Delivery Unit safety plans. - Invest in plant and materials, such as motorised trolleys, RRVs with trailers, road trailers, and small tools and other equipment e.g. grinders. - Improve planning and logistics through Safe and Effective Working initiatives such as the stores improvement programme.
	Improvement in safety at level crossings	- Commit funding to deliver 130 level crossing interventions throughout CP6. - Target improved protection of user worked crossing by investing £6m for the installation of miniature stop lights.
Deliver <u>performance improvements</u> for our customers	Improvement in CRM-P measure to 1.20	- Deliver precision timetabling, by following agreed principles such as those relating to right time starts and service recovery. - Introduce Incident Management Software, alongside other new technology, to the Derby and York ROCs by the end of Year 1 of CP6. - Support the System Operator with the production of timetables, using performance data to propose alterations. - Work with FNPO to review the timetable, identifying opportunities to improve average speed origin-destination.
	Achieve jointly agreed customer measures	- Monitor our performance against the activities included in the previously agreed performance delivery strategies through joint control rooms with our train operators. - Report on performance measures, as identified by TOCs in development of the Level 2 customer scorecards, at every Level 1 / Alliance Board meeting. - Update and agree service recovery principles, with our TOCs twice a year, in line with timetable changes.
<u>Efficient delivery</u> of renewals, maintenance and operations activities	11% renewals efficiencies	- Improve workbank evaluation and option selection. - Adopt a targeted delivery / contracting strategy. - Optimise access planning. - Reduce deliverer overheads.
	4% operations and maintenance efficiencies	- Invest in and implement Intelligent Infrastructure initiatives, including Remote Condition Monitoring on all critical assets. - Complete implementation of our Safe and Effective Working programme by Year 3 CP6. - Deliver risk based maintenance improvements. - Continue to centralise signalling operations to the York and Derby ROCs.
<u>Improve asset reliability and sustainability</u>	9.9% reduction in service affecting failures	- Improve the productivity of our maintenance organisation, through the delivery of our Route Intelligent Infrastructure programme, and dedicated working group. - Renewals strategy to focus on 'lowest initial cost' works - Off Track and Drainage managed by a separate Route Asset Manager with a dedicated budget to support the underlying sustainability of our earthworks and track assets and reduce risk to assets of extreme weather
	Achieve Composite Reliability Index target of 8.9%	- Improve the short-term condition and performance of our assets by prioritising renewals funding towards activities which minimise safety risks and improve asset performance - Adopt a policy of life extension and refurbishment, rather than full renewals works
	Integrated asset management strategy	- Develop line off route asset management strategies focussed on route strategic outcomes. - Optimise route delivery strategies to increase value for money. - Develop and implement end to end integrated business planning processes across all functions. - Drive an organisation that is empowered and which has clear lines of accountability.

1.5 Summary of our proposed distribution of funding and efficiencies to deliver our plan

The following section provides an overall summary of the distribution of our funding to deliver our strategy, reflecting these changes

Our baseline CP6 budget is £5.45bn (in cash prices)

Figure 5 shows how we will allocate our budget between Operations, Maintenance and Renewals.

We will allocate our Renewals budget between the various asset disciplines based upon a detailed bottom-up assessment of the risk profile of each workbank, informed by the local knowledge of our Route Asset Managers. This has been 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. extension of electrification on the MML, legislative compliance and policy, and increased weather resilience requirements). Figure 6 shows the resultant allocation of our renewals budget which we will deliver during CP6.

Our baseline plan includes 8.1% renewals and maintenance efficiencies

As we set out in section 8.4, 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 7 illustrates the proposed geographic distribution of spend across the LNE & EM route.

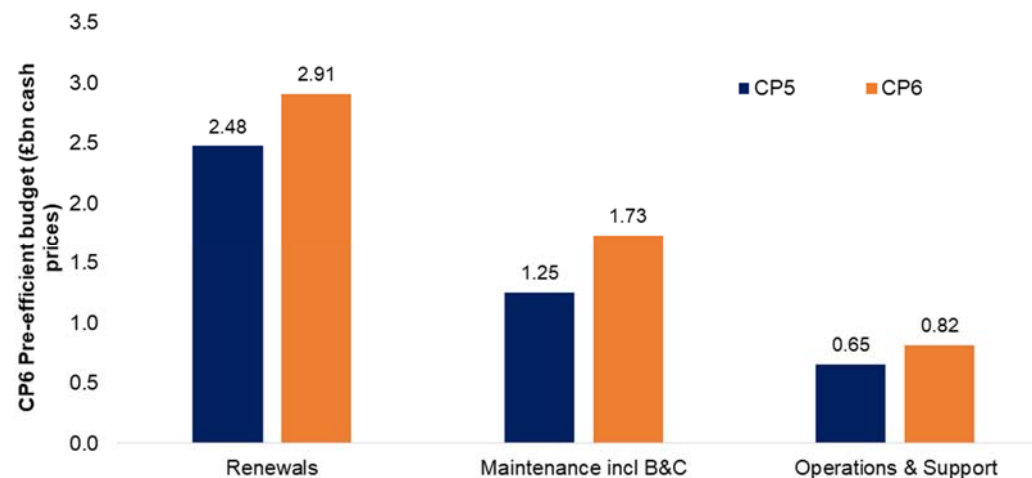


Figure 5: LNE & EM CP6 funding allocation between O&M and Renewals

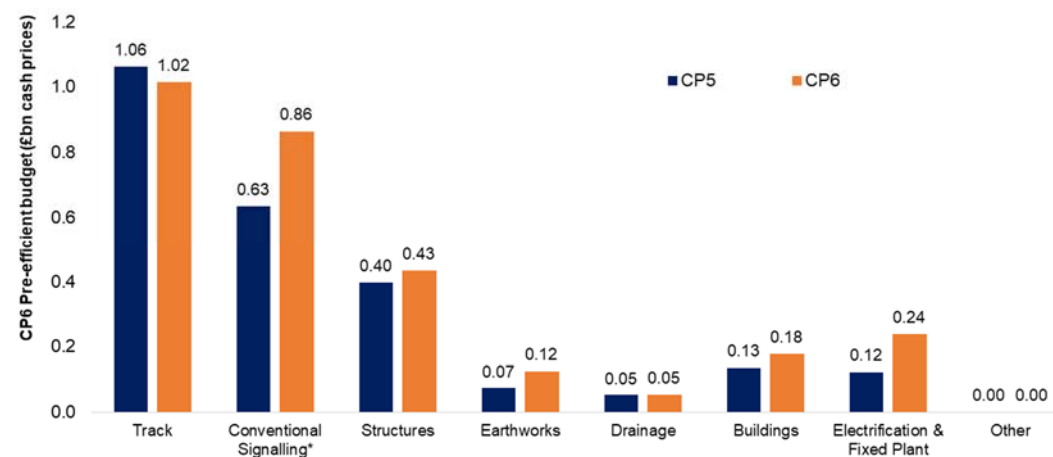


Figure 6: LNE & EM CP6 Renewals funding by asset

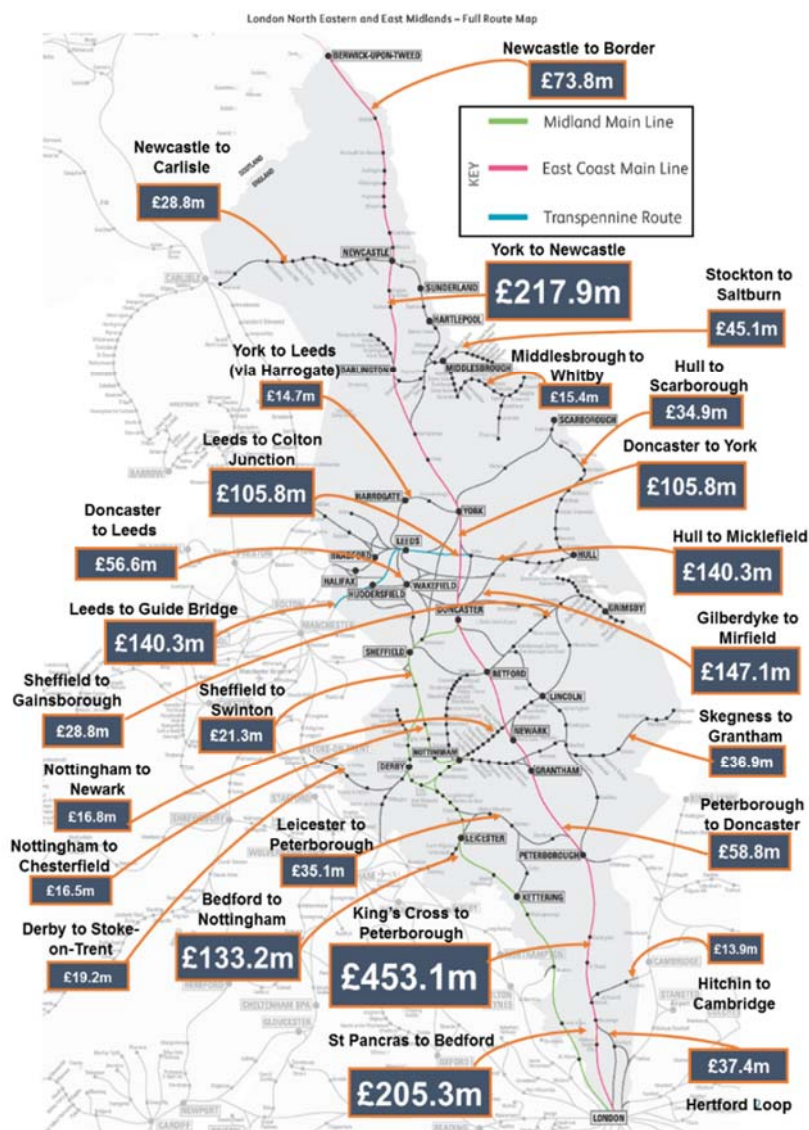


Figure 7: Overview of planned renewals spending in CP6 on the LNE & EM Route. Figures are indicative based on 2017/18 RF6 submission.

1.6 Summary of the remainder of our RSP

Chapter 2 – 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 3 – Safety sets out the Route's objectives, and our Stakeholders' key priorities relating to safety, as well as how we propose to continue to change the culture of the organisation to realise the benefits of devolution

Chapter 4 – Performance, Customers and People sets out the Route's objectives, and our Stakeholders' key priorities relating to train performance and other locally driven measures. This section 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 5 – Sustainability and asset management capability sets out the Route's objectives, and our Stakeholders' key priorities relating to sustainability and asset management capability. In this section we have set out our prioritised asset intervention strategy alongside strategies for sustainable development, technology and innovation.

Chapter 6 – Financial performance sets out the Route's objectives, and our Stakeholders' key priorities relating to financial performance. This section discusses 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 7 – 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. This section also includes a description of our Digital Railway strategy.

Chapter 8 – Delivery strategy provides a summary of the strategies that will be employed to ensure efficient and effective delivery of our plan.

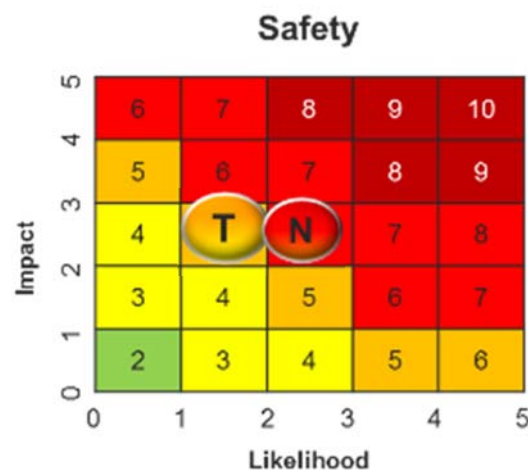
Chapter 9 – Headwinds and efficiency includes a description of the head winds and efficiency plans accounted for in our plan.

Chapter 10 – Risk and uncertainty in the plan sets out our estimate of the degree of financial uncertainty within our plan, including our estimate of the overall range of uncertainty across our expenditure and income for CP6.

Chapter 11 – CP6 regulatory framework sets out the funding and financing implications of our plan for CP6.

1.7 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 DRAM 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).

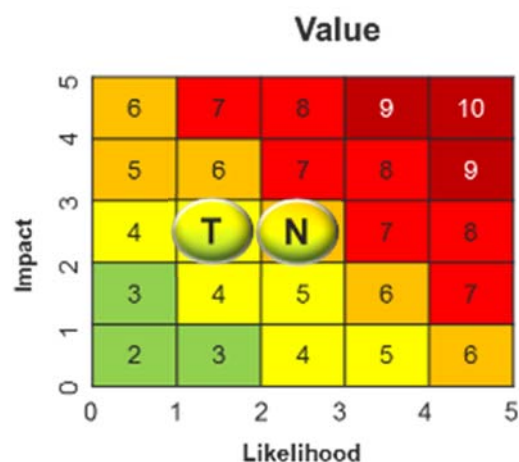


Summary of risk outcome

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 by the end of CP6.

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 risk based approach to investment decisions will result in improved performance in areas such as Drainage, Earthworks and E&P.

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.

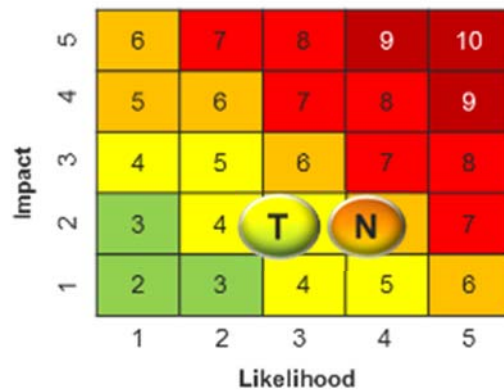


Summary of risk outcome

Value is currently poor and just better than appetite as renewals unit rates have increased throughout the current control period, resulting in volume reductions for CP6 that have impacted sustainability.

Significant focus has gone into assuring the rates used for planning CP6 including the forecasting of headwinds. Work is also progressing in relation to efficiencies and as these mature may deliver greater efficiency than previously expected. This will enable the route to meet the increased efficiency challenge posed by the ORR.

Performance

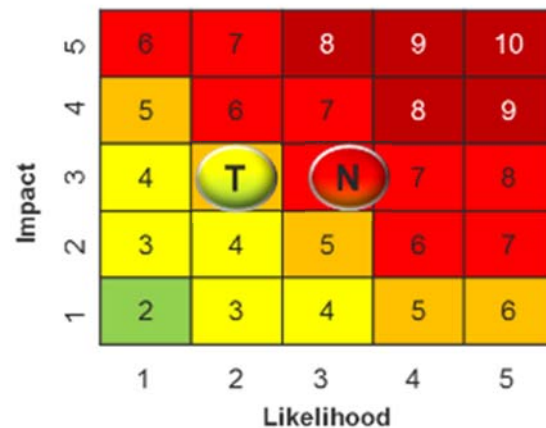


Summary of risk outcome

The funding level will restrict our ability to meet our customers' and key stakeholders' performance targets. However, targeting key areas such as operational management, performance management, remote condition monitoring and risk based maintenance improvements, will result in reductions in service affecting 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 an aging network and significant growth in train miles and a more challenging timetable.

Political/ Reputation



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.

2 Route objectives

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

2.1 Long term scorecard

The following table provides the Long term scorecard throughout CP6 and into CP7 for the Route.

Table 1: Long term scorecard

Long term scorecard	Forecast	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	Achievability	Definition
Safety											
Lost Time Injury Frequency Rate (LTIFR)	WORSE THAN TARGET	0.534	0.338	0.295	0.248	0.214	0.179	0.179	0.179		Means time lost to injuries and fatalities among Network Rail staff and contractors employed by Network Rail.
	TARGET	0.509	0.322	0.281	0.236	0.204	0.170	0.170	0.170		
	BETTER THAN TARGET	0.484	0.306	0.267	0.224	0.194	0.162	0.162	0.162		
Risk Management Maturity Model (RM3)	WORSE THAN TARGET	6	6	6	6	6	6	6	6		Measures our achievement of milestones for health and safety risk management. This measure will be defined in more detail over the next year as targets will be set year on year.
	TARGET	8	8	8	8	8	8	8	8		
	BETTER THAN TARGET	10	10	10	10	10	10	10	10		
Train Accident Risk Reduction (TARR)	WORSE THAN TARGET	60%	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%	80%		
	BETTER THAN TARGET	100%	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	6		Measures our achievement of the Top-10 milestones to reduce level crossing risk.
	TARGET	8	8	8	8	8	8	8	8		
	BETTER THAN TARGET	10	10	10	10	10	10	10	10		
Financial Performance											
Financial Performance Measure – Gross Profit & Loss*	WORSE THAN TARGET	-11.0	-11.9	-11.7	-11.6	-11.4	-11.3	TBC	TBC		Measures how we are performing against our Income & Opex budget. Our target for the year is £0 (break-even). A positive figure represents outperformance against our target. *Note that measures have been determined by applying a % to the OPEX budget, as income has not been finalised at RF8.
	TARGET	0.0	0.0	0.0	0.0	0.0	0.0	TBC	TBC		
	BETTER THAN TARGET	11.0	11.9	11.7	11.6	11.4	11.3	TBC	TBC		
Financial Performance Measure – Gross Renewals (£m)	WORSE THAN TARGET	-27.7	-30.1	-36.7	-34.5	-31.4	-28.4	TBC	TBC		Measures how much renewals projects are costing compared to our budget. Our target for the year is £0 (break-even). A positive figure represents outperformance against our target.
	TARGET	0.0	0.0	0.0	0.0	0.0	0.0	TBC	TBC		
	BETTER THAN TARGET	27.7	30.1	36.7	34.5	31.4	28.4	TBC	TBC		

Long term scorecard	Forecast	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	Achievability	Definition
Financial Performance Measure – Gross Enhancements* (£m)	WORSE THAN TARGET	-27.2	-36.8	-23.7	-10.8	-1.0	0.0	TBC	TBC		Measures how much Enhancements are costing compared to baselines. Our target for the year is £0 (break-even). A positive figure represents outperformance against our target. *Note refers to remitted enhancements only
	TARGET	0.0	0.0	0.0	0.0	0.0	0.0	TBC	TBC		
	BETTER THAN TARGET	27.2	36.8	23.7	10.8	1.0	0.0	TBC	TBC		
Cash Compliance	WORSE THAN TARGET	38.5									Measures how well we use each year's available funding
	TARGET	19.3									
	BETTER THAN TARGET	0	0	0	0	0	0	0	0		
Investment											
Top Investment Milestones	WORSE THAN TARGET	80%	80%	80%	80%	80%	80%	80%	80%		These milestones measure our achievement of interim milestones of our top renewals and enhancement projects.
	TARGET	90%	90%	90%	90%	90%	90%	90%	90%		
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%		
Sustainability and Asset Management											
Renewals - 7 key volumes	WORSE THAN TARGET	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%		Our seven key volumes for renewals are plain line track; switches and crossings; signalling and equivalent units; underbridges; total earthworks; wire runs; and conductor rail.
	TARGET	95.0%	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%	100.0%		
Composite Reliability Index (CRI)	WORSE THAN TARGET	n/a	0.0%	0.0%	0.0%	0.0%	0.0%	TBC	TBC		The Composite Reliability Index ("CRI") is a measure of the short-term condition and performance of our assets including track, signalling, points, electrification, telecoms, buildings, structures and earthworks. The index shows the total percentage improvement in asset reliability compared to the end of the previous Control Period.
	TARGET	n/a	0.5%	3.2%	6.1%	7.4%	8.9%	TBC	TBC		
	BETTER THAN TARGET	n/a	0.9%	6.5%	12.0%	14.4%	17.1%	TBC	TBC		
Composite Sustainability Index (CSI)	WORSE THAN TARGET	TBC	TBC	TBC	TBC	TBC	-1.8%	TBC	TBC		The Composite Sustainability Index (CSI) is a measure which shows the percentage improvement of asset sustainability compared to the baseline. The baseline is the outturn at the end of CP4. Depending on the asset type, asset sustainability is measured either by remaining life of the asset or by asset condition score and is weighted by the replacement value of the asset. Note: The CSI forecast is in line with the Final Determination. This will be updated via change control with the ORR in May/June to reflect the CP5 actuals and RF11 (Delivery Plan) submission
	TARGET	0.50%	-	-	-	-	-1.6%	TBC	TBC		
	BETTER THAN TARGET	TBC	TBC	TBC	TBC	TBC	-1.4%	TBC	TBC		
Number of service affecting failures (SAF)	WORSE THAN TARGET	5,914	5,885	5,856	5,680	5,498	5,416	TBC	TBC		Asset Reliability Service Affecting Failures ("SAFs") is a measure of the number of unique TRUST "reliability" incidents causing delay in the Period attributed to Track, Points, Signalling & Electrification causes.
	TARGET	5,796	5,856	5,680	5,498	5,416	5,324	TBC	TBC		
	BETTER THAN TARGET	5,677	5,826	5,505	5,316	5,333	5,232	TBC	TBC		
Performance, Customers and People Measures											
LNER Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%		Roll up of Level 2 scorecard
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%		
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%		
Northern Customer	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%		Roll up of Level 2 scorecard
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%		

Long term scorecard	Forecast	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	Achievability	Definition
Scorecard	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%		
East Midlands Trains Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%		Roll up of Level 2 scorecard
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%		
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%		
Grand Central Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%		Roll up of Level 2 scorecard
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%		
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%		
Hull Trains Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%		Roll up of Level 2 scorecard
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%		
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%		
Nexus - Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%		Roll up of Level 2 scorecard
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%		
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%		
Cross Country - Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%		Roll up of Level 2 scorecard
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%		
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%		
TransPennine Express Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%		Roll up of Level 2 scorecard
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%		
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%		
Govia Thameslink Railway (GTR) Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%		Roll up of Level 2 scorecard
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%		
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%		
Freight Delivery Metric (FDM-R)	WORSE THAN TARGET	92.5%	94.4%	94.4%	94.4%	94.4%	94.4%	TBC	TBC		The percentage of trains which Network Rail has delivered successfully. Failed to deliver is the percentage of commercial freight services that do not reach their destination within 15 minutes of their booked arrival time; and which have either been cancelled, or delayed 15 or more minutes, by Network Rail or another operator that is not a commercial freight operator.
	TARGET	94.0%	94.8%	94.8%	94.8%	94.8%	94.8%	TBC	TBC		
	BETTER THAN TARGET	94.5%	95.2%	95.2%	95.2%	95.2%	95.2%	TBC	TBC		
Freight Growth Target (Billion Net Tonne Miles)	WORSE THAN TARGET	n/a	2.71	2.75	2.85	3.02	3.29	TBC	TBC		NR freight growth target specific to the route
	TARGET	n/a	3.01	3.06	3.16	3.36	3.65	TBC	TBC		
	BETTER THAN TARGET	n/a	3.31	3.36	3.48	3.69	4.02	TBC	TBC		
Consistent Route Measure –	WORSE THAN TARGET	n/a	1.56	1.45	1.36	1.34	1.32	TBC	TBC		Annual minutes of Network Rail attributed delay to passenger trains from incidents occurring within the route boundary normalised by the actual mileage travelled by passenger trains within that route.
	TARGET	n/a	1.42	1.32	1.25	1.22	1.20	TBC	TBC		

Long term scorecard	Forecast	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	Achievability	Definition
Performance (CRM-P)	BETTER THAN TARGET	n/a	1.28	1.19	1.13	1.10	1.08	TBC	TBC		
Number of Railway work complaints	WORSE THAN TARGET	1,082	842	760	798	758	720	TBC	TBC		Number of complaints logged by Customer relations team
	TARGET	1,028	800	682	750	675	642	TBC	TBC		
	BETTER THAN TARGET	974	758	608	700	595	565	TBC	TBC		
Your Voice action Plans Completed	WORSE THAN TARGET	n/a	80%	80%	80%	80%	80%	80%	80%		100% of Managers covered by YV Survey (6 or more direct reports) have an Engagement Action plan with evidence to support completion of annual actions for audit purpose
	TARGET	n/a	90%	90%	90%	90%	90%	90%	90%		
	BETTER THAN TARGET	n/a	100%	100%	100%	100%	100%	100%	100%		
Completion of everyone learning	WORSE THAN TARGET	n/a	80%	80%	80%	80%	80%	80%	80%		All staff across the route have completed the Everyone Learning Training Programme by December 2019
	TARGET	n/a	90%	90%	90%	90%	90%	90%	90%		
	BETTER THAN TARGET	n/a	100%	100%	100%	100%	100%	100%	100%		
Performance reviews and Objective setting completed	WORSE THAN TARGET	n/a	80%	80%	80%	80%	80%	80%	80%		The ability to evidence all Band 1-4 staff have had an annual and interim performance review discussion with SMART objectives set - to be audited throughout the performance year
	TARGET	n/a	90%	90%	90%	90%	90%	90%	90%		
	BETTER THAN TARGET	n/a	100%	100%	100%	100%	100%	100%	100%		
Strategic Workforce Plan Milestones	WORSE THAN TARGET	n/a	6	6	6	6	6	6	6		Evidence in place to support completion of Strategic Workforce Planning project
	TARGET	n/a	8	8	8	8	8	8	8		
	BETTER THAN TARGET	n/a	10	10	10	10	10	10	10		

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

2.2 Key drivers of long-term performance

The table in section 2.1 sets out our long-term targets for CP6. In summary, the key drivers of this performance are as follows:

2.2.1 Safety

Efficient and effective delivery

During CP6 in line with our objectives we will continue to focus on improving occupational safety. Our target 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.

2.2.2 Financial performance

The scorecard forecast of £0m within the financial performance measures for each year of CP6 recognises our intention to deliver our maintenance, operations and renewals activities in line with our plan. By the time CP6 begins the Route's continued focus on disciplined cost control will allow a return to a more efficient and effective delivery of our renewals activities, which have been a key driver of negative financial performance in CP5.

2.2.3 Investment

In CP6 the strategy and milestones remains unchanged.

2.2.4 Sustainability and 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, which is being partly addressed by the additional £142m of sustainability funding. However early in CP6 we expect a detrimental impact on incident count associated with projected traffic growth. ECML overhead line resilience remains a concern and this 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

2.2.5 Performance, Customers and People

Train performance

Since our RF11 (2017/18) RSP submission a key area of focus for the Route has been on reviewing our CP6 performance trajectories in consultation with our customers. This reflects the fact that performance levels are currently lower than anticipated particularly since the May 2018 timetable change, therefore a degree of performance recovery needs to be built into our customer agreed scorecards. In addition, significant work has gone into attempting to reach consensus on overall performance trajectories reflecting customer feedback at RF11. More information on the development of these trajectories can be found in Appendix A.

Passenger satisfaction

Focus on our customers and stakeholders

Across our operators, passenger satisfaction 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 customer facing investments are 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 LNER to create

a 'one team' approach at Leeds station will seek to improve the customer experience and subsequent NPS scores.

2.3 Regulatory floors

For us 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, are as proposed by the regulator in the Final Determination, and will act as a level below which the ORR would consider undertaking formal investigation for licence breach.

Table 2: Regulatory floors

Regulatory floors	19/20	20/21	21/22	22/23	23/24
Consistent route measure – passenger performance (CRM-P)	1.68	1.58	1.51	1.48	1.46
Freight Delivery Metric – route (FDM-R)	93.9%	93.9%	93.9%	93.9%	93.9%
Composite Sustainability Index (CSI)	-	-	-	-	-2.0%

Further information on the methodology used to calculate these regulatory floors is explained below.

Network Sustainability (CSI): 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 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 DEF.

3 Safety

3.1 Safety

Safety		18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	Achievability
LTIFR	WORSE THAN TARGET	0.534	0.338	0.295	0.248	0.214	0.179	0.179	0.179	
	TARGET	0.509	0.322	0.281	0.236	0.204	0.170	0.170	0.170	
	BETTER THAN TARGET	0.484	0.306	0.267	0.224	0.194	0.162	0.162	0.162	
New safety measure – in development	WORSE THAN TARGET	6	6	6	6	6	6	6	6	
	TARGET	8	8	8	8	8	8	8	8	
	BETTER THAN TARGET	10	10	10	10	10	10	10	10	
Passenger train accident risk reduction measures	WORSE THAN TARGET	60%	60%	60%	60%	60%	60%	60%	60%	
	TARGET	80%	80%	80%	80%	80%	80%	80%	80%	
	BETTER THAN TARGET	100%	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	6	
	TARGET	8	8	8	8	8	8	8	8	
	BETTER THAN TARGET	10	10	10	10	10	10	10	10	

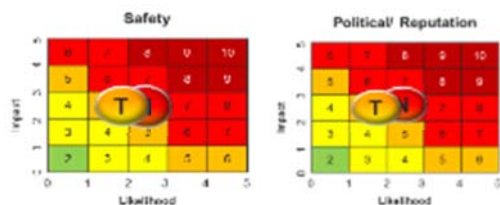
3.1.1 Stakeholder priorities

Safety has always been a key priority for our stakeholders, however throughout our CP6 stakeholder engagement process, we have been able to understand what their specific priorities for safety are in CP6. In developing and updating our plan, we have endeavoured to address each of these as best possible, and a summary of these priorities is included in the table below.

