Network Rail Monitor

Quarters 3-4 of Year 3 of CP5 16 October 2016 to 31 March 2017

20 July 2017

Contents

1. Overview

Health and safety

1.1 Network Rail has delivered good safety management in 2016-17, in some cases reaching a higher level than predicted at the start of Control Period 5 (CP5). There were no passenger fatalities on infrastructure or stations managed by Network Rail during the year, but sadly 2016-17 saw one contractor fatality arising from a road traffic accident. The workforce Lost time Injury Frequency Rate (LTIFR) reduced over the year in line with Network Rail's target. The number of RIDDOR specified injuries was 90 compared to 72 in 2015-16.

1.2 However, Network Rail's rate of improvement has slowed and we need to see that the company has the building blocks in place to continue to deliver improved safety performance in the future. There has been no further improvement in Network Rail's management maturity as measured by the RM3 maturity model. We have seen a plateauing in performance indicators on asset condition (for example on track geometry) and in the course of our inspections, we continued to find instances where Network Rail staff did not comply with the company's rules, procedures and engineering standards. We also noted Network Rail's lack of progress with the implementation and integration into the business of important systemic changes such as *Business Critical Rules, Role Based Competency*, *Risk Based Maintenance*, and the *Linear Asset Decision Support tool.*

1.3 In some areas, our inspections have shown that Network Rail may be relying on risk control processes heavily dependent on the knowledge, competence and expertise of individual staff. This increases the vulnerability of those controls. There were two significant incidents in 2016-17 where it was only human intervention - the last line of defence - that prevented a very serious outcome. These were the Grove Nook Lane (Barrow on Soar) bridge collapse in August 2016 and the Hunton Bridge Tunnel (Watford) cutting failure in September. Network Rail must continue to push for further improvements, particularly in assurance activities, to promote more reliable and sustainable control of risk.

1.4 The asset safety lagging indicators, for example track geometry and rail breaks, are currently favourable. But some assets are vulnerable, especially earthworks and structures and associated drainage. Our inspections and reviews suggest that deferral of renewals work is increasing pressure on maintenance and inspection functions, placing further demand on a safety control system which is heavily reliant on human intervention.

1.5 The rate of level crossing closures has slowed. Network Rail has stated that it would aim to achieve a 25% risk reduction using the £99m ring-fenced fund. However, we recognise the challenges the company faces given the complexities associated with the remaining level crossings. There were six fatal accidents on level crossings during 2016-17[1]. Network Rail must continue to work at reducing risk at these sites for example through more effective implementation of new technology.

Train service performance

Passenger

1.6 In England and Wales, punctuality as measured by the Public Performance Measure (PPM) moving annual average (MAA) ended the year at 87.4% compared with Network Rail's internal target of 89.9% and the regulated target of 92.3%. This is down on 2015-16 when 88.9% was achieved. Performance in 2016-17 has been adversely affected by industrial action impacting train operators, particularly Southern. There were some areas of strong performance, particularly Virgin Trains West Coast and TfL Rail and we found no evidence of underlying or national system-wide issues. However, we remain concerned about Network Rail's delivery to Virgin Trains East Coast, Southeastern, Govia Thameslink Railway (GTR) and South West Trains where we have stepped up our monitoring.

1.7 Southeastern is the only operator that missed its performance strategy targets where the proportion of Network Rail-caused delay increased substantially throughout 2016-17. We therefore investigated Network Rail's delivery of performance for this operator. We found evidence that Network Rail's South East route had a sustained focus on getting the basics right, from annual planning through to day-to-day operations, and that it was doing everything reasonably practicable to get back to its targets.

1.8 An important factor affecting performance in this route has been engineering work to deliver the Thameslink programme. In 2016 new equipment around London Bridge failed soon after it had been brought into use, causing significant delay. While the responsibility for delivering the programme and maintaining the operational railway are with different parts of Network Rail, we found evidence that the relationship between the two has matured over time and they are now working closely together. However, this incident was a timely reminder of the need to consider maintenance plans early on when delivering major engineering work. This is particularly important on aging infrastructure where more trains are running and where normal contingency options are unavailable as any asset failure will cause significant knock on delays. The detailed report is published alongside this monitor.

[1] This may change as a result of coroners' inquests

1.9 Cancellations and Significant Lateness (CaSL) ended the year at 4.0%, 1.1 percentage points (pp) above (i.e. worse than) the internal target and 1.8 pp above the regulatory target. This is also worse than 2015-16 when 3.1% was achieved.

Freight

1.10 Network Rail's performance for the freight sector was relatively strong. The Freight Delivery Metric (FDM) MAA at the end of the year stood at 94.4%, well ahead of the national regulatory target of 92.5%.

Asset management

1.11 Network Rail has seen the overall reliability of assets improve slightly over the course of year. The Composite Reliability Index (CRI), which measures asset reliability across the network compared to the end of CP4, improved reaching +15.8%, compared to +14.8% at the end of 2015-16. But the underlying picture varies across different types of assets. Larger improvements in track reliability (+13.9%, up from +10.4%) and telecoms (+3.4%, up from -23.5%) were offset by falls in earthworks (-31.4%, down from -17.6%) and operational property (+28.5%, down from +33.6%).

1.12 On asset renewals carried out this year, Network Rail significantly exceeded its planned volumes for the year for civils (underbridges 13% and earthworks 93% above plan respectively) and electrification and power (overhead line 24% and third rail +3% below plan).

1.13 There was however, a 12% shortfall in plain line track works due to a fall in high output productivity, and a smaller shortfall in signalling works (6%). £800m worth of work has been deferred, which will have longer-term implications for network sustainability. Network Rail has not delivered the regulated outputs for the new Civils Asset Management System (CSAMS) and decommissioning of GEOGIS.

Developing the network

1.14 Network Rail completed 27 out of 41 Enhancement Delivery Plan (EDP) milestones due to be completed in 2016-17. Four milestones were revised including the Intercity Express Programme (IEP) test track on the Western Route. Of the 10 milestones missed, two were significant – Edinburgh to Glasgow Improvements Programme (EGIP) Key Output 1 (infrastructure open for use) and Gospel Oak to Barking electrification (entry into service for testing and driver training).

1.15 We are currently reviewing the *Great Western Electrification Programme.* We have some concerns about the level of risk associated with the deliverability of the December 2017 Entry into Service milestones contained in the EDP.

1.16 We are still concerned about Network Rail's overall capability to plan and deliver enhancements. The company has been unable to provide evidence that benefits have been delivered through the *Enhancements Improvement Programme (EIP)* as required under our Notice of October 2015 link. Progress against delivery milestones in the plan itself has been good, but we have yet to see evidence that new ways of working have been rolled out effectively across the business and are delivering the expected capability improvements. The business change approach for this programme does not appear to be in line with other examples of best practice around Network Rail. We will continue to monitor this closely to confirm that the required improvement from the baseline position in 2015 has been achieved.

1.17 This year was the first year of operation of the Memorandum of Understanding between the Department for Transport (DfT) and Network Rail. This has driven an increasingly collaborative approach to governance and portfolio management.

Expenditure and finance

1.18 In 2016-17, Network Rail underspent its net budget of £5,377m by £499m. However, work to the value of £992m was not done and will be delivered at a later date. This includes £800m of renewals work, £163m of enhancements work and £29m of schedule 4 compensation payments for track possessions.

1.19 Taking this into account, for the work delivered, Network Rail underperformed against its own budget by £335m on renewals (adjusted to £84m in line with the RAB sharing mechanism)[2] and £140m on enhancements (adjusted to £28m in line with the RAB sharing mechanism)[3]. Network Rail's efficiency in 2016-17 for the core business was -5.0% for the control period to date.

1.20 The gross renewals underperformance of £335m was largely due to less track work (£132m) being delivered by the high output plant than planned. This led to additional contractor claims and reduced volumes and higher cost of work actually delivered. Other factors were:

- the impact of additional scope and emergency work on civils as well as higher unit rates (£114m); and
- signalling issues including project delays (£38m).

Network Rail has also not delivered its planned efficiency initiatives.

[2] Network Rail generally retains 25% of any out/underperformance of the renewals and enhancement costs. This is consistent with our RAB roll forward policy.

[3] The interpretation of this variance now reflects the recommendations of the Hendy Report (November 2015) and the subsequent Enhancement Delivery Plan (EDP), which changed the baseline of the calculation of financial performance reflecting the increased anticipated final costs (AFC) for many enhancement projects.

1.21 Enhancements underperformance was largely due to increased contract costs, supply chain constraints and access issues on Northern Hub (£80m), EGIP (£38m), East West Rail (£35m) and on the three projects electrifying the Shotts, Rutherglen-Coatbridge and Stirling-Alloa lines ('collectively known as the *Rolling Programme of Electrification)* in Scotland (£15m).

1.22 An underperformance against budget of £76m on schedule 8 compensation payments reflects delays due to asset failures. It also reflects various infrastructure incidents such as flooding, landslips and fires. Examples are severe flooding in London in June 2016 (£10m), Storm Doris (£10m) and a landslip at Watford (£5m).

1.23 There is also an underperformance against budget of £65m in maintenance. This is due to lower than planned efficiencies; higher costs of civils and building inspections because of restricted access to sites; additional investment in the implementation of performance improvement programmes; and increased levels of maintenance needed because of the delay in renewals projects.

1.24 An outperformance in support costs (£36m) is primarily due to a favourable reassessment of insurance liabilities to reflect a reduced level of expected claims.

1.25 Following the company's classification to the public sector by the Office of National Statistics (ONS), Network Rail agreed to borrow from DfT instead of issuing bonds. The amount of new borrowing available from DfT is limited to £30.9bn across CP5 for Great Britain, after this was increased by £0.7bn following the Hendy Review.

1.26 Compared to its forecast at the start of CP5, Network Rail has spent more than it expected on the renewals and enhancements work it delivered in 2014-15, 2015-16 and 2016-17. It is forecasting to spend more on work to be delivered during the last two years of CP5, 2017-18 and 2018-19 as well. This means there is pressure on its borrowing facility with DfT.

1.27 Network Rail's latest business plan for Great Britain includes financial headroom of £0.3bn during the remaining two years of CP5, i.e. it thinks it will not need to use £0.3bn of the borrowing facility.

1.28 In our November monitor we noted the financial risks the company faces. These risks remain and include: given its recent performance, the company may not deliver its current planned efficiencies; movements in interest rates; inflation; and the amount of money it needs to set aside for funding the cost of its financial instruments[4]. In addition, asset disposal proceeds are uncertain and they are likely to be lower than originally forecast. This is putting more pressure on Network Rail's

[4] Prior to reclassification, Network Rail borrowed directly from the financial markets. To reduce its exposure to interest rate, currency and inflation fluctuations, Network Rail took out a range of financial instruments. Many of these require Network Rail to set money aside in the form of collateral, and this amount varies as markets move.

financial position. Network Rail needs to develop its contingency plans further to address these pressures.

1.29 In case some of these income and cost pressures materialise, Network Rail has plans to generate additional savings of £0.3bn in England & Wales, but they are not guaranteed. Network Rail has received additional grant funding of £0.3bn from DfT in 2017-18.

1.30 Network Rail has provided us with some high-level information on how it would deal with further pressures, but we are concerned that the company does not have a formal route-based plan in place for England & Wales to deal with these pressures, although it does have one for Scotland. We will therefore continue to engage with Network Rail on this issue and will monitor closely its plan to deliver its efficiency savings in Great Britain.

1.31 We are making changes to the way we monitor Network Rail's efficiency for CP5 and we will report on this in the next monitor. As part of our work on PR18 we are consulting on the reasons why Network Rail has not delivered renewals efficiency improvements in CP5, and how ORR should change its approach to assessing Network Rail's plans for CP6. In addition we have commissioned an independent reporter study into the progress that Network Rail is making in developing these CP6 plans, to help provide greater assurance that its final plans will contain robust efficiency proposals across all areas of expenditure.

