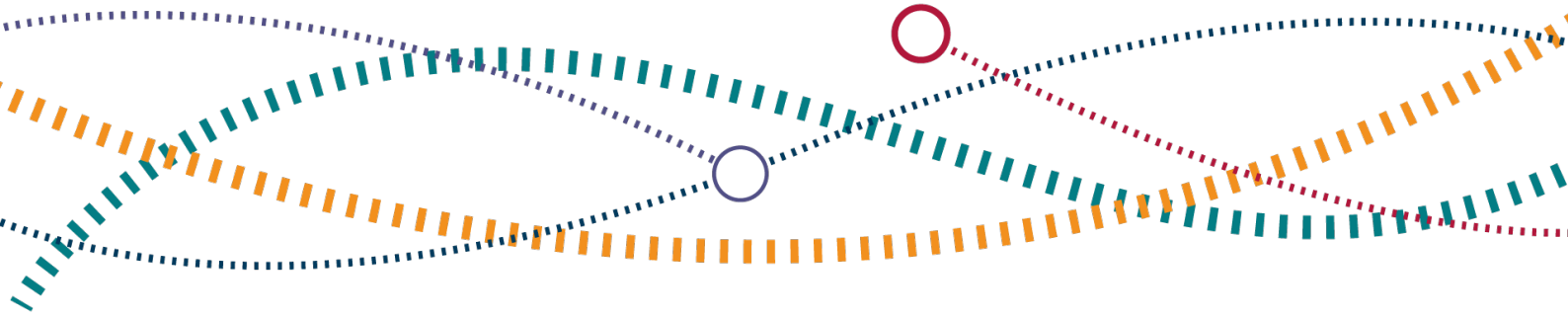
OFFICE OF RAIL AND ROAD

PR23 draft determination:

Supporting document – sustainable and efficient costs: Part I

15 June 2023



Contents

About this document

This document details our technical assessment and findings on sustainable and efficient costs for our 2023 periodic review draft determination. This cost assessment document (Part I) is the summary of our more detailed assessment in the accompanying supplementary documents (Part II and Part III).

PR23 will determine 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 draft determination sets out:

- our review of Network Rail's strategic business plan (SBP); and
- decisions on its proposed 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 managing change and the financial framework.

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

Document type	Details
Executive summaries of our determination	Our key proposals from our draft determination for: • England & Wales • Scotland

Overviews of our determinations	What Network Rail will need to deliver and how funding will be allocated in: • England & Wales • Scotland
Consolidated decisions	A summary of our draft decisions across Great Britain
Introduction	An overview of PR23 and background to our draft determination
Settlement documents	Detailed draft decisions for each of: • Scotland • Eastern region • North West & Central region • Southern region • Wales & Western region • System Operator
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 & 8 incentives regimes • Managing change

Responding to the consultation on our draft determination

We are consulting on our draft determination and welcome comments from stakeholders on any of our documents which form the draft determination on or before 31 August 2023.

Responses should be submitted in electronic form to our inbox: PR23@ORR.gov.uk. We request stakeholders provide their response using this proforma.

We intend to publish all responses on our website alongside our final determination in October 2023. Annex A to our proforma document sets out how we will treat any information provided to us, including that which is marked confidential.

Next steps

After taking account of stakeholder responses, we expect to issue our final determination on Network Rail's delivery and funding for CP7 by 31 October 2023.

We expect to issue our review notices by December 2023 and, subject to Network Rail's acceptance, issue notices of agreement and review implementation notices. These will give effect to the decisions made during PR23 in time for CP7 to commence from 1 April 2024 and for Network Rail to develop its plans for delivery.

1. Summary and conclusions

1.1 This document sets out ORR's findings on sustainable and efficient costs for control period 7 (CP7) which will run from 1 April 2024 to 31 March 2029. 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 £44.8 billion in CP7 on operations, support, maintenance and renewals (OSMR). This includes industry costs and rates and risk provision, but excludes costs for traction electricity of £4.5 billion, leading to a total of £49.3 billion. British Transport Police (BTP) costs are not included in this figure. OSMR expenditure for England & Wales is proposed to be £40.0 billion for CP7, which is approximately 5% higher than CP6 in real terms (CP6 costs were approximately £38.2 billion net of traction electricity costs).

1.3 Network Rail's interim strategic business plan (SBP) for Scotland proposes expenditure of £4.8 billion (net of traction electricity costs). This expenditure is approximately £0.2 billion (4%) higher than CP6 in real terms.

1.4 In this document we discuss the efficient level and allocation of expenditure on OSMR activity. Our review, described in this document, is based on the Network Rail 'risk-adjusted' Strategic Business Plan (SBP) for England & Wales and the interim SBP for Scotland, both submitted to ORR in February 2023 with additional clarifications received during March and April 2023. It should be noted that there will be minor differences between the expenditure detailed in this plan and that of the 'full' plan for England & Wales published by Network Rail on 19 May 2023 and Scotland SBP that will be published shortly.

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

Key Findings

1.6 Network Rail's England & Wales full plan contains £0.5 billion of risk provision. We consider this insufficient for CP7 and do not consider that Network Rail can deliver the full plan with this relatively small provision. We have, therefore, focussed our review on the risk-adjusted plan.

1.7 Across the network, Network Rail's SBP indicates that expenditure would increase in maintenance, operations and non-controllable opex in CP7. Support costs would reduce, as would renewals expenditure.

1.8 Under the risk-adjusted plan, 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 is also forecast to decrease by £1.2 billion (8%) in England & Wales, and by £0.3 billion (14%) in Scotland compared to CP6.

1.9 Network Rail's Technical Authority (TA) has assessed that some asset classes in some regions have "issues requiring addressing" or areas where "greater definition of mitigations is required". Our own detailed review of the SBP, informed by our Targeted Assurance Reviews during CP6 and evidence from Network Rail's CP6 position, has revealed specific asset areas which will require additional renewals expenditure in CP7. However, we are confident that this additional expenditure can be found within the available funding, through targeted and judicious re-prioritisation of other items in the plans.

1.10 We consider that up to £0.6 billion of funding should be re-allocated to core asset renewals (from other areas of the plan) to mitigate the risks which would otherwise arise from a decline in asset sustainability. This £0.6 billion would be split £0.55 billion in England & Wales and £0.05 billion in Scotland.

1.11 We have identified a range of options for Network Rail to re-prioritise expenditure. Our priorities are 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 highlighted above, while giving Network Rail some flexibility to prioritise within these options.

1.12 Our proposed options were identified from our detailed review of Network Rail's risk-adjusted plan. We identified items in the plan where we expect the actual expenditure in CP7 will be lower than stated in the plans, either because cost estimates were high, or because the activities are likely to slip into CP8. Additionally, we considered that some items in the plans were discretionary in nature and could be re-prioritised. The scale of funding released by this re-prioritisation would amount to approximately £0.8 billion, which would be more than sufficient to cover the estimated £0.6 billion gap in core renewals funding.

1.13 As such, we consider that Network Rail has a range of options as to how to fund the core renewals gap and not all options would necessarily need to be adopted.

1.14 In Scotland there remains £0.22 billion from the Statement of Funds Available (SoFA) which has not been allocated in the plan Network Rail Scotland submitted on 24 February 2023 (its interim SBP). We consider an element of this (estimated to be £0.05 billion) should be prioritised for core renewals. This leaves £0.17 billion unallocated, which we will discuss below.

1.15 We consider that Network Rail's England & Wales and Scotland plans have insufficient risk provision in the context of the current economic environment and the experiences from CP6. We have set out opportunities for Network Rail to increase CP7 risk provision within each plan.

1.16 We have reviewed Network Rail's assumptions for efficiency, headwinds, input price inflation, Consumer Price Index (CPI) inflation and other income. We are proposing some limited adjustments to Network Rail's assumptions. Network Rail proposed an England & Wales efficiency target of £3.4 billion in its full plan but under the risk-adjusted plan this value is £3.2 billion due to the reduction in efficiency opportunity from a lower level of renewals expenditure. We propose to maintain Network Rail's overall efficiency challenges of at least £3.2 billion in England & Wales (for the risk-adjusted plan) and £0.43 billion for Scotland (of which £0.38 billion is for directly incurred OSMR).

1.17 Our proposed adjustments on input price inflation, headwinds and other income would be sufficient in England & Wales to cover the additional funding required for higher than previously forecast CPI inflation and income gaps (due to lower property income and changes to charges and incentives). We are also proposing to introduce a train performance improvement and innovation fund (PIIF).

1.18 Most of the adjustments to financial assumptions applied to England & Wales are also applicable in Scotland. Our proposed adjustments would cover funding gaps which have emerged since Network Rail submitted its SBP. We propose that the funding released by our adjustments to the interim plan is added to the remaining unallocated SoFA funding in Scotland of £0.17 billion noted above. We propose that this is used to provide more adequate risk provision (i.e. closer to the risk provision in CP6) and a targeted train performance fund which will apply only in Scotland. We anticipate the amounts available for this fund will change as Network Rail Scotland evolves its plans and as assumptions on available funding change (e.g. due to updated inflation forecasts).

1.19 We have identified an unsupported increase in pre-efficient costs in operations expenditure in some regions. We are not proposing adjustments to Network Rail's operations expenditure in our draft determination. However, we are continuing to

investigate and this may present opportunities for further efficiencies, which we would address in our final determination.

Context

1.20 At the inception of PR23 we set out four objectives in June 2021: 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 SoFA, which were published in December 2022. Scottish Ministers' SoFA and HLOS requirements were published in January 2023.

1.21 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.

1.22 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 Scotland 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.

1.23 Before the PR23 process began, it was anticipated that expenditure in CP7 would be higher than CP6. This was driven by the upfront costs of the move from conventional to digital signalling along with a projected increase in expenditure on core renewals. Digital signalling costs include not just the replacement of infrastructure but also the associated enabling costs, fleet fitment and training for maintainers, operators and drivers. These additional areas of expenditure on digital signalling are beyond what has previously been classified as OSMR. We remain supportive of digital signalling and the long-term deployment plan for England & Wales. Ensuring appropriate and efficient expenditure on digital signalling in CP7 is vital for achievement of the longer-term digital signalling strategy.

1.24 Although Network Rail's plans for CP7 include circa 5% more expenditure than CP6, the funding is constrained relative to the needs of the asset renewal cycle and the additional costs of implementing digital signalling. PR23 has been conducted within a wider context of fiscal constraints and high inflation. Network Rail has limited opportunities to prioritise expenditure other than robustly costing and phasing large programmes, moderating core renewals, and increasing efficiency.

1.25 We were asked to provide advice to the Secretary of State and Scottish Ministers last year, as they were making decisions about the funding that would be made available in their respective SoFAs. In that advice we considered the implications of a 'fiscally constrained' funding envelope and a 'significantly fiscally constrained' (fiscally constrained minus 10%) funding envelope.

1.26 Our view was that the fiscally constrained scenario would not give rise to undue concerns for safety; and not create unrecoverable consequences for asset condition. However, it would increase the reliance on reactive mitigations (e.g. operational controls) and this was likely to have an adverse impact on train performance (more likely towards the end of CP7). It would also not allow for a minimum whole life cost approach.

1.27 The expenditure for OSMR envisaged in the SoFA for England & Wales sits part-way between the 'fiscally constrained' and 'significantly fiscally constrained' scenarios previously developed by Network Rail and considered in our advice. We explained then, and have since repeated, that the constrained funding for CP7 will require some challenging decisions on priorities and an increased need for efficiencies.

1.28 Transport Scotland's SoFA is providing £4.2 billion of cash funding for CP7 (across network grant and fixed track access charges). Network Rail Scotland had been planning for a CP6 funding settlement of £4.0 billion, so has approximately £0.2 billion currently unallocated to specific areas of OSMR.

1.29 Against this backdrop Network Rail produced three plans in February. An interim plan covering Scotland and two scenarios of the plan for England & Wales; the 'full' plan and the 'risk-adjusted' plan. Network Rail's risk-adjusted plan for England & Wales deprioritised renewals expenditure in the regions to increase the risk provision and improve deliverability. We do not believe the full plan has sufficient risk provision to be deliverable therefore our assessment focuses on the risk-adjusted plan throughout our PR23 supporting documents.

1.30 Finally, Network Rail has developed its plans using November 2022 Office of Budget Responsibility (OBR) forecast inflation rates. More recent forecasts, including the March 2023 update, have increased the forecast cost of the plan making it more difficult for Network Rail to deliver the expected volume of work for the funding available. We have worked with Network Rail to understand this challenge and to quantify the anticipated cost of the latest forecast. Our draft determination makes an adjustment to account for the impact of higher than forecast inflation, which we discuss later in this document.

Key areas of expenditure

1.31 As noted above, PR23 assesses Network Rail's expenditure on OSMR for its entire rail network. Operations, maintenance and support are classified as operating expenditure (opex) whilst renewals are classified as capital expenditure (capex). Network Rail also incurs other opex on Electric Current for Traction (EC4T, although charges are passed through directly to train operators), as well as business rates and charges from other organisations such as the levy for funding ORR. Collectively these are classified by Network Rail as 'non-controllable opex'. Table 1.1 shows the change between CP6 and CP7 in Network Rail expenditure for the whole network. It should be noted that figures are in 2023-24 prices and therefore differ from the total outturn cash values of the SoFAs.

Table 1.1 Change in Great Britain wide, post-efficient expenditure between CP6 and CP7

	CP6 £ billion	CP7 £ billion	Percentage change
Maintenance, operations and support	20.2	20.6	+1.8%
Non-controllable opex	4.6	6.4	+39.6%
Renewals	20.9	20.0	-4.3%
Total OSMR	**45.6**	**47.0**	**+2.8%**
Uncommitted risk funding	**0**	**2.4**	**n/a**

Source Network Rail databook. Note: includes England & Wales expenditure based on the risk-adjusted plan. Renewals shown are total renewals, covering all capex, not just core asset renewals.

1.32 In CP7, what Network Rail refers to as “non-controllable” opex is forecast to increase by nearly 40% above CP6 costs in real terms. This is driven principally by a 56% increase in EC4T and a 12% increase in business rates. To provide a more meaningful analysis, expenditure on non-controllable opex is omitted in the percentage figures quoted below.

1.33 Controllable opex has increased above CP6 levels by 1.8% across the network. This is driven by increases in operations and maintenance expenditure including the reclassification of £0.6 billion of Route Services capex to opex for CP7. Table 1.2 details the changes in CP7 expenditure for each nation when compared with CP6. The National Functions costs will be spread across England & Wales and Scotland.

Table 1.2 Changes in expenditure CP6 to CP7

	Network wide expenditure change CP6 to CP7 in £ million	England & Wales expenditure change CP6 to CP7 in £ million	Scotland expenditure change CP6 to CP7 in £ million	National Functions expenditure change CP6 to CP7 in £ million
Maintenance	+706 (+6.7%)	+123 (+1.3%)	-12 (-1.1%)	+595 (N/A)
Operations	+208 (+5.2%)	+156 (+4.3%)	+53 (+14.4%)	0
Support	-555 (-9.6%)	-110 (-6.5%)	-4 (-3.2%)	-440 (-11.2%)
Total controllable opex	**+360 (+1.8%)**	**+168 (+1.1%)**	**+37 (+2.4%)**	**+154 (+3.9%)**
Renewals	-889 (-4.3%)	-1,219 (-7.6%)	-327 (-14.4%)	+596 (+23.3%)
Total controllable opex and capex	**-529 (-1.3%)**	**-1,051 (-3.4%)**	**-289 -(7.6%)**	**+750 (+11.5%)**

NB: England & Wales expenditure is based on the risk-adjusted plan.

Source: Network Rail databook

1.34 In England & Wales regions, controllable opex (which comprises maintenance, operations and support) has increased from CP6 in real terms by £0.17 billion

(1.1%). There has been a £0.12 billion (1.3%) increase in maintenance, however, not shown in the table is that three of the England & Wales regions have shown a decrease in forecast maintenance expenditure, with only the Eastern region's expenditure increasing (up £0.21 billion, which is 6.8%).

1.35 Scotland's controllable opex has increased by £0.04 billion (2.4%), and for the interim SBP maintenance expenditure is little changed; it would only be £0.01 billion (1.1%) below the CP6 level.

1.36 Operations expenditure has increased in CP7 by £0.21 billion (5.2%). England & Wales has a proposed increase of £0.16 billion (4.3%) and there is a proposed £0.05 billion (14.4%) increase in Scotland. Only the Eastern region's expenditure has decreased from CP6; it is down £0.03 billion (2.7%).

1.37 Support expenditure has decreased in CP7 in comparison with CP6 by £0.56 billion (9.6%). National Functions expenditure in this area are down £0.44 billion (11.2%), England & Wales regions' expenditure is down £0.11 billion (6.5%) and Scotland's expenditure is down less than £0.01 billion (3.2%).

1.38 The largest area of expenditure across the network is renewals which makes up approximately £20.0 billion (42.6%) of the total expenditure across Great Britain. Within England & Wales regions, approximately £14.9 billion (50.0%) of expenditure in the risk-adjusted plan is in renewals, which is down approximately £1.2 billion (7.6%) on CP6. In Scotland renewals expenditure is approximately £1.9 billion (55.2%) of total expenditure, which is down approximately £0.33 billion (14.4%) on CP6. Both figures do not include the renewals expenditure in the National Functions which are up £0.6 billion (23.3%) on CP6; these costs will be allocated to regions and are discussed in detail in the Part II document.

1.39 Network Rail has allocated its renewals expenditure for England & Wales based on the size and asset sustainability requirements of the regions, noting other local factors (such as interaction with High Speed 2 (HS2)). Renewals expenditure has decreased in each of Eastern (-14.6%), Southern (-17.2%) and Wales & Western (W&W) (-10.5%), however, the exception is North West & Central (NW&C) where expenditure has increased (14.9%).

1.40 Within renewals, track is the largest expenditure area accounting for £3.5 billion (23.4%) of the CP7 renewals expenditure in the England & Wales regions and £0.6 billion (30.9%) in Scotland. However, track expenditure is down on CP6 by £1.3 billion (27.7%) in the England & Wales regions and £0.3 billion (29.4%) in Scotland. The combined England & Wales regions and also Scotland have

allocated less of their respective expenditure to track, prioritising expenditure on other assets. Currently, the overall profile of track condition is relatively good, enabling prioritisation on other core renewals.

1.41 Across Great Britain, signalling expenditure has reduced from CP6 by £0.27 billion (6.9%), however in CP7 there is additional expenditure of £1.7 billion on digital signalling. The Network Rail SBP builds on the digital signalling deployment work carried out in CP6, moving the network towards the European Train Control System (ETCS) capability. This expenditure is analysed in detail in the Digital Signalling chapter in Part II.

1.42 Network Rail's proposed expenditure on earthworks would reduce in CP7 by £0.25 billion (16.1%), however, there is an increase of £0.12 billion (22.4%) in drainage expenditure. There has been significant CP6 activity on these assets as part of Network Rail's actions to address the recommendations of the Lord Mair and Dame Slingo reports into weather resilience and climate change on the railway.

1.43 Network Rail's SBP sets out its intention to spend an increased amount, £0.17 billion (89.2%), across the network on off-track assets (boundaries, access and land management) with England & Wales nearly doubling its allocation to this asset category (£0.16 billion, which is 95.8%).

1.44 The planned workbank of renewal activity is baselined against the CP6 exit position Network Rail forecast in November 2022. The expected CP6 exit position has since changed, with more renewals being deferred from CP6 into CP7. This will alter the mix of work which Network Rail will need to prioritise in its CP7 plans.

1.45 With renewals expenditure proposed to reduce in CP7, Network Rail is anticipating increasing its use of maintenance interventions. Network Rail's detailed maintenance plans for CP7 were still being developed while we conducted our review for the draft determination. These plans will be informed by outcomes from its Modernising Maintenance programme in CP6 which aims to reduce headcount and improve productivity for future control periods.

Market-led approach

1.46 Within each of its regions in England & Wales, Network Rail 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.

1.47 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 it did not provide specific proposals in its SBP. Network Rail has acknowledged that a further prioritisation during CP7 would require discussion with ORR and funders to implement.

1.48 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

1.49 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 stretching but realistic, is essential to encourage Network Rail to improve value for money for its customers and funders.

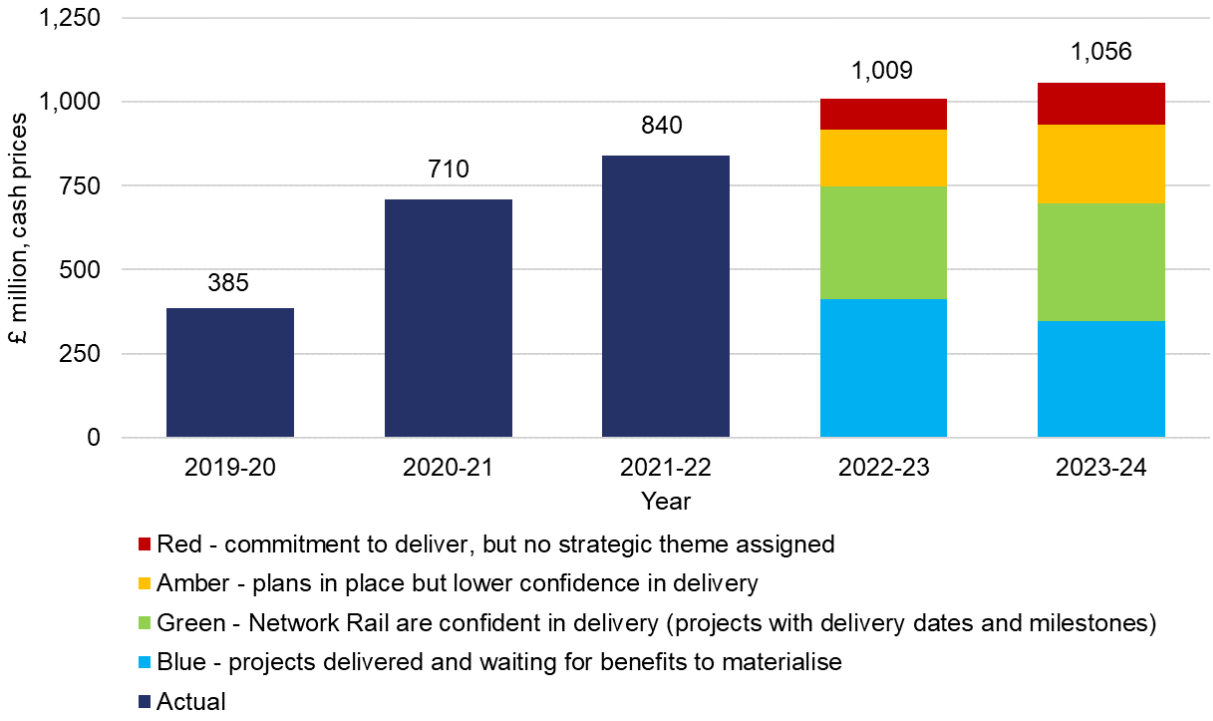
1.50 In addition to determining Network Rail's efficient expenditure in our periodic reviews, we monitor and report on the company's efficiency improvements and wider financial performance in our Annual Efficiency and Finance Assessments of Network Rail.

1.51 Our PR18 determination required Network Rail to make £3.5 billion of efficiency improvements in CP6. As a result of cost pressures from the pandemic, Network Rail increased its own target by £0.5 billion to £4.0 billion with the

additional savings coming mostly from planned reductions to pay awards and bonuses, and from other workforce modernisation initiatives.

1.52 As reported in our latest Annual Efficiency and Finance Assessment and shown in Figure 1.1, Network Rail's delivery of efficiency improvements in the first three years of CP6 has been good. It has delivered £1.9 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 £0.9 billion across the first three years of CP6. Simply put, this means that Network Rail spent £0.9 billion more on delivery than we expected in the first three years of CP6.

Figure 1.1 Network Rail's actual and forecast efficiency in CP6

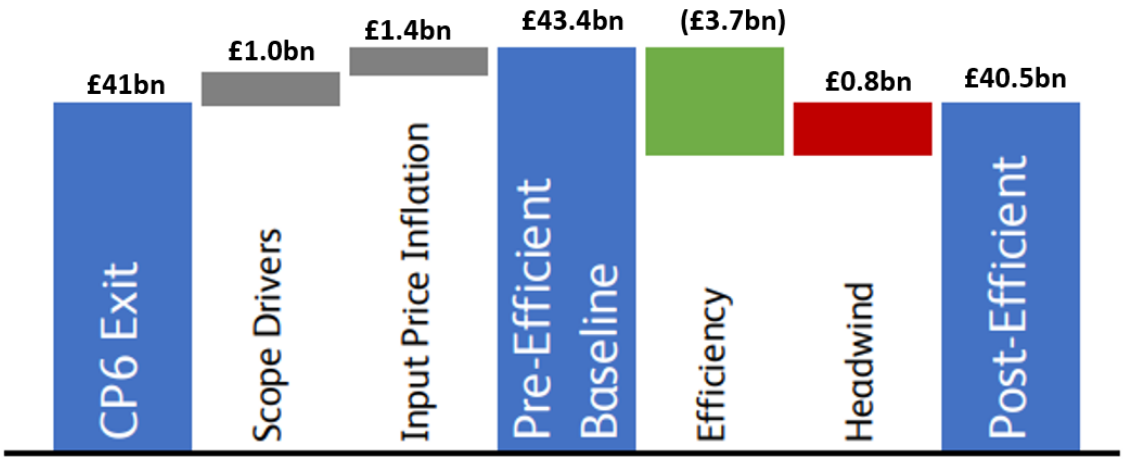


Source: Annual Efficiency and Finance Assessment of Network Rail 2021-22

1.53 General inflation is currently 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.

1.54 Figure 1.2 and Table 1.3 summarise the efficiency, input prices and headwinds that are included in Network Rail's strategic business plan for its operating expenditure (operations, support and maintenance activities) and for its renewals expenditure in CP7.

Figure 1.2 Network Rail's assumed efficiencies, headwinds, tailwinds and input prices in CP7 (2023-24 prices)



Source Network Rail SBP

Note: Network Rail risk adjusted (Great Britain) costs exclude risk, electricity for traction and industry costs and rates.

Table 1.3 Network Rail's assumed efficiencies, headwinds, tailwinds and input prices in CP7, risk-adjusted plan

£ million 2023-2024 prices	Pre-efficient CP7	Input prices	Headwinds and tailwinds	Efficiencies	Post efficient
England & Wales	37,642	1,257	705	-3,232	36,372
Scotland	4,315	160	82	-429	4,129
Great Britain	**41,956**	**1,417**	**787**	**-3,660**	**40,500**

ORR analysis of Network Rail CP7 SBP

Note: pre-efficient costs include CP6 exit plus scope drivers. Costs exclude risk, electricity for traction and industry costs and rates. Costs are rounded and may not sum.

England & Wales costs based on the risk-adjusted plan. Efficiencies shown for England & Wales and Scotland include the allocation from National Functions

Our assessment of efficiency

1.55 Network Rail's SBP suggests that it can deliver £3.7 billion of efficiency improvements across Great Britain, comprising £3.2 billion from its activities in England & Wales under the risk-adjusted plan, and £0.4 billion from its activities in Scotland.

1.56 The efficiency trajectory in Table 1.4 equates to an efficiency improvement of 15% for Network Rail's renewals activities (capex), and 10% for operations, maintenance and support activities (opex) by the end of CP7, compared with the end of CP6.

Table 1.4 CP7 total OSMR efficiencies included in Network Rail SBP (including allocation of National Functions efficiencies)

£ million 2023-2024 prices	2024-2025	2025-2026	2026-2027	2027-2028	2028-2029	Cumulative
England & Wales risk adjusted plan	331	501	710	785	905	3,232
Scotland	38	76	93	105	117	429
Great Britain	**369**	**577**	**803**	**890**	**1,021**	**3,660**

Source: Network Rail's SBP. Efficiencies are rounded and may not sum.

1.57 Our analytical approaches for assessing efficiency improvements fall into 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 benefit from their detailed approach which identifies specific ways in which efficiencies can be achieved and potential overstating of pre-efficient costs. However, bottom-up studies do not account for all of Network Rail's activities. This means that there is implicit uncertainty in

extrapolating their findings to form a view about the scope for efficiency improvements by Network Rail. Part II summarises the findings of our bottom-up studies (in the Efficiencies, headwinds, tailwinds, inflation and input prices chapter).

(b) Our **top-down studies** used statistical analysis of aggregate level data to examine trends within Network Rail's regions and the National Functions and to comparator companies. Our top-down studies benefit from their holistic approach, meaning that they should capture most 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). Part III (Annex G) summarises the findings of our top-down studies.

1.58 Our Targeted Assurance Reviews conducted during CP6 have helped to inform our bottom-up 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 delivered by Network Rail across the regions.

1.59 We have reviewed Network Rail's consultants' reports on finance, procurement, Human Resources and Information Technology, which have been used to validate proposed efficiencies.

1.60 We have also conducted econometric analysis of maintenance and renewals costs. This showed that Network Rail in England & Wales could achieve efficiencies of between 5.0% and 11.0% on maintenance expenditure and between 0.0% and 14.0% on renewals. For Scotland, the efficiency estimates were 1.0% to 6.0% on maintenance and 0.0% to 0.4% on renewals. We are reviewing the data on Scotland as the analysis may not be appropriately identifying how some issues such as variation in work should be treated.

1.61 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.

1.62 Network Rail's SBP includes a high-level summary of the ways in which its regions and National Functions intend to make efficiency improvements in CP6. These include efficiencies achieved from closer working with industry partners linked to

the creation of Great British Railways, business opportunities, technology adoption and efficiency savings from renewals activities.

1.63 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 which considers whole industry cost and makes smarter decisions with better information on their overall financial impact. Network Rail considers that industry reform enables 30% of the company's planned CP7 efficiencies.

1.64 However, there is uncertainty about the scope and timing of industry reform, meaning that if Network Rail is unable to achieve the identified efficiencies from closer working, the efficiency targets for England & Wales would be more stretching than they already are.

1.65 We remain to be convinced about the level of efficiency that Network Rail can achieve from Project Reach (a partnership designed to secure third-party funding for telecoms upgrades along the rail network). We consider 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 much of the efficiency would be recognised in CP8 and CP9, rather than in CP7 as indicated in Network Rail's SBP.

1.66 Network Rail has set out high-level plans for how it will deliver a number of the efficiency improvements which would be required in CP7. However, it now needs to further develop these high-level plans in more detail to show how it will deliver the relevant business changes and to justify that they will deliver the stated level of efficiency.

1.67 Taking account of this analysis, we have retained Network Rail's overall efficiency assumptions and 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 £0.43 billion of efficiencies (£0.38 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

1.68 Network Rail's SBP for CP7 included £0.8 billion of headwinds across Great Britain. Excluding the impact of the pandemic, this is around 24% lower than

currently forecast in CP6 once the impact of the pandemic has been removed. Following the submission of its SBP, Network Rail has indicated that it would reduce its CP7 headwind assumptions having considered revised inflation forecasts. The company is now forecasting £0.4 billion of headwinds for England & Wales and £0.08 billion for Scotland (including its share of National Functions).

1.69 We have assessed the headwind figures against CP6 headwinds, and we have accepted Network Rail's updated headwinds assumptions of £0.4 billion for England & Wales and £0.08 billion for Scotland. 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. As more detail becomes available in future planning rounds, we will continue to monitor and report on Network Rail's fishbone analysis including its forecast headwinds.

