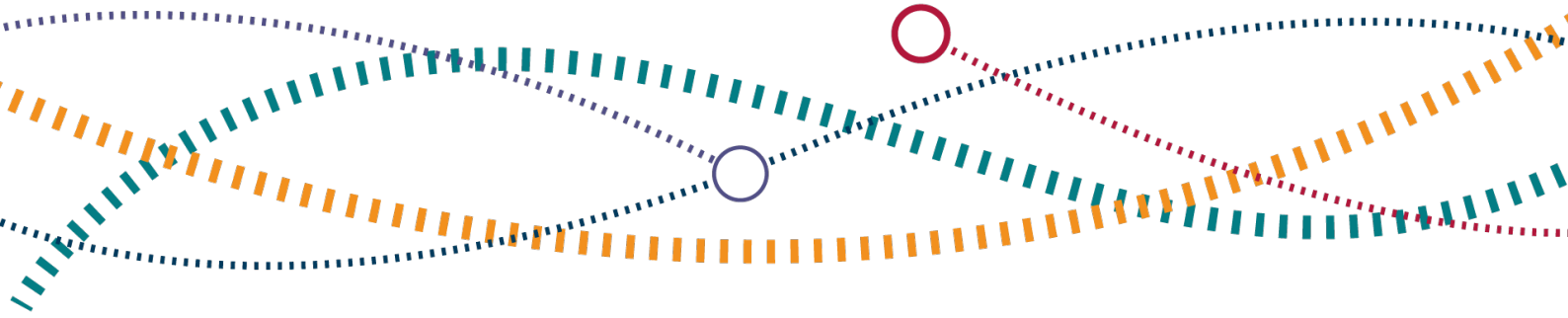
OFFICE OF RAIL AND ROAD

PR23 final determination:

Supporting document – sustainable and efficient costs

31 October 2023



About this document

This document details our technical assessment and findings on sustainable and efficient costs and is one of five supporting documents of our final determination for the 2023 periodic review (PR23).

PR23 determines what the infrastructure manager for the national rail network, Network Rail, is expected to deliver with respect to its operation, support, maintenance and renewal (OSMR) of the network during control period 7 (CP7), which will run from 1 April 2024 to 31 March 2029, and how the available funding should be best used to support this.

This strongly influences:

- the service that passengers and freight customers receive and, together with taxpayers, ultimately pay for; and
- the charges that Network Rail's passenger, freight and charter train operator customers pay to access its track and stations during CP7.

Our final determination sets out:

- our decisions on Network Rail's outcome delivery and its planned expenditure to secure the condition and reliability of the network;
- changes to access charges and the incentives framework; and
- relevant policies on the financial framework, managing change and holding to account.

In addition to **this document**, we have also published as part of our final determination:

Document type	Details
Summary of conclusions and overviews	Our decisions on what Network Rail will need to deliver and how funding should be allocated: • Summary of conclusions and overview for England & Wales • Summary of conclusions and settlement for Scotland

Document type	Details
Consolidated decisions	A summary of our final decisions across Great Britain
Introduction	An overview of PR23 and background to our final determination
Settlement documents	Detailed final decisions for the System Operator and each of Network Rail's regions in England & Wales: • Eastern region • North West & Central region • Southern region • Wales & Western region See our summary of conclusions and settlement document for detailed information for Scotland.
Supporting documents	Technical assessments of: • Health and safety • Outcomes • **Sustainable and efficient costs** • National Functions • Other income
Policy positions	How we intend to regulate Network Rail during CP7 in relation to: • Financial framework • Access charges • Schedules 4 and 8 incentives regimes • Managing change • Holding to account With the exceptions of managing change and holding to account, our policy position documents include our assessment of stakeholder views on our proposals. Stakeholder views for managing change and holding to account are published in a separate document.

Document type	Details
Impact assessments	A consolidated set of assessments of the impact of our final policies on access charges and contractual incentives on affected parties

Next steps

We will now implement our final determination. Implementation is the process through which we amend operators' track and station access contracts to give effect to new access charges and incentives (such as Schedule 8 benchmarks and payment rates) determined through the periodic review. We expect to issue our review notices in December 2023 and, subject to Network Rail's acceptance, issue notices of agreement and review implementation notices in time for CP7 to commence from of 1 April 2024.

We expect Network Rail to publish a delivery plan for CP7 that is consistent with our final determination. We have published a notice alongside our final determination which sets out expectations for the scope and timing of the delivery plan.

Contents

1. Summary & conclusions

1.1 This document sets out ORR's findings on sustainable and efficient costs for CP7 which will run from 1 April 2024 to 31 March 2029. It includes a summary of our draft determination (published in June 2023) and subsequent consultation responses. All costs are in Financial Year 2023-24 prices unless stated otherwise.

1.2 Across the network in Great Britain, Network Rail proposes to spend £43.1 billion in CP7 on OSMR. This includes industry costs and rates and risk provision, but excludes costs for traction electricity (EC4T) of just under £5.0 billion. The total including EC4T is £48.0 billion. British Transport Police (BTP) costs are not included in this figure.

1.3 Inflation is higher than forecasts at the time of our draft determination, this has reduced the value of the CP7 spend in real terms. When compared with figures calculated in our draft determination OSMR expenditure for England & Wales is now approximately 1% lower than CP6 in real terms. For CP7 England & Wales OSMR spend (excluding traction electricity costs) is proposed to be £38.5 billion (CP6 costs were approximately £38.9 billion).

1.4 Network Rail's strategic business plan (SBP) for Scotland OSMR expenditure is approximately 1% lower than CP6 in real terms. Scotland proposes expenditure of £4.55 billion net of traction electricity costs; (equivalent CP6 costs were approximately £4.60 billion).

1.5 In this document we discuss the efficient level and allocation of expenditure on OSMR activity. Our review builds on the findings set out in the draft determination and the consultation responses including additional information supplied by Network Rail.

1.6 Network enhancements are funded and regulated outside the periodic review process.

Context

1.7 At the inception of PR23 in June 2021 we set out four objectives: safety; performance; asset sustainability; and efficiency. Since then, the UK Government set out its high-level requirements for England & Wales in the high level output specification (HLOS) and associated statement of funds available (SoFA), which

were published in December 2022. Scottish Ministers' SoFA and HLOS requirements were published in January 2023.

1.8 The UK Government expects Network Rail to maintain a strong standard of safety, deliver cost efficiency while supporting its wider objectives including national and local growth priorities, levelling up and making progress against governments' sustainability and broader environmental targets (e.g. moving towards a low-emissions railway, conserving and enhancing biodiversity). It also expects Network Rail's asset management strategy to support key revenue-generating flows, whilst ensuring that flows with services which typically see a higher subsidy requirement continue to receive an appropriate level of service.

1.9 Scottish Ministers expect Network Rail Scotland to maintain a strong standard of safety, manage efficient costs and achieve value for money for taxpayers, while maintaining focus on punctuality, reliability and asset sustainability. The Scottish Minister's HLOS also sets requirements for effective integration of Network Rail Scotland, ScotRail and other industry stakeholders, targeting investment to contribute towards increasing economic growth, climate change adaptation and contributions to the achievement of net-zero.

Consultation responses

1.10 Of the 43 responses received to our draft determination, the majority (33) provided a view on CP7 costs. A full analysis of the consultation responses is published in PR23 final determination: draft determination consultation responses. This document sets out the key aspects applicable to the assessment of sustainable and efficient costs. In addition, each chapter of this document will include a narrative on responses relevant to its content.

1.11 Most responses relevant to this document expressed concern at the lower renewals spend in CP7 (compared with CP6) and the potential impact on the future sustainability of the network. There was, therefore, significant support for the increase in core renewals we proposed in our draft determination.

1.12 There was also widespread support for our creation of funding for performance related interventions in the form of the performance, improvement and innovation fund (PIIF) in England & Wales and a Scotland targeted performance fund.

1.13 There were nine respondents who provided a view on our environment and sustainability assessment – and who generally welcomed our determination.

1.14 The views received on our proposals for efficiency, headwinds and input prices were broadly supportive of our assessment. However, there was some concern expressed, primarily from Trade Unions that high efficiency targets could impact the workforce.

Key changes from our draft determination

1.15 Network Rail has accepted the move to the risk-adjusted plan and the increased focus on core renewals spend that we set out in our draft determination. There was some difference in the mix of spend and the forecast expenditure presented by Network Rail and it was able to reflect a more accurate understanding of expected under-delivery in renewals activity in CP6. In this document we set out our final view on Network Rail's core renewals expenditure proposals – including in light of consultation responses and our overall assessment of how the increased expenditure can be funded.

1.16 The largest change since the draft determination is the impact of inflation on Network Rail's plan. In England & Wales, Network Rail has calculated that since it published its SBP, the latest forecast of inflation has had an impact of £1.4 billion; £0.6 billion of which we made allowances for in our draft determination. In Scotland inflation has had a total impact of £107 million, of which £68 million was covered in our draft determination. More details can be found in Chapter 9 (efficiency, headwinds, tailwinds and input prices).

1.17 The combined impact of inflation, increased core renewals spend and other increases in expenditure has resulted in Network Rail proposing to fund an element of its plan via an 'overlay' of £600 million in England & Wales; the Scotland plan is fully funded. Network Rail clarified that "this overlay does not reflect further ambition in efficiency". Instead, it is recognition that further trade-offs across the plan will be required for its delivery plan. However, we are clear that any trade-offs made must not adversely impact on our assessment of safety and asset sustainability in this final determination and have therefore identified options to fund the overlay which could be used to provide certainty on asset sustainability.

Key findings

1.18 Across the network, Network Rail's SBP indicated that expenditure would have increased in maintenance, operations and non-controllable opex in CP7 when compared to CP6. Support costs would have reduced, as would renewals expenditure. Table 1.1 provides the revised spend based on Network Rail's SBP.

Table 1.1 OSMR spend in CP7

Spend area	GB CP7 spend £ billion	Percentage change from CP6	England & Wales CP7 spend £ billion	Percentage change from CP6	Scotland CP7 spend £ billion	Percentage change from CP6
Operation	**4.4**	9.1%	**3.9**	7.7%	**0.5**	22.2%
Support	**5.1**	−14.1%	**4.6**	−14.6%	**0.5**	−8.7%
Maintenance	**11.4**	6.8%	**10.3**	6.7%	**1.1**	7.8%
Renewals including ETCS	**19.7**	−6.9%	**17.6**	−6.1%	**2.1**	−12.8%
Risk	**1.7**	N/A	**1.5**	N/A	**0.2**	N/A
OSMR adjustment	**−1.1**	N/A	**−1.0**	N/A	**−0.1**	N/A
Total OSMR	**41.2**	**−1.4%**	**36.8**	**−1.4%**	**4.3**	**−1.8%**
Non controllable OPEX including EC4T	**6.9**	43.5%	**6.2**	41.9%	**0.7**	60.9%
Total CP7 Spend	**48.0**	**3.2%**	**43.0**	**3.2%**	**5.0**	**3.6%**

Source: ORR analysis of Network Rail draft determination response databook FY24/25 prices

1.19 Under the SBP, effective volumes of renewals in CP7 would decrease compared to CP6 by 13% across the network; 15% in England & Wales and 6% in Scotland. The associated expenditure on renewals was also forecast to decrease in the SBP by £0.6 billion (3%) in England & Wales, and by £0.3 billion (11%) in Scotland compared to CP6.

1.20 Our detailed review of the SBP, informed by our Targeted Assurance Reviews (TARs) during CP6 and evidence from Network Rail's CP6 position, revealed specific asset areas which will require additional renewals expenditure in CP7. In our draft determination we set out an additional spend of £600 million on core renewals (£550 million in England & Wales and £50 million in Scotland). In its response Network Rail has assigned an additional spend of £585 million (£541 million in England & Wales and £44 million in Scotland) on core renewals. This is

discussed in detail in Chapter 3 (renewals and maintenance). We have examined the mix of asset spend (and deviations from our draft determination view) and are content with Network Rail's proposals at this point in the process, although further assurance will be required through the delivery plan.

1.21 Network Rail's Technical Authority has assessed the revised asset spend and has stated that the primary areas of concern from the original SBP have been addressed. However, Network Rail's Technical Authority notes that some asset classes in some regions still have areas where "greater definition of mitigations is required". We concur with the Technical Authority view that suitable targeted mitigations can be implemented to protect long-term sustainability of the network and we will continue to monitor the mitigations as Network Rail develops its delivery plan. This is discussed in Chapter 3 (renewals and maintenance).

1.22 Network Rail's draft determination response included revised spend and effective volumes for CP7. As a result of the increase in core renewals, effective volumes are now slightly higher than they were at the SBP, though still down on CP6.

1.23 At this stage, in the absence of details of schemes being undertaken in CP7, the increased spend in maintenance provides the headroom to manage the known impacts of reduced CP7 spend on renewals. Table 1.2 shows the combined spend on renewals and maintenance for CP7 and compares with CP6. There is a small percentage drop in England & Wales and but there is a relatively larger percentage reduction in Scotland. Noting the current overall asset condition in Scotland, we are satisfied Network Rail has demonstrated adequate measures for CP7 to sustain levels of safety and asset performance across the network.

Table 1.2 Combined Renewals and Maintenance spend in CP7

	Total CP7 renewals and maintenance spend (£ billion)	Percentage change from CP6
England & Wales	27.8	−1.8%
Scotland	3.3	−6.6%
Great Britain	**31.1**	**−2.3%**

Source: Network Rail draft determination response databook. Note: this table includes the additional spend on core renewals but not the adjustment used to fund them.

England & Wales

1.24 Network Rail has accepted the move to its "risk-adjusted" plan in England & Wales as set out in our draft determination. The "risk-adjusted" plan represented the

more realistic, deliverable plan and continuing to consider two plans in parallel would have created more uncertainty for regions and the supply chain. Our final determination is based on an increase in core renewals spend above the "risk-adjusted" plan, this is discussed in Chapter 3 (renewals and maintenance).

1.25 In its draft determination response Network Rail has proposed funding increased expenditure on network assets since its SBP via an overlay of £600 million. This overlay is applied to the England & Wales regions only and covers both capex and opex. We are concerned that applying this overlay to regional renewals and maintenance plans could result in a reduction in volumes, scope or quality of asset interventions, which would undermine the benefit of increasing funding on core renewals. To mitigate this risk, and to provide certainty in plans, we have provided a view on how Network Rail could choose to fully fund renewals and ensure reasonable risk funding without applying an overlay to the critical areas of regional renewals and maintenance.

1.26 We are not mandating the methodology Network Rail uses to fully fund additional core renewals and other revisions to its SBP. We will, however, expect Network Rail to adhere to some key principles:

(a) we do not expect funding to be sourced from existing core assets or maintenance plans that are already identified in CP7. Either directly (e.g. by reducing total volumes of work) or indirectly (e.g. by downgrading from full renewals to refurbishments) or by compromising scope or quality of works. However, we recognise that the detailed workbank of interventions will need to adapt within these plans; and

(b) we do not expect a decline in outcome measures.

1.27 We have identified a range of options for Network Rail to re-prioritise expenditure. Our priorities remain based on our PR23 objectives of safety, performance, asset sustainability and efficiency. We consider that the options identified should provide sufficient flexibility in expenditure to fund the additional core renewals, the impact of inflation and maintain a suitable risk fund, while giving Network Rail as much flexibility as possible to prioritise within these options.

1.28 Our proposed options were identified from our detailed review of Network Rail's SBP and the company's response to our draft determination. We have identified items in the SBP where we expected the actual expenditure in CP7 would be lower than stated in the plans, for example because cost estimates were high and also some items in the plans which were discretionary in nature and could be re-

prioritised. We have also identified areas where Network Rail could make a strategic decision to de-prioritise funds, albeit with a reduced confidence in delivery. These are decisions which Network Rail will need to take for the delivery plan.

1.29 We have categorised the options we are presenting to Network Rail as 'priority adjustments', 'strategic choices' and 'future opportunities', which are explained in Chapter 3 (renewals and maintenance). We have assessed how it should be possible to release approximately £1.2 billion and, as such, there is sufficient opportunity to fully fund the £0.5 billion of additional core renewals in England & Wales and increase risk-funding to £1.5 billion (from £1.1 billion after accounting for the additional inflation and input price effects since our draft determination, as explained in Chapter 9 efficiency, headwinds, tailwinds, inflation and input prices).

1.30 In the draft determination we reviewed Network Rail's assumptions for efficiency, headwinds, general inflation (as measured by CPI) and input price inflation (i.e. that beyond general price inflation). Our efficiency challenge detailed in the draft determination of at least £3.2 billion for England & Wales has been maintained for the final determination. We will continue to monitor Network Rail's plans for delivering this level of efficiency in CP7 as part of our regulatory financial reporting.

1.31 Network Rail has supplied additional information on input prices in response to our draft determination. Although we recognise a minor error in the calculation we used at draft determination (which we have now corrected) we still conclude that Network Rail's exposure to input price inflation is overstated. However, we also recognise that an element of lag will exist between inflationary changes and the placement of procurement contracts which will limit the benefit Network Rail experiences from the forecast future fall in inflation rates and we have therefore made an adjustment to our determination on this basis. Our view is that input price inflation is unlikely to exceed £1.0 billion in England & Wales in CP7; this is £0.3 billion above our draft determination position. Table 1.3 sets out this and other adjustments for England & Wales.

1.32 At the time of our draft determination, inflation was escalating and there was significant uncertainty on what impact it would have in CP7. Recognising this, and other drivers of uncertainty in CP7, such as the impact of climate change, we proposed a figure of £2.15 billion of risk funding in England & Wales. Since we published our draft determination, inflation has remained relatively high but has been declining and is forecast to return to levels largely consistent with the Bank of England 2% target. Our final determination reflects this change in circumstances.

1.33 Our final determination specifies a ring-fenced risk fund of circa £1.5 billion for England & Wales. We have provided a suite of options where we believe Network Rail can generate risk funds without adversely impacting its delivery of the regulatory outcomes in this final determination.

1.34 In our draft determination we highlighted the potential for the digital signalling programme to slip into CP8, this was particularly true for elements linked to West Coast Main Line (North) WCML(N). Network Rail has accepted our conclusions and in its draft determination response it has proactively re-programmed an element of the work into CP8. We still consider there exists the possibility of slippage and have identified an element of the digital signalling fleet fitment programme as a 'future opportunity'. Additionally, we believe Network Rail has overstated the Signalling Equivalent Unit (SEU) rates for digital signalling in CP7. We have included an appropriate adjustment within our 'priority adjustments'.

1.35 Our draft determination noted the likelihood that up to £300 million of renewals works on the WCML(N) programme may slip into CP8. Network Rail agreed with our conclusion and proposed to reprogramme £100 million into CP8, then treat the remainder of the programme as a "soft ringfence" which may slip and therefore release funding for risk provision.

1.36 In our draft determination we also indicated that there was potential scope for a reduction in operations and support costs. Additional information supplied by Network Rail since the draft determination supports our challenge on these costs, however, there is insufficient granularity available for ORR to specify where cost reductions should be made without impacting outputs. We have therefore consolidated an operations and support challenge to pre-efficient costs of £150 million across Network Rail England & Wales regions and the National Functions.

1.37 Our draft determination included funding for a PIIF of £40 million, recognising the benefits of a similar fund which we introduced in CP6. Network Rail's response recognised the benefit of the PIIF, however, it felt that it was only able to fund the PIIF to a value of £20 million. Across a broader range of consultation responses, there was a high degree of support for the PIIF. Having examined the options for cost deferral or works rescoping in CP7, we are confident that a PIIF of £40 million can be accommodated.

Scotland

1.38 Network Rail Scotland's draft determination response has demonstrated a plan to fully fund the additional structures work we identified in our draft determination, through a reduced spend in other non-critical areas of the plan. The impact of

inflation has been funded, as has the full value of input prices. However, the Scotland plan does not make provision for the Scotland targeted performance fund (a separate ring-fenced fund to support performance improvement in Scotland). The full movement of costs in the Network Rail Scotland plan are discussed in Chapter 9 (efficiency, headwinds, tailwinds, inflation and input prices).

1.39 We have reviewed Network Rail's assumptions for efficiency, headwinds, input price inflation, Consumer Price Index (CPI) inflation and other income. We are proposing adjustments to Network Rail Scotland's assumptions; these are set out below, in Table 1.4 and, in more detail, in Chapter 9 (efficiency, headwinds, tailwinds, inflation and input prices).

1.40 In our draft determination we proposed to maintain Network Rail's efficiency challenge of at least £0.43 billion for Scotland (of which £0.38 billion is for directly incurred OSMR). Network Rail has reclassified part of the efficiency challenge as a challenge for income (i.e., higher other income). So, while the efficiency challenge of at least £0.41 billion (of which £0.36 billion is for directly incurred OSMR) has reduced slightly (by £19 million), the overall expected post-efficient costs to be recovered through network grant or regulated charges is £10 million higher as we had already assumed a £10 million challenge in other income so the net increase in income is £9 million and we have not made other adjustments to the efficiency assumptions, so the reduction in efficiency is £19 million.

1.41 As explained above, Network Rail has supplied additional information on input prices which we have used to revise our position from a draft determination value of £90 million in Scotland. As in England & Wales we believe input prices have been overstated in Scotland and although we are revising our view, we believe that input prices are unlikely to exceed £120 million in CP7. This is a £30 million increase from our position at draft determination.

1.42 In Scotland, Network Rail's initial SBP set a risk fund of £206 million. In our draft determination we increased this by £101 million, acknowledging that Network Rail Scotland won't be able to flex risk fund as readily as the combined regions in England & Wales (the portfolio effect) and the greater efficiency challenge in Scotland. At the time we noted that this increase was subject to the next iteration of Network Rail's plans and the evolution of inflation forecasts; its latest figure is £242 million.

1.43 For our final determination, we have utilised some of the risk fund identified at draft determination to offset against the impact of inflation since the May 2023 Bank of England forecasts. Our revised risk fund for Scotland, at £225 million, recognises

the additional challenge of achieving the efficiency target in Scotland and the lack of a portfolio effect.

1.44 Transport Scotland indicated in its draft determination response that the Scotland targeted performance fund was a key element of our determination, and it viewed the funding of such a scheme as foremost for CP7. We also see this as a key element of the CP7 settlement given the train performance challenge in Scotland and have set the fund at £50 million.

1.45 Network Rail has supplied additional information on input prices in Scotland in response to our draft determination. Although we recognise a minor error in the calculation in the draft determination (which we have now corrected) we still believe Network Rail's exposure to input price inflation is overstated. However, we also recognise that an element of lag will exist between inflationary changes and the placement of procurement contracts which will limit the benefit Network Rail experiences from the forecast future fall in inflation rates and we have therefore made an adjustment to our determination on this basis. Our view is that input price inflation is unlikely to exceed £120 million in Scotland in CP7; this is £30 million above our estimate in the draft determination.

1.46 The forecast reduction in spend on input prices (compared with Network Rail) allows us to maintain funding for a Scotland targeted performance fund and set a level of risk funding above Network Rail's SBP provision for risk.

Market-led approach

1.47 Within each of its regions in England & Wales, Network Rail states that it has sought to prioritise expenditure on renewals in a manner which is consistent with the requirements of the UK Government's HLOS: to support revenue generation while contributing to national and local growth priorities; and levelling up by prioritising expenditure on high revenue generating routes. On routes which generate lower revenues it is proposing to take a more reactive approach to maintenance, and it suggests risks will be mitigated using operational restrictions. It refers to this as a 'market-led' approach.

1.48 Our view is that, at least in part, the market-led approach is a continuation of 'route criticality', which is an established approach to prioritising investment in rail. We recognise that, if deployed appropriately, it could achieve greater alignment between infrastructure management and customer/passenger outcomes. As such it could support a more 'whole industry' approach to rail investment. However, Network Rail's market-led approach is still under development. Network Rail has

advised that it could pursue this approach to a greater extent during CP7 but has not provided specific proposals in its SBP. Network Rail has acknowledged that a further prioritisation during CP7 would require discussion with ORR and funders to implement.

1.49 We will maintain dialogue with funders and with Network Rail on how any further prioritisation should be treated and how it should be delivered. In assessing any further prioritisation, our focus will remain on our objectives of safety, performance, asset sustainability and efficiency. We will continue to ensure that Network Rail is suitably monitored and held to account for delivery of its CP7 plan and that changes are managed appropriately. We will use our 'Holding to account' and 'Managing Change' policies for this.

Efficiency, headwinds, tailwinds, inflation and input prices

1.50 An important part of our assessment of Network Rail's efficient expenditure in CP7 has been to assess the scope for the company to make improvements to the efficiency of its business activities. Determining efficiency assumptions that are stretching but realistic is essential to encourage Network Rail to improve value for money for its customers and funders. This is done within the context of headwinds, tailwinds and the impact of inflation / input prices.

1.51 General inflation hit its highest level in over 40 years during the last year. Given its impact on Network Rail's cost base and its heightened volatility, our overall assessment of the impact of inflation on Network Rail's CP7 business plan is an important part of our PR23 determination.

Our assessment of efficiency

1.52 Network Rail's SBP suggests that it can deliver at least £3.2 billion from its activities in England & Wales under the risk-adjusted plan, and £0.41 billion from its activities in Scotland. This aligns with our findings in the draft determination, however, there has been a £19 million reduction in Network Rail's efficiency target in Scotland to recognise the reclassification of some business improvements from efficiency to income.

1.53 Furthermore, the profile of savings in Scotland has been modified to shift some efficiencies to later in CP7. The reprofiled efficiency trajectory addresses the concern raised in our draft determination. Details of these changes are in Chapter 9 (efficiency, headwinds, tailwinds, inflation and input prices).

1.54 In our view, the initiatives that Network Rail has identified to deliver efficiency improvements in CP7 seem reasonable at this stage in the planning cycle. Whilst there are some areas of stretch, we consider this is also reasonable at this point.

1.55 Taking account of this analysis, and the feedback through the consultation process, we have retained Network Rail's overall efficiency assumptions. We have decided that an efficiency challenge of at least £3.2 billion on the risk-adjusted plan is stretching but realistic for England & Wales in CP7. Using similar analysis, we have concluded that Network Rail Scotland should deliver £0.41 billion of efficiencies (£0.36 billion directly). We note that the efficiency assumption for Scotland is more challenging than for England & Wales. This adds to the risks for Network Rail Scotland as explained later in this document.

Our assessment of headwinds and tailwinds

1.56 Network Rail's SBP for CP7 included £0.8 billion of headwinds across Great Britain, however this was subsequently revised down to £0.5 billion following additional economic analysis.

1.57 In Network Rail's response to the draft determination, headwinds have reduced further to £0.3 billion (£287 million in England & Wales and £34 million in Scotland). Based on our discussions with Network Rail and challenge at draft determination, we have accepted Network Rail's revised headwinds forecast for CP7.

1.58 Network Rail's SBP does not include any assumed tailwinds in CP7. Network Rail has stated that any tailwinds are assumed to net off against headwinds. However, Network Rail is currently forecasting around £0.6 billion of tailwinds in CP6, the majority of which relates to pay awards below CPI inflation, and pandemic related savings to staff travel and similar.

1.59 The proposed reduction in forecast tailwinds compared to CP6 raises the question of whether they are understated in Network Rail's SBP. We accept that elements of the specific tailwinds that benefited Network Rail in CP6 are unlikely to be repeated in CP7. However, we do consider that some tailwinds will arise. We have accepted Network Rail's updated headwinds assumptions of £0.3 billion for England & Wales and £34 million for Scotland. We consider that Network Rail's updated forecast of headwinds less tailwinds adequately addresses our concern about the lack of identified tailwinds. Therefore, we do not propose to make any further adjustment to our assessment of efficient costs in relation to headwinds less tailwinds.

Our assessment of inflation and input prices

1.60 We use two categories for examining the effects of inflation on Network Rail's business: general inflation, as measured by CPI; and input price inflation, which relates to the specific basket of goods that Network Rail purchases such as steel and concrete. In Network Rail's view, its input price inflation has typically been around one percentage point per year higher than general inflation over recent years.

1.61 In its England and Wales risk-adjusted plan, Network Rail assumed just under £1.7 billion of inflation in CP7. This comprises £0.3 billion of general inflation and £1.3 billion of input price inflation. The Scotland plan included £0.09 billion of general inflation and £0.16 billion of input price inflation. In our draft determination we took a different view informed by the framework developed by our external advisors. The adoption of this framework meant input price assumptions reduced from £1.3 billion to £0.7 billion for England & Wales and from £0.16 billion to £0.09 billion in Scotland.

1.62 Forecast CPI inflation in CP7 has increased since November 2022 which was the inflation forecast used in Network Rail's SBP. Network Rail's latest forecast, which is based on the May 2023 Bank of England CPI forecast has increased costs from our draft determination by £1.5 billion (£1.4 billion in England & Wales, and £0.1 billion in Scotland). Network Rail has also proposed an additional £0.4 billion cost increase on its input prices due to a 'lagged inflation' effect.

1.63 In its draft determination response Network Rail provided additional evidence to support its view on input prices and the lag effect; this included analysis conducted by its consultants, Oxera.

1.64 We have not been persuaded to the full extent of Network Rail's proposed adjustment to input prices. However, we have decided to increase our input price adjustment for England & Wales by £0.3 billion to £1.0 billion, and by £30 million to £120 million for Scotland.

Other income

1.65 After Network Rail submitted its SBP, it identified a £0.3 billion shortfall in income in England & Wales, mostly relating to omitted Schedule 4 and 8 costs relating to freight; and lower property income. Network Rail's draft determination response closes this gap to £0.1 billion. There is no income shortfall in Scotland, between the SoFA and Network Rail's SBP.

Overall findings on efficiency, headwinds and tailwinds, inflation and input prices, and on other income

1.66 Table 1.3 summarises the financial adjustments that we are proposing to make to post efficient costs in England & Wales, following our review. It shows what our view was of the items at key points in the PR23 process. Chapter 9 (efficiency, headwinds, tailwinds and input prices) details the movements in these items.

Table 1.3 View on post efficient costs and other income in England & Wales

£ billion, 2023-24 prices	Network Rail SBP	ORR draft determination	ORR final determination	Comments
Input prices	1.3	0.7	**1.0**	Our final view of £1.0 billion is £0.7 billion lower than Network Rail's latest forecast.
Impact of rising CPI inflation on CP7 costs net of income	− 0.2	+0.4	**1.2**	We have accepted the increase in inflation between the SBP and Network Rail's latest forecast.
Headwinds	0.7	0.3	**0.3**	We have accepted Network Rail's revised headwinds forecast.
Income shortfall	0.3	0.3	**0.1**	There is a gap of £0.1 billion between Network Rail's income forecast for CP7 and its available funding.
Property income	1.4	1.5	**1.5**	We accept Network Rail's latest forecast which includes our £90 million challenge.
Train performance improvement and innovation fund	−	0.04	**0.04**	We have included a £40 million train performance improvement and innovation fund in the England & Wales settlement.

Source: ORR analysis of Network Rail SBP. Amounts may not sum due to rounding.

1.67 Table 1.4 summarises the financial adjustments that we are proposing to make following our review to post efficient costs in Scotland. It shows what our view was of the items at key points in the PR23 process. Chapter 9 (efficiency, headwinds, tailwinds and input prices) details the movements in these items.

Table 1.4 View on post efficient costs and other income in Scotland

£ million, 2023-24 prices	Network Rail interim SBP	ORR draft determination	ORR final determination	Comments
Input prices	162	90	**120**	We have taken a different view on input prices to Network Rail
Impact of rising CPI inflation on CP7 costs net of income	−50	18	**57**	We have accepted the increase in inflation between the SBP and Network Rail's latest forecast.
Headwinds	82	82	**34**	We have accepted Network Rail's assumption
Property income	85	95	**104**	We accept Network Rail's further income challenge on property
Train performance fund		101	**50**	We have included a train performance fund in the Scotland settlement

Source: ORR analysis of Network Rail SBP. Amounts may not sum due to rounding.

Asset sustainability

Renewals

1.68 Renewals funding for CP7 covers increased expenditure on areas such as digital signalling, but the total OSMR funding is broadly similar to CP6, meaning there is less expenditure available for core renewals. Additionally, we knew from our review of Network Rail's initial plans in 2022, that certain key assets would deteriorate even if expenditure was held constant.

1.69 We looked carefully at the asset sustainability implications of Network Rail's SBP. Regional expenditure in CP7 on core asset renewals (i.e. excluding renewals expenditure by National Functions) was down 8% in England & Wales under the initial risk-adjusted plan; and down 14% in Scotland under the interim SBP.

1.70 In its SBP submission, Network Rail forecast the following in CP7:

(a) Towards the end of CP7 service affecting failures of assets is forecast to increase. This will be reflected in the decline of the composite reliability index (CRI) measure. CRI is explained in Annex D.

(b) Asset portfolio condition and performance will reduce compared to steady state funding (steady state being asset portfolio maintained at CP6 exit performance levels). Other things being equal, this will lead to increasing long-term costs. This will be reflected in a decrease in the measure of asset sustainability, the composite sustainability index (CSI). CSI is explained in Annex E.

(c) It will take until CP11 in England & Wales and CP12 in Scotland, to recover asset condition and performance to endof-CP6 levels, assuming funding is available in CP8 and beyond for the required increase in expenditure.

(d) Network Rail has indicated that it will apply reactive, operational measures such as temporary speed restrictions to mitigate increased service affecting failures; and will prioritise funding to higher revenue generating routes.

1.71 Asset sustainability has important long-term implications for safety and performance. Network Rail's own assurance by its Technical Authority highlighted specific asset types in some regions which were areas of potential vulnerability, or where mitigations had not been adequately demonstrated.

1.72 Our own, independent assessment agreed with the assets and regions identified as concerns by the Technical Authority, as well as some more widespread issues. Our assessment considered information provided in the SBP, PR23 challenge sessions with Network Rail and information gathered in CP6 through regular monitoring and our TARs.

1.73 Network Rail agreed with our draft determination proposal that, to address these asset sustainability concerns, it should increase expenditure on core asset renewals, although with a slightly different mix of specific asset types and regions. We set out in our draft determination indicative estimates of the additional expenditure required and in Table 1.5 we show Network Rail's proposed spend

which also takes account of CP6 under-delivery of renewals; information which was not available at the time of our draft determination.

Table 1.5 Additional core asset expenditure across network

Region / Asset area FY23/24	ORR draft determination £ million	Network Rail draft determination response £ million	Effective volumes percentage increase
Earthworks	210	237	19.0%
Track	100	86	3.1%
Structures and tunnels	220	175	13.9%
Operational property	50	0	0.0%
Signalling	0	67	1.7%
Electrification and fixed plant	0	20	22.3%
England & Wales Remaining high priority areas	20	0	0.0%
Total	**600**	**585**	**N/A**

Source: ORR analysis of Network Rail draft determination response; effective volume increases will be the result of more work and a change in the mix of work.

1.74 Table 1.5 also shows the increase in effective volumes which will be delivered across the network as a result of the changes made to the SBP. It is important that Network Rail delivers an appropriate level of effective volumes of renewals with the additional spend set out above. Network Rail will need to confirm these in its delivery plan and the delivery of effective volumes will form a key part of our CP7 monitoring activity.

1.75 We recognise that there is no further SoFA funding available for these additional core renewals so we have identified a range of options for Network Rail to re-prioritise expenditure. Our priorities remain based on our PR23 objectives of safety, performance, asset sustainability and efficiency. We consider that these options should provide sufficient expenditure to fund the additional core renewals, whilst maintaining a suitable risk fund, while giving Network Rail flexibility to prioritise within these options.

1.76 The projects and activities identified as sources to fund additional core renewals comprise:

(a) **West Coast Main Line North** (WCML(N), between Crewe and Carlisle): A large programme of renewals is required on the WCML(N) between CP7 and CP10. Some of these assets are life expired and require renewal in CP7, but Network Rail proposes to accelerate the full programme of renewals into CP7 and CP8, to complete all disruptive works before, based on our current understanding of plans, the introduction of HS2 services on the WCML(N), at the end of CP8.

(b) **Digital signalling**: The digital signalling portfolio includes infrastructure renewals, fleet fitment, enabling projects, research, development and innovation projects and CP6 legacy projects. All of these contribute to Network Rail replacing its conventional signalling systems with European Train Control System (ETCS) technology.

(c) **High Output plant**: This is a set of machinery which enables track renewals activity to be conducted mechanically, with an associated efficiency saving.

(d) **Route Services technology projects**: Route Services is one of the National Functions and supplies Network Rail's regions with specialist services. This includes managing projects to develop technology, for example software, apps or infrastructure monitoring devices.

(e) **Project Reach**: Project Reach is a joint investment between Network Rail and private sector investors, which aims to use the rail corridor as a route for cabling, with the benefit to Network Rail of access to modern cables with increased capacity.

(f) **System Operator (SO) strategic projects support fund**: The SO is responsible for making the network operate to high performance and efficiency standards. This fund is for potential projects to improve performance that are yet to be specified.

(g) **Operations and Support**: Operations describes the set of functions directly associated with the movement of trains on the railway, and the specialist roles dedicated to delivering this. Support functions are business enabling staff including Finance, Legal and Human Resources. They are located in both the regions and in the national functions. Our draft determination highlighted that spend has grown and that there was limited supporting evidence to justify this growth within a fiscally constrained plan.

1.77 Table 1.6 summarises our proposed options to reduce expenditure in order to address the gap between required expenditure (including on core assets) and available funding. This amounts to a total potential spend reduction / deferral opportunities of approximately £1.2 billion.

Table 1.6 Suite of projects where we have agreed with Network Rail / otherwise identified cost adjustments for the final determination

Expenditure item	Category	England & Wales potential spend reduction £ billion	Scotland potential spend reduction £ billion
Reprogramming WCML(N) elements into CP8	Priority adjustment	0.1	N/A
Digital signalling portfolio including SEU rates	Priority adjustment	0.2	N/A
Route Services projects	Priority adjustment	0.09	0.01*
High Output plant	Strategic choice	0.04	N/A
Route Services additional challenge	Strategic choice	0.09	0.01
Project Reach	Strategic choice	0.14	N/A
Operations and support challenge	Strategic choice	0.15	circa 0.01
System Operator strategic projects fund	Strategic choice	0.02	<0.01
WCML(N) and Crewe renewals delivery	Future opportunity	0.32	N/A
Digital signalling fleet fitment delivery	Future opportunity	0.04	<0.01
Total		**1.2**	**circa 0.03+**

Source: ORR analysis of Network Rail SBP and draft determination response.
**Network Rail's adjustments post draft determination include a £10 million reduction in Route Services spend for Scotland*

1.78 Elements of the digital signalling portfolio relating to infrastructure renewals and CP6 legacy projects sit within regional and National Functions' programmes. Several of our proposals to re-prioritise funding could impact these same

programmes, so we have checked for any potential double-counting of savings. Network Rail's response to our draft determination included a £100 million reduction on WCML(N) and a £215 million reduction on digital signalling programmes. We have confirmed with Network Rail that £62 million of ETCS works in North West & Central (NW&C) had been included in both of these numbers. In Table 1.6 we have kept this £62 million in our WCML(N) adjustment but excluded it from our digital signalling adjustment, to avoid double-counting.

1.79 We are confident that through the re-prioritisation of the options listed in Table 1.6, Network Rail could release sufficient funding to cover the £0.6 billion overlay in England & Wales and supplement the risk fund to reach £1.5 billion. This provides certainty to the core renewals programme and adds confidence to the supply chain.

1.80 Depending on the cost adjustment options considered by Network Rail, there will be funds released to Scotland which should be used to increase the risk funding there. The exact amount will depend on the choices Network Rail makes from the options set out above. For planning purposes, we have estimated that this is likely to be approximately £15 million and we have added this to the Scotland risk fund.

1.81 In the latest iteration of Network Rail's plans, the profile of renewals spend in all regions is smoother in CP7 than it was in CP6, where there had been a peak in the plan in year 3. The CP7 profile reduces steadily over years 1 to 3, then declines more rapidly in years 4 and 5, but we anticipate this will be smoothed out in the final delivery plan.

1.82 Each of Network Rail's regions is taking a bespoke approach to procurement for CP7. We have received assurance from the regions that they are finalising contracts and embedding new operating models in 2023, to ensure these are stable and ready to start delivering efficiently in April 2024. For example, Southern has procured business partners to deliver all disciplines of renewals works in CP7 and CP8, with development contracts in place since March 2023, allowing a 13 month mobilisation period. Digital programmes are also to be delivered through a framework, with suppliers continuing to deliver major signalling projects across CP7 and CP8.

Asset Sustainability

1.83 Longer-term forecasts presented in the SBP show asset condition is expected to decline over CP7 and future control periods unless there is greater expenditure in the next control periods to arrest this decline. The required funding is defined by

that necessary to return asset condition to end of CP6 levels. This is referred to as "steady state".

1.84 To return to steady state Network Rail has estimated it could take until at least CP11 due to limitations on capacity, access, affordability and the cycle of degradation of assets; this is compounded by the forward cost of technology advancements. It is estimated that the cost would be between an additional £9.0 billion to £12.0 billion above current levels of funding in England & Wales. Based on current asset strategies and outcome requirements, this funding will need to be phased over the next four control periods.

1.85 To return to steady state in Scotland would take until at least CP12 and cost between an additional £1.0 billion to £1.5 billion over current levels of funding phased over the next five control periods, based upon current asset strategies and outcome requirements.

Digital signalling, weather resilience, climate change and environmental sustainability

1.86 Network Rail's SBP indicates £1.7 billion total expenditure for the digital signalling portfolio, which was allocated to regions or National Functions; and an additional £0.3 billion which was not allocated and therefore was not funded in the SBP. Our draft determination review focused on the allocated expenditure only.

1.87 The £1.7 billion includes signalling infrastructure renewals, fleet fitment, enabling projects, Research, Development and Innovation (RD&I) projects and CP6 legacy projects which contribute to the delivery of digital signalling in CP7. Included within this figure is an element of expenditure for Scotland totalling approximately £0.02 billion. This is Network Rail Scotland's contribution to the National Functions led digital signalling projects (e.g. Target 190) and the delivery of enabling projects which will support the deployment of digital signalling.

1.88 In our draft determination, we proposed an option for a circa £0.26 billion reduction in CP7 spend on digital signalling, from a combination of reducing unit rates and programme slippage from CP7 to CP8. Network Rail's response proposed £185 million of reprogramming into CP8 (of which £62 million was already included in its reprogramming for WCML(N)). The response also proposed a £30 million reduction in spend on the OTTO enabling project leading to a total adjustment in CP7 of £153 million. We support these proposed reductions in digital signalling spend.

1.89 However, Network Rail provided additional evidence which confirmed it is forecasting CP7 signalling unit rates similar to CP6 rates, even though circa 25% of the CP6 rates were associated with development costs. As the CP6 works were the first large-scale implementation of ETCS on the network, we would expect higher development costs – but it would be inefficient to repeat these development costs on future programmes. As a result, we propose a circa 10% (circa £50 million) reduction to pre-efficient unit rates.

1.90 All regions have submitted Weather Resilience and Climate Change Adaption plans and associated plans on carbon reduction and environmental sustainability. Both the England & Wales and the Scotland HLOSs included detailed requirements around environmental sustainability. Although the regional plans vary in quality, overall we consider that more detailed commitments need to be provided in the final delivery plan, so we can hold Network Rail to account effectively in CP7. This is discussed in Chapter 7 (environmental Sustainability).

Maintenance

1.91 Reduced spend on renewals is likely to mean that maintenance expenditure will need to increase towards the end of CP7. Regions have now been able to demonstrate through information not available at the time of our draft determination that alignment work between maintenance planning and renewals has taken place. Making the best use of the information currently to hand, allowances have been made to take into account any possible increase in maintenance demand due to the current renewals forecast.

1.92 However, the maintenance plan requires further refinement and scrutiny of deliverability as part of the production of Network Rail's delivery plan. Network Rail's Technical Authority will need to continue to monitor the impact of modernising maintenance, including through the post implementation review to facilitate the sharing of lessons learnt between routes and regions.

Operations

1.93 Network Rail's SBP lacked detail on operations generally and we sought additional information from Network Rail. Furthermore, there has been inconsistency in the way operations and support costs have been derived in Network Rail and we will be working with the company through CP7 to improve this structure.

1.94 Our consultants (Steer/Amberside/Civity) have completed an international benchmarking exercise on Network Rail's operations (and support) costs, which has also informed an updated assessment of the plans provided.

1.95 We have reviewed the information provided and believe there is scope for some reduction in operations costs but have opted not to specify adjustments in order to allow Network Rail the flexibility to adjust its plan as it requires.

1.96 The principles of reducing vacancy gaps, better managing fatigue among operations staff and professionalising operations competence are outlined in the SBP. These seem reasonable and appear to flow from pre-existing and recognised operational challenges in these areas. However, information supplied by Network Rail does not have sufficient detail to allow us to confirm that the expenditure associated with these spend increases is optimised.

1.97 Network Rail has forecast that service affecting failures will increase in CP7 and this is expected to cause operational restrictions (e.g. temporary speed restrictions). All regions need to better demonstrate through delivery plans that their operational approach and resource levels suitably mitigate any additional risk to operations (rather than transferring impacts to train operators).

1.98 While there are many common features between all regions' plans, there are also differences between the approaches. These present an opportunity for inter-regional learning, which we expect Network Rail to exploit during CP7.

1.99 As identified above, the increase in pre-efficient operations costs in some regions has not been explained in sufficient detail. This is complicated by the inconsistency in the cost reporting structure. We are confident that opportunities exist for reductions to pre-efficient spend and have identified a 'strategic choice' for Network Rail to consider the Operations and Support costs in tandem to reduce pre-efficient spend.

Support

1.100 Support costs make up a significant element of Network Rail's costs, comprising circa 13% of Network Rail's total OSMR. There is a large element of flexibility in the level of costs and Network Rail's regions together with the National Functions have varying levels of expenditure in this area.

1.101 Support expenditure in the SBP was projected to be £0.8 billion (14%) lower across the network than in CP6. However, this should be seen in the context of CP6 changes: firstly, an increase in support costs during the 'Putting Passengers First' programme, then again due to the pandemic, and finally a decrease in costs with a reduction in headcount due to management modernisation programmes. Our internal regional benchmarking and the international study completed by our

consultants suggest that the current devolution model could be further optimised beyond efficiencies identified to date.

1.102 In looking at strategic opportunities for Network Rail to release further funding into core renewals, our assessment indicated there may be opportunities to reduce pre-efficient expenditure across both Support and Operations by up to a total of £150 million as part of the strategic decision-making to fund the CP7 plan. We expect the majority of the savings to be found in regional and national support categories.

Research, development and innovation (RD&I)

1.103 To align with best practice, we require Network Rail to deliver effective RD&I programmes that improve efficiency and value for money. In CP7, Network Rail aims to deliver business requirements through a combination of direct and co-funded projects. For CP7, the SBP includes RD&I expenditure of £0.15 billion in England & Wales and £0.02 billion in Scotland (£0.17 billion for Great Britain overall). This is a £0.10 billion reduction on CP6 funding levels, excluding digital signalling expenditure.

1.104 We have concluded that, noting constraints on funding and the need to prioritise core renewals and maintenance, £0.17 billion is a proportionate level of expenditure for CP7. However, coordination of RD&I activities with other bodies such as the Rail Safety and Standards Board (RSSB) will be essential to avoid duplication and to share efforts and funding wherever possible. We also note that this £0.17 billion for RD&I is only a small part of Network Rail's total spend on developing and implementing technology, which is in excess of £1.2 billion.

1.105 As explained above, in our draft determination we proposed a performance improvement and innovation fund (PIIF) for England & Wales and a Scotland targeted performance fund. In our final determination we set these at £40 million and £50 million respectively, for the reasons explained in PR23 final determination: supporting document – outcomes.

