3. Output framework

Key messages in this chapter

- The output framework consists of outputs which Network Rail must deliver for the money it receives, indicators which we use for monitoring purposes and 'enablers' which assess the capability of the company in both the short and long-term.
- The crucial difference in terms of regulation between outputs and enablers / indicators is that if Network Rail is likely to fail, or fails, to deliver an output we would consider whether this amounts to a licence breach and we may take enforcement action against the company (outputs are often referred to as 'regulated outputs'). A failure to deliver either an enabler or an indicator would not in itself be considered as a potential licence breach. However, either may indicate trends which raise concern about Network Rail's likely future compliance with an output that we may want to take licence enforcement action to address.
- We have set challenging but achievable outputs in areas that matter most to passengers and freight customers.
- There will be a new health and safety output that will reduce risk at level crossings and more level crossings will be closed.
- We are significantly strengthening the requirements on Network Rail to improve the management of its assets. There will be specific quality standards for the company's knowledge of its assets and requirements to improve its asset management capability.
- A major programme of improvement works will transform travel in and between urban areas, with existing major projects such as Crossrail, the Edinburgh to Glasgow improvement programme and Thameslink completed and the completion of new projects such as the electrification of the Welsh Valley Lines (covered in detail in chapter 9).
- There will be an output to achieve 92.5% of passenger trains on time by 2019, despite growing passenger and freight demand. The focus will be on improving services in the worst performing areas, with a new output for all but two franchised train operating companies in England & Wales to have at least nine out of ten trains on time by 2019. Two companies, Virgin Trains and East Coast will have a dual PPM and CaSL target, reflecting concerns about the impact of long delays on passengers on these routes. We have also added a minimum 88% PPM requirement for First Great Western high speed services, in addition to the nine out of ten output for all the services it runs.
- There will be a new output for freight train service performance, with 92.5% of freight trains to be on time, as measured by the freight delivery metric.

Key messages in this chapter (continued)

- Disruption to passengers will fall by 8%, and disruption to freight customers will be 17% lower at the end of the control period than it is today. Because of the large programme of improvement works on the network, there may be increased local and short-term disruption, but this will be kept to a minimum.
- We expect Network Rail to set itself ambitious environmental targets, with challenging carbon reduction trajectories and a greater focus on making assets resilient to climate change and extreme weather.
- There will be new enablers which will help us assess Network Rail's customer service, its management of large investment programmes and its 'system operator' capability - how well it plans capacity and manages the use of capacity on the infrastructure.
- We will monitor new indicators, including right time performance, average lateness, asset condition, passenger satisfaction, journey time (average speed) and the availability of a cross-border service between England and Scotland.
- We are introducing a change control mechanism to potentially adjust Network Rail's passenger train service performance outputs if franchises are let with train service performance requirements that are materially inconsistent with the outputs we set.
- This determination will considerably improve transparency by requiring more and better quality information to be made publicly available in an accessible format.
- The output framework is extensive, reflecting the complexity of the rail network, the scale of the investment being made and the expectations of its customers and funders that what they are paying for will be delivered. Compared to CP4, we have decreased the number of performance outputs (removing sector level outputs) and added asset management outputs (to strengthen the requirement on Network Rail to improve the management of its assets).
- We have set 58 outputs and given passenger operators and Network Rail the flexibility to agree further annual outputs for punctuality (PPM) and cancellations (CaSL). We do not consider that our monitoring of indicators presents a burden on Network Rail, as we would expect that it would already be collecting this information. The indicators for CP5 will help us to identify emerging issues with the delivery of outputs in time to take appropriate steps where necessary.

Structure of this chapter

3.1 This chapter is structured as follows:

(a) the **introduction** explains the choices and considerations involved in setting outputs, the wider framework, and the process for setting the framework in CP5. It then summarises the main outputs we have set;

(b) the **HLOS** section very briefly summarises the requirements that the governments set out in 2012;

(c) the **outputs consultation** section explains the rationale behind the output framework we consulted on in August 2012, and the differences from the CP4 output framework;

(d) the **responses to our outputs consultation** section summarises the feedback we received on our outputs consultation;

(e) the **Network Rail's proposals** section outlines how the output framework put forward in Network Rail's SBP differed from that in our consultation;

(f) the **our decisions** section outlines our draft determination proposals and consultation feedback, and confirms the outputs, indicators and enablers we are setting for CP5; and

(g) the **next steps** section explains how the periodic review process concludes.

Introduction

Choices around outputs

3.2 We need to decide what Network Rail should deliver – what are the company's outputs in return for the money it receives? Currently these outputs are set in terms of areas such as train service reliability (including the percentage of trains arriving on time), the delivery of enhancement projects and reducing disruption to passengers from engineering work.

3.3 Having decided what areas we should set outputs for, we then need to decide the level at which the output should be set and the time period for which the output should apply (e.g. should there be a different requirement for each year?). There is a further choice about the level of disaggregation – do we set outputs for, say, the whole of England & Wales, or should we also set outputs at the level of the route or train operator. Finally, we need to decide whether there should be a change control process to allow outputs to be amended during CP5 in certain circumstances.

3.4 We want to set outputs in the areas that matter most to passengers and freight customers, but we also need to take into account wider factors. Just setting more and more outputs is not necessarily a good thing as it may constrain Network Rail so far that it increases the risk the company faces and potentially increases costs. We also want to give Network Rail flexibility to work with the industry to deliver in a way which maximises value for money.

The output framework

3.5 In this control period, CP4, we have defined outputs but we have also defined indicators which we use for specific monitoring purposes. For example, we have asset

condition indicators to make sure that Network Rail is not meeting its outputs by storing up problems for the future by 'sweating the assets'.

3.6 In CP4 we also defined 'enablers' which assess the company's capability to deliver future improvements (i.e. not just within, but beyond, the current control period) in outputs and / or efficiency.

3.7 It is this combination of outputs, indicators and enablers that we call the output framework.

3.8 The crucial difference in terms of regulation between outputs and enablers / indicators is that if Network Rail is likely to fail, or fails, to deliver an output we would consider whether this amounts to a licence breach and we may take enforcement action against the company (outputs are often referred to as 'regulated outputs'). A failure to deliver either an enabler or an indicator would not in itself be considered as a potential licence breach. However, either may indicate trends which raise concern about Network Rail's likely future compliance with an output that we may want to take licence enforcement action to address.

3.9 In its response to our draft determination consultation, Network Rail said "The volume of output, indicators and enabler measures being monitored in the proposed framework is extensive. ORR describes the draft determination as a package but ORR proposes to regulate each element of the package. In total, we estimate that around 3,700 measures will be monitored by ORR on a routine basis".

3.10 The output framework is indeed extensive. This reflects the complexity of the rail network, the scale of the investment being made and the expectations of its customers and funders that what they are paying for will be delivered. Compared to CP4, we have decreased the number of performance outputs (removing sector level outputs) and added asset management outputs (to strengthen the requirement on Network Rail to improve the management of its assets).

3.11 We do not consider that our monitoring of indicators presents a burden on Network Rail, as we would expect that it would already be collecting this information. The indicators for CP5 will help us to identify emerging issues with the delivery of outputs in time to take appropriate steps where necessary. We take a proportionate, risk based approach to monitoring and where we are assured risks are well managed during CP5 we would expect to monitor less.

The process for setting the output framework

3.12 The process for setting the output framework started with the advice we provided to the Scottish Ministers and the Secretary of State in March 2012. Following this:

(a) in June/July 2012, the HLOSs were published;

(b) in August 2012, we published our outputs consultation;

(c) in January 2013, Network Rail published its SBP;

(d) in June 2013, we published our draft determination;

(e) in October 2013, this final determination was published;

(f) in December 2013, Network Rail will publish its draft delivery plan; and

(g) in March 2014, Network Rail will publish its final delivery plan.

Brief summary of the CP5 outputs

3.13 Because this has been an extended process, in some ways it is easier to briefly describe our decisions, and then describe each stage for getting to this point. For CP5 we have again developed a framework based on outputs, indicators and enablers. Our decisions are summarised in Tables 3.1 and 3.2 (the full output framework is shown in Table 3.12).

3.14 The rest of this chapter describes each stage of the process for setting outputs, leading to more detail on our decisions, then describes how the process concludes.

3.15 All national outputs include franchised and open access operators.

Table 3.1: Summary of our decisions on CP5 outputs

Area	Outputs
Train service reliability	• PPM[71] for England & Wales (annual[72] and CP5 exit of 92.5%), Scotland (annual 92% and CP5 exit of 92.5%) and franchised TOCs in England & Wales (rolling annual output JPIP[73], no TOC to exit CP5 below 90%, except East Coast and Virgin who must not exit CP5 with PPM below 88% or CaSL above 4.2% and 2.9% respectively). In addition First Great Western high speed services must not exit CP5 with PPM below 88% • CaSL[74] for England & Wales (annual and CP5 exit of 2.2%) and rolling annual output JPIP • Freight Delivery Metric[75] (National annual 92.5%)
Enhancements	• Enhancement projects to be delivered. Scheme delivery milestones (set in an enhancements delivery plan). Milestones for delivery of projects in ring-fenced funds. • Development milestones for early stage projects

[71] Public performance measure (PPM) is the proportion of trains that arrive at their final destination on time. A train is defined as on time if it arrives within five minutes of the planned destination arrival time for London & South East and regional services; or ten minutes for long distance services.

[72] See Table 3.5 for annual PPM outputs.

[73] JPIPs are joint performance improvement plans.

[74] CaSL (Cancellations and Significant Lateness) is a combined measure of punctuality and reliability. It is a percentage measure of scheduled passenger trains which are either cancelled (including those cancelled en route), miss one or more scheduled stops or arrive at their scheduled destination 30 or more minutes late.

[75] Freight Delivery Metric (FDM) measures the percentage of freight trains arriving at their destination within 15 minutes of scheduled time. It only covers delay caused by Network Rail.

Area	Outputs
Health and safety	• Network Rail required to deliver a plan to maximise the reduction in risks of accidents at level crossings, using a £99m ring-fenced fund [76]
Network availability[77]	• PDI-P (National CP5 exit of 0.58) • PDI-F (National CP5 exit of 0.73)
Network capability	• Base requirement at start of CP5 in terms of track mileage & layout, line speed, gauge, route availability, electrification type[78]
Stations	• Station Stewardship Measure (SSM) by station category, and Scotland (annual)[79]
Asset management[80]	• Asset management excellence model (AMEM) capability for each core group at National level • Asset data quality for each asset type at National level • Milestones for ORBIS (Offering Rail Better Information Services)

3.16 The differences between our draft and final determination are:

(a) Annual PPM (England & Wales) – our draft determination proposed the annual PPM outputs outlined in Table 3.4. In our final determination we have decided to set the annual PPM outputs outlined in Table 3.5; a reduction in the PPM required in the first three years of CP5.

(b) TOC PPM – our draft determination proposed no TOC should exit CP5 with PPM below 90%. In our final determination we have decided this output will exclude East Coast and Virgin, who must not exit CP5 with PPM below 88% or CaSL above 4.2% and 2.9% respectively. We have also added a minimum 88% PPM output for First Great Western high speed services.

(c) PDI – our draft determination proposed a PDI-P target of 0.539 and a PDI-F target of 0.593. In our final determination we have decided to set a PDI-P target of 0.58 and a PDI-F target of 0.73 at the end of CP5.

(d) Health and safety – our draft determination proposed that Network Rail should deliver a plan to maximise the reduction in risks of accidents at level crossings,

[76] Note safety is not a devolved responsibility so all safety related outputs, indicators and enablers apply to England, Wales and Scotland.

[77] The Possession disruption index – passenger (PDI-P) and Possession disruption index – freight (PDI-F) measure the level of disruption caused by planned engineering possessions over a period of time.

[78] This output provides for a minimum level for the whole network. The capability of some parts of the network will improve during CP5 as a result of the enhancement programme.

[79] See Table 3.5 for outputs.

[80] See 'Our decisions on asset management' section for outputs.

using a £67m ring-fenced fund. In our final determination we have decided to increase this ring-fenced fund to £99m.

3.17 The reason for each change is explained in the 'our decisions' section.

Table 3.2: CP5 output framework – summary of indicators and enablers

Area	Indicators	Enablers (these support all output areas)
Train service reliability	• PPM: sector and sub-operator[81] • Right-time performance[82]: England & Wales, Scotland, sector, TOC and sub-operator • Average lateness[83]: England & Wales, Scotland, sector, TOC and sub-operator • CaSL: Scotland, sector and sub-operator • Delay minutes, split by category (including Network Rail on TOC, TOC on self and TOC on TOC): for National, England & Wales, Scotland, sector, Network Rail route and TOC • FDM by strategic freight corridor • Freight delay minutes (national) • Scotland KPI package[84]	• Safety management maturity (Railway Management Maturity Model – RM3) • System operator capability • Programme management capability (P3M3[85]) • Customer service maturity
Enhancements	• Enhancement fund KPIs (e.g. average scheme benefit cost ratios) • Improved governance processes for HLOS funds • Project activities and milestones	
Depots	• Light Maintenance Depot Stewardship Measure: England & Wales, Scotland and National	
Asset management	• Asset condition for robustness and sustainability at National and route level • AMEM lite capability at route level • Renewal and maintenance volumes by asset type and spend at National and route level	

[81] Sub-operators are a subset of operators' services, consisting of an aggregation of service groups, most commonly used for performance analysis purposes.

[82] Right-time performance measures the percentage of trains arriving early or within 59 seconds of schedule.

[83] Average lateness measures the number of minutes late a train is at destination and key intermediate points along its route, including an allowance for cancellations.

[84] See section 3.84.

[85] P3M3 is the Cabinet Offices' Portfolio, Programme, and Project Management Maturity Model.

Area	Indicators	Enablers (these support all output areas)
Environment	• Scope 1[86] and 2[87] traction and non-traction carbon dioxide emissions: England & Wales and Scotland • Carbon embedded in new infrastructure • Sustainable development KPIs	
Other	• Passenger satisfaction • Journey time (average speed) at England & Wales, Scotland, sector, TOC and sub-operator • Cross-border service availability	

3.18 The differences between our draft and final determination are:

(a) Carbon intensity – our draft determination proposed a carbon intensity indicator. In our final determination we have decided that carbon intensity will not be an indicator in CP5.

(b) Programme management capability – our draft determination said that we would agree a metric to measure Network Rail's programme management capability. In our final determination we have decided we will use P3M3 as an enabler for baselining and measuring project, programme and portfolio management maturity.

3.19 The reason for each change is explained in the our decisions section.

The HLOSs

3.20 The HLOSs[88] are a 'given' and where appropriate their requirements have been included as outputs in this determination.

3.21 The Secretary of State's HLOS included a requirement for PPM in England & Wales to reach 92.5% (MAA[89]) by the end of CP5, funding for a number of enhancement projects to be delivered, and funding for ring-fenced funds to deliver certain strategic objectives, such as station improvements. There was also the option for PPM to be higher, and CaSL lower: "if the ORR determines this is value for money and can be affordably achieved without compromising delivery of other HLOS requirements".

[86] Scope 1 carbon dioxide emissions result from activities directly under the control of Network Rail.

[87] Scope 2 carbon dioxide emissions are those resulting from energy purchased by Network Rail. These emissions are as a result of Network Rail's activities, but not directly under its control.

[88] *High Level Output Specification 2012,* Department for Transport, July 2012 is available at https://www.gov.uk/government/publications/high-level-output-specification-2012 and the *High Level Output Specification 2012*, Transport for Scotland, June 2012 is available at http://www.transportscotland.gov.uk/strategy-and-research/publications-and-consultations/j232012-00.htm.

[89] Moving annual average (MAA) – the average of the last 13 four-week time periods.

3.22 The Scottish Ministers' HLOS specified an end CP5 requirement of 92.5% PPM (MAA) (and a minimum annual requirement of 92%), enhancement schemes to be delivered and ring-fenced funds e.g. to close level crossings. There was a requirement to set up a process to make journey time improvements and keep at least one cross-border route available at all times.

Outputs consultation

3.23 In August 2012 we consulted[90] on the proposed CP5 output framework. We included the requirements of the HLOSs. In some areas we described how we would set the HLOS outputs in more detail (e.g. set enhancement obligations in the form of detailed enhancements milestones, as in CP4), to give clarity to what will be delivered and when.

3.24 But we also proposed to go beyond the HLOSs and;

(a) strengthen the focus on asset management, to emphasise the importance of Network Rail becoming an excellent asset manager. We proposed that we set some asset management measures as outputs;

(b) replace our CP4 freight delay minutes output with 'freight CaSL', an output more closely linked to freight operator priorities (freight performance was not specified in the HLOSs);

(c) focus outputs on train operators / services rather than Network Rail routes, setting PPM and CaSL outputs by TOC, but monitor indicators of Network Rail's performance at route level;

(d) continue and extend the use of enabler measures, to monitor progress of Network Rail's capability to deliver;

(e) establish new environmental indicators, to measure Network Rail's progress in sustainable development; and

(f) introduce and monitor a 'whole industry scorecard' to give context to our assessments of delivery (see chapter 23 on monitoring, enforcement and reporting).

3.25 The main differences between the proposed CP5 output framework and our existing CP4 framework are that for CP4:

(a) performance outputs were set at sector level;

(b) Network Rail caused delay minutes (to passenger and freight operators) were set as an output; and

[90] *Network Rail's output framework for 2014-19*, Office of Rail Regulation, August 2012, available at http://www.rail-reg.gov.uk/pr13/consultations/outputs.php.

(c) we did not set any asset management outputs, although we did specify asset management maturity scores as an enabler during CP4.

3.26 We also published the findings of a review[91] by the independent reporter Arup, of the effectiveness of the CP4 output framework. We have explained how Arup's findings are taken into account, in our determination of the output framework, in each of 'our decisions' sections of this chapter.

3.27 Table 3.3 shows the proposed CP5 output framework in our consultation.

Table 3.3: Outputs consultation: proposed CP5 output framework

Area	Outputs	Indicators	Enablers (these support all output areas)
Train service reliability	Passenger - PPM: England & Wales, Scotland - PPM by operator - CaSL: England & Wales, Scotland - CaSL by operator Freight - Freight CaSL	Right-time performance (by operator) Average lateness (by operator/service group) Network Rail caused delay (by route) Suite of cause of delay indicators	Asset management excellence, by route Safety management maturity New system operator capability enabler, which could cover: Process of assembling, validating and publishing the timetable Possessions planning
Enhancements	Enhancement scheme delivery milestones (set out in an enhancements delivery plan)	Enhancement fund KPIs (e.g. average scheme benefit cost ratios) Improved governance processes for HLOS funds	
Safety	Level crossing risk reduction plan delivery milestones		

[91] *CP4 regulated outputs*, Arup, August 2012, is available at http://www.rail-reg.gov.uk/pr13/consultations/outputs.php.

Area	Outputs	Indicators	Enablers (these support all output areas)
Network availability (reducing disruption from engineering works)	PDI-P (or alternative measure proposed by the industry) PDI-F (or alternative measure proposed by the industry)	Possession indicator report metrics	Understanding / measuring capacity availability and utilisation Network planning Network change Possible further measures including customer service maturity
Network capability	Base requirement at start of CP5 in terms of track mileage & layout, line speed, gauge, route availability, electrification type		
Stations	Station condition measure (existing SSM measure migrating to new measure in CP5)		
Depots		Average condition score	
Asset management	Asset management excellence capability Asset data quality Milestones for ORBIS / operating strategy project	New indicators for asset policy delivery, and asset performance / condition monitoring More transparent condition reporting	

Area	Outputs	Indicators	Enablers (these support all output areas)
Environment		Indicators demonstrating reductions in carbon dioxide emissions associated with OMRE[92] sector Carbon and energy efficiency KPIs Carbon embedded in new infrastructure Sustainable development KPIs (to be determined)	
Other		Journey time indicator Station accessibility indicator Indicators of improvements in passenger information Possible supply chain engagement indicator Possible levels of innovation indicator	

Responses to our outputs consultation

3.28 We received responses from a wide range of passenger / freight representatives, passenger / freight operators, funders, suppliers and Network Rail. Very broadly, consultees:

(a) supported our proposed output framework structure;

(b) believed the CP4 approach to enhancements delivery plan milestone obligations and change control worked well, and supported its continuation into CP5;

(c) welcomed the introduction of a whole industry scorecard to set Network Rail's performance in a wider context;

[92] OMRE refers to operating, maintenance, renewals and enhancement activity.

(d) agreed obligations should be operator / service-focused (rather than Network Rail route focused) where possible, although ORR should still monitor indicators at route level;

(e) supported new indicators such as right-time performance and station accessibility;

(f) believed a journey time indicator is a good idea but hard to define; and

(g) welcomed our drive towards a more transparent output framework and monitoring process.

3.29 There was disagreement on:

(a) the status of asset management outputs – in particular, while Network Rail emphasised the importance of improved asset management, it did not believe it should be subject to regulated outputs in this area;

(b) the appropriateness and practicality of a trade-off / change control mechanism, in particular in relation to HLOS outputs; and

(c) the extent of regulated output obligations set, as opposed to indicators and enablers.

Network Rail's proposals

3.30 Network Rail's SBP proposed its own framework. The main differences between Network Rail's proposal and the output framework in our consultation were:

(a) no asset management outputs – Network Rail believes we should not set outputs for asset management measures, as this would be a move towards input-based regulation;

(b) performance indicators – Network Rail did not commit to reporting right time performance (in England & Wales) or average lateness;

(c) no journey time indicators – Network Rail's view is this would be too complex to create and implement in a meaningful fashion;

(d) no station accessibility measure – Network Rail considers there are existing legal commitments in this area and an indicator could therefore lead to confusion over accountability;

(e) passenger information – Network Rail sees this as best measured through the National Passenger Survey and therefore should not be a metric in the output framework;

(f) supply chain engagement/innovation – Network Rail believes there are existing metrics and is working on developing new metrics that can measure progress outside the output framework; and

(g) no safety management maturity enabler – Network Rail does not believe RM3 is an appropriate enabler as it sees this as a move towards input-based regulation.

Our decisions on outputs

3.31 The following sections confirm the decisions we have taken in each output area. In each section we have explained the decision we need to make, the analysis we undertook and the output, indicator or enabler we are setting. We have also summarised feedback from our draft determination consultation. Our decisions are structured around the following areas:

(a) train service reliability (passenger and freight performance);

(b) enhancements (investment projects);

(c) health and safety;

(d) network availability (disruption from possessions);

(e) network capability (speed and type of trains that can operate on the network);

(f) stations and depots;

(g) asset management;

(h) environment; and

(i) other (system operator capability, programme management capability, customer service maturity, passenger satisfaction, journey time and cross-border route availability).

Our decisions on train service reliability

3.32 We have reviewed Network Rail's SBP and commissioned analysis from the independent reporter Nichols[93].

3.33 This section is structured as follows:

(a) background on CP4 performance;

(b) whether Network Rail's SBP contains sufficient evidence that the England & Wales HLOS PPM and CaSL requirements will be met. As Network Rail presented much of its analysis on a 'probability' basis, i.e. a percentage likelihood that it would hit the HLOS requirement, we have reviewed this to understand whether Network Rail's plans will deliver the HLOS requirements. If it appeared that they would not, we would require the company to do more;

[93] *HLOS Performance and Reliability Analysis and Targets review*, Nichols, April 2013, available at http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

(c) whether there is an affordable, value for money case for increasing England & Wales PPM and CaSL outputs, to answer the question raised in the Secretary of State's HLOS about whether the requirement should be tightened;

(d) whether the end CP5 England & Wales HLOS PPM and CaSL outputs should be supplemented with additional annual outputs and the proposed level of these outputs. As related issues it considers whether there should also be sector level outputs or other outputs such as delay minutes;

(e) if TOC level outputs for PPM and CaSL (in England & Wales) should be set and, if so, how that should be done. In particular, whether a process should be introduced whereby the industry sets TOC level outputs annually, subject to our oversight, and whether each TOC level output should have to reach a minimum level;

(f) what indicators we should specify, and at what level;

(g) whether Network Rail's SBP contains sufficient evidence that the Scotland HLOS PPM requirements will be met; and

(h) whether freight outputs based on FDM should be established, whether these should be annual outputs and the level of these outputs.

Background on CP4

3.34 Network Rail has had a number of problems delivering its PPM outputs in CP4 and we have taken licence enforcement action. As a result of our concerns regarding performance in the long distance sector[94] we carried out an investigation and required Network Rail to develop a performance recovery plan. We accepted Network Rail's plan for 2012-13 but found a likely future licence breach for 2013-14. We made an order containing a reasonable sum which will require Network Rail to pay £1.5m for every 0.1 of a percentage point that performance falls short of the regulated PPM (MAA) output.

3.35 Network Rail proactively produced recovery plans for the London & South East[95] and regional[96] sectors when it became clear that its outputs might not be achieved.

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[94] The long distance sector is the industry sector of operators operating long distance services; Arriva CrossCountry, East Coast, East Midlands Trains, First Great Western, Greater Anglia, and Transpennine Express and Virgin Trains. Train operating companies can operate services in more than one sector. For example, First Great Western operates services in each of the three sectors; London & South East, long distance and regional.

[95] The London and South East sector is the industry sector comprising services operated by South Eastern Railway, Southern Railway, South West Trains, First Great Western, Chiltern, London Midland, First Capital Connect, Greater Anglia, C2C and London Overground.

[96] The regional sector is the industry sector comprising services operated by Arriva Trains Wales, First Great Western, London Midland, Northern, East Midlands Trains, and Merseyrail.

3.36 In Scotland performance was poor in the early part of the control period but good cooperation and strong management by Network Rail and First ScotRail improved the position somewhat. However, performance in the early part of 2013-14 means that it is now unlikely that it will achieve its PPM (MAA) output at the end of CP4.

3.37 Freight performance was poor in the early part of CP4. We concluded that Network Rail had breached its licence and took enforcement action that mandated establishment of the Freight Recovery Board in January 2012. This generated effective, collaborative working across the industry, stimulating an improvement in performance. Despite this, it is unlikely that the CP4 target for Network Rail freight delay per 100 train km will be achieved.

England & Wales: will the PPM and CaSL outputs be met?

3.38 Network Rail presented its SBP forecasts in terms of probability distributions – it calculated how likely it was that it would deliver different levels of PPM and CaSL.

3.39 Network Rail reviewed all the plans from its operating routes, summed their impacts and calculated that there was a 25% chance that it would hit the HLOS requirements. However, it then added in a number of national and TOC initiatives that would improve performance and this increased the level of confidence to 75%.

3.40 Nichols found much of the analysis to be reasonable, but considered that Network Rail had underestimated the performance benefit from implementation of the Traffic Management System (TMS), enhancements, CP4 and CP5 national initiatives and fleet reliability. Nichols also considered that Network Rail had potentially over-estimated the negative impact of traffic growth on performance.

3.41 In its SBP, Network Rail assumed it will achieve its CP4 exit outputs for PPM and CaSL. However, both Network Rail's and Nichols's latest assessment indicates that these are not likely to be met. Nichols also considered that Network Rail had under-estimated the negative impact of severe weather on performance.

3.42 Taking all this into account we concluded in the draft determination that there is around a 45% confidence of Network Rail achieving the HLOS PPM output and around a 50% confidence of Network Rail achieving the HLOS CaSL output based on Network Rail's route and national plans.

3.43 In the draft determination we said that with nearly a year of CP4 to run, we saw this as challenging but achievable, and believe that it represented a reasonable degree of confidence. We proposed a CP5 exit output of 92.5% for PPM (MAA) and 2.2% for CaSL (MAA) as outputs.

3.44 In its response to our draft determination consultation, Network Rail said it was committed to delivering the 92.5% HLOS PPM target, but believed performance targets "should not be considered a minimum threshold in regulatory terms". Network Rail said "the regulatory framework must recognise that this level of confidence means that half of the time we are as likely to miss the target as achieve it, and that

missing the target should not therefore be regarded as unacceptable (and therefore requiring regulatory intervention) provided that we have taken all reasonable steps to meet it in what would be regarded as normal circumstances".

3.45 Our confidence assessment in the draft determination was based on the evidence presented by Network Rail and our analysis of the confidence levels and scenarios Network Rail presented in the SBP. We have decided that a 45% confidence level at this stage of the process represents an achievable challenge and we will treat performance outputs in the same way as any output, and regulate Network Rail in line with our enforcement policy (see chapter 23 on monitoring, enforcement and reporting).

3.46 Passenger Focus is disappointed that only minor improvements in performance are sought, but many other respondents (including FirstGroup, East Midlands Trains, Go-Ahead and Transport for Greater Manchester) support the 92.5% HLOS PPM target. Some respondents would like the measure reviewed to more closely reflect the passenger experience.

3.47 There are many ways of measuring performance on the rail network but we believe the robustness and accuracy of PPM makes it a suitable output. We have decided to set PPM and CaSL outputs at the same level proposed in the draft determination; CP5 exit output of 92.5% for PPM (MAA) and 2.2% for CaSL (MAA) as outputs.

England & Wales: should the HLOS PPM and CaSL outputs be increased?

3.48 The England & Wales HLOS has an option for the end CP5 national PPM (MAA) output of 92.5% to be increased and CaSL (MAA) output of 2.2% to be reduced (unlike PPM, a lower CaSL rate is better) if this demonstrated value for money, was affordable and did not compromise delivery of other HLOS requirements.

3.49 Network Rail did not explicitly consider this as it felt the initial industry plan (published previously) was clear it would not be value for money. Nichols carried out an assessment of the potential impact of setting a higher national level output for PPM or CaSL, in terms of value for money, affordability and trade-off with other outputs, but noted the difficulty of calculating this at the national level. Its assessment of value for money and affordability showed that the cost of driving further performance improvement was increasingly difficult as performance itself improved. Therefore, it is likely that the case for targeted investments will be strongest on those routes or service groups which are the worst performing services or those with the highest economic impact.

3.50 Taking all this into account we concluded in the draft determination that the PPM and CaSL outputs for England & Wales should not be increased beyond those specified in the HLOS. We received no substantive feedback to this conclusion in our draft determination consultation and have therefore decided to retain the outputs proposed in the draft determination.

Additional England & Wales performance outputs

3.51 The following section reviews whether we should set further performance outputs in this determination.

3.52 The first issue is whether to supplement the end CP5 PPM and CaSL outputs with annual outputs. In our outputs consultation we said it is important to set outputs year-by-year, to drive progress towards the end CP5 output and to ensure passengers' ongoing interests are not compromised in the delivery of the end CP5 output. In our draft determination we said that on balance it is important that annual performance is broadly maintained during CP5, hence we have set annual outputs. We also said we see these annual outputs as an important 'anchor' for TOC level outputs.

3.53 In its SBP, Network Rail's phasing to deliver HLOS assumed a CP4 exit level of 92.5% for PPM (MAA) and 2.2% for CaSL (MAA). Based on our own analysis and Network Rail's latest forecasts, the entry point into CP5 is likely to be lower than this.

3.54 In our draft determination we proposed the annual outputs for PPM and CaSL in Table 3.4 below, which reflected the CP5 entry point in Network Rail's SBP.

Table 3.4: Our draft determination proposal on CP5 annual outputs for PPM and CaSL

	2014-15	2015-16	2016-17	2017-18	2018-19
CP5 PPM (MAA) England & Wales outputs	92.2	92.3	92.4	92.4	92.5
CP5 CaSL (MAA) England & Wales outputs	2.2	2.2	2.2	2.2	2.2

3.55 In its response to our draft determination consultation, Network Rail confirmed that it is unlikely to meet its CP4 exit target for England & Wales (92.6%). Network Rail has proposed an alternative CP5 performance trajectory, based on a revised CP4 exit forecast of 91.1%.

3.56 We acknowledge that performance has fallen behind Network Rail's projections since the SBP, but do not consider 91.1% to be a reasonable CP4 PPM exit figure for England & Wales as it represents a further deterioration in performance. We have therefore decided to set the annual outputs for PPM and CaSL in Table 3.5 below, based on a CP4 exit of 91.4%, which we believe is achievable given current performance.

Table 3.5: Our decision on CP5 annual outputs for PPM and CaSL

	2014-15	2015-16	2016-17	2017-18	2018-19
CP5 PPM (MAA) England & Wales outputs	91.9	92.1	92.3	92.4	92.5
CP5 CaSL (MAA) England & Wales outputs	2.2	2.2	2.2	2.2	2.2

3.57 We then considered whether we should continue with the PPM and CaSL outputs by sector (long distance, regional, London & South East) as in CP4. In our outputs consultation we pointed out that sector outputs put a greater focus on certain types of services, but they also add another layer of outputs which could be seen as unnecessary. Network Rail supports a move away from sector level outputs, although some operators pointed out that they are useful for comparative purposes.

3.58 There are benefits to aggregating services to sector level, for example holding similar operators to account and providing useful analysis of national performance. However, the approach has created some issues, for example during CP4 we implemented performance investigations at a sector level, despite the underperformance being driven by only one or two operators in that sector.

3.59 In our draft determination we said that on balance, we had decided not to maintain the sector level outputs. We proposed that performance at a sector level will be reported as an 'indicator' for CP5 as we see benefits from being able to group operators together to provide an interim level between train operators' performance and national performance. Sector level indicators also provide consistency with performance monitoring in CP4.

3.60 In its response to our draft determination consultation, Network Rail said it does not see value in sector level indicators, and said the "National Task Force does not consider sectors as a useful grouping for planning or reporting". Virgin also shares this view.

3.61 We believe, for the reasons outlined above, that sector level monitoring is valuable, and we have decided to maintain sector level indicators for CP5.

3.62 In CP4 we also set outputs for Network Rail caused delay minutes for England & Wales, Scotland and freight. In our consultation we said we will not set delay minutes as outputs in CP5, as PPM is a more passenger focused measure. In its review of CP4 regulated outputs, Arup stated that delay minute outputs may drive Network Rail to focus more on delay attribution than on the root causes of delay. Network Rail said it would not set delay minutes targets for CP5.

3.63 During CP4 we concluded that it was most effective to focus on and hold Network Rail to account for delivery of the measures that most closely reflected the passengers' experience – PPM and CaSL. However, delay minutes are a useful measure for identifying performance trends and we have decided they will be an indicator.

Performance of individual TOCs

3.64 We need to decide whether there should be performance outputs at franchised TOC level, and if so whether these outputs should be set by ourselves or the industry, and, as a related point, whether TOCs should achieve a minimum PPM by the end of the control period.

3.65 In our outputs consultation we said it is essential that PPM and CaSL outputs are set for each TOC, because Network Rail could otherwise try to meet the national output by focusing efforts and resources on some TOCs to the detriment of others. Network Rail's consultation response said it did not agree with ORR setting operator level performance outputs, but proposed that TOC PPM trajectories are agreed via the JPIP[97] process, and this had wider support in the industry. This approach has been discussed by the industry, and we have worked with the National Task Force to agree governance protocols for unsatisfactory or unresolved JPIPs.

3.66 In our draft determination we said we support the industry's proposal and commitment to the JPIP process and we have decided that PPM and CaSL in year one of the agreed two year JPIPs should constitute outputs (a rolling annual output). We said we expect Network Rail to include annual forecasts by operator in the CP5 delivery plan and to update these forecasts during the control period.

3.67 In the event Network Rail cannot agree a JPIP with a TOC we would expect to set an interim requirement taking the second year of the last agreed JPIP as the starting point (for the first year of CP5 this means the second year of the 2013-2015 JPIPs). For franchised TOCs we would also work with the relevant franchising authority to ensure the JPIP process works smoothly to agree a JPIP as soon as possible (see chapter 23 on monitoring, enforcement and reporting).

3.68 In our draft determination we concluded that there should be a minimum point such that no franchised TOC in England & Wales exits the control period with a PPM (MAA) of less than 90%.

3.69 In its response to our draft determination consultation, Network Rail said "90 per cent is an inappropriate level of PPM to target for franchised long distance operators. We consider a more appropriate target for those operators is 88 per cent PPM by the end of CP5 with potential lower daily variability". Not all franchised long distance operators responded in the same way as Network Rail. East Coast and Virgin agree that 90% is unrealistic, but have different views on what an alternative target should be. Arriva (representing CrossCountry) did not comment on TOC level PPM, and FirstGroup (representing First Great Western) supported a 90% TOC PPM target but has also told us that it believes that Network Rail should deliver a minimum of 88% for the Long Distance component of its PPM. Many other operators (including Northern, East Midlands, Chiltern and Greater Anglia) supported a minimum performance floor for each TOC, assuming that a focus on worst performing routes would not downgrade higher performing routes, particularly those already above 90% PPM. A minimum performance floor for each TOC was also supported by West Coast Rail 250, Passenger Focus, Metro and Transport for London (TfL).

[97] Joint performance improvement plans (JPIPs) are based on a two-way obligation of Network Rail and the train operating company (TOC) to improve performance

3.70 Following further discussion we have decided that all England & Wales franchised TOCs should exit CP5 with a PPM (MAA) level of at least 90%, except East Coast and Virgin Trains who will have a dual PPM and CaSL output. East Coast and Virgin Trains must exit CP5 with a PPM (MAA) of at least 88% (representing the minimum level of punctuality East Coast and Virgin Trains believe are acceptable to their passengers), and a CaSL output of no more than 4.2% and 2.9% respectively, which represents the level of CaSL that would be associated with a 90% PPM achievement. Network Rail should also deliver a minimum PPM (MAA) of 88% for First Great Western high speed services at the end of CP5. These changes reflect the views from the operators about the importance their passengers attach to addressing incidents causing long delays on these routes – delays of 30 minutes or more. We reviewed the relationship between PPM and CaSL and set CaSL targets which, taken with the 88% PPM outputs, will provide a target equivalent to the 90% PPM for other franchised operators.

Performance indicators

3.71 We need to decide what performance indicators should be reported in England & Wales to enable us to understand factors causing variance from the regulated outputs, and whether:

(a) trajectories should be set for these indicators; and

(b) the level of disaggregation at which these should be reported.

3.72 Our draft determination for CP5 included fewer performance outputs than were set in CP4, when sector level outputs and outputs for delay minutes were set. We stated that it is essential that a number of other indicators are reported in order to help us understand performance and monitor risk to delivery of the regulated outputs.

3.73 We proposed the following data should be reported each period:

(a) delay minutes, split by category (including Network Rail on TOC, TOC on self and TOC on TOC) for National, England & Wales, sector, Network Rail route and TOC;

(b) PPM by sector and service group (sub-operator);

(c) CaSL by sector and service group (sub-operator);

(d) PPM and CaSL at TOC level (annual as an output);

(e) right-time performance by England & Wales, sector, TOC and sub-operator;

(f) average lateness by England & Wales, sector, TOC and sub-operator;

(g) FDM by strategic freight corridors; and

(h) freight delay minutes nationally.

3.74 In its response to our draft determination consultation, Network Rail said “much of the information requested (e.g. right time performance) relates to TOC performance and

the TOCs see published performance as commercially sensitive, the level of granularity that the ORR is looking to publish needs to be agreed with the industry". We made it clear in our draft determination that we require Network Rail to publish the proposed performance indicators in a transparent and accessible manner, and we have not received any objections from TOCs.

3.75 East Midlands and South West Trains both said "There needs to be a greater recognition in the final determination of the industry aspiration to move to and incentivise Network Rail to recognise Right Time Railway", and Passenger Focus believes right time performance should be an output rather than an indicator. We will increase our monitoring of right time performance in CP5.

3.76 Passenger Focus also suggested that our final determination should "Go further than service group in disaggregating PPM, 'right time', average lateness, CaSL and delay minutes". We support this objective in principle and we will urge the industry to make more disaggregated performance data available as part of the industry's drive to become more transparent.

3.77 We have decided that Network Rail should report on each of the indicators proposed (see above) in our draft determination, each period. The only change from our draft determination is that we require reporting of indicators by sub-operator rather than service group. This is a point of clarification, in response to feedback from some draft determination consultation responses.

3.78 Network Rail should set trajectories for all the above indicators (with the exception of right time performance and average lateness) at national level (this could be done in its JPIPs or FPIPs[98]). The trajectories will not constitute outputs, but variation from a trajectory may indicate a trend which raises regulatory concern about likely future compliance with an output. We also require Network Rail to develop a robust method of forecasting right time performance and average lateness, such that trajectories can be produced for these measures in the future.

Performance in Scotland

3.79 We need to decide whether:

(a) the SBP contains sufficient evidence that the Scotland HLOS end CP5 and annual PPM outputs will be met; and

(b) the proposed package of KPIs for Scotland addresses the additional HLOS requirements.

3.80 Network Rail has built a plan to deliver between 91.5% and 93% PPM (MAA) by the end of CP5 and one of the key assumptions of this plan is for Scotland to outturn 92.0% at the end of CP4. At the end of 2012-13, Scotland outperformed its PPM

[98] Freight performance improvement plans (FPIPs) are based on a two-way commitment by Network Rail and the freight operating company (FOC) to improve performance.

output and although our analysis shows that there is some doubt Scotland will achieve 92.0% at the end of CP4, we still expect Network Rail to deliver 92.5% at the end of CP5.

3.81 The second aspect of the HLOS requirement is for performance of each franchise let by Scottish Ministers to not fall below 92.0% in any given year of the control period. We recognise that there are potential performance risks, such as the Edinburgh to Glasgow Improvement Programme, however we believe that despite a lower than anticipated CP5 entry point Network Rail ought to deliver at least 92.0% in each year of the control period.

3.82 We have therefore concluded that Network Rail's SBP for Scotland is likely to deliver the HLOS output for PPM (MAA).

3.83 In our draft determination we said we will work with Network Rail, Transport Scotland and the Association of Train Operating Companies to develop a package of indicators to monitor performance in Scotland.

3.84 We have now agreed the following package with the stakeholders referred to above:

(a) right time performance and PPM for ScotRail and ScotRail service groups[99] and service codes[100];

(b) right time performance and PPM for cross border TOCs, Caledonian Sleeper services, peak and off-peak commuter services (heavily used intermediate stations[101]) the 100 most heavily loaded trains in terms of passenger volume[102] and the worst performing trains[103]; and

(c) trains run (normal plan, amended plan, actually run) during severe disruption.

3.85 This package will address the seven key objectives outlined in the Scotland HLOS and cover the most important aspects of passenger experience, focusing on heavily used trains and stations. It also acknowledges the importance of right-time operation, delivery in times of disruption and reliability of connections. Network Rail will publish the full package of indicators on its website with its draft delivery plan in December 2013.

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[99] Service groups are a collection of service codes that are grouped for Performance Monitoring purposes. Their level of disaggregation is between sub-operator and service code level

[100] Service codes are a specific set of services that operate along the same parts of the rail network and share the same origin and/or destination.

[101] Heavily used intermediate stations are defined as the ten intermediate stations (calling points) in Scotland that have the highest number of trains stopping at them.

[102] The 100 most heavily loaded trains only include First ScotRail services and are selected based on the latest available passenger counts.

[103] Worst performing trains are defined as those weekday services that fail PPM on 50% of all journeys.

Addressing the poorest performing services or those with greatest economic impact

3.86 We need to decide whether the plan outlined in Network Rail's SBP and supporting documentation to "focus on worst performing service groups" is adequate to meet the England & Wales HLOS expectation[104].

3.87 Network Rail identified the worst performing service groups in its SBP submission[105] and has ascribed a value (low, medium, high) to peak and off peak services within these service groups. This has generated useful analysis for identifying the services that should be targeted.

3.88 However, the performance plans for England & Wales and Scotland, and the supporting route plans do not include any detail for how performance of these service groups will be improved beyond the performance improvement that will be driven by the route and national activities outlined. Network Rail has confirmed it will include more detail in the JPIPs.

3.89 As stated above, a number of respondents to our draft determination consultation were concerned that a focus on worst performing services would detract from high performing routes. We have made it clear that we expect all franchised TOCs to achieve a minimum performance level. And it would not be acceptable for Network Rail to address performance on worst performing routes, while others declined significantly below JPIP levels (see chapter 23 on monitoring, enforcement and reporting).

Freight performance

3.90 We need to decide whether to have a freight performance output and if so what it should be.

3.91 Neither HLOS specified output requirements for freight train service performance, but it is important for freight customers that such an obligation is in place. In our outputs consultation we proposed development of a new freight measure based on passenger CaSL. Responses to our outputs consultation indicated that the current CP4 output (Network Rail caused freight delay per 100 train kilometres) was not directly relevant to freight end users and recommended it was replaced with a new measure.

[104] "In respect of both PPM and CaSL, the Secretary of State requires that the industry focuses on improving the worst performing routes and those on which lower levels of reliability have the greatest economic effect and would wish to see a plan is produced to this effect."

[105] See Appendix 2 to *CP5 strategic business plan supporting document – performance plan for England Wales and Scotland*, Network Rail, available at: http://www.networkrail.co.uk/browse%20documents/strategicbusinessplan/cp5/supporting%20documents/outputs/performance%20plan%20for%20cp5.pdf.

3.92 The Freight Recovery Board has developed the FDM, which measures the percentage of freight trains arriving at their destination within 15 minutes of scheduled time. It only covers delay or cancellation caused by Network Rail.

3.93 Network Rail has modelled the relationship between the CP4 and CP5 measures which shows that its forecast CP4 outturn of 2.94 delay minutes per 100tkm is equivalent to 95.4% FDM.

3.94 Network Rail has proposed to introduce a national performance output of 95% for each year of CP5 and a performance floor of 91.35% with no regulatory intervention if performance remained above this level.

3.95 We agree that the FDM should replace delay minutes as the regulated output for freight performance. The FDM has been developed with agreement from the Freight Joint Board[106] and has a good level of industry and customer support. This aligns with Arup's review of CP4 regulated outputs, which concluded that a new freight measure should be developed that more accurately reflects the impact of Network Rail on freight flows.

3.96 We agree with Network Rail that outputs should be set at a national level as it is difficult to predict which freight operators will be operating paths throughout CP5.

3.97 We do not agree with Network Rail's proposals for a performance floor in CP5 of 91.35% as we believe that it is based on a number of downsides to performance and does not take into account any potential benefits. It also assumes that factors that could have an adverse effect on performance, such as traffic growth and increased speed, take effect on day one of the control period when we would expect these to be phased into any projection.

3.98 In our draft determination we said the output for FDM should be set at 92.5%, to reflect the uncertainty of the CP5 start position and downsides to performance during CP5 such as traffic growth, weather and engineering work. In their responses to our draft determination consultation, Freightliner and DB Schenker raised concerned that a FDM target of 92.5% represents lower performance than that proposed in Network Rail's SBP, and current CP4 freight performance.

3.99 We believe a 92.5% FDM target is challenging, for a new metric, and have decided this will be the target for CP5. This output will be an annual output. As discussed with the industry, we are not basing Network Rail's benchmark for the freight Schedule 8 regime (see chapter 20 for more details) on this target, given it is a new metric. Instead we have based the benchmarks on Network Rail performing in CP5 at a level equal to the delay minute target we set for the final year of CP4, which matches the internal delay minute target Network Rail included in its SBP. This is an appropriate package of measures.

[106] The Freight Joint Board replaced the Freight Recovery Board, as a voluntary industry-led initiative.

3.100 FDM is a new metric and it will be important that we monitor it particularly carefully. We intend to use a number of supplementary indicators, including the CP4 measure (Network Rail caused freight delay per 100 train kilometres). We will also work with the industry to define other indicators to measure FOC caused delays. These indicators will not form regulated outputs, but are designed to provide information on areas which are not fully reflected in the FDM and act as a check against any perverse behaviour that might result from strategies designed to drive improvements against the FDM.

3.101 In its response to our draft determination consultation Passenger Focus asked whether the new FDM would raise "implications for overall network punctuality, and therefore impact on passenger trains, if there is less incentive for freight trains to run precisely 'right time'?". Passenger Focus's concern is that the regulated target only applies to Network Rail caused delay, whereas Network Rail is responsible for overall PPM for passenger services. We have decided that the package of performance outputs (including the new FDM, PPM and CaSL) will incentivise Network Rail to minimise freight delay that would cause reactionary delay to passenger services. As well as considering the impact of Network Rail delay on TOCs we have considered the concerns of TOCs around FOC on TOC delay. We have agreed with the RDG Freight Group that metrics on this will be reviewed.

3.102 Network Rail and the freight operators are working on a wider set of initiatives to improve performance. For example, reducing FOC on TOC delays by better timetable planning and greater use of pre-validated paths and on the use of capacity in terms of reducing the number of paths in the timetable database that are not required. The industry will be involved in the development of any new measures.

Our decisions on enhancements

3.103 We said in the outputs consultation that we intend to continue to have milestones for enhancements in Network Rail's delivery plan and to have a change control mechanism. Both these approaches worked well in CP4 and are widely supported. Setting out when Network Rail will deliver each stage of a project, and keeping this updated, is useful information for stakeholders and customers. We will use these milestones to monitor whether Network Rail is on course to deliver each project. We will categorise some of the milestones as outputs.

3.104 Although the outcomes of delivering enhancements are not specifically picked up in the National Passenger Survey they can be one of the biggest drivers of satisfaction in areas where the benefits are delivered. Therefore, we will make sure that outputs are based on the timing of the delivery of passenger and freight customer benefits, as this is what matters to customers. These will be confirmed in the enhancements delivery plan, which will be published by Network Rail and agreed by us before the start of the control period. A draft will be published in December 2013 and open to wider consultation before being finalised by March 2014. In this way the delivery

milestones will reflect stakeholder input, and the main issue is likely to be ensuring a match between the service level changes operators are trying to deliver and Network Rail's infrastructure changes. For example, matching the delivery of longer platforms with the introduction of longer trains.

3.105 For projects at an early stage of development the regulated outputs in the March 2014 delivery plan will be to achieve GRIP 3. After that they will be changed to the delivery milestones when these are defined. Detailed outputs of the enhancements projects are dealt with in chapter 9 alongside efficient costs, as the two are closely linked.

3.106 In their responses to our draft determination consultation, Network Rail and Passenger Focus both supported this approach.

Our decisions on health and safety outputs

3.107 We need to decide what outputs, indicators and enablers we will use to hold Network Rail to account on health and safety.

3.108 Network Rail has a legal obligation under the Health and Safety at Work etc. Act 1974 to maintain and, where reasonably practicable, improve health and safety.

3.109 In the draft determination we said we were setting one output for level crossings, requiring Network Rail to deliver a plan of projects in CP5 to achieve the maximum possible reduction in risk of accidents at level crossings using the £67m ring-fenced fund made available by the Secretary of State. In its response Network Rail proposed a further reduction in risk of accidents at level crossings with additional funding. We are including an additional £32m in the determination to provide a total of £99m to Network Rail, to deliver a plan of work to achieve the maximum possible reduction in risk of accidents at level crossings. Network Rail has indicated that, based on its experience in CP4, it will achieve a 25% reduction in risk for £99m. This is in addition to Network Rail's legal duty to reduce risk so far as reasonably practicable.

3.110 Network Rail for the first time has produced a long-term strategy for health and safety and set its own vision and goals. These include, for example, eliminating all fatalities and major injuries to the workforce with a 50% reduction in train accident risk by 2019. We will monitor Network Rail's implementation of its new strategy.

3.111 Network Rail has said it will use RM3 along with other measures to determine the success of its safety and wellbeing strategy, but has not explained what other measures it will use. We will continue to use RM3 as an enabler as the information used by the model is generated through our inspection work.

3.112 More generally we will continue to monitor and inspect Network Rail's health and safety performance and where necessary use our regulatory tools to secure legal compliance and continuous improvement. We expect Network Rail to develop measures to show how it is improving its management of health risks.

Our decisions on network availability

3.113 In CP4 we set outputs for passenger and freight disruption using the PDI-P and PDI-F measures. For CP5 we need to decide if network availability outputs should be set, and what the levels of the outputs should be.

3.114 In our outputs consultation we proposed to continue the obligations on Network Rail to reduce disruption to passengers and freight from engineering work[107]. We noted the potential development of a new metric but, given a lack of industry consensus, proposed to continue setting PDI-P and PDI-F as the output. Network Rail agreed with this approach in its consultation response.

3.115 In its review of CP4 regulated outputs, Arup said PDI-P and PDI-F are difficult to understand, very few people can articulate the calculation process, and few people understand how their actions impact the results, or whether it is driving the right behaviours. Network Rail is working with the industry to develop an alternative measure based on working timetable (WTT) compliance. Network Rail will measure network availability using the WTT compliance measure (in parallel with PDI-P and PDI-F), with a view to replacing PDI-P and PDI-F in CP5. Arup (in its role as independent reporter) reviewed the accuracy and reliability of the new WTT measure. It concluded that while the measure is more transparent than the PDI metrics, it needs further explanation and development to determine its accuracy in different scenarios.

3.116 Despite the concerns around the complexity of PDI measures, they appear to have delivered their objectives. Disruption to passengers and freight has reduced in CP4 as a result of initiatives such as multiple worksites in single possessions and enhancement of diversionary routes. Passengers have also seen a reduction in rail replacement bus hours in CP4. Also, despite much discussion of alternative measures, no robust alternative has been put forward. Given the direct impact on passengers and freight customers, we have decided to retain PDI-P and PDI-F as outputs, and set CP5 exit outputs for both measures.

3.117 Network Rail already produces a four-weekly Possession Indicator Report containing supporting and diagnostic metrics such as the volume of bus replacement of train services, advanced notice of possessions and overruns, and the use of single line working.

3.118 In its SBP, Network Rail presented PDI-P and PDI-F forecasts (based on likely spend rather than specific plans) that we believed were reasonable given the enhancements and renewals planned for CP5. In our draft determination we proposed setting outputs at these levels: CP5 exit for PDI-P of 0.539 and a PDI-F of 0.593 (equivalent to a 14% reduction in passenger disruption and a 33% reduction in freight disruption, between 2014-2019, based on Network Rail's CP4 exit target).

[107] Network Rail needs to restrict access to its network to carry out many of its maintenance and renewals activities. These restrictions of access are often referred to as possessions.

3.119 In its response to our draft determination consultation, Network Rail presented updated PDI forecasts based on the revised pre-efficient spend profiles for enhancements and renewals. Network Rail's updated forecast for PDI-P is 0.653 (equivalent to a 4% increase in passenger disruption) and its updated forecast for PDI-F is 0.786 (equivalent to an 11% decrease in freight disruption). In addition Network Rail also asked for £45m of extra assumed expenditure to continue to fund some initiatives that are happening now that will make a difference to network availability in CP5 and which have broad industry support. However, it has been unable to quantify the specific impact on PDI forecasts.

3.120 Freightliner pointed to an apparent contradiction between our draft determination 33% reduction in disruption to freight as measured by the PDI-F index and our Schedule 4 analysis stating that freight will face increased disruption due to higher possessions activity. This is in part explained because our Schedule 4 estimate of possession activity is for maintenance and renewals, whereas the PDI-F index also includes enhancements. It also reflects that the PDI-F measure is based on traffic data for 2006-07 and Possession Planning System data for 2006-07 and 2007-08. Our possessions estimate is based on CP5 maintenance and renewals activity plans and freight mileage data from 2011-12.

3.121 The amount of enhancements and renewals work in CP5 inevitably means that there will be disruption to passengers and freight users. However, Network Rail is incentivised to minimise this disruption and should continue to embed the positive initiatives it has done in CP4 in terms of both the 'seven day railway' initiative and improved information for passengers. We accept that the SBP forecasts are no longer realistic, given the revised spend profiles for enhancements and renewals in our draft determination, but the revised forecasts do not represent a sufficiently ambitious target to incentivise Network Rail. We have decided to allow the extra assumed expenditure but will set revised outputs alongside this. We have decided to set these targets midway between the CP4 outturn and the SBP forecast: i.e. CP5 exit for PDI-P at 0.58 (equivalent to an 8% reduction) and PDI-F at 0.73 (equivalent to a 17% reduction). We will monitor disruption throughout CP5.

3.122 Network Rail will report network availability using both the new WTT metric and PDI-P / PDI-F during CP5 with a view to potentially changing in the future.

3.123 Until the industry defines improved measures, we will continue to monitor PDI-P and PDI-F carefully with a number of supplementary indicators from the Possession Indicator Report. These are not regulated outputs but are designed to:

(a) provide information on areas which are not fully reflected in the PDIs;

(b) help us to understand movements in the PDIs; and

(c) act as a check against any perverse behaviours that might result from strategies designed to drive improvements against the PDIs.

Our decisions on network capability

3.124 We need to decide how to protect the baseline capability of the network and reflect future enhancements in network capability monitoring.

3.125 In our outputs consultation we said a network capability output is required to provide a minimum level of capability so that Network Rail cannot reduce capability without going through industry processes. Network Rail agreed with this approach in its consultation response.

3.126 In our draft determination we said the baseline capability of the network will be that in place as at 1 April 2014. This will be described in Network Rail's Sectional Appendices, Geographic and Infrastructure System (GEOGIS) Database and National Gauging Database. We said that together these sources must describe the capability of the network in terms of track mileage and layout, line speed, gauge, route availability and electrification type / mileage.

3.127 In their response to our draft determination consultation, some freight organisations said they believe there could be capability discrepancies that need to be corrected formally and until then should remain part of the infrastructure baseline set at the start of CP4. There was also a comment on the transparency and accessibility of Network Rail's information and that there was inconsistency between routes in what they published.

3.128 We note that throughout CP4, Network Rail has reported changes to line speed, gauge, route availability and electrified track in its Annual Return. The company must propose changes formally to industry stakeholders under the network change process and it can discuss such changes with them in their regular gauging meetings. We have asked the freight operators concerned to set out where they believe discrepancies exist and we will use Network Rail's stakeholder gauging meetings as the forum to discuss them and seek redress. Only those changes completed formally under part G of the network code should be declared in the new baseline at 1 April 2014.

3.129 We have decided that the output for network capability will not change from that outlined in the draft determination.

3.130 Network Rail must be clear that, where any outstanding work to restore capability has not been completed by the end of CP4, it must complete the work without any additional CP5 funding. As is the case now, Network Rail will be funded to maintain the baseline as a minimum, subject to any formal changes through the network change process.

3.131 We require Network Rail to provide us with electronic copies of the adjusted baseline for network capability as at 1 April 2014 and transparently publish all changes to the baseline network capability and update its documentation. Network capability must then be maintained at this level, unless the specification is altered through the

industry network change procedure (for example in connection with enhancement projects to deliver increased capacity). This aligns with Arup's review of CP4 regulated outputs, which said that while the outputs of track mileage and layout, linespeed, gauge, route availability and electrified track capability have not changed much nationally, they are nevertheless useful measures to ensure capability does not deteriorate.

3.132 Network Rail must ensure that during and following the devolution of some management decisions to route level, the collection and provision of capability data are maintained on a consistent and timely basis across all routes and network headquarters.

3.133 We will publish an annual summary of capability changes.

Our decisions on stations and depots

3.134 Station condition is an output in CP4 and is measured with the Station Stewardship Measure (SSM). We need to decide whether to set station condition as an output in CP5 and whether to continue with SSM as the measure. In CP4 depot condition is monitored using the Light Maintenance Depot Stewardship Measure (LMDSM), but is not an output. We need to decide whether to continue monitoring depot condition using the LMDSM.

3.135 Stations in England & Wales are classified in six categories[108] and outputs are set for each category along with an aggregated output for Scotland. SSM is calculated by assessing the asset remaining life (how long an element is expected to last at the point of inspection) of key elements against the asset life expectancy (how long an element is expected to last when first made).

3.136 In our outputs consultation we said we will continue with the existing SSM as an output and migrate to the new SSM+[109] if agreed with Network Rail. In its response, Network Rail said it believed SSM should be an indicator, reflecting the changing ownership of stations and the fact that it is only one component of the station environment that influences customer experience.

3.137 SSM has been reviewed by the independent reporter for data assurance (Arup) three times in CP4. Data quality has improved from a C4[110] (significant shortcomings in the

[108] The Department for Transport categorises stations into National Hub (category A), Regional Interchange (category B), Important Feeder (category C), Medium Staffed (category D),Small Staffed (category E) and Small Unstaffed (category F).

[109] SSM+ provides a clearer disaggregation for measuring condition and better, value based, weights using Modern Equivalent Asset Value as the weighting applied to the condition of station components (to replace the current weighting). It also defines the disaggregation at which the condition assessment should take place.

[110] The independent reporter for data assurance (Arup) assesses the reliability of data on a scale of A (appropriate, auditable, properly documented, well-defined and written records, reporting arrangements, procedures, investigations and analysis shall be maintained, and consistently applied across Network Rail) to D (as A, but with some highly significant shortcomings in the system), and

system and data is accurate to 25%) to a B2 (minor shortcomings in the system and data is accurate to 5%), but is still below our A2 (system is reliable and data is accurate to 5%) data quality expectation. We expect SSM to achieve A2 data quality by April 2017.

3.138 Stations are a key passenger interface, and a determinant of passenger satisfaction on the railway. Station condition is also a potential safety concern and poorly maintained stations can present a risk to passengers.

3.139 In our draft determination we said we require Network Rail to maintain station condition at anticipated CP4 exit levels[111] and achieve the SSM figures it has provided to us (see Table 3.6 below) in its SBP clarifications.

Table 3.6: Annual Station Stewardship Measure outputs for CP5

Station Stewardship Measure	2014-15	2015-16	2016-17	2017-18	2018-19
Category A (England & Wales)	2.24	2.24	2.24	2.23	2.23
Category B (England & Wales)	2.34	2.33	2.33	2.33	2.32
Category C (England & Wales)	2.40	2.40	2.39	2.39	2.38
Category D (England & Wales)	2.40	2.39	2.39	2.38	2.38
Category E (England & Wales)	2.40	2.40	2.39	2.39	2.39
Category F (England & Wales)	2.48	2.47	2.47	2.46	2.46
Scotland	2.33	2.33	2.33	2.32	2.32

3.140 In its response to our draft determination consultation, Network Rail said that the SSM projections in the SBP can no longer be achieved, due to a "substantial reduction in franchised station expenditure from the SBP". In our view Network Rail did not substantiate this assertion (see also maintenance and renewals chapter 8).

3.141 Virgin does not believe SSM is effective, and Railfuture believe SSM should contain additional measures such as passenger facilities. Passenger Focus believes the outputs should be more challenging, and believes ORR should "be looking for the underlying station condition to improve more significantly over time". We believe any further development of SSM should await progress with DfT's re-franchising programme, which will transfer responsibility for long term maintenance and renewal for some stations to the TOC. In anticipation of this process we commissioned a

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accuracy on a scale of 1* (data used to calculate the measure is accurate to within 0.1%) to X (data cannot be measured).

[111] A lower SSM score indicates a better station condition.

scoping study[112] for a possible new station measure with input from selected parties from Network Rail and ATOC.

3.142 After consideration of these responses we have decided to set the outputs proposed in our draft determination (see Table 3.6 above). We believe these represent challenging but achievable targets, given the funding available. We have decided to retain SSM as a regulated output in CP5. Network Rail must collate the SSM scores for all stations including those transferred to TOCs.

3.143 In our outputs consultation we said we would not set LMDSM as an output, but would monitor it as an indicator, reflecting the supporting role depots play in delivery of other outputs.

3.144 LMDSM is calculated in the same way as SSM – the asset remaining life of a range of elements is compared to asset life expectancy. As with SSM, data quality of LMDSM was also reviewed three times in CP4. Data quality improved from a C5 (significant shortcomings in the system and data is accurate to 50%) to a C2 (significant shortcomings in the system and data is accurate to 5%), but is still well below our A2 data quality expectation. We expect LMDSM to achieve A2 data quality by April 2017.

3.145 As proposed in our draft determination, we have decided that LMDSM should continue to be an indicator in CP5. It will be monitored as an asset condition measure.

Our decisions on asset management

3.146 In our outputs consultation we noted that, although Network Rail's management of its assets had improved, the pace of change had been too slow. Network Rail's SBP submission clearly shows that the level of maturity varies across the assets, and we have regularly set out our concerns about problems in particular geographical areas. Recent data casts doubt on Network Rail's delivery of its own asset management plans.

3.147 Although we support the move to a more devolved structure, it also raises new challenges. The new route directors for asset management will be integrated with the maintenance delivery organisation, providing a sharper focus on targeting the management of the assets on delivering the operational railway at the route level. But asset management capability is unlikely to be fully embedded at the route level yet, and it will take some time for the structure to evolve, as the central organisation focuses on providing more of a specification and assurance role. We are keen to see that the assurance process is robust, to ensure that the asset polices are applied correctly and effectively.

3.148 Our consultation said that we need to be able to measure Network Rail's progress in terms of:

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[112] *Shaping Station Stewardship Measure*, Faithful+Gould, July 2013, is available at http://www.rail-reg.gov.uk/upload/pdf/ssm-working-group-2013-07-31.pdf

(a) asset management capability;

(b) data quality;

(c) the delivery of the ORBIS programme;

(d) asset condition;

(e) asset performance; and

(f) the delivery of its asset policies in terms of volumes of work.

3.149 We said that we were considering setting the first three areas as outputs in order to drive faster improvement.

3.150 Network Rail's SBP response on asset management did not fully address the concerns we had raised in our outputs consultation, the ongoing concerns we had raised about delivery, or provide assurance on how the relationship between the central organisation and the routes will work.

3.151 Excellent asset management is a critical pre-cursor to a high performing, efficient and safe railway. We have decided that in order to secure the improvements that we consider are needed, we will set asset management outputs in line with our consultation proposal.

Asset management capability

3.152 The quality of Network Rail's asset management capability is key to performance and efficiency in CP5 and beyond. The independent reporter (AMCL) has carried out regular assessments of Network Rail's maturity against its Asset Management Excellence Model (AMEM, see Table 3.7 below). This model currently has 23 activities that are aligned with PAS55, with each activity given a score from 0% to 100%. A score of over 70% is needed to be in the excellent category.

3.153 For CP4, the 23 activities were aggregated into 6 groups, and improvement trajectories for those groups were agreed with Network Rail. AMCL's latest assessment[113] has shown that while Network Rail has improved recently, it only met two of the six targets as at January 2013.

[113] *2013 SBP AMEM Assessment*, AMCL, May 2013, is available at http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

Table 3.7: Asset Management Excellence Model – Network Rail's capability progress in CP4

Core Groups	Network Rail as assessed 2009	AMCL Roadmap Target for SBP	Network Rail as assessed at SBP
1 - Asset Management Strategy & Planning	56.3%	64.7%	65.8%
2 - Asset Management Decision-Making	47.3%	59.7%	58.7%
3 - Lifecycle Delivery Activities	64.8%	70.5%	69.2%
4 - Asset Knowledge Enablers	51.7%	63.5%	60.7%
5 - Organisation & People Enablers	63.0%	71.1%	67.3%
6 - Risk & Review	49.5%	58.1%	60.8%

3.154 During CP5 we expect Network Rail to make sufficient progress in asset management maturity such that the renewals and maintenance parts of its SBP for CP6 will be based on a bottom-up workbank for the whole of CP6. This will be created by applying its asset policies to all assets in all asset groups, in accordance with good asset management practice, and condition 1.19 of its network licence.

3.155 To help ensure Network Rail's SBP for CP6 meets our expectations, in our draft determination we proposed outputs for the asset management excellence scores, one for each of the six groups, which should be achieved by the time of the CP6 SBP submission, in January 2018. We said we expect Network Rail to continue to improve its asset management capability after its CP6 SBP submission, so we also proposed outputs for the end of CP5.

3.156 The output levels in the draft determination for the six groups ranged from 70% to 75% in January 2018 and 72% to 77% by the end of CP5.

3.157 In its response to our draft determination consultation, Network Rail said that asset management measures should be indicators, rather than outputs, as they are "inputs to the achievement of performance outputs and improved efficiency". Network Rail believes that if AMEM is to be an output, the target should be 70%, as this is the threshold AMCL define as excellent. Network Rail also questioned the appropriateness of outputs for each of the 6 groups. A number of other respondents, including several TOCs, ATOC, Railway Industry Association and Rail Freight Group supported the establishment of asset management outputs, saying this will improve asset management capability and quality.

3.158 Network Rail has a general duty under the terms of its network licence to achieve best practice in asset management to the greatest extent reasonably practicable. AMCL's AMEM definition of excellence (70%) is somewhat less than best practice: according

to AMCL's benchmarking analysis[114], the highest AMEM score in their rail sector sample is currently 75% (the highest across all sectors is 80%). However, we accept that progress towards best practice becomes more challenging beyond 70%. Ultimately we expect Network Rail to develop its own view of how far to go beyond excellence, and to articulate the supporting business case. We expect Network Rail to do this in its SBP for CP6. For CP5 we have concluded that using AMEM scores as outputs will help ensure Network Rail meets its licence obligations, and the expectations of stakeholders.

3.159 The AMEM model will be re-baselined when the forthcoming ISO55000 standard for asset management is published. This will replace the current 23 activities with 39. It is important that Network Rail continues to make progress towards best practice in all 39 activities, however we recognise that some activities are more important than others for a rail infrastructure asset manager. In our draft determination we proposed outputs based on combining the 39 activities into 6 groups. This approach gives Network Rail some flexibility to direct effort towards the activities it believes are most important, while ensuring good progress overall. We have concluded that this remains the best approach for CP5. Each group score will be computed according to the average of the question scores for all activities in that group.

3.160 In its response to our consultation, Network Rail referred to recent work by AMCL on the confidence limits associated with its AMEM scores. For the SBP assessment, the 80% confidence interval for the overall score is ±1.5%. The confidence interval for individual groups varies between ±1.8% and ±5.9%. The range of tolerance reflects where we asked AMCL to focus effort during the SBP assessment. AMCL has confirmed that the assessment protocol can be adapted to make the tolerance more consistent across the groups.

3.161 We have therefore decided to set a score of 72% for each group as a regulated output. If Network Rail achieves a group score of 72%, the probability it exceeded the 70% excellence threshold for that group will be around 90%. We have decided that these outputs will apply at the time of Network Rail's CP6 SBP submission (January 2018). For the remainder of CP5, we expect Network Rail to demonstrate continuous improvement towards best practice, consistent with achieving its aims for CP6.

3.162 While this means the company will no longer be required to meet the core group scores of up to 77% by 2019 proposed in the draft determination, this approach will ensure Network Rail reaches excellence, while avoiding what could be perverse incentives to chase scores beyond excellent in some groups, regardless of whether this is delivering clear benefits. It also makes the required level for the 'asset management and decision making' group (which includes the critical area of

[114] *AMCL end of CP4 and CP5 trajectories report,* AMCL, July 2013, is available at http://www.rail-reg.gov.uk/upload/pdf/amcl-cp5-am-targets-july-2013.pdf.

maintenance planning) more challenging than in our draft determination (72% is required rather than 70%, giving a stronger assurance that excellence will have been reached), while giving the company flexibility over which groups to target for further improvements post January 2018.

3.163 During CP5 we will also monitor Network Rail's asset management capability at route level (where asset management decisions will increasingly be taken), as well as at network-wide level. This will provide assurance that corporate asset management strategies and policies are being applied by the routes consistently and effectively. We are working with Network Rail to develop an AMEM-lite indicator, to monitor progress at route level, based on the elements of the AMEM assessment that are applicable at route level. The AMEM-lite methodology will be piloted on two routes, and then applied to all routes before the end of CP4, to provide a baseline for monitoring progress at route level during CP5. We expect AMEM-lite to be applied annually and can be used to inform the full AMEM capability model. The results will provide evidence of whether Network Rail is on course to achieve the AMEM outputs in time for its SBP submission for CP6.

Asset data quality

3.164 Asset management is only as good as the data on which it is based. As our analysis in the maintenance and renewals chapter shows, poor data reduces the quality and value of Network Rail's SBP.

3.165 We already have a standard method for assessing asset data quality based on confidence grading of data reliability (the process or 'governance' for producing the data: A to D scale) and a grading of accuracy and completeness (1* to 6). The results of a recent audit by Arup[115] applying this approach are in Table 3.8 below.

Table 3.8: Our decisions on asset data quality outputs

Asset Groups	May 2013 ARUP Scores	Output (April 2017)
Track		
Plain Line	B3	A2
Switches & Crossings	B3	
Signalling		
Interlockings	A2	A2
Signals	A3	
Train Detection Equipment	A3	
Point Operating Equipment	A3	
Level Crossings	A2	

[115] *Audit of asset data quality*, Arup, May 2013, is available at http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

Asset Groups	May 2013 ARUP Scores	Output (April 2017)
Telecomms	-*	A2
Electrical Power		
High Voltage Switchgear	-*	A2
Transformers	-*	
Overhead Line Equipment	B2	
Conductor Rail	B4	
High Voltage Cables	-*	
Buildings	B1	A2
Structures		
Underline Bridges	B5	A2
Overline Bridges	B5	
Earthworks	-*	A2

*The data quality of these asset types has not been fully assessed at the time of publication.

3.166 In our draft determination we said that Network Rail cannot be an excellent asset manager without good quality data for all its assets. We therefore proposed that asset data quality should reach grade A2 for all asset types except buildings, for which we proposed A1. We set these as outputs to be achieved by April 2017, to support Network Rail's CP6 SBP submission.

3.167 In its response to our draft determination consultation, Network Rail accepted that good quality data is necessary to manage its business effectively, but opposed the principle of asset data quality being a regulated output, proposing instead that it should be an indicator. Network Rail pointed out that Arup's B1 score for buildings was qualified due to the small sample size, and that in its subsequent annual return assessment, a score of B2 was given based on much the same data. It also said that the asset data attributes that will be required by its decision support tools cannot be defined now, but will be defined and delivered by the ORBIS programme.

3.168 We remain of the view that good asset data is fundamental to asset management, and that establishing asset data quality as regulated outputs during CP5 will help ensure that Network Rail meets its obligations under condition 1.20 of its network licence.

3.169 We have concluded that the A2 score will be an output and will apply to core asset data for all asset types. The term 'core asset data' refers to specific data attributes and these will be defined as part of the ORBIS programme, with the definition and dates shown in Table 3.9.

ORBIS milestones

3.170 The ORBIS programme represents a major investment in asset management by Network Rail. The programme is reasonably well defined and we proposed a series of

specific milestones, as outputs in the draft determination. In its response, Network Rail said it does not consider that ORBIS milestones should be regulated outputs, but indicators instead.

3.171 The ORBIS programme is fundamental to Network Rail progressing towards best practice, and we have decided to set ORBIS milestones as outputs to help ensure the programme delivers the benefits envisaged. We have retained the milestones proposed in our draft determination (incorporating clarifications from Network Rail's response to our draft determination consultation), and added those required for improved data quality, as discussed above. The full set of milestones is shown in Table 3.10. The ORBIS milestone for the track data specification (including for core data) is January 2014. We will monitor progress against this milestone.

Table 3.9: Our decisions on ORBIS milestone outputs

Decision Support Capability	Milestone Description	Date
Track Linear Asset Decisions Support (LADS) will bring together disparate track data sources to enable NR to target work more efficiently	National roll-out complete	May 2014
Signalling Signalling Decision Support (SDS) will bring together disparate signalling data sources to enable NR to target work more efficiently	Data specification complete, including for core data	January 2015
	National roll-out complete	September 2015
Electrification & Plant Electrification & Plant Decision Support (E&PDS) will bring together disparate E&P data sources to enable NR to target work more efficiently	Data specification complete, including for core data	April 2015
	National roll-out complete	December 2015
Structures Ellipse replaces CARRs (Civils Asset Register & Reporting system) as the master system for Civils Structures	Data specification complete, including for core data	June 2014
	Asset hierarchies established and Ellipse designated as master system for Civils	June 2016
GEOGIS decommissioned	GEOGIS will be replaced by strategic Asset Management Platform systems	December 2016
Handheld - Fault and incident data capture app roll-out complete	The new app will allow maintenance staff to enter fault data into handheld devices and for this to be electronically transmitted to control centre staff	August 2014

3.172 The success measure of each milestone will be our approval of each milestone's completion report.

Asset condition and performance indicators

3.173 An excellent asset management company must have the tools to measure the condition and performance of its assets at appropriate intervals, to match the predicted residual life and failure modes (why the asset fails in service) and also to develop appropriate plans to maintain and renew these accordingly.

3.174 In our draft determination we said we would monitor a suite of asset condition indicators, at the national and route level, to improve our ability to understand how well Network Rail is delivering. The creation of route asset managers for each discipline (for example, track and signalling) as part of devolution, places asset management much closer to both maintenance and renewal delivery. We need to adapt our monitoring approach accordingly, so that we can, for example, understand whether higher performance could be delivered at an individual TOC level depending on asset performance at the route level.

3.175 In our draft determination we said we had developed a series of measures of condition (sustainability) and performance (robustness) with Network Rail collaboratively. We proposed to monitor the 'level one' indicators defined in Table 3.10 below. Network Rail will publish these indicators in its delivery plan.

Table 3.10: Our decisions on asset condition indicators for CP5

	Robustness (Periodic)		Sustainability (Annual)	
Asset discipline	**Measure**	**Reported by**	**Measure**	**Reported by**
Track	Rail Breaks and Immediate Action defects per 100km	Route	Track - Used Life - Rail	Route
	Plain Line Poor Track geometry	Route	Track - Used Life – Switches & Crossings	Route
	Track failures (service affecting)	Route	Track - Used Life - Sleepers	Route
			Track - Used Life - Ballast	Route
Signalling	Signalling failures (service affecting)	Route	Signalling Condition Index (Signalling Infrastructure Condition Assessment Remaining Life)	Route
Telecoms	Telecoms failures (service affecting)	Route	Telecoms - Remaining Life	Route
Electrical Power	Alternating Current traction power failures (service affecting)	Route	Electrification & Plant (E&P) - Remaining Life - Conductor Rail	Route
	Direct Current traction power failures (service affecting)	Route	E&P - Remaining Life – Overhead Line Equipment	Route
	Non traction operational power supply failures (service affecting)	Route	E&P - Remaining Life - Signalling Power Cable	Route
Buildings	Reactive faults (attention within 2hr and 24hr)	Route	Percentage Asset Remaining Life - Stations	Route

	Robustness (Periodic)		Sustainability (Annual)	
Asset discipline	**Measure**	**Reported by**	**Measure**	**Reported by**
			Percentage Asset Remaining Life – Light Maintenance Depots	Route
Structures	Number of open faults with a risk score ≥12	Route	Structures – Primary Loadbearing Element Condition Banding	Route
			Tunnel Condition Monitoring Index	Route
Earthworks	Earthwork failures	Route	Earthworks - Condition Banding	Route
Drainage	None		Track Drainage - Condition Banding	Route
			Earthwork/Structure Drainage - Condition Banding	Route
Points	Points failures (service affecting)	Route	None	

3.176 In its response to our draft determination consultation, Network Rail said "the ORR has taken a different view to us on our asset stewardship and how asset sustainability is measured". We do not agree with this, and have worked collaboratively with Network Rail throughout the development of these measures. Passenger Focus believes that the condition of all assets should improve and is concerned that Network Rail is proposing a decline in the condition of some assets.

3.177 We will monitor the condition of all assets closely, to ensure that Network Rail complies with its asset policies.

3.178 In addition to the level one asset condition measures we have proposed above, we also intend to continue to monitor level two indicators as per Network Rail's Annual Return and its internal periodic Infrastructure Condition Report.

Volume indicators

3.179 We have assessed Network Rail's asset policies through challenge by our own engineers and independent reporters. But we have not dictated any aspect of policy detail.

3.180 Network Rail has used its models or bottom-up development of workbanks to turn the policies into a series of activity volumes, to be published (e.g. in its delivery plan), which profiles the work over the prospective five year control period. We do not set the required volumes or drive Network Rail to carry out renewals on less busy routes to meet volume or unit rate targets. The priority for individual renewals comes from Network Rail's whole life cost models and policies for each asset group, which it uses to define the work required to meet asset condition targets.

3.181 We are primarily interested in Network Rail's delivery of outputs across the control period and long-term sustainability. We will monitor the maintenance and renewals volumes included in Network Rail's delivery plan, as it is clear from CP4 that there is a correlation between operational performance and volumes of activities such as tamping. We will expect Network Rail's delivery plan to be in line with its asset policies and to provide us with delivery volumes for each asset. This was not done comprehensively in CP4 (for example buildings and drainage volumes were not provided) and we require this to be addressed in CP5. Network Rail will need to provide us with a justification for any material divergences between the actual volumes delivered in a year and those forecast in the delivery plan and we will monitor this on a forward looking basis (i.e. whether the volumes are likely to be delivered). Taken at a route level these measures will help inform our decisions on the future deliverability of TOC level JPIP performance outputs.

Decisions on the environment

3.182 The HLOSs made it clear that the Secretary of State and the Scottish Ministers expect Network Rail to manage the network with minimum impact on the environment. The Secretary of State's HLOS said the industry should set itself carbon and energy efficiency objectives. The Scottish Ministers' HLOS seeks a continuous and sustained carbon reduction. We need to decide how we will measure Network Rail's performance in this area, while avoiding any potential dual regulation.

3.183 In April 2013 the industry-wide Sustainable Rail Programme published its Meeting Rail's Carbon Ambition plan. The plan acknowledges the need to reduce operational and embedded carbon, develop a whole life carbon measurement tool and measure emissions accurately. The plan includes a number of industry-wide actions that will translate to an absolute reduction in traction CO_2 emissions of 12% by the end of CP5.

3.184 A number of Network Rail's plans will have positive environmental benefits. The electrification programme will reduce carbon emissions, Network Rail has signed a ten-year contract for supply of low-carbon electricity, and we are setting incentives to reduce transmission losses for electricity used by rolling stock and to encourage consumption to be metered.

3.185 Network Rail produced carbon emission forecasts in the SBP and we (jointly with Network Rail) commissioned the independent reporter (Arup) to validate the accuracy

and reliability of the forecasts. Arup concluded[116] that there was scope for improving the process for producing these forecasts.

3.186 Our outputs consultation proposed there should be no environmental outputs for Network Rail in CP5. In its review of CP4 regulated outputs, Arup questioned the value of environmental outputs, given the relative immaturity of the measures. There are also existing environmental and legal obligations on Network Rail[117] and many of Network Rail's sustainable development activities are regulated by others.

3.187 However, Network Rail must set itself ambitious and stretching targets. The Secretary of State's HLOS stated the "industry should also set out plans for embedding the rail industry's Sustainable Development Principles[118] and measuring and reducing the carbon embedded in new infrastructure, throughout the lifecycle of programmes and projects. This should include the use of a suitable carbon accounting methodology". We will monitor Network Rail's asset policies and programme / project planning, to ensure this requirement is met.

3.188 Network Rail plans to forecast and report on the following measures, which we have decided will be indicators in CP5:

(a) Scope 1 and 2 carbon dioxide emissions associated with Network Rail's own operations (traction, non-traction and total);

(b) carbon embedded in new infrastructure; and

(c) sustainable development KPIs (to be detailed in the CP5 delivery plan).

3.189 There will be independent assurance of these indicators, to ensure Network Rail's environmental reporting is relevant, accurate and reliable.

3.190 We expect Network Rail to address the recommendations in Arup's report before the revised carbon emission and intensity forecasts are published in its delivery plan. Network Rail's carbon reduction forecasts must also support the industry's goal of an absolute reduction in traction CO_2 emissions of 12% by the end of CP5, and a reduction in carbon embedded in new infrastructure.

3.191 In our draft determination we said it is vital that railway infrastructure is resilient to climate change and extreme weather. We said Network Rail does not have robust

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[116] *Review of Network Rail's carbon reduction calculations and CP5 trajectory*, Arup, May 2013, is available at http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

[117] Network Rail is required to report environmental incidents, and events of non-compliance with environmental permits, to the Environment Agency and Scottish Environment Protection Agency. Network Rail is also required to report the condition of Sites of Special Scientific Interest (that it owns) to Natural England, Scottish Natural Heritage and Countryside Council of Wales, and its carbon footprint via the Carbon Reduction Commitment, to Department for Energy and Climate Change.

[118] *The Rail Industry Sustainable Development Principles*, RSSB, February 2009, is available at http://www.rssb.co.uk/SiteCollectionDocuments/national_programmes/sustainable_rail/Rail Industry Sustainable Development Principles.pdf.

climate change resilience plans and required it to provide further evidence (with its delivery plan) of how its assets are resilient to climate change and extreme weather. In its response to our draft determination consultation, Network Rail provided a climate change and weather resilience document. It emphasises the need for a whole life cycle approach and provides examples of how Network Rail is making assets resilient to climate change and extreme weather. We believe this is a robust plan and provides the evidence we sought in our draft determination. Network Rail has also provided an example of a climate change and weather resilience plan at route level (for Western) and committed to publishing plans for all other routes by the end of September 2014. We will review these plans and monitor progress against the specific project delivery milestones in each route.

3.192 In 2010 the Department for Environment, Food and Rural Affairs (Defra) published a set of Noise Action Plans addressing noise management issues under the terms of the Environmental Noise (England) Regulations 2006, as amended[119]. The railways action plan identified ORR and DfT as the rail authorities required to implement any actions or secure budget for actions. In 2012 Defra completed the second round of noise mapping[120]; identifying areas affected by railway noise. The Welsh and Scottish governments have also carried out similar noise mapping exercises. Railway noise exposure is obtained through modelling. The industry's Noise Policy Working Group (NPWG) is considering additional research in CP5 to supplement the mapping work with recorded data, particularly in connection with acoustic track quality. Network Rail also has planned activities in CP5, including rail profile grinding and electrification projects that will support mitigation of the noise impacts identified in the latest noise mapping round. The NPWG agrees this is the most effective method of addressing railway noise impacts. We will monitor Network Rail's progress and continue to engage with the NPWG to address railway noise in the worst affected areas across Great Britain.

Decisions on other areas

System operator capability

3.193 System operation is important: it is about planning and managing the use of the whole system efficiently, rather than building, owning and maintaining it. Good system operation is not about getting more traffic on to the network at all costs - it is about optimising within constraints, including customers' and funders' requirements. The

[119] These regulations implement the Environmental Noise Directive in England and require, on a five year cycle, the production of strategic noise maps and the preparation of Action Plans for large urban areas (agglomerations), roads and railways, based on the results of the noise mapping.