1.70 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 the pandemic related savings to staff travel and similar. 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 most recent forecast headwinds less tailwinds from the £0.8 billion to £0.5 billion across Great Britain, adequately addresses this point. Therefore, we do not propose to make further adjustment to our assessment of efficient costs in relation to headwinds less tailwinds.

Our assessment of inflation and input prices

1.71 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.

1.72 In its England and Wales risk-adjusted plan, Network Rail has 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 includes £0.09 billion of general inflation and £0.16 billion of input price inflation.

1.73 Forecasting Network Rail's input price inflation is a difficult task, even in times where general inflation is stable, as there is no single inflation index which matches the basket of goods that Network Rail purchases that is independent of Network Rail's own purchasing power. However, we are concerned about the high level of input price inflation included in Network Rail's cost assumptions for CP7. Network Rail's assumption for input price inflation is more than four times the amount of assumed general inflation and is over 50% higher than in CP6.

1.74 We commissioned the consultants, Europe Economics, to review Network Rail's approach for assessing input price inflation. Europe Economics proposed a framework that has been endorsed by the Competition and Markets Authority (CMA) through its final report into water companies price determinations. We consider that this framework is better suited for assessing Network Rail's forecast input prices because it adopts a less disaggregated approach. It also focusses 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. It also includes a materiality test for whether an input price adjustment should be included.

1.75 Applying Europe Economics' framework, we have calculated that for input prices in England & Wales, Network Rail's proposed £1.3 billion forecast, should be reduced by £0.6 billion. We are proposing a £0.07 billion reduction for Scotland to £0.09 billion.

1.76 Levels of forecast CPI inflation are currently highly uncertain. Since submitting its SBP to us in February, the Office of Budget Responsibility (OBR) issued a new CPI forecast in March 2023 which includes higher levels of CPI into CP7. Applying the March 2023 OBR forecast increases the impact of CPI inflation by £0.6 billion in England & Wales and £0.07 billion in Scotland in CP7.

Other income

1.77 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 is currently working through this issue with its regions and National Functions and has not yet put forward options for funding this gap.

1.78 However, we consider that there is an opportunity for Network Rail to generate £0.09 billion of additional income from its property portfolio in England & Wales and £0.01 billion in Scotland as we set out in our PR23 draft determination: supporting document on other income. Our adjustments to the wider CP7 plan, as

outlined in Table 1.5, would mean that this £0.3 billion lower income in England & Wales is funded. However, we expect Network Rail to put forward its own detailed proposals in its response to our draft determination and we will continue to work with Network Rail on this issue. 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

1.79 Table 1.5 summarises the financial adjustments that we are proposing to make to post efficient costs in England & Wales, following our review.

1.80 We propose that the net funding released by our financial adjustments is used for a £0.04 billion performance improvement and innovation fund and to increase the risk provision by £0.15 billion. This performance fund will apply only in England & Wales. This is intended to kick-start collaborative, cross-industry solutions with the aim of improving train performance between train operators and Network Rail. The details of this fund are discussed in Part II (in the Operations chapter).

Table 1.5 Changes to post efficient costs and other income in England & Wales based on the risk-adjusted plan

£ billion, 2023-24 prices	Network Rail SBP expenditure	Proposed adjustment	Comments
Input prices	1.3	-0.6	We have taken a different view on input prices to Network Rail
Impact of rising CPI inflation		+0.6	The SBP is based on November 2022 OBR forecasts, this adjustment reflects the March 2023 OBR forecast
Headwinds	0.7	-0.4	To address inflation and constrained funding Network Rail indicated that it would stretch headwinds, we agree with this challenge
Income shortfall		0.3	There is a shortfall in Network Rail's income assumptions between its plan and the SoFA
Property income challenge		-0.09	We consider that there is opportunity for additional income on property

£ billion, 2023-24 prices	Network Rail SBP expenditure	Proposed adjustment	Comments
Train performance improvement and innovation fund		0.04	Network Rail should allocate expenditure for a performance improvement fund in CP7
Risk fund	2.0	0.15	For changes to assumptions on efficiency, headwinds, input prices, CPI inflation and income, we recommend that this is used to increase the cash risk fund
Total adjustment		**0.0**	

Source: ORR analysis of Network Rail SBP, risk-adjusted plan.
Negative figures denote less expenditure than would be required under Network Rail's plan (positive figures more expenditure); please note figures are rounded so may not sum

1.81 Table 1.6 shows our proposed financial adjustments to Network Rail's plan for Scotland. There were unallocated funds from the SoFA in Network Rail Scotland's interim SBP due to the interim plan being prepared at a time when funding was not confirmed, but expected to be constrained, and the interim plan was largely complete by the time the SoFA and HLOS for Scotland were published. The £0.17 billion of unallocated funds discussed above should be added to this amount. We propose that any surplus funding is prioritised for core renewals and that the balance of any remaining funding is split between increasing the risk provision (i.e. so it is closer to the risk provision in CP6) and a targeted train performance fund for Scotland. The details of this fund are discussed in Part II (in the Operations chapter).

Table 1.6 Changes to post efficient costs in Scotland

	Network Rail SBP expenditure £ million	Proposed adjustment £ million	Comments
Input prices	162	-72	We have taken a different view on input prices to Network Rail
Impact of rising CPI inflation		+68	The SBP is based on November 2022 OBR forecasts, the plan has been

	Network Rail SBP expenditure £ million	Proposed adjustment £ million	Comments
			updated for March 2023 OBR forecasts.
Headwinds	82		We have retained Network Rail's assumption
Property income challenge		-10	We consider that there is opportunity for an income challenge on property
Total adjustment		**-14**	The net adjustment should be added to the (as yet) unallocated funds in the Scotland plan.

Source: ORR analysis of Network Rail SBP.

Asset sustainability

Renewals

1.82 Renewals funding for CP7 covers increased expenditure on areas such as digital signalling, but the total 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.

1.83 We have also 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) is down 8% in England & Wales under the risk-adjusted plan; and down 14% in Scotland.

1.84 Expenditure on track renewals in particular, has reduced. Although there are areas of track which require renewals, in general across the network we find that the track asset is in a reasonable condition. If Network Rail prioritises track expenditure appropriately, a CP7 expenditure lower than CP6 would not be unduly detrimental to the long-term sustainability or performance of the track asset.

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

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

(b) Asset portfolio condition and performance will reduce compared to steady state funding (asset portfolio maintained at CP6 exit performance levels), 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 Part III (Annex E);

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

(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 income routes.

1.86 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.

1.87 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 Targeted Assurance Reviews.

1.88 We propose that Network Rail should increase expenditure on core asset renewals in specific asset types and regions, to address these asset sustainability concerns. We have developed indicative estimates of the additional expenditure required, as set out in Table 1.7. These are indicative estimates and Network Rail should carry out more detailed analysis, also considering the potential to mitigate these sustainability concerns through maintenance or other approaches.

Table 1.7 Proposed additional core asset expenditure

Region	Asset area	Estimated expenditure increase £ million
Eastern	Earthworks	30
Southern	Track	50
	Structures	50
	Earthworks	80
	Operational Property (e.g. Victoria Station)	50
W&W	Track	50
	Structures and Tunnels	100
	Earthworks	100
General England & Wales	Fire safety in tunnels	20
	Remaining high priority areas	20
Scotland	Structures	50
Total		**600**

Source: ORR analysis of Network Rail SBP.

1.89 Our estimate includes specific assets and regions, but also additional expenditure applied across England & Wales to include improving fire safety in tunnels and addressing remaining high priority areas where maintenance activities will not mitigate the risks highlighted.

1.90 We estimate the total additional expenditure for England & Wales at £0.55 billion; Network Rail has indicated a figure of at least £0.3 billion. We note that (post-efficient) core renewals expenditure is £1.7 billion lower than in CP6 and hence we consider the required expenditure in England & Wales is likely to be closer to £0.55 billion than Network Rail's estimate. We continue to work with Network Rail to quantify the expenditure required, to address the core asset renewals shortfall.

1.91 We recognise that there is no additional SoFA funding available for these additional core renewals. So, we have identified other items in Network Rail's plan

which represent lower priorities for OSMR funding than these core asset renewals. We are proposing a range of options, for items which Network Rail could consider re-prioritising to release funds for core renewals. These items are:

(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 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 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 venture with an external telecommunications provider 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.

1.92 Table 1.8 summarises our proposed options to reduce expenditure on these items, in order to fund additional core asset renewals.

Table 1.8 Suite of expenditure projects where we have identified possible cost adjustments

Expenditure item [total expenditure]	Rationale for adjustment	Potential reduction in expenditure	
		England & Wales	Scotland
WCML(N)	Complex programmes which interact with multiple other programmes are likely to be delayed. Our	£0.3 billion	N/A

Expenditure item [total expenditure]	Rationale for adjustment	Potential reduction in expenditure	
		England & Wales	Scotland
[£1.2 billion]	analysis of CP6 data showed that 12 months to 18 months slippage was typical for similar projects in NW&C. While we support Network Rail's approach to this programme, we estimate that circa 25% of the proposed works will slip into CP8, reducing expenditure in CP7 by circa £0.3 billion.		
Digital signalling portfolio **[£1.7 billion]**	Assessment of these complex projects and programmes indicates that cost estimates and delivery assumptions are not yet mature. Experience from the East Coast Digital Programme (ECDP) in CP6 showed that Network Rail was able to reduce costs significantly from its initial, immature estimates, once it engaged the supply chain. We estimate that the actual expenditure on digital signalling in CP7 should be closer to the costs achieved on ECDP in CP6, which would result in a circa 15% reduction in expenditure in CP7.	£0.26 billion	<£0.01 billion
High Output Plant **[£0.04 billion]**	Network Rail's CP7 plans have not been able to leverage efficiency from High Output Plant. Although opportunities remain, regions have elected not to use the service in CP7. We propose to remove CP7 expenditure for overhaul of High Output plant (£0.04 billion). 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.	£0.03 billion	<£0.01 billion
Route Services projects **[£4.2 billion]**	In CP6 we completed a technology adoption Targeted Assurance Review, which raised concerns about scope creep and lack of adoption of technology 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 control between Route Services and Network Rail's regions, to improve delivery and adoption.	£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	£0.14 billion	N/A

Expenditure item [total expenditure]	Rationale for adjustment	Potential reduction in expenditure	
		England & Wales	Scotland
	anticipate that other options for releasing expenditure may be preferable.		
Total		**circa £0.8 billion**	**circa £0.02 billion**

NB: England & Wales expenditure is based on the risk-adjusted plan.
Source: Network Rail databook

1.93 Elements of the digital signalling portfolio relating to infrastructure renewals and CP6 legacy projects sit within regional and National Functions' programmes. Several of our options to release funding could impact these same programmes, notably the option to re-phase works on WCML(N) in NW&C and the option to reduce Route Services technology expenditure. Once Network Rail has reviewed these options and determined its priorities, it will need to consider any interactions, which may decrease the total cost reduction that is achievable; however this decrease is not expected to exceed £0.02 billion.

1.94 We are confident that through the re-prioritisation of the options listed in Table 1.8, Network Rail could release sufficient funding to cover £0.6 billion of additional core asset renewals.

1.95 NW&C renewals expenditure in CP7 is £0.57 billion higher than CP6. Even if Network Rail were to elect to reprofile the full £0.3 billion proposed above for WCML(N) and also apply reductions to digital signalling expenditure, the region's renewals expenditure would still be higher in CP7 then in CP6, while expenditure in all other regions is reducing.

1.96 Depending on the cost adjustment options considered by Network Rail, there may be funds released to Scotland. However, this would be less than £0.02 billion and, alone, would be insufficient to fully fund the required additional expenditure on asset renewals in Scotland (of around £0.05 billion). However, in Scotland the total expenditure on OSMR in the interim Network Rail Scotland plan is £0.22 billion less than the SoFA for the reasons explained earlier. We therefore propose that Network Rail funds the required increase in core renewals from this amount. This should be its first priority for any additional funding.

Asset Sustainability

1.97 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 performance to end of CP6 levels. This is referred to as “steady state”.

1.98 To return to steady state would take until at least CP11 and cost between an additional £9.0 billion to £12.0 billion above current levels of funding in England & Wales. Based upon current asset strategies and outcome requirements, this funding will need to be phased over the next four control periods. 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 four control periods, based upon current asset strategies and outcome requirements.

Digital signalling, weather resilience, climate change and environmental sustainability

1.99 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. Our review has focused on the allocated expenditure only. 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 Technical Authority led digital signalling projects (e.g. Target 190) and the delivery of enabling projects which will support the deployment of digital signalling.

1.100 In England & Wales our draft determination proposes that there is scope for a circa 15% reduction in Network Rail’s CP7 digital signalling expenditure (circa £0.26 billion). This reduction is based on our assessment that unit rates used for infrastructure renewals are not sufficiently mature and are too high. Additionally, there is the potential for delays to the delivery of these projects based on the actual delivery data for conventional signalling renewals in CP6. We remain fully supportive of the deployment of digital signalling and recommend Network Rail reviews its proposed expenditure across all projects and programmes in the portfolio to ensure they are stretching but realistic. If Network Rail applies the reduction in expenditure we propose to this portfolio then we would expect associated costs in Scotland to reduce by < £0.01 billion.

1.101 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 detail in Part II (in the Environmental Sustainability chapter).

Maintenance

1.102 A reduced expenditure on renewals is likely to mean that maintenance expenditure will need to increase towards the end of CP7. Network Rail now needs to assess the impact on maintenance expenditure in light of our proposed changes to the core renewals, as this may mitigate some of the forecast increase in service affecting failures. We discuss our requirements for clearer maintenance plans in our PR23 draft determination: supporting document on health and safety and in Part II. In particular, we identify the need for the next iteration of plans to recognise the stretch on Network Rail's current maintenance capability and effective implementation of the maintenance modernisation programme, which is a critical enabler of increased maintenance effectiveness in CP7.

Operations

1.103 At £4.2 billion for Great Britain, Network Rail's SBPs include an overall increase in operations expenditure during CP7 of £0.2 billion (5%) when compared to CP6. This appears to be a significant change in CP7 operations expenditure, noting that the majority of operations costs typically relate directly to staff numbers.

1.104 Network Rail's SBP lacks detail on operations generally and there is not a consistent breakdown of how operations cost changes have been derived. However, we have reviewed the information provided and we have identified specific adjustments, or clarified what further information we need in the delivery plans.

1.105 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, we are requesting more details to ensure that the expenditure associated with these changes is efficient.

1.106 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 that their operational approach and resource levels suitably mitigate any additional risk to operations (rather than transferring impacts to train operators).

1.107 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.

1.108 As identified above, the increase in pre-efficient operations costs in some regions is not yet fully explained nor understood in detail. We are continuing to investigate, but this area may present an opportunity to generate further cost reductions in the final delivery plan.

1.109 The Eastern region's plan is an outlier from the other regions in that it reduces operations expenditure by £0.03 billion (-2.7%) compared to CP6. Based on the information available, this plan still appears to cover the key activities including the national improvement principles described above. Other regions' operations expenditure increases by varying amounts, between £0.03 billion (2.8% of Southern's CP6 expenditure) and £0.1 billion (18.6% of W&W's CP6 expenditure).

Support

1.110 Support costs make up a significant element of Network Rail's costs, comprising 10% of Network Rail's regions total controllable opex. There is a large element of flexibility in the level of costs and both Network Rail's regions together with the National Functions have varying levels of expenditure in this area.

1.111 Support expenditure in CP7 is projected to be £0.56 billion (9.6%) lower across the network than in CP6. However, this must 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.

1.112 We are currently conducting benchmarking activity through external consultancy on Network Rail's support costs (this also covers operations costs). This work will conclude in summer 2023 and will form part of our final determination.

Research, development and innovation (RD&I)

1.113 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.

1.114 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 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.

1.115 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.

Risk Findings

1.116 Network Rail has used £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 circa £1.5 billion of this has been spent on the financial impact of risks which have materialised in England & Wales in CP6. Risk impacts have included the pandemic, industrial action, inflation, input prices, earthworks and weather resilience. Other areas of expenditure include the additional requirements of the Track Worker Safety programme, performance improvement schemes and extra maintenance and renewals.

1.117 Network Rail suggests that risk fund usage in Scotland is likely to be close to £0.5 billion (in cash prices) by the end of CP6 against an original provision of £0.28

billion (in 2017-18 prices). Scotland's risk fund has been topped up during CP6 through deferred renewals, reductions in business rates and central charges, inflationary increases in variable income and workforce reform efficiencies.

1.118 There are several 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. Network Rail has estimated that each one percentage point change in inflation alters the plan each year by £0.2 billion in England & Wales and £0.02 billion in Scotland.

1.119 The England & Wales full plan has a risk provision of £0.5 billion. We have considered this provision in the context of the current economic environment and the experiences from CP6 and we do not consider this amount is sufficient to manage the programme over the full five-year period. The risk adjusted plan also has a provision of £0.5 billion within Network Rail centre but a further 5% (£1.5 billion total) allowance in the regions generated by identifying renewals and other activities which could be deprioritised (i.e. deferred) from CP7 to later control periods.

1.120 We do not consider that the full plan has sufficient risk provision to deliver in full in CP7. We therefore propose that Network Rail follows the risk-adjusted plan which releases an additional £1.5 billion expenditure into the regions (in addition to the £0.5 billion held in Network Rail centre) to fund risk. The expenditure released by the risk-adjusted plan is a significant contribution in moving the regional plans to a more secure funding position.

1.121 Taking the areas of risk noted earlier into consideration and recognising the utilisation of risk funds in CP6, £2.0 billion in England & Wales is also unlikely to be sufficient for CP7. We therefore recommend that Network Rail uses any funds released from our re-appraisal of input prices, headwinds and property income to generate additional risk provision in the plan.

1.122 Network Rail Scotland’s SBP has a risk provision of approximately £0.2 billion and will not have access to the funds held centrally in Network Rail as the England & Wales determination is separate to the Scotland determination. We have examined the proposed CP7 provision and consider that Network Rail should increase funds set aside for risk across the five-year programme in Scotland.

1.123 Furthermore, noting the Scottish Ministers' focus on performance, we consider that, in addition to increasing risk funding, there is scope to use the unallocated funds on expenditure which prioritises performance.

1.124 As detailed above, there is a difference between the Network Rail Scotland SBP and the SoFA of £0.22 billion. We are proposing that Network Rail Scotland's first priority should be to allocate £0.05 billion of this to core renewals as set out in Table 1.7. There is a potential release of funds in Scotland of approximately £0.02 billion, depending on which of our options Network Rail considers from Table 1.8. The net expenditure that remains to be allocated is approximately £0.2 billion.

1.125 We propose that any unallocated funding in Scotland (net of provision for core renewals and cost changes since the interim SBP was developed) is used to provide more adequate risk provision (i.e. similar to the amount set aside in CP6) and a targeted performance fund (consisting of infrastructure and operational initiatives) for Scotland. For illustration, based on the 24 February interim plan, we calculate that the amount for risk funding would be approximately £0.1 billion and £0.1 billion for the targeted train performance fund. However, we anticipate these amounts will change as Network Rail Scotland evolves its plans and as assumptions on available funding change, (e.g due to updated inflation).

1.126 Further details on our assessment of risk within the SBP can be found in Part II (in the Risk chapter). The rationale behind the targeted performance fund is described in Part II (in the Operations chapter).

Conclusions

1.127 We find Network Rail's targeted efficiency improvements in CP7 from the CP6 exit position of 10% in opex and 15% in capex are credible. Under the risk-adjusted England & Wales plan this would generate at least £3.2 billion; we consider this is stretching but realistic. The Scotland efficiency target is £0.38 billion for direct costs and £0.43 billion when including its share of efficiencies in the network wide cost allocation. Although this is realistic, it is particularly stretching, which amplifies the importance of ensuring sufficient risk funding.

1.128 We propose that Network Rail should further develop its plans to take account of the adjustments we have set out to post-efficient costs in Table 1.5 for England & Wales and Table 1.6 for Scotland.

1.129 Towards the end of CP7, service affecting failures are anticipated to increase. Asset portfolio condition and asset performance are expected to deteriorate at an

increased rate compared to 'steady state' funding, requiring an increase in long-term renewals expenditure. It is expected to take until at least CP11 to recover asset condition and for asset performance to return to exit CP6 levels, subject to available funding in future control periods.

1.130 Our proposed determination is that additional funding of £0.6 billion is required across the whole network for core renewals to mitigate potential sustainability and performance risks. We also require Network Rail to provide more information, to confirm alignment between maintenance and renewals plans, as these were still being developed during our review.

1.131 We have identified a range of options for Network Rail to reprioritise expenditure, as set out in Table 1.7. The combined value of these options is more than £0.8 billion, so this should be sufficient to cover our proposed £0.6 billion of additional core renewals, while providing Network Rail with some flexibility in how it prioritises these options.

1.132 This reprioritisation is designed to address the key risks arising from a reduction in core renewals in CP7, protect asset sustainability, reduce the long-term cost to recover to a steady state and help mitigate the forecast increase in service affecting failures towards the end of CP7. Additionally, increasing CP7 expenditure on core renewals may help to reduce the demand on reactive maintenance, at a time when Network Rail is trying to embed changes through its maintenance modernisation programme.

1.133 In Scotland we understand that Network Rail has continued to review prioritisation across its plan and has responded to earlier assurance observations regarding structures and earthworks. Increased volumes of activity have been identified for these assets which is being reviewed by Network Rail's Technical Authority. We note that (post-efficient) core renewals expenditure is circa £0.3 billion lower in Scotland than in CP6. We consider a required minimum increase in expenditure of £0.05 billion is appropriate.

1.134 Network Rail intends to apply more reactive measures such as temporary speed restrictions to mitigate increased service affecting failures; and to prioritise funding to higher income routes. We are continuing to challenge Network Rail to provide clear plans and policies in these areas, to assure us that its proposed approach is efficient and adequately mitigates known risks.

1.135 Operations costs have increased for CP7; we continue to work with Network Rail to understand the drivers for this increase and ensure any increases are efficient.

1.136 In summary, in our draft determination we propose that Network Rail:

(a) pursues the risk-adjusted plan in England & Wales;

(b) protects core assets through increased expenditure above that set out in its SBP, specifically:

(i) Earthworks expenditure in the Eastern region;

(ii) Earthworks, structures, track and operational property in the Southern region;

(iii) Earthworks, track, structures and tunnels in the W&W region;

(iv) Metallic structures in Scotland; and,

(v) Improving fire safety in tunnels and any unmitigated sustainability issues.

(c) reprioritises expenditure on specific large programmes, to release funding for the additional core renewals above;

(d) continues to develop its plans with an efficiency target of at least £3.2 billion in England & Wales, and £0.43 billion in Scotland (with £0.38 billion for regionally incurred OSMR);

(e) takes a different view on input prices which, together with the revised headwinds already proposed by Network Rail, funds the latest view of CPI inflation, the income shortfall and a performance improvement fund in England & Wales;

(f) increases its risk funding in England & Wales and Scotland. Focusing on the risk-adjusted plan in England & Wales secures a further £1.5 billion of cash risk funding; and

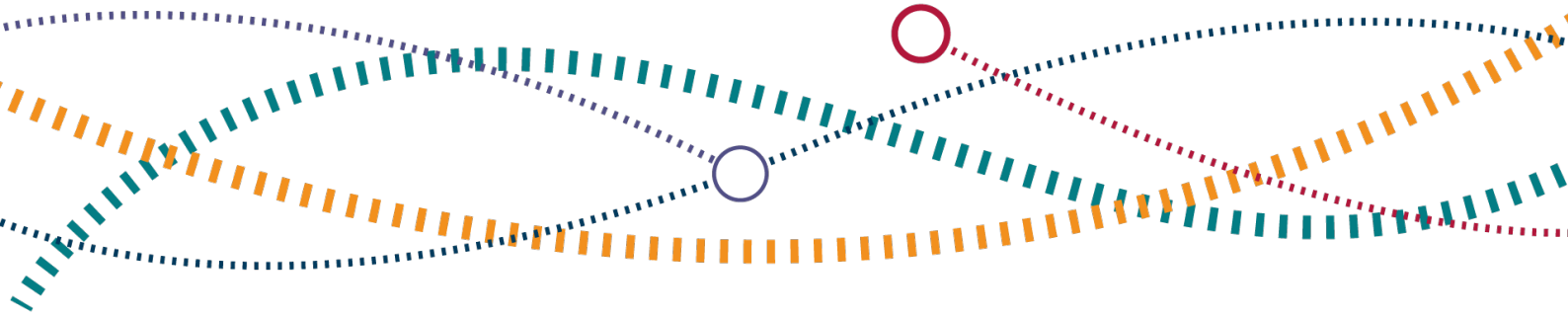
(g) for Scotland, the balance of any unallocated SoFA funding (net of the core renewals increment) should be used to provide more adequate risk funding and a targeted performance fund in Scotland.

OFFICE OF RAIL AND ROAD

PR23 draft determination:

Supporting document – sustainable and efficient costs: Part II

15 June 2023



About this document

This technical assessment on sustainable and efficient costs is one of five supporting documents of our draft determination for the 2023 periodic review (PR23). Our cost assessment is split into three parts: the first document (Part I) is the summary, the fuller explanation of reasoning is contained in this document (Part II) and Annexes are in Part III.

Introduction

Document overview

1.1 This document sets out details of ORR's draft conclusions on sustainable and efficient costs for control period 7 (CP7) which will run from 1 April 2024 to 31 March 2029. All costs are in FY23/24 prices unless otherwise stated. A summary of our conclusions can be found in Part I and supporting annexes are available via Part III.

1.2 Across the network in Great Britain, Network Rail proposes to spend £44.8 billion in CP7 on operations, support, maintenance and renewals (OSMR). This includes industry costs and rates and risk provision but excludes costs for traction electricity of £4.5 billion leading to a total of £49.3 billion. British Transport Police (BTP) costs are not included in this figure. OSMR expenditure for England & Wales is proposed to be £40.0 billion for CP7, which is approximately 4.9% higher than CP6 in real terms (CP6 costs were approximately £38.2 billion net of electricity for traction costs).

1.3 Network Rail's interim strategic business plan (SBP) for Scotland proposes expenditure of £4.8 billion (net of traction electricity costs). This is approximately £0.2 billion (4.0%) higher than CP6 in real terms.

1.4 In this document we discuss the efficient level and allocation of expenditure on OSMR activity. Our review, described in this document, is based on the Network Rail 'risk-adjusted' Strategic Business Plan (SBP) for England & Wales and the interim SBP for Scotland, both submitted to ORR in February 2023 with additional clarifications received during March and April 2023. It should be noted that there will be minor differences between the expenditure detailed in this plan and that of the 'full' plan for England & Wales published by Network Rail on 19 May 2023 and Scotland SBP that will be published shortly.

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

Methodology

Introduction

2.1 PR23 will determine what Network Rail must deliver in control period 7 (CP7) and the funding it requires to do this.

2.2 Network Rail operates under its Network Licence; a core obligation of which is that it must secure the operation, maintenance, renewal and enhancement of the network in order to satisfy the reasonable requirements of persons providing services to railways and funders. This is in respect of the quality and capability of the network and the facilitation of railway service performance. Examples of reasonable requirements include the outputs established in this periodic review or firm commitments included in Network Rail's delivery plans.

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')
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;

Timelines	Document	Key Messages
		- 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.
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.

ORR's objectives

2.3 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.

Review of CP7 OSMR expenditure

2.4 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.

2.5 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

2.6 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

2.7 In advance of receiving the SBP's, 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 our Targeted Assurance Reviews (TARs), consultancy commissions and Independent Reporter work, as well as our holding to account and monitoring activities through CP6. See Part III – Annex A for more details of our intelligence gathering in CP6.

2.8 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; and

(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

2.9 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;

2.10 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.

2.11 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".

2.12 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

2.13 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 Risk chapter. 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.

2.14 As discussed in the Risk chapter, 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.

Quality and Analytical Assurance Overview

2.15 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'. The tool underwent an independent Verification and Validation process to improve the robustness of the data and outputs. See Part III (Annex A) for further details of the ORR Cost Tool.

Maintenance and renewals

Introduction

3.1 The immediate future including CP7 has many uncertainties. These range from unpredictable climate change effects to inflation. Against this backdrop the importance of sound asset management strategies cannot be overstated.

3.2 This chapter describes our assessment of the maintenance and renewals expenditure within the Network Rail plans. It considers both the expenditure in CP7 and the long-term implication on asset sustainability.

Methodology

3.3 We have followed the general methodology described in the section 'Introduction and Methodology' (chapter 2). Any details specific to the methodology for Maintenance and renewals are given below in the remainder of this section.

Asset management planning

Assessment criteria

3.4 We considered whether Network Rail's CP7 plans demonstrate a reasonable approach to understanding its asset base and to allocating the maintenance and renewals resources available in a way that reflects funders' strategic objectives as set out in their respective HLOSs. The following questions framed our assessment:

(a) are plans based on clear, appropriate asset management policies?;

(b) do plans include appropriate justification for the volumes of proposed work, including by year, asset type and region?;

(c) do plans identify the implications for asset sustainability and management (including at an England & Wales and Scotland level)?; and

(d) do plans consider whole life cycle cost, such that Network Rail is not unduly creating cost or deliverability risks in future control periods? We recognise that, due to constrained funding, Network Rail may not be able to adopt the lowest whole life cost solutions in CP7 (e.g. where the lowest whole life cost solution has unaffordable up-front capex costs). So, we have assessed whether Network Rail has made appropriate trade-offs (e.g. if a renewal is

being delayed, whether it has reasonable mitigations in place and whether it was prioritised appropriately);

3.5 We also held a series of meetings with Network Rail to test its overall assurance process, which involved meetings with Network Rail's specialists, e.g. to understand decision support tools (DSTs) or specific projects, and with Network Rail's Technical Authority (TA) Network Technical Heads and with regions.