Reporting on Network Rail's performance in CP6

1.32 Later this month, as part of PR18, we will be publishing our consultation on the overall framework for regulating Network Rail in Control Period 6 (CP6). As part of this, we want to consider our approach to reporting on all aspects of Network Rail's performance in CP6 – including through the Network Rail Monitors. An important objective will be to make the Monitors more useful to stakeholders and a key element will be a move towards more detailed reporting at route level in line with Network Rail's devolution agenda. We will therefore develop and implement, ahead of April 2019, a reporting approach that accurately and fairly reports route comparisons. We expect to consult stakeholders as part of that process.

2. Health and Safety

2.1 The railway is a system and we focus on health and safety issues across the whole of that system. This section of the monitor reports on:

- Network Rail's performance against key health and safety indicators;
- the findings from our inspections and investigations of Network Rail; and
- other key issues.

Some of the issues we report on here are linked to other sections, particularly section 4, Asset Management.

Performance against key indicators

2.2 During 2016-17, there were no passenger fatalities on infrastructure or stations managed by Network Rail. However, there were three passenger fatalities at the following stations which are managed by train operating companies:

- at Hither Green station, on 1 April 2016, a passenger slipped off the edge of a platform and was struck by a train;
- at Horley station, on 22 October 2016, a passenger attempted to cross the tracks between platforms and was struck by a train; and
- at Barnt Green station, on 9 February 2017, two passengers crossed the tracks between platforms, one of whom was struck and fatally injured by a train.

2.3 The year saw one contractor fatality arising from a road traffic accident on the A267 at Little London, East Sussex on 5 June 2016. Last year's notable achievement of zero industry-caused workforce or public fatalities has not therefore been repeated this year. Unconfirmed data show that during 2016-17 there were six level crossing fatalities compared to four in 2015-16.

2.4 Network Rail met two of its high-level safety objectives for the year. It outperformed its target for close calls reported, recording 205,555 against a target of 120,000. At the end of 2016-17 it had achieved a 7% reduction in all public fatalities. Suicides were also down by 7%. Although level crossing fatalities increased, there was a reduction in other accidental fatalities bringing the combined total down by 5%.

2.5 The following targets were missed:

- on workforce safety, the Lost time Injury Frequency Rate (LTIFR) ended the year at 0.449. A reduction in the number of lost time injuries was offset by an increase in RIDDOR-specified injuries, 90 compared to 72 in 2015-16.

(Although narrowly missing its target of 0.447, this was Network Rail's best ever LTIFR);

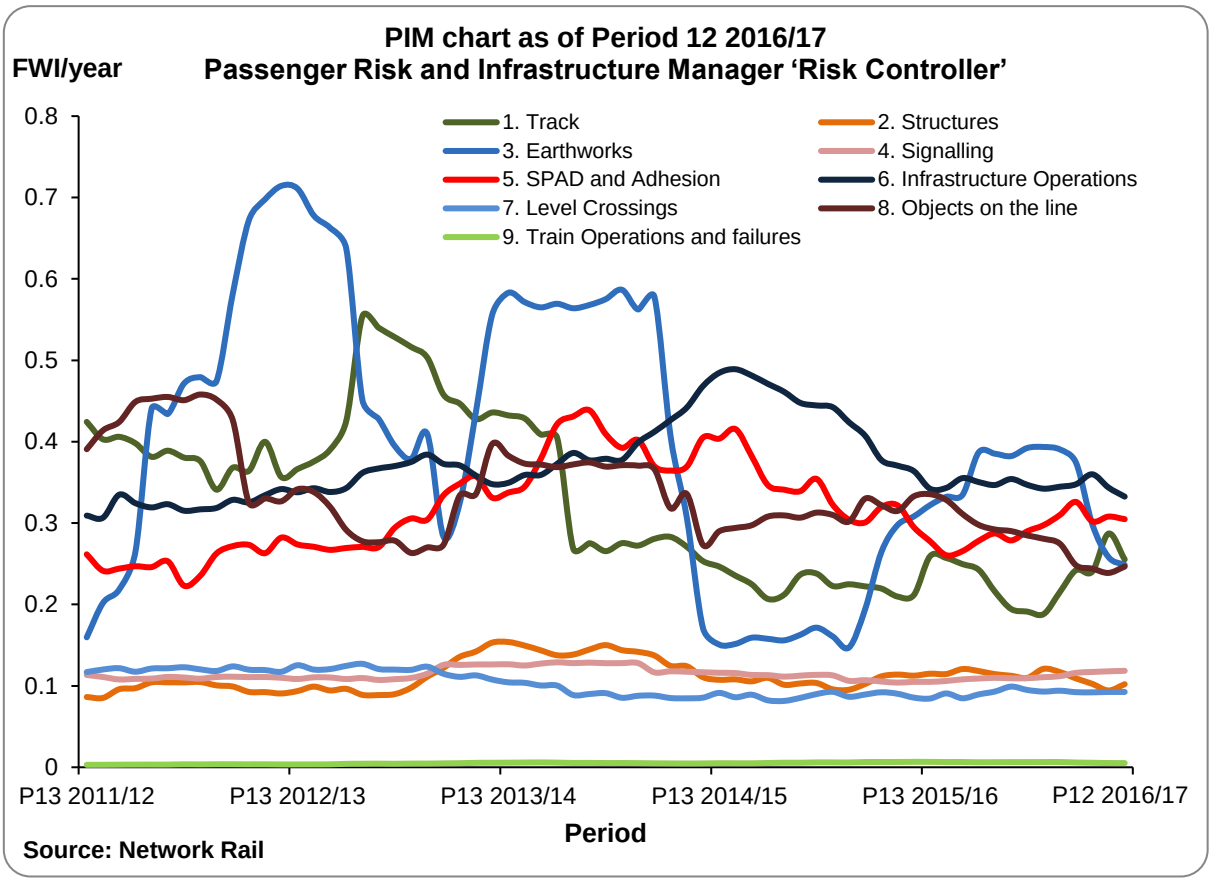
- at the end of the year, 76.3% of close calls had been closed out within 90 days against Network Rail's target of 80%. Scotland had the most significant shortfall, recording 66%;

- Train Accident Risk Reduction (a composite metric picking up various programme milestones and volumes) was not met. At the end of the year, it stood at 78.7% against a target of 80%. Parts of the programme were significantly more successful than others and we highlight some of these in later sections;

- in relation to level crossings, Network Rail achieved a cumulative risk reduction of 18.1% (from CP4 exit baseline). It missed its national target of 20% and four out of ten of its *Level Crossing Risk Reduction Programme* milestones. However, it should be noted that the targets are internal ones, not ORR-imposed. Furthermore, this level of risk reduction has been achieved despite the absence of anticipated law reform that would make level crossing closure a smoother process; and

- there has been a 34% increase in the number of road traffic accidents involving Network Rail staff or contractors on duty compared to 2015-16 (up from 131 to 176). This is despite a 27% decrease in the number of road traffic offences. Network Rail is undertaking a review of the *Lifesaving Rules* involving driving incidents to ensure all routes and functions are investigating incidents appropriately. We will await the conclusion of that work before deciding if we need to do more to understand trends.

2.6 Last year we reported that many safety performance measures and precursor indicators were at historically 'best ever' levels. 2016-17 has seen a levelling out of those trends. Previously improving trajectories have 'plateaued' and in some cases, we have seen reversals. Within the Train Accident Precursors Indicator Model (PIM), for example, Infrastructure Operations and Level Crossings were marginally worse than target. Even where the overall risk reduction trajectory is being met, there are some sub-sets of data where performance has worsened. Track figures, for example, are within target overall but there is a reported 54% increase in the Twist and Geometry Faults sub-group over the past year (see the upturn in the Track element of the following PIM chart).



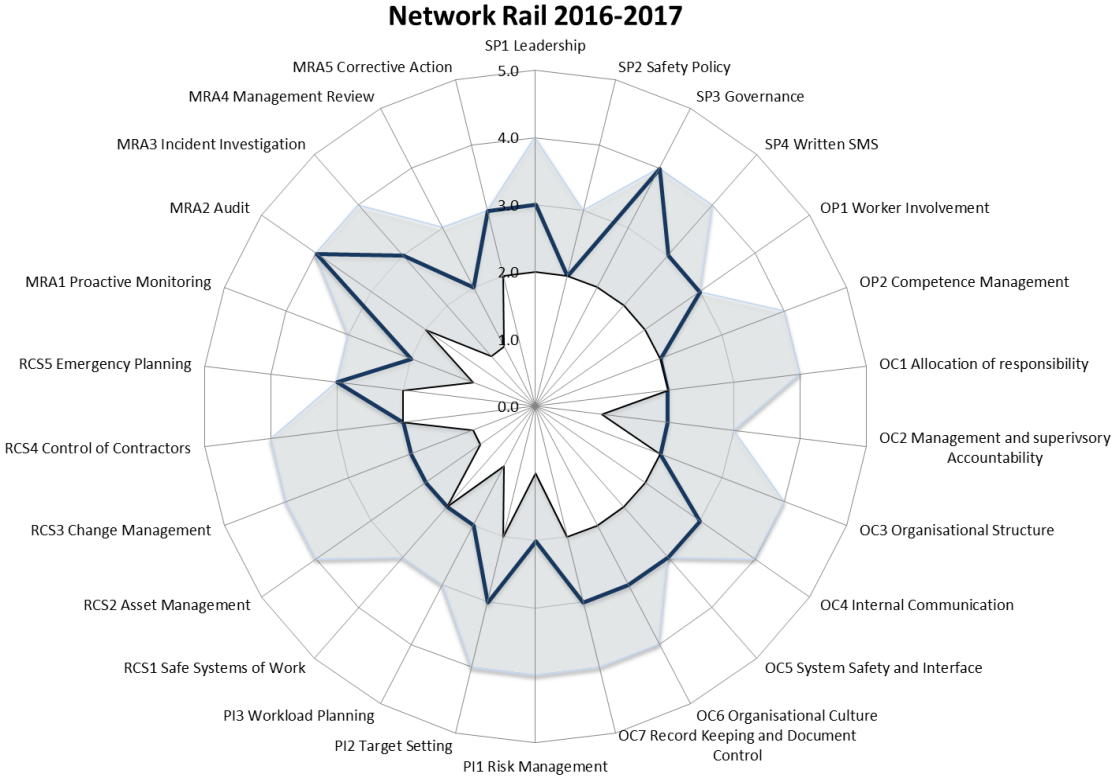
Risk Management Maturity Model RM3

2.7 We use the outputs from our inspections and investigations to inform our judgements about how mature Network Rail's management systems are. We do this in a structured way by using the RM3 criteria to highlight strengths and weaknesses in Network Rail's *Safety Management System (SMS)*.

2.8 The results for 2016-17 are shown in the chart below. The bold blue line indicates the final rating. This shows that the majority of ratings are at levels two and three – 'managed' and 'standardised'. Two elements achieved level four, 'predictable' – Audit and Governance. This is the same as for 2015-16, and, overall, there is very little difference between the two years. The chart for 2015-16 can be found in the Network Rail Monitor for Q3-4 for 2015-16 at link.

2.9 This is the fifth year we have used RM3 to evaluate Network Rail's management maturity. Whilst there have been some fluctuations over the years (nine criteria have improved; four have worsened) there has been no substantive change; nine categories have remained unchanged, rated at 'managed' and four at 'standardised'.

2.10 The light blue shaded area on the chart below describes the range of ratings for every criterion. Our final evaluation is determined by where the balance of the evidence lies, but as the chart shows, there is considerable variation in many of the SMS elements. We have seen this every year that we have carried out the RM3 assessment. It indicates inconsistency in the application of Network Rail's SMS across its network.