[120] The Department for Environment, Food and Rural Affairs maps noise on the rail network to identify areas with significant noise nuisance. The mapping is used to direct actions that mitigate nuisance noise from the rail network. Further information can be found on the Department for Environment, Food and Rural Affairs' website: http://services.defra.gov.uk/wps/portal/noise.

nature and extent of the constraints that exist on the rail network differ from those that exist in other network industries. For example, the opportunities for interchange and diversion are limited, as passengers do not like changing trains.

Aims and objectives

3.194 In our draft determination, we reiterated our intention to develop a new system operation capability enabler. We said that this new enabler would measure the performance of system operation functions, including, but not limited to: the process of assembling, validating and publishing the timetable, possessions planning, understanding / measuring capacity availability and utilisation, network planning and network change. We said that:

(a) the enabler will take the form of a dashboard of measures (rather than any single measure);

(b) an illustrative dashboard will be drawn up and agreed with Network Rail in time for inclusion in the final determination;

(c) the exact content of the dashboard will be consulted on by Network Rail as part of its December 2013 draft delivery plan;

(d) the dashboard will be finalised and in place before the start of CP5; and

(e) we will expect Network Rail to publish its performance against dashboard measures annually throughout CP5 and we will keep its content under review.

3.195 Our measurement of the performance of system operation functions should help improve our understanding of Network Rail's decision making. Measurement should provide clarity as to whether Network Rail has the information, capability and incentives to make the right decisions at the right time in the right way to optimise the use of the existing network and to plan capacity enhancements. It should help to identify what improvements are required including whether Network Rail has the right incentives to encourage and support good system operation performance. Measures should provide transparency and assurance to access beneficiaries and funders, help to promote fairness and facilitate more informed decision making.

3.196 It is important to stress that, overall, our intention is not to create a new raft of measures that we are going to monitor and regulate to. The measures should provide insight to Network Rail's performance in carrying out its system operation activities. If Network Rail is able to demonstrate its progress and good performance of its system operation functions then the regulatory framework can adapt and respond accordingly.

Response to draft determination consultation and industry views

3.197 In its response to the draft determination, the Rail Freight Group stated that it supports the need to develop the system operator function and to encourage this through the outputs framework. DB Schenker noted that good system operation is critical. Freightliner stated that it considered that further work on the role and

responsibilities of the system operator, drawing on input from TOCs and FOCs, is urgently needed to develop the system operator concept, since it is not yet fully developed or understood in the wider industry.

3.198 Chiltern considered that there is no framework to encourage Network Rail to get more capacity out of the existing system and that Network Rail is 'programmed' to prioritise performance results over sale of capacity. It noted that there are many ways of creating additional capacity without embarking upon major schemes and that Network Rail currently lacks an incentive to chase out these initiatives because the incentive signals are about achieving performance targets and maintaining and renewing the asset. Chiltern would expect a world class system operator to naturally seek out these opportunities.

3.199 DB Schenker raised concerns about the potential effect of devolution on Network Rail's performance of its system operator functions and while it acknowledged Network Rail having established a central freight team to deal with this concern, it suggested that the pace of devolution may test the effectiveness of these arrangements. Freightliner raised concerns around Network Rail's train planning service and the apparent devolution of powers over access rights to its routes. It highlighted the importance of an integrated approach, particularly as freight operators' paths usually cross many routes and stressed the importance of our continued role as a 'referee' on issues around access to the network.

3.200 Freightliner stated that it supports our proposal in terms of developing an illustrative dashboard, and was happy to contribute to a better definition and understanding of the system operator concept. DB Schenker cautioned that a dashboard of measures must not be overtaken by events – for example a switch from rail to road – and suggested that the dashboard should be capable of illustrating qualitative issues – for example path quality.

3.201 Network Rail stated that while it, in principle, agrees with developing a dashboard of metrics to measure system operator performance, it recognised the importance of avoiding conflicting impacts/perverse incentives. For example, Network Rail is keen to align the system operator metrics with the Journey Time metric.

3.202 Beyond the draft determination, Network Rail has sought the views of the industry through discussion of the emerging dashboard of measures with the Planning Oversight Group (POG). RDG wrote to us on 2 October 2013 to inform us that POG will support Network Rail in developing meaningful and useful indicators to be included in Network Rail's draft delivery plan. To facilitate this, POG has established a sub-group with cross-industry representation. We welcome this wider industry involvement in developing the dashboard and agree that suitable measures should provide transparency and assurance to operators and funders.

Capacity measures

3.203 In our view it should be possible to develop a measure or set of measures of capacity availability and utilisation. It should also be possible to measure capacity constraints and the extent to which Network Rail is minimising those constraints that are within its control. However, we recognise that developing useful capacity measures for railways is challenging and that there are few existing reliable measures of capacity availability and utilisation.

3.204 Recently, Network Rail has conducted pilot studies of how the network is used - to identify both theoretical capacity and actual utilisation and the reasons why they differ. This work has helped to highlight some of the constraints e.g. customer and funder requirements for different rolling stock speed characteristics or stopping patterns. This could aid future discussions as to the possible removal or relaxation of some of these constraints to improve efficiency in the management of network capacity and so allow Network Rail to increase both performance and capacity utilisation at the same time.

3.205 Network Rail will analyse other parts of the network – focusing on those parts of the network where there are competing and conflicting demands for the use of capacity. The work should facilitate more informed decision making. It might, for example, create an overall improvement in, and speeding up of, the handling of access applications.

Illustrative dashboard

3.206 Ultimately we are interested in whether Network Rail is delivering good outcomes from system operation. Many system operation functions contribute to outcomes but are not measurable. For example, a good process for assembling, validating and publishing the timetable should help to deliver the 'right' capacity utilisation and operational performance.

3.207 Types of outcome measures which may be suitable for inclusion in the system operation dashboard include:

(a) capacity or volume related measures i.e. how much the system is used. For example, actual train km per track km could be measured until such a time as reliable and robust capacity measures are developed;

(b) performance or quality related measures i.e. punctuality, delays, cancellations etc. Measures could, for example, include average lateness per passenger and the Freight Delivery Metric;

(c) customer perceptions and service related measures i.e. appreciation, response times etc. This could include measures which reflect responses to the National Passenger Survey and freight end user surveys; and

(d) financial related measures i.e. indicators of optimal system operation including trade-offs. This could include measures such as cost of performing system

operator functions or payments under various regulatory contractual and financial incentives regimes e.g. Schedule 8.

3.208 While outcome measures are important we recognise they can be indicators of the performance / behaviours of parties other than the system operator. This also means that many of these measures feature elsewhere in our measurement of Network Rail or industry performance.

3.209 We understand that the POG sub-group is of the view that measures included in the dashboard should focus on the outcomes that access beneficiaries expect from an effective system operator. It considers that the metrics and measurements should be of use to the industry, ORR and funders in assessing the performance of those functions clearly defined within the system operator capability. However, the POG sub-group recognises also that many of the outputs, indicators and enablers relevant to Network Rail at national and route level will also provide evidence of overall performance.

3.210 In addition to these high level measures, we have also looked at what practical problems Network Rail and operators face 'on the ground'. Network Rail is working to develop and improve the tools, information, data and processes on which good system operation relies. These capability improvements include:

(a) capacity and performance management[121];

(b) people, skills and culture[122]; and

(c) the long term planning process[123].

3.211 Measures of these improvements in inputs and processes are important. Network Rail will identify suitable indicators of the progress of these work streams - for example key project milestones - for inclusion in the dashboard. This should allow us and the industry to monitor the development of the company's capability to perform its system operation functions.

Next steps

3.212 We will continue to work with Network Rail and the wider industry (through the POG sub-group) to develop the measures for the dashboard. The dashboard must be agreed and put in place before the start of CP5. Since measures, for example of

[121] This aims to better understand and reconcile trade-offs between different uses of the network. Currently, there are three significant areas: a) supporting and influencing funders and timetable participants in franchise and significant timetable change; b) balancing the allocation of access for train operation and efficient infrastructure management; and c) providing a clearer framework of the decision support tools to inform capacity planning.

[122] This involves investment in people and plans to develop the right capabilities and skills in the organisation through targeted training and development programmes.

[123] The LTPP comprises a series of studies (market studies, route studies and cross-boundary analysis).

capacity availability and utilisation, are at an early stage of development they will require further refinement over CP5. This will necessitate close working with Network Rail and the on-going support and engagement of the wider industry.

Programme management capability

3.213 In our outputs consultation we stated that Network Rail needs to monitor its own capability in programme and project management. We also said we expect Network Rail to propose a framework for each of these areas by which we can also monitor its progress.

3.214 We commissioned the independent reporter Nichols to provide constructive challenge to Network Rail in its assessment of how best to drive continuous improvement in its programme and project management. Nichols' report found that Network Rail's project management capability is advanced, but it could improve its programme and portfolio management, and identified priority areas within its business where this will add most value. Nichols recommended Network Rail baseline and monitor its capability using the Cabinet Office's Portfolio, Programme, and Project Management Maturity Model (P3M3).

3.215 We have therefore decided to include P3M3 as an enabler that measures Network Rail's effectiveness in project, programme and portfolio management capability. Network Rail will confirm the milestones, for baselining and developing its capability, in its delivery plan.

Customer service maturity

3.216 We need to decide whether Network Rail's customer service maturity should be an enabler in CP5 and hence whether it should set a trajectory for its level of maturity through CP5.

3.217 Network Rail has measured the satisfaction of its passenger and freight operator customers in its annual survey throughout CP4. The survey gives a good guide but does not allow Network Rail to understand if it is a genuinely customer-focused organisation.

3.218 Network Rail has been developing an appropriate model for measuring its overall level of customer service maturity in CP5. It committed to establishing a trajectory for its customer service maturity in its SBP. We support this and believe that the model will provide a much fuller picture of the level of service delivered to its customers than its annual survey alone. However, the SBP did not specify any detail as to how it proposed to do this.

3.219 We have been monitoring Network Rail's work to establish the trajectory. Network Rail has appointed KPMG to work with it to identify, develop and implement an appropriate model and establish a trajectory to reach a CP5 exit target.

3.220 Network Rail needs to develop a clear plan to establish an appropriate model. Network Rail has committed to consulting the industry on its proposed metric and

action plan for implementing the model. We will ensure that Network Rail responds positively to feedback received and uses it to develop a model for implementation.

3.221 In our draft determination we said we would require Network Rail to develop a customer service maturity model, with trajectories and an action plan. The model must be able to baseline performance as of 1 April 2014, and act as an enabler for excellent customer service maturity throughout CP5. In its response to our draft determination consultation, Network Rail said it will develop a baseline in the first year of CP5, which is later than we expected, but we accept this position. We will require Network Rail to consult on the proposed measures in its draft delivery plan consultation, and baseline its performance by March 2015, and set CP5 exit targets.

Passenger satisfaction

3.222 We are focused on improving the passenger experience. Supporting a better service for passengers is a key strategic objective for ORR and a priority for the wider rail industry.

3.223 The National Passenger Survey (NPS, Passenger Focus) provides biannual passenger satisfaction results for the rail industry. We monitor it to assess progress in the passenger experience across the network.

3.224 In our draft determination we said we have included the NPS as an indicator in our output framework. This will support continuous improvement in service and raise awareness of our passenger role. No material comments were received in relation to this issue and we therefore confirm the decision set out in our draft determination.

Journey time

Journey time metric

3.225 We need to decide whether to establish a metric to measure changes in journey time.

3.226 The Secretary of State and Scottish Ministers' HLOSs both note the importance of reducing journey times where strategic opportunities present themselves. There are several initiatives planned for CP5 (including the Edinburgh to Glasgow Improvements Programme and investments in the Great Western, East Coast and Midland Main Lines) that will cut journey times across borders, and between key cities.

3.227 In our outputs consultation we said it is important that performance improvements must not be achieved simply at the expense of journey times. We acknowledged that developing a metric would be challenging, but useful given the funds committed to journey time reduction. In its response, Network Rail said a journey time indicator would be complex, but a metric linked to improvement funds could be considered. In our draft determination we said we would work with the industry and funders to develop a journey time metric.

3.228 In its response to our draft determination consultation, Network Rail said it was developing a journey time speed metric[124]. Transport Scotland proposed an alternative metric[125] for ScotRail that it suggested could also be used to monitor Network Rail's performance. Elsewhere, there was general support for the introduction of a journey time metric, and requests (from Rail Freight Group and DB Schenker) for the metric to be extended to cover freight.

3.229 We have discussed the proposed measures with stakeholders and decided that a journey time metric based on average speed will be introduced, at operator and sub-operator level. There will be specific measures for services in Scotland.

Opportunities for reducing journey times

3.230 The HLOS for Scotland also required a process to be developed for "all opportunities for journey time improvements through planned works, network maintenance, network changes, timetabling and signalling exercises to be explored and implemented where they offer best value for money."

3.231 The Route Investment Review Groups (RIRGs), which include Network Rail's strategic planning teams, train operators and other stakeholders (such as Transport Scotland and DfT), currently provide a forum for discussing future renewals and enhancement schemes on each route. These have helped to deliver some improvements to journey times.

3.232 However, the industry (through the Planning Oversight Group (POG), which includes Network Rail) recognises that there is scope for improving processes for identifying opportunities for journey time improvements. It has proposed to work with Network Rail to identify best practice and apply this consistently across the network and to examine other areas where improvements could be made to support journey time improvements (such as through timetabling).

3.233 We note Transport Scotland's view that the RIRG process is too limited, for example, it does not adequately provide for potential journey time improvements identified by stakeholders to be fully explored. It has also expressed to us a concern that opportunities are being missed to improve journey times in the course of maintenance and renewals work even though these could be implemented at no additional cost. We also note the responses to the draft determination from other stakeholders seeking better arrangements for identifying and implementing journey time improvements.

3.234 We welcome the proposal from POG to set out how improvements could be made to these processes. We require Network Rail to review its processes for identifying

[124] Journey Time Metric (average speed) = Total planned distance (miles) / Total planned journey time (mins) * 60

[125] Journey Time Metric (mins per mile) = Total Planned Journey Time (mins) / Total Planned Distance (miles)

journey time improvements, working with POG and other key stakeholders including Transport Scotland to do this, and establish improved arrangements across Great Britain by the start of CP5. Amongst other things, these arrangements should ensure that:

(a) Network Rail considers potential improvements to journey times that could be delivered using opportunities arising from its day-to-day activities such as renewals. Where improvements can be delivered without requiring additional funding, Network Rail should implement these where practicable. There should be sufficient transparency over this process to give assurance to key stakeholders that such opportunities are being actively considered, and provide for them to challenge if they feel that opportunities are being missed;

(b) there is adequate scope for the involvement of customers and funders in exploring potential improvements to journey times, including the opportunity to fund incremental improvements or advocate the use of ring-fenced funds for this; and

(c) improvements are delivered where there is a value for money case and funding.

3.235 In conjunction with the journey time metric KPI discussed earlier, this should provide a clear and measurable process for facilitating incremental improvements to journey times, with progress assessed against the baseline position of 31 March 2014.

Cross-border service availability

3.236 We need to decide if there should be a requirement on Network Rail to make at least one cross-border (between England and Scotland) route available at all times.

3.237 The Scottish Ministers' HLOS said "Cross border rail services provide vital connections for passengers, key routes to market for freight users and contribute to regional economic development, including within Scotland. In support of this, the Scottish Ministers require that where maintenance, renewal or enhancement activity is required on cross border routes, at least one of those routes will be planned to be available at all times for the passage of timetabled sleeper, passenger and freight services through to London without the need for change."

3.238 This requirement spans both England and Scotland and the Secretary of State did not specify a similar requirement. It is not clear what costs would be involved in providing a total guarantee one route would always be open. Network Rail's SBP acknowledges the importance of the requirement, but highlights potential difficulties on certain dates, such as English Bank Holidays.

3.239 In our draft determination we said that the availability of a cross-border route (as described in the Scottish Ministers' HLOS) would be an indicator. We said Network Rail must use all reasonable endeavours to plan to keep at least one cross-border route open at all times, but we recognised that this might not always be possible. We

said we would review this requirement throughout CP5 and discuss with Transport Scotland, DfT, and Network Rail.

3.240 In its response to our draft determination consultation, Network Rail said there was little benefit in introducing an indicator and proposed that "the existing process for informing Transport Scotland of the availability of a cross border route continues through CP5". Transport Scotland said it was disappointed that it would not always be possible to maintain at least one cross-border route and was keen to understand our expectations of Network Rail.

3.241 We understand Transport Scotland's position. However, we do not believe it is feasible to guarantee the availability of a cross-border route at all times. There is no ring-fenced fund for cross border availability, and we cannot reasonably expect Network Rail to anticipate all external events that could jeopardise availability of a cross-border route. We do however require Network Rail to use all reasonable endeavours to plan to keep at least one cross-border route available at all times, alert operators, funders and ourselves when this will not be possible, and justify any instances where this is not possible. Network Rail's internal planning processes must recognise the significance of this issue and provide appropriate guidance.

3.242 More generally Network Rail must follow industry processes, particularly the requirements of the network code. Any instances where Network Rail considers that it is not possible to keep at least one cross-border route open would need to be consistent with this framework. Network Rail consults on timetable changes every six months and is required to issue proposed changes 59 weeks before the commencement of the new timetable. A train operator can appeal (using industry appeals processes) against the changes and we make the final decision, where any party is dissatisfied with the outcome of the appeal.

3.243 We have decided that cross-border service availability will be an indicator.

Change control

3.244 In CP4 we have a change control mechanism for enhancements. This has worked well and (for example) allowed us – in consultation with the industry – to adjust enhancement programmes when the scope or requirements has changed.

3.245 Network Rail has proposed that a broader mechanism is introduced to allow other outputs to be changed in one specific circumstance – where the DfT or Transport Scotland specifies franchises in a way which is materially inconsistent with Network Rail's outputs.

3.246 We agree this is sensible and allows the regulatory settlement and franchising to be more joined-up. In our draft determination we proposed to introduce a change control mechanism for performance outputs, on the terms outlined above.

3.247 In its response to our draft determination consultation, Network Rail said the change control "mechanism needs to be broadened so that we have greater flexibility to deal

with unexpected growth or other external changes". We do not believe it is appropriate to have an open-ended change control mechanism, or define all potential external changes that could legitimately lead to an output change. We will therefore introduce a change control mechanism for performance outputs, as per our draft determination proposal.

3.248 Any change to a regulated output will involve consultation with affected parties. We will make the final decision on change control requests.

CP5 output framework

3.249 This chapter confirms the decisions we have taken on outputs, indicators and enablers. It presents our analysis of HLOS requirements, Network Rail's SBP, independent reporter studies and consultation feedback. We have considered all of these in specifying our output framework, which is summarised below in Table 3.11.

Table 3.11: Our decisions on the CP5 output framework

Area	Outputs	Indicators	Enablers (these support all output areas)
Train service reliability	• PPM: for England & Wales (annual with a CP5 exit of 92.5%), Scotland (annual 92% and CP5 exit of 92.5%) and franchised TOCs in England & Wales (rolling annual output JPIP, no TOC to exit CP5 below 90%, except East Coast and Virgin who must not exit CP5 with PPM below 88% or CaSL above 4.2% and 2.9% respectively. Additional 88% minimum for First Great Western high speed services at the end of CP5) • CaSL for England & Wales (annual and CP5 exit of 2.2%) and rolling annual output JPIP • Freight Delivery Metric (National annual 92.5%)	• PPM: sector and sub-operator • Right-time performance: England & Wales, Scotland, sector, JPIP and sub-operator • Average lateness: England & Wales, Scotland, sector and JPIP • CaSL: sector and sub-operator • Delay minutes, split by category (including Network Rail on TOC, TOC on self and TOC on TOC): for National, England & Wales, Scotland, sector, Network Rail route and JPIP • FDM by strategic freight corridor • Freight delay minutes (national) • Scotland KPI package	• Safety management maturity (Railway Management Maturity Model – RM3) • System operator capability • Programme management capability (P3M3) • Customer service maturity
Enhancements	• Enhancement scheme delivery milestones (set in an enhancements delivery plan) • Development milestones for early stage projects	• Enhancement fund KPIs (e.g. average scheme benefit cost ratios) • Improved governance processes for HLOS funds • Project activities and milestones	
Health and safety	• A plan of projects in CP5, to achieve the maximum possible reduction in risk of accidents at level crossings using the £99m ring-fenced fund		

Area	Outputs	Indicators	Enablers (these support all output areas)
Network availability	• PDI-P (National CP5 exit of 0.58 • PDI-F (National CP5 exit of 0.73)		
Network capability	• Base requirement at start of CP5 in terms of track mileage & layout, line speed, gauge, route availability, electrification type		
Stations	• SSM by station category for England & Wales, and Scotland (annual)		
Depots		• Light Maintenance Depot Stewardship Measure: England & Wales, Scotland and National	
Asset management	• Asset management excellence (AMEM) capability for each core group at National level • Asset data quality for each asset type at National level • Milestones for ORBIS	• Asset condition for robustness and sustainability at National and route level • AMEM lite capability at route level • Renewal and maintenance volumes by asset type and spend at National and route level	
Environment		• Scope 1 and 2 traction and non-traction carbon dioxide emissions: England & Wales and Scotland • Carbon embedded in new infrastructure • Sustainable development KPIs	

Area	Outputs	Indicators	Enablers (these support all output areas)
Other		• Passenger satisfaction • Journey time • Cross-border service availability	

Differences between our draft and final determination

3.250 We have considered all the feedback and evidence received from our draft determination consultation, and made the following change to the output framework:

(a) Annual PPM (England & Wales) – the output for the first three years has been lowered to reflect Network Rail's lower than anticipated CP4 exit rate (see Table 3.5 for details).

(b) TOC PPM – we have confirmed that all England & Wales franchised TOCs should exit CP5 with PPM no lower than 90%, except East Coast and Virgin, who must not exit CP5 with PPM below 88% or CaSL above 4.2% and 2.9% respectively. We have also added a minimum 88% PPM output for First Great Western high speed services.

(c) PDI – the CP5 exit rate for PDI-P and PDI-F has been lowered (to 0.58 and 0.73 respectively) to reflect the reprofiling of enhancement and renewal activities.

(d) Carbon intensity – we specified this as an indicator but Network Rail has signed a ten-year contract for supply of low-carbon electricity and therefore there is little value in monitoring its carbon intensity. We expect Network Rail to emphasise low-carbon electricity in new procurement contracts.

(e) Programme management capability – P3M3 will be the enabler for baselining and measuring project, programme and portfolio management maturity.

Main differences compared to PR08

3.251 Table 3.12 below summarises the main changes in each output area from CP4.

Table 3.12: Summary of differences between CP4 and CP5 output framework

Area	Outputs	Indicators	Enablers (these support all output areas)
Train service reliability	PPM: franchised TOC CP5 exit output and industry sets TOC level outputs via JPIPs Freight: delay minutes measure replaced with Freight Delivery Metric		New safety enabler (Railway Management Maturity Model) New system operator capability enabler New programme management capability enabler New customer service maturity enabler
Enhancements	New approach for regulating early stages schemes		
Health and safety	New level crossing risk reduction plan output (England & Wales and Scotland)		
Network availability (reducing disruption from engineering works)	Potential new (working timetable compliance) measure to run in parallel to PDI-P and PDI-F		
Stations	Potential new (SSM+) measure		
Depots		Light Maintenance Depot Stewardship Measure monitored as part of asset condition suite of indicators	
Asset management	New national capability output (AMEM) New core data quality output (confidence grades) New ORBIS output	New asset condition indicators for robustness and sustainability New route capability indicator (AMEM lite) Renewal and maintenance volumes by asset type and spend at National and route level	

Area	Outputs	Indicators	Enablers (these support all output areas)
Environment		New indicators for carbon dioxide emissions	
Other		New Passenger satisfaction (National Passenger Satisfaction Survey) indicator New journey time indicator New cross-border route availability indicator	

Next steps

3.252 Network Rail needs to agree the two year JPIPs with individual TOCs and the milestones for its enhancement projects (including completion dates for projects that are well advanced and development milestones for projects at an early stage of development).

3.253 Network Rail will publish its plans in its draft delivery plan in December 2013. The final delivery plan will be published in March 2014 following consultation.

4. Overview of efficient expenditure

Key messages in this chapter

- Our assumptions on how much money Network Rail needs to spend to deliver its outputs and other commitments are fundamental to our decisions on the company's revenue requirements.
- We have undertaken a thorough review of Network Rail's plans across all areas of expenditure to ensure that our assessment is challenging but achievable.
- We have reviewed cross-cutting issues such as the management of inflation, which potentially apply to all areas of expenditure, and issues specific to certain types of expenditure.
- We have set Network Rail a challenge of achieving 19.4% efficiency savings on its support, operations, maintenance and renewals expenditure in CP5.
- Our assumptions for maintenance and renewals expenditure include both volumes of work and the unit cost of doing this work today.
- We consider that Network Rail has the capability to deliver this challenge and our assessment should incentivise Network Rail to reduce its expenditure in a safe and sustainable way.

Main changes since our draft determination

- After reviewing the evidence from responses to our draft determination, we have changed our efficiency challenge from 19.6% in our draft determination to 19.4% in our final determination.

Structure of the chapter

4.1 This chapter is structured as follows:

(a) introduction and background to the chapter;

(b) CP4 experience;

(c) approach to our PR13 assessment;

(d) cross-cutting issues;

(e) efficient expenditure assumptions; and

(f) overview of efficiency assumptions.

Introduction and background

4.2 Assessing the level of efficient support, operating, maintenance, traction electricity, industry costs and rates, renewals and enhancement expenditure that Network Rail needs to deliver its required outputs in CP5 and to sustain asset condition for the longer term is a core part of our work on PR13. The assumptions that we make on the level of efficient expenditure are fundamentally important to our determination of the company's overall revenue requirements.

4.3 In our 2003 determination, we assumed that Network Rail could achieve efficiency improvements of 31% by the end of CP3 (i.e. 2008-09) on its support, operations, maintenance and renewals costs. In our 2008-09 annual efficiency and finance assessment of Network Rail[126], we found that the company had achieved efficiencies of 27% in CP3.

4.4 In PR08, we assessed that the efficiency gap for Network Rail's support, operations, maintenance and renewals expenditure at the end of CP3 was 35%. In PR08, we set Network Rail's revenue requirement on the assumption that it could close around two thirds of this gap in CP4, i.e. achieve 21% efficiencies by the end of CP4. Network Rail is now forecasting that it will achieve efficiencies of 18% in CP4. This means that the gap at the end of CP4, in simple terms, based on our PR08 analysis, would be 17%.

4.5 The Rail Value for Money (RVfM) study set a clear challenge for the rail industry to reduce its costs. The study assumed that Network Rail could deliver between approximately 50% - 75% of the industry savings identified for CP5. Annex G sets outs how our PR13 assumptions compare to the RVfM study findings.

4.6 We reviewed Network Rail's SBP in detail and compiled our own extensive evidence base. We have assessed the quality of the input data Network Rail has used (for example on its unit costs), its planned volumes of work and proposed efficiencies.

4.7 In a number of areas, Network Rail's submission was a considerable improvement over the submission provided for PR08, but there were still weaknesses, e.g. a number of documents were submitted late and with significant inconsistencies. However, compared to PR08, Network Rail made much more realistic assumptions about the expenditure reductions that could be achieved. This is reflected in our determination where in some areas we have only made small changes to Network Rail's SBP numbers.

4.8 The responses to our draft determination have been reviewed and we have made some specific changes to our draft determination to take account of the evidence from

[126] The annual efficiency and finance assessment of Network Rail 2008-09 is available at: http://www.rail-reg.gov.uk/upload/pdf/404.pdf.

the consultation responses and to ensure an appropriate balance to our determination.

4.9 In its response Network Rail focused on two areas of expenditure, track and signalling renewals and information management, where it thought that we had underestimated its costs. This evidence has led us to make changes in these areas, although not on the scale the company proposed, as we did not think that some of its suggested changes reflected levels of efficient expenditure.

4.10 We have developed a substantial body of evidence to support our decisions. Our decisions are supported by comparisons with how work is carried out in other industries and in other countries, based on studies by independent consultants and our own in-house analysis. Our analysis is set out in this document, with more detailed supporting reports on our website[127].

4.11 We set out in detail how we reached our assumptions on each expenditure area in the other chapters of this document. In this chapter we summarise how we approached our assessment.

CP4 experience

4.12 In our PR08 determination for Network Rail we set Network Rail's total support, operating, maintenance and renewals expenditure at £23,380m (2012-13 prices).

4.13 The PR08 efficiency assumptions were for Network Rail to reduce its support, operating, maintenance and renewals costs by 21% by the end of CP4 (i.e. the end of 2013-14). Our annual PR08 efficiency assumptions are shown in Table 4.1.

[127] See http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

Table 4.1: Our PR08 efficiency assumptions

	2009-10	2010-11	2011-12	2012-13	2013-14
Support and operations					
Net efficiency	2.8%	2.8%	4.0%	4.0%	4.0%
Cumulative net efficiency	2.8%	5.5%	9.3%	12.9%	16.4%
Maintenance					
Net efficiency	3.2%	3.2%	4.0%	4.5%	4.5%
Cumulative net efficiency	3.2%	6.3%	10.1%	14.1%	18.0%
Renewals					
Net efficiency	5.0%	5.0%	5.5%	5.5%	5.5%
Cumulative net efficiency	5.0%	9.8%	14.7%	19.4%	23.8%
Total					
Net efficiency	4.2%	4.1%	4.7%	4.9%	4.9%
Cumulative net efficiency	4.2%	8.2%	12.5%	16.8%	21.0%

4.14 Network Rail's PR13 SBP forecast level of efficiency for CP4 is three percentage points below its original PR08 delivery plan target that would have met our PR08 determination. This is likely to mean that on a PR08 basis Network Rail's efficiency improvement in CP4 will be around 18%.

4.15 Our assessment of Network Rail's efficient expenditure in CP5, and hence the efficiency savings that we expect Network Rail to achieve in CP5, assume that Network Rail delivers its SBP forecast of 18% efficiency savings at the end of CP4.

Approach to our PR13 assessment

Regulatory techniques

4.16 Economic regulators use a wide variety of techniques to analyse the scope for efficiency savings in regulated companies. As no single approach will necessarily provide a definitive answer on the scope for future efficiency improvement, it is preferable to look at evidence from a range of approaches and sources and exercise a degree of judgement in forming a view on what should be achievable. Both 'top-down' and 'bottom-up' approaches are generally used to inform assessments of the scope for efficiency improvement.

4.17 Bottom-up approaches focus on identifying specific improvements in efficiency based on technologies or working methods that are known about at the time by those undertaking the study. Therefore, by definition, a bottom-up approach, even if it is exhaustive in its inclusion of all potential efficiency improvements that are known about at the time, is likely to understate the scope for future improvements in efficiency.

4.18 Top-down approaches typically utilise statistical techniques to produce high-level comparisons between companies or industries taking into account trends over time.

4.19 We consider that we are following best practice in efficiency assessment by using both bottom-up and top-down approaches to complement each other and provide useful evidence to inform our overall judgements.

High level approach for PR13

Background and our determination

4.20 We have conducted our assessment of efficient expenditure thoroughly and we have engaged with Network Rail throughout the course of PR13. Network Rail has worked with us constructively throughout this process. The independent reporters have also provided significant input into our assessment.

4.21 In undertaking our assessment, we have considered the impact on safety management and also Network Rail's capability to deliver its work programme in CP5.

4.22 We have adopted a transparent approach to our work and we have undertaken a significant amount of analysis to review and challenge Network Rail's submissions, including its performance plans, asset policies, efficiency assumptions and modelling tools (including the infrastructure cost model) that it has used as a basis for its plans.

4.23 At the start of PR13 we said to Network Rail that we wanted it to robustly justify its plans. It has not done this in all areas and Network Rail has recognised that there is scope for further improvements.

4.24 We asked Network Rail to set out its plans separately for England & Wales, Scotland and the nine England & Wales operating routes. Network Rail did this and we have undertaken separate assessments to produce figures for England & Wales, Scotland and for the nine England & Wales operating routes, although much of our underlying analysis has been common to the whole network.

4.25 In broad terms our approach has been to:

(a) review bottom-up calculations of how Network Rail justifies its expenditure in detail, e.g. its planned volumes of work. We have focused on:

(i) route-based assessments. In PR13 we have undertaken more of our efficient expenditure assessments at a route level based on Network Rail's route level submissions, i.e. at a much greater level of disaggregation than PR08; and

(ii) a more detailed bottom-up review of Network Rail's SBP than in PR08;

(b) benchmark Network Rail's activities against other companies in Great Britain and overseas;

(c) carry out top-down assessments of Network Rail's overall efficiency for support, operations, maintenance and renewals compared to companies in the UK and in other countries. We have used comparisons against other regulated industries as

we did in PR08 and we made improvements to our approach compared to PR08 by benchmarking Network Rail more extensively against non-railway comparators and non-European rail comparators and by improving on the econometric work we undertook in PR08; and

(d) make a judgement on the level of efficient expenditure taking into account the overall package and the achievable pace of change on efficiency.

4.26 Compared to PR08, we have relied more on our detailed benchmarking analysis and less on top-down international econometric modelling, using the latter as a 'sense check' to give us greater confidence in our detailed benchmarking analysis.

4.27 Assessing the efficient level of expenditure for enhancements is different from the approach taken for maintenance and renewal activities, although some of the same data is used. This difference is mainly due to the nature of enhancements projects, which often have bespoke solutions involving a range of different types of work and include significant development and delivery expenditure spread over several years.

4.28 Our efficient expenditure assessment of enhancements has improved since PR08 in terms of the quality of the data available to us. We have reviewed how Network Rail captures cost data from its existing programme of works and how it uses this information in building cost estimates for the CP5 programme. This work included a review of international and non-rail benchmarks.

4.29 One issue that we said in our draft determination we may need to consider further is that it is not clear how much of Network Rail's efficiencies can come from alliances and other industry initiatives.

4.30 Network Rail noted that in CP4, it has entered into nine alliance arrangements, including one deep alliance. Network Rail anticipates that further alliance arrangements will develop throughout CP5, particularly as a result of the refranchising schedule and noted that its SBP efficiency plans are predicated upon its ability to work more closely with its partners. The use of alliances also received support from some other respondents.

4.31 We support the use of alliances and other industry initiatives by Network Rail to help it deliver efficiencies that will benefit funders and customers and we have incentivised Network Rail to work with the industry to 'outperform' our determination, and benefit from this outperformance.

Cross-cutting issues

4.32 We have carried out an analysis of possible savings for each area of expenditure. But there are some potential savings – the management of inflation, input prices, frontier shift, employment costs and occupational health – that could apply to all areas of expenditure. We have termed these 'cross-cutting' issues and this section explains how we have treated these issues.

Network Rail's management of inflation

Background, our decisions in previous decision documents and our draft determination

4.33 In our December 2012 financial issues decisions document[128], we set out our approach to incentivising Network Rail to efficiently manage its inflation risk. We explained that in CP5 we will allocate input price risk to Network Rail but that we will not allocate general inflation risk to Network Rail. In that document we also said that we would commission a study to identify how efficiently Network Rail manages inflation risk and that we would further adjust our efficiency assumptions, e.g. increase or decrease them, based on the findings of the study. We considered that this will incentivise Network Rail to efficiently manage inflation in CP5.

4.34 In January 2013, we commissioned Credo, our consultants, to carry out the study into Network Rail's management of inflation risk (both general inflation risk and input price risk). The study included both a qualitative assessment and quantification of the efficiency of Network Rail's approach to managing inflation risk.

4.35 As part of its review, Credo met with Network Rail's senior management and with staff from Network Rail's procurement functions. Credo also reviewed a variety of Network Rail's procurement contracts and developed a modelling tool to help quantify the level of efficiency in this area. Credo spoke with 18 infrastructure owners and suppliers to understand how they managed inflation risk. To assess Network Rail's overall effectiveness in managing inflation risk, Credo developed a 15 principle framework which defines what good inflation management might encompass.

4.36 Credo found that Network Rail manages its expenditure to hit efficiency targets with inflation layered on top and that inflation is generally thought to be a factor that is beyond Network Rail's direct control. The study reported that Network Rail's paramount drive is to manage down overall costs and this means there is no explicit emphasis on managing inflation risk - it is just one of several factors that drive commercial outcomes. Credo highlighted the importance of inflation within Network Rail's overall regulatory settlement. For example, it estimates that cumulative general price inflation accounts for 16% (c. £1bn) of Network Rail's total CP4 expenditure, compared to cumulative expected CP4 efficiencies of 23.5% (c. £1.4bn).

4.37 Credo found that Network Rail has a 'performance gap' of approximately 25% in its management of inflation compared to the industry average. Credo estimated that it may be possible to close this gap by the end of CP5, which could generate savings of between £97m and £433m (£257m in its central case scenario).

4.38 As a result of this study, we made adjustments to our efficiency assumptions to reflect the impact of improved inflation management on Network Rail's costs. However, we

[128] *Financial issues for Network Rail in CP5: decisions*, December 2012, available at http://www.rail-reg.gov.uk/pr13/PDF/pr13-financial-issues-decisions-dec12.pdf.

recognise that it is possible that our other analysis of Network Rail's efficient expenditure may already include some of the savings from improved management of inflation. As such, we took a cautious view of the potential efficiencies that can be achieved and applied a 0.2% per annum increase to our efficiency assumptions across Network Rail's CP5 support, operations, maintenance, renewals and enhancement costs.

Responses to our draft determination

4.39 Network Rail did not agree that an efficiency overlay of 0.2% for its management of inflation is appropriate. Network Rail stated that this approach is unconventional and the efficiency overlay unprecedented in economic regulation. Network Rail also noted that applying the efficiency overlay amounts to an additional £150m of savings which would double-count other aspects of its efficiency challenge and that we have not taken this into account. Network Rail and its consultants, Oxera, indicated that we should articulate what we hope to achieve by imposing an additional cost reduction target where other economic regulators do not consider it necessary.

4.40 Network Rail considered that Credo's modelling approach does not use data supported by empirical evidence. Network Rail stated that Credo's modelling should be re-performed using assumptions that it considered would be more realistic.

4.41 The Rail Industry Association (RIA) stated that it is yet to be convinced of the substitutability that Network Rail may be able to achieve, to be able to offset external pressures on input prices.

Our comments on the responses to our draft determination

4.42 It is normal for economic regulators to consider the effects of inflation (both general inflation and input price inflation) on a regulated company and to make adjustments for the effect of input price inflation. It is hard to separate input price effects from general inflation, e.g. RPI. Given this, Credo, our consultants, assessed Network Rail's overall management of inflation (both general inflation and input price inflation). Credo found that Network Rail does not efficiently manage inflation.

4.43 The adjustment that we have made to our expenditure assumptions is similar in nature to an input price adjustment in that we are assessing how Network Rail's costs are likely to change relative to general inflation and then adjusting for that difference.

4.44 For example, if we thought that the input price factors affecting renewals such as employment costs or the price of steel are likely to reduce 1% per annum relative to changes in RPI, then we could account for that issue by reducing our estimate of Network Rail's renewals costs each year in CP5 by 1.0%.

4.45 This is the same approach as we have used for our management of inflation assumption. The only difference is that the source of the estimated change in costs for input prices would normally be an external source, e.g. market prices for steel

whereas the source of the potential change in costs for our management of inflation assumption is the efficiency of Network Rail's management of inflation.

4.46 An example of a management of inflation issue is that our employment cost consultants, IDS, found that between 2007 and 2012, all pay settlements in Network Rail's maintenance and operations bargaining units have been above the level of the annual RPI inflation rate. Over the same 2007 - 2012 period, comparing annual basic pay rises at Network Rail with the median level of annual basic pay settlements and awards across the economy, Network Rail's maintenance and operations bargaining units have given increases above the all economy median in five of the six annual reviews, with maintenance receiving an additional increase in November 2010 from the Phase 2BC re-organisation.

4.47 Although we have tried to ensure that our management of inflation efficiency assumption does not double-count our other efficiency assumptions, we recognise that it is possible that our other analysis of Network Rail's efficient expenditure may already include some of the savings from improved management of inflation.

4.48 Therefore, we have taken a conservative view of the potential efficiencies that can be realised and applied a 0.2% per annum increase to our efficiency assumptions across Network Rail's CP5 support, operations, maintenance, renewals and enhancement expenditure (this is around 50% of the implied efficiency assumption that Credo identified). We are confident that this assumption does not double-count our other efficiency assumptions.

4.49 Network Rail has not provided any specific evidence of any double-counting in our efficiency assumptions because the argument it was making was one in principle.

4.50 Also, as a sense check of how deliverable our assumption on the management of inflation efficiency is, it is useful to compare the size of the management of inflation efficiency assumption with the size of our other efficiency assumptions. In particular, our top-down efficiency assumption for support and operations costs is 3.7% per annum (the average of CEPA's average efficiency assumption of 4.4% per annum and Oxera's average of 3.0% per annum). Therefore, we have aimed off by 0.7% per annum (4.4% - 3.7%). So, if the management of inflation efficiency assumption is added to the 3.7% top-down efficiency assumption for support and operations costs, the total efficiency assumption would be 3.9%, which is 0.5% below CEPA's average efficiency assumption of 4.4% per annum.

4.51 In relation to Oxera's comment about why we are adjusting our efficiency assumptions for Network Rail's management of inflation, we are doing this because we have evidence that Network Rail does not manage inflation as efficiently as it could do.

4.52 In relation to Network Rail's comments about the robustness of Credo's modelling, both we and Credo recognise that quantifying this analysis is difficult. This is one of the reasons we have aimed off when we have applied the results of Credo's analysis to our calculation of Network Rail's efficient expenditure.

4.53 With regard to RIA's comment, we consider that a purchaser can affect the particular inflation that it faces by the choices that it makes in its selection of goods and services to buy and the way in which it buys these goods and services. The impact of inflation can therefore be managed to an extent.

Our determination

4.54 After considering these issues and the responses to our draft determination, for the reasons set out above and elsewhere in the document, we have decided to continue to apply a 0.2% per annum efficiency assumption across Network Rail's CP5 support, operations, maintenance, renewals and enhancement expenditure, as this is a cross-cutting issue that applies to all of Network Rail's expenditure.

4.55 This decision has been taken in the round with our other efficiency assumptions and in particular together with our decisions on input prices, frontier shift, employment costs and occupational health. We are confident that this assumption does not double-count our other efficiency assumptions.

Input prices

Background and our draft determination

4.56 Input price inflation is the change in the prices of Network Rail's inputs (the goods and services it consumes). Input price inflation can be measured in absolute terms or relative to movements in more general price indices, such as RPI or CPI.

4.57 Our approach to risk and uncertainty in PR13 is to allocate to Network Rail the risks that it is best placed to manage. This should ensure that it is incentivised to secure continuous improvements in value for money and operate commercially where appropriate, e.g. in managing its financial risks. As we consider that it is possible to efficiently control the effect of input price inflation, Network Rail will be at risk for any deviations between the actual inflation that it faces and RPI in CP5.

4.58 In order to calculate Network Rail's efficient expenditure in CP5 we have to make assumptions about the level of input price inflation that we expect Network Rail to experience.

4.59 In PR08, we adjusted our efficiency assumptions to reflect the input price inflation forecasts from a Network Rail commissioned study by LEK. Although we had some concerns about LEK's methodology and assumptions, we considered that, overall, the results were broadly robust and represented a reasonable estimate of expected input price inflation in CP4.

4.60 However, during CP4, the actual levels of input price inflation that Network Rail has experienced to date are likely to have overall been significantly lower than the assumptions that we used to adjust our PR08 efficiency assumptions. Network Rail has therefore financially benefited from these variations from our assumptions.

4.61 Network Rail's SBP included its forecast of CP5 input price inflation. In contrast to its detailed PR08 submission, the CP5 forecast was based on a high-level review of

other input price forecasts, including recent regulatory forecasts. Table 4.2 sets out Network Rail's forecasts. Network Rail has assumed that it will be able to absorb any input price effects within its proposed efficiency profile for support, operations and maintenance expenditure but not for renewals expenditure.

Table 4.2: Network Rail's SBP input price inflation forecasts

Expenditure	Input price effect (per annum)
Support and operations	0.00%
Maintenance	0.00%
Renewals	0.70%

4.62 Given the following considerations, we decided to make no explicit adjustments to our efficiency assumptions for input price inflation:

(a) Network Rail has assumed a low level of input price inflation over CP5 on renewals and no input price inflation over CP5 on support, operations and maintenance expenditure;

(b) the uncertainty in forecasting and measuring input price inflation; and

(c) our approach to funding risk, i.e. in our financial framework we are not providing Network Rail with upfront funding for risks.

4.63 However, we said we would still adjust Network Rail's access charges, network grant and RAB for changes in RPI as we do not consider that general inflation is efficiently controllable by Network Rail.

Responses to our draft determination

4.64 Network Rail did not agree with our assumptions on input prices. Essentially its main point was that it thinks that there is input price inflation on renewals expenditure and other regulators have recognised this. Network Rail also noted that analysis of input price inflation is uncertain.

Our comments on the responses to our draft determination

4.65 Like other economic regulators, we take decisions on input prices based on evidence. Network Rail's analysis shows that it expects renewals price inflation to be 0.70% per annum, but the evidence supporting this assumption was not robust and it is not clear how Network Rail has taken account of risk in its assumptions.

4.66 Actual input price inflation in CP4 has probably been negative and, based on Network Rail's own analysis, it has probably financially benefited from input price inflation. This is because we assumed in PR08 that input price inflation would be positive.

4.67 Generally, Network Rail's approach to risk has been to propose that it should be funded in advance for risks that may or may not materialise. We consider that Network Rail is probably taking a similar approach in its proposals on input prices. We

think that the risk surrounding a forecast of input price inflation in CP5 should be dealt with through the balance sheet buffer[129].

Our determination

4.68 As Network Rail acknowledges, forecasting input price inflation is subjective and the results are uncertain. Given this, it is important that we take our input price decision in the round and in particular our decision should take account of our other decisions, particularly in relation to efficiency and our treatment of risk and uncertainty.

4.69 Network Rail has not provided any robust evidence to support its views on input prices. We have assumed that input price inflation is zero in CP5.

4.70 This decision has been taken in the round with our other efficiency assumptions and in particular together with our decisions on the management of inflation, frontier shift, employment costs and occupational health.

Frontier shift

Background and our draft determination

4.71 Estimates of frontier shift[130] for an organisation are usually inferred through the assessment of historical changes in productivity in relevant sectors (weighted appropriately to match the organisations' activities), with an adjustment, if appropriate, to reflect that some of these sectors may have seen productivity changes owing to 'catch-up' as well as frontier shift.

4.72 Network Rail's SBP included a report by Oxera, which provided an estimate of frontier shift of 0.55% to 0.8% per annum for operations and support only[131]. The cumulative effect would be around 2.7% to 3.9% over CP5. This effect was considered by Network Rail together with input price inflation, when it derived the stretch element of its overall efficiency target.

4.73 Our assessment of Network Rail's SBP was that while we understand that separating out frontier shift and other efficiencies is complex, some separation is necessary and desirable in order to produce robust results. Furthermore, we noted the approach to estimating these effects is well established. For example, the differences in

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[129] The balance sheet buffer is the difference, at a point in time, between Network Rail's actual level of financial indebtedness and the level of financial indebtedness allowed by its network licence. The restriction on Network Rail's level of debt is presented as a percentage (i.e. debt/RAB) in its network licence. This is explained further in the financial framework chapter (Chapter 12).

[130] Frontier shift is the on-going productivity improvements that even the best performing companies would expect to achieve above that reflected in general inflation. In other words, over time, even the best companies can get better at what they do.

[131] Note this estimate also includes capital substitution effects. By capital substitution effects we mean that if frontier shift is assessed against the separate parts of Network Rail's activities, then for those activities, the use of capital expenditure to drive efficiencies in those activities needs to be taken account of elsewhere in the business. However, if Network Rail's expenditure is assessed as a whole, the effect of the use of capital expenditure is already taken account of.

methodology between Oxera's report for Network Rail and CEPA's report for us are small.

4.74 In comparison to PR08 and previous work, we have adopted an approach that assesses Network Rail's expenditure as a whole, rather than separating out elements of expenditure because:

(a) this removes the need to take into account capital substitution effects directly, for which Network Rail had raised concerns; and

(b) we consider that assessing frontier shift at a more aggregate level is likely to be more robust.

4.75 Based on analysis undertaken on our behalf by CEPA, our overall estimate for frontier shift is 0.3% per annum which equates to 1.5% for CP5 as a whole[132]. This adjustment could apply to Network Rail's total expenditure, including support, operations, maintenance, renewals and enhancements.

4.76 In our draft determination, we only applied a frontier shift adjustment in our estimate of enhancements efficiency (the frontier shift for enhancements expenditure only is 0.4%) and we did not adjust our efficiency assumptions for other expenditure. This is because it was not clear for those costs, whether our efficiency assumptions include effects similar to frontier shift.

Responses to our draft determination

4.77 Network Rail stated that it is not appropriate to apply an additional frontier shift to support and operations costs as frontier shift is already taken into consideration in the CEPA/Oxera estimates.

Our comments on the responses to our draft determination

4.78 No additional analysis has been provided by Network Rail to support its views. We have not applied frontier shift to expenditure that we have applied a top-down assumption to, so we are confident that we are not double-counting the frontier shift efficiency assumption with our other efficiency assumptions.

Our determination

4.79 For the reasons set out above and elsewhere in the document, we confirm the decision set out in our draft determination to apply a frontier shift of 0.4% per annum to enhancement expenditure and we have not adjusted our other expenditure assumptions for frontier shift.

4.80 Overall, our approach to frontier shift is pragmatic, as it is unlikely our bottom-up assumptions fully include all the potential frontier shift efficiencies. This means we

[132] This is in real terms, and is based on CEPA's 'Adjusted TFP' approach with an assumed split of 75% frontier shift and 25% catch-up for the industries upon which the calculations are based.

have taken a cautious approach to frontier shift in CP5, which should help incentivise Network Rail to 'outperform' our determination, and benefit from outperformance.

4.81 This decision has been taken in the round with our other efficiency assumptions and in particular together with our decisions on the management of inflation, input prices, employment costs and occupational health.

Employment costs

Background and our draft determination

4.82 In January 2013, we commissioned Incomes Data Services (IDS) to review Network Rail's total employment costs and determine if they are efficient[133]. The review benchmarked the total reward package for key groups of Network Rail employees against those in other rail and non-rail industry jobs.

4.83 The IDS study found that the total reward for Network Rail's role clarity grades (mainly office-based staff, e.g. accountants and information management staff) is around 9% higher than the market rate. IDS found larger gaps for maintenance and operations staff, with maintenance workers' total reward 32% above the market rate and operations staff 36% above the market rate. IDS's findings are consistent with our PR08 Inbucon report, given that Network Rail's pay awards for operations and maintenance staff have been above inflation in CP4. Network Rail's own analysis is broadly consistent with these findings.

4.84 Network Rail's explanation of its pay strategy for operations and maintenance staff is that it takes a wide view of the overall cost savings to be achieved taking into account factors such as productivity.

4.85 Our determination sets the overall package for Network Rail in CP5. In most cases, it does not state how Network Rail should spend the revenue that it is allowed to recover, e.g. the level of remuneration for its employees or how it should achieve its efficiency savings.

4.86 The IDS study reinforced our view that Network Rail can deliver significant savings in CP5 but in our draft determination we did not explicitly adjust our efficiency assumptions for the findings of the IDS study because overall our efficiency assumptions are already challenging but achievable.

Responses to our draft determination

4.87 Network Rail stated that the IDS study looked at the remuneration trend from 2007 to 2012 on a per employee basis but did not examine the staffing levels of Network Rail and therefore the study is not able to provide a view on staff output or the number of staff that should be employed. Consequently, Network Rail considered that the study

[133] This is available at: http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

did not factor into the benchmarking comparison, the efficiency savings made to date and those planned for CP5.

4.88 The Transport Salaried Staffs' Association (TSSA) disagreed that savings can be made through employment costs. TSSA noted the caveats in the IDS study and queried whether the impact of equal pay claims was taken into account, which TSSA thought could be significant. TSSA also noted there is an equal pay 'timebomb' within Network Rail, which needs to be addressed so that it does not require further job cuts to deal with it. TSSA also disagreed with what it perceived to be an implication in our draft determination that savings can be made through employment costs. TSSA asked us to make our views known on this in our final determination.

Our comments on the responses to our draft determination

4.89 The focus of the IDS study was on total employment costs per employee, not on the level of efficiency of Network Rail's total expenditure on employment, for example whether Network Rail employs the correct numbers of staff in certain roles. Therefore, we agree with Network Rail that the study did not look at the number of staff that should be employed or savings planned for CP5. However, it did take account of staff output when considering how the roles within Network Rail could be benchmarked.

4.90 In response to TSSA's comments, it is for Network Rail to manage its business, so we do not make specific comments on how Network Rail should manage its employment costs. It is our role to make assumptions on the level of efficient income and expenditure in CP5 for the purpose of our calculation of Network Rail's revenue requirements.

Our determination

4.91 Our final determination applies no explicit adjustment to our efficiency assumptions for the findings of the IDS study because overall our efficiency assumptions are already challenging but achievable.

4.92 This decision has been taken in the round with our other efficiency assumptions and in particular together with our decisions on the management of inflation, input prices, frontier shift and employment costs.

Occupational health

Background and our draft determination

4.93 Poor management of occupational health issues has a detrimental effect on the individuals who suffer ill-health and it creates inefficiencies and costs within organisations.

4.94 Our recent inspection work has found that Network Rail has no suitable coordinated approach to health management, particularly at route level. Network Rail acknowledged that historically occupational health issues have not been managed systematically. However, Network Rail has now produced its Employee Health and

Wellbeing vision and strategy and a six-point action plan to start to deliver this strategy in CP5.

4.95 In our draft determination, we applied a conservative increase to our overall efficiency estimates of approximately 0.07% per annum across Network Rail's support, operations, maintenance, renewals and enhancements expenditure to reflect the savings which could be achieved through improvements in occupational health. This amounts to approximately £20m of savings in the final year of CP5.

Responses to our draft determination

4.96 The responses on our occupational health efficiency assumptions are included in the health and safety chapter (chapter 11), together with our comments on those responses, apart from Network Rail's response that we should not have applied the occupational health efficiency assumption to all expenditure as that approach could double-count efficiency savings from occupational health with our other efficiency assumptions.

Our comments on the response to our draft determination

4.97 It is clear that where we have applied a bottom up efficiency assumption, we have not included an adjustment for occupational health. Therefore, we are clearly not double-counting those assumptions. Where we have applied a top-down assumption, it may be the case that a top-down assumption may include an effect similar to occupational health.

4.98 However, we are confident that there is no double-counting of efficiency savings. This is because our efficiency assumptions should be considered in the round and given how much we are aiming off in our calculation of our top-down efficiency assumptions, it is unlikely we have double-counted occupational health savings.

4.99 For example, for our overall top-down efficiency assumption on support and operations expenditure, we have aimed off by 0.7% per annum, which is ten times bigger than the occupational health efficiency assumption of 0.07% per annum.

Our determination

4.100 For the reasons set out above and elsewhere in the document, we have decided to retain our draft determination assumptions and apply a small increase to our overall efficiency estimates of approximately 0.07% per annum across Network Rail's support, operations, maintenance, renewals and enhancement expenditure to reflect the savings which could be achieved through improvements in occupational health. This is a cautious approach.

4.101 This decision has been taken in the round with our other efficiency assumptions and in particular together with our decisions on the management of inflation, input prices, frontier shift and employment costs.

Efficient expenditure assumptions

4.102 This section outlines our specific assumptions in each area of expenditure, including the cross-cutting savings explained above.

Support

Background

4.103 Support costs include expenditure on activities that 'support' Network Rail's business. These are mainly administrative costs, such as costs related to finance, but include other running costs such as utilities and insurance.

4.104 In its SBP, Network Rail set out its plan to deliver a 24% reduction in its support costs over CP5. This included cost reductions by the end of CP5 compared to 2013-14 costs of 12% in core support costs[134].

4.105 Our approach to the assessment of Network Rail's support costs is set out in detail in the support expenditure chapter (chapter 5). In summary, we have decided on a base year and 'rolled forward' costs for that year through each year of CP5 by applying an efficiency assumption. We have derived our efficiency assumption by applying a combination of both top-down and bottom-up approaches. Where Network Rail has provided robust analysis of its functions' costs, we have used Network Rail's forecast. However, where Network Rail has provided insufficient justification for its forecasts, we have applied a top-down efficiency estimate to our view of Network Rail's pre-efficient costs.

Responses to our draft determination and our comments on the responses to our draft determination

4.106 Network Rail's responses on support expenditure are included in the support expenditure chapter (chapter 5) together with our comments on those responses. We received no other material consultation responses on support costs.

Our determination

4.107 Our assessment of efficient support costs for CP5 assumes that Network Rail can achieve efficiencies in core support costs of 20% by the final year of CP5 and a reduction in total support costs of 25% by the end of CP5. Overall there is a saving of £621m in CP5 compared to total CP4 support costs of £2,740m and £113m less than Network Rail's SBP assumption of £2,232m.

[134] We are focusing on core support costs because we consider a comparison at that level provides a more useful comparison to Network Rail's assumptions than looking at total support costs, which includes costs like the National Delivery Service.

Operations

Background

4.108 Operations expenditure is expenditure incurred in 'operating' the rail infrastructure such as expenditure on signallers and control staff. Our approach to the assessment of Network Rail's operations expenditure is set out in detail in the operations expenditure chapter (chapter 7).

4.109 Network Rail's SBP set out its plan to deliver a 13% reduction in operations expenditure over CP5 primarily through the implementation of a new way to run its infrastructure, known as the network operating strategy. This strategy should reduce Network Rail's operations costs as it will reduce the number of signallers required to operate the network.

4.110 We have reviewed Network Rail's proposals against various domestic and European benchmarks. We have also conducted our own assessment as to whether the strategy can deliver the proposed benefits. Network Rail will compare favourably with international benchmarks once the strategy is implemented. However, Network Rail's proposed costs for operations activities outside signalling are above benchmarks with other UK regulated industries. For our assessment of these non-signaller costs we have taken into account domestic benchmarks and savings from cross-cutting issues.

Responses to our draft determination

4.111 Network Rail's main response on operations expenditure was that it does not think that it is appropriate for us to use a hybrid approach and apply our top-down efficiency assumption to operations activities outside signalling and to also apply the cross-cutting efficiency assumptions to those costs.

4.112 Network Rail compared the combined operations and support expenditure challenge of 24% to the CEPA and Oxera top-down average efficiency assumption of 17.2% and it thinks our assumptions are stretching. Network Rail also stated that we have not taken account of QX cost reductions in our forecast of QX income.

Our comments on the responses to our draft determination

4.113 We have considered Network Rail's concerns about our hybrid approach to our assessment. Network Rail has generally supported us in using more bottom-up analysis to support our assumptions. However, when we do not think its analysis is robust we can either develop our own bottom-up assumptions or use a top-down approach. By definition deriving a bottom-up estimate when we do not think Network Rail's plan is robust is not straightforward, e.g. it does not have a set of policies for how much money it should spend on information management, in the same way that it does for track renewals. There is also an asymmetry of information between us and Network Rail.

4.114 Therefore, when Network Rail has not provided a robust bottom-up analysis for a part of its business, we think that applying a top-down approach would be more

appropriate and the most important issue is checking that the efficiency assumption for that part of the business is reasonable and that the efficiency assumptions for operations expenditure overall are reasonable.

4.115 In relation to applying a top-down efficiency assumption to operations activities outside signalling. Network Rail has not provided adequate evidence to show that its assumptions are efficient or that our approach is inappropriate. We also note that the main cost of operations is employment costs and the IDS report found that Network Rail's operations staff were paid 36% above the market rate.

4.116 Network Rail noted that the total challenge on support and operations expenditure is higher than the top-down efficiency assumption derived from an average of CEPA and Oxera's analysis. However, CEPA and Oxera's forecasts are averages over a significant amount of data from a number of industries, which Network Rail's comment does not seem to take account of, as it simply compares the average of CEPA's and Oxera's top-down efficiency averages to our overall assumptions on support costs, rather than considering the reasons for the differences.

4.117 For example, one of the main drivers of the cost reductions we have assumed in operations costs is the network operations strategy, which has a one-off effect for the areas where it is being applied. There are also significant one-off changes that Network Rail is proposing in some areas of its expenditure that are included in support costs but are actually more engineering related. Once those costs and group costs are excluded from support costs to provide a more useful comparison, the efficiency challenge is 20%, which is higher than the average of CEPA and Oxera top-down efficiency assumption of 17.2%, but lower than CEPA's own average of 22.0%.

4.118 Also, in response to Network Rail's point about QX, we have now taken account of QX cost reductions in our forecast of QX income. Network Rail's issues with cross-cutting issues are discussed above.

Our determination

4.119 Our assessment of Network Rail's efficient operations expenditure in CP5 assumes that Network Rail can achieve 17% efficiencies by the final year of CP5. This is a saving of £271m in CP5 compared to total CP4 operations expenditure of £2,239m and £59m less than Network Rail's SBP assumption of £2,027m.

Maintenance and renewals

4.120 Maintenance expenditure covers the work required to maintain assets efficiently and sustainably. Maintenance work may be either planned (for example, routine or visual inspections) or reactive (for example, responding to asset failures). Maintenance expenditure is forecast and assessed for each of the following main asset categories: track, civil structures and earthworks, signalling, electrification, telecommunications, and plant and machinery.

4.121 Renewals expenditure covers work to replace assets which have reached, or are nearing, the end of their useful lives with the modern equivalent asset. Renewals expenditure is forecast and assessed for the same asset types as maintenance (track, civil structures and earthworks, signalling, electrification, telecommunications, plant and machinery) as well as buildings, and other renewals.

4.122 In Network Rail's SBP, its maintenance plans for CP5 assumed efficiencies of 13.8% by the final year of the control period and total maintenance expenditure in CP5 of £5,282m. We have restated these figures in this chapter so that they are more comparable with our determination, to take account of accounting changes between CP4 and CP5, and the effects of traffic and network growth.

4.123 Network Rail's renewals plans for CP5 assumed an increase in expenditure compared to CP4 driven by a programme of rationalisation and centralisation of signalling and electrical control, a large increase in expenditure on civil structures and earthworks, accelerated renewals (due to enhancements), a programme to improve asset information and additional investment schemes. It planned efficiency savings of 15.8% by the final year of the control period and total renewal expenditure in CP5 of £13,559m. These figures have also been restated as described above.

4.124 The efficiencies include those embedded in Network Rail's proposed CP5 asset policies and consider efficiency across all costs classified as renewals, whereas Network Rail's efficiency assumption in its SBP was based on a subset of renewals asset types (i.e. the main asset categories such as track). Based on our review and the evidence, we have included efficiency savings in other categories of renewals expenditure, where Network Rail assumed no efficiencies, e.g. information management.

4.125 Our approach to the assessment of maintenance and renewal efficiencies is set out in detail in the asset management: maintenance and renewals chapter (chapter 8). In summary, we have carried out both a bottom-up and top-down assessment of efficiency, including:

(a) a detailed review of Network Rail's plans, including an audit of its benchmarking work and SBP efficiencies;

(b) our bottom-up benchmarking and efficiency studies conducted for PR13;

(c) our review of previous studies (for example those carried out for PR08 and for the RVfM study) and cataloguing of remaining efficiency opportunities; and

(d) our top-down statistical (econometric) analysis of the efficiency gap to the frontier rail infrastructure manager.

4.126 The efficiency assumptions for maintenance and renewal draws mainly, on (a) to (c) with (d) used as a sense check.

Responses to our draft determination

4.127 Network Rail noted that the maintenance and renewals efficiency profiles in its SBP and in our draft determination are all based on comprehensive bottom-up assessments of how much Network Rail can change its ways of working in CP5. They already account for emerging developments in technology and incorporate significant elements of stretch (notably in signalling and maintenance).

4.128 Network Rail stated that it is not methodologically consistent to include top-down efficiency overlays in addition to a thorough bottom-up assessment by either Network Rail or by us. Additionally, Network Rail stated that in the case of renewals expenditure, it thinks that some issues related to the top-down efficiency overlays sit largely outside its control, as they are more of an issue for the contracting base that Network Rail relies upon to carry out the works. Network Rail also noted that any advances in these areas are already accounted for in the efficiency assumptions for CP5 that it included in its SBP.

4.129 RMT mentioned the concern previously raised by Network Rail about our top-down benchmarking of maintenance and renewals.

Our comments on the response to our draft determination

4.130 Our draft determination applied efficiency overlays to our bottom-up efficiency assessment for the management of occupational health and inflation. We continue to consider that these adjustments are appropriate as the bottom-up assessment did not address these potential areas of efficiency. The overlays have been applied at a level, which is considered appropriate in the round and after also taking account of Network Rail's ability to influence its costs.

4.131 As we note above, our maintenance and renewals efficiency assumptions draw mainly on other analysis, e.g. bottom-up analysis, rather than our top-down analysis.

Our determination

4.132 We assume that Network Rail can achieve maintenance efficiencies of 16.4% by the final year of the control period and we assume that it spends £5,166m on maintenance during CP5. This is £116m less than proposed in the SBP. This is largely due to adjustments to pre-efficient reactive maintenance as described in the asset management: maintenance and renewals chapter (chapter 8).

4.133 Our assessment of efficient renewals expenditure for CP5 assumes lower levels of pre-efficient expenditure, where its plans were not sufficiently justified. For example, we have assumed lower levels of expenditure on buildings, information management and R&D, and made adjustments where we have identified issues with its unit costs.

4.134 We assess that Network Rail can achieve renewals efficiencies of 20.0% by the final year of the control period and we assume that Network Rail spends £12,107m on renewals during CP5. This is £1,452m less than it proposed in its SBP.

Enhancements

4.135 As explained above, our assessment of the efficient level of expenditure for enhancements is different from the approach taken for other costs. Firstly, we looked at whether the proposed projects were required to meet the HLOSs. We then scrutinised individual project costs and portfolio efficiency overlays.

Responses to our draft determination

4.136 Other than the comments Network Rail has made above about the application of frontier shift, we have included all other responses, e.g. the responses in relation to the Northern Hub and Uckfield train lengthening projects, in the enhancements chapter (chapter 9).

Our determination

4.137 Of the £12.4bn enhancement expenditure in Network Rail's SBP, there were about £3.3bn of costs for projects that are determined outside of our review by the governments (Thameslink, Crossrail, Borders and an element of EGIP[135]) and £1.3bn of ring-fenced funds. We scrutinised the remaining £7.8bn of expenditure and we think that these projects can be delivered for £7.0bn, largely as a result of applying Network Rail's own efficiency overlay to more projects, where we thought the efficient level of expenditure should be lower. We also reduced the allowances for risk that Network Rail had included in its SBP on some of its projects, where we concluded they were too high.

4.138 Finally, we have included about £1.3bn in our determination for[136]:

(a) an assumption for non-government investment framework schemes (consistent with our assessment of other single till income) (£416m);

(b) additional Schedule 4 costs as a result of the recalibration of Schedule 8 (£172m);

(c) funding for R&D (£50m);

(d) additional funding for level crossings (£32m);

(e) CP4 rollovers (£246m);

(f) funding for ETCS cab fitment (£194m); and

(g) funding for depots and stabling (£312m).

[135] The Edinburgh to Glasgow Improvement Programme.

[136] This expenditure is explained in the enhancements chapter (Chapter 9).

Package

Background and our draft determination

4.139 In our draft determination we identified why we thought our package was challenging but achievable.

Responses to our draft determination

4.140 Network Rail thought that our overall draft determination package unrealistically requires it to go beyond its SBP ambitions and deliver even higher levels of performance and cost savings with less investment, and less money to operate, manage and enhance the railway.

4.141 Some other respondents said that our draft determination was achievable and some thought that there might be deliverability issues with the package.

Our assessment

4.142 In PR13, we have set Network Rail's revenue requirement for Great Britain on the assumption that it will achieve 19% efficiencies on its support, operations, maintenance and renewals by the end of CP5. We have decided that it is reasonable to assume that Network Rail will achieve this level of savings in CP5 and it builds on the efficiencies of 40% in total that Network Rail has already achieved in CP3 and CP4.

4.143 All our decisions on the overall PR13 settlement are made as part of a 'balanced package' for CP5. By balanced package we mean one which considers the outputs to be delivered, the costs, the incentives, the risks, Network Rail's capability to safely and sustainably deliver the efficiency savings and the safety requirements.

4.144 The package should be considered and judged as a whole. Our considered view after fully considering the responses to our draft determination and our statutory duties, is that this determination is challenging but achievable for Network Rail in terms of efficiency, value for money and deliverability, and indeed could potentially be exceeded without compromising the delivery of outputs (including health and safety). It will improve safety and it takes account of long-term needs as well as the short-term – i.e. it is sustainable.

4.145 Furthermore, it incentivises Network Rail to efficiently manage the costs it can control and provides strong incentives in CP5 for Network Rail to strive for continuous and sustained improvements in efficiency, building on the improvements in efficiency that Network Rail has achieved in CP3 and CP4.

4.146 It also provides appropriate protections against risk. We have made specific provisions to provide protections against certain risks, for example the new civils adjustment mechanism. We have also made some specific changes to our draft determination to take account of the evidence from consultation responses and ensure an appropriate balance, for example we have increased our expenditure assumption on track renewals.

4.147 For the above reasons we do not agree with Network Rail's response.

Overview of efficiency assumptions

4.148 Our determination of Network Rail's efficient expenditure reflects our assessment of both the expenditure-specific analysis and the cross-cutting issues discussed above.

4.149 Tables 4.3, 4.4 and 4.5 set out the efficiency assumptions that we have applied to Network Rail's support, operations, maintenance and renewals expenditure.

Table 4.3: Our assumptions on CP5 efficiency (Great Britain)

Expenditure	2014-15	2015-16	2016-17	2017-18	2018-19	CP5 total
Support	9.0%	4.9%	6.2%	3.3%	4.3%	24.9%
Operations	1.9%	2.9%	4.3%	4.2%	5.4%	17.4%
Maintenance	3.7%	3.3%	3.5%	3.5%	3.6%	16.4%
Renewals	8.4%	3.6%	3.8%	2.7%	3.2%	20.0%
Weighted average efficiency	**6.8%**	**3.6%**	**4.0%**	**3.1%**	**3.6%**	**19.4%**

Table 4.4: Our assumptions on CP5 efficiency (England & Wales)

Expenditure	2014-15	2015-16	2016-17	2017-18	2018-19	CP5 total
Support	9.0%	4.8%	6.2%	3.3%	4.3%	24.8%
Operations	2.0%	2.8%	4.3%	3.9%	5.5%	17.3%
Maintenance	3.7%	3.4%	3.5%	3.5%	3.6%	16.6%
Renewals	8.4%	3.6%	3.7%	2.7%	3.2%	19.9%
Weighted average efficiency	**6.8%**	**3.6%**	**4.0%**	**3.1%**	**3.6%**	**19.4%**

Table 4.5: Our assumptions on CP5 efficiency (Scotland)

Expenditure	2014-15	2015-16	2016-17	2017-18	2018-19	CP5 total
Support	9.5%	5.0%	6.1%	3.4%	4.5%	25.6%
Operations	1.3%	3.8%	3.8%	6.7%	4.1%	18.3%
Maintenance	3.5%	3.0%	3.3%	3.3%	3.3%	15.4%
Renewals	8.3%	3.0%	4.5%	2.8%	3.3%	20.2%
Weighted average efficiency	**6.8%**	**3.4%**	**4.2%**	**3.2%**	**3.5%**	**19.5%**

5. Support expenditure

Key messages in this chapter

- Support costs are mainly administrative costs that Network Rail incurs to deliver its outputs, such as costs related to finance, human resources and information management. However, this category also includes other running costs such as utilities costs and insurance.
- We have reviewed Network Rail's proposals and assessed them against a number of rail and non-rail benchmarks. We have seen some improvements in Network Rail's analysis compared to PR08.
- Network Rail's support functions have made progress in reducing costs during CP4. However, there are still inefficiencies to be addressed in CP5.
- In our final determination we assumed Network Rail's total support costs to be £2,119m over CP5. This is £113m less than Network Rail forecast in its SBP and £621m less than Network Rail's CP4 costs (based on its PR13 SBP forecast). This represented a 20% efficiency improvement in Network Rail's core support costs (i.e. excluding group costs and other support functions). Network Rail assumed a 12% efficiency improvement in core support costs.
- The reductions in our assumptions compared to the SBP of £113m were in information management (£39m over CP5), insurance costs (£35m over CP5), group costs (£33m over CP5), cross-cutting efficiencies (£16m), other support costs (£5m) offset by an increase in utility costs (£16m). These differences are shown in Table 5.6 and explained in paragraph 5.74.
- Our forecast of Network Rail's expenditure on support costs in our determination is 5.5% of Network Rail's total expenditure.

Main changes since our draft determination

- We have reviewed the evidence received in consultation responses and have adjusted some of our assumptions for our final determination. The main change since our draft determination is that we have included an additional £25m of redundancy costs (part of group costs).

Structure of this chapter

5.1 This chapter is structured as follows:

(a) introduction to the chapter;

(b) description of support costs;

(c) Network Rail's proposal;

(d) our assessment;

(e) summary of our draft determination;

(f) responses to our draft determination;

(g) our comments on the responses to our draft determination; and

(h) our determination.

Introduction

5.2 This chapter summarises our assessment of Network Rail's CP5 expenditure on its support functions.

Description of support costs

5.3 Network Rail's operating expenditure includes support costs, operations expenditure and traction electricity, industry costs and rates. In this chapter, we explain our assessment of Network Rail's support costs only. We cover operations costs and traction electricity, industry costs and rates in the next two chapters.

5.4 Support costs include expenditure on activities that 'support' Network Rail's business. These are mainly administrative costs, such as costs related to finance, human resources (HR) and information management. This category includes other running costs such as utilities and insurance. It also includes some engineering costs, such as asset management services.

5.5 Some of Network Rail's support costs are 'recharged' to other parts of the business, i.e. they are included in operations, maintenance, renewals and enhancements expenditure. For its regulatory accounts and its SBP, these recharges are calculated in accordance with the rules set out in our regulatory accounting guidelines (RAGs)[137]. The figures we present in this chapter are shown after any recharges[138].

[137] The RAGs are available at: http://www.rail-reg.gov.uk/server/show/nav.149.

[138] Network Rail presents its support costs data after recharges. We have used the same approach in presenting our analysis in our determination but we have analysed total support costs before recharges to other parts of Network Rail's business.

5.6 Since PR08, Network Rail has made a number of changes to its definition of support costs. For example, pensions and staff incentives costs are now charged to the rest of the business, e.g. operations, instead of being held in support costs.

5.7 Support costs are an important part of Network Rail's overall revenue requirement, especially as they are funded in the year that they are incurred. Network Rail spent £477m (in 2012-13 prices) on support costs in 2011-12 (after recharges) and Network Rail's SBP assumed that support costs will be around 5.5% of its total support, operating, maintenance, renewals and enhancement expenditure in CP5, and around 8% of its projected gross revenue requirement.

Network Rail's proposal

5.8 As part of PR13, Network Rail has generally produced more comprehensive analysis and supporting information than it did in PR08. For example, in support of its SBP, Network Rail independently benchmarked (for example against external comparators) 95% of support costs across its corporate services (HR, finance, information management etc.) and has provided detailed function-by-function plans. This has given us a better view of Network Rail's costs and ultimately has allowed us to make more informed decisions.

5.9 In its SBP, Network Rail set out its plan to deliver a 24% reduction in its support costs over CP5[139]. This includes cost reductions by the final year of CP5 (compared to 2013-14 costs) of 12% in core support costs. We distinguish between core and non-core support costs because some of the functions included within Network Rail's support costs category are engineering-related functions.

5.10 Network Rail's cost savings are driven by a number of initiatives, including the development of a new operating model for its central functions, e.g. HR, which will allow it to more effectively support the business.

5.11 Table 5.1 sets out Network Rail's SBP assumptions for the cost of its support functions over CP5 and Table 5.2. sets out Network Rail's SBP assumptions for the cost of its support functions between Great Britain, England & Wales and Scotland over CP5.

[139] Network Rail's total savings in its SBP were presented as a comparison between the last year of CP5 and the last year of CP4 and did not adjust for atypical costs in the last year of CP4.

Table 5.1: Network Rail's SBP forecast of support costs in CP5 for Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Human Resources	63	59	59	54	52	49	273
Information Management	59	65	65	65	65	65	324
Government and Corporate Affairs	20	18	18	17	17	17	86
Group Strategy	13	11	11	11	11	10	53
Finance	29	28	27	25	25	24	129
Business Services	16	14	13	13	13	13	66
Accommodation	77	72	72	66	65	64	339
Utilities	39	38	38	37	37	36	186
Insurance	53	52	52	52	52	51	259
Legal and Inquiry	6	6	6	6	6	6	30
Safety and Sustainable Development	13	10	8	7	7	7	39
Strategic Sourcing	11	10	9	9	8	8	44
Business Change	4	4	3	3	3	3	16
Other corporate functions	4	3	3	3	3	3	16
Core support costs (excluding group)	**406**	**390**	**384**	**368**	**363**	**356**	**1,860**
Efficiency		4.0%	1.4%	4.2%	1.5%	1.9%	12.3%
Asset Management Services	51	42	41	41	41	40	205
Network Rail Telecom	45	46	37	32	30	26	172
National Delivery Service	7	5	3	1	(0)	(2)	7
Investment Projects	0	0	(0)	0	(0)	0	0
Commercial Property[140]	7	(3)	(3)	(4)	(4)	(5)	(19)
Support costs (excluding group)	**515**	**479**	**462**	**439**	**429**	**415**	**2,224**
Group costs	39	0	(0)	1	2	5	8
Support costs (including group)	**554**	**480**	**462**	**440**	**431**	**420**	**2,232**
Efficiency		13.4%	3.7%	4.8%	1.9%	2.7%	24.2%

[140] Network Rail's SBP separates out its commercial property costs from its support costs. However, for our analysis we include commercial property costs within our support cost analysis.

Table 5.2: Network Rail's SBP forecast of support costs in CP5 by area

£m (2012-13 prices)	Great Britain	England & Wales	Scotland
Human Resources	273	245	27
Information Management	324	292	32
Government and Corporate Affairs	86	77	9
Group Strategy	53	48	5
Finance	129	116	13
Business Services	66	59	7
Accommodation	339	319	20
Utilities	186	168	19
Insurance	259	233	26
Legal and Inquiry	30	27	3
Safety and Sustainable Development	39	35	4
Strategic Sourcing	44	39	4
Business Change	16	14	2
Other corporate functions	16	14	2
Core support costs (excluding group)	**1,860**	**1,688**	**172**
Asset Management Services	205	184	20
Network Rail Telecom	172	154	17
National Delivery Service	7	7	1
Investment Projects	0	0	0
Commercial property	(19)	(18)	(1)
Support costs (excluding group)	**2,224**	**2,015**	**209**
Group costs	8	7	1
Support costs (including group)	**2,232**	**2,022**	**210**

5.12 Network Rail's support costs include 'group costs'. These costs are usually large/one-off items (or atypicals) or recharges to elsewhere in the company. We provide a breakdown of Network Rail's SBP forecast of CP5 group costs, consistent with the analysis above, in Table 5.3.

Table 5.3: Network Rail's SBP forecast of group costs in CP5 for Great Britain

£m (2012-13 prices)	CP5 total
Income from High Speed 1	(28)
Consultancy / legal / other	25
Project support recharges	(122)
Redundancy costs	100
Contingency	33
Total group costs	8

Our assessment

Overview

5.13 We have assessed the efficient level of Network Rail's support costs in CP5. We have reviewed Network Rail's SBP and supporting evidence, commissioned external consultancy studies on certain areas of support costs as discussed below, and carried out our own analysis to support our assessment. The following paragraphs explain our approach and the evidence that we have used.

5.14 Our approach to assessing Network Rail's support costs was to:

(a) select a base year;

(b) adjust the base year to remove any atypical or inappropriate costs;

(c) roll forward the base year for each year of CP5 to give the pre-efficient costs;

(d) apply our own efficiency assumption to the pre-efficient costs;

(e) decide between a bottom-up efficiency assumption and a top-down efficiency assumption; and

(f) assess capitalisation and recharges to capital expenditure.

Base year, adjustments and roll forward

5.15 We have used Network Rail's PR13 SBP forecast of 2013-14 expenditure as the base year for our assessment. However, in any one year Network Rail may incur one-off costs or receive one-off income. So that we could assess a representative year of expenditure, i.e. it is comparable to future years' spend, we have removed any significant one-off or 'atypical' costs (or income) from the base year. We set out the adjustments that we have made later in this chapter. We then rolled forward the base year.

5.16 Table 5.4 sets out the adjustments that we have made to Network Rail's 2013-14 support costs to determine our base year expenditure for CP5. These adjustments result in a net reduction in base year costs of £40m and have two main effects on our assessment:

(a) impact on efficiency assessment. To calculate our efficiency assumption for Network Rail's CP5 support costs, we compare our assumption of Network Rail's support costs in the final year of CP5 to our base year costs. Any changes we make to the base year will impact on the calculation of our CP5 efficiency assumptions; and

(b) impact on our CP5 cost assessment. Where we have adjusted the base year and Network Rail:

(i) assumed in its SBP that these costs continue into CP5, any changes we make will impact on our assessment of Network Rail's CP5 costs, e.g. contingency, as well as the calculation of our efficiency assessment; and

(ii) did not assume that these costs continue into CP5, there is no impact on our CP5 support cost assessment.

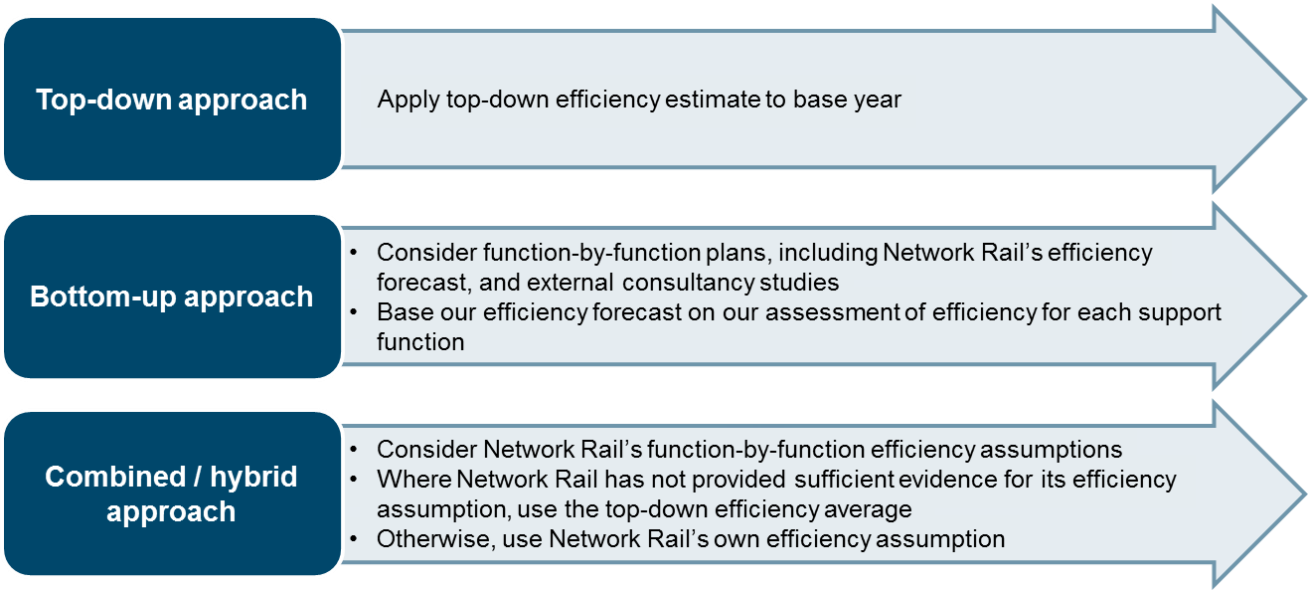
5.17 In Table 5.6, we have presented our assessment on a function-by-function basis, i.e. we do not separate out the effect of any base year adjustments on our CP5 cost assumptions, as this would complicate the analysis. As an example, our determination assumption of Network Rail's CP5 insurance costs is £35m lower than Network Rail's SBP and around £15m of the £35m reduction is due to our £3m adjustment to Network Rail's base year insurance costs.

Evidence for efficiency assumptions

5.18 We then considered what efficiency adjustment to apply. We had evidence from studies by CEPA, Oxera, Civity, BDO/CEPA and Willis. Compared to PR08, we have completed a more wide ranging set of studies on support costs. These studies are summarised below and each study, or an executive summary of the study, is available on our website[141].

5.19 Figure 5.1 sets out the three main options for determining Network Rail's efficient support costs in CP5.

Figure 5.1: Options for determining Network Rail's efficient support costs



5.20 We have based our assessment of Network Rail's CP5 support costs on the combined/hybrid approach. This means that where Network Rail has provided robust analysis of its functions' costs, we have used Network Rail's forecast of costs. However, where Network Rail has provided insufficient justification for its forecasts, we have applied a top-down efficiency assumption to our view of Network Rail's pre-

[141] These studies are available at: http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

efficient costs. We have done this for information management, insurance and other Corporate Functions.

5.21 Our top-down efficiency assumption has been calculated by taking the average of CEPA's forecast of 4.4%[142](the CEPA study is summarised below) and Oxera's forecast of 3.0%[143] annual efficiency estimates. We recognise that the use of a top-down efficiency assumption is subjective, so by taking this approach we have made our final determination more robust.

Top-down comparison of Network Rail's support and operations costs against other companies (CEPA)

5.22 The purpose of CEPA's study was to provide estimates of Network Rail's scope for achieving efficiency gains in support and operations costs over CP5. This study drew on the historical performance of other UK network industries and different sectors' productivity performance in order to determine the possible scope for efficiency gains for Network Rail in CP5. CEPA used the following methods to provide a range for the scope for efficiency gains: Real Unit Operating Expenditure (RUOE); Total Factor Productivity (TFP); and a Labour, Energy, Materials and Services cost measure (LEMS).