Network Rail's plan

Summary of maintenance and renewals costs

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

Table 3.1 Summary of maintenance expenditure (£ millions)

Region	CP6	FY25	FY26	FY27	FY28	FY29	CP7	CP6 to CP7 % Change
	£m	£m	£m	£m	£m	£m	£m	%
Eastern	3,176	686	681	681	675	668	3,390	6.8%
Southern	2,443	494	487	482	477	472	2,414	-1.2%
W&W	1,530	309	304	295	291	291	1,490	-2.7%
NW&C	2,277	451	452	454	449	449	2,255	-0.9%
England & Wales	9,426	1,941	1,923	1,912	1,893	1,880	9,549	1.3%
Scotland	1,053	215	208	208	206	204	1,041	-1.1%
National Functions	1	112	115	120	123	126	595	N/A%
GB wide	**10,480**	**2,268**	**2,247**	**2,240**	**2,222**	**2,210**	**11,186**	**6.7%**

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

Table 3.2 Summary of renewal expenditure (£ millions)

Region	CP6	FY25	FY26	FY27	FY28	FY29	CP7	CP6 to CP7 % change

	£m	£m	£m	£m	£m	£m	£m	
Eastern	4,989	1,029	963	878	724	666	4,260	-15%
Southern	4,409	647	873	803	764	565	3,651	-17%
W&W	2,878	539	542	601	485	409	2,576	-10%
NW&C	3,814	854	832	960	890	849	4,384	15%
England & Wales	16,090	3,068	3,210	3,241	2,863	2,489	14,871	-8%
Scotland	2,268	404	404	392	362	379	1,941	-14%
National Functions	2,561	532	550	498	853	724	3,157	23%
GB wide	**20,857**	**4,005**	**4,163**	**4,131**	**4,077**	**3,592**	**19,969**	**-4%**

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

Table 3.3 Regional comparison of CP7 planned expenditure for renewals compared to CP6

% change from CP6 to CP7	Eastern	Southern	W&W	NW&C	Scotland	England & Wales	National Functions	GB
Track	-36%	-30%	-32%	-4%	-29%	-28%	N/A	-28%
Off Track	35%	255%	219%	-11%	49%	96%	N/A	89%
Signalling	-28%	-27%	-16%	60%	-16%	-6%	N/A	-7%
Level crossings	-8%	-38%	6%	44%	33%	-6%	N/A	-4%
Structures	-6%	-7%	-37%	3%	-8%	-11%	N/A	-11%
Earthworks	-15%	-32%	-7%	-3%	15%	-18%	N/A	-16%
Drainage	28%	49%	37%	-11%	64%	16%	N/A	22%
Buildings	2%	-17%	24%	10%	3%	1%	N/A	-1%
Electrification and fixed plant	21%	-8%	-2%	4%	-29%	6%	-77%	-2%
Telecoms	-20%	-8%	65%	-7%	-8%	-1%	35%	18%
Other renewals	-189%	87%	118%	57%	-96%	221%	38%	53%
Renewals Total	**-15%**	**-17%**	**-10%**	**15%**	**-14%**	**-8%**	**23%**	**-4%**

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

Findings

3.7 We found clear evidence that plans have been developed at a local level by each region and that Network Rail has also introduced a continuous planning process through which its regions and National Functions plans were regularly reviewed.

3.8 We found that regions allocated expenditure for each asset area, including maintenance and renewals (M&R), based on their assessment of priority.

3.9 Total renewals expenditure is down 4% versus CP6 across the GB network but the reduction is not evenly distributed between regions and National Functions. There is a significant increase in digital signalling expenditure in National Functions (not separated out in the tables); Regions in England & Wales plan to spend on

average 8% less on renewals in CP7; Network Rail Scotland plans to spend 14% less.

3.10 Network Rail is forecasting overall a relatively flat level of expenditure over the control period, with a peak in year 3 for renewals. Year 5 for renewals is the exception where there is a circa £500 million reduction compared to previous years.

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

3.12 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.

3.13 Historically track and signalling are the largest renewals expenditure areas, as is the case in CP7. Signalling expenditure is down in all regions except NW&C, again driven by WCML(N). There are significant reductions proposed in track expenditure for both England & Wales & Scotland.

3.14 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.

3.15 The largest percentage increase is in off-track expenditure, which includes vegetation and boundary management. This increase reflects issues with vegetation management in CP6.

3.16 In the four regions in England & Wales, maintenance expenditure in CP7 has increased compared to CP6 by £123 million (1%); and in the interim SBP for Scotland, expenditure has reduced by £12 million (1%). 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 £706 million (6.7%) and this is predominantly due to the reallocation of £595 million from capex to opex in National Functions.

3.17 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 some time for the new ways of working to become fully embedded.

3.18 We now discuss our findings on maintenance in more detail, followed by our findings on renewals.

Maintenance findings

3.19 Maintenance is the day-to-day upkeep of the network and is critical to keeping the railway safe whilst supporting a reliable train service. Network Rail delivers maintenance of track, signalling, electrification & plant (E&P) and off-track asset categories. It uses in-house resources organised into Maintenance Delivery Units (MDUs), supplemented by external contractors.

3.20 Maintenance of other asset types, including earthworks, buildings and structures is managed via Network Rail's asset management teams and delivered by its supply chain, rather than the MDUs. Five percent of the maintenance budget is in the National Functions, where the majority of maintenance activities are procured externally.

3.21 During CP6, we carried out a TAR on Network Rail's maintenance organisational 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 (orr.gov.uk).

3.22 At the time of the SBP submission, Network Rail was not in a position to provide its bottom-up maintenance plans and was only able to provide a brief summary of its proposed approach and funding requirements. Our draft determination is based on our CP6 monitoring and the limited information included within the SBP. We are expecting more information ahead of our final determination.

3.23 Table 3.4 shows the change in regional expenditure on maintenance between CP6 and CP7. In CP7, Network Rail plans to spend circa £9.5 billion on maintenance activities across the four England & Wales regions which is a circa 1% increase compared to CP6; and in the interim SBP for Scotland, £1.04 billion on maintenance activities which is a circa 1% decrease on CP6.

Table 3.4 CP6 and CP7 regional maintenance expenditure (£ millions).

Regions (£m 2023/24 prices)	CP6 total £m	CP7 total £m	% change

Eastern	3,176	3,390	6.8%
NW&C	2,277	2,255	-0.9%
Southern	2,444	2,414	-1.2%
W&W	1,530	1,490	-2.7%
England & Wales Total	**9,426**	**9,549**	**1.3%**
Scotland	**1,053**	**1,041**	**-1.1%**

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

England & Wales – maintenance expenditure increases

3.24 The net changes from CP6 to CP7 shown in these tables are made up of cost increases, offset by efficiencies. In England & Wales, the regions have identified scope drivers and headwinds which account for £732 million of increased costs. The main drivers include:

(a) changes in the categorisation of CP6 renewals items as maintenance in CP7 within National Functions;

(b) response to ash dieback;

(c) input price headwinds;

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

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

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

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

Scotland – maintenance expenditure increases

3.25 Scotland has identified scope drivers and headwinds which account for £106 million of increased costs in CP7. The main drivers 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

3.26 The above cost increases are broadly balanced by proposed maintenance efficiencies of £609 million in England & Wales and £118 million in Scotland. The majority of these 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

3.27 During CP6 and in the planning for CP7, Network Rail has made several significant changes to its maintenance approach to make the railway safer for the public, passengers and its workforce; and to deliver some key efficiencies to the taxpayer. These are summarised below:

(a) increase in drainage maintenance: We found that Network Rail has delivered a change in activities and resources during CP6 to deliver greater levels of drainage inspection and maintenance across the network. The stated aim being to reduce as much as practical the risk of landslips around the network. 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: We found that Network Rail changed its approach to vegetation management during CP6 to include identifying more ways to protect, maintain and, where possible, enhance biodiversity across the railway. 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: In CP6 Network Rail implemented a Track Worker Safety Task Force to oversee a programme to reduce system health and safety and wellbeing incidents. We found that almost all of the national maintenance workbank has been reviewed and refined, aligning tasks with safer access. 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: in Part III (Annex B) we define the different maintenance strategies which Network Rail adopts. We found that the approach to maintenance has been based on traditional, time-based intervals but is gradually moving to a semi-predictive, risk-based approach for some asset types and geographic areas, based on asset condition information and expected timings of asset failure. If implemented correctly, risk-based maintenance supports a more effective approach to undertaking maintenance activity and allows an increase in the reliability of assets by applying suitable maintenance regimes and targeting known areas of failure; 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) revising the approach to undertaking routine, planned maintenance in its engineering standards, in line with advances in materials, technology and improvements in condition monitoring;

(ii) providing maintenance staff with overlapping skills so that they are better equipped to fix the most common faults and improve response to incidents on the network;

(iii) reviewing team size guidance and rostering to ensure that they have the right number of people, with the right skills, on each maintenance shift; and

(iv) continued implementation of technology to support maintenance activity, including remote condition monitoring.

3.28 We acknowledge the following specific activities which are ongoing:

(a) Track Worker Safety Task Force (STF) has made several changes to the way regions undertake maintenance activities and this has impacted the level of access required to deliver maintenance activity.

(b) recent industrial action has impacted regions' progress in simultaneously delivering maintenance activity within compliant timeframes; reducing their CP6 backlog; and developing their detailed plans for CP7;

(c) given the timing of publication of the HLOS and SoFA, regions have not yet been able to fully work through the impact of reduced levels of renewals activity and how this might then impact on required maintenance activities; and,

(d) the Modernising Maintenance programme is a critical enabler of increased maintenance activity in CP7. However, this programme is still being implemented and it will take time for the new ways of working to be embedded across the organisation.

3.29 The combination of the above factors has contributed to significant uncertainties in the regions' CP7 maintenance planning.

3.30 To support improvements in delivery capacity, Network Rail reported that it has commissioned external experts to work with the regions and their delivery units (DUs) to further develop their plans, with a particular focus on the deliverability of planned CP7 maintenance activity. We will take this and any additional information into account when making our final determination.

3.31 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 DUs.

3.32 For CP6, a maintenance reporting target was not set, rather we sort to understand what level of compliance was being achieved and to ensure consistency and accuracy of reporting. 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 draft determination: supporting document on outcomes for more information.

Maintenance planning in regions

3.33 Network Rail advised us that it is using its Activity Based Planning (ABP) tool. This was introduced at the end of Control Period 5 (CP5) and is a bottom-up maintenance resource planning process and cost estimating tool for maintenance activities. At the time of the SBP submission the ABP outputs had not been assured or provided to us. Network Rail has subsequently provided ABP data which demonstrates that MDU-level maintenance plans are progressing in

readiness for CP7, but planning is still ongoing. We are continuing to discuss these maintenance plans with Network Rail and we will provide further commentary in our final determination.

3.34 CP7 plans are expected to be largely based on CP6 exit levels of maintenance activities, as captured in the ABP tool. The CP6 exit levels of maintenance activity and required resources are then adjusted for any anticipated changes either positive or negative between CP6 and CP7 to inform the CP7 plans.

Impact of reduced renewals on maintenance activity

3.35 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.

3.36 Current Network Rail estimates are provided in Table 3.5.

Table 3.5 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%

***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.**

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

3.37 Our supplementary advice in September 2022 concluded that if there was to be any increase, it was likely to be minor and only become apparent towards the end

of the control period. On that basis, we consider that the above estimates are likely to be overstated. However, we are continuing to work with Network Rail as their maintenance plans develop, to get better evidence to verify the above estimates.

3.38 In addition to the increased maintenance expenditure, Network Rail has suggested that reduced renewals will likely lead to an increased need for operational restrictions, such as an increased use of temporary speed restrictions so that safety outcomes can be protected. See the Operations chapter of this document for more details.

3.39 Network Rail currently manages deferred renewals between years and control periods via increased maintenance activities and minor works. 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. With changes to working practices, for example improved planning and the transition to risk-based maintenance, in our view there is a possibility that most MDUs will be minimally impacted by reduced renewals expenditure in CP7. Our view is that any increases in maintenance expenditure as a result of reduced renewals would start to materialise later in CP7.

3.40 However, we remain concerned with a strategy that seeks to replace engineering solutions with operational controls to manage safety risk and we are seeking further assurances from Network Rail. This is discussed in more detail in our PR23 draft determination: supporting document on health and safety.

Impact of climate change and adverse weather on maintenance

3.41 The impacts of climate change and adverse weather that have been experienced throughout CP6 will most likely continue into CP7. Through our TARs and regular engagement, we have recommended in CP6 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. Whilst acknowledging the significant amount of work being undertaken in CP6, there is more that will be required to be undertaken in CP7. Having reviewed the SBP, we have found that there are still evidential omissions from Network Rail's plans which will need to be resolved in CP7. See the Environmental Sustainability chapter of this document for more details.

Increased maintenance activity for vegetation management, including ash dieback

3.42 We found that 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 the Environmental Sustainability chapter 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

3.43 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

3.44 Since the SBP was submitted, regions and routes across England & Wales and Scotland have undertaken significant work to update their plans for CP7 for their internally delivered maintenance activity. This work is continuing ahead of the publication of the Scotland SBP and all regions' CP7 delivery plans next year.

3.45 Whilst there have been improvements, the TA's updated internal assurance gave a number of recommendations to further improve the plans. TA's recommendations to the regions were:

(a) all regions to undertake further work to develop and iterate their ABPs ahead of the production of Network Rail's CP7 Delivery Plan, including to further embed the impact of Modernising Maintenance and the impact of lower levels of renewals in CP7 (particularly in the later years of CP7 where the impact of lower renewals on maintenance is the highest);

(b) set out what is being done at a region and route level to control and mitigate the expected increase in Service Affecting Failures (SAFs) in CP7 – specifically further improving the overall coherence of renewals and maintenance plans, use of technology and insight tools, and other mitigations / controls that may be required;

(c) regions and routes to explain all non-modelled DU maintenance activity or/and seek to include this within modelled DU maintenance (wherever possible); and

(d) continue to work to share best practice across the regions through to CP7.

3.46 At this stage, there is understandably a focus on off track and lineside assets as Network Rail seeks to improve resilience to climate change and extreme weather and the increased maintenance activity on these assets will increase the demand for resources. Further consideration is required on the impact that increased vegetation management is likely to place on the supply chain.

3.47 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.

3.48 Regions are partly dependent upon delivery of infrastructure monitoring by Route Services. However, we note regions can procure and implement monitoring within their own budgets. Maintenance modernisation adds to this dependency as routes will have to increasingly rely upon the use of technology to undertake maintenance activity in CP7. There is a risk 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 to provide clear commitments for infrastructure monitoring in CP7 so we can better hold it to account.

3.49 We note that this is an iterative planning process. Therefore, regions and routes will need to continue to develop and refine their planning over the coming year. In particular there is a need to show the link more clearly between renewals and maintenance activity in CP7 as well as the efficiencies achieved through the implementation of Modernising Maintenance in CP6. These updates will need to be reflected in Network Rail's CP7 delivery plans.

3.50 We will consider any additional information received from Network Rail ahead of our final determination.

Maintenance staff resourcing and competence

3.51 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 Part III – 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.

3.52 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 have seen limited evidence that Network Rail has

identified the competency development required, scoped or quantified the new requirements.

3.53 Other than in operations, we have found little or no new commitment on improving competence within the submission even though it has been acknowledged by Network Rail that it has issues in some areas and / or regions. Whilst the SBP acknowledges the need to improve compliance with standards and legislation, through increased staff competence in several disciplines, it does not appear to contain any measurable commitments or milestones for achieving this.

3.54 Network Rail's position was that a detailed competency development plan was not a requirement of the SBP but these would be developed for the delivery plan. We will review the next iteration of Network Rail's plans and will be exploring the above areas around competence and proposed staffing numbers.

Obsolescence management

3.55 Obsolescence Management should take into account an asset's life span with a plan to replace obsolete parts as they age, before this becomes critical. Obsolescence represents a challenge in a number of asset areas, the most pressing being signalling.

3.56 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.

3.57 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.

3.58 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

3.59 At this stage, we consider that a marginal increase in expenditure from CP6 should be deliverable with 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.

3.60 We note that there are changes in CP7 which make deliverability more challenging such as 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 plans.

Reporting of maintenance effectiveness

3.61 In CP7, Network Rail plans to introduce a wider suite of seventeen maintenance KPIs. Our view is that these will help to gauge the effectiveness of Network Rail's Modernising Maintenance programme.

3.62 We are supportive of the introduction of additional KPI's in this area.

Asset renewals findings

3.63 This section provides details of our analysis of regions' proposed asset renewals in CP7. Capex expenditure by National Functions is also referred to in the SBP as 'renewals' and this is discussed separately in the National Functions chapter.

3.64 Renewals are defined as replacement of existing assets on a like-for-like or modern equivalent basis e.g., works that will provide long term benefits such as replacing a section of life-expired track. 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 of the scope of our periodic review.

3.65 We found that regions have generally developed their workbanks based on asset condition data and agreed priorities, notable exceptions being HS2 enabling renewals in NW&C; and Project Reach, which have a more externally driven requirement.

3.66 Where funding was insufficient to carry out all the proposed renewals, regions have been required to prioritise renewals based on: minimum, safe asset condition and legal requirements; medium to longer term asset sustainability; and then route criticality or specific critical locations.

Renewals planning in regions

3.67 We found that Network Rail's approach to allocating renewals expenditure was 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.

3.68 In addition, the SBP failed to demonstrate sufficient alignment between renewals and maintenance activity planning. Further analysis is available in Part III (Annex B).

Effective renewals volumes

3.69 In addition to the expenditure figures presented by Network Rail in its SBP, we have reviewed the associated renewals volume. For most assets, Network Rail reports 'effective volumes'. See Part III (Annex B) for background to Network Rail's reporting of effective volumes in CP6.

3.70 In Table 3.6 and Table 3.7 we have set out the effective volumes Network Rail has proposed in its CP7 SBP, compared to its CP6 Delivery Plan (DP19).

Table 3.6 Effective volume comparison between CP6 and CP7, England & Wales

England & Wales			
	CP6 (DP19)	**CP7 Committed**	**CP7 as a % of CP6**
Plain Line	8,083	5,221	65%
Switches & Crossings	1,953	1,436	74%
Signalling	4,667	4,962	106%
Structures	96,350	68,511	71%
Earthworks	1,517	1,819	120%
Power & Electrical	260	452	173%

NB. Effective volumes is a measure of how much additional life a renewal activity adds to an asset, which provides a medium-term view of sustainability. It is calculated as a weighted aggregation of renewals volumes, where the weighting distinguishes between activity types and their different impacts on asset life.

Each asset area has a different effective volume and they are not directly comparable i.e. One track unit is not equal to one structures unit.

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

Table 3.7 Effective volume comparison between CP6 and CP7, Scotland

Scotland			
	CP6 (DP19)	CP7 Committed	CP7 as a % of CP6
Plain Line	1,293	694	54%
Switches & Crossings	205	141	69%
Signalling	782	565	72%
Structures	27,417	17,460	64%
Earthworks	567	474	84%
Power & Electrical	6	17	268%

NB. Effective volumes is a measure of how much additional life a renewal activity adds to an asset, which provides a medium-term view of sustainability. It is calculated as a weighted aggregation of renewals volumes, where the weighting distinguishes between activity types and their different impacts on asset life.

Each asset area has a different effective volume and they are not directly comparable. i.e. One track unit is not equal to one structures unit.

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

3.71 In almost all cases the effective renewal volumes being planned are less than those planned in CP6. Network Rail has explained that the reduction in effective volumes is predominately constrained 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.

3.72 The medium to longer term impact of the reduction in effective volumes is most evident in the decreasing trend in Composite Sustainability Index (see Part III – Annex E). In reviewing the overall renewals portfolio, some specific asset areas are highlighted below that require further consideration by Network Rail.

3.73 Network Rail's TA provided assurance of the regional renewals plans. TA identified significant areas of concern in the planned level of renewals in the following areas:

(a) Track (W&W);

(b) Earthworks (Eastern, Southern along with W&W);

(c) Tunnels (W&W); and,

(d) Structures (Southern, W&W and concerns about metallic structures in Scotland).

3.74 We independently identified similar areas of concern to the TA's assurance. For example, during CP6 we completed a TAR which identified issues around metallic structures (see Part III – Annex B for more background on this issue). In addition to the assets and regions which the TA identified as the highest level of concern, we have highlighted the following areas that we believe also need consideration:

(a) a need to further improve fire safety in tunnels;

(b) Track in Southern;

(c) Operational property in Southern (Victoria station roof); and

(d) the need to improve in areas which TA's assurance identified as the second highest level of concern, across England & Wales.

3.75 Since Network Rail submitted its SBP, its TA team has continued to work with regions to develop a better understanding of options around any possible shortfall in renewal areas, including discussions across regions. For consistency, all the expenditure figures presented here are based on the SBP submission, but we continue to review plans with Network Rail as they develop and we will reflect any changes in our final determination.

3.76 In Table 3.8 we have set out our initial estimate of the additional core asset renewals expenditure that would be required to address the main vulnerabilities. Our assessment is based on the current information we have and does not consider, at this stage, additional maintenance mitigations which Network Rail is still developing, or any further reallocation of renewals by region since the SBP (or since the interim SBP in Scotland).

Table 3.8 Estimated core renewals additional expenditure (£ millions).

Region	Asset area	£ million
Southern	Track	50
	Structures	50
	Earthworks	80
	Operational property (Victoria station roof)	50
Eastern	Earthworks	30
W&W	Track	50
	Structures & Tunnels	100
	Earthworks	100
General	Fire safety in tunnels	20
	Address areas at TA's second highest level of concern	20
Total England & Wales		**550**
Scotland	Structures	50
Network total		**600**

Source: ORR analysis, based on expenditure and assurance included in the SBP submission

3.77 Given the constrained levels of funding, this £600 million of additional expenditure will need to be funded from outside the regions' core asset renewals plans. In the conclusions sections, and in subsequent chapters, we explain the options available to Network Rail to redirect expenditure to the core asset renewals identified above.

Deliverability of renewals

National concerns

3.78 As the proposed renewal volumes are 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.

Regional deliverability of renewals

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

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

3.81 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 the Digital Signalling chapter.

3.82 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).

3.83 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 Part III (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.

Interdependence with enhancements / other portfolios

3.84 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 outside

of the scope of PR23, however, we have reviewed if there are interactions which may have a material impact of the SBP expenditure.

3.85 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.

3.86 In NW&C, renewals around Crewe and the WCML(N) have significant interactions with Network Rail delivered enhancements programmes, as well as HS2 enhancements 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.

3.87 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.

3.88 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

3.89 We have reviewed Network Rail's plans and we are satisfied that its proposals to support freight growth through its OSMR activities are reasonable.

3.90 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 3rd party investment is a key factor in freight growth and that demand for rail freight remains strong. 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

3.91 Decisions around what renewals to undertake and their priority is dependent on the quality of the data upon which they are based.

3.92 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.

3.93 We have 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.

3.94 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 (ADG) 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.

3.95 We also examined regional proposals for maintaining asset data quality over CP6. We found that Network Rail does not have a clear commitment on data quality. Network Rail has put forward the argument that commitments on asset data are not required at this stage.

3.96 Accurate asset data is a key asset in itself and should be a priority for Network Rail, which is proposing to spend circa £20 billion on renewals over CP7. The lack of a clear asset data strategy being set out in the SBP is therefore a cause for concern. We disagree with Network Rail's view that measurable commitments on asset data are not needed until the final delivery plan and we require an indication of the data strategy before draft determination.

Asset performance and asset sustainability measures

3.97 Our review considered five key parameters: Effective volumes; service affecting failures (SAF); maintenance effectiveness; Composite Reliability Index (CRI); and Composite Sustainability Index (CSI). Part III (Annexes D and E) provides a summary of how CRI and CSI are calculated.

Service affecting failures (SAF)

3.98 These are attributed to specific asset incidents (track, points, signalling and traction power) causing delay. The threshold for delay is generally three minutes, but some one-to-two-minute delays are attributed where required for performance management.

3.99 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 SAF, reflecting increasing passenger and freight traffic volumes.

3.100 Regions have submitted forecasts for SAFs in CP7. Regions consider this to be an acceptable increase in SAF, when compared to their expected end of CP6 position, based on the constrained funding for renewals in CP7. See Table 3.9.

Table 3.9 Proposed levels of SAF exit CP7 vs CP6

	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 TA	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 TA	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 TA and the Regions.

3.101 As part of our review, we considered if the baseline being put forward by regions was sufficiently challenging. Table 3.10 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 3.10 Proposed baseline

	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 Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

3.102 We challenged why some regions 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.

3.103 In response to our challenges, we were advised that, prior to the regions submitting the SBP, the TA carried out its own SAF forecasts. This showed the balance of positive and negative impacts on SAFs, acknowledging uncertainty in the remainder of CP6.

3.104 We challenged Network Rail to compare the regions' SAF targets against its network-wide assessment to determine whether regions were within an expected range. The TA found that all regions were within expectations, with the exception of W&W.

3.105 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.

3.106 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.

Composite reliability index (CRI)

3.107 The CRI is an indicative measure of the reliability of the overall network taking into account the different asset types and criticality. See Part III (Annex D) for more detail. We required Network Rail to compare the regional CRI targets (see Table 3.11) against its network-wide assessment, to determine whether the region's targets were within an expected range. Network Rail's own assurance indicated regions had followed reasonable processes and the regional results are within a credible range. However, there were some concerns on electrical power which is sensitive to weighting factors in the CRI forecast.

Table 3.11 Proposed CRI by region

Region	2028/29	Forecasted change v 2023/24
Eastern	-2.7%	-2.7%
NW&C	-8.3%	-8.3%
Southern	-3.3%	-3.3%
W&W	-7.9%	-7.9%
Scotland	TBC	TBC

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

3.108 For the same reasons given for our review of SAF, 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)

3.109 This section sets out our analysis and decisions in relation to Network Rail's proposed CSI forecast for CP7.

3.110 CSI is the relative change in the residual asset life or condition. In CP6 we decided to use the start of CP5 CSI value as the baseline against which change was reported for CP6. In light of the 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 their CSI score.

3.111 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 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.

Network success measures for CP7

3.112 We found that each region has developed plans for renewal of the assets on their part of the network. The TA then assessed the impact of these plans using the CSI model.

3.113 The national percentage change between the end of CP7 and baseline (at the end of CP6) is projected in the SBP as a 3.1% decline for England & Wales & 3.4% decline for Scotland. Individual regions CSI forecasts are shown in Table 3.12.

Table 3.12 CSI calculation all regions

Region	End of CP7 CSI versus end CP6
Eastern	-2.9%
NW&C	-3.5%
Southern	-3.0%
W&W	-3.1%
England & Wales	-3.1%
Scotland	-3.4%
National	-3.2%

Source Network Rail, risk-adjusted plan

3.114 In agreeing any trajectory, 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 using our proposed CP7 Holding to account policy.

3.115 Ahead of our final determination we will work with Network Rail to understand the potential impact on CSI, of our proposed £600 million additional expenditure on

core renewals (£550 million England & Wales and £50 million for Scotland, discussed above).

3.116 Each England & Wales region identified additional renewals which would be carried out if their regional risk funding was made available for delivering additional core asset renewals (i.e. following the 'full' plan, rather than the 'risk adjusted' plan). This risk adjustment was approximately 5% of the regions' total budgets. The CSI forecasts, if these additional renewals were undertaken, are shown in Table 3.13.

Table 3.13 CSI calculation, all regions, including contingent expenditure element

Region	End of CP7 CSI trajectory
Eastern	-2.5
NW&C	-3.2
Southern	-2.7
W&W	-2.7
England & Wales	-2.8
Scotland	-3.4
National	-2.9

Source Network Rail, risk-adjusted plan

3.117 The difference in renewal expenditure between the 'full' plan and the 'risk-adjusted' plan for England & Wales is approximately £1.2 billion. And from using these two factors we have calculated the approximate expenditure required to deliver a 1% increase in CSI; this is shown in Table 3.14.

Table 3.14 Regional submission of committed renewals

Region	Reduction £m	End of CP7 CSI trajectory risk-adjusted plan %	End of CP7 CSI trajectory full plan %	Difference in CSI %	Estimated cost per 1 % increase £m above risk-adjusted plan.
Southern	244	-3.00	-2.70	-0.30	800
Eastern	475	-2.90	-2.50	-0.40	1,200
NW&C	298	-3.50	-3.20	-0.30	1,000
W&W	166	-3.10	-2.70	-0.40	400
Total	**1,183**	**-3.10**	**-2.80**	**-0.30**	**3,400**

On what asset type the additional renewals are undertaken can be more influential than expenditure amount in total.
Because of rounding figures may not add up
Source analysis of Network Rail databook Financial Year 2023-24 prices

3.118 From the above it can be estimated that an additional renewal expenditure of circa £3.4 billion would deliver a one percentage point improvement in CSI for England & Wales. For Scotland we estimate that the expenditure to improve CSI by one percentage point would be circa 10% of that in England & Wales, or £340 million.

3.119 In Table 3.15, we have estimated the improvement that might be achieved from the £600 million additional expenditure on core renewals.

Table 3.15 Change in CSI from additional renewals expenditure

	CP7 exit 'full' plan %	CP7 exit 'risk-adjusted' %	CSI	£m VAR	ORR cost adjustments £m	Change in CSI re cost adjustment %	End CP7 CSI with ORR cost adjustment %
Eastern	-2.5	-2.9	-0.4	475	30	-0.03	-2.9
NW&C	-3.2	-3.5	-0.3	298	0	0.00	-3.5
Southern	-2.7	-3.0	-0.3	244	230	-0.28	-2.7
W&W	-2.7	-3.1	-0.4	166	250	-0.60	-2.5
England & Wales	**-2.8**	**-3.1**	**-0.3**	**1183**	**550**	**-0.14**	**-3.0**
Scotland	**-3.4**	**-3.4**	**0.0**	**0**	**50**	**-0.01**	**-3.4**
National	**-2.9**	**-3.2**	**0.3**	**1183**	**600**	**-0.15**	**-3.0**

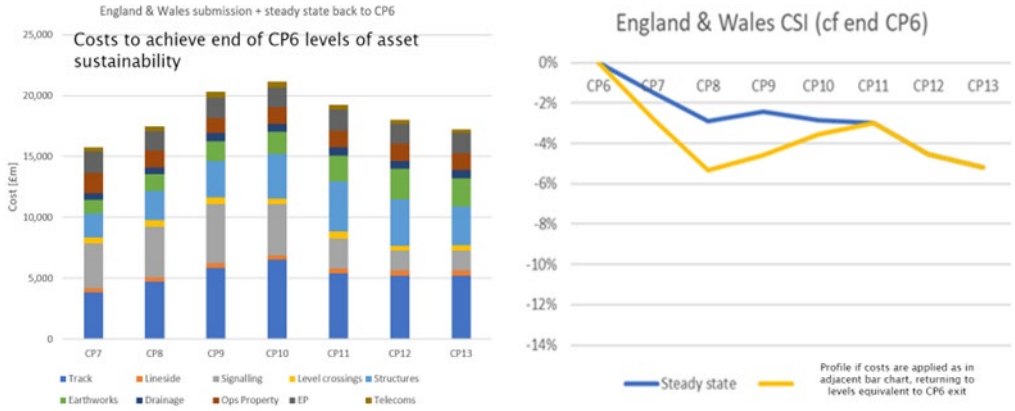
Source analysis of Network Rail data Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

CSI view for CP8 to CP12

3.120 Figures 3.1 and 3.2 demonstrate possible CSI profiles (shown on the right-hand side) based on a projected level of funding available to Network Rail (left-hand side). The longer-term forecasts are subject to funding from CP8 onwards.

3.121 In these models, the CP7 funding is based on the 'risk-adjusted' plan and funding for CP8 onwards is set at a level which brings CSI back towards a 'steady state', represented by the blue line. The steady state (blue line) represents similar asset performance to the end of CP6. Through better use of technology, Network Rail predicts it can achieve this level of performance even if asset condition declines slightly, hence why the blue line does not need to stay at 0% on the graphs.