2.11 We prepare a detailed report each year for Network Rail describing our RM3 findings and sharing the evidence on which we base our judgements. This is the start of our conversation about how safety management can be improved. For 2016-17, we pointed to repeated instances of failure to implement process effectively. These included both well-established procedures (such as identifying and acting on track geometry faults within prescribed timescales or documenting interim mitigation for asset deferrals) and newer processes (such as introducing Plain Line Pattern Recognition (PLPR) or the Linear Asset Decision Support tool). We have seen some initiatives that have flowed from improved safety leadership falter and fall short of their full potential; these include *Business Critical Rules, Role Based Competence* and *Planning and Delivering Safe Work (PDSW)*[5].

[5] We note however, that progress with PDSW has been made, with the formal launch of the revised Standard 019 on 3 July 2017.

2.12 Our detailed RM3 report to Network Rail describes how we have seen a clear commitment to making improvements in health and safety management. However that same report identifies repeated evidence that delivery of these commitments is constrained by:

- changes of personnel in leadership roles;
- deferral of renewals and reduced volumes of other work e.g. drainage improvement work, and delays to other safety-related projects such as *Business Critical Rules* etc; and
- an increasing emphasis on reactive activities and a consequential loss of focus on medium to longer-term improvement programmes.

2.13 The lack of growth in Network Rail's management maturity, along with a slowing of positive trends in performance indicators, suggests that Network Rail's improved safety management record of recent years may be vulnerable. The company needs to focus on improvements, particularly in assurance activities, in order to promote more reliable and sustainable control of risk.

Track

2.14 Trends in performance indicators show a mixed and sometimes complex picture for 2016-17. Track geometry and fault measures all still show an improvement compared to CP4 exit, but for some the rate of improvement has slowed or even begun to reverse.

2.15 Repeat twist faults, although still better than CP4 exit levels, have deteriorated over the last year. It is a complex picture. Most routes show improving trends in new twist faults, and some of the 'repeats' may be a reporting anomaly. We are pressing Network Rail to establish the real level of repeat incidence and, thus, risk. We have escalated our concerns about management of repeat track geometry faults and are requiring the company to demonstrate plans to improve both nationally and on individual routes.

2.16 Our inspections in 2016-17 showed:

- there is a clear and systematic process for measuring and monitoring track geometry, although robustness of delivery could be improved – especially management of the output of Track Recording Vehicles;
- in respect of assurance, follow-up and escalated track geometry management concerns, we have more productive engagement with staff in the central technical authority part of Network Rail. Engagement with the routes has been more challenging and it is harder to secure route-level plans;

- despite the commitment of staff in the Safety, Technical and Engineering Directorate, information is often delayed and/or partial. Some individuals in engineering and safety roles with whom we deal appear over-stretched and this is reflected in the slow responses to many RAIB recommendations. In many cases we are aware that substantial work has been done in response to incidents, but Network Rail struggles to report it in a timely fashion;

- Network Rail has made good progress with the fitment of tubular stretcher bars, achieving 1,948 point ends against a target of 1,850. However, there are indications that the post-Grayrigg improvements made to Switches and Crossings (S&C) asset data in Ellipse have been eroded as many Maintenance Delivery Units (MDUs) have, during the course of delivering stretcher bar fitment, found that the data in Ellipse is no longer accurate;

- delays were experienced in the implementation of Plain Line Pattern Recognition and Eddy Current Testing for rolling contact fatigue;

- the rollout of *Business Critical Rules* has been limited and future implementation plans seem to lack drive. We have seen this initiative repeatedly reduced in scope and ambition and its delivery timescales extended. Its first attempted implementation was not sufficiently well-supported to be successful, a setback from which the initiative has not fully recovered. To be effective, it requires reprioritisation and resourcing.

- *role-based competence* has fallen behind schedule. Without its full deployment Network Rail will continue to struggle to demonstrate that its competence management system (especially for Track Maintenance Engineers) is as effective as it should be; and

- inspections of deferred track renewals across all routes showed that there was no demonstrably consistent means to manage the impact of deferrals. There was no evidence of immediate safety risk, but it was not always clear that the effects of deferral had been assessed fully, or that appropriate interim mitigations had been identified and implemented. We have made a number of recommendations to improve the rigour and transparency of processes to manage deferrals.

Civils and Drainage

2.17 Monitoring the effectiveness of Network Rail's management of civil assets such as structures and earthworks is a high priority for ORR. This is because of the age of these assets and their susceptibility to rapid deterioration in adverse weather. In addition, signs of imminent failure are often hard or impossible to detect by visual

inspection. Finally, much of the work that Network Rail had planned to carry out over the next two control periods has been deferred because of funding constraints.

2.18 The criticality of these assets is underlined by their inclusion in many of the elements of Network Rail's *Train Accident Risk Reduction Programme*. The company did not deliver all the planned aspects of the programme during the year. There was, for example, a significant delay in the achievement of the *Civils Strategic Asset Management Solution (CSAMS)* with a knock-on effect on several other initiatives for civil and drainage assets which rely on the improved quality and ease of use of asset data CSAMS will bring.

2.19 The planned work on risk reduction measures for sites at high risk of damage from water scour in extreme rainfall events was completed. However, the planned volumes of drainage improvement work were not achieved in a majority of routes. Network Rail's professional Head of Drainage had identified these targets as delivering train accident risk reduction.

2.20 PIM figures for both structures and earthworks are on a downward trajectory – reflecting fewer incidents. This may be attributable in large part to relatively benign weather. However, a number of incidents (such as the collapse of a bridge onto open railway lines at Barrow on Soar in August 2016 and the derailment and subsequent train collision due to a landslip at Watford in September 2016) provided an illustration of the potential for catastrophic consequences and the vulnerability of some of the controls and mitigations. Network Rail needs to maintain its focus on the management of risks associated with this group of assets.

2.21 The following findings came out of our inspections during the year.

- The management of risk associated with deferred renewals of structures and earthworks varies from route to route. No immediate significant concerns were identified during ORR site visits, but we concluded that Network Rail needs to improve the standard of its recording of both the rationale for deferring a renewal and the identification of mitigation measures.

- Inspection and examination becomes even more important in the context of deferred renewals. Despite this, we found that for some routes Network Rail was unable to deliver earthworks and/or structures examinations in accordance with the required standards. We have continued to press for improvements and the backlogs have significantly reduced. But we are not convinced this is sustainable in future because Network Rail has not yet demonstrated that it has adopted measures to address the root causes of such backlogs. There is also currently no programme for examination of Hidden Critical Elements (HCEs) in operational property (buildings) assets, although work has now started on this.

- Network Rail has made progress on the management of scour risk. Stage One risk assessments are complete in most routes and remediation work has been accelerated.

- The examination regime for ancillary structures, in particular signal posts, has been enhanced and a procedure to widen the scope of those improvements will be introduced progressively until the final compliance date of April 2020.

- Although some progress has been made, there are still gaps in Network Rail's asset knowledge, particularly in respect of drainage. More positively, work to complete the identification of all earthworks assets has now been completed.

- We have seen evidence of improvements in the centrally developed 'Drainage Roadmap' describing planned works to develop drainage asset management against an asset management excellence model template. This work is encouraging but provision of adequate drainage systems and management of those assets remains a concern.

- We investigated a number of landslip incidents in 2016-17. We found that there were too many barriers between asset disciplines, where the sharing of knowledge across those boundaries could have delivered more effective control of risk. Network Rail must improve its understanding of how individual asset management systems work and how they interact to ensure a sufficient level of system risk management is achieved. The company has acknowledged and responded positively to this challenge.

- Investigation of the derailment at Watford tunnel on 16 September 2016 revealed a weakness in Network Rail's arrangements for responding to short-notice notification of adverse or extreme weather. Steps are being taken within LNW Route to address this matter, and these should also be considered by other routes.

- Although there have been some useful developments with remote monitoring methods for earthworks, progress remains slow. Network Rail has not yet developed a coherent strategy for the implementation of remote monitoring across the network.

- Several incidents during the year (notably the collapse of a retaining wall at Liverpool Lime Street on 28 February 2017 depositing 200 tonnes of debris onto railway lines and causing widespread disruption) have demonstrated the potential impact of third party activities on the safe operation of the railway. Network Rail, and the wider railway industry, need to consider how best to minimise third party risks.

Electrical Safety

2.22 Our inspections have revealed varying levels of maturity in relation to the management of risks from electrical assets. At a senior level within Network Rail, and particularly within its Safety, Technical and Engineering Directorate, there is a clear acknowledgement of and commitment to securing better compliance with the law and improved control of risks. None of this is without significant challenge. The legacy infrastructure pre-dates most of the significant legislation and was not designed to comply. 'New' electrification schemes have to be fitted onto existing infrastructure such as platforms, bridges and level crossings.

2.23 A very significant development has been the production of a decision support tool to aid investment and renewal decisions. Network Rail intends to deploy this tool to secure improved control of risk and legislative compliance for its 'legacy' assets over three control periods (15 years). Network Rail estimates that, if left to condition-related renewals, this process would take over 100 years. We welcome the general approach proposed and will continue to scrutinise the detail of resulting plans.

2.24 Throughout 2016-17, we have monitored Network Rail's progress in delivering its electrical safety improvement plans. There are a number of strands to this programme, at varying stages of development. These include:

- *Safer, Faster isolations*. For DC systems there are well-developed, practically tested solutions. For AC, the physical equipment has not yet been developed and consequently it has been much harder to arrive at solutions. We have therefore told Network Rail that we would be content for more of the CP5 ring-fenced funds to be spent on procuring and fitting equipment for DC networks; and

- *Single Approach to Isolations.* Network Rail is making progress. We have challenged the company to ensure that the hierarchy in the *Electricity at Work Regulations* is reflected properly and that terminology is easily understood.

2.25 We have continued to liaise closely with electrification projects throughout the year. Network Rail has produced improved guidance for such schemes to aid them in controlling risk and complying with the law, but there is still a legacy of option selections made five to seven years ago when Network Rail's and funders' understanding of compliance requirements was not so well-developed. The result is that we see expensive and difficult retrospective solutions, sometimes leading to schemes overspending and becoming delayed.

2.26 In the course of our inspections, we met committed and enthusiastic staff, but we have not yet seen a consistent level of understanding of legal requirements. This has occasionally manifested in proposals that go beyond the reasonably practicable. This arises because decisions are not underpinned by high quality assessments of risk. In some schemes, we have seen good examples of risk assessment, but Network Rail needs to ensure that projects improve mechanisms for capturing and spreading such good practice.

2.27 We are inspecting the efficacy of *Lifesaving Rules (LSRs)* for electrical safety. The work is not yet complete, so we have not finally reported. However, we have communicated our interim finding that one rule, 'Test before earth' was well understood and adopted, but the other rule 'Test before touch' at worksites was not observed at any of the ten isolations inspected. This additional rule is central to staff having confidence that their worksite is subject to a safe isolation of electrical supply. Misunderstanding about the physical extent and timescales of isolations is at the heart of incidents where staff have been harmed. Again these findings illustrate the importance of Network Rail strengthening its own assurance processes.

Level Crossings

2.28 Network Rail closed 67 crossings and achieved changes in public rights of way at a further seven during 2016-17, still narrowly missing its own target for risk reduction. This reflects the increasing difficulty in securing level crossing closure.

2.29 Overall, there were fewer events (as defined in the Level Crossing PIM chart) than the five-year trend, but the overall level of risk in the PIM remained fairly constant. Precursor risk associated with behaviour at automatic crossings increased. Actual risk is outside the target risk reduction trajectory. Network Rail reports the moving annual average (MAA) for significant level crossing events rose by 14.2% during 2016-17.