1.106 In April 2022 we published a Targeted Assurance Review on Technology Adoption, which found that railway technology delivered as centrally-managed projects often struggled to define a scope which was both deliverable by central teams, and likely to be adopted by regional users. This led to projects going through many cycles of re-scoping, which extended schedules and increased costs. Network Rail's RD&I programme for CP7 includes initiatives to improve cultures and collaboration around new technology. We are supportive of this

initiative, as this is crucial to unlocking the benefits from all other spend on technology in CP7. However, we have not received adequate assurance from Route Services that the wider portfolio of new technology projects in CP7 is addressing our concerns, so we have included a 'priority adjustment' of £100 million reduction to address current inefficiencies, as well as a 'strategic choice' to consider further reductions of up to £100 million.

Risk Funding

1.107 Network Rail has used or allocated all of its CP6 risk funding with over £1.5 billion (£1.3 billion in England & Wales and £260 million in Scotland, in cash prices) being spent on the financial impact of risks. Total risk funding provided in PR18 was £2.7 billion in England & Wales and £284 million in Scotland (cash prices). Risk impacts have included the pandemic, industrial action, inflation, input prices, earthworks and weather resilience.

1.108 We recognise that there are several significant risks in CP7: inflation; ongoing challenges around train performance; weather resilience; and the embedding of maintenance reforms, among others. The volatility of inflation is of particular concern as the SoFA is a cash settlement which means Network Rail will need to mitigate significant inflation risk within CP7.

1.109 In our draft determination we concluded that the Network Rail full plan for England & Wales had insufficient risk funding and proposed that the risk-adjusted plan be adopted; this has been accepted by Network Rail.

1.110 The impact of increased levels of inflation since the SBP needs to be funded from within the plan as do the other supported cost increases we have set out above, along with a reasonable risk fund.

1.111 The options we have set out in Table 1.6 would fully fund the supported cost increases since the draft determination including core renewals and inflation and would also provide for a risk fund in England & Wales of £1.5 billion. This represents approximately 3.9% of OSMR expenditure in CP7.

1.112 Network Rail Scotland will not have access to the risk funds held centrally in Network Rail. Additionally, we recognise the challenge Network Rail Scotland will have in delivering on its CP7 efficiency target, these factors must be considered as part of setting a risk fund.

1.113 Network Rail's draft determination response proposed zero funding for a Scotland targeted performance fund, instead it prioritised funding to cover the cost

increases since the draft determination and to provide a risk fund of £287 million (subsequently reduced to £242 million, but that is before Network Rail has adjusted for a reduction in available funding of £76 million). We have a different view on the scale of input price rises to Network Rail and we believe that there is more funding available so provision can be made for the impact of inflation in Scotland, input price effects, the train performance fund and a reasonable level of CP7 risk fund. We have set the risk fund for Scotland at £225 million, which represents approximately 5% of OSMR for Scotland.

1.114 Further details on our assessment of risk within the SBP can be found in Chapter 10 (financial risk). The rationale behind the PIIF and Scotland targeted performance fund is described in Chapter 5 (operations).

2. Methodology

Introduction

2.1 This chapter sets out the methodology we used to assess Network Rail's plans and the consultation responses to our draft determination.

Consultation responses

2.2 The relevant consultation responses were grouped into themes. Further details on the responses are included in Annex G, including the number of responses which were received for each theme. The themes are given below:

(a) Core renewals / asset spend (including track, drainage, earthworks etc);

(b) Maintenance including modernising maintenance;

(c) Operations & Support;

(d) Efficiency (including head/tailwinds, frontier shift, benchmarking);

(e) Inflation and Input prices;

(f) Risk;

(g) Environment & sustainability ;

(h) Digital Signalling;

(i) High output / on-track plant;

(j) PIIF and the Scotland targeted performance fund; and

(k) Project Reach.

2.3 Network Rail responded to the draft determination with a detailed submission. This included:

(a) Network Rail detailed PR23 draft determination response;

(b) Regional responses (Eastern, W&W, Southern, NW&C and Scotland);

(c) National Functions (Route Services, Technical Authority, System Operator and Corporate Services and Group Property) responses; and

(d) Additional Supporting Evidence.

2.4 Transport Scotland responded to the draft determination with a detailed submission. This included:

(a) PR23 - draft determination - Settlement documents for Scotland and System Operator (Annex B) - 5 September 2023;

(b) PR23 – ORR consultation on draft determination for CP7 – reply on behalf of the Scottish ministers - 5 September 2023; and

(c) Transport Scotland response to ORR's draft determination – ORR's eight key proposals (executive summary) and significant topics for Transport Scotland - 5 September 2023.

Changes from draft determination

2.5 The changes to this chapter are due to the inclusion of an overview of the consultation response process and a summary of the methodology we used to create the final determination.

PR23 process

Table 2.1 Overview of ORR's advice to date

Timelines	Document	Key messages
June 2021	Launch of PR23	Our launch letter sets our four objectives (Safety, Performance, Asset Sustainability, and Efficiency) and lays out the PR23 framework.
July 2021	Comprehensive Spending Review (CSR)	The CSR recognised the pressure in the overall rail system, resulting in Network Rail committing to achieving additional efficiencies to reduce the funding required by government.
May 2022	'PR23 Advice to UK Government (covering England & Wales)'	The UK Government's decisions on CP7 outputs and funding are being made in very challenging circumstances due to Coronavirus (COVID-19) pandemic. Overall safety levels would be maintained at least to the CP6 exit point level throughout CP7. Asset condition would decline to an extent. Network Rail would continue to deliver in line with its environment sustainability strategy. Efficiency target of £3.7 billion (£1.6 billion for 'business as usual').

Timelines	Document	Key messages
June 2022	'PR23 Advice to the Scottish Ministers'	Network Rail Scotland's plan reflects a fiscally constrained environment but expects to: maintain current levels of safety; maintain current levels of train performance; manage a decline in asset sustainability and consequently asset performance
July 2022	ORR's first supplementary advice to the UK Government on the development of its high level output specification (HLOS) and statement of funds available (SoFA)	We consider that Network Rail is likely to have underestimated the implications of a reduced funding scenario on train performance.
September 2022	ORR's second supplementary advice to the UK Government on the development of its high level output specification (HLOS) and statement of funds available (SoFA) - September 2022	Risk from rising inflation. Risk from delay to implementation of workforce modernisation programme. Completing HS2 related work on WCML(N) within CP7 reduces the whole life cost. Digital Signalling is critical, the costs are not fully assured. Large reductions in asset renewal in CP7 will result in significant consequences for the required level of expenditure in subsequent control periods.

Timelines	Document	Key messages
October 2022	Supplementary advice on Network Rail's System Operator and National Functions' costs	Updated forecasts based on the 'reduced cost' funding level for CP7. On SO and National Functions, there is scope for a significant reduction from the proposed increase compared with CP6. Nevertheless we recognise that in some areas of network-wide costs there may be a case for increased expenditure in CP7 as against CP6. Insufficient detail provided on the costings of the Electrical Safety Delivery programme. Network Rail's proposed costs on insurance are higher than CP6. Further discussions are required between the UK and Scottish governments on allocating the costs of digital signalling, including the costs of fleet fitment.
June 2023	Draft determination	ORR's draft determination sets out our views on Network Rail's plans for spending £44.8 billion for Britain's rail network (£40.0 billion for England and Wales, £4.8 billion for Scotland) from April 2024 to March 2029 - the period known as CP7. Our assessment identifies that while Network Rail's plans largely deliver against government priorities, a greater focus is needed on train performance and renewing core assets. Better train performance will benefit passengers and freight customers, while core assets like track, structures and earthworks need to be resilient - especially with the challenges presented by climate change.

ORR's objectives

2.6 As set out in our PR23 launch letter in June 2021, our four priorities for PR23 are:

(a) Safety: the rail network must be maintained in a safe condition for all of its users, workers and the public;

(b) Performance: the railway must be customer-focused, making effective use of its capacity to deliver passenger and freight services that are punctual and reliable;

(c) Asset sustainability: assets must be planned and managed to deliver their greatest value over the course of their operational lives; and

(d) Efficiency: Network Rail (or Great British Railways as its successor body) must be subject to stretching but realistic efficiency targets.

Public Consultation on draft determination

2.7 Responses to the public consultation have been collected and these were disseminated to the relevant ORR technical experts.

2.8 The technical experts reviewed the individual responses, assessing the views obtained, any other pertinent system changes (e.g. inflation) and implementing any necessary changes to the determination.

2.9 There have been 43 responses, 33 of which are applicable and relevant to this Sustainable and Efficient Costs supporting document.

Review of CP7 OSMR expenditure

2.10 Through the sustainable and efficient cost assessment analysis, we have sought to achieve the following:

(a) confidence that Network Rail funding levels (taking into account an appropriate level of challenge and risk) are sufficient to meet the HLOS requirements and ORR's priorities, as set out in our launch letter;

(b) confidence that all expenditure that Network Rail is likely to incur in CP7 has been included;

(c) confidence that expenditure included within Network Rail's plans is appropriate, attributable and reasonable for the planned activities;

(d) understanding, and ultimately an ability to assess the robustness and appropriateness of expenditure to understand deliverability for:

(e) types of expenditure (such as renewals and maintenance);

(f) asset areas (such as structures);

(g) ongoing programmes (such as Research, Development & Innovation (RD&I));

(h) individual projects (such as Project Reach);

(i) global factors (such as efficiency and input prices);

(j) traceability of expenditure between regional cost lines and network totals; and

(k) understand the relationship between all of the above information and both financial and deliverability risk, risk plans and strategies.

2.11 We looked at each cost category from the perspective of whether the projected expenditure would be:

(a) **Allowable** – is Network Rail doing the right things?

(i) Is the plan aligned to the HLOS and ORR's priorities as set out in the launch letter?

(ii) Are there major works that have been omitted / included unexpectedly?

(b) **Appropriate** – is expenditure commensurate with the work?

(i) Is expenditure comparable to previous years?

(ii) Is the workbank comparable with history and known future requirements?

(iii) Are the unit rates efficient?

(iv) Do plans address specific areas of known concern from CP6 (e.g. metallic structures, earthworks, ageing of the infrastructure? Including concerns we have raised, or other parties have raised in CP6 through our progressive assurance activities?

(c) **Assigned/ Apportioned** – are these the right expenditure items for funding?

(i) Across the whole plan – are the areas of expenditure the priority areas?

(ii) When compared with other regions is the expenditure optimised/ coherent?

(iii) Are the allocations between regions/asset groups of the right balance?

(iv) Are appropriate efficiency assumptions assigned to the different expenditure categories?

(v) Do plans reflect an appropriate allocation of expenditure between each of the regions and National Functions?

(d) **Assured** – has suitable rigour and quality control been applied to check the expenditure items within Network Rail?

Cost Category Definitions

2.12 Network Rail's expenditure categories are either controllable (Network Rail refers to costs as 'controllable' expenditure when Network Rail can influence spending levels and the mix of expenditure) or non-controllable (other types of expenditure that Network Rail has less control over including wider industry costs such as traction power and business rates). We reviewed all cost categories but the approach to scrutinising each of these categories differs considerably as they are each distinct.

Review of the SBPs

Pre SBP engagement

2.13 In advance of receiving the SBPs, we reviewed the intelligence gathered over the course of CP6. This included our work to review earlier iterations of Network Rail's plans through the Comprehensive Spending Review (CSR) and initial submission. We also undertook subject-specific reviews including TARs, consultancy commissions and Independent Reporter work, as well as our holding to account and monitoring activities through CP6. See Annex A for more details of our intelligence gathering in CP6.

2.14 In preparation for PR23, consideration was given to the following questions for each asset type and region:

(a) How has Network Rail's expenditure or activity plans changed from the PR18 determination and then evolved over the course of CP6?

(b) What are our views on higher risk areas / regions? Which should be focussed on and why?

(c) Are there any areas we were less concerned about and why?

(d) Are there any specific issues for Scotland?

(e) What has been learned from our holding to account activities and studies undertaken and what actions remain outstanding?

(f) What is the linkage between the HLOSs and each asset e.g. any environmental / sustainability work? or asset implications from the HLOS encouragement of Freight?

SBP engagement

2.15 On release of its plan we adopted a risk-based approach for assessing Network Rail's SBP, to identify areas where we required greater confidence that the submission was robust, and areas where the real-world impact would be material. Other key sources of evidence were:

(a) our asset knowledge collected from ongoing monitoring activities;

(b) Network Rail's SBP plans, databooks and assurance reports (on renewals, maintenance, deliverability, costs and others);

(c) Network Rail's asset policies and standards, which are in use in CP6; and,

(d) data received from Network Rail (or other sources) in CP6, through our business as usual monitoring activities.

2.16 Network Rail provided an overview and introduction session at the end of February 2023, highlighting the key areas of the plan. We followed up with regional "listening sessions" in March, where each region and each of the National Functions briefed us on the detail of its plan. We also received briefings on particular aspects of the plan such as environmental and sustainability and held listening sessions covering finance and risk, efficiencies, headwinds and tailwinds.

2.17 Following the listening sessions and based on evidence gathered through our review of the SBP, we provided Network Rail with a list of clarification questions. Network Rail responded to these and we discussed its responses in detailed "challenge sessions".

2.18 We combined information and knowledge we have developed through our CP6 holding to account activities with information provided by Network Rail through the SBP, supporting documents, listening sessions and challenge sessions to develop our views set out in this document.

Use of Network Rail's 'risk-adjusted' plans

2.19 As noted above, we have reviewed several iterations of Network Rail's CP7 plans. By the end of 2022, Network Rail was developing two plans in parallel for England & Wales: a 'full' plan and a 'risk-adjusted' plan. The risk-adjusted plan identified renewals expenditure in the regions that could be deprioritised to increase the CP7 risk funding. This is described in more detail in the Chapter 10 (financial risk). When we began our detailed review of the SBP in March 2023, some expenditure

figures were still being presented to us as both a ‘full’ version and an alternative ‘risk-adjusted’ version.

2.20 As discussed in the Chapter 10 (financial risk), we concluded that the ‘risk-adjusted’ plans were more realistic. On this basis, all the expenditure figures presented in this document relate to Network Rail’s ‘risk-adjusted’ figures, unless we have explicitly stated otherwise. In its response to our draft determination, Network Rail agreed with our conclusion and has moved to the risk-adjusted plan.

Quality and Analytical Assurance Overview

2.21 Our quality assurance process includes several methods to ensure the accuracy and reliability of data and information presented. This drew upon our ‘ORR Cost Tool’ which uses the latest databook provided by Network Rail. The tool underwent an independent Verification and Validation process to improve the robustness of the data and outputs. See Annex A for further details of the ORR Cost Tool. The tool is used to perform “sense checks” on Network Rail’s data and as a single source of truth for our analysis.

3. Renewals and maintenance

Introduction

3.1 This chapter sets out our final assessment of the renewals and maintenance expenditure within the Network Rail plans. It considers both the expenditure in CP7 and the long-term implication on asset sustainability, and it is based on additional information we have received and analysed since the draft determination.

Consultation responses

3.2 Respondents shared the concern we voiced in our draft determination that a lack of appropriate funding could lead to a negative cycle where Network Rail is stretched to maintain assets and, as such, renewals of core assets are delayed which leads to the current assets needing further maintenance work and costing more money in the long run.

3.3 There were also concerns raised around the potential impacts on the wider supply chain of a reduction of renewals investment. Respondents highlighted specific technical areas which were of particular concern to them, for example the investment at leased stations and the adequacy of earthworks and drainage weather resilience.

3.4 There were specific concerns raised by GB Railfreight and East Midland Railway around the proposed level of renewals in the Eastern region, with support for an additional increase in renewals allocation above ORR proposals.

3.5 Additionally, there were concerns that a reduction in renewals might lead to an additional burden on Network Rail's maintenance function and result in additional operational constraints such as speed restrictions.

3.6 Respondent also highlighted concerns around the modernising maintenance programme implementation. Some of the concerns were related to the changes to maintenance regimes and reliance on the modernising maintenance programme which is still largely untested across the network.

3.7 The freight sector was particularly concerned that heavy axle weight capability is not compromised, and that freight operators and customers can have confidence and certainty in this important area. It was noted that ORR had highlighted that

Network Rail is not maintaining the network in line with the network capability it is funded to deliver. This is a matter which respondents felt must be addressed to avoid the risk that bulk freight flows are unable to operate on certain lines where they have contractual rights to do so.

3.8 In general, there was support for ORR's proposal to reallocate additional funding towards core renewals, compared to Network Rail's original plan.

Changes from draft determination

3.9 There are three key areas of change since our draft determination.

(a) Firstly, we have accepted Network Rail proposed additional renewals expenditure items amounting to an additional £585 million (£541 million in England & Wales; £44 million in Scotland) of investment and associated volumes, which is comparable to the £600 million in our draft determination. The split of additional spend by asset / region differed slightly from what we proposed, however, the mix satisfactorily addresses our concerns.

(b) Secondly, Network Rail has proposed areas of spend reduction to fund additional core renewals, including a reduction on WCML(N), on the digital signalling programme and Route Services technology projects. Our view on these proposals and other potential sources of funding are set out in the relevant chapters of this document.

(c) Finally, we have accepted Network Rail updated methodology for calculating asset sustainability and setting success measure outcomes.

3.10 In addition, Network Rail has made minor changes to the maintenance forecasts, which we consider acceptable.

3.11 There are a number of areas where we are looking for Network Rail to undertake further assurance work as part of production of its delivery plan. These being:

(a) Competency and organisation effectiveness – our draft determination requested a detailed competency development plan that would then form part of our CP7 holding to account activities. This has not yet been provided but, Network Rail has committed to provide it in its delivery plan. It should contain a time bound plan with key milestone and reportable success measures.

(b) Asset data – we require Network Rail to provide clear commitments on improvements to asset data quality in its delivery plan. This will form part of

our CP7 holding to account activities. We would expect this to be a combination of delivery milestones and data quality measures. This is critical to meeting the HLOS requirements and successfully implementing modernisation.

(c) Maintenance planning – since our draft determination we have seen some high-level alignment of planning. It is recognised that plans continue to mature and the maintenance plan requires further refinement and scrutiny for deliverability as part of the production of the delivery plan. Network Rail's Technical Authority will need to continue to monitor the impact of modernising maintenance, including through the post implementation review to facilitate the sharing of lessons learnt between routes and regions.

(d) Potential increase in operational controls – since the draft determination, Network Rail has stated that regional plans should limit the need for additional Operational restrictions in CP7 above those in CP6. Network Rail's Technical Authority recognises that this is an area where increased assurance is required.

(e) Obsolescence planning – Since the draft determination, we consider there is insufficient planning for obsolescence. Ahead of its final delivery plan, we expect Network Rail to provide a detailed plan for how it will finalise and implement its obsolescence management policies in the regions and National Functions during CP7.

(f) Composite reliability index (CRI) - We still considered that all regions and especially W&W and NW&C have been insufficiently challenging in accepting a decline in asset reliability. Benchmarking across the regions showed further scope for all regions, especially Wales & Western (W&W) and NW&C, to further challenge themselves around their projected increases in Service Affecting Failures and as a result a decrease in CRI, by applying innovative techniques to improve asset reliability.

Network Rail's plan

Summary of renewals and maintenance costs

3.12 Tables 3.1, 3.2 and 3.3 set out Network Rail's renewals and maintenance expenditure for CP7 and how these have changed from CP6.

Table 3.1 Summary of renewal expenditure

Region	CP6 £ million	FY25 £ million	FY26 £ million	FY27 £ million	FY28 £ million	FY29 £ million	CP7 £ million	CP6 to CP7 % Change
Eastern	5,173	960	935	915	765	627	4,202	−18.8%
Southern	4,485	753	838	777	759	524	3,650	−18.6%
W&W	2,961	574	558	559	539	400	2,630	−11.2%
NW&C	3,887	900	783	870	790	773	4,117	5.9%
England & Wales	16,506	3,188	3,114	3,121	2,852	2,323	14,599	−11.6%
Scotland	2,239	424	410	391	365	386	1,975	−11.8%
National Functions	2,444	657	664	654	621	562	3,158	29.2%
Great Britain	**21,189**	**4,269**	**4,188**	**4,167**	**3,837**	**3,271**	**19,773**	**−6.9%**

Source: Network Rail draft determination response Financial Databook; Year 2023-24 prices (post-efficient).

Table 3.2 CP7 renewal expenditure by region and asset class (£ million)

Asset class	Eastern	Southern	W&W	NW&C	Scotland	England & Wales	National Functions	GB
Track	1,211	778	676	872	513	3,538	–	4,050
Off Track	73	106	93	42	46	313	–	359
Signalling	839	746	420	1,238	308	3,243	–	3,550
Level crossings	189	75	105	96	37	465	–	502
Structures	554	429	348	539	435	1,870	–	2,305
Earthworks	250	472	305	274	218	1,301	–	1,518
Drainage	124	138	81	177	129	519	–	648
Buildings	374	397	297	415	110	1,483	–	1,593

Asset class	Eastern	Southern	W&W	NW&C	Scotland	England & Wales	National Functions	GB
Electrification & fixed plant	646	393	167	371	89	1,577	–	1,666
Telecoms	56	102	65	66	37	289	483	809
Other renewals	−113	14	74	26	55	1	1,854	1,910
ETCS							821	821
Renewals Total	**4,202**	**3,650**	**2,630**	**4,117**	**1,975**	**14,599**	**3,158**	**19,733**

Source: Network Rail draft determination response Financial Databook; Year 2023-24 prices (post-efficient).

Table 3.3 Summary of maintenance expenditure

Region	CP6 £ million	FY25 £ million	FY26 £ million	FY27 £ million	FY28 £ million	FY29 £ million	CP7 £ million	CP6 to CP7 % Change
Eastern	3,247	699	698	695	689	683	3,465	6.7%
Southern	2,471	504	500	494	489	484	2,470	−0.1%
W&W	1,621	312	309	299	295	295	1,510	−6.9%
NW&C	2,274	453	457	465	461	462	2,299	1.1%
England & Wales	9,613	1,969	1,964	1,953	1,934	1,924	9,744	1.4%
Scotland	1,053	221	215	214	213	212	1,075	2.1%
National Functions	–	107	113	113	115	120	569	N/A
Great Britain	**10,666**	**2,297**	**2,292**	**2,281**	**2,262**	**2,256**	**11,388**	**6.8%**

Source: Network Rail draft determination Financial Databook; Year 2023-24 prices (post-efficient).

Findings

3.13 Total renewals expenditure (including core, other and ETCS renewals) is down 7% versus CP6 across the GB network but the reduction is not evenly distributed between regions and National Functions.

3.14 Renewals and maintenance have previously excluded digital signalling expenditure as much of the work in CP6 was treated as enhancements. CP7 maintenance and renewals plans now include provision for train fitment costs for rolling stock operators which was not treated as a renewal activity in CP6.

3.15 All regions' renewals expenditure is lower than in CP6 except NW&C where expenditure includes provision for a programme of works on the West Coast Mainline – North (WCML(N)), with the stated aim of avoiding disruption by planned renewals in future control periods, once HS2 is operational.

3.16 Drainage expenditure is planned to increase in CP7 in all regions, except for NW&C. Network Rail indicated that the increase was driven by weather resilience strategies which have improved over CP6, including lessons learned from the Carmont derailment. We challenged NW&C on its drainage expenditure and the region presented its own assurance findings, indicating that it has adequate mitigations and improved asset condition data, following significant investment and improvement projects in CP6.

3.17 Off-track expenditure which includes vegetation and boundary management has a significant increase over CP6. This increase reflects issues with vegetation management in CP6.

3.18 In the four regions in England & Wales, maintenance spend in CP7 has increased compared to CP6 by £640 million (7%); and in Scotland, spend has increased by £82 million (8%). However, there is a significant variation between the regions, with Eastern indicating the highest overall increase. Network Rail's overall maintenance expenditure has increased by £722 million, this being predominantly driven to a reallocation from capex to opex in National Functions.

3.19 Network Rail's Modernising Maintenance programme is a critical enabler of increased maintenance effectiveness in CP7. However, this programme is currently being implemented and it will take time for the new ways of working to become fully embedded.

3.20 Network Rail is forecasting a declining level of overall renewals expenditure over CP7, with a peak in year 1 for renewals. Year 5 for renewals being the lowest

where there is a circa £500 million reduction compared to the previous year and approximately £1.0 billion less than that in year one.

3.21 Network Rail's plans at this stage generally show the earliest likely commencement of work and comprises projects that have been developing for some time, plus projects that have been deferred from CP6. Network Rail considers that it is advantageous to start in this way whilst subsequently working with suppliers to reprofile some work towards the end of CP7 based on efficient and effective delivery criteria. This reprofiling is discussed in more detail below, in the context of renewals deliverability.

Renewals findings

3.22 This section provides details of our analysis of the regions' proposed asset renewals in CP7. Capex expenditure by National Functions is also referred to as 'renewals' and this is discussed separately in Chapter 4 (National Functions). Works which are primarily intended to increase the capacity or capability of the network, such as extending electrification of the network or construction of a new station, are classified as an enhancement and are outside the scope of our periodic review.

3.23 Network Rail responded positively to our draft determination recommendation that additional core renewals were required.

Renewals planning in regions

3.24 Network Rail's approach to allocating renewals expenditure is not entirely consistent between asset types, regions and National Functions. Rather it appeared that each asset type had been assessed in isolation from other asset areas that it interfaced with. For example, we found limited (or no) details on:

(a) boundary points between regions;

(b) embankment condition influenced by its drainage quality;

(c) signalling reliability influenced by its power supply stability; or

(d) track quality influenced by condition of the embankment or subgrade.

Effective renewals volumes

3.25 In addition to the expenditure figures presented by Network Rail, we have reviewed the associated renewals volumes. For most assets, Network Rail reports

'effective volumes'. See Annex B for background to Network Rail's reporting of effective volumes in CP6.

3.26 In almost all cases the effective renewal volumes planned in the Network Rail SBP were less than those planned in CP6. Network Rail explained at the time that the reduction in effective volumes is predominately impacted by the funding available. To manage life expired assets within the available funding, Network Rail plans to undertake more refurbishment and life extension renewals, rather than full replacement which would typically be the lowest whole life cost option.

3.27 Since Network Rail submitted its SBP, its Technical Authority has continued to work with regions to develop a better understanding of options around any possible shortfall in renewal areas, including discussions across regions.

3.28 The following tables summarise movements between the SBP and Network Rail's draft determination response. For all asset areas as a result of the proposed changes in renewals expenditure there is an increase in forecast effective volumes with the exception of switches and crossing in Scotland, which has a reduction of 18%. This reduction being due to a change in work mix.

Table 3.4 Effective volumes change between SBP and Network Rails response to draft determination − England and Wales.

Asset area	SBP committed	Network Rail draft determination response	Change
Track	3,861	3,980	120
Switches & Crossings	1,466	1,515	49
Signalling	4,776	4,801	24
Earthworks	1,781	2,209	428
Structures	67,202	77,209	10,006
Electrical and fixed plant OLE	590	739	148

Source: Network Rail Technical Authority

Table 3.5 Effective volumes change between SBP and Network Rails response to draft determination – Scotland.

Asset area	SBP committed	Network Rail draft determination response	Change
Track	565	584	19
Switches & Crossings	141	116	−25
Signalling	565	631	66
Earthworks	474	474	0
Structures	17,460	19,202	1,742
Electrical & fixed plant	17	22	5

Source: Network Rail Technical Authority

3.29 The effective volumes we will use to monitor Network Rail through CP7 will be confirmed as part of the delivery plan.

Deliverability of renewals

National concerns

3.30 As the proposed renewal volumes were generally less than those planned or delivered in CP6 we do not expect any additional deliverability challenges relative to CP6. In some areas, where there is less volume (e.g. track) there may be opportunities for Network Rail to improve its deliverability due to reduced demands on access.

3.31 In the latest iteration of Network Rail's plans, the profile of renewals spend in all regions is smoother in CP7 than it was in CP6, where there had been a significant peak in year 3. The profile reduces steadily over years 1 to 3, then declines more rapidly in years 4 and 5, but we anticipate this will be smoothed out in the final delivery plan.

Regional deliverability of renewals

3.32 Network Rail's submission included regional self-assessments of renewals deliverability, as well as central assurance of the regional plans by Network Rail's Technical Authority.

3.33 During CP6, we collected regular data from a sample of approximately 450 renewals projects and we carried out our own, independent assessment of deliverability.

3.34 We identified specific deliverability challenges in two areas: the WCML(N) renewals programme and the digital signalling portfolio. These are discussed in detail in the conclusions section below and in Chapter 8 (digital signalling).

3.35 All five regions are proposing significant changes to their procurement and delivery strategies in CP7. In addition to improving deliverability, these strategies are intended to unlock efficiencies. The regional strategies are:

(a) introduction of the Southern Integrated Delivery model (£378 million stated efficiency);

(b) full embedment of the Agile Client Eastern model (multiple stated efficiencies, totalling £159 million);

(c) introduction of the Intelligent Client Operating Model in NW&C (£226 million stated efficiency);

(d) introduction of the Intelligent Client model in W&W (£82 million stated efficiency); and

(e) introduction of the Team Scotland model in Scotland (multiple stated efficiencies, totalling £213 million).

3.36 We found all five strategies to be reasonable, in principle, but all five are still relatively new and are not fully embedded within Network Rail or the supply chain. In Annex C we have provided concise summaries of the five regional strategies; their key characteristics; and particular areas of focus for ORR's holding to account in CP7.

3.37 We have received assurance from the regions that they are finalising contracts and embedding new operating models in 2023, to ensure these are stable and ready to start delivering efficiently in April 2024. For example, Southern has procured business partners to deliver all disciplines of renewals works in CP7 and CP8, with development contracts in place since March 2023, allowing a 13 month mobilisation period. Digital programmes are also to be delivered through a framework, with suppliers continuing to deliver major signalling projects across CP7 and CP8.

Interdependence with enhancements / other portfolios

3.38 Network Rail's submission included a list of enhancements which are assumed to be going ahead in CP7. There is uncertainty about the scope and timelines of these enhancements. Deliverability and expenditure on enhancements is determined outside of PR23, however, we have reviewed if there are interactions which may have a material impact on CP7 expenditure.

3.39 The interactions included efficiencies, namely Eastern proposed an £11.5 million efficiency if renewals work can be delivered in tandem with works on the Midland Mainline enhancement programme. This £11.5 million appears to be reasonable and if the enhancements assumptions were to change, could be made up by additional efficiencies elsewhere. Southern proposed a £7.3 million efficiency by transferring St Pancras lower-level assets to HS1 Ltd. Based on the information provided to date, this £7.3 million does not meet the definition of an efficiency and should be removed and made up by additional efficiencies elsewhere.

3.40 In NW&C, renewals around Crewe and the WCML(N) have significant interactions with Network Rail delivered enhancements programmes, as well as HS2 enhancements (as planned at November 2022) delivered by others. Network Rail's OSMR plans will be impacted if the assumptions about the scope and timelines for enhancements turn out to be incorrect. We have considered this as part of our conclusion on WCML(N) funding, discussed in the conclusions section below.

3.41 In Scotland, Transport Scotland has specified greater inter-linkage between enhancements and renewals projects. In CP6 the plans had some inter-linkage due to the reprioritisation of enhancements following budget changes, which flow into CP7. It is likely that enhancements funding in Scotland will reduce from CP6 to CP7 and this could result in changes to enhancements projects assumed in the SBP.

3.42 Network Rail has stated that alignment between OSMR and enhancements plans in Scotland has improved due to a new route corridor approach. However, given the situation on funding and strategic uncertainty around gauging and signalling in Scotland, these plans lack maturity.

Freight growth

3.43 We have reviewed Network Rail's asset management plans and we are satisfied that its proposals to support freight growth through heavy axle weight renewals are reasonable. However, in our PR23 final determination: settlement document for

the System Operator, we have set out a requirement for additional information on targeted actions it needs to undertake in CP7 to support freight growth.

3.44 Several of the SBP documents refer to freight growth being achieved through named enhancements projects, which are funded through other Government portfolios and are outside this determination. Decisions around some of these projects are still uncertain. However, we note that third party investment is a key factor in freight growth. On this basis, we found that even if the named enhancements projects were delayed or rescoped, Network Rail's proposals for OSMR expenditure to enable freight growth would still be reasonable.

Asset data quality

3.45 During CP6 we have made our position clear to Network Rail that information about infrastructure assets should be treated as an asset in its own right. It should be assured, maintained and renewed with equivalent arrangements to the physical assets. This follows best practice reflected in the requirements of the international standard for data quality, ISO 8000.

3.46 We have previously raised concerns about data quality (completeness, timeliness, accuracy etc). We are unable to verify decisions that have been made on incomplete information. In addition, we have ongoing concerns about a known backlog in examinations and assessments. Once these backlogs are recovered, Network Rail might identify additional areas of expenditure that have not been accounted for in the plans.

3.47 Acknowledging our concerns over the course of CP6, Network Rail has made progress in improving the quality of its asset data. This has been driven in part by the implementation of an "asset data governance" framework which has allowed it to deliver basic data quality requirements and dedicate resources specifically to the delivery of data quality. Whilst this improvement has applied to most asset areas, we found that for switches and crossings, electrical power and drainage assets there are still gaps in knowledge.

3.48 We examined regional proposals for maintaining asset data quality over CP7. We found that Network Rail did not have a clear commitment on data quality. Network Rail put forward the argument that commitments on asset data were not required at this stage.

3.49 Accurate asset data is a key asset in itself and should be a priority for Network Rail, which is proposing to spend nearly £20 billion on renewals over CP7. The lack of a clear asset data strategy being set out in the SBP was therefore a cause

for concern. We disagreed with Network Rail's view that measurable commitments on asset data were not needed until the final delivery plan and in our draft determination we required an indication of the data strategy.

3.50 In response to the draft determination, Network Rail submitted an asset data strategy which sets out Network Rails ambition for CP7 to strengthen the alignment of data across asset classes and between infrastructure management and operations. The strategy makes a number of commitments for CP7:

(a) People – apply established competency framework to identify skill gaps.

(b) Process – progress further improvements to policies and process framework, and ensure that the data in systems is accurate, available and accessible to support improved operational decision-making.

(c) Systems – continue to invest in the renewal and enhancement of technology platforms.

3.51 We are content with the proposals in response to the draft determination and we seek from the delivery plan an appropriate level of specificity on the asset data strategy.

Additional core renewals

3.52 In our draft determination we set out our initial estimate of the additional core asset renewals expenditure that would be required to address the main vulnerabilities. Our estimate was this would be in the region of £550 million in England & Wales and £50 million in Scotland.

3.53 In its draft determination response, Network Rail set out a proposal which broadly addressed our challenge, with a revised additional spend of £541 in England & Wales and £44 million in Scotland. The mix of spend by asset / region varied and our assessment is shown in Table 3.6.

Table 3.6 Additional core asset expenditure

Region / Asset area	ORR draft determination £ million	Network Rail draft determination response £ million	Rationale
Eastern earthworks	30	30	Eastern acknowledges the concerns identified in our draft determination and will allocate additional funding to high-risk areas, such as soil and rock cuttings, primarily in North & East regions.
Eastern track	0	55	Based on additional information on track condition and CSI forecasts since the SBP, Eastern has proposed to increase spend, focussing on addressing broken rails on high-speed lines. We are satisfied with the justification for this additional spend, noting that over the past seven years, Eastern has recorded more than 36% of the network's broken rails, particularly on East Coast Main Line.
Eastern structures	0	30	Based on the latest forecasts for CSI and freight growth targets since the SBP, Eastern has proposed to increase spend. We are satisfied with the justification for this additional spend, which should prioritise the need to address under-strengthened bridges across the region.
Eastern signalling	0	30	Eastern has proposed to increase spend, noting poor asset condition on the North London Line which, unlike much of the region, has not had the benefit of recent modernisation plans. We are satisfied with the justification for this additional spend.
Eastern electrification & fixed plant (E&FP)	0	20	Eastern has proposed to increase spend, to address localised poor asset condition and also the benefits of continuity for the supply chain. We are satisfied with the justification for this additional spend, noting in particular E&FP assets on Thameside requiring renewals.

Region / Asset area	ORR draft determination £ million	Network Rail draft determination response £ million	Rationale
Southern earthworks	80	122	Southern acknowledges the concerns identified in our draft determination and proposed a further increase in spend based on the latest detailed plans (delivering 115 additional volume units). We are satisfied with the justification for this additional spend, which should prioritise asset condition and identified risks.
Southern track	50	0	Southern acknowledges the concerns identified in our draft determination but has provided additional information suggesting that this £50 million of renewals deferred into CP8 was based on the asset age profile, rather than condition issues, and that these assets can be reasonably managed in CP7 through increased maintenance. We are satisfied with the justification for managing this through additional maintenance.
Southern Structures	50	32	Southern acknowledges the concerns identified in our draft determination, but the latest detailed plans indicate £32 million of additional spend should be sufficient to mitigate the high-risk items (notably £11 million for refurbishing metallic structures). We are satisfied with the justification for this level of additional spend, noting that that risk-based interventions will be used where possible, including refurbishment and component replacement rather than full renewals.
Southern operational property	50	0	Southern proposes not to increase renewals spend on operational property and has provided additional information on its plans to manage asset condition of Victoria Station roof, without the need for full renewal in CP7. We accept the justification for not including this additional spend, on the condition that Network Rail's delivery plan should provide details of its intervention plan for Victoria Station roof, to satisfy our concerns raised in our draft determination.

Region / Asset area	ORR draft determination £ million	Network Rail draft determination response £ million	Rationale
Southern signalling	0	37	Southern identified a modelling error in its SBP plan and its updated plans require increased spend on conductor rail renewals. We are satisfied with the justification for this additional spend.
W&W earthworks	100	85	W&W acknowledges the concerns identified in our draft determination, but the latest detailed plans indicate £85 million of additional spend should be sufficient to mitigate the high-risk items. We are satisfied with the justification for this level of additional spend.
W&W track	50	31	W&W acknowledges the concerns identified in our draft determination, but the latest detailed plans indicate £31 million of additional spend should be sufficient to mitigate the high-risk items (providing a 4% increase in volume). We are satisfied with the justification for this level of additional spend, noting the dependency on increased track maintenance in CP7.
W&W structures and tunnels	100	69	W&W acknowledges the concerns identified in our draft determination, but the latest plans indicate £69 million of additional spend should be sufficient to mitigate the high-risk items (providing a 64% increase in volume). We are satisfied with the justification for this level of additional spend, but we expect to see further detail on W&W's approach (rather than just principles) in the delivery plan.
General England & Wales fire safety in tunnels	20	0	At this stage, Network Rail hasn't identified additional funding in its high-level plan updates for fire safety in tunnels. However, we have been provided with assurance that the Technical Authority and regions will continue to review this and provide an update in their delivery plans. We are satisfied with the assurance provided and we will continue to engage with Network Rail to address specific risks and mitigations during CP7.

Region / Asset area	ORR draft determination £ million	Network Rail draft determination response £ million	Rationale
England & Wales Remaining high priority areas	20	0	Network Rail identified other asset areas that require additional expenditure which was not identified by ORR in its draft determination, (e.g. in Eastern). We are satisfied that Network Rail has reviewed the high-risk areas and reallocated additional spend accordingly.
Scotland structures	50	44	Network Rail Scotland has responded positively to our draft determination and its latest iteration of the plans has reallocated spend between assets, with an overall net increase in renewals spend of £44 million. This included an increase of £62 million for structures, which addresses our concerns in the draft determination. Network Rail Scotland also proposed a small increase in spend on earthworks and electrification & fixed plant. These spend increases were offset by justified reductions in track and signalling. We are satisfied with the justification for this level of additional spend and for the reallocation between assets.
Total	**600**	**585**	

Source: ORR analysis of Network Rail draft determination response.

3.54 Network Rail assurance of its revised plan considered:

(a) are the renewals and maintenance plans aligned?

(b) have adequate adjustments been made to reflect latest position on expected delivery of renewals in CP6?

(c) Has sufficient assessment been taken on changing patterns of safety risk and have these been factored in sufficient activity and resources to counteract threats?

3.55 We are satisfied that Network Rail's response addresses the concerns from our draft determination. The details of which we will expect to see in its delivery plan.

3.56 The nature of the constraints on funding has required regions to evaluate trade-offs, generally favouring levels of activity for asset types that contribute most to mitigation of safety risk and that secure asset performance.

3.57 While Network Rail's response considers known elements of under-delivery in CP6, there is potential for further slippage in CP6. Combining this with constrained funding for CP7, we require Network Rail to develop much clearer mitigating actions to be described by the relevant regions as part of their ongoing work to the CP7 delivery plan. This should include a means to assess changing risk exposure.

Maintenance findings

3.58 During CP6, we carried out a targeted assurance review on Network Rail's maintenance organisation structure. We found significant differences between the regions which impacts the way they structure their planning for CP7. For more details see Network Rail's Approach to Maintenance – Targeted Assurance Review. Whilst differences between regions is expected and is not in itself a cause for concern, it makes drawing comparisons more challenging.

3.59 At the time of our analysis for the draft determination, Network Rail had not developed adequate bottom-up maintenance plans. Since then, Network Rail has provided activity based plans which include the spend in Table 3.7 which shows the change in regional expenditure on maintenance between CP6 and CP7. In CP7, Network Rail plans to spend circa £10.3 billion on maintenance activities across the four England & Wales regions which is an approximately 7% increase compared to CP6. In Scotland, Network Rail plans to spend £1.1 billion on maintenance activities which is an approximately 8% increase on CP6.

Table 3.7 CP6 and CP7 total regional maintenance expenditure (£ million)

Regions (£ million 2023/24 prices)	CP6 total £ million	CP7 total £ million	Percentage change
Eastern	3,247	3,639	12.1%
Southern	2,471	2,581	4.5%
W&W	1,621	1,594	−1.7%
NW&C	2,274	2,438	7.2%
England & Wales Total	**9,613**	**10,253**	**6.7%**

Scotland	**1,053**	**1,135**	**7.8%**

Source: Network Rail draft determination Financial Databook; Year 2023-24 prices (post-efficient).

England & Wales – maintenance expenditure increases

3.60 The net changes from CP6 to CP7 shown in Table 3.7 are made up of cost increases, offset by efficiencies. In England & Wales, the regions identified scope drivers and headwinds increased costs. The main drivers include:

(a) response to ash dieback;

(b) input price headwinds;

(c) investment in weather resilience and climate change adaptation;

(d) increases in maintenance to offset reduced renewals activity;

(e) maintenance of new assets delivered by major enhancements projects; and

(f) activity to comply with new and emerging standards.

Scotland – maintenance expenditure increases

3.61 Scotland has identified scope drivers and headwinds, the main drivers of which include:

(a) investment in weather resilience and climate change adaptation;

(b) input price headwinds;

(c) vegetation management;

(d) access; and

(e) incident response.

Maintenance efficiencies

3.62 The above cost increases offset to an extent by proposed maintenance efficiencies but not fully, such that overall maintenance spend increases in CP7 compared to CP6. The majority of these efficiencies are derived from:

(a) implementation of the Modernising Maintenance programme;

(b) greater use of risk-based maintenance; and

(c) greater use of technology, especially remote condition monitoring systems.

Maintenance approach in CP7

3.63 In addition to the spend changes highlighted above, during CP6 Network Rail began making some important changes to its technical approach to maintenance. These will impact outputs and efficiencies in CP7 and the areas we will be monitoring in particular are:

(a) increase in drainage maintenance: This is in response to the Lord Mair and Dame Slingo recommendations following the Carmont derailment. We support this, as it aligns with the recommendations from our May 2021 TAR into drainage maintenance in CP6;

(b) greater focus on biodiversity: This is in response to the findings of the Varley Report which was an independent review of Network Rail's approach to vegetation management across England & Wales and was an HLOS requirement;

(c) improving track worker safety: The implementation of this programme was accelerated in CP6 which has impacted the way Network Rail takes access to deliver maintenance activities. Network Rail is still working through the impact of these changes on its plans;

(d) implementing risk-based maintenance: see Annex B where we define the different maintenance strategies which Network Rail adopts. We will hold Network Rail to account to deliver the benefits and efficiencies it has identified by the increased use of risk-based maintenance; and

(e) modernising maintenance: Network Rail's maintenance modernisation programme is currently underway and includes several changes to the way it undertakes its maintenance activity to improve efficiency and safely. This includes:

(i) reviewing engineering standards and new technology;

(ii) increase in multi-skilled maintenance staff; and

(iii) reviewing team sizes and rostering.

Impact of reduced renewals on maintenance activity

3.64 Due to reduced core renewals expenditure in CP7 and an ageing asset base, Network Rail needed to consider increasing maintenance expenditure in CP7, to keep assets operational. Current Network Rail estimates are provided in Table 3.8.

Table 3.8 The estimated increase in maintenance activity by asset type as a result of delayed renewals and an ageing asset base

Asset type	Increase in maintenance required by end of CP7*
Track	5%
Signalling & level crossing	10%
Telecoms	10%
Electrification	5%
Off-Track	5%
Structures	0%
Operational property	10%

Source Network Rail databook Financial Year 2023-24 prices (post-efficient), risk-adjusted plan
**Numbers in the table are rounded and will vary from region to region. Drainage expenditure is included within Track and Off-Track. Earthworks maintenance is not delivered by MDUs.*

3.65 Our understanding is that the ratio of time-on-tools versus non-time-on-tools in Network Rail MDUs is low, indicating an opportunity for improvement in resource effectiveness. We are continuing to work with Network Rail as maintenance plans develop, to get better evidence to verify any changes in resource requirements.

3.66 Our draft determination highlighted our concerns with a strategy that sought to replace proactive engineering solutions with operational controls. Network Rail's response to the draft determination, confirmed an increase in core renewals and provided initial assurance of better alignment between renewals and maintenance. These additions address our concerns to some extent, but this is still a significant change in strategy from CP6 to CP7. This is discussed in more detail in our PR23 final determination: supporting document – health and safety.

Impact of climate change and adverse weather on maintenance

3.67 The impacts of climate change and adverse weather that have been experienced throughout CP6 are expected to continue into CP7. Through our TARs and regular engagement in CP6, we have recommended that Network Rail needs to better manage its drainage, earthworks and overhead line electrification assets and improve its understanding and response to severe weather events. See Chapter 7 (Environmental Sustainability) of this document for more details.

Increased maintenance activity for vegetation management, including ash dieback

3.68 Network Rail's plans include increased maintenance for vegetation management in CP7. This includes managing vegetation for signal sighting, Overhead Line Electrical (OLE) clearance, leaf fall and earthworks stability, whilst increasing biodiversity. See Chapter 7 (Environmental Sustainability) of this document for details. This is also discussed in our recently published review of vegetation management.

Maintenance costs associated with CP6 and CP7 enhancements

3.69 The CP7 plan also includes maintenance costs to support new assets delivered through CP6 and CP7 enhancement schemes. This includes assets delivered as part of the Transpennine Railway Upgrade (TRU), the Midland Main Line electrification and East West Rail. We are continuing to work with Network Rail to obtain details on the impacts of these enhancements, as the maintenance plans mature.