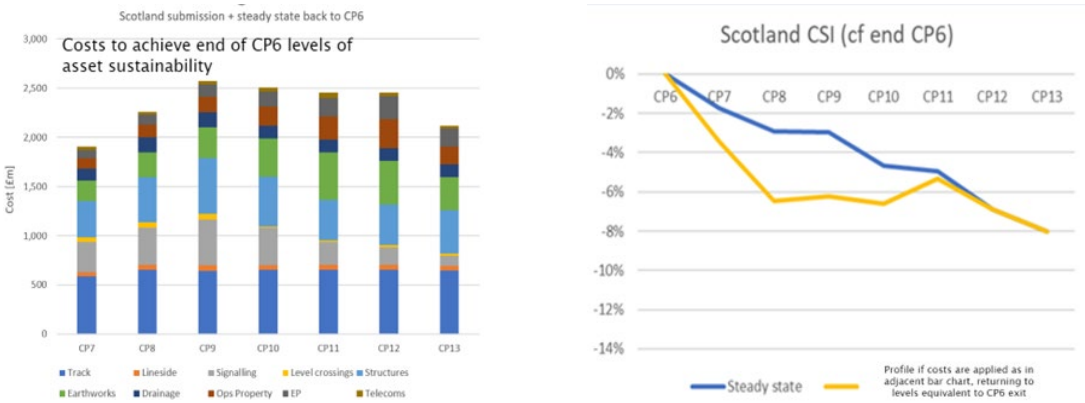
Figure 3.1 Change in CSI England & Wales compared to end CP6



Source Network Rail

3.122 To return to steady state would take until at least CP11 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. However, Network Rail's analysis is based on a more optimistic view of CP6 delivery (as reported at November 2022, rather than later forecasts, which are reporting a decline in the volume of renewals to be delivered in CP6); therefore, the cost to return to steady state may be higher.

Figure 3.2 Change in CSI Scotland compared to end CP6 based on the interim SBP



Source Network Rail

3.123 Although Scotland is shown with a greater decline in CSI than 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 we have challenged Network Rail to provide clear evidence of maintenance plans to mitigate asset deterioration.

3.124 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 four control periods, based upon current asset strategies and outcome requirements.

Conclusions on maintenance

3.125 Ahead of our final determination we are working with Network Rail to verify that it has sufficiently balanced the outcomes of its maintenance modernisation programme with the required activity due to fewer renewals and the increase in asset numbers due to enhancements expected over CP7. Detailed maintenance activity plans will need to reflect these factors clearly.

3.126 We are supportive of the introduction of additional KPI's in the maintenance areas that have been proposed by Network Rail.

3.127 Further information on Network Rail's maintenance plans was received at the end of April which we are reviewing. We note that the Network Rail Technical Authority reports that the regions and routes across England, Wales and Scotland have undertaken significant work to update their maintenance plans for CP7. Also, that Network Rail has commissioned external experts to work with the regions and their delivery units (MDUs) to develop their plans. A key action that Network Rail has identified is for all regions to undertake further work to more clearly show the link between renewals and maintenance activity in CP7 as well as the efficiencies achieved through implementing modernising maintenance. We will use this and any further information submitted to provide an updated position in our final determination.

3.128 In terms of staff resourcing and competence, ahead of Network Rail's final delivery plans we expect to see clear analysis linking work volumes, productive time (including access constraints) with resource requirements. We expect this analysis to include how any current backlog of work will be overcome and a steady state realised in the maintenance function.

3.129 In the next iteration of its plans, we expect Network Rail to provide a detailed competency development plan. This will form part of our CP7 holding to account activities.

Conclusions on renewals

3.130 The SBP, as submitted, is relying on lower levels of risk mitigation than CP6. Specifically, there will be a greater reliance on temporary speed restrictions and reactive maintenance rather than proactive renewals.

We have therefore concluded that additional expenditure is required for core renewals in some regions and asset types (see Table 3.8 for details). Overall, we estimate that Network Rail needs to allocate an additional £550 million on core renewals in England & Wales and £50 million in Scotland.

3.131 Our deliverability assessment concluded that there were items within Network Rail's plan where either; it may not deliver the project or programme in full in CP7; or the plan could be delivered at a lower cost; or the items could be considered a lower priority for CP7. These provide a suite of options to release the £600 million additional funding for core renewals. These options are described in the conclusions below and in later chapters.

3.132 **Composite reliability index:** Benchmarking across the regions showed further scope for all regions, especially W&W and NW&C, to further challenge themselves around their projected increases in SAF and decreases in CRI, by applying innovative techniques to improve asset reliability.

3.133 **Asset data**: In its delivery plan, we require Network Rail to provide clear commitments on improvements to asset data quality. This will form part of our CP7 holding to account activities. We concluded that Network Rail's plan does not provide sufficient details to quantify the extent of infrastructure monitoring, or the benefits it is delivering. This is critical to meeting the HLOS requirements and successfully implementing modernisation. We require Network Rail to provide clear, quantifiable commitments in its delivery plan, which we will use to hold it to account in CP7.

3.134 **Obsolescence management:** Ahead of its final delivery plan, we expect Network Rail to provide a detailed plan for how it will develop its obsolescence management policy in the regions and National Functions during CP7. This plan should include milestones and key objectives for the successful delivery of an obsolescence management policy taking account of the IR's findings. We will hold Network Rail to account for delivery of this policy during CP7.

Proposed options to release funding for additional core renewals

3.135 We consider that there is a circa £550 million additional core renewal expenditure requirement in England & Wales and £50 million required in Scotland. Below we have set out where Network Rail could consider reallocation of available funding to meet this requirement.

Digital signalling portfolio

3.136 We discuss our findings on Network Rail's plans for its digital signalling portfolio in the Digital Signalling chapter of this document. In that chapter we explain how the total expenditure for the digital signalling portfolio could be reduced to circa £1.5 billion. This represents a circa 15% reduction from the expenditure allocated in Network Rail's SBP across digital signalling infrastructure renewals, fleet fitment, enabling projects, RD&I projects and CP6 legacy projects which contribute to the delivery of digital signalling in CP7.

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

3.137 Network Rail's SBP includes 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, E&P, level crossings, power supply and many conventional signals which will be replaced with ETCS level 2. While many of the assets are approaching being life expired, Network Rail proposed that some of these works could be delivered in CP8 to CP10, but should be brought forward to CP7 to deliver as consolidated packages of work (for efficiency) and to complete any disruptive works before the planned introduction of HS2 services on the WCML(N) line, at the end of CP8.

3.138 As noted in our supplementary advice to funders last year, we support Network Rail's approach of prioritising renewal of life expired assets; packaging renewals for more efficient delivery; and the aspiration to complete disruptive access before the introduction of HS2 services at the end of CP8. However, our supplementary advice noted that the full £1.2 billion of works may not be deliverable in CP7. We have now reviewed the information in Network Rail's SBP, and we have revisited our data on delivery of similar works in CP6. We still have concerns about the deliverability of the full £1.2 billion of works in CP7.

We propose an option for Network Rail to release funding in CP7 by re-profiling some WCML(N) works into early CP8, to account for likely slippage. We suggest £900 million total funding for renewals at Crewe and WCML(N), as a stretching but realistic level of funding in CP7. This represents a £300 million (25%) reduction from the £1.2 billion in Network Rail's SBP, on the assumption based on our analysis that large parts of the programmes will slip by approximately 12 months to 18 months into the beginning of CP8.

3.139 We estimate the magnitude of this adjustment as £300 million, based on the evidence set out in Part III (Annex F).

Technology delivered as centrally managed projects

3.140 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. We discuss this in more detail in the National Functions chapter of this document.

High Output plant refurbishment

3.141 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 the National Functions chapter of this document.

Project Reach

3.142 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 the National Functions chapter of this document.

3.143 Table 3.16 summarises our proposed options to reduce expenditure on the above items, in order to fund additional core asset renewals.

Table 3.16 Suite of expenditure projects where we have identified possible cost adjustments

Expenditure item [total expenditure]	Rationale for adjustment	Potential reduction in expenditure	
		England & Wales	Scotland
WCML(N) [£1.2 billion]	Complex programmes which interact with multiple other programmes are likely to be delayed. Our analysis of CP6 data showed that 12 to18 months slippage was typical for similar projects in NW&C. While we support Network Rail's approach to this programme, we estimate that circa 25% of the proposed works will slip into CP8, reducing expenditure in CP7 by circa £0.3 billion.	£0.3 billion	N/A
Digital signalling portfolio [£1.7 billion]	Assessment of these complex projects and programmes indicates that cost estimates and delivery assumptions are not yet mature. Experience from the East Coast Digital Programme (ECDP) in CP6 showed that Network Rail was able to reduce costs significantly from its initial, immature estimates, once it engaged the supply chain. We estimate that the actual expenditure on digital signalling in CP7 should be closer to the costs achieved on ECDP in CP6, which would result in a circa 15% reduction in expenditure in CP7.	£0.26 billion	<£0.01 billion
High Output Plant [£0.04 billion]	Network Rail's CP7 plans have not been able to leverage efficiency from High Output Plant. Although opportunities remain, to date the regions have elected not to use the service in CP7. We propose to remove CP7 expenditure for overhaul of High Output plant (£0.04 billion). 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.	£0.03 billion	<£0.01 billion
Route Services projects [£4.2 billion]	In CP6 we completed a technology adoption Targeted Assurance Review, which raised concerns about scope creep and lack of adoption of technology 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 control between Route Services and Network Rail's regions, to improve delivery and adoption.	£0.09 billion	£0.01 billion

Expenditure item [total expenditure]	Rationale for adjustment	Potential reduction in expenditure	
		England & Wales	Scotland
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
Total		**circa £0.8 billion**	**circa £0.02 billion**

Source: Analysis of Network Rail data. Financial Year 2023-24 prices (post-efficient), risk-adjusted plan

National Functions

Introduction

4.1 This chapter considers National Functions' spend, which include 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 (RS) 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 to high performance and efficiency standards by integrating the industry to deliver customer needs. This includes strategic projects to support greater effectiveness and delivery of necessary change. Its vision is to make the network operate as one seamless and high performing unit.

(c) Technical Authority (TA) 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.

Methodology

4.4 We followed the methodology as set out in chapter 2 with a particular focus on whether:

(a) Network Rail's assumptions on pre-efficient and post-efficient costs reasonable, robust and well-justified; and

(b) Network Rail has followed a reasonable approach to allocate National Functions costs to the regions.

Network Rail's plan

4.5 Table 4.1 shows Network Rail's National Functions costs for CP7 in comparison to CP6.

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

National Function	CP6	CP7	% Change
Route Services	4,019	4,215	5%
System Operator	580	531	-8%
Technical Authority	3,762	5,177	38%
Corporate Services	2,240	2,214	1%
Group	468	1,487	218%
Total	**11,070**	**13,624**	**23%**

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

4.6 Overall National Functions' OSMR costs are increasing by 25% compared to CP6. The main driver for this is the 35% rise in non-controllable operational expenditure (traction electricity +56% and business rates +12%). Excluding non-controllable opex, total OSMR expenditure for National Functions is reducing by 2.2% compared to CP6. Additional renewals expenditure is increasing (+23%), 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 11% compared to CP6.

4.7 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 is also proposing to hold £500 million of risk funding against this line in CP7. Risk funding is discussed further in the Risk chapter.

4.8 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.

Challenges to National Functions costs

4.9 In reviewing these costs, Network Rail has set out that engagement between the National Functions and regions throughout the planning process has been key. This is important because of the essential services the functions provide to the regions, which then support delivery for customers and wider stakeholders. As outlined above the costs of these functions are also allocated to the regions.

4.10 This engagement has included deep dive reviews on the National Programmes and other key cost areas, alongside reviews at a function level for Route Services, System Operator and Technical Authority. This has given each region the opportunity to review, discuss and challenge the plans.

4.11 Network Rail has also discussed its National Functions plans during the CP7 planning process with Transport Scotland and DfT. Funders have required the functions to fully justify their areas of spend.

4.12 We recognise that this internal and external challenge, alongside that from ourselves, has led to reductions in National Functions costs in the SBP from earlier iterations of the CP7 plans. This is particularly important in light of the constrained funding available for CP7.

Findings on National Functions expenditure

Route Services

4.13 Route Services expenditure on its regular support activities has decreased by circa 5% in CP7 compared to CP6, with operational expenditure increasing by 13% whilst renewals expenditure has decreased by 19%. The 5% overall increase in expenditure on CP6 shown in Table 4.1, is driven by an increase of 11% on National Programmes. These are major programmes which Route Services is leading on behalf of the regions.

4.14 National Programmes includes the Electrical Safety Delivery (ESD) programme. This is a network-wide change programme which will improve electrical safety through new technology. Starting in CP6 and due for completion in CP8, the ESD programme has reduced its costs for CP7, from an earlier estimate of £515 million down to £361 million in the SBP. Network Rail confirmed that focus for the programme as a result of reduced funding will now be on enabling legal safety and compliance improvements. We are seeking further clarity from Network Rail on the ESD programme scope and that the regional plans are fully aligned on this, given the latest reduction in funding has only recently been agreed centrally. We expect to see clear scope and timescales for the installation of technology and realisation plans for the benefits this will bring.

4.15 We fully support the intent of this programme and our Health & 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.

4.16 National Programmes also includes 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 to meet their CP7 maintenance requirements. This is demonstrated by the £659 million expenditure planned for CP7, which is an 83% increase from CP6.

4.17 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 to be able to maximise the return, in terms of performance and efficiency.

4.18 National Programmes also includes Intelligent Infrastructure (II). 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. The £116 million allocated in CP7 is based on prioritisation led by the TA and comprises:

(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 TA and endorsed by the regions.

(b) £48 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.

Project Reach

4.19 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.

4.20 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.

4.21 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.

4.22 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 3rd 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.

4.23 Given that Project Reach is not a core renewal activity in CP7, we expect Network Rail to ensure there is sufficient funding for core asset renewals, as a higher priority than Project Reach. However, we note Network Rail's commitment to Project Reach and we recognise that Network Rail may prefer to include Project Reach in its plans and rely on other options to release funding for core renewals.

High Output

4.24 High output (HO) 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).

4.25 Network Rail has yet to reach an agreed position for provision of this service in CP7. The SBP includes costs for HO refurbishments in Route Services (£38.1 million) but there are no associated volumes in the regional plans. We challenged

Network Rail to demonstrate alignment between central and regional plans and it has advised that it is working to resolve this issue.

4.26 During CP6 we commenced a TAR into HO machinery. Due to the current lack of direction for future use of HO, this TAR is ongoing. However, the interim findings are that throughout CP6 there have been concerns with utilisation, performance and workbank planning. We have seen no evidence that these issues will be resolved for CP7.

4.27 HO provides less boots on ballast and a safer work area as opposed to conventional renewals of the same nature. When used correctly HO can provide a faster, more cost effective service. On this basis we support its use. However none of the regions included a clear workbank of HO work in the SBP plans; and only one region (NW&C) has identified any potential work for HO in CP7. Hence, Network Rail needs to consider both the short and long-term business case for retaining the machines and the associated support.

4.28 Additionally due to the lack of agreement between Route Services and the regions, the planning window for HO for the first year of CP7 has been missed. This situation therefore needs resolving quickly if Network Rail intends to realise any benefits of HO in the early part of CP7.

4.29 Network rail needs to reach internal agreement on the above points, and then present to us, a credible plan for how it will operate this service in CP7, along with a strategy for future control periods.

Technology delivered as centrally managed projects

4.30 In CP6, we engaged with a wide range of Network Rail technology projects and we reached some important conclusions and recommendations. Key sources of evidence from our CP6 work are as follows:

(a) In April 2022, we published a TAR on Technology Adoption [link], which looked at seven case studies. We demonstrated that railway technology delivered as centrally managed projects, consistently 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, often lasting 5 years to 10 years and in some cases failing to deliver an in-demand product at the end. See the RD&I chapter for additional discussion on technology adoption.

(b) Efficiency reporting in CP6 showed a number of technology/IT projects where Network Rail were reporting efficiencies, but some of this efficiency may have

been over-stated. For example, pre-efficient cost estimates may have been too high; or savings may have been driven by tailwinds, including deflation in like-for-like technology or a highly competitive supply chain. Notable schemes involved CCTV and signalling.

4.31 As part of PR23 we have considered the overall technology portfolio, but we have also engaged with individual technology projects. Our PR23 review has identified the following evidence, which corroborates the issues from CP6 noted above:

(a) We reviewed a number of large technology projects, including: ESD (£361 million) which includes the Safer Faster Isolations project; OTTO (£73 million, discussed in the Digital Signalling chapter of this document); and Traction Power Control Management System (TPCMS, £184 million). All of these projects were carried over from CP6, but their scope and timelines remain poorly defined. Furthermore, we did not see clear reference to these projects in the regional business plans.

(b) In the RD&I chapter we have highlighted that TA's RD&I plan has £40 million which "includes funding for our innovation culture change programme". We support this initiative, as this is a critical factor in unlocking benefits from the total expenditure of circa £1.2 billion on technology and RD&I in CP7. However, we did not see any evidence in the SBP or during PR23 challenge sessions, that regions or Route Services are aware of TA's cultural improvement programme. As a result, we have no assurance that cultural improvements will be effective, ahead of CP7.

Procurement and other spend

4.32 Much of the responsibility for Procurement in Network Rail sits within the Commercial & Procurement team in Route Services. The team's headcount has reduced by 24% since 2018 whilst maintaining similar levels of procurement activity.

4.33 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 FTE per £1 billion expenditure. The study found that this is below the cross-government average and external benchmarks.

4.34 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 v 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 both within Route Services and for the wider business to be achieved.

4.35 IT expenditure has increased by 2% compared to CP6 at £1.26 billion. Within this, operational expenditure is forecast to be 17% higher than in CP6 at £755 million, which reflects growing demand for IT and digital services within Network Rail with a larger IT estate to support; but also reflects an accounting re-classification of some items from capital to operational expenditure. 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.

4.36 Alongside this, renewals expenditure is forecast to reduce by 27% to £405 million due to a reduced level of funded IT improvement delivery and a shift in accounting classification from capital to operational expenditure.

4.37 Benchmarking analysis by Gartner in 2020-21 identified that IT staff levels at Network Rail were below the peer average for FTEs by 35% and IT spend per employee was below the market average by almost 42%.

4.38 Digital Signalling fitment costs are also included within the Route Services plan. This is discussed in the Digital Signalling chapter of this document.

System Operator

4.39 SO total costs are down by 8% on CP6, largely due to the headcount reductions made as part of the workforce modernisation programme.

4.40 Our view is the costs proposed for CP7 are broadly reasonable. However, we recognise that there will be challenges associated with the plan, such as managing the delivery of long-term programmes in a fiscally constrained environment.

4.41 The System Operator plan and associated costs are discussed in more detail in our PR23 System Operator settlement document.

Technical Authority

4.42 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 56% higher in CP7 than in CP6.

4.43 Excluding traction electricity costs, operational expenditure for the Technical Authority is forecast to reduce slightly to £261 million, compared to £264 million in CP6. Renewals expenditure has decreased significantly from £565 million to £374 million. The largest component of the reduction is for Research, Development and

Innovation (RD&I) which has reduced by £104 million compared to CP6. RD&I is discussed in more detail in the RD&I chapter of this document.

4.44 In developing its SBP, the TA indicated that its focus has been on ensuring compliance to statutory and legislative requirements and aligning priorities with the wider business.

4.45 Given the nature of the Technical Authority function and the reduction in renewals expenditure (from £565 million to £374 million) in the SBP plan, we consider that the proposed costs are broadly reasonable.

Corporate Services

4.46 Through the Putting Passengers First and workforce modernisation programmes, headcount is now 21% lower across these functions than at the start of CP6. The majority of Corporate Service costs are operational expenditure related, and the SBP submission has total costs in CP7 across these functions at £41 million below the comparable forecast exit position for CP6.

4.47 As noted above the CFO includes the Group Property unit, where controllable operational expenditure costs are down by £15 million to £65 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.

4.48 Further discussion on the property aspect of Network Rail's SBP is included in our PR23 Income: supporting document.

4.49 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.

4.50 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.

4.51 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. Externally facing areas of the function were found to be comparable in size with those seen elsewhere.

4.52 The Corporate Services expenditure in the SBP lacks detail on increases in expenditure, noting that the headcount reduction already made in CP6. We are asking Network Rail to provide further clarification, but this area may present an opportunity to contribute to further cost reduction in the final delivery plan.

Cost allocation

4.53 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), BT 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.

4.54 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.

4.55 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.

4.56 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.

4.57 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).

4.58 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).

4.59 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.

4.60 Overall, our review of Network Rail's SBP 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.

4.61 Table 4.2 to 4.4 summarise the allocation of network wide costs to each region and how this compares to CP6. Table 4.5 shows the full breakdown of CP7 allocations for each function and region.

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

Region	CP6	CP7	Variance
Eastern	1,835	2,226	+390
NW&C	1,489	1,707	+219
Scotland	697	656	-40
Southern	1,573	1,645	+72
W&W	918	1,028	+110
Total	**6,511**	**7,261**	**+750**

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 (£ millions)

Region	CP6	CP7	Variance
Eastern	1,360	1,944	+585
NW&C	944	1,468	+523
Scotland	395	629	+235
Southern	1,397	1,746	+349
W&W	464	576	+112
Total	**4,560**	**6,363**	**+1,804**

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

Region	CP6	CP7	Variance
Eastern	3,195	4,170	+975
NW&C	2,433	3,175	+742
Scotland	1,091	1,285	+194

Southern	2,969	3,391	+422
W&W	1,382	1,603	+221
Total	**11,070**	**13,624**	**+2,554**

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

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

Table 4.5 Summary of CP7 National Functions total allocated costs to regions (£ millions)

National Function	System Operator		Route Services		Technical Authority		Corporate Services*		Group		Total	
	£	%	£	%	£	%	£	%	£	%	£	%
Eastern	169	32%	1,307	31%	1,513	29%	700	32%	481	32%	4,170	31%
NW&C	128	24%	954	23%	1,178	23%	575	26%	341	23%	3,176	23%
Southern	102	19%	899	21%	1,526	29%	416	19%	448	30%	3,391	25%
W&W	78	15%	618	15%	457	9%	287	13%	164	11%	1,604	12%
England & Wales total	**477**	**90%**	**3,778**	**90%**	**4,673**	**90%**	**1,978**	**89%**	**1,434**	**96%**	**12,340**	**91%**
Scotland	55	10%	437	10%	503	10%	236	11%	54	4%	1,285	9%
Great Britain Total	**531**	**100%**	**4,215**	**100%**	**5,177**	**100%**	**2,214**	**100%**	**1,487**	**100%**	**13,624**	**100%**

**This consists of the CFO directorate, HR and Communications. The Group Property unit is part of the CFO.*

Note: The costs for BTP are excluded from the above table as it is funded through separate grants from the Government which is outside of the PR23 process.

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

Conclusions on National Functions expenditure

4.62 We concluded that, overall, Network Rail has followed a reasonable approach to aligning its National Functions' plans to available funding, including regional engagement and prioritisation. We support the methodology used to then allocate these costs to each of the regions. However, we identified some shortcomings, discussed below.

4.63 In the light of headcount reductions in the National Functions that have taken place in the latter half of CP6, we concluded that there would be limited potential for further operational expenditure cost reductions from levels proposed in the SBP.

4.64 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.

We propose 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 suggest the magnitude of this cost challenge should be in the order of circa 10% of renewals spend on technology projects. This could release circa £100 million across the Route Services portfolio. This cost challenge is intended to incentivise 'right first time' scope on technology projects and avoid multiple cycles of re-scoping, or final products which are not adopted.

4.65 Our assessment is that Project Reach represents lower priority for use of OSMR funding in CP7 than other core asset renewals. Although we note Network Rail's commitment to Project Reach and anticipate that other avenues for releasing funding for core renewals may be preferable.

4.66 It is unfortunate that Route Services has yet to reach a position of having agreed a plan with the regions for provision of the HO service in CP7, or to understand demand for this in future control periods. Ahead of our final determination, we require Route Services to present a final agreed position for the HO service in CP7. If the conclusion is reached that the regions do not want to make use of this service, consideration must be made as to the need for HO services in CP8 and beyond. Plans should consider expected volumes, service reliability, staff competence, equipment obsolescence, purchase lead times and value for money. We will review this information and we may need to consider further adjustments in our final determination, relating to HO expenditure.

We propose an option to reduce CP7 funding for the High Output Fleet by £38 million. This relates to refurbishment of 1x Track Relaying System (TRS) and 1x Ballast Cleaning System (BCS), which we judge is not good value for money as these are not being used effectively by the regions; and they are expected to be replaced before CP8.

Operations

Introduction

5.1 Operations describes the set of 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 types of 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'; and

(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 Strategic Business Plans, specifically focused on how these translate through into use of allocated funds for operations.

Methodology

5.4 As well as the general methodology described in the Methodology chapter, 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).

5.5 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.

5.6 Prior to the final determination, we will further support our assessment by completing an international benchmarking exercise which we have commissioned. This will assess Network Rail's operations (and support) costs against participating European rail infrastructure managers and other UK infrastructure providers.

5.7 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. At the present time there is no plan for major workforce reform within operations.

Network Rail's plan

5.8 Table 5.1 shows the spend on operations contained in Network Rail's SBP.

Table 5.1 **Table 5.1 Overall summary of operations costs in SBPs for Great Britain (£ million)**

Summary cost line	CP6	CP7	% Change
Eastern	1,105	1,075	-2.7%
NW&C	848	899	6.0%
Southern	1,097	1,127	2.8%
W&W	560	664	18.6%
England & Wales total	**3,609**	**3,765**	**4.3%**
Scotland	366	419	14.4%
National Functions	0	0	-
Great Britain Total	**3,975**	**4,183**	**5%**

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

5.9 For CP7, Network Rail plans to increase spend on operations by approximately 5%. One contributor to this increase in costs may be an increase in signaller headcount to fill existing vacancy gaps, which is being accelerated during the final year of CP6. This is intended to ensure that operating the base train service is less reliant on rest day working and overtime.

5.10 This also contributes to a proactive staffing approach 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.

5.11 Operations headcount (including signallers) also appears to be increasing in some locations to ensure appropriate management of fatigue. Specific detail has not been provided within the SBP.

5.12 The other common increases within the plan focus on:

(a) Better management of operational competency, following on mainly from the current 21st Century Operations programme being run by the System Operator; and

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

5.13 All regions have increased operations spend compared to CP6, except for Eastern – which currently shows a small reduction in this area. Despite this, the regional plans still describe a level of operational efficiency being achieved in all regions.

5.14 Table 5.2 presents a high-level overview of the drivers of changes in operations spend within each region's plan.

Table 5.2 Key points from 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.
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.
Scotland	Reduction in signaller vacancy gap from 10% to 5%, reducing premium hours and overtime.

Region	Key operations spend drivers
	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.

Source Network Rail

5.15 We have not yet been provided with the granular detail of how changes in spend are built up, especially when compared to CP6. For example, it is difficult to determine the proportion of increased operations costs in W&W and Scotland that is driven by filling existing vacancies, as opposed to additional staffing levels that support improved management of fatigue. We are also unable to see what level of investment NW&C region is putting into its Operational Improvement Fund.

5.16 Ahead of our final determination, we are continuing to engage with Network Rail to obtain more detailed information, to assure us that changes in spending are commensurate with delivery of the outcomes promised.

Findings

5.17 At £4.18 billion, Network Rail's SBP includes an overall increase in operations expenditure during CP7 of £208 million (circa 5%) when compared to CP6. This appears to be a significant change in CP7 operations expenditure, which we were not expecting, given that the majority of operations costs typically relate directly to staff numbers which are down on CP6.

5.18 The operations sections of the SBP lack detail including any breakdown of how operations spend changes have been derived. As such, our conclusions are based largely on qualitative information and judgement. We are asking Network Rail to provide further clarification, but this area may present an opportunity to contribute to further cost reductions in the final delivery plan.

5.19 The principles of reducing vacancy gaps, better managing fatigue among operations staff and professionalising operations competence are outlined in the SBP. These seem reasonable from what we can establish and appear to flow from pre-existing and pre-understood operational challenges in these areas. However, there is insufficient data to check how the application of these principles drives changes in costs.

5.20 That said, the plans do appear to outline appropriate improvements in both the resilience and competence of operations resources. They focus on better development and management of both professional competence and fatigue, both of which have been highlighted by historical incidents as areas requiring improvement in quality and consistency.

5.21 We found some efficiencies which have been quantified in the SBP. However, we have challenged Network Rail to provide greater detail throughout the plan to allow us to validate the approach to deriving the estimates of spend and efficiencies prior to final determination.

5.22 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.

5.23 Eastern region's plan is an outlier from the other regions in that it reduces operations cost by £30 million (2.7%) compared to CP6. Based on the information available, this plan still appears to cover the key activities including the principle changes described above. Other regions' operations costs increase by varying amounts, between £30 million (2.8% of Southern region's CP6 operations expenditure) and £104 million (18.6% of W&W region's CP6 operations expenditure).

5.24 With Network Rail's support, we are also benchmarking Network Rail's national operations and support costs against European rail infrastructure managers and other UK infrastructure providers. This work will be finalised after our draft determination and will feed into our analysis for the final determination.

Performance improvement and innovation

5.25 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.

5.26 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.

5.27 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.

5.28 We are therefore asking each region to be more explicit about how it uses (and plans to use) PIMS to drive performance improvement, ahead of our final determination.

5.29 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.

5.30 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.

5.31 Ahead of our draft determination we consulted on the PIF in our December Financial Framework consultation and received feedback from Network Rail, TOCs and other industry groups. Throughout CP6 we also reported on the PIF in our Annual Assessment of Network Rail reporting. Both exercises have informed our conclusions here.

5.32 We have challenged Network Rail to ensure that any relevant learning from regional operations initiatives is shared with other regions.

Impact of worsening asset condition on operations

5.33 Network Rail is forecasting an increase in service affecting failures (SAFs) in CP7, due to reduced renewals. This was discussed in detail in the Maintenance and Renewals chapter. Network Rail acknowledges that this would have some impact on operations activities, in particular due to temporary speed restrictions and an increase in signal faults.

5.34 We identified, through the regional plans and challenge sessions, that each region planned to maintain the current operational response staffing levels through CP7. There is no evidence available at this time to demonstrate regions have made changes to address the increased operational risk that greater numbers of asset failures will pose. We have not seen clear evidence of proactive operational measures to offset the impacts, such as planned timetable revisions to bring greater predictability for passengers and freight.

5.35 Network Rail's plans also lacked additional, reactive, operational staffing mitigations, to offset the impact of asset deterioration. We would expect to see proactive and reactive mitigations to these risks, to manage the workload on existing staff effectively and to prevent an increase in incident response times.

5.36 We are continuing to discuss this issue with Network Rail, including the effect that our proposed £600 million increase in core renewals expenditure may have on operations.

Conclusions on operations

5.37 Limited 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.

5.38 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.

5.39 Based on the qualitative information provided, we concluded that reasonable initiatives have been identified. However, there may be potential for further efficiencies in operations, especially in the regions planning an increased expenditure in CP7. We are continuing to work with Network Rail to obtain more detailed information and identify specific efficiencies, ahead of our final determination.

5.40 Ahead of our final determination, we require Network Rail to demonstrate that its operational plans align to asset management plans, which are currently forecasting an increases in SAFs. Each region must clearly identify how it is mitigating performance risks, proactively and reactively. We require Network Rail to provide us with a disaggregated summary of the significant changes between CP6 and CP7 operations costs. We also seek a disaggregated summary of operational efficiencies in its CP7 plans.

Performance improvement and innovation

5.41 Ahead of our final determination, we expect Network Rail to provide a clear explanation of how PIMS and RM3P fit into plans in the regions and System Operator.

We propose an England & Wales national Performance Improvement and Innovation Fund, similar to that included in CP6. We also propose a Scotland focussed targeted train performance fund. Further detail is provided below.

5.42 If Network Rail includes any performance improvement funds in its delivery plan, it should outline the governance arrangements clearly, including any interaction between national and regional funds.