2.30 Events that occurred during the year show some of the significant areas where Network Rail needs to concentrate its efforts. There were six fatalities at crossings, two more than last year. Unlike the previous two years, these included occupants of vehicles as well as pedestrians. In November 2016, a cyclist was struck and killed at Old Stoke Road on LNW Route; on 3 January 2017, a passenger train struck a road vehicle at Marston Automatic Half Barrier (AHB) crossing, fatally injuring the driver; and at Frampton Mansell (Western) on 7 February 2017, a road vehicle driver was killed when struck by a passenger train.

2.31 On 7 October 2016 at Virtual Quarry Open crossing on LNW route a train struck a tipper truck attempting to cross the line. There were no injuries. Two injuries were reported when a train struck a road vehicle at Nairns no. 117 crossing on 12 August

2016. On 25 August 2016, a passenger train struck a car which had incorrectly turned onto the railway from Crescent Road crossing on LNW. On 27 May 2016, a passenger train struck a lorry at Fishguard Harbour open crossing. Again, no injuries resulted. All these incidents, though, had the potential for catastrophic harm to rail passengers.

2.32 This was further illustrated on 10 April 2016 when a passenger train struck a tractor at Hockham Road crossing in Anglia. Hockham Road, Frampton and Nairns no 117 are all crossings where the user is required to telephone the signaller to obtain permission to cross. This can be a vulnerable means of controlling risk. Signallers sometimes have incomplete information about positions of trains under their control, particularly in long signal sections, and may make mistakes. These incidents also emphasise the importance of Network Rail adopting a strategy to improve the accuracy of information provided to crossing users.

2.33 Our main inspection programme in 2016-17 was of arrangements at whistle board crossings. We inspected 128 crossings across all routes. We found that:

- the quality of asset information was generally better than last year;
- sounding of train horns was an unreliable warning. It was not always done, and when the horn was sounded it was not always at the correct location to give sufficient warning;
- Network Rail risk assessments were improving but the aspirations of local managers to improve risk control (by introducing additional warning technologies, for example) were often frustrated by resource constraints and slow industry processes;
- whistle boards should be provided on both approaches to crossings – even where sighting is sufficient – because it is a natural human response to expect to hear a warning in both directions; and
- consideration of additional risk during the 'night time quiet period' (NTQP) did not lead to additional local measures.

2.34 Network Rail recognised the significance of its growing intelligence about greater use than originally thought during the "extreme" hours of the NTQP - that is between 23:00 and midnight and between 06:00 and 07:00. Effective industry leadership secured adoption of a reduction in the NTQP so that it is now between midnight and 06:00.

Worker Safety

2.35 There was one workforce fatality in 2016-17 – a serious road traffic accident which occurred in June 2016. RIDDOR-specified injuries went up from 72 last year to 90 this year. This was significant enough to drive up the FWI (Fatalities and Weighted Injuries) rate by 15.3% for 2016-17 compared to the previous year. On the other hand, the wider normalised measure of LTIFR (Lost Time Injuries Frequency Rate) decreased by 8.6% to its best ever level.

2.36 Network Rail's concentrated focus on road driving safety has secured improvements in a steady reduction in road traffic offences. Yet, at the same time, road traffic accidents have increased. Work is continuing to review the LSRs and to understand better the root causes of this apparently contradictory trend.

2.37 We welcome the more cautious, incremental approach set out in the latest edition of NR/L2/OHS/019 '*Safety of People working on or near the line'*. We recognise Network Rail's efforts to regularise procedures across the network and support the move to retain a single, accountable role for site safety and to involve that person in planning. We also support a permit to work system. We accept that it is more realistic to let Maintenance Delivery Units (MDUs) decide for themselves their degree of readiness and appropriate timescales to proceed with change.

2.38 Our main inspection findings from 2016-17 are:

- we have been impressed by the excellent LNE South initiative '*safe and effective worksites*'. This shows that, with a little extra effort to plan work, there is no need for frustrated access or excessive signaller workload and that Green Zone working can be maximised;
- we have highlighted the limitations to improvements that TOCs and FOCs can make to depots electrified by 3rd rail and shown that Network Rail has landlord responsibilities to eliminate and mitigate risks; and
- we have seen the benefits of Plain Line Pattern Recognition (PLPR) and negative short circuiting devices for worker safety and urge Network Rail to expedite deployment of both initiatives.

Occupational health

2.39 During 2016-17, we observed a noticeable loss of leadership, focus and direction in the period following the departure of the Head of Occupational Health and Wellbeing. This interval allowed a markedly reduced commitment to improved occupational health in parts of Network Rail. With the recent appointment of a Chief Medical Officer, we look forward to a reversal of that trend.

2.40 We saw evidence that the company needs to further improve:

- the way it measures progress in its health and wellbeing strategy;
- the way it assesses the impact and effectiveness of the various initiatives; and
- its understanding of the resources required to deliver its ambitions.

However, we also found increasing recognition of these areas for improvement and a determination to address them.

2.41 We found that over the last 18 months there had been a shift in emphasis to improve fitness for work or "wellness". Network Rail needs to ensure that this does not eclipse efforts to secure better basic occupational health compliance. We have also seen some very positive progress in developing guidance and supporting material to implement a refreshed approach to the management of mental health concerns. Network Rail's work in this area has been class leading.

2.42 We continued to find variations in the adoption and execution of national initiatives, even where we considered the central programmes to be excellent – such as asbestos management. We saw evidence of a tension between the aspirations of the central technical authority and individual routes or parts of Infrastructure Projects. For example, the web-based resource for health-specific improvement frameworks was withdrawn in early 2016. In its place, as described in Network Rail's annual return, a range of educational material was made available. Our inspections found that this was indeed the case but that no monitoring or reviews had taken place to ensure understanding and adoption. Furthermore, the picture varied greatly across routes. There was still a lack of basic understanding about what the law requires, especially the 'hierarchy of controls' with elimination at the top and PPE and process at the bottom.

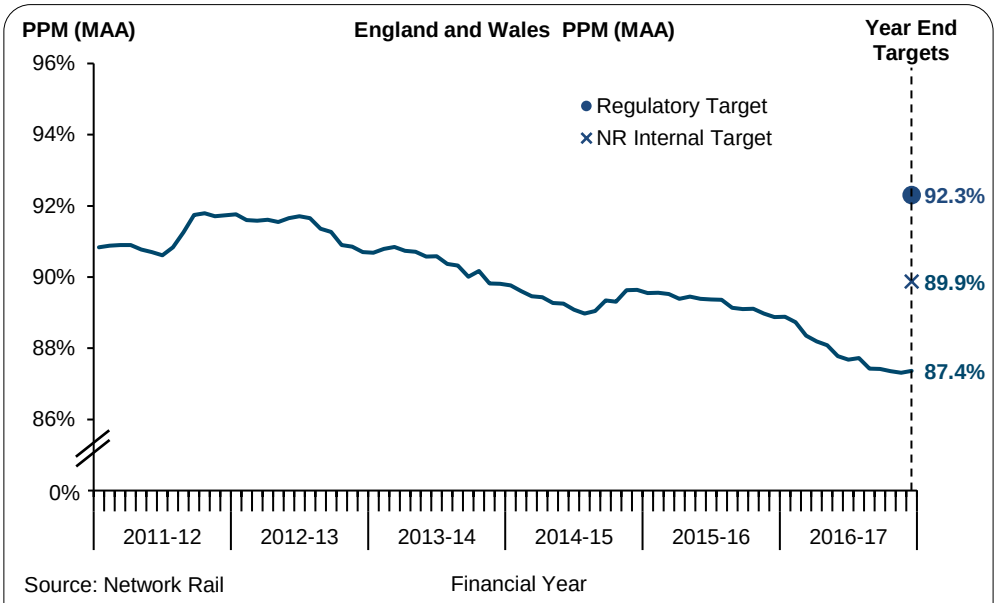
2.43 As a result of inspection work during 2016-17, we wrote to Network Rail about Hand Arm Vibration Syndrome (HAVS) management. Our site inspections showed a worsening of arrangements in some cases, particularly regarding investigation of new or worsening HAVS symptoms being carried out as a result of 'tier one' pre-exposure baseline assessment, as required by legislation. We served an Improvement Notice on assessment of HAVS risks at Chester MDU. We continue to explore the thoroughness of Network Rail's management of HAVS across the network.

2.44 There was one example of very good practice for which we commend Network Rail. When high output plant was brought in-house, Network Rail worked hard to implement the existing plan to address the risks from silica in ballast dust released during track renewals. It was noteworthy that emphasis was placed on elimination (at quarries and aggregate handling depots) and suppression (within ballast cleaning and track renewals systems) rather than adopting a default reliance on PPE alone. Further – we found on site evidence of the setting out of clear expectations, and active monitoring of compliance.

3. Train service performance

National level performance

3.1 Train performance continued to decline in the second half of 2016-17. At the end of the year punctuality as measured by the Public Performance Measure (PPM)[6] moving annual average (MAA) was 87.4%, a decline of 0.3 percentage points (pp) in the last six periods. This was 2.5pp worse than Network Rail's year-end internal target and 4.9pp worse than the year-end regulatory target.

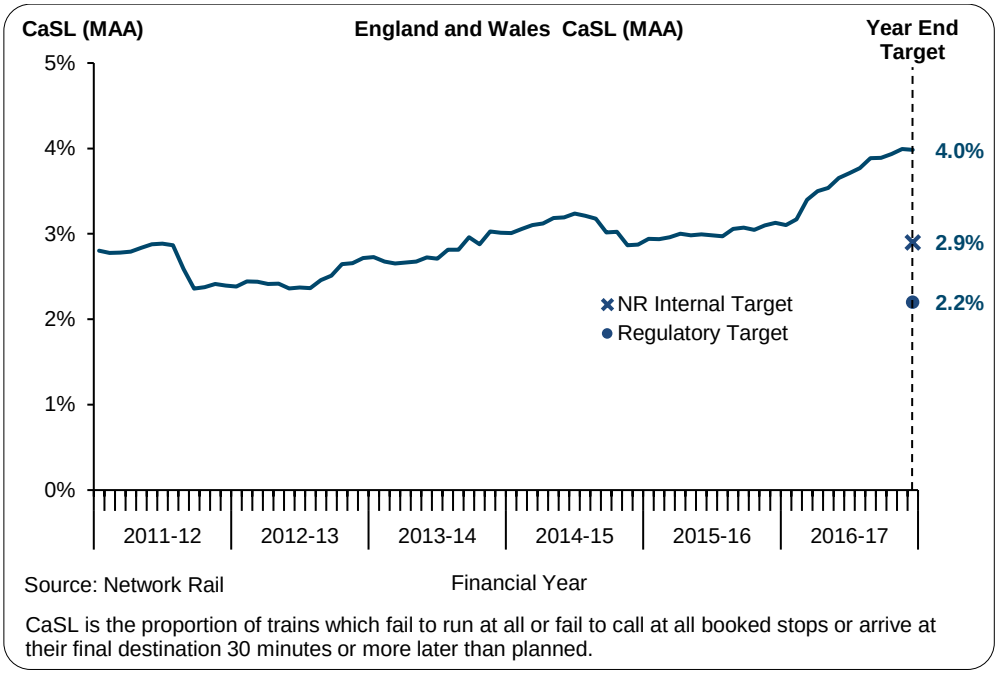


Source: Network Rail

PPM is the proportion of trains arriving at their final destination on time. On time is within five minutes (or ten minutes for the long distance sector).

3.2 Over the same period, Cancellations and Significant Lateness (CaSL) MAA increased by 0.3pp to 4.0%. It is now 1.1pp above (i.e. worse than) Network Rail's year-end internal target and 1.8pp above the year-end regulatory target.

[6] PPM is an assessment of punctuality as delivered by train operators. ORR regulates Network Rail's delivery of performance to the train operators.