Maintenance assurance

3.70 Figure 3.1 summarises the themed areas raised on maintenance and renewals alignment.

Figure 3.1 Maintenance Assurance

Item	Eastern Y/N	NW&C Y/N	Southern Y/N	Scotland Y/N	W&W Y/N
1. **Track** - There will be a changed emphasis of maintenance. Additional activity and resources will be required incl 1.1 Increased volumes of Stone blowers / tampers & 1.2 Strengthened coverage of train borne monitoring	Y	Y	Y	Y	Y
2. **Signalling** - There will be a changed emphasis including 2.1 Life extension from M and R 2.2 Continued deployment of monitoring 2.3 Strengthened obsolescence management required for signalling transition to ETCS.	Y	Y	Y	Y	Y
3.**Electrification & Plant** - There will be a changed emphasis on some management practices 3.1 Changed / extended coverage of end of life interventions 3.2 Continued use of technology to monitor signalling power & 3.3 Extended monitoring deployment 3.4 Strengthening of supplier capability on mid life refurbishment (e.g. Scotland bringing resources in house, Western & Wales strengthening in house management of power supply)	Y	Y	Y	Y	Y
4.**Drainage** - Increased demands on Drainage resource, impacting activity & headcount	Y	Y	Y	Y	Y
5.**Telecoms** - Increased quantum of Telecoms maintenance activity	N	N	Y	N	N
6. **Lineside** - Increased quantum of Lineside activity	N	N	Y	Y	Y
7. **Earthworks** - Extended scope / coverage of earthworks monitoring. (covered in Capex plan for earthworks)	Y	N	N	N	Y
8. **Skills and Competency** - Development of a clear scope of what will be required and the resources and timeline to complete training design and implementation.	Y	Y	Y	Y	Y
9. **Modernising Maintenance -** Acknowledged uncertainty surrounding realisation of benefits and need for some corrective actions (and variation in resources) including agility of faulting response	N	Y	N	Y	Y
10. **Enhancement** impact - this could be potentially disruptive based upon the scale of enhancements works planned.	N	Y	N	N	N
11. **Data** - Ambition to improve data, resources, plan and milestones required.	N	Y	Y	Y	Y

Source Technical Authority assurance of regional renewals and maintenance plans for CP7: draft determination response

3.71 All regions and routes are at differing levels of maturity in terms of forecasting the full effects of the changes due to Modernising Maintenance and there is some uncertainty around when the benefits will be fully realised in CP7.

3.72 Regions are partly dependent upon delivery of technology projects, including, infrastructure monitoring by Route Services. Maintenance modernisation also has this dependency. There is a risk (and resource impact) that if the technology is unavailable or does not work as intended, this might then require the reinstatement of some manual activities, such as inspections. We are continuing to challenge Network Rail Route Services to provide clear commitments for infrastructure monitoring in CP7 so we can better hold it to account.

Maintenance staff resourcing, competence and organisational effectiveness

3.73 Network Rail is proposing a move from full renewals to part refurbishment; a greater number of deferrals and some work being aligned to climate change and weather resilience activities. Network Rail has stated that decision making and

associated actions will be increasingly based on data, and factors such as risk-based maintenance (see Annex B for details on risk-based maintenance). Against this backdrop there is clear evidence that a change in skills and competencies will be required to deliver this change.

3.74 We expected Network Rail to recognise that the changes it describes in its SBP will have a material impact on the competencies it will require to manage assets in a changing environment. We are yet to see sufficient evidence that Network Rail has identified the competency development required, scoped or quantified the new requirements. Whilst Network Rail acknowledges the need to improve compliance with standards and legislation, through increased staff competence in several disciplines, the company is yet to propose any measurable commitments or milestones for achieving this.

3.75 Network Rail's updated submission advised that its regions have sought to understand the headcount and competence requirements for maintenance in CP7, taking into consideration the impact of lower levels of renewals activity in CP7 on maintenance activity. Regions also considered the expected improvements in productivity through the implementation of modernising maintenance, the implementation of new technology and the adoption of additional risk-based and reliability-centred maintenance practices in their competence plans.

3.76 Through the development of the safety risk bow tie framework (which we describe in our PR23 final determination: supporting document – health and safety) and the assessment of the alignment of maintenance and renewals plans, Network Rail recognises that it still needs to do more to strengthen its competence management plans in CP7. In addition, there is a need to support regions to create better defined plans, including facilitating cross regional conversations on how best to realise the competency output and, where appropriate, prioritisation of effort. The requirements will need to be developed from analysis of required competencies aligned to the changing risks across CP7.

3.77 Network Rail has given a commitment to provide an update on competency plans as part of its delivery plan as well as throughout CP7, where necessary to reflect changing needs.

Maintenance headcount

3.78 Network Rail has now provided details of the proposed changes in its internal maintenance headcount within the regions for CP7 compared to CP6.

Table 3.9 Comparison of Network Rail regional maintenance headcount requirements CP7 vs CP6

Discipline	CP6 Average	CP7 Average
England & Wales		
Electrification and fixed plant	1,664	1,658
Off track	1,427	1,440
Permanent way*	5,612	5,643
Signals and telecoms	2,898	2,863
Total	**11,602**	**11,604**
Scotland		
Electrification and fixed plant	157	200
Off track	190	276
Permanent way*	589	592
Signals and telecoms	331	296
Total	**1,267**	**1,364**

Source Network Rail's ABP Summary CP6 to CP7 Headcount
**'Permanent way' teams maintain the track (rail, sleepers, ballast etc)*

Obsolescence management

3.79 We identified obsolescence as a challenge to asset management in a number of asset areas, the most pressing being signalling. In March 2023, we commissioned an Independent Reporter (IR) to review the obsolescence management of Network Rail's signalling assets. The scope of the study was to understand if risk is managed appropriately, e.g. whether there is sufficient knowledge, equipment in reserve or in the supply chain to sustain conventional signalling maintenance, refurbishment, and renewals to meet the demands of conventional signalling degradation over the next 30 years.

3.80 The IR study is ongoing, but the initial findings are as follows:

(a) there is not a clear and consistent policy on obsolescence management, however there are asset policies that provide some information on obsolescence;

(b) there is clear understanding of the responsibilities across Network Rail regions and central functions but the ultimate accountability for leadership on obsolescence management is not clear;

(c) obsolescence management plans are not in place;

(d) Network Rail's plans for minimising obsolescence during design are more advanced than other areas of the obsolescence lifecycle. Activities are in place to use open standards and engage with the supply chain to manage single supplier risk;

(e) no evidence was presented of risk assessments being carried out to understand the risk of items becoming obsolete and selecting an approach to managing obsolescence. This indicates obsolescence is being managed in a reactive way;

(f) Network Rail demonstrated a good understanding of options to resolve obsolescence once it had occurred. However, there is a lack of clarity about how decisions have been reached for the various solutions proposed; and

(g) metrics to monitor the performance of obsolescence management are not in place. This is due to the obsolescence management being at an early stage and needing to mature.

3.81 Overall, the IR has found a lack of planning of obsolescence management. Most activities are being carried out in a reactive way and the future risk is not clearly understood by all regions. Network Rail needs to further address obsolescence management in its CP7 planning.

Deliverability of maintenance

3.82 We considered that a marginal increase in expenditure from CP6 should be deliverable subject to clear planning by the regions. However, we have some specific concerns around how known scarce resource roles will be filled, such as structures examiners and chain saw operatives.

3.83 We noted that there are changes in approach in CP7 which will affect deliverability of maintenance, including changes to rules around staff working in close proximity to moving trains; modernising management and maintenance; and decreasing

renewals. These changes will need to be factored into Network Rail's delivery plan.

Reporting of maintenance effectiveness

3.84 In CP6 we highlighted a lack of visibility of maintenance activity reporting. In response to our challenge Network Rail introduced a maintenance reporting KPI, which compares planned hours to actual hours achieved by the regions and delivery units.

3.85 In CP7, Network Rail plans to introduce a wider suite of seventeen maintenance KPIs, these are being trialled in the last year of CP6. Our view is that these will help to gauge the effectiveness of Network Rail's Modernising Maintenance programme. In our draft determination we were supportive, and continue to be so, of the introduction of additional KPI's in this area.

3.86 Now that we consider the data represents an accurate reflection of maintenance activities being undertaken, for CP7 we have added 'maintenance compliance' as a supporting measure in our outcomes framework. See our PR23 final determination: supporting document – outcomes for more information.

Risk of increased operational restrictions

3.87 In our draft determination we highlighted our concern that Network Rail was proposing to make increased use of operational restrictions to mitigate reduced renewals in CP7.

3.88 In response, Network Rail's Technical Authority assurance has found in general that the regions responses to our draft determination included increased volumes of minor works, partial renewals and targeted maintenance, informed by stronger contemporary insights of asset state in lieu of full renewals.

3.89 Regions stated that for most asset classes these increases in maintenance volumes will mitigate the impact of reductions in full renewals. Regions have stated that they are not expecting to see an increased dependency on operational restrictions, other than in circumstances where impacts cannot be proactively managed and are likely to be of minor impact, for example heavy axle weight restrictions on structures within lines of route not normally utilised by heavy freight traffic.

Sustainability

Service affecting failures (SAF)

3.90 SAFs are attributed to specific asset incidents (track, points, signalling and traction power) causing delay.

3.91 Historical rates of SAF reduction have been up to 5% per year, although in CP5 that rate of fall slowed. In CP6 the rates of SAF decreased significantly during the mid-years, mainly as a result of the pandemic and industrial action, with fewer trains running. Towards the end of CP6 there has been a slight increase in the number of SAFs, reflecting increasing passenger and freight traffic volumes.

3.92 Regions submitted forecasts for SAFs in CP7 indicating an increase in SAFs, when compared to their expected end of CP6 position, based on the constrained funding for renewals in CP7. See Table 3.10.

Table 3.10 Proposed levels of SAF exit CP7 vs CP6

Region	CP7 baseline (based on forecast to end of CP6, 2023/24)	End of CP7 forecast (2028/29)	Forecasted change over CP7
Eastern	7,805	7,920	1.5%
NW&C Technical Authority *	5,329	5,725	7.4%
NW&C SBP*	5,329	5,748	7.8%
Southern	4,541	4,696	3.4%
W&W	3,266	3,545	8.5%
England & Wales	20,941	21,885	4.5%
Scotland Technical Authority *	1,783	1,828	2.5%
Scotland SBP*	1,821	1,885	3.4%
Total	22,724	23,713	4.4%

*Source: Network Rail. *multiple values are given representing separate analysis by Technical Authority and the Regions.*

3.93 As part of our review, we considered if the baseline being put forward by regions was sufficiently challenging. Table 3.11 shows Network Rail's proposed baseline (forecast at end of year 5 of CP6), compared to how regions performed in year 4 of CP6.

Table 3.11 Proposed baseline levels of SAF

Region	End CP5 baseline	CP6 yr. 4 forecasts	CP6 yr. 5 forecasts (baseline for CP7)	CP7 exit 28-29	% change exit CP7 to CP6 year 4	% change exit CP7 to CP6 year 5
Scotland	2,306	1,777	1,821	1,885	6.0%	3.5%
Eastern	8,424	7,750	7,805	7,920	2.2%	1.5%
NW&C	5,544	5,516	5,329	5,748	4.2%	7.8%
Southern	5,206	5,080	4,541	4,696	−7.5%	1.5%
W&W	3,207	3,239	3,266	3,545	9.5%	8.5%

Source Network Rail Technical Authority

3.94 We challenged why some regions (W&W and NW&C) consider that there would be an increase in SAFs in the final year of CP6 and if this was then creating an artificially high baseline against which performance will be measured against in CP7. We also challenged why Southern expects there to be such a significant decrease in SAFs in year 5 of CP6 from the level experienced in year 4.

3.95 In general, there is a relationship between the age/condition of assets and failure rates. This means that, in Network Rail's view, CP7 renewals plans are likely to negatively impact the rate of SAF, due to reduced renewals. In our supplementary advice in September 2022 we set out why we considered that the timing of these impacts is complex. As an example, assets that are reaching the end of their service life are more prone to faults, or failure. However, the nature of the faults, or failure and their subsequent impact are uncertain.

3.96 Also, there might be a gap between the assumed end of asset life and asset failure. This 'lag' effect means that it is unlikely that the number of asset failures will increase significantly in CP7 when compared to the exit position of CP6. Therefore, we consider that the rate of SAF increase by the regions is likely to be overstated. Nevertheless, we would expect an increase in failures over time, which would likely be significant in later control periods if renewals expenditure levels are not restored.

3.97 For the reasons given previously, we considered that all regions and especially W&W and NW&C were insufficiently challenging in accepting an increase in SAFs and a corresponding decline in asset reliability as measured using the Composite Reliability Index (CRI).

3.98 Since the draft determination Network Rail has continued to work to strengthen evidence and recalibrate key analysis (most significantly regarding the performance of signalling assets). This work remains ongoing and will permit revised forecasts based on latest calibrated data to be provided ahead of the CP7 delivery plan.

Composite reliability index (CRI)

3.99 The CRI is an indicative measure of the reliability of the overall network taking into account the different asset types and criticality; see Annex D for more detail. Network Rail's CRI forecasts are set out in Table 3.12.

Table 3.12 Proposed CRI by region

Region	2028/29
Eastern	−2.7%
NW&C	−8.3%
Southern	−3.3%
W&W	−7.9%
Scotland	−3.5%

Source: Network Rail, Network Rail is currently developing the CRI forecasts for Scotland

3.100 For the same reasons given for our review of SAFs, we considered that all regions and especially W&W and NW&C have been insufficiently challenging in accepting a decline in CRI. Regions need to further challenge themselves to apply innovative techniques to improve asset reliability.

Composite sustainability index (CSI)

3.101 CSI is the relative change in the residual asset life or condition. In CP6 we used the start of CP5 CSI value as the baseline against which change was reported. In light of improvements made to CSI calculations in CP6, we consider it appropriate to reset the baseline to 'exit of CP6', for use in CP7. Each region will report on its scorecard annually against its CSI score.

3.102 Network Rail's plans for CP7 forecast a decline in levels of sustainability for the control period and in the longer term, this is a greater decline than that set out in our PR18 final determination. In general terms, regions have justified this decline on the grounds that they have prioritised safety and train performance over longer-term sustainability; we concur with this assessment.

Asset sustainability success measures for CP7

3.103 The national percentage change between the end of CP7 and the baseline (at the end of CP6) is projected in Network Rail's SBP as a 3.1% decline for England & Wales and a 3.4% decline for Scotland. Individual regions CSI forecasts are shown in Table 3.13. We recognise that there may be material factors outside of Network Rail's control that impact on its ability to achieve the trajectory. We will hold Network Rail to account for factors which are within its control.

3.104 In our draft determination we required that Network Rail should revisit the CSI forecasts in light of the additional effective renewals that we required, taking into account any changes in asset knowledge gained since preparation of the SBP and updated forecast exit positions for CP6.

3.105 In response, additionally to the revised work volumes (including additional core renewals), Network Rail has updated its suite of models used to forecast the asset condition measures out to the end of CP7 to account for:

(a) Latest asset inventories and condition data.

(b) Updated forecast work to the end of CP6.

(c) Recalibration of model parameters, in the light of recent data.

(d) Updated unit costs.

3.106 As a result of the above, Network Rail has updated its forecast. The final CSI forecasts for the end of CP7 (using the updated CSI models) are shown below, compared to the SBP.

Table 3.13 CSI success measures for CP7

Region	1. End of CP7 CSI versus end CP6 (old models)	2. End of CP7 ORR forecast in draft determination (old models)	3. End of CP7 CSI verses end CP6 (updated models)	4. Draft determination response (updated models)
Eastern	−2.9%	−2.9%	−2.7%	−2.0%
NW&C	−3.5%	−3.5%	−3.6%	−3.2%
Southern	−3.0%	−2.7%	−2.8%	−3.0%
W&W	−3.1%	−2.5%	−2.8%	−2.0%
England & Wales	−3.1%	−3.0%	−2.9%	−2.5%
Scotland	−3.4%	−3.4%	−2.7%	−2.1%
National	−3.1%	−3.0%	−2.9%	−2.5%

Source Network Rail consolidated asset sustainability supporting evidence.

CSI view for CP8 to CP13 – long-term scenarios

3.107 Network Rail has developed four long-term (out to CP13) renewal scenarios using the updated models. These being:

(a) Steady state meets Network Rail's core objectives. For most assets, this means maintaining the current condition and/or outputs.

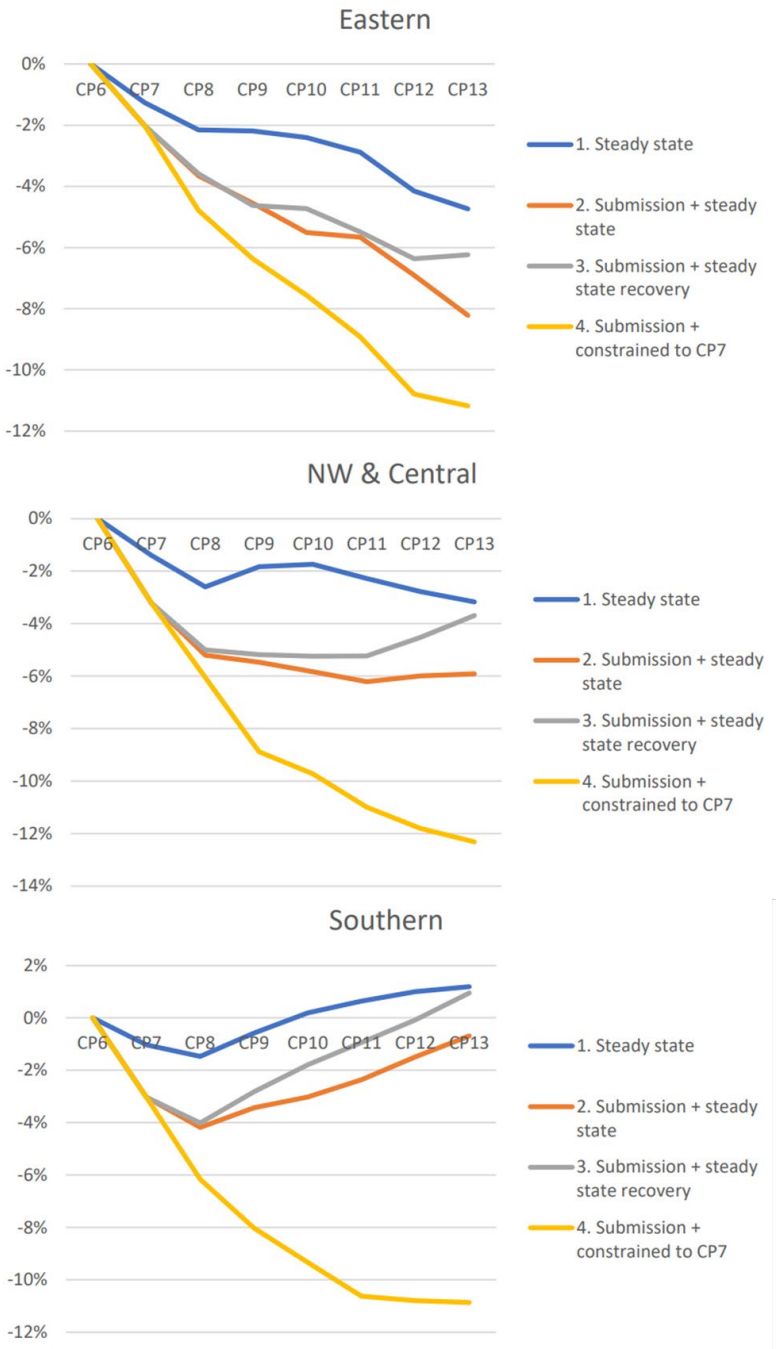
(b) Submission plus return to steady state starts with the latest submission costs and volumes in CP7. From CP8 to CP13 the works are increased back towards the steady state, but never increased beyond the steady state costs. This means that a loss in asset condition due to lower volumes in CP7 than the steady state is not recovered in the medium term. There is also a limit of around 20% on regional spending increases by asset group per control period (although this can be varied according to the delivery constraints for each asset type).

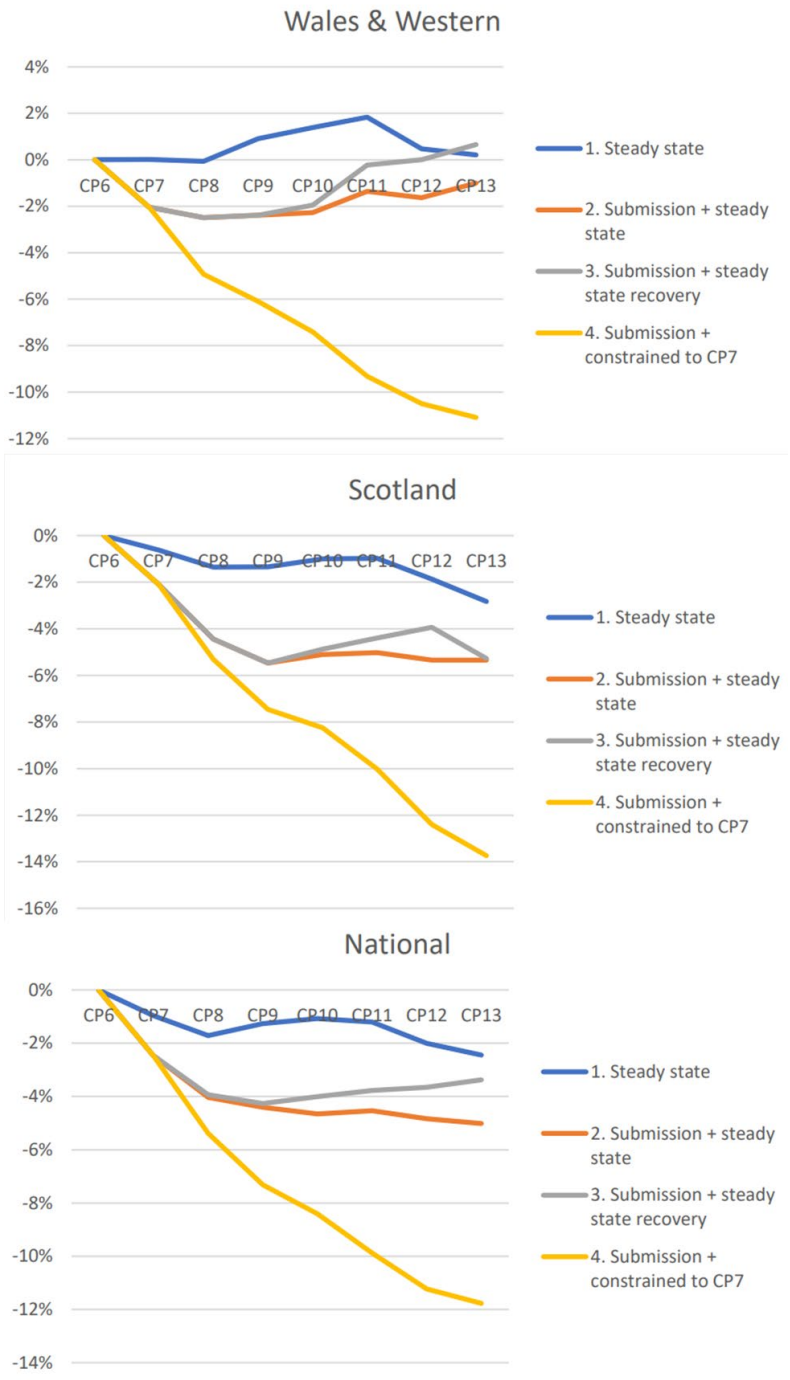
(c) Submission plus steady state recovery again starts with the latest submission costs and volumes in CP7, but this time attempts to recover the steady state objectives as soon as possible. This can mean the costs can exceed the steady state forecast costs, although the restriction on increases per control period are still applied.

(d) Submission plus constrained works again starts with the latest submission costs and volumes in CP7. However, subsequent national spending funding is assessed independently per asset group and control period is restricted to the CP7 submission costs. This shows the impact of continuing at this level of activity in the long-term.

3.108 Figure 3.2 shows possible CSI profiles based on the above scenarios.

Figure 3.2 Long-term CSI forecasts (updated CP7 models)





Source Network Rail Updated forecasts for Network Rail response to PR23 ORR draft determination – 31 August 2023

3.109 Although Scotland is shown with a greater decline in CSI than in England & Wales this needs to be seen in the context that Scotland's network starts from a higher overall CSI score in CP6. In addition, the traffic demands overall in Scotland are less than in England & Wales and therefore Network Rail argues that a lower condition score is an acceptable outcome, whilst meeting the same safety and

performance requirements. We recognise Network Rail's position but we have concerns over the rate of decline and Network Rail will need to provide clear evidence of maintenance plans to mitigate asset deterioration.

3.110 Network Rail proposed that to return to steady state nationally would take until at least CP11, but likely longer, and cost an additional circa £9 billion to £12 billion above current levels of funding, spread over the next four control periods, based upon current asset strategies and outcome requirements.

3.111 To return to steady state in Scotland would take until at least CP12 and cost an additional £1 billion to £1.5 billion over current levels of funding phased over the next five control periods, based upon current asset strategies and outcome requirements.

Conclusions on renewals and maintenance

Conclusion on renewals

3.112 Whilst we accept the additional investment of £541 million for England and Wales and £44 million for Scotland in core renewals, we have noted specific asset and regions where additional technical information is required in the delivery plan.

3.113 We accept the proposed changes to effective volumes for CP7 which will need to be set out in the delivery plan.

3.114 Further work is required on planned volume delivery and investment profiles to deliver a smoother renewals profile over the course of CP7.

Conclusion on asset data

3.115 We expect the regions to deliver data improvement plans for CP7 as part of the delivery plan. Progress against these plans should be subject to regular reporting to us. We will discuss with Network Rail the potential to broaden and evolve the current asset data accuracy measures to enable more effective measurement of asset data quality as Network Rail works towards its delivery plan.

3.116 We require an annual review incorporating key stakeholder views on asset data to be undertaken by Network Rail reporting from March 2025 for inclusion in its annual return to us.

3.117 We support Network Rail's proposed approach to success measures, including delivery against milestone commitments and data quality measures.

Conclusion on maintenance

3.118 We concluded that the regions and the Technical Authority have been able to demonstrate the capability to produce aligned renewals and maintenance plans and we expect to see clearer evidence in the delivery plan.

3.119 The maintenance plan requires further refinement and scrutiny for deliverability as part of the production of the delivery plan. Further work is required by the regions and National Functions to fully embed modernising maintenance into the ABP tool so that there is an understanding around benefits, cost and impact to planned work and volumes. In addition further consideration is needed to account for any reduction in renewals

3.120 Network Rail's Technical Authority will need to continue to monitor the impact of modernising maintenance, including through the post implementation review to facilitate the sharing of lessons learnt between routes and regions.

Conclusion on competency and organisational effectiveness

3.121 Network Rail has given a commitment to provide an update on competency plans as part of its delivery plan as well as throughout CP7, where necessary to reflect changing needs. It should contain a time bound plan with key milestone and reportable success measures. In submitting this plan, it is essential that the plan demonstrates that it has executive level support and sets a common framework for use across the whole of Network Rail.

Conclusion on SAF and CRI

3.122 Regions, especially W&W and NW&C, still need to further challenge themselves around their projected increases in SAFs and as a result a decrease in CRI, by applying innovative techniques to improve asset reliability.

3.123 This review needs to be completed in advance of the delivery plan submission.

Conclusion on CSI

3.124 We accept the proposed trajectories to CSI using the updated models as shown in Table 3.13; (2.5% decline in England & Wales, 2.1% decline in Scotland).

Proposed options to release funding for additional core renewals

3.125 In its draft determination response, Network Rail has proposed funding the required increase in expenditure on network assets since its SBP (e.g. due to the impact of inflation and the £541 million additional core renewals) via an overlay of

£600 million. This overlay is applied to the England & Wales regions only and covers both capex and opex.

3.126 We are concerned that applying this overlay to regional renewals and maintenance plans could result in a reduction in volumes, scope or quality of asset interventions, which would undermine the benefit of increasing funding on core renewals. To mitigate this risk, and to provide certainty in plans (which will benefit the supply chain), we have provided a view on how Network Rail could choose to fully fund renewals and ensure reasonable risk funding without applying an overlay to regional renewals and maintenance.

3.127 We are not mandating the methodology Network Rail uses to fully fund additional core renewals and other revisions to its SBP. We will, however, expect Network Rail to adhere to some key principles:

(a) we do not expect funding to be sourced from existing core assets or maintenance plans that are already identified in CP7, either directly (e.g. by reducing volumes of work) or indirectly (e.g. by downgrading from full renewals to refurbishments) or by compromising scope or quality of works. However, we recognise that the detailed workbank of interventions will need to adapt within these plans; and

(b) we do not expect a decline in outcome measures.

3.128 We have identified a range of options for Network Rail to re-prioritise expenditure. Our priorities remain based on our PR23 objectives of safety, performance, asset sustainability and efficiency. We consider that the options identified should provide sufficient expenditure to fund the additional core renewals and maintain a reasonable risk fund, while giving Network Rail as much flexibility as possible to prioritise within these options.

3.129 The proposed options were identified from our detailed review of Network Rail's SBP and the company's response to our draft determination. We identified items in the SBP where we expected the actual expenditure in CP7 would be lower than stated in the plans, for example because cost estimates were high and also some items in the plans which were discretionary in nature and could be re-prioritised. We have also identified areas where Network Rail could make a strategic decision to de-prioritise funds, albeit with a reduced confidence in delivery. These are decisions which Network Rail will need to take.

3.130 We have categorised the options we are presenting to Network Rail as 'priority adjustments, 'strategic choices' and 'future opportunities'.

(a) Priority adjustments are areas where we have an agreement with Network Rail that spend should change (e.g. through proactive re-profiling of activity into CP8); or where we have identified spend increases in Network Rail's plans which are not sufficiently evidenced (such as a rise in pre-efficient costs). We expect Network Rail to implement these changes to its plan.

(b) Strategic choices are areas of the plan where there is potential to reduce spending with a lesser impact on activity outputs. This area also includes challenge where activities appear to be delivering lower value for money, or where Network Rail has justified its approach but where there is uncertainty over the magnitude of spend or efficiencies in its plans.

(c) Future opportunities are areas where, based on historic evidence, we are expecting Network Rail's plans to slip spend into CP8. Based on historic evidence of delivery within the specific regions we have estimated a potential amount of spend which may move into CP8 based on historic averages. This should be treated as a 'future opportunity' and funds can be used to support the risk fund; Network Rail's response to our draft determination proposed a similar approach, calling it "soft ring-fencing. The evolution of the programmes should be monitored during CP7 to recognise the approach.

3.131 We have calculated that it should be possible to release approximately £0.40 billion of funding via priority adjustments, approximately £0.45 billion by strategic choices and up to £0.36 billion by future opportunities. There is sufficient opportunity for spend reduction / deferral of over £1.2 billion which will fully fund the additional core renewals required in England & Wales.

3.132 We are satisfied that Network Rail Scotland has identified funding for the £44 million additional core renewals in the draft determination response.

Options for funding core renewals

3.133 Our proposed priority adjustments, strategic choices and future opportunities are set out below.

West Coast Mainline, North (WCML(N)) expected slippage into CP8

3.134 Network Rail's SBP included circa £1.2 billion for renewals around Crewe and from Crewe to Carlisle on the WCML(N). This includes renewal of life-expired assets on stations, track, electrification and fixed plant, level crossings, power supply and many conventional signals which will be replaced with ETCS level 2. In the draft determination for WCML(N) we expected circa £300 million of funding to slip into CP8 due to deliverability challenges, therefore reducing the CP7 spend.

3.135 Network Rail responded that it agreed with our concerns regarding deliverability and that it has proactively reprogrammed £100 million into CP8 (£62 million ETCS, £17 million electrification and fixed plant, £21 million buildings). The remainder of the funding is proposed by Network Rail to be treated as a "soft ringfence" which may slip and therefore release funding for risk provision. Network Rail states that Crewe Renewals are "in flight" and will not be subject to the same deliverability challenges as WCML(N).

3.136 We agree that the reprofiling of £100 million provides a more realistic plan for Network Rail and the supply chain and we support Network Rail's proposed approach which it refers to as "soft ringfencing". However, we would only apply this approach to the disputed portion of spend. We also still have concerns about the deliverability of Crewe Renewals based on data for similar renewals in CP6. Therefore, we propose that £270 million of "future opportunity" is included for Crewe and another £50 million for the remainder of WCML(N). This is based on our analysis at draft determination that large parts of the programmes will slip by approximately 12 months to 18 months into the beginning of CP8.

Digital signalling portfolio

3.137 Network Rail's response has proposed a reduction to the digital signalling portfolio. We agree with elements of this but have provided further challenge on pre-efficient spend. We discuss our findings on Network Rail's plans for its digital signalling portfolio and potential spend adjustments in Chapter 8 (digital signalling).

Technology delivered as centrally managed projects

3.138 We propose an option to reduce funding for technology projects delivered by Route Services, by circa £100 million. This cost challenge is intended to incentivise 'right first time' scope and address historical inefficiencies around project scoping, which we have observed in CP6 and in PR23. This is the challenge we detailed in our draft determination and is discussed in more detail in Chapter 4 (National Functions).

3.139 We propose an additional strategic challenge on Route Services of £100 million which Network Rail may choose to implement using the savings Route Services has identified in its draft determination response. We also discuss this in more detail in Chapter 4 (National Functions).

High Output plant

3.140 We propose an option to reduce funding for refurbishment of High Output plant by £38 million. This is on the basis that this plant is not being utilised effectively and

may become obsolete in future control periods. We discuss this in more detail in Chapter 4 (National Functions).

Project Reach

3.141 We recognise Network Rail's position that there is a business case for delivering Project Reach in CP7, but we are of the view that it represents a lower priority than the core asset renewals. We note Network Rail's commitment to delivering Project Reach and we anticipate that other options to release funding may be preferable. We discuss this in more detail in Chapter 4 (National Functions).

Operations and Support challenge

3.142 Our review of the proposed CP7 spend on support and operations in England & Wales has identified the potential for a combined challenge to the pre-efficient costs in these areas. We discuss this in more detail in Chapter 5 (operations) and Chapter 6 (support).

System operator strategic risk fund

3.143 In our draft determination, we asked Network Rail to fully justify the spend of £24 million on a SO strategic projects support fund. The additional information supplied fell short of providing sufficient evidence to support the projects or spend profile. We therefore propose a strategic option to remove this spend from CP7. The System Operator plan and associated costs are discussed in more detail in our PR23 final determination: settlement document for the System Operator.

3.144 Tables 3.14-3.16 summarises our proposed options to reduce expenditure relative to the SBP on the above items, in order to fund additional core asset renewals. The tables cover priority adjustments, strategic choices and future opportunities respectively.

Table 3.14 Priority adjustments: suite of projects where we have agreed with Network Rail / otherwise identified cost adjustments for the final determination

Spend item [total spend pre adjustment]	Rationale for adjustment	Potential spend reduction in England & Wales	Potential spend reduction in Scotland
WCML(N) reprogramming into CP8 **[£1.2 billion]**	In line with Network Rail's response to our draft determination, we agree that an element of the WCML(N) programme shall be proactively reprogrammed into CP8, to improve deliverability and certainty of the plan.	£0.1 billion	N/A
Digital signalling portfolio including SEU rates **[£1.7 billion]**	We agree with Network Rail's response to the draft determination, that an element of the digital signalling programme shall be proactively reprogrammed into CP8; and spend on the OTTO enabling project shall be reduced. Our analysis also shows that pre-efficient unit rates are too high, as they are similar to CP6 rates, which included c.25% for 'first adopter' development costs. Repeating all of these development costs in CP7 would be inefficient.	£0.2 billion	N/A
Route Services projects **[£4.2 billion]**	In CP6 we raised concerns about scope creep and lack of technology adoption, as a result of poor communication between central teams and regions. We are continuing to see these issues on Route Services projects. We propose a pre-efficient cost challenge of circa £0.1 billion to Route Services renewals expenditure on technology projects. This challenge is to encourage better scope definition and controls between Route Services and regions, removing inefficiencies seen in CP6. This is the challenge we imposed at draft determination which Network Rail's response has not sufficiently addressed.	£0.09 billion	£0.01* billion
Total		**circa £0.4 billion**	**circa £0.01* billion**

*Source: Network Rail databook. Note: England & Wales expenditure is based on the risk-adjusted plan and Network Rail draft determination response. *Network Rail's adjustments post draft determination include a £10 million reduction in Route Services spend for Scotland but this is not explicitly linked to our challenge on pre-efficient costs.*

Table 3.15 Strategic choices: suite of projects where we have identified possible cost adjustments

Spend item [total spend pre adjustment]	Rationale for adjustment	Potential spend reduction in England & Wales	Potential spend reduction in Scotland
High Output plant [£0.04 billion]	Network Rail has not completed its plans for High Output in CP7. The renewals assumptions in the regional plans in the SBP did not include High Output work but did include the costs of Network Rail completing the work using conventional approaches. Providing specific funding for High Output could double-count funding and High Output work should be more efficient overall; this is explained in Chapter 4 (National Functions). Network Rail must also consider the best way of delivering a service in CP8 noting required volumes, service reliability, staff competence, equipment obsolescence, purchase lead times and value for money.	£0.04 billion	N/A
Route Services additional challenge [£4.2 billion]	Route Services has responded to the challenge laid out in our draft determination with a suite of changes which it proposed making to its projects. Network Rail may elect to implement these changes in addition to the challenge we laid out in our draft determination, however, we require that project outputs are not adversely impacted.	£0.09 billion	£0.01 billion
Project Reach [£0.14 billion]	Our assessment is that Project Reach represents a lower priority for use of OSMR funding in CP7 than other core asset renewals. However, we note Network Rail's commitment to Project Reach and we anticipate that other options for releasing expenditure may be preferable.	£0.14 billion	N/A
Operations and support challenge	Ops & Support: Our draft determination indicated there was potential scope for a reduction in operations & support costs (with the greatest opportunity in support). Additional information supplied by Network Rail and from our consultancy report since the draft determination supports the challenge. We have therefore consolidated an operations & support challenge to pre-efficient costs for regions & functions.	£0.15 billion	<£0.01 billion

Spend item [total spend pre adjustment]	Rationale for adjustment	Potential spend reduction in England & Wales	Potential spend reduction in Scotland
SO strategic project support fund **[0.024 billion]**	As part of our draft determination we asked the SO to provide information to fully justify this spend. The information supplied falls short of specifying any key projects or a realistic spend profile.	£0.02 billion	<£0.002 billion
Total		**circa £0.45 billion**	**circa £0.02 billion**

Source: Network Rail databook. Note: England & Wales expenditure is based on the risk-adjusted plan and Network Rail draft determination response.

Table 3.16 Future opportunities: Suite of projects where we have identified probable cost adjustments during the course of CP7

Spend item [total spend pre adjustment]	Rationale for adjustment	Potential spend reduction in England & Wales	Potential spend reduction in Scotland
WCML(N) and Crewe renewals **[circa £0.7 billion]**	There is likely to be further slippage or reprogramming (beyond the £100 million proactively reprogrammed in Table 3.15), but there is significant uncertainty on the magnitude of this. Hence, Network Rail's proposal to 'soft ringfence' this programme. For the remainder of the WCML(N) asset renewals we estimate up to £50 million further slippage into CP8. Network Rail's response did not consider reprogramming of renewals at Crewe, but our evidence suggests there is still potential for slippage or reprogramming of up to £270 million into CP8. The total for WCML is therefore £320 million.	£0.32 billion	N/A

Spend item [total spend pre adjustment]	Rationale for adjustment	Potential spend reduction in England & Wales	Potential spend reduction in Scotland
Digital signalling fleet fitment [£0.8 billion]	Our draft determination indicated circa 15% of this programme could slip into CP8. We support Network Rail's response, to proactively reprogramme some regional renewals into CP8. There is likely to be further slippage of the national enabling programme, but there is significant uncertainty on the magnitude of this. Hence, Network Rail's proposal to 'soft ringfence' this programme. We estimate there could be up to £50 million slippage of the fleet fitment programme into CP8.	£0.04 billion	<£0.01 billion
Total		**circa £0.36 billion**	**circa <£0.01 billion**

Source: Network Rail databook. Note: England & Wales expenditure is based on the risk-adjusted plan and Network Rail draft determination response.

4. National Functions

Introduction

4.1 This chapter considers National Functions' spend, which includes traditional back-office functions such as Finance and Human Resources, as well as railway-specific business activities that Network Rail undertakes centrally on behalf of the regions.

4.2 The National Functions consists of the following areas:

(a) Route Services which supplies Network Rail's routes with services that the national team is best placed to provide (e.g. supply chain operations, some procurement and IT). These services are brought together into a single, service delivery directorate. This approach should allow national co-ordination where appropriate, and for Network Rail to benefit from economies of scale and greater efficiency from specialised delivery.

(b) System Operator (SO) is responsible for making the network operate by integrating the industry to deliver customer needs. This includes strategic projects to support greater effectiveness and delivery of change.

(c) Technical Authority provides technical leadership in areas including health and safety, sustainability and managing quality and information, providing support and delivering assurance for the safe, reliable and effective functioning of infrastructure assets.

(d) Corporate Services includes areas such as the Chief Financial Officer (CFO) directorate, Human Resources (HR) communications and business transformation programmes. The CFO includes corporate finance, legal, group property unit, and risk and assurance. The property unit provides advice on retail and rental strategy to each of the regions, which ultimately have accountability for their own property portfolios.

4.3 National Functions costs also include funding for external industry bodies such as British Transport Police (BTP), Railway Safety and Standards Board (RSSB) and ORR.

Consultation responses

4.4 In the responses received to our draft determination, there was general support for our proposed approach to holding the National Functions to account in CP7.

4.5 Common themes in responses were around the need for our approach to be proportionate in the context of our regionally led regulation of Network Rail, whilst also ensuring the functions are being challenged to deliver as efficiently as possible by both ORR and Network Rail regions. Respondents also supported the additional efficiency challenge we put on Route Services in our draft determination.

4.6 Route Services' response to our draft determination includes an indicative reduction of £100 million in spend. This reduction represents cuts in scope across its plan, rather than our draft determination proposal to deliver the same scope but reduce pre-efficient costs by £100 million to address inefficiencies.

4.7 Alongside this are financial adjustments of an additional £21 million in the Route Services plan to reflect central forecasts on pay, input prices, headwinds and efficiencies.

4.8 Network Rail has chosen to retain Project Reach in its plan, with associated spend having been reduced by £39 million to reflect a revised project start date and a reduction in rail network coverage.

4.9 Network Rail has also retained High Output costs for the overhaul of one ballast cleaning system in its plan and has added some additional spend and volumes of work.

Changes from draft determination

4.10 Since our draft determination, we have reviewed the proposals for National Functions spend presented to us by Network Rail as part of its response to our consultation. We have retained our draft determination challenge for a reduction of £100 million in pre-efficient costs for central technology projects as a priority adjustment.

4.11 We have also set out a strategic option for Route Services to consider reducing costs in its plan by a further £100 million.

4.12 We are not proposing any changes to spend from our draft determination for the High Output service.

4.13 We are proposing that Network Rail considers an option to remove the £24 million SO strategic project support fund proposed in its SBP; further details are in the PR23 final determination: settlement document for the System Operator.

Network Rail's plan

4.14 Table 4.1 shows Network Rail's National Functions costs for CP7 in comparison to CP6. The CP7 figures stated in this chapter relate to Network Rail's draft determination response and these may change slightly in its delivery plan.

Table 4.1 National Functions OSMR costs (including traction electricity, industry costs & rates and operational expenditure) (£ million), CP7 v CP6

National Function	CP6	CP7 SBP	% Change
Route Services	4,042	4,159	3%
System Operator	645	522	−19%
Technical Authority	3,880	5,672	46%
Corporate Services	2,314	2,247	−3%
Group	385	1935	402%
Total	**11,267**	**14,534**	**29%**

Source Network Rail draft determination response Financial Year 2023-24 prices (post-efficient)

4.15 Overall National Functions' OSMR costs in its draft determination response are increasing by 29% compared to CP6. The main driver for this is the 44% rise in non-controllable operational expenditure (traction electricity +62% and business rates +11%). Excluding non-controllable opex, ETCS and risk provisions, total OSMR expenditure for National Functions is reducing by 3% compared to CP6. Additional renewals expenditure is increasing (+5%), which is primarily due to the inclusion in the Route Services plan of Project Reach and Digital Signalling fleet fitment costs (items not comparable with CP6). Total support costs are down by 16% compared to CP6.

4.16 The 'Group' line in table 4.1 relates to funding allocations and provisions made centrally that do not relate to a specific National Function. This line includes workforce modernisation provisions and insurance costs. Network Rail was also proposing to hold £494 million of risk funding against this line in CP7. Risk funding is discussed further in Chapter 10 (financial risk).

4.17 Total insurance costs of £485 million are forecast for CP7, a £166 million (57.3%) increase from CP6. These are included under Group costs in the table above. Network Rail obtains insurance to reduce risk or comply with legal or regulatory obligations. It has different types of insurance to deal with different risks across its business. Insurance costs are managed centrally.

Findings on National Functions expenditure

Route Services

4.18 Route Services expenditure on support activities has decreased by circa 7% in CP7 compared to CP6, with total operational expenditure increasing by 27% whilst renewals expenditure (excluding ECTS and risk provisions) has decreased by 17%. The overall increase in expenditure above CP6 shown in Table 4.1, is driven by major programmes which Route Services is leading on behalf of the regions; these are described below.

Electrical Safety Delivery (ESD)

4.19 National Programmes include the ESD programme. This is a network-wide change programme which Network Rail expects to improve electrical safety through new technology. Starting in CP6 and due for completion in CP8, Network Rail has reduced the ESD programme costs for CP7, from an earlier estimate of £515 million down to £361 million in the SBP, with a further reduction to £334 million as part of the £100 million of cost reductions in its draft determination response.

4.20 Network Rail confirmed that focus for the programme as a result of funding constraints will now be on enabling legal safety and compliance improvements, with some safer, faster isolation technology deferred to CP8. We are seeking further clarity from Network Rail on the ESD programme scope and that the regional plans are fully aligned on this plan.

4.21 We fully support the intention of this programme and our PR23 final determination: supporting document – health and safety supporting document discusses the expected benefits in more detail. However, we have concerns about the deliverability of this (and other programmes) given that the scope, budgets and timelines are still evolving and are poorly defined, despite several years of work on the programme during CP6.

4.22 We expect to see in Network Rail's Delivery Plan a clear scope and timescales for the installation of technology and realisation plans for the benefits and outcomes this will bring.

Infrastructure monitoring

4.23 National Programmes also include infrastructure monitoring. Network Rail has identified this as an area that is a critical business priority for CP7. The existing monitoring fleet is approaching end of life and there is strong demand from the regions for this capability to meet their CP7 maintenance requirements. Route Services has proposed £475 million spend on infrastructure monitoring in CP7, which is a 32% increase from CP6, however, we expect the delivery plan to include a clear scope and milestones for deliverables to the regions.

4.24 We are supportive of this work and the need for improvements in infrastructure monitoring. However, it will require a tightly defined scope to be agreed with the regions ahead of the delivery plan in order to be able to maximise the return, in terms of performance and efficiency, without de-scoping and compromising outcomes. Note in its draft determination response, Route Services has proposed to reduce this level of funding from the level proposed in its SBP by £51 million as a result of de-scoping its plans.

Intelligent Infrastructure

4.25 National Programmes also includes Intelligent Infrastructure. This is Network Rail's multi-control period digital asset performance management programme, using technology to turn asset data into useable information. Intelligent Infrastructure costs have reduced compared to CP6 as the programme moves into more of a 'business-as-usual' stage.

4.26 Network Rail indicates that the £115 million it has allocated in CP7 is based on prioritisation led by the Technical Authority. This spend comprises of:

(a) £68 million for buildings and civils work to continue the work to address safety concerns identified by the Lord Mair and Dame Slingo reviews. This was requested by the Technical Authority and endorsed by the regions.

(b) £47 million to provide the minimum level of core capability required to support existing and new requests from the regions. This includes the continued development of 'predict and prevent' capabilities. In its draft determination response, Network Rail has proposed funding for this aspect has been reduced by £1 million from the SBP.