Key stakeholder priorities	Response
Focus on Level Crossings safety	LNE & EM will undertake over 130 level crossing interventions in CP6. As described in section 5.3.1, these will include over 36 interventions to fully renew and automate level crossings, 22 interventions to prevent barriers being lowered onto vehicles on the level crossing and 22 barrier renewals/life extension works. As a result of additional funding identified through the Draft and Final Determination process, £6m will be available to specifically target improved protection of user worked crossings (UWCs).
Safe management of Vegetation along Route	Vegetation management will see additional spend within CP6 to move towards compliance with updated standards.
Prioritise safety with the introduction of new services	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 7.2).
System Risk – sharing best practice and improvements	High level co-operation through the Route System Safety Panel, bringing together operators, IP and RSSB to make improvements through shared safety learning and to measure and undertaken system risk on the Route. This includes onboard and station safety, operational risk and community safety.

3.2 Safety activity prioritisation and risk outcome

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 targets 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".		
N o.	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.	A programme based on a "CP6 Safety Plan" has been developed to target causes lost time accidents. Key areas of focus will be safety leadership, increasing employee engagement and accountability, and further investment in training and development. Activities will include: - Upskilling staff on the correct manual handling methods for the plant and equipment they use - Workshops focusing on identifying and assessing risk and how to implement controls, with particular focus on personal accountability - Education and training for drivers to reduce the risk of road traffic accidents involving employees We will continue a programme of maintenance depot upgrades which provide the right environment for a cultural change, helping employees approach their work in a safe and professional manner.	HoRSHE / COO	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 that reduce manual handling risk and improved planning and logistics through Safe and Effective Working which will limit the need for manual handling.	HoRSHE / COO	CP6 Y1 / End CP6
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 130 level crossing interventions in CP6, varying in scale and complexity. These will include over 36 interventions to fully renew and automate level crossing operations, 22 interventions to prevent barriers being lowered onto vehicles on the level crossing and 22 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 in Appendix D. Where a level crossing cannot be closed or improved through technology, we will strengthen our public education and awareness programme to target specific locations and users to reduce the risk of misuse.	DRAM / RMD / HoRSHE	In progress / End CP6
4	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 and ticketing controls. We will continue to work with stakeholders such as BTP and Samaritans to target known hotspot areas and increase surveillance resources and education through schools.	DRAM / COO / HoRSHE	Continuous implementation and review throughout 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.

3.3 Safety strategy

3.3.1 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. LNE & EM has set itself a world class safety target of 0.17 LTIFR by the end of CP6. This will be delivered through the Route’s safety plan which is based on three key pillars:

- **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. Strong leadership combined with effective communications will create a safety orientated environment and hold everyone accountable for their safety in the organisation. Specific initiatives to promote this culture will include:

- Safety leadership training aimed at management staff to ensure managers within teams are accountable for the occupational safety of colleagues under their management.
- Strong safety communications targeted at key touchpoints in the working day. This will 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.
- 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.
- Continuing our policy of integrating 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

At LNE & EM **66%** of all lost time injuries are caused by Slips, Trips and Falls; being struck by poorly secured objects; and by manual handling injuries. We will target these key drivers of lost time injury to reduce LTIFR through:

- Undertaking activities which focus on eliminating manual handling injuries (see heading below)



Figure 8: The Workforce 'Safety Wheel'

- Driver training: Additional training for drivers and monitoring devices fitted to vehicles to prevent lost time injuries related to vehicle accidents.
- Improving conditions and facilities: We will level surfaces and providing additional welfare facilities at key access points to reduce likelihood of Slips, Trips and Falls.
- New tools: Introduce new tools and policies, such as a ban on the use of hammers during track works to prevent pandrol clips from releasing and hitting our staff.
- Communications Strategy: An annual safety communications plan, including weekly safety hour topics, and quarterly stand down days, will cover key topic areas. We will use a variety of medium to relay safety messages, including posters, videos, briefing packs and practical activities. A review process which involves employee representatives will provide feedback for continuous development and improvement of our safety communications.
- Fatigue improvement: We are developing a Fatigue Management Plan to reduce fatigue risk to employees. This follows the Fatigue Risk standard, but also includes awareness for employees on identifying and managing fatigue and reporting where they are not fit to work.
- Risk awareness training: We will undertake 1 Day IOSH Training for specific groups of employees in Year 1 of CP6, alongside other risk awareness training programmes to be available for all staff from Year 2 of CP6.
- Focus on Accident Investigators: We will invest in upskilling Lead Investigators in Year 1 to enable accurate information to be obtained regarding the nature of the accident, how it occurred, who was affected and the resulting impact of the accident. This will support the Route in identifying effective risk controls to prevent accidents and incidents.

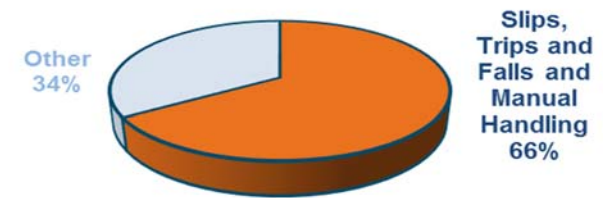


Figure 9: Causes of LTIFR at LNE & EM

Eliminating manual handling injuries

We have set ourselves the objective of eliminating manual handling injuries by the end of CP6. Initiatives to drive this include:

- Manual handling training: 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. This in house manual handling training will be a focus for the Route across the first three years of CP6.
- Identification of risky activities: 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.
- Introduction of technology: Identify and implement new technology to reduce the risk of manual handling injuries. Specific technology to be introduced is currently being identified. This technology is expected to be implemented throughout Years 1 and 2 of CP6.
- Improved planning and logistics: Using the Safe and Effective Working programme to streamline planning and logistics processes, and reduce the need for manual handling activities.

Safer Trackside Working (STW)

The Route supports the STW programme and has adopted and trialled the ZKL 3000 remote control track circuit operating devices (TCODs). We will continue to embed the use of the remote control TCODs throughout CP6, sharing best practice and identifying further locations for fitment.

In addition, we will explore use of all newly designed and approved equipment to make the taking and giving up of lineside line blockages safer as well as more effective and efficient, and using technology built into the railway signalling system e.g. LEWIS to provide a warning when working open line.

3.3.2 System Safety

Passenger Safety

We will 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 ROC. This will include enhanced training for the signalling controllers being deployed in the ROC.

LNE & EM 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 amend working arrangements where lessons can be learned from incidents.

In CP6 the Route will 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. We will share 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. We will maintain and improve our asset integrity through the use of decision support tools to support reductions in the likelihood and impact of equipment failures. Examples include further roll out of monitoring and analytics in key areas such as track circuits, switches and crossings and Level Crossings.

Station Safety

Our management teams at Kings Cross and Leeds will embed initiatives that will deliver a lower number of slips, trips, and falls, and incidents at the platform-train-interface. These initiatives 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.

3.3.3 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. 130 level crossing interventions are planned during CP6 with an anticipated FWI benefit of 0.33. However, increased traffic on the Network in CP6 is expected to increase this level crossing FWI value across CP6. 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.

We have integrated our approach to external incidents making sure we don't lose opportunities for one solution to have benefits across suicide, trespass, vandalism and other issues. This approach includes 3 pillars - denial of means, response and recovery and understanding the problem. Denial of means includes the increase in vigilant presence through training and deployment of resources to interrupt and intervene with incidents, or prevent them by high visibility patrols. We have implemented and will implement physical mitigations to prevent access to the line at critical locations. We combine physical prevention with patrolling to ensure that any remaining points of access such as stations and level crossings remain incident free.

We have engaged with and fund partnership working with British Transport Police, Samaritans and Local Authorities. We have funded 3 embedded inspectors seconded from the British Transport Police to take charge of the tactical deployment of resources from BTP, Network Rail and specialist contractors.

We have, for example, lineside fenced over 79 kilometres, platform end gated 146 stations, mid platform fenced 11 stations, introduced smart cameras at 2 stations at crucial hotspot locations where lives have been repeatedly lost or suicide attempts have been made. We have established a highly effective patrolling strategy funding specialist contractors and additional BTP resource.

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

Suicide Prevention:

- A target of 10% increase in lifesaving interventions per year
- £1.4m station mitigations
- Samaritans partnership plan for community outreach
- Local Authority partnership trials will be expanded

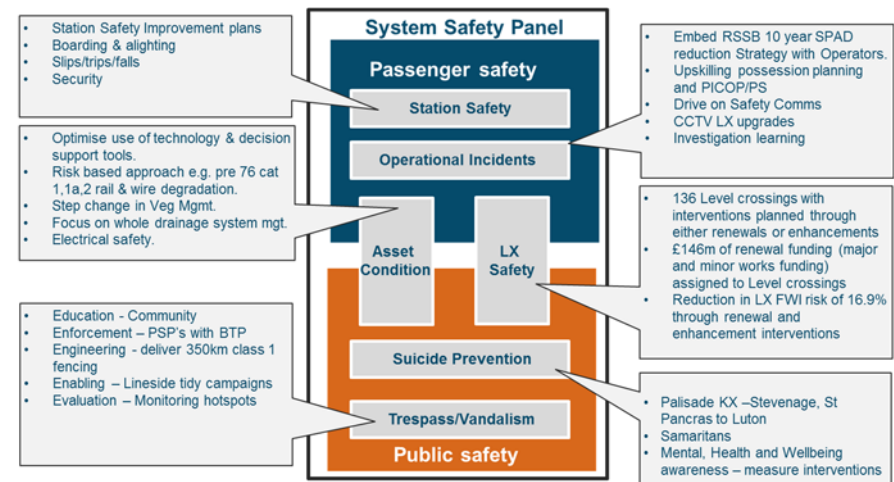


Figure 10: LNE & EM's System Safety Panel

- BTP partnership operations outline plan developed including additional funded resource of 17 officers
- BTP Embedded Inspectors x 3
- Emergency Intervention Unit
- Flagship roving suicide prevention patrols to continue with 40 patrollers

Trespass:

- £6m available fencing budget allocated to route trespass hotspots, animal incursion and cable theft target hardening
- Community engagement and outreach programme
- Joint BTP operations targeting seasonal peaks and hotspot location
- Patrolling will integrate with suicide hotspots for maximum benefit

3.3.4 Specific Safety Improvement Schemes

The ORR's Final Determination set out the need for additional spending on safety as part of the CP6 plans. As a result, an additional £80m (18/19 prices) of safety related expenditure was allocated across all of the Routes nationally, for inclusion in their updated CP6 plans. Of this, Network Rail set out that approximately 30% of this should be allocated to improve protection of user worked crossings (UWCs) through the installation of miniature stop lights (MSLs).

LNE & EM was allocated £5.9m of this to focus on UWCs, on top of existing safety expenditure included in the Route's base plan.

3.4 Occupational Health & Wellbeing strategy

Network Rail's Occupational Health and Wellbeing programme aims to optimise the Occupational Health management and safety of its workforce, by effectively mitigating, monitoring and diagnosing occupational health conditions. The Route will empower staff to take individual ownership of their health and provide support and information on how to improve both mental and physical wellbeing through health campaigns, kiosks and stand down days.

The Route is committed to expanding its mental health first aid training programme throughout CP6, which will allow employees to recognise colleagues 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.

3.5 Security strategy

Security is core to Network Rail's culture and is embedded in everything that the organisation does. The Route's management of security at Kings Cross and Leeds is considered to be particularly well managed. All security threats identified across the Route are addressed in line with processes as part of our business continuity management system. New developments or the introduction of new schemes are considered by the Route to present an opportunity to consider, review and improve railway security. The Route's approach to security is in alignment with the national security strategy, as we will focus on the following objectives in CP6:

- Safeguarding our people
- Reducing the safety, railway performance and cost impacts of security incidents
- Establishing clear roles and responsibilities for security within the Route
- Establishing performance management systems that provide clear and relevant security information to stakeholders
- Reducing the cost of security through standardisation
- Establishing and maintaining a safe and secure culture, supported from the top down.

During CP6, the Route's Security and Resilience Committee will continue to undertake regular reviews of security threats, and manage implementation of mitigations, such as security fences, access, CCTV and alarms. Cyber security is also a key consideration for the Route, and throughout CP6 we will continue to educate employees on cyber security risks through eLearning and internal briefings throughout CP6. Additionally, we will require project teams introducing software based systems to take security threat into consideration during design phase.

4 Performance, Customers and People

4.1 Performance, Customers and People objectives

Performance, Customers and People		18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	Achievability
LNER Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%	
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%	
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%	
Northern Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%	
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%	
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%	
East Midlands Trains Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%	
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%	
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%	
Grand Central Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%	
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%	
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%	
Hull Trains Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%	
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%	
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%	
Nexus - Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%	
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%	
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%	
Cross Country - Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%	
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%	
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%	
TransPennine Express Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%	
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%	
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%	
Govia Thameslink Railway (GTR) Customer Scorecard	WORSE THAN TARGET	0%	0%	0%	0%	0%	0%	0%	0%	
	TARGET	50%	50%	50%	50%	50%	50%	50%	50%	
	BETTER THAN TARGET	100%	100%	100%	100%	100%	100%	100%	100%	
Freight Delivery Metric (FDM-R)	WORSE THAN TARGET	92.5%	94.4%	94.4%	94.4%	94.4%	94.4%	TBC	TBC	
	TARGET	94.0%	94.8%	94.8%	94.8%	94.8%	94.8%	TBC	TBC	
	BETTER THAN TARGET	94.5%	95.2%	95.2%	95.2%	95.2%	95.2%	TBC	TBC	

Freight Growth Target (Billion Net Tonne Miles)	WORSE THAN TARGET	n/a	2.71	2.75	2.85	3.02	3.29	TBC	TBC	
	TARGET	n/a	3.01	3.06	3.16	3.36	3.65	TBC	TBC	
	BETTER THAN TARGET	n/a	3.31	3.36	3.48	3.69	4.02	TBC	TBC	
Consistent Route Measure – Performance (CRM-P)	WORSE THAN TARGET	n/a	1.56	1.45	1.36	1.34	1.32	TBC	TBC	
	TARGET	n/a	1.42	1.32	1.25	1.22	1.20	TBC	TBC	
	BETTER THAN TARGET	n/a	1.28	1.19	1.13	1.10	1.08	TBC	TBC	
Number of Railway work complaints	WORSE THAN TARGET	1,082	842	760	798	758	720	TBC	TBC	
	TARGET	1,028	800	682	750	675	642	TBC	TBC	
	BETTER THAN TARGET	974	758	608	700	595	565	TBC	TBC	
Your Voice action Plans Completed	WORSE THAN TARGET	n/a	80%	80%	80%	80%	80%	80%	80%	
	TARGET	n/a	90%	90%	90%	90%	90%	90%	90%	
	BETTER THAN TARGET	n/a	100%	100%	100%	100%	100%	100%	100%	
Completion of everyone learning	WORSE THAN TARGET	n/a	80%	80%	80%	80%	80%	80%	80%	
	TARGET	n/a	90%	90%	90%	90%	90%	90%	90%	
	BETTER THAN TARGET	n/a	100%	100%	100%	100%	100%	100%	100%	
Performance reviews and Objective setting completed	WORSE THAN TARGET	n/a	80%	80%	80%	80%	80%	80%	80%	
	TARGET	n/a	90%	90%	90%	90%	90%	90%	90%	
	BETTER THAN TARGET	n/a	100%	100%	100%	100%	100%	100%	100%	
Strategic Workforce Plan Milestones	WORSE THAN TARGET	n/a	6	6	6	6	6	6	6	
	TARGET	n/a	8	8	8	8	8	8	8	
	BETTER THAN TARGET	n/a	10	10	10	10	10	10	10	

In readiness for CP6 we have developed separate Level 2 Customer scorecards that have been developed in discussion with each of our individual TOC customers. There are two elements to these scorecards: Performance measures such as On Time performance and Time to 3; and other Locally Agreed Measures. The Performance, Customers and People measures included in the Route's Long term scorecard for CP6, above, are aligned with these Level 2 Customer scorecards, representing a summary of the measures included on each individual customer scorecard.

4.1.1 Stakeholder priorities

Key stakeholder priorities	Response
Performance trajectories aligned to franchise commitments	As set out in Appendix A, we have worked closely with all of our key TOC customers to seek agreement on our PPM trajectories and the initiatives that will support them. Given the performance issues experienced in 2018/19, our focus is on recovering, then stabilising performance, so that incremental improvements can then be delivered. The joint performance delivery strategies set out in 4.3 are designed to support this whilst minimising risks to performance, resulting from the known increases in intensity of usage during CP6, and to maximise opportunities for performance improvements (e.g. resulting from improved reliability from new trains).
Focus on Right Time performance	We have added 'On Time' punctuality targets to some of our individual customer scorecards and have incorporated initiatives to improve on time "Start of Day" performance in our Train Performance Strategy (see 4.3).

Key stakeholder priorities	Response
Improve the way customers are involved in decisions	In response to feedback from the ORR and our customers, we have committed to developing a set of Performance Delivery Strategies with each of our key customers prior to the commencement of CP6. These strategies, which are described in more detail in section 4.3, have been worked up jointly with each of our customers, and agreed plans will be in place at the commencement of CP6.
Support in delivering improved service to customers as measured by NRPS metrics	Delivery of satisfactory train performance is the key determinant of customer satisfaction. Our train performance strategy will support performance recovery from 2018/19, stabilisation then incremental improvement. Additionally, we have included NRPS measures on the majority of our Level 2 customer scorecards.
Focus on customer satisfaction at Route managed stations	As set out in section 5.3, we are targeting the majority of our Buildings renewals spend in CP6 at stations, particularly our managed stations at King's Cross and Leeds. Our managed stations are the places where passengers quality of experience during their journey is impacted the most. Our major activities in CP6 will include platform resurfacings at stations such as Leeds as well as refurbishment of footbridges. Our retail strategy (7.5.2) will also support passenger satisfaction with a refresh of 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).
Improvements at franchise managed stations	We are targeting the majority of our Buildings Renewals spend in CP6 at stations, including franchise managed stations such as Middlesbrough, Newcastle, York.
Focus on the safety and wellbeing of our people	Our workforce safety strategy (3.3.1) including investment in manual handling training, safer trackside access and fatigue risk management will support improvements to employee satisfaction and engagement. More broadly, the Route is focused on empowering employees to take individual ownership of their health and safety, by providing support and information through a range of health campaigns, kiosks and stand down days, focused on mental and physical wellbeing.
Focus on building the relationship between our people and our customers	The Route has started the implementation of our 'Customer Days' for all employees across the Route. Customer Days allow employees the opportunity to build relationships with our customers – both train operators and passengers, by spending a day with customers out on a range of sites, including on track, on a train, in a station or in a signal box.

4.2 Activity prioritisation and risk outcome

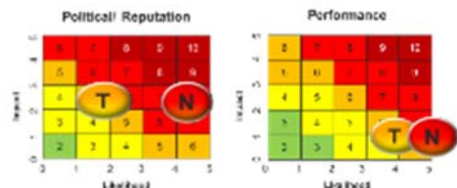
4.2.1 Train performance

Summary of objectives		In line with our strategic objective ' prioritise safety and performance ', we will seek to maintain or improve on current performance levels whilst 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.			
No	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' to ensure existing capacity is used more efficiently, and will work with our customers through our Alliances and other joint working arrangements (e.g. Timetable Readiness Group) to refine timetable changes and better understand any associated risks prior to implementation. We are centralising signalling operations in the ROC 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: Recovering from the May 2018 timetable	Current performance levels for Northern have been significantly impacted as a result of the May 2018 timetable disruption. We	HoP	Northern	Ongoing

LNE & EM Route Strategic plan

	disruption	have been working closely with Northern to develop a sensible and phased approach to performance recovery in CP6. We have established a Timetable Readiness Control Room which is currently focused on the upcoming Dec 18 and May 19 timetables. We are also continuing to work closely with capacity planning and the System Operator to adopt lessons learnt from May 2018 and improve our base plan.			
3	R: Agreeing the CP6 performance trajectories	We are continuing to work with each of our customers to reach a joint understanding of the performance impact for each element set out in the Scorecard. Despite our ongoing engagement, there remains a likelihood that we will only reach agreement on certain elements of the projections for CP6. One area in particular which is subject to ongoing discussion is the CP6 entry point, especially given current performance levels. We note that all our customers have been advised that CP6 entry point and CRM-P trajectories can be altered by joint agreement provided both parties are satisfied with the evidence for the change. Constructive use of this change mechanism is our preferred approach given uncertainties relating to impact and timing of enhancements, timetable changes and fleet programmes in CP6. The Route acknowledges that this approach is already in development with the ORR as part of a national change management framework.	HoP	All	Ongoing
4	R: Uncertainty around new EMT franchise	Commitments to performance in the current East Midlands franchise process will not be formalised until around mid-2019. In addition, the current formal stakeholder arrangements for the East Midlands franchise are also anticipated to change to reflect a new collaborative partnership between the next operator and Network Rail, as specified in the East Midlands franchise ITT. We have established formal resources to work proactively with franchise bid teams to agree any plans as required for the successful future operation of that franchise, with final arrangements to be formalised once the preferred bidder is announced by DfT.	HoP	EMT	Ongoing
5	R: Uplift in GTR services through the Thameslink Core	We have established a Timetable Readiness Control Room for the uplift in Thameslink traffic.	HoP	EMT / LNER	Ongoing
6	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
7	R: External delays	The Route is committed to continue delivering the external mitigations through CP6.	HoP	All	Ongoing
8	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
9	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, for example with LNER, fleet will be introduced in phases and performance monitored closely. Lessons learnt will also be adopted from IEP introduction on Western Route.	DRAM	All	End CP6
10	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
11	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
12	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
13	O: Improve train performance by deploying ETCS on the Moorgate Lines and then the Southern section of the ECML, with a forecast ~1% 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

¹ East Coast Digital Programme – Strategic Outline Business Case

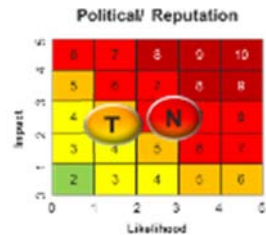


Summary of risk outcome

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.

4.2.2 Locally driven customer measures

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, LNER, 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	Network Rail 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, LNER, Hull Trains, GTR	Year 3 CP6 (2021)
3	R: Risks to passenger Satisfaction measures – reliability of new rolling stock and subsequent performance risk	Network Rail 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, LNER, 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 COO	FTPE, Northern Rail, LNER, 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 CoComms	FTPE, Northern Rail, LNER, 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.

Our Train Performance, Operational Performance and Capacity and Timetabling Strategies to support delivery of our targets are set out below.

4.3 Train Performance Strategy

We will develop joint Performance Delivery Strategies with each of our key customers. These strategies have been worked up jointly with each of our customers, and agreed plans will be in place at the commencement of CP6. As a minimum these plans will provide:

Governance structures: A summary of the key stakeholders within each organisation (LNE & EM Route and each customer) and their responsibilities in relation to performance

- **Joint Working arrangements:** An overview of the formal channels available to each customer to raise performance related issues (e.g. Right Time Railway Groups and Alliance Boards)
- **Threats, risks and opportunities:** A summary of the key performance impacting factors in CP6 including:
 - o Key dates;
 - o Potential risk (or benefit) to performance;
 - o Proposed mitigation actions; and
 - o Responsibilities.

Where relevant, this will include:

- o **Approach to precision timetable development** – as detailed in section 4.5.
- o **Access strategy** – Including our approach to obtain access to address asset failures that are likely to have severe impact on services (e.g. focusing on overnight repairs) to limit delays and TSRs that slow down services.
- o **Approach to business continuity and recovery plans** – This will cover all major service disruptions, including updates to service recovery plans and Standard Operating procedures (SOPs) to ensure incident response is structured and effective.
- o **Approach to incident management** – establishment of formal training and rehearsals for our response teams to ensure they are capable of responding to all locations within a 30 minute window (15 minutes at critical locations).
- o **Approach to 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.

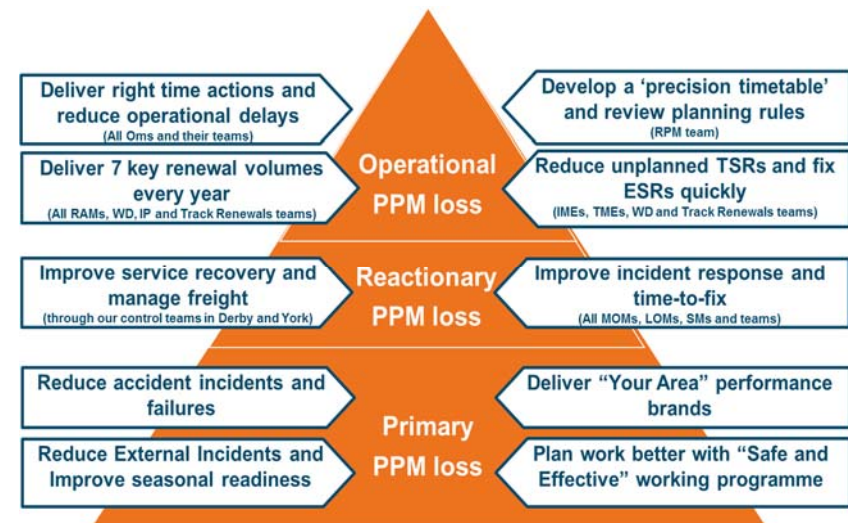


Figure 11: Our Train Performance and Operations initiatives will target PPM loss.

- An overview of the schedule of planned performance-related workshops

In addition to the customer specific Performance Delivery Strategies set out above, we are also planning to:

- **Introduce Incident Officers in the Route Operations Centre** led by the Senior Incident Officer. The introduction of incident officers will continue to improve the process of service recovery following disruptive incidents and drive joined up industry approach to contingency planning;
- **Introduce further patrols/inspections** at 'hot spots' and targeted fencing projects to reduce the risk of trespass and fatalities. We note that further patrols have recently been introduced in September 2018 based on the improvements experienced to date. The route has committed to continuing this through CP6; and
- **Continue to implement vegetation clearance** to sites with historic issues with safety as well as autumn performance risk.

4.4 Operational Performance strategy

4.4.1 Route Operations Strategy

Consolidate operations to deliver efficiencies

During CP6 we will improve our operational capabilities by transforming maintenance and centralising our operations, enabling us to work more closely and collaboratively with our TOCs when issues arise.

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.

Incident Management System 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 Network Rail 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.

4.4.2 Approach to resilience

Throughout CP5, DPI on the Route fell to record low levels (achieving its lowest total delay minutes for a period for over eight years in Period 4 of 2017²). Despite these improvements, DPI has increased from these low levels towards the end of the control period mainly due to a number of severe weather incidents, reliability of fleet and the introduction of the May 18 timetable. Combined, these events led to a 30% increase in delay across the route. In CP6, we will apply lessons learnt and build on the success which was achieved towards the middle of CP5. We will update and develop our robust 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 will improve response times for incidents 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)
- improve the equipment they are using (e.g. 'grab bags' at strategically critical locations to ensure that tools and equipment to repair and resume services are easily available)
- improve 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.

Alongside this will work with our TOC customers to refresh and revise service recovery plans. We will 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 Control teams at our ROCs 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.

4.5 Capacity and timetabling strategy

Prioritise Safety and Performance

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.

4.5.1 Moving towards a precision timetable

One of the key focus areas for the Route in CP6 is in the area of train performance, specifically, how we are planning to recover performance from the current levels resulting from the May 18 timetable disruption. To support this, we have implemented a Timetable Readiness Group which meets every fortnight to discuss upcoming timetable changes (e.g. May 19). The scope of these meetings is to identify and deliver the critical path outcomes for the release and delivery of the planned timetable changes and currently involves input from Network Rail (Route and System Operator), Northern and TPE alliance boards.

In addition to this, we will support the system operator in their production timetables that maximise 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

² <https://www.networkrailmediacentre.co.uk/news/lne-em-hits-new-record-for-performance>

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. Furthermore 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 constraints 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.

4.5.2 Major timetable changes between now and in CP6

Focus on our customers and stakeholders

The table below details the planned changes to timetables expected between now and the end of CP6. Overall, these will result in a 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 3: Proposed timetable changes affecting CP6 based on current franchise commitments

Customer	Planned timetable changes affecting CP6	Year
LNER	- 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	2021/22 2021 2019
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 services³	2018 2019
Northern	2000 extra services per week (12% increase), with 400 additional Sunday services - New cascaded rolling stock.	2019 2019
East Midlands	- East Midlands new franchise ITT specification - Midland Mainline: St Pancras-Corby electrified services and additional 1tph and seat capacity from Dec-20; Bi-mode long distance services fully operational from Dec-23 - Regional: Timetable and capacity improvement from Dec-21 including more peak trains and capacity at Lincoln and Nottingham, improved weekend services	2020/ 2023 2021

³ 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 Coast Trains Ltd	Up to 35 new services each week between London and Edinburgh	2022
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	2018-2020

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.

4.5.3 Future capacity and growth

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

The Route expects growth in several of its markets over CP6 and over the longer term, in line with recent forecasts published by STE. Forecasted growth is taken into consideration in the development of the Route's CRM-P targets for CP6.

4.6 Organisational capability

The Route has included a number of People measures on the Long term scorecard for CP6, such as completion of the 'Your Voice' action plans, achievement of Workforce Plan milestones. We intend to use these measures on the scorecard to monitor our performance in line with the Route's People Strategy. We have developed our 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.

Engage our workforce

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.

We will implement our Attraction Strategy (**Error! Reference source not found.**) 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



Figure 12: LNE & EM Attraction Strategy to recruit / promote the brightest and best

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 300 employees are enrolled in the Route's talent programme.

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

We will also implement our Resource 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 safety 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.