Proposed option to increase operations expenditure

5.43 To support Network Rail to deliver the train performance trajectories we have set, we propose Network Rail includes a Performance Improvement and Innovation Fund (PIIF) in England & Wales, similar to the fund established in CP6. We propose an increase in operations expenditure of £40 million in CP7 for this initiative. This should be focussed on kick-starting collaborative, cross-industry

solutions with the aim of improving train performance between train operators and Network Rail.

5.44 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.

5.45 We propose that the CP7 PIIF could be funded from the financial adjustments discussed in the Efficiency, Headwinds, Tailwinds, Inflation and Input Prices chapter of this document.

5.46 Moving forward we will work with Network Rail and wider industry in preparation for the PIIF in CP7. This will cover:

(a) changes to CP6 PIF criteria for the types of project that can be funded from the PIIF;

(b) governance of the fund: we expect that the fund will be largely governed similar to CP6 PIF; and

(c) expectations for how knowledge gained through projects funded in CP6 is acted upon and explore further possibilities for implementation via the PIIF.

5.47 We expect Network Rail to consider our proposal for a performance improvement fund in England & Wales, ahead of our final determination.

5.48 In Scotland, we propose to include a separate “targeted train performance fund”. This should be funded from unallocated expenditure within the interim SBP from the Scotland SoFA, which is discussed in the Efficiency, Headwinds, Tailwinds, Inflation and Input Prices chapter.

5.49 This Scotland focussed targeted train performance fund would support Network Rail Scotland in making its contribution towards the Scottish Ministers’ stretching performance challenge. We propose that funding is split between infrastructure and operational interventions which are intended to improve performance. The latter could also require working with ScotRail.

5.50 We will work on the arrangements for any such fund with Network Rail and Transport Scotland ahead of our final determination.

Support

Introduction

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

6.2 Support functions staff are located in regions and within National Functions. Our analysis for this chapter is focused on Network Rail's support spend in the regions. The National Functions support spend, which is re-charged to the regions, has been assessed separately.

Methodology

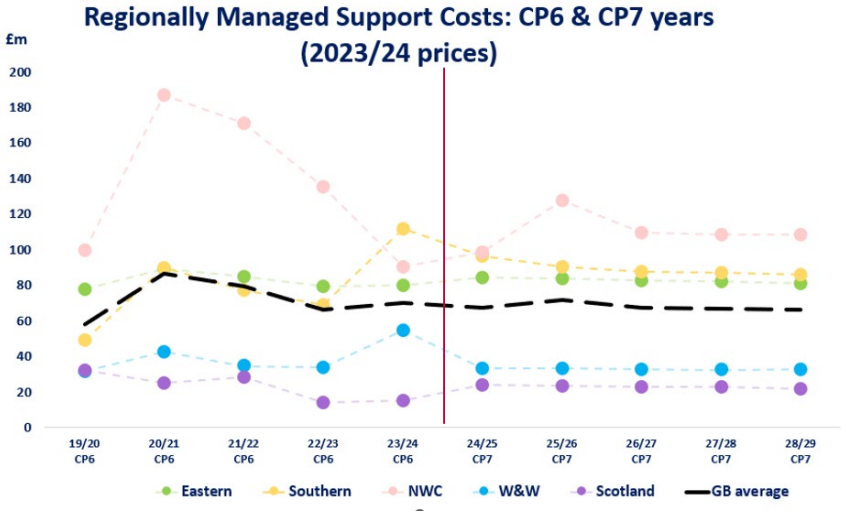
6.3 We have followed the general methodology described in the Methodology chapter. Any details specific to the methodology for support costs are set out below.

6.4 We are undertaking three levels of analysis. First, we are comparing the support costs of the regions against each other. Second, we are comparing Network Rail's support costs against comparator European railways. Third, we are comparing Network Rail's support costs against other UK utilities. To support the second and third levels of analysis, we commissioned consultants (Steer) to benchmark Network Rail's support costs, both national and regional, against international and domestic comparators. The consultant's work is ongoing, initial findings were considered in this draft determination and final conclusions will be considered in our final determination.

Network Rail's plan

6.5 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 subsequent management modernisation, which decreased support headcounts. Within CP6 the regions and National Functions saw temporary increases in support costs. Regional costs and the network average are shown in Figure 6.1.

Figure 6.1 Regionally managed support costs CP6 & CP7



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

6.6 In its SBP, Network Rail has set out its support costs for CP7. Table 6.1 shows a comparison of support costs for CP6 and CP7. These are the 'direct' support costs for each region.

Table 6.1 Network Rail support cost comparison from CP6 to CP7 by region

Region	CP6 (£ million)	CP7 (£ million)	% Change
Eastern	411	414	0.7%
NW&C	684	554	-19.0%
Southern	398	448	12.4%
W&W	198	165	-16.5%
England & Wales total	**1,692**	**1,581**	**-6.5%**
Scotland	120	116	-3.2%
Great Britain Total	**1,811**	**1,697**	**-6%**

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

6.7 There is considerable variation between CP6 and CP7 and between regions. In the SBP the regions set out their main drivers for support costs, summarised below.

(a) Eastern is forecasting a small increase in support costs, justified by the region as follows:

(i) The costs for functional departments were forecast in line with CP6 exit rates; and,

(ii) The region is confident it will deliver the full commitment to support management modernisation principles within the wider workforce reform programme.

(b) NW&C and W&W are forecasting a significant reduction in support costs, justified by the regions as follows:

(i) In W&W, CP7 support costs are in line with CP6 exit rates, which includes the full delivery of management modernisation, with further efficiency targeted. Within the Capital Delivery function, the transition to an 'intelligent client' model generates headcount reductions from the start of CP7. Support costs in relation to biodiversity and decarbonisation will increase by a small amount to support environmental sustainability objectives.

(ii) In NW&C Project Alpha (a one off CP6 initiative to improve train performance) will not continue into CP7. Full delivery of management modernisation has been included in the forecast.

(c) Southern is forecasting a significant increase in support costs, broken down by the region as follows:

(i) The plan includes functional departments that provide support. These include Finance, Property, HR, Engineering & Asset Management, Safety, Passenger, Planning & Sponsors.

(ii) The support plan also includes Regional led initiatives such as Environment & Sustainable Delivery, Crime & Trespass.

(d) Scotland is forecasting a small decrease in support costs, justified by Network Rail Scotland as follows:

(i) The region now has a larger proportion of direct support costs based in Scotland than was the case in CP5, offset by reductions in the number of people working in Network Rail's functions. These costs are expected to remain relatively flat through CP7 following efficiencies and reductions in headcount that were delivered in CP6 through the

Modernising Management agenda, but which should have continuing benefit through CP7.

Findings

6.8 We have assessed how much of the regions' total controllable opex is made up of support costs, as shown in Table 6.2:

Table 6.2 Comparison of regional support costs.

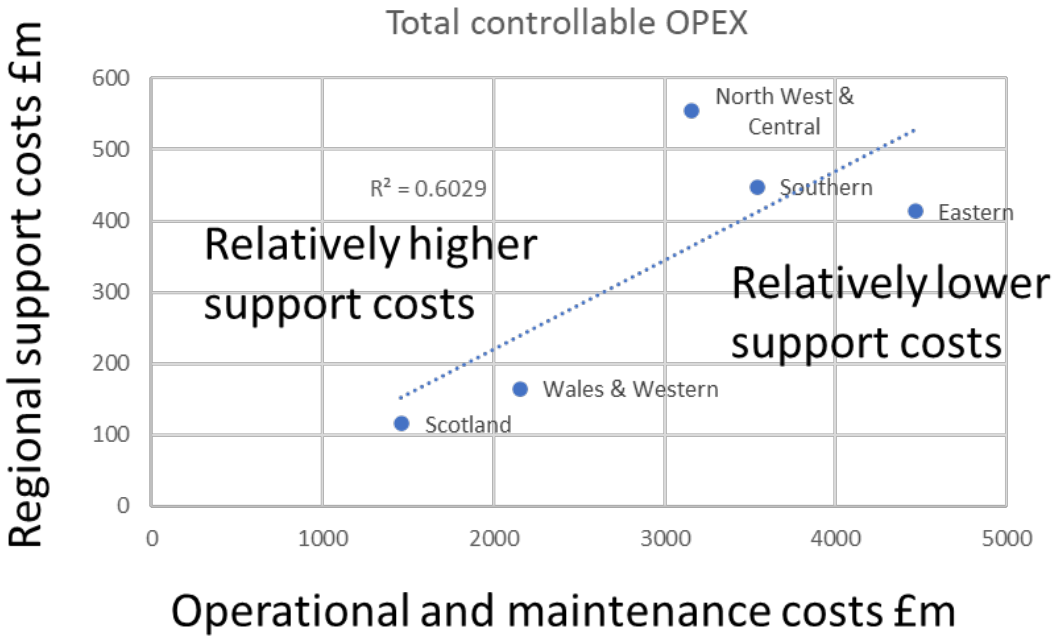
Region	CP7 regional support costs (£ million)	Total regional controllable opex (£ million)	Regional support cost as % of Total controllable opex
Eastern	414	4,879	9%
NW&C	554	3,709	15%
Southern	448	3,989	11%
W&W	165	2,319	7%
Scotland	116	1,576	7%

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

6.9 The support costs of NW&C and Southern region are a higher proportion of total opex costs than the other three regions. W&W, Scotland and Eastern have a lower proportion.

6.10 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 gives a relatively strong relationship between the two factors. In general, the larger the total opex, the larger the support costs. Our findings are shown in Figure 6.2.

Figure 6.2 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

6.11 The two outliers are NW&C and Eastern region. NW&C has a higher-than-expected level of support costs, and Eastern has a lower than expected level of support costs.

6.12 In July 2023, we expect to receive the findings from our consultant's (Steer), who are undertaking the second level of analysis (comparing Network Rail with European rail networks) and the third level (comparing Network Rail with other UK utilities) in our analysis. We will use this output as part of our final determination.

Conclusions on support

6.13 Support costs are a significant element of Network Rail's costs, comprising 10% of the regions' total controllable opex. There is a large element of flexibility in the regions' approach to managing support. In addition, different regions will have different organisational structures, and these will have different cost implications. For example, a region may have more routes than another, or operate in a part of the country with higher average salaries. Support functions such as legal, financial and human resources are essential for an organisation to operate effectively.

6.14 There has been considerable variation in support costs during CP6, with firstly an increase in support costs due to Putting Passengers First; costs of the pandemic;

and then a decrease in costs with management modernisation reducing headcount.

6.15 Our analysis highlighted a large variation in support costs across the five regions. Support costs as a percentage of overall controllable opex also varied by region. We concluded that NW&C and Eastern were outliers from the overall trend in support costs. NW&C has a higher than average level of support costs (15%), while Eastern has a lower than average level of support costs (8%).

6.16 To help further inform our analysis, we are undertaking an external benchmarking exercise led by consultants (Steer). We will discuss the findings with Network Rail and this will feed into our final determination.

Environmental sustainability

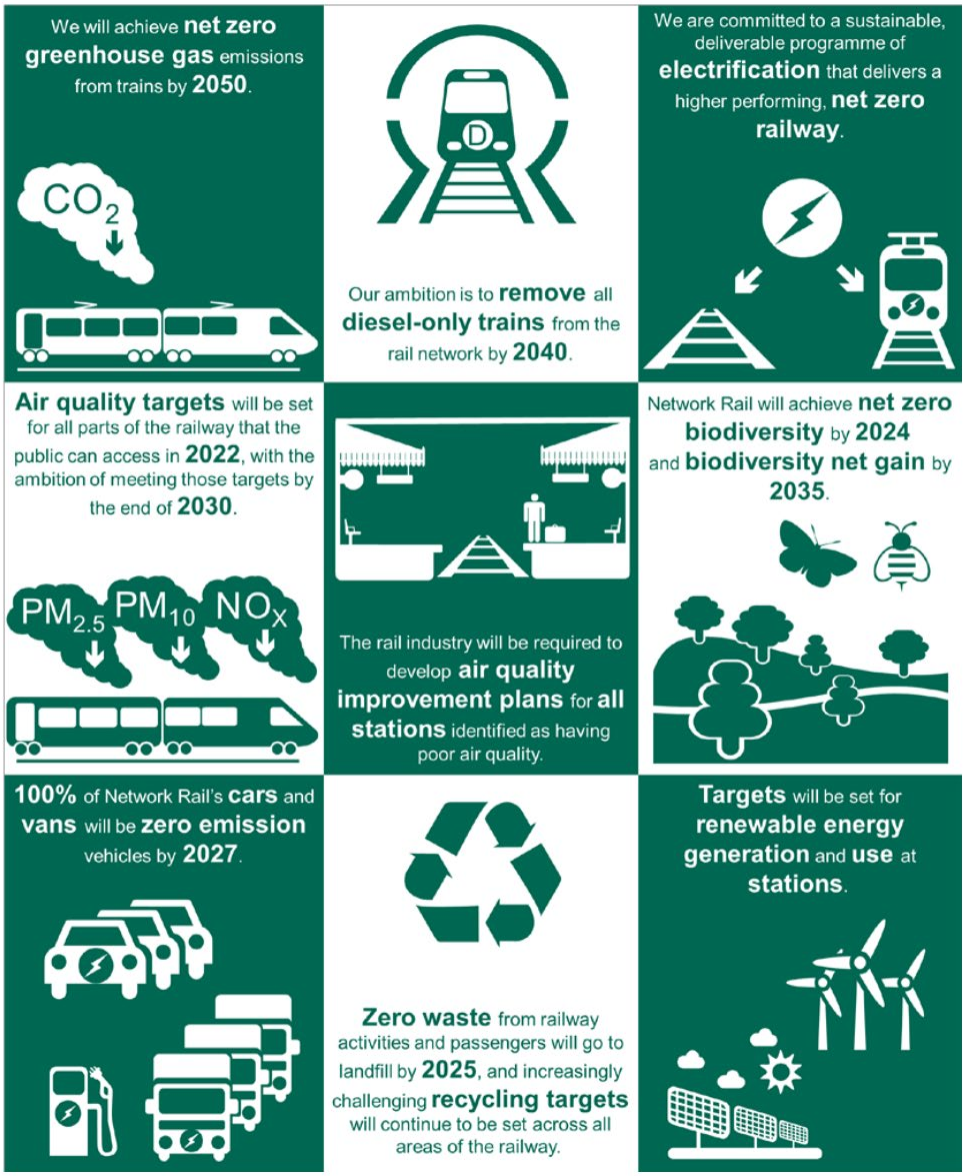
Introduction

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. The growing expectation for environmental sustainability is reflected in the two HLOS documents which both include requirements in the areas of weather resilience, decarbonisation, social value and working with stakeholders.

7.2 The England & Wales HLOS identified requirements for 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. Figure 7.1 sets out the England & Wales Government environment priorities.

Figure 7.1 England & Wales Government environment railway priorities



Source: DfT Rail environment policy statement 2021

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.

7.6 Environmental sustainability is a rapidly developing subject and this is the first ORR Periodic Review where this information is being assessed in detail. As a result, the findings and conclusions in this chapter fall into three categories:

(a) Some areas are well understood and there are already agreed measures and targets. An example is scope one and scope two carbon emissions. In these areas, we have assessed whether Network Rail's forecasts are stretching but realistic. Details of the measures and targets are discussed separately, in our PR23 draft determination: supporting document on outcomes.

(b) Some areas are well understood, but Network Rail is still refining its measures and targets for CP7 or establishing baselines. Examples are scope three carbon emissions and biodiversity units. In these areas, we have assessed whether there are sufficiently clear commitments in Network Rail's plans, that we could effectively hold it to account on in CP7. If not, we have requested specific information to be included in Network Rail's delivery plan, ready for the start of CP7.

(c) Some areas are still being developed and do not have clear measures. An example is 'nature-based solutions'. We will continue to work with Network Rail during CP7, to develop a pragmatic approach to reporting and holding to account in these areas.

Methodology

7.7 We have followed the general methodology described in the Methodology chapter. Any details specific to the methodology for environmental sustainability are outlined below.

7.8 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:

(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 the sustainable use of material.

7.9 Our key sources of information were: Network Rail's SBP, including draft regional Weather Resilience and Climate Change Adaptation (WRCCA) plans; challenge sessions with Network Rail (including specific environmental sustainability meetings with each region); and Independent Reporter work.

7.10 We commissioned an Independent Reporter to review Network Rail's forecasts for scope one and scope two carbon emissions against our baseline trajectories. This work is ongoing (initial outputs are expected in late June 2023).

Network Rail's plan

Funding

7.11 Expenditure for environmental sustainability across Great Britain in CP7 is £2.2 billion and has significantly increased compared to CP6 reflecting the focus in the HLOSs and wider changes in environmental sustainability challenges. Most regions also identified weather resilience benefits from core renewals spend.

7.12 Table 7.1 shows the expenditure identified by the TA against the England & Wales full plan and the Scotland plan. From the information available we found that spend has significantly increased in this area in CP7 from CP6.

7.13 We do not have the detail of how this expenditure will be impacted by the reduction in renewals spend under the England & Wales risk-adjusted plan. Only an element of the expenditure will be affected, most likely part of the £940 million spend on weather resilience and adaptation. If this reduces (as expected) in line with core renewals, there will still be a significant increase in expenditure in CP7 when compared with CP6.

7.14 Expenditure values provided by TA are shown in Table 7.1. These vary from information provided in the SBP and the regional plans. After further investigation we understand that there was inconsistency in the methodologies used to report data.

Table 7.1 CP6 vs CP7 opex and capex expenditure on Environment & Sustainable Development and WRCCA (£ million)

	Environment and Sustainable development			Weather Resilience and Climate Change Adaptation		
Summary cost line	**CP6 £m**	**CP7 £m**	**Change £m**	**CP6 £m**	**CP7 £m**	**Change £m**
England & Wales	40	**522**	483	385	**940**	555
Scotland	0.3	**49**	48	211	**480**	269
National Functions	135	**88**	-47	168	**101**	-67
Great Britain total	175	**659**	484	764	**1,520**	756
Note: Network Rail has stated high-level figures of £1.6 billion for weather resilience and environmental improvements in England & Wales in CP7. This figure includes the share of the National Functions costs.						

Source Network Rail TA Financial Year 2023-24 prices (post-efficient), full plan

7.15 Although spend is considerably higher in Scotland compared to CP6, Network Rail has indicated that spend has nevertheless been constrained. Funding has been allocated for core energy efficiency, Zero Emission Vehicles (ZEVs) fleet conversion and resilience programmes (which includes funding identified in other asset disciplines' volumes that will deliver increased resilience).

7.16 Network Rail has said that whilst it is committed to supporting the Scottish Government's legal requirement for net zero emissions by 2045, in the short term it has had to reduce investment in relevant activities, in order to balance other priorities (i.e. renewals needed to mitigate safety and performance risks). It also anticipates that this will introduce the need for higher funding in future control periods to meet net zero by 2045.

7.17 This does raise some concerns, as future control periods are likely to need a higher level of ambition and increased funding to ensure Network Rail can fully support the Scottish Government's ambition. We also have some concerns that the funding restrictions have resulted in a lower level for ambition for other key sustainability themes set out in Scotland's Railway's Sustainability Strategy such as biodiversity and circular economy.

Findings

Decarbonisation

7.18 Scope one, scope two and scope three are categories of carbon emissions which a company creates through its own activities and those of the wider value chain. The categories are summarised as follows:

(a) Scope one emissions – This covers the emissions that a company produces directly, for example while running its boilers and vehicles;

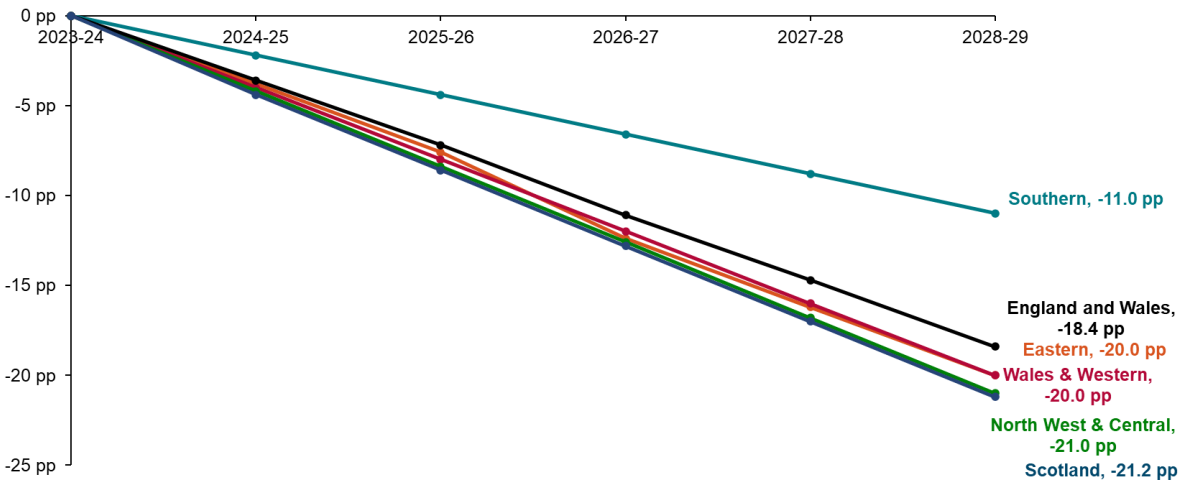
(b) Scope two emissions – This covers the emissions a company produces indirectly, for example when the electricity it buys is being generated; and

(c) Scope three emissions – This covers all other emissions which are produced as a consequence of the company's activities, for example when employees commute to company offices, or emissions relating to the supply chain.

Regions

7.19 Figure 7.2 shows the forecast carbon reductions (scope one and two) for each region. The TA's guidance outlines a target of 21%. We consider that the ambition of achieving reductions of between 18% to 21% in the control period is in line with HLOS requirements.

Figure 7.2 Carbon scope one and two reductions forecast CP7

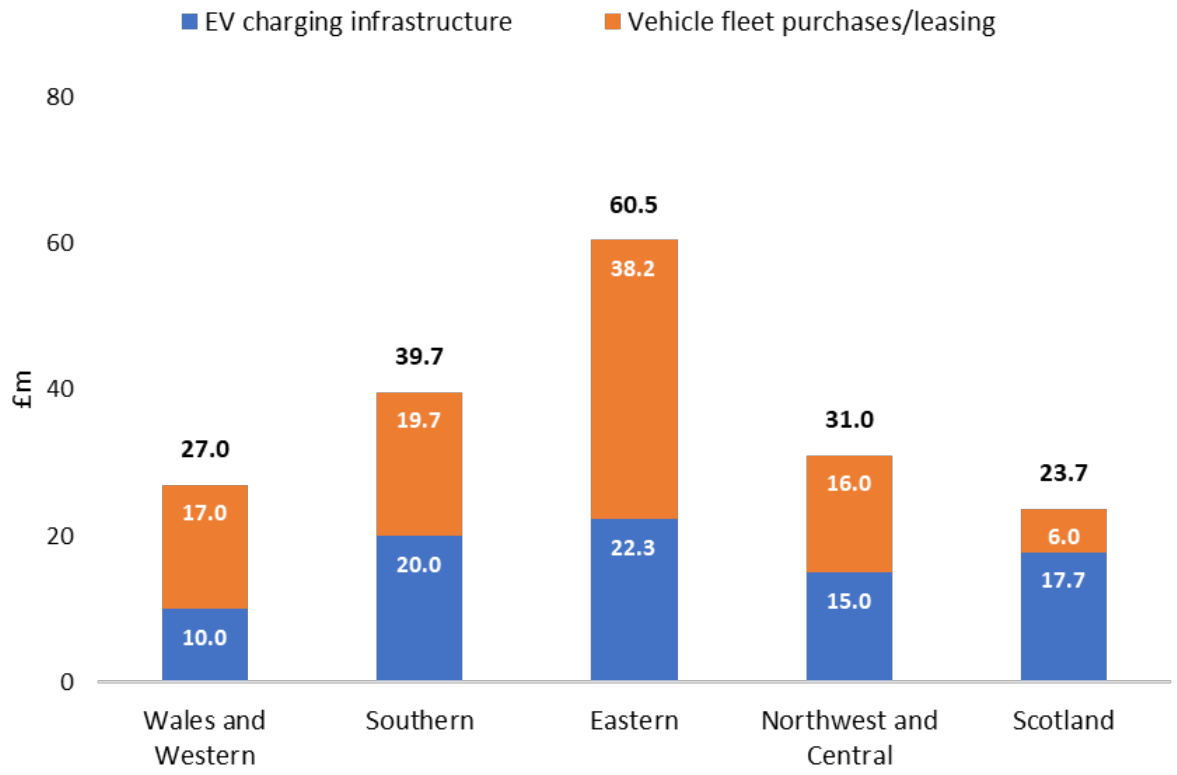


Source Network Rail full plan

7.20 We challenged the Southern region to understand why its forecast was significantly less ambitious than other regions. The region stated that this is a conservative forecast.

7.21 The funding allocated to decarbonisation across Network Rail has increased in CP7 and is approximately £293 million. A significant element of this funding and a key enabler to reduce emissions is the transition to ZEVs. We will monitor progress on moving to ZEVs as an enabler for delivering decarbonisation target in CP7. The breakdown of this investment by region is shown in Figure 7.2.

Figure 7.3 Regional spend on ZEVs and infrastructure (£ millions).



Source Network Rail TA, Financial Year 2023-24 prices (post-efficient), full plan

7.22 The SBP submission did not explain these regional differences. We have challenged Network Rail to provide details, including fleet sizes and infrastructure volumes to support these costs.

7.23 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. Southern identify 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.

7.24 All regions identified other initiatives including: energy reduction; renewable energy; and alternative power sourcing. However, we found that scope and cost

for these initiatives was not provided in sufficient detail for us to hold Network Rail to account effectively on these items.

7.25 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 the control period. This will need to be provided in the delivery plan.

7.26 Scotland's submission identified off-setting additional emissions above the SBP target to make it 'carbon neutral' by the end of CP7. We will continue to challenge Network Rail to seek carbon reductions through better practices and designs, rather than using offsetting.

7.27 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 the associated outputs.

7.28 The current England & Wales and Scotland regional plans have not provided clear commitments on scope three emissions or reducing 'infrastructure carbon' by the end of the control period. We have seen evidence of the enabling activities put in place by Network Rail to capture the components for baselining scope three emissions. However, there is insufficient information about data or how this would be reported, for us to hold Network Rail to account effectively.

National Functions

Technical Authority

7.29 The TA 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 purchasing of traction electricity. The decarbonisation work programmes that it proposed to deliver 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).

7.30 We found that some of the above items lack specific measurable targets and key milestones.

7.31 The TA submission did not set out its contribution or forecast for reduction in scope one and scope two emissions through CP7. However, its submission did indicate that the TA will lead development of whole life carbon tools, as an enabler for reducing scope three emissions during CP7, by the regions and other central functions.

Route Services

7.32 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.

7.33 Route Services also indicates that it will use its strong 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.

7.34 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.

7.35 Route Services highlighted in challenge sessions 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.

7.36 Route Services also set out an ambition to facilitate a 75% reduction in carbon in infrastructure compared to the CP6 baseline. This includes: the use of recycled products; rail milling to extend the lifetime of rail; to process, recycle or sell aggregates from renewal work; integrate best practice low carbon requirements, processes and standards; and establish a low carbon components catalogue. 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.

7.37 Route Services has provision for £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.

System Operator

7.38 The System Operator 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.

7.39 The System Operator will use the Network Rail scope one and two emissions target of an 18% reduction to shape and monitor performance in its own function. However, it does not set out details on how this will be achieved.

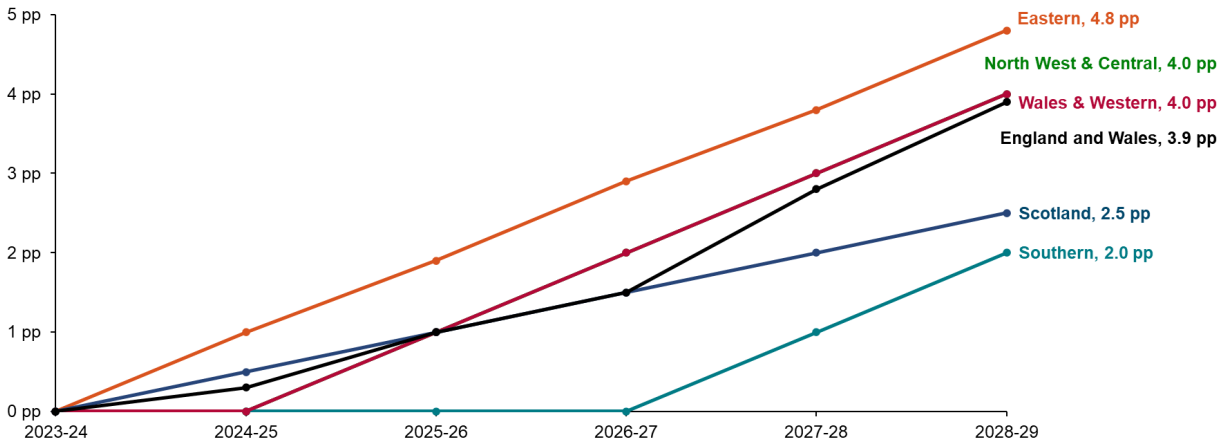
7.40 No funding has been set out specifically for decarbonisation within the System Operator's plans.

Biodiversity

Regions

7.41 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. Of the regions, only Eastern has committed to an increase of biodiversity units of 4.8% in line with guidance from the TA. The forecast outputs of all regions are shown in Figure 7.4.

Figure 7.4 Regional forecasts of biodiversity units for CP7



Source Network Rail full plan

7.42 Scotland forecasts a 2.5% increase over the control period. It is important to note that there is no explicit target for biodiversity set in the Scotland HLOS. However, we would expect Network Rail to be following best practice for all regions.