5.23 CEPA found that, subject to Network Rail delivering its CP4 targets, the average annual change in RUOE of 4.4% (for comparator industries in their third price control[144]), and the LEMS cost measure for electricity, gas and water supply (11-15 years since privatisation) of 5.1%, could represent an appropriate annual target for each year of CP5. Savings of this order are consistent with broader studies of Network Rail's relative efficiency, e.g. the benchmarking work included in the RVfM study, which suggested that Network Rail's costs are significantly higher in a range of activities than those of its international peers[145].

International support and operations benchmarking (Civity)

5.24 We commissioned consultants, Civity, to benchmark Network Rail's support and operations expenditure against other railway infrastructure managers. The aim was to help us to understand whether, and to what extent, there is a gap between the

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[142] We commissioned CEPA to produce a study on the scope for Network Rail to achieve efficiency gains in operations and support costs in CP5. This is available at: http://www.rail-reg.gov.uk/pr13/PDF/cepa-orr-om-productivity-over-cp5.pdf.

[143] Network Rail included a study by Oxera on the scope for efficiency improvements in Network Rail in its SBP.

[144] CEPA based its assumptions on the third control period because it assumes that when Network Rail took over its responsibilities, the effect of Railtrack's problems had reset efficiency levels to the level at privatisation. Therefore, as CP5 is the third control period after Network Rail took over its responsibilities, CEPA's analysis was based on the efficiency levels in comparator industries in their third control period.

[145] These results are similar to the analysis that Oxera carried out for us in PR08. Oxera's PR08 study is available at: http://www.rail-reg.gov.uk/upload/pdf/pr08-oxeraeffic-160408.pdf.

efficiency of Network Rail's support and operations expenditure and that of comparators (particularly the most efficient rail infrastructure managers). Civity's views on operations costs are included in the operations expenditure chapter (chapter 7).

5.25 For support costs, Civity found that, in relation to its peers (based on total expenditure, staff size, and labour costs), Network Rail's total expenditure on support functions (representing 8% of its total annual expenditure) is in the middle of the peer group. Civity also found that this was the case for individual support functions, with the exception of procurement, where Network Rail's position is at the higher end of its peer group.

5.26 However, Civity did conclude that the current positioning of Network Rail relative to its peers cannot be used to draw reliable conclusions on Network Rail's efficiency and that further disaggregation of costs would be necessary to produce more reliable analysis. We consider that this study has identified a number of useful issues but we have not used it to inform our determination of support costs for CP5 due to the issues over data reliability highlighted by Civity.

Pace of change study (BDO/CEPA)

5.27 The purpose of the study was to develop a greater understanding of the potential pace of change for the cost savings that Network Rail could achieve in its support functions over CP5. The study considered a number of companies and reviewed how they reacted to significant changes to their businesses, e.g. from mergers, regulatory change through a price control and changing markets. The study also sought to estimate Network Rail's fixed and variable support costs and determine how the split between fixed and variable costs can impact on a company's ability to react to a significant business change, e.g. a merger, acquisition or price control.

5.28 The study found that major change within other organisations can often be seen first in support costs, with significant cost reductions achievable within two to four years, although this was potentially more difficult to sustain in the long term. The study also found that where there is a significant business imperative, e.g. potential bankruptcy, the pace of change is at its most rapid and most extensive. When reflecting on Network Rail's current position, the report concluded that Network Rail's historic pace of change in support costs has been slow and steady and that there was scope to increase the speed at which Network Rail implements its change programmes.

5.29 We did not use this analysis directly, but it provided an important sense check on the appropriateness of the use of the top down efficiency average. Given the overall challenge of our PR13 package we consider that the speed at which we are assuming costs savings can be made in this area is reasonable.

Insurance costs (Willis)

5.30 We commissioned Willis (an insurance broker) to review Network Rail's proposed annual insurance costs for each year of CP5 to consider whether Network Rail's overall insurance strategy is appropriate and whether its proposed insurance costs

are efficient, e.g. are there some risks that Network Rail could manage more efficiently than it is proposing?

5.31 Willis concluded that Network Rail's overall approach to insurance costs is efficient. However, it identified some aspects of Network Rail's insurance cover where Network Rail may not take an efficient approach, e.g. terrorism insurance.

Network Rail studies

5.32 In support of the IIP, SBP and as part of progressive assurance, Network Rail has commissioned a number of external and internal studies. We have considered the findings of these studies in our assessment of Network Rail's CP5 support costs.

5.33 These studies included:

(a) Oxera study on the scope for efficiency improvements in Network Rail in its SBP;

(b) Hackett benchmarking of key support functions, e.g. HR;

(c) IPD workplace management benchmarking;

(d) Gartner study on information management; and

(e) Arup review of NDS.

Capitalisation and recharges

5.34 Network Rail's support functions provide services to other areas of the business where the costs of these activities are capitalised rather than expensed in the year, e.g. renewals expenditure.

5.35 As part of its SBP, Network Rail provided a high level reconciliation of transfers of support costs into renewals and enhancement costs, which we have reviewed. This analysis showed an additional £62m of capitalised costs, which was not consistent with its assumptions on support costs.

5.36 Network Rail has not been able to adequately explain this inconsistency and the burden of proof is on it to show that its unit costs are appropriate. As we explain in the enhancements expenditure chapter (chapter 9), Network Rail has not done this. As a result we have deducted £62m from enhancement costs for Great Britain[146] for our determination. We have assumed that all capitalised costs are variable and so we have changed the support costs that are included in capital expenditure in line with any reduction or increase in our underlying capital expenditure assumptions.

Summary of our draft determination

5.37 In our draft determination we determined Network Rail's total support costs to be £2,093m over CP5. This represented a 20% efficiency improvement in Network Rail's

[146] This was a more straightforward way of making the adjustment than adjusting both renewals and enhancements expenditure.

core support costs (i.e. excluding group costs and other support functions), compared to Network Rail's 12% SBP efficiency assumption. This was £139m less than Network Rail forecast in its SBP and £647m less than Network Rail's CP4 costs (based on its PR13 SBP forecast).

Responses to our draft determination

5.38 Network Rail had a number of concerns with our assessment and in particular that it:

(a) did not think that it was appropriate to use a hybrid approach to our assessment. It considered that we should either apply the top-down efficiency assumptions to the whole of support costs or use a bottom-up approach, rather than a combination of the two different methods;

(b) disagreed with our use of cross-cutting efficiency overlays as it considered that these were already factored into the top-down efficiency assumptions;

(c) did not think that further efficiencies (above its SBP assumptions) could be achieved in Legal and Inquiry and Other Corporate functions;

(d) considered that it required additional funding, above its SBP assumptions, for redundancy and severance (£122m) and pensions (£135m);

(e) considered that it would incur higher insurance costs due to increases in Schedule 4 & 8 costs over CP5; and

(f) did not think that we should have excluded £25m of costs relating to consultancy and other costs that it included within group costs for CP5, as it thinks that its forecast is lower than its historical experience.

5.39 Freightliner supported our decision to continue to set efficiency targets for Network Rail's support costs. Freightliner suggested that there was an imbalance in the industry between the resources that Network Rail has and those of the TOCs and FOCs.

5.40 RMT stated it was totally opposed to any cuts in Network Rail's finances, and that it had concerns about cuts to support, operations, maintenance and renewals costs in CP5.

5.41 TSSA noted our efficiency assumption on Network Rail's core support costs (20% over CP5) and said that it was concerned that the resources required to deliver the level of change required in CP5 had not been considered. It also suggested that issues with major change programmes in CP4 may, in some part, be due to poor resourcing of support for these changes. TSSA asked us to consider, holistically, whether the efficiencies we are assuming on support costs in CP5 are possible.

Our comments on the responses to our draft determination

5.42 Our approach to cross-cutting efficiencies is addressed in the overview of efficient expenditure chapter (chapter 4). We have considered the issues raised by respondents on support costs and have the following comments.

Hybrid approach

5.43 We have considered Network Rail's concerns about our hybrid approach to our assessment. Network Rail has generally supported a more bottom-up analysis to support our assumptions. However, when we do not think its bottom-up analysis is sufficiently robust we can either develop our own bottom-up assumptions or use a top-down approach. By definition, deriving a bottom-up estimate when we do not think that Network Rail's plan is robust is not straightforward, e.g. it does not have a set of policies for how much money it should spend on information management, in the same way that it does for track renewals. There is also an asymmetry of information between us and Network Rail.

5.44 Therefore, when Network Rail has not provided a robust bottom-up analysis we consider that applying a top-down approach would be more appropriate. The most important issue is checking that the efficiency assumption for that business unit is reasonable and that the efficiency assumptions for support costs, overall, are reasonable.

5.45 We have applied a top-down approach for information management, insurance and other corporate functions but not all support costs. Applying our top-down efficiency assumptions to the whole of Network Rail's core support functions, would mean our assessment of its support costs would be £15m higher. Using the average of CEPA's analysis, our assumptions on core support costs would be £23m lower. In our view these alternative approaches show that our overall hybrid approach is reasonable. We consider the issues involved with these costs in more detail below.

5.46 Network Rail's bottom-up information management analysis was not robust. Given the information asymmetry between us and Network Rail, and that Network Rail did not provide an appropriate level of detail to explain its own analysis[147] we considered that it was more appropriate to use a top-down approach to assess the efficiency of information management expenditure.

5.47 As a sense check, Network Rail's own report on information management efficiency by Hackett showed a 16% efficiency gap in information management support costs, which is similar to our top-down assumption. However, instead of applying the 16% assumption, Network Rail in its SBP thought that an efficiency assumption of 7% was

[147] Significant issues were also raised by Network Rail after the SBP was issued and in Network Rail's response to our determination.

more appropriate. The other main issue with our assessment of information management costs is that we do not agree with Network Rail's assumption for the increased support costs of new systems, which it has not adequately justified. Our assumption provides a similar level of funding for the costs of supporting new information management systems in CP5 as Network Rail spent in CP4. Network Rail has not adequately shown why that is not a reasonable assumption.

5.48 Network Rail's bottom-up insurance costs analysis was not robust. In particular, it did not clearly set out why its approach to insurance does not double-count other costs that we are funding, e.g. Schedule 4 and 8 costs and why its approach is efficient, i.e. whether it is insuring risks that are most efficiently managed by self-insurance rather than external insurance, e.g. terrorism. Also, it is not clear that Network Rail applied efficiency assumptions to its self-insured costs in its SBP.

5.49 Given the asymmetry of information between us and Network Rail on the issue of the appropriate scope of its insurance costs, we considered that it would be more appropriate to apply a top-down assumption for our assessment of efficiency of insurance costs. As a sense check, if we had just adjusted for the double-count in Schedule 4 and 8 costs, the scope of terrorism cover and if we had applied the maintenance and renewal efficiency assumptions to the insurance claims it is self-insuring (as the costs involved are, for example, the costs of repairing damage to property, which is an engineering-type cost rather than a typical support cost) then our insurance cost assumption would be similar to the assumption in our draft determination.

Legal and Inquiry and other corporate functions

5.50 In light of Network Rail's responses, we have reviewed our analysis of Network Rail's Legal and Inquiry and other corporate functions.

5.51 Network Rail provided limited justification of its assumptions for its other corporate functions costs and so we have retained our top-down efficiency assumption on this area of its costs.

5.52 However, Network Rail did provide some justification of its Legal and Inquiry costs. As a result, we do not think that it is appropriate to apply the full top-down efficiency assumption. Instead, we applied an efficiency assumption of 10% over CP5 to reflect that some elements of Network Rail's plan were reasonable. We did not use Network Rail's efficiency assumption because we consider that some areas of its plan were too cautious and not all costs were adequately justified. Also, for some of the issues that Network Rail identified as requiring additional expenditure in CP5, e.g. telecoms, it did not include the additional income that would be delivered elsewhere in its plan.

Pensions

5.53 Network Rail's pensions costs analysis identified issues that might increase pension costs. However, we do not specifically fund employment costs (pension costs are a

part of employment costs) and these issues need to be considered in the context of the IDS employment cost report which found that Network Rail's employment costs were higher than the market by 9% for support staff, 32% for maintenance staff and 36% for operations staff.

5.54 We also note that this analysis was provided late in the assessment process, is not robust and only considers a limited number of issues that could increase costs and does not identify issues that could reduce costs.

Redundancy and severance costs

5.55 Our draft determination redundancy and severance cost assumption was similar to Network Rail's SBP assumption. The analysis supporting our assumption was based on actual redundancy and severance costs in previous years. Given that Network Rail's efficiency challenge is of a similar magnitude in CP5 as CP4, we consider that it is reasonable to base our assumption of redundancy and severance costs on Network Rail's historic expenditure.

5.56 Network Rail has not identified why this is not a reasonable approach to forecasting a very uncertain number and its own analysis was provided late in the assessment process and is not robust. However, in light of Network Rail's concern we have reviewed our analysis and we have now excluded two atypical years from our analysis, which has meant our redundancy and severance cost assumption has increased by £5m per annum (£25m for CP5 in total).

Insurance

5.57 We do not fund insurance cover for Schedule 4 & 8 costs in our determination as our assumption for Schedule 4 & 8 costs already covers the effect of external events. Given this approach, we have adjusted Network Rail's baseline insurance costs to remove Schedule 4 & 8 costs where Network Rail has identified this cost in its plans. But there may still be some insurance costs covering extreme events that were included in Network Rail's external insurance costs in its SBP. So, it is not clear that including these costs in Network Rail's support costs is consistent with our Schedule 4 forecast, as we may be double-counting this cost.

5.58 We have taken a pragmatic approach to this issue and we have not adjusted Network Rail's baseline insurance costs to remove some of the costs of extreme events because the issue is not clear. We have also not adjusted for the additional costs Network Rail has requested in its response to our draft determination because it is not clear that the insurance costs that may be included in support costs are not double-counted by our Schedule 4 assumptions, as we may be double-counting this cost.

Other comments

5.59 Network Rail has not provided adequate evidence to justify the consultancy/legal/other costs it has included in group costs.

5.60 We note RMT and TSSA's comments on our assumptions for Network Rail's CP5 support costs, and in particular their comments on deliverability and issues with major change programmes in CP4. We consider that our efficiency assumptions on this area of Network Rail's costs are challenging but also achievable. It is also important to consider the decisions that we make in our final determination as an entire package.

5.61 We also note Freightliner's comments on our support cost efficiency assumptions.

Our determination

Overview

5.62 In our assessment of Network Rail's support costs in CP5 we have considered:

(a) whether we need to make adjustments to base year costs;

(b) any implications of Network Rail's approach to the capitalisation and recharging of support costs;

(c) the findings of the studies that we have commissioned to review different elements of Network Rail's support costs;

(d) the studies provided by Network Rail (both internal and external);

(e) whether Network Rail has included any contingency within its forecasts – we have excluded contingency where relevant; and

(f) the additional overlay for Network Rail's management of inflation and occupational health.

5.63 Our analysis has been described above. We set out below our adjustments to base year costs before summarising our expenditure assumptions.

Base year

5.64 We have reviewed Network Rail's SBP forecast of its expenditure of £554m on support costs in 2013-14. We have identified a number of one-off (or atypical) costs or costs that it is not appropriate to include in our assessment of CP5 support costs, e.g. financial penalties, contingency, CP4 specific expenditure and a double-count of insurance costs with Schedule 4 & 8 costs in CP5 and have adjusted the base year for them.

5.65 These adjustments result in a net reduction in base year costs of £40m. Table 5.4 sets out the adjustments that we have made to Network Rail's 2013-14 support costs to get to our base year expenditure for CP5.

Table 5.4: Adjustments to our base year assumptions for 2013-14

£m (2012-13 prices)	Great Britain	England & Wales	Scotland
Network Rail's SBP forecast	554	502	52
Contingency	(26)	(23)	(3)
CP4 funds	(11)	(10)	(1)
Insurance costs	(3)	(3)	(0)
One-off costs and incomes	(10)	(9)	(1)
Information management	5	4	0
Utilities	5	5	1
Allocation adjustments	-	(4)	3
Total adjustment	(40)	(40)	(0)
FD base year assumption	**514**	**462**	**52**

5.66 We explain the reasons for each adjustment to the 2013-14 base year for support costs below:

(a) reduction in contingency (£26m). We are not providing specific contingency for support costs in CP5 and Network Rail can use its balance sheet buffer to manage the risks involved with support costs;

(b) reduction in CP4 funds (£11m). This is expenditure on the performance fund and the seven day railway fund in 2013-14, that will not be spent in CP5;

(c) reduction in insurance costs. To reflect a double-count of Schedule 4 & 8 costs (£3m);

(d) reduction in one-off incomes/costs in 2013-14 (£10m). This reduction is £5m lower than our draft determination assumptions as we have included an additional £5m of redundancy to reflect Network Rail's CP4 average expenditure on redundancy costs;

(e) increase in information management costs. To reflect an increase in support costs for new information management systems. This has the effect of increasing costs over CP5 by £21m and is similar to Network Rail's estimate of its incremental support costs for new information management systems in CP4. This is £21m lower than Network Rail included in its SBP but Network Rail has not adequately justified its forecast and it increased its forecast of the cost of the new systems by £18m in its response to our draft determination, which was also not adequately justified; and

(f) increase in utilities costs (£5m). To correct an error in Network Rail's forecast.

5.67 As shown in Table 5.4, these adjustments result in an adjusted base year expenditure for Great Britain of £514m compared to Network Rail's SBP assumption of £554m. We also presented our base year expenditure assumptions for England & Wales and Scotland in Table 5.4.

5.68 To calculate these assumptions we have allocated costs based on Network Rail's latest allocation methodology, which was developed after it published its SBP. We show the impact of the updated allocation methodology in Table 5.4.

Efficient forecast of costs

5.69 After considering the evidence we have used Network Rail's bottom up assumptions for Network Rail's forecasts apart from, IM, insurance, Legal and Inquiry and other Corporate Functions. For IM, insurance and other Corporate Functions we have applied our top-down efficiency assumption of 17.2% over CP5 and for Legal and Inquiry we have further reviewed Network Rail's plan and decided that a 10% efficiency assumption is appropriate as described below. We have also taken our own view of group costs as described below.

5.70 On the basis of our assessment, we have determined Network Rail's total support costs to be £2,119m over CP5. This is £113m less than Network Rail forecast in its SBP and £621m less than Network Rail's CP4 costs (based on its PR13 SBP forecast). This represents a 20%[148] efficiency in Network Rail's core support costs (i.e. excluding group costs and other support functions). Given the overall challenge of our PR13 package, we consider that the speed at which we are assuming that cost savings can be delivered in this area is reasonable.

5.71 Our forecast of Network Rail's expenditure on support costs in our determination represents 5.5% of Network Rail's total expenditure.

5.72 Table 5.5 sets out our efficiency assumptions for CP5 and the implied post-efficient level of support costs for Great Britain.

Table 5.5: Our assessment of CP5 support costs (Great Britain)

£m (2012-13 prices)	CP4		CP5					
	2013-14	Base year	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Human Resources	63	63	59	59	53	51	48	271
Information Management	59	64	61	59	57	54	52	283
Government and Corporate Affairs	20	20	18	18	17	17	16	85
Group Strategy	13	13	11	11	11	10	10	53
Finance	29	29	28	27	25	24	24	128
Business Services	16	16	14	13	13	13	12	65
Accommodation	77	77	72	72	65	65	63	337
Utilities	39	44	41	41	40	39	38	201
Insurance	53	50	48	46	44	43	41	222
Legal and Inquiry	6	6	6	6	6	6	5	29

[148] Our efficiency assumption is calculated with reference to the 2013-14 base year.

£m (2012-13 prices)	CP4		CP5					
	2013-14	Base year	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Safety and Sustainable Development	13	13	10	8	7	7	7	39
Strategic Sourcing	11	11	10	9	9	8	8	43
Business Change	4	4	4	3	3	3	3	16
Other Corporate Functions	4	4	3	3	3	3	3	16
Core support costs (excluding group)	**406**	**412**	**385**	**375**	**354**	**343**	**331**	**1,787**
Efficiency	-	N/A	6.7%	2.5%	5.7%	3.0%	3.5%	19.7%
Asset Management Services	51	51	41	41	40	41	40	203
Network Rail Telecom	45	45	45	36	31	29	25	166
National Delivery Service	7	7	5	3	1	(0)	(2)	7
Investment Projects	0	0	(0)	(0)	(0)	(0)	(0)	(0)
Commercial Property[149]	7	7	(3)	(3)	(4)	(5)	(5)	(20)
Support costs (excluding group)	**515**	**522**	**474**	**452**	**423**	**408**	**388**	**2,144**
Group costs	39	(8)	(6)	(7)	(5)	(4)	(2)	(25)
Support costs (including group)	**554**	**514**	**468**	**445**	**417**	**403**	**386**	**2,119**
Efficiency		**N/A**	**9.0%**	**4.9%**	**6.2%**	**3.3%**	**4.3%**	**24.9%**

Summary of changes from the SBP and our draft determination

5.73 Tables 5.6 sets out the key changes to our assessment from the draft determination and provides a comparison to the SBP efficiency assumptions for CP5 and the implied post-efficient level of support costs for Great Britain.

Table 5.6: Key changes between SBP, draft determination and final determination for Great Britain – CP5 totals

£m (2012-13 prices)	SBP	DD*	FD*	FD less SBP	FD less DD
Information Management	324	285	285	(39)	-
Utilities	186	202	202	16	-
Insurance	259	223	223	(35)	-
Group costs	8	(51)	(26)	(33)	25
Cross-cutting efficiencies	-	(16)	(16)	(16)	(0)
Other support costs	1,455	1,449	1,450	(5)	1
Total	**2,232**	**2,093**	**2,119**	**(113)**	**26**

***** We show individual function costs before we adjust for cross-cutting efficiencies.

[149] Network Rail's SBP separates out its commercial property costs from its support costs. However, for our analysis we include commercial property costs within our support cost analysis.

5.74 The main differences between Network Rail's SBP and our final determination were:

(a) information management, £39m lower. As we explain above the two main differences between our assumptions and Network Rail's SBP are that we think Network Rail can achieve higher efficiencies in this area than it did and that it will need less expenditure for new systems;

(b) utilities, £16m higher. This adjustment corrects an error in Network Rail's SBP;

(c) insurance, £35m lower. As explained above we have adjusted for a double-count between insurance costs and Schedule 4 & 8 costs (approximately £15m) and we think Network Rail can achieve efficiencies in these costs (£20m);

(d) group costs, £33m lower. This difference is explained below; and

(e) cross-cutting efficiencies, £16m lower. As described in the overview of efficient expenditure chapter (chapter 4), we have assumed that Network Rail can make additional efficiencies from its management of inflation and occupational health.

5.75 Table 5.7 sets out the main differences between our assumptions of group costs for our final determination and Network Rail's assumption in its SBP.

Table 5.7: Our assessment of CP5 group costs for Great Britain

£m (2012-13 prices)	SBP	DD	FD	FD less SBP	FD less DD
Income from High Speed 1	(28)	(28)	(28)	-	-
Consultancy / legal / other	25	-	-	(25)	-
Project support recharges	(122)	(122)	(122)	-	-
Redundancy costs	100	100	125	25	25
Contingency	33	-	-	(33)	-
Total	**8**	**(51)**	**(26)**	**(33)**	**25**

5.76 The main differences between our assumptions of group costs for our final determination and Network Rail's assumption in its SBP are that we have:

(a) not included consultancy/legal/other costs of £25m as they were not adequately justified;

(b) not included contingency of £33m as we are not providing specific contingency for support costs in CP5 and Network Rail can use its balance sheet buffer to manage the risks involved with support costs; and

(c) included an additional £25m for redundancy and severance costs, after a further review of Network Rail's actual expenditure in CP4 on these costs as explained above.

5.77 The main differences between our final determination and Network Rail's SBP were:

(a) group costs, we have increased redundancy and severance by £25m as explained above in the section on redundancy and severance costs; and

(b) other support costs, we have increased our estimate of Legal and Inquiry costs as we are now applying a lower efficiency assumption to these costs as described above in the section on Legal and Inquiry and other corporate functions.

5.78 Table 5.8 sets out the total support cost expenditure assumed in Network Rail's SBP, in our draft determination and in our final determination.

Table 5.8: CP5 total support cost expenditure

£m (2012-13 prices)	CP4	SBP	DD	FD	FD less SBP
Great Britain	2,740	2,232	2,093	2,119	(113)
England & Wales	2,466	2,022	1,884	1,908	(114)
Scotland	274	210	209	211	1

5.79 Tables 5.9, 5.10 and 5.11 set out our detailed CP5 expenditure assumptions for Great Britain, England & Wales and Scotland compared to the SBP and draft determination.

Table 5.9: Our assessment of CP5 support costs (Great Britain)

£m (2012-13 prices)	SBP	DD	FD	FD less SBP	FD less DD
Human Resources	273	271	271	(2)	-
Information Management	324	283	283	(41)	-
Government and Corporate Affairs	86	85	85	(1)	-
Group Strategy	53	53	53	(0)	-
Finance	129	128	128	(1)	-
Business Services	66	65	65	(1)	-
Accommodation	339	337	337	(2)	-
Utilities	186	201	201	14	-
Insurance	259	222	222	(37)	-
Legal and Inquiry	30	27	29	(1)	1
Safety and Sustainable Development	39	39	39	(0)	-
Strategic Sourcing	44	43	43	(0)	-
Business Change	16	16	16	(0)	-
Other corporate functions	16	16	16	(0)	-
Core support costs (excluding group)	**1,860**	**1,786**	**1,787**	**(73)**	**1**
Efficiency	12.3%	19.8%	19.7%	7.4%	(0.1%)
Asset Management Services	205	203	203	(2)	-
Network Rail Telecom	172	166	166	(5)	-
National Delivery Service	7	7	7	(0)	-

£m (2012-13 prices)	SBP	DD	FD	FD less SBP	FD less DD
Investment Projects	0	(0)	(0)	(0)	-
Commercial Property[150]	(19)	(20)	(20)	(0)	-
Support costs (excluding group)	**2,224**	**2,143**	**2,144**	**(80)**	**1**
Group costs	8	(50)	(25)	(33)	25
Support costs (including group)	**2,232**	**2,093**	**2,119**	**(113)**	**26**
Efficiency	24.2%	25.2%	24.9%	0.7%	(0.3%)

Table 5.10: Our assessment of CP5 support costs (England & Wales)

£m (2012-13 prices)	SBP	DD	FD	FD less SBP	FD less DD
Human Resources	245	245	246	0	0
Information Management	292	255	255	(36)	-
Government and Corporate Affairs	77	77	77	0	0
Group Strategy	48	48	48	(0)	-
Finance	116	116	116	0	0
Business Services	59	59	59	(0)	0
Accommodation	319	307	307	(12)	-
Utilities	168	180	180	13	-
Insurance	233	199	199	(34)	-
Legal and Inquiry	27	25	26	(1)	1
Safety and Sustainable Development	35	35	35	(0)	0
Strategic Sourcing	39	39	39	(0)	0
Business Change	14	14	14	0	0
Other corporate functions	14	14	14	(0)	0
Core support costs (excluding group)	**1,688**	**1,615**	**1,617**	**(71)**	**1**
Efficiency	12.4%	19.9%	19.7%	7.3%	(0.1%)
Asset Management Services	184	176	176	(9)	-
Network Rail Telecom	154	149	149	(5)	-
National Delivery Service	7	6	6	(0)	-
Investment Projects	(0)	(0)	(0)	(0)	-
Commercial Property[151]	(18)	(18)	(18)	1	-
Support costs (excluding group)	**2,015**	**1,929**	**1,931**	**(84)**	**2**
Group costs	7	(45)	(23)	(30)	23

[150] Network Rail's SBP separates out its commercial property costs from its support costs. However, for our analysis we include commercial property costs within our support cost analysis.

[151] Network Rail's SBP separates out its commercial property costs from its support costs. However, for our analysis we include commercial property costs within our support cost analysis.

£m (2012-13 prices)	SBP	DD	FD	FD less SBP	FD less DD
Support costs (including group)	**2,022**	**1,884**	**1,908**	**(114)**	**24**
Efficiency	24.3%	25.1%	24.8%	0.5%	(0.3%)

Table 5.11: Our assessment of CP5 support costs (Scotland)

£m (2012-13 prices)	SBP	DD	FD	FD less SBP	FD less DD
Human Resources	27	25	25	(2)	0
Information Management	32	28	28	(4)	-
Government and Corporate Affairs	9	8	8	(1)	0
Group Strategy	5	5	5	(0)	-
Finance	13	12	12	(1)	0
Business Services	7	6	6	(0)	0
Accommodation	20	30	30	9	-
Utilities	19	20	20	2	-
Insurance	26	23	23	(3)	-
Legal and Inquiry	3	3	3	(0)	0
Safety and Sustainable Development	4	4	4	(0)	0
Strategic Sourcing	4	4	4	(0)	0
Business Change	2	1	1	(0)	0
Other corporate functions	2	1	1	(0)	0
Core support costs (excluding group)	**172**	**170**	**170**	**(2)**	**0**
Efficiency	12.1%	19.8%	19.7%	7.6%	(0.1%)
Asset Management Services	20	28	28	7	-
Network Rail Telecom	17	17	17	(0)	-
National Delivery Service	1	1	1	0	-
Investment Projects	(0)	(0)	(0)	(0)	-
Commercial Property[152]	(1)	(2)	(2)	(1)	-
Support costs (excluding group)	**209**	**214**	**214**	**4**	**-**
Group costs	1	(5)	(2)	(3)	2
Support costs (including group)	**210**	**209**	**211**	**1**	**2**
Efficiency	23.9%	25.9%	25.5%	1.6%	(0.4%)

[152] Network Rail's SBP separates out its commercial property costs from its support costs. However, for our analysis we include commercial property costs within our support cost analysis.

6. Traction electricity, industry costs and rates

Key messages in this chapter

- We have updated Network Rail's forecast of traction electricity costs for the latest forecast of electricity prices in CP5. This has reduced the forecast of traction electricity costs in Great Britain by £549m in CP5 compared to Network Rail's SBP.
- We have reviewed Network Rail's proposals and we have concluded that the amount that Network Rail pays for British Transport Police (BTP) costs could be lower. Our forecast of these costs for Great Britain in CP5 is £26m lower than Network Rail's SBP.
- Our final determination forecast of total expenditure on traction electricity, industry costs and rates in CP5 is £3,056m. This represents 8% of Network Rail's total expenditure.

Main changes since our draft determination

- Our assessment of expenditure on traction electricity, industry costs and rates in CP5 has reduced by £58m since our draft determination. This is mainly due to the effect of revised forecast prices for traction electricity and a reduction in our business rates forecast.

Introduction and background

6.1 This chapter summarises Network Rail's proposals and our assessment of Network Rail's CP5 expenditure on traction electricity, industry costs and rates.

6.2 This chapter is structured as follows:

(a) introduction and approach to funding;

(b) Network Rail's proposals;

(c) summary of our draft determination;

(d) summary of the responses to our draft determination;

(e) our comments on the responses to our draft determination; and

(f) our decisions.

Definition of traction electricity, industry costs and rates

6.3 Network Rail's influence over the costs covered in this chapter varies as described in the financial framework chapter (chapter 12). Therefore, as was the case in PR08,

each of these costs needs a bespoke treatment as discussed below. The costs include:

(a) traction electricity;

(b) business rates (i.e. cumulo rates);

(c) British Transport Police (BTP) costs;

(d) the Rail Safety and Standards Board (RSSB) levy;

(e) ORR licence fee and the railway safety levy; and

(f) other costs. This includes reporters' fees, Confidential Incident Reporting & Analysis System (CIRAS) fees and RDG contributions.

Approach to funding

6.4 We have reviewed Network Rail's SBP submissions for industry costs and rates and considered the justification that it has provided us for its forecasts. As we set out in the financial framework chapter (chapter 12), our approach to these costs is as follows:

(a) Network Rail's own use of traction electricity is controllable by Network Rail, so we have incentivised it to manage these costs efficiently;

(b) we consider that Network Rail can sufficiently influence the transmission losses element of traction electricity costs and the costs of BTP, RSSB and reporters, so we have incentivised Network Rail to aid the efficient management of BTP and RSSB costs and manage reporters' costs efficiently;

(c) for business rates, as long as Network Rail can satisfy us that it has negotiated them efficiently, we will log-up/down any variances in these costs between the assumptions in our determination and the actual costs. The variances will be included in the opex memorandum account and we will adjust Network Rail's allowed revenues in CP6; and

(d) we do not think that the ORR licence fee, the railway safety levy and other industry costs (excluding reporters' costs), e.g. CIRAS fees are sufficiently controllable by Network Rail. Therefore, any variances in these costs between the assumptions in our determination and the actual cost will be logged-up/down in the opex memorandum account and we will adjust Network Rail's allowed revenues in CP6.

Network Rail's proposals

6.5 With the exception of its own traction electricity costs, Network Rail does not consider that it can fully control these costs. As such, Network Rail's SBP did not include any efficiency assumptions for these costs. We have set out Network Rail's CP5 SBP

assumptions of CP5 traction electricity, industry costs and rates for Great Britain, England & Wales and Scotland in Tables 6.1, 6.2 and 6.3.

6.6 In its SBP, for CP5 Network Rail included an additional £77m of costs compared to Table 6.1 in traction electricity, industry costs and rates (the total was £3,701m). This reflected costs that Network Rail included in its SBP for the maintenance of assets transferred from the British Rail Residuary Board (£10m) and to reflect its estimate of the costs it could potentially incur from the asymmetry of the route-level efficiency benefit sharing (REBS) mechanism (£67m), i.e. although it may meet our efficiency assumptions in aggregate, underperformance in some routes and outperformance on others could lead to a net payment from Network Rail to train operators.

6.7 We have included no funding for these issues in our determination as we think the PR13 determination is deliverable by Network Rail and it would be inappropriate for us to assume ex-ante that Network Rail will underspend in some areas of the package and overspend in other areas. Also, we were informed that the effect of the transfer of British Rail Residuary Board assets should be cost neutral for Network Rail.

6.8 We have excluded these costs from Table 6.1 to make Network Rail's SBP comparable with our determination. However, in the executive summary and Network Rail's revenue requirements chapter (chapter 14), we have included these costs[153].

Table 6.1: Network Rail's SBP CP5 traction electricity, industry costs and rates (Great Britain)

£m (2012-13 prices)	CP4	CP5					Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Traction electricity	238	247	480	495	532	589	1,240	2,343
Business rates	151	149	149	150	168	172	577	787
British Transport Police	71	71	71	71	71	71	382	355
RSSB	9	9	9	8	8	8	46	41
ORR licence fee and railway safety levy	17	16	15	15	14	14	87	74
Other industry costs	5	5	5	5	5	5	18	24
Total	**491**	**496**	**729**	**743**	**798**	**858**	**2,349**	**3,624**

[153] This is because, although we think it is inappropriate to include these costs in traction electricity, industry cost and rates, Network Rail has included them and that has increased Network Rail's view of the net revenue requirements, so to be comparable with Network Rail's net revenue requirements we need to include them.

Table 6.2: Network Rail's SBP CP5 traction electricity, industry costs and rates (England & Wales)

£m (2012-13 prices)	CP4		CP5				Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Traction electricity	224	232	447	461	498	553	1,163	2,192
Business rates	135	133	134	134	151	154	519	705
British Transport Police	66	64	64	64	64	64	349	320
RSSB	8	8	8	7	7	7	41	37
ORR licence fee and railway safety levy	15	14	14	13	13	12	78	67
Other industry costs	5	5	5	4	4	4	15	22
Total	**452**	**456**	**671**	**684**	**736**	**795**	**2,162**	**3,342**

Table 6.3: Network Rail's SBP CP5 traction electricity, industry costs and rates (Scotland)

£m (2012-13 prices)	CP4		CP5				Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Traction electricity	14	15	33	33	34	36	77	151
Business rates	16	16	16	16	18	18	58	82
British Transport Police	7	7	7	7	7	7	37	35
RSSB	1	1	1	1	1	1	5	4
ORR licence fee and railway safety levy	2	2	2	1	1	1	9	7
Other industry costs	1	1	0	0	0	0	2	2
Total	**40**	**40**	**58**	**59**	**62**	**63**	**187**	**282**

Summary of our draft determination

6.9 Our draft determination included forecasts of traction electricity, industry costs and rates. The main issues were that we:

(a) used an updated forecast of electricity prices in CP5 compared to Network Rail's SBP; and

(b) applied efficiency assumptions to the amount Network Rail pays for BTP and RSSB costs.

Summary of the responses to our draft determination

6.10 Only a small number of consultees commented on our draft determination.

6.11 Comments in relation to our approach to funding Network Rail in CP5 for traction electricity, industry costs and rates are covered in the financial framework chapter (chapter 12). Responses on our approach to the recovery of traction electricity costs are summarised in the access charges chapter (chapter 16).

6.12 Network Rail raised the following issues in relation to our draft determination assumptions:

(a) our assumptions on the amount that Network Rail pays for BTP costs and RSSB costs were too low. Network Rail noted that these costs had been considered as part of a thorough review processes by the British Transport Police Authority (BTPA) and RSSB and that the benefits of the services provided by these bodies had already been reflected in its plan. Network Rail did not think that it was appropriate to include incremental efficiencies above those included in its SBP in our determination;

(b) in relation to the ORR fee and railway safety levy, that we should commit to stretching efficiency targets in our own costs over CP5;

(c) it did not expect the transfer of assets from British Railway Board (Residuary) Limited (BRBR) to be cost neutral and thought that funding should be provided for its on-going costs in relation to managing these assets; and

(d) it considered that funding should be provided for REBS asymmetry.

6.13 Other responses focused on our assumptions for the amount that Network Rail pays for BTP costs.

6.14 The BTPA did not agree with our draft determination assumptions for Network Rail's share of BTP costs. In its response, BTPA set out its responsibilities for determining BT Police's plans and budgets, i.e. the BTPA, and not us, determines how much Network Rail pays. It stated that its scrutiny ensures that the BTP budget is austere and is no more than is required to finance the policing plan that it has decided is necessary. BTPA provided its latest assumptions for BTP costs, showing a 3.5% increase in BTP costs (in real terms) between 2013-14 and 2016-17. BTPA also noted that Network Rail is not a member of BTPA but a Policing Service Agreement (PSA) holder and that the Network Rail director that is a BTPA member does not fulfil this role as a Network Rail representative. BTPA also noted that the cost of policing has fallen on a 'pence per passenger kilometre' basis.

6.15 Virgin Trains considered that we should satisfy ourselves that the assumed reduction on Network Rail's BTP costs should not risk the work done by BTP on suicide prevention, which it considered key to improved performance levels.

Our comments on the responses to our draft determination

6.16 Our comments on BTP and RSSB issues are included in the 'our decision' part of this chapter. Our other comments are:

(a) the ORR licence fee and railway safety levy are not set by our PR13 determination. We are just including an estimate of the fee in the calculation of Network Rail's revenue requirement. We are committed to continuous improvement in the way that we use our resources to maximise the value of our regulation, while minimising our own costs;

(b) we had been informed that the transfer of BRBR assets was intended to be completed on a cost neutral basis. Network Rail has not adequately shown why there is a net increase in its costs that should be funded; and

(c) it is not appropriate that funding for this uncertain cost should be provided ex-ante but if there is a net payment for CP5, due to the asymmetry of the REBS mechanism, then we will fund that payment through the opex memorandum account.

Our decisions

Traction electricity

Background

6.17 Network Rail recovers the vast majority of its traction electricity costs from train operators who require electricity to run their electrified train services. Network Rail also supplies traction electricity to third parties such as London Underground.

6.18 Network Rail also uses traction electricity (approximately £10m per year) for railway operations. For example, for signalling and at the major stations that it operates, such as London Euston.

6.19 Our review of traction electricity costs has taken place alongside our work on traction electricity charges. In the access charges chapter (chapter 16), we set out how we have calculated our forecast of traction electricity costs and how Network Rail is incentivised to efficiently manage transmission losses and its own use of traction electricity.

6.20 We were content with the general approach that Network Rail has taken in calculating its forecast of traction electricity costs for CP5. However, Network Rail's SBP calculations were underpinned by the Department of Energy and Climate Change (DECC) projections from 2011. In our draft determination, we used more recent DECC projections from September 2012. However, given the large amount of uncertainty over future electricity prices, we said that we would review our assumptions for our final determination.

Our decision

6.21 For our determination, we have updated our analysis using the DECC latest (September 2013) forecast. Although this revised forecast is higher than the one we used for our draft determination, it is published in nominal prices and our determination is in 2012-13 prices. When we adjust for our forecast of inflation, which is higher than the forecast we used for the draft determination, the overall effect is a reduction in traction electricity costs of £26m.

6.22 Our assumptions for Network Rail's traction electricity costs in CP5 are set out in Table 6.4.

Table 6.4: Our determination of traction electricity costs for CP5

£m (2012-13 prices)	CP4	CP5					Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Great Britain	238	246	340	359	393	456	1,240	1,794
England & Wales	224	231	316	335	368	428	1,163	1,679
Scotland	14	15	23	24	25	28	77	115

6.23 Our overall assumptions for traction electricity costs in CP5 are £1,794m for Great Britain, £1,679m for England & Wales and £115m for Scotland. These are respectively lower than Network Rail's SBP forecast by £549m for Great Britain, £513m for England & Wales and £36m for Scotland[154].

Business rates (i.e. cumulo rates)

Background

6.24 As a result of the previous rating revaluation in 2010, Network Rail's business rates are fixed in real terms for the first three years of CP5. The next rating revaluations for England, Wales and Scotland have been deferred by the governments and will now take effect in April 2017. Network Rail has provided an estimate of the potential effect of the next rating revaluation on the business rates that it will pay from 2017.

6.25 We said in our draft determination that we thought our business rates estimates for CP5 were probably too high and that, given the subjectivity and uncertainty involved in the assessment, we would review our assumptions for our final determination.

Our decision

6.26 We have discussed this issue further with Network Rail since our draft determination and we have undertaken our own analysis. We consider that Network Rail's SBP was too high and so we have reduced our forecast of Network Rail's business rates in CP5 by £26m for Great Britain compared to our draft determination assumptions.

[154] Network Rail's forecasts in its SBP were £2,343m for Great Britain, £2,192m for England & Wales and £151m for Scotland.

6.27 Our assumptions for Network Rail's business rates costs in CP5 are set out in Table 6.5.

Table 6.5: Our determination of business rates for CP5

£m (2012-13 prices)	CP4	CP5					Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Great Britain	151	149	149	149	168	175	577	789
England & Wales	135	133	133	133	151	157	519	707
Scotland	16	16	16	16	18	18	58	83

6.28 Overall our CP5 assumptions for business rates of £789m for Great Britain, £707m for England & Wales and £83m for Scotland are higher than Network Rail's SBP forecast by £2m for Great Britain, £2m for England & Wales and £1m for Scotland[155]. This difference is due to the effect of two issues:

(a) in our draft determination, we corrected an error in Network Rail's SBP forecast which increased costs by £28m; and

(b) in our final determination, we have taken a different view to Network Rail on the methodology supporting forecast business rates which reduced costs for Great Britain by £26m.

British Transport Police costs

Background

6.29 In support of our assessment of the amount that Network Rail pays for BTP costs, we have considered the following evidence:

(a) the Winsor report on the pay and conditions of police officers and staff, which outlined 121 recommendations designed to facilitate an efficient, well-resourced and highly skilled police service with a modern system of remuneration;

(b) the relevant sections of the RVfM study, which set out recommendations designed to deliver efficiency savings beyond those already planned by the BTPA. These included:

(i) the transfer of some of BTP's activities to other forces and the sharing of specialist functions and support activities;

(ii) extending efficiency opportunities, including a review of the staffing mix, merging HQ functions and revisions to rostering;

(iii) local alignment with train operators and infrastructure managers, and a revised service specification procedure; and

[155] Network Rail's forecasts in its SBP were £787m for Great Britain, £705m for England & Wales and £82m for Scotland.

(iv) major structural change, such as merging BTP with other forces in Great Britain in order to remove overhead costs; and

(c) discussions with Network Rail, BTPA and BTP which indicated that there was scope to make improvements in efficiency. However, these initiatives have not been quantified.

6.30 After consideration of this information and given that Network Rail provided insufficient justification of its SBP forecast of these costs, in our draft determination assessment we applied the top-down CEPA/Oxera average efficiency gain per annum[156] to our view of the pre-efficient amount that Network Rail pays for BTP costs, i.e. an average 3.7% efficiency gain per annum, which equates to a 17.2% cumulative efficiency gain over CP5.

Our decision

6.31 We acknowledge the responses by Network Rail, BTPA and Virgin on BTP costs and have the following comments:

(a) we agree that it is for the BTPA to decide how much Network Rail should pay for the BTP. Therefore, Virgin's concern is not an issue for our determination;

(b) it is our responsibility to determine Network Rail's total efficient costs. This involves making assumptions on every type of cost that the company incurs and our assessment needs to be based on evidence;

(c) Network Rail is the largest funder of BTP and we think that it is capable of exercising industry leadership when commenting on BTPA's proposed budgets for BTP. Network Rail also chairs the Rail Delivery Group Policing and Security sub group, which also has representation from TOC MDs, the BTP Deputy Chief Constable and BTPA Chief Executive; and

(d) the Winsor report and the RVfM study identified a number of initiatives for reducing costs and Network Rail has not adequately explained why these initiatives are not appropriate.

6.32 It is very important that our determination is based on evidence and that Network Rail is incentivised to provide good quality evidence. Since our draft determination, Network Rail has not provided us with any further robust evidence of the efficiency of the amount that Network Rail pays for BTP costs and we have not changed our assessment.

6.33 Our assumptions for the amount that Network Rail pays for BTP costs in CP5 are set out in Table 6.6.

[156] This is based on the average of two studies (CEPA 4.4% and OXERA 3.0).

Table 6.6: Our assumptions for the amount that Network Rail pays for BTP costs in CP5

£m (2012-13 prices)	CP4	CP5					Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Great Britain	71	71	68	66	63	61	382	329
England & Wales	66	64	61	59	57	55	349	296
Scotland	7	7	7	7	6	6	37	33

6.34 Overall our assumptions for the amount that Network Rail pays for BTP costs of £329m for Great Britain, £296m for England & Wales and £33m for Scotland are lower than Network Rail's SBP forecast by £26m for Great Britain, £24m for England & Wales and £2m for Scotland[157].

Rail Safety and Standards Board (RSSB) levy

Background

6.35 We have considered Network Rail's SBP submission for the RSSB levy in CP5. Network Rail has provided insufficient evidence of its forecasts for this area of expenditure and so we have taken Network Rail's forecast of the 2013-14 RSSB levy and applied the top-down CEPA/Oxera average efficiency gain to this forecast (average 3.7% per annum). Our approach gave the same costs over CP5 as Network Rail's SBP assumption.

Our assessment

6.36 It is important that our determination is based on evidence and that Network Rail is incentivised to provide good quality evidence. Since our draft determination Network Rail has not provided us with any further robust evidence of the efficiency of its share of RSSB costs and we have not changed our assessment.

6.37 Our assumptions for the amount Network Rail pays for RSSB costs in CP5 are set out in Table 6.7.

Table 6.7: Our assumptions for the amount that Network Rail pays for RSSB costs in CP5

£m (2012-13 prices)	CP4	CP5					Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Great Britain	9	9	8	8	8	8	46	41
England & Wales	8	8	8	7	7	7	41	37
Scotland	1	1	1	1	1	1	5	4

[157] Network Rail's forecasts in its SBP were £355m for Great Britain, £320m for England & Wales and £35m for Scotland.

6.38 Overall, our assumptions for the amount that Network Rail pays for RSSB costs of £41m for Great Britain, £37m for England & Wales and £4m for Scotland are the same as Network Rail's SBP forecast.

ORR licence fee and the railway safety levy

Background

6.39 In our draft determination, we took the 2013-14 ORR licence fee and railway safety levy and converted these into 2012-13 prices to be consistent with our determination. The licence fee is paid only by Network Rail whereas railway service providers contribute to the safety levy, based on their level of turnover. For our draft determination assessment, we allocated a proportion of the safety levy to Network Rail using our 2012-13 allocation assumptions because the 2013-14 allocation was not yet known.

6.40 In our draft determination we assumed that Network Rail paid the same ORR licence fee and the same railway safety levy in each year of CP5 as we had forecast for 2013-14.

Our assessment

6.41 We have reviewed our assumptions of the ORR licence fee and railway safety levy for our final determination. We have used our latest expenditure forecasts from 2013-14 to 2015-16 that have been agreed with HM Treasury and we have rolled forward these assumptions to the later years of CP5. Overall, we have assumed a 10% cost saving over CP5.

6.42 Our assessment of the forecast ORR licence fee and the railway safety levy that will be charged to Network Rail in CP5 are set out in Table 6.8.

Table 6.8: Our assessment of the forecast ORR licence fee and the railway safety levy that will be charged to Network Rail in CP5

£m (2012-13 prices)	CP4	CP5					Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Great Britain	17	17	16	16	16	15	87	80
England & Wales	15	15	14	14	14	14	78	72
Scotland	2	2	2	2	1	1	9	8

6.43 Overall, our assumptions for the ORR licence fee and the railway safety levy of £80m for Great Britain, £72m for England & Wales and £8m for Scotland are higher than Network Rail's SBP forecast by £6m for Great Britain, £5m for England & Wales and £1m for Scotland[158].

[158] Network Rail's forecasts in its SBP were £74m for Great Britain, £67m for England & Wales and £7m for Scotland.

Other costs

6.44 We used Network Rail's SBP forecasts for other industry costs, e.g. CIRAS and reporters' costs[159] in our draft determination. We have now reviewed our draft determination assumptions and consider that these assumptions are still appropriate for our final determination.

Summary

6.45 Our assumptions on traction electricity, industry costs and rates are summarised in Tables 6.9, 6.10 and 6.11.

Table 6.9: Our assessment of CP5 traction electricity, industry costs and rates (Great Britain)

£m (2012-13 prices)	CP4	CP5					Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Traction electricity	238	246	340	359	393	456	1,240	1,794
Business rates	151	149	149	149	168	175	577	789
British Transport Police	71	71	68	66	63	61	382	329
RSSB	9	9	8	8	8	8	46	41
ORR licence fee and railway safety levy	17	17	16	16	16	15	87	80
Other industry costs	5	5	5	5	5	5	18	24
Total	**491**	**496**	**586**	**602**	**653**	**719**	**2,349**	**3,056**

6.46 Overall our assumption of Network Rail's CP5 traction electricity, industry costs and rates for Great Britain is £3,056m, which is 8% of Network Rail's total CP5 expenditure. This is £568m lower than Network Rail's forecast of £3,624m in its SBP and is largely due to a reduction in traction electricity costs of £549m, as we have used a more up to date forecast of electricity prices than Network Rail.

[159] Independent reporters are firms that provide independent expert advice and are used by us to review some aspects of Network Rail's performance, plans and activities, e.g. its financial reporting. They owe a duty of care to both ORR and Network Rail but Network Rail pays for their costs.

Table 6.10: Our assessment of CP5 traction electricity, industry costs and rates (England & Wales)

£m (2012-13 prices)	CP4	CP5					Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Traction electricity	224	231	316	335	368	428	1,163	1,679
Business rates	135	133	133	133	151	157	519	707
British Transport Police	66	64	61	59	57	55	349	296
RSSB	8	8	8	7	7	7	41	37
ORR licence fee and railway safety levy	15	15	14	14	14	14	78	72
Other industry costs	5	5	5	4	4	4	15	22
Total	**452**	**456**	**537**	**553**	**601**	**665**	**2,162**	**2,812**

6.47 Our assumption of Network Rail's CP5 traction electricity, industry costs and rates for England & Wales is £2,812m. This is £530m lower than Network Rail's forecast of £3,342m in its SBP and is largely due to a reduction in traction electricity costs of £513m as we have used a more up to date forecast of electricity prices than Network Rail.

Table 6.11: Our assessment of CP5 traction electricity, industry costs and rates (Scotland)

£m (2012-13 prices)	CP4	CP5					Total	
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	CP4	CP5
Traction electricity	14	15	23	24	25	28	77	115
Business rates	16	16	16	16	18	18	58	83
British Transport Police	7	7	7	7	6	6	37	33
RSSB	1	1	1	1	1	1	5	4
ORR licence fee and railway safety levy	2	2	2	2	1	1	9	8
Other industry costs	1	1	0	0	0	0	2	2
Total	**40**	**40**	**48**	**49**	**52**	**55**	**187**	**245**

6.48 Our assumption of Network Rail's CP5 traction electricity, industry costs and rates for Scotland is £245m. This is £37m lower than Network Rail's forecast of £282m in its

SBP and is largely due to a reduction in traction electricity costs of £36m as we have used a more up to date forecast of electricity prices than Network Rail.

6.49 Tables 6.12, 6.13 and 6.14 set out the changes we have made in our final determination compared to our draft determination and Network Rail's SBP for Great Britain, England & Wales and Scotland.

Table 6.12: Comparison of CP5 traction electricity, industry costs and rates (Great Britain)

£m (2012-13 prices)	SBP	DD	FD	FD - SBP	FD - DD
Traction electricity	2,343	1,820	1,794	(549)	(26)
Business rates	787	815	789	2	(26)
British Transport Police	355	329	329	(26)	-
RSSB	41	41	41	(0)	-
ORR licence fee and railway safety levy	74	86	80	6	(6)
Other industry costs	24	24	24	0	-
Total	**3,624**	**3,114**	**3,056**	**(568)**	**(58)**

Table 6.13: Comparison of CP5 traction electricity, industry costs and rates (England & Wales)

£m (2012-13 prices)	SBP	DD	FD	FD - SBP	FD - DD
Traction electricity	2,192	1,702	1,679	(513)	(24)
Business rates	705	729	707	2	(23)
British Transport Police	320	296	296	(24)	-
RSSB	37	37	37	(0)	-
ORR licence fee and railway safety levy	67	78	72	5	(6)
Other industry costs	22	22	22	-	-
Total	**3,342**	**2,864**	**2,812**	**(530)**	**(53)**

Table 6.14: Comparison of CP5 traction electricity, industry costs and rates (Scotland)

£m (2012-13 prices)	SBP	DD	FD	FD - SBP	FD - DD
Traction electricity	151	117	115	(36)	(2)
Business rates	82	85	83	1	(3)
British Transport Police	35	33	33	(2)	-
RSSB	4	4	4	0	-
ORR licence fee and railway safety levy	7	8	8	1	(1)
Other industry costs	2	2	2	0	-
Total	**282**	**250**	**245**	**(37)**	**(5)**

7. Operations expenditure

Key messages in this chapter

- Operations costs are those incurred in 'operating' the infrastructure such as for signallers and control staff. Network Rail's main proposal in this area is to implement a new way to run its infrastructure, often referred to as the Network Operating Strategy (NOS), which changes signalling control so that more signals can be operated from a small number of operating centres.
- The operational benefits of this strategy have the potential to be wide ranging, including reduced safety risk and better management of disruption, with the latter meaning that passengers and freight users should have shorter delays and more accurate information when things go wrong. It should also result in lower costs as fewer posts will be needed.
- We have reviewed Network Rail's proposals against domestic and European benchmarks. We have also conducted our own assessment of whether the strategy can deliver the proposed benefits.
- Network Rail will compare favourably with international benchmarks once the strategy is implemented. The company is at an early stage but the timescales are underpinned by a sensible rationale and consistent with other infrastructure companies that have done something similar. However, the level of efficiency for activities outside signalling are below benchmarks with other UK regulated industries and we think this can be improved.
- We have assumed that approximately £2bn of expenditure is required for CP5 with a cumulative efficiency of 17% in England & Wales and 18% in Scotland, which is an increase from the SBP of four percentage points in England & Wales and three percentage points in Scotland, to bring it in line with domestic benchmarks. We think Network Rail can achieve this through, amongst other things, better management of inflation and better management of occupational health.
- The main issues raised in the consultation responses to the draft determinations were: the appropriateness of assuming top down efficiencies for non-signaller spend; the appropriateness of assuming efficiencies resulting from cross cutting issues; the pace for delivering cost reductions; and the safe implementation of the strategy. We considered these and concluded that they do not change our original decisions in the draft determination.

Introduction

7.1 Network Rail has started to implement a long-term operating strategy that is introducing modern technology to operate the rail network more efficiently. It will centralise control so that more signals can be operated by fewer people and at fewer locations. This is expected to facilitate better decisions about managing the train service. For example, better technology and wider coverage of control should help staff to reduce the knock on effects caused by an incident and quickly get services back up and running. In addition to improved reliability the new technology should help Network Rail to plan capacity better meaning that more trains could be introduced. Passengers should also receive better and more timely information about their journey.

7.2 To make this happen, signals need to be controlled remotely which requires widespread deployment of advanced signalling technology across the network. This is planned to be done alongside other renewals, but in order to deliver the strategy an increase in the volume of signalling work of around 20%[160] is needed in CP5. Alongside this signalling work Network Rail plans to centralise staff into fewer operating centres (Figure 7.1) and introduce modern systems to manage train movements. A number of new centres will be built and a new system to manage traffic will be introduced. Eight of the proposed centres have already been built with the remainder due to be completed over the next two years. All of this combines to allow Network Rail to progressively change the way it operates the network over the next 15 years. It will be done in stages as signalling control is activated at the new centres and staff relocate to them.

7.3 The costs of this work are spread around Network Rail's business, for example updating signalling is part of the signalling renewals expenditure. Both the costs and benefits will influence other elements of the settlement, such as volumes of signalling renewals and levels of train service reliability. These are considered in the relevant chapters of this determination.

7.4 The main financial benefit will be lower operations expenditure as fewer posts will be required to manage the network. This chapter explains our examination of the operating strategy and presents our conclusions on assumed levels of efficient operations expenditure required for CP5.

7.5 Approximately 70%[161] of operations costs are affected by the operating strategy. We have assessed all operations costs but with a particular focus on those affected by the strategy.

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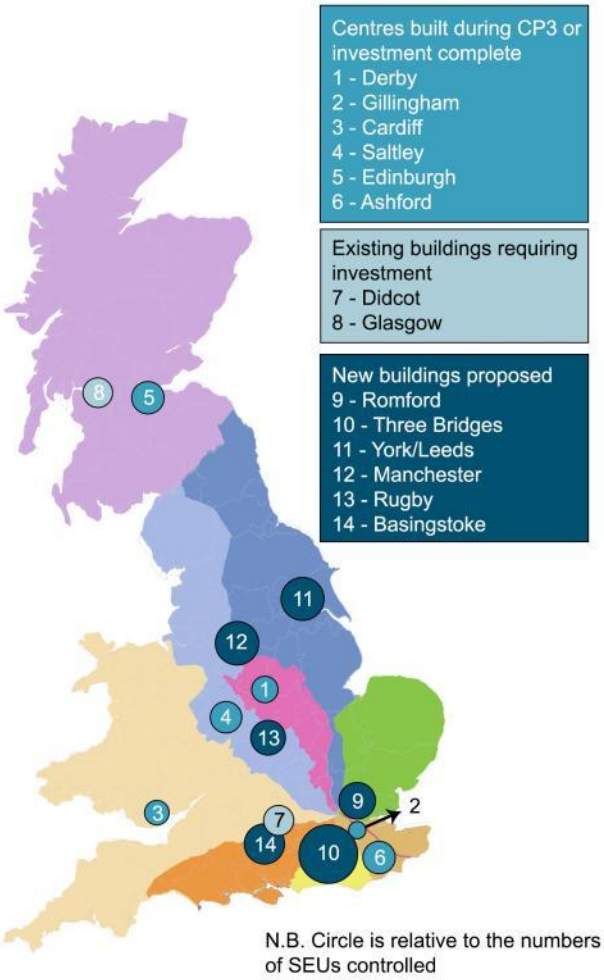
[160] As set out in Network Rail's business case supplied in support of the SBP.

[161] From the costs supplied by Network Rail proposed signaller costs for CP5 are £1,365m from a total of £2,027m.

7.6 From our early consultations it is clear that the industry is broadly supportive of the strategy, although it is at an early stage and several parties have expressed caution. The RMT set out general opposition to various elements of the SBP, including the operations strategy. Network Rail is working with the main unions in developing the strategy and we explain in chapter 11 our conclusion that there is nothing in the determination that prevents Network Rail complying with Health and Safety law.

Figure 7.1: New operating centres proposed in the SBP*



* SEUs are the signalling equivalent units which can be used as way of illustrating the span of control for each operating centre

Description of operations costs

7.7 Operations costs include expenditure on activities that 'operate' the infrastructure to allow trains to run such as signalling, timetabling and managing disruption. Costs are broadly categorised as:

(a) 'signaller', including signallers, level crossing keepers, controllers and electrical control room operators, which are affected by the operations strategy; and

(b) 'non-signaller', including staff on the ground managing disruption, staff in the managed stations, teams attributing delays and those dealing with customer relations, which are directly affected by the operations strategy.

7.8 The SBP identified an additional category 'Central Network Operations', which include centralised functions such as timetable management and performance management. For our assessment we have considered these with the non-signaller costs and refer to them as such.

Network Rail's proposals

7.9 The SBP set out Network Rail's operations expenditure for CP5. Some maintenance costs, such as maintenance at stations, were included because they are costs managed by the operations function. Because of the way we have assessed the level of efficient expenditure we have removed maintenance costs from our operations assessment and included them in our maintenance assessment.

Table 7.1: Summary of Network Rail's SBP proposal for GB expenditure (with maintenance costs)

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	439	439	439	439	439	439	-	2,195
Annual efficiency	-	0.9%	2.1%	3.5%	2.9%	4.0%	-	12.8%
Post-efficient expenditure	439	435	426	411	399	383	2,239*	2,054

* Taken from appendix 9 of the SBP databook which updates actual and forecast expenditure in CP4 and replaces the delivery plan update.

Table 7.2: Summary of Network Rail's SBP proposal for GB expenditure (without maintenance costs)

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	433	433	433	433	433	433	-	2,165
Annual efficiency	-	0.7%	2.1%	3.6%	3.2%	4.1%	-	12.9%
Post-efficient expenditure	433	430	421	406	393	377	2,239 *	2,027

* Taken from appendix 9 of the SBP databook which updates actual and forecast expenditure in CP4 and replaces the delivery plan update.

Signaller costs

7.10 Reductions in signaller costs will happen when existing signalling control is transferred to the new centres as part of the operating strategy. While Network Rail has started to implement some of the elements needed, there remain a number of key dependencies affecting the rate of change. These include the ability of Network Rail and its supply chain to complete the required signalling renewals and the company's approach to redeployment and redundancy in consultation with the trade unions. Network Rail has devised a programme for staffing the operating centres that it considers is the most efficient approach, taking into account the constraints. This programme drives the rate of cost reductions and consequently the levels of efficiency it can achieve in CP5.

7.11 The strategy will be delivered by many different parts of Network Rail and is coordinated centrally. The specific reductions in signaller costs will be delivered by each of the routes and were set out in the route plans.

Non-signaller costs

7.12 Costs for the non-signaller activities in the routes remain broadly static in CP5 but there is a small efficiency saving on costs related to Network Operations HQ activities. This will mainly be the result of an initiative to improve the way Network Rail plans access and possessions.

Benchmarking

7.13 In developing its plans Network Rail carried out some work to benchmark the operational cost of running the railway infrastructure in Great Britain against other European railway operators. We reviewed[162] this work and found that the task was approached thoroughly but there were a number of areas that could be strengthened, particularly around including non-signaller costs in the benchmarking, as well as considering internal comparisons of its own routes. Network Rail responded positively to these recommendations and revised its work accordingly. The revised findings were inconclusive but indicated that Network Rail is not currently at the frontier in terms of operations expenditure but implementing the operations strategy would take it closer.

Progressive assurance

7.14 We put in place a number of assurance meetings in the period running up to the SBP and Network Rail worked openly and constructively. As a result the information provided in support of the SBP was in the format and to the level of detail that we required for our assessment.

[162] Network Rail bottom up benchmarking review: benchmarking of operations costs: final report – executive summary, March 2012, available at: http://www.rail-reg.gov.uk/pr13/PDF/arup-operations-costs-benchmarking-020312.pdf.

Our assessment

7.15 Network Rail's plans set out a new way to run its infrastructure. We reviewed this to determine efficient levels of expenditure required for CP5. We tested different aspects of its proposals and commissioned our own work from which to draw conclusions. We removed the maintenance costs for the purposes of our assessment to avoid double counting with our review of maintenance expenditure explained in chapter 8.

Review of the operations strategy economic case

7.16 In our advice to the Secretary of State and Scottish Ministers we reviewed the initial business case and concluded that the rationale was sound. We told Network Rail to update the business case for the SBP submission and reformat it to take into account the strategic, financial, commercial and management cases as well as the economic case. Whilst the business case is GB wide the elements within it are disaggregated for Scotland and England & Wales. We checked the way that the economic appraisal had been calculated against standard industry practices (webTAG in England & Wales and STAG in Scotland) and concluded that the revised case still provides good value for money in both Scotland and England & Wales, with both having a benefit cost ratio of 3:1.

Review of the operations strategy management case

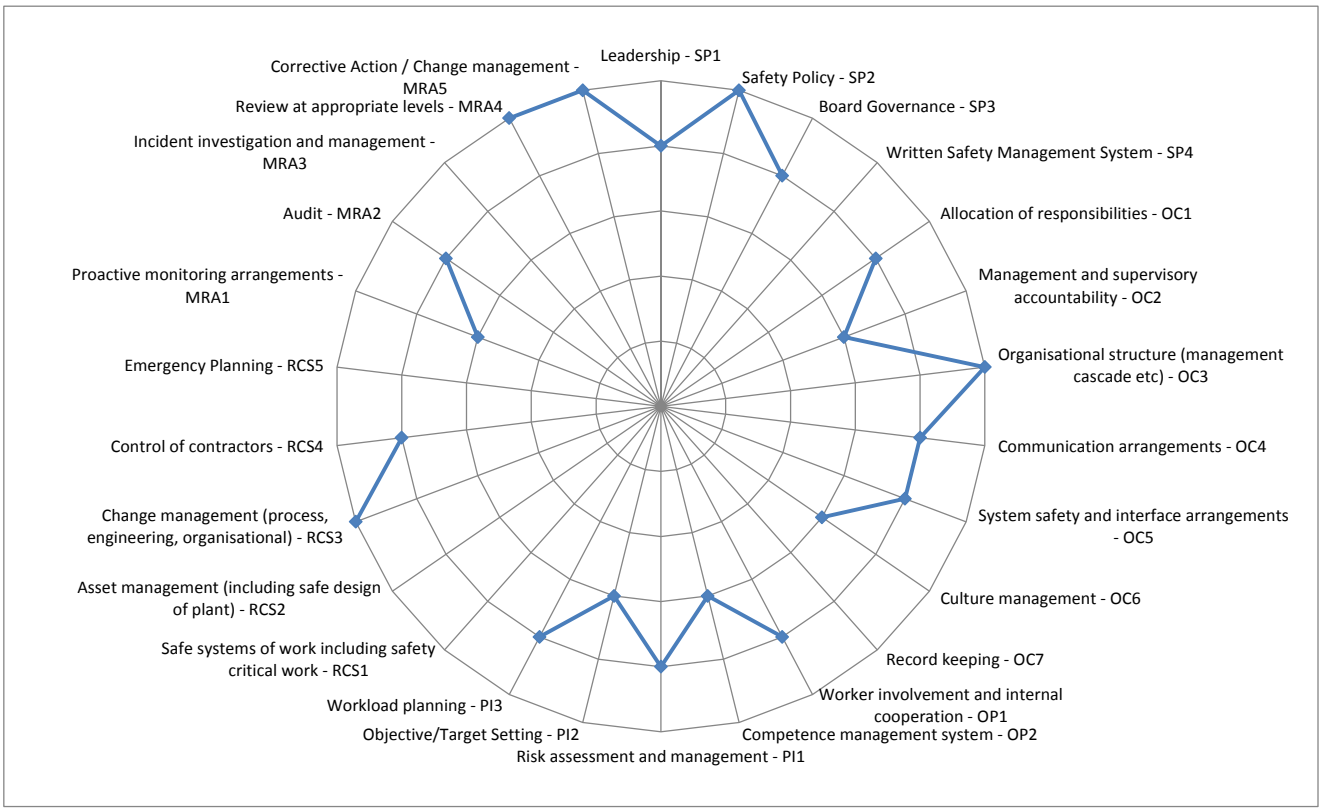
7.17 Using our Rail Management Maturity Model (RM3)[163] we evaluated the capability of Network Rail to deliver the operating strategy and associated reduction in headcount. An ORR team of experts was used who had experience of applying this model to the safety management of a number of rail industry organisations. A five point scale was applied to a number of categories based on the team's judgement of the evidence collected. Further detail on the evaluation criteria can be found on our website[164].

7.18 We found areas where we considered there was the potential to deliver excellence (level 5), in particular, governance, monitoring and review. Other areas were considered to be predictable (level 4) or standardised (level 3) with none at levels 1 or 2. These are summarised in Figure 7.2. We concluded that if performance in the excellent areas is maintained and improvements made in the other areas then the systems are capable of allowing successful delivery of the operating strategy programme. We also concluded that the way the programme has been planned and the systems developed offers Network Rail examples of excellence which should be shared through the organisation.

[163] http://www.rail-reg.gov.uk/pr13/PDF/nr-rm3-evaluation-sep2012.pdf.

[164] http://www.rail-reg.gov.uk/upload/pdf/management-maturity-model.pdf.

Figure 7.2: Summary of our RM3 assessment (the outside of the wheel is level 5 excellent)



Review of CP4 signalling volumes

7.19 The main constraint in delivering the strategy is the rate at which the volume of signalling renewals can be done with Network Rail's own resources and those of its supply chain. It has devised a programme that accelerates signal renewals to align them with plans to migrate staff to the new control centres. Network Rail is broadly on course to deliver its CP4 volumes, although there is a peak of work required this year. For CP5 the total amount of work will almost double and, in CP4, testers[165] have been a scarce resource. Wherever possible, Network Rail has smoothed the profile and identified the times when it expects testers to be in short supply. Further explanation of our analysis of signalling volumes is set out in the renewals section of chapter 8.

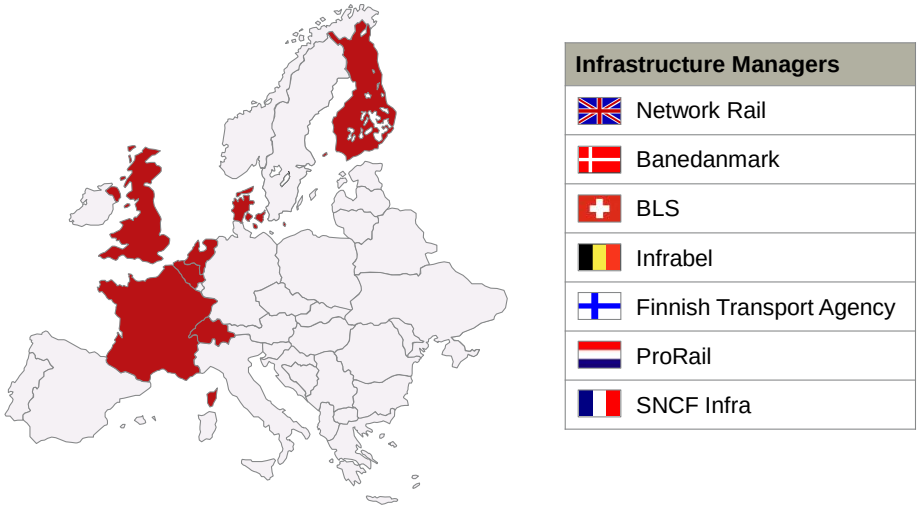
International benchmarks

7.20 Network Rail's own work on benchmarking was inconclusive, although we acknowledge the difficulties around benchmarking operations costs. We commissioned the management consultants Civity to benchmark Network Rail's operations (and support) costs against other European railway infrastructure managers to see how they compare. This work was designed to build upon Network

[165] These are staff required to check that new or renewed signals function as designed and in a safe way.

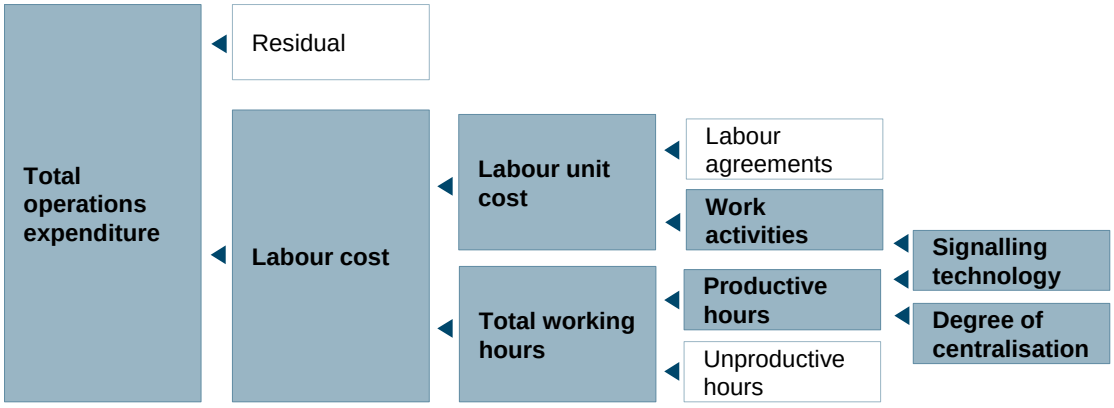
Rail's own work and other analysis done for the RVfM study. It looked at total operations costs, i.e. both signaller and non-signaller.

Figure 7.3: European comparisons used in the Civity review



7.21 Six peers agreed to take part in the study and provided comparable data, shown in Figure 7.3. From this data Civity concluded that most programmes that are similar to Network Rail's operating strategy take 15-20 years to implement. The analysis also showed that on completion of the operating strategy Network Rail would be at a leading position compared to this peer group in terms of cost efficiency. Figure 7.4 shows the areas that Civity analysed to inform its conclusions.

Figure 7.4: Scope of the Civity review



Comparisons with UK regulated industries on catch up and frontier shift

7.22 In March 2012, we published a report[166] by CEPA on the assessment of the scope for efficiency improvements based on comparisons with other UK regulated industries. This concluded that an appropriate annual target for CP5 would be 4.4% per annum for both support and operations costs. Network Rail completed its own review of this

[166] http://www.rail-reg.gov.uk/pr13/PDF/cepa-orr-om-productivity-over-cp5.pdf

study using OXERA and included the findings alongside its SBP submission, which was a central estimate of 3% per annum. As we set out in chapter 6 (support expenditure), we have decided to use the average of these two studies as our top-down efficiency assumption.

Table 7.3: Comparison of cumulative efficiency

GB (2012-13 prices)	End CP4 (2013-14)	End CP5 (2018-19)	Cumulative Efficiency
Mid-point between CEPA and OXERA analysis			**17%**
Signaller costs in SBP	£298m	£246m	17%
Non signaller costs in SBP	£135m	£131m	3%

Consultation responses to the draft determination

7.23 Network Rail's response focused on the top down efficiency assumptions we had made to non-signaller expenditure and those we had made for cross cutting issues. It suggested that these savings were unrealistic and inappropriate.

7.24 The trade union TSSA confirmed that it had been fully engaged by Network Rail in developing the strategy but it had concerns about safe implementation. This was similar to a point raised by the RMT in its earlier response to the SBP, which we considered before publishing the draft determination.

7.25 The other main response included a suggestion that cost savings could be accelerated by using different traffic management technology to that currently being developed by Network Rail.

Our conclusions

7.26 We reviewed the consultation responses and found that the points raised did not affect our original conclusions in the draft determination.

7.27 Table 7.4 summarises our decisions on the assumed level of efficient operations expenditure for Great Britain. We have assumed that approximately £2bn of expenditure is required for CP5 with a cumulative efficiency of 17% in England & Wales and 18% in Scotland, which is an increase from the SBP of four percentage points in England & Wales and three percentage points in Scotland.

Table 7.4: Summary of our assumptions for operations expenditure (CP5 total) – Great Britain

£m (2012-13 prices)	SBP	FD	FD-SBP
Signaller expenditure	1,366	1,366	0
Non signaller expenditure	661	606	(55)
Overlay for cross cutting issues	-	(4)	(4)
Total	**2,027**	**1,968**	**(59)**

Signaller expenditure

7.28 Network Rail is at the start of its programme to change the way it operates the network. We reviewed the business case and concluded that it represents value for money.

7.29 We agreed with the international benchmarking analysis showing that, compared to a group of European peers, Network Rail will be at a leading position once the strategy is completed in terms of costs and staff productivity.

7.30 We looked at whether Network Rail had the right approach to deliver the strategy. Using our own management maturity model we concluded that the current management arrangements should lead to successful delivery. However, the programme is at an early stage and there are risks from introducing new technology that need to be managed. We will monitor progress and Network Rail should report on progress in its Annual Return.

7.31 We considered whether there was scope to accelerate the programme and therefore bring about more cost savings earlier. In comparing Network Rail to its European peers we found that the expected time span to deliver the strategy is in line with other countries that have embarked on something similar. We also looked at the high level programme where the main constraint is Network Rail's ability to deliver signalling renewals and re-control rather than, as suggested in the consultation responses, the type of traffic management technology. We have concluded that, at this stage, these cannot be accelerated any further. However, as the overall strategy will continue into CP6 and CP7 we will revisit this in the next periodic review when the programme will have matured and Network Rail has learnt from its experiences.

Non signaller expenditure

7.32 Compared to other regulated industries within the UK we have concluded that the level of efficiency for non-signaller expenditure can be improved from the SBP. In the draft determination we proposed the application of our top-down efficiency assumption to these costs. Network Rail disagreed with this approach on the grounds that it was inappropriate to apply an average to one specific area of expenditure. This issue is discussed in chapter 4.

Cross cutting issues

7.33 In addition we also consider that Network Rail can make savings from cross cutting issues explained in chapter 4, i.e. better management of inflation and better management of occupational health.

Comparisons with RVfM

7.34 The RVfM study examined the operating strategy and concluded that it was an opportunity to improve VfM. It did not make any additional recommendations in this area and did not include any further cost reductions in its calculations over and above those delivered by the strategy.

Great Britain

Table 7.5: Summary of our assumptions for operations expenditure – Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	433	433	433	433	433	433	-	2,165
Annual efficiency	-	2%	3%	4%	4%	5%	-	17%
Post-efficient expenditure	433	425	412	395	378	358	2,239	1,968

England & Wales

Table 7.6: Summary of our assumptions for operations expenditure – England & Wales

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	393	393	393	393	393	393	-	1,965
Annual efficiency	-	2%	3%	4%	4%	6%	-	17%
Post-efficient expenditure	393	385	374	358	344	325	2,034	1,787

Scotland

Table 7.7: Summary of our assumptions for operations expenditure – Scotland

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	40	40	40	40	40	40	-	200
Annual efficiency	-	1%	4%	4%	7%	4%	-	18%
Post-efficient expenditure	40	39	38	37	34	33	205	181

Great Britain

Table 7.5: Summary of our assumptions for operations expenditure – Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	433	433	433	433	433	433	-	2,165
Annual efficiency	-	2%	3%	4%	4%	5%	-	17%
Post-efficient expenditure	433	425	412	395	378	358	2,239	1,968

England & Wales

Table 7.6: Summary of our assumptions for operations expenditure – England & Wales

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	393	393	393	393	393	393	-	1,965
Annual efficiency	-	2%	3%	4%	4%	6%	-	17%
Post-efficient expenditure	393	385	374	358	344	325	2,034	1,787

Scotland

Table 7.7: Summary of our assumptions for operations expenditure – Scotland

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	40	40	40	40	40	40	-	200
Annual efficiency	-	1%	4%	4%	7%	4%	-	18%
Post-efficient expenditure	40	39	38	37	34	33	205	181

8. Asset management: maintenance and renewals expenditure

Key messages in this chapter

- This chapter covers our assessment of Network Rail's plans for managing its assets, for example its plans for maintaining and renewing track.
- How Network Rail manages its assets is closely linked to the performance and safety of the railways, and will have a major impact on what outputs it can deliver and at what cost, not only in the next five years but over the longer-term. Network Rail must maintain and renew the rail network in a timely, efficient and economical manner to the greatest extent reasonably practicable, as set out in its Network Licence.
- The costs associated with maintaining and renewing assets make up approximately 45% of Network Rail's total expenditure requirements in CP5.
- We, supported by the independent reporters, have carried out a comprehensive review of Network Rail's plan including the quality of its inputs (for example, asset base and cost information), its asset management approach (for example, its asset policies), its planned efficiency and its planned volumes, costs and outputs. We have also conducted our own international efficiency and benchmarking studies, looking at working practice and cost comparisons.
- Network Rail's maintenance and renewal plans are an improvement over those produced for PR08. The asset policies set a clearer direction in terms of what work needs doing, why and where.
- Plans have been submitted for each of Network Rail's ten operating routes. They have been produced by a process of challenge between the centre and routes which has resulted in better plans than would otherwise have been available.
- But there are areas of weakness which cut across the whole approach. For example: asset information management requires improvement; asset policies have not considered trade-offs between asset types; whole life costing analysis, which is crucially important in developing asset policies, needs strengthening by improving its inputs such as unit costs and understanding of degradation; Network Rail has more to do to understand how its asset management links to the delivery of high level outputs such as performance; and policies are weaker in defining the maintenance interventions and intervals required.

Key messages in this chapter (continued)

- Because Network Rail's knowledge of its civils assets and some aspects of its electrification and drainage assets is poor, there is higher uncertainty in parts of its plans.
- Our final determination reflects our consideration of responses to the draft determination and our review of further evidence supplied by Network Rail. We summarise respondents' views and any resulting updates to our determination at the start of the chapter. Our review of the further evidence supplied by Network Rail has resulted in increases to our assessed efficient expenditure, including for track, signalling, and information management (IM) renewals, totalling £127m.

Maintenance

- Maintenance work is crucial to safety and performance on the network. Plans should be built on a strong understanding of what work needs to be done (for example, the miles of track to be inspected). This can then be priced using current understanding of the costs of carrying out work and the future reductions in cost because of improved efficiency.
- But Network Rail has built its plans by projecting forwards its current resource requirements, with adjustments for the changing network and improved efficiency. It has not clearly demonstrated that its plans are linked to the work required. This means that the line of sight to its policies and the outputs that the company needs to deliver is weak.
- Our analysis finds that, over CP5, maintenance efficiencies of 10.1% are achievable, compared with 9.7% assumed by Network Rail. The higher efficiency is driven by better management of resources. However, we have changed the profile of the efficiency to reflect our concerns over delivery in CP4 when Network Rail reduced staffing levels before fully embedding more efficient ways of working. We have assumed lower efficiencies early in CP5; in the first year we have assumed 3.7% efficiency whereas Network Rail assumed 5.3%. Our efficiency profile assumes higher efficiency of 16.4% at the end of the control period, compared with 13.8% assumed by Network Rail. We have not assumed savings beyond this, partly because of our concern about how rapidly Network Rail can introduce changes without potentially compromising safety or performance.
- Overall we assess that Network Rail needs to spend £5.2bn on maintenance during CP5, £116m less than proposed in the SBP.

Key messages in this chapter (continued)

- This means that Network Rail will have to move to a more predictive and preventative maintenance regime (rather than reacting to failures). A good example of this approach was seen when Network Rail carried out a detailed review of its overhead line assets in the Stratford area prior to the Olympics, identified defects and put in place a preventative work programme that resulted in improved performance both during the Olympics and beyond. Network Rail will also have to realise efficiencies from changes to its practices, such as carrying out more automated inspections, making sure the right work is done at the right location at the first visit and making sure that working arrangements allow the most productive use of time.
- Our assessed efficient expenditure requirement for maintenance is unchanged from our draft determination, except where we have improved information on reactive maintenance costs. This results in an accounting movement of £522m from renewals to maintenance, which is £14m higher than we assumed in the draft determination.

Renewals

- Network Rail's renewal plans have, in general, a strong linkage to asset policies. They are built on a combination of workbanks in the shorter-term and modelled volumes in the longer-term.
- Some key national programmes of work have been proposed to deliver long-term improvements and efficiencies, and we support these. They include the Network Operation Strategy (NOS) to centralise signalling and electrical control, a programme to update the signalling system (by moving to the European Train Control System (ETCS)), and programmes aimed at improving asset management capability through improved asset information management (ORBIS), improved buildings and civils management (BCAM), and wider adoption of best practice asset management.
- Network Rail has conducted benchmarking to support its efficiency plans. This included a programme of international benchmarking of engineering practice which is far more extensive than it has ever previously carried out.
- But there are weaknesses in Network Rail's proposals. Its calculation of its current unit costs contains some errors and makes allowances for risk and contingency which are likely to be overestimated or duplicated. For buildings the proposed level of expenditure before efficiencies is not justified. For civils there are wide-ranging issues that need to be addressed to produce a robust plan.

Key messages in this chapter (continued)

- Network Rail's management of its civil engineering assets (such as bridges and tunnels) has been a long-running issue. In 2010 concerns about its approach led to us and Network Rail commissioning Arup to carry out a fundamental review. Arup found widespread issues and made recommendations, for example, to improve asset policies, asset information, assessment of risk and resources. Network Rail has started to make significant improvements and this is reflected in its proposed CP5 policies. However, there remains a lot more to be done. It has not presented a complete or consistent set of plans, some parts of the plans were submitted late and they contained many errors.
- Network Rail proposed expenditure of £2.6bn on civils renewals during CP5, whereas we have assessed expenditure required to be £2.4bn. However, there is high uncertainty around the civils plans and we agree with Network Rail that civils should be dealt with differently. Recognising that the volume of work needs to increase we will provide increased funding (compared to CP4) for the first two years of CP5 where plans are more robust. For years three, four and five of the period we have assumed an increased level of expenditure but actual funding will be assessed by a 'civils adjustment mechanism' which requires Network Rail to submit further plans in the first year of CP5. This will allow us to review the work that is planned, to assess the efficiency of that work and to adjust accordingly.
- Across all asset categories our analysis finds that, over CP5, renewals efficiencies of 14.4% are achievable, compared with 12.6% assumed by Network Rail. Our analysis finds that efficiencies of 20.0% are achievable by the final year of CP5, whereas Network Rail has proposed equivalent efficiencies of 15.8%. We have assumed greater opportunities from improved management of possessions, improved management of the supply chain, improved asset management systems, better targeting of work and adoption of innovative renewals practices.
- In our draft determination we assessed efficient renewals expenditure to be £1.6bn lower than proposed in the SBP, due to adjustments to pre-efficient expenditure (for example, for buildings and information technology renewals), higher efficiency assumptions for most asset types (for example, track and civils) and different treatment of proposed investment expenditure (for example, funding for R&D).