Project Reach

4.27 Project Reach is a workstream proposed by Network Rail to deploy high-capacity fibre optic cables across England & Wales, using the rail corridor. Network Rail will be sharing the cost with a chosen "concessionaire" which will undertake the

majority of the work. In return for doing this work, the concessionaire will be able to use several fibres to generate revenue. Network Rail will become the owner of the cable asset when it is installed.

4.28 Project Reach is not mentioned as a requirement in the England & Wales HLOS. Transport Scotland has stated during PR23 discussions that it does not wish to fund the project through the periodic review process.

4.29 Project Reach would involve replacing existing fibre optic cables, which were not due for renewal until CP8. Network Rail asset teams have confirmed that existing copper and fibre telecoms assets are nearing end of life and will require renewal in future control periods, but we have not seen any evidence that the renewals are required in CP7.

4.30 In the longer term, the existing assets will require replacement and it would be beneficial to replace them with high-capacity cables. Network Rail has indicated that there are third parties willing to support the delivery of Project Reach if it is delivered in CP7 and hence there may be a window of opportunity to deliver this project at a lower whole life cost, if there is sufficient funding available in CP7.

4.31 Given that Project Reach is not a core renewal activity in CP7, in our draft determination we expected that Network Rail should ensure there is sufficient funding for core asset renewals, as a higher priority than Project Reach. However, we note in its consultation response Network Rail has stated its continued commitment to Project Reach and its preference for other available options to release funding for core renewals.

4.32 In its response, Network Rail has also indicated that funding for Project Reach has reduced by £39 million from its SBP spend of £141 million. This reflects a delay to the project start and a reduction in the commitment perimeter from 7,891 kilometres of the network to 6,784 kilometres. Note that these costs relate to England & Wales only.

High Output

4.33 High Output is the umbrella term Network Rail uses to describe its high-capacity engineering train fleet consisting of ballast cleaning systems (BCS) and track renewal systems (TRS).

4.34 In our draft determination we stated the need for Network Rail to reach an agreed position between Routes Services and the regions for provision of this service in CP7. In its response to our draft determination Route Services stated its intention

was to use one machine in CP7 for the BCS service but no committed volumes to utilise this had been confirmed by the regions.

4.35 Route Services' response retains the proposed costs in its SBP for the overhaul of its BCS machine (circa £40 million) and an additional circa £150 million provision has been added to the Group CP7 spend for the as yet unallocated costs of operating this machine.

4.36 We have yet to see a clear strategy from Route Services for the intended use of high output in future control periods beyond the general intention in its response that they plan to utilise high output capability for track renewals in CP8.

4.37 We recognise the work Route Services has done since our draft determination on trying to find sufficient volumes to justify the use of its BCS machine and this work needs to continue ahead of its delivery plan to fully cover the costs of the service in CP7. We conclude that Network Rail should not include the provision of £150 million in its CP7 plan.

4.38 The approximately £40 million for the overhaul of the machine is, in our view, a strategic option for Network Rail to consider taking out of its plan. We recognise the need for this overhaul if usage rates justify it, but would challenge whether this proposal is the most efficient way to approaching the overhaul. Route Services should consider any opportunities for cost savings that may be available from, for example, retiring the rest of the high output fleet or alternatively by utilising machines that have already been overhauled during CP6.

Technology delivered as centrally managed projects

4.39 Our draft determination stated that there are known inefficiencies in Network Rail's delivery of technology projects in CP6 and previous control periods. Our draft determination proposed a pre-efficient cost reduction of approximately £100 million from Route Services capital spend on technology projects, to reflect the removal of inefficiencies going forwards.

4.40 Network Rail's response disagrees with our position. Route Services has proposed a £100 million reduction, but it proposes to achieve this by reducing scope or delaying milestones on projects with outputs critical to safety, performance and sustainability. Route Services states that there is no room for further efficiency, on the basis that it has already reduced headcount and that it is at a "lean" level of resource. We do not support this approach.

4.41 Network Rail's response indicates that it has not sufficiently acknowledged or learnt lessons from a historic poor delivery of technology programmes. Route

Services has not taken on board the recommendations for improvement provided in our draft determination or during CP6 including through our TARs. This remains a concern for us and is reflected in our final determination.

4.42 In particular, in CP6 we undertook a number of investigations (including but not limited to our TAR on Technology Adoption Case Studies Technology Adoption Case Studies - Targeted Assurance Review) which consistently found Network Rail projects which were severely delayed or which have failed to deliver benefits entirely. These projects are currently managed by Route Services. The following is a summary of key project milestones:

(a) **CSAMS -** The project started in 2011, with key milestones missed in 2016 and again in 2017. The project was closed out without delivering in 2017. The project was restarted in 2018 for specific outputs. Until recently, it had a new expected date of Q1 2024, but in Feb 23, Network Rail confirmed this was delayed again to Q1 2027;

(b) **SCADA/TPCMS -** Started design in 2005, moved into final design/delivery in April 2013. In PR18, Network Rail stated that the benefits of SCADA would be delivered in CP6. Older versions of the system have not delivered suitable levels of performance and have significant ergonomic concerns. In February 2023, Network Rail indicated the forecast start of delivery will be delayed to February 2024;

(c) **MyWork app -** project started in 2012 as part of ORBIS. In 2015 ORBIS disbanded and handed over the MyWork app to drainage teams, who commenced trials. In 2016 one region raised issues and ultimately elected to procure its own alternative, which created duplication of efforts and inefficient interfaces between systems. In April 2020, all regions requested an alternative, as this tool did not meet their needs;

(d) **Welding plant -** The Mobile Flash Butt Welder project started in 2004 and the equipment was approved for use in 2012. In 2012 Network Rail committed to purchase 10 machines. A lack of adoption was acknowledged in 2017, and by 2021 Network Rail was looking to sell machines. Network Rail is currently developing other welding plant technology, but lessons are not being learnt.

4.43 These delays incurred significant additional costs, with Network Rail staff and external contractors working on projects for far longer than planned, while failing to

deliver timely benefits to the railway. This is inefficient, as the 'cost per unit of benefit' is excessive.

4.44 The root cause of delays, identified by our TAR, was systemic poor communication between development teams (i.e. National Functions) and regional users. This resulted in a failure to agree scope and timelines which were realistically deliverable; and added benefit to the regions. We expect Network Rail to achieve 'right first time' scope and communicate progress more effectively with the regions. This would reduce the time to deliver outputs and hence reduce costs, without any reduction in headcount.

4.45 On this basis, our position from the draft determination stands. Our final determination includes a pre-efficient cost reduction of £100 million from Route Services capex spend, to reflect inefficiencies in CP6 costs, which must not be carried forwards into CP7. We expect these savings to be achieved by better working practices, including improving communication between Route Services and regional teams, to ensure scope and timelines are agreed and clearly documented. Wherever possible, agreed scope and timelines should be committed to in the delivery plan.

4.46 Throughout CP7 we intend to use the independent reporter to conduct reviews of Route Services performance against its committed scope, timelines and budget.

4.47 In our PR23 final determination: supporting document on health and safety, we have identified specific critical projects where outputs are required urgently for Network Rail to meet its health and safety obligations, including but not limited to elements of: Electrical Safety Delivery; TPCMS; and the infrastructure monitoring portfolio. We expect pre-efficient savings to be made through improved working practices, while still retaining the outputs of these safety critical projects. We expect the scope and outputs of these safety critical projects to be clearly committed to in the delivery plan, as noted above.

Further strategic options

4.48 Chapter 3 (renewals and maintenance) of this report sets out our requirement for increased spend on core renewals and notes that Network Rail has proposed to identify further savings between the publication of our final determination and its delivery plan. Chapter 3 notes that certain areas of the plan should be protected from further spend reductions, to avoid impact on critical outputs.

4.49 Route Services projects identified as safety critical in our PR23 final determination: supporting document on health and safety, should be protected from any scope reductions as part of this exercise.

4.50 However, our evidence from CP6 suggests that there may be potential for further savings of up to £100 million from the remainder of the Route Services capex portfolio. This is over and above the £100 million saving from correcting inefficient CP6 working practices described above and in our draft determination. This additional spend reduction may be achieved in some form by the proposal included within Network Rail's draft determination response but this must be without impacting safety critical programmes.

Procurement and other spend

4.51 A 2022 benchmarking study by Efficio found that Network Rail's annual third party expenditure was £7.7 billion in 2021-22 and that the Commercial and Procurement team operates with 72 full time equivalents per £1 billion expenditure. The study found that this is below the cross-government average and external benchmarks.

4.52 The focus in CP7 for this team is on delivery through their range of operating and contracting models alongside the use of category strategies to inform decisions on 'make vs buy' and routes to market. They also intend to use incentivisation and partnerships in order to drive innovation. Successfully implementing this proposed approach will be key for the forecast efficiencies to be achieved, both within Route Services and for the wider business.

4.53 In its response to our draft determination, Network Rail has reduced IT expenditure by £6 million from the level proposed in its SBP to £1.154 billion, which also represents a reduction on spend in CP6. At the same time, through the management modernisation programme, overall IT headcount is down by 17% and is expected to remain at a constant level in CP7.

4.54 Alongside this, IT renewals expenditure is forecast to reduce on CP6 and by £6 million on the SBP to £399 million due to a reduced level of funded improvement delivery and a shift in accounting classification from capital to operational expenditure.

4.55 Benchmarking analysis by Gartner in 2020-21 identified that IT staff levels at Network Rail were identified as operating with 19% fewer heads than comparable organisations.

4.56 Alongside the cost reductions from the SBP detailed above from ESD, IT and intelligent infrastructure, Route Services in its draft determination response has

proposed a further £15 million in cost reductions to total £100 million overall. These come from the removal of the fitment of an in-car safety system for its road fleet (£5 million), alongside some funding from Asset Information Services (£5 million), Engineering Services (£3 million), and Network Rail training (£2 million).

System Operator

4.57 System Operator total costs are down by 19% on CP6, largely due to the headcount reductions made as part of the workforce modernisation programme.

4.58 Our view is the costs proposed for CP7 are broadly reasonable, apart from its £24 million strategic project support fund mentioned previously. Network Rail's response to the request in our draft determination for this spend to be fully justified falls short of specifying key projects or a realistic spend profile, so we therefore view this as a strategic option rather than a priority in a fiscally constrained plan.

4.59 The System Operator plan and associated costs are discussed in more detail in our PR23 final determination: settlement document for the System Operator.

Technical Authority

4.60 The Technical Authority's costs include the cost of traction electricity, which is largely passed through to operators. As noted above, traction electricity costs are expected to be 62% higher in CP7 than in CP6.

4.61 Excluding traction electricity costs and industry costs and rates, operational expenditure for the Technical Authority is forecast to increase to £278 million, compared to £256 million in CP6. This is largely a result of an additional £20 million Network Rail has allocated for performance improvement and innovation fund (PIIF) in the Research, Development and Innovation (RD&I) funding in response to the challenge we made on this in our draft determination. The PIIF is discussed further in Chapter 5 (operations).

4.62 Renewals expenditure has decreased significantly from £484 million in CP6 to £340 million for CP7. This includes Network Rail's response to our draft determination which proposed a further cut of £16 million from the SBP. This cut is held by Network Rail as an overlay with saving opportunities identified ahead of the delivery plan. The largest component of the overall reduction in Technical Authority's renewals spend from CP6 is for RD&I which is discussed in more detail in the Chapter 11 (RD&I); however, RD&I spend is still expected to be £1.2 billion in total (including further technology development and adoption) in CP7.

4.63 Given the nature of the Technical Authority function and the reduction in renewals expenditure (from £484 million to £340 million) in the SBP plan, we consider that the proposed costs are broadly reasonable.

Corporate Services

4.64 The majority of Corporate Service costs are related to operational expenditure. The draft determination response had costs in CP7 across these functions at £252 million below the latest forecast exit position for CP6.

4.65 Costs for Corporate Services have increased by £19 million in Network Rail's response to our draft determination to reflect recently agreed pay awards and changes to industry costs. Corporate Services has told us it has applied a 1.2% funding stretch across its functions to respond to funding pressures experienced by Network Rail.

4.66 As noted above the CFO includes the Group Property unit, where controllable operational expenditure costs are down by £10 million to £70 million in CP7 from their CP6 comparator position (FY 2023-24 multiplied by 5). This CP6 comparator is used given the devolution of much of the responsibility for property to the regions which took place partway through the control period. The reduced operational expenditure costs in CP7 reflects reductions made to headcount in the function as part of the wider modernisation programme.

4.67 Further discussion on the property aspect of Network Rail's SBP and its draft determination response is included in our PR23 final determination: supporting document – other income.

4.68 Each function within Corporate Services has undertaken benchmarking work in CP6 with external consultancies to review their size with those in equivalent organisations. For the CFO, a benchmarking study by the Hackett Group in 2021 found that the function was borderline top quartile efficiency, with higher efficiency and a lower headcount compared to equivalent firms elsewhere.

4.69 The HR function has undertaken benchmarking work with Gartner in 2022 which demonstrated the function to have 'Level 3' maturity overall, where 'Level 1' is 'low' and Level 5 is 'high' maturity. The findings from the report have been incorporated into initiatives undertaken by both the function and wider organisation to address areas of the function where the maturity score was lowest.

4.70 For Communications, a review of the function's operating model was undertaken by the VMA Group in 2020, which was then used to inform the function's

restructure in 2021. In particular, the internal communication team capability was reduced with business partnering teams set up instead as the benchmarking highlighted overservicing for communications support. External facing areas of the function were found to be comparable in size with those seen elsewhere.

4.71 The Corporate Services expenditure in the SBP lacked detail on increases in expenditure, noting the headcount reduction already made in CP6. In our draft determination we asked Network Rail to provide further clarification, and it responded by providing detail on increases in non-controllable industry costs and detailed that inflationary cost increases have been planned with inflation forecasts. Corporate Services told us it has assumed that further cost increases will be managed by scope changes within the functions.

4.72 We have concluded that the proposed costs for Corporate Services are broadly reasonable.

Cost allocation

4.73 The costs of National Functions are allocated to the regions and are in addition to the regions' 'direct' expenditure. These allocated costs are an important part of regional budgets as they relate to activities that support the delivery of regional outputs and the running of Network Rail as a whole. They cover both operating and renewals costs and Network Rail defines them in four broad categories:

(a) Pass through costs: These are charged to Network Rail as one company and cover items such as costs for 'electricity for traction' (EC4T), property rates (also referred to as 'Cumulo' rates), British Transport Police costs, and other industry costs. Network Rail is funded for these costs on behalf of the industry but has very little or no control over them.

(b) Shared costs: as previously discussed it is more efficient to manage some activities nationally rather than in each of the regions, for example the IT estate, logistics and shared services. Shared costs also include the significant national investments proposed for CP7 that will support and provide benefits to all regions, for example, expenditure on systems by Route Services, System Operator or Technical Authority.

(c) Central overheads: Central overheads cover the provision of activities such as HR, finance and legal services.

(d) Group costs: Group costs cover major one-off items including insurance, restructuring accruals and other provisions.

4.74 The proportion of costs and income directly managed by regions has continued to increase during CP6, with key transfers of National Functions' activities devolved to regions including Infrastructure Projects, Group Property, Telecommunications and various teams from Human Resources, System Operator, Legal and Engineering.

4.75 This resulted in over 3,000 heads being devolved from the National Functions to the regions. In addition to the devolution of these accountabilities to regions, National Functions have reduced their headcount by around 1,500 heads since 2021-22. The combination of these two changes means that National Functions are smaller than in previous control periods.

4.76 As part of PR18, we commissioned CEPA to review Network Rail's allocation of costs. CEPA concluded that there were no significant instances where cost allocations appeared unreasonable but provided some recommendations for Network Rail to improve transparency and some allocation methodology.

4.77 Centrally incurred costs are predominantly allocated to regions at a granular level based on various cost drivers. Network Rail identifies an appropriate cost driver depending on the type of cost incurred and will allocate on a more specific basis where appropriate (for example centrally managed renewals works only taking place in one region will be allocated only to that region).

4.78 Network Rail confirmed to us that the network-wide function costs have been allocated to the regions using a similar methodology and allocation drivers to those used in CP6. The only exception to this is the change in approach for the allocation of ORR costs, which are now simply split equally across the five regions (they were previously split on an eight-route basis, as that was the structure in place at PR18).

4.79 Where CP7 data is available this has been used for the allocation. Otherwise CP6 data has been used. This approach has been reflected in the spend data provided by Network Rail.

4.80 Overall, our review of Network Rail's plans has confirmed that the allocation methodology which CEPA reviewed previously has been followed. This methodology has matured over CP6 and is now well understood. We therefore support the approach applied and will keep this under review during CP7.

4.81 Table 4.2 to Table 4.4 summarise the allocation of network wide costs to each region in Network Rail's response to our draft determination and how this compares to CP6.

Table 4.2 National Functions allocated costs (excl. Traction Electricity, Industry Costs and Rates (TEICR)) to regions, CP7 v CP6 (£ million)

Region	CP6	CP7	Variance
Eastern	1,906	2,378	+472
NW&C	1,494	1,831	+337
Scotland	630	600	-30
Southern	1,483	1,764	+281
W&W	980	1,110	+129
Total	**6,493**	**7,682**	**+1,189**

Source Network Rail databook Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

Table 4.3 National Functions allocated TEICR costs to regions CP7 v CP6 (£ million)

Region	CP6	CP7	Variance
Eastern	1,410	2,031	+620
NW&C	1,073	1,580	+507
Scotland	418	672	+254
Southern	1,380	1,951	+571
W&W	492	619	+126
Total	**4,774**	**6,852**	**+2,079**

Source Network Rail databook Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

Table 4.4 National Functions total allocated costs to regions, CP7 v CP6 (£ million)

Region	CP6	CP7	Variance
Eastern	3,316	4,408	+1092
NW&C	2,567	3,411	+844
Scotland	1,048	1,272	+224
Southern	2,863	3,715	+851
W&W	1,473	1,728	+256
Total	**11,267**	**14,534**	**+3,267**

Source Network Rail databook Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

Conclusions on National Functions expenditure

4.82 We are supportive of the outcomes that Network Rail is looking to deliver from its National Programmes and recognise the cost reductions that have been made to many of these from earlier iterations of the Route Services CP7 plan. However, given the funding environment and the concerns we have raised in CP6 about technology projects with poor scope definition, we remain concerned that technology projects may not be delivered efficiently in CP7.

4.83 In our draft determination we proposed an option for Network Rail to release funding for core asset renewals, by applying a reduction in the pre-efficient expenditure on centrally managed technology projects. We suggested the magnitude of this cost challenge should be in the order of circa 10% of renewals spend on technology projects, which could release approximately £100 million across the Route Services portfolio.

4.84 We are maintaining our challenge from our draft determination that Route Services should reduce its pre-efficient renewals spend on technology projects by £100 million. We reiterate that this relates to better definition of scope to enable timely delivery and removal of inefficiencies; this can be done without impacting outcomes.

4.85 We further propose a strategic option for Route Services to reduce expenditure by a further £100 million across its technology portfolio. This additional spend reduction may be achieved in some form by the proposal included within Network

Rail's draft determination response but this must be without impacting safety critical programmes.

4.86 Our assessment remains that Project Reach represents lower priority for use of OSMR funding in CP7 than other core asset renewals. Although we note Network Rail's continued commitment to Project Reach and acknowledge that other avenues are likely to be preferred by Network Rail to release funding for core renewals.

4.87 The renewals assumptions in the regional plans in the SBP did not include High Output work but did include the costs of Network Rail completing the work using conventional approaches. Providing specific funding for High Output could double-count funding and High Output work should be more efficient overall. Route Services has yet to reach an agreed position with the regions for provision of the High Output plant in CP7 and we are concerned by the absence of a clear strategy as to the need for High Output services in CP8 and beyond. For CP7 we do not support the additional £150 million in Network Rail's draft determination response. We expect Route Services to source sufficient volumes so these costs can be fully covered ahead of its delivery plan. The approximately £40 million remaining for the overhaul of this machine is a strategic option for Network Rail to consider whether to include in its plan and also whether this is being approached in the most cost-efficient way.

5. Operations

Introduction

5.1 Operations describes the functions directly associated with the movement of trains on the railway, and the specialist roles dedicated to delivering this. It is a core activity for Network Rail in providing safe and reliable train services.

5.2 The main job roles within operations include (but are not limited to):

(a) Signallers - who directly engage in the operation of signalling equipment on the railway infrastructure.

(b) Controllers – who directly engage in operational route and incident control and oversee the effective delivery and performance of the network in real-time.

(c) Station operations staff - staff within Network Rail's directly managed stations, variously undertaking roles in station operations (dispatch, station control) and station management (security/facility/customer service and passenger assistance).

(d) Electrical control operators - engaged in management of power supply and isolations on the railway infrastructure.

(e) Mobile and local operations managers – who undertake day-to-day operational functions 'on the ground'.

(f) An operations management hierarchy, including relevant rostering and support staff.

5.3 In this section we describe our review of the operations plans provided by Network Rail in its SBP for CP7, specifically focused on how these translate into use of allocated funds for operations.

Consultation responses

5.4 Other than Network Rail itself, there were no responses to our draft determination consultation on underlying operations and support costs.

5.5 Network Rail provided further information on the build-up of key cost lines as part of its response. It also clarified the mapping of various cost allocations, particularly

between operations and support, which has enabled us to map costs between CP6 and CP7.

5.6 Consultation responses to our proposal to create a PIIF were almost entirely positive. Transport Scotland sought to confirm that Scottish Government funding would not be used to contribute to it (noting that there is a separate Scotland targeted performance fund).

5.7 The £40 million value of the fund was also generally well received. One response suggested an unspecified higher value, while consultation responses from Network Rail suggested a (minimum) £20 million dedicated performance fund to be held as an increase to the Technical Authority's Research, Development and Innovation budget.

5.8 Some consultation responses asked about the governance of the PIIF, including consideration of how roll-out of successful performance schemes might be funded. Network Rail proposed that, instead of being managed directly by the System Operator (SO) as in CP6, the SO would chair the Technical Authority panel deciding on use of the fund.

5.9 The principle of a Scotland targeted performance fund was also well received, especially by Transport Scotland. Network Rail highlighted in its consultation response that its calculations of input prices were different to ORR's assessment and that it did not believe funds would be available for a Scotland targeted performance fund.

5.10 Transport Scotland highlighted in its response that, in its view, Scotland targeted performance fund funding should be available for any performance improvement on Scotland's railway - specifically including direct investment into train reliability projects.

Changes from draft determination

5.11 Our consultants (Steer /Amberside and Civity) have completed an international benchmarking exercise on which is published in the Benchmarking Network Rail Operations & Support Costs report, which has informed our assessment of the plans provided.

5.12 Our assessment indicates there may be opportunity to reduce pre-efficient expenditure across the entirety of Support and Operations by up to a total of £150 million as part of strategic decision-making. Our review since the draft determination, informed by the consultancy report and by examining the plans

provided to us, has identified that the combined areas of operations and support may provide further opportunity to reduce pre-efficient costs during CP7. The expectation is that the majority of the spend reduction would be found in the support area.

5.13 The proposed value of the PIIF for England & Wales remains at £40 million.

5.14 A Scotland targeted performance fund valued at £50 million will be set for Scotland.

Methodology

5.15 As well as the general methodology described in Chapter 2 (methodology), our assessment of Network Rail's operations plans has also been based on:

(a) experience and professional judgement based on our ongoing monitoring and reporting on Network Rail's operations activities; and

(b) review of the performance forecasts provided by Network Rail, in part utilising an Independent Reporter (Arup supported by Winder Phillips Associates).

5.16 We have undertaken a risk-based, non-exhaustive assessment of the operations elements of Network Rail's SBP. The approach is commensurate with the fact that operations costs are predominantly driven by staff costs, where significant change is only likely based on significant technological change and/or major workforce reform.

5.17 Having highlighted areas of further interest in the draft determination, we have continued to request additional information to support this assessment from Network Rail. This has been provided as part of the draft determination response, with additional dialogue to clarify further questions arising.

5.18 We note that, while the European Train Control System (ETCS) is now beginning to be deployed, it is not expected to drive notable change to operations costs during CP7. Reform within operations to derive maximum benefit from this or related schemes should be realised in CP8 and beyond.

5.19 Prior to the final determination, we have further strengthened our assessment by completing an international benchmarking exercise. This has been undertaken by a team from Steer, Amberside and Civity who assessed Network Rail's operations and support costs against participating European rail infrastructure managers and other UK infrastructure providers.

Network Rail's plan

5.20 Table 5.1 shows the updated spend on operations contained in Network Rail's draft determination consultation, following on from the prior analysis of the SBP.

Table 5.1 Overall summary of operations costs in draft determination response for Great Britain (£ million)

Summary cost line	CP6	CP7	% Change
Eastern	1,140	1,195	4.8%
NW&C	868	907	4.4%
Southern	1,109	1,136	2.4%
W&W	515	673	30.7%
England & Wales total	**3,632**	**3,911**	**7.7%**
Scotland	387	473*	22.2%
National Functions	0	0	-
Great Britain Total	**4,019**	**4,384**	**9.1%**

*Source Network Rail draft determination response databook Financial Year 2023-24 prices (post-efficient). *Cost includes funding for Scotland targeted performance fund.*

5.21 Each region's plans include at least a modest increase in pre-efficient operations costs, although in the case of North West & Central this is driven entirely by the transfer of the station portfolio (and all related costs) from support into operations.

5.22 The increase in Wales & Western is much higher, at approximately 31%. Wales & Western has increased operations costs in the latter years of CP6. As well as the policy-led signaller increase noted above, Wales & Western has increased operational headcount to allow for the introduction of the Elizabeth Line, and to 'right-size' the operations team to support recovery from its problems with train performance, which are further explained in the PR23 final determination: supporting document – outcomes. These are being carried forward into CP7 and the larger cost increase represents these changes being extended across the five-year cycle.

5.23 All regions' increases build from changes made during CP6 that will continue into CP7. Primarily, Network Rail is increasing signaller headcount across all regions,

aiming to reduce or eliminate existing vacancy gaps. This programme is being accelerated during the final year of CP6.

5.24 The approach has the dual aims of ensuring that operating the base train service is less reliant on rest day working and overtime and achieving compliance with fatigue standards.

5.25 It also contributes to a proactive staffing model that seeks to mitigate staff attrition rates; these have historically resulted in a short-term gap while new staff are trained to the point of being operationally competent.

5.26 The other-common increases within the regional plans for CP7 result from:

(a) better management of operational competence, building from the current 21st Century Operations programme being run by the SO; and,

(b) in some regions, either widespread or localised traffic management systems to enable a better-informed approach to managing train service disruption.

5.27 Despite the overall increase, all England & Wales regional plans still require a significant level of operational efficiency to be achieved in CP7.

5.28 The inclusion of a Scotland targeted performance fund of £50 million in our determination, means that operations costs will increase by 22% (9% excluding the fund).

5.29 Table 5.2 presents a high-level overview of the drivers of changes in operations spend within each region's plan; it predominantly highlights items that were included in each region's SBP as originally presented. However, to support this final determination, we have also assessed additional information Network Rail has provided in response to questions we raised both in the draft determination and during subsequent engagement. Table 5.2 also includes the result of this engagement.

Table 5.2 Key points from SBP regional operations plans

Region	Key operations spend drivers
Eastern	Filling signalling vacancy gaps and better fatigue management. Proactive recruitment to manage attrition, retirement and skills risk. Better operational competence management structure.

Region	Key operations spend drivers
NW&C	"Right-sizing" signalling, operational and electrical control teams, with headcount set at the level anticipated for CP6 exit. Better operational competence training and management structure. Localised decision support and traffic management systems. In-region "Operational Improvement Fund". Renewing operations staff accommodation.
Southern	Filling signalling vacancy gaps and better fatigue management. Proactive recruitment to manage attrition, retirement and skills risk. Better operational competence management structure. More signalling simulators.
W&W	Filling signalling vacancy gaps & better fatigue management. Better operational competence management structure. Traffic management implementation across region. Improvements in operations working environments and accommodations. Increased operations headcount to support Elizabeth Line operations.
Scotland	Reduction in signaller vacancy gap from 10% to 5%, reducing premium hours and overtime. Proactive recruitment to manage attrition, retirement and skills risk. In-house signaller training programme. Operations staff development and coaching. Better operational competence training and management structure (including RailSmart Employee Development System and 21st Century Ops). More signalling simulators and virtual reality training tools. Consolidation of signalling and control centres. Local or national deployment of Luminate Traffic Management system. Increased electrical control headcount. Scotland targeted performance fund (£50 million)

Source Network Rail and ORR further assessment

5.30 This table predominantly highlights items that were included in each region's SBP as originally presented.

5.31 To support this final determination, we have also assessed additional information Network Rail has provided in response to questions we raised both in the draft determination and during subsequent engagement.

Findings

5.32 At £4.38 billion, Network Rail's response to the draft determination includes an overall increase in post-efficient operations expenditure during CP7 of £365 million (circa 9%) when compared to CP6. This represents a significant change in CP7 operations expenditure.

5.33 The majority of operations costs relate directly to staff numbers, and most of the increase in the plan's costs is due to the strategic decision made in CP6 to fill signaller vacancies (which historically have typically run at approximately 10% in places, with the vacancy gaps filled using overtime and rest day working).

5.34 The principles behind the decision to reduce vacancy gaps include better management of fatigue among operations staff and professionalising operations competence, as outlined in the SBP, as well as reducing the reliance on overtime to be able to run the planned train services. These principles are reasonable and flow from existing and understood operational challenges in these areas.

5.35 The Steer/Amberside and Civity benchmarking report on operations costs identified that excessive use of overtime was causing an efficiency gap for Network Rail, when compared to the European peer group average.

5.36 Our consultants' report recommended Network Rail take steps to reduce such working. Additionally, the report strongly implied a lack of staff availability to support training and developmental activities that will increase the quality of outcomes (as well as opportunities afforded to individuals).

5.37 This change in strategic approach is therefore welcomed, as it seeks to address the primary finding, and we agree that the plans outline appropriate improvements in these areas.

5.38 In some regions, there is a plan to further recruit additional signallers beyond establishment (i.e. beyond the level of 'zero vacancies'). This brings greater resilience in operations, as the time required to train a signaller is notably longer than the notice period when an individual leaves the role.

5.39 We recognise this is a sensible and pragmatic approach to support railway operational delivery.

5.40 However, in the short-term position of a financially-constrained plan where prioritisation is required, this may or may not represent the best overall use of funds when compared to (for example) investing in assets to reduce the risk of operational restrictions being implemented. Network Rail should consider the balance between these areas carefully.

5.41 While there are many common features between all regions' plans, there are also differences between the regional approaches. These appear to provide inter-regional learning opportunities to be exploited by Network Rail during CP7.

5.42 Significant operations cost efficiencies have been quantified in the SBP and in response to our draft determination. For England & Wales these total £259 million, contributing to the overall efficiency challenge.

5.43 In Scotland, £7 million in operations cost efficiencies have been proposed. While this represents a much lower proportion of operations costs, this is commensurate with the strong emphasis the HLOS in Scotland puts on train performance and the particularly stretching performance targets for Network Rail in Scotland.

Future opportunities

5.44 Our consultants' benchmarking report identified further differences between Network Rail's national operations costs and those of other European rail infrastructure managers, some of which drive relative inefficiency in the UK system.

5.45 The report identifies that efficiency in other countries derives from large-scale digitalisation (including digital signalling) and from the reconfiguration of operational systems and decision-making structures that the technology can support – primarily in the form of centralisation.

5.46 Network Rail should explore these opportunities further as part of the approach to network development; we recognise that only a proportion of related spend reductions and efficiency benefits are likely to be realised in CP7 with most expected to be in CP8 and beyond.

Performance improvement and innovation

5.47 The Performance Improvement Management System (PIMS) was developed by Network Rail on behalf of industry during CP6, in response to ORR's 2018

provisional order requiring performance capability to be improved. This is the framework through which this capability improvement has been delivered; Network Rail now owns the framework on behalf of the rail industry.

5.48 We found that NW&C was the only region to discuss PIMS in its SBP supporting documentation. It is not featured in the England & Wales national document nor in regional or System Operator documents. The Risk Management Maturity Model for Performance (RM3P), which is one of the key PIMS products, is only mentioned in the Eastern region's supporting documentation. There were infrequent references to PIMS and RM3P in three regions' accompanying documents which described performance forecast methodologies; these methodology documents also contain references to the "whole system model" of performance but no description of how this will be used.

5.49 Through our business-as-usual regulation in CP6, we saw that Network Rail is committed to these frameworks and they are now embedded within the day-to-day management of the railway (as opposed to being a separate project and cost line). However, we expected to see clear explanation in the SBP of how these frameworks fit into Network Rail's plans in the regions and System Operator, because:

(a) Network Rail provides industry performance leadership, through the System Operator;

(b) PIMS and RM3P represent industry good practice; and

(c) many TOCs are mandated through their National Rail Contracts to co-operate with Network Rail on industry good practice in improving performance systems.

5.50 We expect all regions to continue to use PIMS to drive performance improvement in CP7. Network Rail has included some level of performance improvement linked to the use of these processes in its updated CP7 forecasts. We continue to challenge Network Rail to ensure that any relevant learning from regional operations initiatives is shared between regions to the benefit of the overall network.

5.51 In CP6, Network Rail's plans included a Performance Innovation Fund worth £40 million (2017-18 prices). During CP6, this fund has supported innovative projects aimed at driving improvements in performance that would otherwise not have been funded due to: cross industry coordination issues; or because the benefits are too uncertain; or benefits would take a long-time to realise. The CP6 PIF has provided

seed funding to over 100 innovation projects, with 65 being completed to date, there are opportunities to learn from its use and governance for CP7.

5.52 The fund was not intended as a substitute for Network Rail's core operations, maintenance and renewals spend, nor a substitute for spend by franchised passenger operators to meet their contractual commitments, as set out in our PR23 draft determination: policy position on the financial framework.

5.53 Our draft determination proposed a £40 million PIIF in England & Wales, to be included in the System Operator's plan, as it was in CP6.

5.54 Network Rail's SBP included £165 million funding for RD&I fund in CP7 (GB - wide), of which £147 million is allocated to England & Wales, and £18 million allocated to Scotland, contributing towards delivery of an outcome-focused, balanced portfolio. Improving the performance, reliability and capability of infrastructure comprises one of the key principles from RD&I investment in CP7, enhancing operational performance and supporting freight traffic growth.

5.55 From an England & Wales perspective, Network Rail's response to the draft determination highlighted the opportunity to align the management and governance of the RD&I funds and PIIF for CP7. It included an additional £20 million in the Technical Authority's expenditure for England & Wales; taking total RD&I in England & Wales to circa £170 million – with the £20 million funded in opex and the remainder in RD&I renewals. It also committed to invest not less than £20 million on performance improvement and innovation initiatives proposed by England & Wales regions or passenger and freight operators (in addition to circa £35 million of infrastructure performance-focused schemes included in the RD&I pipeline allocated to England & Wales).

5.56 Network Rail has proposed that this be managed collaboratively with the System Operator and allocation overseen through a new board (or separate part of an existing board) chaired by the Chief Network Operator. Ahead of the CP7 delivery plan Network Rail would review and revise the governance structure which will allow it to communicate to industry what the PIIF will look like and the types of initiatives that may be accepted for funding.

5.57 Our determination must consider Network Rail's proposed approach along with consultation responses received from other parties, and the high priority on performance outcomes.

5.58 In Scotland, Transport Scotland and Scottish Ministers agreed that our proposed Scotland targeted performance fund should be put in place. The benefits and

valuation of the fund, have been considered alongside pressure on the plan from risk funding and inflation. We highlight that governance of the fund must be consistent with Network Rail's license obligations. The fund is explained in more detail in our PR23 final determination: supporting document – outcomes.

Impact of worsening asset condition on operations

5.59 In its SBP, Network Rail forecast an increase in service affecting failures (SAFs) in CP7 due to reduced renewals. This was discussed in Chapter 3 (renewals and maintenance) of this document. Network Rail acknowledged that this would have some impact on operations activities, especially due to anticipated increases in temporary speed restrictions and in signal faults.

5.60 We identified, through the regional plans and challenge sessions, that each region planned to keep the current operational response staffing levels consistent through CP7. There was no evidence available at that time to demonstrate that the regions had planned changes to address the increased operational risk that greater numbers of asset failures would pose.

5.61 Subsequent reprioritisation of funding into core renewals as a result of our draft determination has notably reduced the anticipated increase in service affecting failures. There has also been significant work involving safety and engineering teams to ensure that the operational risk profile arising from the plans is appropriately managed.

5.62 While we have still not seen clear and consistent evidence of proactive operational measures to improve overall outcomes (such as planned timetable revisions to cater for known challenges), our main concern from the draft determination (significant decline on some routes) has been alleviated by the changes made.

Conclusions on operations

5.63 Increases in spend in most regions appears commensurate with plans to reduce vacancy gaps in key operational grades and to manage the risk arising from staff fatigue. Other valuable initiatives, to improve competence in operations and the quality of decision-making, build on national programmes ("21st Century Operations") and learned experiences from CP6.

5.64 While there are many common features between all regions' plans, there are also differences between the regional approaches. In CP7, we expect Network Rail to share best practice and exploit lessons learned between regions which are adopting different approaches.

5.65 Significant operations cost efficiencies have been quantified in the SBP and in response to our draft determination. For England & Wales these total £259 million, contributing to the overall efficiency challenge.

5.66 We recognise the recruitment of additional signallers beyond establishment is a sensible and pragmatic approach to support railway operational delivery. However, given the financial constraints across the CP7 plan, we highlight that this approach represents a strategic choice available in some regions that could contribute to limited cost reductions for the delivery plan.

5.67 Our assessment indicated there may be opportunity to reduce pre-efficient expenditure across the entirety of Support and Operations by up to a total of £150 million as part of the strategic decision-making.

5.68 We have chosen not to be prescriptive about where savings should be drawn from within the overall £9.6 billion pre-efficient plan for these areas. We expect the majority of the savings to be found in support categories and from both regional and national support. Our internal regional benchmarking and the international study completed by our consultants suggest that the current devolution model could be further optimised beyond efficiencies identified to date.

5.69 However, our assessment of the operations plans also suggests there may be some further, but limited opportunities within the tactical and operational detail of the delivery plan – beyond efficiencies identified - to reduce costs. Examples may include:

(a) Deciding whether it is appropriate in the current financial context to recruit signallers beyond establishment (noting we recognise this would be good business practice within an unconstrained financial environment);

(b) Considering whether all additional costs incurred to bolster operations during the COVID-19 pandemic have been successfully reversed out of the cost base; or

(c) Assessing whether reductions in overtime payments arising from the reduction in signaller vacancies will exceed those currently presented.

Performance improvement and innovation

5.70 Since our draft determination, we have engaged extensively with Network Rail on performance expectations for CP7.

5.71 At draft determination, we proposed an England & Wales national PIIF, similar to that included in CP6. We also proposed a Scotland targeted performance fund. Further detail is provided below.

5.72 To support Network Rail to deliver the train performance trajectories we have set, we confirm that Network Rail should include a PIIF in England & Wales, building on the fund and governance established in CP6.

5.73 Following on from consultation responses, we determine that, due to its potential range of uses and the large number of parties who may benefit from improved performance (freight and passenger), £40 million should be provided for this initiative in CP7 in England & Wales.

5.74 We are content with Network Rail's proposal that this fund be held by alongside the Research, Development and Innovation budget in the Technical Authority, with the System Operator chairing the allocating panel.

5.75 PIIF should be focussed on kick-starting collaborative, cross-industry solutions with the aim of improving train performance between train operators and Network Rail.

5.76 The fund should be used to fund projects that deliver a measurable improvement in performance. We propose that innovative projects should be prioritised over improvements delivered only through existing methodologies. Our proposal recognises:

(a) the need to urgently improve train performance during CP7; and

(b) historical barriers to funding for approaches which were innovative.

5.77 Moving forward we will support Network Rail and wider industry in preparation for the PIIF in CP7, including:

(a) updating CP6 PIF criteria;

(b) updating governance of the fund (which we expect to operate in a similar manner to the PIF; and

(c) ensuring knowledge gained from projects funded in CP6 can be acted upon, including through implementation via the PIIF.

5.78 In Scotland, we propose to include the Scotland targeted performance fund at a value of £50 million. Funding arrangements are discussed in Chapter 9 (efficiency, headwinds, tailwinds, inflation and input prices).

5.79 This focussed Scotland targeted performance fund would support Network Rail Scotland in making its contribution towards the Scottish Ministers' stretching performance requirement. Network Rail is to finalise governance of the fund, in line with its licence requirements, prior to publishing its CP7 delivery plan.

6. Support

Introduction

6.1 The support functions include Finance and Legal, Human Resources (HR), Communications, Engineering and Asset Management, and Commercial.

6.2 Support functions staff are in regions and also within National Functions. Each region pays its own costs for support plus a proportion of the National Functions' costs; the methodology for allocating these costs is discussed in Chapter 4 (National Functions).

Consultation responses

6.3 Other than Network Rail itself, there were no responses to our draft determination consultation on operations and support costs. The Network Rail responses included regional responses.

6.4 In CP7 post-efficient costs for support are £5.1 billion which is £831million lower than CP6. Updated support costs in the draft determination response are circa £150 million lower than the SBP, which is primarily due to changes in group provisions for workforce reform, previously held as support costs.

6.5 While the responses varied in detail, all regions highlighted that they had agreed to the 10% efficiency challenge in the SBP.

6.6 Scotland's railway provided no specific feedback on support costs in its response to the draft determination.

Changes from draft determination

6.7 Since the draft determination, the regions and national functions have altered their projected CP7 support spend.

6.8 In the regions the changes to the direct support spend (i.e. spend in the regions) were due to numerous reasons. These included the transfer of modernising maintenance from support; regulatory compliance for asbestos and fire risk assessments; and security investments. Eastern and NW&C's costs have decreased by £18 million and £20 million respectively. Scotland and Southern's costs are almost unchanged. Wales and Western's support costs have increased

by £26 million. In total, there is a relatively small reduction in total regional direct costs for support of £12 million.

Table 6.1 Network Rail CP7 total regional support spend in £ million

Region	National Function costs allocated to the regions	Regional direct support costs	Total support costs
Eastern	1,022	396	1,418
NW&C	792	534	1,327
Southern	693	447	1,140
W&W	506	191	696
England & Wales total	**3,012**	**1,568**	**4,580**
Scotland	363	117	480
Great Britain Total	**3,375**	**1,685**	**5,061**

Source Network Rail draft determination response databook Financial Year 2023-24 prices (post-efficient),

Methodology

6.9 We have followed the general methodology described in Chapter 2 (methodology). Any details specific to the methodology for support costs are outlined below.

6.10 We commissioned consultants (Amberside Steer, supported by Civity) to benchmark Network Rail's support costs, both national and regional, against international and domestic comparators.

6.11 We also undertook our own analysis. We looked separately at regional direct support costs and National Functions' support costs.

6.12 For regional direct costs we assessed how much these costs have changed between CP6 and CP7. We also assessed how much each region spent on its direct support costs, as a proportion of its total regional controllable opex.

6.13 For the National Functions support costs, we assessed how much these costs have changed between CP6 and CP7.

Findings

Our consultants' review of support costs

6.14 We employed consultants to benchmark Network Rail's network operations and support costs against relevant infrastructure managers in Europe and the UK. The European comparators were ProRail (Netherlands), BaneNor (Norway), Infrabel (Belgium), SZCZ (Czechia), SNCF Reseau (France), Trafikverkat (Sweden) and SBB Infra (Switzerland). In the UK, costs were compared with National Highways.

6.15 The study compared costs for human resources, information management (also known as IT or digital services), finance and procurement and other corporate services. Our consultants found that across support functions, Network Rail benefits from the potential for significant economies of scale, in comparison to peer organisations which are much smaller in size.

6.16 Network Rail has also implemented significant management headcount reductions across support functions in CP6, which should increase cost-efficiency in CP7. However, these reductions have been made after headcount increases which were a result of the re-allocation of resources to the five regions under Network Rail's putting passengers first programme.

6.17 In specific functions Steer/Amberside/Civity found that:

(a) Network Rail's HR costs were affected by the scale and complexity of Network Rail's business. It employed 46% more HR full-time equivalents (FTE) than comparators. The complexity of HR demands and workload across Network Rail, given its legacy systems and terms and conditions is likely to be a significant factor in its cost levels.

(b) Network Rail's Finance staff costs per £ of operating costs are 45% higher than the peer group average, although when normalised for the size of the network, Network Rail's finance costs per network km are 38% above the peer group average. The significant size of Network Rail in comparison to the peer group organisations is likely to contribute to its cost-efficiency, as we would expect it to exploit economies of scale. Network Rail, unlike the comparators, has devolved regional business units with strong finance teams as well as central finance functions which increases costs.

(c) Network Rail's Information Management (IM) costs per organisational FTE are 85% less than the peer group average and significantly lower than even the next lowest other member of the peer group. Network Rail's own

benchmarking found that its IM expenditure was lower than that of its peers, but this likely affected the quality of IT services and digital transformation.

(d) Network Rail's procurement costs are above the peer group average. The consultants were not able to find a simple explanation for this, however Network Rail provided evidence that showed they have a relatively high performing procurement function.

Regional direct support spend

6.18 We looked at how regional direct support projected spend has changed since CP6 and how the regions compare.

6.19 There has been considerable change in Network Rail in CP6, with a large re-organisation under the 'Putting Passengers First' programme, which increased support headcounts; and then subsequent management modernisation, which decreased support headcounts. As a result, CP7 regional direct support costs are lower in CP7 than in CP6.

6.20 In its response to the draft determination, Network Rail has set out its support costs for CP7. Table 6.2 shows a comparison of support costs for CP6 and CP7. These are the 'direct' support costs for each region.

Table 6.2 Network Rail direct support cost comparison from CP6 to CP7 by region

Region	CP6 (£ million)	CP7 (£ million)	% Change
Eastern	413	396	-4.2%
NW&C	709	534	-24.6%
Southern	403	447	11.0%
W&W	198	191	-3.6%
England & Wales total	**1,723**	**1,568**	**-9.0%**
Scotland	119	117	-2.1%
Great Britain Total	**1,843**	**1,685**	**-8.5%**

Source Network Rail draft determination response databook Financial Year 2023-24 prices (post-efficient)

6.21 NW&C costs have fallen significantly as several one-off items in CP6 are being discontinued. Project Alpha, the region's drive to improve performance and a re-allocation of station costs are the prime drivers of this. Southern's costs have increased because of a re-allocation of maintenance savings.

6.22 We have assessed how much of the regions' proposed total controllable opex is made up of support costs, as shown in Table 6.3.

Table 6.3 Comparison of regional support direct costs.