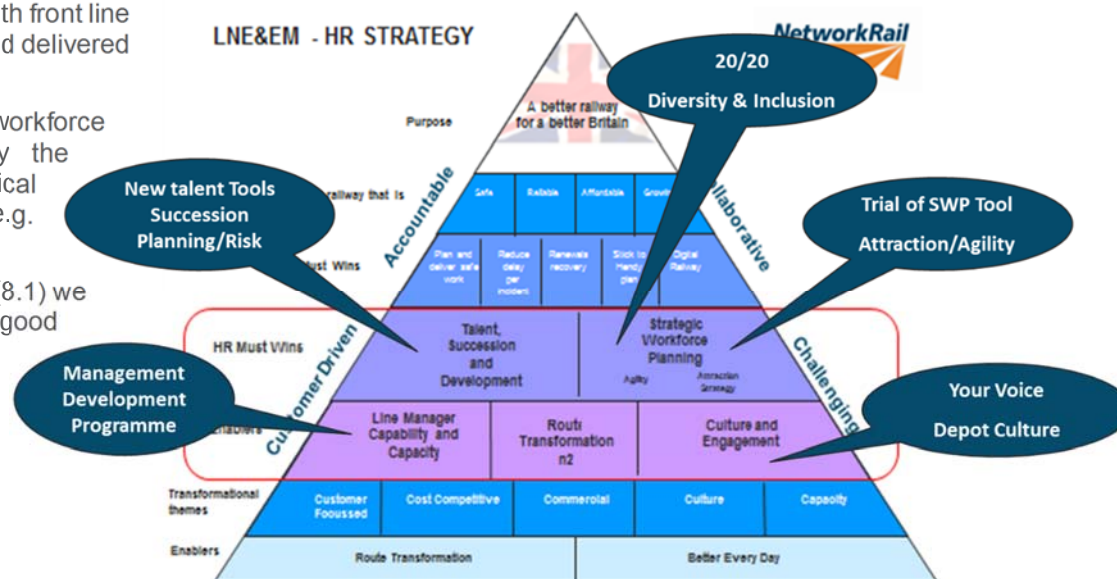


Figure 13: LNE & EM HR Strategy

5 Sustainability & asset management capability

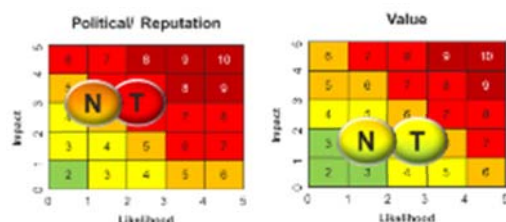
5.1 Sustainability & asset management capability objectives

Sustainability and Asset Management Capability		18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	Achievability
Renewals - 7 key volumes	WORSE THAN TARGET	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	90.0%	
	TARGET	95.0%	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%	100.0%	
Composite Reliability Index (CRI)	WORSE THAN TARGET	n/a	0.0%	0.0%	0.0%	0.0%	0.0%	TBC	TBC	
	TARGET	n/a	0.5%	3.2%	6.1%	7.4%	8.9%	TBC	TBC	
	BETTER THAN TARGET	n/a	0.9%	6.5%	12.0%	14.4%	17.1%	TBC	TBC	
Composite Sustainability Index (CSI)	WORSE THAN TARGET	TBC	TBC	TBC	TBC	TBC	-1.8%	TBC	TBC	
	TARGET	0.50%	-	-	-	-	-1.6%	TBC	TBC	
	BETTER THAN TARGET	TBC	TBC	TBC	TBC	TBC	-1.4%	TBC	TBC	
Number of service affecting failures (SAF)	WORSE THAN TARGET	5,914	5,885	5,856	5,680	5,498	5,416	TBC	TBC	
	TARGET	5,796	5,856	5,680	5,498	5,416	5,324	TBC	TBC	
	BETTER THAN TARGET	5,677	5,826	5,505	5,316	5,333	5,232	TBC	TBC	

Key stakeholder priorities	Response
Reductions in service affecting failures to support performance improvements	We are targeting a 9.9% reduction in service affecting failures during CP6. This is supported by a 15% increase in maintenance expenditure, combined with our strategy to improve the productivity of our maintenance organisation with an improvement in the proportion of non-time on tools from 58% at CP5 exit to 49% at CP6 exit (see section 8.5). Within our Renewals strategy (section 5.3) we will minimise Safety, Performance and Reputational risks across the asset portfolio within funding constraints. Budget increases are focused upon life extension of our critical Signalling and E&P assets, whilst we have created a new Off Track and Drainage Route Asset Manager with a dedicated budget which will support the underlying sustainability of our earthworks and track assets.
Improved approach to access planning and unplanned disruption, with closer involvement of operators in developing access plans.	Our Access Strategy (section 8.5.1) sets out our plans for working with industry partners to develop a long-term access strategy for CP6 to enable more efficient and effective delivery of maintenance, renewals and enhancements.
Improved vegetation management.	As set out in section 8.5.2 during 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
Greater focus on sustainability and environment	The Route is committed to responding to the challenges of climate change to improve long-term asset resilience and sustainability. As described in our Sustainable Development strategy in section 0, the route has created a new Drainage and Off Track RAM to place a focus on the delivery of weather resilience schemes in high risk areas throughout CP6. The Route has also been developing a weather resilience plan which is expected to be published prior to the commencement of CP6.

5.2 Sustainability & asset management capability activity prioritisation

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 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.	DRAM/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.	DRAM	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 8.10) and achieve ISO55001 compliance will help us improve the way we manage our assets on an ongoing basis.	DRAMHOM	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%)	DRAMHOM	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	CP5 Year 5
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	CP5 Year 5
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	CP5 Year 5



Summary of risk outcomes

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.

5.3 Asset by asset key outputs

5.3.1 Summary Route asset strategy

Focus on our customers and stakeholders

Prioritise Safety and Performance

In line with our Vision and Objectives (Section 1.3), we will minimise Safety, Performance and Reputational risks across the asset portfolio within funding constraints. This process began in May 2016 with an 'unconstrained' plan, which has since been iterated through the Business Planning process to arrive at this Delivery Plan. We have also reflected the Assurance work undertaken by Safety, Technical and Engineering in refining final allocations of budget. We will as far as possible mitigate funding constraints through our robust process of benchmarking and challenging unit rates as described in section 8.4. However the overall upward trajectory in unit rates seen in CP5, as well as revisions to unit rates throughout the CP6 planning process have meant that volume has been removed from the plan, increasing risk to the business.

A selection of key trade-offs that were made between asset types during the budget allocation process for CP6 are demonstrated in Table 4 below.

Table 4: A selection of risks and trade offs considered during the CP6 budget constraining process

Asset	Risks	Decisions to Mitigate/Manage Risk
Track	Pre-1978 con-cast rail creates risk of contact fatigue and is 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.

As the table above shows, we have re-allocated activity from Renewals to Life Extension, refurbishment and maintenance within our finalised plan. Overall, there is a 15% increase (post-efficient) in Maintenance spend during CP6, compared to CP5. Within this, specific funding will be set aside for off-track, with a focus on Vegetation 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, will allocate the biggest net budget reduction to track, where it is considered that remote monitoring technology is best developed to manage risk. The Structures budget has also been uplifted during the planning process after assessment of risk. Signalling has been allocated a significant budget increase relative to CP5, but this is still a sub-optimal plan as the Route's signalling equipment is aged and requires significant investment. The remaining funding released from Track will be spent across the E&P, Structures, Buildings and Geotechnical assets to assist in managing the associated risks. An overview of our CP6 strategy for each asset set out below.

Track

**Workbanks
prioritised based
on safety and
performance**

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. Based on the level of funding we have been allocated for CP6, we have planned the Track workbank based on maintaining the safety of the network throughout the control period.

Intervention strategy drivers

We will prioritise expenditure based upon a combination of likelihood of failure and criticality of route section in order to minimise the numbers of passengers affected by track failures. This will mean that our reduced volumes are being targeted at those areas which have the greatest effect on safety and performance, in line with our strategic objectives (Section 1.3.1).

Intervention types and activities in CP6

Our track workbank in CP6 will include:

- **Rail renewal:** Due to the large population of pre 1978 rail, an increasing trend in Rolling Contact Fatigue (RCF) and an increase in rail breaks due to foot corrosion, increased volumes of renewal will be required in CP6. Rail milling will improve the management of RCF and extend rail life. The award of sustainability funding will enable an additional 100km of rail to be renewed.
- **Switch and Crossing refurbishment and renewal:** Kings Cross Renewal will be aimed at reducing asset risk and enhancing performance. The Route is down on the STE Model Baseline numbers for CP6 which will have an impact on reducing points failures, asset related failures (053/054 defects) and premature failure of concrete S&C layouts. The award of sustainability funding will enable renewal of an additional 31 units of S&C in CP6.
- **Plain Line refurbishment and renewal:** Volumes will be reduced relative to CP5 and will be directed specifically at TSR prevention, reducing cyclic top trends and preventing Wrong Side Failures
- **High Output Renewal:** Reliance on High Output renewal will be reduced relative to CP5 but it is still critical to sustain key lines such as Bedford to London and key freight / diversionary routes.
- **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 expected risk scores for Track and S&C in CP6 relative to CP5 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.

Profile of delivery

LNE's delivery schedule will be relatively consistent throughout CP6, with slightly higher volumes in the first half 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

Workbanks prioritised based on safety and performance

Additional investment in 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. Our programme of works is compatible with plans to roll out Digital Railway on the southern section of the ECML, with all but the most critical works at the southern end of the Route delayed until the second half of CP6 so that renewals funding can be diverted to Digital Rail should it receive Business Case approval and associated funding.

Intervention strategy drivers

We will target the life extension 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 (section 1.3.1). These include areas such as King's Cross and West Hampstead in the South as well as Goole and Wakefield in the North. In order to deliver within budget we have de-scoped some interventions to lower cost renewal work types and removed others. Our current workbank assumes that planned enhancements to MML, TPE and ECML are delivered in CP6.

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

We will primarily deliver life extension and partial resignalling work types, rather than full scale resignalling works. Full re-signalling will be focused on areas where asset condition, reliability and safety are of greatest concern such as at King's Cross, Middlesbrough Whitehouse and Swindon as Figure 15 shows. In order to maintain asset condition within budget we will allocate a 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.

Key Elements of plan: LNE	CP5 exit			CP6 exit		
	S	P	R	S	P	R
Plain Line Rail	5	4	4	5	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

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

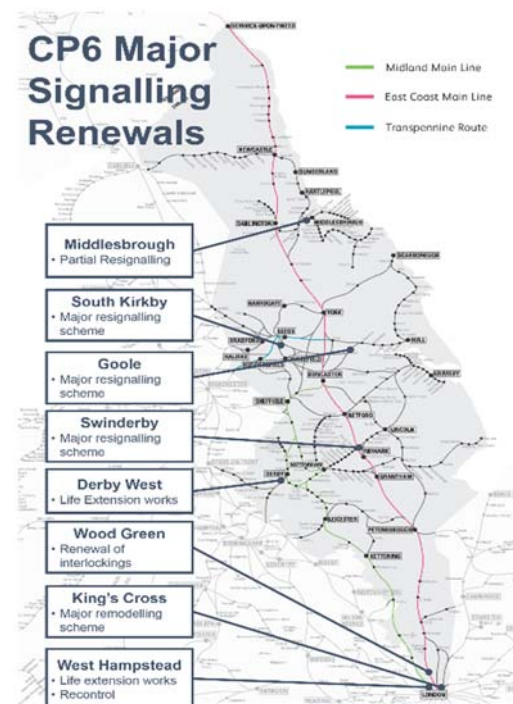


Figure 15: Top nine areas we plan to spend on renewing signalling as part of our CP6 plans

Our maintenance strategy for CP6 will involve increasing use of predictive technologies such as RCM so that works can be better targeted. Centralisation of control of signalling functions and upgrading signalling control points to modern technology will enable improved performance and reduced whole life costs.

LNE & EM will deliver over 130 level crossing interventions in CP6. These will include 36 interventions to fully renew and automate level crossing operations, 22 interventions to prevent barriers being lowered onto vehicles on the level crossing and 22 barrier renewals/life extension works. Upgrades to level crossings 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 will continue to work alongside local stakeholders to replace level crossings with road bridges where the opportunity arises.

CP6 Asset Performance Outputs

The outcomes of our CP6 workbank will be to maintain a stable performance at CP6 exit against the headwind of increased intensity of usage of our network.

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.

Profile of Delivery

LNE's delivery schedule will have slightly higher volumes in the first half 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

In CP6 we will deliver an asset life extension programme to our Structures portfolio. We will take a 'Lowest Initial Cost' approach, with a high number of individual assets receiving targeted limited interventions to extend asset life within budget. Delivery of this approach will be supported by:

- A greater reliance upon asset condition data gathering and engineering evaluation, to enable more informed decision making to appropriately manage

Key Elements of plan: LNE	CP5 exit			CP6 exit		
	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

Key Elements of plan: EM	CP5 exit			CP6 exit		
	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 16: Signalling risk outcomes in terms of Safety (S), Performance (P) and Reputation (R) from CP5 exit to CP6 exit for LNE & EM

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.



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.

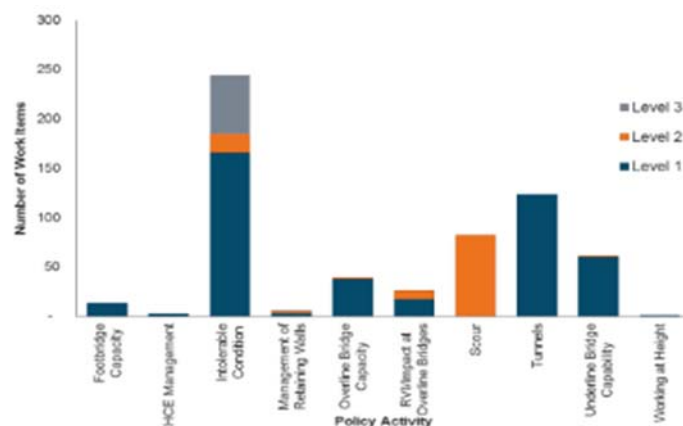


Figure 17: Prioritisation of structures activities and types of intervention in our CP6 workbank

Intervention strategy drivers

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 17. The workbank will 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. In addition, sustainability funding will be invested to improve the CSI output of selected schemes within our workbank, which will be fully renewed under a whole-life cost approach. In accordance with the Structures Asset Policy, the Route will undertake Hidden Shaft Investigation works at 180 Tunnel assets within CP6.

Intervention types and activities in CP6

74% of the Structures capital workbank that we will deliver in CP6 align to STE Policy Activity Level 1. These works will maintain asset safety within tolerable limits in addition to complying with both legislation and asset capability. We will also deliver significant volumes of refurbishment work on some of our ageing major structures. Train Accident Risk Reductions (TARR) 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.

CP6 Asset Performance Outputs

Our 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

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 as 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.

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.

Delivery Strategy

Engagement with our Delivery Partners 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 & Haringay. It is very difficult to undertake heavy Civil Engineering works in these locations, as such both scheme development and interaction with key stakeholders is currently being undertaken due to the expected prolonged delivery lead-times and the novel methodologies which will likely be required to deliver these works.

Provision has been made within the plan to develop CP7 schemes earlier to enable an ongoing rolling programme of renewals; this will realise further efficiencies throughout CP7.

Earthworks

We will maintain or improve the safety and asset condition of Earthworks, in line with our strategic objectives (1.3). Our Earthworks strategy in CP6 will be to (1) deliver our workbank which is focused on the riskiest earthworks assets across the Route and (2) invest in increasing our knowledge of all of the civils assets supporting or surrounding our embankments and cuttings including understanding how these act as a System and interact with Structures, Drainage and Off Track assets. The newly created Drainage and Off-Track asset team will support this strategy by focusing on the resilience of earthworks assets during periods of high rainfall, managing drainage systems as a whole through regular maintenance and capital investment where required.

Intervention strategy drivers

Workbanks prioritised based on safety and performance

The workbank we will deliver during CP6 has been developed using the Earthworks Policy guidance as a starting point and refining it based on our asset engineers' knowledge of the history of the site, the anticipated geotechnical failure modes and the perceived risk to the railway or public. This is supplemented using 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.

Intervention types and activities in CP6

Figure 19 shows that, broadly, sites which received the highest risk scores (E category and D category) under policy guidance require the highest levels of expenditure. Given budget constraints we will deliver

	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

Figure 18: Structures risk outputs in terms of Performance (P), Safety (S) and Reputation (R)

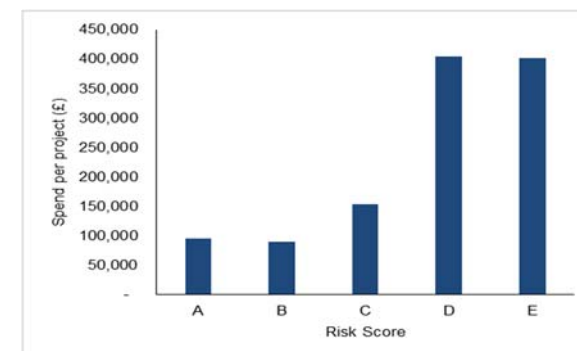


Figure 19: The risk scores of projects in our Earthworks workbank and CP6 spending per project assessed with these scores.

Key Elements of Plan	CP5 Exit			CP6 Exit		
	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 20: Our Earthworks risk outcomes in terms of Safety (S), Performance (P) and Reputation (R) from CP5 exit to CP6 exit

fewer of the higher value interventions than recommended through policy guidance and STE modelling but are ensuring that we target these at the known highest risk locations based upon the assessment described above. Additional Sustainability funding has been made available for 82 schemes which had previously been deferred from our CP6 plan. This work, which is primarily maintenance and refurbishment type work, will contribute to the sustainability of our route's asset base and reflected in the improvement in the asset scores which will contribute to an improvement in the Sustainability measure.

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 20. 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 slightly we believe that we can manage the safety risk and even reduce the performance risk as outlined above.

Delivery Strategy

We have re-profiled our planned spend to ~£15m in Year 1 of CP6 in order to increase certainty of delivery. The majority of the larger schemes planned with IP are already developed to GRIP 4 and our first package of Minor Works schemes are being planned with WD for delivery early in 2019/20. In addition to the physical works schemes being planned for 2019/20 we are carrying out a large package of investigation, assessment and design schemes for the later years of the Control Period. Our spend profile for Years 2, 3 and 4 is fairly constant, with a planned spend of between £23m and £27m per year. Year 5 expenditure will be £35m due to the major Browney Curve Earthworks scheme being scheduled for that year.

Drainage

Workbanks prioritised based on safety and performance

We have created a new role of Drainage and Off-Track RAM who will be responsible for delivering drainage maintenance and renewal in CP6. This lack of direct responsibility for Drainage and Off-Track issues was identified as a key reason for the deterioration in the asset condition of Track and Earthworks in CP5. 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

We have developed our drainage workbank by undertaking detailed surveys of drainage risks 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 will also undertake wider weather resilience interventions to in these areas to prevent incidences of wider asset failure in the future.

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 are being rebuilt this year (2018/19) 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 c£15m upgrading this asset which is likely to include piling the hillside and installing scour protection alongside the River Browney.

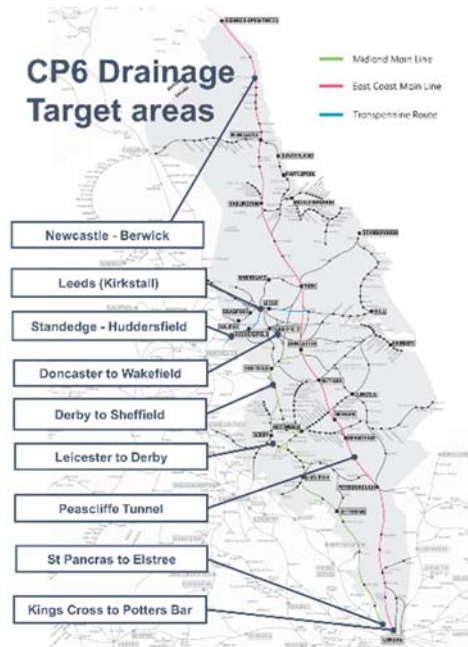


Figure 22: Drainage target areas

Buildings

Intervention strategy drivers

Our buildings workbank will prioritise those assets which require essential works. In order to deliver within budget, 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 will target the majority of our spend in CP6 at our stations, particularly our managed stations at King's Cross and Leeds and our franchised stations such as Middlesbrough, Newcastle, York. Our stations are the places where passengers quality of experience during their journey is impacted the most. This work will include platform resurfacings at stations such as Leeds as well as refurbishment of footbridges. Franchised stations renewals have been consulted with TOCs and local authorities and incorporated into an integrated station plan with the TOCs' commitments to ensure the plans are aligned. We will also invest in our Maintenance Delivery Units and Maintenance Depots to repair buildings as well as improve staff welfare facilities.

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 will undertake this in a systems-based manner to take into account the wider assets our drainage systems support. We will 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 identify and develop solutions for the root cause of problems across all asset types.

CP6 Asset Performance Outputs and emerging delivery plans

We expect a marked improvement in risk metrics, in particular Train Accident Risk Reduction measure, to which Drainage works contribute approximately 35%. It is envisaged that the majority of our Drainage workbank will be delivered using Works Delivery due to the relative size of drainage works. Work will be delivered alongside Track and Earthworks to share access windows during other interventions and minimise disruption

Key Elements of Plan	CP5 Exit			CP6 Exit		
	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 21: Our Drainage risk outputs

Case Study: Peterborough MDU

The Network Rail 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 Network Rail, LNER 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 car parks released for housing and retail development.



Our maintenance regime will move towards reactive maintenance as well deploying the latest remote monitoring technologies to better target works.

The majority of the workbank will be undertaken on the basis of lowest initial cost refurbishment or life extension works. For some schemes full renewals will be undertaken where it is more economical to do so, for example where significant preparatory work such as scaffolding is required to get access to the site.

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.

Delivery strategy

We will use a variety of delivery mechanisms throughout CP6 due to the bespoke nature of the assets. Smoothing the works across the five years will allow for inclusion of feasibility of schemes and more robust design works prior to delivery.

Emerging delivery plans

We plan to use a variety of delivery mechanisms throughout CP6 due to the bespoke nature of the assets. The delivery schedule has been realigned to ensure more competent delivery of schemes during CP6. Smoothing the works across the five years will allow for inclusion of feasibility of schemes and more robust design works prior to delivery. 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.

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.

Key Elements of Plan	CP5 Exit			CP6 Exit		
	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

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

Intervention strategy drivers

We will focus our works towards heavy maintenance and life extensions rather than renewal to improve resilience, address worsening asset condition and prevent predicted asset failure. In order to deliver within budget we will deliver significantly reduced 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.

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. We will also renew degraded and ageing fuse / switchgear. Alongside insulation resistance monitoring this will improve reliability, performance and safety. On the MML we will deliver 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.

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. We will also replace signalling power distribution cables in key locations that are unaffected by enhancement schemes. We will undertake 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 delivery strategy

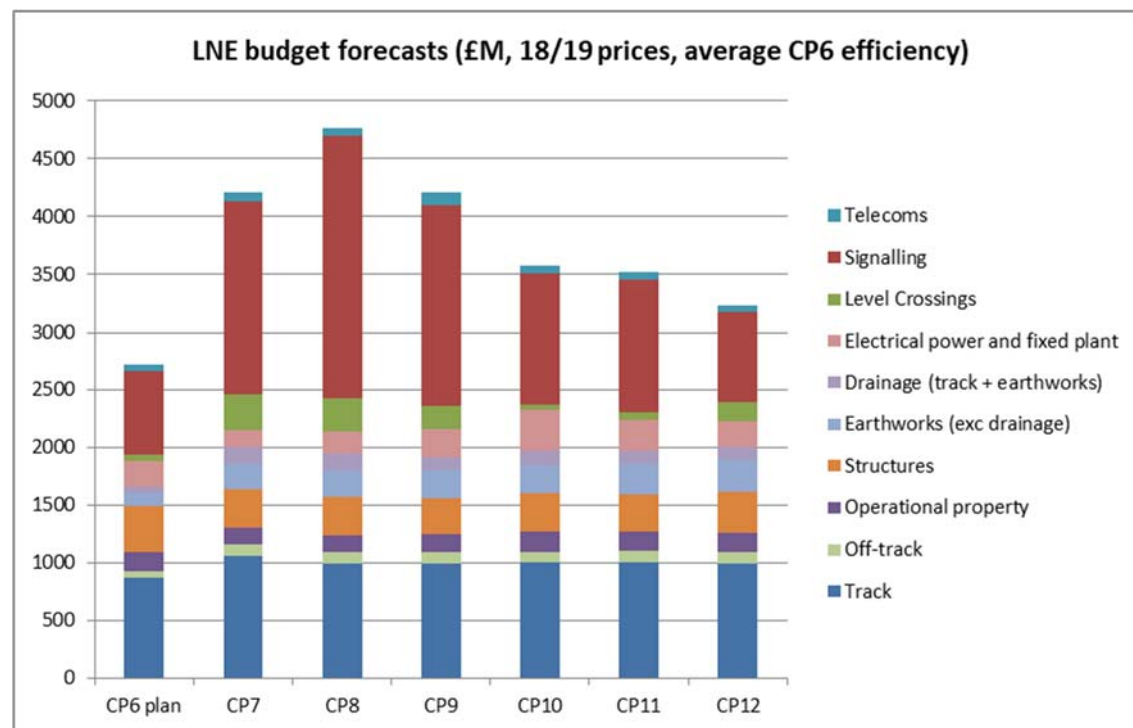
The outcomes of our CP6 workbank will be to reduce key metrics within tolerable safety limits. However signalling power supplies on the ECML and areas not impacted by the IEP programme will become a critical issue towards CP6 exit as these assets approach the end of their useful design lives. Our plans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

Key Elements of Plan (LNE)	CP5 Exit			CP6 Exit		
	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

Key Elements of Plan (EM)	CP5 Exit			CP6 Exit		
	S	P	R	S	P	R
AC Traction Power distribution	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 24: 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)

5.4 Long run forecast



This graph describes the long term expenditure forecast to control period 12, assuming expenditure levels for CP6 are consistent with the levels outlined in this plan.

Beyond the end of CP6, the assumed level of investment is that to retain the character (condition and performance) of the asset at CP6 levels.

Individual asset condition and output long term trajectories for this long term level of spend can be found in Appendix E.

Note: The information included in this graph is in 18/19 prices not cash prices, therefore the costs will not align to other numbers within the strategic plan/Databook.

Expenditure and implications	Mitigations
For drainage and off track the spend in CP7, and every CP after that, is roughly double that of CP6. Since CP6 will see a substantial uplift in budget from previous CPs, this onward up lift in later years reflects the strong focus on these assets. Small risk that the current supply chain will need to be expanded.	Through CP6 the RAM(DOT) team will increase in size to manage the increase focus on drainage and off track. The route will also be looking to resize and potentially relocate some of the DU Off Track teams. The RAM(DOT) will also be reviewing the current supply chain with C&P within the route.
For Signalling, the spend rate in CP7 and beyond is driven by the DR roll-out strategy. There is a large risk that the technology will not reach an adequate state of maturity in time, and that the supply chain will be able to adapt and deliver the plan	Life Extension activity will be carried out where possible to avoid the need for conventional resignalling. In CP6, the industry will learn how to carry out this work on the required scale.

5.5 Sustainable Development strategy

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 will be prioritised in CP6 are summarised in the table below.

Table 5: Weather Resilience schemes included in our submissions

Weather resilience scheme included in core plan	
Scheme	£m (18/19 prices, pre-efficient)
• 40 % embankment renew and refurbishment schemes will include an element of weather resilience work.	£13.5m
• 75 % of soil and rock cutting renew and refurbishment schemes will include an element of weather resilience work.	£10.8m
• Scour schemes on Underline Bridges which carry high criticality routes over watercourses	£25.75m

The drainage management strategy, overseen by our new RAM (Drainage and Off Track), will change in CP6 with an increased focus on 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.

We will deliver a proactive regime of tree felling and vegetation management with particular focus on dead, diseased and dying trees identified as high risk through our surveys. This will reduce the risk of rolling stock coming into contact with encroaching vegetation and reduce risk of OLE failure through fallen trees or debris fouling running lines. This will also reduce likelihood of 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. Our renewals and maintenance plans will deliver targeted scour protection, tunnel portal drainage improvements, equipment housing temperature control and improved seasonal preparedness.

The Route has consulted with the Centre's Sustainable Development (SD) team as part of its CP6 business planning and supports in principle its Short Form Strategy published in August 2018. This sets out the SD team's key plans over the next 8 years (which includes CP6). These priorities are:

- Making environmental management part of an Integrated Management System (IMS) compliant to ISO14001 standards and introducing changes in behaviour, procurement processes and lineside activities to reduce environmental impact of the organisation.
- Inclusion of social performance management in the IMS to improve reputation, manage our impact on lineside neighbours, maximising opportunities for socio-economic growth and investment in local communities through Network Rail's employee volunteering programme.
- Delivering energy & carbon strategies to enable business units to implement efficiency programmes to reduce energy costs, capital carbon, generate income and reduce carbon footprint and implement an energy management system.
- Delivering its weather resilience and climate change adaptation action plan – enhance asset and infrastructure resilience to current and future weather conditions and streamline preparation for, response to, and recovery from extreme weather events.
- Driving environment and sustainability awareness through leadership training, competence development and awareness campaigns.