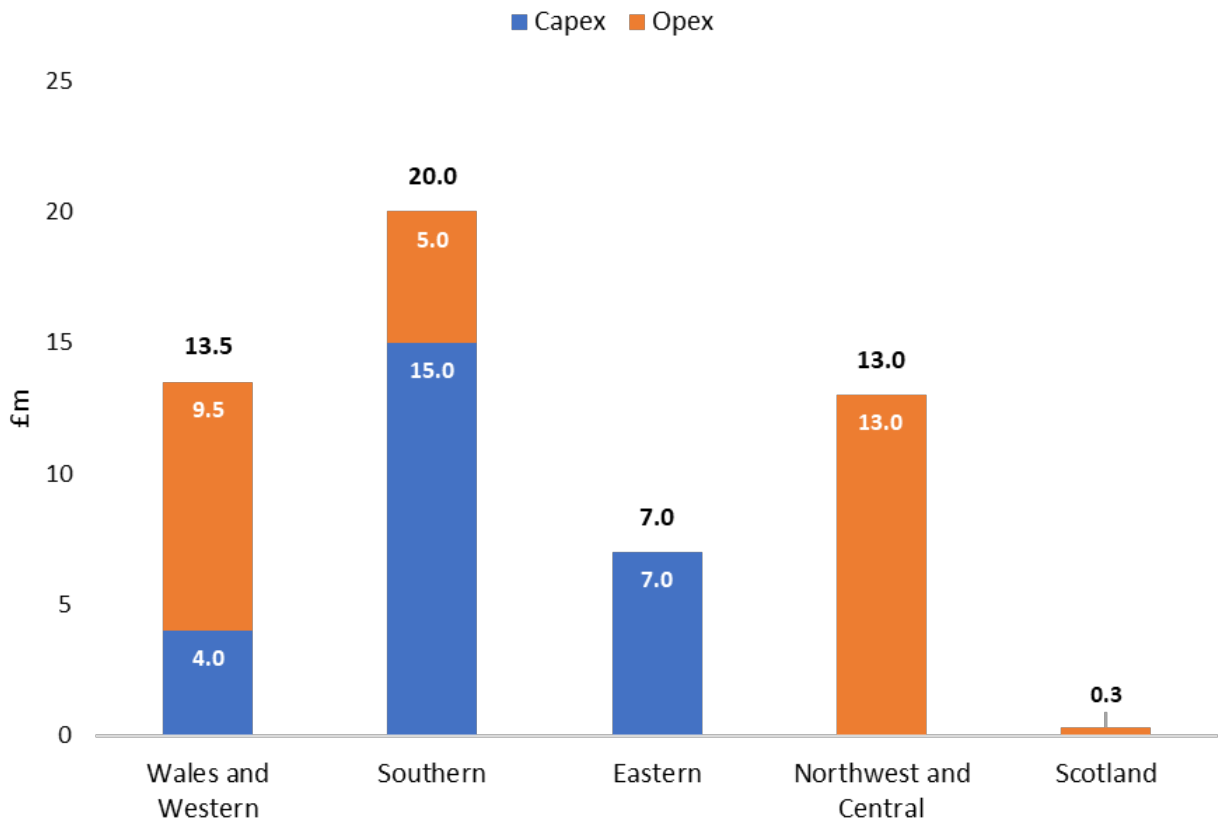
7.43 The Southern plan has a proposed baseline of 2.0% which is a significant reduction on TA guidance. In our challenge sessions with the region, Southern has

stated this is a conservative forecasting approach due to the nature of introducing new initiatives; we have challenged this with Southern.

7.44 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. However, we would still expect consistency between the regions and alignment to the TA's guidance.

7.45 Information provided by the TA clarified that £54 million of spend is included in the regional plans for biodiversity. The funding allocated by each region is shown in Figure 7.5.

Figure 7.5 Regional funding allocated to biodiversity (£ million)



Source Network Rail Financial Year 2023-24 prices (post-efficient), full plan

7.46 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 are not yet available to us.

7.47 There is no specific funding set aside for delivering the forecast increase of 2.5% in the Scotland plan. However, there is £0.3 million identified for the management of invasive species. Network Rail Scotland has indicated that it will be developing a delivery plan for how vegetation management practices will be undertaken. There will also be a requirement placed on the supply chain to deliver this activity as part of routine work.

7.48 Southern and Eastern discuss offsetting in the plans. We will continue to challenge Network Rail to seek opportunities to improve biodiversity through better practices and designs, rather than offsetting. If Network Rail is to use projects outside the rail corridor for offsetting, then clarity will be required on the benefit to the railway and long-term maintenance commitments of external projects.

7.49 The England & Wales HLOS identifies wider requirements in this area (and the area of resilience) associated with working with landowners and nature-based solutions. Information provided in the SBP is limited in both areas. Work planned in this area varies between regions, however we identified that NW&C have committed to six projects and Eastern have identified spend in this area. However, even in these regions there is limited detail on this work and the expected outputs.

7.50 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 interim SBP there were no details of spend on partnership schemes with external parties, or an approach set out for how the region will work with third parties to deliver nature-based and partnership scheme solutions as required by the HLOS.

National Functions

7.51 The Route Service and Systems Operator submission do not identify biodiversity initiatives, although they have land under their direct control via the depots Network Rail operates.

7.52 The Technical Authority's submission indicates funding of £0.6 million for the annual measurement of network-wide biodiversity, and to develop a land-use management strategy to deliver an improvement in biodiversity.

7.53 Some elements of the central functions' plans and targets clearly align to the requirements of both HLOSs. Notably the TA's plans to measure network-wide biodiversity annually and to develop a land use management strategy for improving biodiversity. However, the SBP does not set out in sufficient detail how Network Rail will deliver its plans in line with other obligations under the

Environment Act 2021; and contains no detail on how Network Rail's plans will contribute towards delivery of the Government Environmental Improvement Plan and environmental targets.

7.54 There is also limited detail to demonstrate consideration of all aspects of the Rail Environment Policy Statement, or how the TA and other central functions can help support and enable regions to consider nature-based solutions when undertaking resilience improvements.

Weather Resilience and Climate Change Adaptation (WRACCA)

Regions

7.55 The Scotland HLOS requires Network Rail to maximise planned renewals with the intention to improve resilience to risk exposure. The interim SBP for Scotland identifies circa £500 million for weather and climate resilience.

7.56 The England & Wales HLOS requires railway infrastructure to be as resilient as reasonably possible to the effects of climate change and extreme weather, with the focus of climate change adaptation. The England & Wales SBP identifies circa £1 billion on improving resilience to extreme weather and climate change. It states expenditure over CP7 comprises planned maintenance and renewals activities where improved resilience to extreme weather and climate change is a primary benefit of the activity.

7.57 In the England & Wales SBP spend in this area is 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).

7.58 All the regional plans cover weather resilience and, although the definitions vary, spending does align to these categories. Table 7.2 shows the breakdown by region of opex and capex spend as provided by the TA.

Table 7.2 Regional WRCCA funding (£ million)

Region	W&W	Southern	Eastern	NW&C	Scotland	All regions total

Total opex	0.4	148	94	94.3	70.7	407.4
Total capex	29.2	47.8	200.2	325.7	408.8	1011.7
Total	**29.6**	**195.8**	**294.2**	**420**	**479.5**	**1419.2**

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

7.59 There is a significant variation in the planned expenditure between regions. W&W has a significantly lower spend in this area compared to other England & Wales regions. We challenged W&W and the region clarified that it has not categorised condition driven renewals within its WRCCA plans. We are concerned that this omission may mean W&W is missing opportunities to design weather resilience into renewals.

7.60 The difference between England & Wales and Scotland is in part down to different approaches to risk assessment and spend categorisation. All regions' WRCCA plans demonstrate an understanding of the risks in the region and options to address these. However, WRCCA plans did not clearly commit to outputs from all the activities planned, i.e. the reduction in risk and how any residual risk will be managed.

7.61 In the SBP all regions identify the importance of maintaining spend for drainage and earthworks through the control period. Regions also discuss the need to address actions from the Lord Mair and Dame Slingo taskforces.

7.62 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.

7.63 The England & Wales and Scotland HLOSs 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. The spend required in CP7 to implement these adaptation pathways is not clearly set out in the regional plans.

7.64 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. However, these were individual projects and we recommended more sharing of best practice and wider adoption of these approaches across the network. None of the regional plans or draft WRCCA plans identify cost efficiency savings that could be achieved by delivering partnership or/and nature-based solutions.

7.65 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.

7.66 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 (MOU) with Natural Resources Wales. However, limited detail is provided on how this will address coastal squeeze or habitat compensation. In our challenge session, the W&W region confirmed it was aware of these requirements and committed to addressing these issues on a site by site basis but noted the constraints on funding.

National Functions

Technical Authority

7.67 The Technical Authority submission includes a commitment to develop a long-term adaptation pathways strategy (£1.2 million expenditure in CP7) and to agree service level agreements with the regions for extreme weather events. In our view these are reasonable initiatives and we will hold TA to account to deliver benefits.

Route Services

7.68 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. The SBP states that delivery is aligned to regional asset renewal and improvement, to feed into the regions' Weather Risk Taskforce programme. However, the SBP does not provide details of the scope, funding or a committed

timeline to deliver this platform. The £116 million set out 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 the National Functions chapter.

7.69 The Route Services plan does not include climate change impacts in its risk assessment and how this might impact on its operations.

System Operator

7.70 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

7.71 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". The SBP 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 to generate energy. However, the potential efficiency was not quantified.

7.72 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.

Regions

7.73 Through our challenge sessions with Network Rail, we found that regions expect potential efficiencies through environmental and sustainable development activities. For example through energy saving, collaborative schemes and reductions in material usage and waste. However, these efficiencies have not yet been quantified in the regional plans.

Technical Authority

7.74 The TA has not quantified any efficiencies relating to environmental sustainability. Reference is made to industry reform opportunities for CP7 including: materials reuse; modern methods of construction; renewables from the estate (indicated as only CP8 onwards due to funding constraints); whole system energy and waste projects; and a 'renewables for traction' programme. The TA 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.

Route Services

7.75 Route Services' plan sets out supply chain operations enabled efficiencies of approximately £61 million, which includes: waste reduction from process and service delivery; improved non-heavy construction materials; and supply chain and operational footprint reductions. Route Services has not identified efficiencies directly relating to carbon emission reductions.

System Operator

7.76 The SO submission did not set out any efficiency savings through environmental and sustainability initiatives.

Social Value

7.77 The England & Wales HLOS requirements include "optimising the social value of rail infrastructure to as great an extent as is reasonably possible".

7.78 All regional plans identify social value and the need to undertake activities in this area. We found that regional plans 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).

7.79 The Technical Authority submission includes a commitment to support the adoption of a social value tool for projects in CP7. The submission does not include any specific funding for delivering social value outcomes, however it has set out capex funding for enablers for improving capability and systems, and for integrating strategies which may address social value.

7.80 The Route Services submission makes 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.

7.81 The System Operator submission includes high level commitments to increasing the understanding of social value in the function, to ensure compliance with the Social Value Act and Social Value Framework. However, the submission does not provide any further detail on planned activities associated with this.

Other obligations

7.82 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".

7.83 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 any targets or commitments clearly.

Conclusions on environmental sustainability

7.84 Expenditure on environmental sustainability is increasing from CP6 to CP7, reflecting Network Rail's focus in the HLOSs and the level of ambition within the company 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 we need to ensure the expenditure is linked to clear commitments, so we can hold Network Rail to account effectively in CP7.

7.85 Scope one and scope two carbon emissions targets should align to the TA guidance. Therefore, we propose that Southern increases its target to a 20% reduction, rather than 11%. Regional targets are set out in our PR23 draft determination: supporting document on outcomes. We request that Network Rail provided details of actions it is planning to achieve carbon reductions in its delivery plans.

7.86 We expect Network Rail to share best practice between all regions on biodiversity. On this basis, we concluded that Network Rail Scotland should increase its biodiversity units target to circa 4%, to bring it in line with other regions. Regional targets are set out in our PR23 draft determination: supporting document on outcomes. We request that England & Wales regions provide further detail on

actions and volumes planned, to achieve their biodiversity targets. We request that Network Rail Scotland provides clarity on how biodiversity activities will be funded in Scotland.

7.87 Network Rail regions have not provided sufficient detail on how they will meet the December 2027 target for ZEVs. We require Network Rail to include clear commitments on ZEV delivery plans in CP7, along with other decarbonisation initiatives, which we will use to hold it to account in CP7.

7.88 The England & Wales SBP and interim Scotland SBP indicate 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.

7.89 We concluded that the W&W region's WRCCA plan was not following best practice by not including 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. In addition, W&W should provide clarity on how it will ensure compliance with requirements around coastal squeeze and habitat compensation (which is a specific requirement in Wales).

7.90 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. We expect regions to provide more information on this in the final WRCCA plans. Similarly, we expect regions to include further details on adaptation pathways.

7.91 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).

7.92 We recognise that Network Rail is continuing to refine its environmental sustainability measures and targets, including scope three carbon emissions, infrastructure carbon, air quality and the 'One Planet Index'. We will continue to engage with Network Rail in the coming months, with the aim of agreeing measures and targets ready for the start of CP7. We expect to see these measures set out in details in Network Rail's delivery plan, wherever possible.

7.93 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 request that Network Rail includes clear commitments in its delivery plan wherever possible, but we recognise that development may be ongoing at the start of CP7.

Digital signalling

Introduction

8.1 Network Rail included allocated expenditure of £1.7 billion in its SBP. This spend 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.

8.2 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 Secretary of State also requires Network Rail to apply a strong and robust efficiency challenge across the digital signalling portfolio.

8.3 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.

8.4 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.

8.5 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 when renewing digitally compared with conventionally. Additional safety and performance benefits are also expected but these are harder to quantify.

Methodology

8.6 We have followed the general methodology described in the Methodology chapter. Any details specific to the methodology for digital signalling are set out below.

8.7 During CP6 we also 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.

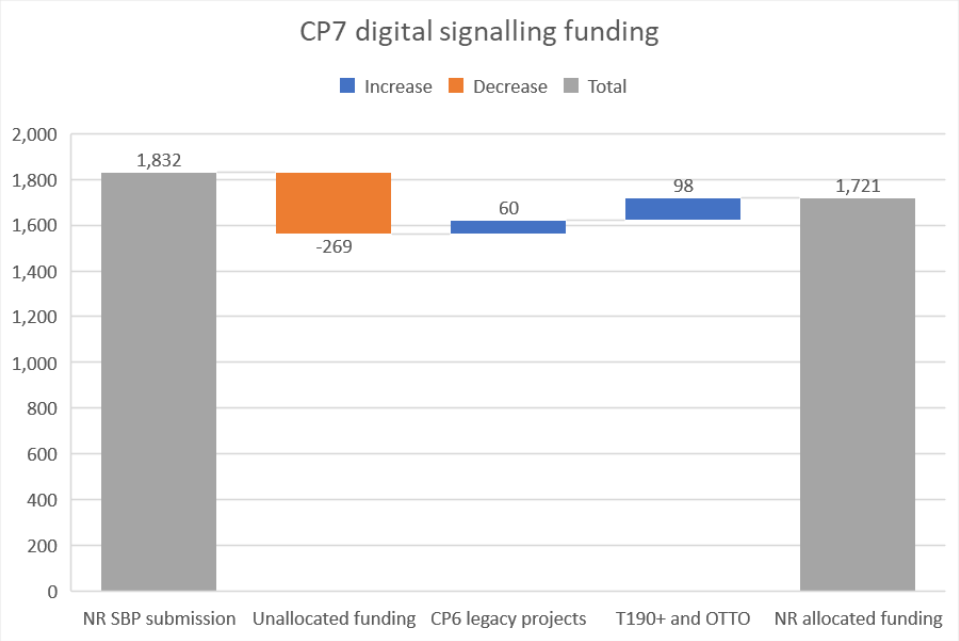
Network Rail's plan

8.8 Network Rail's plans for the deployment of digital signalling are different in Scotland and England & Wales. In its SBP, Network Rail included proposed spend to support the deployment of digital signalling in England & Wales across infrastructure renewals, fleet fitment, enabling projects, research, development and innovation (RD&I) and CP6 legacy projects.

8.9 Network Rail Scotland is not proposing to carry out infrastructure renewals using ETCS 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 Industry Partnership Digital Railway (IPDR) has been estimated by Network Rail to be £10 million. Network Rail Scotland will also contribute to some spend in Route Services and Technical Authority which will support the deployment of digital signalling.

8.10 The waterfall chart in Figure 8.1 shows the proposed spend in Network Rail's SBP and the scope items which we have reviewed in this chapter.

Figure 8.1 CP7 digital signalling portfolio



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

8.11 Network Rail's SBP states a figure of c.£1.8 billion for the deployment of digital signalling in CP7. This consists of infrastructure renewals in the regions, fleet fitment and enabling projects in IPDR.

8.12 When we reviewed Network Rail's SBP we found £269 million of the proposed spend was not allocated to regions or National Functions. Instead, Network Rail proposed the unallocated spend of £269 million could be drawn down from Group risk during the control period to support the deployment of digital signalling.

8.13 We consider it unlikely that funding from Group risk provision will be available for digital signalling spend given our concerns expressed in the Risk chapter. Therefore, in this chapter, we have only reviewed the allocated spend in Network Rail's plans for digital signalling across its regions and National Functions.

8.14 Our review also included projects which support the deployment of digital signalling in Route Services (CP6 legacy projects) and Technical Authority (RD&I projects including Optimised Train Track Operations (OTTO) and 'Target £190k plus' (T190+) which are explained later in this chapter). We consider these projects should be included in the wider portfolio for digital signalling and as such we have included the proposed spend in these areas in our review. This means the funding Network Rail allocated in its SBP totals £1.72 billion.

8.15 Network Rail's cost estimates continue to evolve and we have been presented with multiple, different spend figures for the same items which contribute to the delivery of digital signalling, e.g. because different teams define the scope of digital signalling differently. To avoid confusion, we have listed the items which we refer to as 'the digital signalling portfolio' in Table 8.1. At our request, Network Rail confirmed that these are the appropriate spend values to use for our review.

Table 8.1 CP7 Digital signalling spend

Programme	Region / Business unit	Proposed CP7 spend (£ million)
Infrastructure renewals	Eastern, NW&C, Southern, W&W	742
Fleet fitment	Eastern region Industry Partnership Digital Railway (IPDR)	699
Enabling projects	Eastern region Industry Partnership Digital Railway (IPDR)	121
Research, development and innovation projects	Technical Authority	98
CP6 legacy projects	Route Services	60
Total		**1,721**

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

8.16 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 in the text below.

Digital signalling infrastructure renewals

8.17 Network Rail has included spend of £742 million for digital signalling infrastructure renewals. This has been allocated across the regions in England & Wales where the assets are being renewed digitally and is set out in Table 8.2.

Table 8.2 Digital signalling infrastructure spend in CP7

Region	Infrastructure renewal project	Proposed CP7 spend (£ million)

Eastern	East Coast Digital Programme (ECDP)	262
	Midland Mainline South St Pancras	45
***NW&C**	West Coast Mainline North Warrington	354
	West Coast Mainline North Preston and Carlisle	74
Southern	Brighton Mainline South Haywards Heath	7
W&W	Great Western Mainline Paddington to Hayes	0.2
Total		**742**
**The spend values Network Rail presented for digital signalling infrastructure in NW&C differ from the values Network Rail presented in its WCML(N) plans. We challenged Network Rail on this and it confirmed there is no double counting in the total spend proposed for CP7, but the digital and WCML(N) plans may be referring to the same scope of works*		

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

8.18 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

8.19 Network Rail has included spend of £699 million for fleet fitment split across passenger, freight, heritage and charter and on-track machines (OTMs). This spend is allocated to the IPDR budget in Eastern region.

8.20 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

8.21 Network Rail included proposed spend of £121 million for enabling projects, allocated to the Eastern region. These 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 GB requirements	50
Driver competence retention	Includes provision to develop and deliver systems for drivers to maintain ETCS competency once trained to support efficient migration to ETCS signals	5
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

8.22 Network Rail included proposed spend of £98 million for RD&I projects in CP7; these projects are allocated to the Technical Authority budget. The proposed spend and objectives of digital signalling projects in 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 (T190+)	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

Optimised Train Track Operation (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	73
Total		**98**

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

CP6 legacy projects

8.23 Network Rail included proposed spend of £60 million for CP6 legacy projects in CP7. 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
Fitment of ETCS onboard OTMs	Fitment of OTMs and associated business change for East Coast Digital Programme (ECDP)
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
Total	**£60 million**

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

Findings

8.24 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.

8.25 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.

8.26 During CP6 we 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.

8.27 Having reviewed the SBP and after considering all the factors that need to come together for Network Rail's digital signalling portfolio, we still have concerns. Primarily, these are around the maturity of the infrastructure renewals workbank, including the development of unit rates and the delivery schedules of some programmes in CP7.

8.28 Network Rail's SBP provided detailed information on the complete CP7 strategy for fleet fitment. However, Network Rail's £1.7 billion allocated spend does not cover all of the fleet fitment required to deliver the benefits from the associated CP7 renewals programme.

8.29 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. At the time of its SBP submission, Network Rail said the scope of both T190+ and OTTO were being reviewed.

8.30 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. We have concerns about the cost and deliverability of these projects and consider Network Rail should assess the proposed spend (as discussed in the National Functions chapter).

Conclusions on digital signalling

8.31 We support the deployment of digital signalling and the long-term deployment plan (LTDP) and are supportive of appropriate and efficient spend on digital signalling in CP7. We also recognise the cost reductions that have been made to the digital signalling portfolio from earlier iterations of the CP7 plan.

8.32 We have based our assessment on the proposed spend which has been allocated by Network Rail to specific regions or business units. Due to £269 million of proposed spend not being allocated, the plans for digital signalling may represent

an incomplete plan. In advance of our final determination, we expect Network Rail to provide a single plan for digital signalling which contains all the items necessary in CP7 with fully allocated spend against each item.

8.33 Network Rail will need to confirm the scope and benefits of the RD&I projects, clearly outlining the projects' schedules. We will carry out a review of these projects during CP7 to assess their delivery against the programme and requirements Network Rail provides.

8.34 We have concluded that in Network Rail's £1.7 billion allocated plan, the fleet fitment programme is not sufficiently aligned with the infrastructure renewals programme. Ahead of our final determination, we expect Network Rail to provide a plan with allocated spend where fleet fitment and infrastructure renewals are fully aligned.

8.35 Based on our detailed assessment of SEU rates and deliverability, we have concluded that there are opportunities to reduce the level of spend for digital signalling. This is explained below.

Option for adjustment to digital signalling expenditure

Our draft determination proposes an option to reduce the total funding for the digital signalling portfolio to circa £1.5 billion. This includes the programmes listed in Table 8.1. This represents a circa 15% reduction from the £1.7 billion spend allocated in Network Rail's SBP across all programmes and projects which are part of the digital signalling portfolio.

8.36 This reduction of circa 15% should be achieved through a combination of reducing rates across the projects and programmes, prioritising works which are essential to the deployment of digital signalling in CP7 and, where appropriate, re-phasing works into the start of CP8. It is for Network Rail to determine how best to achieve this across the following programmes:

(a) infrastructure renewals in Eastern, NW&C, Southern and W&W regions;

(b) fleet fitment programme (passenger, freight OTMs and heritage and charter);

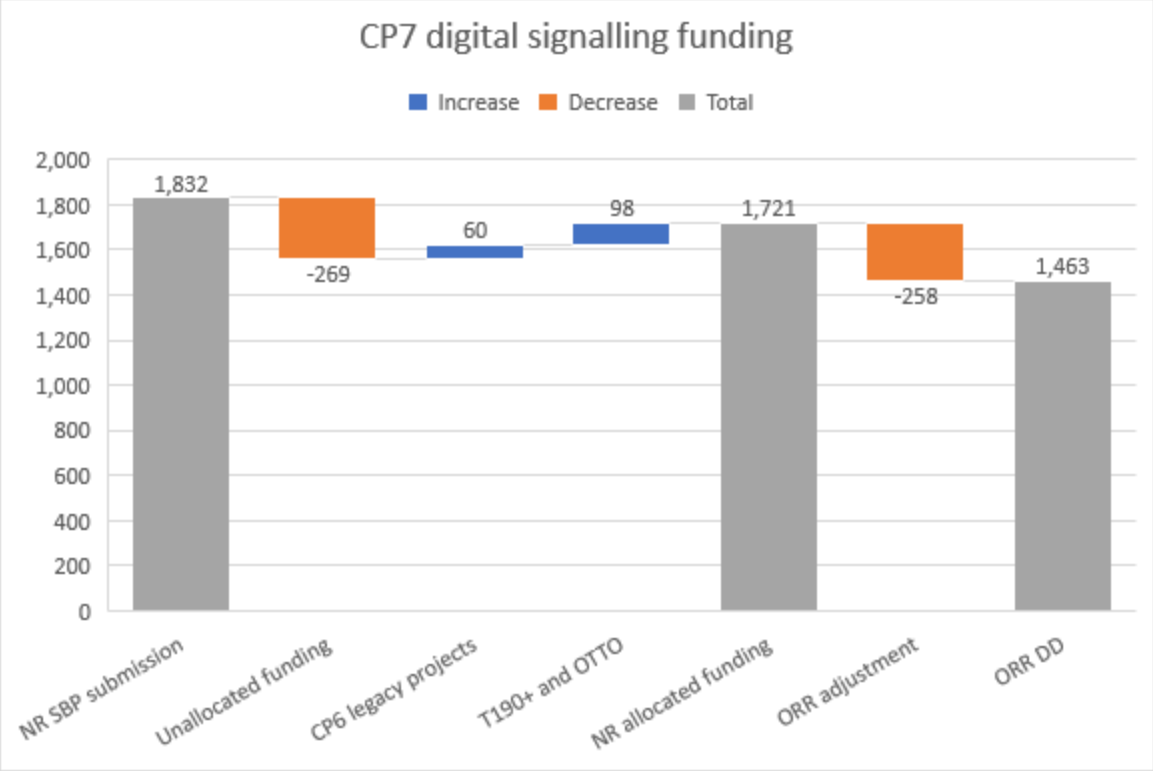
(c) enabling projects (market application readiness, driver competence retention, industry network management systems for ETCS, parallel proving, industry partnership portfolio capacity);

(d) RD&I (T190+ and OTTO); and

(e) CP6 legacy projects (fitment of ETCS onboard OTM's and development of training capability in the maintenance, renewal, operation and enhancement of ETCS technology).

8.37 Figure 8.2 shows a waterfall of the changes we propose to Network Rail's digital signalling spend.

Figure 8.2 CP7 Digital signalling proposed adjustment to expenditure



Source: ORR's PR23 analysis of figures presented by Network Rail

8.38 We reached our view by considering the evidence available from:

(a) consideration of the maturity of Network Rail's unit rates for the proposed digital signalling infrastructure renewals compared with unit rates for mature projects and programmes. We found that all digital signalling renewals projects were adopting base rates (before any adjustments for site specific allowances, headwinds etc.) which were significantly higher than supplier developed rates for ECDP, which is an enhancement currently in delivery in CP6. 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 to

forecast costs based on this learning. The proposed unit rates for CP7 digital signalling renewals are at least 15% higher than CP6 supplier developed rates and in some cases more than 50% higher;

(b) CP6 TARs, consultant reports, our signalling market study and our supplementary advice to Ministers on digital signalling;

(c) review of unit rates and delivery schedules of CP6 enhancements which are deploying ETCS technology e.g., East Coast Digital Programme (ECDP) and Transpennine Route Upgrade (TRU);

(d) actual delivery of CP6 conventional signalling renewals (in a sample of 53 projects, c.40% were delayed by one year or more, this was across all regions and delays were most prevalent in NW&C region); and

(e) Network Rail and industry feedback on schedule risks to the fleet fitment programme.

8.39 We consider a funding envelope of circa £1.5 billion is stretching but realistic for the allocated digital signalling portfolio across CP7. Network Rail should re-assess its proposed spend, ensuring projects and programmes are prioritised in line with our conclusions on deliverability and efficiencies. If necessary, works should be re-phased into later years of the control period or CP8. The programme should also be reviewed in the context of potential deliverability constraints based on evidence from actual CP6 conventional signalling renewals.

8.40 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. Our draft determination includes other options to release funding, which may affect the same programmes, notably the option to re-phase works on WCML(N) in NW&C; and the option to reduce Route Services technology spend. Once Network Rail has reviewed these options and determined its priorities, it will need to consider any interactions, which may decrease the total cost reduction that is achievable; this decrease is not expected to exceed £15 million.

Efficiency, headwinds, tailwinds, inflation and input prices

Introduction

9.1 This chapter examines Network Rail's proposed 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), 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 Assessment 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.

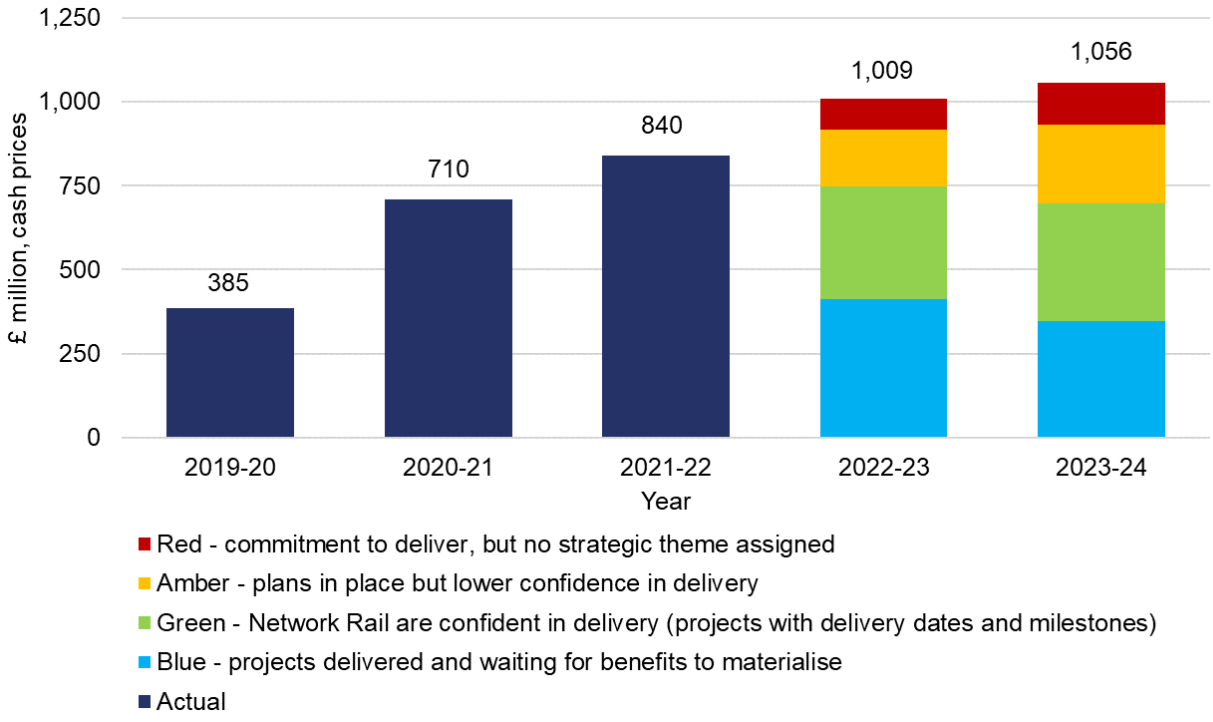
9.5 Network Rail successfully implemented this reporting framework, which has enabled us to develop a better understanding of how the company's business processes are improving and how it has responded to external pressures including the pandemic and current inflationary pressures.

9.6 Our PR18 determination required Network Rail to make £3.5 billion of efficiency improvements in CP6 across the GB network. As a result of cost pressures from the pandemic, Network Rail increased its own target by £0.5 billion to £4.0 billion with the additional savings coming mostly from planned 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 three years of CP6 has been good. It has delivered £1.9 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 £0.9 billion across the first three years of CP6. Simply put, this means that Network Rail spent £0.9 billion more on delivery than we expected for what it delivered in the first three years of CP6.

9.8 It should be noted that efficiency and financial performance 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.

Figure 9.1 **Network Rail's actual and forecast efficiency in CP6**



Source: Annual efficiency and finance assessment of Network Rail 2021-22

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.

Methodology

9.10 We have followed the general methodology described in the Methodology chapter, however. We have also used some specific activities to assess Network Rail's efficiency and associated cost base, as set out below.

Efficiency

9.11 Economic regulators use a range of approaches to assess the scope for efficiency savings by their 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. So, we consider that it is preferable to draw on a range of evidence in forming a view on the scope for efficiency improvements by Network Rail.