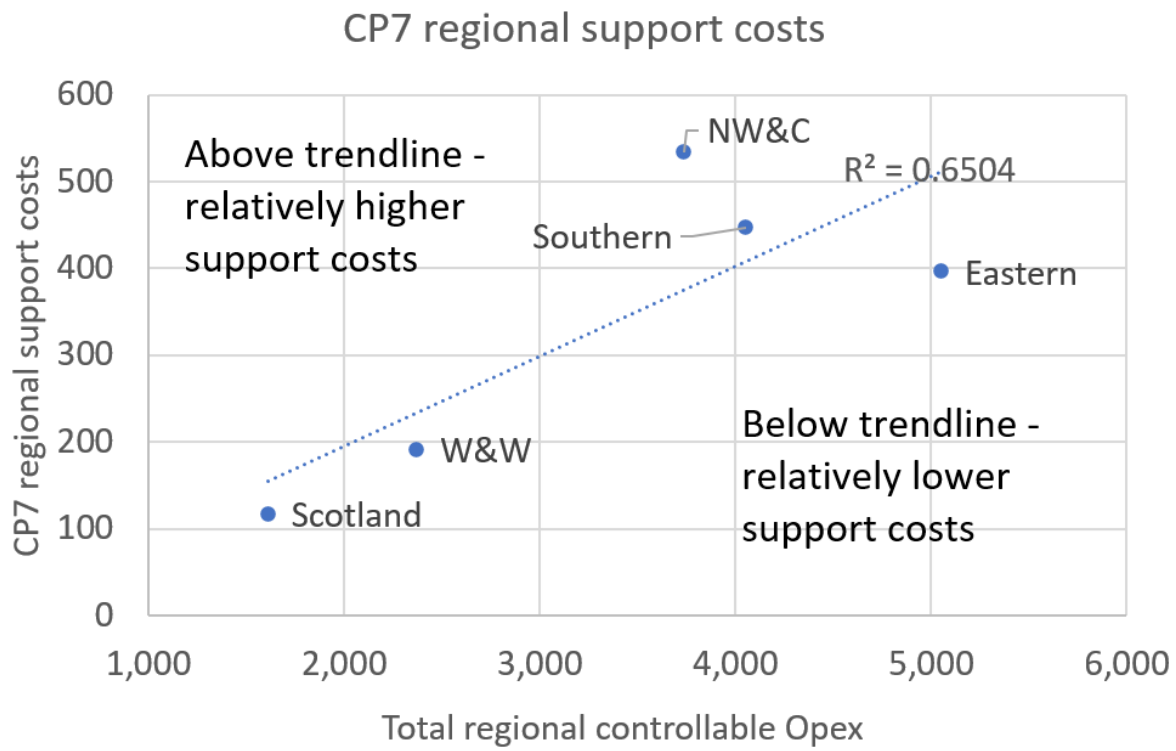
Region	CP7 regional support direct costs (£ million)	Total regional controllable opex (£ million)	Regional support cost as percentage of Total controllable opex
Eastern	396	5,056	7.8%
NW&C	534	3,740	14.3%
Southern	447	4,053	11.0%
W&W	191	2,374	8.0%
Scotland	117	1,665*	7.0%

*Source Network Rail draft determination response databook Financial Year 2023-24 prices (post-efficient) * includes Scotland targeted performance fund*

6.23 The support costs of NW&C and Southern region are a higher proportion of maintenance and operations costs than the other three regions. W&W, Scotland and Eastern have a lower proportion. This variation has not been explained by Network Rail. It is not explainable by the size of the region nor by the region's complexity in terms of the number of routes.

6.24 We then considered the size of each region to understand how regional geography affects support costs. We have used operations and maintenance costs as a proxy measure for the size of a region. A straight linear regression between support costs and operations and maintenance costs indicates a clear relationship between the two factors, albeit with a very small sample size. In general, the larger the total operations and maintenance costs, the larger the support costs. Noting the small sample size our findings are indicative of a trend as shown in Figure 6.2.

Figure 6.1 Operations and Maintenance Cost against Regional Support Costs



Source ORR analysis of Network Rail data Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

6.25 This analysis indicates that NW&C has relatively higher spend on support proposed for CP7 than other regions and Eastern's are lower. This is not readily explainable by any major factors and has not been explained by Network Rail.

National Functions support spend

6.26 We have also looked at the spend on support that national functions are anticipating for CP7. Route Services provides the largest share, at nearly half of all support costs. This is followed by Group, and then the System Operator and Corporate Services. Table 6.4 shows the proposed CP7 spend by National Function compared with CP6 spend.

Table 6.4 Comparison of National Functions CP7 spend to CP6

Region	CP6 (£ million)	CP7 National Function costs (£ million)	Percentage change
Group	1032	563	-45%

Region	CP6 (£ million)	CP7 National Function costs (£ million)	Percentage change
System Operator	449	431	-4%
Corporate Services	539	427	-21%
Route Services	1,719	1,606	-7%
Property	54	70	29%
Technical Authority	256	278	8%
National Functions Total	**4,049**	**3,375**	**-17%**

Source Network Rail databook draft determination response Financial Year 2023-24 prices (post-efficient)

6.27 There have been large changes between Network Rail's CP6 and CP7 costs. The main reason is that work has been devolved to regions, or it was from non-repeatable one-off costs, such as redundancy. These support costs are allocated to regions.

Conclusions on support

6.28 Support costs are a significant element of Network Rail's costs. They comprise 12% of the total network OSMR spend. The combined total of the regions' direct support costs, and the national functions support costs, which are allocated to the regions, is £5.1 billion. Combining support with operations, the total cost is £9.4 billion post-efficient.

6.29 Support costs varied during CP6. There was an increase in support costs with firstly devolution to the regions under Putting Passengers First, and then the one-off costs of the pandemic. Toward the end of CP6, support costs decreased as the management modernisation initiative reduced headcount.

6.30 We acknowledge Network Rail's commitment to achieve 10% opex efficiencies across CP7. But the overall financial challenge that the industry faces is significant. In our view, Network Rail can make further pre-efficient cost savings from its support functions.

6.31 We think that Network Rail can make an additional £150 million of costs reductions across Network Rail's support and operations activities. This represents 1.6% of support and operations expenditure.

6.32 It is difficult without access to the detail of Network Rail's plans to identify specific areas where cost reductions can be made without putting undue pressure on other parts of the organisation. We consider that there is scope for Network Rail to drive out cost savings from its support functions, which Network Rail is best placed to do ahead of CP7.

7. Environmental sustainability

Introduction

7.1 Network Rail's approach to environmental sustainability has developed through CP6, leading to the production of its Environmental Sustainability Strategy for 2020-2050.

7.2 The England & Wales HLOS identifies requirements to conserve and enhance biodiversity and the need for due regard to be paid to the requirements set out in the Rail Environment Policy Statement.

7.3 The England & Wales HLOS specifically highlights Network Rail's other obligations under the Environment Act 2021, the Government Environment Improvement Plan and DfT's Rail Environment Policy Statement. While we are not the enforcing body for these obligations, we must be aware of them, to hold Network Rail to account against the HLOS in CP7.

7.4 The Scotland HLOS includes requirements for weather resilience and risk assessment of the planned mitigating controls. There are also detailed requirements regarding measurement of carbon emissions.

7.5 In both HLOSs there were requirements to align to wider Government policy. The England & Wales HLOS sets out that Network Rail will continue to make progress against cross-cutting government sustainability and broader environmental targets and obligations, including contributing to the achievement of Net Zero by 2050, the Greening Government Commitments and the improvement of air quality. The Scotland HLOS requires Network Rail to play its role in reducing carbon emissions through the outcomes in Scotland's Railway Sustainability Strategy.

Consultation responses

7.6 Environmental sustainability was raised as a key issue in nine of the consultation responses from stakeholders across the industry, including trade unions and devolved government bodies.

7.7 Network Rail provided a detailed consultation response which covered several of the areas raised in our draft determination and is discussed in this document. However, Network Rail has not provided, despite requests, expenditure details for

environment and sustainability updated to reflect its move to the risk-adjusted plan in England & Wales.

7.8 A number of stakeholders raised the importance of adaptation and resilience of assets to the impacts of climate change and the need for plans to address these impacts. Management of risk and transparency of spend were also raised as important opportunities in this area.

7.9 Responses in other areas included Transport for Greater Manchester (TfGM) welcoming the increased awareness and implementation of sustainability measures. However, Transport for the North (TfN) raised concerns regarding the level of ambition related to the carbon forecasts, and whether they are compatible with the Government or TfN's goals of net zero by 2050 or 2045 respectively.

Network Rail – core renewals

7.10 Network Rail's England and Wales response included an increase in core renewals equating to £541 million and in Scotland £44 million including sustainable development funding which will improve asset resilience and adaptation to climate change.

Network Rail - carbon

7.11 The Network Rail responses included a confirmation that the regional carbon emissions forecasts for Southern would change from an 11% reduction to a 20% reduction, in line with our proposal in the draft determination.

7.12 All of the Network Rail regions also provided further detail on the carbon reductions and funding linked to decarbonisation activities. However, none of the regions included the effect of grid decarbonisation in these updates.

Network Rail – biodiversity

7.13 The Network Rail responses included a confirmation that the regional forecasts for net gain in biodiversity units would change for Southern and Scotland. Both regions have now adopted a 4% forecast for CP7, which we proposed in our draft determination to make them consistent with other regions.

7.14 Network Rail Scotland highlighted that the metric presents a number of challenges and limitations. The England and Wales response also raised the importance of qualitative metrics in this area to enable effective monitoring through CP7.

7.15 The Network Rail response stated it is exploring opportunities to increase the use of nature-based solutions when undertaking resilience improvements.

Network Rail - Weather resilience and climate change adaptation (WRCCA)

7.16 The Network Rail response stated that since we commented on the draft WRCCA plans, a consistent methodology for identifying maintenance and renewals activities has now been created. Network Rail stated it will include details in its final WRCCA plans (to be issued alongside its delivery plans in March 2024) and will engage with us throughout this process.

7.17 On the WRCCA plans the Network Rail response acknowledged the points raised in our draft determination on the need to clearly commit to outputs from all the activities planned; and provide sufficient clarity on funding for mitigation measures, the residual level of risk and how this is managed.

7.18 Our position on the changes to core renewals is discussed in Chapter 3 (renewals and maintenance). We see the increase in expenditure and focus on weather resilience as an improvement to the original plan. However, to ensure transparency and to allow effective monitoring, Network Rail must provide the information requested in the final delivery and WRCCA plans.

Changes from draft determination

7.19 Since the draft determination we have concluded the first phase of an independent reporter commission on the assessment of Carbon emissions scope 1 and 2 forecasts proposed by Network Rail.

7.20 The second phase of the independent reporter study is still in progress, which will assess Network Rail's response to the recommendations. Once the review has been completed, we expect Network Rail to engage with us and to produce a plan to address the independent reporter's findings and recommendations. We expect Network Rail to include with its delivery plan a detailed description of how it intends to calculate decarbonisation metrics.

7.21 In line with Network Rail's consultation responses and new evidence received, this chapter includes the following updates since our draft determination:

(a) Carbon emissions scope 1 and 2 forecasts for the Southern region;

(b) Evidence provided by the regions with regard to decarbonisation activities;

(c) Evidence and findings of the independent reporter work in the areas of targets, Zero Emission Vehicles (ZEV) plans and route services activities;

(d) Biodiversity forecasts for the Southern and Scotland region and evidence submitted by Network Rail regarding metrics in this area; and

(e) Evidence related to funding of weather resilience and climate change adaptation work and consultation responses provided by Network Rail in this area.

Methodology

7.22 Our review of Network Rail's plans followed the general methodology described in Chapter 2 (methodology). Any details specific to the methodology for environmental sustainability are outlined below.

7.23 Our review focussed on four areas, which reflect the requirements of the HLOSs, as well as our own judgement on key challenges going into CP7. These were:

(a) a low-emissions railway;

(b) a reliable railway service that is resilient to climate change;

(c) improved biodiversity of plants and wildlife; and

(d) minimising waste and maximising the sustainable use of material.

Network Rail's plan

Funding

7.24 The spend values provided by Network Rail are based on the SBP 'full plan' at the draft determination. Network Rail is currently revising these numbers to provide the risk-adjusted values in the delivery plan.

7.25 Network Rail Scotland's latest plans do not explicitly identify funding for biodiversity and circular economy. Our requirements in these areas are set out below.

Findings

Decarbonisation

Regions

7.26 Since our draft determination, the first phase of the independent reporter work assessed how Network Rail regions had constructed forecasts in each of the regional SBPs. The findings of this work indicated potential opportunities during CP7 to improve on forecasts provided by Network Rail and a clearer approach to show key contributing elements of scope 2 emissions.

7.27 The independent reporter recommended that Network Rail should undertake a detailed review of the ZEV transition programme and implement a strategy for successful delivery of the required infrastructure across Network Rail, which will allow for setting of appropriate leading and lagging performance indicators and setting the focus on infrastructure delivery before vehicle procurement. Network Rail's response to this recommendation will be assessed in phase two of the independent reporter's work.

7.28 Three of four regions within England & Wales (Eastern, NW&C and W&W) acknowledged the UK Government requirement of updating the fleet by December 2027. The Southern region identified funding for ZEVs but did not explicitly link this to a time-bound commitment. Whilst there is no specific target for ZEVs in Scotland, Scotland is adopting a broadly similar approach to England & Wales.

7.29 All regions identified other initiatives including: energy reduction; renewable energy generation; and alternative power sourcing. Further information and evidence of work on these initiatives has been provided to the independent reporter. However, Network Rail has not provided sufficient details and we expect this to be included in its final delivery plan.

7.30 The England & Wales SBP indicates a high-level commitment to source 100% of non-traction energy from renewable sources by 2030. However, it does not state the trajectory for achieving this during CP7. We will continue to engage with Network Rail in CP7 and hold it to account to deliver on this commitment.

7.31 Scotland's submission identified offsetting additional emissions above the SBP forecast to make it 'carbon neutral' by the end of CP7. Network Rail Scotland's response identified offsetting additional emissions above the SBP forecast to make it 'carbon neutral' by the end of CP7. We will continue to challenge Network Rail to firstly exhaust options for carbon reductions through better practices and designs, and where this is not possible, to pursue options for carbon offsetting

within its own estate and supply chain (referred to as carbon 'insetting') before considering offsetting through external bodies.

7.32 Although primarily aimed at Scottish public bodies, we draw Network Rail's attention to the guidance from the Scottish Government on Public sector leadership on the global climate emergency outlines good practices in this area. The emission reductions from carbon offsetting in Network Rail's plan are currently being assessed by the independent reporter and we expect Network Rail Scotland to action any findings from this work.

7.33 Circular economy is discussed by all regions. However, the level of funding identified in the plans vary and there is generally little detail on the activities planned and associated outputs. Shortly after the publication of the draft determination Network Rail informed us that it did not intend to progress the One Planet Indicator as a supporting measure. Without this metric there is a need to introduce a circular economy metric. This is discussed further in our PR23 final determination: supporting document – outcomes.

7.34 The current England & Wales and Scotland plans have not included clear commitments on reducing infrastructure whole-life carbon or scope 3 emissions by the end of CP7. We expect all Network Rail regions to provide a regional baseline and forecasts of the whole-life infrastructure carbon emissions measure for the remaining years of CP7 in its delivery plan. We expect Network Rail Scotland to also develop a baseline for the Carbon emissions scope 3 measure and to include forecasts of this measure for each year of CP7 in its delivery plan. We expect reporting of this measure to commence at the start of the control period.

National Functions - decarbonisation

Technical Authority

7.35 The Technical Authority submission highlights the following requirements from the Sustainability Strategy: completion of transition of fleet cars and small vans by 2027; assets to transition away from natural gas by 2029; and improvements in the purchasing of traction electricity. The decarbonisation work programmes that it proposed to deliver under its full plan in CP7 includes feasibility studies for low carbon traction (£0.9 million); demonstrator projects for renewables and battery storage (£0.9 million); whole life carbon tools (£0.6 million); and traction decarbonisation (£3.5 million). These are not expected to change significantly under the risk-adjusted plan, however, Network Rail will need to confirm in its delivery plan.

7.36 We found that some of the above items lack specific measurable targets and key milestones. We will continue to engage with Network Rail in CP7 and hold it to account to deliver on these commitments.

7.37 The Technical Authority submission did not set out its contribution or forecast for reduction in scope 1 and scope 2 emissions through CP7. However, its submission did indicate that it will lead development of whole life carbon tools, as an enabler for reducing scope 3 emissions during CP7, by the regions and other central functions.

Route Services

7.38 Route Services set out that it will provide the processes, tools and standards along with capability to contribute towards Network Rail's decarbonisation strategy through: large-scale energy solutions; low whole-life carbon designs; deployment of ZEVs; science based targets for its sourcing strategy; and adopting an approach in line with a circular economy.

7.39 Route Services also indicates that it will use its purchasing power to leverage regional solutions for: energy efficiency / performance contracts; Power Purchase Agreements (PPAs); low-carbon lineside buildings and station components; and incentivising supply of 'green steel' from electric furnaces.

7.40 The Route Services plan states that the decarbonisation targets are 'ambitious, stretching goals', and these include: purchase of 100% non-traction electricity from renewable sources by 2030; transition of all car and van fleets to ZEV by 2027; and the entire fleet by 2030. Route Services' plan however did not include clear commitments on how these goals will be delivered. The independent reporter work has also raised concerns that Route Services had not fully quantified its impact on Scope 1 and 2 emissions and subsequently produced a plan to address this. Recommendations have been made through this work

7.41 Route Services highlighted in the SBP that there is a risk the business will not be able to meet the target for 100% of the car and van fleet to be ZEVs by 2027, due to funding constraints. This risk has not however, been set out or mitigated in the regional SBP submissions, or in the Chief Environment Officer's commentary and commitments. As discussed earlier in this chapter, the independent reporter raised concerns regarding delivery of the ZEV project and recommendations have been made through this work.

7.42 Route Services also set out an ambition to facilitate a 75% reduction in carbon in infrastructure compared to the CP6 baseline and details a number of activities to

achieve this. There are also high-level commitments around scope 3 emission reductions and adoption of a circular economy, but these are not supported with any further detail. Some of these processes are to a degree already in place in CP6 through, for example, the Green Catalogue and Network Rail Surplus App.

7.43 Route Services has provision for circa £33 million for a national decarbonisation programme through supply chain operations, but no detail on how this breaks down was provided. The SBP indicates that current electricity procurement is around £500 million per year. The Route Services plan is not expected to change significantly due to the move to the risk-adjusted plan.

System Operator

7.44 No funding has been set out specifically for decarbonisation within the System Operator's plans. However, it states it will support decarbonisation through supporting rail electrification, battery and hydrogen schemes and improving freight capacity and competitiveness, driving a shift from road to rail.

7.45 The System Operator's updated plan indicated that it will use a revised scope 1 and 2 emissions target of an 18% reduction to shape and monitor performance in its own function. However, it did not set out details on how this will be achieved.

Biodiversity

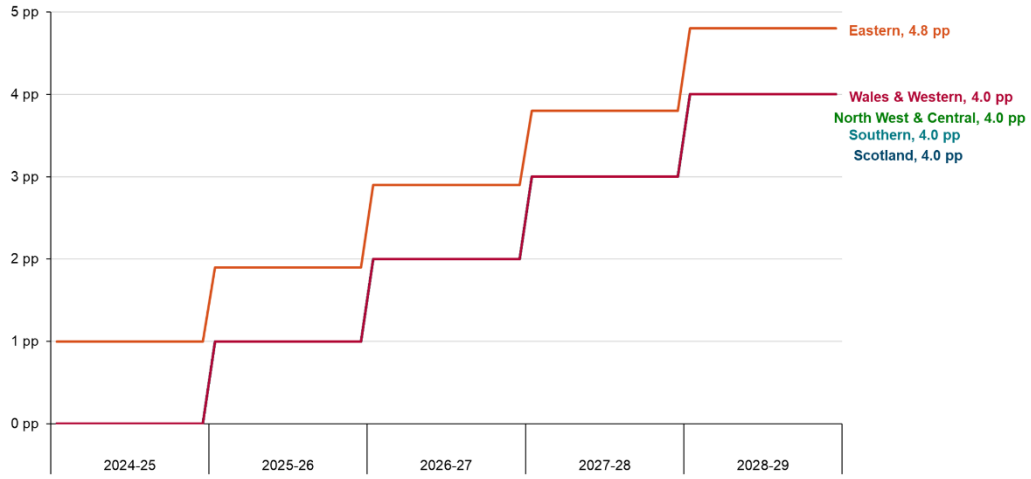
Regions

7.46 The 'biodiversity units' metric is a habitat-based approach used to assess an area's value to wildlife. The metric uses habitat features to calculate a biodiversity value.

7.47 In our draft determination we raised the need for the Southern and Scotland regions' forecasts for biodiversity to align to technical authority guidance and other regions.

7.48 The Network Rail responses included a confirmation that the regional forecasts for biodiversity would change for Southern and Scotland. Both regions will set a 4% forecast for CP7, aligned to our draft determination and other regions.

Figure 7.1 Network Rail proposed CP7 forecasts for biodiversity units (updated in response to our draft determination)



Source Network Rail draft determination response

7.49 Network Rail Scotland highlighted that the metric presents a number of challenges and limitations. The England and Wales response also raised concerns about the margin of error that must be considered in monitoring year-on-year percentage changes and the importance of qualitative metrics through CP7.

7.50 Our position is that it is vital to have a metric in this area to demonstrate biodiversity improvements. We are also aware that Network Rail have worked with stakeholders to develop the current metric which is the foundation of its state of nature reporting. However, as stated in the draft determination, the biodiversity units metric is still relatively new, the forecasts set are top down and there is uncertainty around these until further data is available. We will continue to work with Network Rail through CP7 with regards to this metric; any complementary metrics that may be developed to meet the requirements of the Welsh and Scottish governments; and qualitative metrics to support our holding to account.

7.51 Information provided by the Technical Authority at the time of the SBP clarified that £54 million of spend is included in the regional plans for biodiversity. Again, this is not expected to change significantly as part of the move to the risk-adjusted plan.

7.52 In England & Wales, proposed expenditure on biodiversity has significantly increased from CP6 to CP7 to reflect the requirements of the HLOS. However, the details of the work to be undertaken and volumes to be delivered have not yet been provided to us. In its response Network Rail has stated this will be developed as it progresses the CP7 delivery plan, particularly in relation to vegetation management plans.

7.53 Our draft determination highlighted funding for biodiversity in Scotland was limited to £0.3 million identified for the management of invasive species. Network Rail Scotland has stated that it is currently in the process of finalising its CP7 biodiversity delivery plan and aims to deliver biodiversity improvements by leveraging workstreams and resources within its existing core processes, for example the vegetation management strategy. While the extent of biodiversity improvements through the vegetation management strategy is yet to be finalised, Network Rail Scotland believes that this is the most cost effective way to achieve the target by the end of CP7. We will continue to engage with Network Rail Scotland in CP7 to ensure its approach to funding biodiversity improvements is delivering benefits.

7.54 Southern and Eastern discuss offsetting in the plans and NW&C has also stated in its response that it will attempt to follow the biodiversity offsetting hierarchy where practicable but some projects may require the purchase of biodiversity offsets. We will continue to challenge Network Rail to exhaust options for improving biodiversity through better practices and designs, before considering offsetting. If Network Rail is to use projects outside the rail corridor for offsetting, then it must reflect established best practice and provide clarity on the long-term maintenance commitments.

7.55 The England & Wales HLOS identifies wider requirements in this area (and the area of resilience) associated with working with landowners and considering nature-based solutions. Information provided in the SBP was limited in both areas. Work planned in this area varies between regions, however we identified that NW&C committed to six projects and Eastern identified opportunities in this area. However, even in these regions there was limited detail on this work and the expected outputs.

7.56 Network Rail is exploring opportunities to increase the use of nature-based solutions when undertaking resilience improvements and will collaborate with third parties to support activities undertaken outside the railway boundary (e.g. catchment based flood management schemes). The W&W and NW&C regional responses also commit to increase the use of nature-based solutions when undertaking resilience improvements and to collaborate with third parties.

7.57 The Scotland HLOS requires Network Rail to work in partnership with Scottish Rail Holdings, ScotRail Trains Ltd. and other external stakeholders to deliver its net zero, climate change adaptation and sustainability objectives while contributing to related Scottish Government objectives. In the Scotland SBP there were no details of spend on partnership schemes with external parties, or an approach set out for

how Network Rail Scotland will work with third parties to deliver nature-based and partnership scheme solutions as required by the HLOS. We expect Network Rail's delivery plan to set out its approach in these areas.

National Functions - Biodiversity

7.58 Some elements of the central functions' plans and targets clearly align to the requirements of both HLOSs. Notably the Technical Authority's SBP submission indicated a plan to spend £0.6 million, to measure network-wide biodiversity annually and to develop a land use management strategy for improving biodiversity. However, the SBP did not set out in sufficient detail how Network Rail will deliver its plans in line with other obligations under the Environment Act 2021; and contained no detail on how Network Rail's plans will contribute towards delivery of the Government Environmental Improvement Plan and environmental targets.

7.59 There was also limited detail to demonstrate consideration of all aspects of the Rail Environment Policy Statement, or how the Technical Authority and other central functions can help support and enable regions to consider nature-based solutions when undertaking resilience improvements. We expect Network Rail's delivery plan to set out its approach in all of these areas.

Weather Resilience and Climate Change Adaptation (WRCCA)

Regions

7.60 The Scotland HLOS requires Network Rail to maximise planned renewals with the intention to improve resilience to risk exposure. The final SBP for Scotland, issued after we produced our draft determination, identifies £496 million for weather and climate resilience which is a £16 million increase on the spend of £480 million which is the cost provided by the TA for the draft determination.

7.61 The England & Wales HLOS requires railway infrastructure to be as resilient as reasonably practicable to the effects of climate change and extreme weather, with the focus on climate change adaptation. The England & Wales SBP identified circa £1 billion of spend on improving resilience to extreme weather and climate change. This spend was identified in two ways:

(a) dedicated weather resilience activity (i.e. activities that are being undertaken solely for the purpose of improving the network's resilience to extreme weather);

(b) business as usual activities with weather resilience benefits (i.e. maintenance and renewal activities which are driven by both poor asset condition, as well as extreme weather and climate change challenges).

7.62 The England and Wales draft determination response includes an increase in core renewals of £541 million. Network Rail confirmed that this will lead to an increase in work with benefits to weather resilience and climate change adaption. However, the full detail is not available at present.

7.63 Network Rail's response acknowledged the points raised in our draft determination regarding the need to clearly commit to outputs from all the activities planned; provide sufficient clarity on funding for mitigation measures; and clarify the residual level of risk or how this is managed. Network Rail is seeking to address this as part of its final WRCCA plans and will engage with us throughout this process.

7.64 In the SBP all regions identified the importance of maintaining spend for drainage and earthworks through CP7. Additional core renewals spend on earthworks is discussed in chapter 3 (renewals and maintenance). Regions also acknowledged the need to address actions from the Lord Mair and Dame Slingo taskforces.

7.65 The Scotland HLOS requires Network Rail's WRCCA plan to set out the main threats and mitigations. We found that the WRCCA plan achieves this. The Scotland HLOS also requires "risk assessment of the planned mitigating controls, including operational responses, that relate to environmental-related failures of earthworks, drainage or structures and revise these, if required, to address any areas of weakness identified by the risk assessment". The SBP and WRCCA plan do not at this stage provide sufficient clarity on funding for mitigation measures, the residual level of risk or how this is managed. We expect this to be included in Network Rail's final delivery plan.

7.66 The England & Wales and Scotland HLOSs both require a longer-term planning approach. We found that regions vary in the level of detail they provide in this area, but all reference "adaptation pathways" which will be implemented in CP7. Funding was identified in the Scotland plan, but this is not clearly set out in the England & Wales regional plans.

7.67 The England & Wales and Scotland HLOSs also require collaboration with relevant stakeholders, to manage weather resilience efficiently, as a system. This aligns with the requirement to work with landowners and consider nature-based solutions. In 2021 we published a series of TARs which found that Network Rail had achieved significant risk reductions at relatively low costs through

collaborative and nature-based approaches, notably on flood protection schemes, see our Targeted Assurance Review on weather resilience for more detail. However, these were individual projects and we recommended more sharing of best practice and wider adoption of these approaches across the network.

7.68 None of the regional plans or draft WRCCA plans identify cost efficiency savings that could be achieved by delivering partnership and / or nature-based solutions. However, as discussed above, the England and Wales response from Network Rail states that it will provide an update on this as part of the final WRCCA plans.

7.69 The England & Wales HLOS requires assessment of "all possible types of extreme weather events across all asset classes" to be carried out by each region. There is uncertainty around the scope of all possible extreme weather events, so our review considers whether Network Rail has taken a proportionate approach to mitigating foreseeable events. Overall, we found that the approach to developing the WRCCA plans was proportionate but, as noted above, there was a lack of detail around outputs and mitigations.

7.70 In Wales there are additional government requirements regarding coastal squeeze and habitat compensation. The W&W plan highlights work undertaken in CP6 with third parties and references a memorandum of understanding with Natural Resources Wales. However, limited detail is provided on how this will address coastal squeeze or habitat compensation. Further information was provided by the region in its draft determination response stating parts of the railway also form the sea defence in some coastal areas. As "maintenance on the same footprint" is not included in legislation in relation to coastal squeeze, there are no schemes currently planned in CP7 which would require extension outside of the existing sea defence footprint.

National Functions – Weather resilience and climate change adaptation

Technical Authority

7.71 The Technical Authority submission includes a funded commitment to develop a long-term adaptation pathways strategy and to agree service level agreements with the regions for extreme weather events. In our view adaptation pathways are an important initiative and we will hold the Technical Authority to account to deliver the associated benefits.

Route Services

7.72 The SBP includes provision for a 'Weather Services Platform' within the Route Services 'Infrastructure Monitoring and Intelligent Infrastructure' workbank. This is intended to improve weather monitoring and allow better planning and response to

extreme weather. However, the SBP does not provide details of the scope, funding or a committed timeline to deliver this platform. The £116 million set out in the SBP for the national 'Intelligent Infrastructure' programme includes a strategic objective for system resilience including climate change, but again there is no detail on capex or opex spend directly associated with the Weather Services Platform. We have discussed our concerns about poorly defined scope on technology projects in Chapter 4 (National Functions).

7.73 The Route Services plan does not include climate change impacts in its risk assessment and how this might impact on its operations.

System Operator

7.74 The System Operator's stated approach for CP7 is to complete the actions agreed by Network Rail following the Weather Risk Taskforce and transition this to business as usual. Its focus is on developing tools, training/competence and business changes to ensure Network Rail improves safety for rail passengers, in the event of more frequent or more severe extreme weather. This includes recommendations from the Dame Slingo and Lord Mair taskforces, as well as RAIB and industry reviews of the Carmont accident. We will continue to engage with the System Operator to ensure benefits are being realised from these actions.

Efficiencies from climate change adaptation and decarbonisation

7.75 The England & Wales HLOS states the "SoS expects ambitious yet realistic approaches where the achievement of further efficiencies is no longer appropriate, throughout all of these including considerations for making progress on climate change adaptation and decarbonisation within delivery".

7.76 In general, we found that Network Rail has identified potential efficiencies through environmental and sustainability improvements, but further work is needed to define the value of outputs and to quantify potential cost savings.

7.77 The Network Rail submission included a 'Delivering an efficient railway' summary report, which identified the intention to reduce energy usage and carbon footprint through the use of Solar Cells. However, the potential efficiency was not quantified.

7.78 Through our challenge sessions with Network Rail, we found that regions expect potential efficiencies through environmental and sustainable development activities. However, these efficiencies have not yet been quantified in the regional plans.

7.79 The Technical Authority has not quantified any efficiencies relating to environmental sustainability. However, reference is made to industry reform opportunities for CP7. The Technical Authority submission notes engagement with third parties and the Environment Agency on WRCCA solutions but does not quantify potential efficiency savings. This is an area we consider could be further explored by Network Rail and it has acknowledged this in its England and Wales consultation response.

7.80 Route Services' SBP submission sets out supply chain operations enabled efficiencies of approximately £61 million; this is expected to change slightly in the delivery plan. Route Services has not identified efficiencies directly relating to carbon emission reductions.

7.81 The SO submission did not set out any efficiency savings through environmental and sustainability initiatives.

Social Value

7.82 The England & Wales HLOS requirements include "optimising the social value of rail infrastructure to as great an extent as is reasonably possible".

7.83 All regional plans identified social value and the need to undertake activities in this area. We found that regional plans and consultation responses contained varying levels of detail on activities planned, spend required and measurement of outputs (for example RSSB has produced a tool for measuring social value).

7.84 The Technical Authority SBP submission included a commitment to support the adoption of a social value tool for projects in CP7. The submission did not include any specific funding for delivering social value outcomes, however it did set out capex funding for enablers for improving capability and systems, and for integrating strategies which may address social value.

7.85 The Route Services SBP submission made a commitment to apply the Social Value Framework and related policies to its activities. However, the submission does not provide detail on spend or expected benefits associated with this commitment.

7.86 The System Operator submission included high level commitments to increase the understanding of social value in the function, to ensure compliance with the Social Value Act and Social Value Framework. However, the submission did not provide any further detail on planned activities associated with this commitment.

Other obligations

7.87 The England & Wales HLOS highlights Network Rail's other obligations under the Rail Environment Policy Statement and the Environmental Improvement Plan. Network Rail's SBP states: *"We are continuing to understand the full impact of any new targets from the Environmental Improvement Plan on the railway and will continue to monitor updates in legislation and government policy and evolve our strategy where necessary".*

7.88 We did not find any clear discussion of the Rail Environment Policy Statement in the SBP. While we are not the enforcing body for these obligations, they are listed in the HLOS requirements, so we would expect Network Rail's final delivery plans to set out how it will contribute to any forecasts and commitments clearly.

Conclusions on environmental sustainability

7.89 Expenditure on environmental sustainability is increasing from circa £0.9 billion in CP6 to circa £2.2 billion in CP7; consisting of £1.5 billion in England & Wales regions, £0.5 billion in Scotland and £0.2 billion in National Functions. This is consistent with the focus in the HLOSs and the level of ambition within Network Rail, which we support. Most regions have also included asset renewals with weather resilience benefits, which further increases the expenditure in this area. We have concluded that this increase is reasonable, but Network Rail needs to ensure the expenditure is linked to clear commitments, so we can hold Network Rail to account effectively in CP7.

7.90 The England and Wales response to our draft determination included an increase in core renewals by £541 million. Network Rail confirmed that this will lead to an increase in work with benefits to weather resilience and climate change adaption, the detail of which we look forward to receiving in Network Rail's delivery plan.

7.91 The Southern region has augmented the scale of scope 1 and 2 carbon emissions reductions as a result of our challenge in the draft determination, and now all regions are at a level we deem to be in line with HLOS requirements. We support the independent reporter's conclusion from the first phase of its work, that there is a need for improved clarity and consistency around the impact of grid decarbonisation.

7.92 The independent reporter's initial work, and further information provided by Network Rail as a part of this, has indicated that it expects Network Rail to outperform its forecasts which are aligned with what we set in the draft determination. Based on these findings we view the carbon emissions scope 1 and

2 forecasts above as a minimum requirement for the levels of performance we expect in CP7.

7.93 Once the independent reporter has been concluded, we expect Network Rail to engage with us and to produce a plan to address recommendation made from both phases of the independent reporter's assessment. We expect Network Rail to include with its delivery plan a detailed description of how it intends to calculate decarbonisation metrics.

7.94 The consultation responses from Southern and Scotland included confirmation that the regional forecasts for biodiversity net gain will increase to 4% for CP7. This is the minimum level set by other regions and we welcome the increased ambition from Southern and Scotland. Regional forecasts are set out in our PR23 final determination: supporting document – outcomes.

7.95 Network Rail's responses to our draft determination have stressed the importance of qualitative measures for biodiversity and we will work with the regions on this. However, we also expect England & Wales regions to provide further detail in their final delivery plans on actions and volumes planned, to achieve their biodiversity targets.

7.96 Network Rail regions have not provided sufficient detail on how they will meet the December 2027 target for ZEVs. This was also identified by the independent reporter. We expect Network Rail to include clear commitments on ZEVs in its delivery plans. We also require Network Rail to address the recommendations made by the independent reporter in this area, and to provide more robust investment plans for charging infrastructure.

7.97 The England & Wales SBP and interim Scotland SBP indicated a high-level commitment to source 100% of non-traction energy by 2030 from renewable sources. In the delivery plan, Route Services should clearly set out the commitment and detailed plans to achieve this goal.

7.98 We concluded that the W&W region's WRCCA plan was not following best practice by excluding condition-driven renewals in its weather resilience benefits and expenditure. We require the W&W region to include details of this spend in its final WRCCA plan.

7.99 Further information has been provided by the W&W region regarding coastal squeeze. However, the delivery plans should provide clarity on how costs arising in this area and the area of habitat compensation (which are specific requirements in Wales) will be managed in CP7.

7.100 We concluded that regional WRCCA plans correctly identified current risks and issues but provided limited detail on the outputs delivered by the work listed in the WRCCA and the residual risks. This has been acknowledged in Network Rail's response to our draft determination. We expect regions and central functions to provide more information on this in the WRCCA delivery plans. Similarly, we expect delivery plans to include further details on adaptation pathways.

7.101 We expect Network Rail to provide details of efficiencies relating to environmental sustainability in its delivery plans. Additionally, Network Rail will need to provide evidence of the approach to look for improvements in biodiversity and decarbonisation where financial efficiencies cannot be achieved (as stated in the HLOS).

7.102 We have engaged with Network Rail regarding supporting metrics through the PR23 process and our decisions in this area are captured in the PR23 final determination: supporting document – outcomes. We expect to see these measures set out in detail in Network Rail's delivery plans, wherever possible.

7.103 We recognise that work is ongoing to develop practical measures in areas including nature-based solutions, partnerships with other stakeholders, 'circular economy' and social value. We expect Network Rail to include clear commitments in its delivery plan wherever possible, but we recognise that development of some measures will be ongoing at the start of CP7.

8. Digital signalling

Introduction

8.1 Network Rail included allocated expenditure of £1.7 billion in its SBP. In our draft determination we asked Network Rail to review its plans and we considered a 15% reduction in expenditure (circa £255 million) could be achieved in CP7 through re-profiling digital signalling renewals into later years of CP7 and into CP8. We also considered unit rates could be reduced through ongoing learning from the East Coast Digital Programme (ECDP) and research, development and innovation (RD&I) programmes.

8.2 The spend for digital signalling supports the migration to European Train Control System (ETCS) on some of Network Rail's core signalling assets. ETCS utilises in-cab technology and removes the need for line-side signals on the network. This requires the industry to work collaboratively to expand the signalling market.

8.3 The England & Wales HLOS requires the continued adoption of digital signalling aimed at improving asset sustainability, increased capacity, safety and reliability to provide greater value for money. The Secretary of State recognises in the HLOS that renewing the network digitally at the point of renewal represents the most cost-effective way to transition to an ETCS railway. The HLOS also requires Network Rail to apply a strong and robust efficiency challenge across the digital signalling portfolio.

8.4 Scotland's HLOS notes the different strategy being adopted in England & Wales and states that Scottish Ministers consider the deployment of digital signalling does not align with Scotland's strategic priorities at this time. Instead, Network Rail Scotland will continue to develop its strategy focused on 'line of route' conventional signalling renewals and extending asset life.

8.5 We support the deployment of digital signalling across the network in England & Wales. We also recognise Network Rail Scotland's current position and the continued development of its signalling strategy, noting that there may be opportunities in future control periods for Network Rail Scotland to transition to ETCS technology on parts of its network.

8.6 We consider that the deployment of digital signalling will help to mitigate cost spikes in future control periods due to a bow-wave of signalling renewals. This is because deployment should support a reduction in the cost per unit, which are

referred to as Signalling Equivalent Units (SEU's). These are anticipated to be lower in future control periods when renewing digitally, compared with renewing conventionally. Additional safety and performance benefits are also expected but these are harder to quantify.

Consultation responses

8.7 Network Rail was the only respondent on digital signalling. We have summarised its response below with further detail provided in this chapter.

(a) Network Rail is not proposing to reduce the spend for cab fitment or digital signalling enabling projects, instead it proposed to 'soft ringfence' these elements of the digital signalling portfolio;

(b) It has proposed to reduce spend on digital signalling infrastructure renewals; and

(c) It has proposed to reduce spend for OTTO (Optimised Train Track Operation) and alter the activities it will deliver as part of this programme.

Changes from draft determination

8.8 In our draft determination, we asked Network Rail to review its plans for digital signalling considering affordability and deliverability challenges. The changes to the digital signalling portfolio are:

(a) as with the rest of Network Rail's plans, it has moved to the risk-adjusted plan. Other spend has been reduced. £269 million, which Network Rail originally assumed could be drawn down from the central risk fund, has been removed;

(b) re-profiling of digital signalling renewals into CP8 which has led to a reduction in CP7 spend of circa £123 million;

(c) reduction of £30 million spend for research and development on OTTO;

(d) pre-efficient cost challenge of 10% on SEU rates for digital signalling renewals; and

(e) a 'future opportunity' to reduce a proportion of spend in IPDR (fleet fitment and enabling projects) to account for plans continuing to mature during CP7, be it through changes to phasing or natural slippage.

Methodology

8.9 We have followed the general methodology described in Chapter 2 (methodology). Any details specific to the methodology for digital signalling are set out below.

8.10 During CP6 we assessed Network Rail's digital signalling plans through:

(a) TARs, where we have reviewed Network Rail's plans to understand the benefits, enablers and constraints. We worked closely with industry to understand the capability and capacity of the supply chain to deliver on these plans;

(b) our signalling market study which was published in November 2021 where we made several recommendations aimed at expanding the railway signalling market and encouraging suppliers to compete on cost, quality, and innovation; and

(c) in Autumn 2022 we also provided advice to Ministers in England & Wales & Scotland, specifically on the deployment of digital signalling in CP7.

8.11 Since we published our draft determination in June 2023, we have continued to work with Network Rail and industry to review Network Rail's plans for the deployment of digital signalling in CP7.

Network Rail's plan

8.12 Network Rail Scotland is not proposing to carry out infrastructure renewals using ETCS in CP7 and will therefore only contribute to funding some enabling projects, RD&I and CP6 legacy projects which benefit the whole network. Scotland's contribution to the digital signalling portfolio in IPDR is expected to be £10 million which funds network wide enabling activities. Network Rail Scotland will also contribute to some spend (circa £10 million) in Route Services and Technical Authority which will support the deployment of digital signalling. This was agreed between Network Rail and Transport Scotland as the funding is focussed on RD&I which will benefit the whole network. Network Rail Scotland will not contribute to other central costs that Network Rail incurs for digital signalling deployment, unless and until it agrees to the adoption of ETCS in its Signalling Scotland's Future Strategy for signalling. These costs will be logged and will be allocated to Network Rail Scotland in the future.

8.13 Network Rail's draft determination consultation response includes proposed spend of circa £1.5 billion for the deployment of digital signalling in CP7, this is a circa

£150 million reduction since its SBP. This consists of infrastructure renewals in the regions, fleet fitment and enabling projects in IPDR, CP6 legacy projects and research and development projects. The below table sets out Network Rail's proposed expenditure for digital signalling included in its draft determination response.

Table 8.1 Change in proposed spend from SBP to draft determination response

Programme	Region / Business unit	Proposed CP7 spend (£ million)	Change since draft determination (£ million)
Infrastructure renewals	Eastern, NW&C, Southern, W&W	557	-123*
Fleet fitment	Eastern region Industry Partnership Digital Railway (IPDR)	699	0
Enabling projects	Eastern region Industry Partnership Digital Railway (IPDR)	121	0
Research, development and innovation projects	Technical Authority	68	-30
CP6 legacy projects	Route Services	60	0
Total		**1,506**	**-153**

*Source Network Rail response to draft determination, 2023-24 prices (post-efficient), risk-adjusted; *Excludes £62 million of reduction on WCML(N) to avoid double-counting.*

8.14 We have also reviewed projects which support the deployment of digital signalling in Route Services (CP6 legacy projects) and Technical Authority (RD&I projects including OTTO and Target £190k plus which are discussed later in this chapter.

8.15 Network Rail's digital signalling portfolio requires the regions and business units to work together with external stakeholders to deliver projects and programmes which will each contribute to the successful deployment of digital signalling. We set out the proposed spend and objectives of each of these spend areas below.

Digital signalling infrastructure renewals

8.16 Network Rail included proposed spend of £742 million in its SBP for digital signalling renewals. In its draft determination response, it included spend of £557 million for digital signalling renewals. Network Rail has made the following changes to its digital signalling renewals:

(a) re-phased renewals in NW&C which are part of the WCML(N) programme making a circa £123 million reduction;

(b) applied an efficiency challenge to ECDP of circa £25 million; and

(c) proposed changes to Midland Mainline South St Pancras of approximately £37 million.

8.17 As part of the re-phasing of the renewals in the WCML(N) programme, there have also been other reductions made by the region, approximately £62 million of which are associated with digital signalling. We have included these proposed reductions in the overarching WCML(N) portfolio rather than the digital signalling portfolio. We discuss this in more detail in Chapter 3 (renewals and maintenance).

8.18 Table 8.2 sets out the proposed spend for digital signalling renewals in England & Wales in CP7.

Table 8.2 Digital signalling infrastructure spend in CP7

Region	Infrastructure renewal project	Proposed CP7 spend (£ million)
Eastern	ECDP	237
Eastern	Midland Mainline South St Pancras	8
NW&C	WCML(N) Warrington, Preston and Carlisle	305
Southern	Brighton Mainline South Haywards Heath	7
W&W	Great Western Mainline Paddington to Hayes	0.2
Total		**557.2**

Source Network Rail Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

8.19 Delivering the benefits of infrastructure renewals requires Network Rail to successfully deliver fleet fitment and enabling projects in advance of commissioning the renewals. This is because train fleets must be fitted with the relevant technology so they can run on the network and train drivers must be trained to use the new signalling system, gaining the required competence.

Fleet fitment

8.20 Network Rail included £699 million for fleet fitment split across passenger, freight, heritage and charter and on-track machines (OTMs) in its SBP. This spend is allocated to the IPDR budget in the Eastern region. It has not made any changes to the funding request for fleet fitment in CP7. However, as discussed earlier in this chapter and in line with Network Rail's move to the risk-adjusted plan, the £269 million was not allocated in Network Rail's SBP and therefore was not considered in our draft determination. It is therefore essential that Network Rail continues to refine its fleet fitment plans and ensures they are linked to the renewals programme.

8.21 The strategy for fleet fitment aligns closely with the digital signalling renewals as they are intrinsically linked, with fleet fitment needing to be completed before the digital infrastructure can be used. Fleet fitment is a substantial 'up-front' activity with much of the spend occurring in CP7. It must be co-ordinated alongside wider changes to fleet strategy and fleet availability across industry.

Enabling projects

8.22 Network Rail included proposed spend of £121 million for enabling projects, allocated to the Eastern region in its SBP. It has made changes to the proposed spend. The enabling projects are set out in Table 8.3 and support the deployment of digital signalling in CP7.

Table 8.3 Digital signalling enabling projects spend in CP7

Enabling projects	Aims and objectives of the project	Proposed CP7 spend (£ million)
Market application readiness	Development of supplier framework contracts which support a partnership approach and include a contribution to signalling product development to assist in meeting network wide requirements	50
Driver competence retention	Includes provision to develop and deliver systems for drivers to maintain ETCS competency once	5

	trained to support efficient migration to ETCS signals	
Industry network management systems for ETCS	Develops a consistent approach for the support and maintenance of various systems required to manage an ETCS railway	12
Parallel proving	Prove the initiatives which deliver greater efficiency or reduce the unit cost of ETCS renewals	5
Industry partnership portfolio capacity	Develops internal, industry and centre of excellence capability to support the deployment of digital signalling	49
Total		**121**

Source Network Rail Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

Research, development and innovation projects

8.23 In the SBP Network Rail included proposed spend of £98 million for RD&I projects associated with digital signalling in CP7; these projects are allocated to the Technical Authority budget. Since our draft determination Network Rail has proposed changes to the OTTO RD&I programme, reducing spend on this programme by £30 million, which reduces the total RD&I spend for digital signalling to £68 million. It will continue with some areas of the OTTO programme, for example, possession and speed restriction management systems.

8.24 The proposed spend and objectives of digital signalling projects in the Technical Authority are set out in Table 8.4.