5.6 Research, Development and Technology (R, D&T)

LNE & EM has a track record of being early adopters of new technologies. 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. We 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 pro-actively engaged with Intelligent Infrastructure and will support the successful roll-out of this core strategy. The Route also supports in principle the Central R, D&T team's July 2018 Short Form Strategy. This sets out a series of plans to rollout initiatives such as Intelligent Infrastructure and other plans to make the railway more data-enabled, cost efficient and commercialise new innovations in line with Network Rail's "Open for Business" Agenda. The rationale for these is based on the Industry's "Rail Technical Strategy (RTS) Capability Delivery Plan (January 2017) as set out in our Innovation Strategy (5.7 below).

5.7 Innovation strategy

The ORR has determined that a performance innovation fund of up to £10m is launched by Network Rail for access by Routes during CP6. The purpose of this is to support innovative proposals to improve passenger and freight performance, with funding to go towards testing and implementation of these new ideas.

To identify potential proposals to put forward for consideration by the Centre to receive funding under from this Performance Innovation Fund, the Route will leverage its existing investment panel process. It is proposed that Business Cases are to be developed for these new ideas that fit the requirements of this Innovation Fund, which are then submitted to the Route's investment panel for consideration, following the same process as proposed asset renewal schemes. These innovation Business Cases will be assessed by the investment panel based on points such as the proposed cost, efficiencies offered and deliverability of the proposal.

The LNE & EM Route is aligned in principle with the organisation's drive to foster Innovation, as articulated in its August 2018 Short Form Strategy. This strategy in turn is based on the RTS Capability Delivery Plan. This identifies twelve whole system 'key capabilities' that the railway needs to meet industry's objectives of increasing capacity and improving customer service in a sustainable and affordable manner⁴. To build these capabilities throughout the industry, Network Rail will need to collaborate and develop new mechanisms for funding the development and deployment of technology. To implement this, NR Centre's Innovation Team will integrate Research, Development and Technology into Industry Planning to get new methods and techniques deployed and delivered onto the railway. Currently as part of Industry Planning, NR is in the processes of learning from the pathfinder projects that have been deployed in the final years of CP5, these will be matured over 2019 to show they are market ready for wider deployment during CP6. Such examples of these on the LNE & EM Route have included Safe & Effective working trials in Doncaster (see 8.5.2) and the Digital Railway preparation on the Moorgate branch (see 7.3.4).

5.8 Asset management capability

During CP6 we will roll out our Asset Management Transformation Strategy, which will improve our asset management processes to bring them into line with relevant asset management quality standards.

Our first priority is to establish Route Asset Management Plans (RAMPs) and effective processes to deliver a stable, reliable work bank (cost & volume). We will review our processes and arrangements and compare them with the international asset management standard ISO BS 55001, identifying where we have gaps in our methodology and determining what further the Route needs to consider, with the ultimate aim of achieving accreditation to BS55001.

The key areas which the Route is expected to focus on, in order to align with ISO 55001 include:

- Asset Management Decision Making, which will include
 - o Implementation of decision support tools and frameworks to optimise investment across operations, maintenance and renewals;
 - o Validation and improvement of the quality of data used for operations, maintenance and renewal decisions;

⁴ [Rail Technical Strategy Capability Development Plan](#)

- o Implementation of a solution for improved workbank analytics;
- o Integration of asset management decision making framework with Intelligent Infrastructure and S&EW
- Organisational Effectiveness – encouraging collaboration, and breaking down silos across the Route, by:
 - o Identifying senior sponsors and leads;
 - o Developing capability improvement workstreams;
 - o Clarifying BAU roles, responsibilities and accountabilities;
 - o Initiating a culture that challenges ways of working, and developing a forum to encourage innovation and continuous improvement;
 - o Identifying critical business process pressure points and implementing end-to-end improvement programme;
 - o Establishing a Business Change PMO to align, coordinate and drive all areas of business change.
- Business Planning, which will include:
 - o Development of end-to-end, integrated business process across all functions;
 - o Introduction of a Route business planning capability/team to coordinate all Route business planning activities;
 - o Measurement of what matters – improvement of data quality and control and focused use of leading and lagging key performance indicators
- Delivery Optimisation and Effectiveness to improve financial accountability and controls, commercial acumen and control of procurement and supply chain, by:
 - o Optimising the route delivery strategy to improve cost efficiency and reduce costs;
 - o Alignment of deliverer objectives;
 - o Establishment of processes and controls to improve ownership and accountability for financial performance;
 - o Implementation of improved renewals scope and cost controls;
 - o Adopting a Route-wide approach to coordination and integration of work activity and access planning;
 - o Development of a Route owned procurement and delivery strategy.

This strategy will support our target of reducing the number of service affecting failures by 9.9% across CP6, will support efficient delivery through more stable plans, improve competency levels against our specified requirements, maintain our data quality at grade A2 and build in continuous improvement from our governance and assurance activity. Ultimately this will drive down whole life cycle costs of managing our infrastructure.

5.9 Specific Sustainability Targeted Investment

Table 6 sets out how we have allocated the additional Sustainability funding resulting from the Final Determination.

Table 6: Summary of LNE & EM's Sustainability submission

Asset group	High-level overview of packages	Total funding (£m, 18/19 prices)
Track	• Majority of works are S&C and re-railing, with a focus on replacing life expired assets on ECML • Targeted where base submission renewals volumes are significantly below STE/BRT modelled volumes	53
Earthworks	• 82 schemes in total incl. a mix of renewal, refurb and "light refurb" on embankments, rock and soil cuttings	23
Structures	• Highest priority schemes target increasing scope and sustainability of baseline CP6 renewals where 'lowest initial cost' approach was adopted in light of funding constraints	37
Signalling	• Renewal of critical control system at Tyneside IECC	10

Asset group	High-level overview of packages	Total funding (£m, 18/19 prices)
Total		£123m

One of our key priorities for this sustainability funding was track. The main reason for this is because of the funding constraints that were applied to our CP6 plan. Most of our track sustainability funding has been allocated to re-railing and S&C renewals due to the criticality of these assets. For example:

- S&C renewal volumes in our CP6 workbank were significantly lower than in CP5 (180 units compared to 364 units at CP5). Our base sustainability submission therefore contains funding to undertake an additional 35 S&C units on the highest criticality routes.
- LNE has over 1,000 track km of pre-1976 rail. Our CP6 workbank originally contained only 300km of re-railing works. Our base sustainability submission has provided an additional circa 90km of re-railing in CP6.

As noted above, these costs are post-H&E, and are consistent with the Route's latest position on headwinds and efficiencies, as set out in our financial submission.

Deliverability / Phasing of sustainability submissions

In developing our sustainability packages of work we have carefully considered the delivery profile of the works alongside our wider CP6 submission and enhancements programme. The approach we have adopted is:

- A number of schemes represent scope changes to baseline schemes that had previously been de-scoped to meet affordability constraints. These projects are typically further developed than 'new' schemes;
- We have typically allocated funding towards the second half of CP6 (i.e. in years 3-5). This will allow us more time to develop, plan and schedule works alongside our existing workbanks.

We acknowledge that our individual packages of work are subject to ongoing deliverability assessments to ensure that the schemes ultimately selected for inclusion in our workbank have sufficient allowances for access, resource etc.

6 Financial performance

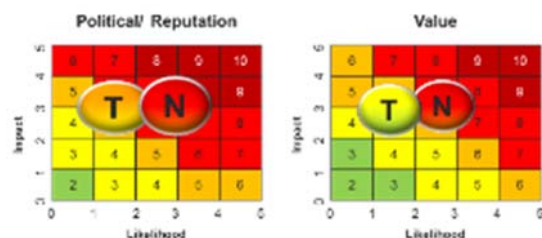
6.1 Financial performance objectives

Financial Performance		18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	Achievability
Financial Performance Measure – Gross Profit & Loss*	WORSE THAN TARGET	-11.0	-11.9	-11.7	-11.6	-11.4	-11.3	TBC	TBC	
	TARGET	0.0	0.0	0.0	0.0	0.0	0.0	TBC	TBC	
	BETTER THAN TARGET	11.0	11.9	11.7	11.6	11.4	11.3	TBC	TBC	
Financial Performance Measure – gross excl. enhancements (£m)	WORSE THAN TARGET	-27.7	-30.1	-36.7	-34.5	-31.4	-28.4	TBC	TBC	
	TARGET	0.0	0.0	0.0	0.0	0.0	0.0	TBC	TBC	
	BETTER THAN TARGET	27.7	30.1	36.7	34.5	31.4	28.4	TBC	TBC	
Financial Performance Measure – gross enhancements only (£m)	WORSE THAN TARGET	-27.2	-36.8	-23.7	-10.8	-1.0	0.0	TBC	TBC	
	TARGET	0.0	0.0	0.0	0.0	0.0	0.0	TBC	TBC	
	BETTER THAN TARGET	27.2	36.8	23.7	10.8	1.0	0.0	TBC	TBC	
Cash compliance – income & expenditure	WORSE THAN TARGET	38.5								
	TARGET	19.3								
	BETTER THAN TARGET	0	0	0	0	0	0	0	0	

Key stakeholder priorities	Response
Better financial discipline to support efficient and effective delivery of our CP6 commitments	The Route has introduced a second financial controller focusing on operational expenditure, in addition to a financial controller focusing on Capex. As set out in section 8.2 we have a dedicated CP6 Readiness workstream which is tracking and reporting upon our readiness to deliver our CP6 commitments on time and on budget. Amongst other things, this is tracking key unit rates, stats of capital project development, headwinds and efficiencies development, with mitigating actions being put in place to address risks of under-delivery. Our plans include overplanning for efficiencies so that if an initiative does not deliver the planned benefit there is capacity to compensate. As we set out in 7.1.1 headroom has been included in our plans, with £135m allocated Route risk portfolio fund.
Encouragement of Third Party Funding	As we set out in 6.3 we have re-structured our Route Sponsorship Team with significantly greater focus on managing and attracting funding from local, regional and national third parties.

6.2 Financial performance activity prioritisation

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 RSP 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 included, with £135m allocated Route risk portfolio fund from Network Rail's CP6 Plan. 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)	DRAM	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.

6.3 Financial Sustainability strategy

6.3.1 Financial sustainability strategy

Network Rail is committed to undertaking a Financial and Commercial Transformation Programme (FaCT) in order to deliver long term financial sustainability for the organisation, addressing the need for wider sources of funding and financing for enhancements. One of the key projects within this is the 'Future Capital and Financing Structure project', which will lead to the implementation of a financial framework with sustainable financing arrangements for CP6, as agreed with stakeholders, agree an appropriate CP6 WACC with the ORR, and deliver a healthy balance sheet. Other elements of this transformation programme, include a third party funding and financing strategy, the Route's approach to which is described in more detail below.

6.3.2 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. These schemes range from new footbridges to significant projects such as the complete redevelopment of the existing Leeds Station, which will see the integration of 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 property team is working 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 a summary of which is included in Table 7.

Table 7: Summary of projects in development with third party involvement in CP6

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, Wixams, Leeds (Thorpe Park), Horden (Peterlee), Doncaster (Robin Hood Airport)	352
Depots	York	7

6.3.3 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

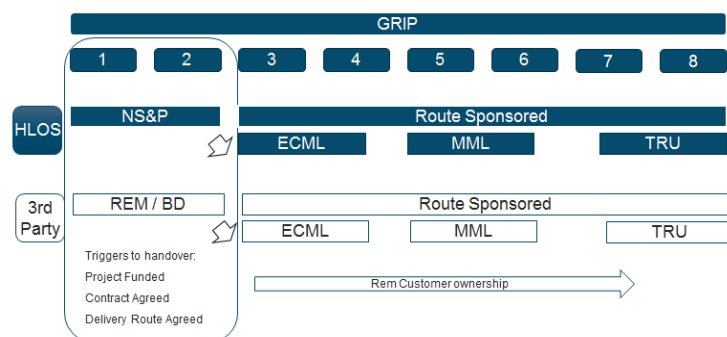


Figure 25: Illustrates how new projects transition from System Operator or Business Development to Sponsorship

The Business Development team has been created which will follow the project life cycle as defined in Figure 25, with the REM focusing on securing third party funding for the development phase, supported by three Business Development Sponsors which have recently been recruited. 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.

6.3.4 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 subsequent 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.
- 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 and 5 Combined Authorities relating to transportation investment priorities. 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.

7 Activities & expenditure

7.1 Cost and volume summary

Our CP6 Operations, Maintenance and Renewals submission is £5.45bn in cash prices, inclusive of headwinds and efficiencies. Digital Railway implementation is excluded from this budget.

The Route's CP6 renewals budget was developed by considering the various asset disciplines, and allocating funds based upon a detailed bottom-up assessment of the risk profile of each workbank, informed by the local knowledge of our Route Asset Managers. This was 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. Our proposed plans were then adapted to reflect the ORR's Final Determination, with our final plan reflecting the following:

- A net £105m of additional efficiencies were identified by the Route in response to the efficiency challenge laid out by the ORR.
- £142m of additional funding was allocated to renewals works targeted at improving asset sustainability. These funds are primarily targeted at improving the sustainability of our vital Track, Earthworks and Structures assets
- £15.0m of additional funding was allocated for additional workplace management measures at some of our key workplace locations.
- £5.9m of additional funding was allocated to improve protection of UWCs.

A number of adjustments have been made to the final profile and distribution of our funding in CP6 to increase certainty of delivery against our targets. These changes included:

- A re-allocation of £155.3m from Capex to Opex to provide a robust funding position for additional vegetation and drainage works
- A re-allocation of funding within our renewals budget to ensure that we maintain an acceptable risk profile across all assets, and to minimise deliverability risks associated with the additional efficiencies associated with the ORR's efficiency challenge.

Throughout CP6 we will review our plans on an ongoing basis, including considering how we use contingency, tracking and challenging our unit rates, and monitoring our delivery against our efficiency targets, and adapting as necessary.

The following tables set out our Renewals, Operations and Maintenance costs for CP6. These plans are predicated on the key assumptions laid out in Appendix B and will be updated through Change Control should these assumptions.

Table 8: Renewals Costs (post headwinds and efficiencies in cash prices)

Asset type	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	25/26
Track	£m	Renewals	248	254	222	164	175	1,063	192	222	236	183	183	1,016	203	203
Conventional Signalling	£m	Renewals	108	139	92	134	161	634	147	182	171	185	179	864	173	173
Structures	£m	Renewals	80	137	90	46	43	396	53	95	99	102	85	434	87	87
Earthworks	£m	Renewals	12	13	24	18	6	73	15	27	23	24	35	123	25	25
Drainage	£m	Renewals	9	11	13	9	10	52	13	13	10	10	7	53	11	11
Buildings	£m	Renewals	37	38	7	12	40	134	55	52	29	24	18	178	36	36
Electrification & Fixed Plant	£m	Renewals	19	16	34	24	30	123	36	51	55	58	38	238	48	48
Other	£m	Renewals														
Total Renewals	£m	Renewals	513	608	482	407	465	2,475	511	642	623	586	545	2,907	581	581

Table 9: Key Volumes

	Unit of Measure	Funded by	CP5 (Volume)						CP6 (Volume)						CP7 (Vol)	
			14/15	15/16	16/17	17/18	18/19	CP5	19/20	20/21	21/22	22/23	23/24	CP6	24/25	25/26
Plain Line	Linear track Km	Renewals	402	433	285	195	230	1,545	202	366	370	336	348	1,622	324	324
S&C	No. of S&C units	Renewals	267	332	366	242	285	1,492	116	205	178	160	153	812	162	162
Conventional Signalling	SEU	Renewals	88	209	73	36	503	909	70	413	326	394	220	1,424	285	285
Embank/Soil Cut/Rock Cut	No. of	Renewals	100	486	792	3,029	249	4,656	515	753	831	912	1,021	4,032	806	806
Underbridges	Number of assets intervened on	Renewals	30	63	54	20	37	204	30	48	37	50	31	196	39	39
Underbridges	m2 plan deck area worked on	Renewals	6,077	29,239	37,515	14,869	15,057	102,757	9,856	17,873	17,122	20,988	20,868	86,707	17,341	17,341
Wire runs	No. of	Renewals	5	17	25	21	22	90	10	0	0	0	0	10	0	0
Conductor Rail renewal	Km	Renewals	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 10: Operating Costs (post headwinds and efficiencies in cash 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	25/26
Track							107	120	122	125	127	601	131	135
Off track							13	14	16	16	16	75	16	17
S&T							40	47	47	48	49	231	50	52
E&P							20	23	23	24	25	115	26	27
DU HQ							39	28	35	35	37	174	38	39
DU/WD Maintenance excl. B&C	158	173	185	186	183	885	219	232	243	248	254	1,196	262	270
Non DU Maintenance	33	38	52	62	76	261	80	73	67	67	68	355	70	72
Civils: Buildings Maintenance	0	0	13	34	34	81	19	15	16	16	17	82	17	18
Civils: Structures Maintenance	0	0	25	0	0	25	20	20	21	21	22	104	23	23
Civils: Earthworks Maintenance	0	0	3	0	0	3	2	3	3	3	4	15	4	4
Total Maintenance Costs	191	210	278	283	292	1,254	339	344	349	356	364	1,752	375	387
Operations	95	95	97	104	109	500	119	119	120	124	128	610	132	136
Support	21	23	21	27	59	152	32	35	36	39	41	183	42	44
Operations & Support Costs	116	119	117	131	168	652	151	154	156	163	169	793	174	179
Total Controllable Costs	307	329	395	414	461	1,906	490	498	505	519	533	2,545	549	566
Non-Controllable Costs														
Headcount														
Permanent	5,476	5,474	5,603	5,687	5,868	5,868	6,074	6,012	5,973	5,958	5,943	5,943	5,913	5,910
Agency	35	30	9	6	6	6	7	7	7	7	7	7	7	7

7.1.1 Risk funding

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 inefficient. Therefore, our strategic plan includes £135m of Route risk portfolio fund, which has been created through funding from Network Rail's overall CP6 plan. This Route risk portfolio fund is particularly for the business performance risk we face in the control period, including inflationary increases above the agreed inflation level as defined in the core plan.

Ideally, actual results will be in line with our CP6 plan and we will be able to release this Route risk portfolio fund to invest it in improving the railway. In addition to this Route risk portfolio fund, we have £193m allocated for contingent renewals works.

If needed, we will also have the opportunity to access the Group Portfolio Fund in CP6. Again, we will ideally spend this on further investment to improve the railway. Group Portfolio Funding 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.

7.2 Enhancements

In contrast to previous Control Periods, in CP6, Enhancements can be introduced at any time. A DfT funded Enhancement is required to go through the three key stages of the Investment Decision Framework before it can progress to the delivery phase. These stages are:

- Decision to Develop
- Decision to Design
- Final Investment Decision (FID)

Significant Enhancements that are funded from other sources are expected to follow the same process.

A number of Enhancements that have been through this process include Thameslink, East Coast, Leeds Capacity Update, and Midland Mainlines.

7.2.1 Approach to programme sponsorship

Enable
investment to
time & budget

Programme
sponsorship
capability

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 of the access windows we obtain for enhancements to enhance the efficiency and effectiveness of Maintenance and Renewals works (see section 8.5.1).

7.2.2 Our enhancement schemes

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 phases of power supply upgrade between Wood Green and Edinburgh.

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 (Figure 26), Peterborough – upgrade the Down Slow line between Fletton to Peterborough, Doncaster Station area enhancements, including an additional platform, IEP enabling projects covering gauging in England and Scotland, platform extensions and PSU1 related power infrastructure upgrades (see below) and Power Supply Upgrade Phase 1 Wood Green to Bawtry (PSU1)

The programme will deliver the following benefits to passengers:

Increase capacity from 6 to 8 LDHS tph between King’s Cross and Doncaster, increase capacity from 5 to 6 LDHS tph from Doncaster to Newcastle, and a reduction in journey times for the fastest LDHS services to 4 hours to/from London to Edinburgh and 2 hours to/from London to Leeds. DfT noted these outputs are to be treated as conditional as trade-offs may still be needed to be made as further work is completed by NR to develop the timetable.



Figure 26: Grade separation works at Werrington

Leeds Capacity Update

TRU remains in development phase, and the design and delivery for the complete programme of works is not funded in this plan. However, an element of the TRU Intermediate Interventions, the Leeds Capacity upgrade, has passed final investment decision, and is fully funded for delivery in CP6. This project is to provide additional capacity at Leeds Station to support the operation of longer trains and additional services on a number of routes. The project will be delivered in the following phased strategy:

Phase 1 - Recontrol of the signalling control system to the York ROC, Phase 2 - The relocking of 8No. existing signalling interlockings to provide additional signalling capacity, Phase 3 - A new 8-car platform (platform 0) and longer train standages on platforms 6. Track remodelling to the West end of the station to provide greater operational flexibility. Associated resignalling and Phase 4 - Development phase to be undertaken as part of Transpennine Route Upgrade

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, cleaner and quieter 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. 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 and Derby to Sheffield Journey Time Improvement (JTI): selected infrastructure interventions to improve line speed.

The programme will deliver the following benefits to passengers:

Provision of 25kv electrification from the existing limits at Bedford to Kettering and Corby; providing traction power for 2 electric passenger train services, enabling of improved journey times through the delivery of key infrastructure schemes; Additional capacity for a 6th Long Distance High Speed service to serve between St Pancras and Kettering / Corby; and 3 freight paths per hour between Bedford and Kettering. The capability of the network will be enhanced through the extension of platforms at key stations south of Leicester and New stabling facilities will also be provided at Kettering.

7.3 Digital Railway

7.3.1 Digital Railway business case

Realising Digital Railway

As we set out in our Vision and Objectives (1.3.1) Enabling Digital Railway is a key component of our strategy to improve the overall capability of our devolved Route organisation. DR will bring about a new era in sustainable high performance, efficiency, skill development, and cross industry collaboration. The following sections provide an outline of the Route's strategy for delivering Digital

Railway on ECML South in CP6, which is now at an advanced stage with the launch of the procurement of delivery partners for Train Control, Traffic Management and Railway Systems Integration.

Whilst we are accelerating our plans to deliver Digital Railway on ECML South, funding plans have not been finalised and remain subject to business case approval for incremental funding requirements to those planned into the renewal plan. This Strategic Business Plan therefore excludes Digital Railway incremental funding as reflected in the cost and volume tables in section 7.1. However, our renewals plans for the Southern end of the ECML continue to be developed so that we can efficiently divert funding away from conventional signalling renewals and into equivalent Digital Railway renewals

The following sub-section sets out the current status of the ECML South business case.

Status of ECML South business case

The Digital Railway Programme (DRP) has developed five Strategic Outline Business Cases (SOBC) with certain Routes and other stakeholders, for digital upgrade schemes. An enhanced SOBC for East Coast Digital Programme (ECML South) was submitted in May 2018. Amongst other things, this SOBC reflected the position set out in the LNE & EM RF11 (2017/18) RSP, whereby £194 million (2017/18 prices) of CP6 funding LNE Signalling work bank would contribute to Digital Railway renewals (as these conventional signalling renewals would in effect be superseded by the equivalent Digital Railway deployment).

On the strength of the SOBC which was approved by DfT's Board Investment Commercial Committee, the scheme has been advanced through to OBC stage. The objective of this OBC, as agreed with the DfT, is to develop the business case sufficiently to enable the 'Decision to Design' (and progression to Full Business Case (FBC) stage).

Funding of £30m has been identified and authorised, to support the further development of the scheme through to FBC, from the following sources:

- £8m from the Digital Railway Programme in FY18/19, to progress development through to the end of CP5;
- £10m from the National Productivity Investment Fund (as per Secretary of State's letter to Mark Carne on 19th March 2018), £1.5m of which is subject to approval of the OBC; and
- £12m which the LNE & EM Route has indicated it will contribute from renewals budgets should the 'Decision to Design' (and progression FBC) be taken.

The table below illustrates the overall costs for implementation of our recommended technical option **as presented in the Financial Case for the enhanced SOBC in May 2018**, as well as the potential funding sources. Because the Route RF8 CP6 submission, this has been prepared on the basis that Digital Railway implementation is excluded from our CP6 funded works, the figures presented in this table are for information purposes only, and have not been updated since the May 2018 SOBC.

The figures presented in this table reflect the LNE & EM SoFA funding recognised from LNE & EM's renewals budget in our RF11 (2017/18) position at £194m (2017/18 prices). This table will be updated through change control once the development for the OBC is complete, but it is important to note that a number of digital enabling or digital schemes have been initiated that alter this figure. These include Kings Cross remodelling which through its signalling renewal will be a key digital enabler for ECML South in its layout, system specification and product application. This also includes the Northern City Line renewal which will be a full ETCS renewal as a result of incremental funding agreed with the DfT to enable industry change which will allow us to achieve greater outcomes for the planned renewal. Along with some other considerations, the remaining renewals planned and funded in this area that will contribute to the further digital deployment is estimated to be £101m (2017/2018 prices).

Table 11: East Coast Digital Programme SOBC Summary

East Coast Digital Programme (Option 3b – ETCS no signals plus Option 4 – TMS) - Source: East Coast Digital Programme SOBC Financial Case (May 2018)	Development stage	SOBC (May 2018)	BCR	With HS2 2b Option 3b: 1.5 Option 4: 0.5	Without HS2 2b Option 3b: 10 Option 4: 3.5
	Expected delivery year	2021-2026	Appraisal period	Option 3b: 60 years Option 4: 30 years	

Implementation cost (£m, nominal)				
	CP5	CP6	CP7 & beyond	Total (£m)
Digital Infrastructure	15	259	1,086	1,360
Telecoms	0	9	32	41
Railway Integrator	0	10	40	50
Other	17	204	830	1,051
ETCS On-Board - Freight	0	262	0	262
ETCS On-Board - OTM	0	139	0	139
Sub-Total (assumed core NR delivered)	32	883	1,988	2,903
Franchise in-cab fitment	0	103	5	108
Open access in-cab fitment	0	33	0	33
Civil Engineering Enhancements	0	0	0	0
TOTAL	32	1,019	1,993	3,044

Sources of funding in CP6 (£m, nominal)	
	CP6 (£m)
CP6 Funding currently allocated	
LNE & EM CP6 SoFA funding diverted to DR (£194m in 2017/18 prices)	209*
Other	92
Franchise in-cab fitment	103
Net funding requirement	615

* NB: This is the £194m that was identified in LNE & EM's RF11 (2017/18) submission as the LNE & EM Route contribution from SoFA renewals funding. This has been inflated to nominal prices using the inflation assumptions that underpin the SOBC

* NB: This table will be updated once the development for the ECML South OBC is complete, but it is important to note that the Route has now initiated a number of digital enabling or digital schemes in ECML South which alters the remaining value as described above.

It should be noted that the implementation costs for ETCS On-Board – Freight, ETCS On-Board – OTM and Digital Railway Programme costs referenced in the above table are detailed in the Strategic Plans for Digital Railway Programme, FNPO and Route Services.

Funding position and CP6 change control

As stated above, the funding position for DR implementation on the ECML South is yet to be settled and is being progressed through the development of the Business Case.

Should DR implementation on the ECML South be approved at FBC, the LNE & EM Route will need to work closely with ORR to employ the change control mechanism so that funds that are currently allocated to the relevant LNE conventional signalling volumes can be diverted to the equivalent DR works.

7.3.2 Specification and Benefits

The outline proposition for ECML South 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.

7.3.3 LNE&EM Digital Railway Delivery Strategy

Realising Digital Railway

On the strength of the SOBC, funding of £30m has been identified to support the further development of the scheme through to FBC.

In line with our recommended delivery strategy set out in the SOBC, the Route has already begun the process of market engagement and procurement with a view to appointing:

- A Train control (ETCS) technology partner
- A Traffic Management technology partner
- Programme integration and management partner to support the development of scheme through to OBC, FBC then delivery.

Our procurement strategy is designed to specifically address the fast-changing nature of digital technology, and is built upon lessons learned from previous programmes. Key features of our strategy include:

- **Appointing delivery partners early in the development cycle**, enabling us to capitalise on the expertise of the supply chain during the definition and development of the scheme
- **Outcome-based contracting** – with incentives that drive suppliers towards delivering the desired programme outcomes
- **Risk transfer** – a client / supplier model that transfers risks to the parties best placed to manage them, with a supplier responsible for managing the integration across the programme.

Early targets for our partnerships will include achieving an industry endorsed output specification, an optimised procurement plan and a business case that provides conclusive industry funding provision which allows for confident market engagement and to commence deployment.

Reaching this position as early as possible is critical for realising the alignment of opportunities that underpin the business case. In particular:

- If the programme is delayed conventional renewals to life expired signalling assets at the southern end of the ECML will be urgently required, which would undermine the Digital Railway investment plan
- Integration of Digital Railway deployment with industry train fitment and readiness plans.

The detailed work we have undertaken to develop the scheme and commence procurement activities reflect this urgency and mean that we are strongly positioned to roll out delivery.



Figure 27: Map of Digital Railway implementation

7.3.4 The Moorgate Plan

As part of our core CP6 Signalling Renewals plan set out in section 5.3, 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. This provides the greatest opportunity for a digital railway anywhere on the network.

In CP6 we will therefore 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 £18.6m renewals plan has been supported by the DfT with a £3.3m contribution from 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.

7.4 Telecoms strategy

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 and has been updated in line with the July 2018 short form strategy. 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.