Key messages in this chapter (continued)

- Since the draft determination Network Rail has presented new evidence which we have reviewed and, where it was compelling, we have updated our assessment. This has resulted in an increase in funding (relative to the draft determination) for track, signalling, ORBIS and information technology renewals. We have also reviewed our approach to assessment of wheeled plant renewals, resulting in reduced funding for that category. In total the outlined changes increase our assessed expenditure by £127m. We have also made an accounting change which moves expenditure associated with fitting signalling equipment in trains from renewals to enhancements (a reduction of £194m compared to our draft determination).
- Our final determination assesses that Network Rail needs to spend £12.1bn on renewals during CP5. This is £1.5bn less than proposed in the SBP.

Introduction

8.1 It is very important that Network Rail is capable of managing its assets effectively, including planning and delivering appropriate maintenance and renewal works. Effective asset management helps to deliver a safe, efficient railway which delivers the outcomes that stakeholders want, both now and in the future.

8.2 Our PR13 work has reviewed many aspects of Network Rail's asset management in great detail. We have assessed its development of asset management plans, from the definition of high level strategy, through development of asset policies to the planning of maintenance and renewal work in the routes. We have assessed the inputs to its plans: the asset information and understanding of costs that underpins them. We have also taken account of the company's delivery of work during CP4.

8.3 This chapter starts by giving a summary of Network Rail's CP5 plans for maintaining and renewing its assets safely, including:

(a) an overview of its asset management plans, including its planned asset management capability improvements, key asset management programmes of work and new asset policies;

(b) an overview of its process for the development of planned volumes and expenditure; and

(c) a summary of its projected volumes and costs to maintain and renew the network, and forecasts of measures to demonstrate what the work delivers.

8.4 The chapter then presents our assessment of Network Rail's plans, including:

(a) our approach to the assessment of efficient maintenance and renewal expenditure;

(b) our assessment of each of the building blocks of Network Rail's maintenance and renewals plans;

(c) our assessment by main asset category and by route; and

(d) our conclusions on the efficient volumes of maintenance and renewal work and associated efficient expenditure required in CP5.

8.5 Our work in this area is supported by extensive independent reporter work.[167] The associated reports are published on our website. We have considered the reporters' findings in developing our view of maintenance and renewal efficient expenditure requirements for CP5.

Our presentation of expenditure and efficiency in this chapter

Expenditure

8.6 We present all CP4 expenditure on the basis of regulatory accounting in CP4 and therefore on the same basis as Network Rail presented its planned CP4 expenditure in its SBP. We exclude from CP4 expenditure the £250m associated with accelerating civil engineering works from CP5, which formed part of the additional investment measures announced by the UK Government in its Autumn 2011 budget statement.

8.7 We present all CP5 expenditure on a slightly different basis to CP4. In CP5, works which have previously been treated as renewals expenditure, but which are associated with small scale works on buildings and civil engineering structures, are treated as maintenance costs to align with Network Rail's statutory accounts. These works are termed 'reactive maintenance'. In its SBP Network Rail moved some of these costs from renewals to maintenance (approximately £250m over the control period associated with the Civil Engineering Framework Agreement (CEFA) contract, discussed later in this chapter). We have made a further adjustment to include all reactive maintenance costs as maintenance expenditure. In our draft determination we assumed that reactive maintenance costs were 4% of total renewals costs and applied the adjustment as a high-level overlay. In its response to the draft determination Network Rail set out its assumed level of reactive maintenance included in its plans. We have reviewed the assumptions made and consider them to be appropriate. Our final determination is therefore based on an improved understanding of likely reactive maintenance requirements in CP5 resulting in a post-efficient movement of £522m from renewal to maintenance (whereas the draft determination assumed a post-efficient movement of £507m). To provide a valid comparison we have applied the accounting adjustment based on Network Rail's

[167] http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php

reactive maintenance assumptions to both Network Rail's figures and our own from CP5 onwards.

8.8 In our draft determination we presented costs associated with fitting ETCS equipment on trains as renewal expenditure but proposed that we would change this approach for the final determination. In our final determination we have treated these costs as enhancement and have removed them from both Network Rail's signalling renewals figures and our own.

Efficiency

Maintenance

8.9 In its SBP Network Rail presented its maintenance efficiency plans using the final year of CP4 as a baseline. We are also using the final year of CP4 as a baseline but we have made adjustments so that it represents the position before efficiencies more accurately. We have:

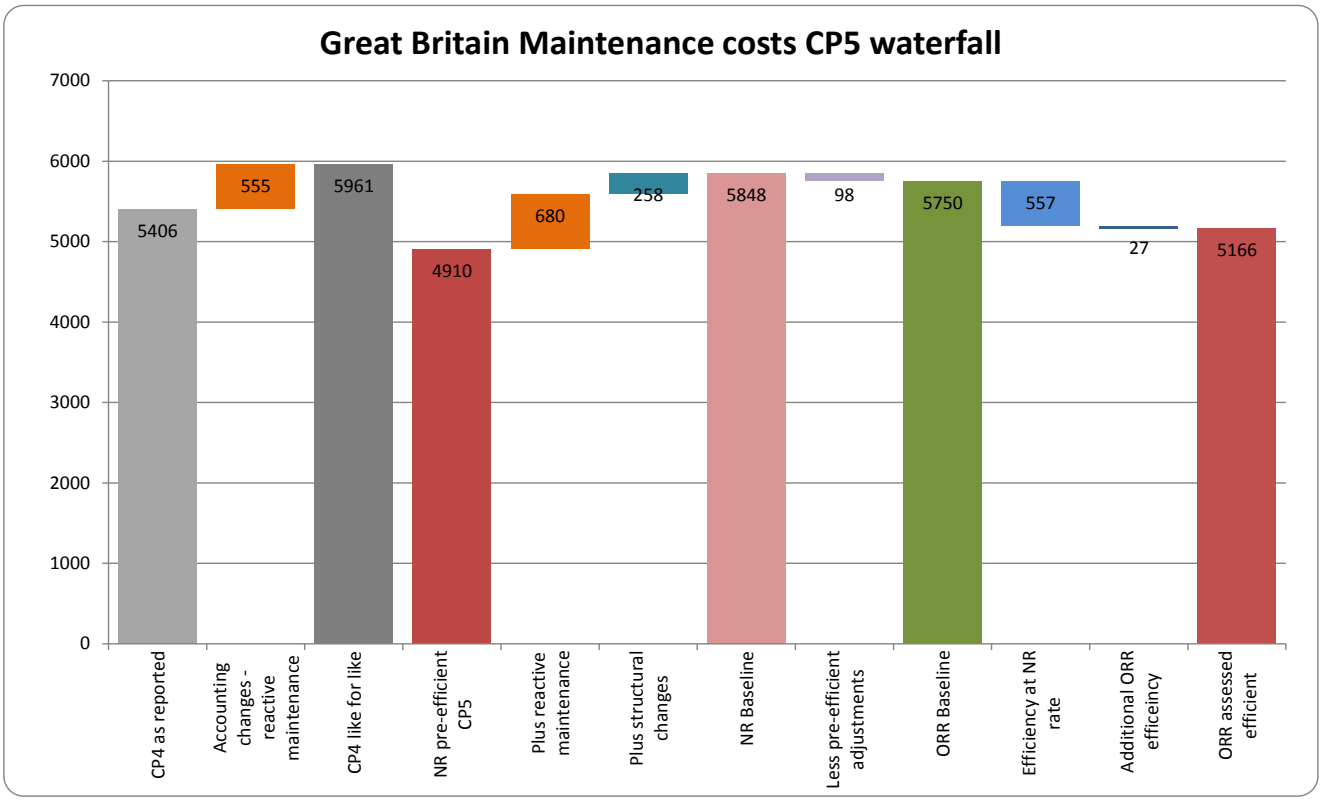
(a) added reactive maintenance costs as discussed above;

(b) increased the baseline on a yearly basis for 'structural factors'. These increases are to take account of the increased traffic and enhancement projects which will drive the need for more maintenance works and to exclude 'special projects' from the baseline which are not representative of on-going expenditure requirements; and

(c) reduced the reactive maintenance part of the baseline for issues identified in how these costs have been forecast.

8.10 These adjustments create the 'ORR baseline' against which we have calculated our assessed efficiencies.

Figure 8.1: Our presentation of maintenance efficiencies in CP5*



*Note: This chart is a simplified representation based on a number of high-level assumptions and will not fully reconcile to all relevant tables.

8.11 Where numbers in Figure 8.1 are different to those in our draft determination, this is due to improved information on reactive maintenance costs, resulting in a more accurate accounting movement from renewals to maintenance. Network Rail's response to our draft determination forecast £680m of pre-efficient reactive maintenance expenditure during CP5, whereas our draft determination assumed the figure was £641m.

Renewals

8.12 In its SBP Network Rail presented its renewals efficiencies against a pre-efficient baseline representing the volumes of work required by its new CP5 asset policies (discussed later in this chapter) and its assumed costs at the end of CP4. The new policies are intended to deliver sustainable outputs more efficiently, and therefore there are efficiencies embedded in its SBP pre-efficient expenditure. It presented its renewals efficiencies for certain key asset types. We have adjusted Network Rail's SBP pre-efficient baseline by:

(a) deducting reactive maintenance costs as discussed above;

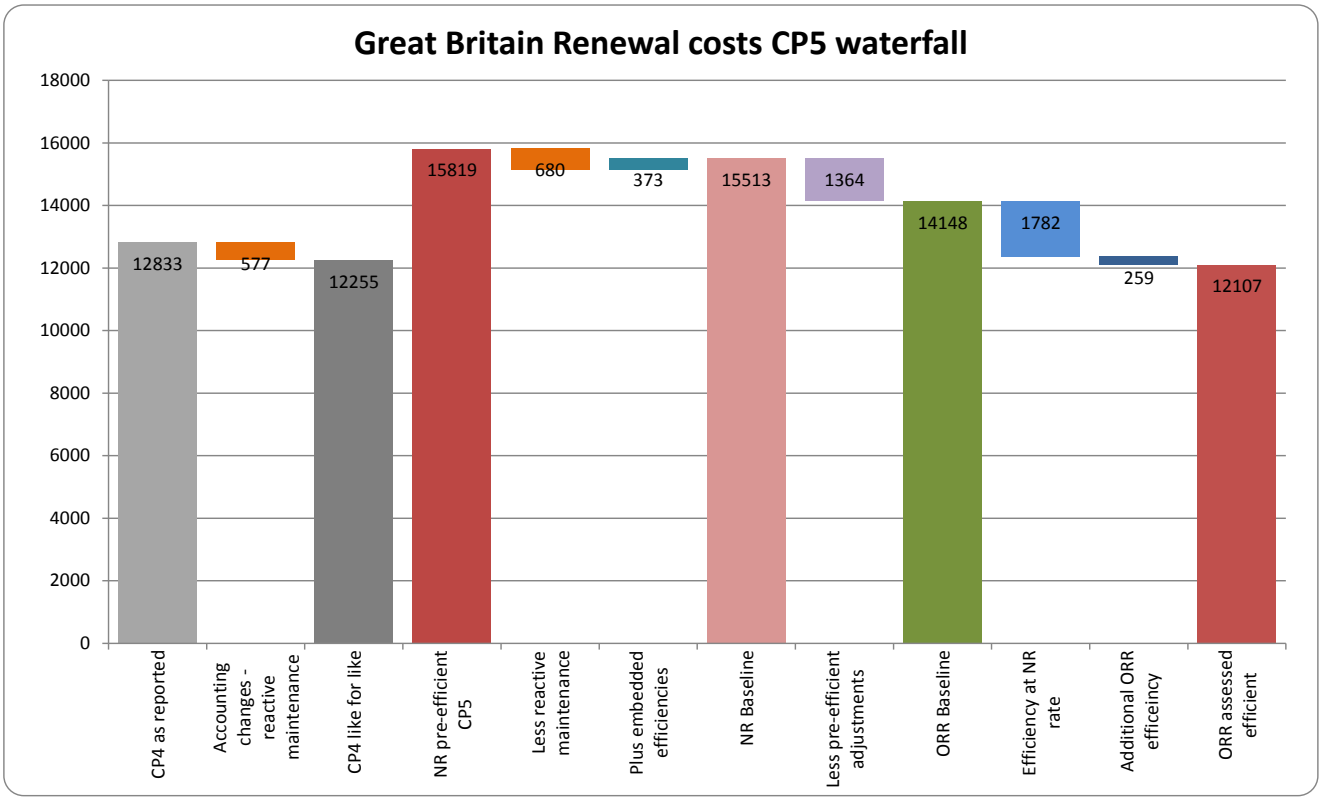
(b) adding on those efficiencies which we have assessed to be embedded in its asset policies to give a 'Network Rail baseline';

(c) making reductions to the Network Rail baseline to reflect our assessment of its pre-efficient plans giving the 'ORR baseline'; and

(d) considering efficiency across all types of renewal expenditure, not just for certain asset types.

8.13 We have presented Network Rail's proposed efficiencies as the difference between the Network Rail baseline and the post-efficient costs in the SBP. We have presented our assessed efficiencies as the difference between the ORR baseline and our assessed post-efficient expenditure. Our approach to renewals assessment is shown in Figure 8.2.

Figure 8.2: Our presentation of renewals efficiencies in CP5*



*Note: This chart is a simplified representation based on a number of high-level assumptions and will not fully reconcile to all relevant tables.

8.14 Where numbers in Figure 8.2 are different to those in our draft determination, this is due to:

(a) ETCS train fitment costs (£194m) being treated as enhancement expenditure, whereas our draft determination treated them as renewals. This affects all CP5 totals columns;

(b) improved information on reactive maintenance costs, resulting in a more accurate accounting movement from renewals to maintenance. Network Rail's response to our draft determination forecast £680m of pre-efficient reactive maintenance expenditure during CP5, whereas our draft determination assumed the figure was £641m;

(c) our final determination making a smaller reduction to pre-efficient costs than applied in our draft determination; and

(d) our final determination assessing a slightly lower level of efficiency than applied in our draft determination.

Responses to our draft determination

8.15 Responses to our assessment of maintenance and renewals in the draft determination are highlighted here. In addition, some detailed commentary on the draft determination text was received, has been considered and, where accepted, we have made amendments to our final determination.

Asset management capability

8.16 The majority of respondents were supportive of our proposed greater focus on asset management capability, including at route level, in CP5. Some stated a need for improved transparency of asset management data by route.

8.17 We agree on the need for greater transparency of asset management information by operating route and will continue to press for improvement. Network Rail's SBP included improved disaggregation of plans by operating route compared to PR08. We have set out our requirements for Network Rail's delivery plan, including greater visibility by operating route, and our monitoring regime for CP5 requires more disaggregated reporting of asset management information than was required in CP4.

8.18 Respondents, including Network Rail, were supportive of our approach to funding improved civils asset management and to introducing a civils adjustment mechanism. RIA's response recognised our concerns driving the civils adjustment mechanism but considered that it introduced uncertainty which could lead to supply chain inefficiencies.

8.19 We consider that the civils adjustment mechanism is appropriate to deal with the uncertainty of Network Rail's civils renewals plans as submitted in the SBP. We have included a provision for civils renewals expenditure in our final determination which reflects our best view of the likely, significantly increased levels of activity. Network Rail is expected to deliver the civils renewals volumes proposed in the SBP for the first two years of the control period and this gives the supply chain increased certainty for those years. We expect Network Rail to present its proposals for years three to five in good time to enable the supply chain to plan effectively.

8.20 ATOC and several TOCs responded that Network Rail should improve its asset management policies in relation to depots. They also said that Network Rail's renewals policy should ensure that the modern equivalent replacement considers the needs of current and future operators, passengers and stakeholders. Stagecoach's and Virgin's responses questioned whether Network Rail was ensuring that whole

industry costs are minimised. They highlighted infrastructure asset management concerns on their routes.

8.21 We agree that asset management policy with respect to depots can be improved. We have set asset management capability outputs to ensure continuous improvement in CP5, including for depots. We have made no adjustment to Network Rail's proposed levels of renewal expenditure on depot plant. Network Rail has a licence requirement to manage its assets efficiently. This includes renewing and/or enhancing assets with a modern equivalent asset which is capable of meeting the needs of current and future stakeholders. It also includes ensuring that whole industry costs are minimised over the lifetime of assets.

8.22 Chiltern and Arriva considered that work volumes and asset condition should be monitored as outputs. Passenger Focus questioned whether asset condition should be improved over the period.

8.23 We consider that it is important to monitor volumes and asset condition as indicators of whether assets are being managed sustainably. We have made improvements to our monitoring framework for CP5. However, we believe that it is important that Network Rail has the flexibility to manage its activity during the period to deliver in the most efficient way possible and to respond to new information. Where delivered volumes and/or condition fall materially short of its plans we will expect Network Rail to demonstrate that this is not at the expense of sustainable asset management.

8.24 GB Railfreight's response raised concern over a shortage of electrical engineering expertise in the industry and therefore concern over deliverability of electrification works.

8.25 We agree that availability of electrical engineering expertise is a risk. Network Rail's SBP included its assessment of deliverability which considered resourcing of the electrification programme. We have carried out our own assessment of deliverability and agree with Network Rail's overall assessment. It has identified the key factors constraining delivery and has action plans in place to deal with them.

8.26 Network Rail's response to our draft determination set out its plans to improve its approach to asset management with respect to climate change and weather resilience. It provided an update to its Climate Change and Weather Resilience document. RIA expressed concern over the resilience of the network and welcomed our recognition of the scale of the issue. TSSA questioned why there was no significant funding to achieve resilience.

8.27 We will monitor Network Rail's progress against its climate change and weather resilience plans. We consider our assessed level of efficient maintenance and renewal expenditure to be sufficient for Network Rail to manage its assets at minimum whole life cost, and expect Network Rail to be able to demonstrate that its asset management adequately includes consideration of climate change and weather resilience.

Maintenance and renewal efficiency

8.28 ATOC and Transport Scotland supported our view that greater efficiency can be driven through wider industry collaboration, including through Network Rail's improved interaction with its supply chain and through closer working with operating companies. RIA welcomed Network Rail's progress in collaborating with its supply chain but stressed the need to ensure this approach continues, stating its view that a regular measure of collaborative working needs to be introduced. TfL expressed concern that alliancing might lead Network Rail to favour TOCs that are part of alliances over those with competing needs to access the network.

8.29 We think that greater collaboration is vital to drive efficiency within the industry. We have considered this in our assessment of efficiency and are incentivising it through our determination. We have set out our approach to rail industry alliances, making it clear that Network Rail must treat all operators fairly in negotiating, agreeing and operating alliances.

8.30 Network Rail, DfT and FirstGroup stated support for our focus on bottom-up benchmarking to inform efficiency assumptions. RMT expressed concern over our top-down benchmarking given the comments in Network Rail's SBP, which cited serious problems with data and their use for analysis. RMT also expressed concern over our bottom-up benchmarking, commenting that it lacked transparency and credibility. TSSA said that a cautious approach to efficiency should be taken and that it is unconvinced that new technologies might deliver efficiencies.

8.31 We note the general support for our bottom-up approach to benchmarking and we have put greater emphasis on this compared to PR08. We believe that top-down benchmarking also has an important role to play and we have used this as a cross check on our bottom-up work. We have addressed issues identified with previous top-down benchmarking through a substantial data evaluation and correction exercise, discussed later in the chapter. The bottom-up efficiency assumed in our draft determination was based on the outputs of wide-ranging reporter and consultancy studies which we have published, and Network Rail's own efficiency evidence. Our model has been reviewed by Arup and found to be logical, transparent and supported by a comprehensive evidence base.

8.32 RMT and TSSA raised concerns over assumed maintenance efficiencies including risk based maintenance and multi-skilling. They considered that maintenance efficiencies may lead to increased safety risk.

8.33 We have taken account of Network Rail's delivery of maintenance efficiencies in CP4 in developing our view of efficient expenditure requirements. We consider that there are both safety and efficiency benefits to be gained from adoption of maintenance best practice, including properly managed implementation of reliability centred maintenance and an appropriate level of multi-skilling. We have conducted a consultancy study which has identified the efficiencies available to Network Rail if it

adopts best practice, without compromising health and safety. We are strengthening the outputs framework and indicators for asset management and will be monitoring Network Rail's delivery of planned asset maintenance and renewal volumes. We expect Network Rail to produce an overall maintenance strategy which clarifies how the various maintenance initiatives will be optimised and integrated across the asset base. This strategy should include a change management plan to show how the strategy will be delivered taking account of human factors and staff competency issues.

8.34 RIA's response supported our endorsement of a whole life cost approach to asset management but considered that this might result in initial upward pressure on unit costs and further pressure on supplier's margins. It also considered there to be an issue around whether Network Rail delivers its assumed end-of-CP4 efficiency and the further pressure on supplier margins that could result if it does not.

8.35 Our assessment has reviewed Network Rail's planned volumes and costs which rely on its asset polices, which in turn rely on its whole life cost analysis. Our assessment has therefore considered appropriate funding to deliver a whole life cost approach, but we recognise that Network Rail has further work to do to refine its analysis. We have tempered our assessment of efficiency by weighting between Network Rail's analysis and ours. We consider our proposed efficiency to be achievable within the range of likely end-of-CP4 outturn. In responding to our determination we expect Network Rail to manage its activities in a sustainable way to deliver whole industry efficiency.

8.36 Arriva's and GB Railfreight's responses considered that Network Rail can realise efficiencies through improved planning and management of possessions. Freightliner stated the importance of Network Rail maintaining a steady volume of renewals work throughout CP5.

8.37 We agree that improved possession planning and management is vital to deliver further efficiency. We commissioned a consultancy study to consider the opportunities in CP5 and have reflected its findings in our efficiency analysis. We also recognise the importance of managing workbanks to ensure efficiencies within the industry. We have reflected this in our assessment of efficiency.

8.38 RIA's response raised its concern that there must be no hiatus in workload at the start of CP5, as this leads to inefficient planning and allocation of resources for suppliers and a consequent adverse impact on delivery and cost.

8.39 We recognise the importance of Network Rail profiling its work and providing sufficient visibility of its plans to improve efficiency throughout the supply chain, and have considered this in our assessment of efficiency. In PR13 the transparency and disaggregation of Network Rail's plans has improved but further improvements can be made. We have made it clear that its CP5 delivery plan must be consulted on and published before the start of CP5 and we have updated our monitoring and reporting

requirements to improve transparency. We have also introduced a mechanism to enable early investment for enhancement works as discussed in chapter 9.

Track renewals

8.40 Network Rail stated that the pre-efficient reductions to track unit costs applied in the draft determination were incorrect, and cannot be delivered through central management of risk and contingency.

8.41 We have reviewed the assumptions applied at draft determination, the evidence available in the SBP and the independent reporter's review of unit costs. The adjustment applied reflected several issues identified by the reporter with respect to Network Rail's oversight of risk estimation in the planning process, its application of further overlays and its methodology for producing pre-efficient costs based on the planned 2012-13 workbank. Since our draft determination we have commissioned Arup to undertake a review of our adjustment to track unit costs considering the findings from its reporter study and Network Rail's response. Arup found that the 2% adjustment was, in its view, potentially too high. We have also reviewed new evidence from Network Rail relating to the detail of its track unit cost and efficiency modelling. We found the modelling to be comprehensive and in line with best practice. As a result, we have reduced our adjustment to 0.25% in our final determination.

8.42 Network Rail said that track efficiencies assumed by us in the draft determination are unrealistic. It stated that work volumes are 'locked-down' and efficiencies are constrained by access. It said that its benchmarking and efficiency work should be graded 'good' rather than 'fair', which would result in more weight being given to its efficiency analysis. RIA stated that, in its view, the draft determination's assumptions for track renewal unit cost reductions were particularly challenging and that it had no confidence that the target figures could be achieved within the CP5 timescales.

8.43 We accept that delivering track renewals efficiencies will become more challenging in CP5 due to access constraints and the focus of its asset policy on more critical routes, but this has been considered in our efficiency assessment. We have reviewed further, detailed information submitted by Network Rail setting out the modelling and evidence base behind its track efficiency projections. On the basis of the further information provided we accept that Network Rail's track efficiency analysis is of good quality. For this reason we have given Network Rail's analysis greater weighting in deriving our assumed CP5 efficiency.

Signalling renewals

8.44 Network Rail's response stated that the pre-efficient reductions to signalling unit costs are incorrect. It said that its ability to reduce signalling unit costs beyond the level proposed in the SBP is limited, due to contracts having been let and workbanks which are locked down. It stated that our draft determination was wrong to assume that the new signalling contracts have transferred more risk to its contractors. Network Rail's

response also said that the pre-efficient reduction to level crossings unit costs was unjustified.

8.45 We have reviewed the adjustments applied in our draft determination to pre-efficient signalling and level crossings unit costs. The adjustments reflected the findings of the independent reporter with respect to the levels of overlay applied, the overall reduction in risk through the new supplier contracts and the levels of uncertainty driven by the unit cost development methodology applied. Having reviewed Network Rail's response, we consider that there remains justification for a pre-efficient unit cost reduction for signalling and level crossings. This is discussed further in our assessment of signalling and level crossings renewals costs. We recognise that Network Rail will have limited ability to influence signalling expenditure in early CP5 and have reduced our adjustment in the early years of the period to reflect this.

Other core renewals

8.46 Network Rail said that it considered the assumptions on other core renewals to be unrealistic. It considered the reduction in the scope of buildings renewals implied by the draft determination would have implications for the sustainability of outputs and will lead to sub-optimal whole life costs.

8.47 We consider that the adjustments which we have applied to other renewals asset categories are appropriate. For buildings, telecoms and electrical power assets the extent to which projections are based on non-unitised costs results in greater uncertainty in plans. Network Rail's limited oversight of the risk estimation process and overlays, particularly for non-unitised costs, is likely to lead to an overstatement of requirements. We consider Network Rail's plans for buildings to be more uncertain than for other asset categories. This is the result of uncertainties in all stages of the planning process. Further detail is provided in our assessment of buildings renewals costs.

IM renewals and ORBIS

8.48 Network Rail considered that the level of investment that we assumed for IM renewals will enable it to deliver the core IT infrastructure renewals but that it would not allow for investment in new systems to deliver CP5 outputs. Network Rail submitted further information as part of its draft determination response relating to £181m of IM investment which it believes is required to support CP5 outputs. It also stated its view that our draft determination should not have assessed ORBIS and IT expenditure together.

8.49 We have reviewed and updated our assessment of Network Rail's CP5 IM renewals and ORBIS expenditure. In the draft determination we assessed IM renewals and ORBIS expenditure together. For our final determination we assessed these two areas of expenditure separately because less than one third of ORBIS costs relate to IM expenditure, the rest relating to business change activity. The updated assessment

increases our assessed IM renewals requirement by £52m and our assessed ORBIS expenditure by £14m.

Reactive maintenance

8.50 Network Rail's response included its assessment of likely reactive maintenance costs over CP5. In our draft determination we made an accounting adjustment to treat reactive maintenance costs as maintenance expenditure rather than renewal. We assumed that reactive maintenance costs were 4% of costs accounted as renewals. We have updated this assumption to reflect the new information provided by Network Rail. This has no effect on the overall total for maintenance and renewals but moves expenditure between the categories.

Other developments since our draft determination

8.51 We have completed further work to assess Network Rail's proposed £71m expenditure on a new design of excavator, optimised for the rail environment, to replace the existing fleet. Our final determination assumes £10m of renewal expenditure to fund development works (see chapter 11).

8.52 We have further considered treatment of costs for fitting new signalling equipment in trains. We consider that there are very significant uncertainties in the programme for CP5 and therefore the likely outturn costs. We have therefore decided to treat these costs on an efficient emerging cost basis, with the efficient cost validated progressively through ex-post efficiency reviews. We have included a provision of £194m within our assessment of enhancements expenditure and removed these costs from our assessment of renewals expenditure. Our reasoning is detailed in chapter 9.

8.53 We have commissioned an audit of our maintenance and renewal efficient expenditure model which has resulted in the correction of some minor errors. We have also made some minor improvements to the model, for example to improve the accuracy of costs at a disaggregated level. These changes account for small variations in expenditure figures between the draft determination and final determination.

Network Rail's proposals for management of its assets

8.54 Network Rail is improving its asset management capability and plans to improve further in the remainder of CP4 and CP5. It has set out its key initiatives for CP5, including:

(a) optimisation of asset policies;

(b) further development of risk-based maintenance;

(c) improved asset information;

(d) further rollout of remote condition monitoring;

(e) development of the Asset Management Services (AMS) organisation; and

(f) development of improved asset management competence and culture.

8.55 Network Rail's SBP submissions are based on the new and improved ways of managing its assets which will be delivered by asset management capability improvements from specific programmes of work. The key programmes are set out below.

Asset Management Improvement Plan (AMIP)

8.56 We have consistently stressed the importance of Network Rail developing its asset management capability. Since 2006 we have measured this using the Asset Management Excellence Model (AMEM). Early in CP4 we and Network Rail agreed targets for improved capability as measured by AMEM to be delivered by the end of the control period. Network Rail set out how it would deliver these in its Asset Management Improvement Plan (AMIP). We have been monitoring progress against the agreed targets. Whilst Network Rail is delivering real improvements it is behind the targets in key areas and must catch up to deliver our requirements for the end of CP4.

8.57 The company has set out its proposed trajectory for further improved capability in CP5 as discussed in chapter 3. In summary it is proposing continued improvement to reach an average AMEM score of 73% at the end of CP5.

Offering Rail Better Information Services (ORBIS)

8.58 Good asset information management is essential to good asset management. We have pressed Network Rail to develop and implement plans for improved data quality, including improved processes for the collection, management and reporting of data and improved asset information systems.

8.59 Network Rail has acknowledged the need for better asset information management and has proposed a large investment in an improvement programme, ORBIS. This includes the Asset Data Improvement Programme (ADIP) aimed at delivering asset information improvements in the short-term in order to improve inputs to the planning process for CP5. Its proposed investment in ORBIS is £173m in CP5. This investment is forecast to deliver wide-ranging benefits, including £270m of efficiencies within CP5. We consider these efficiencies in our total assessment of efficiencies.

8.60 Since publication of the SBP, Network Rail has written to us to set out the key milestones associated with ORBIS which it intends to use to monitor progress. As set out in chapter 3, we will monitor delivery of these milestones as regulated outputs.

8.61 Network Rail's asset data feed into its asset policy modelling and workbank development. We have audited the quality of its asset data as discussed in more detail later in this chapter.

Buildings & Civils Asset Management transformation programme

8.62 In summer 2010, we and Network Rail commissioned a comprehensive independent reporter study into all aspects of civil structures management in response to evidence of poor practice, including:

(a) Network Rail's difficulty in producing a credible PR08 civil structures and earthworks expenditure programme;

(b) its declaration that it could not guarantee sustainable stewardship beyond CP6;

(c) three bridge failures within an 18 month period; and

(d) the serving of a safety improvement notice on the Southern route. (Subsequently other improvement notices were served network-wide.)

8.63 The resulting report[168] revealed numerous shortfalls in efficient, effective stewardship and recommended a 77 point improvement plan. Network Rail accepted this and has now converted it into a detailed action plan, the Buildings & Civils Asset Management (BCAM) transformation programme. A report on progress to December 2012 is available on our website[169]. We are continuing to monitor its delivery and have again commissioned Arup to review its embedment into the routes' normal daily activities.

8.64 Improvements arising from the review have included better asset knowledge, the new civil structures and earthworks asset policies that have been used for the SBP submission, and a review of appropriate staffing levels. These have all influenced Network Rail's proposals for civils maintenance and renewal expenditure in CP5. The improvements must be embedded in the routes throughout the control period.

Network Operating Strategy

8.65 Network Rail's plans include proposals for investment of £1,485m to deliver NOS. £876m of this is expenditure to accelerate signalling renewal work, over and above the work required due to condition. The investment will centralise signalling and electrical control to 14 control centres. The plans indicate that this investment will result in operational efficiencies. Our review of the NOS business plan, including the associated efficiencies, is discussed in more detail in chapter 7.

Intelligent Infrastructure

8.66 Intelligent infrastructure is Network Rail's initiative to increase its Remote Condition Monitoring (RCM) of assets. RCM uses technology to detect asset degradation, making it possible to defer intervention until shortly before assets fail. Network Rail has started implementing this technology during CP4 and plans to increase its rollout in CP5 to cover further signalling, telecoms, and electrification and plant assets. Since publication of the SBP the company has written to us setting out some further details

[168] http://www.rail-reg.gov.uk/upload/pdf/reprters-audit-rev-policy-arup-mar11.pdf.

[169] http://www.rail-reg.gov.uk/upload/pdf/arup-transformation-2013-05-01.pdf.

of the volumes of assets to be fitted with RCM over CP5. We expect Network Rail's milestones associated with intelligent infrastructure to be set out fully in its delivery plan and will monitor delivery of these as indicators.

8.67 The CP5 plans include expenditure of £95m on intelligent infrastructure.

New asset policies

8.68 Network Rail's asset management capability improvements have driven some significant improvements in its business planning. In particular the company has produced a suite of new asset policies which set out how it will manage its assets in CP5. The policies provide a framework to plan the volume of work activity that Network Rail considers is appropriate to manage its assets safely, efficiently and sustainably, whilst meeting the required outputs.

8.69 The new policies are set out in a consistent format using a ten stage framework:

(i) asset description;

(ii) historical analysis;

(iii) asset criticality;

(iv) route criticality;

(v) asset degradation;

(vi) intervention options;

(vii) planning and funding scenarios;

(viii) model development;

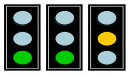
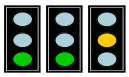
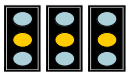
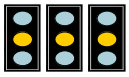
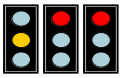
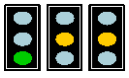
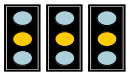
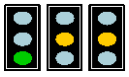
(ix) investment options; and

(x) policy selection.

8.70 Network Rail has, for the first time, developed a suite of whole life cost models to support its asset policies. The policies set out the asset specific outputs which it believes will be delivered by the proposed interventions.

8.71 The company has set out its own analysis of the robustness, sustainability and whole life cost efficiency of its policies. It has assessed the extent to which its route maintenance and renewal plans align with central policy. Its findings are summarised below. We set out our assessment of asset policies later in the chapter.

Figure 8.3: Network Rail's assessment of its asset policies

Asset	Policy maturity (Robustness / sustainability / efficiency)	Alignment of route renewal plans with policy	Alignment of route maintenance plans with policy
Track			
Signalling			
Structures			
Earthworks			
Drainage, fencing and other off-track			
Electrical Power			
Telecoms * Centrally developed plan by Network Rail Telecoms		 *	
Buildings			

8.72 Network Rail does not consider that any of its CP5 asset policies has been demonstrated to meet all three tests of robustness, sustainability and efficiency. It considers the track and signalling policies to be the most mature and structures, earthworks, drainage and telecoms to be less mature. It recognises that its structures policy is not yet fully aligned with route renewal plans.

8.73 We summarise key features of the CP5 asset policies below.

Track asset policy

8.74 Track assets include rail, sleepers, ballast, plain line, and switches and crossings (S&C).

8.75 Network Rail's CP5 track policy is a refinement of previous policy, applying differing intervention options depending on the performance requirements of different parts of the network. This is achieved by moving from the banding of routes into four 'quadrants' to the new policy of using five 'criticality bands'. The policy promotes a focus on high specification interventions, such as full renewal, for track on more critical routes and a greater focus on refurbishment and maintenance to extend asset lives on lower criticality routes. Whole life costing has been applied to help define the optimum intervention regime.

8.76 The policy introduces a move from more manual based inspections towards greater use of automated train-borne inspection and measurement and improved assessment of ballast, formation and drainage condition. On the back of improved information it aims to deliver better planning and targeting of work, including better use of wheeled

plant (such as high output track renewals plant). The policy requires a move towards preventative maintenance addressing root causes and a risk based approach to inspection and maintenance. The track policy is supported by the new drainage policy.

8.77 Network Rail forecasts that the condition and performance of track will be maintained both in the short- and long-term. Ballast fouling and S&C condition are expected to improve. The policy is predicted to result in a steady state or reduced number of safety related track infrastructure failures such as rail breaks and geometry faults, with priority given to high criticality routes and critical S&C.

Off-track asset policy

8.78 The off-track asset policy addresses the management of boundary fencing and vegetation. This is the first time that the off-track policy has been produced as a separate document. (Management of these assets was previously included in the track policy.)

8.79 The policy requires more proactive management of fencing and vegetation, rather than the reactive approach that has been prevalent in CP4. Network Rail plans to improve a significant percentage of the asset base and this has resulted in a substantial investment in off-track assets being proposed for CP5.

8.80 The policy for boundary fencing aims to reduce unauthorised access and thereby reduce the safety and performance risk to the railway. It is supported by improving asset knowledge which has allowed modelling of renewal and maintenance volumes and has led to an improved specification of materials. This should result in better whole life costs while ensuring that the most appropriate type of fencing is used, taking account of current and future adjacent land use.

8.81 The policy for vegetation management requires a proactive, cyclical approach to manage vegetation sustainably and to manage risks such as obscured signals, leaves on the line, damage to structures and falling trees. It specifies a range of interventions, ranging from routine maintenance to highly mechanised or chemical treatment.

8.82 Network Rail forecasts that its off-track policy will deliver boundary measures that meet its legal obligations and in doing so proactively manages the safety and performance risks posed by unauthorised access to the railway by people or animals. It will also manage vegetation, through a cyclical maintenance regime, in a way which best supports safe and punctual rail operations.

Signalling asset policy

8.83 The CP5 signalling asset policy covers the management of signals, their control and communication systems, interlockings (which ensure trains are routed safely), points, train detection and level crossings. Level crossings are also the subject of a separate policy which primarily addresses the management of safety risk.

8.84 The policy has been developed based on whole life cost modelling to consider the trade-off between different intervention strategies and to identify the most appropriate technology to apply. It proposes a move from conventional re-signalling to a more targeted approach of component renewal to maximise the asset life. This approach has been integrated with programmes of major interventions relating to the European Train Control System (ETCS) and implementation of NOS. The policy proposes to migrate control of signalling to centralised operational control centres at renewal. It proposes that signalling is converted to ETCS operation when renewal is required and there is sufficient rolling stock equipped for ETCS operation.

8.85 Signalling maintenance regimes are to be based on the criticality of the asset and tailored to asset type, configuration and location. The policy makes greater use of reliability centred maintenance and remote condition monitoring to achieve this. For high criticality routes the policy involves a move towards more predictive maintenance, informed by remote condition monitoring; for low criticality routes it means a move towards more reactive maintenance. The policy also proposes the use of extended maintenance to manage assets until their renewal through major programmes of intervention such as those driven by ETCS and NOS.

8.86 Application of the policy is forecast to result in a peak of signalling renewals expenditure in CP5 and a peak in remaining life in CP7, largely driven by the pattern of ETCS re-signalling.

Level crossing asset policy

8.87 Network Rail has produced a level crossing asset policy for the first time. This reflects a need to increase the focus on level crossings as a system rather than as a collection of separate components.

8.88 The policy proposes to reduce the safety risk that level crossings contribute to the rail network, to maintain or improve condition and capability, and to move to a targeted renewal of subsystem parts. The policy sets out Network Rail's planned reduction of level crossing safety risk and its plans to facilitate closure, using the funds specified in the HLOSs: £65m for England & Wales and £10m for Scotland (both 2011-12 prices)

8.89 Whilst the policy considers renewal and maintenance issues, the focus is on reducing risk. Network Rail has developed a model to assess the risk reduction that can be achieved by a range of potential interventions.

8.90 There is a particularly close association between level crossing systems and signalling. The policy recognises the relationship between level crossings and the introduction of ETCS and NOS which are key components of the signalling policy.

8.91 A key output of the policy is the assessment of how the level crossing safety fund can be applied to achieve the greatest reduction in risk.

Structures asset policy

8.92 The CP5 structures asset policy covers assets including underbridges, overbridges, major structures, tunnels, retaining walls, culverts, coastal defences and minor structural assets.

8.93 The policy represents a substantial change to previous policy. It applies a risk based approach to deliver defined levels of safety, availability and capability. For bridges, the policy proposes application of different maintenance and renewal interventions to address the risk associated with the condition of key structural components called principal load bearing elements (PLBEs). The associated intervention strategy is captured in a suite of 'policy-on-a-page' documents which aim to articulate policy clearly and simply, and to achieve a consistent approach to structures asset management across the network. The policy-on-a-page documents cover the main bridge types, substructures, culverts, retaining walls, tunnels and footbridges.

8.94 Network Rail has continued to develop a whole life cost model for structures, an approach it started for CP3. The bridges model analyses intervention strategies for the main bridge types. Significant groups of structures such as tunnels, major structures, and coastal, estuarine and river defences are not captured in the modelling but are assessed using individual bottom-up intervention or management plans.

8.95 The policy requires maintenance of structures on a newly developed programme of planned preventative works. Application of reliability centred maintenance is being considered but is not yet fully integrated. The case for wider application will be considered in CP5.

8.96 Network Rail's plans, based on improved condition data and the new policy, include a large increase in renewal volumes to restore the assets to a robust and sustainable position. The company proposes that the new policy is implemented over two control periods to manage funding and deliverability, with interventions focused on high criticality assets during CP5. This approach results in a peak level of expenditure in CP5 and high expenditure in CP6. Network Rail states that its understanding of civil assets is continuing to improve and the predicted volumes of work may change as a consequence. Application of the policy is forecast to improve average asset condition scores for PLBEs on bridges, reducing risk over CP5 and CP6.

Earthworks asset policy

8.97 The CP5 earthworks asset policy covers the management of embankments and cuttings.

8.98 The policy differs from the previous policy because, instead of undertaking work based on condition alone, it applies a risk-based approach to decide what work needs to be done, where and when. Work to be carried out is prioritised according to a risk metric, which is assessed on asset type, condition and criticality. For example, cuttings are considered a higher risk asset type and, within this group, rock cuttings

pose the highest risk. Condition is banded against four headings: top poor, poor, marginal and serviceable.

8.99 Four main work types are defined for earthworks assets: examination to assess condition, maintenance (for example minor repairs) to maintain asset condition, refurbishment to improve asset condition, and renewal of poor, top poor and failed assets. Drainage work (renewal, refurbishment or maintenance of the drainage) is also a key priority for earthworks, as covered by the new drainage policy.

8.100 Network Rail has developed an earthworks whole life cost model. The model has been used to investigate a wide range of policy options and intervention strategies to support the CP5 policy.

8.101 The policy aims to maintain asset condition and risk levels throughout CP5 and in the long-term. To achieve this there will be increased levels of maintenance and refurbishment and a reduction in full renewal work compared to CP4.

Drainage asset policy

8.102 Network Rail has produced a drainage asset policy for the first time, recognising the importance of drainage for performance and asset management across other key asset types. The policy covers drainage relating to earthworks, track, tunnels, structures and buildings. The document concentrates on the track and earthworks drainage, as this forms the majority of the drainage assets and has higher associated expenditure.

8.103 Network Rail's knowledge and management of its drainage assets has historically been poor. To start to address this it has carried out the Integrated Drainage Project (IDP), to review asset knowledge, carry out a survey where records are incomplete and establish a national drainage database. The policy draws on the outputs of the IDP.

8.104 The policy considers two components to drainage asset condition: its structural integrity and its service condition. Structural integrity defects are addressed by repairing or replacing the asset. Service condition relates to the water carrying capacity of the asset and defects are addressed through works such as cleansing or vegetation clearance. In both cases pipework condition is measured on a one to five grading system. Condition data for drainage remain incomplete and will be assessed over a period of years.

8.105 The criticality of the drainage assets is based on the criticality of those other asset groups which it impacts and benefits, such as track and earthworks. The policy defines various intervention options (inspect, survey, maintain, refurbish, renew and new build) depending on criticality, which are intended to minimise costs over the lifetime of the asset. For higher criticality assets the policy requires a more proactive approach to inspection and maintenance. Application of the policy is forecast to result in significantly increased renewals costs in CP5 compared to CP4 in order to bring the

condition of the drainage assets up to a sustainable level, but this should reduce expenditure on dependent assets such as track and earthworks.

Buildings asset policy

8.106 The buildings asset policy covers maintenance, repair and renewal works on managed stations, franchised stations, light maintenance depots, maintenance delivery unit buildings and lineside buildings.

8.107 The policy is in two parts, 'building fabric' and 'mechanical & electrical equipment'. It extends the strategy applied in CP4 to cover better the range of operational property assets. The policy categorises stations into six groups, A to F, based on revenue and the number of people using the station (as was the case with the previous policy).

8.108 It utilises an improved asset information system to understand better the condition and degradation of assets, to understand the impact of interventions and to facilitate whole life costing.

8.109 The policy requires station and light maintenance depot condition, as measured by the Station Stewardship Measure (SSM) and the Light Maintenance Depot Stewardship Measure (LMDSM), to be maintained at the levels achieved at the end of CP4. For buildings Network Rail is proposing to use the yearly number of 2 and 24 hour reactive faults to measure robustness and Percentage Asset Remaining Life (PARL) to measure sustainability. It forecasts that reported reactive faults will remain static in CP5, but that PARL will improve by 1% in CP5 and 16% by CP11 to give 58% PARL at that point. Across the buildings asset categories the policy requires maintenance, repair and renewal works to be carried out to ensure that the properties remain fit for purpose.

8.110 Further franchising of maintenance and renewal activities to TOCs may also result in review and development of SSM during the control period and a reduction in Network Rail's funding requirement.

Electrical power asset policy

8.111 The CP5 asset policy for electrical power covers the management of traction power supply systems (including power from overhead lines and from conductor rail), and non-traction power supplies (including power for signalling, point heaters and conductor rail heating).

8.112 The policy is a significant development of the policy used in CP4. Network Rail has changed its approach, from age-based to condition based, to achieve a lower whole life cost to manage the assets. The CP5 policy also introduces asset and route criticality and improved safety principles. It is supported by the use of whole life cost modelling to identify the optimum intervention options for the key assets covered by this policy. Modelling has been carried out for: overhead line equipment; signalling power supply systems (PSPs and signalling power distribution cables); HV switchgear

for the AC and DC electrification systems; conductor rail; and HV cables on the DC electrification systems.

8.113 There is an increased focus on safety in the asset policy (also discussed in chapter 11), including actions to reduce the amount of working on or near live conductors. The policy considers management of capacity on the network through improved system planning for electrification infrastructure. It proposes investment in metering and management systems to support the more efficient use of energy.

8.114 Network Rail forecasts that its electrical power policy will deliver a slight increase in the number of traction power failures causing delays of ten minutes or greater. This is due to a significant increase in electrical power assets in CP5, driven by the major programmes of electrification across the network. If the asset base was to remain the same as at the end of CP4, Network Rail forecasts levels of performance consistent with the end of CP4. Network Rail has modelled remaining life until CP11. These long-term forecasts highlight a reduction in remaining life, but this is again driven by the introduction of new assets due to the programme of CP5 electrification.

Telecoms asset policy

8.115 Network Rail Telecom's (NRT) CP5 asset policy for telecoms proposes a move from conventional renewals to a more targeted approach of component renewal to maximise the asset life. Whole life cost modelling has been carried out to consider the trade-off between different intervention strategies. The policy is aligned with programmes of major interventions relating to implementation of NOS.

8.116 Telecoms maintenance regimes are to be based on the criticality of the asset and tailored to asset type, configuration and location by means of implementing Service Level Agreements (SLA) with clients (the routes). The success of the asset policy is predicated on developing these SLAs that are not yet in use and therefore not proven to be achievable. NRT states that it will not be in a position to know whether the SLAs are achievable until around the middle of CP5. The policy also relies on the greater use of remote condition monitoring and the development of Risk-based maintenance Of Telecoms Equipment (ROTE) to release maintenance staff to resource the planned in-house renewal activity.

8.117 The policy aims to continue to meet the CP4 exit performance KPIs throughout CP5 despite a significant increase in asset quantities due to the introduction of GSM-R/FTN.

Wheeled plant asset policy

8.118 The CP5 asset policy for wheeled plant is a development of CP4 policy and covers management of a diverse collection of rail and road vehicles.

8.119 The policy is based on the requirements of the vehicle maintenance and overhaul instructions, assessment of fleet condition and known demands driven by routes and central requirements. It promotes a mix of new fleet procurement, life extension and

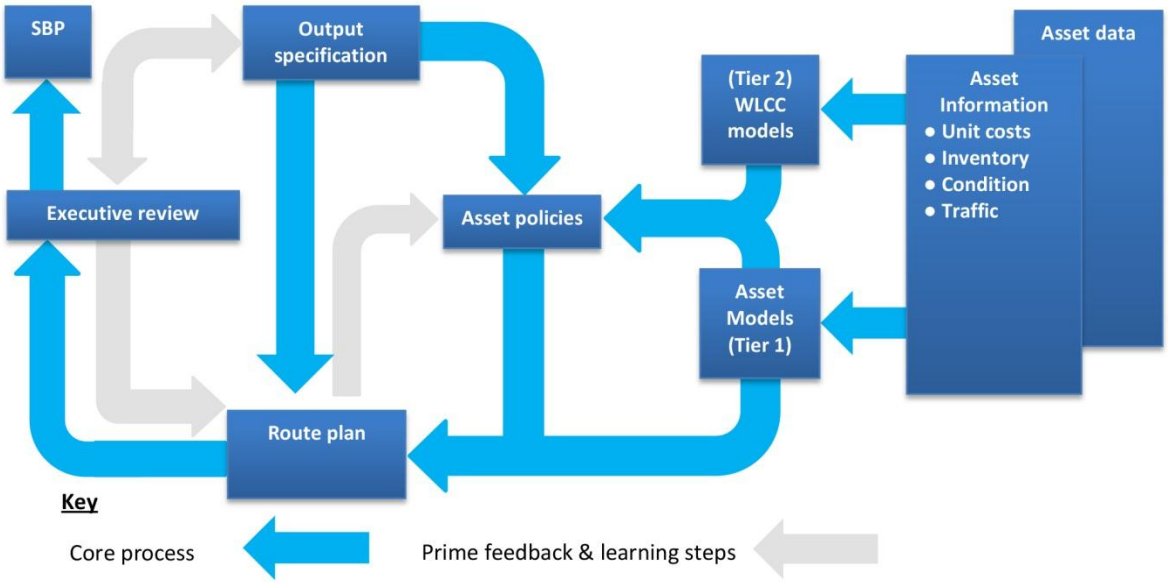
maintaining the fleet to the existing condition. The policy drives efficiencies by extending the periods between maintenance and overhaul. The proposed intervention regime for fleet maintenance is based upon engineering information which Network Rail acknowledges is currently limited and inconsistent across some fleets.

8.120 The policy aims to deliver an overall condition, reliability and availability of fleet at the end of CP5 which is no worse than at the end of CP4, except where driven by customer demand.

Network Rail's development of its maintenance and renewals plans

8.121 Network Rail's SBP set out the process by which it developed its maintenance and renewal plans. This process is illustrated in Figure 8.4.

Figure 8.4: Network Rail's process for development of its maintenance and renewal plans



Development of maintenance plans

8.122 The key inputs to its maintenance plans are its current resource levels (labour, plant and materials), its projections of how these will need to change in CP5 (for example, to maintain new electrification assets) and its view of available efficiencies during the period. These have been used to develop its route plans for maintenance which feed directly into the SBP.

8.123 Network Rail is also developing new approaches to maintenance which are referenced in its asset policies and maintenance strategy. These have been modelled to develop a central view of future volumes and therefore costs of work.

8.124 We discuss our view of Network Rail's maintenance planning process in further detail later in the chapter.

Development of renewals plans

8.125 The key inputs to Network Rail's renewals plans are its asset information (type, number, condition, location, criticality etc.), its asset degradation information and its cost information (for example unit costs).

8.126 The fundamental building block of the renewal plans is the company's suite of asset policies which set out the interventions that it will carry out in managing its assets. The policies are used in two parallel but linked processes: they are modelled to develop a central view of future volumes and therefore costs of work; and they are used by Network Rail's ten operating routes to develop route-based workbanks, volumes and costs. The plans developed by the centre and those developed by the routes are used to challenge each other at all stages of their development. The final SBP submissions are developed from a combination of the two.

8.127 We discuss our view of Network Rail's renewals planning process in further detail later in the chapter.

Route plans

8.128 Network Rail has, for the first time, presented its maintenance and renewals plans in ten operating route plans. This reflects the recent organisational change which has devolved some asset management decision making to the routes.

8.129 For maintenance its expenditure plans are based on route estimates of the resource required to safely maintain the railway. The route-based figures include consideration of the impact of increased traffic and new infrastructure.

8.130 Network Rail's renewals expenditure plans are based on the outputs of a challenge process between modelled expenditure requirements and plans developed by the routes. The company's models produce route renewals expenditure forecasts which consider route specific asset information, unit costs disaggregated by structural factors and efficiencies applied by local asset mix. The routes produced their plans based on their local knowledge of the asset base, knowledge of delivery constraints, understanding of local costs and local efficiency initiatives. The challenge process between modelled expenditure and route-based plans has helped to improve the robustness of the route plans.

8.131 Key route specific issues are discussed in the Maintenance and Renewals sections below.

Network Rail's maintenance plans

Volumes

8.132 As discussed previously the company has built up the maintenance plans in its SBP by forecasting its resourcing requirements. In general it has not used volumes of required work as the basis for developing its maintenance expenditure plans.

8.133 Following submission of the SBP we have required Network Rail to submit its planned volumes of maintenance work to be delivered by its maintenance expenditure plans. Certain volumes have been submitted for track, electrification and power, and signalling maintenance activities, a subset of which are shown in Table 8.1. We have worked with Network Rail to develop appropriate maintenance volume measures for use as indicators in CP5 and these will be included in its delivery plan.

Table 8.1: Network Rail's planned maintenance volumes, Great Britain

Description (unit)	CP5					CP5
	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Tamping (km)	6,933	6,873	6,749	6,688	6,781	34,023
Stoneblowing (km)	3,738	3,712	3,668	3,649	3,687	18,454
Manual wet bed removal (bay)	20,608	20,457	19,784	18,916	18,316	98,081
S&C tamping (point end)	4,480	4,395	4,372	4,320	4,331	21,899
Mechanical spot re-sleepering (sleeper)	5,486	5,415	5,368	5,425	5,391	27,084
Replacement of S&C bearers (each)	8,512	8,340	8,021	7,416	8,055	40,344
S&C arc weld repair (number)	10,673	10,696	10,711	10,714	10,783	53,578
Mechanical wet bed removal (bay)	12,189	12,152	12,023	11,249	10,962	58,575
Level 1 patrolling track inspection (mile)	206,577	201,836	197,972	197,901	199,631	1,003,918
Mechanised patrolling track inspection (mile)	8,372	7,462	7,162	7,162	7,241	37,399
Replacement of pads & insulators (sleeper)	553,385	544,931	538,586	515,209	529,333	2,681,444
Jointed track hot weather preparation (joint)	552,404	547,527	538,101	532,860	531,832	2,702,724
Manual correction of PL track geometry, CWR (track yard)	1,152,599	1,164,832	1,121,455	1,070,372	1,070,232	5,579,489
Manual rail grinding (rail yard)	418,045	417,777	417,517	417,365	417,659	2,088,363
Rail changing (rail yard)	201,615	197,715	193,905	190,932	191,793	975,960
Fences and boundary walls (yard)	1,010,959	1,045,381	1,036,425	1,049,740	1,082,847	5,225,352

Description (unit)	CP5					CP5
	2014-15	2015-16	2016-17	2017-18	2018-19	Total
S&C inspection, other (point end)	205,544	206,526	208,930	211,437	215,341	1,047,778
S&C maintenance, other (point end)	422,003	420,720	421,167	420,365	422,869	2,107,125
S&C renew half set of switches (each)	874	864	851	835	865	4,289
S&C stoneblowing (point end)	858	949	1,073	1,043	1,037	4,961
Track inspection, other (miles)	312,536	313,560	314,742	315,743	316,517	1,573,097
Train grinding - S&C (point end)	3,985	3,997	4,003	4,015	4,145	20,144
Signalling cables (various)	124,454	124,483	124,485	124,418	124,412	622,251
Equipment housing locations (each)	296,870	296,757	296,431	296,319	296,206	1,482,583
Point end routine maintenance powered (point end)	477,654	477,761	477,862	478,064	478,076	2,389,416
Signals routine maintenance colour lights (each)	192,955	193,027	192,488	192,624	192,427	963,520
Train detection - axle counters (each)	15,096	15,750	16,380	17,024	17,115	81,366
Train detection - TC's AC (each)	100,431	99,916	99,894	99,860	99,852	499,951
Train Detection - TC's DC (each)	137,104	136,054	134,481	133,254	133,079	673,972
Level crossings (each)	84,001	84,001	83,927	83,868	83,815	419,612
Maintain conductor rail (various)	47,641	47,641	47,489	47,263	47,114	237,147
Maintain OHL components (various)	194,666	199,649	204,566	204,536	222,871	1,026,287
Maintain points heating (each)	140,549	140,550	140,551	140,552	140,552	702,753
Maintain signalling power supplies (number)	42,964	42,964	42,964	42,964	42,964	214,821

Efficiency

8.134 When directly comparing expenditure forecast for the final year of CP5 with proposed expenditure in the final year of CP4, maintenance costs appear to increase. However,

this excludes the effect of the CEFA and reactive maintenance accounting change between the two control periods, ignores the effects of traffic and network growth, and does not adjust for projects which are not representative of on-going expenditure requirements. When the expenditure forecast for the final year of CP4 is adjusted for these effects the network total efficiency proposed is 13.8%, for Scotland it is 10.0%, and for England & Wales it is 14.2%.

8.135 The forecast maintenance efficiencies are planned to come from a wide range of initiatives including:

(a) a risk based approach to maintenance ensuring that maintenance regimes are tailored to the configuration, condition and location of individual assets;

(b) improved information management allowing better targeting of work, improved response to infrastructure faults and reduced reliance on paperwork processes;

(c) further implementation of remote condition monitoring;

(d) improved working practices and multi-skilling;

(e) increased standardisation of maintenance tasks;

(f) further mechanisation, including the full rollout of plain line pattern recognition and new vegetation clearance plant;

(g) improvements to the maintenance support and administration organisation;

(h) further recycling of materials; and

(i) optimisation of contracting strategy where appropriate.

8.136 Network Rail has included some ‘stretch’ (approximately £140m) in its maintenance efficiency targets, over and above the efficiencies which it has allocated to specific initiatives.

Expenditure

8.137 Network Rail’s SBP sets out proposed maintenance expenditure in CP5 of £5.3bn, of which £4.8bn relates to England & Wales and £0.52bn relates to Scotland. This compares to maintenance expenditure of £5.4bn in CP4, of which £4.9bn is in England & Wales and £0.48bn is in Scotland. The following tables set out its high level maintenance expenditure plans.

Table 8.2: Network Rail's plans, maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	1,165	1,172	1,174	1,172	1,166	-	5,848
Efficiency	-	5.3%	2.6%	2.3%	2.1%	2.4%	-	13.8%
Post-efficient expenditure	982	1,103	1,082	1,058	1,035	1,004	5,406	5,282

Table 8.3: Network Rail's plans, maintenance, England & Wales

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	1,052	1,055	1,056	1,054	1,052	-	5,269
Efficiency	-	5.4%	2.1%	2.5%	2.2%	2.9%	-	14.2%
Post-efficient expenditure	893	995	976	953	930	903	4,928	4,757

Table 8.4: Network Rail's plans, maintenance, Scotland

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	113	118	117	118	113	-	579
Efficiency	-	3.9%	6.4%	1.0%	1.0%	-2.0%	-	10.0%
Post-efficient expenditure	89	108	106	104	104	102	478	525

Maintenance by asset

8.138 Network Rail has set out its maintenance plans by asset as described below.

Track

8.139 Network Rail's plans for track maintenance costs incurred by the routes (i.e. excluding the maintenance costs incurred by NDS) are set out in Table 8.5.

Table 8.5: Network Rail's plans, track maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Pre-efficient expenditure	-	434	439	439	438	435	2,185
Efficiency	-	4.7%	3.5%	2.4%	2.3%	2.6%	14.5%
Post-efficient expenditure	420	414	404	395	384	372	1,969

8.140 The plans show increased pre-efficient levels of track maintenance expenditure compared to the final year of CP4 due to the effects of increased traffic and enhancement works. The company's modelling of the off-track and drainage policies suggest that increased expenditure is required to address a substantial backlog of work and to improve asset condition to a sustainable level.

8.141 Maintenance volumes show an increase in proactive maintenance activities to improve and maintain track quality, particularly the increased use of mechanised stoneblowing. Work items such as ballast replacement and wet-bed removal are forecast to reduce as a result of better drainage management and more targeted refurbishment items.

8.142 For track maintenance Network Rail is proposing efficiencies of 14.5% by the final year of CP5. These efficiencies are projected to come from better asset management (including improved whole life cost analysis, more proactive risk based maintenance, improved ability to automate inspection and maintenance works and improved data quality) and from improved unit costs (through better programming of work, more specialised teams but with greater multi-skilling and better management of possessions).

Signalling

8.143 Network Rail's plans for signalling maintenance are set out in Table 8.6.

Table 8.6: Network Rail's plans, signalling maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Pre-efficient expenditure	-	158	158	158	159	160	793
Efficiency	-	4.6%	1.9%	1.6%	2.3%	2.0%	11.8%
Post-efficient expenditure	158	151	148	146	143	141	729

8.144 The volume of signalling maintenance is projected to increase in some routes due to enhancement works, for example Thameslink and Crossrail. Some reduction in

maintenance activity is driven by the simplified maintenance regimes associated with new asset types, but this is countered by increased maintenance work driven by installation of new obstacle detection assets at level crossings.

8.145 Network Rail's plans for signalling maintenance include proposed efficiencies of 11.8% for Great Britain by the final year of CP5. These efficiencies are projected to come from a range of initiatives, many of which are common for maintenance of different asset types. They include improved asset information management, a more targeted risk-based approach, better programming of work, greater multi-skilling, better management of possessions, improved rapid response and adoption of remote condition monitoring (for example on level crossings).

Civils and buildings

8.146 Network Rail's plans for civils maintenance are set out in Table 8.7.

Table 8.7: Network Rail's plans, civils and buildings maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Pre-efficient expenditure	-	82	82	82	81	82	408
Efficiency	-	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Post-efficient expenditure	35	82	82	82	81	82	408

8.147 Activities associated with maintaining structures, earthworks and buildings are largely reported within the renewals budgets. The only activities reported as 'maintenance' are examinations and assessments which are currently subcontracted out through the national Civil Engineering Framework Agreement (CEFA). The CEFA contract covers inspection of assets such as bridges, tunnels, stations, lineside buildings, earthwork cuttings and slopes. Network Rail is restructuring and retendering this arrangement for CP5.

8.148 In its SBP submission, Network Rail treated all CEFA costs in CP5 as maintenance. In the final year of CP4 £35m of CEFA costs are treated as maintenance and £49m are treated as renewals. Total CEFA costs remain steady over CP4 and CP5 at slightly over £80m.

8.149 Network Rail has not forecast efficiencies associated with examinations and assessments during CP5.

Electrical power and fixed plant

8.150 Network Rail's plans for electrical power and fixed plant maintenance are set out in Table 8.8.

Table 8.8: Network Rail's plans, electrical power and fixed plant maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Pre-efficient expenditure	-	94	101	104	105	108	512
Efficiency	-	9.6%	3.7%	3.5%	1.2%	2.2%	18.9%
Post-efficient expenditure	73	85	88	87	87	88	435

8.151 Network Rail forecasts that its pre-efficient expenditure on maintenance of electrification and plant assets will increase substantially during CP5. This is due to new electrification assets being delivered through widespread enhancement works. The Western route is forecast to see a trebling of expenditure due to Great Western electrification, and Wales and East Midlands routes will also require increased maintenance activity due to enhancement works. Increased activity is also driven by additional cable testing work to comply with legislative requirements.

8.152 Network Rail's maintenance plans for electrical power and fixed plant are largely based on historical headcount with overlays applied for maintenance of new assets and increased efficiencies. Efficiencies are projected to be generated by activity reductions from initiatives such as improved planning and targeting of work, adoption of improved remote condition monitoring and application of risk based maintenance. Unit cost efficiency initiatives include developing a multi-skilled workforce, improving resourcing strategy and improving possession strategy. Network Rail projects electrification and fixed plant maintenance efficiencies of 18.9% for Great Britain by the final year of CP5.

Telecommunications

8.153 Network Rail's plans for telecoms maintenance incurred by the routes (i.e. excluding the maintenance costs incurred by NRT) are set out in Table 8.9.

Table 8.9: Network Rail's plans, telecoms maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Pre-efficient expenditure	-	22	22	21	21	21	107
Efficiency	-	3.9%	3.7%	2.6%	3.3%	5.0%	17.1%
Post-efficient expenditure	21	21	20	19	19	18	97

8.154 Telecoms maintenance activity will increase at the start of CP5 due to the increased asset base driven by the FTN / GSM-R project. During the period maintenance requirements will be reduced as obsolete assets are removed. Telecoms maintenance efficiencies are forecast to come from increased productivity with more renewals work being delivered and charged out.

Other Network Operations maintenance

8.155 Network Rail's plans include significant expenditure against other maintenance cost items, such as indirect staff within the routes and at headquarters, route asset management teams, asset management services and national delivery service.

8.156 Asset management services costs in maintenance include the costs associated with the asset information directorate, asset management technical services and asset management telecoms. Across support and maintenance activities, asset management services are forecast to deliver 20% efficiencies.

8.157 National Delivery Service (NDS) forms part of Network Rail's corporate services function and is its national logistics and procurement service provider. Its maintenance activities include operation and servicing of strategic plant (e.g. rail grinding and infrastructure monitoring plant), support logistics (e.g. train network runs and shunting) and associated staff costs. NDS activities are forecast to deliver 15% efficiencies during the period (over both support and maintenance activities).

Maintenance – route specific issues

8.158 All routes have assessed their maintenance expenditure requirements for CP5 through resource based plans. The routes have generally accepted central proposals for efficiency opportunities and, in some cases, set out their own initiatives. Network Rail's post-efficient plans are set out by route in Table 8.10.

Table 8.10: Network Rail's post-efficient maintenance plans, by route

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Anglia	99	104	101	100	98	92	494
East Midlands	50	57	58	56	54	54	280
Kent	67	75	72	70	70	66	352
LNE	154	161	161	157	155	155	789
LNW	252	280	269	267	259	250	1,326
Scotland	89	108	106	104	104	102	525
Sussex	52	58	60	54	52	49	273
Wales	52	62	61	61	61	60	306
Wessex	78	87	84	81	76	73	402
Western	87	110	109	107	105	103	535

Note: CP5 expenditure includes additional costs associated with reactive maintenance.

8.159 We highlight some of the key route specific factors included within the SBP below.

Anglia

8.160 The Anglia route plan includes incremental maintenance expenditure required for Crossrail and the introduction of an additional OLE team on the North London Line.

8.161 Some local efficiencies have been identified, including those resulting from delivery of capital expenditure, improved S&T response, rationalisation of depots and reorganisation of works delivery.

East Midlands

8.162 The route plan includes significant maintenance efficiencies but these will be offset by the increased maintenance requirements introduced by the Thameslink programme and electrification of the Midland Main Line.

8.163 Forecast efficiencies are in line with central submissions and include gains through remote condition monitoring and plain line pattern recognition.

Kent

8.164 The Kent route plan includes extra resource for measuring the condition of signalling power supply cables. Its electrical power asset base will increase due to enhancements including Thameslink, Crossrail and other HLOS associated power supply upgrades.

8.165 Kent's maintenance costs are influenced by a high number of structures which require additional maintenance resource (bridges which support the rails on longitudinal timbers) and by a high density of S&C with difficult access. It is also proposing changes to practice through, for example, mechanised vegetation management, more remote condition monitoring, use of plain line pattern recognition and mobile maintenance units.

LNE

8.166 The LNE route maintenance plan considers the requirement for increased resource to service the new electrification assets between Leeds, Selby and at Colton Junction. It also includes the introduction of mobile maintenance units to make best use of track access opportunities, and two dedicated drainage teams to mitigate the risk of bank slips in extreme weather. The impact of NOS is considered to be cost neutral. The route sees real efficiency gains to be made through better front-line planning and assumes further efficiencies will be delivered through the centrally identified initiatives.

LNW

8.167 LNW's plan is generally in line with policies and centrally identified efficiencies but some further efficiencies have been identified by the route. It proposes routine helicopter patrols of OLE, enhancing the train-borne collection of conducting systems information and efficiencies in the management of track geometry.

8.168 The scope of the route's maintenance activity is increased due to enhancement works including electrification in the north-west and at the south end of LNW. The plan includes a significant increase in resource for testing of cables and for introduction of dedicated lookout operated warning system teams.

Scotland

8.169 The Scotland route plan commits to delivering the volumes of maintenance work determined by the asset management organisation to reflect asset policy. It has made some changes to route criticality classifications to reflect their importance to the Scottish network.

8.170 The route plan includes a significant increase in volumes of track work such as tamping, rail replacement and fencing to address areas of non-compliance and remove temporary non-compliances. The higher volumes partly reflect an increased asset base due to enhancements and the Borders rail link.

8.171 The route has carried out an aerial survey of vegetation to target its vegetation management programme to return the asset to a sustainable position. Its drainage plans are also based on improved asset knowledge from the national drainage survey and include routine drainage surveys within the maintenance remit.

8.172 Further electrification resource has been planned to deliver increased work driven by improved asset knowledge, signalling power cable testing requirements and enhancement schemes such as EGIP and the Borders rail link.

8.173 The plan includes consideration of the impact of central efficiency initiatives which particularly drive efficiency for track and electrification. Although centrally derived efficiencies are thought to deliver benefits for signalling and telecoms delivery, the plan assumes that they will not generate savings to headcount, as resource requirements are driven by the need to provide an emergency response. The route has developed a local initiative to move to two person signalling and telecoms teams to deliver efficiency.

Sussex

8.174 The route has, in the main, accepted centrally identified maintenance efficiencies and identified some additional local efficiencies. Its plans include the consolidation of delivery units into one route-wide delivery unit and the rationalisation of depots. Track efficiencies are envisaged from higher productivity of new on-track machines and better rail management (tamping and rail-head grinding). Signalling efficiencies are lower than national efficiencies due to the plan not to fit lightweight structures until halfway through CP5.

8.175 In some areas it identifies drivers of increased work load, for example where there is an increase in the asset base, as is the case with the GSM-R network.

Wales

8.176 The Wales route maintenance plan aims to deliver central policy and to implement centrally identified maintenance efficiencies. It identifies that enhancement schemes will impact the route's maintenance requirements for electrification.

Wessex

8.177 The route considers its maintenance plan to be in line with asset policy but identifies a need to improve track maintenance in CP5 as it recognises that it may not meet the CP4 exit targets. Additional volumes of track maintenance are forecast in response to tonnage increases following enhancements in CP4. Vegetation management is identified as a particular problem for the route, with a proposed programme of lineside de-vegetation and weed killer treatment.

Western

8.178 Western's plans for maintenance in CP5 are driven by major investments over the period, including Crossrail, Reading remodelling and electrification. Maintenance activities will be impacted by increased traffic and resulting degradation rates, an increased asset base and a reduction in access. The route will significantly increase its electrical power resource to maintain the increased asset base. In other asset disciplines maintenance and renewal works carried out in possessions will be impacted by the increased need for electrical isolations towards the end of the period.

8.179 Efficiencies in the Western plan are aligned with the nationally identified strategies and include the move towards risk based maintenance regimes, increased mechanisation and a multi-skilled workforce. The route sees key opportunities in maintaining assets as systems (particularly S&C), taking a holistic approach to the risks being controlled.

Network Rail's renewals plans

8.180 This section covers Network Rail's plans for renewals in CP5. Its proposed volumes of asset renewal during the period are set out in Tables 8.11 to 8.13. These tables set out some of the key volumes planned by Network Rail; they do not capture all volumes proposed. We have worked with Network Rail to develop appropriate renewal volume indicators for CP5 and these will be included in its delivery plan. The company's planned renewals expenditure and efficiencies are set out in Tables 8.14 to 8.16.

Volumes

8.181 Network Rail has forecast track renewals volumes for CP5 based on the new ways of working defined by its track policy. This has made comparison of volumes to CP4 difficult. Conversion of the volumes to kilometres of rail, sleeper and ballast renewal, and number of S&C units show that the company plans to deliver fewer kilometres of

rail and sleepers, more kilometres of ballast and significantly more S&C units. These changes are mainly driven by the new policy, but also include accelerated renewals.

8.182 Signalling volumes, as measured in Signalling Equivalent Units (SEUs), are forecast to be much higher in CP5 than in CP4. Total SEU renewals almost double, from approximately 5,800 in CP4 to approximately 11,000 in CP5. The increase is largely driven by renewals associated with delivery of NOS. The SEU volume for CP5 shows a marked increase in ETCS delivered units, in line with the national strategy. The number of level crossings renewals to be delivered also increases from 123 in CP4 to 499 in CP5, again largely driven by NOS and requirements for obstacle detection.

8.183 Network Rail forecasts that its new civils asset policy requires a step-change in civil asset renewals volumes, with increases relative to CP4 in almost all work types. Volumes of underbridge works are forecast to increase by 101%, volumes of overbridge works by 7%, volumes of tunnels works by 58% and volumes of coastal and estuarial defence works by 141%.

8.184 Volumes of renewals relating to buildings assets have not been captured during CP4 but have been forecast for CP5 for franchised and managed station assets.

8.185 Plans for electrification and fixed plant show increased volumes of conductor rail and low voltage DC (LVDC) distribution cables compared to CP4. AC distribution volumes are significantly lower than in CP4 as are all DC distribution volumes with the exception of LVDC distribution cables. A high volume of signalling power cable renewals is planned to address a recently identified backlog of work. The plans include new volume measures for CP5, including volumes of overhead line mid-life refurbishments and of signalling power cable renewals.

Table 8.11: Network Rail's planned renewal volumes (subset of main categories), Great Britain

Volumes	Units	CP5					CP5
		2014-15	2015-16	2016-17	2017-18	2018-19	Total
Track							
Conventional plain line, heavy refurb (concrete, MO)	km	108	162	218	227	211	926
Conventional plain line, rail renewal	km	267	239	272	267	250	1,294
Conventional plain line, single rail	km	36	33	37	39	36	180
Conventional plain line, steel relay	km	11	11	16	22	10	70
Conventional plain line, complete Trax	km	211	194	188	204	205	1,001
High output, ABC	km	235	195	171	137	178	915

Volumes	Units	CP5					CP5
		2014-15	2015-16	2016-17	2017-18	2018-19	Total
High output, heavy refurb (concrete, HO)	km	0	67	56	0	48	171
High output, rail sleeper relay	km	126	83	191	187	171	757
Plain line refurb, heavy (other)	km	41	38	36	39	35	189
Plain line refurb, medium (concrete)	km	191	205	210	214	234	1,054
Plain line refurb, medium (other)	km	169	175	170	194	191	898
S&C, full renewal	S&C	325	289	343	272	282	1,510
S&C, heavy refurb	S&C	263	324	393	427	432	1,841
S&C, medium refurb	S&C	428	431	435	410	424	2,130
Signalling							
Conventional resignalling	SEU	1,742	2,769	2,559	1,715	1,048	9,832
ETCS resignalling	SEU	0	80	115	146	868	1,209
Level crossings	no.	58	95	137	124	85	499
Civils							
Overbridges	sq ms	10,012	10,012	10,012	10,012	10,012	50,062
Underbridges	sq ms	156,530	153,468	154,031	153,463	156,846	774,337
Tunnels	sq ms	24,627	24,627	24,627	24,627	24,627	123,136
Buildings (franchised stations)							
Building - Roof Structure	sq ms	20,493	4,934	2,660	2,879	2,549	33,515
Platform - Surface	sq ms	69,868	62,404	85,518	56,410	29,137	303,337
Canopy - Roof Structure	sq ms	21,195	18,093	20,729	18,305	16,058	94,380
Train Shed - Roof Structure	sq ms	30,314	10,613	22,480	2,765	450	66,622
Footbridge - Surface	sq ms	5,855	3,337	5,049	4,578	2,663	21,482
Electrical power and fixed plant							
Overhead line mid-life refurb	wire runs	59	70	70	65	52	316
Overhead line structure renewal	no.	116	158	186	63	99	621
DC distribution HV switchgear renewals	no.	17	36	3	9	3	68
DC distribution HV cable	km	47	25	28	21	21	142

Volumes	Units	CP5					CP5
		2014-15	2015-16	2016-17	2017-18	2018-19	Total
LV DC switchgear renewal	no.	82	78	70	69	34	332
Conductor rail renewal	km	40	32	40	23	15	149
Signalling power distribution	km	299	267	248	189	152	1,155
Telecoms							
SISS CIS	no.	251	565	735	531	483	2,565
SISS PA	no.	2,662	2,265	2,242	2,113	1,714	10,996
SISS CCTV	no.	1,007	1,466	1,377	394	351	4,596

Table 8.12: Network Rail's planned renewal volumes (subset of main categories), England & Wales

Volumes	Units	CP5					CP5
		2014-15	2015-16	2016-17	2017-18	2018-19	Total
Track							
Conventional plain line, heavy refurb (concrete, MO)	km	95	149	182	191	175	793
Conventional plain line, rail renewal	km	241	213	246	241	224	1,164
Conventional plain line, single rail	km	24	21	24	27	24	120
Conventional plain line, steel relay	km	3	3	8	14	2	30
Conventional plain line, complete Trax	km	176	160	154	170	171	831
High output, ABC	km	235	195	171	137	178	915
High output, heavy refurb (concrete, HO)	km	0	67	56	0	48	171
High output, rail sleeper relay	km	126	83	169	165	149	692
Plain line refurb, heavy (other)	km	41	38	36	39	35	189
Plain line refurb, medium (concrete)	km	112	127	132	136	156	662
Plain line refurb, medium (other)	km	127	133	128	152	149	689
S&C, full renewal	S&C	298	262	316	245	255	1,376
S&C, heavy refurb	S&C	238	299	368	402	407	1,714
S&C, medium refurb	S&C	385	388	392	367	381	1,913

Volumes	Units	CP5					CP5
		2014-15	2015-16	2016-17	2017-18	2018-19	Total
Signalling							
Conventional resignalling	SEU	1,725	2,514	1,867	1,594	966	8,666
ETCS resignalling	SEU	0	80	115	146	868	1,209
Level crossings	no.	53	95	126	123	81	478
Civils							
Overbridges	sq ms	8,941	8,941	8,941	8,941	8,941	44,706
Underbridges	sq ms	133,845	132,073	132,391	130,723	133,470	662,504
Tunnels	sq ms	20,400	20,400	20,400	20,400	20,400	102,000
Buildings (franchised stations)							
Building - Roof Structure	sq ms	20,173	4,669	2,638	2,879	2,549	32,908
Platform - Surface	sq ms	69,868	62,404	85,408	56,410	29,137	303,227
Canopy - Roof Structure	sq ms	21,195	18,093	20,729	18,281	16,058	94,356
Train Shed - Roof Structure	sq ms	30,314	10,613	22,400	2,395	0	65,722
Footbridge - Surface	sq ms	5,855	3,337	5,049	4,578	2,663	21,482
Electrical power and fixed plant							
Overhead line mid-life refurb	wire runs	56	67	67	62	49	301
Overhead line structure renewal	no.	113	155	183	60	96	606
DC distribution HV switchgear renewals	no.	17	36	3	9	3	68
DC distribution HV cable	km	47	25	28	21	21	142
LV DC switchgear renewal	no.	82	78	70	69	34	332
Conductor rail renewal	km	40	32	40	23	15	149
Signalling power distribution	km	272	240	220	149	121	1,001
Telecoms							
SISS CIS	no.	228	565	727	502	449	2,470
SISS PA	no.	2,662	1,471	2,242	2,113	1,714	10,202
SISS CCTV	no.	1,007	1,466	1,377	394	351	4,596

Table 8.13: Network Rail's planned renewal volumes (subset of main categories), Scotland

Volumes	Units	CP5					CP5
		2014-15	2015-16	2016-17	2017-18	2018-19	Total
Track							
Conventional plain line, heavy refurb (concrete, MO)	km	13	13	36	36	36	134
Conventional plain line, rail renewal	km	26	26	26	26	26	130
Conventional plain line, single rail	km	12	12	12	12	12	61
Conventional plain line, steel relay	km	8	8	8	8	8	40
Conventional plain line, complete Trax	km	34	34	34	34	34	171
High output, ABC	km	0	0	0	0	0	0
High output, heavy refurb (concrete, HO)	km	0	0	0	0	0	0
High output, rail sleeper relay	km	0	0	22	22	22	65
Plain line refurb, heavy (other)	km	0	0	0	0	0	0
Plain line refurb, medium (concrete)	km	78	78	78	78	78	392
Plain line refurb, medium (other)	km	42	42	42	42	42	209
S&C, full renewal	S&C	27	27	27	27	27	134
S&C, heavy refurb	S&C	25	25	25	25	25	127
S&C, medium refurb	S&C	43	43	43	43	43	217
Signalling							
Conventional resignalling	SEU	17	255	692	121	82	1,167
ETCS resignalling	SEU	0	0	0	0	0	0
Level crossings	no.	5	0	11	1	4	21
Civils							
Overbridges	sq ms	1,071	1,071	1,071	1,071	1,071	5,356
Underbridges	sq ms	22,685	21,395	21,639	22,740	23,375	111,834
Tunnels	sq ms	4,227	4,227	4,227	4,227	4,227	21,137
Buildings (franchised stations)							
Building - Roof Structure	sq ms	320	265	22	0	0	607

Volumes	Units	CP5					CP5
		2014-15	2015-16	2016-17	2017-18	2018-19	Total
Platform - Surface	sq ms	0	0	110	0	0	110
Canopy - Roof Structure	sq ms	0	0	0	24	0	24
Train Shed - Roof Structure	sq ms	0	0	80	370	450	900
Footbridge - Surface	sq ms	0	0	0	0	0	0
Electrical power and fixed plant							
Overhead line mid-life refurb	wire runs	3	3	3	3	3	15
Overhead line structure renewal	no.	3	3	3	3	3	15
DC distribution HV switchgear renewals	no.	0	0	0	0	0	0
DC distribution HV cable	km	0	0	0	0	0	0
LV DC switchgear renewal	no.	0	0	0	0	0	0
Conductor rail renewal	km	0	0	0	0	0	0
Signalling power distribution	km	27	27	28	40	31	154
Telecoms							
SISS CIS	no.	23	0	9	29	34	94
SISS PA	no.	0	794	0	0	0	794
SISS CCTV	no.	0	0	0	0	0	0

Efficiency

8.186 Network Rail has proposed CP5 exit renewals efficiencies of 15.8% for the network, 15.5% for Scotland and 15.9% for England & Wales[170].

8.187 The company has set out plans for its renewals efficiencies in a series of business cases. Key areas for delivering efficiencies are:

(a) development of policies which Network Rail considers to be better optimised for minimum whole life cost;

(b) asset information efficiencies to be delivered by ORBIS;

(c) better scheduling of work;

[170] In Network Rail's SBP it presented renewals efficiency for 'core' asset renewals only, which it defined as track, signalling, civils, buildings, telecoms, and electrification and plant. It presented figures excluding the efficiencies which are built into its CP5 asset policies. Figures presented here are for all renewals expenditure and include the efficiencies which are built into its CP5 policies.

(d) more effective contractual relationships;

(e) standardisation of processes; and

(f) multi-skilling of staff.

8.188 Efficiencies are discussed by main asset category later in the chapter.

Expenditure

8.189 Network Rail forecasts renewals expenditure of £13.6bn across the network, £1.48bn in Scotland and £12.1bn in England & Wales. This level of expenditure is considerably higher than in CP4 despite efficiencies achieved in CP4 and forecast to the end of CP5, and despite an accounting change moving costs from renewals to maintenance. Network Rail's key proposals which drive this increase in expenditure are:

(a) the rationalisation and centralisation of signalling control through implementation of NOS;

(b) a large increase in proposed expenditure on civil structures and earthworks renewals resulting from the application of the updated policy and a better understanding of asset condition, degradation and risk, the net effect of which is forecast to deliver a step-change improvement in the level of civil assets risk on the network;

(c) renewals brought forward from future control periods to deliver work more effectively, for example as the result of enhancement schemes, or to make use of access before it is limited by traffic growth;

(d) proposed expenditure on improving asset information systems and management, ORBIS; and

(e) a proposal for additional investment schemes where Network Rail believes there is a business case. For example it has proposed additional investment in improved information technology, Research & Development (R&D), safer and faster isolations and a new system to provide alerts to track workers.

Table 8.14: Network Rail's plans, renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	2,989	3,149	3,196	3,119	3,060	-	15,513
Efficiency	-	8.3%	2.8%	2.8%	1.5%	1.4%	-	15.8%
Post-efficient expenditure	2,784	2,741	2,808	2,771	2,663	2,576	12,833	13,559

Table 8.15: Network Rail's plans, renewals, England & Wales

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	2,672	2,756	2,839	2,795	2,743	-	13,805
Efficiency	-	8.1%	2.9%	2.6%	1.6%	1.5%	-	15.9%
Post-efficient expenditure	2,510	2,455	2,458	2,465	2,388	2,308	11,446	12,074

Table 8.16: Network Rail's plans, renewals, Scotland

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	316	393	357	325	316	-	1,708
Efficiency	-	9.6%	1.4%	4.1%	0.8%	0.3%	-	15.5%
Post-efficient expenditure	273	286	350	305	275	267	1,387	1,484

Outputs

8.190 Network Rail has forecast the asset condition and performance metrics which its policies will deliver as described in chapter 3. For both condition and performance its approach is, in the main, to keep asset specific metrics constant at the level forecast for the end of CP4. However, for civil structures, earthworks and off-track it is planning an improvement in overall condition. For track, number of failures per year causing delays of greater than 10 minutes is forecast to increase marginally. For electrification and plant the same metric is forecast to increase by approximately 10%. For structures, the number of open risk items with a risk score of greater than 20 is expected to reduce significantly by the end of CP5.