Source: Network Rail

CaSL is the proportion of trains which fail to run at all or fail to call at all booked stops or arrive at their final destination 30 minutes or more later than planned.

Factors behind the decline in performance

3.3 We engage regularly with Network Rail and train operating companies (TOCs) so we can fully understand the performance trends. We have also undertaken regular site visits to see at first hand the challenges Network Rail faces and how it plans to tackle them. At this stage, our principal concerns are as set out below.

1. The performance of Govia Thameslink Railway (GTR)

3.4 At the end of 2016-17 GTR's PPM MAA had fallen to 74.2%, 9.8pp below its year-end Performance Strategy target. This has a significant impact on national level performance as GTR operates 17% of services and accounts for 19.6% of passenger journeys made in England and Wales.

3.5 Over the course of the last 18 months, there have been a number of reviews of train service performance, including a cross industry review led by Chris Gibb on behalf of the Secretary of State. We are continuing to monitor Network Rail's delivery closely, noting the renewed impetus and detailed attention it has brought in recent months.

2. The performance of South West Trains (SWT)

3.6 Following a stable performance in 2015-16, the decline in PPM MAA over 2016-17 was the second worst in the country, with morning peak services between Raynes Park and Waterloo being a major challenge. SWT's PPM MAA fell from 85.6% at the end of 2015-16 to 81.7% at the end of 2016-17. The proportion of Network Rail-caused delay minutes is also high (at 70.8%). The forthcoming blockade to deliver planned capacity enhancement works, highlights the need to improve performance. In response, Network Rail has re-invigorated its oversight, prioritised key areas of

work to improve asset reliability and put in place measures to fix faults more quickly (such as having fault teams on standby at key locations). We will continue to monitor delivery of performance for this TOC closely.

3. The performance of Virgin Trains East Coast (VTEC)

3.7 Performance in 2016-17 continued to decline. While Network Rail-caused delay minutes saw an absolute increase, their proportion decreased, due to worse performance by the TOC. Issues with Overhead Line Equipment (OLE) have been among the principal concerns. Network Rail has undertaken a detailed review of its OLE resilience, focusing on rectification work in the Doncaster area. It has worked closely with train operators on service recovery principles and the TOCs have expressed confidence in what the company is doing. We will continue to monitor closely.

4. The performance of Southeastern

3.8 Following noticeable improvements in PPM (MAA) in the second half of 2014-15, performance declined sharply in 2015-16 continuing with a steady decline in 2016-17 and ending the year at 86.1 % PPM, 2.4pp short of the performance strategy target. The level of Network Rail-caused delay has also been high in 2016-17. 71.1% of delay minutes, 65.8% of PPM failures and 64.9% of CaSL failures were attributable to Network Rail. In addition, new assets installed during engineering work at London Bridge and Lewisham have failed in live operation soon after being brought into use, causing significant disruption.

3.9 Network Rail has brought its activities across the South East Route into a consolidated plan (the 'Galaxy Plan'). It has reduced the number of infrastructure failures and started a number of initiatives to tackle reactionary delay. There are positive indications from the first periods of 2017-18, suggesting that there has been a turnaround in asset performance on the South East Route.

3.10 We looked at Network Rail's plans in more detail at the end of 2016-17 and concluded that there may be a case for further regulatory action. We have therefore undertaken a short investigation into the issues.

Investigation findings

3.11 In May 2017, we initiated an investigation of Network Rail's delivery of performance for Southeastern. We concluded that Network Rail was doing everything reasonably practicable at the time to recover performance for Southeastern. However, we made a number of observations on the steps that Network Rail was taking to improve performance. The company has indicated that it is likely to accept these and will work with ORR to agree timescales for responding to each of them. Our report can be found here.

Our approach in year three of CP5 (2016-17)

3.12 We have held Network Rail to account for the delivery of Performance Strategy targets, outputs that are locally agreed between the company and its customers (the TOCs). When these are aggregated at a national level, this becomes Network Rail's internal target. But, for clarity, the internal target is not a regulatory target.

3.13 We set a 'regulatory threshold', outside which we will consider further action. For PPM, this is 2.0pp below (worse than) Performance Strategy target and for CaSL, this is 0.2pp above (worse than) the Performance Strategy target.

3.14 At the end of 2015-16, we considered regulatory intervention in respect of Network Rail's delivery to four TOCs all of which finished the year outside the regulatory threshold, even after TOC-caused delays had been removed from the calculation. We decided to monitor Network Rail's delivery for these TOCs in 2016-17 more closely. Of the four, TransPennine Express (TPE) has seen performance improve during the year moving back within the regulatory threshold, with PPM MAA improving by 2.8%. GTR, Southeastern, and Heathrow Express (HEx) have all experienced a further decline in PPM MAA and at the end of the year were still performing outside the threshold for regulatory intervention.

Delivery of performance at TOC level

PPM

3.15 At the end of 2016-17, five operators (Grand Central, London Midland, Northern, TfL Rail and Virgin Trains West Coast (VTWC)) had met or were ahead of their Performance Strategy targets. VTWC's performance was particularly noteworthy with the TOC achieving a PPM MAA of 89.1% against a target of 87.0%. Merseyrail recorded the highest absolute PPM MAA score (95.8%), 0.5pp up on its performance at the end of 2015-16.

3.16 Other than GTR, the worst performer was Hull Trains (HT). HT PPM MAA was 81.8%. This was 3.2pp below the 2016-17 Performance Strategy target. After GTR, the worst franchised performer was Virgin Trains East Coast (VTEC). VTEC PPM MAA increased to 83.1%, an improvement of 0.4pp in the last six periods, but at the end of the year, it was still 3.9pp below the 2016-17 Performance Strategy target.

3.17 South West Trains (SWT) PPM MAA was 87.1% at the end of 2016-17, 3.7pp below the Performance Strategy target. This is a reduction of 1.3pp in the last six periods. The decline in PPM is not due to a single specific aspect of performance. Rather, we have seen performance declining across all areas and cause codes.

3.18 Southeastern PPM MAA was 86.1% at the end of 2016-17, 2.4pp below the Performance Strategy target. This is a reduction of 0.1pp in the last six periods. TOC feedback has suggested that South East Route has focused on Sussex Area (at the expense of Kent Area). The difference between temporary speed restriction (TSR) volumes across the two routes may support this contention.

3.19 HEx PPM MAA was 89.8% at the end of 2016-17, 3.6pp below the Performance Strategy target. This is a reduction of 1.0pp in the last six periods. The imposition of a "two-track railway" effectively halving capacity at weekends continues to cause HEx problems, while train regulation and OLE have also affected performance.

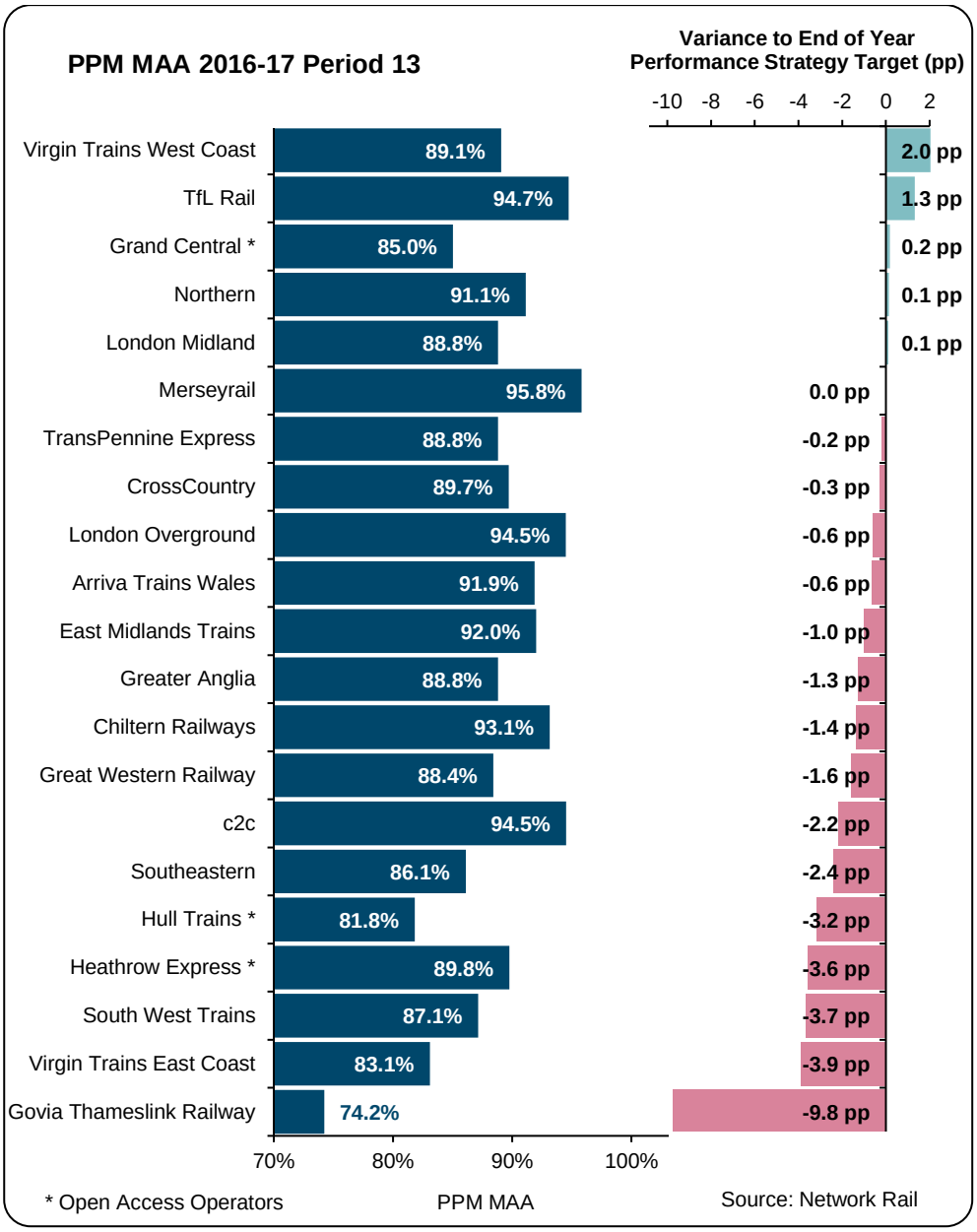
3.20 We continue to monitor Network Rail's delivery of performance to each of these TOCs closely, attending liaison meetings with routes and TOCs, performance/Alliance Boards and quarterly reviews as appropriate.