Table 12: NRT's national Telecoms themes

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

NRT CP6 National Themes	Drivers
	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

In developing the NRT plan, a number of requirements for different stakeholders have been identified, and Table 13 below describes how the national telecommunications plan will look to address these requirements in the short and long term.

Table 13: NRT's plans to address stakeholder requirements, as provided by Network Rail Telecom

Stakeholder	Prioritised need	Short-term objectives	Long-term objectives
DfT	Delivery of performance levels for franchises	Support conversations at the earliest point to share core NRT imperatives – CP5 accelerated spend.	Early engagement to drive forward the CP6 core scenario.
Routes	Upgrade GSM-R cab radios to ameliorate national interference (funded to focus on reactive infill only)	Delivering a reactive infill programme in CP6. Cab radio V.4 upgrade already in progress.	The upgrade programme will continue into CP6.
	Concerns with amount of life expired SISS assets (CIS & PA) due to delayed renewals.	Significant renewals – refer to the activity and expenditure table.	Early engagement to drive forward the CP6 core scenario as stated in the investment section (scenario planning) of the NRT plan
	Concerns over ongoing use of platform based DOO	To be supported through a more cost-effective solution for DOO	Early engagement to drive forward the CP6 core scenario
	Migration from legacy systems and operations to reduce the support costs from having dual networks in operation. Part of the connectivity.	Migration is a key imperative in realising reduced support costs achieved by use of an intelligent infrastructure.	Early engagement to drive forward the CP6 core scenario
	Impact on route teams (reactive approach and increased maintenance inspections)	Migration is a key imperative in realising reduced support costs.	Early engagement to drive forward the CP6 core scenario
	Deferred of large amount of assets and systems hardware increases risk to business continuity.	We have planned significant spend profile to address the balance.	Evaluate the Telecom Professional head. Early engagement to drive forward the CP6 core scenario as stated in the investment section (scenario planning)

Stakeholder	Prioritised need	Short-term objectives	Long-term objectives
	Improved performance data is required – will allow the root cause of issues to be identified and addressed.	Our planned strategy of adopting a predict and prevent approach to maintenance puts data at the heart of decision making, with better management information being made available from a wider roll-out of condition monitoring equipment and use of enhanced analytics.	Transition to a single IP telecommunications network will improve availability, performance, scalability and security of national connectivity and assets.

The NR Telecoms Short Form Strategy (July 2018) has set out a plan of activities over the following 8 years, including CP6, that the LNE & EM Route supports in principle and it is assumed these apply to the LNE&EM Route's telecoms assets. These are as follows:

- Improving safety by designing safety in to all new products and services and continuing strong focus on Everyone Home Safe Every Day.
- Increasing system and service availability by improving the resilience of critical operational telecoms infrastructure and systems, investing in network management and monitoring capability to further predict and prevent issues. In line with other maintenance initiatives such as Intelligent Infrastructure (see 8.5.2.2), LNE will work with NR Telecoms to transition over time from fixed asset lifetime renewals, to a performance and risk based renewals cycle, in order to realise maximum benefit over time for our investment.
- Improving customer experience by transitioning to a single customer portal and introducing customer relationship management tools, satisfaction measuring techniques and executing improvement plans aimed at exceeding expectations.
- Assisting the maturity of the Telecoms business by; helping them to develop and deliver improved interfaces and processes across our teams, investing and developing better governance and sponsorship and introducing lean principles and further continuous improvement activities. NR telecoms will continue its engagement with industry and where appropriate, adopt their best practices.
- Transitioning to a next generation network by; accelerating the build of our consolidated core network nationally in preparation for the digital railway, supporting trials and business cases for improved mobile connectivity on trains. Using Telecoms assets and infrastructure to support the government's digital agenda where it is safe and non-disruptive to the operational railway. We will explore how we can extend the use of telecommunications infrastructure such as the optical fibre network, generating incremental income to Network Rail.

7.5 Property strategy

Third party funding and/or financing

The LNE & EM Route Property team's CP6 plans have been influenced by NR Centre's August 2018 Short Form Strategy and has been tailored to reference specific assets and opportunities on the LNE & EM Route as set out below. The high level objectives set out in the Centre's Short Form Property strategy (that applies across all Routes) include:

- Managing and growing the income on all property assets that could be commercialised for business as usual. Using an Asset disposal strategy to raise £1.3bn cash for enhancements, release land for 12,000 new homes (included within its residential programme)
- Providing excellent customer service to our rail passengers, tenants and neighbours
- Support the safe and efficient operation of the railway by providing professional property services and fit for purpose working environments
- To attract third party investment into the railway and help to develop and improve the station estate

LNE & EM's property team has a track record of success working with TOCs, Councils and developers to achieve a range of financial outcomes, including:

- Attracting and facilitating investment into the rail sector;
- Generation of income through the portfolio (Commercial Estate, Retail, Freight and Easements);

- Capital receipts through development, shared value e.g. Doncaster, Wakefield and Brough;
- Sale of non-operational land assets, some for residential development which assists 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 and for new stations and facilities e.g. Wakefield Westgate, and for MDUs e.g. Doncaster.

Our planning and surveying teams, working with the Project teams, support delivery of rail projects e.g. Leeds Southern entrance, Hitchin loop, Doncaster loop, Werrington grade separation and level crossing closures/improvements - Ellistown No.2 (closure) and Sleaford West/Methley North (improvements).

The 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.

Early stage planning of projects and engagement with Property will be an ongoing focus to ensure 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.

Route 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, the corporate estate will be more efficient and should therefore realise OPEX savings. In particular we will focus on our York, Derby and Doncaster offices as prospects for achieving efficiencies.

7.5.1 Disposals and Income Generation

The 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 and EM Route have been identified with potential for circa 6,000 homes, including Cricklewood Goods Yard (2,000 homes) and York Central and Queen Street (1,350 homes). Clearance is required for a number of these sites and the team 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 or sections of track which could be transferred to third parties for capital receipts whilst not prejudicing freight operations. To increase current freight property income and track access charges, the Property team will look to bring new rail served facilities back into use such as Hull Dairycoates and Luton Leagrave and via Strategic Freight Site call downs at Leeds Whitehall Goods Yard and Castleford Wheldon Road.

The team have ambition to work more collaboratively with the Train Operators to look at joint disposals where benefits to the industry can be realised, e.g. reducing costs or enhancing passenger's experience.

The team will also continue to manage the retained commercial estate which will provide income from leasing land and buildings to third parties.

7.5.2 Retail Income (Managed Stations)

Our retail income strategy will target continued growth in retail sales at stations. 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 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).

7.5.3 Protection of our Infrastructure

The Property town planning team also plays an important role in scrutinising third party planning applications and development where development is adjacent to the railway, impacts on our infrastructure, or 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 or other infrastructure or level crossing closure (e.g. closure and diversion of level crossing at Baldock Road, Royston).

7.5.4 Land Strategies

Land strategies will be developed to:

- Understand the operating accommodation and land needs of the Route
- Lead to a reduction in operating costs by the removal of liabilities, consolidation of accommodation and reduction in spending on accommodation.
- Generate capital receipts and release land for housing.
- Identify funding opportunities to attract third party inward investment.
- Enable station and rail enhancements

This will be a collaborative approach between the Building RAM, the System Operator, Investment Director, Route Enhancement Manager and Sponsor teams. Examples include:

- 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, National Railway Museum and Homes England
- York station and Queen Street estate comprehensive use and improvement plans
- Newcastle Central Gateway – See inset
- Peterborough Land Strategy working with the Council, LNER and LEP to secure station enhancements including a multi-storey car park and new MDU thereby releasing land for housing development.
- Station Strategy for specific train operators (LNER) with masterplans for each station to enhance the station facilities and provide the release of land for

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, LNER, and NR. The first phase has delivered 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 space MSCP & facilitation of the potential for some 3,500 homes, 81,000sqm of mixed use development and a new primary school.



development, where appropriate.

- New stations at Elland, Horden, White Rose and Thorpe Park
- 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.

8 Delivery strategy

8.1 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, including the addition of stretch targets and challenges agreed as part of the ORR's Final Determination. These activities are designed to minimise risks around deliverability and cost, learning lessons from CP5, as set out in Table 14 below.

Table 14: Activities to identify and evaluate cost and delivery risk in forming our CP6 plans

Delivery issue / risk	How we will continue to mitigate this risk through appropriate forward planning during CP6
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 8.4) 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 8.4)
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 8.3).
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 8.3)
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 8.5)
Poor visibility of Enhancements projects occurring on the Route	Introduction of regular review requirements on Enhancements work plans at strategic points throughout the year to maximise the potential for integration with other renewals and maintenance activities, optimising access windows ensuring some form of Schedule 4 discount could be achieved.
Late remitting of work items	The production and acceptance of remits will accelerate/continue as we recognise that the timeframes between remit and due date are too short in some cases. Longer durations will allow maximum schedule 4 discounts to be the norm, will allow for maximum integration and will allow for the Route to select the optimum deliverer, and for the deliverer to select the optimum route to market.
Remit/Workbank Change	Implement measures to control and recognise the impact change has on efficient delivery, which includes identifying what is causing late changes to remits, and developing processes to avoid in the future.

These activities will improve confidence in the delivery of our CP6 volumes to time and budget and will enable us to 'hit the ground running' in CP6. They will form the basis of detailed re-planning of each year's activity within CP6 as we update our Delivery Plan on an annual basis.

Our preparatory work on cost competitiveness and delivery gives us confidence that our efficiency targets can be delivered. We will also 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 volume, and will mitigate against the various cost and delivery risks which could unfold during CP6.

8.2 Planning a Better Network strategy

As part of the planning process for CP6, the Route created a workstream to focus on our readiness for delivery of our commitments during CP6.

8.2.1 Mobilisation prior to CP6

We have created a dedicated workstream and resource to focus on our readiness for delivery of our commitments during CP6.

8.2.2 Mobilisation prior to CP6

Our mobilisation programme includes the following activities:

- Setting up a Program Management Office (PMO) and level 1 program management control room;
- Developing and implementing an appropriate governance structure to support CP6;
- Identifying and monitoring key leading indicators to track the Route's progress towards CP6 delivery; and
- Directly linking the Mobilisation programme with the Route's Asset Management Transformation programme to ensure cross-fertilisation of ideas and facilitation of long term solutions to issues identified.

This programme will ensure that the Route can monitor, identify and act upon any emerging issues or changes that need to be made in order to ensure it is best placed to enact its delivery plans from the beginning of and throughout CP6.

8.2.3 Key measures of readiness

We have developed a full programme control room structure, linked to existing internal forums where possible, which will track progress of our preparation for CP6 and delivery within CP6.

The control room structure provides a visual representation of how the Route is tracking towards the achievement of our key CP6 milestones, demonstrating the Route's current position compared to the Target for CP6 Year 1 CP6 Annual targets, and the glidepath which has been developed to drive our progress. By identifying the delta between the Route's current position, and Year 1 targets, we are able to highlight key areas of risk, pre-empt any issues or blockages that may interfere with our ability to deliver on our commitments and develop mitigation plans.

The tracking of these key metrics through the control room structure is an ongoing process, with these metrics updated every two weeks, and monitored by our senior management team on an ongoing basis.

Examples of some of the key areas which are monitored include:

- Key unit rates
- Status of capital project development – authorisation, access, remits
- Headwinds and efficiency development
- Safety scorecard measures
- Opex cost drivers
- Customer engagement
- Train performance levels.

8.2.4 Readiness throughout CP6

The key activities undertaken as part of the readiness workstream will transfer into business as usual activities for the Route.

The Route will continue to track the key readiness measures throughout CP6, with this to feed into an ongoing monitor, review and update cycle. Continuous tracking of these measures will allow us to monitor progress by period, toward the end of year targets across a range of areas. It will allow for identification of situations where metrics may be consistently tracking below the glidepath required to achieve the Year-end target. By identifying underperformance in real time, the Route can be more responsive to issues that are interfering with delivery of the CP6 Plan, and develop and

implement solutions in a more timely manner. This process will support annual updates to our Delivery Plan which are required under Route Based Regulation.

8.3 Project Delivery (IP) strategy

The Route, along with IP, have identified the following initiatives, that will allow IP to improve alignment with planning processes, supply chain engagement from the outset, and ultimately the deliverability of projects.

8.3.1.1 Robust early planning

Robust joint delivery and procurement strategy

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.

We have and continue to conduct detailed joint planning with our deliverers to ensure a smooth transition into CP6 activities. These include the Deliverability Workshops and project development activities set out below.

As part of our CP6 Readiness workstream we are actively tracking the volume and value of remits for works in Year 1 which have been issued to and accepted by deliverers in order to ensure that all projects are fully remitted or that contingency plans are put in place for those that are not.

8.3.1.2 Deliverability workshops

In preparation for CP6 we have undertaken detailed joint deliverability assessments with our deliverers. This has included an ongoing series of workshops 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 work through and address the key deliverability issues relating to our CP6 plans. 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.

These Deliverability Workshops will continue throughout CP6 so that we are able to jointly work up plans in more detail to facilitate agreement as part of a joint business planning process.

8.3.1.3 Early project development

Building on the Deliverability Workshops, we will work closely with our deliverers during 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.

8.3.1.4 Integrated approach to delivery

The joint planning process described above provides a practical example of how we will become more integrated in our approach to delivery. As part of our Annual business planning process in CP6 we will jointly agree our plans and targets with our deliverers, starting with this CP6 Delivery Plan as the baseline.

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. 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 relationship include:

- We will use the CP6 workbank to create a collectively understood work programme which treats the entire enhancement and renewal work bank as a portfolio with discrete 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 (8.5.1) 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 throughout 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.

8.4 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. The sections below describe the process we have undertaken in preparation for CP6, which will form the basis for tracking and updating our expected unit rates throughout CP6.

8.4.1 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.

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 28).

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.

8.4.2 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 were 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.



Figure 28: Example benchmarking output

8.4.3 Summary of costing approach for each asset type

The table below summarises the basis of costing that has been used for each asset type.

Table 15: Costing Basis 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	STED book rates	16%
	RAM	LDRs based on engineering estimates and dialogue with deliverers	76%
	IP	Bottom up engineering estimates along with historical cost data	8%
Off Track	RAM	Average contracted rate	100%
Drainage	RAM / Works Delivery	Historic delivered rate	100%
Geotech	IP	Benchmarked historic delivered rate, including an uplift for known scope changes (RAM/IP/Works Delivery)	78%
	Works Delivery	Historic delivered rate along with engineers' estimates	22%
Structures	IP	Bottom-up cost forecast of project workbank based on engineers' estimates of similar projects, and subject to peer/deliverer review	62%
	Works Delivery		38%
Buildings	IP	Bottom-up cost forecast of project workbank based on engineers' estimates of similar projects, and subject to peer/deliverer review	52%
	Works Delivery / Maintenance		44%
	Direct Delivery / Other		4%

8.4.4 Approach to operations and maintenance cost forecasting

Maintenance costs have been developed using the Activity Based Planning Tool v6.1. 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, IMEs, 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. We expect to achieve this reduction through natural attrition over the course of CP6.

8.4.5 Supply chain capability

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) IP seek to transition to a 'closer to fewer' procurement model whilst the Route desire to build relationships with the appropriate number of suppliers, including SMEs. This means being closer to our supply chain. In order to do this we will seek to implement a procurement model that:

- 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

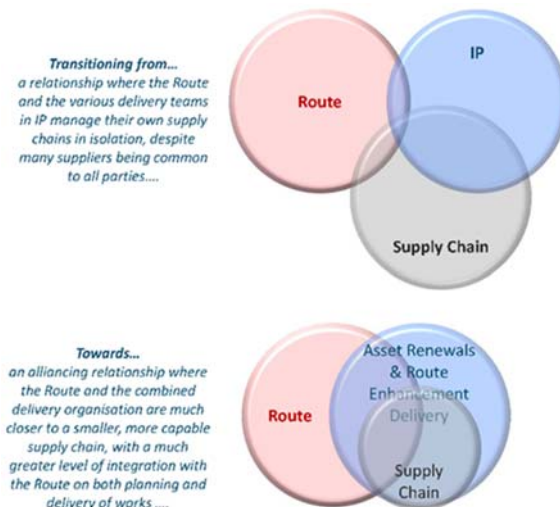


Figure 29: LNE&EM plans to ensure better alignment between ourselves, IP and our Supply Chain in CP6

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 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 TRU, 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.

8.5 Maintenance strategy

8.5.1 Access

Efficient and optimal access planning

We will work collaboratively with our customers, delivery functions, train and freight operating colleagues to maximise the efficient use of access with minimum disruption to the rail industry's customers and end users.

We have completed planning Access for Year 1 of CP6 within the existing industry processes. For the remainder of CP6 we will seek 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.

8.5.1.1 Maintenance access will provide the baseline

Our Safe and Effective Working programme (see section 8.5.2.2) will be a key pillar of our CP6 plan. This 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. 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 and safer.

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.

8.5.1.2 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. We are working with our TOC customers to agree the access windows 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.

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

8.5.1.3 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 30) and sharing details of workbanks across teams to allow for better alignment of works.
- **Alignment with Enhancements:** Co-ordinating with enhancements programmes occurring in CP6 such as Thameslink, TRU, King's Cross remodelling to optimise their access windows.

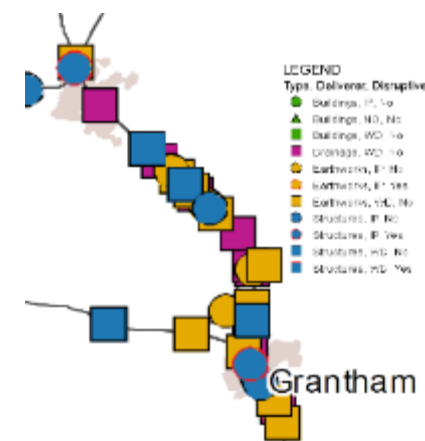


Figure 30: Electronic layered mapping tools will be deployed allowing different teams to coordinate access to maximise efficiency of delivery

8.5.2 Maintenance capability

8.5.2.1 Improving maintenance for a changing Route

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 to bring to bear in CP6. This alignment of challenges caused us to review every aspect of our maintenance to identify more effective and efficient ways of delivering work.

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

- Signalling Power Supply Testing – new legislation means that we are

47.5%

Figure 31: 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.

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.

8.5.2.2 Maintenance strategy in CP6

Our maintenance strategy will deliver 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 and has led to decreases in backlog and increased work completed on time. SEW incorporates many of the planning initiatives under the Intelligent Infrastructure programme, helping us plan maintenance work more effectively around available access windows. This will be rolled out across the remainder of the Route and is due to be completed by the end of Year 2 of CP6, and will comprise the following elements:

- **Stable, Planned cyclical Maintenance Activity** is a core element of this initiative, which will move as much maintenance work as we can into the available possession access as set out in section 8.2.1. This will reduce the level of Red Zone working and 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 our skilled maintenance teams transporting

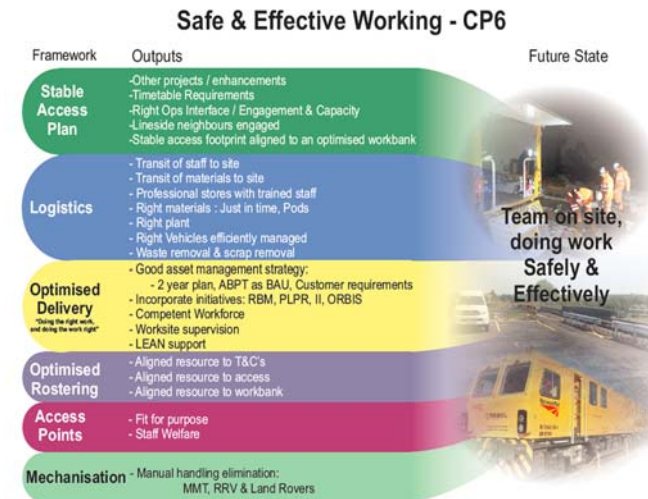


Figure 32: Safe and Effective working plan

Peterborough South Pway adopted SEW in July 2018

Since having adopted the Safe and Effective working program, Peterborough South Pway has reported the following results:

- GREEN ZONE ACCESS UP FROM 30% TO 91%
- RIGHT TIME DELIVERY UP FROM 30% TO 84%
- NON –TIME ON TOOLS HOURS DOWN 40%
- WORKS ORDER REPRIORITISATIONS DOWN BY 70%
- BACKLOG - ZERO

materials and waste themselves, which can lead to workplace injuries and inefficient fleet usage

- **Improved Worksite Supervision** – More Lean supervision and performance management through the introduction of a production management approach, reducing the risk of unacceptable standards of work and productivity

- **Improved Access Points** - we will upgrade our access points to include additional facilities and safety features depending upon the type of access that is required (see section 8.5.1).
- **Structural Review** - the implications of the SEW Stable Maintenance Plan will trigger an examination of whether we have the right resources in the right place to deliver both the planned and unplanned maintenance. It will consider the changes in traffic growth, the signal box migrations and historical fault data to understand if we also have optimised our Response resources and competencies to meet the demands of the timetable. This review will also encompass the support teams.

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 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 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.

8.5.2.3 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, are reflected in our Opex submission (see section 7.1). 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.

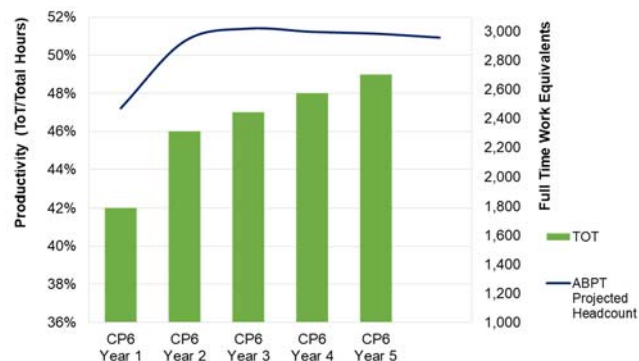


Figure 33: Projected hours worked and headcount during CP6 as a result of our Maintenance strategy

Figure 33 illustrates the expected impact on overall hours worked (i.e. time on tools, including capex recovery work) and the projected headcount resulting from this.

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 58% at CP5 exit to 49% 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 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.

8.6 Communications

The LNE&EM Route Communications Strategy will focus on improving the perceptions held by our stakeholders, promoting the benefits delivered by our investment in the railway for customers and passengers, and focusing our colleague engagement 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 Route has recently established a Customer Relationship Management (CRM) team, to improve customer relationships, and address TOC

concerns. The team is responsible for representing the voice of our customers at both a working group and Executive level with the intention of genuinely improving the service that we provide. This CRM team works closely with our Communications team to make sure that their strategies and approach to engaging with customers is aligned.

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.

8.7 Change

Engage our workforce

Rail's Organisation

Improved organisational capability

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 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.

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 through a route wide Change Management Office.

8.8 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

Improved organisational capability

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 through 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 8.6).

8.9 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 4.6) and supplemented by our targeted route initiative with Executive sponsorship

8.10 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.

8.10.1 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.

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 BS EN ISO9001 (Quality), BS EN ISO14001 (Environment), BS ISO45001 (Safety) and BS 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.

8.10.2 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. RM3 is a measure on our Long term Route scorecard and Level 1 scorecard.

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.

8.10.3 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 (section 8.7).

8.11 Information Technology and Information Management

8.11.1 Supporting Route Services' information technology strategy

The Centre's IT strategy, maintained by the Chief Information Technology Office, is going through a major refresh cycle in parallel with the PR18 process. 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 during CP6, include:

- **Line of Business:** Business change initiatives relating to how the organisation plans and runs train paths, manages railway assets and runs a railway business. For example, supporting our implementation of precision timetables, combined access planning, national records management, cost and volume reporting and virtual control centres.
- **Business Transformation:** providing the support and integration to business transformation programmes including Digital Railway and Intelligent Infrastructure (see 8.5.2.2) which span multiple areas of the organisation.
- **Innovation:** Deploying IT to support innovation across the organisation as set out in 5.7.
- **IT Transformation:** The Route Services IT Transformation Programme will aim to deliver a new Digital Business Platform, and create new supplier framework along with a changed service organisation for better customer service and improved IT asset management.
- **Run, Renewals and Enhancements:** Maintenance, renewal and rationalisation of the IT estate, including business application & hardware renewal & IT licenses. For Route Services IT this includes investment for the IT services managed by RS IT. A risk and value assessment will be used to determine prioritisation of renewals activity.

8.11.2 Information management

As we move towards a more data-driven railway both in terms of how we plan to improve our operational performance (see 4.4.1) and in terms of our maintenance strategy (see 8.5.2.2), the LNE & EM Route will need to develop more robust methods of capturing, storing and using information to

ensure relevant data protection legislation is adhered to and that commercially sensitive or confidential information remains protected. The LNE & EM Route is therefore aligned in principle with the August 2019 Short Form Strategy produced by Network Rail's Information Management Team.

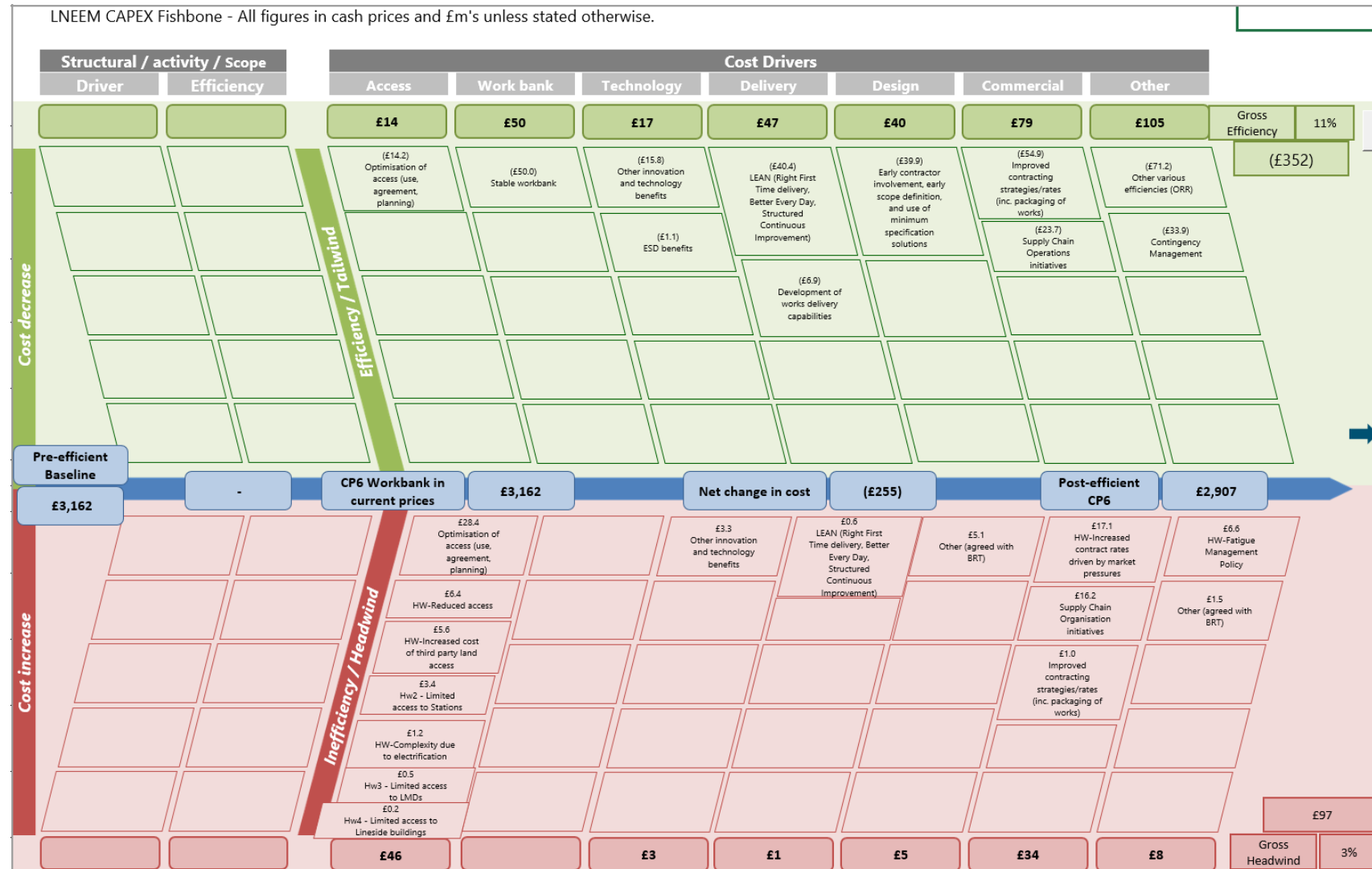
The Short Form Strategy references "The Information Strategy" long form strategy published in 2017. This sets out three specific areas of focus for improving information management standards across the organisation. These are:

- **People:** Ensuring our staff have the appropriate skills, competency, certification and engagement to manage information in a secure, safe and appropriate manner. This will be done using accredited bodies to upskill staff to become certified information professionals where required and will be supported by a network of "Information Champions" throughout the organisation.
- **Processes:** Ensuring information undergoes appropriate assurance processes that these are supported by relevant frameworks such as the "Data Information and Knowledge competency framework" and that continuous improvement is employed to ensure leaner methods of information management are employed. This will be facilitated by the deployment of automated tools by the Information Management Team.
- **Systems:** Creating systems which provide structure and guidance to those handling information, this includes clear policies and standards, and well-communicated frameworks and processes which are supported appropriate registers and models.