Renewals by asset

Track

8.191 Network Rail's plans for track renewals are shown in Table 8.17.

Table 8.17: Network Rail's plans, track renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	780	769	833	794	779	-	3,954
Efficiency	-	7.6%	3.6%	2.3%	3.2%	3.5%	-	18.8%
Post-efficient expenditure	816	720	684	725	669	633	3,762	3,431

8.192 Network Rail's proposed track policy is intended to maintain track performance throughout CP5 at the level targeted for the end of CP4. It proposes an increased focus on refurbishment and maintenance options as alternatives to full renewal, and increased focus on S&C to target work at more critical assets and reduce risk. This approach leads to a reduced volume of rail and sleeper renewal but an increased volume of ballast and S&C renewal.

8.193 Track renewal expenditure (excluding off-track assets) is forecast to be £3.08bn (£3.55bn before efficiencies) in CP5, compared with £3.52bn expenditure expected in CP4.

8.194 The off-track policy moves from a reactive approach to failed assets to a proactive one using clear risk-based intervention criteria and this is forecast to result in expenditure of £0.35bn (£0.41bn before efficiencies) in CP5, much greater than the £0.24bn planned in CP4.

8.195 The track renewals expenditure plans include £325m of accelerated renewals. £169m of this relates to renewals brought forward on the Western route in anticipation of engineering access constraints following electrification and completion of Crossrail. £64m of the accelerated renewals are in LNE where carrying out track renewals prior to electrification enhancements will reduce unit costs. Anglia is planning £30m of accelerated track renewals to benefit from synergies with the Crossrail programme. Wessex, Sussex, Kent and East Midlands routes have included accelerated renewals driven by increased tonnage as a result of enhancements.

8.196 Network Rail is planning track renewals efficiency of 18.8% by the end of CP5. This is projected to come from improved supply chain management, revision of standards and rules, reduction in site overheads, and a transition to design and build contracts. Contractor resource utilisation will be improved through better workbank visibility and

better profiling of work through weeknights to facilitate a full-time, more highly skilled workforce.

8.197 Off-track renewals efficiencies of 19.2% are planned by the end of CP5.

Signalling

8.198 Network Rail's plans for signalling renewals are shown in Table 8.18.

Table 8.18: Network Rail's plans, signalling renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	827	888	845	731	636	-	3,927
Efficiency	-	8.5%	4.5%	5.1%	4.2%	4.7%	-	24.2%
Post-efficient expenditure	533	757	776	701	581	482	2,421	3,296

8.199 Its signalling renewals plans are influenced by three main drivers: condition driven renewals, the implementation of NOS and the industry move to ETCS. It has built its plans by overlaying programmes of work on to the base level of renewals work required by adoption of CP5 policy.

8.200 NOS drives a large increase in signalling renewals spend in CP5 but its benefits are realised in operating expenditure. The move to ETCS should generate other benefits in the long-term including reducing the lineside assets and related work, improving capacity and improving safety.

8.201 Proposed signalling renewal expenditure for CP5 is £3.30bn (£3.93bn before efficiencies), compared to £2.42bn planned in CP4.

8.202 Signalling renewals efficiencies of 24.2% are forecast to be delivered by the final year of CP5. Some of these are forecast to be delivered through scope efficiencies from its CP5 policies and enabled by the ORBIS asset information programme. The remainder are built into its framework contracts and include efficiencies from collaborative / partnership working, efficiency initiatives identified by Network Rail and efficiencies agreed to be delivered by the contractor.

Civils

8.203 Network Rail's plans for civils renewals are shown in Table 8.19.

Table 8.19: Network Rail's plans, civils renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	592	576	575	572	590	-	2,904
Efficiency	-	4.6%	2.1%	2.2%	3.0%	2.7%	-	13.8%
Post-efficient expenditure	397	565	539	525	506	509	1,944	2,644

8.204 Network Rail has forecast civils expenditure of £2.64bn (£2.90bn before efficiencies) in CP5. This compares to planned expenditure of £1.94bn in CP4. The increase in proposed expenditure is driven by projected costs from implementation of CP5 policy and improved understanding of the civils asset base. The new policy is intended to deliver a lower level of risk on the network.

8.205 Network Rail's plans include civils renewals efficiency of 13.8% by the final year of CP5. Its identified efficiency initiatives are largely common to structures and earthworks. A key enabler of efficiency is planned to be improved asset information which is expected to be more readily available, to enhance decision making and to be delivered through improved asset monitoring regimes. Better business planning and better collaboration between asset teams will improve work packaging to maximise possession productivity. Innovative ways of delivering high volumes of work and unit cost reductions from improved supply chain management also contribute to projected efficiencies.

Buildings

8.206 Network Rail has forecast buildings expenditure of £1.19bn in CP5 (£1.39bn before efficiencies) as shown in Table 8.20. This compares to a forecast expenditure of £1.28bn in CP4.

Table 8.20: Network Rail's plans, buildings renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	334	311	285	250	214	-	1,394
Efficiency	-	9.6%	4.2%	2.0%	3.4%	4.3%	-	21.4%
Post-efficient expenditure	216	302	270	242	205	168	1,279	1,187

8.207 Network Rail's plans include buildings renewals efficiencies of 21.4% by the final year of CP5. These efficiencies are expected to come from scope efficiencies from its CP5

policies, improved asset management systems, improved planning of work and improved tendering of work.

8.208 Franchised stations account for over half of the total funding requested for buildings and plans have been developed from a modelled approach. Lineside buildings, light maintenance depots and depot plant have also been modelled. Expenditure requirements for the other asset types have been planned using historic levels of expenditure.

Electrical power and fixed plant

8.209 Network Rail has forecast electrical power and fixed plant expenditure of £0.92bn in CP5 (£1.18bn before efficiencies), as shown in Table 8.21. This compares to a forecast expenditure of £0.80bn in CP4.

Table 8.21: Network Rail's plans, electrical power and fixed plant renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	284	271	248	199	176	-	1,178
Efficiency	-	14.6%	6.1%	4.1%	5.4%	1.2%	-	28.2%
Post-efficient expenditure	280	243	217	191	144	127	797	922

8.210 The volumes of renewal work proposed for CP5 are markedly different to those forecast to be delivered during CP4. This is a result of significant changes to the asset policy, an increased focus on electrical safety, higher volume forecasts to maintain outputs in CP5 and the impact of enhancement schemes. For example, the CP5 asset policy changes the mix of overhead line renewals compared to CP4. The policy results in a lower volume of re-wiring and campaign changes but a new requirement for mid-life refurbishments as supported by whole life cost analysis.

8.211 Efficiency for electrical power and fixed plant is projected to be 28.2% by the final year of CP5. This efficiency is proposed to be delivered through four key initiatives:

(a) programme optimisation: providing an accurate forward view of planned work to suppliers enabling improved efficiency in the supply chain;

(b) standard scheme design: development of standard designs, where applicable, to reduce design effort;

(c) procurement: using standard specifications and market stimulation to expand the potential supplier base and increase competition; and

(d) delivery model: optimising the mix of work between internal resources and contractors.

Telecommunications

8.212 Network Rail plans expenditure of £0.41bn on telecoms renewals in CP5 (£0.47bn before efficiencies), as shown in Table 8.22.

Table 8.22: Network Rail's plans, telecoms renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	132	103	100	74	55	-	465
Efficiency	-	8.1%	3.0%	3.3%	2.0%	3.1%	-	18.2%
Post-efficient expenditure	236	122	92	86	63	45	1,150	408

8.213 The plans for telecoms show a significant reduction from CP4 levels of expenditure. This is due to large programmes of work related to GSM-R and FTN undertaken during CP4 coming to an end.

8.214 Efficiencies of 18.2% are projected by the final year of CP5 for telecoms renewals. These are forecast to be delivered through scope efficiencies from its updated CP5 policies, improvements to workbank planning, efficiencies from adoption of different technologies and an improved approach to design.

Wheeled plant and machinery

8.215 Network Rail plans renewals expenditure of £0.60bn on wheeled plant and machinery in CP5 (£0.64bn before efficiencies) as shown in Table 8.23.

Table 8.23: Network Rail's plans, wheeled plant and machinery renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	168	122	123	131	94	-	637
Efficiency	-	8.3%	-1.9%	-1.6%	0.0%	0.2%	-	5.3%
Post-efficient expenditure	86	154	114	117	124	89	346	598

8.216 The plans for wheeled plant and machinery show an increase in expenditure compared to CP4. This is largely driven by increased expenditure on road-rail vehicles and provision of additional high output fleets.

Other renewals

8.217 Network Rail has put forward proposals for renewal expenditure in other areas. The majority of this is for investment in schemes which the company believes will deliver value for money and/or safety benefits in the long-term.

IM renewals

8.218 Network Rail plans expenditure of £613m on IM renewals in CP5, an increase of £146m compared to CP4.This excludes expenditure on ORBIS. The proposal is based on benchmarking work that the company has carried out, which indicates higher levels of investment by other organisations.

Property

8.219 Property renewals include expenditure on maintenance delivery units, offices and commercial property. The SBP includes expenditure of £124m on property renewals, a reduction of £130m on expenditure in CP4.

Asset information strategy - ORBIS

8.220 The SBP includes plans for the asset information improvement programme ORBIS as discussed previously.

Intelligent Infrastructure

8.221 Network Rail has included expenditure of £95m in its plans for the further roll-out of remote condition monitoring as discussed previously.

Systems for safer working

8.222 The SBP includes a proposal for £100m in CP5 to deliver new technology to provide protection to staff working trackside.

Faster and safer isolations

8.223 Network Rail's plans include £230m proposed expenditure to deliver infrastructure which will allow electrical isolations to be carried out more efficiently and more safely on both the DC and AC networks.

Research and Development

8.224 Network Rail has included £300m proposed expenditure to increase its R&D activity. This level of expenditure has been developed on the basis of the company's benchmarking of expenditure across all sectors.

Renewals – route specific issues

8.225 Route specific renewals plans are set out below, highlighting any deviation from asset policy and central plans.

Table 8.24: Network Rail's plans, post-efficient renewals by route

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Anglia	245	202	231	277	240	203	1,153
East Midlands	144	162	145	125	119	107	659
Kent	221	228	222	199	195	207	1,052
LNE	449	413	453	429	473	502	2,270
LNW	566	536	557	571	534	525	2,722
Scotland	273	286	350	305	275	267	1,484
Sussex	191	168	184	159	172	154	838
Wales	173	193	155	163	120	112	742
Wessex	209	216	214	261	250	210	1,149
Western	312	337	298	280	285	288	1,488

Anglia

8.226 Anglia route's most significant challenges during CP5 are the delivery of works relating to Crossrail, the delivery of level crossings safety improvements and the migration of signalling operations to the new route operating centre at Romford. The route sees potential opportunities for deep alliances arising from the re-franchising of Greater Anglia and Essex Thameside. Maintenance and renewals for buildings is already part of the Greater Anglia franchise.

8.227 The route's track plan addresses ageing S&C and poor track quality, with the primary aim being to deliver reliability on the high criticality routes and remove the risk of Temporary Speed Restrictions (TSRs) due to geometry faults and rough rides. An increased percentage of S&C units will be treated either by renewal or refurbishment. Re-railing volumes are slightly higher than modelled to address the high levels of rail defects on the route.

8.228 Proposed signalling work is driven primarily by NOS.

8.229 The route delivery plan contains significant civils renewals including works on major structures (for example swing bridges). The plan notes that full compliance with the new policy will not be achieved until CP6. Buildings work includes major roofing activity at Liverpool Street Station which will continue into CP6. Overall the route's station activity is lower than in CP4 because of the full maintenance and renewal leases awarded to the Greater Anglia franchise which has been assumed to continue when the current franchise is renewed in 2014.

8.230 The reliability of the overhead line equipment in Anglia is considered low and some substation components are being renewed due to obsolescence. A significant volume of lineside 650v signalling power supply equipment will be replaced. The route is

continuing the re-wiring of 1940s overhead line equipment between Liverpool Street and Shenfield / Southend.

8.231 There are few major variations to the national asset policies. Track re-railing volumes in the first two years have been increased to address rolling contact fatigue on Essex Thameside and rail defects between Ely and Peterborough.

East Midlands

8.232 The East Midlands asset management plan is heavily influenced by two key issues: the development of a signalling workbank to deliver NOS and HLOS requirements, and the electrification of the route between Bedford, Corby, Nottingham and Sheffield. Implementation of NOS results in a significant acceleration of signalling renewals to facilitate major capacity schemes. The electrification of the route results in the requirement to carry out track lowering schemes, bridge reconstruction for gauge clearance and some advancement of renewals works in signalling and structures.

8.233 The route has deviated from policy in certain areas. All bridges will be included in the bridge painting and vegetation clearance programmes.

8.234 Rail renewal volumes are higher than required by policy, driven by the decision to remove all pre-1976 rail. (The rail manufacturing process used before 1976 resulted in rail which is far more prone to developing defects.)

Kent

8.235 Kent's route plan centres on the major challenges around delivery of the Thameslink programme and gaining sufficient access in order to carry out routine maintenance and renewals activities. This is an issue for the London Bridge area and for a number of works requiring high levels of access, such as Charing Cross and Cannon St bridges, Sevenoaks and Bo-Peep tunnels, the S&C renewals programme, the East Kent re-signalling project and power supply upgrade projects.

8.236 Track geometry in the Kent route has been below target recently due to a combination of drought conditions and insufficient track maintenance (such as tamping and stoneblowing activities). The route's track plans propose an increase in renewal, refurbishment and reballasting of S&C, particularly on the high criticality routes. No high output ballast cleaning is proposed. Plain line refurbishment will be in line with policy and will include removal of obsolete components. Rail renewal plans concentrate on the removal of old and defective rail on the New Cross Gate to Norwood route which sees an increase in tonnage.

8.237 Kent's structures proposals are driven by bridge expenditure including schemes at the major river crossings at Charing Cross and Cannon Street. Where there is a business case, Kent is seeking to replace bridge decks which use longitudinal timbers to provide rail support as this system requires increased maintenance. Earthworks are an issue for the Kent route: the plan reports that 6% of its 478 miles of earthworks are

classified as ‘poor’. The route also has to deal with the problem of summer shrinkage on clay embankments, which can cause track quality problems.

8.238 Signalling renewals are being heavily driven by the Thameslink programme, NOS and migration of control to the new ROCs.

8.239 The route plan does not include any significant variations from the national asset policies.

LNE

8.240 The LNE route asset management plan is dominated by renewal requirements in track, signalling and civils. The track plan incorporates a degree of asset rationalisation and supports the central policy with a shift from renewal to refurbishment depending upon criticality. A significant increase in S&C renewal interventions is planned, including in the Doncaster and Colton areas. The route plan includes replacement of all pre-1976 rail on high criticality (criticality band 1) lines.

8.241 For signalling, the plan sees the introduction of ETCS on the south end of the East Coast Main Line (ECML) together with a number of renewals and re-controls that will be delivered in line with the NOS strategy.

8.242 The route’s plan for civil assets includes an increase in expenditure over previous control periods to address a backlog of work associated with earthworks and to address deficiencies in capability within the structures portfolio. The route plan identifies a significant issue with historic mineworkings which require continuing investigation and remediation to mitigate the risk.

8.243 The route has proposed additional investment in earthworks beyond the level required by CP5 policy. This is to improve the overall condition of the asset base to a sustainable level before fully implementing the new policy.

8.244 For electrification and plant, the route is planning to install additional signalling power supply back-up at key locations on the ECML and to replace signalling power cables to improve overall reliability. Additional drainage works over and above asset policy requirements are proposed to reduce operational risk. In addition, the route anticipates accelerating re-wiring of overhead line equipment where delivery efficiencies can be achieved alongside power supply enhancement works.

LNW

8.245 The LNW route plan includes extensive re-signalling work, including at Birmingham New Street, Watford and Wolverhampton. It proposes insourcing of repetitive civil structures inspections.

8.246 The plan proposes variances from the asset policies in a number of areas. This includes acceleration of renewals in several asset categories to align with proposed enhancements. For track assets the route will not remove all pre-1976 rail before the end of CP5. For civil assets it proposes: waterproofing of underbridges where track

and formation renewals are being undertaken; improved drainage maintenance access; accelerated replacement of long timber bridges to deliver a modern structure supporting conventional ballasted track; and enhanced bridge strike mitigation measures. For buildings assets the route proposes enhanced measures to reduce energy consumption at stations, a programme of platform reconstructions to address variance to stepping distance standards and rationalisation of route accommodation. For electrification and plant it proposes some rationalisation and removal of obsolescent assets.

Scotland

8.247 The Scotland route asset management plan is dominated by renewal requirements in track, signalling and civils. Its plans for track include the introduction of high and medium output plant on the ECML and WCML, renewal of slab track in Queen Street Tunnel and increased volumes of off-track work. Its plans for signalling include the migration of Motherwell Signalling Centre to the West of Scotland Signalling Centre and development work associated with deployment of ETCS in CP6. Its plans for civils renewals are based on the remediation of high risk assets for which condition is poor and has been deteriorating in CP4. The civils plan for Scotland includes approximately £40m on major structures, which is approximately 40% of the network total expenditure on major structures. In the Scottish route this work is dominated by the ongoing painting and refurbishment of the Tay Bridge, new work to the Clyde Bridge and routine maintenance to the Forth Bridge which will be necessary despite the completion in CP4 of the major refurbishment work.

8.248 The plan includes some variances to asset policy and, in some cases, reflects changes to route criticality classifications based on their importance to the Scottish network. For track the route proposes higher volumes of sleeper renewal to address non-standard sleepers on high speed routes. The route's signalling plans include renewal of the signal box at Carnoustie driven by the need to renew the adjacent level crossing. For civils the route has included plans to provide slope protection netting on all tunnel approaches and to address legacy issues associated with mining. For electrification and plant the plan includes some advancement of signalling power feeder cable renewals.

Sussex

8.249 The Thameslink enhancement is a key focus of activity on the Sussex route. The condition of the track, signalling and electrification assets on the route has progressively worsened over time to the point where performance is below the PPM targets and reliability is not sufficient to meet the existing timetable. The route is proposing to increase refurbishment of track assets, in particular carrying out more ballast cleaning. It proposes to increase remote condition monitoring to enable maintenance work to be carried out on a more predictive basis. Some signalling work is being accelerated from CP6 to CP5 as a result of the NOS programme.

8.250 For track the volumes of work are in line with central policy, except where life extension of the asset is not deemed to be whole life cost effective. Sussex has proposed to increase the use of high performance rail in preparation for the Thameslink services from 2018. There are no other significant variances from the central asset policies.

8.251 The Sussex plan includes a significant increase in replacement of metallic structures driven by the high proportion of this type of structure on the route, many of which are over a hundred years old and in need of modern replacement. Proposed earthworks volumes are above network average reflecting the unsatisfactory state of clay embankments on the route, which has a direct link to track quality.

8.252 The Sussex route plan has been built around improving reliability for Thameslink services, with increased traffic levels, an ageing asset and reduced access time. There is a focus on re-railing to reduce the pre-1976 rail and manage increased levels of rail defects on the route.

Wales

8.253 The Wales route asset management plan is dominated by renewal requirements in track, signalling and civils as part of a 15 year vision for overhauling its asset base. The route plan is significantly affected by new electrification which is driving bridge reconstructions at various locations and significant signalling renewals in the Welsh Valleys and Port Talbot area, aligning with NOS.

8.254 The signalling plan includes the completion of the Cardiff area signalling renewals and the renewal of the Shrewsbury-Newport and Chester-Llandudno sections which will be delivered in line with the NOS business case for centralising control. The route is coordinating track renewals with re-signalling work to maximise efficiencies in terms of design, capability and access.

8.255 No variances to asset policy have been highlighted within the Wales plans other than the acceleration of activities to coordinate renewal interventions with enhancements.

Wessex

8.256 The Wessex route asset management plan is largely focused on condition based renewals. The route's track condition remains the key area of work for CP5 with rolling contact fatigue and the general condition of S&C presenting key challenges. Waterloo, the major terminal on this route, will be the focus of various activities with around a quarter of S&C refurbishment taking place in the Waterloo area. Re-signalling of Feltham is the only condition based signalling scheme with the remainder of the signalling work being integrated with NOS. Some enhancements to power supply will be needed to accommodate 10-car operations, but on the whole electrical power and fixed plant assets will follow the national condition based renewals approach. Resilience of assets remains an area of concern and Wessex aims to address this by, for example, introducing dual end fed signalling power systems in critical areas.

Wessex is susceptible to risk from heavy rainfall and has focused on drainage as a key risk with respect to both track and earthworks assets. Its structures plans include the removal of higher risk asset types (cast iron and long timbered bridges) over and above the requirements of the policy.

8.257 Although there is no variation to the national track asset policy noted, re-railing is expected to be higher than that modelled centrally due to a number of factors including: volume of pre-1976 rail, excessive side wear on tight curves and the impact of historical tonnage assumptions. For stations, there are two variations to policy noted: maintaining building elements instead of renewal (e.g. lattice girder footbridges and trestle platforms); and life extension of lineside buildings instead of renewal.

Western

8.258 Renewals investment on the Western route is dominated by track, signalling and civil assets. The plan is significantly affected by major enhancements schemes. Crossrail generates the need for accelerated track renewals between Paddington and Maidenhead to cope with significant increased tonnage. New electrification drives bridge reconstructions and significant signalling renewals in alignment with NOS. In addition significant work is proposed for the Bristol area to coordinate renewal activities and to deliver the capacity requirements outlined in the HLOS.

8.259 Track volumes are in line with policy, targeting pre-1976 rail replacement and ageing S&C on critical routes. Heavier weight rail (CEN 60) will be installed on high criticality routes with increased traffic.

8.260 Structure volumes are being driven by the need to address assets in very poor condition as part of a risk prioritised recovery plan over two control periods. The Western route continues to have difficulties with earthworks reliability and has the highest proportion in the ‘poor’ category (9% compared with the network figure of 5%). This is reflected in the planned expenditure on earthworks.

8.261 The plan includes some variance to asset policy where renewal activities have been accelerated to coordinate with enhancements. The structures plan includes works to address known issues with a specific bridge type (box girder bridges) and to develop a longer-term strategy for coastal defences in Devon, particularly the high profile Dawlish sea wall. Western has a high proportion of issues with historic mining activities, principally Cornish tin mining, and the plan includes continuation of a rolling programme to deal with this legacy.

Our assessment methodology – maintenance and renewals

8.262 In July 2011 we consulted on our proposed methodology for the assessment of Network Rail’s plans. After consideration of the responses we refined our methodology, developing workstreams to focus on:

(a) asset management capability;

(b) asset policies;

(c) asset data;

(d) unit costs (pre-efficient);

(e) planning - modelling and workbank development; and

(f) efficiency.

Each of these areas is discussed in the subsequent sections of this chapter.

8.263 Prior to the submission of the SBP we, and the independent reporters, engaged with Network Rail to understand the process it was adopting in developing its plans by route and to allow early review of them where practical. We called this engagement 'progressive assurance'. Progressive assurance provided some early sight of the process being adopted but did not provide the opportunities for early review which were originally envisaged as Network Rail did not submit the expected level of evidence in advance of the SBP and provided limited engagement with the routes prior to its submission.

8.264 In our assessment of the SBP we have separately considered:

(a) the volumes and level of expenditure required to deliver the required outputs, before further efficiencies in CP5; and

(b) the efficiency available in CP5 and therefore the efficient level of expenditure in CP5.

8.265 We have assessed all stages of the development of Network Rail's plans through the detailed review by our engineering experts and through independent reporter work. Figures 8.5 and 8.6 show our interpretation of the high level processes Network Rail has used in developing its maintenance and renewals plans, with colour coding applied to show our assessment process. The colour of each box in the diagrams indicates the reporter study which reviews it. The diagrams are intended to give an overview and do not show the full complexity of the processes adopted or review and feedback loops.

8.266 Both Figure 8.5 and 8.6 show our assessment of Network Rail's plans in four areas:

(a) the development of its CP5 asset policies;

(b) the central modelling of volumes and costs (including efficiencies) associated with implementing those policies;

(c) the route based development of volumes and costs (including efficiencies) associated with implementing those policies; and

(d) the development of Network Rail's submitted SBP.

8.267 Figure 8.5 shows that, for maintenance, policy development and central modelling has been carried out. The outputs of the central modelling were provided to the routes, but our assessment has found insufficient evidence of how these areas of work have fed into the final SBP submission. In particular, the line of sight between asset policies and maintenance plans presented in the SBP is not clear. The maintenance plans are largely based on projections of resource requirements with a high level consideration of proposed activity levels, but have not been demonstrated to be aligned with policy requirements. We have seen some evidence of the challenge process between the routes and the centre but we have concerns about how robust this has been. For example, route plans have generally adopted centrally derived efficiency initiatives but have not demonstrated further consideration of how they will be implemented.

8.268 Figure 8.6 shows that renewals plans are developed based on the requirements of asset policies. Asset policies are based on whole life cost modelling and rely on understanding of unit costs, degradation and the impact of interventions. They also rely on specification of the outputs which they are intended to deliver. We have some concerns over the specification of outputs, discussed later.

8.269 For renewals, asset policies have generally been demonstrated to feed into both central modelling and route based plans. In both cases the volumes and costs associated with implementation of the policies are developed using understanding of the asset base (for example, the number of assets and their condition), cost information (including unit costs of work activities), understanding of degradation and efficiency initiatives. We have seen evidence of a challenge process between central and route based plans in all aspects of the planning process. The final SBP submission is a result of that challenge process.

Figures 8.5: Our assessment of Network Rail's maintenance plans

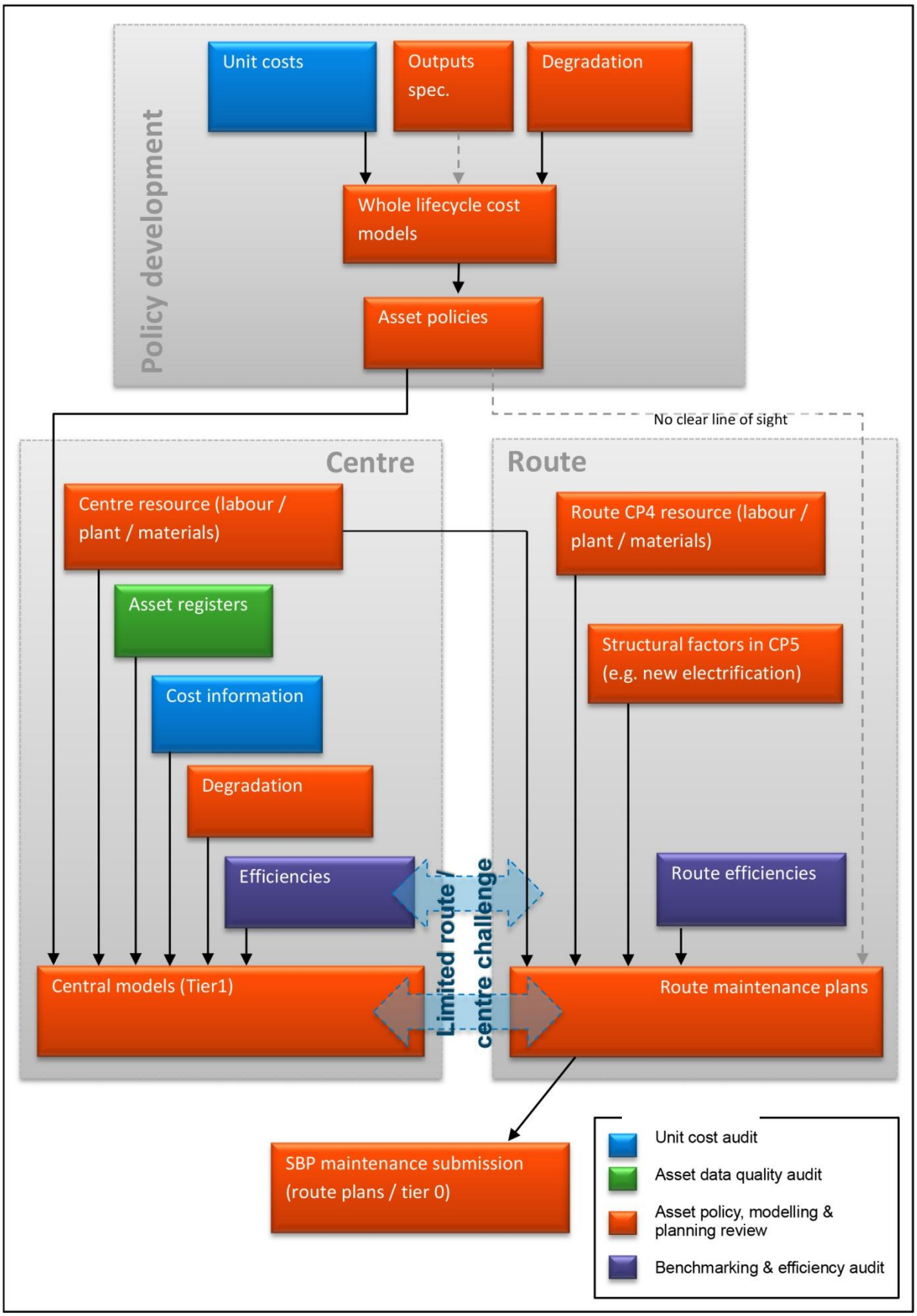
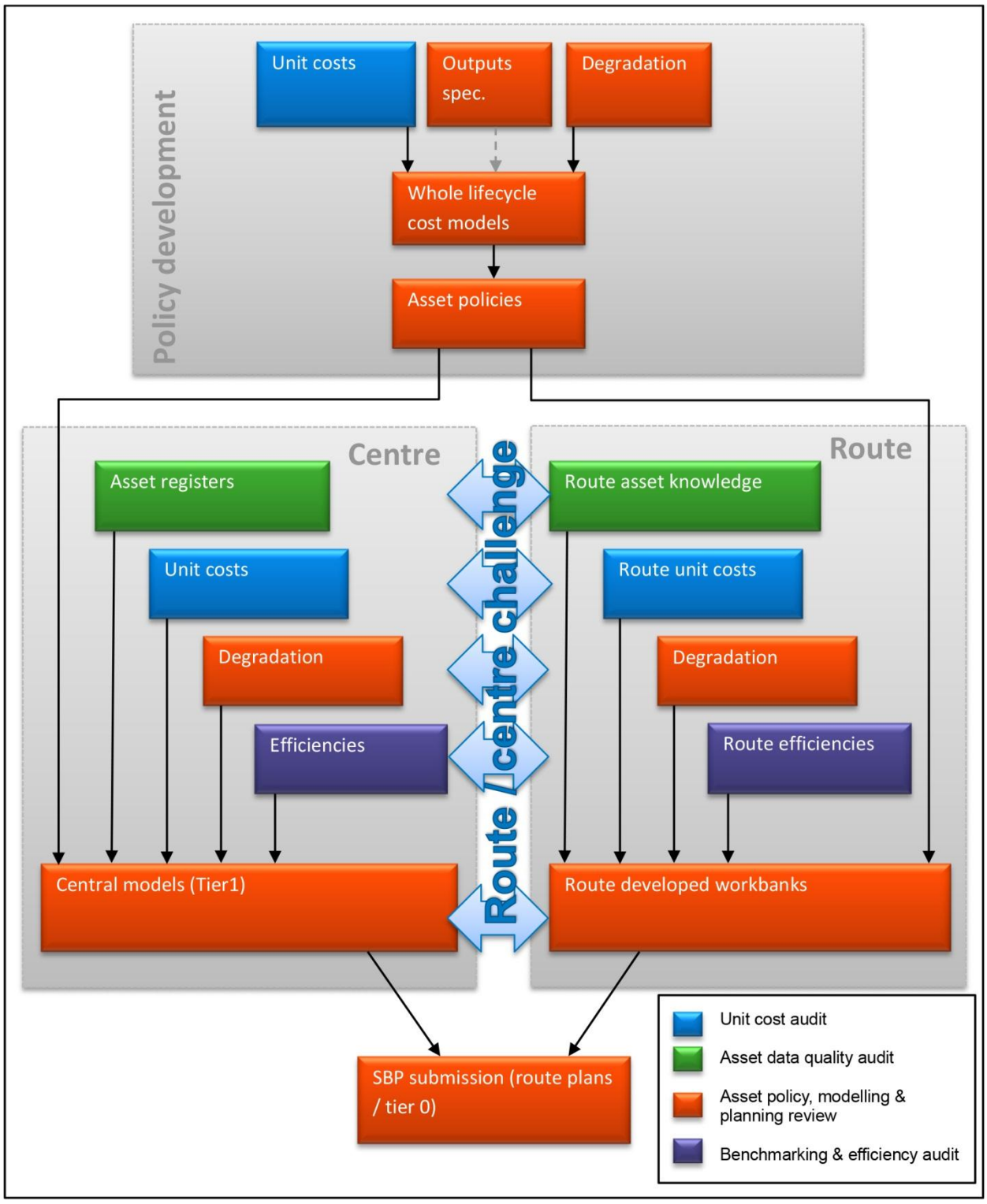


Figure 8.6: Our assessment of Network Rail's renewals plans

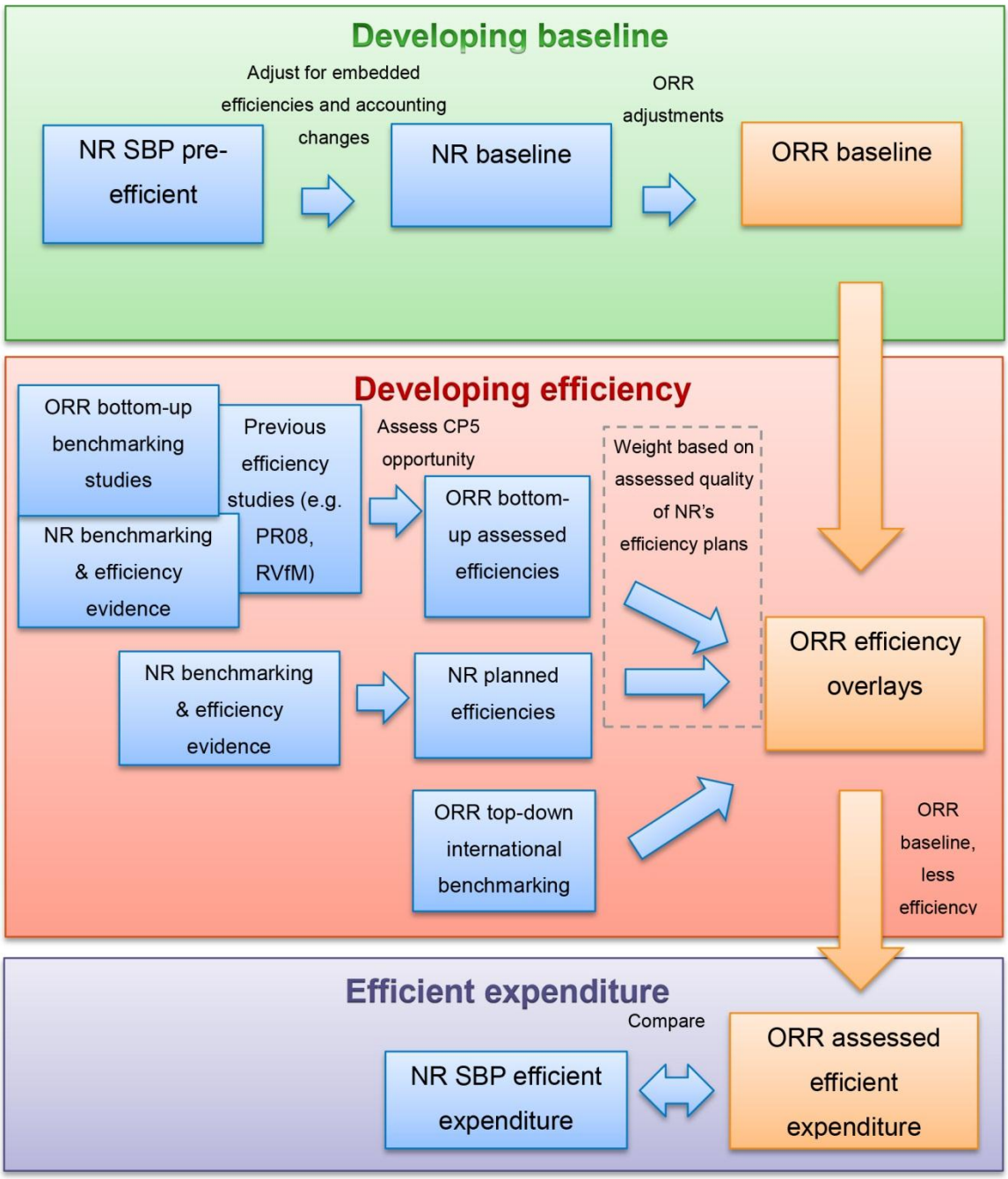


8.270 As well as auditing Network Rail's development of its plans we have carried out our own assessment of the efficiencies that are available through improved asset management. This is discussed in detail later in the chapter.

8.271 Where our review has found material issues with Network Rail's planning process that are likely to lead to a bias in its forecast costs and volumes we have made adjustments to reflect this.

8.272 Figure 8.7, below, gives an overview of the approach adopted.

Figure 8.7: Our approach to developing our assessed efficient maintenance and renewal expenditure



Developing the ORR baseline

8.273 Network Rail's pre-efficient plans are presented on the basis of applying its new asset policies and unit costs as at the end of CP4. In some cases its new policies are

considered to be more efficient than current practice, requiring less work to be done to give the same outputs. These efficiencies are embedded in the new policies and are referred to as 'embedded efficiencies'. Since these are efficiencies that Network Rail proposes will be delivered in CP5 we have adjusted the pre-efficient plans to recognise them and generate a 'Network Rail baseline'.

8.274 We have made adjustments to the Network Rail baseline where we do not consider that it accurately reflects the costs associated with continued application of CP4 policies and the end-of-CP4 level of efficiencies. For example we have made adjustments where we believe that its end-of-CP4 unit costs are inaccurate. These adjustments generate an 'ORR baseline'.

Developing the ORR efficiency overlay

8.275 Our efficiency overlay is influenced by the studies that we have commissioned in PR13, our review of all previous efficiency studies, our top-down benchmarking and our view of the robustness of Network Rail's benchmarking and efficiency evidence, informed by the independent reporter's audit.

8.276 In developing our final view of the efficiency overlay we have weighted the results of our bottom-up efficiency analysis and Network Rail's efficiency analysis based on our assessment of the quality of the company's benchmarking and efficiency work. This draws on the outputs of the independent reporter's audit. Where we have more confidence in Network Rail's efficiency projections (for example where we think its benchmarking has been comprehensive, robust and there is transparency in how this has informed its SBP efficiencies) we have applied more weight to its view of efficiency. Where Network Rail's efficiency plans are considered weaker (for example where we think that benchmarking is less comprehensive or where there is a less transparent link between benchmarking and SBP efficiencies) we have applied more weight to our analysis.

8.277 Finally, we have reviewed the efficiency overlay against the range of efficiencies produced by our top-down international benchmarking.

Developing ORR assessed efficient expenditure

8.278 We have applied our view of the efficiency available during CP5 to the ORR baseline to produce our ORR assessed efficient expenditure. This can be directly compared with Network Rail's efficient expenditure (or 'post-efficient' expenditure) as set out in its SBP.

Our assessment of route plans

8.279 We and the independent reporters, Arup and AMCL, have carried out a detailed assessment of plans by operating route. The assessment has included:

(a) review of the route specific SBP submissions, including route plans and disaggregated costs and volumes data;

(b) review of the SBP development process adopted, including the development of central modelled plans and route-based plans, and their influence on the submitted SBP;

(c) ten overarching route based challenge meetings: one with each of the ten operating route management teams; and

(d) 34 meetings to assess the development of asset management plans in the routes.

Interoperability

8.280 Interoperability is a European Commission initiative to promote a single market in the rail sector, which includes making it easier for trains to travel across different rail networks. This is partly achieved through common specifications called Technical Specifications for Interoperability (TSIs). Statutory requirements for interoperability are set out in The Railways (Interoperability) Regulations 2011.

8.281 The SBP included the assumption that planning for an interoperable railway would not require specific additional costs in CP5 beyond existing levels of capital expenditure. Network Rail's planned expenditure for maintenance, renewal and enhancements is assumed sufficient to meet the requirements of the interoperability regulations and the TSIs, and therefore our determination is also on this basis.

Our assessment by workstream

8.282 The rest of this chapter sets out the findings of our review and our conclusions. First it sets out our overarching findings against the workstreams listed in paragraph 8.262 and then it provides detail by asset category and route.

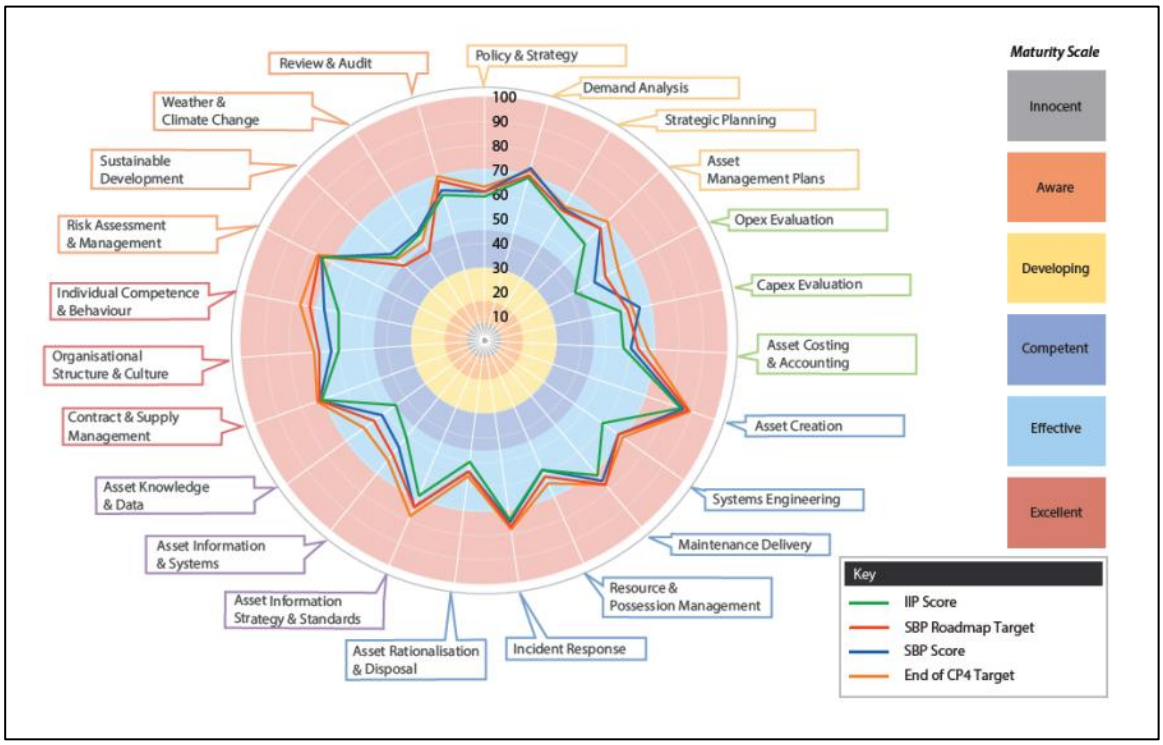
Asset management capability

8.283 During CP4 we set targets for Network Rail to improve its asset management capability by the end of CP4, including milestones at publication of the IIP and at publication of the SBP. Network Rail has not fully delivered against these milestones, but has nonetheless made significant improvement in its capability and has achieved PAS55 certification (the standard that denotes it has reached a level of good practice).

8.284 Figure 8.8 shows Network Rail's assessed asset management capability at the time of the SBP submission as measured by AMEM[171]. Asset management capability is measured for each of 23 key activities, with lower scores (closer to the centre of the circle) representing lower asset management capability maturity and higher scores (closer to the perimeter of the circle) representing higher asset management capability maturity.

[171] *2013 SBP AMEM Assessment*, AMCL, May 2013, available at: http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php

Figure 8.8: Network Rail's asset management capability at SBP submission as measured by AMEM



8.285 The AMEM findings show that Network Rail has further improvements to make in some key areas of asset management to reach its end-of-CP4 target. At the time of the SBP submission it was significantly behind its targets in opex evaluation (i.e. the justification of maintenance interventions based on analysis of cost and risk), asset costing and accounting, resource and possession management, asset information and systems, asset knowledge and data, organisational structure and culture, individual competence and behaviour, and review and audit.

8.286 The AMEM findings provide strong support to our assessment of Network Rail's plans and the areas in which further efficiencies might be available. Further improvements in its asset management capability will be key to enabling efficiency improvements in CP5. We have set asset management capability targets as regulated outputs as discussed in chapter 3.

8.287 We discuss Network Rail's approach to asset management in more detail below, including by asset type and route.

Asset policies

8.288 We have carried out a detailed review of Network Rail's asset policies and their justification. We have set out our framework for reviewing asset policy, including tests of robustness, sustainability, efficiency (of policy, in terms of minimum whole life, whole industry cost (abbreviated to 'whole life cost' in this chapter)) and further tests of alignment with good practice, consistent with PAS 55.

8.289 In assessing robustness we consider whether it is reasonable to believe that the asset policy can deliver the required outputs, for England & Wales and Scotland in CP5.

8.290 Our assessment of sustainability considers whether, if demand on the network were to remain steady, the application of the asset policy would continue to deliver the outputs specified indefinitely. A sustainable asset policy is one which delivers (at least) the agreed outputs for the final year of the control period in the long-term (to at least end of CP11) if demand on the system remains within the capacity limits of the current network and any enhancement schemes already committed to by industry. In assessing sustainability we have carried out a detailed review of Network Rail's long-term modelling of policy and outputs, either through long-term workbanks or strategic planning models. This test is important to ensure that, in managing its assets, Network Rail is making genuine efficiencies and is not deferring essential work at the cost of inefficiently higher expenditure in later control periods.

8.291 Our assessment of the efficiency of asset policies considers whether they have been demonstrated to deliver the required outputs both in the short- and long-term at lowest possible whole system cost over the lifetime of the assets. In assessing minimum whole life cost we have considered whether both scope and unit cost efficiencies have been fully considered.

8.292 Network Rail has made significant progress in developing and justifying its policies. In particular it has, for the first time, produced a suite of tools to support its development of minimum whole life cost asset policy. The tools are considered to be comparable to or at the frontier of best practice.

8.293 Network Rail has significantly reworked its policies, presenting them in a ten stage process, in line with best practice as recommended by the asset management independent reporter, AMCL. They show a step-change in quality and coverage. New policies have been developed in key areas and existing policies have been refined where previously mature (for example, track) or rewritten where known to be poor (as is the case for civil structures policy).

8.294 The CP5 policies reflect a further move towards the differentiation of asset interventions depending on the asset's criticality, and therefore better target expenditure on the basis of risk. They also move towards a more targeted approach to asset management, renewing only those components that require renewal where this is believed to be the most cost effective whole life approach.

8.295 Although Network Rail has made significant progress in the development and justification of its asset policies we consider that some areas of weakness remain. Deficiencies in Network Rail's asset knowledge limit its ability to demonstrate that its policies are fully optimised. Network Rail still does not have asset data knowledge of sufficient quality, in particular relating to asset degradation. Its knowledge of asset unit costs and application for the purposes of planning is currently not of sufficient quality

to provide certainty in its proposed asset policies and in its planned expenditure in CP5.

8.296 Network Rail has not optimised management of its assets across asset types. It has not considered whether network performance might be delivered better through a different mix of performance at the asset category level. The company has not demonstrated that it understands the relationship between its asset management plans and high level outputs such as PPM.

8.297 Network Rail's application of its CP5 asset policies in its planning is varied. For maintenance there is limited evidence of its policies feeding into its SBP submissions. For renewals the application of policy is generally stronger for track, signalling and electrical power and fixed plant. It is weaker for civils and buildings. We discuss this in more detail in our assessment by asset type.

Asset data

8.298 The quality of asset management planning is entirely dependent on the quality of information held about the assets, and the asset system more widely. We have expressed serious concern about aspects of Network Rail's asset information systems and data quality management and have pressed for improvement. Network Rail has recognised the need for improvement. It has undertaken a programme of work, the Asset Data Improvement Programme (ADIP), to enhance the accuracy and currency of its asset information. Improvements have been prioritised to support development of the SBP and to support effective and safe maintenance of the railway. Network Rail has also set out its longer-term strategy for developing asset information management capability in its ORBIS plans. This programme of works is intended to change the way in which asset information is collected, stored and used, with the aim of improving railway safety, efficiency and capability.

8.299 We mandated the independent reporter, Arup, to conduct an extensive audit of Network Rail's asset data processes and resulting data quality, in part to understand the implications for the quality of the company's plans for CP5[172]. This audit has given us and Network Rail a more comprehensive understanding of the company's asset information systems, the quality of the processes through which asset information is maintained and the completeness and accuracy of the data held. The reporter separately audited:

(a) Network Rail's data governance and capture processes; and

(b) the actual data held, assessing its completeness and accuracy.

8.300 The audit found some areas of good practice in Network Rail's data management. Data governance was generally found to be good, but it was noted that processes

[172] *Audit of asset data quality*, Arup, May 2013, available at http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php

have been implemented recently and may not yet have impacted on currently held data. Data capture and entry processes were found to be sound for centrally managed data systems and consistency was found in the datasets used centrally and by routes in developing the SBP. The delivery unit teams were able to demonstrate good local data management through the System Support Manager role and the use of Ellipse as the primary asset management system. The completeness and accuracy of data held was found to be more robust for plain line track, operational property, signalling interlockings, level crossings and overhead line equipment.

8.301 The audit also found aspects of data management that were poor and which represent key areas of concern. The completeness and accuracy of data held was found to be poor for civil structures and conductor rail. (Subsequently Network Rail has been working to improve civils data.) Local data governance was found to lack formal process. Some local databases were not integrated to ensure consistency and efficiency. Route teams were found to be adopting inconsistent approaches to reviewing and verifying data quality.

8.302 Going forwards it is essential that Network Rail is able to demonstrate that it understands its asset information requirements, has the systems and processes in place to deliver those requirements and is auditing the quality of asset information held. Through the ADIP and ORBIS programmes it is developing these areas and we will monitor its progress closely. We have set out how we plan to monitor asset information quality in chapter 3.

8.303 The quality of asset information affects our view of the robustness of Network Rail's plans. For example, poor quality information may lead to inefficient targeting of work, inappropriate prioritisation of workbanks and uncertainty over the scope of work required. Our efficiency analysis has considered the efficiencies which might be available from improved asset information.

Unit costs

8.304 It is essential that Network Rail has a robust unit cost framework in place for both maintenance and renewals. A complete, up-to-date and accurate set of unit costs enables accurate business planning, more reliable benchmarking of costs, identification of efficiency opportunities, demonstration of achieved efficiencies and development of asset policies that minimise the whole life cost of managing Network Rail's assets.

8.305 We have assessed Network Rail's unit cost frameworks for maintenance and renewal looking at both the quality of reported data, and the processes by which these data are used to develop a forecast of unit costs for the purposes of planning.

8.306 In May 2011, we wrote to Network Rail[173] to set out our expectations for its unit cost framework at SBP in terms of system reliability, accuracy and coverage. We stated a requirement for both maintenance and renewal related unit costs to achieve a confidence grading of A2 at the time of submission of the SBP. The company has put a substantial amount of work into improving its capture and reporting of unit costs. We have, through the independent reporter Arup, audited Network Rail's unit cost framework at SBP[174]. The company has not yet achieved the level of system reliability that was expected. Arup gave Network Rail's unit costs relating to renewals a confidence grading of B2. It found that the cost analysis framework (CAF), through which the majority of unit costs relating to renewals are captured, does not appear to capture all project costs for certain asset categories through the GRIP stages. In addition the company's maintenance unit costs are not at confidence A2. This has implications for the robustness of Network Rail's policy development, planning, benchmarking and its ability to demonstrate realisation of efficiencies.

8.307 Further to the above audit of actual (delivered) unit costs we have also audited, through the independent reporter Arup, the quality of the unit cost information which has been used in developing the SBP. This may be different to actual unit costs for reasons including: further efficiencies to the end of CP4; new work types projected for CP5; and better information about future unit costs (for example information from new contract placements).

8.308 For all asset types Network Rail's plans are based on a mixture of unitised costs, non-unitised costs and project cost estimates. Unitised costs are used to develop plans covering 47% of maintenance and renewal expenditure. For maintenance, none of the plans is based on unitised costs. Of the renewals expenditure plans roughly 64% is based on unitised costs, 23% is based on non-unitised costs and 12% is based on project cost estimates. Generally, more certainty can be attributed to those areas of expenditure where Network Rail has forecast expenditure on the basis of required volumes and costs, or on the basis of well-developed project cost estimates. There is generally less certainty where forecast expenditure is based on historic costs rolled forward.

8.309 Network Rail has not directly used its collected maintenance unit costs in its planning for CP5. Its maintenance plans have been developed on the basis of historical levels of resource expenditure, high level consideration of future activity levels, structural changes and efficiencies. There is limited read-through to the quantification of types of work and their cost of delivery. Network Rail carried out some central modelling of volumes and associated costs for the IIP, but we have seen limited evidence that this has been used to develop or evaluate the costs presented in the SBP. We are

[173] http://www.rail-reg.gov.uk/upload/pdf/unit_costs_letter-090511.pdf

[174] PR13 review of Network Rail's maintenance and renewal unit costs used in planning, Arup, May 2013, available at http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php

concerned by the limited use of historical maintenance unit costs in the development and validation of Network Rail's plans and, because plans do not directly take volumes and types of work activity as inputs, the line of sight from optimised policy to planned expenditure is not clear.

8.310 Network Rail has used its historical unit costs relating to renewal to varying degrees in developing its renewals plans. For some assets its plans are largely based on historical unit costs (for example track, earthworks and drainage). For other asset categories it has priced elements of its work activities based on labour, plant and materials costs using estimating techniques (for example, electrification and power, and buildings). For signalling the unit costs used are based on average framework signalling unit rates with a number of Network Rail overlays. In all cases factors have been applied to generate the all-in unit cost at the end of CP4. We are concerned that the systems currently being used for the capture of unit costs are not currently capturing them at an appropriate level, using a cost breakdown structure that reflects the requirements of the business planning process.

8.311 Arup has identified some key concerns with the unit costs and non-unitised projections used. Where expenditure is based on rolling forward non-unitised costs there is high potential for over-forecasting of expenditure. The process used for challenge of plans has focused effort on justifying expenditure which is greater than run-rate, and has not placed enough emphasis on justifying a continuation of historical levels of expenditure. For unitised costs based on historical spend there is potential for costs to vary due to the underlying mix of work types, for example where historical volumes of a work type are considerably different to those projected. Network Rail has not provided comprehensive analysis to assess the effect of these issues (but has provided an example for track). For all unit costs there is concern that the estimation of risk, contingency and management overhead costs has not been given adequate oversight at the programme or portfolio level. This has high potential to lead to an overestimate of risk and contingency. Findings by asset category are presented below.

8.312 We consider that further efficiencies can be achieved through a more robust understanding of unit costs, optimising the performance and cost trade-off, optimising asset policies, using the information to inform better supply chain management and understanding better where efficiencies might be achieved through comparative analysis.

Modelling and workbank development

8.313 Network Rail's plans are built up either by forecasting the volumes of work required or resource requirements, and projecting associated costs. This forecasting is carried out both centrally, using strategic planning models, and locally through the development of route workbanks.

8.314 Strategic planning models forecast expenditure in two ways: based on volumes of work multiplied by unit costs (unitised); and based on extrapolation of historical costs (non-unitised).

8.315 Volume based modelling uses current information held about the assets, forecasts the assets' degradation and applies interventions, as set out in its asset policies, to forecast the volume of work required. It then applies unit costs to forecast expenditure requirements. Modelling based on extrapolation of historical costs is a more basic approach but is appropriate where there are no clearly defined repeated work types or where the run-rate of expenditure gives a more accurate forecast of future expenditure.

8.316 The independent reporters, Arup and AMCL, have audited Network Rail's strategic planning models for all asset categories, assessing:

(a) input data (are the input data consistent with asset data registers, degradation modelling and unit cost modelling?);

(b) computational accuracy (do they function as intended?);

(c) modelling principles (are they modelling policy accurately?);

(d) model uncertainty (what is the range of uncertainty in modelled outputs?); and

(e) model outputs (are the outputs accurate and are they fed through to the SBP submission?)

8.317 The audits found that modelling varied by asset category, including the extent to which the modelling represented application of asset policy. There was wide variation in certainty of inputs and outputs. Computational accuracy was, in general, found to be good. Our key concerns are:

(a) the quality of maintenance modelling and the extent to which it has been used in development of the SBP submission;

(b) civils structures modelling of asset policy, its inputs and therefore outputs;

(c) franchised station modelling of asset policy, its unit cost and degradation inputs; and

(d) fencing modelling of asset policy and inventory input data.

8.318 We present our modelling findings in more detail in our review by asset type.

Our assessment of route plan development

8.319 We have seen evidence of a challenge process between centrally modelled renewals plans and route based plans, but the strength of this varies between asset groups. For example, challenge of track plans has been relatively good, whereas for buildings we have seen limited evidence of routes challenging centrally modelled numbers. Despite this variability, the process implemented has worked to improve the quality of plans by operating route.

8.320 Both modelling and route based plans are built on route specific asset information and unit costs which, to some extent, reflect the structural factors in routes.

8.321 In some instances routes have used route-specific unit costs and efficiencies where they believe they have better local information. Routes have considered local constraints in their plans.

8.322 Overall we consider that Network Rail has applied a suitable process for the development of route plans. However the late running of the process has led to some inconsistencies in plans. Robustness of plans by route is still dependent on accurate route based unit costs. These vary significantly in quality and they are not yet tested.

Climate change and resilience

8.323 An overarching consideration in our assessment of Network Rail's maintenance and renewal plans has been the extent to which they have addressed climate change and resilience of the network both in the short- and long-term.

8.324 Network Rail, in conjunction with RSSB, has undertaken extensive research to understand likely future climate change scenarios and has led the industry's initial response to the Climate Change Act 2008.

8.325 Whilst it is clear that Network Rail has developed its understanding of the impact of climate change on some elements of its infrastructure it is imperative that this understanding is developed further for all assets and, in particular, for earthworks and drainage.

8.326 The CP5 asset policies generally contain improved consideration of climate change. However we have not seen evidence that these elements have been embedded in Network Rail's standards and specifications. Specific consideration needs to be given to:

(a) specification of new components / equipment / systems to provide robust performance for anticipated climate scenarios over the design life. For example, Network Rail might consider including projected climatic ranges in the specification of new systems such as overhead line, track and structures.

(b) evaluation of existing systems to identify and justify interventions to improve resilience to projected climate change. For example, Network Rail might consider increasing tension in overhead line systems to reduce the likelihood of dewirement due to high wind speeds, or improvements to sea defences to mitigate changes in tidal reach.

(c) review and amendment of existing operating and maintenance practices to improve mitigation of the impact of climate change. For example, Network Rail might review its maintenance practices to improve management of climate driven failure modes or alter its stressing ranges for running rails.

8.327 In our draft determination we stated a requirement for Network Rail to update its Climate and Weather Resilience document to include a strategic review of the key nodes in its network. We required the updated document to demonstrate how Network Rail has assessed the risk associated with climate change at those key nodes and how it has assessed the need for measures to improve their resilience. In its response to our draft determination Network Rail provided an update to its Climate Change and Weather Resilience document which set out its approach to the strategic review of key nodes. It clarified what was embedded in the SBP through its asset policies and practices and provided examples of relevant projects. It also provided an example of a climate change and weather resilience plan at route level (for Western) and committed to developing plans for all other routes by end of September 2014. We will review these plans and monitor progress against the milestones in each route.

Our assessment of maintenance and renewal efficiency

8.328 In developing our view of the overall potential for Network Rail to realise efficiencies in CP5 we have considered a wide range of evidence, including:

(a) Network Rail's benchmarking for PR13, which we have reviewed;

(b) benchmarking studies which we have commissioned for PR13;

(c) previous studies carried out, from which we have identified efficiency opportunities remaining at CP4 exit (including all PR08 work, RVfM study, reporter work and external studies);

(d) evidence from our engineering experts and safety audits;

(e) our overarching efficiency opportunities, relevant to all areas of expenditure (for example improved management of inflation); and

(f) our top-down econometric modelling, which uses mathematical techniques to benchmark Network Rail against comparators and assess how much more efficient it would need to be to match the best performers.

8.329 We summarise some of the key evidence considered below.

Maintenance and renewal efficiency – our studies

8.330 We have conducted a suite of benchmarking studies for PR13, including benchmarking against international comparators (both within and outside Europe) and comparators from other industries. Our studies have benchmarked asset management, possession management, supply chain management, project and programme management, innovation and maintenance strategy. All of these studies have identified opportunities to realise further efficiencies during CP5. The reports are available on our website[175]. Some of their key findings are summarised below.

[175] http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php

Asset management

8.331 The independent reporter, AMCL, has conducted an assessment of Network Rail's asset management capability as described earlier in the chapter. It has considered emerging evidence in comparable sectors to identify the efficiencies which might be realised in CP5 through improved asset management. The reporter estimates that Network Rail could identify 15 to 20% maintenance savings and 10 to 15% renewals savings from more risk-based renewal and maintenance interventions alone. It has also identified many opportunities to improve the planning and delivery of work which all have the potential to reduce the costs of engineering works over the lifetime of the assets.

8.332 We have separately commissioned a study by Civity to consider the scope of savings which might be available from better asset management. Civity's report draws on a range of evidence concerning Network Rail's asset management and supports many of the findings from the AMEM review. The report concludes that the range of potential savings is wide but is in line with the findings of the RVfM study.

Possession management, Lloyds Register Rail

8.333 We commissioned a study to benchmark the efficiencies which might be available during CP5 from the improved management of possessions. The study carried out benchmarking using six international comparators, including ones from North American, Asia and Australasia.

8.334 Six key themes were identified:

(a) delivery of engineering work: Network Rail's unit costs appear high. The gap to comparators has been measured across a wide range of studies as being between 10 and 40%, partly due to differences in engineering access;

(b) timing of engineering access: Network Rail relies largely on longer weekend possessions, whereas comparators were found to use overnight possessions in which dedicated, multi-skilled teams deliver repeatable maintenance and renewal activities. Some comparators extend track time through adjacent line open operation. Productivity, quality and unit costs are improved through use of a full time workforce. This approach has the potential to lead to substantially increased revenues;

(c) invest in maintainability: the study considers that Network Rail's approach to asset management has been characterised by lowest first cost and benefits could be realised from greater consideration of costs over the lifetime of assets. Comparators invest more heavily in infrastructure to provide improved train routing, faster isolation and low maintenance track. It highlights the opportunities presented by the ETCS programme;

(d) planning processes: Network Rail books engineering possessions early, which results in more reworking of plans. Contractors are involved later, and pathing of

engineering trains can also occur later. There are inconsistent links to the timetabling process. Devolution presents a big opportunity for improvements;

(e) contracting policy: Network Rail involves contractors late in the process resulting in late re-working of plans. It tenders work in smaller packages. Its contracting strategy has resulted in use of a casual workforce, resulting in lower quality, loss of learning and the requirement for more prescriptive safety processes; and

(f) possession management: Network Rail's productivity is comparatively low. It is slower at carrying out isolations and has more prescriptive safety rules which result in slower uptake and hand back of possessions. It plans for greater contingency, both in terms of the equipment required and time to hand back possessions and yet its possessions result in more disruption to services. Benchmarking suggests that Network Rail typically achieves 3.5 hours of productive time out of an 8 hour possession, whereas comparators typically achieve 6.5 hours.

8.335 The study suggests that the benefits potentially available from improved possession management are between £50m and £150m per year. It considers that benefits to the wider industry might be greater, resulting from increased revenues and reduced operational costs.

Supply chain management

8.336 Civity reviewed Network Rail's supply chain management against 'world class' practice and identified some significant gaps in capability. It found key areas for improved efficiency including:

(a) better workbank planning with improved smoothing and longer-term visibility to give its supply chain greater opportunity to optimise its resource management;

(b) application of a more collaborative approach to supplier engagement;

(c) further standardisation and modularisation of assets;

(d) adoption of industrial processes to deliver work more efficiently;

(e) improved access arrangements and higher productivity;

(f) a leaner but higher skilled procurement function;

(g) further development of the cost database and unit cost modelling; and

(h) further benchmarking against international peers to identify efficiency opportunities.

8.337 Civity concluded that efficiencies of £300m to £400m per year might be achievable in CP5 from improved supply chain management.

Project and programme management, Halcrow

8.338 We commissioned Halcrow to review Network Rail's project and programme management capability and the efficiencies which might be available from improvement.

8.339 The following key opportunities were identified:

(a) a greater focus on programmes of work to understand system-wide issues and benefits – rather than a more narrow focus on projects;

(b) a greater focus on the development phase, reducing the time to develop schemes;

(c) a more collaborative approach in use of the supply chain, reducing the need for duplicated resource;

(d) a move to more output based procurement, allowing greater innovation in the supply chain;

(e) improved whole life cost analysis, particularly for new infrastructure, to optimise option selection for investment decisions;

(f) improved early estimating and improved analysis of changes in scheme costs through their lifecycle;

(g) reduced inefficiencies in managing projects and improved automation of reporting systems to reduce opex costs;

(h) improved project and programme management capability and therefore improved efficiency;

(i) improved transparency in project reporting; and

(j) application of best practice project and programme management across the business – including in maintenance and renewals.

8.340 The study identified that efficiencies were available in maintenance and renewals but did not quantify those savings. Many of the themes identified above are relevant to maintenance and / or renewals. We have taken this into account in our analysis.

Innovation

8.341 We commissioned Balfour Beatty RailKonsult (RailKonsult) to conduct a study into the efficiencies available to Network Rail from best practice innovation and the introduction of technologies which are new to the railway in Great Britain. The study separately considered: innovation process best practice; a scan of innovations applicable to rail; and an assessment of the potential value of innovation during CP5. It recognised that much work has been undertaken in the last two years to improve the innovation process. Through its benchmarking RailKonsult identified significant opportunities for the rail industry to improve its innovation practice, including:

(a) setting clearer objectives;

(b) developing a long-term technology plan;

(c) simplifying industry interfaces;

(d) improving understanding of the link between R&D and return on investment;

(e) developing dedicated specialisms and centres of excellence; and

(f) reducing 'fear of failure' culture.

8.342 The study noted that the rail industry spends less on R&D than other industries.

8.343 The study identified a range of innovations which were either not included in Network Rail's business plans or for which it considered greater efficiencies could be realised. These included: mobile maintenance units, under-sleeper pads, staff protection systems, improved recycling of components, chemical treatment of timber bearers, improved system monitoring, non-intrusive crossovers, modular level crossings, improved use of ground penetrating radar technology, repadding machines, specialist gantries, plastic sleepers, improved modelling of bridge behaviour and new overhead line component technologies. An assessment of the potential benefits that might be available from implementation of these innovations in CP5 was carried out, concluding that the range was £57m to £113m.

Maintenance strategy

8.344 Potential to gain efficiencies by optimising maintenance strategy on the basis of risk has been identified by several previous studies. We commissioned RailKonsult and AMCL to carry out a benchmarking study to identify best practice maintenance strategy and the efficiencies which might be available through its adoption. This was informed by AMCL's extensive asset management best practice analysis and benchmarking, including international and cross-industry benchmarking.

8.345 The study identifies core themes for comparison of identified best practice with practice as currently seen in Network Rail: strategy and planning, decision making, asset knowledge, delivery planning, organisation and people, review and improvement. Key findings are: a formalised approach to Maintenance Requirements Analysis (MRA) is required; industry records need improving, particularly failure and reliability data, to facilitate adoption of Failure Modes Effects and Criticality Analysis (FMECA) processes; there is opportunity for more automated condition monitoring equipment; resource planning could be improved; competencies need to be maintained to address industry change; and there remains scope to improve efficiency and quality in delivery of works, for example through adopting Lean and Six-Sigma approaches.

8.346 The study identifies that adoption of a risk based approach to inspection and maintenance has led to efficiencies of between 15 and 30% in comparator organisations. It assesses the scale of opportunities remaining for CP5 by asset category, given the plans that Network Rail has in place. Further efficiencies are thought to be available in CP5 as follows: 10% for signalling assets, 7% for electrical

power and plant assets, 10% for telecoms assets. No further efficiencies are identified for track beyond those plans already in place. No further efficiencies are identified for civil structures given the extensive work already underway to improve inspections (and civils asset management more widely) in CP4 and assumed to form part of Network Rail's SBP.

Maintenance and renewal efficiency – previous studies

8.347 In addition to studies which have been conducted as part of the PR13 process there is an extensive body of work which has been carried out previously. This includes consultant reports produced for the RVfM study, for PR08 and for other efficiency analyses. Many of the opportunities identified by these studies remain relevant, some are still to be addressed, some have been partially addressed and some have been fully implemented. We have carried out a systematic review of all PR08 and RVfM study documents to identify and catalogue all efficiency opportunities. We have used engineering consultants, RailKonsult, to assess the extent to which the opportunities identified will remain valid at the end of CP4, to quantify the remaining efficiency and to opine whether the full remaining efficiency could be achieved in CP5.

Maintenance and renewal efficiency – Network Rail's evidence

8.348 Network Rail has carried out benchmarking in support of its efficiency projections for CP5. We, supported by the independent reporter Arup, have audited this benchmarking. Our findings are set out by main asset category in the section that follows. The key overarching findings are set out here.

8.349 Network Rail's programme of benchmarking work has been more extensive than it has ever carried out before. It includes internal and external benchmarking, international (including outside Europe) benchmarking, and, in some cases, benchmarking against other industries. The company has devoted a large resource to the programme and it has produced useful results. We consider that the benchmarking carried out represents a good start, and the efficiency opportunities identified are useful benchmarks. In some cases the data produced are less comprehensive than would be ideal. Network Rail has had difficulty in finding a suitable number of comparators that are willing to fully engage and provide quantified data within the timeframes of its PR13 programme. It has focused on understanding 'better practice' rather than understanding the quantum of efficiency that could be realised in CP5.

8.350 Network Rail has recognised that international benchmarking requires a long-term engagement plan and that it should become a 'business-as-usual' activity. We support the continued development of this work. As the benchmarking programme continues into CP5 we expect it to identify further better practices and efficiency opportunities that can be realised during the control period and beyond.

8.351 The reporter's review highlights that a significant increase in pre-efficient baseline expenditure can lead to efficiency savings being cancelled out over the long-term. We

recognise this and have challenged Network Rail's pre-efficient costs rigorously. Where the company has not provided sufficient evidence to support its pre-efficient expenditure forecasts we have made adjustments.

Maintenance and renewal efficiency – overall view

Our bottom-up efficiency analysis

8.352 Our overall view of the efficiency available in CP5 is informed by the expert views given in the full range of studies described. We have carried out a comprehensive review of all efficiency evidence highlighted by these studies and taken a view on the likely efficiency opportunity which will remain at the end of CP4. In doing this we have considered the extent to which Network Rail has already addressed the issue identified, or has plans in place to address it by the end of CP4.

8.353 In evaluating the efficiencies available to Network Rail in CP5 we have considered the full efficiency over and above that achieved in CP4. This includes the efficiencies which we believe will be gained through the implementation of the proposed CP5 policies, referred to as "embedded efficiencies" since they are embedded in the CP5 policies. In its SBP Network Rail set out its pre-efficient plans on the basis of CP4 exit unit costs and application of CP5 policies.

8.354 The full body of evidence that we have catalogued has been mapped to associated costs in Network Rail's SBP. This results in our view of efficiency by route for maintenance and renewal. In developing our quantified view of efficiencies from the underlying evidence we have used the judgement of the ORR's expert asset engineers and safety professionals. This judgement is informed by Network Rail's plans, the views of the independent reporters, and the views of numerous industry experts as expressed in the studies reviewed. Our judgement is intended to be taken 'in-the-round'.

8.355 All efficiencies identified have been reviewed to identify possible safety implications. We do not consider that any of the efficiencies identified need result in any detrimental impact on safety; many of them have the potential to deliver a substantially safer railway.

8.356 Many source documents suggest a range of plausible efficiencies from the initiatives identified. We have taken a conservative view, recognising that there may be overlaps in evidence and efficiencies. We have given consideration to the deliverability of identified efficiencies within CP5.

Our efficiency overlays

8.357 The efficiency overlays that we have applied are the result of weighting our bottom-up developed efficiencies and Network Rail's efficiencies. The weighting we have applied is based on our view of the robustness of Network Rail's benchmarking and efficiency work, and for renewals it varies by asset category. This is informed by the

independent reporter's review of the company's benchmarking and efficiency evidence.

Table 8.25: Our assessment of Network Rail's renewals benchmarking and efficiency and our applied weightings

Asset	Assessment of Network Rail's benchmarking and efficiency	Weighting applied to Network Rail's efficiency analysis	Weighting applied to ORR's efficiency analysis
Renewals			
Track	Good	75%	25%
Signalling	Good	75%	25%
Civils[176]	Some significant limitations	25%	75%
Buildings	Fair	50%	50%
E&P	Good	75%	25%
Telecoms	Some significant limitations	25%	75%

8.358 For maintenance the reporter's review of benchmarking and efficiency found a range of issues and we have reflected this in developing our view. Further details of efficiency are given by asset category later in the chapter.

8.359 Finally, we have reviewed cross-cutting areas of potential efficiency which have not been covered by our bottom-up analysis or in the efficiency evidence which Network Rail has set out. These include inflation management and occupational health management as discussed in chapter 4. Our review of these concludes that a further 1.12% efficiency can be gained by the final year of CP5.

8.360 We conclude that maintenance efficiencies of 16.4% and renewals efficiencies of 20.0% are available by the final year of CP5.

International top-down benchmarking

8.361 We have carried out international top-down benchmarking as described in detail at the end of the chapter. The results of the top-down benchmarking, whilst not fully directly comparable, give us higher confidence that the efficiency overlays which we have developed using bottom-up techniques, and which we have applied to develop our view of efficient costs, apply an appropriate level of challenge.

[176] For years 1 and 2 of CP5 we have accepted Network Rail's civils renewals efficiency

Maintenance and renewals assessment

8.362 We set out our assessment of maintenance and renewals below. Because Network Rail took different approaches in producing its maintenance and renewals plans we have set out our assessment separately.

Maintenance assessment

Pre-efficient

8.363 Network Rail's maintenance policy and strategy is discussed in various parts of the SBP submission, including in the asset policies, the 'Infrastructure maintenance strategy' document, the 'Optimising maintenance regimes' document and in its maintenance efficiency business cases. The documents set out, at a high level, Network Rail's proposed approach to maintaining its assets.

8.364 Network Rail has carried out central modelling of maintenance activities required based on its asset portfolio and interpretation of the high level requirements set out in the asset policies. Maintenance expenditure has then been calculated for direct activities (i.e. maintenance work carried out on infrastructure assets) by multiplying volumes of activity by maintenance unit costs. Indirect costs (such as route based maintenance management teams) have been modelled separately. Network Rail provided the outputs of its central modelling to the routes.

8.365 Routes separately produced maintenance expenditure plans on the basis of their projected headcount requirements. These plans were variable in the extent to which they took account of route specific factors. There was evidence of routes taking account of major infrastructure changes such as enhancement related new electrification assets, but little evidence of changes in response to new asset policies, except in their assumed efficiency overlays.

8.366 Network Rail did not submit maintenance volumes with its SBP. Subsequently we asked for a breakdown of maintenance volumes to be provided and these have been submitted for CP5 for some maintenance work types relating to track, signalling, and electrification and power.

8.367 We consider that the links between Network Rail's proposed approach to maintenance, its submitted volumes and its planned maintenance expenditure are weak. Network Rail's submitted plans are resource based. The templates used in the financial modelling system to collate the routes' costs did not support a volumes based approach. As a result Network Rail has been unable to provide assurance that its maintenance costs represent the costs of the actual volume of maintenance work required in CP5.

8.368 These limitations in Network Rail's maintenance planning lead to uncertainty in the maintenance plans put forward. However, we have not identified an overall bias in the approach taken in building the pre-efficient plans and have therefore not made

adjustments for this uncertainty (with the exception of an adjustment for reactive maintenance costs).

Maintenance efficiency

8.369 Network Rail has developed a set of maintenance efficiency documents which describe the efficiency initiatives identified, as informed by its programme of benchmarking. Examples of the key areas identified are: risk-based maintenance, improved working practices, savings in the indirect maintenance costs, better asset information (and therefore improved targeting of work and improved response to infrastructure faults), more mechanisation, further roll-out of intelligent infrastructure, multi-skilling, standardisation, improved contracting strategy and further recycling of materials. Network Rail's identified central efficiencies were estimated to deliver £194m of efficiency savings in CP5.

8.370 Some local efficiencies have been developed by the routes which are estimated to deliver £140m of efficiency savings in CP5. These largely relate to improved planning processes and to consolidation of route delivery units to generate efficiencies in indirect costs.

8.371 In addition to central and route initiatives Network Rail has assumed that further, as yet unidentified, route initiatives will generate £140m further savings in CP5.

8.372 The independent reporter, Arup, has audited the benchmarking and efficiency analysis carried out for maintenance activities. In summary, it considers that the approach taken to external benchmarking and the evidence presented has some limitations, and that the approach to internal benchmarking has not informed efficiency initiatives. Arup found that central efficiency initiatives were not disaggregated by route and there was limited evidence of routes challenging central efficiency proposals. Due to the issues identified by Arup we have used our view of available maintenance efficiencies in developing our assessed efficient expenditure.

8.373 We have conducted our own analysis of the maintenance efficiencies that might be available during CP5. The key difference between our assessed maintenance efficiency and Network Rail's submission is that we assume a different profile, with lower efficiencies to be delivered in the earlier years of CP5 and higher efficiencies to be delivered in the later years. This assumption reflects our concerns over the delivery of efficiencies in CP4 when Network Rail reduced staffing levels before fully embedding more efficient ways of working. Our findings are given by asset below.

Track

8.374 We consider that the most significant track maintenance efficiencies are available from improved asset management systems, further automation of inspection, improved possession management, alliances and improved ballast distribution systems. Our assessed total efficiency in CP5 is comparable to Network Rail's but we have assumed a different profile, resulting in higher efficiency in the final year of CP5.

Table 8.26: ORR assessed costs, track maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Pre-efficient expenditure	-	434	439	439	438	435	2,185
Efficiency	-	3.6%	3.6%	3.6%	3.7%	3.7%	17.0%
Post-efficient expenditure	420	418	408	393	377	361	1,958

Signalling

8.375 We consider that the key areas of efficiency for signalling maintenance are remote condition monitoring, recycling of materials, risk based maintenance, procurement policy and improved asset management systems. Our assessed total efficiency for CP5 is comparable to Network Rail's but, as with track, we have assumed a different profile.

Table 8.27: ORR assessed costs, signalling maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Pre-efficient expenditure	-	158	158	158	159	160	793
Efficiency	-	2.8%	2.8%	2.9%	3.0%	3.1%	13.7%
Post-efficient expenditure	158	153	149	145	141	138	728

Civils and buildings

8.376 A significant proportion of submitted costs for civils and buildings maintenance work appears to arise from Network Rail's own review and administrative activities, including possessions management. Our assessment of civils maintenance efficiency assumes a small amount of efficiency from these activities and from improved supply chain management.

Table 8.28: ORR assessed costs, civils and buildings maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Pre-efficient expenditure	-	82	82	82	81	82	408
Efficiency	-	0.6%	0.6%	0.6%	0.7%	0.7%	3.1%
Post-efficient expenditure	35	81	81	80	79	79	400

Electrification and power

8.377 We have identified significant electrical power and fixed plant maintenance efficiencies from improved processes for inspection of overhead lines, improved procurement policy and improved asset management systems. We have assumed a profile delivering higher efficiencies in the final year of CP5 than that assumed by Network Rail.

Table 8.29: ORR assessed costs, electrical power and fixed plant maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Pre-efficient expenditure	-	94	101	104	105	108	512
Efficiency	-	4.4%	4.5%	4.6%	4.7%	4.8%	20.9%
Post-efficient expenditure	73	90	92	90	87	86	445

Telecoms

8.378 The key areas of efficiency identified by our analysis are improved procurement policy, and improved asset management systems, with greater efficiency than forecast by Network Rail being delivered by the final year of CP5.

Table 8.30: ORR assessed costs, telecoms maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Pre-efficient expenditure	-	22	22	21	21	21	107
Efficiency	-	4.4%	3.6%	3.7%	3.8%	4.0%	18.1%
Post-efficient expenditure	21	21	20	19	18	18	95

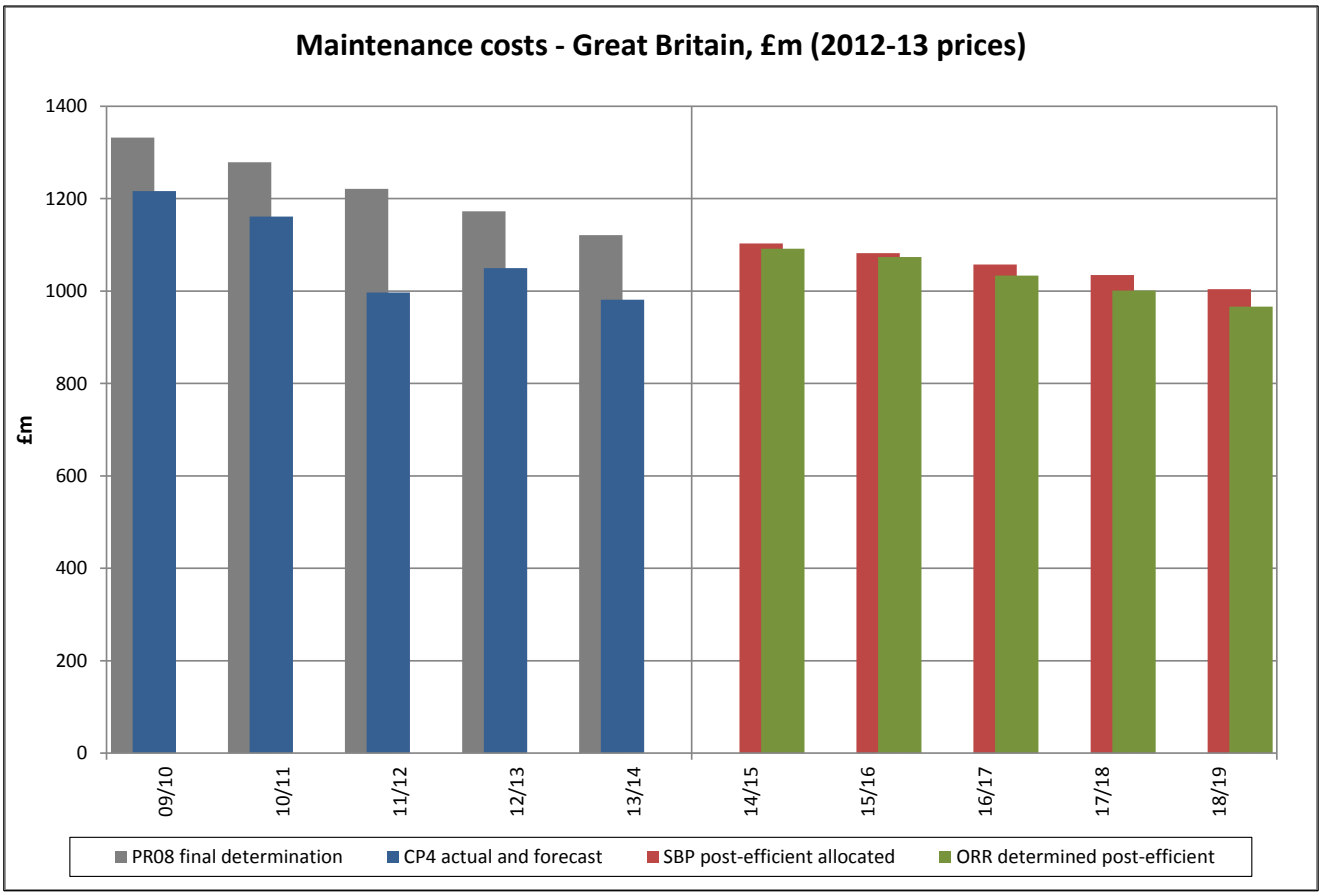
Other maintenance costs

8.379 For other maintenance costs we have found a higher efficiency potential compared to Network Rail's assumptions. These are primarily based on improved procurement policy, improved asset management systems which will enable better planning, and other maintenance overhead efficiencies.

Maintenance findings overview

8.380 Our assessed efficient maintenance expenditure is illustrated below. We have reduced Network Rail's proposed expenditure by £116m.[177]

Figure 8.9: Our assessment of efficient expenditure for maintenance



Renewals assessment

8.381 We set out our renewals assessment by asset below, including our review of underlying asset data, unit costs, policy and modelling, efficiency and a summary of our findings.

Track assessment

Asset data

8.382 Track asset data quality is reasonable but requires some improvement: the independent reporter, Arup, graded plain line data and S&C data B3. (Plain line data used in development of the SBP were graded B2.) Network Rail has a good understanding of track service lives.

[177] The increase in expenditure from CP4 to CP5 is due to an accounting change which reclassifies some small scale works, referred to as 'reactive maintenance', as maintenance instead of renewal.