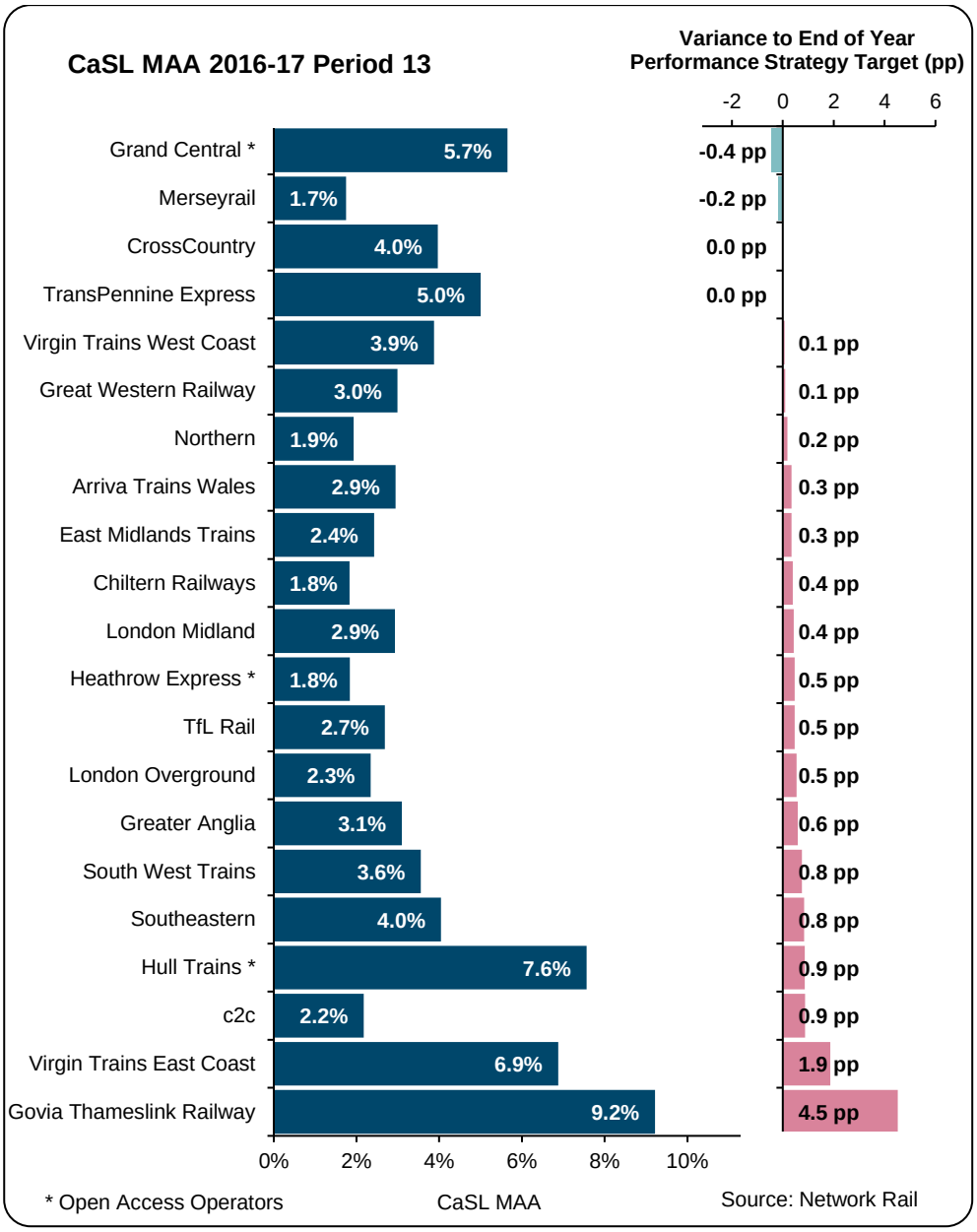
CaSL

3.21 At the end of 2016-17, four operators (CrossCountry, Grand Central, Merseyrail and TransPennine Express) met or were ahead of the CaSL targets in their performance strategies. Merseyrail recorded the lowest (i.e. best) absolute CaSL MAA score (1.7%), an improvement of 0.2pp relative to performance at the end of 2015-16.

3.22 Other than GTR, the worst performer was Hull Trains. CaSL MAA for this operator increased (i.e. worsened) by 0.9pp in the last six periods reaching 7.6% at the end of the year. This was 1.9pp worse than the 2016-17 Performance Strategy target.

3.23 The charts below show all operators' performance ranked by difference to their Performance Strategy targets at the end of 2016-17.


PPM MAA 2016-17 Period 13
Variance to End of Year Performance Strategy Target (pp)
-10 -8 -6 -4 -2 0 2
Virgin Trains West Coast 89.1% 2.0 pp
TfL Rail 94.7% 1.3 pp
Grand Central * 85.0% 0.2 pp
Northern 91.1% 0.1 pp
London Midland 88.8% 0.1 pp
Merseyrail 95.8% 0.0 pp
TransPennine Express 88.8% -0.2 pp
CrossCountry 89.7% -0.3 pp
London Overground 94.5% -0.6 pp
Arriva Trains Wales 91.9% -0.6 pp
East Midlands Trains 92.0% -1.0 pp
Greater Anglia 88.8% -1.3 pp
Chiltern Railways 93.1% -1.4 pp
Great Western Railway 88.4% -1.6 pp
c2c 94.5% -2.2 pp
Southeastern 86.1% -2.4 pp
Hull Trains * 81.8% -3.2 pp
Heathrow Express * 89.8% -3.6 pp
South West Trains 87.1% -3.7 pp
Virgin Trains East Coast 83.1% -3.9 pp
Govia Thameslink Railway 74.2% -9.8 pp
70% 80% 90% 100%
* Open Access Operators
PPM MAA
Source: Network Rail



Route scorecards

3.24 Network Rail introduced route scorecards in 2016-17 to monitor its Key Performance Indicators and to align its train performance targets more closely with TOC requirements. Most TOCs have agreed a PPM and CaSL target, while some, e.g. VTEC, have set out a Right Time metric. Train performance accounts for 20% of a route's overall score. We use the data in the scorecards as part of the evidence to determine whether Network Rail is doing everything reasonably practicable to achieve its regulated performance outputs.

3.25 Scorecards are at a relatively early stage of maturity, and there are still some areas Network Rail needs to develop, for example:

- Year-end forecasts – there is a lack of visibility of the methodology used to produce the year-end forecasts for agreed performance metrics. Improving these forecasts will increase the credibility of the metrics in the scorecard.
- Prioritisation of effort – When a KPI is irrecoverable there is a possibility that effort may be diverted to other KPIs that can still be achieved. For example, on South East Route, it became obvious in the latter part of the year that GTR PPM/ CaSL and Network Rail delay minutes (which amount to 10% of the scorecard) were almost certainly going to be missed substantially. In these cases, we need to be assured that Network Rail does not abandon the pursuit of target in order to focus on other areas where the target is still deliverable.

Network Rail is addressing these and other issues as the scorecards evolve over time.

Other performance interventions and measures

Delay minutes

3.26 We monitor Network Rail delay minutes as a key indicator of train performance. As the chart on page 35 shows, at the end of 2016-17, 61% of delay minutes in England and Wales were attributable to Network Rail, 29% were “TOC on Self” (delays to a passenger train operating company's services caused by that company) and 10% were “TOC on TOC” (delays to a passenger train operator’s services caused by another train company). The position is broadly consistent with previous years.

South East Reparations fund

3.27 Following a previous investigation into performance delivery to GTR in 2014-15, Network Rail agreed to implement a £4.1m reparations fund. This comprised four distinct activities:

- the introduction of dedicated track teams;
- the provision of additional station staff;
- an expansion of the Land Sheriffs programme; and
- the implementation of an Incident Management System (IMS).

3.28 Three of the schemes have been implemented successfully and have delivered a range of benefits. The implementation of the fourth, IMS, has been delayed pending its incorporation into a wider national programme. In financial terms, only half the agreed fund has been spent to date and, while the delay to IMS seems prudent, it

does mean the anticipated benefits have been delayed. We will continue to monitor progress in this area.

Network capability

3.29 'Network capability' describes the capability of the network in terms of track mileage and layout, line speed, gauge, route availability and the amount of electrified track. Network Rail's network licence requires the company to accurately describe and maintain (subject to network change) the baseline capability for which it is funded for the benefit of its stakeholders. For CP5, we said that the baseline capability of the network would be that in place as at 1 April 2014.

3.30 The industry's Network Capability Steering Group is the forum for engagement between Network Rail and a range of industry stakeholders. Whilst we have not received any formal complaints, a number of operators have raised concerns and we have tasked Network Rail to improve its processes, so the information the company holds and that stakeholders rely on adequately reflects the physical state of the network enabling those stakeholders to plan their businesses with a reasonable degree of assurance.

Network availability

3.31 Measures of network availability are intended to provide an indication of the impact of planned engineering work on passengers and freight customers. Network availability is currently measured using the Possession Disruption Index (PDI) for Passengers (PDI-P) and Freight (PDI-F).

3.32 Network Rail has identified a number of inaccuracies that have been introduced to the calculation for PDI-P which are affecting the ability to meet target. In particular, alterations to service groups resulting from franchise changes since the beginning of CP5 have resulted in either missing information or an arbitrary change the estimated number of passengers using an affected service. Therefore, changes to the value of PDI-P outturn are not necessarily a true reflection of the impact possessions have on passengers. It is likely that similar issues also effect PDI-F.

3.33 As a result of these inaccuracies, Network Rail has proposed an alternative suite of measures to monitor network availability. These are based on the processes used to plan possessions, including the number of access disputes raised and the number of possessions that attract the maximum notification discount for early planning.

3.34 However, we require that Network Rail continues to report PDI, with some modifications, until such time that it is possible to present an appropriate and industry-agreed solution reflecting the experience of passengers and freight customers. Further industry engagement on this area will be part of the Outputs Framework consultation, which will be published at the end of July.

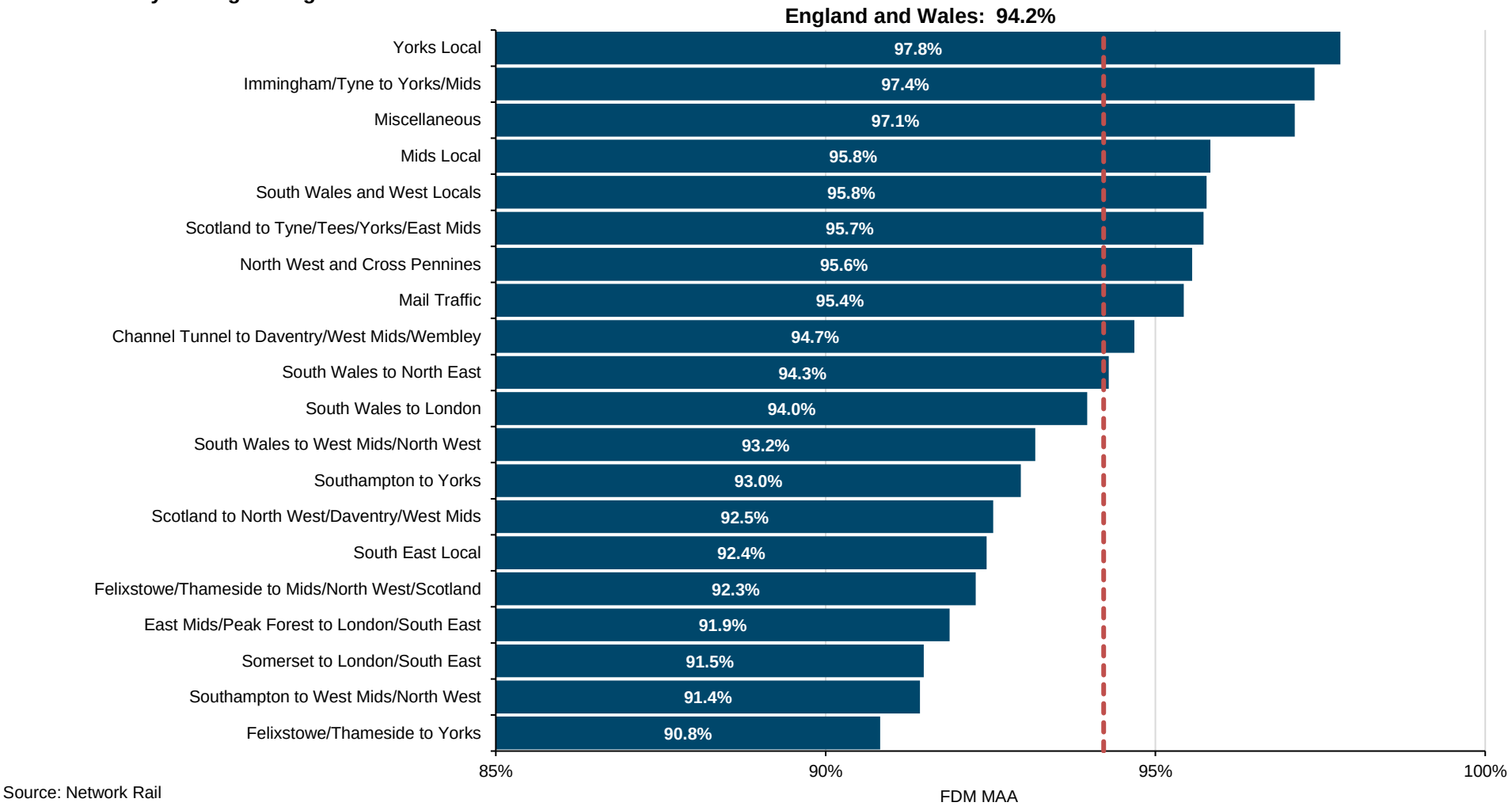
3.35 Network Rail has notified the ORR that the CP5 target for PDI-P is not likely to be met, largely as a result of the issues identified above, with the possibility of PDI-F target also being missed.