The results of the above will help the LNE & EM Route to become a 'value driven organisation' based on accurate, timely and integrated information which will in turn help us to deliver a better railway.

9 Headwinds and efficiency

9.1 Capex fishbone



9.2 Opex fishbone

LNEEM Opex Fishbone - All figures in cash prices and £m's unless stated otherwise.



9.3 Cost drivers, headwinds and efficiency

9.3.1 Summary of cost changes between CP5 and CP6

Table 16 below sets out how our Totex (Renewals, Operations, Maintenance and headwinds and efficiencies) is profiled for each year relative to our pre-efficient plan.

Table 16: Summary of Route efficiency (Cash prices)

Totex (O,M,R)	CP5					CP6					CP6 total
	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	
Core plan (£m)	513.0	608.0	482.0	407.0	465.0	1,025.1	1,174.4	1,205.2	1,182.3	1,161.8	5,749.8
Head winds (%)	0.0%	0.0%	0.0%	0.0%	0.0%	3.01 %	2.91 %	2.92 %	2.82 %	3.09 %	2.95 %
Efficiency (%)	0.0%	0.0%	0.0%	0.0%	0.0%	(5.43)%	(5.87)%	(9.04)%	(9.40)%	(10.52)%	(8.12)%
Post-HW, post-Eff spend (£m)	513.0	608.0	482.0	407.0	465.0	1,003.8	1,139.7	1,131.5	1,104.5	1,075.4	5,452.4

9.3.2 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 asset 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 were 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 resulted in a final set of headwinds and efficiencies, which are as included in our submission, together with a documented audit trail setting out how these were concluded, together with a robust supporting calculation basis.

10 Risk and uncertainty in the plan

Table 17: Summary of risk allocation (Cash prices)

	Unit of Measure	CP5 (£m)	CP6 (£m)						CP7 (£m)	
		18/19	19/20	20/21	21/22	22/23	23/24	CP6	24/25	25/26
Risk (SBP Route)	£m	n/a	0.0	23.1	30.5	34.4	37.4	125.5	36.6	37.7
Risk (Contingency Ren)	£m	n/a	0.0	33.4	52.4	52.0	55.4	193.2	53.3	54.9

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 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 section 10.1.2 below.

10.1.1 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. In the SOBC tested scenarios, where the capital cost was increased by 30%, the value for money remained high. However, there are risks for use of the SOBC numbers for RSP 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

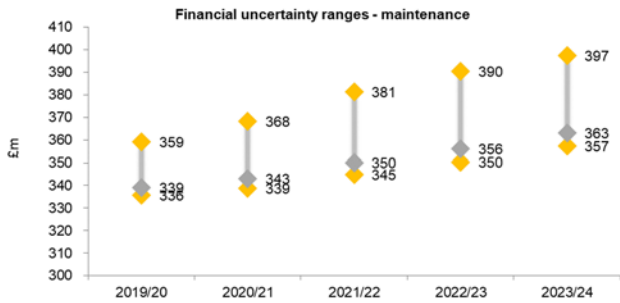
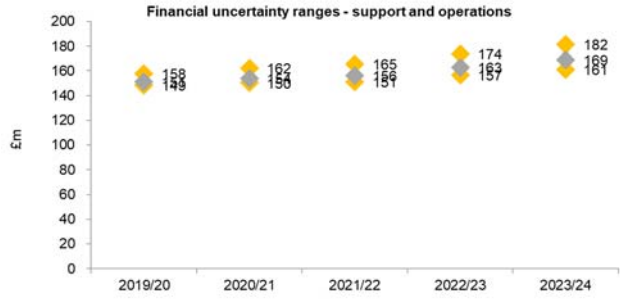
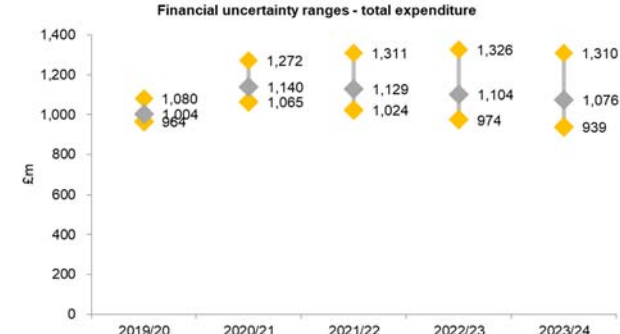
benefit realisation. This will manage the multiple parties involved in the delivery of the scheme.

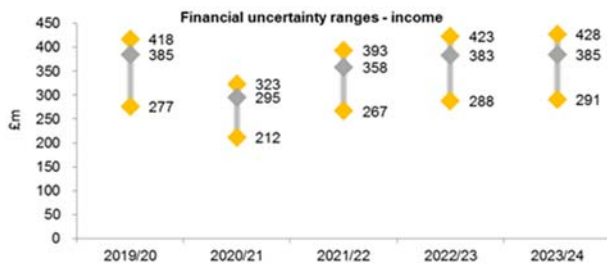
10.1.2 Uncertainty ranges for CP6

Table 18 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 18: Uncertainty ranges for CP6

Area	Potential range (low – spot – high)	Summary of key drivers of the uncertainty range	% of range																									
		Driver of range	Lower %	Upper %																								
Renewals	Financial uncertainty ranges - renewals <table><thead><tr><th>Year</th><th>High Estimate</th><th>Spot Estimate</th><th>Low Estimate</th></tr></thead><tbody><tr><td>2019/20</td><td>561</td><td>514</td><td>483</td></tr><tr><td>2020/21</td><td>736</td><td>643</td><td>581</td></tr><tr><td>2021/22</td><td>755</td><td>623</td><td>536</td></tr><tr><td>2022/23</td><td>750</td><td>585</td><td>478</td></tr><tr><td>2023/24</td><td>715</td><td>544</td><td>434</td></tr></tbody></table>	Year	High Estimate	Spot Estimate	Low Estimate	2019/20	561	514	483	2020/21	736	643	581	2021/22	755	623	536	2022/23	750	585	478	2023/24	715	544	434	Deliverability of forecast efficiencies - Potential under delivery of efficiencies by up to 50%	-17%	17%
		Year	High Estimate	Spot Estimate	Low Estimate																							
		2019/20	561	514	483																							
		2020/21	736	643	581																							
		2021/22	755	623	536																							
		2022/23	750	585	478																							
2023/24	715	544	434																									
Understanding of maintenance and/or renewals work banks - Potential impact of Digital Railway	-17%	17%																										
Cost of supplier and contractor costs - Track rates have historically been volatile so historic variations have been used to calculate a potential high end of +10% to +15%.	-15%	15%																										
Availability of access	-13%	13%																										
Weather and other serious incidents	-7%	7%																										
Maintenance		Deliverability of forecast efficiencies - Potential under delivery of efficiencies by up to 50%	-10%	15%																								
		Changes in policy and practises e.g. asset policies, fatigue management or new standards - Headwinds range of uncertainty	-9%	15%																								
		Other 1 - Suicide Prevention - Headwinds range of uncertainty	0%	12%																								

	Financial uncertainty ranges - maintenance <table><thead><tr><th>Year</th><th>Central Estimate (£m)</th><th>Lower Bound (£m)</th><th>Upper Bound (£m)</th></tr></thead><tbody><tr><td>2019/20</td><td>339</td><td>336</td><td>359</td></tr><tr><td>2020/21</td><td>343</td><td>339</td><td>368</td></tr><tr><td>2021/22</td><td>350</td><td>345</td><td>381</td></tr><tr><td>2022/23</td><td>356</td><td>350</td><td>390</td></tr><tr><td>2023/24</td><td>363</td><td>357</td><td>397</td></tr></tbody></table>	Year	Central Estimate (£m)	Lower Bound (£m)	Upper Bound (£m)	2019/20	339	336	359	2020/21	343	339	368	2021/22	350	345	381	2022/23	356	350	390	2023/24	363	357	397	Cost of supplier and contractor costs	-6%	9%
Year	Central Estimate (£m)	Lower Bound (£m)	Upper Bound (£m)																									
2019/20	339	336	359																									
2020/21	343	339	368																									
2021/22	350	345	381																									
2022/23	356	350	390																									
2023/24	363	357	397																									
		Understanding of maintenance and/or renewals work banks	-5%	7%																								
Support and operations	Financial uncertainty ranges - support and operations <table><thead><tr><th>Year</th><th>Central Estimate (£m)</th><th>Lower Bound (£m)</th><th>Upper Bound (£m)</th></tr></thead><tbody><tr><td>2019/20</td><td>153</td><td>149</td><td>158</td></tr><tr><td>2020/21</td><td>162</td><td>150</td><td>167</td></tr><tr><td>2021/22</td><td>165</td><td>159</td><td>170</td></tr><tr><td>2022/23</td><td>174</td><td>163</td><td>179</td></tr><tr><td>2023/24</td><td>182</td><td>169</td><td>189</td></tr></tbody></table>	Year	Central Estimate (£m)	Lower Bound (£m)	Upper Bound (£m)	2019/20	153	149	158	2020/21	162	150	167	2021/22	165	159	170	2022/23	174	163	179	2023/24	182	169	189	Deliverability of forecast efficiencies - Potential under delivery of efficiencies by up to 50%	-16%	34%
		Year	Central Estimate (£m)	Lower Bound (£m)	Upper Bound (£m)																							
		2019/20	153	149	158																							
		2020/21	162	150	167																							
		2021/22	165	159	170																							
2022/23	174	163	179																									
2023/24	182	169	189																									
Changes in policy and practises e.g. asset policies, fatigue management or new standards - Headwinds range of uncertainty	-9%	19%																										
Operational impact of new assets and systems - Transfer to a ROC control system	-1%	3%																										
Impact of changes in traffic	-1%	3%																										
Total expenditure	Financial uncertainty ranges - total expenditure <table><thead><tr><th>Year</th><th>Central Estimate (£m)</th><th>Lower Bound (£m)</th><th>Upper Bound (£m)</th></tr></thead><tbody><tr><td>2019/20</td><td>1,004</td><td>964</td><td>1,080</td></tr><tr><td>2020/21</td><td>1,140</td><td>1,065</td><td>1,272</td></tr><tr><td>2021/22</td><td>1,129</td><td>1,024</td><td>1,311</td></tr><tr><td>2022/23</td><td>1,104</td><td>974</td><td>1,326</td></tr><tr><td>2023/24</td><td>1,076</td><td>939</td><td>1,310</td></tr></tbody></table>	Year	Central Estimate (£m)	Lower Bound (£m)	Upper Bound (£m)	2019/20	1,004	964	1,080	2020/21	1,140	1,065	1,272	2021/22	1,129	1,024	1,311	2022/23	1,104	974	1,326	2023/24	1,076	939	1,310			
		Year	Central Estimate (£m)	Lower Bound (£m)	Upper Bound (£m)																							
2019/20	1,004	964	1,080																									
2020/21	1,140	1,065	1,272																									
2021/22	1,129	1,024	1,311																									
2022/23	1,104	974	1,326																									
2023/24	1,076	939	1,310																									

Income	 Financial uncertainty ranges - income <table><thead><tr><th>Year</th><th>Lower Bound</th><th>Upper Bound</th></tr></thead><tbody><tr><td>2019/20</td><td>277</td><td>418</td></tr><tr><td>2020/21</td><td>212</td><td>323</td></tr><tr><td>2021/22</td><td>267</td><td>393</td></tr><tr><td>2022/23</td><td>288</td><td>423</td></tr><tr><td>2023/24</td><td>291</td><td>428</td></tr></tbody></table>	Year	Lower Bound	Upper Bound	2019/20	277	418	2020/21	212	323	2021/22	267	393	2022/23	288	423	2023/24	291	428	Access charging income	-53%	47%
		Year	Lower Bound	Upper Bound																		
		2019/20	277	418																		
		2020/21	212	323																		
		2021/22	267	393																		
2022/23	288	423																				
2023/24	291	428																				
Schedule 4	-7%	6%																				
Schedule 8	-19%	14%																				
Other income	-15%	13%																				

11 CP6 regulatory framework

This section sets out our latest forecast of expenditure and income for CP6, and also how our forecasts compare to the assumptions ORR made in calculating our CP6 route funding settlement. Consistent with ORR's PR18 final determination, the tables in this section include route-incurred, and allocated, expenditure and income.

CP6 expenditure forecast

In Table 19, below, we provide our latest CP6 forecast of expenditure. The forecast, below, will act as the baseline against which ORR measures financial performance in CP6.

Table 19: CP6 expenditure forecast

£m in cash prices	19/20	20/21	21/22	22/23	23/24	Total	Other*	CP6
Support	32	35	36	39	41	182	579	761
Operations	119	119	121	124	128	611	14	625
Maintenance	339	343	350	356	363	1,752	81	1,833
Renewals	511	643	623	586	545	2,908	601	3,509
Schedule 4 & 8	56	102	69	58	67	353	45	398
EC4T, industry costs and rates	0	0	0	0	0	0	1,002	1,002
System Operator						0	92	92
GPF: route	0	0	0	0	0	0	0	0
GPF: contingent asset management	21	23	49	49	52	193	0	193
GPF: centrally-held						0	182	182
Total costs	1,079	1,265	1,249	1,212	1,195	6,000	2,597	8,596

*Other represents the route allocation of national function costs.

In calculating the route funding settlement for CP6, ORR made assumptions about our costs. Table 20, below, compares our CP6 business plan expenditure forecasts with ORR's PR18 final determination assumptions.

Table 20: Business Plan vs. Final Determination expenditure assumptions

£m in cash prices	CP6 Business Plan			Final Determination			Variance		
	Route	Other*	CP6	Route	Other*	CP6	Route	Other*	CP6
Support	182	579	761	113	477	590	-69	-103	-172
Operations	611	14	625	580	21	601	-31	7	-24
Maintenance	1,752	81	1,833	1,666	123	1,789	-86	43	-44
Renewals	2,908	601	3,509	3,053	698	3,751	145	97	243
Schedule 4 & 8	353	45	398	297	0	297	-56	-45	-102
EC4T, industry costs and rates	0	1,002	1,002	0	1,053	1,053	-0	51	51
System Operator	0	92	92	0	70	70	0	-23	-23
GPF: route	0	0	0	136	0	136	136	0	136
GPF: contingent asset management	193	0	193	195	0	195	1	0	1
GPF: centrally-held	0	182	182	0	195	195	0	13	13
Total costs	6,000	2,597	8,596	6,039	2,636	8,675	40	39	79

Please note: ORR's PR18 final determination did not separately identify the costs allocated to routes from route-incurred costs. However, the table, above, identifies allocated costs based on underlying information from ORR's analysis.

Expenditure has predominantly been re-balanced between Renewals and Maintenance/Operations/Support based on updated views of emerging risks and returning focus back to core maintenance activities. There has been some variance on Support/Operations/Maintenance and Renewals due to Utilities, QX settlement and KX prolongation. The full route risk monies have been allocated to Schedule 8, and Schedule 4 has changed

due to the re-alignment of discount factors.

CP6 income forecast

The expenditure in Table 19 needs to be paid for. In Table 21, below, we provide our latest CP6 income forecast. Our charging income forecast reflects our latest forecast of CP6 traffic levels and is consistent with final CP6 price lists.

Table 21: CP6 income forecast

<i>£m in cash prices</i>	19/20	20/21	21/22	22/23	23/24	Route	Other*	CP6
Variable charges (VUC, EAUC)	-67	-71	-78	-81	-86	-383	0	-383
Stations LTC	-38	-39	-39	-40	-41	-197	0	-197
EC4T	0	0	0	0	0	0	-622	-622
Schedule 4 ACS	-75	-38	-46	-44	-36	-238	-30	-269
FTAC	-185	-172	-184	-191	-198	-931	604	-327
Network Grant (SOMR)	0	0	0	0	0	0	-4,610	-4,610
Income from FNPO	0	0	0	0	0	0	-1,653	-1,653
Other single till income	-62	-63	-65	-66	-68	-324	-229	-553
Income within scope of PR18	-427	-383	-412	-423	-429	-2,074	-6,540	-8,614

Please note: Government grants for corporation tax, financing costs, BT Police costs and enhancements were not agreed as part of ORR's final determination so we have not included them in our forecast of income for completeness.

*Other represents the route allocation of national function income.

In calculating the route funding settlement for CP6, ORR made assumptions about the amount of income we will receive from charges and other income. Table 22, below, compares our CP6 business plan income forecasts with ORR's PR18 final determination assumptions.

Table 22: Business Plan vs. Final Determination income assumptions

<i>£m in cash prices</i>	CP6 Business Plan			Final Determination			Variance		
	Route	Other*	CP6	Route	Other*	CP6	Route	Other*	CP6
Variable charges (VUC, EAUC)	-383	0	-383	-413	0	-413	-30	0	-30
Stations LTC	-197	0	-197	-204	0	-204	-7	0	-7
EC4T	0	-622	-622	0	-656	-656	0	-34	-34
Schedule 4 ACS	-238	-30	-269	-297	0	-297	-58	30	-28
FTAC	-931	604	-327	-327	0	-327	604	-604	-0
Network Grant (SOMR)	0	-4,610	-4,610	0	-4,602	-4,602	0	8	8
Income from FNPO	0	-1,653	-1,653	0	-1,653	-1,653	0	0	0
Other single till income	-324	-229	-553	-320	-203	-523	4	26	30
Income within scope of PR18	-2,074	-6,540	-8,614	-1,562	-7,114	-8,675	512	-574	-62

Income from Variable charges have reduced due to correction of traffic mileage allocation between routes and changes in published rates. Station long term charge has changed due to published regulatory rates. Schedule 4 ACS has been amended due to re-alignment of discount factors.

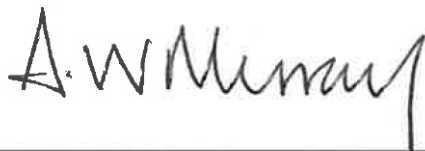
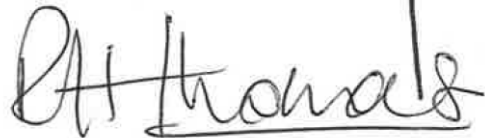
12 Sign-off

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 Managing Director	11/02/2019
	Andrew Murray Director, Route Asset Management	08/02/2019
	Rachel Thomas Route Finance Director	08/02/2019

Appendix A Stakeholder Engagement

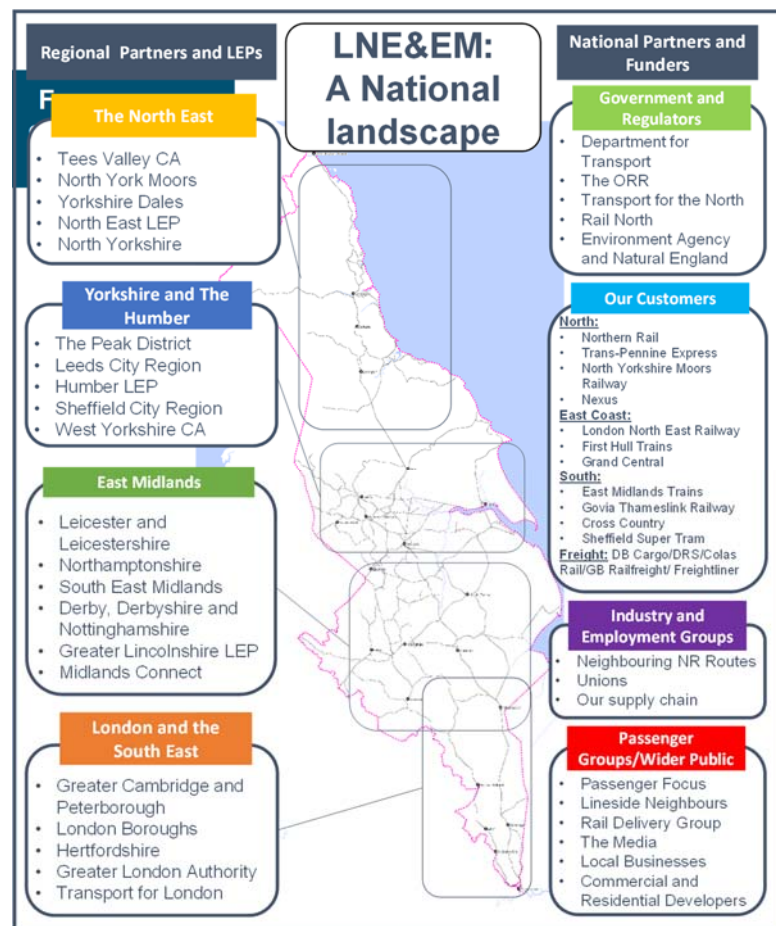


Figure 34: A selection of our diverse range of customers and stakeholders

1.1 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 34. This includes the largest number of TOCs and FOCs operating on any single Network Rail route.

1.2 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 several CP6 stakeholder meetings and workshops to inform our submission. This process has been described below.

1.2.1 Regular customer and stakeholder engagement activities

LNE & EM maintains relationships with each of our customers and stakeholders both formally and informally. We have Alliance Agreements with LNER, Northern and TPE, a joint business plan with Grand Central, and in time for CP6, expect to have developed joint plan with First Hull Trains. We will formalise Alliancing arrangements with the new East Midlands operator once the preferred bidder for the next franchise is announced by DfT, provides a summary of our ongoing customer and stakeholder engagement activities.

Table 23: Ongoing customer and stakeholder engagement

Forum (Frequency)	Objectives and key subjects discussed	Key customers /stakeholders included
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	Alliance Boards: Northern, LNER and TPE. These occur at the MD level Level 1 meetings: EMT⁵, Hull, Grand Central and Nexus. These generally occur at the Head Of Department Level (EMT is at MD level)
Programme Delivery Group (4 weekly)	To monitor delivery of significant programmes and identify and manage associated risks	All TOCs as required
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	All TOCs as required
Event Steering Groups (Quarterly)	To consider capacity for future timetable changes, particularly in relation to major timetable recasts after new assets available	All TOCs as required
Timetable Change Risk Assessment Group (Twice a year)	To ensure all operational and safety risk is identified and mitigated in advance of timetable changes	- All TOCs as required - System Operator
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	- Northern - LNER - TPE

These formal and informal contacts, working Alliances and joint planning with our operators have enabled us to develop a deeper understanding of their ongoing requirements and priorities for CP6.

We have included CP6 Readiness in discussions at meetings with our operators to ensure continued joint monitoring and review of performance trajectories and customer scorecards.

1.2.2 Formal engagement during the CP6 process

During the development of our initial CP6 plan (at RF11, published February 2018), we undertook six workshops, two for each of ECML (March, July), MML (April, June), and TPE (March, July).

To ensure that the workshops were strategic and customer-focused, we limited invitees to our direct TOC and FOC customers, and our key national and regional

⁵ Note: it is anticipated that the formal stakeholder arrangements for the East Midlands franchise are likely to change to reflect a new collaborative partnership between the next operator and Network Rail (Source: DfT; <https://www.gov.uk/government/speeches/east-midlands-rail-franchise-invitation-to-tender>)

stakeholders as summarise in the table below.

Table 24: CP6 customer workshop attendees

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

Since RF11 2018, we have continued to engage with our customers and other stakeholders regarding the development of our CP6 plan. The focus has been on bi-lateral meetings with our customers focusing on:

- Seeking a joint position on our scorecard performance trajectories
- Individual customer workshops on the details of our CP6 plans that are specifically relevant to their operating area.

On the latter of these points, we have held one-to-one workshops with Northern, GTR and Grand Central, and have extended invites to all of our other TOC customers. At these sessions we have provided a tailored briefing on our CP6 plan as it relates to their area of operation, covering train performance; renewals; maintenance; safety and CP6 readiness and mobilisation activities.

We also developed a bespoke CP6 pack for TPE and Northern which provided a summary of key renewals on the northern route, train performance, the ORR's determinations and our Sustainability submission.

Management of issues spanning other Network Rail Routes

A number of our customers operate across various other Network Rail routes as well as ours. As part of our CP6 planning engagement activities, we have incorporated consultation with other Network Rail routes, examples of which include:

- Establishment of the formal Northern Alliance Board with the LNW Route and Northern;
- Interaction with LNW Route with regards to development of performance trajectories for Northern, where factors on both routes have and will continue to be considered in the trajectories;
- When determining the performance related impacts of the Thameslink programme, we consulted with the SE Route to understand how we could utilise their performance modelling template.

1.3 Annual customer scorecards

Each year, LNE & EM have developed and agreed a set of Customer Scorecards with each of our customers. These scorecards contain a set of measures and targets, which are rolled up in the Long term scorecard, and the intention is to track performance on an annual basis against the priority measures set for the upcoming year.

A summary of the key priority areas for our 2019/20 Customer scorecards is provided in

Table 25 below.

Table 25: Key stakeholder priorities from customer scorecards

Customer	Priority theme areas	Examples of measures
LNER	Performance	On Time, Time to 3 , Right Time, PPM, Incident Count, Primary/Reactionary Delay, Cancellations, Compliance to Golden Rules
	Safety	Reduction in Train Accident Risk, RM3, Personal Accident Risk Reduction
	Customer Satisfaction	Customer Satisfaction 360 pulse checks
	Property & Asset Management	Reactive Faults, Open Faults
	Enhancements	Delivery of Gauge Clearance for IEP, FDM & SSI modification for IEP
	Locally Driven Customer Measures	NRPS at Major Stations Leeds and Kings Cross
Northern	Performance	PPM on Time at Destination, Right Time, Incident Count, Primary/Reactionary Delay
	Safety	Joint safety Improvement Plan
	Customer Satisfaction	Monthly Pulse Checks
	Property & Asset Management	Reactive Faults, Open Faults
	Enhancements	Platform Extensions, Capacity Enhancement Projects
	Locally Driven Customer Measures	Autumn Jetting Treatment Applied, NRPS at Major Stations Leeds
Grand Central	Performance	PPM, Cancellations, Incident Count, Primary/Reactionary Delay, Right Time
	Safety	Joint safety Improvement Plan
	Customer Satisfaction	Monthly Pulse Checks
	Locally Driven Customer Measures	NRPS at Major Stations Kings Cross
EMT	Performance	PPM, On Time, Cancellations, Incident Count, Primary/Reactionary Delays
Hull	Performance	PPM, On Time, Cancellations, Incident Count, Primary/Reactionary Delays
	Safety	Joint safety Improvement Plan
	Customer Satisfaction	Monthly Pulse Checks
	Locally Driven Customer Measures	NRPS at Major Stations Kings Cross
Cross-Country	Train Performance	Right Time Departures at York and Sheffield
TPE	Train Performance	PPM MAA; On-Time MAA; Infrastructure delays affecting TPE
	Delivery of Enhancements	Depot Enhancement Project; Platform Extension; CAF Gauging Project; Car Parking Franchise Commitment
	Timetable	Timetable Change Readiness
	Stations	OPHD faults completed within 28 days
GTR	Train performance	Right Time, Cancellations, Primary/Reactionary Delay, Total TSR Delay
Nexus	Train performance	Cancellations, Primary Delay

A key area of focus in the development of CP6 plans has been to review our CP6 performance trajectories in consultation with our customers. A summary of some of the most recent updates to these trajectories and the drivers behind them are included in the table below.

Table 26: Key changes to PPM scorecard trajectories since RF11

Operator	Key change(s) since RF11	Reason(s) driving the change	Status of customer agreement
LNER	CP5 exit/CP6 entry points changed to 75.5%. Profile of trajectory changed to reflect performance recovery in first 3 years before returning to previous levels	The change has been made to reflect current performance levels. Since January the PPM MAA has significantly dropped and the change in trajectory profile has been carried out to ensure there isn't a step up next year and there is a recovery back to "normal" performance levels.	Scenario based trajectories have been worked through at a performance team level. The revised trajectories are yet to be agreed.
Northern	CP5 exit/CP6 entry points changed to 79.0%. Profile of trajectory changed to reflect performance recovery in first 3 years before returning to previous levels	The change has been made to reflect current performance levels. Since January the PPM MAA has significantly dropped and the change in trajectory profile has been carried out to ensure there isn't a step up next year and there is a recovery back to "normal" performance levels.	Scenario based trajectories have been worked through at a performance team level. The revised trajectories are yet to be agreed.
All	Level of Cancellation numbers have been changed for all operators.	Part cancellations previously included with a value of 1 in the calculations, now set at 0.5 in line with industry standard approach.	n/a - Calculation now reflects an industry standard approach.

Commentary on overall trajectories

Prioritise safety and performance Our baseline strategy will broadly maintain performance across the Route, with significant improvements to both Northern and LNER, reflecting our plans to recover from current performance levels. Whilst we anticipate that new rolling stock will deliver performance benefits to the network, this is balanced by the potential risks associated with widespread introduction of new trains. This, together with new service patterns, new destinations served and increased traffic frequency, introduces risk to performance. Our operational and train performance initiatives which will help mitigate some of these performance risks are set out in section 8.

A summary of our customers' performance trajectories set out in our Long Term Scorecard is provided below. These reflect that status of our ongoing discussions with our customers as well as the funding available, current performance levels, TOC activities (e.g. new fleets), passenger growth and other risks.

Note: as we set out below, some of our trajectories are reliant on the delivery of TOC-controlled initiative. The contribution of these initiatives, which has been subject to ongoing consultation with each TOC, is stated at the bottom of each section. TPE has not been stated as this is reported within the London North-Western Route RSP.