Unit costs

8.383 Track unit costs are of relatively good quality. Network Rail's plans are substantially based on the application of unit costs which are well-understood and developed using largely appropriate methodologies.

8.384 Network Rail's pre-efficient unit costs for track work are based on 2012-13 volumes and costs as projected at the time of the SBP. They reflect the projected mix of underlying work types for that year. The independent reporter asked Network Rail to explain the impact of the work mix assumptions for CP5 and, in response, Network Rail provided data showing its impact on conventional complete track renewals. The reporter found that the work mix assumptions were broadly in line with the basis of unit cost estimation but led to an overstatement of 1% for this type of track renewals in CP5. The reporter noted that Network Rail had not demonstrated the appropriateness of work mix assumptions for other work categories. We have made an adjustment to reflect the overstatement for conventional complete track renewals.

8.385 Network Rail's development of unit costs includes an uplift for risk, contingency and Network Rail management. Our draft determination highlighted concerns with these uplifts which required further justification. Network Rail has now provided this justification in most areas. It has also presented to us the detailed work it has done to forecast unit costs and efficiencies over CP5. We consider this modelling to be best practice. Some concern remains that estimation of risk and contingency requires improved oversight to ensure that the total provision is appropriate. In our final determination we have reduced pre-efficient unit costs by 0.25% (whereas our draft determination applied a reduction of 2%) to reflect our concerns over risk estimation and potential overstatement of conventional complete track renewals expenditure.

Policy and modelling

8.386 The CP5 track policy is one of the more mature asset policies. We consider the assessment of asset criticality based on five bandings relating to average delay costs to be an improvement on the similar four quadrant methodology used previously. It results in a more targeted and risk-based policy for maintenance and renewals. The policy differentiates interventions based on criticality, for example requiring more refurbishment to be carried out on lower criticality routes. The move towards a more targeted renewal approach is well-supported by the whole life cost modelling that has been carried out.

8.387 Network Rail has made good progress in demonstrating that the track policy is both robust and sustainable. It has forecast measures of condition (used life) and asset performance (track geometry and serious rail defects) to CP11 which indicate that the policy is not allowing the asset base to deteriorate in the long-term. Performance is forecast to increase to the end of CP6 and then to be maintained until the end of CP11.

8.388 The plain line track whole life cost modelling is considered good. It is based on the best understanding of asset degradation of all the asset categories, and on robust failure modes, effects and criticality analysis. S&C degradation has not been fully validated and currently relies on engineering judgement. Network Rail is carrying out further work to improve its modelling through developing a better understanding of S&C deterioration.

8.389 We consider that the track asset policy has, in the round, met our criteria for robustness and sustainability. Network Rail has demonstrated some significant minimum whole life cost optimisation but there are opportunities for further optimisation. For example, there is uncertainty over the assumed service life increase for refurbished S&C.

8.390 Renewal of track plain line and S&C has been modelled by applying service life assumptions to the current and forecast asset base. The engineering rules applied in the model were found to be consistent with the track policy. Model inputs were found to be accurate with the exception of a minor inconsistency in traffic data and a variation in refurbishment costs of up to 7%. No computational errors were identified and outputs were accurately included in the SBP data tables and showed reasonable alignment with route based plans.

8.391 Network Rail has included expenditure within its plans associated with the acceleration of track renewals from future control periods. This is expenditure which will, in the long-term, deliver work more efficiently. Accelerated track renewals are proposed where future access will be more constrained (for example due to the completion of Crossrail) or where enhancements are leading to increased tonnage. We have reviewed Network Rail's proposals for accelerated track renewals and consider that they are well-evidenced. The proposed volume of maintenance and renewal work is in line with our expectations when considering the accelerated renewals.

Efficiency

8.392 We consider Network Rail's external benchmarking for track to be good. It has conducted a programme of site visits to external comparators to observe working practices and identify better practices which might be adopted on its network. Its track benchmarking has included visits to Sweden, Switzerland, Italy, France and Spain. Information gathered is both qualitative, for example noted differences in work activities, and quantitative, including a high level comparison of unit costs between Network Rail and four European peers. Network Rail's internal benchmarking informed its assessment of structural factors but was not used to compare internal efficiencies. In addition to its benchmarking work, the company has presented its models for future delivery of plain line and S&C renewals. These models are well-developed with clear alignment between the benchmarking work and efficiency measures within the models. Efficiency measures include reducing the size of gangs,

increased multi-skilling of staff, greater use of mid-week possessions and a new contracting strategy. There is moderately good alignment between the proposed efficiencies presented in the track efficiency business cases and the efficiencies which appear in the SBP.

8.393 Our review of efficiency finds similar best practice opportunities to those identified by Network Rail but quantifies them to find greater overall cost efficiencies. Key areas of potential efficiency are further automation of track inspection, improved asset management systems, improved supply chain management and improved management of possessions. In our draft determination we assessed Network Rail's benchmarking and efficiency work as 'Fair' and applied a 50% weighting to our analysis and 50% to Network Rail's. In its response to the draft determination Network Rail stated that it believed that its work should be graded 'Good'. Since our draft determination we have reviewed extensive further evidence relating to Network Rail's unit cost and efficiency modelling for track. The new information provided has significantly improved our confidence in the derivation of Network Rail's plans. We consider the modelling carried out to be comprehensive, robust and in line with best practice. In our final determination we have therefore decided to grade Network Rail's track benchmarking and efficiency as 'Good' and we have applied 25% weighting to our analysis and 75% to Network Rail's.

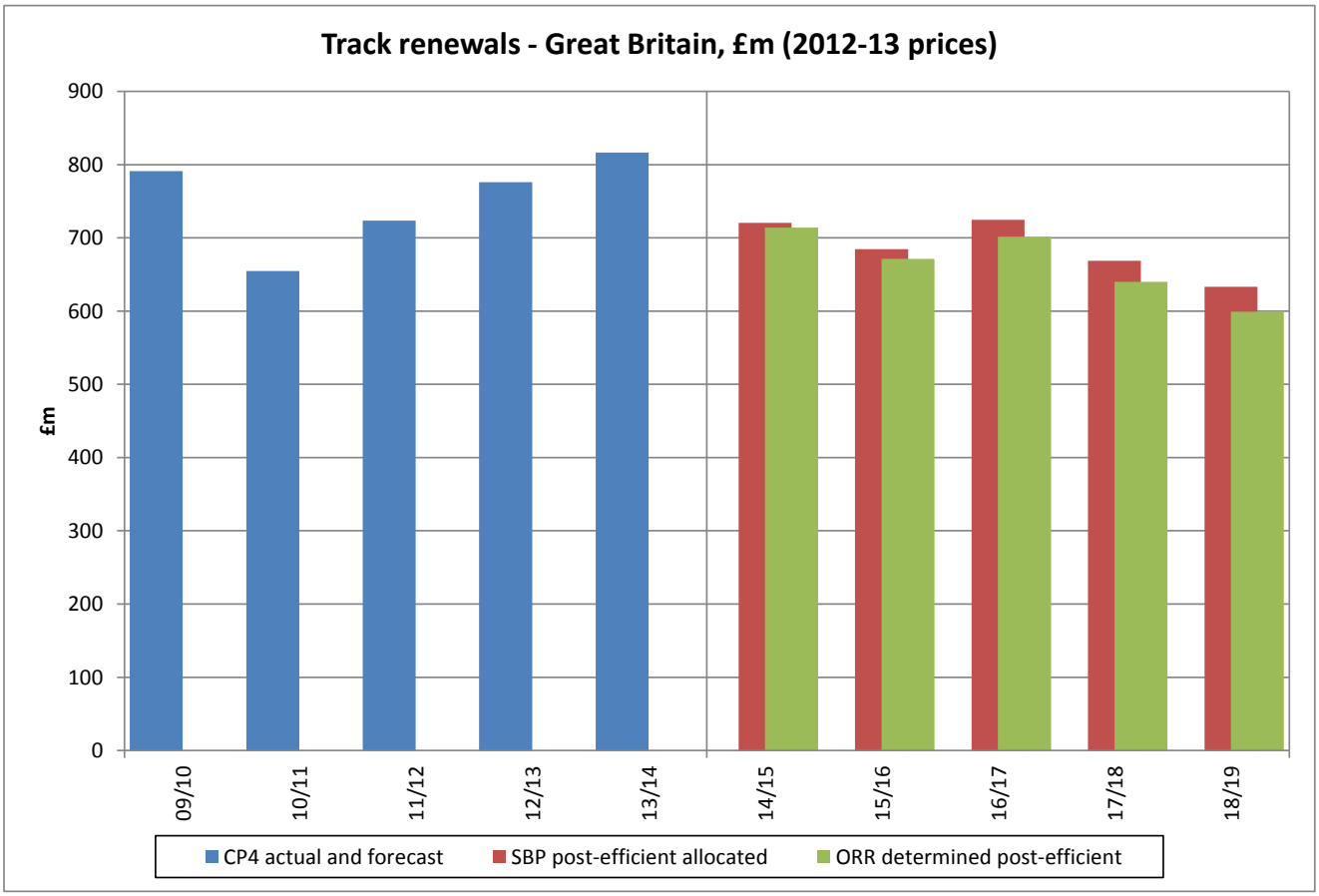
Findings

8.394 Our assessment of the level of track (including off-track) expenditure required during CP5 is shown in Table 8.31 and illustrated in Figure 8.10 below.

Table 8.31: ORR assessed costs, track renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	770	758	822	783	769	-	3,903
Efficiency	-	7.2%	4.6%	3.7%	4.2%	4.6%	-	22.1%
Post-efficient expenditure	816	714	671	701	640	599	3,762	3,326

Figure 8.10: Our assessment of efficient expenditure for track renewals



8.395 In total we have reduced Network Rail's planned renewals expenditure on track and off-track by £106m.

8.396 Our final determination assumes £104m more of efficient track renewals expenditure than assumed in our draft determination.

Off-track assessment

8.397 We welcome the development of an asset policy for off-track assets and the recognition of the importance of off-track assets in contributing to the efficient delivery of network safety and performance.

Asset data

8.398 Network Rail has recently taken steps to increase significantly its knowledge of its off-track assets. Its information relating to boundaries has been improved by routine data collection during boundary inspections. Vegetation knowledge has been improved through the National Lineside Tree Survey, completed in March 2011. Improved asset knowledge has enabled better planning of the volume of maintenance and renewal works required.

Policy and modelling

8.399 The off-track policy is relatively immature since it is new and untested. It promotes the move from a reactive approach to a more proactive management of boundaries and

vegetation as the most cost effective way of managing the assets. The policy results in a planned large increase in expenditure relative to CP4. This expenditure is forecast to improve asset condition to a level which will be sustained from the end of CP5 for England & Wales and from the end of CP6 for Scotland.

8.400 Network Rail has more work to do to demonstrate the efficiency of the policy and to understand the optimum interventions and strategy. It has not yet developed a model for optimising long-term asset management costs. We welcome the move towards a more proactive approach to the management of off-track assets and the safety and performance benefits that this will bring. We believe more can be done to investigate the most appropriate and cost effective ways of managing boundaries and consider that the proposed volumes of work require more substantiation. For example, we consider that there may be benefits in carrying out the work to bring the boundary asset up to a steady state over more than one control period.

8.401 We consider that the proposed policy is likely to be robust and sustainable but the effect of the new policy will have to be monitored closely. The policy is not demonstrated to be minimum whole life cost.

8.402 Network Rail's plans do not specify the volumes of vegetation clearance that will be delivered. The policy states that all fences in 'very poor' condition are to be renewed and all 'poor' condition fences are to be repaired. The plans do not include present and forecast condition measures to show the scale of improvement which will be delivered.

8.403 Modelling is not as refined as for the track asset but it uses reasonably accurate actual data from fencing and vegetation surveys. The off-track model for fencing was found to contain unsubstantiated assumptions which led to uncertainty over its outputs. Unit rates used were found to be rudimentary but consistent with the off-track policy. No computational errors were identified.

8.404 The independent reporter found some uncertainty as to whether the overall costs included in the SBP may be above the levels necessary to deliver policy requirements. We also consider that proposed levels of activity can be delivered over more than one control period, and for these reasons we have reduced Network Rail's pre-efficient plans for management of boundaries in CP5 by 25%.

Efficiency

8.405 Our analysis of off-track efficiency has found significant opportunities from increased mechanisation of vegetation clearance, improved asset management and information systems and improved supply chain management. In total our assessed expenditure for off-track renewals is £318m, which gives Network Rail £75m more than is forecast to be spent in CP4. This is lower than assumed in our draft determination because we have improved the way in which we weigh Network Rail's and our efficiency analysis to make it more accurate for disaggregated costs.

Signalling assessment

Asset data

8.406 Network Rail uses a Signalling Infrastructure Condition Assessment (SICA) tool to prioritise signalling maintenance and renewal works. SICA and its use were audited by the asset management independent reporter in 2011. The reporter found SICA to be fit for the purpose which it was designed for: to prioritise logically the short- to mid-term renewals workbank. Useful remaining lives generated by SICA are underestimated and are not accurate for use in strategic planning. SICA is not a suitable tool for ensuring that signalling assets are managed sustainably to achieve minimum whole life cost. The independent reporter, Arup, graded signalling asset data quality A3, reflecting good practice data governance, but some deficiencies in terms of data accuracy and completeness. (Data used in development of the SBP were graded A2.)

Unit costs

8.407 The independent reporter's audit of signalling unit costs has found some limitations in the approach adopted including the adjustment of new framework rates to reflect historical levels of cost performance. As with other asset types Network Rail has not provided sufficient evidence to demonstrate strategic oversight in the estimation of risk allowances. It has estimated risk at a unit cost level rather than a programme level which has high potential to overestimate risk allowances. In its response to our draft determination Network Rail challenged the adjustment applied to its signalling unit costs. It said that its ability to reduce signalling unit costs beyond the level proposed in the SBP is limited, especially in the earlier years of CP5 as contracts have already been let and workbanks have been locked down. It stated that its new signalling contracts result in higher risk to Network Rail but lower cost. We have reviewed the new evidence provided and accept that the signalling renewals workbank is substantially locked down in the first year of CP5 (approximately 70% by value) and that some of the workbank for the second year is also locked down (approximately 30% by value). We have reviewed new evidence on the risk and contingency uplifts to unit costs. Network Rail has assumed a small reduction in risk being delivered by the new signalling contracts, partially offset by the risk associated with the rollout of new technology. However, we have not seen a fully quantified justification for the figure used. From our assessment of the new evidence presented we consider that Network Rail has less scope to reduce its costs in the first and second years of the control period and have therefore reduced the unit cost adjustments applied in these years. We have applied a 1% reduction in the first year of the control period, 2% in the second year and 3% for the remainder of CP5.

Policy and modelling

8.408 The CP5 policy for signalling sets out a well-justified approach to managing the maintenance and renewal of signalling assets, taking account of the major

programme of works required for both NOS and the staged further introduction of ETCS. Due to the national and long-term nature of these programmes the forecasts of signalling maintenance and renewal works are more dependent on centrally developed long-term workbanks than is the case for other assets. The asset policy includes appropriate statements on the prioritisation, advancement and deferral of work to ensure that the programmes are aligned.

8.409 The policy requires the use of partial and targeted renewals instead of full renewal where possible and this is considered an appropriate, efficient approach where no changes are needed in preparation for ETCS.

8.410 The policy of moving from conventional signalling to ETCS is considered sound. The business case for the national application of ETCS was established and reviewed approximately four years ago. This demonstrated that there was a long-term whole life, whole industry benefit to implementing ETCS, through the reduction of lineside assets, safety benefits and capacity improvements. The plans for CP5 show significant costs, including development costs, to support that long-term benefit.

8.411 The policy to move to more centralised signalling control has been assessed through review of the business case as discussed in chapter 7 and is considered to be appropriate. This programme of work results in a large volume of signalling renewal in CP5 but this is justified by the future benefits in operational costs.

8.412 The volume of signalling renewals in CP5 has been assessed. The development of signalling renewals plans is a well-managed process resulting in volumes of renewal which have a high degree of credibility. The signalling asset policy is considered robust to deliver outputs in CP5.

8.413 We have reviewed the sustainability of the signalling asset policy by challenging the modelling of long-term outputs in Network Rail's signalling strategic planning model. The renewal of signalling assets would normally be managed to maintain a steady level of asset condition measured nationally. In CP5 the plan to accelerate some renewals for the benefit of NOS should result in a small improvement in overall asset condition. We consider that the CP5 signalling asset policy is likely to deliver an asset base of stable condition in the long-term, while delivering the major programmes of work needed by the industry.

8.414 The whole life cost modelling that supports the signalling asset policy has considered an appropriate mix of asset interventions. We have some concern that the degradation modelling may be conservative. The use of SICA in the strategic planning model may result in a slight bias towards over-forecasting in the long-term. However, the development of long-term workbanks, and the alignment of key national programmes of work is excellent and gives confidence that the plan is optimised on a whole life cost basis.

8.415 The signalling model takes the bottom-up developed signalling workbanks as an input. The model was found to be consistent with policy. Some inconsistencies in unit

costs for specific signalling work types were identified. No specific, consistent and material issues were found with computational accuracy in modelling costs and volumes for CP5.

Efficiency

8.416 In its SBP Network Rail claimed that there were £380m of embedded efficiencies being delivered by its CP5 signalling policy. The actual efficiencies being generated by a change of asset policy are difficult to determine (since a change in policy is likely to lead to changes in expenditure in all future control periods). However, our review finds that the level of embedded efficiencies for signalling is likely to be overstated due to flaws in the calculation methodology. We have assumed that signalling embedded efficiencies are £190m.

8.417 Our assessment of efficiency has found that some significant opportunities remain from further adoption of modular signalling, plug-and-play technology, improved asset management systems and from adopting best practice supply chain management. The analysis results in a higher level of efficiency than proposed by Network Rail.

8.418 The independent reporter's audit of Network Rail's benchmarking and efficiency for signalling renewals has found the approach adopted to be reasonably good. In particular it has found the internal and external benchmarking that has been carried out to be sound. Network Rail has engaged with its suppliers in developing signalling framework contracts which reflect commitment to delivering the efficiencies. Given the relative certainty in signalling efficiencies from the supply chain we have applied 75% weighting to Network Rail's efficiency plans and 25% to our analysis.

Routes

8.419 Signalling plans are based on long-term workbanks which have been developed centrally to ensure that they are aligned with the ETCS and NOS programmes. Routes are bought in to the central plans and have reflected them in their route plans.

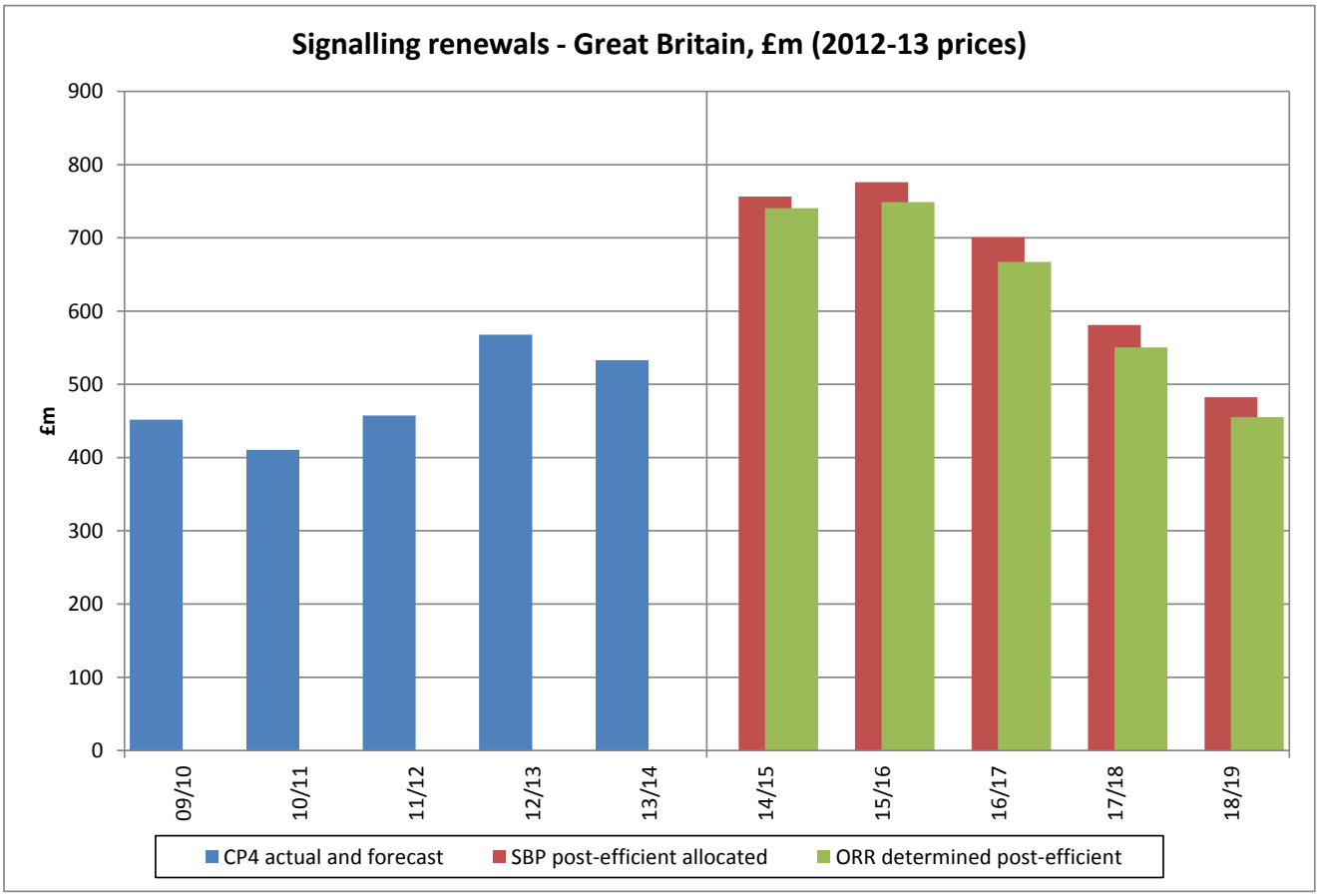
Findings

8.420 Our assessed efficient expenditure for signalling renewals is illustrated below.

Table 8.32: ORR assessed costs, signalling renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	814	864	813	704	613	-	3,807
Efficiency	-	9.0%	4.7%	5.3%	4.7%	5.0%	-	25.7%
Post-efficient expenditure	533	741	749	667	550	455	2,421	3,162

Figure 8.11: Our assessment of efficient expenditure for signalling renewals



8.421 Our assessment of Network Rail's plans supports the large increase in expenditure from CP4 to CP5, which is driven by the asset policy and its consideration of well-justified national programmes of work: NOS and ETCS.

8.422 In total we have reduced Network Rail's planned renewals expenditure on signalling by £134m, but our assessed expenditure is £741m greater than planned expenditure in CP4.

8.423 Our final determination assumes £21m more of efficient signalling renewals expenditure than assumed in our draft determination.

Treatment of ETCS train fitment costs

8.424 In its SBP, Network Rail submitted costs of £194m associated with fitting ETCS equipment on trains. The funding is for industry to undertake first of class design and for wider fleet fitment for non-franchised fleets such as freight and open access operators. (First of class design means that Network Rail is funded to design, develop and install the in-cab solution for the first of each individual class of vehicle. This will then establish the template design solution for the rest of the fleet which will be funded through other means such as through franchises.) Due to different vehicle cab layouts the design will need to be bespoke for each different class of rolling stock and there are risks involved with procuring and implementing this on operational fleets which lead to uncertainty in forecast costs.

8.425 Our final determination includes a provisional sum for ETCS train fitment costs of £194m in our assessment of efficient enhancements expenditure and we have removed these costs from our assessment of efficient renewals expenditure. Details are set out in chapter 9.

Level crossings assessment

Asset data

8.426 The independent reporter graded level crossings asset data quality A2, reflecting good practice data governance, but with some shortcomings in the accuracy or completeness of data.

Unit costs

8.427 Unit costs for level crossings are produced in a similar manner to conventional signalling equipment. However, our review suggests that they include high levels of additional overlays which have not been fully justified and that unit costs are high compared to other control periods. In our draft determination we applied a reduction of 7.5% to level crossings pre-efficient costs. In its response to our draft determination Network Rail stated that this reduction was incorrect and that the level of overlay applied reflected actual costs seen for projects in CP3 and CP4. Network Rail has presented its further analysis of historical projects, which include an uplift of 30% for abnormals and minor works. However, it has not demonstrated clearly that the overlays applied are representative of end-of-CP4 levels or reconciled them with the allowances made for minor works elsewhere in the SBP. We also consider that Network Rail has not provided sufficient evidence to demonstrate strategic oversight in the estimation of risk allowances. In our final determination we have therefore applied a 7.5% reduction to level crossings pre-efficient costs.

Policy and modelling

8.428 For CP5 the volume of level crossing activity is a combination of standalone crossing renewals, crossing renewals associated with signalling renewals and safety improvement upgrades.

8.429 Level crossing renewals and maintenance are managed through the track and signalling asset policies. Network Rail plans to introduce greater coordination of level crossing activities. Key to this is the introduction of level crossing managers who will oversee activities at their designated crossings.

8.430 A criticism in the past has been that signalling renewals have ignored level crossings in the area affected, hence missing opportunities to modernise or upgrade crossings efficiently as part of a larger scheme. Network Rail now indicates a clear intent to improve on this issue in CP5.

8.431 Discussions with Network Rail also indicate a greater understanding of the need to assess risk at level crossings before determining what action is appropriate. We

welcome this and it should result in well-chosen solutions for level crossing renewal and/or upgrade.

8.432 Many manual level crossings will receive attention in CP5 as they will need to be modified to obstacle detection operation. This is likely to result in a small improvement in overall asset condition.

Efficiency

8.433 Technology developments that offer the potential for efficiencies and safety improvements are dependent on a small group of engineers for their success. Some of these projects seem to be very slow in development which may be a result of an imbalance of demand and resources.

Civils assessment

Asset data

8.434 Civils structures asset data quality is below average. Whilst Network Rail now has reasonable data governance processes in place and improvements are being made, there remains very significant inaccuracy in the records held. This leads to high uncertainty in the planned works for CP5. The independent reporter graded the quality of civils asset data required for licence compliance B5, reflecting the incomplete records for datasets which Network Rail has recently started collecting. It assessed the quality of civils asset data for SBP planning purposes to be B4.

8.435 Asset data relating to earthworks are kept in an online earthworks condition database. Network Rail has recently improved its asset knowledge and is undertaking a number of improvements and corrections to this database. The majority of earthworks assets have had at least one examination. Condition data for earthworks are captured using 'hazard' indices which categorise assets as serviceable, marginal, poor or top poor. Coverage of the asset base is good and data are considered to have low uncertainty.

Unit costs

8.436 Civils unit costs are based on a statistical analysis of historical project cost data, drawn from the Cost Analysis Framework (CAF).

8.437 Unit costs are used to develop just over half of the CP5 planned expenditure for overbridges and underbridges, 87% of earthworks expenditure and less than half of the remaining expenditure. The proportion of civils planned expenditure based on non-unitised costs is relatively high and these have a greater level of uncertainty.

8.438 The independent reporter has audited Network Rail's development of its civils unit costs and found a range of issues which introduce uncertainty or bias:

(a) there is significant uncertainty in the method of cost estimation for overbridges and underbridges and the level of preliminary costs within these items is disproportionately high for civil engineering works of this nature;

(b) there is an error in the application of further overlays for preliminary works and management costs which is likely to lead to an overestimation of costs of approximately 10 to 20%;

(c) there is potential for the overestimation of risk and contingency in the unit costs due to overlays being applied at a disaggregated level;

(d) there is inconsistency in the inflation indices used to uplift historical costs for different civils asset categories;

(e) further evidence is required that the historical mix of work is representative of the mix of work in CP5 as this affects unit costs; and

(f) there is very high uncertainty in relation to minor works cost projections.

8.439 For these reasons we have reduced Network Rail's pre-efficient cost forecasts. We have applied a 5% reduction in the first two years on the basis that a greater proportion of expenditure is supported by project estimates, and a 10% reduction for the remaining years where forecasts are more reliant on unit costs.

Policy and modelling

8.440 Network Rail has completely rewritten its civil structures and earthworks asset policies in response to the recommendations resulting from the reporter's review of civils asset management (as discussed previously). We, and the independent reporter Arup, have assessed the new policies and found them to be a very significant improvement on past practice. Previous policies were ambiguous, did not set clear intervention triggers and requirements, and were open to significant interpretation, leaving considerable uncertainty over the required level of work to maintain a safe and sustainable asset base.

8.441 The structures policy sets out the triggers for intervention and clear rules for the nature of the work required. The policy has been supported by simpler and clearer 'policy on a page' documents. Network Rail has produced a whole life cost model for some of the structures assets. The model is a sophisticated tool which has been used to inform the optimisation of interventions. The model has been audited and found to be computationally sound. However, the whole life cost modelling is limited by the quality of its unit cost and asset degradation inputs, leading to outputs which are considered to have moderately high uncertainty.

8.442 The earthworks policy aims to reduce the earthworks related delay minutes (largely driven by embankments) and to reduce the number of asset failures (mainly driven by cuttings). It has been developed using a decision support tool called SCAnNeR. The model has been used to assess intervention options which range from maintenance to full renewal. We have reviewed the model and its application and consider it to be sound. However, the company has further work to do in developing its understanding of degradation and risk prioritisation which may result in further optimisation of the policy. The policy proposes a logical approach to asset interventions on the basis of

route criticality and asset condition, for example recognising that cuttings generally represent a higher safety risk than embankments. However the policy focuses primarily on maintaining and refurbishing earthworks assets rather than carrying out full renewal and this raises issues as discussed in chapter 11. Network Rail has recognized the importance of drainage and its contribution to addressing the root cause of earthworks failures. The prioritisation of drainage work for CP5 is considered appropriate to manage the asset.

8.443 Network Rail has completed an initial causal analysis of the large number (approximately 180) of earthworks failures which occurred in 2012-13 to see if amendments are required to its earthworks standards or policies. This may have an implication for the CP5 workbank.

8.444 As with other asset categories Network Rail has carried out both central modelling and route based development of civils workbanks to forecast the effect of implementing the new policies. The central model for civils structures is called CECOST. It uses similar principles to the CECASE model submitted in support of the company's PR08 SBP. The CECOST modelling and outputs were being developed in short timescales in the run-up to the submission of the SBP. The model was not available for detailed scrutiny as part of our progressive assurance work prior to the SBP submission. Presentation of the model and its outputs has been insufficient to provide assurance that it is producing a robust forecast of work required by the asset policy. Earthworks modelling has been carried out using SCAnNeR. The model has been reviewed based on an engineering assessment of its inputs and outputs and no material issues were found.

8.445 Effectiveness of the new structures and earthworks policies is critically dependent on how well new practice is embedded in the devolved routes and this will be the subject of further review in 2013.The embedment process is in its early stages and is expected to continue throughout CP5. The plans for CP5 include the expenditure associated with these programmes during the period.

Efficiency

8.446 Network Rail has forecast civil renewals efficiency of 13.8% during CP5. Our analysis finds potential for greater efficiency of 19% from adopting best practice asset management for these assets. For example, there is potential for efficiency from better packaging of civils renewals works, improved supply chain management and improved data management, availability and analysis. There will also be efficiencies available due to the high volumes of work required over the next two control periods. Our audit of Network Rail's benchmarking and efficiency work has found that there are some significant limitations to the approach adopted and evidence base presented. Whilst the company's external benchmarking was considered relatively good, the audit found significant limitations in plans at operating route level and a lack of internal challenge applied. For the first two years of the control period our efficiency analysis

finds very similar levels of efficiency to Network Rail's plans. We have accepted Network Rail's efficiencies for these two years. For the remaining three years, due to the weaknesses identified in Network Rail's approach we have applied 25% weighting to its analysis and 75% to ours.

Routes

8.447 Network Rail's routes have, independently, produced workbanks to align with the structures and earthworks asset policies. The route plans developed have been of varying quality. The most complete workbanks are based on a full survey of civil assets and assessment of the most appropriate work required based on on-site condition. Some routes appear to have built workbanks based on relatively poor information and a less complete understanding of the application of the new policy.

8.448 Network Rail has not fully understood the drivers of differences between its route plans and central modelling. This has resulted in a plan which uses the outputs of central modelling for forecasting of some of its detailed costs and route-based plans for others, and leads to potential for inconsistencies.

Findings

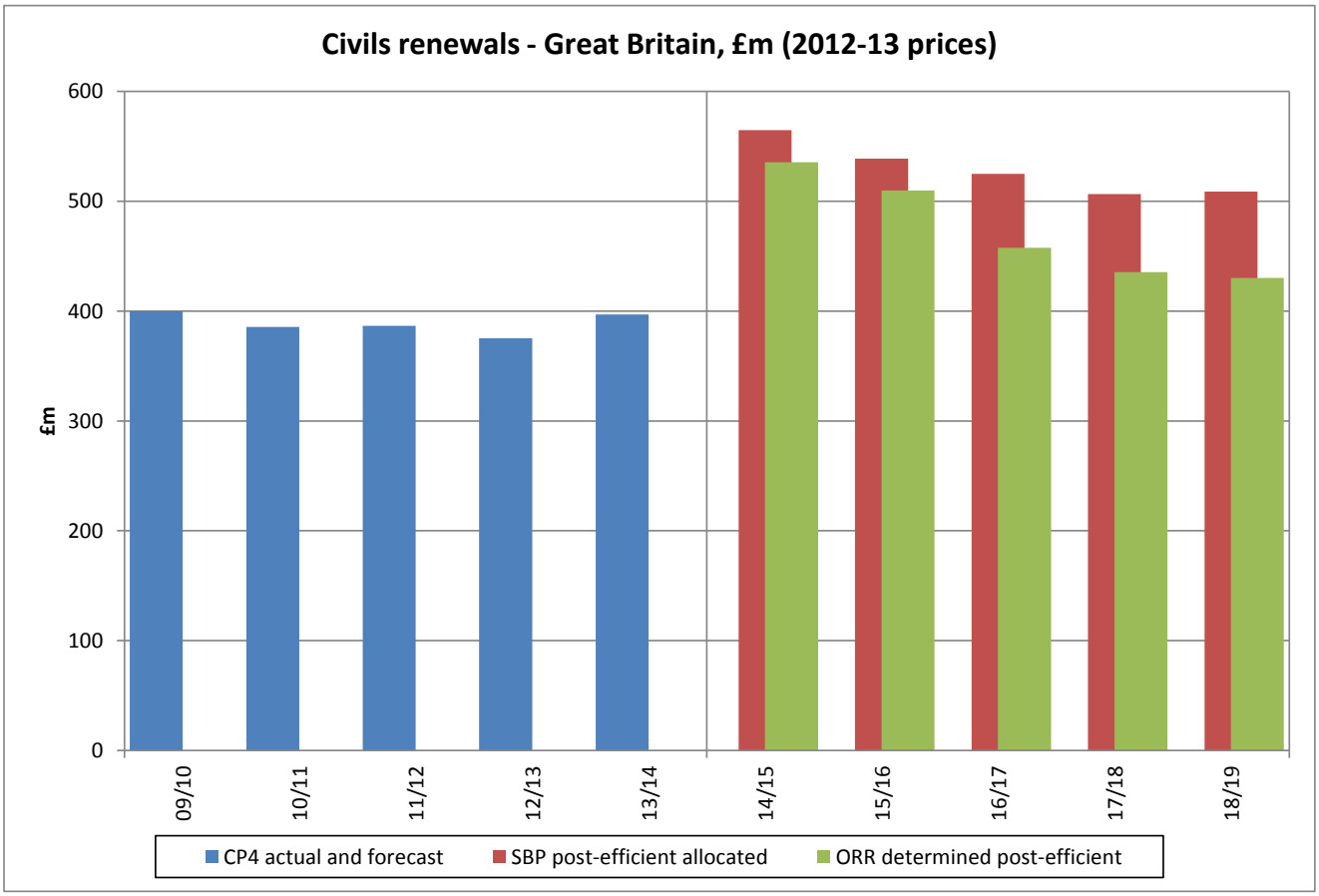
8.449 Network Rail's derivation of its civils plans is not clear. We have held a series of meetings with the company to gain more clarity. These have led to submission of corrections to the original SBP data, submissions of new data and production of further clarification documents. We have concerns about the process for development of the civils plans and have not been assured that the costs and volumes presented are robust, sustainable and efficient. We consider that the proposed costs and volumes for delivery of structures and earthworks asset policies in CP5 and beyond are highly uncertain. Network Rail has further work to do to fully understand the required levels of activity in CP5, CP6 and beyond.

8.450 Our assessment of the level of civils expenditure required during CP5 is shown in Table 8.33 and illustrated in Figure 8.12 below.

Table 8.33: ORR assessed costs, civil engineering renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	562	548	517	514	531	-	2,672
Efficiency	-	4.8%	2.3%	4.9%	4.3%	4.3%	-	19.0%
Post-efficient expenditure	397	536	510	458	435	430	1,944	2,368

Figure 8.12: Our assessment of efficient expenditure for civil engineering renewals



8.451 For the first two years of CP5 we have adjusted Network Rail's pre-efficient unit costs, accepted unit cost efficiencies, and accepted proposed volumes because its plans are largely based on workbanks (i.e. volumes of work at specific locations).

8.452 For years three, four and five of CP5 Network Rail's plans are increasingly reliant on high level modelled outputs. We have less confidence in its volumes, costs and efficiencies. We have adjusted its pre-efficient unit costs and made adjustments to unit cost efficiencies. We have accepted proposed volumes subject to an adjustment mechanism, described below, to deal with the high uncertainty in the plans. Network Rail is to be funded on this basis and these numbers are built into the access charges.

8.453 In total we have reduced Network Rail's planned renewals expenditure on civil engineering works by £275m but we are funding a considerable increase in civils renewals expenditure (£424m more than is planned for CP4, or £571m more after adjusting for CEFA). Recognising that there is high uncertainty around the exact requirement, we propose that civils expenditure is treated differently in the determination, through a 'civils adjustment mechanism'.

Civils adjustment mechanism

8.454 The civils adjustment mechanism will work as follows. In the first two years of the control period Network Rail is expected to deliver the civils renewal volumes proposed

in the SBP. Any under-delivery of volumes will have to be caught up. Volumes should not go above the agreed levels, but if they do the normal RAB roll forward policy will apply. Any underspend or overspend for unit costs reasons will be subject to the RAB roll forward policy. (In simple terms, the RAB roll forward policy allows Network Rail to keep 25% of efficient underspend but requires it to bear 25% of overspend.)

8.455 Network Rail must submit and publish a plan in March 2015 for the work it proposes on renewal of civils assets (i.e. excluding reactive maintenance and other civils maintenance costs) during years three, four and five of CP5. It is important that this plan is of a high quality such that we can form a judgement on the volumes and efficient costs of the work for which Network Rail will be funded[178]. We will issue a notice by 31 March 2014 requiring Network Rail to submit a plan no later than 31 March 2015. We will expect the plan to demonstrate that Network Rail has in place a bottom-up workbank, created by applying its asset policies to the civils asset portfolio, in accordance with condition 1.19 of its Network Licence. The workbank will be specific as to each asset on which work is proposed, its condition (at that time), the scope and cost of the work proposed, and its condition when the work is complete.

8.456 We are taking this step because of the unusual position we find ourselves in, that whereas Network Rail believes a significant backlog of work has developed in civils, its SBP submission has not fully demonstrated this and has also prevented us from concluding on civils expenditure in the determination.

8.457 We will review the plan and form a judgement on the volumes and efficient costs of the work for which Network Rail will be funded in our '2015 civils determination', which we will publish. The volumes and efficient costs could be under or over those assumed in our final determination but, once determined, these will be used to assess Network Rail's efficient delivery during the period. The difference between our 2015 civils determination for the three years and the costs assumed in the PR13 final determination will be settled by a RAB adjustment at the start of CP6.

8.458 Any underspend or overspend on unit costs against the 2015 civils determination will be subject to the normal RAB roll forward policy. If Network Rail under-delivers on volumes it will have to catch up. Over-delivery of volumes will be subject to RAB roll forward.

Drainage assessment

Asset data

8.459 Network Rail's management of its drainage assets has historically been poor. In our PR08 determination we provided funding to improve the condition of these assets.

[178] Network Rail's licence provides for us to require the company to send us plans which demonstrate its compliance and proposed compliance with meeting its obligation to maintain and renew the network in line with best practice and in an efficient way. The licence also provides for us to specify the structure, format, standard and level of detail of the plan by way of a notice.

The company was slow to apply this but is now increasing its focus on management of drainage and this is reflected in its production of a new, separate drainage policy. It has also begun to address its poor knowledge of the asset through the IDP. This has delivered a step-change improvement in the drainage asset register and condition information, but gaps remain. Network Rail has not assessed condition for a significant proportion of the surveyed assets (just over 40%) and has not assessed condition for the majority of drainage assets as it cannot be determined from the type of inspection carried out for IDP. Condition information will not be complete for at least a year.

Unit costs

8.460 Our audit of drainage unit costs has found that forecasts are highly dependent on a low number of unit costs. Network Rail has more to do to demonstrate that the drainage unit costs are appropriately representative of work types.

Policy

8.461 We welcome Network Rail's increased focus on management of drainage assets, the production of a separate drainage policy and the steps taken to improve asset knowledge. However, because the policy is new and untested there remains uncertainty as to whether the policy is robust, and high uncertainty as to whether the policy is sustainable in the long-term and whether it is yet optimised for lowest whole life cost.

8.462 Network Rail's costs associated with drainage are included within its earthworks and track forecasts. Effective drainage management should result in savings to required work for both track and earthworks. By including drainage costs with these elements Network Rail is incentivised to deliver it effectively which should result in direct savings to track and earthworks activities. However, because of outstanding data deficiency and high uncertainty in the CP5 targets, combined with lack of route information provided for review, we consider the volumes and costs to be highly uncertain. We expect Network Rail to improve this substantially in its delivery plan and, in its response to our draft determination, it has committed to doing so.

Efficiency

8.463 The efficiency of Network Rail's drainage plans is addressed through our assessment of track and earthworks efficiency.

Buildings assessment

Asset data

8.464 The independent reporter has audited the governance and completeness of asset data relating to franchised stations and managed stations. Some minor issues with data governance were identified but it was, on the whole, found to be in line with good practice. The dataset reviewed was found to be complete but its accuracy was not assessed as part of the review. Buildings data quality was graded B1 but the

limitations of the assessment should be noted. Buildings asset data and its governance have recently improved through implementation of an enhanced asset management system which allows better recording of all works carried out on the assets, improved control of data quality and better access to information.

8.465 The quality of asset condition data as measured by SSM has improved over CP4 and the reporter's latest review graded it B2.

8.466 We have reviewed data relating to buildings which have been used in the development of the SBP. We have found instances of volume data which are wrong and appear to be using different units or which are entered incorrectly. This reduces our confidence in the outputs of the modelling carried out.

8.467 Network Rail has more to do to understand buildings degradation and intervention curves. The independent reporter has found that degradation assumptions are likely to be pessimistic, resulting in modelled results which overestimate volumes.

Unit costs

8.468 The audit of buildings unit costs has found their coverage to be relatively low and there is scope for this to be increased to improve the accuracy of plans. A significant proportion (approximately 40%) of Network Rail's buildings plans are based on less robust non-unitised costs. The unitised costs developed only cover building structures and fabric and omit unit costs for mechanical and electrical systems. The audit has found that the quality of evidence to support adjustments which uplift national unit costs is poor. The unit costs used include contingencies of 5% which may be high as Network Rail has not demonstrated oversight of its risk estimation at a programme or portfolio level. We have found many instances of unit costs which do not appear credible and/or for which units are inconsistently applied. For these reasons we find very significant uncertainty in both Network Rail's buildings pre-efficient unit costs and non-unitised costs and reflect this in our overall adjustment to buildings plans discussed below.

Policy and modelling

8.469 We and the reporter have separately assessed buildings asset policy for franchised stations, managed stations, lineside buildings, light maintenance depots and maintenance delivery units. The CP5 buildings policy refines the policy applied in CP4 but has improved coverage of the assets. The effect of application of buildings policy is forecast in terms of Percentage of Asset Remaining Life (PARL). Network Rail's modelling of policy projects that, on average, PARL will improve marginally over the control period and in the longer-term (to CP11) it will improve significantly, suggesting that the policy is both robust and sustainable. However, no compelling justification has been provided that the policy represents an optimised approach to the management of risk on the network. It is also noted that the level of expenditure in CP4 has delivered a marginal improvement in the station stewardship measure (SSM) and this is forecast to continue into CP5 and beyond.

8.470 The buildings asset policy distinguishes between asset interventions based on criticality, measured using PARL and the Asset Risk Score. Assets are managed using different strategies depending on whether they are above or below certain threshold criteria for PARL and Asset Risk Score. We have reviewed the criteria being applied and find that the policy may lead to an overstatement of volume requirements by inefficiently prioritising renewal of assets which have considerable remaining life.

8.471 For stations the CP5 asset policy is considered to have met the robustness and sustainability criteria, but there is high uncertainty around whether it is minimum whole life cost. For light maintenance depots the policy is considered, in the round, to have met all three criteria. For lineside buildings and maintenance delivery units the policy is considered to have either some uncertainty or moderately high uncertainty in all three criteria. Overall this has resulted in moderately high uncertainty in the CP5 volumes and costs included within Network Rail's plans.

8.472 The franchised stations model shows some inconsistency with asset policy. Degradation curves used were found to generate higher volumes than the reporter considered necessary. The managed stations model is based on inputs from a workbank, with the exception of lifts and escalators. For modelling of other buildings assets some uncertainty was identified in inventory and unit cost inputs. No significant computational errors were identified in any of the buildings models.

Efficiency

8.473 Our assessment of bottom-up efficiencies finds similar best practice opportunities to those identified by Network Rail's benchmarking work and finds similar levels of efficiency by the end of CP5. For example, there are efficiency opportunities through the improved specification of works including use of innovative materials and through optimisation of policy. The independent reporter's audit of Network Rail's buildings efficiencies has found some uncertainty in the buildings benchmarking and efficiency evidence presented. Internal benchmarking is considered weak but external benchmarking considered reasonably good. We have applied 50% weighting to our analysis and 50% to Network Rail's which reflects our view of the robustness and completeness of the buildings benchmarking and efficiency work conducted by Network Rail.

Routes

8.474 There are some anomalies in the route plans between the average level of expenditure forecast per station. The plans for the Anglia route reflect the transfer of maintenance and renewal responsibilities to the Greater Anglia franchise. We will adjust for further changes in responsibility for management of stations which occur during the period.

8.475 Our assessment of buildings route plans included a 'deep-dive' review of a sample of certain costs included in plans. From the sample reviewed route plans were found to contain errors and/or unjustified cost projections.

Findings

8.476 The SBP proposes pre-efficient expenditure on buildings of £1,394m (before embedded efficiencies). This represents a 9% increase on CP4 buildings expenditure, which was itself a significant increase on levels of expenditure in CP3. All categories of buildings renewals are forecast for increases in the level of pre-efficient expenditure with the exception of managed stations.

8.477 In our draft determination we applied a reduction to buildings renewals pre-efficient costs to reflect the wide range of issues identified in Network Rail's planning. In its response to our draft determination, Network Rail said it considered the reduction in the scope of buildings renewals implied by the draft determination will have implications for the sustainability of outputs and will lead to sub-optimal whole life costs. We do not consider that Network Rail's buildings renewals planning is sufficiently robust to demonstrate expenditure requirements in line with those in its SBP. Our final determination continues to apply a reduction to buildings renewals pre-efficient costs for franchised stations, lineside buildings and maintenance delivery units. We consider this adjustment to be justified because:

(a) buildings renewal costs rely on high levels of non-unitised cost projections and are significantly uncertain;

(b) Network Rail's cost and volume reporting in CP4 has been poor;

(c) buildings asset policy has not been demonstrated to be minimum whole life cost and is potentially overstating renewal requirements due to application of criticality thresholds and pessimistic degradation assumptions;

(d) certain aspects of buildings renewals modelling appear flawed, the results of which have been shared with routes and may have influenced route plans upwards; and

(e) sampling of route plans has found instances of cost projections which are not justified.

8.478 The adjustment applied is necessary due to the quality of Network Rail's plans. We do not consider that this adjustment should result in implications for the sustainability of outputs. It brings pre-efficient expenditure to a level comparable to that seen towards the end of CP4. Expenditure levels in CP4 sustained or improved asset condition. Network Rail must manage its assets sustainably, and we will monitor it closely during CP5, as set out in chapter 3, to make sure that it does.

8.479 For managed stations the projected costs are likely to be reasonable given their bespoke plans but Network Rail has not submitted these plans for review. For light maintenance depots we consider that the proposed increase in expenditure on depot plant is justified.

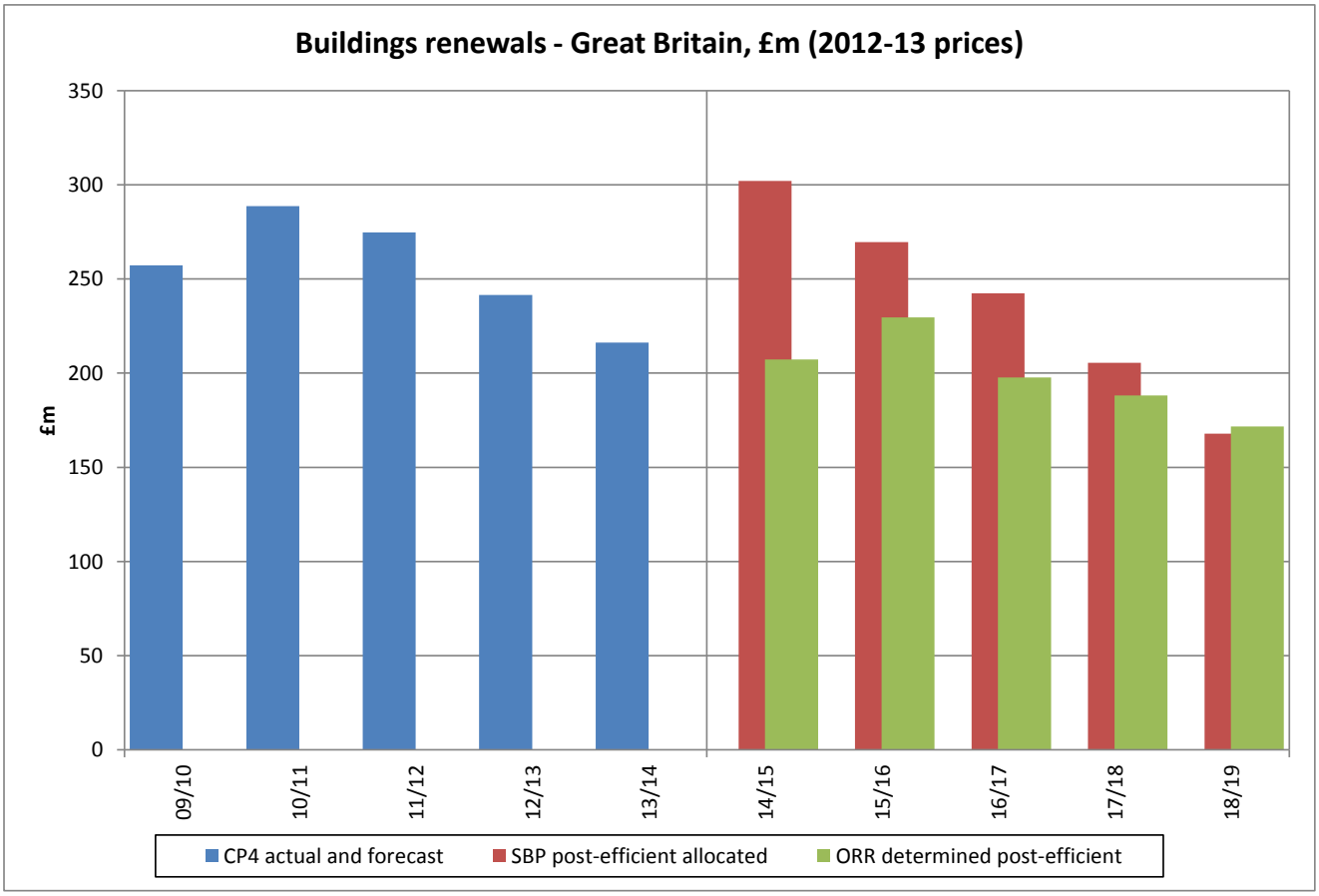
8.480 We have reduced Network Rail's pre-efficient buildings renewals plans by £246m to reflect our findings.

8.481 Our assessment of the level of buildings expenditure required during CP5 is shown in Table 8.34 and illustrated in Figure 8.13 below.

Table 8.34: ORR assessed costs, buildings renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	222	256	228	226	216	-	1,148
Efficiency	-	6.7%	4.0%	3.1%	3.9%	4.5%	-	20.4%
Post-efficient expenditure	216	207	230	198	188	172	1,279	994

Figure 8.13: Our assessment of efficient expenditure for buildings renewals



8.482 In total we have reduced Network Rail's planned renewals expenditure on buildings by £193m.

Electrical power assessment

Asset data

8.483 Network Rail has improved its asset data relating to electrical power assets through the ADIP. It has bettered its understanding of asset degradation and failure modes by collating and analysing historical asset failure data and drawing on the knowledge of

asset specialists. The independent reporter's audit of asset data quality has given overhead line data a grading of B2, showing governance to be largely in line with good practice but with some improvements to documentation required and/or evidence required. For conductor rail the audit's findings were similar for governance, but the accuracy of data was found to be poor, resulting in a grading of B4.

Unit costs

8.484 The reporter's audit of unit costs has identified that roughly half of the SBP expenditure submission for electrical power and fixed plant is driven by non-unitised costs. The evidence supporting these costs is low and this leads to greater uncertainty in the plan.

8.485 Where unit costs have been used in formulating plans these have been developed using an appropriate methodology and are aligned with good practice. The reporter has traced the rates through to the SBP submission. Network Rail has not provided a full justification of the overlays applied to the unit costs and, as with other assets, has not demonstrated a programme level overview of risk estimation. For these reasons we have applied a 2% reduction to the pre-efficient plans for electrical power and fixed plant.

Policy and modelling

8.486 Network Rail has put a lot of work into producing an electrical power asset policy which is a significant improvement on the previous policy. The new policy addresses safety more comprehensively. For the first time it is based on whole life cost modelling. This work has improved the justification and modelling of policy. However, it introduces new ways of working, for example introduction of mid-life refurbishment of overhead lines, which are not yet fully tested and this results in some uncertainty as to whether the policy is robust and sustainable.

8.487 Network Rail has assumed that sustaining electrical power delays (those which cause disruption of greater than 10 minutes) at the level forecast for the end of CP4 will support the delivery of the performance outputs required by the HLOSs. This appears to be a reasonable assumption but Network Rail has not demonstrated a clear link from this measure to its delivery of performance. Through development of the asset policy, Network Rail has made progress with linking work activities in its strategic planning models to the electrical power asset performance indicators to provide assurance that the forecast levels can be achieved. However, discussion with the routes has made it clear that the workbanks are sometimes inconsistent with the central modelling. Our discussions with the routes have also highlighted that they have not consistently provided feedback on the assumptions used in strategic planning models. The disconnects between the strategic planning models (which are linked to asset performance indicators) and the workbanks that underpin the SBP expenditure forecasts, lead to some uncertainty around the robustness of the policy.

8.488 In considering sustainability we have assessed whether electrical power asset performance and condition measures can be maintained in the long-term without an undeliverable spike in work volume. In its SBP, Network Rail has forecast renewals expenditure and remaining life over control periods CP5 to CP11. It forecasts that the long-term profile of expenditure will be reasonably steady, between £0.8bn and £1bn in most control periods. The average remaining life is forecast to reduce from 61% to 51% by CP11. This forecast reduction appears reasonable given the substantial programme of electrification that is planned for CP5.

8.489 The long-term forecasts of electrical power expenditure and condition outputs are based primarily on the central models. The disconnect between central modelling and the bottom-up workbanks that represent the actual work forecast on-site raises similar issues to those raised in our test of robustness.

8.490 The electrical power asset base is varied and includes both linear (for example cables and overhead lines) and point assets (for example switchgear and transformers). To select the assets to be analysed Network Rail has completed an asset criticality ranking using parameters including previous expenditure and impacts on performance, safety environment, operating costs and system capability. This asset criticality prioritised the following assets for whole life cost analysis:

(a) overhead line equipment;

(b) signalling power supply systems (PSPs and signalling power distribution cables);

(c) HV switchgear for the AC and DC electrification systems;

(d) conductor rail; and

(e) HV cables on the DC electrification systems.

8.491 Network Rail has used a sound approach to the whole life cost modelling. However, the determination of optimum, efficient plans using whole life cost analysis tools is highly dependent on the quality of information used as inputs and assumptions. Network Rail has recognised the quality of asset data for electrical power assets has not been good and has developed programmes to improve this. Due to the time this takes, Network Rail has used expert knowledge supported by sensitivity analysis to determine degradation rates rather than comprehensive asset information.

8.492 Network Rail's centrally modelled figures are derived in a strategic planning model. This uses outputs from the whole life cost models and applies the policy to the electrical power asset base. This further emphasises the requirement for reliable asset inventory data to ensure the outputs of this model will provide a robust forecast of expenditure. The whole life cost models have influenced approximately 50% of the expenditure forecast in the SBP for electrical power renewals.

8.493 The electrification and power model was found to be consistent with policy. No material issues were found with computational accuracy in modelling costs and volumes for CP5.

Efficiency

8.494 We have assessed the electrical power efficiency initiatives proposed and agree they should deliver long-term efficiencies. Network Rail has carried out benchmarking against the electricity distribution and transmission industry. Arup's review of Network Rail's work to assess potential electrical power renewal efficiencies concluded the initiatives are well-founded in terms of the range and scope covered. Network Rail's route teams have also included some locally derived efficiencies. The routes have not provided detailed delivery plans for these additional efficiencies. Due to the relatively robust approach Network Rail has taken to developing the majority of its electrical power and fixed plant efficiencies, we have applied 75% weighting to its analysis and 25% to our analysis.

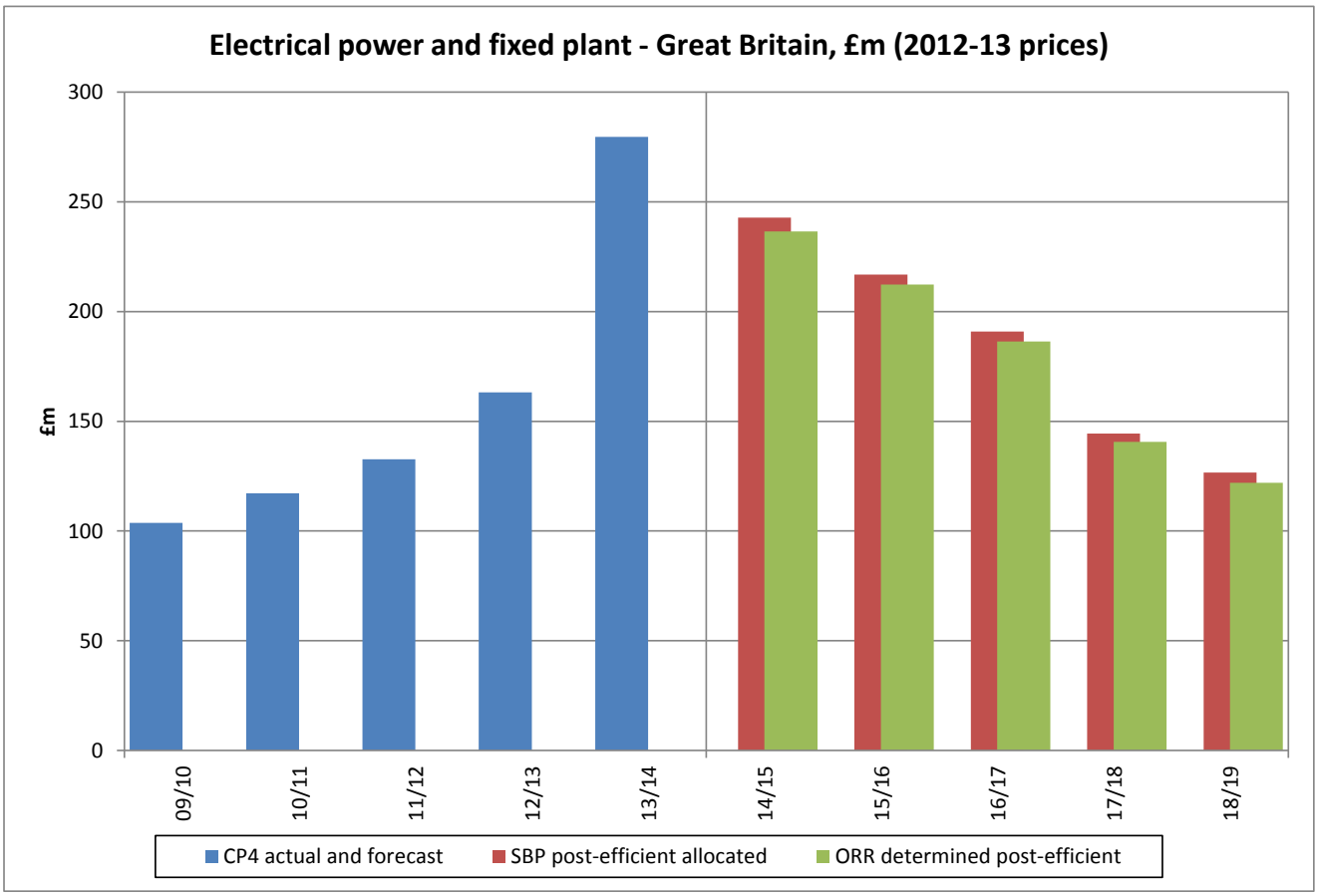
Findings

8.495 Our assessed efficient expenditure for electrical power and fixed plant renewal is illustrated below. We accept the need for an increased level of expenditure relative to CP4. This is driven by the new asset policy which requires more mid-life refurbishment, by the advanced renewal of electrification assets due to enhancement works and by new information which has revealed the need for high levels of signalling power cable renewals to address a backlog of work. The high expenditure in the final year of CP4 is due to a large increase in expenditure on overhead line renewals, DC distribution renewals, supervisory control and system capacity improvements. The profile in CP5 is largely driven by high levels of efficiency, including efficiency from application of the new asset policy.

Table 8.35: ORR assessed costs, electrical power and fixed plant renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	279	265	243	195	173	-	1,155
Efficiency	-	15.1%	5.7%	4.4%	5.7%	2.4%	-	29.5%
Post-efficient expenditure	280	237	212	186	141	122	797	898

Figure 8.14: Our assessment of efficient expenditure for electrical power and fixed plant renewals



Telecoms assessment

Asset data

8.496 Network Rail's telecoms plans are based on asset knowledge collected through its Telecoms Decision Support Tool (DST). This provides a structured approach to collection of telecoms asset data and renewal planning at half nominal life and two years prior to nominal renewal date. The DST system is currently spreadsheet based and would benefit from being moved to a more robust and controlled platform. Ellipse is used as the telecoms asset register. There is currently no direct link between Ellipse and the fault management system (FMS). Asset information management and data quality is being addressed through ADIP and ORBIS.

Unit costs

8.497 The independent reporter's audit of telecoms unit costs found that a high proportion (52%) of telecoms plans was based on non-unitised costs. The projection of these costs and their overlays (e.g. 'abnormals') has not been supported by sufficient evidence and this results in a higher uncertainty relating to telecoms pre-efficient expenditure forecasts. Network Rail's unit costs are built up using an appropriate methodology but treatment of risk and contingency is not clear and, as with other asset categories, no programme level view of risk estimation has been demonstrated.

We have applied a 2% reduction to account for duplication and overestimation of risk overlays.

Policy and modelling

8.498 Network Rail Telecoms (NRT) was set up in August 2011, partly in recognition of the need to manage the telecoms assets on a holistic basis, over the full life of the assets.

8.499 Network Rail recognises that its assets, in particular the Fixed Telecoms Network (FTN), have potential benefits both in terms of added services and commercial opportunities. However, the CP5 SBP submissions exclude all commercial activities, costs and revenues.

8.500 Network Rail has carried out whole life cost modelling in support of its telecoms asset policy. This is a positive step but we consider that the modelling does not yet provide sufficient coverage of the asset base. In depth modelling has only been carried out for processor controlled concentrators. The modelling has been hampered by data quality with extra work carried out to verify FMS data. There is therefore potential for further optimisation of the policy through wider use of the model and improved input data. The policy proposes a move to a more targeted approach of component renewal to maximise the asset life, integrated with programmes of major interventions relating to NOS. This approach appears sound.

8.501 Telecoms maintenance regimes are to be based on the criticality of the asset and based around delivery of Service Level Agreements (SLA) with NRT's clients, the routes. SLAs have not been implemented or fully tested and it will not be clear whether the proposed SLAs are appropriate until the middle of CP5. We therefore do not yet consider that delivery of SLAs has been demonstrated to be a robust or sustainable way of maintaining the assets.

8.502 The asset policy document does not capture the portfolio of telecoms assets consistently. This needs to be resolved to ensure robust reporting in CP5. The policy is also unclear on asset ownership.

8.503 Network Rail has developed its CP5 plans based on application of the policy. Its plans show a reduction in overall expenditure from CP4 driven by the completion of two major programmes of work: GSM-R and FTN.

8.504 In our draft determination we made adjustments to the pre-efficient plans for telecoms renewals where Network Rail had not provided sufficient information to justify them. In its response to the draft determination, Network Rail acknowledged inconsistency between the core SBP documents and the supporting NRT plan. It stated that the inconsistency was explained by migration of systems to FTN, which represents additional scope beyond activity funded in CP4. We have reviewed the further information provided and found that some of the expenditure identified should have been included in its CP4 plans. Where expenditure is driven by migration away from third party networks we believe that Network Rail has had the opportunity to develop

efficient plans over several years. We have not seen sufficiently developed, costed plans for the identified works. Our final determination applies the same approach as our draft determination and reduces pre-efficient telecoms renewals forecasts by £72m.

8.505 The telecoms model was found to be consistent with policy. No material issues were found with computational accuracy in modelling costs and volumes for CP5.

Efficiency

8.506 Our assessment of the efficiencies available for telecoms renewals has found opportunities in the development and sharing of smoothed workbanks, improved management of the supply chain and through application of innovative solutions. We find a slightly lower overall efficiency available than Network Rail's analysis.

8.507 The reporter's audit of Network Rail's telecoms benchmarking and efficiency found that both internal and external benchmarking was limited in coverage and identified efficiencies were not reflected in CP5 workbanks. We have given greater weight (75%) to our analysis given our view of the quality of Network Rail's benchmarking and efficiency analysis.

Routes

8.508 There are no specific route plans for telecoms with assets remaining under the direct control of NRT, but route staff are used to provide first level failure response.

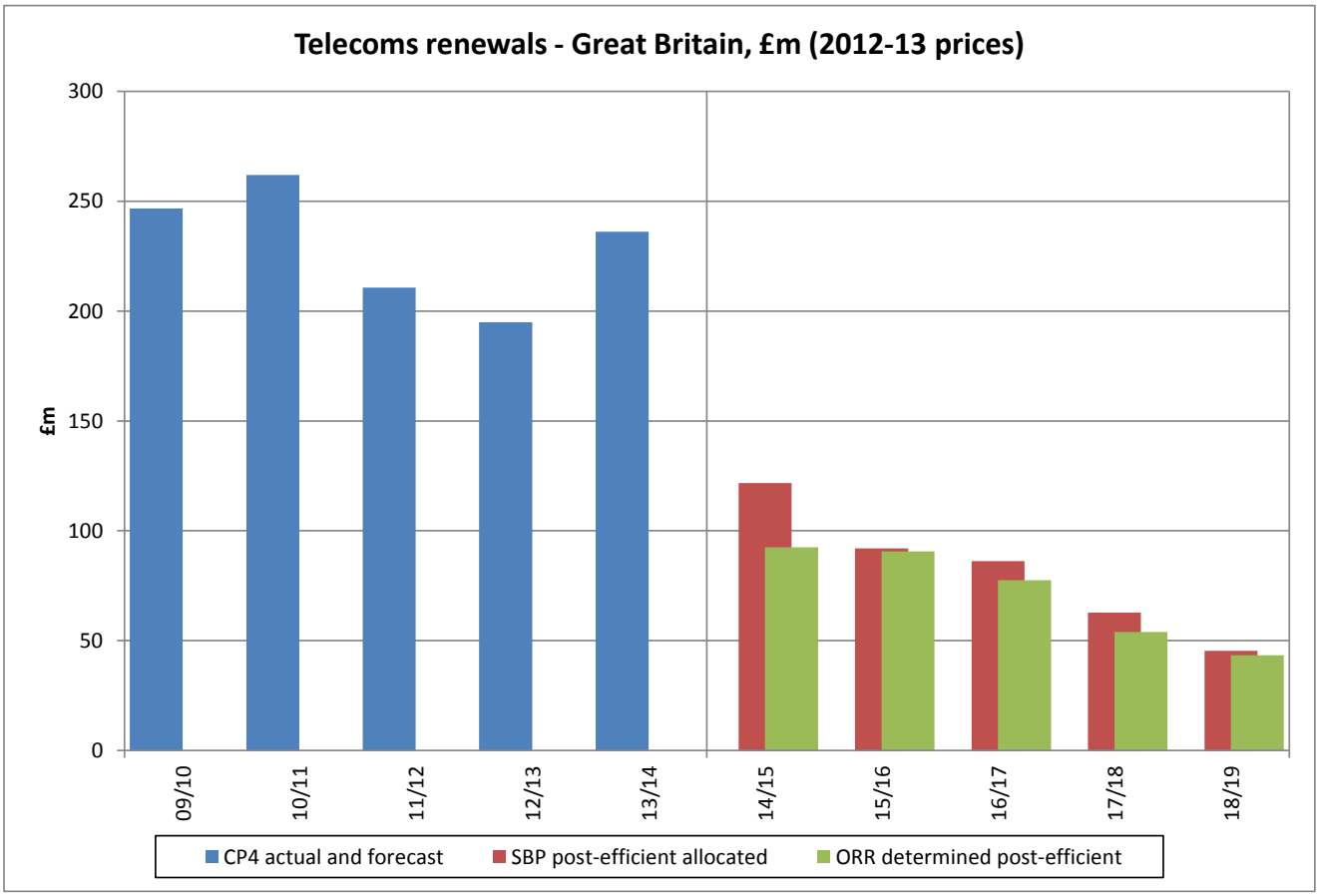
Findings

8.509 Our assessed efficient expenditure for telecoms renewals is illustrated below.

Table 8.36: ORR assessed costs, telecoms renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	96	97	86	62	52	-	394
Efficiency	-	3.7%	3.4%	3.5%	3.2%	3.6%	-	16.2%
Post-efficient expenditure	236	92	91	78	54	43	1,150	358

Figure 8.15: Our assessment of efficient expenditure for telecoms renewals



8.510 Expenditure in CP5 is markedly lower than in CP4 due to the completion of major programmes of work delivering FTN and GSM-R.

Wheeled plant assessment

Asset info

8.511 Network Rail acknowledges that the current level of information available for wheeled plant is inconsistent and limited, which is largely a function of the existing contractual arrangements. Network Rail has taken steps to address this shortcoming through the standardisation of contracts and population of a fleet database, the Fleet Asset Management System (FAMS). Poor asset information hinders Network Rail's ability to develop an optimised asset policy and this is reflected in our assessment. From the information which is available, fleet condition is shown to be good, with high availability and reliability levels.

Unit costs

8.512 The independent reporter's audit of wheeled plant unit costs has found a lack of clear evidence that rates have been built up using a robust methodology. It highlights that, for larger bespoke plant items and systems costs will largely be driven by the market's response to a procurement exercise and that this leads to real difficulties in projecting costs.

8.513 We have made no adjustment to wheeled plant unit costs for management of risk or contingency as Network Rail has not included any specific allowance.

Policy and modelling

8.514 The wheeled plant policy is a significant improvement on CP4 policy but it is still considered relatively immature. The policy attempts to draw together coherent management plans for an extensive but varied set of assets. The assets vary in terms of age, type and complexity of vehicles, and each has its own set of asset management requirements.

8.515 Following review of the detail that sits beneath the policy, we consider that the focus of extending maintenance and overhaul periodicities forms part of a considered and assessed plan for the on-going stewardship of the assets rather than simply a drive to reduce and extend maintenance. We note that the policy does not cover all Network Rail's fleet plans for CP5. The policy only covers those vehicles to maintain the network to the anticipated work volumes. It does not cover route specific vehicles or certain enhancement works, such as Thameslink which has its own provision for fleet procurement.

8.516 The wheeled plant strategic planning model was found to be generally consistent with asset policy, except for the road fleet which was assumed to be replaced every four years whereas policy stated every five. There were no material unexplained issues with input data and no errors found in computation. In our draft determination we made an adjustment to expenditure on road vehicles of £3m to reflect the discrepancy between policy and modelling and concern that the residual value of vehicles at the time of disposal had not been considered. In its response to our draft determination Network Rail stated that there was an error in its policy document and that its modelling assumption of replacing cars every four years was correct. It stated that it had applied a multiplying factor to allow for residual value at time of disposal. We have reviewed and accept these points but consider that the policy for replacing road vehicles is immature and uncertain compared to other fleet assets. We expect the policy to be further developed to inform CP6. We have applied a smaller reduction of £1m in our final determination.

8.517 Because of the limited information available (as described above), the outputs from the policy are very crudely and loosely defined. Success is proposed to be measured by the delivery of the planned shifts and by having a fleet condition no worse than at exit from CP4. Network Rail has proposed no specific monitoring targets for fleet in CP5.

8.518 We are concerned that there is some disconnect between route plans and central modelling of fleet requirements.

8.519 We have reviewed the costs and volumes included in the SBP which are associated with implementation of the fleet policy. The fleet size required to support the fleet policy is modelled by assessing the projected work provided by the routes with

perturbation factors such as the unavailability of possessions and machine failure incorporated. Given the high availability and reliability demanded of the fleet to support the projected work, we are surprised that there has been little consideration of any benefits which could accrue from the provision of additional fleet resource, for example, to provide resilience to changes in work demand, fleet performance (especially on critical fleets) or to provide additional capacity to perform more work.

8.520 Despite our concerns over asset information and demand modelling, we consider that Network Rail has demonstrated that its fleet policy is capable of delivering the planned outputs for CP5. We also consider that it has made the case that the fleet policy is capable of managing the fleet asset sustainably in the long-term. There is further work required to demonstrate how effective the policy would be if faced with a change in the planned outputs, because there appears to be little spare capacity in meeting the planned workload.

8.521 Expenditure in CP5 is forecast to be higher than in CP4. Network Rail has proposed an investment of £141m to make improvements to road-rail vehicles, citing improved safety as the main driver for the investment. We engaged the independent reporter to review the proposal. Of £141m proposed, £71m was for a new design of excavator. The reporter found that, whilst the principle was sound, the business case (considering both safety and efficiency) was not sufficiently developed. It recommended further development work. In our final determination we have made an allowance of £10m for further development, as discussed in chapter 11. If there is a financial business case (and expenditure is more than £5m) investment beyond this allowance could be put forward as a 'spend-to-save' scheme. If the case rests on wider benefits, there is a mechanism for logging up costs.

Efficiency

8.522 Network Rail has provided information on the proposed fleet efficiencies, supported by reasoned justification. The two principal areas proposed are improved procurement and efficiencies in the vehicle maintenance and overhaul process. Our analysis finds slightly higher available efficiencies driven by improved procurement policy. The assumed level of efficiencies is considered challenging but realistic if suitably managed.

Route plans

8.523 There is some discrepancy between fleet policy and fleet requirements as set out in route plans. This has been considered by Network Rail and independently examined with the conclusion that any difference should be manageable.

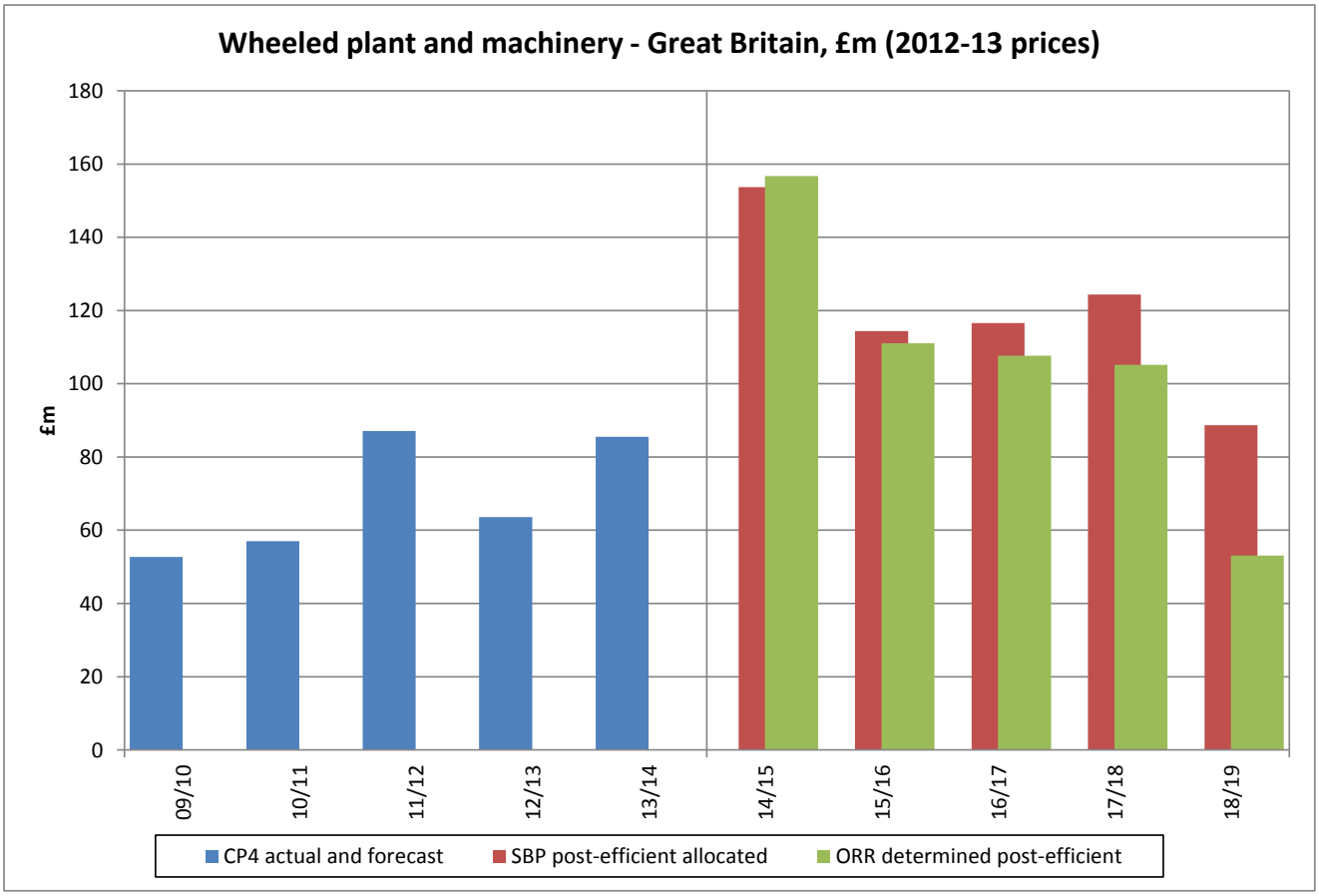
Findings

8.524 Our assessment of the level of wheeled plant expenditure required during CP5 is illustrated below.

Table 8.37: ORR assessed costs, wheeled plant and machinery renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	167	119	116	113	57	-	572
Efficiency	-	6.4%	0.2%	0.2%	0.2%	0.3%	-	7.3%
Post-efficient expenditure	86	157	111	108	105	53	346	534

Figure 8.16: Our assessment of efficient expenditure for wheeled plant and machinery renewals



8.525 The increase in expenditure in CP5 is largely driven by increased expenditure on provision of additional high output fleets. The peak of expenditure in 2014-15 is driven by expenditure on high output and seasonal plant.

Other renewals expenditure assessment

IM renewals

8.526 Network Rail's SBP assumed IM renewals expenditure (including spend on its Traffic Management System) of £613m over CP5. This is approximately £150m above CP4 levels. A significant proportion of Network Rail's SBP forecast for IM renewals was based on high level expenditure assumptions and drew on Gartner's global IT spend

benchmarks[179]. We did not think that the SBP provided sufficient justification for the significant increase in IM renewals expenditure above CP4 levels.

8.527 Following its SBP submission, Network Rail provided further details of its plans, setting out the types of IM projects that it expected to deliver in CP5. This was too late to be considered in our draft determination but we have considered the new information in developing our final determination.

8.528 Our final determination has separately assessed expenditure forecasts associated with ORBIS, discussed below, because less than of third of ORBIS costs relate to IM expenditure (with the rest of the cost relating to business change activity). For IM renewals we have used the same methodology as applied in the draft determination, based on actual CP4 spend and an efficiency trajectory. Our assessment results in an increase of £52m for IM renewals over CP5 compared to our draft determination. This assumes total spend on IM renewals excluding ORBIS of £389m. If Network Rail wants to spend more than this level it has the potential to do so through the spend-to-save framework for information management schemes that improve the business.

Asset information

8.529 In addition to IM renewal expenditure Network Rail has proposed expenditure on ORBIS of £173m during CP5 to deliver improved asset information management. These plans were assessed by the independent reporter, AMCL, in late 2012. The reporter found that the ORBIS vision and roadmap represented a major step forwards in terms of Network Rail's approach to asset information which addresses the existing shortfall between Network Rail's asset information capability and current best practice.

8.530 The reporter found certain elements of the programme that needed further development to address gaps to best practice, particularly the asset information specification and detailed system architecture.

8.531 The initial business case for ORBIS was found to be strong and based on sound evaluation for a programme in its early definition phase. The base case was strongly positive, delivered a good cost-benefit ratio and would start to deliver a positive net cost-benefit in a short period of time (during CP6).

8.532 We support Network Rail’s plans to improve its asset information management. In our draft determination we assessed IM renewals and ORBIS expenditure together and assumed a continuation of CP4 levels of expenditure with an efficiency overlay applied. We have now reviewed further evidence supplied by Network Rail and our final determination assesses ORBIS plans separately. We consider that expenditure of £173m is justified for ORBIS to ensure that Network Rail has the appropriate information management systems in place to support wider improved asset

[179] Gartner is an information technology research and advisory company. The data used for Network Rail’s benchmarking was based on a mix of global organisations with data reflecting average enterprise IT spend levels.

management and the efficiencies assumed in our determination. This is an increase of £14m for ORBIS in CP5 compared to our draft determination.

Property

8.533 Our assessment of Network Rail's plans for property renewals finds that expenditure levels before efficiency are reasonable but that a higher level of efficiency is available. We assume an efficient level of expenditure of £113m.

Intelligent infrastructure

8.534 We have assessed Network Rail's proposal for expenditure of £95m on further roll-out of remote condition monitoring. The proposed further implementation appears reasonable but we have not yet seen sufficiently detailed plans. We have asked Network Rail to quantify what this expenditure will deliver and it has presented high level information. We expect Network Rail to set out detailed plans, including milestones, in its delivery plan. We will monitor delivery against this plan.

Faster and safer isolations

8.535 Network Rail has proposed an investment of £230m in CP5 for taking safer and faster isolations, citing safety improvements as the main reason for the investment. £90m was proposed for improvements on the AC network and £100m for the DC network. The remaining £40m of expenditure was for further DC improvements. The investment of £190m for taking safer and faster isolations on the AC and DC network is considered appropriate but we consider that there is insufficient justification for the £40m for further DC improvements. We have applied an efficiency overlay in line with our assessment of efficiency for electrical power and fixed plant renewals. We assess efficient expenditure of £163m.

Improved protection and warning for track workers

8.536 Network Rail's proposal for £100m expenditure on a system for providing improved protection and warning to track workers is reviewed in chapter 11. We have made an allowance of £10m for the trialling of the proposed system in CP5.

Small plant

8.537 Network Rail's plans for renewal of small plant are considered reasonable and we have made no adjustment, giving efficient expenditure of £51m in CP5.

Research and development

8.538 Network Rail has presented plans for expenditure of £300m on R&D. We fully support an increased focus on R&D. The HLOSs included a £50m innovation fund. In addition to that fund we have set out a matched funding financial incentive as described in chapter 19 and have therefore not included funding for R&D in our assessed renewals expenditure.

Long-run renewals

8.539 Network Rail presented its plans for renewals up to and including CP11. We have conducted a review of these plans including a bottom-up review of plans for CP5 and CP6. We have assumed that the key identified efficiencies will be realised by the end of CP6. Beyond CP6 we have assumed that there will be further, as yet unidentified, efficiency improvements. We have assumed on-going efficiencies of 2% per control period. Our assessment of the long-run renewal expenditure is the average of the efficient renewal expenditure requirements from CP5 to CP11. Our final determination assumes higher long-run renewals figures than our draft determination, resulting from the changes made to our CP5 assessed renewals efficiencies for track being projected forward.

Our conclusions – maintenance

8.540 Our methodology as described in this chapter has resulted in our judgement on the level of efficient maintenance expenditure Network Rail should need to incur to deliver its required outputs. This is set out in the tables below. In comparison to our advice to ministers documents, our conclusions on maintenance expenditure are within the range we set out for both Scotland and England & Wales.

8.541 We have made no explicit adjustment to maintenance volumes as proposed by Network Rail. The company will set out its proposed volumes consistent with delivery of its asset policies and maintenance strategy in its delivery plan. The company will need to provide an explanation where its delivery plan volumes are different to the volumes submitted following the SBP, a subset of which is shown in Table 8.1. We will monitor maintenance volumes during the period against its delivery plan. Network Rail will need to provide us with justification for any material divergences between the actual volumes delivered in a year and those forecast in the delivery plan. We will also monitor on a forward looking basis, considering whether the volumes are likely to be delivered.