Table 8.4 Digital signalling research development and innovation projects spend in CP7

Research, development and innovation projects	Aims and objectives of the project	Proposed CP7 spend (£ million)
Target £190k Plus	Aims to reduce Network Rail's SEU rates down to £190,000. The project has six focus areas each with its own benefits and outputs	25
Various RD&I projects (formally called OTTO)	Aims to introduce some of the benefits of ETCS faster than the Long Term Deployment Plan (LTDP). It does not replace the need for ETCS renewals or the LTDP	43
Total		**68**

Source Network Rail Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

CP6 legacy projects

8.25 Network Rail included proposed spend of £60 million for CP6 legacy projects in its SBP. It has not made any changes in its draft determination response. These projects are fitment of ETCS on-board OTMs and development of training capability in the maintenance, renewal, operation and enhancement of ETCS technology in Route Services' plans. The proposed spend is set out in Table 8.5.

Table 8.5 Digital signalling CP7 spend on legacy projects

CP6 legacy projects	Aims and objectives of projects	Proposed CP7 spend (£ million)
Fitment of ETCS onboard OTMs	Fitment of OTMs and associated business change for East Coast Digital Programme (ECDP)	41
Development of training capability in the maintenance, renewal, operation and enhancement of ETCS technology	Development of training to enable a competent workforce both on and off track, in support of ETCS deployment schemes in CP7 and future control periods	19
Total		**£60**

Source: Network Rail databook Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

Findings

8.26 We recognise the achievements of Network Rail and industry to date in developing the digital signalling portfolio. Significant progress has already been made in CP6 to understand the capability and capacity of industry to deliver the planned digital signalling renewals in CP7 and future control periods.

8.27 This work has driven the development of a whole industry strategy to migrate to ETCS. This strategy includes plans for fleet fitment across passenger, freight, OTMs and heritage and charter trains. It also includes the associated enabling requirements such as training and competence, RD&I and the recently developed train control systems framework. This is a programme for the procurement of major signalling renewals that aims to appoint four suppliers onto ten-year framework contracts to deliver ETCS infrastructure works.

8.28 We expect competition between third party suppliers of signalling projects to be a key driver of value for money over this period, with the Competition and Markets Authority's (CMA) final merger decision being a key enabler of this competition. The CMA's enquiry cleared Hitachi's purchase of the Thales Ground Transportation business, subject to Hitachi's agreement to sell off its existing UK mainline signalling business.

8.29 During CP6 and throughout PR23 we have identified concerns about the maturity of unit rates and the subsequent digital signalling renewal project costs. We also identified deliverability concerns about the schedule for delivering these complex, highly inter-dependent programmes.

8.30 Having reviewed Network Rail's draft determination response and after considering all the factors that need to come together for Network Rail's digital signalling portfolio, we are satisfied that Network Rail has taken steps to address our concerns regarding the deliverability of the digital signalling portfolio.

8.31 However, we remain concerned about the maturity of unit rates in the renewals workbank, including how these are developed and the learning that is being applied from existing programmes such as ECDP. Network Rail has demonstrated that it is using a consistent method to estimate its unit rates. It has also provided us with additional information to inform our view of the maturity of these rates. However, we consider the rates remain too high and that greater learning from ECDP and RD&I programmes should be reflected in the estimated unit rates.

8.32 Network Rail has provided detailed information on the complete CP7 strategy for fleet fitment. However, Network Rail has told us that the proposed spend of £699 million does not cover all of the fleet fitment required to deliver the full benefits from the associated CP7 renewals programme. Network Rail should continue to review the alignment between Infrastructure renewals and fleet fitment in advance of its delivery plan. It will also need to confirm how the benefits of the CP7 digital signalling programme will be delivered.

8.33 We challenged Network Rail on the scope and proposed spend for its RD&I projects related to digital signalling. We are supportive of RD&I where clear benefits can be demonstrated. Since our draft determination Network Rail has reviewed the scope of OTTO and ended the programme. It still intends to deliver some areas previously under the OTTO umbrella and we will continue to monitor the scope of these new projects.

8.34 During CP6 we carried out a TAR into Network Rail's delivery of digital signalling projects in its Route Services function. We found that the two projects Route Services was delivering were behind schedule but were forecasting to spend their funding in CP6. Network Rail has therefore requested further spend to complete these projects in CP7. In our draft determination we raised concerns about the cost and deliverability of these projects and asked Network Rail to assess the proposed spend. Network Rail has not made changes in this area stating that it requires the funding to complete these projects. We remain concerned about the deliverability of these projects and will continue to monitor them.

Conclusions on digital signalling

8.35 We support the deployment of digital signalling and the LTDP along with appropriate and efficient expenditure in CP7. We also recognise the cost reductions that have been made to the digital signalling portfolio from earlier iterations of the CP7 plan and as part of Network Rail's draft determination consultation response.

8.36 Our assessment has taken into account the changes proposed by Network Rail since our draft determination.

8.37 Network Rail will need to confirm the scope and benefits of the RD&I projects, clearly outlining the projects' schedules.

8.38 We have concluded that in Network Rail's £1.5 billion plan for the deployment of digital signalling, the fleet fitment programme is not sufficiently aligned with the infrastructure renewals programme. Ahead of Network Rail's delivery plan it will need to provide a fully aligned plan for fleet fitment and infrastructure renewals.

8.39 Based on our detailed assessment of SEU rates, we have concluded that there are opportunities to reduce these rates further. Consideration should be given to:

(a) the maturity of Network Rail's unit rates for the proposed digital signalling infrastructure renewals compared with unit rates for mature projects and programmes;

(b) we found that all digital signalling renewals projects were adopting base rates (before any adjustments for site specific allowances, headwinds etc.) which were consistent with supplier developed rates for ECDP, which is an enhancement currently in delivery in CP6. However, Network Rail's data indicates that circa 25% of the ECDP rates related to 'first-time' development costs;

(c) while we recognise that there will be local differences and it will take time for regions to mature their renewals work banks, we would expect the overall programme to have learned lessons from CP6 enhancements and it would be inefficient for the full development costs to be repeated again; and

(d) we also expect benefits from RD&I programmes to feed into the renewals workbank. We note that this is accounted for in renewals scheduled for later years of the control period but consider it should also be reflected earlier than Network Rail's current estimates.

8.40 As such we consider a 10% pre-efficient cost challenge should be applied to Network Rail's unit rates for digital signalling renewals. This equates to approximately £50 million.

8.41 We consider Network Rail's proposals to "soft ringfence" spend in IPDR for fleet fitment and enabling projects is a sensible approach. However, we consider this should only apply to part of the portfolio that is most likely to be exposed to slippage in CP7. As such we suggest a 'future opportunity' of circa £40 million from the IPDR portfolio. We are treating this within the suite of options to fund core renewals and risk as a 'future opportunity' as defined in Chapter 3 (renewals and maintenance).

8.42 We conclude that a funding envelope of circa £1.5 billion (after applying Network Rail's proposed reductions and our challenge on unit rates) is stretching but realistic for the digital signalling portfolio across CP7, this represents a circa £200 million reduction since the SBP.

8.43 It is important to note that elements of the digital signalling portfolio relating to infrastructure renewals and CP6 legacy projects sit within regional or National Functions' programmes and as such the interactions and dependencies will need to be assessed.

9. Efficiency, headwinds, tailwinds, inflation and input prices

Introduction

9.1 This chapter examines the scope for Network Rail to make efficiency improvements in its operations, support, maintenance and renewals (OSMR) activities in CP7. It also examines Network Rail's assumed headwinds (cost increases due to factors outside of its control), tailwinds (cost decreases due to factors outside of its control), general (consumer price index (CPI)) inflation and input prices (inflationary pressures different to general inflation).

9.2 A core part of our assessment of Network Rail's efficient expenditure in CP7 has been to assess the scope for the company to make improvements to the efficiency of its business activities. Determining efficiency assumptions that are challenging, but deliverable, is essential to encourage Network Rail to improve value for money for its customers and funders.

9.3 In addition to determining Network Rail's efficient expenditure in our periodic reviews, we monitor and report on the company's efficiency improvements and wider financial performance in our Annual Efficiency and Finance Assessments of Network Rail.

9.4 Network Rail's efficiency declined in CP5 due to several factors that were examined in our annual efficiency and finance assessments. Partly in response to these problems, for our monitoring in CP6, we required Network Rail to report to us in more detail about the factors that drive changes to its OSMR costs over time, both nationally and for each region. This 'fishbones analysis' encompasses cost changes over time due to:

(a) efficiencies and inefficiencies;

(b) changes to scope of work activities;

(c) general inflation (CPI);

(d) input prices; and

(e) headwinds and tailwinds.

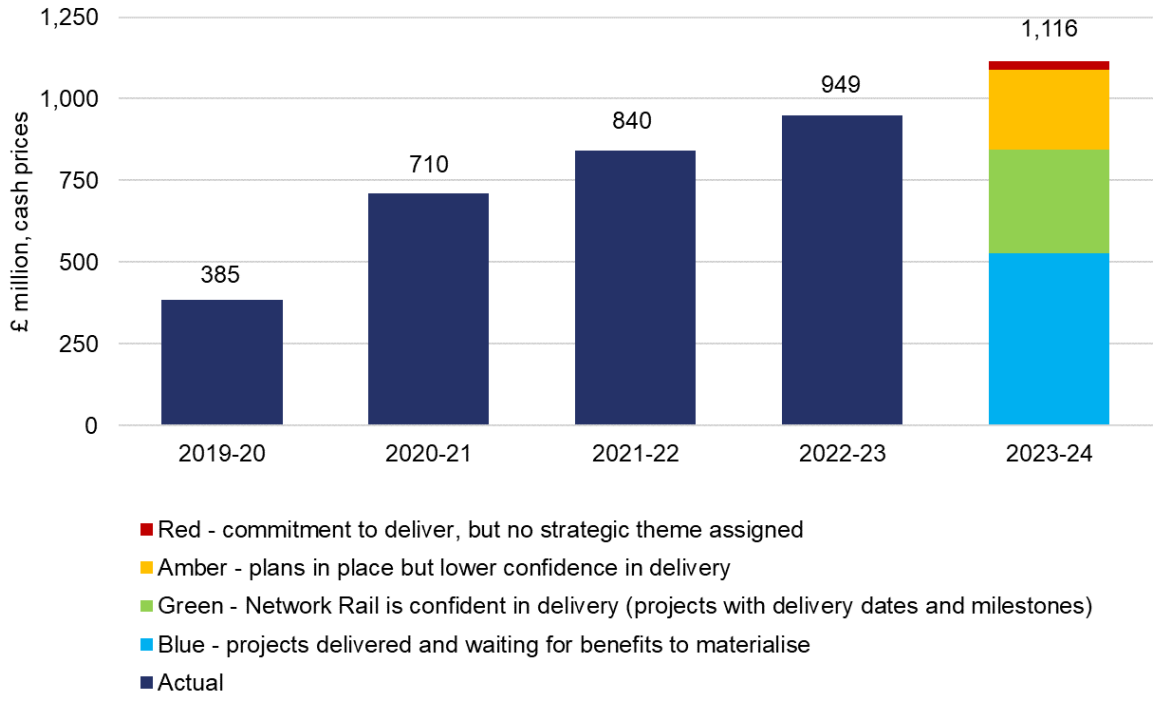
9.5 Network Rail successfully implemented this reporting framework, which has enabled a better understanding of how the company's business processes are improving, and how it has responded to external pressures including the COVID-19 pandemic and current inflationary pressures.

9.6 Our PR18 determination required Network Rail to make £3.5 billion of efficiency improvements in CP6. As a result of cost increases resulting from COVID-19, Network Rail increased its own target by £0.5 billion to £4.0 billion in CP6, with the additional savings coming mostly from reductions to pay awards and bonuses, and from other workforce modernisation initiatives.

9.7 As reported in our latest annual efficiency and finance assessment and shown in Figure 9.1, Network Rail's delivery of efficiency improvements in the first four years of CP6 was good. It has delivered £2.9 billion of efficiency improvements, and it appears on track to deliver around £4.0 billion of efficiency improvements across CP6. However, its wider financial performance has missed its target as Network Rail financially underperformed by £1.9 billion across the first four years of CP6. Simply put, this means that Network Rail spent £1.9 billion more on delivery than we expected for what it delivered in the first three years of CP6.

9.8 Our efficiency and financial performance measures are related but not the same. Our primary measure of Network Rail's financial performance is the Financial Performance Measure (FPM). FPM compares Network Rail's income and expenditure to its CP6 delivery plan. It adjusts for the amount of work done and excludes income and expenditure that is not controllable by Network Rail. Our CP6 regulatory accounting guidelines explain how FPM is calculated. Our efficiency measure looks at cost savings over time from improvements to business processes. NB. FPM is a comprehensive measure of Network Rail's financial performance, for example, it includes enhancements to its network.

Figure 9.1 Network Rail's actual and forecast efficiency in CP6



Key: April 2019 to March 2023: delivered, April 2023 to March 2024: forecast
Source: Annual efficiency and finance assessment of Network Rail 2023

9.9 Over recent months, general inflation has been at its highest level in over 40 years. Given its impact on Network Rail's cost base and its heightened volatility, our overall assessment of the impact of inflation on Network Rail's CP7 business plan is an important part of our PR23 determination. Since Network Rail submitted its SBP, general inflation remained higher than was forecast which has affected our assessment of the effect of inflation on Network Rail's costs in CP7. This matter is examined in this chapter.

Consultation responses

9.10 Respondents generally agreed with our draft determination view that Network Rail should be able to achieve substantial further efficiency savings in CP7, and also, given recent economic uncertainty, that general inflation and input prices are important matters to consider in assessing Network Rail's sustainable and efficient cost in CP7.

9.11 Network Rail's response to our draft determination did not include any changes to our proposed efficiency challenge for Great Britain in CP7. However, it did include a small (£19 million) reclassification from efficiencies to income generating schemes for Scotland. Network Rail's response included a different view about the

effect of input prices in CP7 and included a lower level of forecast headwinds. Network Rail Scotland also further challenged itself on headwinds by reducing them by £48 million to £34 million. These matters are examined in this chapter.

9.12 Transport Scotland agreed with our assessment that Network Rail needs to undertake more work to develop its CP7 efficiency plans, in particular, noting its concern about the achievability of what Network Rail described as transformational efficiencies. Transport Scotland also sought assurances that the Final Determination efficiencies are being benchmarked accurately against best practice in the rail industry and other comparable industries and utilities, including international benchmarking. Transport Scotland stated that our assessment must be carried out on the basis of unit cost comparators. As explained in this chapter, cost benchmarking, as described by Transport Scotland, was an important (though not the only) component of the analysis underpinning the efficiency challenge that we are requiring Network Rail to deliver in CP7 through our PR23 determination.

Changes from draft determination

9.13 We have not changed our efficiency assumptions for England & Wales but have made changes for headwinds, inflation and input prices. We have made similar changes for Scotland, and small changes for Scotland's efficiency.

Methodology

9.14 We have followed the general methodology described in the Methodology chapter. We have also used some specific activities to assess Network Rail's efficiency and associated cost base, as set out below.

Efficiency

9.15 Economic regulators use a range of approaches to assess the scope for efficiency improvements by regulated companies. It is generally agreed that no single approach can necessarily provide a definitive answer on the scope for efficiency improvement due to the complex nature of managing national infrastructure such as the railways. Consequently, we considered that it is preferable to draw on a range of evidence in forming a view on the scope for efficiency improvements by Network Rail.

9.16 Our analytical approaches fell in to two groups of 'bottom-up' and top-down studies:

(a) Our **bottom-up studies** focused on assessing the scope for improvement of specific business activities. By combining these studies, we can form a view about the scope for efficiency improvements by Network Rail as a whole. Bottom-up studies provide a detailed approach which identifies specific ways in which efficiencies can be achieved. However, bottom-up studies do not account for all of Network Rail's activities or its full potential to be more efficient. This means that there is implicit uncertainty in extrapolating their findings to form a view about the scope for efficiency improvements by the company as a whole.

(b) Our **top-down studies** used statistical analysis of aggregate level data to examine trends within Network Rail's regions and to comparator companies. Top-down studies provide a holistic approach, meaning that they should capture all relevant information. However, such studies do not identify how efficiency improvements can be achieved. They can also be limited by uncertainty around the extent to which cost variances can be attributed to different levels of efficiency, or to other factors such as differences in the specific nature of work activities (for example, due to geological or meteorological differences).

9.17 By combining evidence from our bottom-up and top-down studies, we are able to make a rigorous assessment of the scope for Network Rail to make efficiency improvements in CP7.

Our approach for assessing the impact of headwinds and tailwinds on Network Rail's costs in CP7

9.18 Headwinds are unplanned cost increases due to external factors, largely beyond Network Rail's control, making them difficult to plan for. An important example was the costs that Network Rail incurred from operating during the COVID-19 pandemic in CP6 including increased use of personal protective equipment and the need to maintain social distancing during work activities.

9.19 Tailwinds are unplanned cost decreases due to external factors. Like headwinds, by their nature, tailwinds are difficult to plan for as they are a response to factors largely beyond Network Rail's control. An example from CP6 was reduced travel expenditure that Network Rail incurred from making better use of teleconferencing after COVID-19.

9.20 Our approach for assessing headwinds and tailwinds has been to assess the evidence presented in Network Rail's SBP. In particular, whether Network Rail's planning assumptions look reasonable based on likely external factors, and how

the planning assumptions compare to Network Rail's headwinds and tailwinds in CP6, including adjusting for the impact of COVID-19.

Our approach for assessing the impact of general inflation and input prices on Network Rail's costs in CP7

9.21 We used two categories for examining the effects of inflation on Network Rail's business; general inflation, as measured by CPI, and input price inflation, which relates to the specific basket of goods that Network Rail purchases such as steel and concrete. In Network Rail's view, its input price inflation has typically been around one percentage point per year higher than general inflation over recent years.

9.22 We commissioned Europe Economics to conduct an inflation and input price review on Network Rail's method for assessing input prices. Reflecting concerns with Network Rail's approach, we applied an alternative approach developed by Europe Economics for assessing input prices. This approach is underpinned by three assessment criteria:

(a) Is the expected value of the wedge between the input price and CPI material?

(b) Are there sufficient and convincing reasons to consider that CPI does not adequately capture the input price?

(c) Is the input price sufficiently outside of management control over the relevant period?

Network Rail's plan

9.23 Table 9.1 summarises the efficiency, input prices, headwinds and efficiencies that were included in Network Rail's SBP for its operating expenditure (operations, support and maintenance activities) and for its renewals expenditure in CP7. Table 9.1 does not include our adjustments described later in this document and the impact of more recent inflation forecasts used to express CP7 costs in 2023-24 prices.

Table 9.1 Network Rail's assumed efficiencies, headwinds, tailwinds and input prices in CP7

£m, 2023-24 prices	Pre-efficient (CP7)	Input prices	Headwinds & tailwinds	Efficiencies	Post-efficient
Eastern	11,799	357	225	-992	11,389
Southern	9,576	307	176	-781	9,278
W&W	6,160	213	115	-569	5,919
NW&C	10,107	380	189	-890	9,786
Scotland	4,315	160	82	-429	4,129
England & Wales	37,642	1,257	705	-3,232	36,372
Great Britain	**41,956**	**1,417**	**787**	**-3,660**	**40,500**

Source: Network Rail's CP7 SBP

Findings

Efficiency assumptions in Network Rail's SBP

9.24 As shown in Table 9.1 Network Rail's CP7 planning activities suggest that it can deliver £3.7 billion of efficiency improvements in CP7, comprising at least £3.2 billion from its activities in England & Wales, and at least £0.4 billion from its activities in Scotland. The efficiency trajectory is summarised in Table 9.2. It equates to an efficiency improvement of 15% for Network Rail's renewals activities, and 10% for operations, maintenance and support activities (opex) by the end of CP7, compared with the end of CP6.

Table 9.2 CP7 efficiencies included in Network Rail's SBP

£m, 2023-24 prices	2024-25	2025-26	2026-27	2027-28	2028-29	Cumulative
Total OSMR						
Great Britain	369	577	803	890	1,021	3,660
England & Wales	331	501	710	785	905	3,232
Scotland	38	76	93	105	117	429
Eastern	108	167	216	229	271	992

NW&C	77	126	199	221	266	890
Southern	75	119	166	200	221	781
W&W	71	88	129	135	146	569
Opex						
Great Britain	103	188	280	352	422	1,345
England & Wales	87	161	246	312	376	1,182
Scotland	16	27	34	40	46	163
Eastern	29	52	80	101	124	386
NW&C	22	40	61	77	95	296
Southern	22	41	62	80	98	304
W&W	14	28	43	54	59	197
Renewals						
Great Britain	266	389	522	538	600	2,315
England & Wales	244	340	464	473	529	2,050
Scotland	22	49	59	65	71	266
Eastern	79	115	136	128	148	606
NW&C	56	86	138	144	171	595
Southern	53	78	104	120	123	478
W&W	57	61	86	81	87	371

Source Network Rail's SBP for CP7 (risk-adjusted plan)

9.25 On an average basis, i.e., CP7 compared to CP6 in total, for England & Wales, Network Rail's plan equates to a 6% efficiency improvement for opex and 10% for renewals. For Scotland, it is 8% for opex and 11% for renewals.

9.26 Network Rail's plan assumed that it could achieve substantial efficiencies in Scotland from early in CP7. We expressed concern about this profile of efficiencies across CP7. Network Rail's response to our draft determination includes a revised efficiency trajectory for Scotland. Firstly, the overall level of

efficiency in Scotland has been reduced by £19 million to £410 million due to the reclassification of some business improvements from efficiency to income generating schemes. Secondly, net of this adjustment, whilst the level of efficiency for Scotland has not changed, the profile of savings has been modified to shift some efficiencies to later in CP7. The reprofiled Scotland efficiency trajectory addresses the concern raised in our draft determination.

Findings from our bottom-up studies of Network Rail's efficiency

9.27 Other chapters of this document summarise our assessment of efficient costs across different asset classes. Our work included a number of specific studies undertaken by ORR, consultants and independent reporters. The findings of this work are not repeated here. However, our detailed bottom-up studies have identified scope for improvements in many areas of Network Rail's business. These findings include:

(a) our Targeted Assurance Reviews conducted during CP6 have helped to inform our view on CP7 efficiencies. Some of the findings from these reviews include that the quality of the work done is partly based on the asset policy choices by regions and this can affect the levels of efficiency proposed by Network Rail across the regions;

(b) a consultancy study on the efficiency of Network Rail's operations and support costs: Benchmarking Network Rail Operations & Support Costs report;

(c) Network Rail has also shared its own consultancy studies which showed opportunities for efficiency improvements. We have reviewed Network Rail's consultants' reports on finance, procurement, Human Resources and Information Technology, which have been used to validate proposed efficiencies; and

(d) specific findings from our detailed review of the SBP detailed in the relevant sections of this report.

9.28 Our bottom-up studies found clear evidence for the scope for Network Rail to improve its efficiency in CP7.

Top-down studies

9.29 We have used econometric cost benchmarking to help set our efficiency targets for Network Rail in our recent periodic reviews. For PR08 and PR13, we compared

Network Rail to European peers. For PR18, we focussed on comparing Network Rail's internal business units.

9.30 Network Rail's CP7 SBP did not present expenditure on operations, support and maintenance consistent with its reporting in its regulatory financial statements (which are underpinned by our regulatory accounting guidelines). However, Network Rail stated that the total of operations, support and maintenance is consistent. This has restricted our ability to properly understand what is driving proposed changes to Network Rail's plans for these activities in CP7. Network Rail's response to our draft determination has corrected this matter.

9.31 Our econometric benchmarking largely followed the approach that we used in PR18. It compared the costs and performance of Network Rail's five regions over time. We estimated a cost 'frontier' using statistical techniques, and the gap between this and a given region is calculated. Each cost model for both maintenance and renewals (total renewals and unit costs), estimates the cost as a function of its main drivers. These include traffic, track size, possessions, proportion of electrified track, rainfall and volumes of assets renewed. Due to the lack of consistent data noted above, we did not analyse support costs using a statistical model or estimate the efficiency gaps from the cost frontier for support costs. Instead, we analysed the trends in support costs from CP5 to CP7.

9.32 The findings of our econometric benchmarking are available in Part III of our draft determination: supporting document on sustainable and efficient costs. Our analysis covered 95 percent of maintenance expenditure and 88 percent of renewals expenditure (it excluded expenditure incurred by National Functions because these activities are different and hence not suitable for benchmarking against regions). Our renewals average unit cost analysis covered expenditure at a regional level for which it was possible to match expenditure with volumes (63% of total renewals expenditure).

9.33 Our analysis suggests that for England & Wales, there is a potential maintenance efficiency opportunity of between 5.0% and 11.0%. Therefore, Network Rail's proposed efficiency of 10% for maintenance in England & Wales is a stretching but realistic target for CP7.

9.34 Our analysis suggests that for Scotland there is a potential maintenance efficiency opportunity of between 1.0% and 6.0%. This finding suggests that the 10% maintenance efficiency proposed for Scotland is stretching.

9.35 Our findings suggest a total renewals efficiency opportunity of between 0.0% and 14.0% in England & Wales (across the asset base that we have modelled). We therefore consider that Network Rail's proposed 15% target is stretching but realistic. Our findings suggests a total renewals efficiency opportunity of between 0.0% and 0.4% possible in Scotland. This again implies a greater stretch for Scotland.

9.36 It is important to note that econometric cost benchmarking is a high-level analytical approach that cannot provide in-depth insights into the reasons behind differences between forecasts and model predictions.

(a) Our cost benchmarking is based on identifying statistical patterns in the data covering three control periods. So, some past cost inefficiencies may be getting carried forward and impact on the estimates for CP7.

(b) Our analysis does not include all operations, support, maintenance and renewals costs.

(c) There are also inherent differences between Network Rail's regions that are difficult to quantify and to control for. These include factors which lead to different types of renewals and maintenance such as differences in the type of network (urban or rural); differences in geology (lots of tunnels and cuttings compared to flat countryside that floods in other regions); and/or different asset policies and strategies.

9.37 Therefore, the findings of our cost benchmarking analysis are used as one element of a wider evidence base.

9.38 We also conducted average unit cost analysis on components of track renewals (track and switching and crossings), signalling (signalling and level crossings), civils (structures and earthwork) and buildings for which we could match costs and volumes. Because some renewals assets do not have unit costs, this analysis accounts for 63% of total renewals expenditure.

9.39 Our analysis showed that there are larger variations across regions in the average renewals' unit costs for asset classes and work types in CP7 compared to CP6. These variations suggest that there are likely to be regional variations in renewals efficiency. Across all asset classes, the NW&C, and W&W regions have some of the highest average unit costs in CP7, while Eastern has some of the lowest.

9.40 These findings are consistent with Network Rail's own analysis where NW&C was found to have some of the highest unit rates. Our findings are also consistent with

our analysis of renewals using statistical models where NW&C and W&W were found to be the least efficient regions.

Findings from other regulated bodies

9.41 Other regulated companies in the UK are also subject to assessments of the scope for efficiency improvements. Although economic regulators use a range of modelling approaches, they generally draw on statistical econometric analysis to identify:

(a) 'Frontier shift', which provides a challenge for the efficiency of the sector as a whole to improve, including for the highest performing companies. Frontier shift is based on expected future improvements in productivity through innovation and technological progress. It represents the ability for even the most efficient firms to continually improve over time, producing more output for a given cost, or, to maintain outputs but for lower cost (for example, through the application of artificial intelligence (AI)).

(b) 'Catch-up efficiency', which provides a challenge to lower performing companies to catch up with the most efficient companies in the sector.

9.42 Over the past ten years, UK economic regulators have typically set a five-year efficiency challenge of 8.9% for opex and an 8.4% efficiency challenge for capex. Included within this, the frontier shift component has typically been around 1% per year.

9.43 Care is needed when comparing efficiency challenges set by other regulators due to the different business activities that are being assessed, and the different analytical approaches used. For example, some regulators do not combine efficiency changes with headwinds and tailwinds. Comparisons across sectors also need to consider the level of competition, financing and incentives.

9.44 Network Rail's SBP assumed that the company can make efficiency improvements of around 10% for opex and 15% for renewals in CP7 (on an 'exit to exit' basis). We consider that this is reasonable compared to the recent efficiency challenges set by other regulators.

Efficiency plans

9.45 Network Rail's SBP included a high-level summary of the ways in which it intends to make efficiency improvements in CP7. The company has identified broad themes and has started the process of developing more detailed plans for how its regions and central functions will deliver these improvements. These are

summarised in Figure 9.2 and include efficiencies achieved from closer working with industry partners linked to industry reform, business opportunities, technology adoption and efficiency savings from improved delivery of renewals activities.

Figure 9.2 Summary of Network Rail's efficiency plans for CP7

Source: ORR analysis of Network Rail's CP7 SBP. Amounts are in 2023-24 prices based on the Bank of England's November 2022 forecast of inflation and cover the full SBP (not the risk-adjusted plan) for England & Wales and the Scotland plan. As we note above, Network Rail is now using the risk-adjusted plan for England & Wales which has a lower level of efficiency. However, the types of efficiency and materiality of the efficiencies shown in this figure are still relevant.

9.46 Network Rail has emphasised that industry reform is a key enabler for delivering its CP7 efficiencies; not simply through structural and legislative changes to the industry, but through a more collaborative mindset. It considers that industry reform will enable approximately 30% of its planned CP7 efficiencies.

9.47 In addition to industry reform, Network Rail intends to deliver efficiencies driven through national programmes and individual regional strategies, with locally identified efficiencies. These programmes include:

(a) *Improved engineering access*: Better possessions planning to increase productivity in track access windows and minimise disruption to passengers through closer working with industry partners.

(b) *Infrastructure monitoring*: Delivering the benefits of the Modernising Maintenance programme and more efficient delivery of asset information. We note that most of the changes relating to Network Rail's Modernising Maintenance programme are being implemented in CP6 and that there are potentially further opportunities from this programme than Network Rail is currently recognising.

(c) *Digitally connected railway (Project Reach)*: Working with a concessionaire to renew Network Rail's communications network and improve connectivity for rail users, whilst allowing the concessionaire to deploy cables for its own use.

(d) *Supply Chain Operations*: Working closely with regions to improve their engagement with and service from Supply Chain operations to deliver asset specific efficiencies.

(e) *Reforming technical standards*: Applying a more pragmatic and value-based approach to Network Rail's internal standards to reduce complexity and reduce costs.

(f) *Improved use of technology*: Regions will work in partnership with the Technical Authority to develop and deploy new technologies from Intelligent Infrastructure and utilise the research & development pipeline. Asset interventions will be delivered at lower cost and more efficiently.

(g) *Applying learning from Project Speed to renewals delivery*. Project Speed (Swift, Pragmatic, and Efficient Enhancement Delivery) is a government-led initiative to accelerate and improve the delivery of national infrastructure projects. Network Rail has applied Project Speed for its portfolio of enhancements in CP6. It considers that it can achieve around £50 million of efficiency improvements from applying the same principles for delivery of its more complex renewals projects in CP7.

(h) *High-street principles*: Making greater use of general contractors for works that do not directly affect rail infrastructure, particularly across Network Rail's buildings portfolio.

(i) *Plant, on-track machines and vehicles*: Optimising planned usage to increase utilisation of machinery and vehicles to improve hiring and purchase decisions.

9.48 In our view, the initiatives that Network Rail has identified to deliver efficiency improvements in CP7 seem reasonable. Whilst there are some areas of stretch, we consider that this is reasonable at this point in the planning cycle. However, the large proportion of efficiencies that Network Rail has attributed to industry reform introduces risk to the delivery of CP7 efficiencies. There remains significant uncertainty about the scope and timing of industry reform. This means that the new ways of working with industry partners that Network Rail considers necessary may not materialise, or at least materialise as early, as the company has assumed.

9.49 Scotland's efficiency plan includes around £180 million of efficiencies from 'transformational' initiatives, typically impacting more than one functional area and requiring a programme management approach to coordinate and implement the business changes that enable benefits. We consider that there is substantial uncertainty around the nature of these efficiencies and how they can be delivered. We expect Network Rail to provide greater clarity as part of its delivery plan.

9.50 In our draft determination we noted that we were not yet convinced about the level of efficiency that Network Rail can achieve from Project Reach – which is Network Rail's plan to work with a third party to renew its telecommunications network. In particular, we considered that it would be more appropriate to recognise the benefits of renewing Network Rail's communications network in line with when these assets would have required renewing in the absence of Project Reach. This would mean that some of the efficiency should be recognised in CP8 and CP9, rather than in CP7 as indicated in Network Rail's SBP.

9.51 Following our draft determination, Network Rail accepted our view and has subsequently revised its approach for recognising a reduced level of efficiency for early replacement of its telecommunications network. We are content with Network Rail's revised approach for this stage in the planning cycle. Project Reach is examined in more detail in the Chapter 4 (National Functions).

9.52 Network Rail has set out clear high-level plans for how it will deliver efficiency improvements in CP7. The company now needs to further develop these high-level plans to show how it will deliver the relevant business changes.

9.53 Taking account of the above analysis, we have retained Network Rail's overall efficiency assumptions and concluded that an efficiency challenge of at least £3.2 billion is stretching but realistic for England & Wales in CP7. Using similar analysis, we have concluded that Network Rail should deliver £410 million of efficiencies (£361 million for regional OSMR) for Scotland. We note that the efficiency assumption for Scotland is more challenging than for England & Wales. This adds to the risks for Network Rail Scotland, as explained in the Chapter 10 (financial risk).

Headwinds

9.54 Headwinds are cost increases which Network Rail has no, or limited control, over (for example, legislative changes). Because of their size, and subjectivity around whether these costs are at least partially controllable by Network Rail, headwinds are an important area of our review. Headwinds do not include cost movements due to inflation.

9.55 Network Rail expects headwinds in CP7 may include improved operational safety activities (for example, Network Rail incurred significant expenditure on improving fatigue management and track worker safety in CP6), the risk of additional taxes and unforeseen legislative or standards changes. A consistent approach has been applied for forecasting headwinds across Network Rail's regions and National Functions.

9.56 Network Rail's SBP included £0.8 billion of headwinds across Great Britain however this was subsequently revised down to £0.5 billion following additional economic analysis. We accepted the £0.5 billion in our draft determination. In Network Rail's latest forecast, headwinds have reduced further to £0.3 billion (£287 million in England & Wales and £34 million in Scotland). After scrutiny of this and discussion with Network Rail, we are now satisfied that Network Rail's revised forecast headwinds forecast for CP7 is reasonable.

Tailwinds

9.57 Network Rail's SBP did not include any assumed tailwinds in CP7. Network Rail has stated that any tailwinds are assumed to net off against headwinds.

9.58 Network Rail is currently forecasting around £0.6 billion of tailwinds in CP6, the majority of which relates to pay awards below CPI inflation, and COVID-19 related reductions to staff travel and similar costs. The proposed reduction in forecast tailwinds compared to CP6 raises the question of whether they are understated in Network Rail's SBP. We accept that elements of the specific tailwinds that

benefited Network Rail in CP6 are unlikely to be repeated in CP7. However, we do consider that some tailwinds will arise. On balance, we consider that the reduction in Network Rail's forecast headwinds less tailwinds from the £0.8 billion to £0.3 billion across Great Britain, adequately addressed this point. Therefore, we have not made any further adjustment to our assessment of efficient costs in relation to headwinds less tailwinds.

Inflation and input prices

Network Rail's inflation assumptions in CP7

9.59 Network Rail's SBP assumed that inflation would increase costs by £1.7 billion in England & Wales in CP7. This comprised £0.3 billion of general (CPI) inflation and £1.3 billion of additional input price effects. The Scotland plan included £90 million of general inflation and £162 million of additional input prices.

9.60 The CPI inflation assumptions in Network Rail's SBP were based on the Office of Budget Responsibility's (OBR's) November 2022 forecast of CPI, with additional input price inflation affecting operations, support, maintenance and renewals costs. We set out in our draft determination that we considered that Network Rail's input price assumptions were overstated by £0.6 billion in England & Wales and by £72 million in Scotland.

9.61 Forecast CPI inflation in CP7 has increased since November 2022. Network Rail's latest forecast, which is based on the May 2023 Bank of England CPI forecast has increased costs by £1.5 billion (£1.4 billion in England & Wales, and £0.1 billion in Scotland). Network Rail has also proposed a £0.4 billion cost increase from its SBP due to a 'lagged inflation' effect on its input prices. This matter is examined below.

9.62 The movements in Inflation and input prices from the SBP are summarised in Table 9.3 and Table 9.4 respectively.

Table 9.3 CP6 and CP7 inflation

£ million	CP6 inflation	Network Rail CP7 SBP	ORR draft determination	Network Rail draft determination response	ORR final determination	Change from draft to final determination
England & Wales	2,576*	- 172	428	1,209	1,209	+ 781
Scotland	299*	- 50	18	57	57	+ 39

£ million	CP6 inflation	Network Rail CP7 SBP	ORR draft determination	Network Rail draft determination response	ORR final determination	Change from draft to final determination
Great Britain	**2,875**	**- 222**	**446**	**1,266**	**1,266**	**+ 820**

*Source: Network Rails draft determination response databook, 2023-24 prices; *Network Rail did not allocate CP6 inflation in National Functions between England & Wales and Scotland, assumed here to be 90% England & Wales, 10% Scotland.*

Table 9.4 CP6 and CP7 input prices

£ million	CP6 input prices	Network Rail CP7 SBP	ORR draft determination	Network Rail draft determination response	ORR Final determination	Change from draft to final determination
England & Wales	324*	1,257	700	1,749	1,000	- 749
Scotland	17*	162	90	214	120	- 94
Great Britain	**341**	**1,419**	**790**	**1,963**	**1,120**	**- 843**

*Source: Network Rail's draft determination response databook, 2023-24 prices *Network Rail did not allocate CP6 inflation in National Functions between England & Wales and Scotland, assumed here to be 90% England & Wales, 10% Scotland.*

9.63 Network Rail's input price analysis was based on historic price movements in its input prices compared to movements in CPI inflation. This approach assumes that future trends will resemble historical price movements. Network Rail has used the difference, or 'wedge' between the historic input prices and CPI as a basis for its forecast of the input prices in CP7. Network Rail's SBP included an annual input price adjustment of +0.5% for opex, and +1.8% for capex. As shown in Table 9.5, this has changed in Network Rail's latest forecast.

Table 9.5 CP7 annual input price assumptions

Input price category	CP6 input prices	Network Rail SBP	ORR draft determination	Network Rail draft determination response	ORR final determination
Opex	1.0%	0.5%	0.3%	1.0%	0.5%
Capex (renewals)	0.9%	1.8%	0.5%	1.7%	0.6%

Source: Network Rail's draft determination response databook

Europe Economics' findings

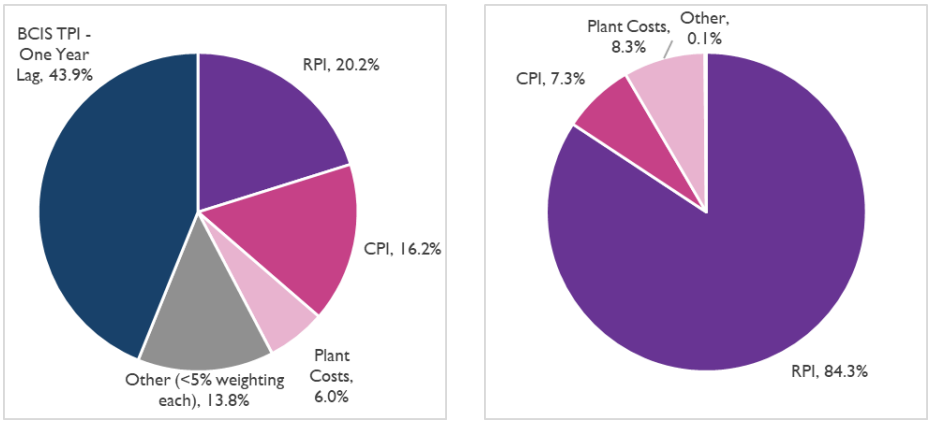
9.64 We commissioned Europe Economics to review Network Rail's approach for assessing input prices (more detail is available in the published Review of Approach to Inflation and Input Prices taken by Network Rail). Europe Economics identified four areas of concern with Network Rail's approach for forecasting input prices which are examined below.

Network Rail's method

9.65 Europe Economics found that although Network Rail's input price analysis was detailed, it placed a significant reliance on only two sources: the Retail Price Index ('RPI') and the Building Cost Information Service Tender Price Index ('BCIS TPI'). This is illustrated in Figure 9.3.

Figure 9.3 Data sources in Network Rail's CP7 input price analysis

Renewals **Opex**



Source: Europe Economics analysis of Network Rail data.

9.66 The Office of National Statistics (ONS) has not considered RPI to be a robust measure of inflation for over ten years (see this ONS article). Europe Economics

noted that RPI has historically been used as an indicator for growth in wages within the rail sector. However, the significant monetary increase identified when using RPI was out of line with historical real wage growth across the wider economy.

9.67 Europe Economics also highlighted Network Rail's reliance on the BCIS TPI index as a concern. Europe Economics noted that the then Competition Commission considered that trade price indices have a larger impact on suppliers, such as construction firms, rather than purchasers such as Network Rail. This would suggest that the cost fluctuations that Network Rail could experience over CP7 might not be accurately captured by TPI.

9.68 Europe Economics found that Network Rail applies a one-year lag to the BCIS TPI index. Network Rail's rationale for applying this lag is that the company considers that this is how long it takes for tender prices to translate into actual prices within its cost base. Europe Economics considered this to be inappropriate and noted that it substantially increases Network Rail's CP7 analysis.

Use of November 2022 OBR forecast

9.69 Europe Economics considered that Network Rail's use of the November 2022 OBR forecast of CPI inflation was outdated and instead recommended using the latest (March 2023) OBR forecast. Network Rail informed us that using the March 2023 OBR forecast of CPI inflation increased Network Rail's cost by around £0.6 billion in England & Wales and £68 million in Scotland in CP7 which we took into account in our draft determination.

Level of disaggregation in Network Rail's analysis

9.70 Network Rail's analysis included separate input price assumptions for cost items which represent less than one percent of its total costs. Europe Economics considered that this granular approach makes it difficult to track the underlying analysis, and therefore makes meaningful review and challenge difficult.

9.71 Europe Economics also noted that it is unlikely that Network Rail's input prices will outturn as forecast as some costs may increase at a slower rate, and some may reduce. However, Network Rail's analysis assumes that all of its costs will increase by more than CPI. The disaggregated approach therefore risks overstating expected input prices.

Wider regulatory precedent

9.72 Europe Economics found that Network Rail's approach for forecasting input prices did not align with the approaches used in other regulated sectors, and that

Network Rail had not sufficiently considered these alternative approaches. Europe Economics provided case studies across a range of regulated sectors including energy, water, aviation and telecommunications.

9.73 Europe Economics proposed a framework that has been endorsed by the Competition and Markets Authority (CMA) for assessing Network Rail's forecast input prices. The framework adopts a less disaggregated approach for assessing input prices, with the focus on fewer cost categories, applies an appropriate inflation index for each cost category and then assesses whether there is a statistically significant historical difference between CPI and the input price index that justifies applying an adjustment.

9.74 Europe Economics' framework is underpinned by three assessment criteria. For an input price adjustment to be included, each of these criteria need to be satisfied:

(a) Is the expected value of the wedge between the input price and CPI material?

(b) Are there sufficient and convincing reasons to consider that CPI does not adequately capture the input price?

(c) Is the input price sufficiently outside of management control over the relevant period?

9.75 The framework also includes a materiality test that an input price adjustment should only be included if the cost category accounts for between five and ten percent of total costs, but only if there is strong evidence of a material difference between the cost category and CPI inflation.

Our view on inflation and input prices in our draft determination

9.76 In our draft determination we set out our view that the framework that Europe Economics developed for assessing input prices has several advantages over Network Rail's approach for the following reasons:

(a) it is more transparent and focuses on key input price categories;

(b) it better captures the relationship between CPI and input prices including whether any variances are statistically significant;

(c) it does not use redundant indices like RPI;

(d) it incorporates analysis of forecasts and not just historic trends, which is important in a time of economic uncertainty; and

(e) it explores whether input prices are already captured within the CPI measure, and so reduces the risk of double counting.

9.77 As outlined in our draft determination adopting this framework would result in lower input price assumptions over CP7. In England & Wales the input price assumption would reduce from £1.3 billion to £0.7 billion. In Scotland the input price assumption would reduce from £158 million to £86 million.

9.78 The Bank of England's and the OBR's CPI inflation forecasts have been volatile over the last year, with each successive forecast suggesting higher CPI inflation in CP7. In our draft determination we took account of the movement between the OBR's November 2022 and March 2023 forecasts, which added £0.6 billion to Network Rail's forecast costs. As examined below, the latest changes to forecast CPI inflation have continued to add to Network Rail's forecast costs in CP7.

Our response to Network Rail and the Oxera report

9.79 In its response to our draft determination, Network Rail disagreed with our approach to assessing input prices. Network Rail commissioned Oxera to review the Europe Economics' work which underpinned our draft determination assessment. This section examines these matters.

The applicability of Europe Economics' framework to rail

9.80 Oxera argued that the Europe Economics framework for assessing input prices was developed for Ofwat's periodic review of water companies and as such is not directly applicable to Network Rail.

9.81 We disagree with this point. In our view, Europe Economics conceptual framework is sufficiently flexible that it can be appropriately applied to rail. Europe Economics did take account of Network Rail's particular circumstances in developing its approach for assessing Network Rail, and this matter is examined within its report. Europe Economics used a cost breakdown and inflation indices that were relevant to Network Rail. We also note that Europe Economics did not propose including a 'volatility test', as was the case for water companies, for Network Rail.

Lagged inflation effect

9.82 Network Rail's has increased its input prices assumptions by £0.4 billion since its SBP for the effect of 'lagged inflation'. This is because, in Network Rail's view, there is a delay between the currently high level of inflation and when its own

contracts will increase. This is because of the long term nature of some of its commercial contracts such that some rates will not reset until early CP7. An example of this is where a contract price was fixed for a number of years before the recent increase in inflation. This means that in CP6 Network Rail has been protected to some extent from high inflation. Network Rail has said that, when those contracts need to be renegotiated in early CP7, it will be at a higher rate due to the recent price increases. Network Rail has stated that this causes a lag effect on its costs, resulting in increased forecast costs in early CP7.

9.83 In our view, Network Rail has not provided sufficient evidence to justify the full amount of its proposed adjustment to input prices due to a lag effect. For example, Network Rail has not provided a detailed list of contracts with lagged indexation and details of the indices used in these contracts. It is also not clear why any lag effect is not already included in the indices underpinning its input price forecast. In our view, inflation indices will reflect lag effects elsewhere in the wider economy and it is not clear why Network Rail will experience greater lags than the rest of the economy.

9.84 Also, Network Rail's should be efficiently managing these issues and not simply assuming that there is a lagged effect of this scale (for example, it could change the structure/terms/length of its contracts or consider alternative suppliers). It is not clear that Network Rail has factored the efficient management of these contracts into its analysis.

9.85 However, we recognise that there is uncertainty around this matter, and that in CP6, Network Rail has recognised a £0.3 billion tailwind from its fixed contractual rates benefitting the company at a time of rising inflation. We have increased the input price adjustment in our draft determination by £0.1 billion adjustment to recognise this matter (see below).

Materiality thresholds

9.86 Oxera did not agree with Europe Economics' use of materiality thresholds in its input price assessment framework, both as a concept and also in its application to Network Rail.

9.87 We do not agree with Oxera that the use of a materiality threshold is unwarranted. The input price analysis supporting Network Rail's SBP was complex with a large number of calculations for small expenditure categories. In our view, this overly complicated and detailed analytical approach provides Network Rail with an asymmetry of information advantage (which we expand on in the next heading).

9.88 Oxera noted that we did not apply our materiality test consistently in our draft determination, specifically in relation to Network Rail's electricity costs. We agree that electricity costs should have been excluded. This matter was complicated by Network Rail's payment for electricity used by train operators ('traction electricity'). Europe Economics did not separately identify Network Rail's own electricity costs from traction electricity costs, which are not relevant for the purpose of Network Rail's input prices as they are funded by a separate charge. Consequently, electricity costs were not identified as failing the materiality test. Because the price of electricity is forecast to reduce in CP7, correcting this has resulted in a £0.2 billion increase in our assessment of CP7 input prices.