Northern

Northern was severely impacted by the May 2018 timetable disruption. As a result, the forecast CP6 entry point 79.0% is significantly lower than at RF11. Network Rail's forecast for PPM MAA for 2023/24 remains unchanged since RF11 at 91.1%, compared with Northern's franchise target of 93.50%. This difference reflects a continuation of the gap that opened up since the start of the franchise in 2016/17 as performance in the West of the franchise has not risen in line with the original franchise assumptions. Work continues to improve the underlying base timetable, fleet reliability and the infrastructure assets, but we do not anticipate that this performance gap will be fully closed given the scale of timetable change and increase in number of services. **Over 4.5% of the projected PPM increase for Northern is estimated to come from Operator initiatives.**

LNER

The 2020 timetable brings about transformational change to the LNER 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. The VTEC franchise PPM target for 2023/34 inherited by LNER is 90%. During tender evaluation, Network Rail expressed significant reservations about this given that such performance levels have not historically been achieved for a sustained period on this route, whilst the 2020 timetable change will bring even greater intensity of use. As a result of current performance levels, the forecasted CP6 entry point 75.5% is significantly lower than it was at RF11 (83.8%). By the end of CP6 this is forecasted to rise to 87.7% and is based on the significant change that is coming to the ECML during CP6. **Over 5% of the projected increase for LNER is estimated to come from Operator initiatives.**

East Midlands Trains

The franchise has yet to be awarded, and is therefore more challenging to reliably forecast future performance. The current assessment is based on known impact of the 2018 Thameslink timetable introduction. At RF11 2018, the DfT proposed a possible target of 94.0% for the 'non-electrification' option by 2023/24. Our own projection for 2023/24 is 91.3% (which remains unchanged since RF11). This is 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 initiatives.**

Grand Central/Hull Trains

The open access operators will encounter the broadly same performance affecting factors on the ECML as LNER. Both will also experience changes to their fleet.

CrossCountry / Nexus

To reflect feedback received from the ORR in its Final Determination, we have now included CrossCountry and Nexus on our Long Term Scorecard.

1.4 Our customers' priorities and how we have addressed them

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

At a strategic level, our customers' priorities are aligned around performance, timetable improvements and introduction of new fleet. This is because 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. Meeting all of these priorities present a challenge as performance improvements cannot all easily be achieved at the same time as increasing intensity of usage of the network without significant increases in funding. In addition, a number of our customers have concerns about Access Planning and unplanned disruption, weather resilience measures and vegetation management.



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 27 below captures how our objectives are aligned with those of our customers and how we have prioritised our activities in response to this.

Table 27: How we have considered our customers' priorities in our CP6 plan

Priority area	Alignment with our objectives	Examples of our customers' priorities and commitments	Examples of feedback received during CP6 stakeholder engagement	How does our CP6 strategy address our customer's priorities and commitments	Limitations of our strategy against our customers' priorities and commitments
Safety and Level Crossings	Prioritise safety and performance	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	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 130 level crossing interventions in CP6.	Further level crossing interventions are identified in our ECML Supplementary Plan (Appendix D). We will be performing other level crossing enhancement/renewals when opportunity arises when there are interlockings renewals taking place nearby.
Performance	Prioritise safety and performance	Several of our customers are committed to ambitious PPM targets within their franchises 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	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'. Our Supplementary Plan for ECML targets delivery of significant performance improvements for all operators using the Route (See Appendix D) Our Weather Resilience strategy 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 new services (timetable)	Prioritise safety and performance Enable investment to time and budget	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 LNER, GTR, FTPE, Northern, Grand Central and an additional ECML Open	Operations, Maintenance and Renewals plans need to support the planned timetable changes, along with on-time delivery of the Enhancements Programme	Our Operational Plan aims to work with our customers and stakeholders accommodate the expected timetable improvements, subject to the detailed industry timetable planning processes (section 8). Efficient delivery of Tier 1 Enhancement Schemes to time and budget – which will enable key aspects of timetable	Our baseline constrained plan does not enable us to meet TOC franchise performance targets alongside accommodating these planned increases in service levels

Priority area	Alignment with our objectives	Examples of our customers' priorities and commitments	Examples of feedback received during CP6 stakeholder engagement	How does our CP6 strategy address our customer's priorities and commitments	Limitations of our strategy against our customers' priorities and commitments
		Access operator.		improvements - is one of the key objectives of our RSP.	
Introduction of new rolling stock	Efficient and effective delivery Enable investment to time and budget	Many of our TOC customers are committed to significant rolling stock replacements: Full introduction of CI700s on GTR; LNER 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 CI180 fleet from 2019; Hull Trains bi-mode Hitachi fleet by Dec 2021	<i>Need to facilitate and support TOC requirement around introduction of new rolling stock</i>	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	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	<i>An optimised access strategy is needed. The Route needs to work more closely with operators to develop access plans</i>	Our Access Strategy 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	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, if funded) and taking account of FNPO requirements as part of Access Planning	<i>See FNPO CP6 RSP and Appendix F</i>	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	Some of our operators wish to see increased focus on Vegetation management, including compliance with latest standards requiring a 6m clearance strip.	<i>One of our operators said they would like to see a strategy associated with vegetation management, particularly on low line-speed, local routes.</i>	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	Focus on our customers and stakeholders, Enable	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	<i>Would like to see more focus small scale customer facing interventions as well as big infrastructure interventions and journey time</i>	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	Overall funding constraints mean that not all local stakeholder requirements can be addressed during CP6.

Priority area	Alignment with our objectives	Examples of our customers' priorities and commitments	Examples of feedback received during CP6 stakeholder engagement	How does our CP6 strategy address our customer's priorities and commitments	Limitations of our strategy against our customers' priorities and commitments
investment	investment to time and budget	our it manages and attracts Third Party Funding	<i>improvements'</i> <i>Opportunity for NR to improve how it achieves further third party funding</i>	when forming our workbank, examples include renewals at Newcastle, York, Middlesbrough, Peterborough and Doncaster. Our Third Party strategy (section 6.3.2) seeks to leverage local relationships and national, regional and local funding sources to jointly fund and deliver improvements in the railway.	Plans will need to be refined through the remainder of CP5 and into CP6 to reflect changing local priorities.

1.5 Our plans to improve customer engagement through CP6

1.5.1 Agreeing, reviewing and monitoring our performance trajectories

Train performance will remain a key priority for LNE & EM as we move into CP6. We will continue dialogue with operators throughout CP6 to understand their performance needs and how these relate to our objectives. We will utilise the yearly target setting process to review and adjust our performance targets for each operator appropriately.

1.5.2 Reviewing our progress with key CP6 related activities

Establishment of our Customer Relationship Management Team

In 2018, we established our Route Customer Relationship Management (CRM) team. This represents a significant investment in improving relationships and to address TOC concerns that previous requests have not been taken seriously. The CRM team consists of 7 team members and is responsible for representing the voice of our customers at both a working group and Executive level with the intention of genuinely improving the service that we provide.

MISSION STATEMENT: "Support the delivery of a brilliant service to our passengers by working proactively, positively and collaboratively with our customers and colleagues."

Our team has been split into 3 groups, based broadly on the geographical split and nature of operations across our Route. Each team is led by a Customer Manager who is responsible for managing the Route's relationships with the following sets of customers:

- 1) **North:** Northern, TPE, North Yorkshire Moors Railway, and Nexus;
- 2) **East Coast:** LNER, Hull and Grand Central; and
- 3) **South:** EMT, GTR, Cross Country, and Sheffield Super Tram.

Importantly, our CRM team also works closely with our Head of Performance to address performance related concerns. It also liaises regularly with our Communications team to make sure that the Route is aligned in its approach to engaging with customers. The following table provides a summary of the various different forms of engagement planned by our CRM team for CP6 as well as the relevant stakeholders/customers.

Table 28: CRM CP6 Strategic Plan – summary of key forms of engagement

Name of document / meeting	Description and objective	Relevant stakeholders / customers
Engagement		
CP6 Stakeholder Management workshops	These meetings have allowed the Route to have more CP6-specific conversations with our customers to provide an overview of our broader CP6 strategy (incl. maintenance, operations, renewals, approach to improving sustainability etc.). The objective is to ensure that all Stakeholders are updated / engaged and communicated with about our CP6 plans prior to and throughout CP6. They also provide an opportunity to discuss the individual TOC performance trajectories for CP6, and reach agreement on these where possible.	All our customers
Pulse Surveys (You Said / We Did Plans)	A monthly / Bi-monthly survey sent out to our Senior Management Teams (SMTs) across both LNE&EM and each TOC. Typically the survey consists of five questions in which each organisation rates the other in areas such as the collaborative nature of the relationship and the level of confidence in delivery. This survey is designed to capture TOC feedback and facilitate discussion at Alliance Board and Level 1 meetings.	All our customers (excl. TPE as LNE&EM is not lead route). Note: GTR Survey is conducted by the SE Route
LNE & EM Processes and Procedures Workshops	A set of workshops to review key Industry processes identified to us by our TOCs as an area which could be improved. For example, this could include access booking, timetable planning, enhancement planning etc. The objective is to identify potential efficiencies and areas which cause both delay and duplication across the industry, providing an opportunity to share best practice and demonstrate continuous improvement.	All our TOCs
Meet the Network Rail Manager	A set of planned visits from the LNE&EM SMT to our stations across the network in order to meet passengers for Q&A sessions around significant projects (including but not limited to timetable changes, planned service disruptions, enhancement projects along the Route etc.), particularly those which are of a disruptive nature.	Passengers / wider stakeholders
Communication		
Monthly Customer Newsletters	Monthly newsletters which are shared across all our TOC's. The first of these was published in September where we developed three specific newsletters targets at the three main areas of our Route (i.e. north, south and east coast). The objective is to inform and educate TOCs on current news and updates which will impact them in the near future. The Route is also planning to develop a series of CP6 specific Customer Newsletters to provide updates to our TOCs about specific CP6 related activities.	All our TOCs
Route update	A six monthly event in which TOCs are invited to the ROC to hear from the Senior LNE & EM team on the strategic direction of the Route. This may include updates on renewals, governance, maintenance, operations, enhancements, safety and updates related to Digital Railway. The Route is planning to host the next Route update to coincide with the commencement of CP6. The intention of this will be to provide an update to all our customers about our key CP6 initiatives. During this update there will be an opportunity for attendees to ask questions and raise any issues or concerns.	All our customers
Monthly reports and Insight	A set of monthly reports for the LNE/EM Exec Team to provide an update on individual TOCs including their key issues, achievements and successes. The objective is to ensure the SMT are up to date with key issues that may affect our relationship with each of our customers.	All of our TOCs
Key activities		
NRPS Station Survey	To support our stations in improving passenger experience and satisfaction levels. In addition to this survey, we plan to continue engagement with our station management team via monthly Operations Meetings, to investigate opportunities to develop and enhance the customer experience.	Passengers / wider stakeholders

Name of document / meeting	Description and objective	Relevant stakeholders / customers
Support for December 18 Timetable Changes	Given the recent May 2018 timetable disruption this remains a key activity for the Route. We have established a Timetable Readiness Group which will remain in place for planned timetable changes throughout the remainder of CP5 and into CP6. This Group meets every fortnight to discuss upcoming timetable changes that affect the LNE & EM route and relevant TOCs. The scope of these meetings is to identify and deliver the critical path outcomes for the release and delivery of the timetable change (the current focus is on the December 18 and May 19 timetable changes). This currently involves input from Network Rail (Route and System Operator), Northern and TPE Alliance Boards. The responsibilities of the Group's members is to uphold the requirements of the ATOC ⁶ which sets out the best practice approach to managing timetable changes with the objective of minimising disruption to passengers and end users. This sets out the roles and responsibilities of each party that is required to plan for a timetable change (i.e. NR, TOCs and FOCs).	All our TOCs, as required. Network Rail System Operator

⁶ Approved Code of Practice: Operational Planning and Implementation of Timetable Change

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	Funding for Digital Railway is excluded from this Strategic Business Plan, as reflected in cost and volume tables. Enhanced ECML SOBC referred to in this submission. Non Route costs have been budgeted for by DR, including those held by the FNPO, TOCs and other parties outlined in the Digital Railway funding breakdown in the table in section 6.3.	Signalling renewals
LNE & EM 02	MML Electrification	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

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 09	Enhancement Deliverability	It is assumed that the current Tier 1 and Tier 2 CP6 enhancement schemes described in this plan have received committed funding to proceed in CP6 (unless stated otherwise)	All Renewal and Maintenance
LNE & EM 10	Central Service Provision	Central services will continue to provide the same services as currently such as NMT	All Renewal and Maintenance
LNE & EM 11	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 12	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 13	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 VTEC's original franchise agreement with the DfT published on 27 November 2014.	All Renewal and Maintenance

Appendix C Route context

The LNE & EM Route is a strategically important national asset which connects the length and breadth of the country. It 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.

Geographically it is the biggest Network Rail (NR) 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. Eight franchised operators and two open access operators (to become three in Control Period 6) serve the Route's 414 stations, catering for the full range of inter-city, inter-urban, regional and commuter markets.



Figure 36: The LNE & EM Route Map

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 35 highlights the Route's importance to its communities and the UK economy as a whole. This serves to emphasise the need for our plans for Control Period 6 (CP6) to make best use of the available funding so that the railway can continue to support a growing economy and expanding population.

Control Period 5 (CP5) was a challenging time for the Route and the industry as a whole. Delivery of our ambitious renewals programme was compromised by under-preparation coming into the Control Period, which contributed to missed targets and cost escalation with our renewals portfolio being delivered less efficiently than in Control Period 4 (CP4). More recently, our passengers have had to endure significant disruption in the wake of planned timetable changes in May 2018 alongside a series of extreme weather events, which we are currently working hard with our TOC customers to resolve.

Despite this, there are many aspects of our delivery which have seen improvements in CP5 which we will build upon in CP6. In 2018/19 year to date, our maintenance organisation is delivering 13% more output in terms of maintenance tasks completed than at the start of CP5, this has been achieved through the implementation of Safe and Effective Working and the fitment of a large amount of remote condition monitoring equipment to points, track circuits and a number of other different asset types which means that average time on tools has increased over the same period. Our consolidated Rail Operating Centres (ROCs) at York and Derby have improved the efficiency of our operations organisation and are enabling 2 million more train miles to operate each year on our network than at the start of CP5.



Figure 35: LNE & EM facts and statistics

Appendix D Scenario planning

Part 1a: Contingent renewals

This section describes the benefits of additional investment in the route which will be enabled should risks fail to materialise.

Sustainability supplementary submission

The Sustainability supplementary submission refers to additional renewal packages, which have been identified to address the sustainability of the Route's asset base, which was one of the key focus areas for the ORR throughout the Draft and Final Determination process.

The Route prioritised these packages based on how effectively they addressed the objective of improving asset condition across the Route, with the aim of ultimately improving the useful lives of our assets (i.e. the sustainability of the railway). Those highest priority packages were included in the Sustainability base submission, as described in section 5.9. The remaining packages, which relate to £345m (in 17/18 prices) of renewals works, form this sustainability supplementary submission.

This submission is currently unfunded, however if additional funding was made available, delivery of the works comprised in this package would provide further material benefits to the sustainability of our asset base.

The following table includes a list of the packages which comprise the Sustainability supplementary submission in priority order, with the Route-level CSI benefit as calculated by BRT in July 2018.

ID	Name	Route-level CSI benefit (%) ⁷	Net cost in CP6 (£m 17/18 prices) ⁸
LNE007	Ops Property – Tranche 1	0.044%	13.8
LNE008	Track (EM) –Tranche 1	0.043%	18.5
LNE009	Track (LNE) – Moorgate baseplate conversion	Not modelled by STE	1.8
LNE010	Track (LNE) – High output ballast cleaning Tranche 1	0.025%	11.6
LNE011	Track (LNE) – Maintenance delivered plain line refurbishment	0.019%	13.5
LNE012	Track (LNE) – Maintenance delivered S&C refurbishment	0.067%	16.6
LNE013	Structures – Emerging Sites since RF11	0.019%	7.4

⁷ As calculated by BRT/STE (3 July 2018)

⁸ Post headwinds and efficiencies

ID	Name	Route-level CSI benefit (%) ⁷	Net cost in CP6 (£m 17/18 prices) ⁸
LNE014a	E&P (LNE) – Tranche 1a (incl. Ferne Park FS & Holloway TSC and some signalling power distribution)	Not modelled by STE	12.9
LNE015a	Structures – Relining of culverts in poor condition (priority 1)	Not modelled by STE	4.7
LNE016a	Signalling (EM) – Signal Structure Remedial works (priority 1)	0.001% (incl. LNE016b)	1.0
LNE014b	E&P (LNE) – Tranche 1b (incl. additional signalling power distribution works)	Not modelled	4.7
LNE015b	Structures – Relining of culverts in poor condition (priority 2)	Not modelled	4.7
LNE016b	Signalling (EM) – Signal Structure Remedial works (priority 2)	0.001% (incl. LNE016b)	1.0
LNE017	Signalling (EM) – LED Signal head conversions	Marginally positive ⁹	1.0
LNE018	Signalling (EM) – Location Case Stagings	Marginally positive ⁵	0.5
LNE019	Track (LNE) – S&C Renewals 2	0.038%	22.6
LNE020	Track (LNE) – Re-Railing Tranche 2	0.018%	7.6
LNE021	Track (LNE) – Plain Line renewals additional sites	0.030%	18.1
LNE022	Signalling (LNE) – East Road	Not modelled by STE	7.9
LNE023	Structures – Upgrade works in core plan to reconstruction	0.164%	31.1
LNE024	E&P (LNE) – Signalling Power Retford and Grantham	Not modelled by STE	9.6
LNE025	Signalling (LNE) – Wakefield Westgate Lineside Renewals	Not modelled by STE	2.9
LNE026	Signalling (LNE) – Alnmouth and Morpeth PMUX Renewals	Not modelled by STE	1.1
LNE027	Track (LNE) – Plain line renewal specification change – Tranche 2	0.041%	12.5
LNE028	Track (LNE) - High Output ballast cleaning – Tranche 2	0.050%	23.2
LNE029	Track (LNE) – High output track renewals	0.037%	21.4
LNE030	Track (EM) – Tranche 2	0.019%	9.1
LNE031	Structures – Upgrade works in core plans to include painting	0.199%	37.7

⁹ CSI impact is small due to the relatively small size of this package to the overall Route.

ID	Name	Route-level CSI benefit (%) ⁷	Net cost in CP6 (£m 17/18 prices) ⁸
LNE032	Buildings – Tranche 2	0.043%	14.2
LNE033	Earthworks – High Priority Deferred Schemes	0.028%	4.1
LNE034	Earthworks – Medium Priority Deferred Schemes	0.015%	3.3
LNE035	E&P (EM) – E&P renewals	Marginally positive ⁵	5.2
Total Sustainability ‘supplementary’ Submission			£345.3m

Part 1b: Investment options

This section describes the benefits of additional investment in the route which will be enabled should risks fail to materialise. This covers two strategic investment options – a package of Level Crossing safety improvements, and the East Coast Supplementary Plan. All costs are quoted in 16/17 prices.

i) Level Crossings

Level Crossing Safety Improvements	CP6 total: (£m)	£66m	CP6 capex:	£66m	CP6 opex:	£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. Below we set out the four incremental packages of investment that have been developed to date. All BCRs 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 (without HS2)	BCR	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 LNER/Grand Central/Hull Trains PPM increase of 1.5% • Forecast LNER 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 (without HS2)	BCR	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 LNER/Grand Central/Hull Trains PPM increase of 1.8% • Forecast LNER 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 (without HS2)	BCR	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 LNER/Grand Central/Hull Trains PPM increase of 2.0% • Forecast LNER 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 (without HS2)	BCR	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 LNER/Grand Central/Hull Trains PPM increase of 2.1% • Forecast LNER 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 UK's 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 increased from 96 trains per day (tpd) up to 183 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 LNER 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 (LNER/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.

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 2. 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 38)

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 LNER & GTR train service increases. This identified how LNER 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.

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



Figure 37: Decreases in total number of service affecting failures.

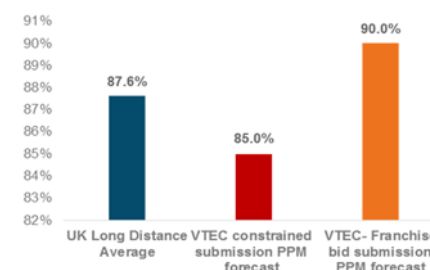


Figure 38: Comparison of PPM MMA for UK intercity operators at Q4 2017, average PPM forecast performance for LNER under the current constrained submission

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.

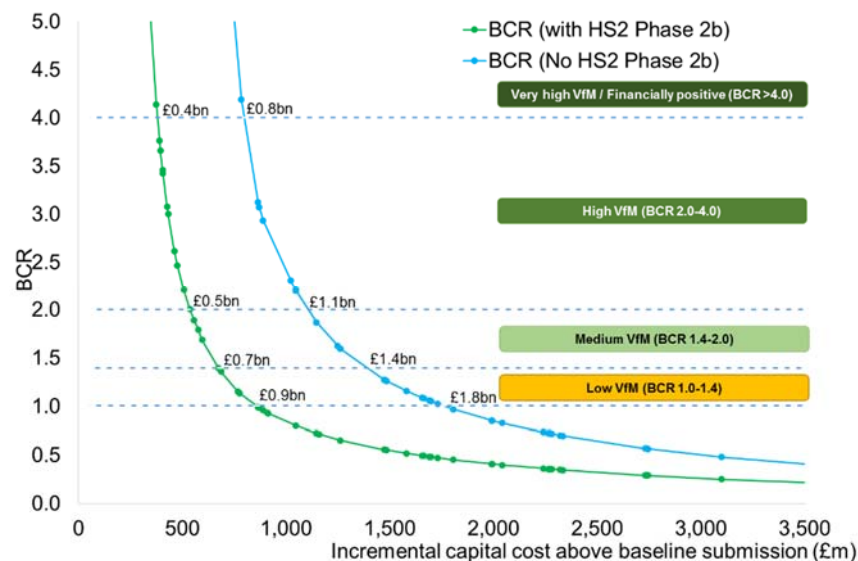


Figure 39: Indicative BCR analysis performed by the Route on the East Coast Investment Option

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 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 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 LNER 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.

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 41. 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.

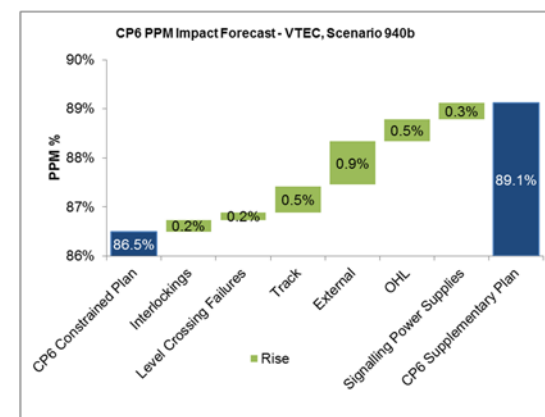


Figure 41: Modelling results of Package 5 showing areas of PPM improvement in the upper bound scenario for LNER. Indicative analysis suggests the same improvements in performance will be realised for Hull Trains and Grand Central

Supplementary plan investment	Cost (£m)	PPM Improvement (ppts)		BCR (60 Year)	
		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 29: 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).

Part 2: decrease in total remaining expenditure for CP6

As has occurred during the latter half of CP5, throughout CP6, the Route will undertake a comprehensive review process of all of its workbanks on an ongoing basis. These reviews would include:

- Monitoring asset resilience, critical performance nodes, and key locations, through the use of technology, such as Route Condition Monitoring;
- Identification and assessment of the risks associated with each asset type, based on asset data collected by the Route;
- Prioritisation of works within the unconstrained workbank, based on the risks identified; and
- Reviewing the Route's base plan and overplan, following the prioritisation process, and revising if necessary.

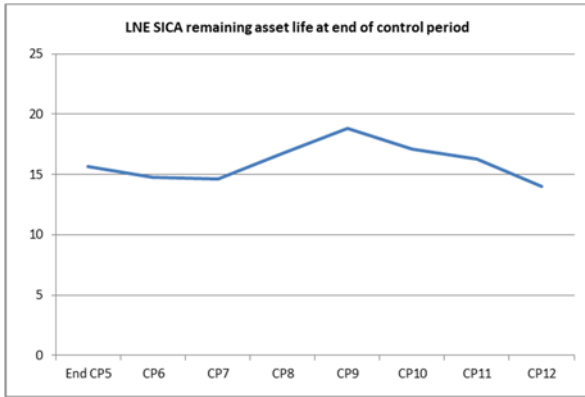
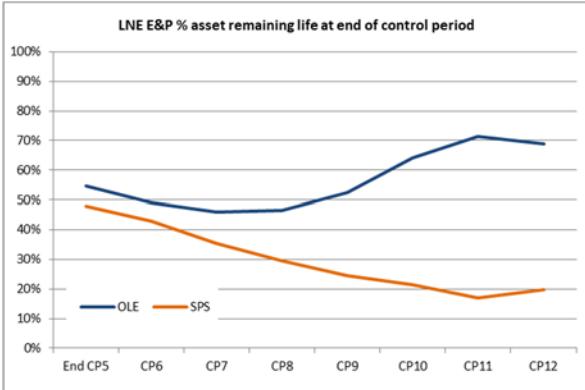
The particular risks to our assets can change over time, and so the Route will ensure this cycle of monitoring, assessing risks, re-prioritising workbanks and revising overplans, will be undertaken by RAMs on an ongoing basis throughout the course of CP6.

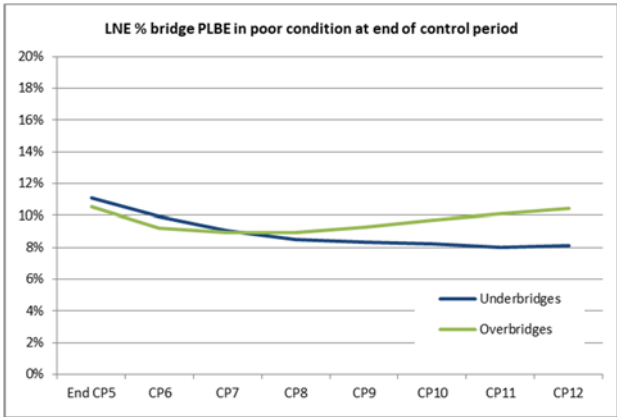
If a scenario were to arise where there was a decrease in the funding available to deliver the remainder of the Route's CP6 plans, and risk funding had been exhausted, the Route would revise the base plan, allocating additional schemes to the overplan, based on the prioritisation and risk assessment process described above. This would be done to ensure that our base plan could be delivered within the available funding. The impact a specific reduction in funding would have on our assets, has not been provided at this time.

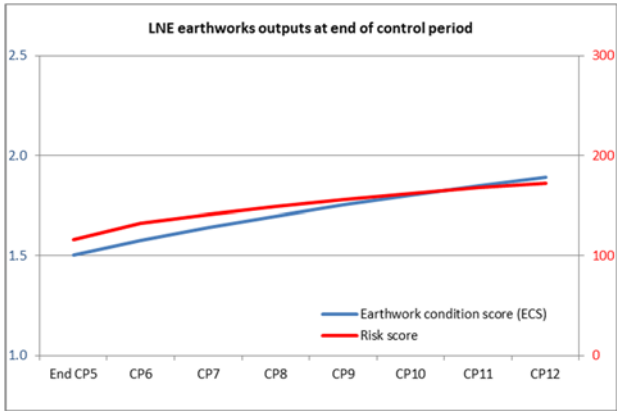
In deciding which works are of a lower priority, the Route's DRAM considers the balance of risk across the Route's whole portfolio of assets, and how trade-offs between asset types can be managed. Examples of some of the risks and trade-offs considered in the development of the Route's renewals plans in the CP6 budget constraining process, can be found in section 5.3.1. The decisions on how best these risks could be best managed, for example focusing on lowest initial cost life-extension works, drove the allocation of the final CP6 budget.