Table 8.38: ORR assessed costs, maintenance, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Network Rail's SBP								
Pre-efficient expenditure	-	1,165	1,172	1,174	1,172	1,166	-	5,848
Efficiency	-	5.3%	2.6%	2.3%	2.1%	2.4%	-	13.8%
Post-efficient expenditure	982	1,103	1,082	1,058	1,035	1,004	5,406	5,282
ORR assessed costs								

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Pre-efficient expenditure	-	1,134	1,154	1,150	1,155	1,157	-	5,750
Efficiency	-	3.7%	3.3%	3.5%	3.5%	3.6%	-	16.4%
Post-efficient expenditure	982	1,091	1,074	1,033	1,001	966	5,406	5,166

Table 8.39: ORR assessed costs, maintenance, England & Wales

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Network Rail's SBP								
Pre-efficient expenditure	-	1,052	1,055	1,056	1,054	1,052	-	5,269
Efficiency	-	5.4%	2.1%	2.5%	2.2%	2.9%	-	14.2%
Post-efficient expenditure	893	995	976	953	930	903	4,928	4,757
ORR assessed costs								
Pre-efficient expenditure	-	1,024	1,038	1,036	1,039	1,045	-	5,180
Efficiency	-	3.7%	3.4%	3.5%	3.5%	3.6%	-	16.6%
Post-efficient expenditure	893	986	965	930	899	872	4,928	4,651

Table 8.40: ORR assessed costs, maintenance, Scotland

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Network Rail's SBP								
Pre-efficient expenditure	-	113	118	117	118	113	-	579
Efficiency	-	3.9%	6.4%	1.0%	1.0%	-2.0%	-	10.0%
Post-efficient expenditure	89	108	106	104	104	102	478	525
ORR assessed costs								
Pre-efficient expenditure		110	116	115	117	112		569
Efficiency		3.5%	3.0%	3.3%	3.3%	3.3%		15.4%
Post-efficient expenditure	89	106	108	104	102	95	478	515

Maintenance, by asset

Table 8.41: ORR assessed costs, efficient maintenance by asset, Great Britain

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Track							
Network Rail SBP	420	414	404	395	384	372	1969
ORR assessed	420	418	408	393	377	361	1958
Signalling							
Network Rail SBP	158	151	148	146	143	141	729
ORR assessed	158	153	149	145	141	138	728
Civils and buildings							
Network Rail SBP	35	82	82	82	81	82	408
ORR assessed	35	81	81	80	79	79	400
Electrification and fixed plant							
Network Rail SBP	73	85	88	87	87	88	435
ORR assessed	73	90	92	90	87	86	445
Telecoms							
Network Rail SBP	21	21	20	19	19	18	97
ORR assessed	21	21	20	19	18	18	95
Other maintenance							
Network Rail SBP	274	216	213	206	202	196	1032
ORR assessed	274	220	212	203	195	187	1017
Reactive maintenance adj.							
Network Rail SBP	0	136	127	123	119	108	613
ORR assessed	0	108	111	102	102	98	522

Maintenance by route

8.542 Our assessed expenditure on maintenance by route is set out in Table 8.42. These feed into our calculation of the REBS baselines as explained in Annex D.

Table 8.42: ORR assessed costs, efficient maintenance by route

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Anglia							
Network Rail SBP	99	104	101	100	98	92	494
ORR assessed	99	102	100	98	95	90	484
East Midlands							
Network Rail SBP	50	57	58	56	54	54	280
ORR assessed	50	55	55	53	52	50	264
Kent							
Network Rail SBP	67	75	72	70	70	66	352
ORR assessed	67	73	71	68	66	63	341
LNE							
Network Rail SBP	154	161	161	157	155	155	789
ORR assessed	154	163	160	153	147	143	766
LNW							
Network Rail SBP	252	280	269	267	259	250	1,326
ORR assessed	252	277	266	259	250	244	1,296
Scotland							
Network Rail SBP	89	108	106	104	104	102	525
ORR assessed	89	106	108	104	102	95	515
Sussex							
Network Rail SBP	52	58	60	54	52	49	273
ORR assessed	52	57	59	52	51	47	267
Wales							
Network Rail SBP	52	62	61	61	61	60	306
ORR assessed	52	61	60	59	58	57	294
Wessex							
Network Rail SBP	78	87	84	81	76	73	402
ORR assessed	78	88	87	83	78	74	409
Western							
Network Rail SBP	87	110	109	107	105	103	535
ORR assessed	87	109	109	106	104	103	531

Our conclusions – renewals

8.544 Our methodology as described in this chapter has resulted in our judgement on the level of efficient renewals expenditure Network Rail should need to incur to deliver its required outputs. This is set out in the tables below. In comparison to our advice to ministers documents, our conclusions on renewals expenditure are within the range (towards the high end) that we set out for Scotland but above the range we set out for England & Wales. This is driven by a large increase in Network Rail's pre-efficient plans between the IIP and the SBP, particularly relating to civils renewals, accelerated track renewals, IT and other investment expenditure.

8.545 The company will set out its proposed renewals volumes consistent with delivery of its asset policies in its delivery plan. The company will need to provide an explanation where its delivery plan volumes are different to the volumes submitted in the SBP, a subset of which is shown in Tables 8.11 to 8.13. We will monitor renewal volumes during the period against its delivery plan. Network Rail will need to provide us with justification for any material divergences between the actual volumes delivered in a year and those forecast in the delivery plan. We will also monitor on a forward looking basis, considering whether the volumes are likely to be delivered.

Table 8.43: ORR assessed costs, renewals, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Network Rail's SBP								
Pre-efficient expenditure	-	2,989	3,149	3,196	3,119	3,060	-	15,513
Efficiency	-	8.3%	2.8%	2.8%	1.5%	1.4%	-	15.8%
Post-efficient expenditure	2,784	2,741	2,808	2,771	2,663	2,576	12,833	13,559
ORR assessed costs								
Pre-efficient expenditure	-	2,737	2,914	2,914	2,849	2,735	-	14,148
Efficiency	-	8.4%	3.6%	3.8%	2.7%	3.2%	-	20.0%
Post-efficient expenditure	2,784	2,508	2,575	2,477	2,357	2,190	12,833	12,107

Table 8.44: ORR assessed costs, renewals, England & Wales

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Network Rail's SBP								
Pre-efficient expenditure	-	2,672	2,756	2,839	2,795	2,743	-	13,805
Efficiency	-	8.1%	2.9%	2.6%	1.6%	1.5%	-	15.9%
Post-efficient expenditure	2,510	2,455	2,458	2,465	2,388	2,308	11,446	12,074
ORR assessed costs								
Pre-efficient expenditure	-	2,446	2,545	2,586	2,553	2,453	-	12,583
Efficiency	-	8.4%	3.6%	3.7%	2.7%	3.2%	-	19.9%
Post-efficient expenditure	2,510	2,242	2,248	2,199	2,113	1,964	11,446	10,766

Table 8.45: ORR assessed costs, renewals, Scotland

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Network Rail's SBP								
Pre-efficient expenditure	-	316	393	357	325	316	-	1,708
Efficiency	-	9.6%	1.4%	4.1%	0.8%	0.3%	-	15.5%
Post-efficient expenditure	273	286	350	305	275	267	1,387	1,484
ORR assessed costs								
Pre-efficient expenditure	-	290	368	328	296	283	-	1,565
Efficiency	-	8.3%	3.0%	4.5%	2.8%	3.3%	-	20.2%
Post-efficient expenditure	273	266	327	278	244	225	1,387	1,341

Renewals, by asset

Table 8.46: ORR assessed costs, efficient renewals by asset, Great Britain

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Track								
Network Rail SBP	816	720	684	725	669	633	3,762	3,431
ORR assessed	816	714	671	701	640	599	3,762	3,326
Signalling								
Network Rail SBP	533	757	776	701	581	482	2,421	3,296
ORR assessed	533	741	749	667	550	455	2,421	3,162
Civils								
Network Rail SBP	397	565	539	525	506	509	1,944	2,644
ORR assessed	397	536	510	458	435	430	1,944	2,368
Buildings								
Network Rail SBP	216	302	270	242	205	168	1,279	1,187
ORR assessed	216	207	230	198	188	172	1,279	994
Electrical power & fixed plant								
Network Rail SBP	280	243	217	191	144	127	797	922
ORR assessed	280	237	212	186	141	122	797	898
Telecoms								
Network Rail SBP	236	122	92	86	63	45	1,150	408
ORR assessed	236	92	91	78	54	43	1,150	358
Wheeled plant & machinery								
Network Rail SBP	86	154	114	117	124	89	346	598
ORR assessed	86	157	111	108	105	53	346	534
IT								
Network Rail SBP	80	123	150	123	109	109	467	613
ORR assessed	80	85	81	78	74	71	467	389
Property								
Network Rail SBP	18	23	30	22	28	22	254	124
ORR assessed	18	22	28	20	24	19	254	113
Other renewals								
Network Rail SBP	121	-130	64	164	352	500	148	949
ORR assessed	121	-174	3	87	247	323	148	487

£m (2012-13 prices)	CP4	CP5					CP4	CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total	Total
Reactive maintenance adj.								
Network Rail SBP	0	-136	-127	-123	-119	-108	0	-613
ORR assessed	0	-108	-111	-102	-102	-98	0	-522

Renewals by route

8.546 Our assessed expenditure on renewals by route is set out in Table 8.47. These feed into our calculation of the REBS baselines as explained in Annex D.

Table 8.47: ORR assessed costs, efficient renewals by route

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
Anglia							
Network Rail SBP	245	202	231	277	240	203	1,153
ORR assessed	245	189	215	257	217	172	1,051
East Midlands							
Network Rail SBP	144	162	145	125	119	107	659
ORR assessed	144	149	133	113	105	89	589
Kent							
Network Rail SBP	221	228	222	199	195	207	1,052
ORR assessed	221	210	202	177	173	179	941
LNE							
Network Rail SBP	449	413	453	429	473	502	2,270
ORR assessed	449	383	420	386	423	436	2,048
LNW							
Network Rail SBP	566	536	557	571	534	525	2,722
ORR assessed	566	478	503	506	468	443	2,397
Scotland							
Network Rail SBP	273	286	350	305	275	267	1,484
ORR assessed	273	266	327	278	244	225	1,341
Sussex							
Network Rail SBP	191	168	184	159	172	154	838
ORR assessed	191	154	170	141	153	130	748
Wales							
Network Rail SBP	173	193	155	163	120	112	742

£m (2012-13 prices)	CP4	CP5					CP5
	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	Total
ORR assessed	173	176	140	144	105	95	660
Wessex							
Network Rail SBP	209	216	214	261	250	210	1,149
ORR assessed	209	192	192	230	220	176	1,010
Western							
Network Rail SBP	312	337	298	280	285	288	1,488
ORR assessed	312	311	273	247	248	243	1,322

International top-down benchmarking

8.547 Benchmarking a firm's costs to those of its peers is widely used among regulators to help assess the scope for efficiency improvements or cost reductions. This approach formed an important element of ORR's assessment at PR08, and for this periodic review we have updated the previous models and approaches used, developed these to take advantage of developments in the field, and addressed some of the questions raised following the PR08 analysis. We are grateful to the Institute for Transport Studies at the University of Leeds for the technical advice and support they have provided to this work, in particular their assistance in identifying and making use of developments in the field since our PR08 work.

8.548 Given Network Rail's position as a national monopoly without similar domestic comparators, it is natural to look to the managers of rail infrastructure in other countries to inform comparisons. This is where international benchmarking can provide important insights into how overall costs of operating and maintaining railways can vary across countries.

8.549 In comparing across countries it is important to choose a set of comparators that have reasonably similar operating conditions so that efficiencies can be separated out from other factors. In selecting the comparators we have focused on other European countries for which data are available and the infrastructure and operating conditions are broadly similar. We also undertook analysis to gauge how sensitive the results are to the selection of comparators.

8.550 Even if comparators are similar it is inevitable that differences will remain. For example, the exact size of the network, balance between single and multiple track, and intensity of usage will all vary from country to country. These all impact on the costs of maintaining and renewing the network, and the relationship between these variables and overall cost is not necessarily straightforward. For example it is not necessarily the case that a railway double the size of another will incur double the cost. To estimate how much each of these factors impact on overall costs we use statistical techniques to estimate the relationships.

8.551 After these techniques have been used, the remaining differences in the data between countries (the 'residuals') are comprised of random differences between countries (for example due to natural events in a particular year), differences between countries due to factors that cannot be directly taken into account (for example different reliability requirements for which consistent cross country information is not available), and true underlying differences in efficiency. The objective of this work is to identify these true underlying differences in efficiency. The following section sets out a summary of a range of statistical techniques and approaches to do this.

Approaches

8.552 There is a wide set of statistical techniques available to benchmark costs across countries. These all use the data to estimate an efficiency 'frontier', which can be set by the best performing firm in the sample (either overall, so taking all years available into account, or for a particular year), or an adjusted frontier which takes into account some of the unobserved factors mentioned above. The distance from any particular firm to this frontier provides a measure of its inefficiency. All these approaches have a common limitation in that they are derived from the data itself, and so the frontier has to be defined by the set of counties included in the dataset. If there is a more efficient country for which we do not have data, the frontier will not be as challenging as it could be, resulting in inefficiency estimates that are systematically conservative.

8.553 There are two main approaches that have been used in this work. These are models using Corrected Ordinary Least Squares (COLS) and Stochastic Frontier Analysis (SFA).

Corrected Ordinary Least Squares

8.554 This approach is the starting point for our analysis. It is a relatively simple approach, commonly used by regulators, where the model produces a line of best fit to the data, so that around half the firms are above the modelled estimate of cost and half below. The lowest cost firm is then identified as the efficient frontier, and the line of best fit adjusted so that it crosses through the lowest cost firm, parallel to the original line. The distance of a particular firm from this line provides an estimate of its inefficiency. As this estimate includes both true inefficiencies, unobserved factors and any errors, it is likely to overstate efficiency gaps in general. As such we make an adjustment to the estimate to reflect these unobserved factors. Given that they are unobserved any adjustment is, to some extent, a matter of judgement. For this work we have reduced estimates by 25%.

Stochastic Frontier Modelling

8.555 This approach differs from COLS in that it attempts to separate out true efficiency from other random variations in efficiency (e.g. one-off natural events). It does so by fitting the model in a fairly similar way and then examining the differences between modelled and actual numbers. In a typical statistical analysis one might expect these differences (the residuals) to follow a normal distribution. But in efficiency modelling

we may expect a skew, reflecting the fact that there will be a number of inefficient firms, but only one efficient one. The approach uses this skew to decompose this residual into true 'noise' and residual efficiency. Taking account of this noise in the model estimation in this way should, all else being equal, yield a more accurate estimate of inefficiency. As such this approach has generally been a focus of our analysis.

Data

8.556 We have used the Lasting Infrastructure Costs Benchmarking (LICB) dataset compiled by the International Union of Railways (UIC) for this analysis. There are currently 14 European rail infrastructure managers participating in this dataset, of which ten have been used in our analysis.[180] We are grateful to the UIC for providing us with access to their dataset, and to Network Rail for working constructively with us in its use. The dataset covers the period 1996 to 2010, and Table 8.48 sets out the variables used from this dataset in our analysis.

Table 8.48: LICB dataset – variables used in analysis

Costs	Network size	Network usage	Network characteristics
Total maintenance and renewal costs	Track km	Passenger train km	Proportion of single track
Maintenance costs	Route km	Freight train km	Proportion of electrified track
Renewal costs	Single track km	Total train km	Passenger train density on network
	Electrified track km		Freight train density on network
			Total train density on network

8.557 In order to make the cost data comparable across countries we have made an adjustment to a common currency using GDP Purchasing Power Parity (PPP) exchange rates. We have also adjusted the data to constant prices. As such overall price differentials (such as wages) are taken into account at an economy wide rather than at a rail specific level. As a sensitivity test we have also adjusted using construction cost PPP, but do not consider this to be the best way of normalising the data. This is because it is not clear that a general construction industry correction factor is well-suited for specific track related renewals and maintenance, that the use

[180] These are Austria, Belgium, Finland, Germany, Italy, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom. Other countries have been excluded either due to non-comparability (e.g. non-similar operating or infrastructure conditions) or data limitations.

of a narrower PPP definition necessarily increases data uncertainty, and the models are generally more unstable when construction PPP is used.

8.558 Following the analysis undertaken for PR08 a set of concerns have been raised regarding the quality of the LICB dataset. We have investigated these, and sought to develop our approach to overcome them as far as is possible. Table 8.49 lists the main concerns and the steps we have taken to investigate and address these.

Table 8.49: Concerns raised regarding the LICB dataset

Concern	Steps taken
Data anomalies where certain years' values are missing or volatile	We have conducted a detailed review of the LICB dataset using a number of different approaches to identify outlying observations. Where outliers have been identified and robust explanation has been provided, we have accepted this, otherwise where a clear data entry error has been made we have applied a correction. Where this has not been possible, or concerns on the overall integrity of the data remain, we have removed the relevant country entirely from our analysis. To account for any additional unidentified data uncertainty, we have also undertaken Monte-Carlo simulation where we have applied a 5% uncertainty factor to each observation in our dataset. The results of this indicate our efficiency results remain robust to this additional uncertainty.
Renewals expenditure may be classed as enhancements by other IMs	This should be more of a historic issue as revised definitions of maintenance and renewals (aimed specifically at achieving consistency) were agreed amongst the LICB participants in 2009. Additionally, we have used adjusted renewals data supplied by Network Rail in our analysis. This has retrospectively adjusted Network Rail's costs back to 2003 to match the revised definitions. We have also conducted additional analysis to accommodate the possibility of systematic misreporting: • our data integrity analysis has looked at maintenance renewal splits by country and these variables over time to try to detect and resolve any changes in behaviour, and cross-country outliers; and • we have looked at the effects of removing countries about which Network Rail have raised concerns on overall efficiency scores, in particular where those countries have set the frontier.

Concern	Steps taken
Some countries may not be renewing at 'steady state' rates	The reported average track renewal rate for countries in our dataset is 2.6%, which is higher than that stated by Network Rail in its CP4 track asset policy. Additionally, Switzerland, the Netherlands and Germany all report rates higher than this average. All else being equal countries with higher renewal rates should incur additional costs, and therefore be less likely to set the frontier. We do not have sufficient evidence available to make steady state adjustments for other countries, and view that making such adjustments across the board would introduce a significant degree of artificiality into the data. As such we have not made systematic adjustments for our analysis. Also: • we find that Network Rail's efficiency score is not generally being lowered by the presence of other countries in the dataset with lower than average rates of renewal. Our analysis shows that countries with low rates of renewal are not always setting the frontier – in other words, it does not appear that our models find those countries that are renewing less than average to be more efficient; • we have, in-line with our PR08 work, adjusted Network Rail's costs by the CP4 steady state rate of track renewal outlined in their track asset policy of 2.3%. This is to accommodate the shifts in renewals volumes experienced as a result of the transition from Railtrack to Network Rail; and • where clear evidence of change in renewals behaviour is evident in the dataset we have excluded the relevant country from the analysis.

8.559 Overall, we consider the LICB dataset to be of a sufficient quality to enable meaningful results to be drawn from analysis, and for this analysis to play a useful cross-check to other efficiency estimates included in this document.

Analysis

8.560 In undertaking our work we have tested a large variety of cost functions. Our preferred cost specification considers total maintenance and renewals expenditure as a function of track km, passenger train density, freight train density, the proportion of single track on the network, and time. This specification has been determined by economic and engineering analysis along with checks of parameter values and stability against a range of models. We have also tested additional variables to these but generally found them to be insignificant or inconsistent with theory.

8.561 We consider that these variables capture the most significant characteristics relevant for modelling, with for example the vast majority of the variation in costs in the data (over 80%) explained by the length of track alone. We have also tested alternative econometric frameworks designed to take omitted variables into account but not found the results from these models to be credible. Furthermore, we have tested specific adjustments for omitted variables in our analysis, and found these to be insignificant in the models considered.

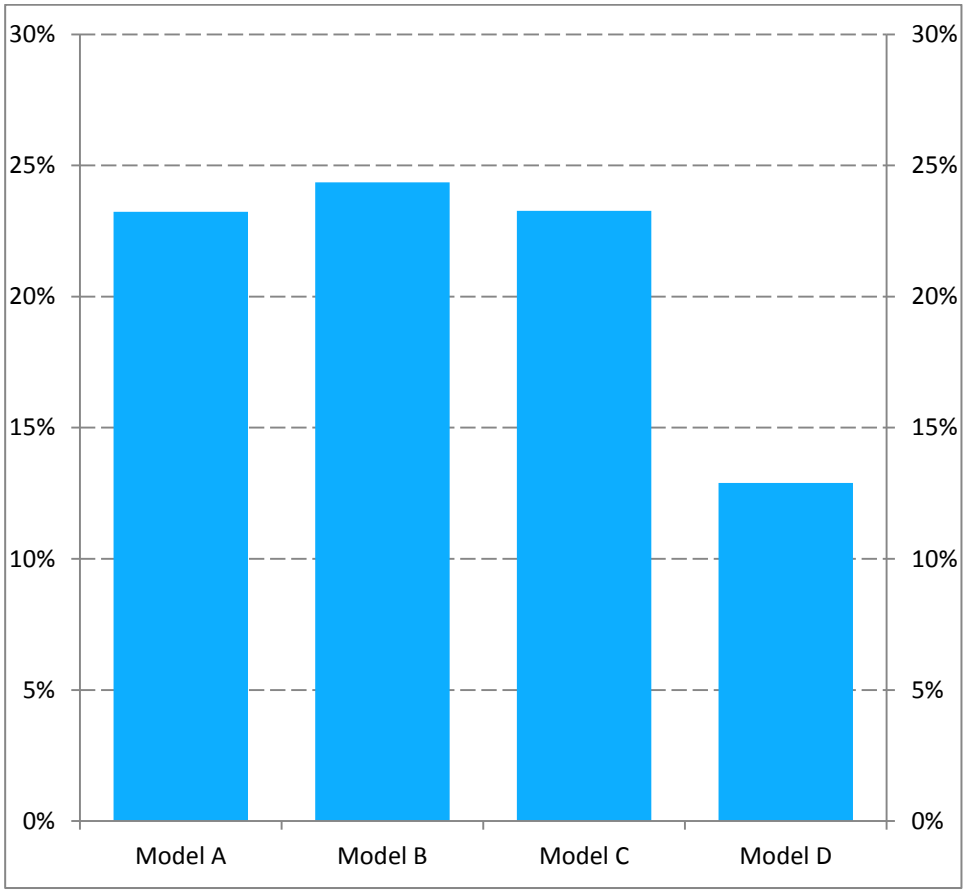
8.562 Using this cost function we have then tested a wide set of efficiency models. We have tested our models for overall theoretical plausibility (i.e. whether or not the assumptions underpinning the model are plausible), parameter plausibility (from an economic and engineering perspective), parameter stability (under the removal/addition of countries, years, or data perturbations), and finally plausibility of the efficiency estimates (i.e. whether or not there is variation across countries and years, and whether or not the spread looks intuitively sensible).

8.563 Following this process there were four models which passed all of our tests. We consider all of these models to be sufficiently robust from an econometric and engineering perspective, and to provide a reasonable model of a reality which is fundamentally unknown. Rather than choosing one of these specifications as the 'preferred' approach, we instead accept there is inherent uncertainty as to the true model and have carried all of these models through to our results. As such we provide a range of inefficiency estimates for Network Rail. We view this approach as fairer and more transparent than selecting just one model.

Overall results

8.564 Figure 8.17 below shows the results from each of the models that we consider to be robust. This analysis produces a distribution of possible efficiency gaps for Network Rail in 2010 ranging from 13% to 24%. Looking at only the models that are not at the upper or lower end of this range would result in an efficiency gap estimate of 23%.

Figure 8.17: Estimates of Network Rail's efficiency gap with preferred models



International regional top-down benchmarking

8.565 In preparation for the PR08 determination we worked with five infrastructure managers in Europe and North America to produce a sub-national, or regional benchmarking dataset, for a single year. The objective of the work was to create separate and independent analysis that could be compared to the econometric analysis prepared by us and ITS using the LICB dataset (discussed above), which is not disaggregated on a regional basis.

8.566 For PR13 we contacted all those infrastructure managers involved in the original study with a view to updating and expanding the analysis. Tight timescales and other resource pressures meant that a number of the original participants were unable to commit to the study but three companies agreed to participate in the update. Unfortunately difficulties in collating data have meant that sufficient progress has not been made for it to be appropriate to make use of this evidence in PR13.

8.567 We remain committed to the further development of this dataset because we consider that regional benchmarking both within Network Rail and against international peers has an important part to play in future reviews. As management of Network Rail is increasingly devolved to the route level, our ability to assess the performance of the routes will increase in importance and this work is central to our ability to achieve this.

While the work currently serves to complement our network level analysis we intend that it should become a credible standalone source of evidence in PR18.

8.568 Over the course of CP5 we will continue to develop this dataset alongside Network Rail's internal route level benchmarking, with a view to involving more European comparators and developing our benchmarking techniques.

9. Enhancements expenditure

Key messages in this chapter

- Enhancements are projects which improve the capacity or capability of the network, such as electrifying the Great Western Main Line or reinstating the line between Edinburgh and Tweedbank. A full list of projects assumed in the determination is set out in Annex E.
- The HLOSs set out what the Scottish Ministers and Secretary of State want to achieve in CP5; this included a substantial programme of work, which was welcomed by the industry. A lot of responses to the draft determination sought the inclusion in the final determination of projects not required by the HLOSs. These were not in scope for funding through this review, but if industry partners have other funding sources, projects can be taken forward under the investment framework during CP5.
- In its SBP Network Rail set out its plans to deliver the HLOSs, which it showed would bring major benefits for passengers and freight customers, including new journey opportunities, more frequent services and longer trains. It proposed 61 projects in England & Wales and 12 in Scotland, with an estimated cost of £12.4bn, including the ring-fenced funds. This compares to about £9bn in our PR08 determination and about £11bn of forecast spend[181] by Network Rail in CP4. Of the proposed £12.4bn approximately 30% was for a major programme of electrification schemes. A further 25% was for Crossrail and Thameslink. 11% was for completing other schemes started in CP4, such as Reading and Birmingham stations. 8% related to two key major capacity and connectivity programmes (Northern Hub and East West Rail). 7% related to a large number of smaller capacity schemes that will ensure that the extra number of passengers expected to arrive at key stations around the country is met. Other Scottish projects added up to 8% and a further 11% was made up by a package of ring-fenced funds (six in England & Wales and five in Scotland). A list of the ring-fenced funds assumed in the determination is set out in Annex E.

[181] Forecast spend is more than that in our PR08 determination because the governments have funded additional schemes since 2008 and there are other projects funded by third parties which were not part of the 2008 review.

Key messages in this chapter (continued)

- Of the £12.4bn, there are about £3.3bn worth of projects where the cost is determined outside of PR13 (Thameslink, Crossrail, some EGIP elements and Borders) and £1.3bn of costs for ring-fenced funds. We scrutinised the remaining £7.8bn which we reduced to £7bn, largely as a result of applying Network Rail's own efficiency overlay to more projects and reducing risk allowances where we concluded that the levels were too high. Part of our assessment used benchmarked costs, such as project management, which we compared with equivalent ones in global rail, water and aviation sectors. In its response to the draft determination Network Rail disagreed with our assessment and also updated the latest cost forecasts for three of the larger projects, this amounted to an extra £700m above that assumed in the draft determination. We considered its response but concluded that our original assessment was reasonable, given that our proposed enhancements cost adjustment mechanism, applied when a project is sufficiently well defined, will include any efficient cost increase.
- Whilst some of the SBP supporting documents were to a good standard, there was a lot of inconsistency in the quality and completeness of the information supplied which meant that more had to be provided later after we had started our assessment.
- Many of the projects (approximately £7bn) were at an early stage of development. This meant that a determination of efficient cost for the entire portfolio was difficult due to the high allowances for risk and uncertainty inherent to projects at this stage. It also meant that Network Rail had not yet been able to involve train operators fully in some of the projects to make sure that scope was best value. Because of this we have decided to take a different approach to securing efficiency and value for money, using a new enhancements cost adjustment mechanism.
- This means we have included a provisional level of funding in the settlement, based on our assessment of Network Rail's SBP submission. As costs become more certain and risk profiles more accurate, Network Rail will resubmit these and we will review them again. As part of this process we expect Network Rail to demonstrate how it has worked closely with train operators and suppliers in defining project scope. One way of doing this is for Network Rail to share cost savings with train operators from their engagement in project development and delivery – an enhancement efficiency benefit sharing mechanism. We are allowing this to happen because it should help Network Rail deliver savings for customers and funders, but are not mandating it. We will need to validate any such costs before they are eligible to be added to the RAB.

Key messages in this chapter (continued)

- In Annex E, we have listed the schemes that will be covered by the enhancements cost adjustment mechanism. In its consultation response, Network Rail agreed in principle to this treatment. Since the draft determination we have worked constructively with Network Rail to further define the process. Other responses to the draft determination supported the approach but sought greater clarity on the detailed process, which we have now included in this chapter.
- The list of projects proposed by Network Rail meet the requirements of the HLOSs, although in Scotland there were two projects in the SBP, namely Carstairs journey time improvements and Edinburgh South Suburban electrification, that were not required by the HLOSs. A number of responses to the draft determination, notably Transform Scotland and Virgin Rail Group, emphasised the contribution the Carstairs project would have on cross border journey times. We recognise the strategic importance of the Carstairs project and the benefits it could bring to the industry, but it was not required by either HLOS; funding has therefore not been assumed in this review. This does not prevent it being taken forward in CP5 should extra funding be identified; the project could then be progressed through our investment framework without having to wait until the next periodic review.
- In respect of other projects in Scotland, we have already agreed the costs for Borders and some elements of the Edinburgh to Glasgow Improvement Programme (EGIP). For the remaining projects, we have decided to treat them along similar lines to the projects in England & Wales, where we will undertake a further review (the enhancements cost adjustment mechanism) when they have reached a more mature stage. The remaining elements of EGIP will be subject to bespoke target price arrangements, but all other projects will be included in the underspend / overspend framework (RAB roll forward policy) that we will continue in CP5 to incentivise efficient project delivery.
- There were a few consultation responses seeking more clarity on the outputs and milestones of the programme in this determination. These will be published in the enhancements delivery plan (March 2014), following consultation, and will be fixed around the timings of what Network Rail needs to do to deliver better service outputs for passengers and freight customers. It will also set out ways by which both train operators and passengers can be involved in defining the outputs and benefits to be achieved from the projects and funds.

Key messages in this chapter (continued)

- The Strategic Freight Network fund has been widely supported in CP4 and is delivering infrastructure for more capacity and longer trains where it is needed. The fund will continue in England & Wales and a new fund will be created in Scotland. We have also agreed to rollover about £40m of expenditure from CP4 into CP5 to complete two schemes that are important enablers to grow rail freight from two major ports. This will be in addition to the proposed £12.4bn.
- In this chapter we set out the principles for how the ring-fenced funds (£1.3bn in total) will be governed and how we will ensure value for money. Generally, stakeholders have been well engaged in the management of CP4 funds through working groups. However, governance arrangements have not always been sufficiently formalised, and passenger groups have not been well represented. In some cases, reporting at fund-level has not been sufficiently visible to stakeholders. We will make sure that in CP5 passenger and freight customer interests are clearly reflected in the governance of the funds and issues that matter to them are considered when schemes are selected.
- In addition to those already mentioned, we received over 30 responses from train operators, local authorities and individuals referring to our enhancements assessment. The most common issues raised were our proposed treatment of the Northern Hub and expanding the scope of works on the Uckfield line to include electrification. We have already agreed to revisit the efficient costs of the Northern Hub once scope has been further defined. Electrification of the Uckfield line was not included in the HLOS requirements and we have therefore not assumed this in the determination.
- Overall, the main changes we have made from the draft determination which affect enhancement projects are: permission to rollover an extra £80m of funding (including the Strategic Freight Network) to complete projects that were started in CP4 but not finished; inclusion of over £300m assumed for new depots and stabling facilities; clarification of how the enhancements cost adjustment mechanism will work; and the update of Schedule 4 costs. These changes are explained further in this chapter.

Introduction

9.1 This chapter covers:

(a) a recap on the enhancement programmes announced in the two HLOSs;

(b) an overview of Network Rail's proposals, as set out in its SBP;

(c) an explanation of what decisions we make at this stage of the review, setting the context for our conclusions;

(d) the major issues we faced in assessing enhancements, such as deciding on efficient costs and the treatment of risk; and

(e) our conclusions on the enhancements portfolio and ring-fenced funds for Scotland and for England & Wales.

9.2 We have made reference to consultation responses throughout the chapter rather than as a stand-alone section, as they were considered in reaching conclusions on distinct aspects of our assessment.

Enhancements in the HLOSs

England & Wales

9.3 The Secretary of State specified the increase in passenger capacity that should be delivered in CP5. This is defined in a capacity metric that identifies the additional number of passengers that should be accommodated on services into major cities[182] and the main London termini[183]. In addition to this specification, the Secretary of State named a number of projects that the government wished to see progressed. This included projects already under way (such as upgrading Birmingham New Street and Reading stations) and new projects such as the electric spine and electrification in South Wales.

9.4 The Secretary of State also made provision for six ring-fenced funds (2011-12 prices):

(a) a Strategic Rail Freight Network fund of £200m to fund improvements defined by the industry;

(b) an East Coast Connectivity fund of £240m to improve capacity and reduce journey times on the East Coast Main Line;

(c) a Passenger Journey Improvement fund of £300m to support journey time and performance improvements;

(d) a Station Improvement fund of £200m, with up to half of this to be used for providing easier access for disabled passengers;

(e) a Development fund of £140m to support innovation and the development in CP5 of potential schemes for CP6; and

(f) a Level Crossing Safety fund of £65m to reduce the risk of accidents at level crossings.

Scotland

9.5 The Scottish Ministers required Network Rail to deliver the following projects:

(a) Edinburgh to Glasgow Improvements Programme;

(b) Borders Railway;

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[182] Birmingham, Manchester, Leeds, Bristol, Leicester, Liverpool, Newcastle, Nottingham, Sheffield.

[183] Blackfriars, Euston, Fenchurch Street, Kings Cross, Liverpool Street, London Bridge, Marylebone, Moorgate, Paddington, St. Pancras, Victoria, Waterloo.

(c) Aberdeen to Inverness Rail Line Improvements Phase 1;

(d) Highland Main Line Rail Improvements Phase 2;

(e) a rolling programme of electrification; and

(f) Motherwell signal box re-signalling and Motherwell Depot stabling.

9.6 They also established five ring-fenced funds (2011-12 prices):

(a) a Scottish Stations Fund of £30m to improve access to railway services;

(b) a Scottish Strategic Rail Freight Investment Fund of £30m to encourage growth in rail freight and reduce emissions;

(c) a Scottish Network Improvement Fund of £60m to develop the capacity and capability of general infrastructure and network communications systems;

(d) a Future Network Development Fund of £10m to develop proposals for CP6 and beyond; and

(e) a Level Crossings Fund of £10m.

Network Rail's enhancements proposals – overview

9.7 Network Rail developed a portfolio of enhancement projects to meet the requirements of the HLOSs.

9.8 As well as the main SBP documentation, Network Rail submitted a large amount of project-specific supporting information, including client briefs, feasibility reports, cost estimates, efficiency and risk methodologies and a summary of project costs.

9.9 Whilst some of the documents were to a good standard, there was a lot of inconsistency in the quality and completeness of the information supplied. There was also little in the way of whole life cost justification for the selected options. Of most concern to us was inconsistency between project estimates, engineering reports and costs included in the SBP which had to be supplemented by further information after we had started our review.

9.10 There was a further challenge categorising project costs in a consistent manner, for example isolating direct costs (such as engineering works) and indirect costs (such as project management), and separating risk allowances from the cost estimate of the works. This was necessary so that we could analyse and benchmark costs across different projects; for example, we found that the direct costs for some of the comparable electrification activities had a wide variation for what is standardised work.

England & Wales

9.11 The SBP set out a list of 61 projects and six funds with a proposed cost of around £11bn which Network Rail considered necessary to meet the HLOS. These have been

categorised as: committed schemes; named schemes; HLOS capacity schemes; ring-fenced funds and others.

Table 9.1: Summary of Network Rail's proposed project costs by category

£bn (2012-13 prices)	SBP
Committed Projects (e.g. Thameslink and Great Western electrification to Swansea)	6.2
Named Schemes (e.g. electric spine, links to airports and Waterloo station)	2.2
HLOS Capacity Metric (e.g. Chiltern platform lengthening)	0.9
Funds	1.2
Other projects (including the CP4 schemes continuing into CP5)	0.5
Total	**11.0**

9.12 Of the England & Wales total approximately 30% of costs were for Crossrail and Thameslink. A further 30% were for a major programme of electrification schemes (about 3% for electrification of the Welsh Valley Lines). 10% of costs related to two key programmes (Northern Hub and East West Rail) with a further 8% of costs made up by a large number of smaller capacity schemes that will ensure that the extra number of passengers expected to arrive at key stations around the country is met. 10% was for the ring-fenced funds and the remaining 12% was for schemes started in CP4 and completing in CP5.

9.13 Network Rail develops projects through the Governance of Railway Investment Projects (GRIP) framework[184], which sets out various stages in a project lifecycle. Table 9.2 shows that there were a number of schemes at an early stage of development, with about two thirds having not yet completed the option selection stage.

9.14 Network Rail proposed in its SBP that the outputs and funding for some of these should only be fixed once they have reached a later stage when a single option has been selected (i.e. GRIP 4). This was the main issue we faced in determining efficient costs and is explained more fully in the section 'major issues in assessing enhancements'.

[184] http://www.networkrail.co.uk/aspx/4171.aspx.

Table 9.2: Stage of Network Rail's project development at the time of the SBP[185]

Stage of project development	SBP value £bn (2012-13 prices)	Number of projects
Output undefined – GRIP 0	1.8	15
Output definition – GRIP 1	0.5	11
Pre-feasibility – GRIP 2	2.7	17
Option selection – GRIP 3	0.3	5
Single option development – GRIP 4	0.2	2
Construction, testing and commissioning – GRIP 6	0.3	6
Programmes (Crossrail, Thameslink, Northern Hub & IEP)	4.0	5
Ring-fenced funds	1.2	6
Total	**11.0**	**67**

9.15 The list of SBP projects was derived from modelling the effects of different options on the capacity metrics. The 'committed' and 'named' schemes were expected to deliver around 90% of the HLOS capacity metrics. The SBP proposed a further 27 projects costing about £900m to deliver the full metrics. These were informed by the route utilisation strategies[186], which had involved cross industry involvement and wider stakeholder consultation. The portfolio of proposed projects was broadly similar to DfT's illustrative option (this was the list of schemes published by DfT alongside the HLOS which indicated how the capacity metrics might be met).

9.16 There were a number of schemes not required by the HLOS that were included in the IIP, some of which were emphasised in the consultation responses to both the SBP and the draft determination. These were not included in the SBP, but Network Rail and industry partners may continue to explore potential funding sources for them outside of this review, through for example the ring-fenced funds or investment framework.

9.17 The CP5 plans have a total value of around £11bn, compared with about £9bn in our PR08 determination (2012-13 prices). On balance, Network Rail has a good track record of delivering enhancements in CP4. The redevelopment of Kings Cross station opened on time. Platform lengthening schemes in both the midlands and south east were ready in time for longer trains to run. The second phase of the Thameslink programme allowing more trains to run between St Pancras and Blackfriars and longer trains to run between Bedford and Brighton was completed on schedule.

9.18 In relation to the projects assumed in our PR08 determination, there have been significant changes during the control period. Some projects have had their scope redefined or been deferred because less rolling stock has been introduced than

[185] Presented in SBP supporting document SBPT3182.

[186] http://www.networkrail.co.uk/aspx/4449.aspx.

originally planned, resulting in about £2bn[187] of reduced spend. About two thirds of this is because the scope of the CP4 work for Thameslink, Stafford area improvements and Werrington junction changed (which we approved through the change control mechanism[188]). However, this does not reflect the full picture in CP4 because the Secretary of State has announced further schemes since 2008, such as the Northern Hub and electrification of the Great Western Main Line. Taking these into account Network Rail is expected to spend close to £9bn[189] on government funded enhancements in England & Wales during CP4.

Scotland

9.19 The SBP set out a list of 12 projects and five funds with a total cost of around £1.4bn, which Network Rail considered was required to meet the Scottish Ministers' HLOS. Table 9.3 outlines these projects and their stage of development. EGIP is a programme that has individual projects at varying GRIP stages. Some works for Borders have already started on the ground but other elements are still in the planning phase.

Table 9.3: Project costs in the Scotland SBP

Projects and funds (2012-13 prices)	SBP (£m)	GRIP stage
Committed projects		
EGIP Electrification (Springburn to Cumbernauld)	26	4
EGIP Electrification (Glasgow to Edinburgh via Falkirk High)	124	3
EGIP (Edinburgh Gateway Station)	31	3
EGIP Infrastructure works	308	1
Borders Railway	124	6
Total committed projects	**613**	
Other Scottish projects		
Aberdeen to Inverness improvements Phase 1	280	0
Highland Main Line journey time improvements Phase 2	121	0
Rolling programme of electrification	171	3
Motherwell re-signalling enhancements	3*	0
Motherwell area stabling	10	0
Other projects to meet the outputs	80	0
Total other Scottish projects	**665**	

[187] Reported in Network Rail's period 13 finance pack for 2012-13.

[188] http://www.rail-reg.gov.uk/server/show/nav.2177.

[189] Reported in Appendix 24 of the SBP databook which updates actual and forecast expenditure for CP4 and replaces the 2013 delivery plan update.

Projects and funds (2012-13 prices)	SBP (£m)	GRIP stage
Funds to deliver specific outcomes		
Scottish stations fund	31	n/a
Scottish strategic rail freight investment fund	31	n/a
Scottish network improvement fund	62	n/a
Future network development fund	10.5	n/a
Level crossings fund	10.5	n/a
Total funds to deliver specific outcomes	**145**	
Total	**1,423**	

***** the supporting information provided with the SBP adjusted this from £11m included in the published SBP.

9.20 About 40% of the costs were for the committed projects: increased capacity and faster services between Edinburgh and Glasgow; and the new Borders railway line linking Midlothian and the Scottish Borders.

9.21 Network Rail's plans have a total value of around £1.4bn, compared with about £465m[190] in our PR08 determination (2012-13 prices). Since 2008, Transport Scotland has announced a further £518m[191] (2012-13 prices) for EGIP and Borders bringing total CP4 expenditure to about £1bn. Whilst a significant amount will be spent over the next year on EGIP and Borders a number of large projects have already been delivered in CP4, including: a new electrified railway between Airdrie and Bathgate; and improvements to the Paisley corridor allowing more frequent and reliable services between Glasgow and Ayrshire.

What we decide in our determination

9.22 This section sets out what aspects of the enhancements portfolio we decide in the periodic review, providing the context for our conclusions.

Outputs

9.23 We said in our outputs consultation[192] that we intended to continue to have milestones for enhancements in Network Rail's delivery plan and to have a change control mechanism. Both these approaches worked well in CP4 and are widely supported. Setting out when each stage of a project will be delivered (and keeping this updated) is useful information for stakeholders and customers. We will use these milestones to monitor whether Network Rail is on course to deliver each project. We will categorise some of the milestones as 'outputs', which means that they could be subject to

[190] Reported in Appendix 24 of the SBP databook which updates actual and forecast expenditure for CP4 and replaces the 2013 delivery plan update.

[191] Reported in Appendix 24 of the SBP databook which updates actual and forecast expenditure for CP4 and replaces the 2013 delivery plan update.

[192] http://www.rail-reg.gov.uk/pr13/consultations/outputs.php.

regulatory enforcement if they are missed or likely to be missed (a further explanation of outputs is set out in chapter 3).

9.24 The outcomes of delivering enhancements are not specifically picked up in the National Passenger Survey. Nonetheless, enhancements can be one of the biggest drivers of customer satisfaction in specific locations or on specific routes where improvements are delivered. Therefore, we will make sure that regulated outputs reflect elements in Network Rail's control and are based on the timing of the delivery of passenger and freight customer benefits, as this is what matters to customers. These will be finalised in the enhancements delivery plan, which will be published by Network Rail and agreed by us before the start of CP5. The overall programme amounts to about £12bn; this is a very significant expenditure of taxpayers' and passengers' money. We will therefore report both on the projects and the ring-fenced funds in the Network Rail Monitor. Combined with the enhancements delivery plan this will highlight the purpose of, and benefits to be achieved by, each project so that progress is clear and can be easily understood.

9.25 Network Rail will consult on a draft of its enhancements delivery plan in December 2013, before finalising this by the end of March 2014. The delivery milestones should therefore reflect stakeholder input, and the main issue here is likely to be ensuring a match between the service level changes that operators are trying to deliver and Network Rail's obligations. For example, the delivery of longer platforms with the introduction of longer trains.

9.26 Several consultees raised concerns about the timing and integration of certain enhancement projects with other third party funded schemes. It is important that the potential synergies between CP5 enhancements and other schemes that would also deliver benefits are taken into account in the enhancements delivery plan, which re-enforces the importance of stakeholders engaging in Network Rail's consultation.

9.27 For projects at an early stage of development the regulated outputs in the March 2014 enhancements delivery plan will be to achieve GRIP 3. After that they will be changed to the delivery milestones, when these are further defined, through the existing change control mechanism that involves consultation with affected stakeholders.

9.28 The enhancements delivery plan will include projects that are funded (or part funded) through the review. Other third party funded schemes are subject to separate contractual and funding arrangements.

Efficient costs to be added to the RAB

9.29 Although we do not take decisions on milestones in the determination we have to estimate what level of efficient costs should be added to the RAB, so that Network Rail's revenue requirement can be calculated and access charges set. In doing this, we have had to consider carefully how to treat risk given that Network Rail included significant risk provision for many projects that were still at an early stage of development.

9.30 First of all, we checked that the proposed projects met the required outputs, i.e. the requirements of the HLOSs. In England & Wales, we verified whether the projects over and above the committed and named schemes would deliver the capacity metrics.

9.31 We then checked the costs of delivering both the individual projects and the wider portfolio were efficient, based on a review of Network Rail's own proposals.

9.32 Finally, we decided how to incentivise Network Rail to outperform our determination and, alongside this, how to incentivise cross industry working with train operators and the supply chain so that project scope is optimised for best value before the detailed design stage. In CP4, Network Rail has started to engage earlier with the supply chain and employ a radically different relationship through project alliances. We support this initiative and have made sure that we do not prejudice any such commercial arrangements.

Governance of the ring-fenced funds

9.33 The governance arrangements for the ring-fenced funds, including how value for money is assured, will be finalised in the enhancements delivery plan. However, we have set out in this determination the principles that they must meet.

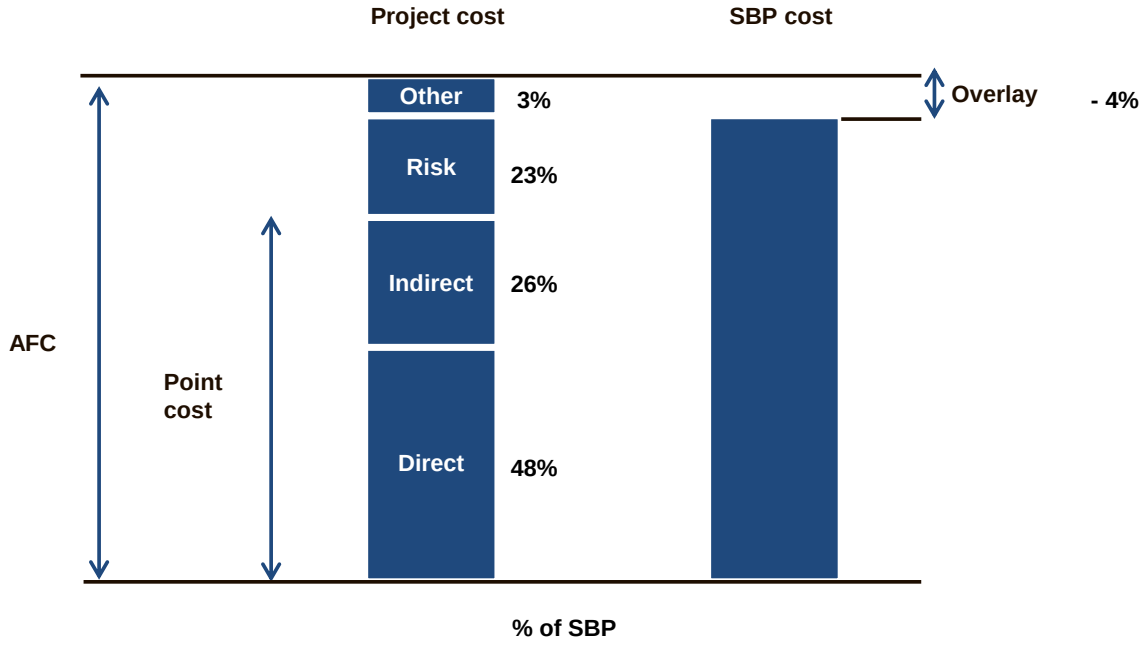
Major issues in assessing enhancements

9.34 Here we set out the major issues we considered in reaching our decisions.

Determining efficient costs

9.35 Determining efficient costs for an enhancement project differs from other areas of expenditure, such as renewals. By their nature enhancements often involve bespoke solutions involving a range of different types of work. For example, an electrification scheme may need to reconstruct a number of bridges as well as erecting overhead wires. This means that, unlike renewals, costing the work is project specific and is not generally based on repeatable work items. Network Rail has built up a cost estimate for each project and applied an efficiency overlay, based on: its own benchmarks; the effects of changes to its project delivery process; and improvements to how it manages its supply chain. It also made some adjustments to take account of risk reduction from delivering a large portfolio of work. This build-up of Network Rail's cost estimates is illustrated in Figure 9.1.

Figure 9.1: Network Rail's build-up of a project cost estimate



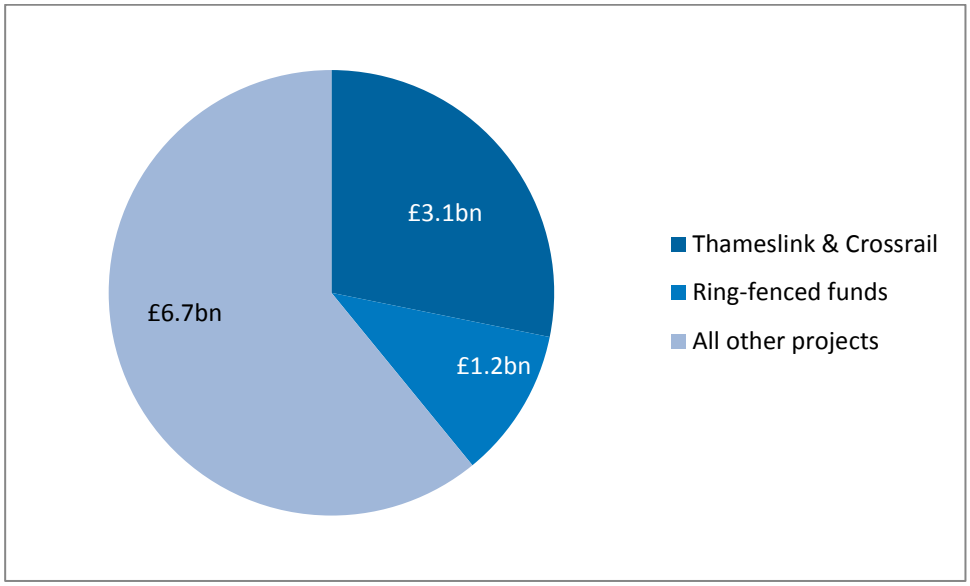
9.36 Network Rail's internal benchmarking of enhancements was based on data collected from CP4 projects, but coverage was low in terms of comparable work and the rates only apply to direct costs, such as construction. In addition, Network Rail was unable to collect enough good quantitative external benchmarking information. We therefore decided to extend the use of benchmarking in our own assessment, particularly to understand indirect costs, such as design or project management, and risk provisions.

9.37 While the total spend on enhancements proposed in the SBP was £11bn for England & Wales, our determination of efficient cost applies to £6.7bn because:

(a) Thameslink and Crossrail total £3.1bn; the costs for these have already been agreed between Network Rail and DfT and both projects are governed by protocols with a pain/gain share mechanism to incentivise efficient delivery; specific contractual arrangements are already in place and we have agreed not to duplicate or cut across these; and

(b) the funds account for £1.2bn. This is a capped amount and we will determine the efficient spend and value for money in the funds during the control period.

Figure 9.2: Network Rail's breakdown of projects in England & Wales

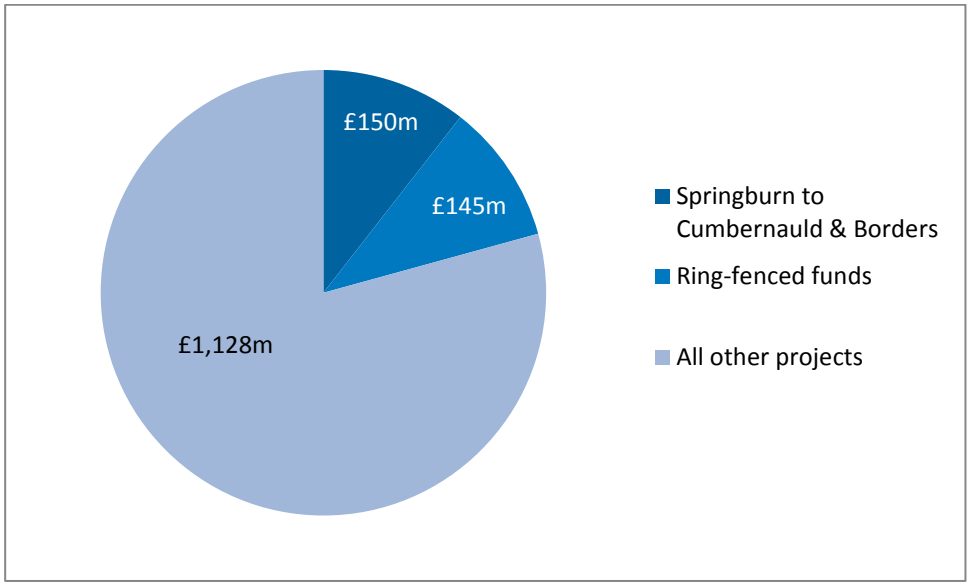


9.38 In Scotland, of the £1.4bn proposed in the SBP:

(a) we have already assessed the Springburn to Cumbernauld and Borders projects through the investment framework (combined total of £150m) and these are subject to target price arrangements with Transport Scotland with their own pain/gain share mechanisms; and

(b) the ring-fenced funds amount to £145m. This is a capped amount and we will determine efficient spend and value for money during the control period.

Figure 9.3: Network Rail's breakdown of projects in Scotland



Project scope and costs

9.39 We carried out a review of efficient project costs informed by two studies: Arup[193] provided advice on whether the projects would meet the England & Wales HLOS metrics; a consortium of Nichols/Turner & Townsend/URS[194] scrutinised the scope and cost estimates of about £7.2bn worth of the projects in England & Wales and Scotland.

Arup review: Check of Network Rail's HLOS capacity metrics for CP4 and CP5

9.40 Arup undertook a detailed review and validation of the model used by Network Rail to define whether the proposed projects would meet the HLOS requirements. This was supplemented by a cross check with Network Rail's route planners on the inputs to the modelling.

9.41 The team also checked on the level of operator involvement, either through the RUSs or subsequent industry consultation, which can indicate whether the projects proposed in the SBP had originated from the RUSs and therefore had good business cases with stakeholder support.

Nichols consortium review: Review of Network Rail's SBP infrastructure enhancement proposals for CP5

9.42 Thameslink and Crossrail were excluded from this work. Other elements out of scope were the ring-fenced funds and projects where our own staff were better placed because of the work we have done in CP4, these were the schemes in CP4 rolling over into CP5, EGIP and Borders.

9.43 Because Network Rail's own benchmarking was insufficient, we included in the Nichols work a remit to draw out any comparisons it had in global rail, water and aviation sectors.

9.44 The consortium structured its review around a seven step process as shown in the figure below.

[193] http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

[194] http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

Figure 9.4: Nichols consortium review methodology

9.45 Of the projects it was able to analyse, both upward and downward adjustments were made to correct any omissions and ensure estimates were in the right price base. For electrification and power supply schemes, the consortium benchmarked direct costs across the CP5 projects. For indirect costs it used its own benchmarking data to check whether those proposed for each project were in line with expected norms. The consortium then looked at both the individual project risk allowances and overall risk portfolio overlay. Finally it assessed Network Rail's efficiency proposals and applied it to a greater number of projects. Its adjustments are summarised in Figure 9.5 and Table 9.4.

Figure 9.5: Overview of cost adjustments from Nichols consortium review

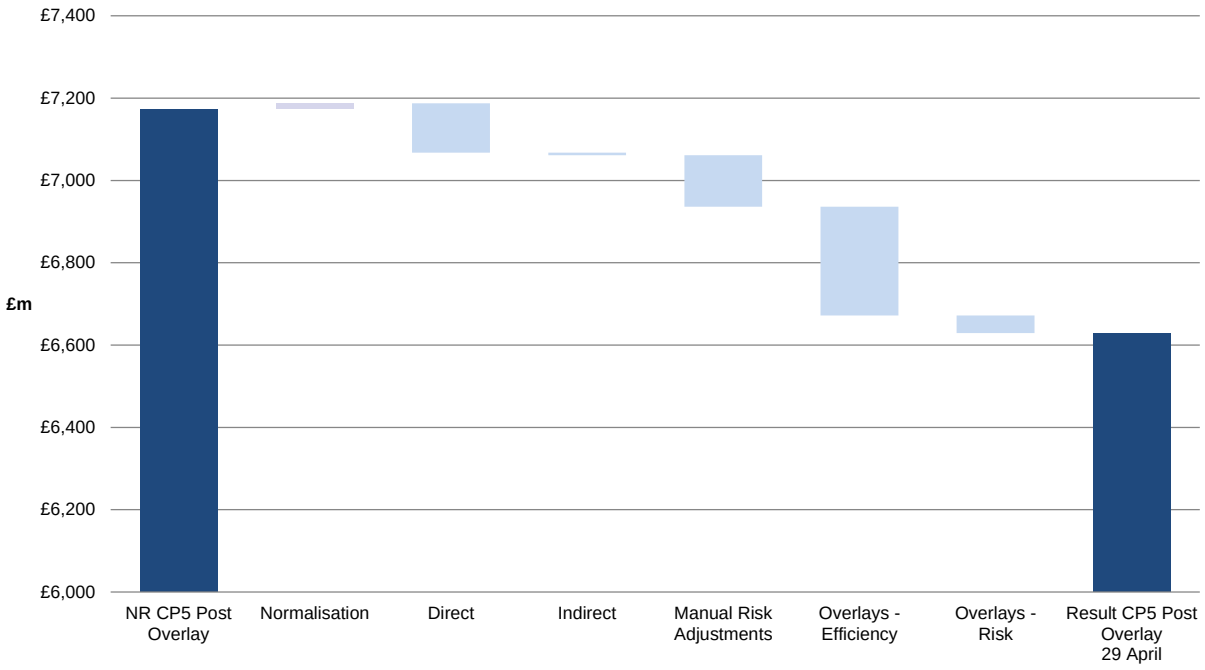


Table 9.4: Overview of cost adjustments from Nichols consortium review

Adjustment type	(£m)	Description
Normalisation	+14	Changes in figures required to align Electric Spine project costs with the DfT forecast, adjustments resulting from reconciliation issues between the Network Rail estimates provided and their SBP submission, and changes required to harmonise the cost base to 4Q12
Direct	-120	A net reduction resulting from proposed adjustments to direct costs including their commensurate indirect and risk uplifts
Indirect	-6	A small reduction resulting from proposed adjustments to indirect costs based on comparisons with accepted norms
Manual Risk Adjustment	-125	Proposed reductions to specific project risk and contingency provisions
Overlays – Efficiency	-265	A net reduction resulting from the proposed changes to Network Rail's efficiency overlay, and to apply this to additional SBP projects
Overlays – Risk	-43	A reduction in relation to Network Rail's portfolio risk overlay, including changes to both the rate applied and the projects impacted
Total	**-545**	

9.46 We checked the Nichols consortium's work against an in-house review of a sample of projects, which was based on our own experience and analysis of CP4 projects added to the RAB through the investment framework, which is the mechanism that allows stakeholders to fund investment in between periodic reviews. Further information on the investment framework can be found on our website[195].

9.47 Network Rail disagreed with the findings of this work in its consultation response seeking the reinstatement of about £310m. It considered that the application of the portfolio risk overlay and the efficiency risk overlay was inappropriate. It also challenged unit cost reductions and other estimating adjustments. We asked Nichols to review Network Rail's response in detail and advise whether in the light of this it would change its original methodology or its proposed adjustments. It concluded that its proposed adjustments were overstated by £20m.

9.48 A significant number of other consultation responses disagreed with the adjustments we made to the Northern Hub.

Frontier shift

9.49 In addition to the individual project reviews, we commissioned CEPA[196] to build upon its analysis of frontier shift for other areas of expenditure and advise how this could be applied to the enhancements portfolio. It concluded a median case of 0.4% per annum savings for enhancements.

Treatment of projects at an early development stage

9.50 A further complication in determining efficient costs is the uplifted levels of risk and uncertainty inherent in projects at an early stage of development. An equally important issue for these projects is that Network Rail has not yet been able to fully engage with train operators in developing scope and selecting the best option. It is widely recognised that decisions made at an early stage of a project have the biggest influence on outturn costs. This was well illustrated in the RVfM study[197]. It is therefore extremely important for train operators to be involved at early stages so that the best whole industry scope is developed that delivers the required operational benefits.

England & Wales

9.51 Of the £6.7bn[198] costs that we examined there was about £6bn based on an indicative definition of scope and risks, i.e. a single option had not yet been developed. Of this

[195] http://www.rail-reg.gov.uk/upload/pdf/investment_framework_guidelines_october_2010.pdf.

[196] http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

[197] Whole system programme management: final report, Atkins, May 2011, available at: http://www.rail-reg.gov.uk/upload/pdf/rvfm-atkins-programme-management-250511.pdf.

[198] As set out in Figure 9.2.

broadly £1.5bn[199] was allocated for risk. This high risk provision made determining efficient costs more difficult and weakens outperformance incentives.

9.52 In the SBP, Network Rail proposed that about £2.3bn worth of these projects should be treated differently. It proposed that our determination should include provisional estimated costs (which for some projects included a 60% uplift for uncertainty). It suggested, once the schemes are more developed and have cost probability distributions, a more accurate portfolio cost estimate can be made; we could then review this and agree an efficient cost. The difference between this portfolio cost and the provisional estimate could then be adjusted for through the RAB or the opex memorandum account, as appropriate, at the start of CP6.

9.53 We asked Network Rail to explain why so many projects were at an early stage of development given that it expects to spend £69m[200] in CP4 on developing schemes for CP5. Most are schemes which DfT included in its HLOS based on limited development work and so the outputs were not sufficiently defined. In these cases we consider it is unreasonable that Network Rail should be penalised. Other projects were at an early stage of development because Network Rail thought it would not be needed for the HLOS, or the development work will be sequential to other CP5 projects (e.g. power supply upgrades). The targeting of development funding in future control periods needs to be better than in CP4, with closer working across the industry with funders.

9.54 Even with the proposed treatment of the £2.3bn schemes there was too much uncertainty in the remaining £4.3bn; which still contained around 20-30% risk uplift from the base estimate. The cost uncertainty also meant that an efficient cost determination on a £4.3bn portfolio would be difficult because it would include around £1bn[201] of risk provision and the accuracy of an efficient cost determination would be reduced.

9.55 We have, therefore, decided to build upon the proposal made by RDG and treat all projects where we set an efficient cost (the £6.7bn portfolio) differently from PR08 and review costs for these later in the control period when they are more certain. The projects proposed for this treatment are listed in Annex E and include Northern Hub, Electric Spine, East West Rail, Waterloo and traction power upgrades. This will allow:

(a) better targeting and setting of efficient costs for the bulk of CP5; and

(b) opportunities to achieve better value for money through deeper engagement of TOCs and FOCs so that we have greater certainty that the right projects are

[199] Calculated by applying the average risk allowance (25%) to £6bn.

[200] Reported in Network Rail's P3 finance pack for 2013-14 and adjusted to 2012-13 price base.

[201] Calculated by applying an average risk allowance (25%) to £4.3bn.

scoped to achieve the best customer benefits within the framework of long-term sustainable asset policies.

9.56 Appropriate governance has to be put in place involving the train operators to ensure the right scope is selected; scope is sufficiently developed; and train operators are engaged as early as possible so that project scope is optimised for best value before the detailed design and delivery stages. Network Rail already involves train operators in the long term planning process and it has also been exploring ways of involving them more fully in project development through a form of gain-share mechanism.

9.57 In its consultation response, Network Rail welcomed this expanded approach and we have had constructive discussion with it to refine the proposed framework. Many other consultation responses supported the approach in principle but sought greater clarity on the detailed process, which we have done in the next section.

9.58 A further point made by Network Rail was that, since the SBP submission the costs for Great Western electrification, Midland Main Line electrification and East West rail have increased by about £376m in total as a result of further development and design work. It acknowledged that the new approach is specifically designed to deal with this happening but considered that it would be sensible to include this additional amount in our assumptions for the determination. As the portfolio of projects develops costs for some may increase whereas costs for others may decrease. We have not added the amount Network Rail suggested at this stage, just as we have not assumed any further cost reductions. This will be addressed through the enhancements cost adjustment framework.

Scotland

9.59 Similarly in Scotland, of the £1.1bn of costs we reviewed, around £800m[202] was based on an indicative definition of scope and risk. In its SBP, Network Rail proposed that the following three schemes should be assessed at a later date in the same way as it proposed for England & Wales, due to the low level of certainty in its cost estimates:

(a) Aberdeen to Inverness Improvements Phase 1;

(b) Highland Main Line Journey Time Improvements Phase 2; and

(c) EGIP – Infrastructure works.

9.60 We think there were high levels of uncertainty in the remaining projects, for example in the phasing of the rolling programme of electrification and the proposed solution for the Edinburgh gateway station. As in England & Wales, we have therefore decided to treat all projects where we set an efficient cost (the £1.1bn portfolio) differently from

[202] The sum of all projects that are GRIP 0 to GRIP 2.

PR08 and review costs for these later in the control period when they are more certain.

9.61 Network Rail is developing proposals for an alliance with the next ScotRail operator, with the new franchise due to start in April 2015. This provides clear opportunities for Network Rail to make sure appropriate governance is in place to work closely together on defining the right scope for the projects. However, this should not exclude working with other train operators operating in Scotland.

Enhancements cost adjustment mechanism - process for determining efficient costs in England & Wales and Scotland

9.62 We are determining the efficient cost and outputs in two steps. The first concluded with this determination, where we included in our assumptions our assessment of efficient costs from the information provided with the SBP. This incorporated the review done for us by the Nichols consortium. We have made adjustments to ensure the funding allocation was appropriate for the stage of project development. We applied an efficiency overlay that was commensurate with a portfolio that was largely at an early stage. This was used in calculating the revenue requirement and access charges.

9.63 We aim to conclude the second step around the end of year 1 of CP5, i.e. March 2015, at which point project development will be more advanced, and therefore the cost certainty will be higher. We will not wait until March 2015 to start reviewing projects but will progress them as soon as they are ready. This will mean that we can determine more accurately the costs to be added to the RAB. There was general support for this approach in the consultation responses, with many of the train operators welcoming the opportunity to work with Network Rail on developing the schemes. We have agreed with Network Rail that there needs to be some flexibility around the end date to cater for a small number of projects that will not quite be at GRIP 3 at this point in time. This flexibility needs to be limited in order to minimise uncertainty and we will agree the extent of flexibility through the enhancements delivery plan.

9.64 In its consultation response, Network Rail confirmed when it expects to have reached GRIP stage 3 for the qualifying projects, which will happen on a rolling basis with the majority by December 2014. During the development work, as more projects reach GRIP stage 3 we will monitor the emerging costs at portfolio level as well as project level. We will challenge projects, particularly where costs escalate above the level assumed in this determination.

9.65 We will approach this progressively by reviewing each project as it reaches GRIP stage 3 and will confirm the efficient project cost allocation after each review, thus giving Network Rail certainty that funding is available for each scheme. The required project funding will be progressively logged up to determine the overall portfolio funding envelope. After this is complete the baseline will be set, and as more projects

move into the detailed design and delivery phase, Network Rail will need to manage any individual cost increases within the overall funding envelope. This should avoid any pauses in project delivery, a concern raised in the consultation responses, particularly by RIA.

9.66 The project cost reviews at GRIP stage 3 will be based on a submission from Network Rail which should demonstrate:

(a) the output is consistent with the HLOS, verified by the HLOS capacity model where necessary;

(b) where appropriate, an update of business case assumptions to confirm value for money;

(c) evidence of operator buy-in to the selected option (e.g. through workshops, value management exercises, or any commercial benefit sharing agreements);

(d) a delivery plan change control submission to set out project milestones;

(e) evidence that the estimate incorporates planned efficiency initiatives wherever appropriate;

(f) a defined strategy on compliance with interoperability TSIs and other relevant statutory provisions, e.g. the project authorisation strategy, endorsed by the Network Rail Authorisations Panel; and

(g) evidence that the selected option is the best whole life cost solution.

9.67 In our draft determination, we said we did not expect the aggregate costs to exceed the amount we set in the determination, but should this happen then there would need to be agreement from the governments as to the way forward. We discussed this further with Network Rail who emphasised the risk of capping expenditure in the determination in that funding may run out before some of the projects at a very early stage can be developed. We have agreed that the estimating uncertainty in the SBP means that the revised aggregate efficient cost may be higher than assumed in the determination. There is scope for Network Rail to be funded for the additional amount, as long as we are satisfied that the costs are efficient and the scheme is eligible to be added to the regulatory asset base.

9.68 We will assess Network Rail's performance against the baseline set by the enhancements cost adjustment mechanism rather than the determination.

9.69 In addition to Network Rail's closer working arrangements with the supply chain, we consider there is a big opportunity for Network Rail to reduce costs and outperform this determination through closer working with train operators on enhancement projects to determine the most efficient scope in the design stages and deliver construction work in a more cost effective way.

9.70 We want to encourage Network Rail and train operators to enter into commercial agreements on relevant enhancements projects that will reward operators if cost

savings are achieved as a result of their involvement. We are not mandating this approach, and it is for Network Rail to decide which projects and the specific terms of any commercial agreement, but we consider it a means to reduce costs further than current industry engagement allows.

9.71 In terms of funding eligibility, we will consider any incentive payment to be part of the project efficient cost where Network Rail and train operators can demonstrate costs have been reduced, including how long-term value has not been compromised by short-term reward or how wider network and cross boundary issues have not been compromised. We consider that this will help Network Rail and train operators to focus enhancements on delivering best value for money for the railway's customers and this approach does not require any changes to the regulatory framework. Incentive payments to train operators could be at both the conclusion of the scope definition and then subsequently for the delivery phase. This will be particularly important for projects where the franchise may change as part of the significant re-franchising programme that will take place in CP5.

Incentivising efficient delivery

9.72 Chapter 12 explains how Network Rail is incentivised to outperform efficient project delivery, including how the underspend/overspend framework (RAB roll forward policy) will apply to enhancements in CP5.

9.73 Specifically in Scotland we have agreed with Network Rail's proposal that the other elements of EGIP should be considered as a bespoke target price arrangement (set at the beginning of the programme, with agreed pain/gain incentives). This relates to the following three projects in the SBP:

(a) electrification of Glasgow to Edinburgh via Falkirk High;

(b) Edinburgh Gateway Station; and

(c) infrastructure works.

9.74 All other enhancement projects in Scotland (except for Borders) are subject to the underspend/overspend framework (RAB roll forward policy).

RAB roll forward policy

9.75 We set out earlier in this chapter a new process for determining efficient costs for some of the enhancements in England & Wales and Scotland that takes account of the early stage of development of a large number of projects submitted in the SBP. This section describes how the framework for incentivising outperformance will work.

9.76 The underspend/overspend framework for enhancements will broadly operate as in CP4. In addition to the deadband being removed, the key difference is that the PR13 determination for enhancement costs will not be the baseline for the framework. Instead it will be set following our second review of the portfolio costs. It will be this

expenditure level that Network Rail will be incentivised to outperform. This will also be used as the base in our assessment of Network Rail's financial performance.

9.77 We will treat differences between the final determination and the baseline as a change to outputs and make a financial adjustment at the end of the control period to make the re-setting of the baseline financially neutral.

9.78 The logging up of enhancements underspend and overspend is detailed in chapter 12, broadly speaking it will be on the following basis:

(a) it will not apply to Crossrail and Thameslink (where there are tailored protocols in place) or EGIP and Borders (where there will be target price arrangements put in place), as these projects have their own pain/gain share mechanism;

(b) it will not apply to: the ring-fenced funds (including CP4 rollovers); the research and development allowance; ETCS cab fitment; and depots and stabling;

(c) for all other enhancement projects (including the Welsh Valley Lines electrification) where Network Rail underspends efficiently, i.e. it underspends whilst delivering the required outputs in full, it will retain the benefit of that outperformance for five years. We will reflect this through an adjustment of the RAB at the beginning of CP6. We will calculate the amount to be deducted as the amount of underspend less 25%. Where Network Rail has underspent due to a failure to deliver required outputs we will reduce the RAB to reflect this but it will not retain 25% of the underspend. Failure to deliver required outputs may also result in us taking enforcement action in line with our published policy.

(d) in England & Wales, we will log-up 75% of any aggregate overspend (i.e. at the portfolio level) subject to any manifestly inefficient overspend being disallowed; and

(e) in Scotland, we will undertake a specific ex-post efficiency assessment on the projects covered by the underspend/overspend framework.

9.79 For the relevant projects we will apply the framework on the aggregate spend, which means Network Rail is free to budget for individual schemes as it sees fit.

Our conclusions

9.80 In this section, we set out our conclusions on: whether the projects meet the requirements of the HLOSs; what level of efficient cost is assumed for the revenue requirement; and what governance arrangements we want for the ring-fenced funds.

England & Wales

HLOS capacity metric requirements

9.81 The Arup review concluded that the model used was fit for purpose. The capacity interventions proposed in the SBP will accommodate the forecast peak growth in the HLOS. Despite high levels of passenger growth, overcrowding at the end of CP5 will

be significantly reduced in some areas (notably in Manchester and at some London terminals).

9.82 From its findings we have drawn the following conclusions:

(a) most model inputs were based on projects that originated through the RUS planning process and hence have had a high degree of consultation with industry parties, such as train operators and passenger groups, and wider stakeholders, such as local authorities;

(b) in general the RUS process identified the projects with the strongest business cases, and it is a selection of these projects which were included in the IIP, HLOS and SBP; and

(c) for each terminal station Network Rail had attempted to spread the interventions across the different routes feeding the station. This was evidenced further by meetings with the Network Rail strategic planners and a specific examination on Leeds and Manchester radial routes.

9.83 During both our SBP and draft determination consultations, we received many responses from stakeholders proposing schemes that they considered should be included in the list of projects assumed for the determination. In the light of the Arup findings we have concluded that these would deliver over and above what is required by the HLOS capacity metrics and we have not included them in the determination.

9.84 However, some of these may qualify for the ring-fenced funds which have their own mechanisms for prioritising investment.

9.85 Because we have created a new process allowing Network Rail to engage more fully with train operators before costs are finalised, there is still opportunity to influence the scope of work in the planning phases and propose better value for money solutions.

Review of enhancement projects

Overview

9.86 Table 9.5 shows a breakdown of our assumed costs for projects in England & Wales. This was mainly informed by the Nichols review but it also included some other adjustments we made. The remainder of this section summarises our conclusions on each category of projects in the table. We considered Network Rail's response to the draft determination, where we agreed with some of its points and acknowledged that costs for some projects may have changed considerably since the SBP as scope has developed further.

9.87 The enhancements cost adjustment mechanism is a new process that will deal with changes to cost estimates (both up and down). We think that this process will address Network Rail's points as we will agree more accurate efficient costs when the projects reach a more advanced stage. As such, we have concluded that Network Rail's

consultation response does not materially affect our original assessment in the draft determination.

Table 9.5: Overview of our assumptions on project costs in England & Wales

£bn (2012-13 prices)	SBP	DD	FD	Difference (SBP to FD)	Difference (DD to FD)
Thameslink & Crossrail	3.1	3.1	3.1	0	0
Ring-fenced funds	1.2	1.2	1.2	0	0
Electrification schemes	3.2	3.0	3.0	(0.2)	0
Other committed schemes	1.7	1.5	1.5	(0.2)	0
Other named schemes & CP4 rollover	0.9	0.8	0.8	(0.1)	0
HLOS capacity metric schemes	0.9	0.7	0.7	(0.2)	0
Other adjustments	-	0.5	0.5	0.5	0
Additional funding since draft determination	-	-	0.6	0.6	0.6
Total	**11.0**	**10.8**	**11.4**	**0.4**	**0.6**

Thameslink and Crossrail

9.88 Both of these projects will deliver significant benefits to passengers travelling across London. We have confirmed that the costs in the settlement are consistent with those agreed with DfT and Crossrail Ltd. In CP5 we will continue to operate under the protocols for these projects, where we recognise that there are specific arrangements to incentivise Network Rail.

Ring-fenced funds

9.89 We made no downwards adjustments as the amounts were specified in the HLOSs. In England & Wales we combined these with the CP4 rollovers for the Strategic Rail Freight Network and Stations Improvement funds. We also included some extra funding for the Level Crossings fund. These adjustments are explained later in this chapter. The final section of this chapter deals with other issues relating to these types of funds.

Electrification schemes

9.90 The Nichols consortium did a detailed assessment of the electrification schemes and costs contained within the SBP. Aside from Thameslink and Crossrail, the electrification portfolio was the largest group of projects in the SBP. It was dominated by; Great Western Main Line, Midland Main Line, North West, Transpennine and Welsh Valley Lines. The Welsh Valley lines electrification will enable the more efficient operation of passenger services on the Valley lines network, replacing ageing diesel traction with a cascaded fleet of refurbished electric trains. The core scheme will involve provision of overhead line equipment with additional infrastructure provided as part of the Cardiff area signalling renewals scheme.

9.91 Electrifying the railway will bring many benefits for both passengers and freight users, most notably the ability to run more frequent trains with shorter journey times and less environmental impact, such as noise and diesel fumes.

9.92 There were a number of other related projects in the SBP, such as Intercity Express Programme, gauge clearance, power enhancement and station/platform schemes, which represented a complex picture, with a significant number of interfaces between projects.

9.93 The Electric Spine is a new programme announced by DfT, and defined in the HLOS as "a high capacity passenger and freight electric corridor running from the South Coast through Oxford, Bedford and via the Midland Main Line to the East Midlands and South Yorkshire, with a link from Oxford to the West Midlands and the North-West". Network Rail identified this as having uncertain scope and outputs at the time of its SBP submission. However, it did include the Midland Main Line (MML) electrification and remodelling of Derby station, both of which were further developed than the remaining programme. In its SBP, Network Rail proposed completion of the MML electrification in early CP6. In the consultation responses to the SBP, there was strong stakeholder challenge arguing that this should be accelerated so that full electrification to Sheffield is achieved in CP5.

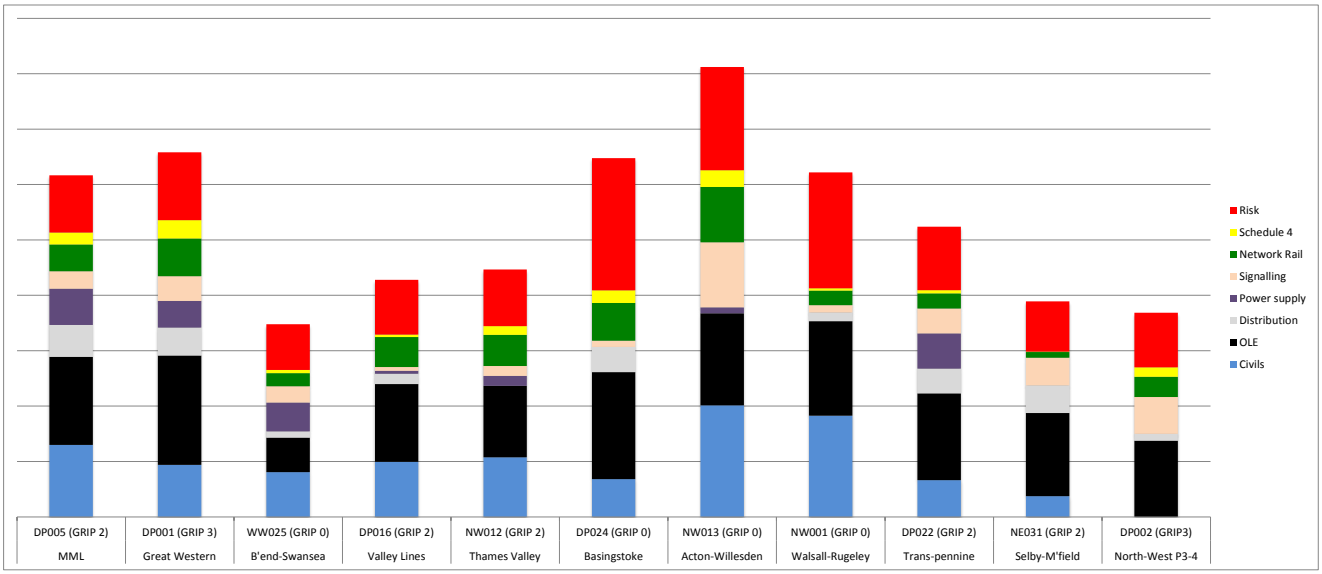
9.94 Given that the MML electrification is further developed than other elements and has very strong operator support, we expect that there is opportunity to re-prioritise the roll-out of the programme, for example by bringing electrification to Sheffield into CP5.

9.95 We have set an assumed level of funding for the Electric Spine programme – including MML electrification and Derby station. It is now for Network Rail and operators to urgently progress the design and development work of the whole portfolio to define the best value outputs in CP5, taking into account rolling stock availability, schedule risks and efficient delivery in the context of a large amount of other electrification work in CP5.

9.96 Given the low level of maturity of the majority of Electric Spine schemes, we have also re-profiled the spend within CP5 assuming that there will be a two year development and design period before implementation gathers pace. As mentioned earlier, we need to make sure that infrastructure delivery is aligned with the introduction of new or cascaded trains and we will do this as the enhancements delivery plan is finalised.

9.97 The Nichols consortium produced some comparative analysis of the schemes which is summarised in the following charts. Network Rail challenged these comparisons in its consultation response but we have concluded that they remain valid.

Figure 9.6: Electrification comparisons from Nichols consortium review (the unit rates have been redacted)



Other committed schemes

9.98 The **Northern Hub** was the largest project in this category. The outputs of this project will enable more frequent train services, faster journey times and new connections across the Pennines plus additional journey opportunities to Manchester airport. The project is designed to support economic growth and has had extensive input from a range of stakeholders. Work started in CP4 and will extend into CP5 to include capacity works in the Castleford corridor, new platforms at Manchester Piccadilly and capacity improvements between Manchester, Liverpool, Rochdale, Sheffield and Chester.

9.99 A significant number of consultation responses related to the adjustments we made to the SBP submission for this programme. These responses included a proposal that the £130m announced by government in March 2012 (relating to one element of the programme) should be ring fenced. Concerns were also raised in respect of a perceived £20m 'cut' it was thought we were planning to make to this element.

9.100 Network Rail made a detailed response stating that we had inappropriately removed about £80m from the assumed expenditure in the SBP.

9.101 We assessed the cost build up submitted with the SBP to deliver the Northern Hub, totalling around £620m. This included the sum of £130m announced by government which we did not assess separately. We concluded that the high level of risk included in the cost estimate was not justified in the SBP submission and we considered that we should apply Network Rail's efficiency overlay to those costs. As a result we reduced the assumed funding of £620m by £122m.

9.102 We acknowledge that the final scope has yet to be determined and will involve many of the bodies that responded on this issue. Once this has been finalised with affected

stakeholders, then we will define them as specific obligations that Network Rail must deliver.

9.103 We also acknowledge that costs may change as scope is finalised, particularly as scope becomes more clearly defined. We agree with the consultation responses that the programme as a whole is not yet far enough developed to establish an accurate efficient cost. We have already stated that we plan to re-assess costs for the Northern Hub through the enhancements cost adjustment mechanism. This will happen by March 2015 at the latest.

9.104 Even beyond this point Network Rail has the ability to set individual project budgets at a different level from our assumed amount as the framework allows them to manage costs at a portfolio level, meaning that any 'overspend' on the Northern Hub could be compensated for by an 'underspend' elsewhere, or vice-versa. This flexibility is an important part of the framework and is weakened if elements of the portfolio are ring fenced. In addition, the Secretary of State's HLOS did not specify a ring fenced amount for the Northern Hub. We therefore disagree with the consultation responses that an element of the programme should be ring fenced and have not done this.

9.105 The **Intercity Express Programme** (IEP) is a package of gauge, track and platform enhancements on the East Coast and Great Western main lines. The works will enable deployment of super express trains in CP5. The first units to be built will be introduced into service on the Great Western Main Line from 2017 and on the East Coast Main Line from 2018. The new trains will bring faster services and additional capacity to major UK cities, along the Great Western Main Line between London, Reading, Bristol, Cardiff and Swansea, and on the East Coast Main Line between London, Leeds, Newcastle and Edinburgh. The Nichols consortium's review highlighted that Network Rail had not applied its efficiency overlay or portfolio risk overlay to this project. In its consultation response Network Rail set out the reasons why it had not applied the overlays to this programme. We agreed in part with Network Rail's view on the application of the portfolio risk overlay (overstated by about £5m) but considered that it does not make a material difference to the determination. However, we will address this in the enhancements adjustment mechanism.