3.36 We acknowledge the complexities and inaccuracies present in the calculation for PDI and will account for these in our assessment of Network Rail's delivery of network availability. We will also initiate an industry wide engagement exercise with the aim of gathering further evidence of Network Rail's behaviour in respect to upholding the spirit of PDI. We anticipate this will conclude in late 2017.

Freight performance

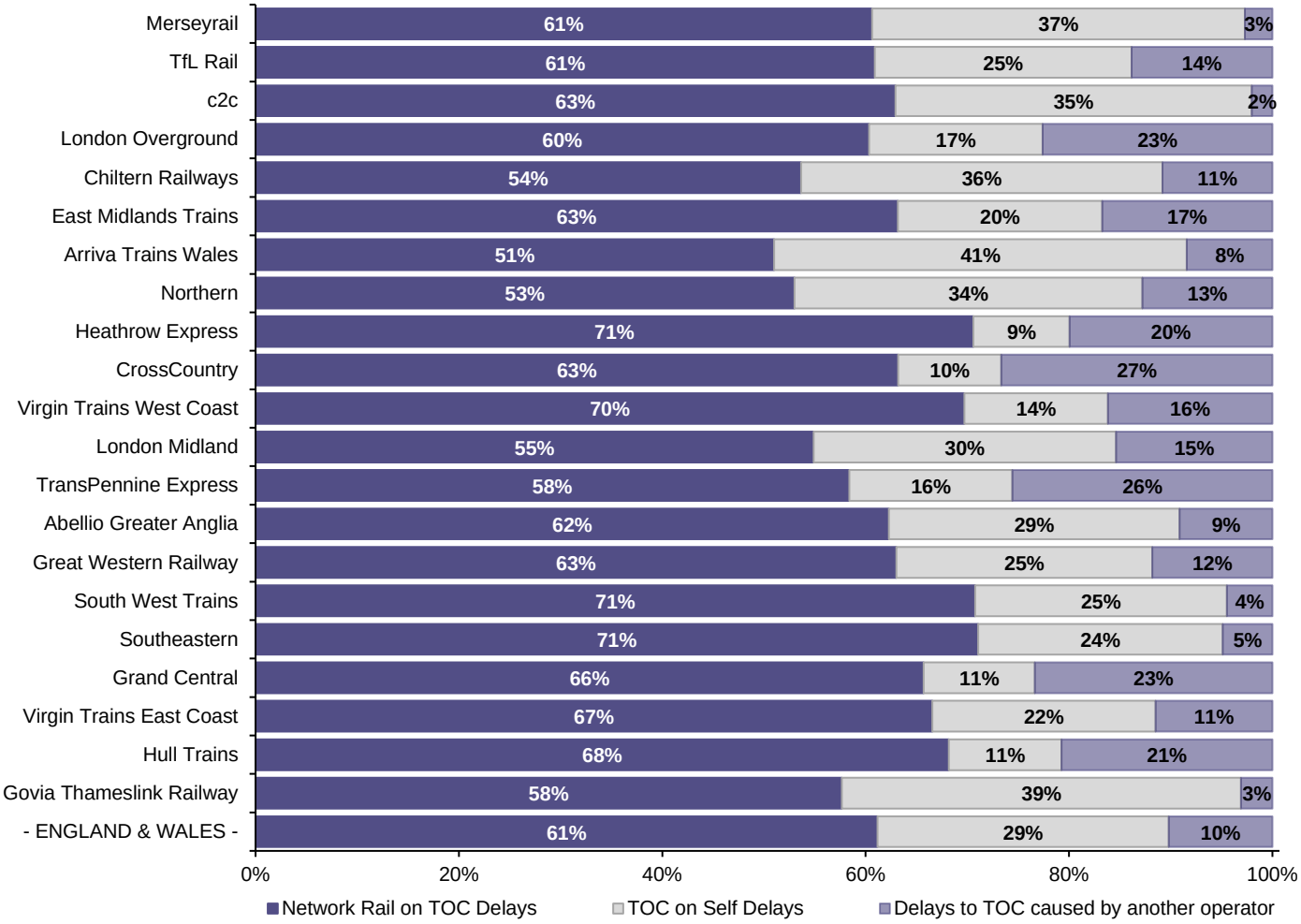
3.37 The regulatory performance measure for freight is the Freight Delivery Metric (FDM). This measures the percentage of freight trains arriving at their destination within 15 minutes of scheduled time. FDM covers delays for which Network Rail is responsible - i.e. not those caused by freight operators. The FDM at the end of 2016-17 was 94.4% 1.9pp ahead of the annual target of 92.5%.

FDM MAA by Strategic Freight Corridor - 2016-17 Period 13



Source: Network Rail

Proportion of Total Delay Minutes by Responsible Category: 2016-17



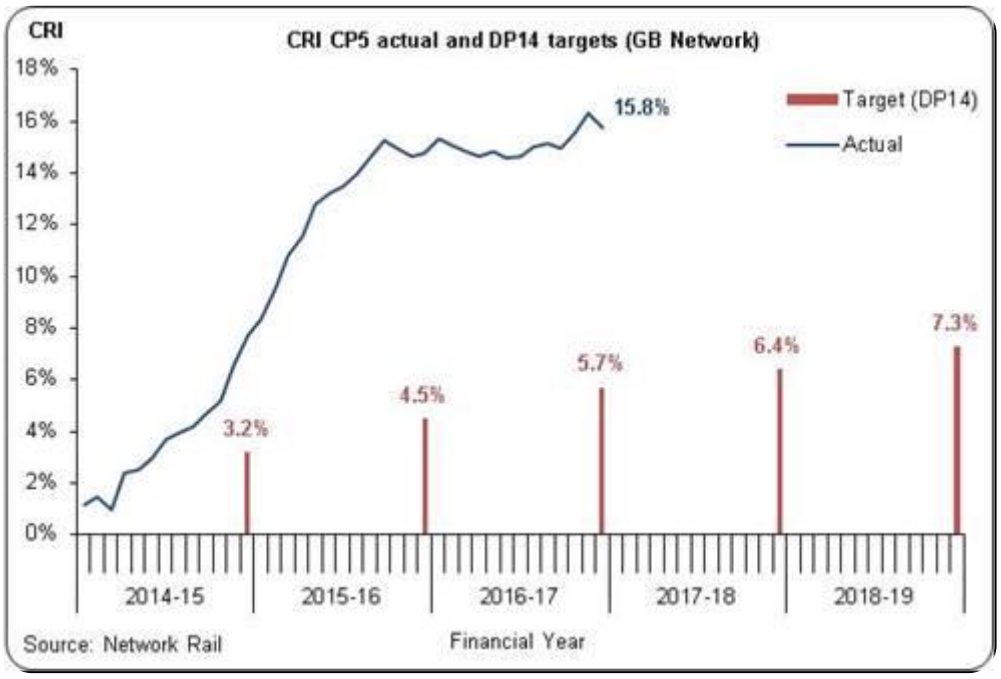
	PPM MAA	CaSL MAA	Trains Planned (Rounded)
Merseyrail	95.8%	1.7%	218,100
TfL Rail	94.7%	2.7%	82,100
c2c	94.5%	2.2%	127,100
London Overground	94.5%	2.3%	490,400
Chiltern Railways	93.1%	1.8%	142,900
East Midlands Trains	92.0%	2.4%	158,300
Arriva Trains Wales	91.9%	2.9%	328,200
Northern	91.1%	1.9%	868,600
Heathrow Express	89.8%	1.8%	50,500
CrossCountry	89.7%	4.0%	103,400
Virgin Trains West Coast	89.1%	3.9%	102,800
London Midland	88.8%	2.9%	423,900
TransPennine Express	88.8%	5.0%	85,100
Abellio Greater Anglia	88.8%	3.1%	440,500
Great Western Railway	88.4%	3.0%	529,600
South West Trains	87.1%	3.6%	593,600
Southeastern	86.1%	4.0%	651,100
Grand Central	85.0%	5.7%	6,400
Virgin Trains East Coast	83.1%	6.9%	51,100
Hull Trains	81.8%	7.6%	4,600
Govia Thameslink Railway	74.2%	9.2%	1,096,900
- ENGLAND & WALES -	87.4%	4.0%	6,555,000