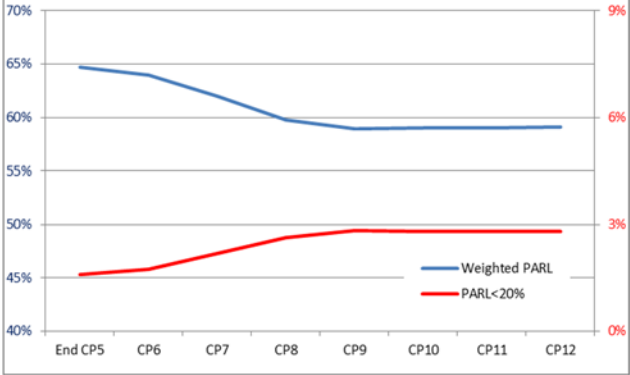
Appendix E Asset by asset long term forecast

Asset	Condition trajectory	Comment																																																																								
Track	LNE track used lives at end of control period <table><caption>LNE track used lives at end of control period</caption><tr><th>Control Period</th><th>Ballast (%)</th><th>Sleeper (%)</th><th>Rail (%)</th><th>S&C (%)</th></tr><tr><td>End CP5</td><td>50</td><td>65</td><td>50</td><td>48</td></tr><tr><td>CP6</td><td>52</td><td>68</td><td>52</td><td>49</td></tr><tr><td>CP7</td><td>55</td><td>70</td><td>54</td><td>50</td></tr><tr><td>CP8</td><td>58</td><td>72</td><td>56</td><td>51</td></tr><tr><td>CP9</td><td>60</td><td>74</td><td>58</td><td>52</td></tr><tr><td>CP10</td><td>62</td><td>76</td><td>60</td><td>53</td></tr><tr><td>CP11</td><td>64</td><td>78</td><td>62</td><td>54</td></tr><tr><td>CP12</td><td>66</td><td>80</td><td>64</td><td>55</td></tr></table> LNE track outputs at end of control period <table><caption>LNE track outputs at end of control period</caption><tr><th>Control Period</th><th>Track SAF per year</th><th>Track FWI per year</th></tr><tr><td>End CP5</td><td>1650</td><td>0.075</td></tr><tr><td>CP6</td><td>1700</td><td>0.080</td></tr><tr><td>CP7</td><td>1650</td><td>0.075</td></tr><tr><td>CP8</td><td>1600</td><td>0.070</td></tr><tr><td>CP9</td><td>1550</td><td>0.065</td></tr><tr><td>CP10</td><td>1500</td><td>0.060</td></tr><tr><td>CP11</td><td>1450</td><td>0.055</td></tr><tr><td>CP12</td><td>1400</td><td>0.050</td></tr></table>	Control Period	Ballast (%)	Sleeper (%)	Rail (%)	S&C (%)	End CP5	50	65	50	48	CP6	52	68	52	49	CP7	55	70	54	50	CP8	58	72	56	51	CP9	60	74	58	52	CP10	62	76	60	53	CP11	64	78	62	54	CP12	66	80	64	55	Control Period	Track SAF per year	Track FWI per year	End CP5	1650	0.075	CP6	1700	0.080	CP7	1650	0.075	CP8	1600	0.070	CP9	1550	0.065	CP10	1500	0.060	CP11	1450	0.055	CP12	1400	0.050	
Control Period	Ballast (%)	Sleeper (%)	Rail (%)	S&C (%)																																																																						
End CP5	50	65	50	48																																																																						
CP6	52	68	52	49																																																																						
CP7	55	70	54	50																																																																						
CP8	58	72	56	51																																																																						
CP9	60	74	58	52																																																																						
CP10	62	76	60	53																																																																						
CP11	64	78	62	54																																																																						
CP12	66	80	64	55																																																																						
Control Period	Track SAF per year	Track FWI per year																																																																								
End CP5	1650	0.075																																																																								
CP6	1700	0.080																																																																								
CP7	1650	0.075																																																																								
CP8	1600	0.070																																																																								
CP9	1550	0.065																																																																								
CP10	1500	0.060																																																																								
CP11	1450	0.055																																																																								
CP12	1400	0.050																																																																								

Asset	Condition trajectory	Comment																											
Signalling	LNE SICA remaining asset life at end of control period <table><thead><tr><th>Control Period</th><th>Remaining Asset Life (Years)</th></tr></thead><tbody><tr><td>End CP5</td><td>16</td></tr><tr><td>CP6</td><td>15</td></tr><tr><td>CP7</td><td>15</td></tr><tr><td>CP8</td><td>17</td></tr><tr><td>CP9</td><td>19</td></tr><tr><td>CP10</td><td>17</td></tr><tr><td>CP11</td><td>16</td></tr><tr><td>CP12</td><td>14</td></tr></tbody></table>	Control Period	Remaining Asset Life (Years)	End CP5	16	CP6	15	CP7	15	CP8	17	CP9	19	CP10	17	CP11	16	CP12	14	The CP6 Signalling business plan is based on a life extension workbank that maintains asset condition until Digital Railway is rolled out. In the run-up to the main thrust of the Digital Railway programme, remaining asset life will be fairly static, remaining level at circa 15 years as life extension schemes keep the existing infrastructure going. As DR rolls out, asset life will improve overall from CP7. From CP10 and beyond, the renewals plan reduces and with it, remaining life decreases. Further work is required on the long term workbank to address this									
Control Period	Remaining Asset Life (Years)																												
End CP5	16																												
CP6	15																												
CP7	15																												
CP8	17																												
CP9	19																												
CP10	17																												
CP11	16																												
CP12	14																												
E&P	LNE E&P % asset remaining life at end of control period <table><thead><tr><th>Control Period</th><th>OLE (%)</th><th>SPS (%)</th></tr></thead><tbody><tr><td>End CP5</td><td>55</td><td>48</td></tr><tr><td>CP6</td><td>50</td><td>42</td></tr><tr><td>CP7</td><td>45</td><td>35</td></tr><tr><td>CP8</td><td>48</td><td>30</td></tr><tr><td>CP9</td><td>55</td><td>25</td></tr><tr><td>CP10</td><td>65</td><td>20</td></tr><tr><td>CP11</td><td>72</td><td>18</td></tr><tr><td>CP12</td><td>68</td><td>18</td></tr></tbody></table>	Control Period	OLE (%)	SPS (%)	End CP5	55	48	CP6	50	42	CP7	45	35	CP8	48	30	CP9	55	25	CP10	65	20	CP11	72	18	CP12	68	18	The SPS trend shows the decreasing asset life of signalling power systems with the current level of spend and activity, this downward trend has been driven by legacy policy and standards issues that have been addressed in the recent revisions of the aforementioned. This demonstrates the need for the change in philosophy that is being implemented currently. The new strategy will influence this trend, driving a more appropriate asset life expectancy beyond CP6.
Control Period	OLE (%)	SPS (%)																											
End CP5	55	48																											
CP6	50	42																											
CP7	45	35																											
CP8	48	30																											
CP9	55	25																											
CP10	65	20																											
CP11	72	18																											
CP12	68	18																											

Asset	Condition trajectory	Comment																											
Structures	 LNE % bridge PLBE in poor condition at end of control period <table border="1"> <thead> <tr> <th>Control Period</th> <th>Underbridges (%)</th> <th>Overbridges (%)</th> </tr> </thead> <tbody> <tr> <td>End CP5</td> <td>11</td> <td>10</td> </tr> <tr> <td>CP6</td> <td>9</td> <td>9</td> </tr> <tr> <td>CP7</td> <td>8.5</td> <td>9</td> </tr> <tr> <td>CP8</td> <td>8.2</td> <td>9.2</td> </tr> <tr> <td>CP9</td> <td>8</td> <td>9.5</td> </tr> <tr> <td>CP10</td> <td>7.8</td> <td>9.8</td> </tr> <tr> <td>CP11</td> <td>7.5</td> <td>10</td> </tr> <tr> <td>CP12</td> <td>7.5</td> <td>10.2</td> </tr> </tbody> </table>	Control Period	Underbridges (%)	Overbridges (%)	End CP5	11	10	CP6	9	9	CP7	8.5	9	CP8	8.2	9.2	CP9	8	9.5	CP10	7.8	9.8	CP11	7.5	10	CP12	7.5	10.2	The future profiles are based on “top down” modelling undertaken by STE to provide indicative funding profiles based on current spend. The modelling has the following assumptions / limitations: • Only considers Underbridge and Overbridge assets • Assume a good mix of worktypes (e.g. replace balanced with repair) • Calculations are based on unit rates As described in the RSP it was recognised as part of STE assurance that the Lowest Initial Cost interventions proposed in CP6, based on current levels of constrained funding are not sustainable in the long term. It is also recognised that greater investment is required in other asset groups. We are working collaboratively with STE to develop future “bottom up” workbanks consisting of Whole Life renewals to better understand & quantify the levels of funding required in future control periods to achieve and maintain a sustainable position.
Control Period	Underbridges (%)	Overbridges (%)																											
End CP5	11	10																											
CP6	9	9																											
CP7	8.5	9																											
CP8	8.2	9.2																											
CP9	8	9.5																											
CP10	7.8	9.8																											
CP11	7.5	10																											
CP12	7.5	10.2																											

Asset	Condition trajectory	Comment
Earthworks	 The graph shows two metrics over time from End CP5 to CP12. The left y-axis represents the Earthwork condition score (ECS) from 1.0 to 2.5. The right y-axis represents the Risk score from 0 to 300. The ECS (blue line) starts at 1.5 at End CP5 and increases steadily to about 1.9 at CP12. The Risk score (red line) starts at approximately 110 at End CP5 and increases to approximately 190 at CP12.	Modelled projections indicate that with the work planned and the anticipated degradation, there is likely to be risk growth. The chart shown comes from the long-term forecast produced using SCAnNeR for the FDP. Modelling assumptions as follows: • End CP5 asset distribution was reforecast using a May 2018 data cut, work volumes for year 5 of CP5 and 1 year of degradation. • End CP6 asset distribution determined using the RF8 work volumes obtained directly from the RAMs (RF6 2017 powerpack scatter). • The end CP6 - end12 volumes were determined using SCAnNeR, searching for a deliverable solution (work mix) which kept the end CP6 national risk score constant until the end of CP12 (this is the definition of the baseline in the SBP documentation). That mix was then applied to each route. As a result of this, routes which have a risk score worse than the national average, at the end of CP6, see an improvement in risk over CP7-12 and vice versa. As LNE&EM route currently have a risk score better than the national average there will be an overall increase in risk over CP7 to CP12.

Asset	Condition trajectory	Comment																											
Operational Property	LNE Ops Property condition at end of control period  <table border="1"> <caption>Estimated data for LNE Ops Property condition at end of control period</caption> <thead> <tr> <th>Control Period</th> <th>Weighted PARL (%)</th> <th>PARL < 20% (%)</th> </tr> </thead> <tbody> <tr> <td>End CP5</td> <td>65</td> <td>45</td> </tr> <tr> <td>CP6</td> <td>64</td> <td>46</td> </tr> <tr> <td>CP7</td> <td>62</td> <td>48</td> </tr> <tr> <td>CP8</td> <td>60</td> <td>49</td> </tr> <tr> <td>CP9</td> <td>59</td> <td>49</td> </tr> <tr> <td>CP10</td> <td>59</td> <td>49</td> </tr> <tr> <td>CP11</td> <td>59</td> <td>49</td> </tr> <tr> <td>CP12</td> <td>59</td> <td>49</td> </tr> </tbody> </table>	Control Period	Weighted PARL (%)	PARL < 20% (%)	End CP5	65	45	CP6	64	46	CP7	62	48	CP8	60	49	CP9	59	49	CP10	59	49	CP11	59	49	CP12	59	49	PARL is not a fully representative indication of all buildings assets over the future control periods as only stations and depots have examinations completed via CEFA and information entered into OPAS which provides the PARL calculation of the asset. Lineside buildings are not inspected via CEFA and thus there is no condition led PARL information. The CP6 determination has been predominately focused on structural assessment failures/recommendations at stations and a focus on surfaces to improve passenger safety. Thus, all remaining asset stock will naturally decrease in PARL over the coming control periods without intervention. During CP6, a revised technical specification for building examinations and a new asset system will be rolled out to include line side buildings. Technology will be used to identify condition changes and external elevations and roofs will have a tactile examination. The revised examination method could highlight future liabilities/risk which have not to date been identified due to current examination regime and thus interventions required. The asset stock within stations, lineside buildings, depots will continually degrade during the lifecycle of the asset, therefore adequate financial budgets will need to be in place to keep the assets at a steady PARL state. The revised new asset management system, being rolled out in CP6, PARL will likely be replaced by a condition score weighted on the criticality of the asset, therefore the implications to the data is an unknown at present. PARL at present is a roll up of all asset/element/feature types with no distinction with the criticality of the asset on the performance of the operation of the station/building. Future assessments could also highlight significant structures requiring significant intervention beyond what has been allocated for repairs/renewals in CP4/5/6
Control Period	Weighted PARL (%)	PARL < 20% (%)																											
End CP5	65	45																											
CP6	64	46																											
CP7	62	48																											
CP8	60	49																											
CP9	59	49																											
CP10	59	49																											
CP11	59	49																											
CP12	59	49																											

Appendix F Freight and National Passenger Ops Plan

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 R: Development of new connections and 'pop-up' terminals in a cost effective and timely manner	• Explore opportunities for longer and heavier trains maximising loco capability • Explore possibility of faster journey times • Support introduction of new wagons that maximise payload/length ratio • Support Terminal and Yard developments – e.g. York and Newcastle areas and other major conurbations. • Support introduction of new connections, 'pop-up' terminals, bringing out of use infrastructure back into use and increased use of lineside loading • Work with FOCs and the Route to facilitate the ongoing operational connectivity of Strategic Freight Site and Supplementary Strategic Freight Site estate • Restore actual capability to published capability where this is required, e.g. Belford, Welton Oil Terminal, Welbeck Colliery, Wardley • 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 and Doncaster IPort) 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 • Explore amended engineering access to provide more operational access and flexibility on the core W12 routes • Facilitate new terminal developments – e.g. Radlett, East Midlands Gateway, Humber and Hinckley • Explore opportunities for new capacity – e.g. F2N schemes, Leicester and Trans-Pennine
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 O: Biomass O: Automotive O: Forest Products O: Bulk, including waste O: HS2 phase 1 spoil and construction materials R: Unit moves generated by Rolling Stock Cascade Programme R: Capacity and capability on certain routes R: Reinstating dormant and out of use infrastructure in a timely manner	• Work with customers to maximise opportunities for longer and heavier trains maximising loco capability • Explore possibility of faster journey times • Support Terminal / Yard developments to facilitate growth • Support introduction of new connections, 'pop-up' terminals, bringing out of use infrastructure back into use and increased use of lineside loading • Restore actual capability to published capability where this is required • 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 • Work with FOCs and the Route to facilitate the ongoing operational connectivity of Strategic Freight Site and Supplementary Strategic Freight Site estate • Work with FNPO Programme Manager HS2, FOCs and Freight End Users to understand the likely HS2 phase 1 capacity requirements, including terminal considerations
5	Logistics and Mail Opportunity O: Potential mail growth on main corridors and premium logistics developments R: Reduction in windows for overnight emergency possessions, and potential impact upon standard possession opportunities	• Explore opportunities for business growth with existing and potential new customers • Review impact upon possession strategy from new flows and impact upon operational contingency and flexibility
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 R: TRU emerging position will not provide gauge enhancement to W12 or additional freight capacity R: Current enhancement proposals may not be delivered due to affordability. An example of this is the decision to withdraw the development of 3 freight loops on the ECML north of York, and withdrawal of reinstatement of 4 tracking between Huntingdon and Woodwalton.	• East/West Rail provision for gauge and freight diversions • Trans-Pennine provision for gauge and freight growth including diversionary capability to meet FOC and FEU aspirations for East-West freight land bridge • 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
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 R: Limited Route funding is prioritised to passenger and mixed route parts of the network at the expense of freight yards and sidings network infrastructure	• Working with Routes and customers to review asset condition on regular basis • Working with Routes to identify and plan necessary infrastructure interventions to protect key freight yards and sidings resilience • 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 R: Without faster freight journey times freight capacity will be marginalised at the expense of more frequent and faster passenger services particularly on core routes, e.g. ECML, MML	• 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	Upgrades and Disruptive Possessions R: Major upgrade programmes such as MML, ECML and TRU will require significant disruptive access R: Routes may seek to make greater use of midweek cyclical maintenance, including enhancing the existing windows	• 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

15	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
----	--	---

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, Route DU's/RAM's	Initial Programme published in May 2018 and to be updated 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, Route DU's/RAM's	Initial Programme published in May 2018 and to be updated 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	Forum created with programme of meeting dates published by FNPO Operations and Safety Manager.
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.

Section	Key Themes	Strategy	Specifics	Owner	Timescale
	Measuring FDM and FDM-R	Focus on key defined routes – e.g. ECML, MML, Trans Pennine corridor and Immingham to Doncaster: Asset Performance Asset Resilience Effective contingency plans	- Target FDM-R LNE&EM target for end CP6 of 94.8% - 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
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 capability. 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

Section	Key Themes	Strategy	Specifics	Owner	Timescale
	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
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

Section	Key Themes	Strategy	Specifics	Owner	Timescale
	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	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

Summary of Investment options

Below is a summary of the investments options laid out within the document, which are required to deliver the benefits articulated in each section.

Investment Option	CP6 Financial Value
Proposed options for freight – 15 year investment programme <i>For further details please see below C.1</i>	£2bn
Freight Safety Improvement programme. For further detail please see section 5.26	£22m
Charter CET installation For further detail please see section 8	£10m

Proposed options for freight – 15 year investment programme

The table below combines the options for funders set out in the April 2017 Freight Network Study with some further schemes proposed through subsequent business development work, and allocates them to a control period for development and delivery. Broadly it is expected that schemes would be developed

during the control period prior to the one in which they are to be delivered. However, some small schemes could be developed and delivered within a single control period. As a result, schemes put forward as options for delivery in CP6 are limited to those for which development work has already taken place or is expected to before the end of CP5, plus some smaller schemes.

Where estimated cost ranges are put forward, these refer to the totality of the expected funding requirements. It is anticipated that this would be drawn from a range of sources including dedicated freight funds, wider industry funding with freight contributions, and third-party funding.

It should be noted that the list mentioned below, are choices for funders and none are committed schemes. Schemes will only progress from concept, through development, and into delivery, by passing joint, incremental funding decision points with the relevant funder(s). Schemes will also only progress to the next stage of the lifecycle, subject to an ongoing assessment of viability and affordability.

	CP6 delivery and development options				CP7 development options
Corridor	➤➤Deliver in CP6	Estimated cost range (£m)	Develop in CP6 ➤➤ Deliver in CP7	Estimated cost range (£m)	Develop in CP7 ➤➤ Deliver in CP8+
1. West Coast Main Line			Preston Station area remodelling	375 – 875	Possible Crewe Yard changes
			Dynamic Down loop Tebay to Shap Summit	250 – 500	Four- tracking Preston to the border
			Dynamic Up loop Carlisle to Plumpton	250 – 500	Carlisle Station remodelling including Four-tracking of approaches;
			Dynamic Up loop Eden Valley to Shap Summit	375 – 875	Three or four-tracking Gretna Jn to Floriston;
			Carstairs remodelling	100 – 250	Four-tracking sections from Carlisle to Carstairs
			Winsford to Weaver Jn interventions (2026)	tbc	Grade separation Law, Holytown and Uddingston Jns
			Gauge clearance of WCML from London to Coatbridge (incremental up to W12)	tbc	Settle & Carlisle upgrade to accommodate all freight traffic
			Gauge clearance to W10/W12 Coatbridge to Grangemouth	tbc	Acton Grange to Warrington capacity Wigan to Preston interventions
			Northampton Loop enhancements (Line speed and headway improvements)	225 -550	Gauge clearance to W12 of the Glasgow South Western route
			Doubling of Stafford South Jn	15- 35	

			----- 775 metre train length capability Weaver Jn to Scotland -----	tbc	Winsford to Weaver Jn interventions (2043)
			Nodal yards at Crewe and Mossend	tbc	
2. East Midlands and Yorkshire			Gauge clearance to W12 of South Yorkshire Joint Line	15 - 35	Diversionary access for Immingham and Teesport ----- Electrification of Yorkshire freight routes ----- W12 gauge clearance of additional platform lines through York and Newcastle
3. Felixstowe to the West Midlands and the North	Doubling of Haughey Jn ----- Headway improvements Bury St Edmunds ----- Ely area capacity, including: • Level Crossings • Bridge strengthening ----- Ely to Soham full doubling ----- Signalling and level crossing improvements Peterborough – Syston East Jn ----- Gauge clearance to W10 and/or W12 Syston to Sheet Stores Jn/Trent Jn ----- Further refine layout at Ipswich Yard	10 – 15 50 – 70 100 – 250 120 -150 50 - 60 5-10 1-5	Loop at Haugley Jn ----- Leicester area capacity ----- Gauge clearance to W10/W12 North Stafford Jn – Stoke ----- 775 metre train length capability in the West Midlands ----- Nodal yards Peterborough and Bescot	35 - 75 600 – 1000 17 - 23 tbc tbc	Further doubling of Felixstowe branch ----- Haugley Jn four-tracking ----- Haugley Jn grade separation ----- Grade separation and additional tracks around Ely ----- New Ely avoiding line ----- Track and signalling enhancements Leicester to Nuneaton ----- Passing loop between Colchester and Witham ----- Four-tracking Werrington Jn to Peterborough ----- Electrification of the Route via Ely ----- Further gauge enhancement (incremental up to W12) of the Route via Ely ----- F2N Phase 3: to accommodate long term growth

					Scheme to accommodate East West Rail traffic on to WCML
4. Southampton to the West Midlands and the North	Doubling of route via Kenilworth	100 - 170	Grade separation at Didcot East Jn and either: • grade separation at Oxford North Jn and improvements at Oxford station, or • four-tracking Didcot to Oxford Nodal yard at Eastleigh Investigations into running trains longer than 775m	100 – 475 tbc tbc	Electrification of diversionary route via Andover Bathampton/Bradford Jn (Dundas Aqueduct) W8/W10 W10 diversionary via Westbury and Melksham Passing loop between Eastleigh and Basingstoke Grade separation at Basingstoke Capacity enhancements between Southcote Jn and Oxford Road Jn Banbury loops Leamington Spa station remodelling Water Orton area interventions Sutton Park Line electrification Electrification of key freight terminals in the West Midlands
5. Channel Tunnel classic routes	Gauge enhancement (incremental up to W12)	50 - 80	Redhill track circuits	15 - 30	
6. Cross London including Essex	Ripple Lane Nodal Yard Thameside level crossings (capacity scheme)	10 – 15 30 - 40	Cross London freight capacity	tbc	Infill electrification Enhancements to signalling on the Gospel Oak to Barking line

Thameside					Freight loop at Gospel Oak on the Gospel Oak to Barking line Modification of signalling block at Hampstead Heath Tunnel Freight regulation loop at Kensal Rise Forest Gate grade separation Possible Pitsea to Ingatestone rail link West Anglia Main Line W12 gauge clearance
7. South West and Wales to the Midlands			Gauge clearance to W10 Bristol to Birmingham	tbc	Bromsgrove Corridor interventions Re-opening of Stourbridge - Walsall/Lichfield Line Electrification of key freight terminals in the West Midlands
8. Northern Ports and Trans Pennine	Gauge enhancement (incremental up to W12) of core Trans Pennine route(s) New Loop between Up Decoy and South Yorkshire Joint Line Trans Pennine freight capacity	100 – 200 5 – 10 tbc	Level crossing enhancements Teesport – Northallerton Level crossing enhancements at East Boldon and Tile Shed	tbc 4	Immingham line speed improvements Line speed improvements from 20mph up to 40mph on the Bootle branch. Enabling works to support the aspiration to reach 3tph from South Liverpool Terminals to the WCML Enabling works to support the aspiration to reach 3tph from Port of Liverpool to the WCML. Rearranging maintenance schedules to allow night-time access to the Chat Moss corridor.

					----- A loop at Edale in the Hope Valley. ----- A loop at Grindleford in the Hope Valley. ----- Electrification of Yorkshire freight routes: • Tapton Junction to Masborough and Nunnery Main Line Junction, via Beighton Junction • Beighton Junction to Woodburn Junction • Hare Park Junction to Leeds Stourton terminal Reception line • Stourton terminal to Whitehall Junction ----- Improved capacity and line speeds on the Calder Valley line. ----- Level crossing enhancements at East Boldon and Tile Shed ----- Diversions access for Immingham and Teesport ----- Capacity interventions on ECML between York & Newcastle ----- Gauge clearance to W12 of South Yorkshire Joint Line ----- Gauge clearance to W12 of further routes serving Yorkshire terminals
9. Midland Mainline			Gauge clearance to W10/W12 between London and Bedford (including cross London route infill) ----- Gauge clearance to W10/W12 between Kettering and Wigston and Between Corby and Manton Jn (including cross London route infill)	tbc ----- tbc	Grade separation at Harpenden and Leagrave Jns ----- Bedford area enhancements including new platform and a new Turnback ----- 4-tracking Kettering North Jn to Kilby

			----- Line speed improvements on Midland Mainline	tbc	Bridge Jn ----- New line linking Stenson Jn to the Midland Mainline ----- Stenson Jn to Sheet Stores Jn linespeed improvements ----- Additional turnback facility at Derby station ----- Further Peak Forest capacity Additional access to Mountsorrel Aggregates Terminal ----- Dore to Sheffield capacity enhancements ----- Reopening of Matlock - Buxton line
10. Great Western Main Line	Gauge clearance to W10/W12 Wootton Bassett to Bristol via Bathampton	4 - 5	Gauge clearance to W12 London to Bristol and Cardiff	8 - 12	Remodelling of Bishton Flyover (with flat junction) and west end of Severn Tunnel Jn ----- Remodelling of Bishton Flyover (with replacement flyover) and east end of Severn Tunnel Jn ----- Grade separation at Maindee West Jn ----- Headway improvements between Bishton and Maindee Jn ----- Headway improvement on Main Lines between Ebbw Jn and Cardiff Central ----- Headway improvement on Main and Relief Lines between Ebbw Jn and Cardiff Central ----- Electrification of Avonmouth Branch

11. Anglo-Scottish and Northern regional traffic			Grantshouse dynamic loops and four-tracking Prestonpans to Drem ----- Edinburgh Suburban Line capacity improvements ----- Four-tracking in Hare Park Jn area ----- Freight loop at Camperdown ----- Looping strategy between Dundee and Aberdeen ----- Strategic infill gauge clearance to W12 of sections connecting to the East Coast Main Line	250 150 - 300 tbc 45 – 111 56 – 140 tbc	Enhancements to loops north of Newcastle ----- Capacity interventions on ECML between York and Newcastle
All corridors	Remove heavy axle weight speed restrictions and/or other freight speed restrictions including on entry and exit of loops	15 - 20	Remove heavy axle weight speed restrictions and/or other freight speed restrictions including on entry and exit of loops	15 - 20	Remove heavy axle weight speed restrictions and/or other freight speed restrictions including on entry and exit of loops
Total		650 – 1100*		2900 - 6060	

*Estimated costs for Trans Pennine capacity enhancements are to be confirmed so are not included in the CP6 total.

Appendix G List of supporting annexes

Annex 1: Change log

Appendix H Glossary of terms

BCR	Benefit Cost Ratio	JTI	Journey Time Improvements	PSP	Principle Supply point
BRT	Business Review Team	KAM	Key Account Management	PSU	Power Supply Upgrade
C&V	Costs and Volumes	KO	Key Output	RAM	Route Asset Manager
CA	Combined Authority	LC	Level Crossing	RAMP	Route Asset Management Plan
COO	Chief Operations Officer	LDHS	Long Distance High Speed	RCM	Remote Condition Monitoring
CP	Control Period	LEP	Local Enterprise Partnership	RDG	Rail Delivery Group
CRI	Composite Reliability Index	LMD	Light Maintenance Depot	REM	Route Enhancement Manager
CRM	Customer Relationship Management	LNE&EM	London North Eastern and East Midlands	RM3	Risk Management Maturity measure
DEF	Delay Event Failures	LNER	London North Eastern Railway	RMD	Route Managing Director
DfT	Department for Transport	LSI	Line Speed Improvements	ROC	Rail Operating Centre
DR	Digital Railway	LTIFR	Lost Time Injury Frequency Rate	RPM	Route Performance Manager
DRP	Digital Railway Programme	LTPP	Long Term Planning Process	RSP	Route Strategic Plan
DRAM	Director of Route Asset Management	MAA	Moving Annual Average	S&C	Switches and Crossings
DU	Delivery Unit	MDU	Maintenance Delivery Unit	S&T	Signalling and Telecoms
E&P	Electrical and Power	MML	Midland Mainline	SAF	Service Affecting Failure
ECML	East Coast Mainline	MMLE	Midland Mainline Electrification	SBP	Strategic Business Plan
EMT	East Midlands Trains	MSL	Miniature Stop Lights	SEU	Signalling Equivalent Units
ETCS	European Train Control System	NPV	Net Present Value	SEW	Safe and Effective Working
FBC	Full Business Case	NR	Network Rail	SME	Small to Medium sized Enterprise
FDM	Freight Delivery Metric	NRT	Network Rail Telecom	SMT	Senior Management Team
FNPO	Freight National Passenger Operator	NRPS	National Rail Passenger Survey	SOBC	Strategic Outline Business Case
FOC	Freight Operating Company	NSC	National Supply Chain	SOP	Standard Operating Procedure
FPM	Financial Performance Measure	NSO	National System Operator	STE	Safety, Technical and Engineering
FTPE	First TransPennine Express	NTOT	Non Time on Tools	STW	Safer Trackside Working
FWI	Fatality Weighted Index	O&M	Operations and Maintenance	TARR	Train Accident Risk Reduction
GC	Grand Central	OBC	Outline Business Case	TMS	Traffic Management Systems
GRIP	Governance of Rail Industry Projects	OHL	Overhead Line	TOC	Train Operating Company
GTR	Govia Thameslink Railway	OLE	Overhead Line Equipment	TPE	TransPennine Express
HOO	Head of Operations	OMR	Operations, Maintenance and Renewals	TPH	Trains Per Hour
HoP	Head of Performance	ORR	Office for Rail and Road	TRU	TransPennine Route Upgrade
HoRSHE	Head of Route Safety, Health and Environment	PIDD	Passenger Information During Disruption	TSR	Temporary Speed Restriction
IEP	Intercity Express Programme	PLPR	Plain Line Pattern Recognition	UWC	User Worked Crossings
IMS	Incident Management System	PMO	Program Management Office	VfM	Value for Money
IP	Infrastructure Projects	PPM	Public Performance Measure	WT	Work type