9.12 Our analytical approaches fall in to two groups of 'bottom-up' and top-down studies:

(a) Our **bottom-up studies** focus 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 benefit from their 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. 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** use statistical analysis of aggregate level data to examine trends within Network Rail's regions and to comparator companies. Top-down studies benefit from their 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). Part III (Annex G) summarises our top-down studies.

9.13 By combining evidence from our bottom-up and top-down studies, we consider that we have 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

9.14 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 pandemic including increased use of personal protective equipment and need to maintain social distancing during work activities.

9.15 Tailwinds are unplanned cost decreases due to external factors. Similar to 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 was reduced travel expenditure that Network Rail incurred from making better use of teleconferencing following the pandemic.

9.16 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 reasonably likely external factors, and how the planning assumptions compare to Network Rail's headwinds and tailwinds in CP6, including adjusting for the impact of the pandemic.

Our approach for assessing the impact of inflation and input prices on Network Rail's costs in CP7

9.17 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 1 percentage point per year higher than general inflation over recent years.

9.18 We commissioned Europe Economics to review Network Rail's method for assessing input prices. Reflecting concerns with Network Rail's approach, we have 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

9.19 Table 9.1 summarises the efficiency, input prices, headwinds and efficiencies that are included in Network Rail's strategic business plan for its operating expenditure (operations, support and maintenance activities) and for its renewals expenditure in CP7.

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
Great Britain	41,956	1,417	787	-3,660	40,500
England & Wales	37,642	1,257	705	-3,232	36,372
Scotland	4,315	160	82	-429	4,129
NW&C	10,107	380	189	-890	9,786
Southern	9,576	307	176	-781	9,278
W&W	6,160	213	115	-569	5,919
Eastern	11,799	357	225	-992	11,389

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

Findings

Efficiency assumptions

9.20 As shown in Table 9.1 Network Rail indicates that it can deliver £3.7 billion of efficiency improvements in Great Britain, comprising £3.2 billion from its activities in England & Wales under the risk-adjusted plan, and £0.4 billion from its activities in Scotland.

9.21 The efficiency trajectory in Table 9.2 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.

9.22 On an average basis, i.e., CP7 compared to CP6 in total, for England & Wales, this equates to a 6% efficiency improvement for opex and 10% for renewals. For Scotland, it is 8% for opex and 11% for renewals. We note that Network Rail's assumed efficiency profile is ambitious, i.e., assumes substantial efficiencies can be achieved from early in CP7. We will review Network Rail's proposed efficiency trajectory ahead of our final determination.

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

Findings from our bottom-up studies of Network Rail's efficiency

9.23 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) 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

(c) Specific findings from our detailed review of the SBP detailed in the relevant sections of this report.

9.24 The findings from our bottom-up studies provide clear evidence for the scope for Network Rail to improve its efficiency in CP7.

Top-down studies

9.25 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.

9.26 Network Rail's CP7 SBP expenditure on operations, support and maintenance is not consistent with its regulatory financial statements (which are underpinned by our regulatory accounting guidelines). However, Network Rail says, 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. Ahead of our final determination, Network Rail should ensure that its proposed CP7 expenditure has been classified on a basis consistent with its regulatory financial statements.

9.27 Our analysis largely follows the approach that we used in PR18. It compares the performance of Network Rail's five regions over time. We have estimated a cost "frontier" 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. Due to a lack of consistent data, 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.

9.28 Our analysis covers 95% of total maintenance expenditure and 88% of total renewals expenditure. It excludes expenditure incurred by National Functions. Our renewals average unit cost analysis covers expenditure at a regional level for which it was possible to match expenditure with volumes (63% of total renewals expenditure).

9.29 Our analysis suggests that for England & Wales, there is a potential maintenance efficiency of between 5.0% and 11.0%. In England & Wales Network Rail's proposed efficiency of 10% for maintenance is a stretching but realistic targets for CP7.

9.30 Our analysis estimates that for Scotland there is a maintenance efficiency saving opportunity of between 1.0% and 6.0%. This finding suggests that the 10% forecast by Network Rail Scotland is more stretching than in England & Wales.

9.31 Our findings suggest a total renewals savings of between 0.0% and 14.0% could be possible in England & Wales across the asset base that we have modelled. When compared with Network Rail's proposed 15% target for renewals, this implies a reasonably stretching, but a realistic target. Our modelling has indicated that there is a total renewals savings of between 0.0% and 0.4% possible in Scotland – again implying greater stretch in Scotland.

9.32 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 estimated discrepancies between forecasts and model predictions. 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. Another consideration is that our analysis does not include all operations, support, maintenance and renewals costs. 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.

9.33 Therefore, the findings of our cost benchmarking analysis are used as one element of a wider evidence base.

9.34 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. Our analysis shows 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. 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.

Other regulated bodies

9.35 Other regulated companies in the UK are also subject to assessments of the scope for efficiency improvements. Although economic regulators use a number of specific 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.

9.36 A range of decisions have been made by UK economic regulators over the past ten years. Over a five-year control period, regulators have typically set an 8.9% efficiency challenge for opex, (i.e. for a company to be 8.9% more efficient for

opex by the end of the control period than at the start), and an 8.4% efficiency challenge for capex. Included within this, the frontier shift component has typically been around 1% per year.

9.37 Caution is required when comparing efficiency challenges set by different regulators due to the different asset bases and different methodological approaches adopted. 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.

9.38 Network Rail's SBP assumes that it 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

9.39 Network Rail's SBP includes a high-level summary of the ways in which its regions and National Functions intend to make efficiency improvements in CP6. The company has identified broad themes and has started the process of developing more detailed plans for how it will deliver required efficiency improvements in CP7. These include efficiencies achieved from closer working with industry partners linked to the creation of Great British Railways (GBR), business opportunities, technology adoption and efficiency savings from renewals activities. These are summarised in Figure 9.2.

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 and cover the full plan for England & Wales and the Scotland plan.

9.40 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 which considers whole industry cost and makes smarter decisions with better information on their overall financial impact. It considers that industry reform enables 30% of its planned CP7 efficiencies.

9.41 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.

9.42 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 reasonable at this point in the planning cycle.

9.43 The large proportion of efficiencies that Network Rail has attributed to industry reform introduces risk to the delivery of CP7 efficiencies. There is 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.

9.44 We remain to be convinced about the level of efficiency that Network Rail can achieve from Project Reach. We consider 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 much of the efficiency would be recognised in CP8 and CP9, rather than in CP7 as indicated in Network Rail's SBP.

9.45 In the National Functions chapter we discussed Project Reach in more detail.

9.46 Network Rail has set out clear high-level plans for how it will deliver efficiency improvements in CP7. However, the company now needs to further develop these high-level plans in more detail to show how it will deliver the relevant business changes and to robustly justify that they will deliver the stated level of efficiency.

9.47 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 on the risk-adjusted plan is stretching but realistic for England & Wales in CP7. Using similar analysis, we have concluded that Network Rail should deliver £429 million of efficiencies (£380 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 Risk chapter of this document.

Headwinds

9.48 Network Rail's SBP for CP7 included £0.8 billion of headwinds across Great Britain. Excluding the impact of the pandemic, this is around 24% lower than currently forecast in CP6. Following the submission of its SBP, Network Rail has indicated that it would reduce its CP7 headwind assumptions having considered revised inflation forecasts. The company is now forecasting approximately £0.4 billion of headwinds for England & Wales and £82 million for Scotland (including its share of National Functions) a total of £0.50 billion.

9.49 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. Regions now need to reflect on how the reduction to headwinds decided by Group Finance should be embedded in their updated plans.

9.50 We have assessed the headwind figures against CP6 headwinds, and we have used Network Rail's updated headwinds assumptions of approximately £0.4 billion for England & Wales and £82 million for Scotland. 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. As more detail becomes available in future planning rounds, we will continue to monitor and report on Network Rail's fishbone analysis including its forecast headwinds.

Tailwinds

9.51 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.

9.52 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 the pandemic related reductions to staff travel and similar. 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 most recent forecast headwinds less tailwinds from the £0.8 billion to £0.5 billion across Great Britain, adequately addresses this point. Therefore, we do not propose to make any further adjustment to our assessment of efficient costs in relation to headwinds less tailwinds.

Inflation and input prices

9.53 In its England & Wales risk-adjusted plan, Network Rail has assumed £1.7 billion of inflation in CP7. This comprises £0.3 billion of general inflation and £1.4 billion of input price inflation. The Scotland plan includes £80 million of general inflation and £160 million of input price inflation.

9.54 Network Rail's assumption for input price inflation is more than four times the amount of assumed general inflation and is over 50% higher than in CP6 and we

are concerned about the high level of input price inflation included in Network Rail's cost assumptions for CP7.

9.55 Its CP7 SBP used the OBR's November 2022 forecast of CPI, with additional input price inflation, above CPI, for operating, support, maintenance and renewals costs. To establish any input price adjustment, Network Rail analysed each of its cost lines and applied adjustments based on specific relevant cost indices. To forecast future price changes, the past movements of each chosen cost index was compared to historical CPI movements. This approach assumes that future trends will resemble historical price movements. The difference, or 'wedge' between the indices and CPI, serves as a basis for the calculation of each input price assumption. The aggregated input price adjustment was derived by comparing the weighted average of each cost item to its cost base.

9.56 As shown in Tables 9.3 and 9.4, based on this approach, Network Rail has calculated that an annual input price adjustment of +0.5% above CPI for opex, and +1.9% above CPI for renewals.

Table 9.3 **Network Rail's inflation assumptions in CP6 and CP7**

Annual input price assumption	Opex	Renewals
CP6	1.00%	0.90%
CP7	0.50%	1.90%
Difference	-0.50%	1.00%

Source: Network Rail input price inflation analysis

Table 9.4 **Network Rail's input price assumptions in CP6 and CP7**

	2024/25		2025/26		2026/27		2027/28		2028/29	
	Opex	Renew	Opex	Renew	Opex	Renew	Opex	Renew	Opex	Renew
CPI	-0.15%		-1.27%		1.25%		1.90%		2.00%	
Input price baseline	0.48%	1.74%	0.48%	1.92%	0.48%	1.89%	0.48%	1.90%	0.48%	1.74%
CPI + input price	0.33%	1.59%	-0.79%	0.65%	1.73%	3.14%	2.38%	3.80%	2.48%	3.74%

Source: Analysis of Network Rail's CP7 strategic business plan

9.57 As explained below, we have taken a different view to Network Rail's about forecast input prices in CP7.

Europe Economics' findings on input prices

9.58 We commissioned Europe Economics to review Network Rail's approach for assessing input price inflation. Europe Economics' report is available here.

9.59 Europe Economics' assessment of Network Rail's approach found four areas of concern which are examined below:

(a) Network Rail's method, in particular the weightings used for costs and the use of compound annual growth rates ('CAGR');

(b) the use of the November 2022 OBR or the Bank of England forecasts of CPI;

(c) the level of disaggregation in Network Rail's analysis and the information asymmetry that this introduces; and

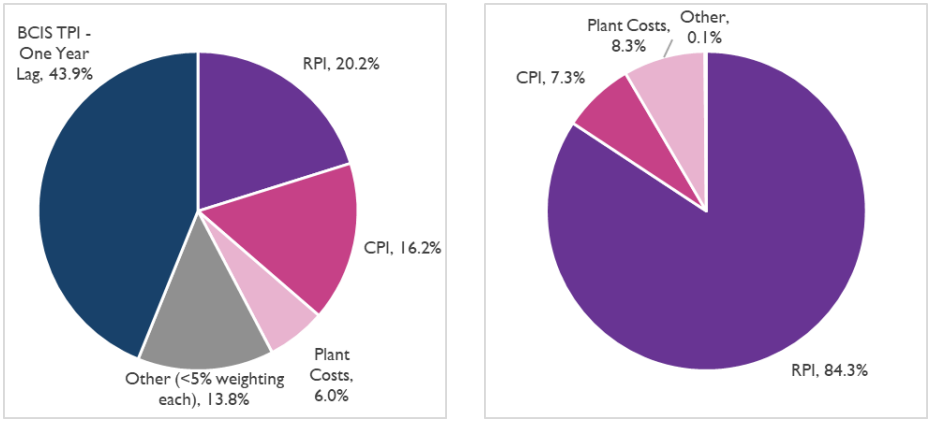
(d) wider regulatory precedent.

Network Rail's method

9.60 Europe Economics found that although Network Rail's input price analysis is detailed, it places a significant reliance on 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.

9.61 The use of RPI has not been recognised by the Office of National Statistics (ONS) as a robust measure of inflation for over ten years as it tends to overstate inflation as stated in 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.

9.62 Europe Economics also highlighted Network Rail's reliance on the BCIS TPI index as a concern. Europe Economics highlighted 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 the tender price index.

9.63 Europe Economics also 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 the input price adjustment within Network Rail's input price analysis.

Use of November 2022 OBR forecast

9.64 While Network Rail was asked by HMT and DfT to complete its analysis of general inflation using the November 2022 OBR forecast of CPI, Europe Economics considered that the forecast did not sufficiently reflect the future path of CPI over CP7. This is due to the forecast's reliance on the market implied trajectory of interest rates. The Bank of England declared at the time that it did not anticipate raising interest rates as much as the market suggested. Therefore, the use of the November 2022 forecast would understate the future movement of CPI.

9.65 Europe Economics recommended that using the latest (March 2023) OBR forecast of CPI would be more accurate. Network Rail has since informed us that using the March 2023 OBR forecast of CPI inflation increases Network Rail's cost by around £0.6 billion in England & Wales and £68 million in Scotland in CP7. We have taken account of this in our assessment and will review this matter again ahead of our final determination.

Level of disaggregation in Network Rail's analysis

9.66 Network Rail's analysis includes separate input price assumptions for cost items which represent less than 1% of its total costs. Europe Economics considered that this approach reduces transparency because it is difficult to track the underlying

analysis, and therefore makes meaningful review and challenge difficult. Europe Economics also noted that it is unlikely that Network Rail's input prices will outturn as forecast. Some costs may increase at a slower rate, and some may reduce. However, Network Rail's analysis assumes that all its costs will increase above CPI inflation. This disaggregated approach therefore risks overstating expected input prices.

Wider regulatory precedent

9.67 Europe Economics found that Network Rail's approach for forecasting input prices did not align with the approaches 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 which included, energy (Ofgem), water (Ofwat), aviation (CAA), telecommunications (Ofcom) and water in Northern Ireland (Northern Irish water) and applied their methods as part of its assessment of Network Rail's assumptions.

9.68 Based on these different approaches, Europe Economics proposed a framework that has been endorsed by the Competition and Markets Authority (CMA) which would be better suited 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.

9.69 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?

9.70 The framework also includes a materiality test that an input price adjustment should only be included if the cost category accounted for between 5 and 10 percent of total costs if there is strong evidence of a material difference between the cost category and CPI inflation.

Our view on Europe Economics' assessment

9.71 In our view, the framework that Europe Economics has developed for assessing input prices has several advantages over Network Rail's approach because:

(a) it is more transparent and focuses on key input price categories;

(b) better captures the relationship between CPI and input prices including whether any variances are statistically significant;

(c) does not use redundant indices like RPI;

(d) incorporates analysis of forecasts and not just historic trends, which is important in a time of economic uncertainty; and

(e) explores whether input prices are already captured within the CPI measure, and so reduces the risk of double counting.

Our view on input prices

9.72 Forecasting Network Rail's input price inflation is a difficult task, even in times of stable general inflation, as there is no single inflation index which would match the basket of goods that Network Rail purchases that is independent of Network Rail's own purchasing power. For the reasons explained above, we have chosen to adopt Europe Economics' framework for examining CP7 input prices.

9.73 We have made an adjustment to correct for an error in Europe Economics' calculation of electricity costs (where Europe Economics overestimated Network Rail's own usage). Applying this correction, our assessment of annual input prices is an increase of 0.3% for opex and of 0.5% for renewals. This equates to £0.7 billion of input prices for England & Wales, compared to Network Rail's proposed £1.3 billion adjustment, so a reduction of £0.6 billion to Network Rail's plan. We are proposing a £72 million reduction for Scotland to £86 million.

9.74 Levels of forecast CPI inflation are currently highly uncertain. Since Network Rail submitted its SBP to us in February, the OBR issued a new CPI forecast in March 2023 which includes higher levels of CPI into CP7. Applying the March 2023 OBR forecast increases the impact of CPI inflation in England & Wales from £0.3 billion to £0.9 billion in CP7.

9.75 Network Rail has also referred to a lag effect, i.e. that a large portion of its CP6 costs were negotiated at a time before the current high levels of inflation. When these contracts are retendered in CP7, Network Rail expects significant cost increases due to this lag. However, Network Rail has provided little evidence to

support this. Based on the findings of Europe Economics' study, we do not consider that a lag effect should be included in our assessment of input prices.

9.76 We intend to continue to work with Network Rail to better understand the effects of CPI inflation and input prices on its CP7 plan before publishing our final determination. To support this, we expect Network Rail to keep us informed of the impact of further changes to forecast CPI inflation and to apply Europe Economics' framework for assessing input prices in CP7.

Other income

9.77 After Network Rail submitted its SBP, it identified £272 million less of income in England & Wales, mostly relating to omitted Schedule 4 and 8 costs for freight, and lower property income. Network Rail is currently working through this issue with its regions and National Functions and has not yet put forward options for funding this gap.

9.78 However, we consider that there is an opportunity for additional income on Network Rail's property portfolio of £90 million in England & Wales and £10 million in Scotland as we set out in our PR23 draft determination: supporting document on other income. Our adjustments to the wider CP7 plan, as outlined in Table 9.5, would mean that this income gap in England & Wales is funded. However, we expect Network Rail to put forward its own detailed proposals in its response to our draft determination and we will continue to work with Network Rail on this issue. There is no income gap for Scotland between the SoFA and Network Rail's SBP.

Conclusions on efficiency, headwinds, tailwinds, inflation and input prices

9.79 We have retained Network Rail's overall efficiency assumptions and concluded 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 should deliver £429 million of efficiencies for Scotland (with £380 million for regionally incurred OSMR).

9.80 We have retained Network Rail's updated headwinds assumptions of £0.4 billion for England & Wales and £82 million for Scotland. Network Rail's SBP does not include any assumed tailwinds in CP7. 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.

9.81 We have assessed input prices in CP7 of £0.7 billion of for England & Wales, compared to Network Rail's proposed £1.4 billion adjustment, so an adjustment of -£0.6 billion to Network Rail's plan. We are proposing a £72 million reduction for Scotland to £86 million.

9.82 Levels of forecast CPI inflation are currently highly uncertain. Since submitting its SBP to us in February, the OBR issued a new CPI forecast in March 2023 which includes higher levels of CPI into CP7. Applying the March 2023 OBR forecast increases the impact of CPI inflation from £0.3 billion to £0.9 billion in CP7 in England & Wales and by £68 million in Scotland. We have taken account of changes to the OBR's forecast of CPI inflation subsequent to Network Rail submitting its SBP in our assessment of Network Rail's efficient costs in CP7 for our draft determination. We will continue to work with Network Rail to better understand the effects of CPI inflation and input prices on its CP7 plan before publishing our final determination. To support this, we expect Network Rail to keep us informed of the impact of further changes to forecast CPI inflation and to apply Europe Economics' framework for assessing input prices in CP7.

Proposed adjustments to efficiency, headwinds, tailwinds, inflation and input prices

9.83 Table 9.5 summarises the proposed changes that we have made to post efficient costs in England & Wales. We have not included any adjustments from our review of renewals expenditure (discussed in the Maintenance and Renewals, National Functions and Digital Signalling chapters) because we are proposing that those potential adjustments are used to fund the additional core renewals required. However, we have included provision for a train performance improvement and innovation fund. This is intended to kick-start collaborative, cross-industry solutions with the aim of improving train performance between train operators and Network Rail. The details of this fund are discussed in the Operations chapter.

Table 9.5 Changes to post efficient costs and other income in England & Wales based on the risk-adjusted plan

£ billion, 2023-24 prices	Network Rail SBP spend	Proposed adjustment	Comments
Input prices	1.3	-0.6	We have taken a different view on input prices to Network Rail

£ billion, 2023-24 prices	Network Rail SBP spend	Proposed adjustment	Comments
Impact of rising CPI inflation		+0.6	The SBP is based on November 2022 OBR forecasts, this adjustment reflects the March 2023 OBR forecast
Headwinds	0.7	-0.4	To address inflation and constrained funding Network Rail indicated that it would stretch headwinds, we agree with this challenge
Income gap		0.3	There is a gap in Network Rail's income assumptions between its plan and the SoFA
Property income challenge		-0.09	We consider that there is opportunity for additional income on property
Train performance improvement and innovation fund		0.04	Network Rail should allocate spend for a performance improvement fund in CP7
Risk fund	2.0	0.15	For changes to assumptions on efficiency, headwinds, input prices, CPI inflation and income, we recommend that this is used to increase the cash risk fund
Total adjustment		**0.0**	

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); please note figures are rounded so may not sum

9.84 Table 9.6 shows our proposed changes to Network Rail's plan for Scotland. There were unallocated funds from the SoFA in Network Rail Scotland's interim SBP due to the interim plan being largely complete by the time the SoFA and HLOS for Scotland was published. Unallocated funds from Table 3.17 should be added to this amount. We propose that any surplus funding is prioritised for core renewals and that the balance of any remaining funding is split between increasing the risk provision and a targeted train performance fund for Scotland. The details of this fund are discussed in the Operations chapter.

Table 9.6 Changes to post efficient costs in Scotland

	Network Rail SBP spend £ million	Proposed adjustment £ million	Comments
Input prices	162	-72	We have taken a different view on input prices to Network Rail
Impact of rising CPI inflation		+68	The SBP is based on November 2022 OBR forecasts, the plan has been updated for March 2023 OBR forecasts.
Headwinds	82		We have retained Network Rail's assumption
Property income challenge		-10	We consider that there is opportunity for an income challenge on property
Total adjustment		**-14**	The net adjustment should be added to the (as yet) unallocated funds in the Scotland plan.

Source: ORR analysis of Network Rail SBP.

Risk

Introduction

10.1 Network Rail has used £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 circa £1.5 billion of this has been spent on the financial impact of risks which have materialised in England & Wales in CP6. 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 Network Rail suggests that risk fund usage in Scotland is likely to be close to £0.5 billion (in cash prices) by the end of CP6 against an original provision of £283 million (in 2017-18 prices). Scotland's risk fund has been topped up during CP6 through deferred renewals, reductions in business rates and central charges, inflationary increases in variable income and workforce reform efficiencies.

10.3 Scotland has circa £6 million risk funding remaining which has not yet been allocated. However, Network Rail Scotland has said that there are further risks anticipated (including adverse weather, non-delivery of efficiencies, poor performance claims, worse than forecast inflationary exposure etc.). Nevertheless, Scotland's risk fund may also be increased in the coming months with unused industrial action provision. We have asked Network Rail Scotland for an update which is expected in July 2023.

10.4 In England & Wales Network Rail has produced two scenarios; the ‘full’ plan and the ‘risk-adjusted’ plan. Network Rail’s risk-adjusted plan for England & Wales identifies renewals and other activities in the regions that can be deprioritised to increase the CP7 risk fund as explained below. There is a single scenario in the interim SBP for Scotland.

Methodology

10.5 Our review of the Network Rail plan follows the methodology set out in chapter 2. It consists of 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.

10.6 Table 10.1 details the studies that were commissioned into Network Rail's estimating and risk process 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

Table 10.2 **Network Rail's CP7 plan for risk**

Plan	OSMR plan £ million	Risk provision £ million	% of total plan
England & Wales full CP7	37,038	500	1.3
England & Wales risk-adjusted CP7	35,560	1,979	5.3
Scotland CP7	4129	206	5.0

Source: Network Rail SBP

10.7 As shown in Table 10.2, the England & Wales full plan has cash risk funding of £0.5 billion, this is held within Group. Scotland's interim SBP has cash risk funding of £206 million held in Scotland; and the region will not have access to the funds held centrally in Network Rail as the Scotland determination is separate to the England & Wales determination.

10.8 Recognising that £0.5 billion (1.3%) is a relatively small amount of funding, Network Rail required that its regions generate locally held risk funding equivalent to approximately 5% of the regions' plan. This has been done principally by deprioritising renewals and other activities to create a 'contingent' fund. The contingent renewals fund totals between 5% and10% of renewals spend but the assets involved vary depending on the regional priorities. There is no contingent renewals fund in Scotland.

10.9 The risk-adjusted plan for England & Wales has cash risk funding of £0.5 billion in Group and a £1.5 billion held in the England & Wales regions. This gives total risk funding of £2.0 billion under this plan. This funding will be used to manage unexpected events, cost growth (e.g. due to inflation), recovery of train performance, weather, embedding of maintenance reforms, delivery of efficiency and other unexpected events through CP7.

10.10 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. Network Rail has estimated that each 1% change in inflation alters the plans in each year by £200 million in England & Wales & £20 million in Scotland.

10.11 Network Rail has 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 is complex to conduct correctly and 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.

10.12 Noting the complexity detailed above, we commissioned independent studies as detailed in Table 10.1 to assess Network Rail's process for Monte Carlo to understand the robustness of the outputs.

Findings

10.13 We have considered the provision of the full plan (£0.5 billion) for England & Wales in the context of the current economic and industry environment and the experiences from CP6 and we do not consider that this risk provision is sufficient to manage this programme over the full five-year period. If this plan was followed by Network Rail and risks materialised, Network Rail would need to reduce spend in renewals to fund the risk impacts. We believe the risk exposure and the

subsequent reactive risk to delivery of the full renewals means that this plan is unlikely to be delivered in full.

10.14 We have looked at the uncertainty that exists during the planning period for CP7 and consider that there is likely to be at least as much volatility in CP7 as in CP6. As such, we would expect Network Rail to have similar risk provision in CP7 to that spent in CP6. However, with the fiscal pressures and required increases in expenditure on key programmes like digital signalling, there is a smaller OSMR provision for regions in CP7. Therefore, setting an appropriate risk provision is a difficult balance between maximising OSMR delivery and confidence in deliverability.

10.15 We have, therefore, based our SBP review on the risk-adjusted plan in England & Wales which has an explicit provision of £2.0 billion for risk. This scenario releases an additional £1.5 billion spend into the regions (in addition to the £0.5 billion held in Network Rail centre) to fund risk. The spend released by the risk-adjusted plan is a significant contribution in moving the regional plans to a more secure funding position.

10.16 Network Rail uses historic averages to model future costs. These have been normalised; however, this process is focussed more on uncertainty than probabilistic risk impacts. This was confirmed by our Sirius report 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'*. Without details of risks which have occurred and their impacts on projects, estimates will not be able to extract these before using past costs and estimates will therefore tend to be inflated.

10.17 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 the Maintenance and Renewals chapter.

10.18 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 stochastic risk modelling.

10.19 We have found that estimates for model uncertainty inputs have not always been generated in plans based on the range of outcomes of past projects, rather they have been generated using arbitrary percentage adjustments such as plus and minus 10%.

10.20 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 stochastic model can be reasonably used to quantify the risk exposure for the SBPs in CP7 for any more than an indicative estimate.

Conclusions on risk

10.21 We do not believe that the 'full' plan has sufficient risk provision to deliver in full in CP7. We therefore propose that Network Rail follows the 'risk-adjusted' plan which would yield approximately £2 billion for England & Wales. Recognising the anticipated levels of risk exposure in CP7 we believe further increases in the risk provision would be prudent. We are therefore recommending Network Rail use the funds released from our re-appraisal of efficiency & headwinds (see Table 9.5) to generate additional risk funding in the plan. This would add a comparatively small amount (approximately £0.15 billion) to the £2 billion funding from use of the risk-adjusted fund in England & Wales.

10.22 Similarly, risk funding of £206 million in Scotland is considered insufficient for CP7 given the risks we have identified above and the efficiency challenge. We are therefore recommending that, after increasing its expenditure on core renewals, the balance of any remaining funding is split between increasing the risk provision (i.e. so it is closer to the risk provision in CP6) and a targeted train performance fund for Scotland. For illustration, based on the 24 February interim plan the amount for risk funding would be around £100 million, taking risk-funding in Scotland to around £300 million. However, we anticipate these amounts will change as Network Rail Scotland evolves its plans and as assumptions on available funding change (e.g. due to updated inflation forecasts).

10.23 We will be monitoring Network Rail's draw-down of risk funds carefully during CP7. We are also expecting Network Rail to improve its financial risk modelling during CP7.

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 in 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, 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, 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. If they 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, it 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: bring the products into use; secure funding; arrange training; and update their methodologies.

Methodology

11.4 We have followed the general methodology described in the Methodology chapter. Any details specific to the methodology for RD&I, including technology adoption are set out below.

11.5 A key challenge for PR23 is to determine appropriate levels of funding for RD&I, ensuring that the allocated funds can be spent efficiently, in the context of overall funding for core renewals and maintenance.

11.6 As part of this review we have met with Network Rail's RD&I team and regions to gauge their views of proposed expenditure and priorities in this area.

Network Rail's plan

11.7 For CP7, the SBP includes RD&I spend of £148 million in England & Wales and £17 million in the interim SBP for Scotland (£165 million for GB overall). The breakdown of the £165 million spend is shown in Table 11.1.

Table 11.1 Breakdown CP7 RD&I direct investment

Funding component	Value £ million	Purpose
First-in-class	60	Accelerated regional first-in-class technology deployment in CP7, targeting productivity, safety, train performance and efficiency improvements.
CP6 roll-over programmes	9	Completion of the remainder of the highest priority UK R&D
Horizon 2020 (EU) rollover programmes and Europe's Rail Joint Undertaking (ERJU) 2nd call	11	Completion of the remainder of the highest priority EU R&D initiated during CP6, delivering solutions ready to be rolled out through CP7 and into CP8 via the First-in-class fund
International Research and Development Partners hip	10	Replacement for follow-on EU R&D – bilateral partnerships which generate co-funding opportunities to maximise value for-money from Network Rail R&D. Medium-term R&D deployed CP8 onwards, targeting productivity, safety and sustainability objectives.

UK Partnerships	5	As for International Partnerships but with UK arms-length bodies. Medium-term R&D deployed CP8 onwards.
Other Programmes follow-on	30	R&D component of other CP7 programmes (e.g., infrastructure manager fleet upgrade, 'Intelligent Infrastructure' follow-up, digital signalling), for deployment in CP7.
Remaining 'core' R&D	40	R&D between Rail Industry Readiness Level 1-6 aligned to regional and functional priorities captured during stakeholder engagement. Includes funding for the innovation culture change programme.
Total	**165**	

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

Findings

11.8 In CP6, RD&I expenditure has been well-managed to date and spent broadly in line with expectations.

11.9 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 be realised in CP8. However, we challenged Network Rail to ensure that any efficiencies which could be delivered within CP7 had been accounted for, bringing down the post-efficient expenditure in the regions' plans. Wherever possible, technology should be self-funded through the savings it produces, allowing SoFA funding to be targeted at other critical activities.

11.10 The SBP states that Network Rail is prioritising 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 stated as 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.

11.11 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.

11.12 We tested Network Rail on its engagement with the wider industry. Network Rail advised us that it had consulted stakeholders across Network Rail and the wider rail industry, 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.

11.13 Network Rail also reported that it is working with industry stakeholders and partners to leverage investment with £70 million of co-funding through cross-industry collaboration, aligned to Network Rail’s business and industry requirements, delivering value for money RD&I through collaborative programmes with other arms length bodies, academia and the private sector.