9.106 **East West Rail** comprises the re-opening of Bedford – Bletchley – Bicester – Oxford as a through route with a link to Aylesbury. This will open up new journey opportunities for both passengers and freight by providing direct connectivity between Oxford, Aylesbury, Milton Keynes and Bedford. This should facilitate economic growth by stimulating residential and commercial development along the route. The project has strong local stakeholder support. As with IEP, the main adjustment we proposed was to apply Network Rail's own portfolio and efficiency overlay, which had not been done. In its consultation response, Network Rail updated the latest status of this project. This will be taken into account in the enhancements cost adjustment mechanism.

Other named schemes and CP4 rollover schemes

9.107 The project to redevelop **Waterloo** was the largest project in this category. The scheme is at the pre-GRIP stage and the intention is to define and develop a scheme that will deal with long-term growth at London's busiest terminus station. Uncertainty around the outputs of this project illustrated why we have decided to revisit costs when the outputs are more fully defined. Network Rail applied its efficiency and portfolio overlays but we have removed these to bring the costs in line with the amount assumed in the SoFA. We have also re-profiled the costs to be more realistic as the project is likely to be a phased delivery throughout CP5.

9.108 **Western access to Heathrow** will create a new route from Heathrow terminal 5 onto the Great Western Main Line heading west. Network Rail and DfT have been working with aviation stakeholders and the project has strong local support. The information provided was good. But the Nichols consortium's review highlighted that the wrong cost base was used in the SBP submission and we have adjusted this accordingly. The HLOS stated that delivery of this project is anticipated to extend into CP6.

9.109 Completion of **Birmingham New Street** station is due in March 2015. The main work in CP5 is to reconstruct the eastern portion of the station, including building a new shopping centre above. This will enhance the passenger experience, reduce overcrowding and improve access. Progress throughout CP4 has been good, in spite of considerable difficulties, both with overcoming extra works required by structural problems with the existing building and with the continuing difficult access which has to be carefully controlled to minimise disruption to the operational parts of the station.

HLOS capacity metric schemes

9.110 This bundle contained 27 projects at a total cost of about £900m. The Arup work confirmed that these projects would deliver the remaining portion of the capacity metrics over and above the committed projects and named schemes. We have made some minor adjustments, including reducing the estimate for the Reading to Ascot platform lengthening to account for opportunities to reduce scope through the use of selected door opening rather than infrastructure works.

9.111 About half of the costs relate to five **traction power supply upgrade projects** in the Anglia, Sussex, Wessex, Kent and London North East routes. Whilst we have made some adjustments to these projects at this stage of the review they will be revisited in the enhancements adjustment mechanism.

9.112 Platform extensions at eight stations on the **Uckfield Line** to allow ten car train operation continues a series of similar projects on the Sussex route in CP4.

9.113 Several consultation responses from local authorities and Railfuture suggested that this project should be designed for electric trains rather than the diesel trains that currently run on the route. This would mean that the project scope would be extended to include electrification works as well as platform lengthening works. The main justification for this was that, as the industry moves towards an electrified railway, the

availability of diesel trains will be limited whereas electric trains will be in greater supply. Therefore, they considered that the line should be electrified as well as platforms lengthened as this would provide greater value for money. It was also noted that a positive consequence of this proposal would be the release of more diesel trains to other parts of the network.

9.114 This proposal would rely on there being a committed plan to procure new electric vehicles, without which the investment would be over and above what is required to meet the desired output.

9.115 The Secretary of State did not specify electrification of this route in the HLOS. However, the HLOS did specify the amount of capacity that needs to be met at London Bridge. As part of the illustrative option, DfT suggested that a way of achieving this would be peak train lengthening with additional diesel units and platform extensions. Network Rail then included this in its SBP.

9.116 Network Rail must design a scheme that meets the government's specification and is based on the most accurate assumptions regarding train formations. There are currently no plans to introduce electric trains on this route and therefore it would be inappropriate to design a scheme that assumed that they would be. Should this change then there are mechanisms that allow Network Rail to redesign the project as appropriate. Therefore, at the moment we have concluded there is no justification to widen the scope of the Uckfield train lengthening project to include electrification works. However, Network Rail will need to consider what provision might be made in the context of wider HLOS requirements for future electrification as this is one of two isolated diesel routes in the area.

9.117 The scope and outputs for the **London Victoria station congestion relief** scheme should provide a much needed increase in circulating space and reorganisation of the ticket office and gatelines. The work needs to dovetail with the other master plan improvements at Victoria and also London Underground's tube station upgrade.

9.118 A key part of the **East Kent re-signalling** scheme is the construction of a new station at Rochester on land provided by the local authority. Other work consists of track and signalling improvements to get 12 car trains on the route and to reduce signalling headways between Rochester and Gillingham.

9.119 **North West train lengthening** work consists of platform extensions at up to 60 sites. Although the detailed selection and definition of project requirements is at an early stage, this is work which is familiar to Network Rail, having completed a large number of platform extensions on the network in CP4.

9.120 Works for the **Midland Main Line capacity** project comprise platform extension and associated track and signalling works. We found some inconsistency in pricing between different locations. However, when compared to benchmark rates, the direct construction costs were slightly low, whilst the indirect costs were high. We have altered the cost allocation to reflect this. The specification for the work, which was at

GRIP 2, was based on the rolling stock in use today. Any change to this will affect the planned project outputs.

Other adjustments

Table 9.6: Breakdown of other adjustments to the SBP in England & Wales

£m (2012-13 prices)	DD	FD	FD-DD
Capitalisation of overheads	(56)	(56)	0
Management of inflation, management of occupational health, frontier shift	(39)	(39)	0
Property and other schemes that are income generating	375	375	0
Additional Schedule 4 costs	169	148	(21)
Additional match funded R&D financial incentive	45	45	0
Total	**494**	**473**	**(21)**

9.121 As explained in chapter 5, Network Rail's support functions provide services to enhancements projects where the costs of these activities are capitalised rather than expensed in the year. Analysis of the SBP showed an additional capitalised cost of £62m in CP5 which did not directly link to its assumptions on support costs and Network Rail has not been able to adequately explain this inconsistency. As a result, we have deducted £62m from enhancement costs across Great Britain. We have divided this amount between England & Wales and Scotland based on current train kilometres and have therefore deducted £56m in England & Wales.

9.122 As with other areas of expenditure, we have applied an overlay for cost savings that will come about by better management of inflation and better management of occupational health. This is described more fully in chapter 4. We have also applied an overlay for frontier shift, where we have agreed with the CEPA analysis described earlier in this chapter.

9.123 As explained more fully in chapter 18, there will be some projects in CP5 that were not included in the SBP but which will generate an income for Network Rail. We must consider these in Network Rail's other single till income. Therefore, we have included an assumed cost of these projects, £416m across Great Britain. As with the capitalised cost, we have divided the total between England & Wales and Scotland based on current train kilometres, resulting in an additional £375m in England & Wales.

9.124 As a result of our **recalibration of Schedules 4 and 8**, explained in chapter 20, Network Rail requested that we make an allowance of an extra £169m in its enhancements costs in the draft determination. At that time we did not have time to scrutinise this amount before publication. Since then Network Rail has explained the methodology for its calculation and updated the figure to £148m. We are satisfied that

the approach was appropriate and included this extra amount in our revenue requirement calculation.

9.125 As set out in chapter 19, we are signalling our support for **R&D and innovation** as a means of improving Network Rail's productivity and reducing its costs in the medium to long-term. We have introduced a matched-funding financial incentive whereby we will match each additional pound which it spends on R&D or innovation (up to £45m). This is in addition to the innovation element of the Development fund, announced in the HLOS.

Additional funding identified since the draft determination

9.126 In England & Wales we have assumed about **£650m** extra expenditure will be needed above the levels in the draft determination for:

(a) the completion of three CP4 seven day railway initiatives (mobile maintenance units, W12 clearance on the ECML and bi-directional signalling on the Brighton Main Line) already explained in the network availability section of chapter 3;

(b) funding provision for depots and stabling, explained next in this chapter;

(c) the treatment of ETCS cab fitment, explained later in this chapter;

(d) extra rollover of CP4 funds, explained later in this chapter; and

(e) level crossings, explained in chapter 11.

9.127 Most of this amount (about £500m) relates to the treatment of ETCS cab fitment and funding provision for depots and stabling. Both of these items were included in the affordability assessment of the draft determination. Essentially, these costs have been moved into the assumed levels of enhancements expenditure: ETCS cab fitment from renewals expenditure; depots and stabling from franchise expenditure. As such, the inclusion of these had a negligible net effect on affordability.

Depots & stabling and ancillary Works

9.128 The CP5 enhancement programme will provide greater route capacity and capability, facilitating longer and more frequent trains, and in some cases new journey opportunities. This will require either new or cascaded rolling stock for services to start running by the end of CP5. Given the current refranchising timetable, and the further project development work still required, it has not yet been possible to specify with any certainty what the scope of work will be for the necessary depot, stabling and rolling stock compatibility works for each route.

9.129 A cost estimate for these works was provided by DfT, totalling £80m for depots and stabling for the HLOS capacity metric projects, £102m for depot and stabling works resulting from the electrification programme in CP5, and £130m for gauge, platform and electric compatibility works, totalling £312m in CP5. Given that these works are sometimes delivered by the train operators or rolling stock suppliers, we did not

include this in our calculation of Network Rail's revenue requirement in the draft determination.

9.130 In its response, DfT stated that it considered Network Rail would deliver best value in undertaking this work and requested that it should be added to Network Rail's funding and obligations. This is driven by concerns that the award date for new franchises on some routes does not allow sufficient time for the new operator to design and deliver this work in time for the commencement of new services. The work also needs to be integrated into the overall route enhancement plans, and is essential to enable the new service patterns envisaged in CP5.

9.131 The DfT estimate is at a low level of maturity, but given this work is a critical enabler for the new train services, we have decided to include a funding provision of £312m on an efficient emerging cost basis for Network Rail to administer and programme manage. Network Rail could either deliver projects itself, or could allocate funding to third parties such as a train operator or rolling stock company, if they were better placed to deliver the work.

9.132 We have recognised that it is unreasonable to make Network Rail wholly accountable for the delivery of depots, stabling and route compatibility works, since the depot location, the scope and specification of work are all dependent on decisions by the train operator and DfT rather than Network Rail.

9.133 Where the depots or ancillary work needs to be completed ahead of franchise award, it will be for the local industry planning groups to propose a set of assumed requirements. Network Rail will then need to confirm with DfT that the requirements are consistent with its franchising plans. The output risk will ultimately be carried by DfT and this will be formalised as part of the enhancements delivery plan entry and the change control process to make clear the assumed output, scope, cost and schedule, and the division of risk.

9.134 Network Rail will need to put governance in place to provide assurance that the funding provision is effectively allocated, and there are checks and controls in place to give assurance that the costs incurred are efficient.

9.135 During CP5, we will carry out ex-post efficiency reviews to ensure that expenditure is efficient and, with this proviso, the out-turn costs will be added to the RAB at the end of the control period (i.e. it will not be part of the enhancements cost adjustment mechanism or included in the overspend/underspend framework).

Scotland

Review of projects

9.136 Table 9.7 shows a breakdown of our assumed costs for projects in Scotland. This was mainly informed by our own review but it also included some other adjustments recommended by the Nichols consortium.

Table 9.7: Overview of our assumptions on project costs in Scotland

£m (2012-13 prices)	SBP	DD	FD	Difference (SBP to FD)	Difference (DD to FD)
EGIP	489	490	490	1	0
Borders	124	127	174	50	47
Other Scottish projects	665	583	477	(188)	(106)
Ring-fenced funds	145	145	145	0	0
Other adjustments	-	62	58	58	(4)
Other additional funding since draft determination	-	-	12	12	12
Total	**1,423**	**1,407**	**1,356**	**(67)**	**(51)**

Edinburgh to Glasgow Improvements Programme (EGIP)

9.137 The Scotland HLOS required Network Rail to deliver EGIP, which will be subject to separate commercial arrangements. Network Rail has been developing the scope of works and delivered some infrastructure elements of the programme in CP4 through the investment framework. Network Rail included a total of £489m of CP5 expenditure in the SBP for EGIP.

9.138 We approved a target price for electrification of Springburn to Cumbernauld through the investment framework in January 2013, with the latest forecast of CP5 expenditure at £16m. We have assumed that this is the efficient expenditure for this project rather than Network Rail's SBP proposed cost of £26m.

9.139 Network Rail has split the remaining forecast EGIP expenditure into three projects:

(a) electrification of Glasgow to Edinburgh via Falkirk High;

(b) construction of Edinburgh Gateway Station; and

(c) infrastructure works including: work at Glasgow Queen Street to accommodate longer trains and improve capacity; platform extensions; signalling improvements; and works at Edinburgh Waverley station to improve capacity.

9.140 Some of the scope has been developed to GRIP 4 in CP4, such as design for electrification of the Glasgow to Edinburgh via Falkirk High line. However, Network Rail is currently awaiting clarification from Transport Scotland on the detailed requirements and timings for the overall programme. There is still uncertainty around some elements of the scope, for example works at Glasgow Queen Street and Edinburgh Waverley stations. We have assumed Network Rail's most recent estimate of £474m, as a provisional sum and we will decide the efficient cost at a later date, when Network Rail and Transport Scotland have agreed the target price arrangements.

Borders

9.141 The Scotland HLOS requires completion of this project, to reinstate the former Waverley Line between Edinburgh and Tweedbank. Although Network Rail stated that this project is at GRIP 3 in the SBP for planning purposes, the main civil works for this project recently started and the project is on schedule to complete in June 2015. We approved the funding for this project through the investment framework in October 2012, including forecast CP5 expenditure of £127m. Network Rail's response to the draft determination stated its latest cost forecast highlighting an increase in CP5 expenditure to £174m with a resultant decrease in CP4 expenditure. This is in line with recent project reports and we have changed our assumption to reflect this.

Other Scottish projects

9.142 Network Rail has worked with Transport Scotland to develop both **Aberdeen to Inverness Improvements (Phase 1)** and **Highland Main Line Improvements (Phase 2)** to GRIP 3 and GRIP 2 respectively in CP4. However, the requirement and phasing for both were changed in the Scottish HLOS.

9.143 Aberdeen to Inverness Improvements (Phase 1) was developed as a programme of works with four phases, planned to be delivered across CP5 and CP6. In response to the HLOS, Network Rail has included the cost of all four phases in CP5, totalling £280m. We applied some minor adjustments based on the conclusions of the Nichols review in the draft determination. Transport Scotland raised concerns that Network Rail's estimate was too high as it expects this programme to be delivered over two control periods. However, the CP5 scope cannot be confirmed until timetabling work and option selection is complete. Since the draft determination we have decided to set a cap for the CP5 expenditure of £191m to address Transport Scotland's concerns.

9.144 The SBP included £121m for Highland Main Line Journey Time Improvements Phase 2. However, this estimate was based on broad assumptions as significant timetable and scope development will need to be re-worked before the scope is confirmed. The Nichols consortium reviewed the costs and recommended there was too much uncertainty to determine the efficient cost, but identified some minor adjustments due to an incorrect price base and we have assumed an efficient cost of £117m.

9.145 The HLOS includes a **rolling programme of electrification**, covering around 100 single track kilometres per year following completion of EGIP. Network Rail proposed five routes to be included in the programme totalling around 225 single track kilometres. Network Rail included a proposed cost of £171m for this programme. The Nichols consortium reviewed this estimate recommending that around half the scope is sufficiently defined to apply the adjusted efficiency target. In its consultation response, Network Rail highlighted a reduction of around £12m due to acceleration of Rutherglen & Coatbridge electrification. We have therefore assumed an efficient cost of £156m. The SBP does not include electrification of the East Kilbride branch which

has not been included in our determination. However, we recognise the industry is working up plans to deliver this through a potential alliance and funding can be addressed in between periodic reviews through the investment framework.

9.146 **Motherwell signal box re-signalling** and **Motherwell Depot stabling** improvements will support more effective operation of train services in the area, improved servicing of trains and improved track maintenance. Network Rail included CP5 cost estimates of £11m for the Motherwell re-signalling and £10m for the stabling improvements. At the time of SBP publication, it became clear that the southern end of the re-signalling was incorrect, reducing Network Rail's estimate to £3m. We have reviewed these and concluded that they were reasonable; that is £3m for Motherwell re-signalling and £10m for Motherwell stabling improvements. Network Rail identified some rephasing of the stabling improvements with associated alterations in cost in its response to the draft determination. We will consider these changes when we determine the efficient cost for this project through the enhancements adjustment mechanism.

9.147 The remodelling of **Carstairs Junction** provides an opportunity to take advantage of a CP5 renewal project in the area and significantly reduce long distance journey times. The **Edinburgh Suburban electrification** project would remove an 'island' of non-electrified railway in the Edinburgh area and provide more flexibility for freight services. The HLOS did not specify the requirement for either project and we removed them for the draft determination. A number of responses to the draft determination, most notably Transform Scotland and Virgin Rail Group, emphasised the contribution that the Carstairs project could make to cross border journey times.

9.148 The merits of each scheme does not change our assessment in matching the list of projects with the HLOS requirements and we have not included them in our assumed level of expenditure as they were not required by either the Scottish Ministers or the Secretary of State and they have not changed their position on this since our draft determination. This does not prevent either scheme being taken forward in CP5, for example through the investment framework, should funding be identified. Indeed, in respect of Carstairs, and the benefits this will bring to Anglo-Scottish services, further discussion about the development of this scheme is underway.

Other adjustments

Table 9.8: Breakdown of other adjustments in Scotland

£m (2012-13 prices)	DD	FD	FD-DD
Capitalisation of overheads	(6)	(6)	0
Management of inflation, management of occupational health and frontier shift	(8)	(8)	0
Property schemes that are income generating	23	23	0
Assumed investment framework schemes that are income generating	19	19	0
Additional Schedule 4 costs	29	25	(4)
Additional match funded R&D financial incentive	5	5	0
Total	**62**	**58**	**(4)**

9.149 As explained in chapter 5, Network Rail's support functions provide services to enhancements projects where the costs of these activities are capitalised rather than expensed in the year. Analysis of the SBP showed an additional capitalised cost of £62m in CP5 which did not directly link to its assumptions on support costs and Network Rail has not been able to adequately explain this inconsistency. As a result, we have deducted £62m from enhancement costs across Great Britain. We have divided this amount between England & Wales and Scotland based on current train kilometres and have therefore deducted £6m in Scotland.

9.150 As with other areas of expenditure we have applied an overlay for cost savings that will come about by better management of inflation and better management of occupational health. This is described more fully in chapter 4. We have also applied an overlay for frontier shift, where we have agreed with the CEPA analysis described earlier in this chapter.

9.151 As explained more fully in chapter 18, there are some projects not included in the SBP that will generate an income for Network Rail, which we have considered in Network Rail's other single till income. Therefore, we need to include an assumed cost of these projects, £416m across Great Britain[203]. As with the capitalised cost, we have divided the total between England & Wales and Scotland based on current train kilometres, resulting in an additional £42m in Scotland.

9.152 As a result of our **recalibration of Schedules 4 and 8**, explained in chapter 20, Network Rail requested that we make an allowance of an extra £29m in its enhancements costs in the draft determination. We did not have time to scrutinise this amount before publication. Since then Network Rail has explained the methodology for its calculation and revised the figure to £25m. We are satisfied that the approach

[203] This is made up of two amounts of £231m and £185m as discussed in chapter 18.

was appropriate and included this extra amount in our revenue requirement calculation.

9.153 As set out in chapter 19, we are signalling our support for **R&D and innovation** as a means of improving Network Rail's productivity and reducing its costs in the medium to long-term. We have introduced a matched-funding financial incentive whereby we will match each additional pound which it spends on R&D or innovation (up to £5m).

Other additional funding identified since the draft determination

9.154 In addition to the changes we assumed on Borders and other Scottish projects, we have assumed about **£12m** extra expenditure will be needed above the levels in the draft determination for:

(a) the completion of some CP4 seven day railway initiatives, already explained in the network availability section of chapter 3;

(b) the treatment of ETCS cab fitment, explained next in this chapter; and

(c) level crossings, explained in chapter 11.

Treatment and funding of European Traffic Control System (ETCS)

9.155 In the SBP, Network Rail set out the industry's ETCS implementation milestones for CP5, with its assumed costs (for both infrastructure and train fitment) in its signalling renewals expenditure. ETCS is the agreed future train control and command system for the European main line network, and the national implementation plan spans some 30 years. It is fundamental to how Network Rail will reduce its signalling infrastructure costs and requires some risk transfer to train operators. The current plan is to commission the Great Western Main Line between London and Bristol in 2019 and the East Coast Main Line between London and Peterborough in 2020. It is a cross-industry programme requiring coordinated changes to lineside infrastructure, control centres, rolling stock (including passenger, freight and engineering trains) and the roll-out of new operational procedures.

9.156 In its SBP, Network Rail assumed £194m (£206m pre-efficient) to fund train-fitment, i.e. retro-fitting rolling stock to make it compatible with ETCS train control on the above routes. It has embedded these costs into its route based signalling renewal plans. The funding assumed was for 'first of class' design and for wider fleet fitment for non-franchised fleets such as freight and open access operators. Because vehicle cab layouts vary, the design will need to be bespoke for each different class of rolling stock. The £194m includes £25m for driver training facilities and recruitment.

9.157 In the draft determination, we proposed to treat this element of ETCS funding as a ring-fenced enhancements fund, reported in the CP5 enhancements delivery plan, and that we would allow for a reasonable level of risk.

9.158 The consultation responses supported this approach. Network Rail emphasised the uncertain nature of the project, pointing out that efficient out-turn costs could be

higher. We also recognised that costs could be lower if the national roll-out plan changes, for example if the route commissioning dates are deferred due to changes in rolling stock cascade dates.

9.159 In our assumptions we have reallocated £194m from renewals expenditure to enhancements expenditure for ETCS cab-fitment. This will not be a capped amount and we have decided to treat this as a funding allowance based on an efficient emerging cost basis; it will also be excluded from the overspend/underspend framework. We will validate the efficient cost progressively throughout the control period through ex-post efficiency reviews.

9.160 This approach negates the need for a risk provision on top of the £194m as indicated in our draft determination, since Network Rail will be funded for actual efficient spend and will not be penalised through the overspend/underspend framework.

9.161 Network Rail will need to put governance in place to provide assurance that the funding provision is effectively allocated to third party deliverers, and there are checks and controls in place to give assurance that the costs incurred are efficient.

9.162 Also, we have decided that ETCS milestones, for both train fitment and infrastructure, should be included in the enhancements delivery plan. This is because the successful commissioning of ETCS on the operational railway is dependent on many industry partners who need clarity and certainty of Network Rail's obligations. Train operators need to plan and implement operational changes in time for any commissioning. Publishing milestones in the delivery plan, subject to ORR scrutiny and regulatory change control, would give such certainty.

9.163 The treatment of ETCS infrastructure expenditure will remain in the renewals category since it was embedded in the signalling unit costs. Over time it will become part of Network Rail's standard approach to renewing life-expired signalling assets. If there is a material change to the ETCS infrastructure scope required in CP5, then this will be treated as a deferred renewal and a RAB adjustment made accordingly.

Rollovers and enabling investment

9.164 It is important to ensure that our approach to a periodic review does not create a hiatus in project delivery. This was emphasised in the consultation responses from representatives of the supply chain as well as by Network Rail and train operators. It is particularly important as the current programme is both large and at an early stage of development. As well as ensuring the enhancements adjustment mechanism is progressive, we have allowed Network Rail to: rollover funding from CP4 to finish off projects that are in delivery; and fund project development for CP5 schemes now before the formal start date of the control period. These are summarised in Table 9.9 and Table 9.10.

Table 9.9 Summary of rollovers to be spent in CP5

£m (2012-13 prices)	
Rollovers included in the draft determination	
Birmingham New Street Gateway	
Bromsgrove electrification	
Redditch Branch enhancement	
Kent power supply upgrade	
Barry to Cardiff Queen Street corridor	
Total	**165**
Rollovers agreed since the draft determination	
Strategic Freight Network	
National Station Improvement Programme	
Access for all	
Northern Urban Centres (including Liverpool to Leeds journey time improvements)	
Total	**81**

Table 9.10 Summary of enabling investment to be spent in CP4 for CP5 schemes

£m (2012-13 prices)	
Enabling Investment	
Midland Main Line electrification	
Northern Hub	
Electric spine	
Others	
Total	**65***

* Most recent estimate in Network Rail's P3 finance pack.

9.165 In June 2013, Network Rail asked to rollover about £40m of the CP4 **Strategic Freight Network** ring-fenced fund due to delivery difficulties on two projects: Southampton to West Coast Main Line train lengthening; and Ipswich Yard. We recognised that both of these are important enablers to grow rail freight from two major ports and allowed the rollover. This extra funding will be added to the CP5 allowance for the **Strategic Rail Freight Network** ring-fenced fund, bringing the total capped amount to **£246m** and a requirement to complete these two schemes.

9.166 In June 2012, before the England & Wales HLOS was published, Network Rail sought to rollover funding of the **National Stations Improvement Programme** to complete the rollout of systems that enhance the provision of information on customer information screens at stations. In addition to this, Network Rail has recently requested rollover of funding for works at Twickenham and Chelmsford stations that

have been delayed for reasons outside of its control. We have agreed to rollover around £7m for these works.

9.167 Network Rail has requested the rollover of about £29m of the **Access for All** funding to finish off works at 29 stations across England & Wales. In May 2012, we allowed Network Rail to bring forward the CP5 allocation (about £57m) into the last year of CP4 to accelerate the programme, despite having concerns that this would not be spent. In the end this was not all spent and we have allowed it to rollover to the first year of CP5, when it was originally planned. We will be monitoring this closely.

9.168 The rollover of NSIP and Access for All funding will be added to the CP5 allowance for the **Stations Improvement fund** bringing the total capped amount to **£242m** and a requirement to complete the 32 schemes.

Interoperability

9.169 Interoperability is a European Commission initiative to promote a single market in the rail sector, making it easier for trains to travel across different rail networks. This is partly achieved through common specifications – Technical Specifications for Interoperability (TSIs). Statutory requirements for interoperability are set out in The Railways (Interoperability) Regulations 2011.

9.170 The SBP included the assumption that implementing an interoperable railway would not require specific additional costs in CP5 beyond existing levels of capital expenditure. We have decided that the assumed level of expenditure for maintenance, renewal and enhancements is sufficient to meet the requirements of the interoperability regulations and the TSIs, and therefore our determination is on this basis.

Review of ring-fenced funds

9.171 Both HLOSs made provision for ring-fenced funds. In some cases these were a continuation of a mechanism in use in CP4. Funds provide Network Rail flexibility (sometimes with rail industry partners) to specify projects to deliver outputs or strategic aims. This gives the industry flexibility around how certain strategic objectives should be delivered. In CP4, total expenditure on the equivalent funds is expected to be £1.4bn in England & Wales and £43m in Scotland (2012-13 prices)[204].

9.172 In England & Wales, Network Rail has proposed a further breakdown of some of the funds, in line with the HLOS. We agree with the proposed split.

9.173 Our role in relation to the funds is:

(a) to check Network Rail's approach for each fund is likely to deliver efficient outcomes, by making sure effective governance processes are followed and that

[204] Reported in Appendix 24 of the SBP databook which updates actual and forecast expenditure for CP4 and replaces the 2013 delivery plan update.

it delivers projects at efficient costs. We do this by assessing a sample of schemes;

(b) to check if progress is on target to meet Network Rail delivery plan milestones;

(c) to ensure transparency and approve changes to Network Rail's delivery plan; and

(d) to resolve disputes or any arising issues.

9.174 We do not participate in scheme selection.

9.175 As part of our review, we looked at the use of CP4 funds[205]. Generally, stakeholders have been well engaged in the management of funds through working groups. However: governance arrangements have not always been sufficiently formalised; passenger groups have not always been well represented on governance or working groups (for example, the performance fund uses an industry group, the National Task Force, for governance); in some cases management and reporting at fund-level has been weak (particularly in early stages), resulting in slippages and risk of non-delivery in CP4.

9.176 In our August 2012 outputs consultation[206], we asked for views on indicators to measure the efficiency and effectiveness of the use of the funds. The responses were generally supportive of funds. Several were keen on greater transparency of cost/programme reporting and business cases. Some supported the introduction of indicators to measure efficiency. Network Rail opposed introducing indicators as they may be too cumbersome and will not work for all funds. It also did not consider that average benefit cost ratio (BCR) is an effective indicator but rather the number of schemes completed would be a more appropriate measure. Passenger Focus stated that we need to consider passenger-centric outputs rather than just process and milestones.

9.177 The Secretary of State's statutory guidance to us[207] set an expectation that value for money should play a key role in prioritising the use of industry-led funding pots in England & Wales.

9.178 In the Scotland HLOS, Scottish Ministers required that management of the funds reflect a number of principles, including: simplicity; evidence based; benefits to passengers and freight users; clarity on purpose and transparency on outcomes. The final arrangements in Scotland must adhere to these.

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[205] http://www.rail-reg.gov.uk/pr13/PDF/sdg-efficient-enhancement-expenditure-0312.pdf and http://www.rail-reg.gov.uk/server/show/nav.2231.

[206] http://www.rail-reg.gov.uk/pr13/consultations/outputs.php.

[207] www.gov.uk/government/uploads/system/uploads/attachment_data/file/3642/sos-guidance-to-orr.pdf.

9.179 Many of the HLOS projects and funds are focused on increasing capacity on the network at key pinchpoints, but there are also wider issues to be tackled in terms of network resilience both from a climate change and a performance point of view. To this end, a Passenger Journey Improvement fund of £309m (2012-13 prices) was included in the Secretary of State's HLOS, which we have assumed in this determination. This fund will be targeted at improving the service to passengers. It is expected that activities will be focused on three areas: journey time improvement; performance/reliability improvement; and other enhancement opportunities that emerge. We are looking to Network Rail and the industry to identify where interventions are required. We expect options for adding line speed improvements to existing renewal and enhancements schemes will be considered, as will locations for targeted improvements (for example, six of the top ten locations for reactionary ('knock on') delays are on the Brighton Main Line). The flooding at Cowley Bridge junction in 2012 is an example of problems with network resilience.

9.180 Both during and beyond CP5, there will be significant opportunities to raise line speeds and increase capacity – including the electrification of significant parts of the network, and in particular the roll-out of ETCS and other new technologies for the management and operation of the network. Alongside the expected longer term impact of HS2, these changes have the potential to offer additional journey-time improvements, with potential economic and connectivity benefits. We are looking to Network Rail, working with the industry, to consider on the back of its Market Studies consultation the scope for journey time improvements from the enhancement of long-distance routes, their social costs and benefits, and their impact on connectivity across Great Britain. It should compare options to make wider changes in the line speeds across the network as technological changes come on stream, alongside targeted interventions to improve journey times and capacity by, for example, addressing bottlenecks. This work should report in time to inform the strategic business plan for the 2018 periodic review.

9.181 Many of the consultation responses to the draft determination supported our conclusions on the ring fenced funds, which were based in some part on the consultation responses we received in August 2012 on the outputs framework.

9.182 ATOC and several train operators raised a specific point about the Customer Information Strategy, seeking clarity on a specific funding route for this system enhancement work. In England & Wales, the Secretary of State made provision for £100m for the Station Improvement fund, explicitly including better passenger information within the scope of this fund. Therefore, the Customer Information Strategy is eligible for funding through the governance arrangements that are established for the Station Improvement fund; as this fund is intended to enable measures to improve the quality as well as the availability of passenger information. The need to fund the strategy should be seen in the context of the licence obligations on train operators and Network Rail.

Governance arrangements

9.183 We expect that robust and transparent governance arrangements will be in place for CP5. These will be finalised in the enhancements delivery plan. Network Rail will consult on its draft enhancements delivery plan in December 2013. We will take any consultation responses into account before agreeing the final plan. However, the SBP supporting document 'Definition of CP5 enhancements' included a section on each of the funds which we have reviewed against the following criteria:

(a) degree of formalisation;

(b) passenger input;

(c) reporting arrangements; and

(d) criteria for scheme selection.

9.184 Through the review we have agreed with Network Rail the following measures.

Degree of formalisation

9.185 Governance arrangements for new funds will be formalised by the existing cross industry planning oversight group on behalf of RDG[208]. The Network Rail fund holder will ensure Terms of Reference (ToR) for each fund are established and that these will be consistent with the overarching governance arrangements. As it will not be practical to involve every stakeholder in all of the funds, Network Rail should set out why specific stakeholders are involved. Regional transport agencies such as TfL and the PTEs are important stakeholders and are currently included in the Rail Industry Planning Group (RIPG) [209] which was originally established by Network Rail to provide governance[210] over the RUS programme.

Passenger representation

9.186 As in CP4, passenger groups will be involved through RIPG, which will oversee all funds. Passenger interests should be clearly reflected in the governance of the funds (except for the Strategic Rail Freight Network fund) with issues that matter to them considered when schemes are selected. This will be done at both the overview level with passenger group involvement and at a local level with train operator involvement. Other organisations such as local authorities and local enterprise partnerships also represent passenger interests. We expect to see evidence that scheme selection meets the needs of passengers.

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[208] http://www.raildeliverygroup.com/.

[209] This group is currently chaired by Network Rail and involves DfT, Transport Scotland, Welsh Government, ATOC, Rail Freight Group, Rail Freight Operators Association, TfL, Centro, Passenger Focus and ORR.

[210] http://www.networkrail.co.uk/browse%20documents/rus%20documents/route%20utilisation%20strategies/network/other%20publications/rus%20governance.pdf.

9.187 This issue is wider than the ring-fenced funds and applies to all projects. Network Rail already involves passenger groups, such as Passenger Focus and the Disabled Persons Transport Advisory Committee in different stages of project development.

9.188 At the very early stages there is an established long term planning process that is well known and transparent[211]. There are two formal public consultations, open to everyone and traditionally attracting good responses from passengers, elected representatives, local authorities and business groups.

9.189 As projects develop and become more defined there are further opportunities for passengers to be involved. There are good examples where Network Rail has involved passengers, such as using Twitter on the Northern Hub; public exhibitions on the plans for Reading station; commissioning Passenger Focus to do completion surveys on small scale station works; and organising a passenger test at Birmingham New Street.

9.190 In its consultation response, Network Rail confirmed that it will take account of Passenger Focus research in setting priority schemes. We have told Network Rail to include in its enhancements delivery plan how and when passengers can be involved in the enhancements programme, which includes both the ring fenced funds and other projects.

Reporting and transparency

9.191 A one-page template, describing each scheme being progressed through the funds, will be published on Network Rail's website. In addition, progress will be reported to the RIPG and through the enhancements delivery plan. In its consultation response Network Rail confirmed that it will include this in its delivery plan.

Scheme selection

9.192 A minimum BCR will be set for funds where it is appropriate, such as the Network Rail Discretionary Fund (NRDF) element of the Passenger Journey Improvement fund. The selection criteria should be made transparent and will be set out in the enhancements delivery plan. In its consultation response Network Rail confirmed that it will include this in its delivery plan.

9.193 In cases where a BCR is not applicable, there will be alternative selection criteria which should ensure that benefits to passengers and freight users are considered. This should be made easily understandable and transparent to stakeholders.

9.194 The steering group for any fund is responsible for deciding what projects should be progressed. It is then the responsibility of the fund holder to secure the right levels of funding for a specific project, and to deliver it efficiently through the Network Rail investment authority process.

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[211] http://www.networkrail.co.uk/Long-Term-Planning-Process/

9.195 The scheme selection for Scottish funds requires that key decisions are taken that will benefit Scotland's rail users and support the policies and priorities of Scottish Minsters. Transport Scotland therefore has a specific role in the governance arrangements.

Monitoring in CP5

9.196 We want to increase transparency and incentivise efficient delivery and value for money of schemes progressed through the funds.

9.197 We will use both in-house staff and the independent reporters to complete reviews on a sample of schemes and track recommendations from previous studies on how to improve fund management and governance. In England & Wales, we will check that projects are delivering minimum BCRs and, where a BCR is not applicable, we will assess whether benefits to passengers and freight users are being realised. In Scotland, we will review projects against the principles specified in the HLOS. As with all of our reviews, we will publish results on our website and conclusions in our Network Rail Monitor.

Passenger benefits

9.198 We discuss above the benefits to passengers that will be delivered by the individual projects. In addition to these, we will make sure that the interests of passengers are reflected in the governance of the funds so that the issues that matter to them are considered when schemes are selected.

9.199 Although the outcome of enhancements do not get specifically picked up in the National Passenger Survey, the delivery of improvements from enhancements will be a significant driver of passenger satisfaction. To ensure that Network Rail's delivery plans reflect what matters to passengers and freight customers, we will make sure that the enforceable milestones that are set on the timing of the delivery of passenger and freight customer benefits.

9.200 We will also carry out selected surveys on scheme completion to measure consumer benefits.

Freight benefits

9.201 The Strategic Freight Network has been widely supported in CP4 and is delivering infrastructure for more capacity and longer trains where it is needed. The fund will continue in CP5 in England & Wales and a new one will be created in Scotland.

9.202 In addition, there are many freight benefits accruing from other schemes. For example, gauge clearance on the Midland Main Line through the electric spine combined with East West Rail will provide potentially shorter routes because freight will be able to move from Southampton to Daventry more directly than it currently does. Another example is the remodelling of Ely North junction to provide for forecast

freight flows across East Anglia as well as enhanced passenger services between Cambridge and each of King's Lynn and Norwich.

10. Deliverability of engineering work

Key messages in this chapter

- In determining the component parts of the CP5 package we have looked at whether outputs are achievable. We also explain whether the overall package can be delivered safely. In this chapter we set out our conclusions on whether Network Rail is capable of delivering the maintenance, renewals and enhancement work set out in this settlement.
- Network Rail is a GB wide company and whilst much of the work will be delivered by the devolved routes our assessment of programme deliverability has been done at the overall level. Our conclusions are therefore at a Great Britain wide level.
- Using total expenditure for maintenance, renewals and enhancements as an approximate indication of the amount of engineering work to be done in CP5 compared with CP4 there is broadly the same level of activity (see Table 3 in the Executive Summary). Network Rail's own assessment concluded that it has a high level of confidence in successfully delivering the required work whilst still meeting its obligations on cost and performance.
- We reviewed Network Rail's assessment, taking into account its track record and how it is planning to manage the delivery risks that it has identified so far.
- We also commissioned our own work in specific areas of risk, such as on complex programmes like ETCS, or work requiring significant step changes in activity, for example the electrification programme.
- Several consultation responses from national freight train operators raised concerns which concurred with our assessment of the main risks and welcomed Network Rail's commitment to identify and reduce delivery risks and update its assessment regularly. We must now ensure that this happens.
- In conclusion we agreed that Network Rail has identified the key factors constraining delivery and has action plans in place to deal with them. There is a process in place with executive-level review to identify further risks and manage them. Given the risks remaining we have decided to regularly review Network Rail's progress against its own action plans.

Key messages in this chapter (continued)

- The main uncertainty was the enhancements at an early stage of development where it has not yet been possible to fully define the scope of work. We require Network Rail to update its deliverability assessment regularly as these projects become more certain and the delivery dates become clearer in the enhancements delivery plan. This is important to make sure Network Rail has assessed deliverability of the overall programme as these projects become more defined. We also require Network Rail to update its deliverability assessment when it submits its plan for spend on civil engineering renewals for years three, four and five.

Introduction

10.1 In the relevant chapters we explain our approach on a range of outputs and efficient costs that will form the CP5 package that Network Rail is funded to deliver:

(a) in chapter 11, we look at whether we think the overall package will be delivered safely;

(b) in chapter 3, we looked at outputs and explain our conclusions on each of these including judgements as to whether specific targets, such as PPM, are challenging but achievable; and

(c) in chapters 5 to 9, we looked at efficient expenditure and concluded whether efficiency targets were achievable. For example, in determining efficient operations costs we did a specific deliverability assessment of the operating strategy. And, for our assumptions on maintenance and renewals costs, we examined the volume levels.

10.2 This leaves the question as to whether the total programme of engineering work (maintenance, renewals and enhancements) can be delivered and this chapter explains our conclusions on this.

10.3 Network Rail is a GB wide company and whilst much of the work will be delivered by the devolved routes our assessment of programme deliverability has been done at the overall level. Our conclusions are therefore at a Great Britain wide level.

10.4 We have compared CP4 to CP5 by using expenditure as a proxy for the amount of work required and by looking at discreet increases in planned volumes. One of the most significant increases in renewals is within the signalling asset, which will nearly double in volume, partly as a result of the operating strategy explained in chapter 7. As well as the work mix changing there will also be different challenges in terms of complexity, for example the operational roll-out of ETCS on parts of the main line network.

10.5 Several consultation responses had concerns about the ability of Network Rail to deliver the CP5 programme with GB Railfreight and DB Schenker particularly

unconvinced that some activities could be delivered. Transpennine Express raised the concern that a lack of Network Rail operational planning resource will be a limiting factor in delivering CP5 engineering work. We will be seeking evidence from Network Rail that they are taking steps to address these risks.

10.6 In general though, responses to the draft determination broadly concurred with our conclusions. Freightliner expressed concern that Network Rail had not updated its deliverability assessment frequently enough during CP4, particularly as the programme of work moved into delivery. Several responses from the supply chain and county councils referred to the risk of creating a hiatus between CP4 and CP5 in the way we propose to treat enhancements; we have dealt with this in chapter 9.

Framework for assessing deliverability

10.7 Assessing deliverability in the context of a periodic review does not fit neatly with any established frameworks, such as HM Treasury's tool kit for assessing a project's management case. As set out in chapter 9 the HLOSs specified a large number of projects, many of which have not yet been developed sufficiently to define and plan the scope of work. This has made it difficult to conclude in absolute terms on whether the package of work is deliverable. We have therefore reviewed Network Rail's process of assessing and managing the risks, and commissioned some specific reviews of our own to test Network Rail's conclusions.

10.8 We have had to strike a balanced view on whether Network Rail's current action plans are sufficient, given the current uncertainties and the time available to manage and reduce the risks.

Network Rail's analysis

10.9 Network Rail has developed ways of assessing deliverability under different planning horizons, i.e. short-term planning of possessions, medium term integration of projects and long-term planning to identify strategic demand/supply issues. In the SBP its deliverability analysis focused on identifying long-term risks. Its assessment collated and challenged the ten individual route plans until it had a sufficiently robust national assessment. The assessment focused on understanding what the critical factors were and identifying mitigating actions. We have agreed with Network Rail that it is not realistic to expect a single integrated and resourced plan for all maintenance, renewals and enhancements work for CP5 at this stage of the planning cycle.

10.10 The analysis provided with the SBP looked at the key factors influencing deliverability, their status and the actions required to increase the confidence in Network Rail's ability to deliver the plan.

10.11 The SBP included a summary of the conclusions of its assessment, with the main factors constraining deliverability being:

(a) increased access requirements compared to CP4;

(b) a shortfall in plant and logistics, particularly tilting wagons and ballast cleaners;

(c) the amount of track renewals and the ability to deliver these with less disruptive engineering closures, e.g. an adjacent line open; and

(d) the amount of electrification work, in particular requiring more supervisory, engineering and management resources.

10.12 Network Rail has action plans against each of these and has a high level of confidence that it can address them in the time available to successfully deliver the required outputs for CP5.

10.13 Following the draft determination we asked Network Rail for an update on its progress in this area. It explained how it was improving its programme integration function to provide more accurate longer-term forecasts. For example it has established a new set of integrated planning principles, and initiated a regular review meeting that considers a six-yearly critical resource forecast. It has also issued improved planning guidelines and rules so that there is consistent long-term forecasting from its devolved routes.

10.14 Network Rail also updated us on its progress with addressing the mitigating actions it had identified in the SBP, for example, the risk of potential shortages of tilting wagons has been identified and procurement is underway to supplement the fleet for CP5 demands.

Our analysis and conclusions

10.15 We have agreed with Network Rail's assessment of what it needs to do to build the capability of its own organisation and that of the supply chain so that the work volumes in CP5 are achievable. We noted that although the aggregate maintenance, renewal and enhancement expenditure is broadly the same as CP4, the volume of enhancement work is greater, and the portfolio is less mature than was the case at the same point in the previous control period. There is also a significant demand for electrification resources that was not required in CP4 and some notable route-based concentrations of work, such as on the Great Western Main Line.

10.16 We found that it had identified the right risks and was actively managing them, with action owners named and an executive-level review process in place.

10.17 In addition to our review of the SBP, we commissioned some specific pieces of work to look at areas of complexity and uncertainty:

(a) Halcrow reviewed Network Rail's readiness to implement the ETCS schemes in CP5. They concluded that the likelihood of success depended on Network Rail

completing a series of important actions in 2013[212]. We will be closely monitoring Network Rail's progress against these;

(b) Nichols reviewed the programme management arrangements of the emerging portfolio of projects in the north of England, which is a CP5 deliverable. Network Rail has agreed to the recommendations and is getting on with implementing them. This increased our confidence that this programme can be delivered within CP5[213];

(c) we reviewed Network Rail's electrification resourcing strategy and attended an internal Network Rail review to build our confidence that Network Rail's actions were being put into practice. For example a key mitigating action is for Network Rail to contractually commit to framework agreements with suppliers so that they have certainty to start building capability ahead of the main implementation timescales; and

(d) as part of our CP4 work we are reviewing the deliverability of the Great Western Main Line electrification programme which we remain concerned about, and are currently seeking evidence that the route electrification programme is part of a robust and integrated programme of work and is therefore deliverable within the timescales DfT have specified.

10.18 Under an early start mechanism we have allowed Network Rail to commence work on some enhancements projects now so there is no hiatus and Network Rail can plan ahead with the industry. This will help to mitigate risk of non-delivery in CP5.

10.19 However, there are still significant challenges for Network Rail to overcome, including:

(a) there is not currently a joined-up and integrated specification and plan covering all infrastructure, rolling stock and depot changes required for CP5. This is needed as soon as possible to give assurance that scope and outputs are aligned and optimised;

(b) there are notable concentrations in the scale of work being undertaken by Network Rail in CP5 that inevitably create deliverability risks, for example the Western route which is responsible for about 20% all projects with a total cost of over £3bn including Reading, Crossrail, IEP, several electrification schemes and ETCS. Network Rail's route plans and our detailed review of the electrification projects provides evidence of the focus and commitment to this major upgrade programme, but this undoubtedly represents a major challenge to efficient and timely delivery. Other examples are the East Coast Main Line and Midland Main Line that have a total of around £2bn of assumed investment;

[212] http://www.rail-reg.gov.uk/server/show/nav.2231.

[213] http://www.rail-reg.gov.uk/server/show/nav.2231.

(c) the profile of SBP expenditure shows cost falling significantly towards the end of the control period. This appears to be unrealistic for a portfolio that includes so many schemes at an early stage of development and we have made an adjustment to re-profile Waterloo and Electric Spine expenditure towards the end of the control period; and

(d) in some areas there will be demand peaks for highly specialised skills.

10.20 In the draft determinations we concluded that Network Rail had put in place a process for identifying and managing the overall delivery risks it faced in CP5 and therefore we supported its assessment that it should be able to deliver the work volumes.

10.21 Further to the consultation responses and an update from Network Rail, we have not changed our assessment, but we are aware that there are particular pinch-points, for example around engineering access and critical resources such as signalling testers, that remain a significant challenge for the industry. We will be holding frequent review meetings with Network Rail to check that its deliverability assessment is being updated, that its work-bank planning process continues to improve, and that its planned actions are being delivered to reduce the risk of non-delivery.

11. Health and safety

Key messages in this chapter

- Network Rail has a legal obligation under the Health and Safety at Work etc. Act 1974 to maintain and, where reasonably practicable, improve work-related health, safety and welfare risks to workers, and the health and safety of passengers and others affected by rail operations. Nothing in our determination should prevent Network Rail from complying with health and safety law.
- We will continue to proactively inspect Network Rail's management of health and safety in CP5 and to monitor Network Rail's delivery of its asset policies, including where this affects infrastructure safety. We will continue to use our regulatory tools to secure legal compliance with health and safety law.
- We will continue to use our railway management maturity model as a benchmark to measure improvement in Network Rail's health and safety management capability.
- This determination addresses safety concerns identified in respect of Network Rail's ability to manage planned track maintenance activities and understand and control the risks associated with structures and earthworks failures.
- We are setting one regulated output for level crossings; Network Rail is required to deliver projects (including level crossing closures), to maximise the reduction in risk of accidents at level crossings using the £67m ring-fenced fund made available by the Secretary of State and an additional £32m provided in this determination.
- The Scottish Ministers provided a ring-fenced fund of £10m to facilitate the closure of level crossings. This is being managed in the same way as other specific funds made available by the Scottish Government.
- We have assumed a different profile for efficiency assumptions for track maintenance (this includes off track in CP5), partly because of our concern about how quickly Network Rail can introduce its planned initiatives and new ways of working without compromising safety.
- Risks to the workforce will be reduced through provision of £163m to enable the taking of faster and safer isolations, and £70m is being made available to replace a number of road-rail vehicles.
- Funds have been made available to develop new technologies to improve protection and warning for track workers (£10m) and to develop specialised, safer road-rail vehicles (£10m).

Key messages in this chapter (continued)

- We are looking for Network Rail to improve its occupational health management and in doing so achieve £20m in cost savings in the final year of CP5, with a total saving of £55m in CP5.
- We expect Network Rail to improve its health and safety performance in CP5 and we will monitor its implementation of the strategies on safety and wellbeing and health and wellness.

Introduction

11.1 Network Rail is required through the determination to provide a railway that is safe for passengers, the workforce and the public, provides a good service to its customers and delivers value for money for taxpayers and funders.

11.2 Health and safety has been integral in our assessment and in our determination and in this chapter we explain the health and safety context in which we have made our decisions. Our determination has been informed by the current health and safety risk profile presented by Network Rail's operations and our assessment of its ability to manage those risks. We have also considered the health and safety risks that Network Rail will face in CP5 arising from its planned activities.

11.3 Health and safety is a matter reserved for the UK Government and its requirements are set out in the HLOS prepared by the Secretary of State. Health and safety arrangements and requirements apply equally to England, Wales and Scotland.

11.4 The primary legislation that protects passengers, the public and the workforce is the Health and Safety at Work etc. Act 1974, which requires employers to ensure so far as is reasonably practicable the health and safety of their employees and those affected by their operations[214].

11.5 We assess Network Rail's health and safety performance through our inspection and investigation work; we monitor its health and safety performance through indicators provided by the rail industry and we compare its performance with other railways.

11.6 We have a range of regulatory tools to secure improvements in health and safety standards and to secure legal compliance with health and safety law. We have a strategy for the regulation of health and safety risks[215].

[214] The term reasonably practicable has a long established history in legislation, it is a narrower term than physically possible and means that the degree of risk in a particular situation can be balanced against the time, trouble, cost and physical difficulty of taking measures to avoid the risk.

[215] See our website at: http://www.rail-reg.gov.uk/server/show/nav.1243.

Our approach to health and safety in the determination

11.7 In our determination we have taken into consideration:

(a) the health and safety risks to passengers, the public and the workforce as a result of Network Rail's operations;

(b) our assessment of Network Rail's ability to control those risks, based on evidence from our inspection findings and our assessment of Network Rail's health and safety management system using our railway management maturity model; and

(c) whether the challenge to Network Rail in terms of our overall package, including the level and phasing of our efficiency challenge, is consistent with Network Rail meeting its safety obligations.

11.8 To make our assessment and draft determination, we reviewed the SBP, held a specific health and safety meeting with Network Rail as part of our series of challenge meetings and sought clarification on health and safety issues at route meetings. In the final determination we have taken account of stakeholder responses.

HLOS requirements

11.9 The Secretary of State considers the continued safe operation of the railway to be of the utmost importance and requires the industry to continue to improve its record on passenger and worker safety through the application of the "so far as reasonably practicable" approach and to ensure that current safety levels are maintained and enhanced by focusing domestic efforts on the achievement of European Common Safety Targets.

11.10 The Scottish Ministers have committed to working closely with the Secretary of State to ensure that the interests of Scotland are fully reflected on issues of safety.

11.11 The Secretary of State included a specific ring-fenced fund of £65m (this was in 2011-12 prices, the £67m referred to elsewhere in this chapter includes an uprating for inflation) to reduce the risk of accidents at level crossings. The Scottish ministers provided a ring-fenced fund of £10m to facilitate the closure of level crossings in Scotland.

Network Rail's SBP submission

11.12 Network Rail made a number of proposals for health and safety in CP5 in its SBP, including:

(a) eliminating all fatalities and major injuries to the workforce with a 50% reduction in train accident risk by 2019;

(b) in the longer term, 'everyone goes home safe, every day';

(c) to reduce the risk of accidents at level crossings by 8%, using the ring-fenced level crossing fund; and

(d) to improve worker safety through three investment funds; for road-rail vehicles, for taking safer and faster electrical isolations and the development of new technology to alert track workers of approaching trains.

Health and safety in CP4

11.13 In the following paragraphs we briefly provide some health and safety context for the decisions in our determination. Further detail on our view of the health and safety performance of Britain's railways is provided in our annual report[216].

11.14 European legislation requires the establishment of industry wide Common Safety Targets and individual member state metrics (called National Reference Values). As of April 2012 the railway in Great Britain was broadly meeting employee and workforce targets.

11.15 The HLOS for CP4 set the rail industry a target to reduce passenger and workforce risk by 3% by March 2014. Passenger and workforce risk is measured using RSSB's Safety Risk Model [217]. At January 2013 (SRM version 7.5), passenger risk had reduced by 5.7% and workforce risk had reduced by 11.6% since the start of CP4.This is an 'all industry' measure and does not make clear Network Rail's specific performance on workforce safety.

11.16 Network Rail uses a fatalities and weighted injuries measure [218] to measure workforce safety and it sets itself targets. During this year the fatalities and weighted injuries measure (FWI) has worsened and at September 2013 the measure was 0.153 compared to the target of 0.092.

11.17 There is little reliable workforce safety data for other European countries, but intelligence suggests that workforce fatalities and injuries are commonly caused by working on or near running lines, working at height, near high voltage electricity and operating road-rail vehicles. These are the same workforce safety issues that we find on our mainline railway.

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[216] *Health and safety report 2013*, ORR, July 2013, available at http://www.rail-reg.gov.uk/server/show/nav.2998.

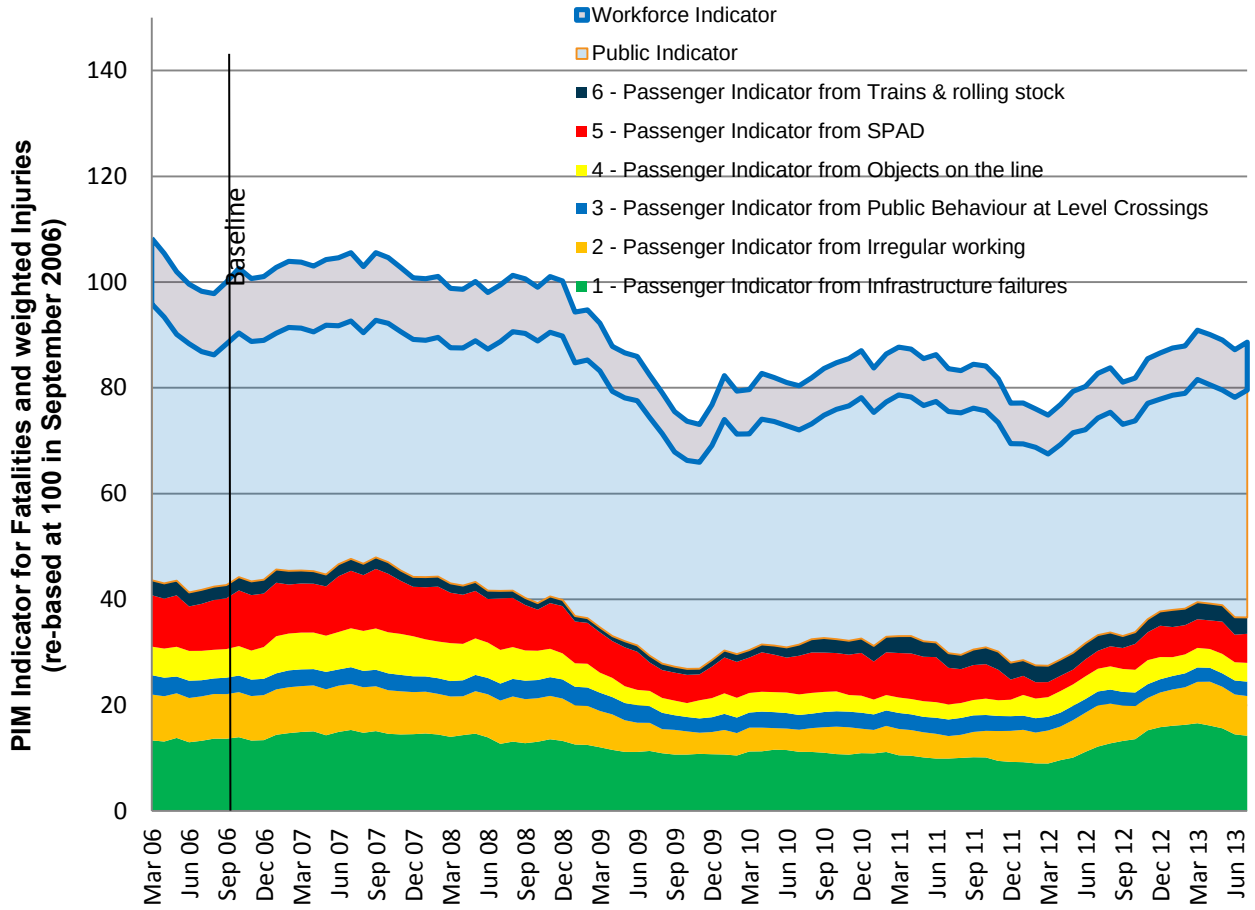
[217] The Safety Risk Model (SRM) is a quantitative representation of the potential accidents resulting from the operation and maintenance of the GB rail network. It comprises a total of 120 individual models, each representing a type of hazardous event. A hazardous event is defined as an event or an incident that has the potential to result in injuries or fatalities.

[218] Network Rail primarily measures workforce safety by the Workforce safety (fatalities and weighted injuries) measure. This measure compares the weighted number of personal injuries that are reported in its Safety Management Information System (SMIS) for all Network Rail staff and contractors working on Network Rail's managed infrastructure, normalised per million hours worked. This measure provides information to help monitor and control accidents and injuries to the workforce.

11.18 Train accidents are rare, but they are the most likely cause of serious harm to members of the public including passengers. The RSSB has developed an industry model to help understand the underlying risks that might result in a train accident. This is the precursor indicator model (PIM); the model quantifies changes in the underlying risk and plots historical data to predict future trends. RSSB set a benchmark for the PIM in September 2006 in order to measure changes from that point.

11.19 The figure below shows the PIM at July 2013, with an overlay to show the overall public (including passengers) and workforce indicators. The figure shows that the PIM has fluctuated but with an overall downward trend until early 2012.

Figure 11.1: Precursor Indicator Model for train accident risk



Source: RSSB PIM version 7.5, July 2013.

11.20 The overall PIM measurement has increased steadily since early 2012 and the risk to train passengers has now returned to about the same level as it was in December 2008. Since March 2013 the measure has fallen slightly. Of all the measured precursors in this model, failed earthworks (due to heavy rainfall and flooding in the summer of 2012) are now the largest single source of train accident risk to passengers. In 2012, the incidence of structural failures was about three times the

average for the preceding three years. The PIM is a mainline industry-wide measure, but the management of the infrastructure is the responsibility of Network Rail.

11.21 The PIM indicator for public behaviour risk at level crossings in 2011-2012 was at an all-time low, reflecting the work by Network Rail and the industry, but the risk has increased 7% in 2012-2013. Level crossings still present nearly half of the potential catastrophic train accident risk, if injuries to passengers in road vehicles are included.

11.22 Network Rail's health and safety performance as measured by the number of adverse events is good compared to other European countries, however, our determination reflects the recent increases in passenger risk (including public risk) from infrastructure failures, the continuing risks associated with level crossings and the risk of fatalities and serious harm to the workforce.

Our inspection work and our assessment of Network Rail's SBP

11.23 It is important to assess how well a business can control the risks arising from its undertakings so that unsafe events do not happen. We assess how well Network Rail is able to identify and control risk through a programme of proactive, risk-based audit and inspection work.

11.24 Findings from our inspection work are judged against our railway management maturity model to assess Network Rail's performance against a number of components necessary for an effective safety management system. In CP4, we assess that Network Rail has improved some aspects of its management capability towards excellence but other components are some way below excellent and require improvement.

11.25 Our determination for CP5 has been informed in particular by our findings from our inspection and investigation work in the areas of infrastructure safety, workforce safety and occupational health.

Track and off track maintenance and renewals

11.26 In CP4, we have inspected Network Rail's management of track, off track and civil engineering assets, because failures in these assets are precursors to train accidents.

11.27 We found insufficient resource in maintenance depots to carry out all the planned maintenance work in track and off track assets. Approximately 2,700 jobs were lost when Network Rail introduced a standard structure and resource model in its maintenance depots, to improve efficiency and reduce costs. The sizing model in off track, drainage and some aspects of track maintenance was not properly scoped and it underestimated the actual work volumes. The lack of resource to deliver the planned maintenance volumes has been compounded by failures to fully implement new technologies such as automated track inspection systems and improve productivity through changes to working practices.

11.28 We prompted Network Rail to carry out a capability study, because we were concerned about its failure to deliver its planned track maintenance volumes. This found that maintenance volumes were insufficient to sustain asset condition in the longer term and it recommended significant additional resource to increase maintenance volumes and recover asset condition in track, fencing, vegetation and drainage.

11.29 Planned maintenance addresses underlying causes of failures and insufficient planned maintenance increases the reliance on inspection and reactive maintenance to maintain a safe railway. It is unlikely that Network Rail will meet its planned track and off track maintenance volumes in CP4.

11.30 We have served formal enforcement notices requiring improvements to the physical condition of the assets (for example repairs to fencing) and requiring improvements to processes for maintaining a safe asset (for example management processes for proper track inspection).

11.31 In its SBP, Network Rail said that maintenance efficiencies in CP5 will come from headcount reductions, improving productivity and avoiding unnecessary work. Network Rail forecast a headcount reduction of 1,262 (8%) on the CP4 exit numbers, with a sharp reduction at the start and end of CP5. The proposed headcount reductions are not of the same order as in CP4, but in our assessment they are significant on top of the reductions already made.

11.32 Network Rail proposes to improve productivity through a number of central initiatives, described in this determination at chapter 8. These include risk-based maintenance; remote condition monitoring, changes to working practices including multi-skilling and improved information management and mechanisation.

11.33 Our assessment of the central initiatives found they are better described than similar initiatives in CP4, but their delivery is dependent on a number of other factors, for example the successful resolution of industrial relations issues and the delivery of renewal and enhancement programmes. Network Rail acknowledges many of the initiatives require a long lead time, and they will not provide sustainable efficiencies until the end of CP5.

11.34 Network Rail's Transforming Safety and Wellbeing strategy sets out a number of key enablers to support the central initiatives and to help achieve changes to working practices. Enablers include an improved safety culture, a simplified rules structure and innovation by the routes. These enablers depend on developing employee competence, capability, judgement and awareness to allow Network Rail to move to being a safer and more efficient organisation.

11.35 There is no plan linking headcount reductions in CP5 with the implementation of the central initiatives and enablers and therefore no contingency plans or go/no-go decision points in the event of central initiatives and enablers not delivering.

11.36 We found a difference of opinion between some routes and the Network Rail centre about what, if any, efficiency will be realised through a simplified rules structure, which is a key enabler. Independent reporters concluded that a simplified rules structure was unlikely to realise any significant net cost saving benefits but it should achieve benefits from improved compliance (safety benefits). The reporters' report can be found on our website[219].

11.37 We found that some routes lacked an understanding of the resource required to deliver the planned off track and drainage work, even though they have agreed to achieve the maintenance and renewal efficiencies.

Response to our draft determination

11.38 A number of respondents to the draft determination, including RMT, TSSA and ASLEF commented on potential adverse effects on safety from the proposed efficiencies in track maintenance and track renewals. In particular concerns were raised about staffing levels in maintenance depots, multi-skilling and risk-based maintenance.

Our determination

11.39 The determination makes a number of provisions to help Network Rail to implement its asset policies and deliver a safe track and signalling infrastructure.

(a) partly because of concerns about how quickly Network Rail can introduce changes without compromising safety, we have assumed a different profile for efficiency assumptions for track maintenance (this includes off track in CP5). This means that Network Rail has more time to introduce initiatives and new ways of working to improve efficiency. Chapter 8 has more details.

(b) Network Rail provided some new information in its response about costs and efficiencies for track renewals and our final determination has increased funding for track renewals by approximately £100m. We will monitor Network Rail's delivery of track renewals to ensure that high criticality renewals are prioritised.

(c) we are strengthening the outputs framework and indicators for asset management and we will be monitoring Network Rail's delivery of planned asset maintenance and renewal volumes.

(d) we require Network Rail to produce an overall maintenance strategy, at the same time as its delivery plan, to clarify how the various maintenance initiatives will be optimised and integrated across its asset base. This strategy should include a change plan to show how it will be implemented taking account of human factors and staff competency issues.

(e) we will continue to audit and inspect the implementation of Network Rail's asset policies and we will use our regulatory tools when necessary to ensure safety.

[219] http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

Structures and earthworks

11.40 Civils structures include bridges, tunnels, earthworks, embankments cuttings, estuarine defences and their associated drainage assets.

11.41 Failures of earthworks increased in CP4, both in overall numbers and severity, including earthwork failures at Cruachan, Loch Treig, St Bees, and Brithdir. There have been a number of occasions when trains have run into failed earthworks, including three within a two month period in Scotland. Nobody was seriously hurt in these incidents but the potential for harm is clear. We served an improvement notice in August 2012, requiring Network Rail in Scotland to assess the risks associated with failed earthworks in adverse weather and put in place appropriate operational control measures (for example speed restrictions). We see operational controls as an interim solution and expect the frequency and severity of earthwork failures to be reduced in CP5 through proper asset management (for example, through the proper provision and maintenance of drainage to cope with severe weather events). We also expect Network Rail to carry out a similar process of risk assessment and controls in other routes.

11.42 CP4 has also seen a number of significant structural failures including at Stewarton, Enterkin Burn Viaduct, River Crane, Bromsgrove, Old Beck and Scout Tunnel. Our inspection work found a significant backlog in structures examinations and we served an improvement notice requiring the backlog of inspections to be addressed. Network Rail has responded to the notice and its knowledge of asset condition is improving, but there are still some significant gaps. For example, at the end of June 2013, 5,900 of the 28,300 bridges in Network Rail's portfolio did not have a current capability assessment (a strength assessment within the last 18 years). Network Rail is working to close this gap by the end of CP4.

Our determination

11.43 This determination makes a number of provisions to help enable Network Rail to implement its asset policies and we will be monitoring Network Rail's delivery of safe civil structures in CP5:

(a) this determination introduces a new civils adjustment mechanism, which is set out in chapter 8. This will allow the volume and nature of the work on civils structures to reflect Network Rail's improving understanding of its asset;

(b) we will ensure that Network Rail takes account of its own risk-ranking process and prioritises structures assets with a high probability of failure and a very significant consequence from that failure (multiple fatalities) in the maintenance and renewal programmes in CP5; and

(c) Network Rail's structures and earthworks policies have been significantly revised for CP5 and we will continue to monitor how well Network Rail manages the sustainability of the assets and their resilience to adverse weather events.

11.44 Abellio in its response supported our approach on the long-term sustainability of the civils structures. They recognised that operational measures to control safety risk had been improved but want to see permanent long-term resilience. No other material consultation responses were received on this issue.

Level crossings

11.45 There are around 6,500 level crossings managed by Network Rail and this accounts for 50% of catastrophic train risk. The safe design, management and operation of level crossings can reduce the risks, have a positive effect on user behaviour and so reduce the number of fatal and serious incidents.

11.46 Network Rail made a commitment in March 2012, following a number of high profile level crossing accidents to reduce the risk of accidents at level crossings by 50% by the end of CP5 through level crossing closures, renewals and upgrades. It is on target to achieve a risk reduction of 26% by the end of CP4. Risk reduction is measured using Network Rail's Level Crossing Risk Indicator Model; the model generates a risk score that can be used to compare risk between level crossings and to monitor changing levels of risk.

11.47 In its SBP, Network Rail proposed to reduce the risk of accidents at level crossings by 8% using the ring-fenced fund made available by the Secretary of State. Projects to achieve the 8% risk reduction included closing 30 high risk level crossings, fitting 200 red light enforcement cameras, and replacing whistle boards with train detection equipment at 300 high risk locations.

11.48 In our draft determination we said Network Rail should use the ring-fenced fund to deliver the maximum risk reduction at level crossings irrespective of geographical location (England, Scotland and Wales) and that the fund should be managed centrally and used across the whole level crossing portfolio.

11.49 The Scottish Ministers in their HLOS provided a ring-fenced fund to facilitate the closure of level crossings to achieve efficiency benefits, although they recognise that there will also be potential safety benefits.

Response to our draft determination

11.50 In its response to the draft determination Network Rail proposed a £120m fund to reduce the risk of accidents at level crossings by 25% in CP5. The £120m[220] is broken down as follows:

(a) £67m ring fenced fund, already provided in the draft determination. Network Rail's response indicates that this is now expected to achieve a 16% risk reduction. This is significantly different from the 8% risk reduction quoted in the SBP. Network Rail says this is because its most recent plans are primarily for

[220] The amounts in the subparagraphs do not sum exactly to £120m due to rounding.

closing crossings. The best benefit to cost ratio comes from closing high risk passive crossings (crossings with fixed warning signs but with no barriers, warning lights or warning sounds);

(b) £10m ring fenced fund already provided in the draft determination for level crossing closure in Scotland;

(c) £32m for level crossings closures (in addition to the £67m in the draft determination); and

(d) £10m to provide new products for routes including red light enforcement and replacing whistle boards with train detection equipment.

11.51 A number of respondents welcomed the ring-fenced level crossing fund; ASLEF and TSSA thought more funding should be made available for risk reduction at level crossings.

Our response / determination

11.52 We have considered all stakeholder consultation responses and conclude:

(a) a level crossing ring-fenced fund of £99m (including the £67m ring-fenced fund in the draft determination) is provided to achieve the maximum reduction in risk of accidents at level crossings. The delivery of the planned projects to deliver this is a regulated output;

(b) arrangements to maximise the sustainable reduction in risk should be set out in Network Rail's delivery plan. These arrangements should include the process for reporting to ORR each year on projects to achieve the maximum risk reduction and actual risk reduction achieved;

(c) the fund should be retained and managed centrally and used across the level crossing portfolio in England, Scotland and Wales;

(d) Network Rail proposes to deliver a 25% reduction in risk at level crossings as soon as possible and in any case by the end of CP5, this follows on from the 25% reduction in risk delivered in CP4. The baseline will be measured using Network Rail's level crossing risk reduction model;

(e) a £10m ring-fenced fund is provided to facilitate level crossing closure in Scotland. This fund will be managed in the same way as other specific funds provided by the Scottish Government, described in chapter 9; and

(f) the risk reduction achieved by using the ring-fenced level crossing fund is in addition to reducing risk so far as is reasonably practicable through, for example, routine risk assessment, the renewals and enhancements programmes, or the introduction of red light enforcement cameras, train detectors to remove the need for whistle boards and cameras to gather data about level crossing use.

Workforce health and safety

11.53 Our recent inspection work continues to show that improvements are required in Network Rail's management of workforce health and safety. Network Rail recognises this is the case and its Transforming Safety and Wellbeing strategy sets out a number of proposals including the development of the right safety leadership and culture.

11.54 In its SBP, Network Rail proposed three separate investment funds to improve the health and safety of the workforce; £100m to develop new technology to warn track workers of approaching trains, £141m for improvements to road-rail vehicles and £230m for taking safer and faster electrical isolations.

11.55 These investments are considered here in our determination because safety improvements were cited as the main reason for the investments. Where we considered the costs of these investments went beyond Network Rail's obligations under the Health and Safety at Work etc. Act 1974, we applied our section 4 duties under the Railways Act 1993 (amended by the Railways Act 2005), to decide on the level of funding.

Track worker safety

11.56 Network Rail proposed an investment fund of £100m in its SBP to develop new technologies to improve protection and warning for track workers.

11.57 Workers are required to work on or near lines where trains are running to carry out inspection and maintenance work. The number of worker fatalities as a result of being hit by a train is at an all-time low; one fatality occurred in 2009 and more recently there was a fatality in 2012. However, there have been some recent incidents when workers have been hit and survived and a number of near misses.

11.58 There are a number of different ways to protect track workers from being hit by trains, including the use of warning systems that give workers enough time to reach a place of safety. Some warning systems are automatic or semi-automatic, but it is still common for track workers to rely on warnings given by people (lookouts) using a flag or horn.

11.59 Our inspection and investigation work in the area of track worker safety has found examples of poor planning and improper risk assessment by Network Rail managers and poor communications, behaviours and hazard perception by those carrying out the work. We have used formal enforcement action to secure improvements in the design and operation of the current warning systems.

11.60 We asked Network Rail to address the main risks associated with working on the track in its SBP and Network Rail has set out how it intends to do this in its Transforming Safety and Wellbeing strategy.

11.61 We fully support and have been pressing for improvements in track worker safety; where work on or near the line is necessary then track workers should have the

highest levels of protection, so far as is reasonably practicable. However, our determination does not provide the £100m as Network Rail proposed because it has not made a compelling case. Instead our determination includes a ring-fenced fund of £10m for the development of new technologies to alert track workers in recognition of the significant benefits to both safety and efficiency that can be obtained from the introduction of such technology. This should be managed as a central fund to ensure that development work is focused and efficient. We will agree the governance arrangements for this fund with Network Rail as part of its delivery plan (which will be published by the end of March 2014).

11.62 Network Rail has committed to improving track worker safety in CP5 and we will monitor the implementation of its Transforming Safety and Wellbeing strategy. We also expect to see improvements to worker safety through the increasing use of technology and the requirement for fewer people to work on or near the line.

11.63 No material consultation comments were raised in relation to this issue.

Road-rail vehicles

11.64 Network Rail proposed an investment of £141m to improve the safety and efficiency of road-rail vehicles.

11.65 Road-rail vehicles are used extensively in maintenance, renewal and construction work, for lifting and moving materials and equipment. Most of these vehicles are converted for the railway from construction machines by attaching rail wheels and many of these machines are used for tasks for which they were not originally designed. For example excavators are converted to lifting machines.

11.66 The road-rail excavator fleet has a particularly poor safety record; workers have been seriously injured or killed when machines have overturned because of their high centre of gravity or machines have run away because of poor braking. These machines have also come into contact with overhead line equipment and have the potential to foul adjacent lines when trains are running. Investigation of accidents and our inspection work has found an underlying pattern of poor machine design and poor risk control. We have served over 20 enforcement notices on road-rail vehicles in CP4 and the industry has responded by making piecemeal improvements with layers of safety features and warning devices being fitted retrospectively.

11.67 In its SBP, Network Rail proposed a specific investment of £141m to improve the safety and productivity of five types of road-rail vehicle:

(a) mobile elevated working platforms;

(b) modular lorries;

(c) Iveco Daily 4x4s;

(d) Mitsubishi Canters; and

(e) excavators with lifting capacity (Liftex machines)

11.68 For the machines listed (a) to (d) above, Network Rail proposed an investment of £70m for a new fleet of vehicles with an improved specification and configuration and to allow life-expired vehicles to be replaced. These machines are conventional machines and commercially available and are converted to perform with road and rail capability.

11.69 Network Rail proposed a fund of £71m to procure a specifically designed and manufactured fleet of machines to replace the current excavator machine (type (e) above).

11.70 Independent reporters reviewed the proposals, but their report was not available at the time of the draft determination and so we included the full investment amount (£141m) at that stage.

11.71 The reporters concluded that there was a case for investment for the replacement of mobile elevated working platforms, modular lorries, Iveco Daily 4x4s and Mitsubishi Canters (types (a) to (d) above). We considered the costs of these investments went beyond Network Rail's obligations under the Health and Safety at Work etc. Act 1974, so we applied our section 4 duties under the Railways Act 1993. We applied efficiency in our model, but at similar levels to those forecast by Network Rail and we assessed the post-efficient expenditure required for road-rail vehicles (a) to (d) above as £70m. The reporters' report can be found on our website[221].

11.72 The reporters found that the design for the new 'Liftex' machine (type (e) above) was insufficiently developed to demonstrate its technical feasibility to meet the necessary safety and productivity challenges. They found there was clear potential for productivity and safety improvements and thought further development was worthwhile.

Our determination

11.73 This determination provides:

(a) £70m for the replacement of mobile elevated working platforms, modular lorries, Iveco Daily 4x4s and Mitsubishi Canters; and

(b) £10m as a ring-fenced fund to develop a replacement machine for the current excavators in recognition of the benefits this could unlock. The fund should be managed centrally to ensure that the design developed meets all safety requirements. We will agree the governance arrangements for this fund with Network Rail before April 2014 through its delivery plan.

11.74 No material consultation comments were raised in relation to this issue.

[221] http://www.rail-reg.gov.uk/pr13/publications/consultants-reports.php.

Taking safer and faster isolations

11.75 The current methods for taking isolations on both the DC and AC electrical networks have not changed for many years. There is heavy reliance on procedures to control the risks of electrocution and electric shock, rather than by using safely designed equipment that allows isolations to be taken remotely. One worker has been killed or seriously injured almost every year since 1998 working on or near Network Rail's power systems.

11.76 Our investigations find confused isolation arrangements, poor understanding of what equipment is live and a lack of clarity about when isolations are required. Current electrical standards on the railway lag behind other UK industries and we have taken recent enforcement action to ensure compliance with the specific requirements of the Electricity at Work Regulations 1989. We have required Network Rail to review its isolation processes particularly at the design and build stage and some progress has been made.

11.77 In its SBP, Network Rail proposed an investment fund of £230m for taking safer and faster isolations in CP5. This proposal included: £127m for DC isolations in key locations in Wessex, Sussex and Kent (£100m of which is in CP5); £79m for improvements to the AC network in England & Wales; £11m for improvements to the AC network in Scotland; and £40m for further unspecified DC improvements. Network Rail has cited safety improvements as the main reason for the investments.

Our determination

11.78 Our analysis found that Network Rail:

(a) has made a positive case for an investment of £190m, for taking safer and faster isolations on the AC network (£90m) and DC network (£100m);

(b) did not provide a sufficient case for the investment of £40m on the DC network; and

(c) £27m of the £230m was for work in CP6 and was not considered.

11.79 We considered the costs of these investments went beyond Network Rail's obligations under the Health and Safety at Work etc. Act 1974 and so we applied our section 4 duties under the Railways Act 1993. We have applied the efficiency assumption for electrical power and fixed plant renewals to the £190m investment and we assess the efficient expenditure at £163m. We will monitor the use of this fund in enhancement work to ensure that it delivers the required safety improvements.

11.80 No material consultation comments were raised in relation to this issue.

Occupational health

11.81 Poor management of occupational health issues has a detrimental effect on the individuals who suffer ill-health and it creates inefficiencies and costs within organisations.

11.82 Our recent inspection work found that Network Rail has no suitable coordinated approach to health management, particularly at route level. We found poor risk assessments and a lack of appropriate basic controls on site. Network Rail acknowledges that historically occupational health issues have not been managed systematically. However, it has now produced its employee health and wellbeing vision and strategy and a six-point action plan to start to deliver this strategy in CP5.

11.83 Network Rail suggested that it could self-finance its occupational health programme in CP5, i.e. that spend on occupational health would be covered by corresponding productivity improvements and hence efficiency savings.

11.84 At the time of the draft determination, we had limited information from Network Rail on the costs associated with ill-health. We carried out some research, literature reviews and case studies and attempted to quantify the costs of inefficiency in occupational health. We considered what good practice looks like, what processes support good practice and their associated costs and estimated likely efficiency savings.

11.85 In our model to quantify the costs, we used three key variables: headcount, absence levels and cost of absence. In the draft determination we applied a conservative increase to our overall efficiency estimates of approximately 0.07% per annum across Network Rail's support, operations, and maintenance, renewals and enhancements costs to reflect the savings which could be achieved through improvements in occupational health. This amounted to approximately £20m of savings in the final year of CP5.

Response to our draft determination

11.86 In its response to our draft determination, Network Rail provided some new information. It indicated that staff absence levels had reduced significantly in CP4 and were now consistent with comparable industries. Network Rail used an alternative bottom-up modelling approach, to calculate potential savings and assumed a 5% improvement in absence rates over CP5. Network Rail's own analysis suggested it could achieve a net saving of £5m over the whole of CP5.

11.87 TSSA welcomed our focus on occupational health but questioned why the upfront costs of implementing a better regime had not been factored into our assessment.

Our response

11.88 We have now reviewed the approach and assumptions that we used in our draft determination and we have also considered the analysis that Network Rail included in its draft determination response.

11.89 Estimates of the cost of ill health are highly dependent on the methodology and assumptions used. We do not consider there to be a single approach to modelling efficiencies in this area and we think that Network Rail's approach is a suitable alternative to our own. However, we consider that Network Rail's assumptions are too conservative, particularly its assumption on the average cost of absence per

employee (Network Rail assumed this was £254, whereas we consider a value of £750 is more appropriate as it is closer to the value used by the Confederation of British Industry (CBI)). Also, Network Rail's analysis considered savings within CP5, rather than savings compared to its position at the end of CP4.

11.90 We have now updated our analysis with the latest information we have for our key assumptions (headcount, absence levels and cost of absence per employee). We have also considered the cost estimates from using Network Rail's preferred approach but reflecting our own key assumptions. This updated analysis provided estimates that were broadly consistent with our draft determination efficiency assumptions, i.e. that Network Rail could reduce its annual cost of ill health by £20m by the last year of CP5.

11.91 Part of the challenge facing Network Rail in improving its occupational health performance is to induce a culture change within the organisation to encourage engagement in its employee health and wellbeing strategy. Given that this change is not likely to drive significant cost increases, we did not specifically include any costs of implementing Network Rail's occupational health programme in our draft determination efficiency assumptions.

11.92 The magnitude of any further costs associated with improving performance are uncertain but experience elsewhere shows that these are typically small i.e. that the return on investment is high. We understand that Network Rail intends to provide some additional resources, e.g. to recruit a chief medical officer, and deliver procedural changes to support improvements in this area but we have received limited information of the associated costs.

11.93 Additionally, any capital expenditure required to implement Network Rail's strategy, e.g. improvements to its information management systems, could be funded through the spend-to-save mechanism[222]. Furthermore, not making any cost adjustments seemed appropriate because our efficiency assumption was already conservative.

Our determination

11.94 Given that our draft determination assumptions were conservative, and that our latest analysis is broadly consistent with our original analysis, we have decided to retain our annual CP5 efficiency assumption of 0.07% from our draft determination. Therefore, in calculating Network Rail's revenue requirement for CP5, we have assumed that the company can reduce its annual cost of ill health by around £20m by the end of CP5, through the better management of occupational health and wellness.

11.95 Although we have calculated our efficiency estimates using absence figures, we recognise that there are limitations with using absence-related metrics, e.g. these

[222] The spend-to-save mechanism is discussed further in our financial framework chapter (chapter 12).

figures can be under-reported. Therefore, we will be encouraging Network Rail to implement a broad range of improvements to achieve efficiencies in this area.

11.96 Given the number of different approaches that can be used to assess the costs of ill health, we have already started to discuss with Network Rail how we can improve our approach in this area. We will continue this dialogue in CP5.

Suicides on the railway

11.97 A number of respondents to the draft determination raised the issue of suicides on the railway. The number of suicides varies annually but the numbers have increased since 2002 and in 2012-13 there were 238 suicides on the railway. The determination has not provided specific funding for this issue, because Network Rail must do all that is reasonably practicable to address this risk through the overall settlement. Network Rail has shown leadership on this issue in the industry and through its work with the Samaritans. In CP5 we will continue to support Network Rail in its work to engage with train operators on this issue.

Network Rail's long-term strategies for safety, health and wellbeing

11.98 For the first time Network Rail has set out a strategic direction for safety in its Transforming Safety & Wellbeing document, with the intention by 2019, of 'eliminating all fatalities and major injuries and reducing train accident risk by 50%, and a longer term vision of 'everyone goes home safe every day'. The strategy document was published in November 2012 and covers the two control periods up to 2024.

11.99 In our assessment, the strategy addresses the known health and safety risks and behavioural issues, but plans to deliver the strategy are still being developed or are in the early stages of implementation. We will discuss with Network Rail the processes it intends to use to measure, audit and review the effectiveness and success of its new strategy.

11.100 Network Rail has recently produced its long-term strategy for its management of employee health and wellbeing. The strategy covers two control periods up to 2024. Network Rail has produced a six point action plan to deliver improvements in CP5. In our assessment the strategy addresses the right issues; we will monitor its implementation in CP5.

Indicators and enablers

11.101 We will continue to assess Network Rail's health and safety management performance in CP5, through our inspection and audit work and we will continue to use our railway management maturity model to assess Network Rail's health and safety management capability.

11.102 We will continue to monitor Network Rail's health and safety performance by tracking the full range of information and data provided by Network Rail and the wider rail industry, including RSSB. In particular, we will monitor:

(a) Network Rail's implementation and delivery of its long-term strategies for health and safety;

(b) the current PIM or any revision of it (RSSB is in the process of preparing a PIM to reflect risk from Network Rail's activities); and

(c) that Network Rail achieves European Common Safety Targets as required by the HLOS.

11.103 Where we have any concerns about Network Rail's health and safety performance and compliance with the law we will continue to use our regulatory tools and legal powers in accordance with our health and safety enforcement policy.