Information asymmetry

9.89 Information asymmetry is an acknowledged issue facing economic regulators, in that regulated companies have significantly more information about their businesses than regulators. Network Rail has access to a far greater level of information about its costs and business activities than we have, and it may choose to be selective in the information that it shares with us to support its business case.

9.90 To help address this problem, Europe Economics' framework places a burden of proof on Network Rail to robustly justify an input price exists rather than for us to show that it is not justified. Oxera stated that Network Rail does not benefit from an information advantage because all parties have access to the same inflation indices. Whilst this is correct, it does not address Europe Economics' main point that Network Rail has a greater level of information about the drivers of its costs than we have and it is not just an issue about the index chosen but what it is applied to.

Use of statistical modelling

9.91 Oxera considered that Europe Economics modelling is systematically biased due to Europe Economics' use of strict statistical significance criteria. In Oxera's view, there is no regulatory precedent for such an approach. Oxera claimed that its analysis shows that there is only a 15–30% chance that Europe Economics would correctly identify input price effects if they do exist in several parts of its analysis.

9.92 We do not agree with Oxera's view about the robustness of Europe Economics' use of statistical modelling. There is regulatory precedent for the approach used by Europe Economics, notably by Ofwat's 2019 Periodic Review of water companies, which was subsequently endorsed by the Competition and Markets Authority (CMA) in its report. At our request, Europe Economics has subsequently

reviewed three relevant reports published by Oxera and found no mention of the types of error that Oxera has referred to. We note that Oxera's own analysis for Network Rail did not include any statistical modelling.

9.93 In our view, the use of statistical modelling to test the relationship between general inflation and input prices is an improvement on previous work in this area. There may be further improvements that can be made and we will keep this under review for future periodic reviews.

The 'Other' cost category

9.94 Network Rail's cost breakdown underpinning Europe Economics' analysis included an 'Other' cost category which represented 27 percent of all opex costs and 17% of all renewals costs. As Europe Economics did not have a detailed breakdown of this cost category, it was unable to identify suitable cost drivers and so did not include an input price adjustment for this expenditure.

9.95 Oxera's analysis included an input price adjustment for these costs based on a further detailed breakdown provided by Network Rail. We accept that such costs could be included, but also note that if this was an important category for above inflation cost increases, we would have expected the necessary information to have been provided to us earlier in the periodic review to allow us to test the assumptions and analysis. Nevertheless, in the time available, we consider only that an 'in the round' assessment is possible, and so make a small allowance for 'Other costs' below.

Our final determination conclusions on inflation and input prices

9.96 We recognise that forecasting inflation in the current economic environment is not easy. We have accepted Network Rail's revised CPI inflation forecasts for CP7. We have made some allowance for the additional input price analysis that Network Rail has provided in response to our draft determination.

9.97 Our draft determination included a £0.7 billion input price adjustment for England & Wales and circa £90 million adjustment for Scotland. In light of the further work that both Network Rail and we have undertaken since our draft determination, we have decided to increase our input price adjustment for England & Wales by £0.3 billion to £1.0 billion, and by £30 million to £120 million for Scotland. These adjustments comprise:

(a) a correction to exclude Network Rail electricity costs from our input price calculation (£0.2 billion increase for England & Wales, £20 million increase for Scotland); and

(b) the inclusion of a lagged inflation and 'Other' costs (£0.1 billion increase for England & Wales, £10 million increase for Scotland). As explained above, we have not seen sufficient evidence to justify Network Rail's proposed £0.4 billion increase for lagged inflation. However, we accept that there is sufficient evidence to accept a smaller adjustment. We also accept that some allowance for 'Other' may be appropriate. However, we have not had timely access to make an informed assessment of the amount, therefore in the round, our assessment includes a small allowance for above inflation increases in "other" costs.

(c) the inclusion of a lagged inflation and 'Other' costs (£0.1 billion increase for England & Wales, £10 million increase for Scotland). As explained above, we have not seen sufficient evidence to justify Network Rail's proposed £0.4 billion increase for lagged inflation and in the time available, we consider only that an 'in the round' assessment is possible. So, we have made an adjustment of £0.1 billion for these matters.

Other income

9.98 Our draft determination noted that Network Rail's SBP income forecast was £0.3 billion lower than planned expenditure in England & Wales.

9.99 This shortfall has now reduced to £0.1 billion in Network Rail's latest forecast, largely due to increased property income (see our PR23 final determination: supporting document on other income for further details). As explained in Chapter 1 (summary and conclusions), Network Rail's latest CP7 forecast includes a £0.6 billion overlay for unfunded expenditure. This overlay includes the £0.1 billion income shortfall. The options we have set out in Chapter 3 (renewals and maintenance) show our view of how Network Rail could choose to fund CP7 core renewals and risk; our calculations make provision for this shortfall.

Conclusions on efficiency, headwinds, tailwinds, inflation and input prices

9.100 We have retained Network Rail's overall efficiency assumptions and concluded that an efficiency challenge of at least £3.2 billion in CP7 is stretching but realistic for England & Wales in CP7. Likewise, we have concluded that Network Rail should deliver £410 million of efficiencies for Scotland (with £361 million from regionally incurred costs and £49 million from Scotland's share of efficiency improvements by central functions).

9.101 We have accepted Network Rail's updated headwinds assumptions of £0.3 billion for England & Wales and £34 million for Scotland. Network Rail's SBP does not include any assumed tailwinds in CP7 but assumes that any that exist will be netted off headwinds. We consider that Network Rail's updated forecast of headwinds less tailwinds adequately addresses our concern about the lack of identified tailwinds. Therefore, we do not propose to make any further adjustment to our assessment of efficient costs in relation to headwinds less tailwinds.

9.102 Forecasts for CPI inflation have increased since the SBP. Our draft determination took account of the changes between the November 2022 and the March 2023 OBR inflation forecasts. Since our draft determination, forecast CPI has increased further. Based on the May 2023 Bank of England CPI forecast, we have accepted a further £0.8 billion increase in forecast costs for England & Wales and £39 million for Scotland.

9.103 Our draft determination included an allowance for input price effects of £0.7 billion for England & Wales and £90 million for Scotland. In light of further work that both Network Rail and ORR have undertaken since our draft determination, we have decided to increase our input price adjustment for England & Wales by £0.3 billion to £1.0 billion, and by £30 million to £120 million for Scotland.

9.104 Table 9.6 and Table 9.7 summarise the proposed changes that we have made to post efficient costs for England & Wales, and for Scotland relating to the financial matters set out in this chapter.

Table 9.6 Changes to post efficient costs and other income in England & Wales

£ billion, 2023-24 prices	Network Rail SBP	Proposed adjustment at draft determination	Additional adjustment at final determination	Final determination	Comments
Input prices	1.3	- 0.6	+ 0.3	**1.0**	Our final view of £1.0 billion is £0.7 billion lower than Network Rail's latest forecast.
Impact of rising CPI inflation on costs net of income	- 0.2	+ 0.6	+ 0.8	**1.2**	We have accepted the increase in inflation between the

£ billion, 2023-24 prices	Network Rail SBP	Proposed adjustment at draft determination	Additional adjustment at final determination	Final determination	Comments
					SBP and Network Rail's latest forecast.
Headwinds	0.7	- 0.4	- 0.1	**0.3**	We have accepted Network Rail's revised headwinds forecast
Income shortfall	0.3	-	-0.2	**0.1**	There is a gap of £0.1 billion between Network Rail's income forecast for CP7 and its available funding.
Property income	1.4	+ 0.1	-	**1.5**	We accept Network Rail's latest forecast which includes our £90 million challenge.
Train performance improvement and innovation fund	-	0.04	-	**0.04**	We have included a £40 million train performance improvement innovation fund in the England & Wales settlement.

Source: ORR analysis of Network Rail SBP. Negative figures denote less expenditure than would be required under Network Rail's plan (positive figures more expenditure). Amounts may not sum due to rounding.

Table 9.7 Changes to post efficient costs and other income in Scotland

£ million, 2023-24 prices	Network Rail SBP	Proposed adjustment at draft determination	Proposed adjustment at final determination	Final determination view	Comments
Input prices	162	-72	+ 30	**120**	We have taken a different view on input prices to Network Rail
Impact of rising CPI inflation on costs net of income	-50	+ 68	+ 39	**57**	We have accepted the increase in inflation between the SBP and Network Rail's latest forecast.
Headwinds	82	-	-48	**34**	We have accepted Network Rail's assumption
Property income	85	+ 10	+ 9	**104**	We accept Network Rail's further income challenge on property
Train performance fund	-	101	-51	50	We have included a train performance fund in the Scotland settlement

Source: ORR analysis of Network Rail SBP. Negative figures denote less expenditure than would be required under Network Rail's plan (positive figures more expenditure). Amounts may not sum due to rounding.

10. Financial risk

Introduction

10.1 Network Rail has used or has allocated £2.7 billion (cash prices) of risk funding for England & Wales within CP6 to date (by the end of year 4). Network Rail estimates that only approximately £1.3 billion of this has been spent on the financial impact of risks which have materialised in England & Wales in CP6. Financial risk impacts have included the pandemic, industrial action, inflation, input prices, earthworks and weather resilience. Other areas of spend include the additional requirements of the Track Worker Safety programme, performance improvement schemes and extra maintenance and renewals.

10.2 In Scotland, Network Rail has used or has allocated £242 million of its risk fund for risks which have materialised in CP6 to date (by the end of year 4). This is compared to an original provision of £284 million (in 2017-18 prices).

10.3 In both England & Wales and Scotland, there is virtually no CP6 risk funding remaining which has not yet been allocated. CP6 risks on issues such as adverse weather, non-delivery of efficiencies, poor performance claims, worse than forecast inflationary exposure etc would need to be funded by reducing other expenditure.

10.4 In England & Wales Network Rail produced two scenarios for the SBP; the 'full' plan and the 'risk-adjusted' plan. Network Rail's risk-adjusted plan for England & Wales identified renewals and other activities in the regions that could be deprioritised to increase the CP7 risk fund as explained below. There is a single scenario in the SBP for Scotland.

Consultation responses

10.5 Network Rail responded to the draft determination with further details to supplement its SBP submission. This included proposals to accept our determination that it should follow the risk-adjusted plan in England & Wales. This would mean risk funding is £2.0 billion. However, Network Rail has funded the £1.5 billion impact of the increased CPI inflation as discussed in Chapter 9 (efficiency, headwinds, tailwinds, inflation and input prices) through the risk fund. This reduces risk funding. Network Rail has also moved £1.0 billion of its view of the cost of input prices from costs to risk funding. This increases risk funding.

Overall, this means Network Rail's response includes around £1.5 billion of risk funding.

10.6 Transport Scotland's response to the draft determination noted the increase in risk funding but stated an expectation that this shouldn't be at the expense of the Scotland targeted performance fund.

10.7 There was limited feedback through the consultation process from other stakeholders on financial risk, however, there was agreement of the move to the risk-adjusted plan in England & Wales. Respondents generally recognised the wider economic climate and the budgeting constraints that Network Rail will operate under during CP7.

Changes from draft determination

10.8 In the draft determination, we made allowance for the Office for Budgetary Responsibility March 2023 forecast impact of inflation. However, since then there have been various movements, such as input prices, which have reduced the England & Wales risk funding from the £2.15 billion we allocated in our draft determination to circa £1.1 billion. In particular, the May Bank of England inflation forecast was higher, which reduced funding by £0.8 billion in England & Wales.

10.9 However, as described in Chapter 3 (renewals and maintenance) we have provided Network Rail with a suite of options to fund core renewals and increase the risk funding which would allow Network Rail to enter CP7 with a risk fund of £1.5 billion in England & Wales.

10.10 In Scotland we also made allowance for the OBR March 2023 forecast impact of inflation. However, since then there have also been significant movements in risk funding mainly due to a further increase in forecast CPI inflation, a reduction in headwinds, a reduction in the train performance fund and lower variable and fixed track access income (following a clarification from Transport Scotland in October on the treatment of inflation, and how changes in variable charges impact on fixed charges). This clarification reduces the available funding by £76 million and we address this below.

10.11 Overall, we have reviewed Network Rail plans and consider that there is scope for a reasonable risk fund (£225 million) whilst also funding a Scotland targeted performance fund (£50 million).

Methodology

10.12 Our review of the Network Rail plan follows the methodology set out in Chapter 2 (methodology). We also conducted a top down review utilising historic information and the output from the studies, complemented by a bottom up review of risk & uncertainty information supplied by Network Rail as part of the SBPs. This review looked at the England & Wales regions, Scotland and the National Functions.

10.13 Table 10.1 details the relevant studies that were commissioned during PR23.

Table 10.1 Risk and estimating external reviews

Review name	Review type	Review period	Contractor	Objectives summary	Report
CP6 to CP7 Transition	Independent Reporter	Jun 22 – Nov 22	AMCL	How unit cost rates are calculated and used	Link
Embedded Risk	Consultancy TAR	Sep 22 – Mar 23	Sirius	Workbank estimation and cost modelling processes	Link

Source: ORR

Network Rail's plan

10.14 The England & Wales full plan had cash risk funding of £0.5 billion, this was to be held centrally. Scotland's interim SBP had cash risk funding of £206 million held in Scotland; and the region would not have access to the funds held centrally in Network Rail as the Scotland determination is separate to the England & Wales determination. This results in Scotland, everything else being equal, requiring a relatively higher risk fund when compared with England & Wales as it does not benefit from the pooling of risk (portfolio effect) that the England & Wales regions do.

10.15 Recognising that £0.5 billion was a relatively small amount of funding, Network Rail required that its regions also generate locally held risk funding of circa £1.0 billion equivalent to approximately 5% of the regions' plan. This had been done principally by deprioritising renewals and other activities to create a 'contingent' fund. This meant that the risk-adjusted plan for England & Wales had cash risk funding of £0.5 billion held centrally and £1.5 billion held in the England & Wales regions. This gave a total risk fund of £2.0 billion under this plan.

10.16 There was no provision for a contingent renewals fund in Scotland; it had a single plan.

10.17 There are several risks in CP7 including: inflation; variable train performance; weather resilience; and embedding of maintenance reforms. The volatility of inflation is of particular concern as, although track access charges are index linked, the SoFA is largely a cash settlement. This means Network Rail will need to manage inflation risks for a large part of its income and expenditure. Network Rail has estimated that each 1% change in inflation alters the plans in each year by £200 million in England & Wales and by £20 million in Scotland.

10.18 Network Rail conducted Monte Carlo modelling to provide an indicative probabilistic (or "P" number) cost outcome for its plan which can help assess the level of risk exposure. Monte Carlo modelling requires:

(a) robust input data normalised for known risk (such as severe weather events which caused cost overruns) and financial impacts (such as inflation & foreign exchange rates);

(b) a clear process to generate three-point estimates and distribution based on the historic data; and

(c) details of discrete risks which could impact the project together with quantified probabilities of occurrence and associated impacts.

10.19 Noting the complexity detailed above, we commissioned independent studies as detailed in Table 10.1 to assess Network Rail's process for Monte Carlo estimation to understand the robustness of the outputs.

Findings

Modelling

10.20 Network Rail uses historic averages to model future costs. These have been normalised to remove known factors (e.g. inflation); however, this process did not consistently remove one off risk impacts from historic data. This was confirmed by the report from Sirius which stated: *"…it has not been possible to identify the contribution of the costs of the historic risks that have occurred within the assessed data set, it is considered likely that the calculated workbank cost estimates are high, inflating the overall estimates"*.

10.21 Sirius also reviewed the risk modelling process in Network Rail and how Monte Carlo data was constructed. The consultants found that *"…the Network Rail risk*

management process does not feed the anticipated cost impact of risks into the overall estimating process, an omission which will underestimate the required funds". This limitation in Network Rail's risk management process may also lead to project overruns on time as well as cost; this aligns with our own findings described in Chapter 3 (maintenance and renewals).

10.22 Our bottom-up review of risks that Network Rail has identified in its SBP including all national, regional and functional plans, has shown an inconsistency in the treatment of risk. We have found limited examples of risk probabilities and impacts being quantified; this is a key component of Monte Carlo risk modelling.

10.23 We have found that estimates for model uncertainty inputs have not always been generated based on the range of outcomes of past projects, rather they have been generated using arbitrary percentage adjustments such as plus and minus 10%.

10.24 Noting the findings from Sirius, and our own concerns around the robustness of Monte Carlo inputs, we do not consider that the outputs from the Network Rail's model can be used to quantify the risk exposure for the SBPs in CP7 for any more than an indicative estimate. Without a robust Monte Carlo model it is not possible to calculate a reliable "P" number for CP7.

Determination of risk funding

10.25 Some of the risks that Network Rail will face will be similar to those in CP6 but some will be different. Also, a lot of the risks will be common across England & Wales and Scotland. So, looking at one region in isolation may not be representative. So, it is useful to compare the spend on risk in CP6 with total expenditure at a Great Britain level. This shows that the risk spend of £1.6 billion (in cash terms) was circa 4% of total expenditure excluding EC4T (in cash terms). We would expect this ratio to be consistent if the comparison was conducted in real terms.

10.26 For England & Wales, our assumption of £1.5 billion risk funding (in 23-24 prices) in CP7 is circa 4% of total expenditure in CP7 (in 23-24 prices), which is similar to the position in CP6. Network Rail agrees in its draft determination response with a risk fund of £1.5 billion in England & Wales.

10.27 Network Rail Scotland cannot pool its funding with the other regions and there is a relatively higher efficiency challenge in CP7. Therefore, we consider that risk funding should be relatively higher than in England & Wales (as a percentage of OSMR). On this basis, noting Network Rail's funding pressures in Scotland, we have determined for CP7 that a risk fund of circa 5% of OSMR (£225 million)

would be appropriate; this is broadly commensurate with Network Rail Scotland's interim SBP and is mid-way between the initial SBP (£206 million) and the £242 million most recently submitted by Network Rail Scotland in correspondence to us.

10.28 In this correspondence it drew out some concerns it had with our assumptions on input prices, the targeted performance fund and risk funding. Network Rail Scotland mentioned £242 million of risk funding, but that is based on total funding which is £76 million higher than is now available (as mentioned above).

10.29 We have explained in Chapter 9 (efficiency, headwinds, tailwinds, inflation and input prices) why we have a different view to Network Rail on input prices, but we agree input prices are a risk, and have considered that in deciding on the amount of risk funding in Scotland. We consider that a targeted performance fund of £50 million is important to help deliver Network Rail's train performance targets and is supported by Scottish Ministers and can be funded whilst retaining a reasonable risk fund of £225 million.

Conclusions on risk

10.30 For the reasons set out above, we set risk funding at £1.5 billion for England & Wales and £225 million for Scotland. Both are fully funded within the financial determination and reflect our assessment of projected costs, CPI inflation and input prices and are appropriate given the tightness of the plans.

10.31 We have provided Network Rail with a suite of options on how to fund some elements of the risk funding in England & Wales, these are detailed in Chapter 3 (renewals and maintenance).

CP7 monitoring

10.32 We expect Network Rail to present a clear risk profile with anticipated draw-down for both England & Wales, the regions and Scotland as part of its delivery plan.

10.33 We will be monitoring Network Rail's draw-down of risk funds carefully during CP7 in accordance with the agreed risk funding governance principles. We are also expecting Network Rail to improve its financial risk modelling during CP7 to address the limitations detailed above.

11. Research, development and innovation, including technology adoption

Introduction

11.1 The England & Wales HLOS requires Network Rail to deliver effective Research, Development and Innovation (RD&I) programmes that improve efficiency and value for money of Network Rail's activity, including how new technology can best support safety, workforce reform and modernisation. The Scotland HLOS includes requirements to deliver efficiency to improve the net cost of the rail system and to develop working practices which take account of the adoption of improvements in efficiency and safety. With respect to electrification, it requires Network Rail to facilitate alternative, lower net-system-cost and innovative, technical solutions.

11.2 RD&I is a critical activity, with the potential to offer significant long-term efficiencies, as well as improvements to safety and operational performance. Overall, CP6 has seen a well-managed range of concepts developed. However, we have raised concerns with Network Rail about the challenges the industry faces, transitioning new technology from development through to adoption in the regions.

11.3 Network Rail's Technical Authority leads the RD&I portfolio which is proposed to be £165 million for CP7 (£147 million in England & Wales and £18 million in Scotland) in the SBP. This portfolio is developed in collaboration with the regions, National Functions, rail industry stakeholders (including RSSB), as well as engaging with universities and research bodies. The RD&I portfolio's primary purpose is to generate concepts and determine if they are technically and commercially viable. These spend levels exclude the provision of performance funds.

11.4 If RD&I concepts are viable, further development is carried out by other teams, for example software or apps might be developed by Route Services or procured from the supply chain. Once technology is developed into a working product, Network Rail may then need to put it through product acceptance and procurement approvals (e.g. checking there are alternative suppliers, keeping costs competitive and avoiding obsolescence). Ultimately, regions need to: adopt products into use; secure funding; arrange training; and update their methodologies.

11.5 As well as £165 million for RD&I in Technical Authority, our determination identified circa £1.2 billion of total spend in other National Functions and regions, directly associated with technology.

Consultation responses

11.6 Network Rail responded to the draft determination with further details on its proposed strategy for RD&I and technology adoption. This included early thinking that identified the following considerations:

(a) The programme must include culture change throughout the organisation, from executive leadership through to frontline teams, from asset management and engineering to finance, legal and procurement teams.

(b) There are several principles in common with other culture change initiatives such as Everyone Home Safe Every Day, Project SPEED and standards challenge. That is, empowering teams, creating a safe environment for challenge and providing supportive, consistent and clear leadership.

(c) There are many existing models for innovation that require exploring. The goal being to be able to assess/measure current readiness and willingness to innovate, to baseline and monitor progress against this baseline. Frameworks such as ISO 56002 Innovation Management, and the industry Innovation Capability Maturity Model, may help to do this.

11.7 Network Rail expects to spend the first 6 months of CP7 developing the details of its innovation culture change programme so this workstream can move to delivery from October 2024. The broad description and benefits of the RD&I portfolio are proposed to remain unchanged from the SBP. The RD&I investment is to be allocated across the strategic objectives of; efficiency, safety, performance, sustainability and customers which we agree with as it maps to our PR23 objectives.

11.8 Network Rail has supplied a high-level breakdown of RD&I spend for CP7 which is set out in Table 11.1.

Table 11.1 RD&I spend in CP7

Area of spend	Spend (£ million)
Efficiency and safety benefits from CP7 onwards, enabling modernisation of core processes. Investment prioritised against higher-readiness technology which is proven via first-in-class funding, to deliver higher Return on Investment	76.5
Future control, command and signalling technology to mitigate risks associated with obsolescence from CP8 onwards	56.5
Current and future safety and performance risks linked to weather resilience and climate change adaptation, and to meet environmental and social sustainability targets	16
Level crossing safety risks and physical and cyber security;	6
Improve the safety of freight operations (e.g. lineside monitoring, heavy axle risk validation to release more paths	2.5*
Freight growth	1.5
Traction decarbonisation	3.5
Passenger experience	2.5
Total	165

*Source: Network Rail draft determination response. *Note: this spend is in addition to the £17 million in SO for the freight safety improvement portfolio.*

Changes from draft determination

11.9 Our draft determination set out the case for including £40 million in Network Rail's England and Wales CP7 plan for a PIIF, and that this should be included in the System Operator's plan. We also included funding in our draft determination for a Scotland targeted performance fund which is discussed in Chapter 5 (operations).

11.10 Network Rail proposed allocating only an additional £20 million to its Technical Authority's expenditure for PIIF, taking total RD&I in England & Wales to £167 million. This increase in funding is in addition to approx. £35 million of infrastructure performance-focused schemes already included in the RD&I pipeline.

11.11 We have determined that £40 million should be the appropriate level of spend to support the required improvements in England & Wales in CP7. This is discussed

in Chapter 5 (operations). However, we agree with Network Rail that there is benefit in aligning the management of these two initiatives more closely via the Technical Authority. While the £40 million PIIF will be held within the Technical Authority's plan, it is to be managed collaboratively with the System Operator, with allocation overseen through a new board, that is to be established in CP7.

Findings

11.12 The SBP stated that Network Rail will prioritise RD&I investment in CP7 to deliver benefits in: financial sustainability; safety and security; performance, reliability and capacity; and environmental and social sustainability. To achieve these objectives, the RD&I portfolio is being built around four key principles:

(a) 'business priority-led and outcome focused': accelerating the rate of adoption of new ideas and technology created by the CP6 and CP7 RD&I programme;

(b) 'focused to the end': delivered within a robust governance and assurance framework providing evidence for, and scrutiny of, progress against benefit realisation, with overall strategic direction and oversight provided by regions. This will be essential to address lessons learned in CP6 related to regional take-up and embedding of new technologies;

(c) 'transparent and collaborative': building on existing collaborative partnerships with other organisations who are addressing the same challenges to accelerate progress towards solutions, for example via the DfT Transport Research and Innovation Board, RSSB and train operator innovation boards. An industry RD&I framework has been developed in partnership with Great British Railways Transition Team and RSSB. This is designed to deliver on the strategic themes and broader Government, Transport Scotland and Transport for Wales objectives; and,

(d) 'innovation as business as usual': upskilling people and providing the tools, organisational capabilities and techniques needed to take controlled risks to innovate in their part of the business.

11.13 In CP7 Network Rail aims to deliver business requirements through a combination of direct and co-funded projects. Direct investment is split between:

(a) funding to progress the priority business requirements to Rail Industry Readiness Level (RIRL) 6, which means innovative solutions are in operational transition, can be repeatedly produced to the required quality and there are realistic demonstrations in operation; and

(b) first-in-class funding dedicated to achieving RIRL 7 and above, which means that innovative ideas are in initial deployment or being rolled out, for either regional innovation or the deliverables from CP6 and CP7 'core' RD&I programmes.

11.14 Co-funded projects are to be delivered by Network Rail working with industry stakeholders and partners to leverage investment with at least £70 million through cross-industry collaboration, aligned to Network Rail's business and industry requirements. The aim is to deliver greater value for money through collaborative programmes with other arms-length bodies, academia and the private sector.

11.15 We challenged Network Rail to provide assurance on its engagement with the wider industry. Network Rail advised us that it had consulted stakeholders, capturing more than 550 separate requirements. These were then consolidated into an aggregated set of business requirements that will be used to construct the detailed programme as the company develops its CP7 delivery plan.

11.16 In April 2022 we published a Targeted Assurance Review on Technology Adoption, which found that railway technology delivered as centrally-managed projects often struggled to define a scope which was both deliverable by central teams, and likely to be adopted by regional users. This led to projects going through many cycles of re-scoping, which extended schedules and increased costs.

11.17 Network Rail's RD&I programme for CP7 includes initiatives to improve cultures and collaboration around new technology e.g. its 'innovation culture change programme'. However, improving Network Rail's culture will require changes in the regions and other National Functions (notably Route Services). Based on our challenge sessions, it is not clear that other teams outside the Technical Authority are aware of this culture change programme or have committed to supporting this initiative. Our concerns about the wider technology portfolio in CP7 are discussed in Chapter 4 (National Functions).

Conclusions on research, development and innovation including technology adoption

11.18 We determine that Network Rail's proposals for RD&I are well founded and supported by a reasonable outline governance framework. However, we determine that the £40 million proposed in our draft determination for a PIIF remains appropriate.

11.19 A budget should therefore be allowed for RD&I and PIIF spend of £147 million in England & Wales (and an addition £40 million for PIIF) and £18 million allocation for Scotland (£205 million for GB overall). A separate Scotland targeted improvement fund is discussed in Chapter 5 (Operations).

11.20 Given the inevitable time lag between RD&I activities and the delivery of potential benefits, there is an expectation that CP7 will start to see efficiencies from CP6 RD&I projects and a recognition that some benefits from CP7 funded RD&I may not be realised until CP8. Where Network Rail has identified efficiencies associated with RD&I which are achievable in CP7, the delivery plan should include clear milestones for delivery to enable regions to adopt benefits.

11.21 Wherever possible, we expect technology should be self-funded through the savings it produces. Should regions identify a business case to increase RD&I funding during CP7, then they should have flexibility to allocate budget from their own resources to do so. However, we expect the Technical Authority to maintain oversight of these activities and report clearly on any such reprioritisation during CP7.

11.22 We support Network Rail's proposed 'first-in-class' fund and 'innovation culture improvement programme' and these areas should be prioritised. This aligns to our recommendations during CP6, that both National Functions and regions require additional support in adopting technology and delivering benefits.

11.23 Matched funding is a very important aspect of the programme. We require Network Rail to take actions to secure significant levels of third-party funding and to tailor its RD&I programme to reflect the availability of money and the changing priorities of the wider industry. We expect Network Rail to provide supplementary information in the delivery plan.

Annex A: Additional details of ORR's methodology

Types of investigation undertaken in CP6

Targeted Assurance Reviews (TARs)

A.1 In our PR18 periodic review we carried out a large number of deep-dives in a short period of time, to assure ourselves about Network Rail's planning for specific asset types in different regions. Over the course of CP6, we have carried out TARs to gather detailed evidence and highlight potential issues, in readiness for the PR23 review. The majority of these TARs are published on ORR's website.

A.2 These TARs provide a key source of information for conclusions and adjustments in our draft determination. Also, many of our TARs gave recommendations to Network Rail for areas we expect to see improved ahead of CP7. If these recommendations have not been acted upon, this could also be the basis for conclusions in PR23.

Independent Reporters

A.3 Independent Reporters provide professional advice to the ORR on the quality of Network Rail's service provision, as specified in its licence. Independent Reporters assess Network Rail's performance across a range of functions including asset management and operational delivery, programme and project management and data quality. They may also be called on to provide assessment of Network Rail's compliance with its wider network licence obligations.

A.4 Network Rail is involved in the scoping and delivery of all Independent Reporter studies, and we will typically publish the reports on our website.

A.5 Independent Reporter studies carried out in CP6 provide a key source of information which led to some of our conclusions in PR23. Also, the Independent Reporters may have provided recommendations for actions to be taken by Network Rail.

Consultant commissions

A.6 During CP6 and as part of PR23, we have commissioned consultants to undertake specific reviews. The main reasons that we would use external consultants are: because they have specialist skills or knowledge which supplement our own, or to

provide an alternative, independent assessment, to validate or challenge our own thinking.

A.7 Where we have used consultants' work as a source of evidence in our PR23 determination, then we have published the reports along with our determination.

ORR Cost Tool

A.8 In March 2022 we reviewed an early iteration of Network Rail's business plan for CP7. One of the key learning points from this review was the difficulty we had in identifying the correct information within the structure of Network Rail databook. To alleviate this issue and reduce the risk of unintended errors, we developed our own cost tool which took Network Rail data and displayed it in a way that was better suited for our PR23 assessment.

A.9 The ORR cost tool was pre-verified to act as the source for all review material / data within ORR. This ensured all numbers quoted are in the same price-base (outturn, risk included) and from the same plan (risk-adjusted plan) etc. The design of the cost tool permits easy verification and calculation.

Annex B: Maintenance and Renewals planning

B.1 In this annex we explain specific elements of Network Rail's asset management processes and terminology, which we have referred to in Chapter 3 (renewals and maintenance).

Maintenance planning in Network Rail's regions

B.2 Each region and its routes are accountable for the planning and delivery of maintenance activities. This includes prioritising asset maintenance activities and managing data and information to measure maintenance performance. This activity is supported by Network Rail's Technical Authority (TA) which has responsibility for setting the company policy and developing the processes, standards and procedures, decision-support tools and monitoring technology for maintenance.

B.3 Network Rail must regularly inspect its assets (either in person or through remote infrastructure monitoring systems) and intervene, when necessary, by undertaking a maintenance activity. There are three types of maintenance activity:

(a) Planned preventative maintenance – a task performed regularly to monitor the status or the condition of railway assets (e.g., inspections or cyclical tasks), to reduce the likelihood of the asset failing and causing disruption on the network.

(b) Instructed maintenance – a maintenance task commissioned, such as against a minor defect identified during an inspection visit. For example, vegetation clearance around signals in order to keep them clear for train drivers to see; and

(c) Reactive maintenance – a task that arises during the day-to-day operation of the railway in response to either an asset failure or an external event (e.g., pumping water after heavy rain).

B.4 Further details of maintenance within Network Rail can be found in our Targeted Assurance Review report.

Reporting of maintenance effectiveness

B.5 In this section we set out an overview of how the effectiveness of maintenance is to be reported against in CP7.

B.6 Within each route, maintenance is managed in a broadly similar manner, there being a periodic reported review process of actual activity compared with planned activity, supported by use of a key performance indicator dashboard.

B.7 In CP6 in response to our challenge to Network Rail to provide reporting of maintenance activities undertaken, it introduced a maintenance reporting KPI, which compared year-to-date planned modelled hours to year-to-date actual modelled hours (based on Actual Norm Times) by region.

B.8 For CP6 a target was not set, rather Network Rail wished to understand what level of compliance was being achieved. For CP7 we require that Network Rail should set a target for compliance and we propose that 98% compliance of planned versus modelled would be a stretching but realistic target. Table B.1 provides an example of CP6 year 5 periodic reporting against this measure.

Table B.1 Planned Hours vs Planned Modelled Maintenance Hours P01 2023-2024

Region	Planned Hours (V0)	Planned Modelled Hours (V1)	Variance
Eastern	1,985,118	2,073,996	4%
North West & Central	1,076,833	1,077,702	0%
Scotland	583,908	594,324	2%
Southern	743,557	776,689	4%
Wales & Western	770,160	770,897	0%
Total	**5,159,576**	**5,293,608**	**3%**

Source: Network Rail

Incident response

B.9 A key area of maintenance is incident response. To understand this area better in July 2021 we published a report based on a review of Network Rail's incident response on overhead line equipment Overhead Line Equipment (OLE) Incident

Response - Targeted Assurance Review - July 2021. And whilst this review only looked at one asset area, we consider that our findings are applicable to others.

B.10 Our review found that resource broadly aligns to the normal workload of routine maintenance and inspection, however, the availability of additional resource in the event of an incident is variable across Network Rail. Technical staff who are likely to be first responders at incidents should be adequately trained and their skills should be continuously monitored. This was not found to be the case currently with Network Rail struggling to maintain competence in incident restoration such as dewirements.

Risk based maintenance

B.11 Network Rail is moving from a time and standards based maintenance regime, to a risk based strategy based on the condition of the asset. In February 2021 we investigated this area further for Electrification & Power asset areas Electrification & Power Asset Condition Monitoring Capability to implement Predict and Prevent Maintenance - Targeted Assurance Review - February 2021.

B.12 There are many benefits to such an approach in targeting maintenance activities where they are most needed, such as reducing unnecessary maintenance activities and enabling asset service lives to be extended beyond their original design life. Most importantly it enables effective trend analysis to enable preventative action to be taken before equipment failure.

B.13 Successful predict and prevent strategies require accurate, comprehensive and timely asset knowledge in order for them to be implemented successfully. Network Rail is aware that its current level of asset knowledge does not currently meet the required standard for implementation. Network Rail is currently working to address this issue to inform its maintenance decision-making.

B.14 With sufficient asset knowledge, a mix of maintenance strategies will be required. These are dependent on the asset class, its criticality and consequence of failure and include predict and prevent, risk based and fix on failure.

B.15 Our assurance review identified that the regions have made progress on improving their condition monitoring capability with several initiatives currently on trial or being proposed. However, these are not currently supported by a formal documented transformation strategy or a programme. The application of appropriate governance and resourcing would help to support a successful implementation.

B.16 The involvement of the train operating companies will be critical going forward with equipment needing to be placed on their rolling stock.

B.17 The retrieval and timely analysis of data collected will also require close cooperation. Progress is being made with a general industry recognition that Network Rail adopting a more condition-based maintenance approach would bring wider benefits to customers and freight operators.

B.18 On the basis of this review, ORR was broadly satisfied that the actions being proposed or currently undertaken were appropriate at that stage. However, a continuing focus in CP7 is required as part of the modernising maintenance strategy.

Management of track geometry

B.19 Management of track geometry using On Track Machines (OTM) is one of the highest priorities within the track asset discipline. Inappropriate OTM management decisions will lead to performance impacts and in certain circumstances safety implications. Network Rail spends a significant amount of time and money on the procurement, leasing and maintenance of OTMs and this warrants scrutiny to ensure ongoing effectiveness and efficiency.

B.20 Network Rail relies on successful deployment of OTMs, specifically tampers and stoneblowers to maintain track geometry. Tamping is the preferred method of track geometry maintenance. Tamping maintains track to a high degree of accuracy, however as the underlying ballast breaks down, it becomes increasingly difficult to maintain high quality long-lasting geometry. Stoneblowing machines are maintenance machines that are an alternative to tamping. These are used where ballast has degraded or become significantly fouled and tamping no longer produces a sustainable result.

B.21 In 2021 we published a review of Network Rail's management of these activities. On-track machines (OTM) Stoneblower & tamping management - Targeted Assurance Review.

B.22 Our review found that a lack of guidance and training for staff making decisions on requirements for stoneblowing. Several of the supporting standards and guidance documents were found to be significantly out of date. We recognise that work is being done in the introduction of new decision support tools and roll-out of the Track Competency Framework that should enhance competency and decision making.

B.23 Success criteria for on-track machines are typically limited to improvements in track geometry traces and standard deviations. We saw some consideration for how specific track geometry defects could be targeted in the specification of work.

B.24 We saw variability of the role of the Route OTM Engineer across the regions and the associated reporting line. We did not see a defined competency profile for the role. Staff in the role would benefit from assessment through the Track Competency Framework to allow regions to understand the responsibilities and requirement of the role within their organisation and support any training or competency requirements.

B.25 We did not see defined strategies for substituting stoneblowing for tamping. We observed that tamping is undertaken until it is perceived as no longer providing a benefit – then a switch to stoneblowing is undertaken. This judgement relies on local expertise and leaves open the possibility for local bias.

B.26 Regions have proactively built their own degradation models to support this decision making. However, the new 'enhanced decision support tool', supplied by the TA was introduced to capture this functionality. We will continue to monitor the rollout of this tool and will be assuring that it delivers the promised benefits.

B.27 We noted issues around capturing data within Network Rail's asset management system. This stemmed from variety in units of measure or mixing of job codes within activities. This aligns with our findings from the review of the business case for the new fleet of stoneblowers. Based on our review we recommended that:

(a) Network Rail should define competency profiles for its Route OTM Engineers. The role should be defined within the Track Competency Framework that is being rolled out and assessment completed against this to understand any supporting requirements;

(b) Network Rail also needs to assure the uptake and effectiveness of the tools and systems used to support decision making in relation to the planning and management of OTM. This should demonstrate the data sources drawn on, the system requirements, interdependencies between systems, areas of overlap and whether these are fit for purpose, in practice; and

(c) Network Rail in addition should assess the adequacy of the existing suite of standards and guidelines relating to the use of on-track machines. This should identify any associated risk and establish any future requirements.

Renewals planning in Network Rail's regions

B.28 Each region and its routes are accountable for the planning and delivery of regional activities. This includes prioritising renewals activities and managing data and information to measure effectiveness. This activity is supported by Network Rail's TA which has responsibility for setting the company asset polices and developing the processes, standards and procedures, as well as decision-support tools.

B.29 The prioritisation process across assets within regions followed a similar method to the workbank development. Each region's Director of Engineering and Asset Management (DEAM) hosted workshops with their asset managers / engineers. These discussions allowed them to highlight the key risks in their respective asset areas. Moderation of assumptions happened as a part of the discussion and individual asset categories with higher residual risks then reviewed and funding reallocated by the DEAM if it was considered appropriate. This was an iterative process during the compilation of the SBPs.

B.30 The allocated funding envelope has required regions to prioritise work across asset types. Regions that have significant asset renewal requirements in one asset area in CP7 have had to reduce spend below their preferred level on other asset areas and defer renewals within and across control periods.

B.31 To understand this area better we reviewed the extent of deferral and re-prioritisation of renewals in the operational property portfolio Operational Property deferred renewal & workbank change control management - Targeted Assurance Review - July 2021. We found that Network Rail has a defined process to manage risks arising from deferred renewals and reports quarterly on its renewal deliverability in each financial year. Reporting does not provide visibility on how regions justify their decisions along with impact on performance outputs such as safety & performance, cost, volumes, efficiency and asset sustainability. Key findings included:

(a) all regions broadly managed risks arising from deferred renewals in Operational Property in line with Network Rail's defined process. However, we identified that there were varied approaches to undertaking risk assessment across regions and a lack of detailed justifications for some deferred schemes on the Wessex route;

(b) change control processes adopted in Eastern, Southern and Wales & Western regions have been evolving following the "Putting Passengers First"

Programme. The processes in Scotland and Wales & Western region are found to be less developed than other regions, which has resulted in a lack of visibility on how impact on cost, volumes and efficiency against baseline targets were assessed and monitored coherently with workbank changes; and

(c) regions have been shown to exhibit a strong focus on assessing safety and performance risks. However, a tool that can provide insight on expected changes in asset conditions alongside the influence of minor works that could extend actual asset life is lacking. Hence, regions find it difficult to currently assess the risk of deteriorating conditions quantitatively for deferred renewals.

Metallic structures

B.32 A key area of concern of concern in CP6 and for CP7, is metallic structures due to their greater vulnerability to deterioration. Our CP6 final determination set out a requirement for Network Rail to develop a sustainable asset strategy for metallic structures for future control periods.

B.33 In April 2023 we published a review of Network Rail's progress in developing a metallic structures sustainability strategy - Metallic Structures Sustainability Targeted Assurance Review.

B.34 This review found that Network Rail's TA currently has a structures framework that sets out strategies and goals for the whole structures asset portfolio. However, a specific national sustainability policy has not been fully developed to address the greater vulnerability to deterioration of metallic structures in future control periods.

B.35 At a regional level there is no evidence of a specific strategy or goals to monitor metallic structures sustainably. We found it difficult to understand the regions' long-term visions and how they deal with the uncertainty of future intervention demands for metallic structures beyond CP7.

B.36 The review also found that regions were not able to quantify the impact on asset sustainability at the exit point of CP6. This was due to under-delivery or deferral of CP6 sustainability schemes, alongside the BAU renewal activities such as strengthening, replacement, or repair works, which can all have impacts on asset sustainability.

B.37 The development of a sustainable asset strategy for future control periods to adequately deliver the whole life management of metallic structures was one of the

final determination requirements for Network Rail to deliver in CP6. We are concerned that this requirement has not yet been met and we expect that a sustainable asset strategy is developed by the end of this Control Period (CP6).

B.38 Given our findings, we require Network Rail to develop a strategy that can articulate its journey required to maintain sustainability of metallic structures. These include continuous monitoring of asset sustainability with development of targeting metrics and having deeper understanding of the outcomes of interventions on metallic structures through key performance indicator(s).

Effective volumes and unit rates

B.39 Throughout Network Rail's SBP and in our draft determination, an 'efficiency' typically means that a defined output will be delivered at a lower cost in CP7, relative to CP6. However, in CP6 we raised concerns with Network Rail about a number of areas where the output or 'quality' of renewals was not clearly defined. In CP6 we have challenged Network Rail through our holding to account activities.

B.40 At the start of CP6, Network Rail began reporting 'effective volumes' for some types of renewals. This was intended to capture variations in quality, for example renewing a bridge by completely replacing it with a modern equivalent, will earn more 'effective volume' than just refurbishing the same bridge by replacing a few damaged components. Previously, both would have earned the same 'total volume', measured in square metres. This is a significant improvement, but we have identified some specific areas requiring more work in CP7. For example, in CP6 there was no effective volume measure for buildings assets, but this is being developed for CP7. This is particularly important, because we require clarity on whether renewed footbridges at stations are complying with modern accessibility standards, including lifts or ramps. There is currently ambiguity about the 'quality' of footbridge renewals.

B.41 There are some asset types where the quality and even the size of jobs are not clearly captured by the effective volume measure. In May 2021 we published a Targeted Assurance Review (TAR) Earthworks Renewals Cost and Volume Transparency - Targeted Assurance Review - 25 May 2021 on earthworks renewals, which found that many projects were seeking engineering solutions of a lower quality, in order to meet a target unit rate. These target unit rates were averages at the regional or even national level and were never intended to give a good estimate of costs on an individual project, but they were driving behaviours on projects.

B.42 The cost of renewals depends on the strategy and policies adopted by each region. For example, our May 2021 earthworks renewals TAR noted that Network Rail Scotland had made a conscious decision to do lower quality repairs on rock cuttings, because this was a key risk and the region wanted to renew as many sites as possible within a fixed budget. Conversely, a key risk in the Southern region was large clay embankments where high quality repairs are the only viable solution, leading to a low number of projects with very high costs. Both are a reasonable approach to managing risk, but our concern was that these differences are not visible through the cost and volume reporting. Without transparency on quality, Network Rail Scotland would appear to be very efficient relative to the average unit rate, while Southern would appear to be very inefficient.

B.43 Also in May 2021, we published two TARs on earthworks and drainage weather resilience Earthworks and Drainage Weather Resilience - Targeted Assurance Review - 25 May 2021; and drainage maintenance Drainage Maintenance - Targeted Assurance Review - 25 May 2021. These both concluded that the greatest opportunities for Network Rail to improve efficiency came from better asset knowledge, better data & technology, and whole-system solutions (including better interaction with neighbours on flood prevention).

B.44 One of the key enablers of opportunity to deliver more effective and efficient renewals is via the introduction of new technologies. Network Rail's endorsement of the Railway Technical Strategy highlights that it will need to introduce new technologies if it is going to deliver its strategic objectives; and that it has been historically "too slow" to develop and adopt new technology in the past.

B.45 For at least the last two Periodic Reviews, Network Rail has provided plans and justification for technology funding, which we challenged and we agreed upon improvements to processes, governance and competence. Benefits have been seen from these improvements and Network Rail is successfully developing and adopting a wide range of new technology every year. For example, over the last three years an average of 265 products each year have achieved Product Acceptance for use on the railway.

B.46 However, in our regular monitoring we continue to find examples of new technology, which is severely delayed, cancelled in the late stages of development, or it is delivered but users refuse to adopt it.

B.47 In April 2022 we published a TAR on technology adoption Technology Adoption Case Studies - Targeted Assurance Review. ORR's review found that a large number of teams across Network Rail need to work together effectively, to get new

technology developed and adopted into use. We found that within each of these teams there were reasonable processes, competent people and a motivation to improve and become more efficient. However, we also found significant challenges at the interfaces between these teams.

B.48 In CP7 Network Rail, as an organisation, needs to provide more cross-team support and guidance: aiding communication between teams; establishing a shared culture between teams; and promoting learning between teams to improve behaviours at these interfaces, so that the organisation as a whole can realise greater benefits from the good work being done within each of the teams.

Network Rail TA's approach to assurance of regional renewal planning.

B.49 Below we set out the criteria used by Network Rail's TA in undertaking its assurance of the regions' plans for CP7. As described in Chapter 3 (renewals and maintenance) of this document, we have drawn on the TA's findings to support our recommendations on the prioritisation of renewals expenditure for core assets. The assessment criteria used by the TA were as follows:

(a) an analysis of the regional assets' condition was informed by the following:

(i) the volume of work deferred from CP6 (a regional specific analysis);

(ii) advised levels of work necessary to achieve steady state (as a benchmark by which to compare actual planned volume);

(iii) the proportion and recent trends of assets in poor / very poor condition, as a precursor to failure (comparisons made across regions and against network averages); and

(iv) the pattern of urgent defects and wrong side failure trends (comparisons made against past regional rates and variation from network level baseline and trends).