11.14 In April 2022 we published a Targeted Assurance Review (TAR) on Technology Adoption (link), which looked at seven case studies. We 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.

11.15 Our TAR recommended support to resolve breakdowns in communication between teams; establishing a company-wide culture around technology adoption; and more pragmatic use of "lessons learned".

11.16 Learning from experience in CP6 and taking on board our TAR recommendations, more than a third of the total RD&I funding (£60 million) will be targeted at a dedicated 'first in class' fund. This fund will be used to accelerate deployment of new knowledge, technology and innovation into business as usual, enabling benefit realisation as soon as possible.

11.17 We are supportive of Network Rail's 'innovation culture change programme' (included within the £40 million 'remaining core R&D' expenditure item). This aligns to our recommendation from our TAR in CP6 and we view this as a key enabler, to unlock more benefits from the total spend on technology in CP7. However, improving Network Rail's culture will require changes in the regions and 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 it.

Investment in Technology

11.18 As well as £165 million for RD&I in Technical Authority, the SBP included £1.2 billion of spend in other National Functions and regions, directly associated with technology. This is discussed in more detail in our PR23 draft determination: supporting document on National Functions and in the National Functions chapter above.

Conclusions on research, development and innovation including technology adoption

11.19 Our draft decision is that £165 million for the RD&I portfolio is a proportionate level of expenditure in CP7. This is an £104 million reduction from the £269 million in CP6, which reasonably reflects the overall constraints on funding and the need to prioritise core renewals and maintenance. We also recognise that this RD&I funding is only a small part of the spend on technology across the SBP.

11.20 Coordination of RD&I activities with other bodies such as RSSB will be essential to avoid duplication and to share efforts and funding wherever possible.

11.21 All regions have discussed the need for technology in their plans. However, we concluded that there was a lack of explicit agreement between regions and National Functions on the priorities, required outputs, budget or timelines for technology projects. We expect to see clearer agreement between National Functions and regional plans on the technology workbank for CP7 in Network Rail's delivery plan. We also expect Network Rail to take all available opportunities to self-fund technology in CP7, through efficiencies within the control period. We have outlined our concerns about technology adoption and scoping of technology projects in the National Functions chapter.

11.22 Should regions identify a business case to increase RD&I funding during CP7, then they have flexibility to allocate budget from their own resources to do so. We consider that this is reasonable, but we expect the Technical Authority to report clearly on any such reprioritisation during CP7 – in particular given the concerns we have identified in the Maintenance and Renewals chapter, about the need to prioritise expenditure on core assets.

11.23 Although Network Rail describes how it will work with third-party organisations, limited detail is provided in the SBP. We expect Network Rail to provide supplementary information in the delivery plan.

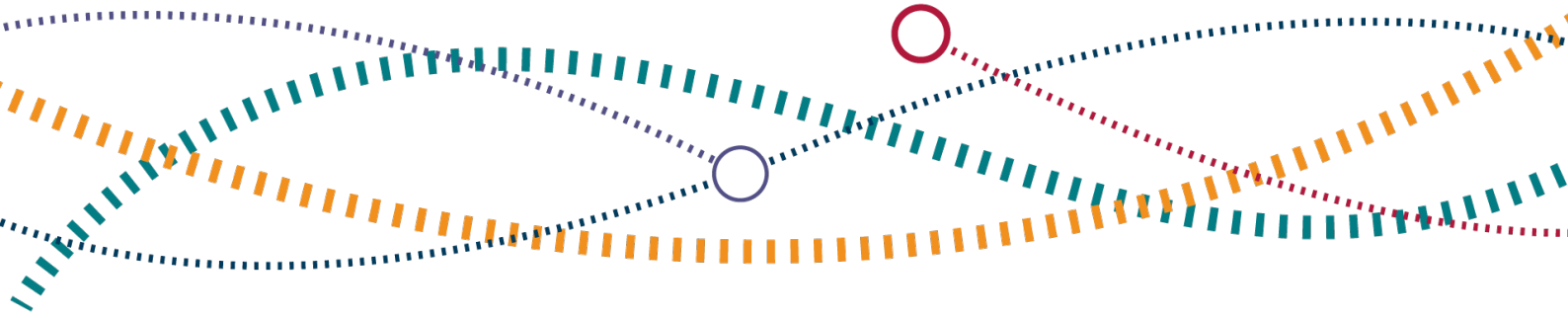
11.24 We support Network Rail's proposed 'first in class' fund and 'innovation culture improvement programme'. This aligns to our recommendations during CP6, that both National Functions and regions require additional support in adopting technology and delivering benefits.

OFFICE OF RAIL AND ROAD

PR23 draft determination:

Supporting document – sustainable and efficient costs: Part III

15 June 2023



About this document

This document details our technical assessment and findings on sustainable and efficient costs for our 2023 periodic review draft determination. This cost assessment document (Part III) comprises the technical annexes providing supporting information to our Part II detailed finding cost assessment document.

1. Annex A – additional details of ORR's methodology

Types of investigation undertaken in CP6

Targeted Assurance Reviews (TARs)

1.1 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 more than 24 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.

1.2 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

1.3 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.

1.4 Network Rail is involved in the scoping and delivery of all Independent Reporter studies and we will typically publish the reports on our website.

1.5 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

1.6 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.

1.7 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

1.8 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 in the 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.

1.9 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.

2. Annex B – Maintenance and Renewals planning

2.1 In this annex we explain specific elements of Network Rail's asset management processes and terminology, which we have referred to in our Part II report. Maintenance planning in Network Rail's regions.

2.2 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 TA which has responsibility for setting the company policy and developing the processes, standards and procedures, decision-support tools and monitoring technology for maintenance.

2.3 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 set out, below:

(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 of an external event (e.g., pumping water after heavy rain).

2.4 Further details of on maintenance within Network Rail can be found in our Targeted Assurance Report Network Rail's Approach to Maintenance - Targeted Assurance Review (orr.gov.uk)

Reporting of maintenance effectiveness

2.5 In this section we set out an overview of how the effectiveness of maintenance is to be reported against in CP7.

2.6 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.

2.7 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.

2.8 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 2.2 provides an example of CP6 year 5 periodic reporting against this measure.

Table 2.1 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

2.9 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 (orr.gov.uk). And whilst this

review only looked at one asset area, we consider that our findings are applicable to others.

2.10 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

2.11 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 (orr.gov.uk).

2.12 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.

2.13 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.

2.14 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.

2.15 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.

2.16 The involvement of the train operating companies will be critical going forward with equipment needing to be placed on their rolling stock.

2.17 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.

2.18 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

2.19 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.

2.20 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.

2.21 In 2021 we published a review of Network Rail's management of these activities. On-track machines (OTM) Stoneblower & tamping management - Targeted Assurance Review (orr.gov.uk).

2.22 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.

2.23 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.

2.24 We saw variability of the role of the Route On-track Machine 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.

2.25 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.

2.26 Regions have proactively built their own degradation models to support this decision making. However, the new 'enhanced decision support tool', supplied by the Technical Authority (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.

2.27 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 On-Track Machine 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

2.28 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.

2.29 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.

2.30 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.

2.31 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 (orr.gov.uk). 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

2.32 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.

2.33 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 (orr.gov.uk).

2.34 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.

2.35 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.

2.36 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.

2.37 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).

2.38 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

2.39 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.

2.40 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.

2.41 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 (orr.gov.uk) 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.

2.42 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.

2.43 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 (orr.gov.uk); and drainage maintenance Drainage Maintenance - Targeted Assurance Review - 25 May 2021 (orr.gov.uk). 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).

2.44 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.

2.45 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.

2.46 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.

2.47 In April 2022 we published a TAR on technology adoption Technology Adoption Case Studies - Targeted Assurance Review (orr.gov.uk). 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.

2.48 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.

2.49 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 Part II 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.

2.50 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.

3. Annex C – Summary of regional delivery operating models for CP7

Eastern

3.1 **Overview:** The Eastern Region has implemented an agile delivery model that integrates the overarching partnership agreement with their organization. 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.

3.2 **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.

3.3 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:

3.4 **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.

3.5 **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.

3.6 **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

3.7 **Overview:** North West & Central for CP7 is planning to integrate its organization and delivery model through an internal enterprise approach that incorporates

elements of Project 13 principles, including capable owner, governance, and organization. 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

3.8 **Key components:** The commercial strategy for CP7 takes cognizance 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.

3.9 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:

3.10 **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.

3.11 **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

3.12 **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.

3.13 **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.

3.14 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:

3.15 **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.

3.16 **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.

3.17 **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 realization of this new approach.

Southern

3.18 **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.

3.19 **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 incentivized to deliver on planned efficiencies with profit linked to performance against the planned volumes.

3.20 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:

3.21 **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.

3.22 **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.

3.23 **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

3.24 **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.

3.25 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.

3.26 **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 have 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:

3.27 **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.

3.28 **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.

3.29 **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.

4. Annex D – Composite Reliability Index (CRI)

4.1 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.

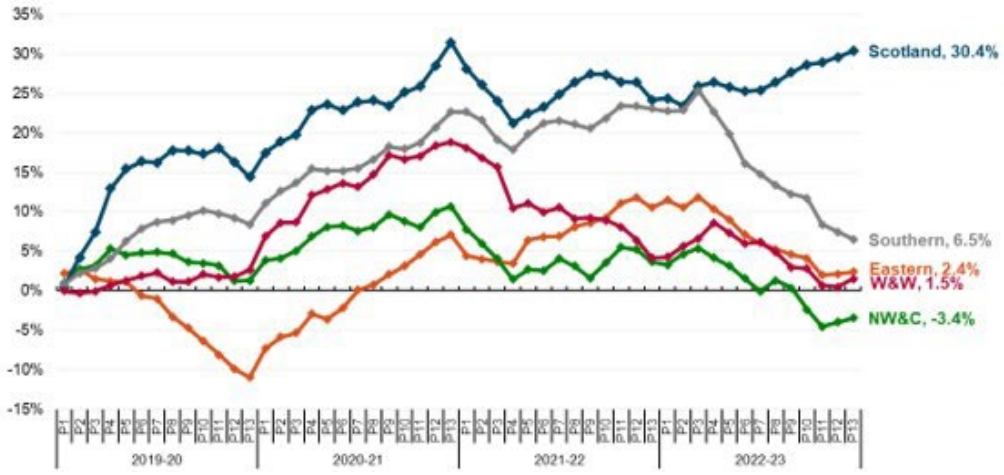
4.2 CRI in CP7 will be reported as the weighted measure of the percentage improvement in asset reliability compared to a 2023/24 baseline. CRI uses different weights for each “route criticality band” and “asset category” to differentiate between high and low impact failures, e.g.;

(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 7x the impact of failures on Band 5 sections.

4.3 Figure 4.1 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 4.1 Long-term CRI performance by region



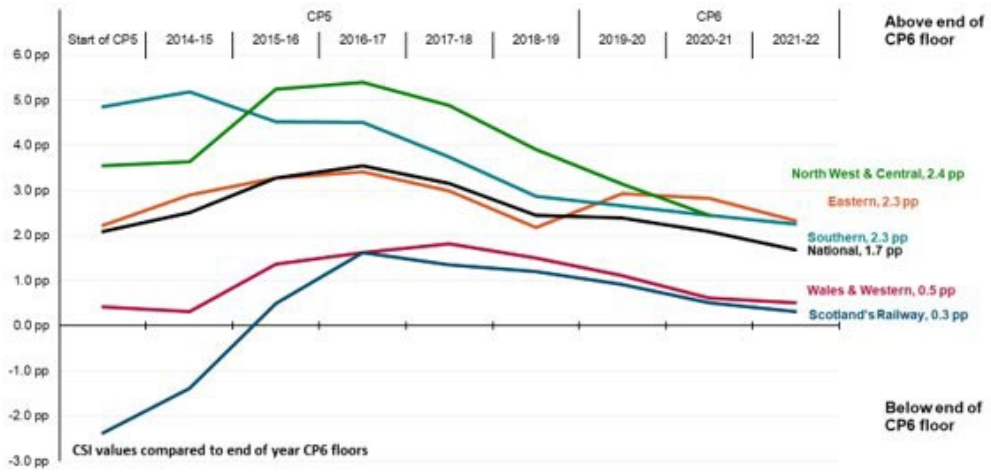
Source: Network Rail

5. Annex E – Composite Sustainability Index

5.1 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.

5.2 Figure 5.1 shows the relative CSI changes by region since the start of CP5.

Figure 5.1 Performance of Regions vs end of CP6 regulatory floor



Source: Network Rail

5.3 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.

5.4 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.

5.5 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.

5.6 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.

5.7 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

5.8 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.

5.9 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

5.10 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.

5.11 The asset groups included within the CSI calculation are: track, lineside, signalling, level crossings, structures, earthworks, drainage, operational property, electrification and plant and telecoms.

5.12 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.

5.13 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.

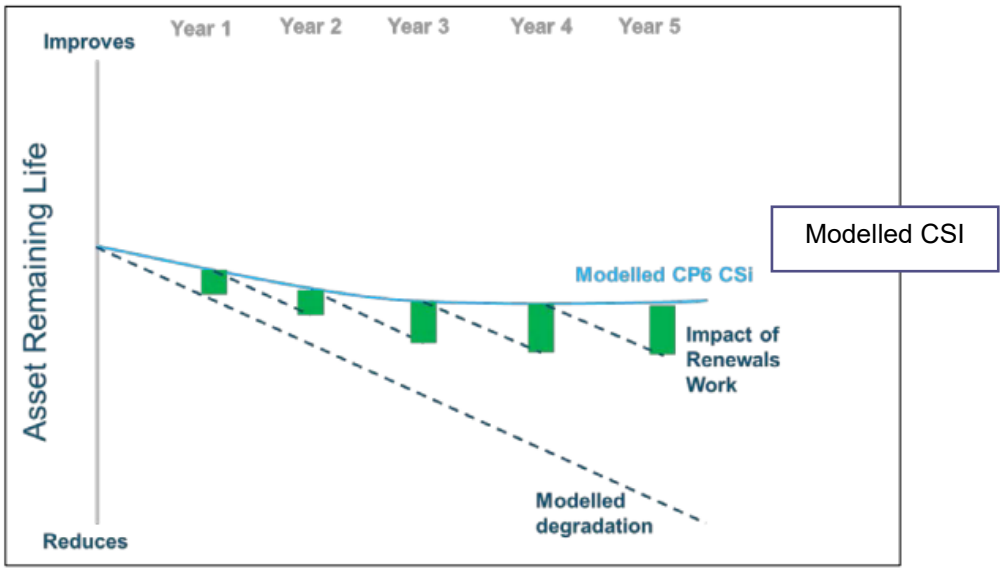
Calculating CSI

5.14 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.

5.15 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.

5.16 Figure 5.2 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 5.2 CSI How the Measure Works



Source: Network Rail

5.17 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.

5.18 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

5.19 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.

5.20 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.

5.21 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.

5.22 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

5.23 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.

5.24 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 (orr.gov.uk). The report further noted that CSI should be complemented by nearer-term tactical performance indicators including the Composite Reliability Index and Service Affecting Failures.

5.25 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.

6. Annex F – Further detail on WCML(N)

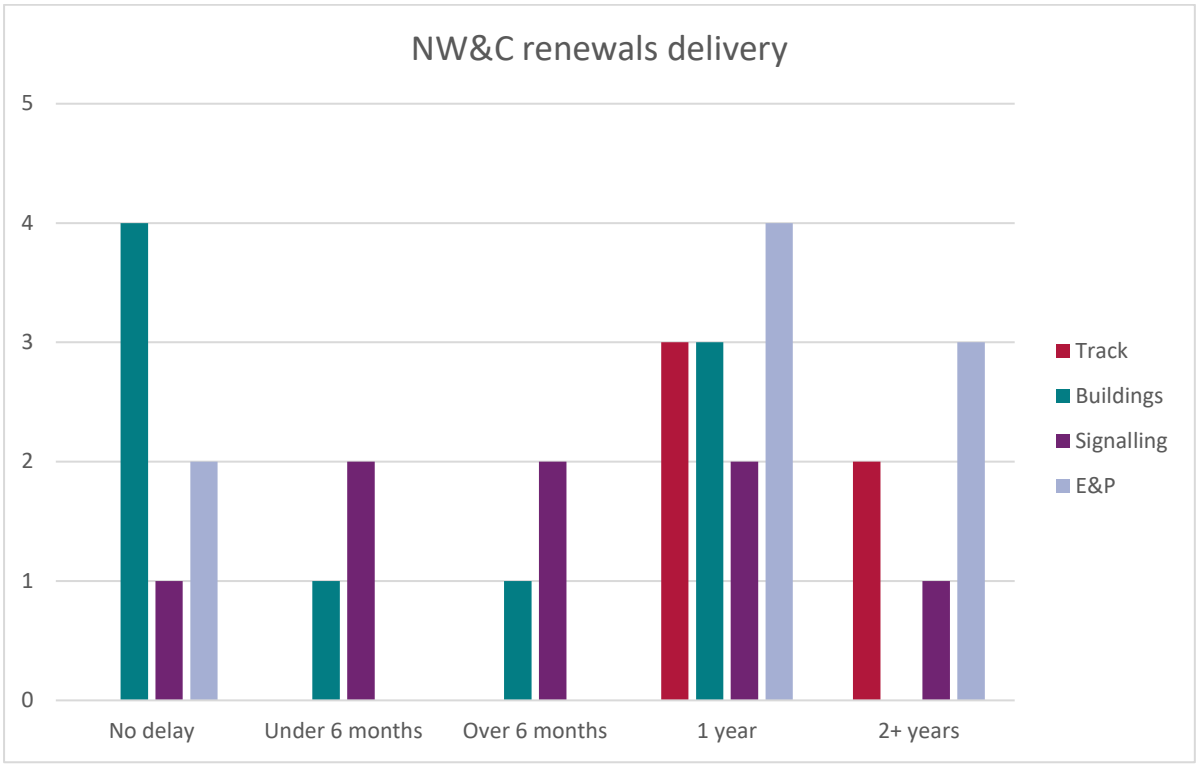
6.1 In this annex we provide further details on one of the options to release funding for expenditure on core renewals (as discussed in Part I and Part II of our cost assessment documents). This option relates to some of the works on the West Coast Mainline (North) – hereafter WCML(N). We have included this as an annex, to provide further detail on the evidence and analysis, which support our conclusions in Part I and Part II of our cost assessment documents.

6.2 Network Rail included £1.2 billion in its SBP for WCML(N) renewals. We have analysed the data sets which are set out in this annex. On this basis we have proposed an option to reduce funding for WCML(N) by £300 million to £900 million. The proposed £300 million reduction represents 25% of the funding requested and is supported by our analysis set out below. This is considered a stretching but realistic level of funding for CP7 which can be achieved by reprofiling some of the works into CP8.

6.3 Since the third year of CP6, Network Rail has been providing us with quarterly data on a sample of live renewals projects. This has produced a database of 491 projects, with a total forecast spend of £5.5 billion, representing roughly half of the renewal spend for the second half of CP6. This database covers all asset types, in all regions and includes data on cost changes, schedule changes, scope changes and text explaining the reason behind any changes.

6.4 We have reviewed the data for renewals in North West & Central, focusing on the asset types relevant to WCML(N). Figure 6.1 shows the difference between the baseline delivery date and the latest update. More than 50% of renewals were delayed by 1 year or more and around 20% by 2 years or more. We have reviewed the reasons for these delays and it is important to note that many were due to factors outside the project's control. Examples include schedule or scope changes on inter-dependent projects (including HS2), or difficulties securing access (in particular, opportunities for longer blockades are limited on the WCML).

Figure 6.1 North West & Central renewals delivery – count of projects with delays of different durations

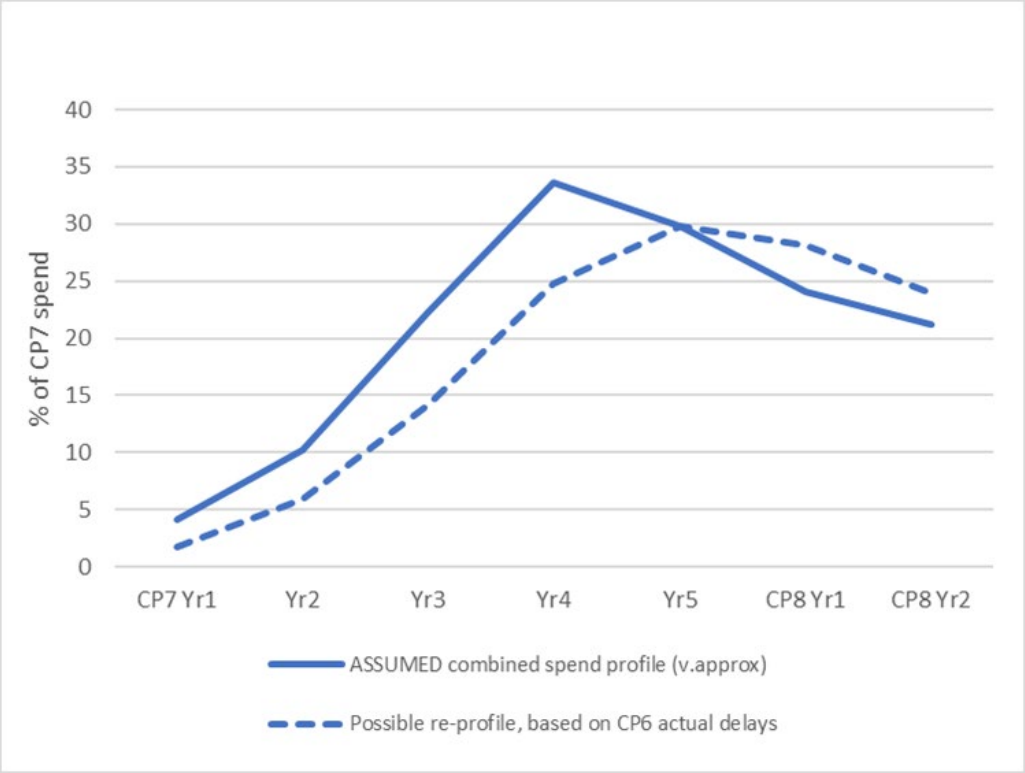


Source ORR analysis

6.5 We asked Network Rail to self-select its "highest priority" projects. So, there may be some sampling bias, but we would expect these projects to be less likely to get delayed or cancelled than other, lower priority projects. Importantly, these projects are representative of the spend, complexity and priority of WCML(N).

6.6 Network Rail is still developing the Outline Business Cases and detailed plans for Crewe and WCML(N), but it has provided an initial deliverability assessment, including start and end dates for the key work packages. Assuming a typical profile of spend for each of these packages, we have tried to estimate the profile of spend in CP7. We have then carried out a basic sensitivity analysis, to determine the possible slippage if these renewals faced similar delays to those in CP6. Figure 6.2 shows an example from this analysis. This basic sensitivity analysis indicated that between 20-30% of CP7 spend might slip into early CP8.

Figure 6.2 ORR's sensitivity analysis of impact of project slippage



Source ORR analysis

6.7 **Delivery of enhancements in Northwest & Central in CP6:** Network Rail plans to deliver the renewals at Crewe and WCML(N) as large programmes of work, in the order of £100 million to £450 million. The governance of renewals is different to enhancements (e.g. different client, different processes for approving changes etc) but the skills and experience required to manage projects or programmes of this size are similar. Therefore, we also reviewed delivery of enhancements in North West & Central in CP6. There have been several enhancements projects in this region with delays similar to the renewals discussed above (12-18 months). Again, many of the causes of these delays were outside of the projects' control, e.g., schedule or scope changes on other, inter-dependent projects. This supports the assumption that these programmes may experience slippage into CP8.

6.8 **Progress on early development of these programmes:** Through our regular engagement with Network Rail projects, we are aware that WCML(N) renewals and related enhancements are already facing delays to development milestones. For example, the Outline Business Case for WCML(N) was originally expected at the beginning of 2023, but is now expected in Summer 2023. Again, there are valid reasons for these delays and we support Network Rail taking the time to

produce a robust plan, but these delays further support the assumption that programmes may slip from CP7 into CP8.

6.9 **Network Rail's own deliverability assurance:** This document, included in its SBP, noted "a number of issues that may be considered minor in isolation, but when taken as a whole became material and prevented the region securing a 'Mature' grade". These issues included access, interaction between renewals and other projects (including HS2 and ETCS) and slippage of works from CP6 into CP7. These observations align to ORR's own observations about deliverability challenges, discussed above.

6.10 **WCML(N) deliverability report:** Network Rail's SBP included a 'Strategic Deliverability Review' specifically for WCML(N), which looked at factors such as competing demands on the supply chain and the length of blockades which might be necessary to deliver the renewals. This report demonstrates that it is possible to deliver the full CP7 plans and we do not dispute the methodology used, but there could still be delays due to other factors not covered in the report, e.g. delays or scope changes on inter-dependent enhancements, loss of access due to reactive works or negotiations with operators and neighbours, extreme weather etc.

6.11 **New operating model for CP7**: The SBP outlines North West & Central's new Intelligent Client Operating Model (see Part III, Chapter 3) which is intended to improve on cost and schedule challenges in CP6. We have summarised this model in 2.18 to 2.21. The approach appears to be reasonable and we recognise the potential for this to prevent some of the avoidable delays seen in the CP6 data. We note that it is a new model, so will take time to embed and there is uncertainty around the level of improvement it will deliver. Network Rail's own deliverability assurance similarly recommends further work to demonstrate this. Furthermore, this new operating model cannot prevent delays caused by external factors, e.g. inter-dependent enhancements, etc.

6.12 In proposing a reduction in WCML(N) funding, we must also consider the possibility that the schedule slips from CP7 into CP8, but costs also increase, counteracting some of the £300 million reduction (discussed in Part II, in the Maintenance and Renewals chapter). Our CP6 data indicates that cost increases against baselines were similar in North West & Central to the national average (c.5%) and this is an area where Intelligent Client Operating Model should be able to provide more certainty.

7. Annex G – ORR's Cost Benchmarking

Introduction and summary

7.1 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.

7.2 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).

7.3 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.

7.4 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.

7.5 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.

7.6 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.

7.7 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.

7.8 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.

7.9 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.

7.10 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.

7.11 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.

7.12 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.

7.13 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.

7.14 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

7.15 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.

7.16 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.

7.17 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.

7.18 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.

7.19 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

7.20 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.

7.21 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.

7.22 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.

7.23 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.

7.24 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

7.25 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

7.26 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.

7.27 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.

7.28 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

7.29 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.

7.30 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.

7.31 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.

7.32 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.

7.33 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.

7.34 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

7.35 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.

7.36 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.

7.37 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.

7.38 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).

7.39 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.

7.40 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

7.41 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.

7.42 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).

7.43 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 7.1 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
NWC	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
W&W	0.87	1.00	0.96	0.82	13	0	4	18
E&W	**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**

7.44 Table 7.1 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 7.2 Efficiency gap 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
NWC	0.67	0.83	0.9998	33	17	0.02
Southern	0.74	0.89	0.9998	26	11	0.02
W&W	0.68	0.84	0.9998	32	16	0.02
E&W	**0.70**	**0.86**	**0.9998**	**30**	**14**	**0.02**
Scotland	**0.83**	**0.996**	**0.9998**	**17**	**0.4**	**0.02**

7.45 Table 7.2 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 7.3 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
NWC	0.69	0.82	0.999	31	18	0.1
Southern	0.76	0.89	0.999	24	11	0.1
W&W	0.69	0.82	0.999	31	18	0.1
E&W	**0.74**	**0.87**	**0.999**	**26**	**13**	**0.1**
Scotland	**0.90**	**1.00**	**0.999**	**10**	**0**	**0.1**

7.46 Table 7.3 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 7.4 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%
Southern	559	1,447	1,178	-269	-19%
NWC	592	1,523	1,376	-147	-10%
W&W	383	756	696	-60	-8%
E&W	**2,319**	**5,206**	**4,731**	**-475**	**-9%**
Scotland	**281**	**551**	**476**	**-75**	**-14%**
GB average	2,600	5,757	5,207	-550	-10%

7.47 Table 7.4 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 H – Glossary of terms

Term/Acronym	Definition
AEFA	Annual Efficiency and Finance Assessment
BoE	Bank of England
BTP	British Transport Police
CAGR	Compound annual Growth Rates
CAPEX	Capital Expenditure
CCTV	Closed Circuit TV
CEPA	Cambridge Economic Policy Associates
CFO	Chief Financial Officer
CP6	Control Period 6
CP7	Control Period 7
CP11	Control Period 11
CPI	Consumer Price Index
CRI	Composite Reliability Index
CSI	Composite Sustainability Index
CSR	Comprehensive Spending Review
DfT	Department for Transport
DST	Network Rail's own decision support tool models
E&P	Electrification & Plant
E&W	England & Wales
EC4T	Electric Current for Traction
ECDP	East Coast Digital Programme

Term/Acronym	Definition
EE	Europe Economics
ESD	Electrical Safety Delivery
ETCS	European Train Control System
FTE	Full Time Equivalent
FY23/24	Financial Year 2023/2024
GB	Great Britain (England, Scotland and Wales)
GBR	Great British Railways
GBRTT	The Great British Railways Transition Team
GRIP	Governance for Railway Investment Projects
HLOS	High Level Output Specification
HO	High Output
HR	Human Resources
HS2	High Speed 2
IPDR	Industry Partnership Digital Railway
IR	Independent Reporter
ITTS	Industry Timetabling Technical Strategy
KPI	Key Performance Indicator
LTDP	Long Term Deployment Plan
M&R	Maintenance and Renewals
MDU	Maintenance Delivery Units
MOU	Memorandum Of Understanding
MTR	MTR Crossrail
MVP	Minimum viable product plan

Term/Acronym	Definition
NW&C	North West & Central
OBR	Office of Budget Responsibility
OLE	Overhead Line Electrical
OPEX	Operational Expenditure
OSMR	Operation, Support, Maintenance and Renewal
OTTO	Optimised Train Track Operations
PACE	Project Acceleration in a Controlled Environment
PIMS	Performance Improvement Management System
PPA	Power Purchase Agreements
PPF	Putting Passengers First
PR23	2023 Periodic Review
RAIB	Rail Accident Investigation Branch
RD&I	Research Development and Innovation
RF9	Delivery plan reforecast, at railway Period 9
RIRL	Rail Industry Readiness Level
RM3P	Risk Management Maturity Model for Performance
RNEP	Rail Network Enhancement Plan
RPI	Retail Price Index
RS	Route Services
RSSB	Railway Safety and Standards Board
SAF	Service Affecting Failures
SBP	Strategic Business Plan
SBT	Science Based Targets

Term/Acronym	Definition
SCO	Supply Chain Operations
SEU	Signalling Equivalent Units
SFI	Safer Faster Isolation
SoFA	Statement of Funds Available
SPEED	Swift, Pragmatic and Efficient Enhancement Delivery
STF	Safety Task Force
TA	Network Rail Technical Authority
TARs	Targeted Assurance Reviews
TEICR	Traction Electricity, Industry Costs and Rates
TPCMS	Traction Power Centralised Management System
TRU	Transpennine Railway Upgrade
W&W	Wales & Western
WCML(N)	West Coast Main Line (North)
WRCCA	Weather Resilience and Climate Change Adaption
ZEV	Zero Emission Vehicle

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