(b) an evaluation of the robustness of region-specific strategy & plans for CP7 considering:

(i) proposed asset strategy and plan volumes are compared with the insights described above;

(ii) proposed asset strategy and plans and their alignment to asset policy;

(iii) checks on plan dependencies, for example: maintenance and deliverability (this is supported by the separate assurance findings for these aspects); and

(iv) the evaluation also involved specific discussions with regional asset leads to clarify understanding of the regional evidence used to develop the proposed strategy and volumes.

B.50 The adopted approach does not apply a formula or establish a quantified boundary. The assurance work has been used in each asset to establish a grade - ultimately these are calibrated judgements from each representative of the asset network technical head.

Annex C: Summary of regional delivery operating models for CP7

Eastern

C.1 **Overview:** The Eastern Region has implemented an agile delivery model that integrates the overarching partnership agreement with their organisation. To achieve this, two multi-disciplinary partnerships will be established based on geographic location, specifically North and South. These partnerships will support the Agile Client Eastern capital delivery operating model.

C.2 **Key components:** The commercial strategy to support this model is that there will be two multi-disciplinary partnerships (North and South), with contractors having individual contracts with Network Rail and an overall partnership agreement based on an integrated railway system approach.

C.3 The Eastern region is currently procuring the overall partnership agreements for CP7 and undergoing a change programme in readiness for CP7.

Areas of focus for ORR's holding to account in CP7:

C.4 **Delayed procurement activities**: The main frameworks for the Eastern region were delayed in going out to market due to cabinet office approvals. This has led to frustration within the supply chain over cancelled and stop-start procurement exercises. Other regions have a much more developed approach to the CP7 frameworks, which leaves questions about resource availability and supply chain appetite.

C.5 **Commercial readiness**: The commercial teams in the Eastern region are currently undergoing a transformation programme to enable them to better manage the new CP7 frameworks.

C.6 **Confidence in delivery**: Eastern region was the only region unable to answer questions on the risks posed by their strategy adequately, and a sense of complacency was evident.

North West & Central

C.7 **Overview:** North West & Central for CP7 is planning to integrate its organisation and delivery model through an internal enterprise approach that incorporates elements of Project 13 principles, including capable owner, governance, and organisation. This approach is called the "Internal Enterprise" and involves implementing an Intelligent Client Operating Model. The aim is to align teams across capital delivery, works delivery, asset management, business development, and route customers.

C.8 **Key components:** The commercial strategy for CP7 takes cognisance of the region's life extension asset policy, which sees an increase in low-value/less complex work. This is achieved by a breakdown of work types when compared to CP6 strategies, with the aim of this more tailored approach being to ensure the optimal contract types and pricing mechanisms are used.

C.9 In its proposed commercial strategies, the region has shown lessons learned from previous control periods and taken onboard Project 13 principles and guidance in the construction playbook.

Areas of focus for ORR's holding to account in CP7:

C.10 **Performance management**: The region has opted for a model and strategy that sees workbanks broken down more than in CP6. To manage this, the region has implemented a new suite of KPIs to manage these contracts.

C.11 **Quality management**: The shift in asset management policy to life extension works and the complimentary strategies which see a move to production line/repeatable works in some asset classes present challenges around quality management.

Scotland

C.12 **Overview:** The Scotland region's existing CP6 strategies roll into the first years of CP7 with frameworks in place across key disciplines within the region. Track will continue under the Rail Systems Alliance Scotland, and the collaborative partnership with Siemens will deliver major signalling work. The strategy for CP7 seeks to support Scottish Government priorities and strengthen the region one team approach with continuous improvement and learning from previous control periods and projects such as the Enterprise model used on the Levenmouth enhancement.

C.13 **Key components:** To help meet Transport Scotland's HLOS requirements, the region has adopted a new route corridor approach for investment. This approach aims to achieve better integration between renewals and enhancements projects with a view to achieving better levels of efficiency.

C.14 The approach within the Scotland Region demonstrates learning from previous control periods, and continuity within frameworks for the start of CP7 allows the region the opportunity to further develop its one-team approach and efficient working practices.

Areas of focus for ORR's holding to account in CP7:

C.15 **Decision-making on enhancements and renewals**: In CP7, Transport Scotland seeks a greater overview of renewals and increased interlinkage between renewals and enhancements. The region's management of this could pose significant challenges to delivery.

C.16 **Future framework procurement**: The region differs from others because its main frameworks straddle CP6 and CP7. Whilst this brings benefits, there are also risks around resource availability and supply chain appetite.

C.17 **Embedment of new investment strategies**: Scotland has adopted a route corridor strategy to investment, and this is a new approach for the region and seeks to enhance the whole system view of the network. Traditional and embedded working practices within asset management could delay the full benefit realisation of this new approach.

Southern

C.18 **Overview:** The delivery model within the Southern region is called The Southern Integrated Delivery ecosystem. It is a Project 13 enterprise model; this differs from other regions that have adopted principles from Project 13 but have not implemented a complete enterprise in their CP7 models. Project 13 has been used across the infrastructure sector for several years and has notably been adopted by the Transpennine Route Upgrade programme and several UK water companies.

C.19 **Key components:** The model has seen the supply chain partners involved in the development of the SBP for Southern and fully sighted on the volumes to be delivered in the control period. This strategy sees new levels of openness and cooperation between Network Rail and the supply chain. Supply chain partners are incentivised to deliver on planned efficiencies with profit linked to performance against the planned volumes.

C.20 This approach by Southern is the first example of the full implementation of Project 13 principles within a region which presents the region with several opportunities within CP7. During our engagement with the supply chain, it has been positive about the model and the new ways of working.

Areas of focus for ORR's holding to account in CP7:

C.21 **Project 13 approach**: The new operating model is based on the Project 13 enterprise, which Southern is the first to use at this scale. This presents a number of opportunities but also presents risks.

C.22 **Maturity of the supply chain**: The new approach requires new ways of working on both the client and contractor side and currently, the commercial processes are being worked on. Benefits will only be realised once the model is working and delivering projects.

C.23 **Major Enhancements**: The model chosen by Southern is purely focused on renewals, and any increase in enhancement projects could represent a deliverability challenge to the region.

Wales & Western

C.24 **Overview:** Wales and Western region for CP7 has adopted a delivery model called Intelligent Client. This model aims to create strong partnerships with asset-specific suppliers, incentivised to develop, design and deliver a portfolio of work and embrace the SPEED (Swift, Pragmatic and Efficient Enhancement Delivery) principles. The region intends to involve the supply chain much earlier in the project lifecycle during CP7 to develop, design and build cost-effective solutions embracing the minimum viable product (MVP) ethos. To achieve this as part of the intelligent client model, the region will be less prescriptive in its specifications and work in a closer partnership with the supply chain compared to CP6.

C.25 The commercial strategy to support the intelligent client model sees the adoption of different types of contracts based on asset category. Some of these make use of existing CP6 and national frameworks. An example of this is in track, where the existing relationship with the South Rail Systems Alliance has been expanded to include development work. In the buildings and civils asset category, an integrated partnership with multiple suppliers packaged by sub-discipline was chosen that will embed collaborative work and early contractor involvement.

C.26 **Key components:** The new delivery model and supporting commercial strategy present the region with several opportunities around efficiency and innovation in

CP7. The supply chain has been involved and consulted in the development and implementation of the new strategies that include the principles and guidance from the Project 13 framework and the Construction Playbook.

Areas of focus for ORR's holding to account in CP7:

C.27 **Level of change**: The Wales and Western region has been through a significant change to implement the new intelligent client model with a considerable portion of capital delivery and sponsorship teams under consultation. This can lead to change fatigue and impact capability.

C.28 **Commercial Readiness**: The new delivery model involves the supply chain earlier and marks a difference in the commercial skillset required to manage those contracts effectively.

C.29 **Asset management approach**: The earlier involvement of contractors sees a step away from specification-driven work and the change to problem statements. This requires a different skillset and greater integrated working than the previous control period.

Annex D: Composite Reliability Index (CRI)

D.1 Composite Reliability Index (CRI) is a measure of overall asset performance across the network. It is calculated by weighting the incidents of a certain set of asset failures by their impact on train service (based on Schedule 8 payments). A higher CRI score means assets are performing better.

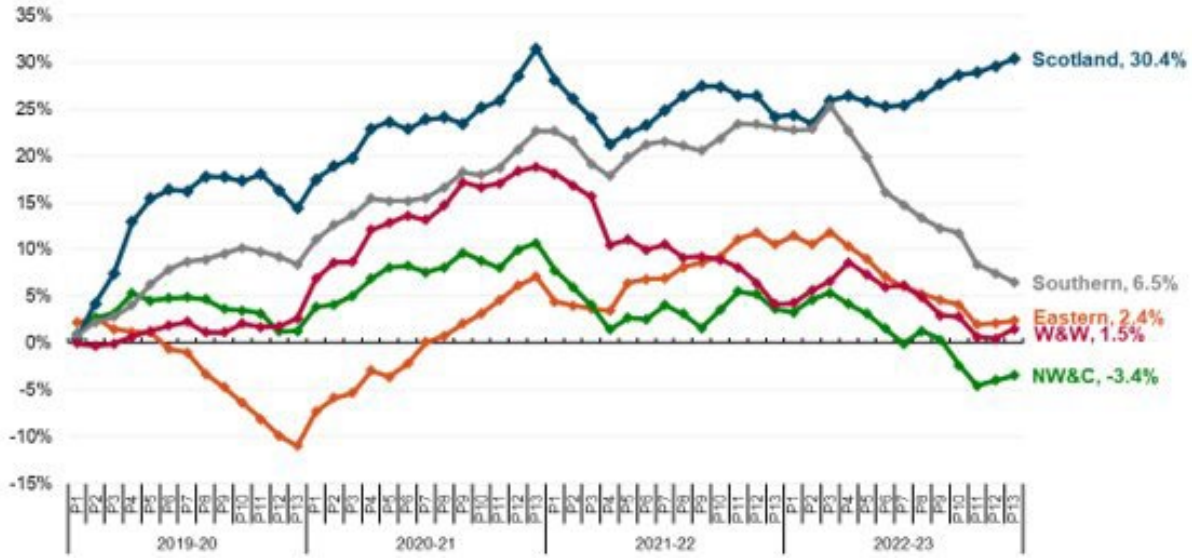
D.2 CRI in CP7 will be reported as the weighted measure of the percentage improvement in asset reliability compared to a 2023/24 baseline. CRI uses different weights for each "route criticality band" and "asset category" to differentiate between high and low impact failures, e.g.;

(a) points failures have on average a 30% greater impact than the overall average impact, while Telecommunications failures have an impact 60% lower than the overall average. Overhead Line Equipment failures have the highest impact; and

(b) points failures on Band 1 route sections have seven times the impact of failures on Band 5 sections.

D.3 Figure D.1 show the long-term CRI performance by regions over the first 4 years of CP6. As can be seen Scotland has achieved the strongest improvement on CRI, whilst North West & Central is performing below the current baseline (exit position of CP5) which is used for measuring CRI against in CP6.

Figure D.1 Long-term CRI performance by region



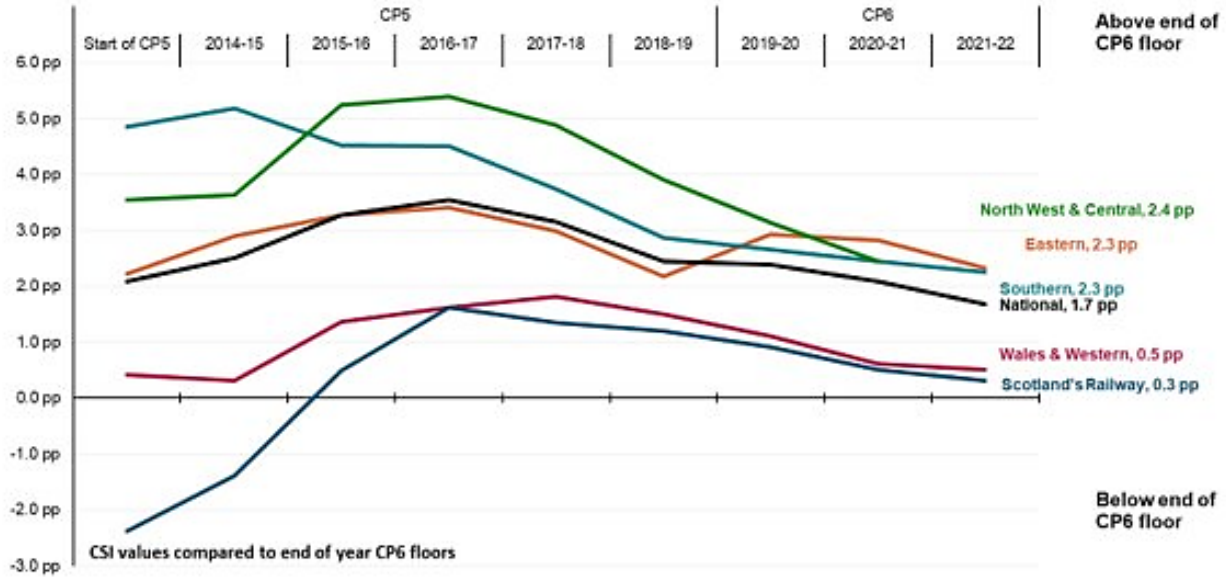
Source: Network Rail

Annex E: Composite Sustainability Index

E.1 The Composite Sustainability Index (CSI) shows the percentage improvement of asset sustainability compared to a baseline. The current 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. It is provided by Network Rail on an annual basis.

E.2 Figure E.1 shows the relative CSI changes by region since the start of CP5.

Figure E.1 Performance of Regions vs end of CP6 regulatory floor



Source: Network Rail

E.3 Understanding network sustainability essentially involves an assessment of the life left in the assets. When assets near the end of their useful life, regions must plan to replace those assets that are still required for the effective operation of the network. Demonstrating that the underlying trends in remaining life of the infrastructure are within manageable 'boundaries' is important in assuring the effectiveness of asset management activity.

E.4 Maintaining and renewing the network in the short-, medium- and long-term to meet reasonably near future demand for railway services is one of Network Rail's key obligations, as set out in its Network Licence (LC1) and one that funders need

to have consideration of, when setting out their HLOS and SoFA. Prioritising short term performance objectives over medium to longer term requirements is expected to result in higher whole life costs than should otherwise be the case.

E.5 We have required a continuing measure of network sustainability in CP7 in order to help us assess Network Rail's progress against this important outcome. This measure is the CSI, and Network Rail has included this on the proposed regional scorecards in its SBP.

E.6 Understanding network sustainability essentially involves an assessment of the life left in the assets. When assets near the end of their useful life, regions must plan to replace those assets that are still required for the effective operation of the network.

E.7 Demonstrating that the underlying trends in remaining life of the infrastructure are within manageable 'boundaries' is important in assuring the effectiveness of asset management activity. A measure of network sustainability therefore allows us to monitor that Network Rail can 'sustain' current asset performance on the railway in future control periods. It also provides an understanding of whether Network Rail's planned renewals work is consistent with seeking to minimise the whole-life cost of the railway.

Measuring network sustainability

E.8 Network Rail assesses that its infrastructure assets would cost around £600 billion to replace. Each year it renews approximately £3 billion (0.5%) of its assets, supporting the asset performance required to meet customer needs, in particular maintaining safety and preventing disruption to train services.

E.9 The £600 billion infrastructure assets comprise:

(a) assets that were built at the same time as the railway, between 100 years and 200 years old, (typically structures, earthworks, buildings and tunnels) – and would cost around £300 billion to replace;

(b) assets installed in past modernisation programmes in the 1950s, 1960s and 1970s, between 45 years and 75 years old (typically electrification, signalling and some track assets), costing around £100 billion to replace; and

(c) assets installed as prior assets came to end of life (all asset forms), shorter-life modern technologies such as telecoms networks that were last renewed more than a decade ago and now require mid-life investment, or assets that

have been installed as part of recent enhancements. These would cost around £200 billion to replace.

Measuring asset condition

E.10 Before the start of CP5 Network Rail developed in conjunction with us a sustainability measure (CSI) to monitor changing patterns of asset life and some aspects of asset performance and risk. This measure uses models that measure changing asset life by modelling patterns of degradation and improvement from interventions. The models are re-run annually using updated survey and work records. The CSI measure is reported on an annual basis and is accompanied with longer term forecasts. It measures the percentage change in asset remaining life.

E.11 The asset groups included within the CSI calculation are: track, lineside, signalling, level crossings, structures, earthworks, drainage, operational property, electrification and plant and telecoms.

E.12 After initial work to address data gaps, since 2017 it has become a reliable means to monitor changing asset condition and remaining life. The CSI measure suggests there has been a slow rate of reduction in remaining asset life since 2017 which is forecast to continue. This, points to a slow underlying rate of deterioration across the asset base since the measure was introduced in 2014.

E.13 In our CP7 outcomes framework we have proposed the continued use of the Composite Sustainability Index (CSI) as the success measure for asset sustainability in CP7.

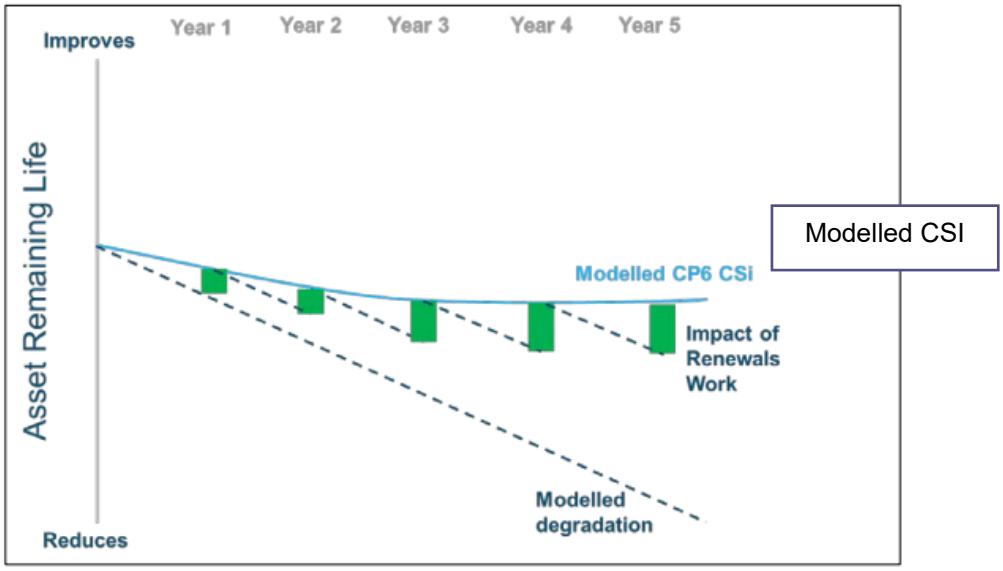
Calculating CSI

E.14 The CSI measure is calculated using the same methodology used since the inception of the measure in CP5. The measure was updated in CP6 to account for improved knowledge on the benefits that were gained from undertaking of certain renewals activities on structures and improved asset inventory for power and electrical assets.

E.15 CSI is calculated and reported by Network Rail using the combined outputs of bespoke and standalone models. The models are run by specialised central resources rather than being produced by the regions, however it is based on the renewals plans for each region. Regions, towards the end of CP6, were provided with a ready reckoner tool to allow them to gain a broad understand of how the renewals choices they may make, could lead to different outcomes.

E.16 Figure E.2 illustrates the basic principles behind the CSI calculation, demonstrating how interventions arrest the modelled decline in asset remaining life, and result in an improved sustainability score.

Figure E.2 CSI How the Measure Works



Source: Network Rail

E.17 Unless there is an increase in asset life replacing work volume then the CSI modelled score will decrease over CP7 and beyond. This additional volume can be achieved by one or a combination of:

(a) reducing expenditure currently allocated to other activities, to allow an increase in expenditure on asset renewal;

(b) better targeting the renewals undertaken; and

(c) increasing the efficiency of asset renewal, allowing more volume for the same expenditure.

E.18 While a slight drop in CSI in any single control period might not in itself be a cause for concern, allowing this to compound over a number of control periods will result in a bow wave of required activity to recover a steady state position that will become undeliverable without significant disruption to customers.

Assessing Network Rail's performance on network sustainability

E.19 CSI combines condition knowledge from each asset into a single index. A lower value means a loss in asset condition (i.e., it is in worse condition), and a higher

value means an improved asset condition. Forecast change is achieved by accounting for both the losses in condition that occur through degradation, and the improvements in condition that are made through renewals activity. This is achieved by applying known rates of change of the assets (from Network Rail's whole lifecycle asset models), and the forecast impact of proposed renewals activity. Each of the asset portfolios (i.e., track, signals, structures etc) has a differing distribution of remaining life and as such the volume of assets at the end of life varies over time.

E.20 CSI as discussed earlier is a single, composite measure and is based on input data (e.g., on renewals undertaken and regular asset condition assessments undertaken) that changes slowly over time. This means an end of control period trajectory has been set rather than year-on-year ones.

E.21 The composite nature of the measure means that fluctuations in different asset classes which contribute to the measure could be masked. For that reason CSI is not used in isolation to hold regions to account. We also take into account a wider array of asset information in reaching our assessment of whether Network Rail is doing everything reasonably practical to deliver a sustainable network. In addition, we use other, more input-based, indicators including:

(a) an asset array of information such as:

(i) asset performance and safety data; and

(ii) Network Rail's own management data, including indicators such as planned and delivered renewals volumes, which we will use to assess whether routes are seeking to drive the CSI score at the expense of those assets that do not contribute to the CSI calculation.

(b) Network Rail annual engineers report for each region and for each asset type on that region, which will provide an assessment of Network Rail's progress towards meeting the end-of-CP7 baseline trajectory;

(c) quarterly liaison meeting with Network Rail's Asset Engineers to monitor work plan compliance; and

(d) reporting within Network Rail's Annual Return.

E.22 As outlined in our PR23 policy framework conclusions, our outcomes framework is a tiered approach comprising of success measures such as CSI, supporting measures and additional assurance. Unlike CP6 we will not be setting a regulatory

minimum floor for the CSI measure. Rather we will determine the outcomes (success measures) that the infrastructure manager should deliver. These outcomes need to be aligned to each governments' HLOS requirements within the funding available and take account of our assessment of each regions' Strategic Business Plan (SBP). Further information is available in our PR23 draft determination: supporting document on outcomes.

Improving the measurement of network sustainability for CP7

E.23 The CSI measure proposed for CP7 has some limitations and does not encompass 100% of assets or all their attributes. It takes a representative sample on the basis that assets not included in the model would be in a similar condition to and treated the same as the ones included.

E.24 In 2021 we commissioned an independent review of CSI and this report identified that CSI could be considered best practice Measurement Methodologies of Infrastructure Asset Health - Issue 1 - Published March 2021. The report further noted that CSI should be complemented by nearer-term tactical performance indicators including the Composite Reliability Index and Service Affecting Failures.

E.25 CSI provides a view of longer-term patterns of change beyond a single control period and allows a clear perspective to be taken on the longer-term impacts of route strategic plans. Beyond this assessment, the most meaningful indicator of how well Network Rail is delivering asset sustainability, is how well its renewals plan is delivered and how this compares with the original plan.

Annex F: ORR's Cost Benchmarking

Introduction and summary

F.1 ORR undertook cost benchmarking analysis on Network Rail's maintenance, renewals and support costs forecasts for CP7 as part of our assessment of its SBPs.

F.2 The analysis compares the expenditure in Network Rail's five regions, so focusses only on regional level expenditure. It covers 95% of maintenance expenditure and 88% of renewals expenditure and excludes expenditure incurred by National Functions such as the System Operator, Route Services and Technical Authority (including on projects such as Project Reach and ETCS). Furthermore, the renewals average unit cost analysis only covers expenditure at a regional level for which it was possible to match expenditure with volumes (63% of total renewals expenditure).

F.3 The CP7 SBPs assume that Network Rail will achieve a:

(a) 10% efficiency savings in operations, support and maintenance costs by the end of CP7; and

(b) 15% efficiency savings in renewals costs by the end of CP7.

F.4 When including national function efficiencies, this is equivalent to savings of £3.2 billion for England and Wales in the risk-adjusted plan and £429 million for Network Rail Scotland (for the interim SBP). If National Function efficiencies are excluded, savings reduce to £2.5 billion for England and Wales and £380 million for Network Rail Scotland.

F.5 Cost benchmarking was used by ORR to help set efficiency targets for Network Rail in the 2008 PR08 and 2013 PR13 periodic reviews. In both cases, we compared Network Rail in its entirety against European peers. While this international comparison informed our determinations at the time, we acknowledged its limitations, particularly given the absence of high quality and consistent data across the countries. During PR18, we focussed on comparing Network Rail's domestic business units.

F.6 Our PR23 analysis continues the approach adopted in PR18 and compares Network Rail's five regions over time. The period covered by our analysis is 17 years for maintenance and 15 years for renewals. A cost "frontier" is estimated

using statistical techniques and the gap between this and a given region in a given year is calculated. Each cost model for both maintenance and renewals (total renewals and unit costs) estimates the cost as a function of its main drivers. These include traffic, track size, possessions, proportion of electrified track, rainfall and volumes of assets renewed (for renewals). Due to a lack of consistent data, we did not analyse support costs using a statistical model or estimate their efficiency gaps from the cost frontier. Instead, we analysed the trends in support costs from CP5 to CP7.

F.7 The analysis suggests that for England and Wales the SBP efficiencies proposals of 10% for maintenance and 15% for renewals are stretching but realistic targets for CP7. For Network Rail Scotland, the 10% for maintenance and 15% efficiency proposals for renewals appear more stretching than in England and Wales. Factors that our model does not control for, including work mix and differences in asset strategies between Network Rail Scotland and other regions, may be distorting these findings.

F.8 The lack of external benchmarks means the analysis cannot provide a full indication of efficiency gaps. Any gap between Network Rail and external comparators would need to be added to the internal gap to show a region's total scope for improvement.

F.9 Cost benchmarking is a high-level tool and does not provide in-depth insights into the reasons behind estimated discrepancies between the forecasts and the models predictions. The cost benchmarking is based on identifying statistical patterns in the data. The data covers three control periods, so some past cost inefficiencies may be getting carried forward and impacting on the estimates for CP7.

F.10 Another consideration when making inferences of efficiency is that the analysis does not look at total operations, support, maintenance and renewals costs (OSMR). For example, our model excludes certain types of renewals and maintenance expenditure. There are also inherent differences between Network Rail's regions that are difficult to quantify and are not controlled for in the model. These include factors which lead to different quality of renewals and maintenance such as differences in the type of network (urban or rural); geology (lots of tunnels and cuttings compared to flat countryside that floods in other regions); and/or asset policies and strategies.

F.11 Therefore, in our wider assessment of SBPs, the findings of our cost benchmarking analysis are used as one element of a wider evidence base which

includes targeted assurance reviews, consultancy reports and Independent Reporters work.

F.12 The analysis of trends in support costs suggests that they rose sharply from CP5 to CP6 (92.0%). This increase was largely driven by:

(a) changes agreed in the PR18 Final Determination, including on Group funding (e.g. new approach to insurance), Route incurred support costs (e.g. costs related to staff, plant & machinery, work place management), Digital Railway related costs, and the introduction of the System Operator (SO);

(b) the Putting Passenger First (PPF) programme and the Coronavirus (COVID-19) pandemic; and

(c) inconsistencies in the categorisation of operations, support and maintenance costs used by Network Rail during the preparation of its CP7 SBPs.

F.13 Total support costs are forecast by Network Rail to decrease by 10.0% from CP6 to CP7. Relative to its size and operating activities, Eastern appears to be the most efficient region. Network Rail Scotland is forecast to spend 15.0% less per train km than England and Wales.

F.14 Network Rail's CP7 SBP expenditure on operations, support and maintenance (OSM) is not consistent with its regulatory financial statements (which are underpinned by our regulatory accounting guidelines). However, Network Rail says, that the total of OSM is consistent. It is likely that this has affected our findings on maintenance and support costs. Ahead of our final determination, Network Rail needs to ensure that its proposed CP7 expenditure has been classified on a basis consistent with its regulatory financial statements.

Results

England and Wales maintenance and renewals

F.15 The England and Wales SBP pre-efficient forecasts for maintenance and renewals expenditure in CP7 are in line with our cost model's predictions (+1.0% and +1.6% respectively). This suggests that Network Rail's pre-efficient proposals may be reasonable.

F.16 We have used several techniques to estimate regions' efficiency levels for CP7. The efficiency estimates from the different techniques are compared and the efficiency gap is shown as the range from the lowest estimate to the largest.

F.17 The analysis suggests that Network Rail in England and Wales could achieve efficiencies of between:

(a) 5.0% and 11.0% on maintenance expenditure; and

(b) 0.0% and 14.0% on renewals.

F.18 These results suggest Network Rail's CP7 efficiency assumption of 10.0% for maintenance for England and Wales is stretching but realistic. Regarding renewals, the top of the range shown above (14.0%) is also close to Network Rail's 15.0% assumption, which implies a reasonably stretching target.

F.19 Our analysis has shown that North West & Central has the lowest potential efficiency savings (between 1.0% and 4.0%) on maintenance and the highest on renewals (between 0.0% and 17.0%). Whilst the finding on maintenance could be driven by inconsistencies in the data, the finding on renewals is consistent with our analysis of trends in unit costs as well as Network Rail's own analysis on unit rates. These two pieces of analysis found that North West & Central has some of the highest unit rates, mainly due to its work mix and access complexity.

Network Rail Scotland's maintenance and renewals

F.20 The pre-efficient forecast for maintenance expenditure for CP7 is in line with our model prediction (+0.3%), a finding which suggests that Network Rail's proposals may be reasonable.

F.21 The pre-efficient forecast for renewals is 13.0% lower than our model's prediction, which may be attributed to various factors including work mix and differences in asset strategies between Network Rail Scotland and other regions. Moreover, Network Rail Scotland's SBP is based on a fiscally constrained approach, which also suggests that it may be forecasting to spend less than its historical average.

F.22 The benchmarking analysis suggests Network Rail Scotland could achieve efficiencies of between 1.0% and 6.0% on maintenance; and 0.0% and 0.4% on renewals.

F.23 The finding on maintenance is smaller than the 10% forecast by Network Rail but comparable to the 4.1% efficiencies that Network Rail Scotland has achieved in the first three years of CP6. Network Rail Scotland is expected to achieve 8% efficiency in its maintenance expenditure by the end of CP7. The modelled efficiency gap on renewals is very small compared to Network Rail Scotland's target of 15.0% for CP7. This suggests that for Network Rail Scotland, the 15.0% efficiency target for renewals would be very stretching. However, this finding could

be consistent with our previous analysis, including the PR18 cost benchmarking report, where we modelled maintenance and renewals together, and found Network Rail Scotland to be 8.0% inefficient whilst England & Wales was 17.0% inefficient.

F.24 These results do not necessarily mean Network Rail Scotland is more efficient than the other regions or cannot achieve efficiencies in CP7 as the data may not be comparable. It may also result from the type of work mix that Network Rail Scotland is planning to undertake in CP7, whose scope may be lower than in England and Wales. In CP6, there were examples of renewals funding being used for enhancements, which could distort our analysis, as we could not adjust our model for it. This could mean our model shows Network Rail Scotland as more efficient than it is.

Average unit costs analysis

F.25 We analysed the pre-efficient average renewals unit costs (expenditure divided by volumes) in two ways:

(a) we compared the trends in renewals unit costs (per asset class and per work type) in CP5, CP6 and CP7; and

(b) using a statistical model, we estimated the cost frontier and the efficiency gap for each region for conventional track renewals.

Unit cost trend analysis

F.26 We conducted the average unit cost analysis on the components of Track (track and switching and crossings), Signalling (signalling and level crossings), Civils (structures and earthwork) and Buildings for which we could match costs and volumes. However, some renewals assets do not have unit costs. Therefore, this analysis accounts for 63% of renewals expenditure at a regional level.

F.27 The analysis of trends shows that there is a larger variation across regions in the average renewals unit costs for asset classes and work types in CP7, relative to CP6. These variations suggest that there are likely to be regional variations in renewals efficiency. Across all asset classes, the North West and Central and Wales and Western (W&W) regions have some of the highest average unit costs in CP7, while Eastern has some of the lowest. These findings are consistent with Network Rail's own analysis where North West and Central was found to have some of the highest unit rates.

F.28 Many factors, including work mix and access complexity, could generate such variations. However, they could also be driven by the regions prioritising activities which achieve a short-term cost saving, while increasing total lifetime costs. Our analysis does not adjust for this. The analysis of trends in volumes shows that it is likely that Network Rail Scotland and some regions are engaging in this activity. A tendency to change the type of renewals work in order to achieve a target lower unit rate has also been confirmed by ORR's previous analysis including the report on Earthworks Renewals Cost and Volume Transparency.

Unit cost analysis using a statistical model

F.29 We also undertook the analysis of unit costs using a statistical model. This involves estimating a cost "frontier" using statistical techniques and calculating the gap between this and each region in each year from 2013-14 to 2028-29. The model estimates the unit cost as a function of its main drivers. These include traffic, track size, possessions, proportion of electrified track, rainfall and volumes of assets renewed. However, due to inconsistencies in the data, we were only able to conduct this analysis on conventional track renewals unit costs.

F.30 The benchmarking analysis suggests that England and Wales forecast pre-efficient unit costs are on average 6% higher than our model's prediction for conventional track renewals, but there are variations between regions: Southern's unit costs are in line with our model's prediction (+2%); North West and Central and Wales and Western's forecasts are higher than our model's prediction (+12% and +11% higher, respectively) whilst Eastern's unit costs are 6% lower than our model's prediction.

F.31 The analysis suggests that England and Wales could achieve efficiency savings between 0.1%-13% which is comparable to our findings using the renewals expenditure model. These findings suggest that Network Rail's CP7 efficiency assumptions on renewals for England and Wales (15%) would be stretching but realistic.

F.32 Network Rail Scotland pre-efficient forecasts on conventional track renewals average unit costs are 14% lower than the model's predictions. This is comparable to the findings using the renewals expenditure model. However, it is not clear why Network Rail Scotland's conventional track renewals average unit costs are estimated to be this much lower than the model predicts.

F.33 The benchmarking analysis suggests Network Rail Scotland could achieve efficiencies of between 0.0%-0.1% in its conventional track renewals average unit costs. This is in line with the findings of our model using renewals expenditure,

which suggests that Network Rail Scotland's forecast of 15.0% would be very stretching.

F.34 That said, these results do not necessarily mean Network Rail Scotland is more efficient than the other regions or cannot achieve efficiencies in CP7. In CP6, we found examples where apparent efficiencies in unit rates were actually due to different asset strategies between regions. For example, earthworks unit rates in Network Rail Scotland were reducing, because they had delivered a large number of rock cutting renewals, with relatively short design lives. This was an appropriate strategy to address the highest risk in that region, but it makes it difficult to compare unit rates 'like-for-like' with other regions, which were delivering renewals with longer design lives.

Support Costs

F.35 Econometric analysis of support costs was not undertaken due to a lack of consistent data. Instead, we analysed support costs by comparing the trends in expenditure by Network Rail's five regions in CP5, CP6, and CP7.

F.36 Total support costs consist of centrally managed and regionally managed expenditure. Total support costs (after adjustments to make them comparable) rose by 92% from CP5 to CP6. This comparison is made after adjusting the CP6 figures to reflect the change to accounting treatment implemented by Network Rail in CP6 to align its accounting policies with DfT's. The effect of this was an increase in support costs of £763 million.

F.37 Part of this increase was driven by factors such as changes to Group funding (e.g. new approach to insurance), Route incurred costs (e.g. costs related to staff, plant & machinery, work place management), Digital Railway related costs and the introduction of the System Operator (SO), which were included in our PR18 Final Determination. The Putting Passenger First (PPF) programme and the Coronavirus (COVID-19) pandemic further increased costs. Inconsistencies in the categorisation of operations, support and maintenance costs used by Network Rail during the preparation of its CP7 SBPs accentuated these increases. The inconsistencies arise because the CP6 SBP figures we used in the analysis are on a different basis to the figures in Network Rail's CP6 Regulatory Financial Statements and/or Network Rail's CP6 Delivery Plan.

F.38 Network Rail's total support costs are forecast to decrease from CP6 to CP7 by 10.0% on average. This is expected to be due to the effects of the pandemic dissipating, Network Rail's management reform and CP7 efficiency. CP7

regionally managed support costs are forecast to show only a 6.0% (equivalent to £110 million) decrease in CP7 as compared to CP6. The decrease in total support cost is therefore driven by a bigger reduction in centrally managed expenditure (11.0% decrease equivalent to £440 million).

F.39 Eastern appears to spend less on support costs than other regions when taking into account the amount of traffic. For example, in CP7 Eastern is forecast to spend 16% less per train km than other regions in England and Wales and 2% less than Network Rail Scotland. However, Network Rail Scotland is forecast to spend 15% less per train km than the England & Wales regions taken together.

F.40 For every £1,000 spent as OSMR in CP7, Eastern is forecast to spend £133 on support costs, compared to an average for all regions of £128 and a high of £131 to £143 in Southern and North West and Central, respectively. Network Rail Scotland is forecast to spend the least of all regions, i.e. £114 for every £1,000 spent as OSMR.

Analysis of the efficiency gaps

F.41 The following tables show the results of the efficiency gap analysis from different techniques. The efficiency score is calculated as minimum cost (i.e. the frontier) / actual cost) and is presented as a value between 0 and 1. The efficiency improvement is then calculated as (1 - efficiency score) * 100.

F.42 The analysis uses the following techniques:

(a) **COLS**- Corrected ordinary least squares (assumes that the difference between actual and minimum cost is solely explained by inefficiency);

(b) **COLS_25%** - COLS results with the frontier set at the upper quartile to allow for noise and avoid the possibility that one extreme observation defines the frontier;

(c) **PSFA**-Pooled stochastic frontier analysis (divides the difference into two parts, i.e. noise and inefficiency); and

(d) **CUESTA**- Stochastic frontier model developed by Raphael Cuesta (divides the difference into noise and inefficiency, and contrary to COLS and PSFA, allows for the possibility that prior year's inefficiency is related to future year's inefficiency).

F.43 The assumption that any variation between actual and minimum cost is solely explained by inefficiency is the main drawback of all COLS models. This assumption is not realistic as many other factors including errors in data measurement, omitted explanatory variables, modelling errors, and other unobservable factors may explain some of the variation. Moreover, unadjusted COLS frontier may be determined by one or a few extreme observations. Therefore, for the purpose of this analysis, we decided not to include the unadjusted COLS results in the comparisons. Instead, we have used the results from the COLS_25% model which adjusts the COLS results by setting the frontier at the upper quartile.

Table F.1 Efficiency gaps for maintenance

	Efficiency scores (minimum / actual cost): (0<=TE<=1)				Efficiency (%)			
Region	COLS Model	COLS_ 25% Model	PSFA Model	CUESTA Model	COLS	COLS_ 25%	PSFA	CUESTA
Eastern	0.80	0.93	0.93	0.97	20	7	7	3
North West & Central	0.85	0.99	0.95	0.96	15	1	5	4
Southern	0.76	0.89	0.90	0.81	24	11	10	19
Wales & Western	0.87	1.00	0.96	0.82	13	0	4	18
England & Wales	**0.82**	**0.95**	**0.94**	**0.89**	**18**	**5**	**6**	**11**
Scotland	**0.82**	**0.96**	**0.94**	**0.99**	**18**	**4**	**6**	**1**

Source: ORR analysis

F.44 Table F.1 shows that, on maintenance expenditure, efficiency scores for England & Wales vary between 0.95-0.89 (from COLS_25% and CUESTA models). This means potential CP7 efficiency savings are between 5.0%-11.0%. There are disparities between regions, with North West and Central being the most efficient region for maintenance. Efficiency scores for Network Rail Scotland vary between 0.94-0.99 (from PSFA and CUESTA models), i.e. Network Rail Scotland's potential efficiency savings for CP7 may vary between 1.0% and 6.0%.

Table F.2 Efficiency gaps for renewals

	Efficiency scores (minimum/actual cost): (0<=TE<=1)			Efficiency (%)		
Region	COLS Model	COLS 25% Model	PSFA Model	COLS	COLS_25%	PSFA
Eastern	0.73	0.89	0.9998	27	11	0.02
North West & Central	0.67	0.83	0.9998	33	17	0.02
Southern	0.74	0.89	0.9998	26	11	0.02
Wales & Western	0.68	0.84	0.9998	32	16	0.02
England & Wales	**0.70**	**0.86**	**0.9998**	**30**	**14**	**0.02**
Scotland	**0.83**	**0.996**	**0.9998**	**17**	**0.4**	**0.02**

Source: ORR analysis

F.45 Table F.2 shows that, on renewals expenditure, efficiency scores for England and Wales vary between 0.86-1.00 (from COLS_25% and PSFA models). This means efficiency savings are between 0.0%-14.0%. There are disparities between regions, with North West and Central being the least efficient region for renewals. Efficiency scores for Network Rail Scotland, show that based on this analysis, there is very little room for further efficiency improvement in renewals, but there may be issues with the data and differences in work mix as explained in the Findings section.

Table F.3 Efficiency gaps for conventional track renewals average unit cost

	Efficiency scores (minimum/actual cost): (0<=TE<=1)			Efficiency (%)		
Region	COLS Model	COLS_25 % Model	PSFA Model	COLS	COLS_25 %	PSFA
Eastern	0.83	0.94	0.999	17	6	0.1
North West & Central	0.69	0.82	0.999	31	18	0.1
Southern	0.76	0.89	0.999	24	11	0.1

	Efficiency scores (minimum/actual cost): (0<=TE<=1)			Efficiency (%)		
Wales & Western	0.69	0.82	0.999	31	18	0.1
England & Wales	**0.74**	**0.87**	**0.999**	**26**	**13**	**0.1**
Scotland	**0.90**	**1.00**	**0.999**	**10**	**0**	**0.1**

Source: ORR analysis

F.46 Table F.3 shows that, on conventional track renewals average unit cost, efficiency scores for England and Wales vary between 0.87-1.00 (from COLS_25% and PSFA models). This means efficiency savings are between 0.0%-13.0%. Efficiency scores for Network Rail Scotland, show that based on this analysis, there is very little room for further efficiency improvement in renewals, but there may be issues with the data and differences in work mix as explained in the Findings section.

Table F.4 Total Support costs: CP5 vs CP6 vs CP7

Region	CP5 Actual (£m)	CP6 SBP (£m)	CP7 SBP (£m)	Change CP6 to CP7 (£m)	Change CP6 to CP7 (%)
Eastern	785	1,481	1,480	-1	-0.0%
North West & Central	559	1,447	1,178	-269	-19%
Southern	592	1,523	1,376	-147	-10%
Wales & Western	383	756	696	-60	-8%
England & Wales	**2,319**	**5,206**	**4,731**	**-475**	**-9%**
Scotland	**281**	**551**	**476**	**-75**	**-14%**
Great Britain average	**2,600**	**5,757**	**5,207**	**-550**	**-10%**

Source: ORR analysis

F.47 Table F.4 shows that total support costs are on average forecast to decrease from CP6 to CP7 by 10% across GB. They are forecast to decrease by 9% in England and Wales and 14% in Network Rail Scotland. Network Rail's CP7 SBP

expenditure on operations, support and maintenance (OSM) is not consistent with its regulatory financial statements (which are underpinned by our regulatory accounting guidelines). However, Network Rail says, that the total of OSM is consistent. It is likely that this has affected our findings on maintenance and support costs. Ahead of our final determination, Network Rail needs to ensure that its proposed CP7 expenditure has been classified on a basis consistent with its regulatory financial statements.

Annex G: Consultation Responses

Introduction and summary

G.1 Consultation on the draft determination was opened for stakeholders and members of the public from 15 June 2023 to 31 August 2023. The consultation sought stakeholder views on the Draft Determination setting out our proposed decisions in the main areas of PR23.

G.2 There were 43 consultation responses in total, including ten forming the Network Rail response (with separate responses from the five regions, Route Services, System Operator, Technical Authority, Corporate Functions and an overall summary). Following receipt of consultation responses, we have reviewed the stakeholder's comments, and these have helped to inform the final decisions set out in our final determination. We are grateful to all those who responded to the consultation.

G.3 Responses to the consultation were filtered into a number of key themes from our draft determination. These included:

(a) Project Reach.

(b) PIIF (Performance Improvement and Innovation Fund) and the Performance Fund.

(c) Core renewals / asset spend.

(d) Maintenance including modernising maintenance.

(e) Digital Signalling.

(f) Operations & Support.

(g) High output / on-track plant.

(h) Environment & sustainability.

(i) Efficiency (including head/tailwinds, frontier shift and benchmarking).

(j) Inflation.

(k) Risk.

(l) Input prices.

Analysis of consultation responses

G.4 The responses received as part of the consultation were grouped into the following categories:

(a) Freight operating companies (FOC).

(b) Train operating companies (TOC).

(c) Government.

(d) Infrastructure manager.

(e) Other industry bodies including Unions.

(f) TOC/FOC Owning Group.

G.5 Analysis of the consultation responses included grouping each response to a draft determination decision within a key theme. Then a specific sub-issue was also assigned to each stakeholder's comment. Further analysis was completed to determine whether the comment agreed, partially agreed or disagreed with the draft determination decision. Finally, the analysis noted whether a different approach was suggested by the stakeholders.

The key themes and findings

G.6 The key relevant themes and the frequency of their occurrences in the consultation responses are indicated below. The results including Network Rail's responses are shown in Table G.1.

Table G.1 Consultation responses

Theme	Number of stakeholder responses containing a specific theme
Core renewals / asset spend (including track, drainage, earthworks etc.)	24
Maintenance including modernising maintenance	10
Operations and Support	1

Theme	Number of stakeholder responses containing a specific theme
Efficiency (inc. head/tailwinds, frontier shift, benchmarking)	10
Inflation and Input Prices	8
Risk	7
Environment and sustainability (inc Carbon, OPI, ZEV, WRCCA)	9
Digital Signalling (including ETCS, OTTO, fleet fitment etc)	1
High output / on-track plant	4
PIIF (Performance Improvement and Innovation Fund) and the Performance Fund.	15
Project Reach	2

G.7 The key themes and findings which are relevant to the Sustainable and Efficient Costs document are shown below and highlight the areas where it was assessed that the respondents either agreed or disagreed with the decision in the draft determination published by ORR. These results were filtered to show the decisions which had the strongest agreement or disagreement and are shown in Table G.2.

Table G.2 Consultation response analysis

ORR decision in draft determination	Consultation responses agree	Consultation responses disagree
ORR focussed its review on the Risk-adjusted plan	4	1
England & Wales and Scotland plans have insufficient risk provision	6	1
Have an England & Wales performance improvement and innovation fund (PIIF)	9	2
There should be increased expenditure on core renewals	15	0
Increase spend on Eastern earthworks	2	0

ORR decision in draft determination	Consultation responses agree	Consultation responses disagree
Increase spend on Southern track	2	0
Increase Southern earthworks	3	0
Increase Wales & Western spend on Track	2	0
Increase Wales & Western spend on Earthworks	2	0
Reprofile of WCML(N) - £0.3bn CP7 reduction	0	3
Decision that £2.0bn is unlikely to be sufficient risk funding in E&W for CP7	3	0
Decision that Scotland's targeted train performance fund should be created	5	1
Decision that Network Rail should align maintenance and renewals plans	2	0

Source: ORR's analysis of consultation responses to our draft determination.

G.8 The consultation indicates that there is clear support for an increase in expenditure on core renewals. It also indicates that there is strong support for the PIIF in E&W and Scotland's targeted train performance fund. The theme which had the least support was the reprofiling proposed due to the anticipated slippage of WCML(N). We have addressed this in Chapter 3 (renewals and maintenance) above.

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