Source: Network Rail

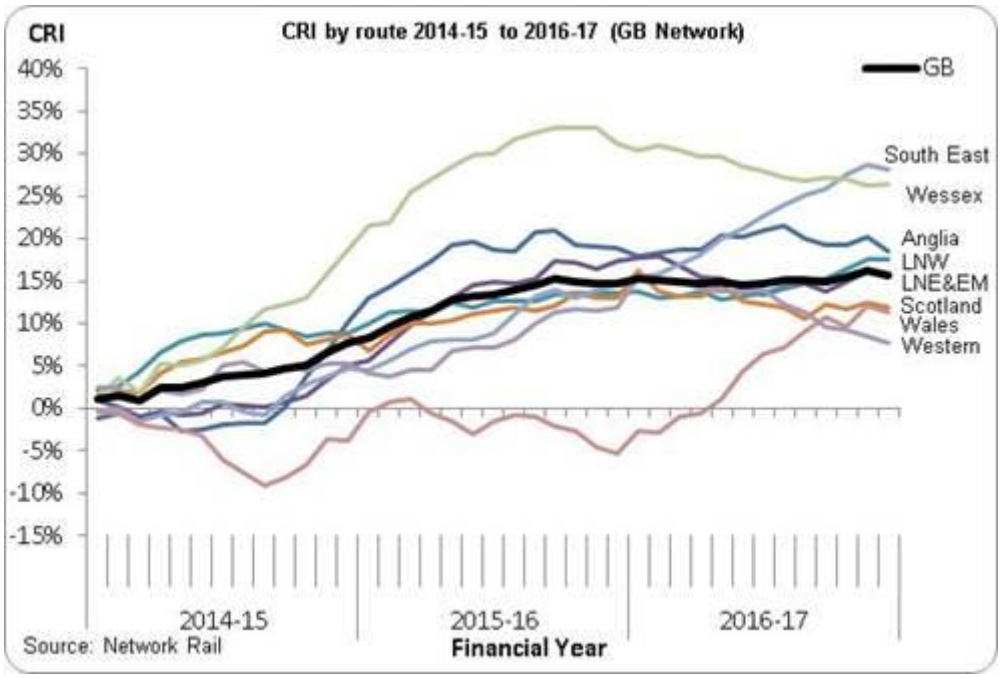
4. Asset management

Asset performance

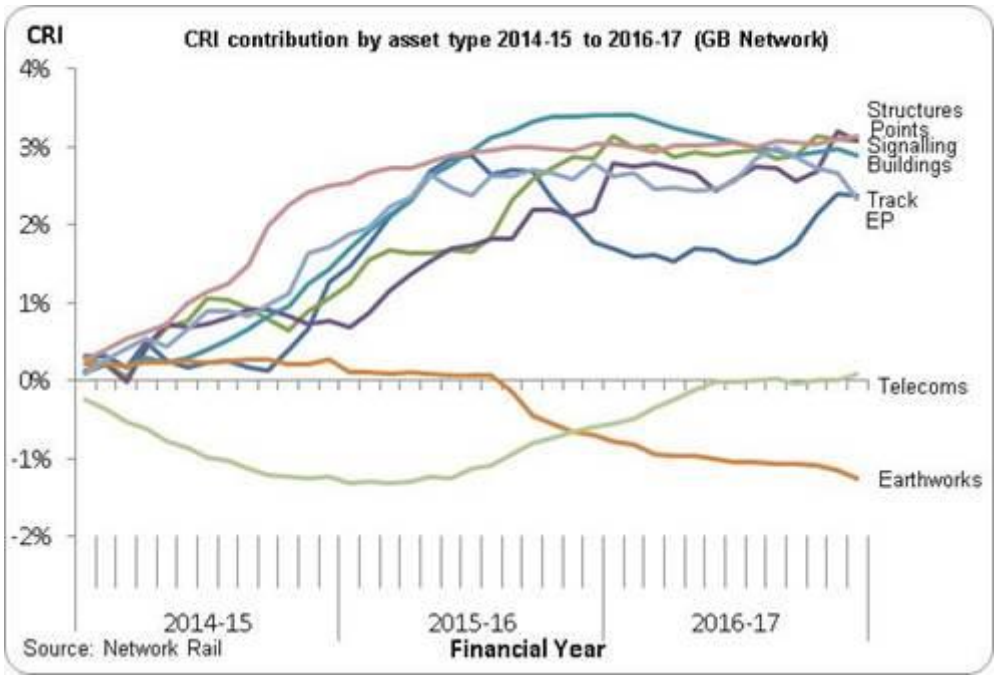
4.1 During the first two years of CP5, Network Rail achieved a significant reduction in service-affecting asset failures across the network, with the overall Composite Reliability Index (CRI) showing a 14.8% improvement relative to the end of CP4. This year asset performance has continued to improve for the network as a whole, but by a smaller amount, with CRI rising to 15.8% by year-end. This is still well ahead of the improvement trajectory Network Rail originally planned for CP5.



4.2 Wales and South East routes improved the most during the year, with in-year CRI gains of 16.7pp and 13.7pp respectively. South East and Wessex have both made considerable improvements of more than 25% since the end of CP4, although Wessex actually declined by 4.7pp during the year after exceeding 30% in the previous year. CRI improved by 4.0pp in LNW, but fell by 4.2pp in Western, which has now improved by only 7.7pp since the end of CP4. There were slight falls of around 1pp or less in in Anglia, LNE/EM and Scotland.

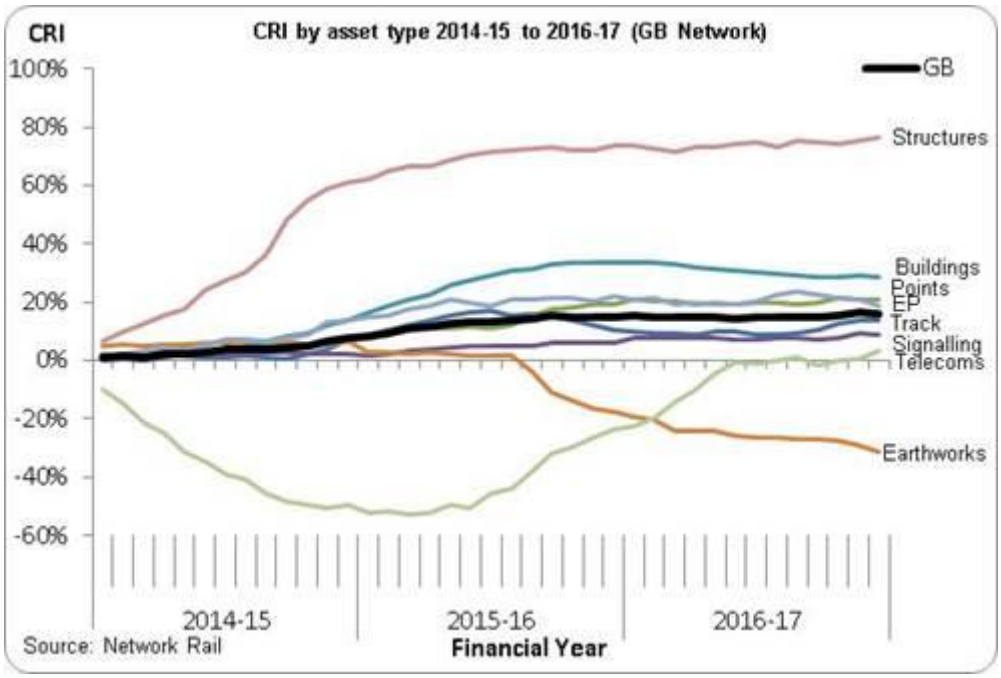


4.3 All asset groups except earthworks made a positive contribution to the overall network CRI. Telecoms recovered from the poor performance during years 1 & 2 of CP5, and is now performing slightly better than at the end of CP4. Track, signalling and points also improved during the year. The overall level of improvement was however offset by declining performance in electrical power, buildings and earthworks.

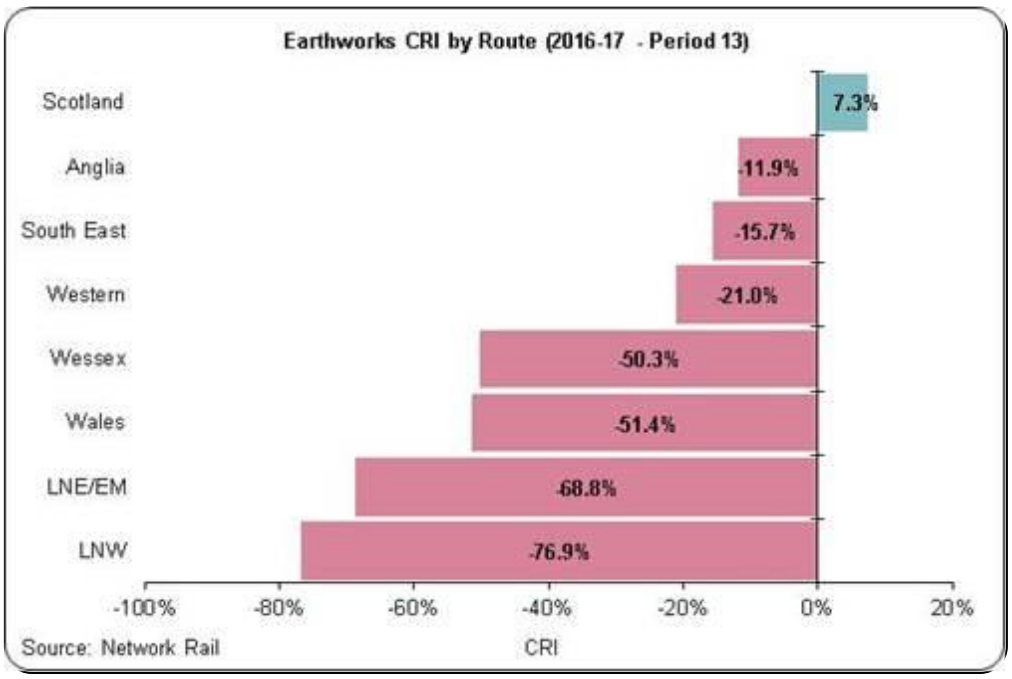


4.4 The earthworks CRI ended the year at -31.4% (that is, 31.4% below the end of CP4 baseline), having fallen from -17.6% at the end of year 2. The earthworks CRI is based on a five-yearly moving average, reflecting the influence of the weather, which can be very variable from year to year. The earthworks CRI fell this year

because the number of failures was higher than during year 3 of CP4; the actual number of failures (93) was significantly lower than during the previous year (162), and below the baseline CP4 five-yearly average (106).



4.5 Scotland is the only route where the earthworks CRI is now above the end of CP4 baseline, having improved to 7.3% from 2.1% the previous year.



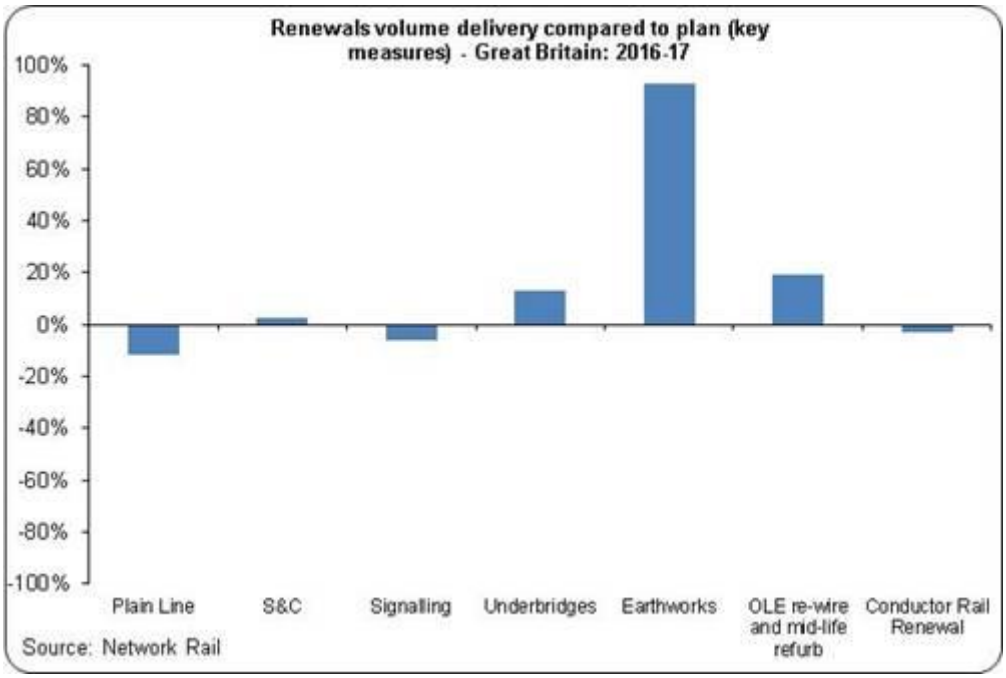
Asset sustainability

4.6 Maintaining and renewing the network is fundamental to Network Rail's responsibilities. Regular maintenance counters the effects of wear and aging to keep the assets safe and performing as intended, but eventually it becomes uneconomic or impractical to maintain them any longer and they have to be renewed.

4.7 Network Rail's asset policies set out its approach to renewing the network assets so that overall condition is sustained on the basis of least whole life cost. The volume of renewals work required during CP5 in accordance with these policies was set out by Network Rail in its 2014 delivery plan (DP14), so we monitor the actual volume of work delivered to understand whether Network Rail is doing enough to sustain the network.

4.8 During the first year of CP5 (2014-15), the volume of renewals work completed by Network Rail was significantly less than planned. The situation improved last year to finish on plan for the year overall except in some areas of civils renewals, but we were concerned that Network Rail's plan for the year had deferred a significant proportion of the 2015-16 renewals originally planned in DP14. We were also concerned that the cost of delivering renewals was significantly higher than budget.

4.9 This year civils renewals finished ahead of Network Rail's business plan for the year DP17 (13% ahead on underbridges, and 93% ahead on earthworks). This was partly as a result of completing projects that were not finished as planned at the end of last year. Signalling renewals were slightly below plan due to the re-phasing of the Scotland Accelerated National Operating Strategy (SANOS) South scheme in Scotland into next year. Plain line track renewal was 12% behind plan, mainly because of lost production by the high output track renewal fleet.



4.10 The cost of delivering renewals again exceeded budget this year. For the work delivered the cost was £385m (16%) higher than budget, mainly due to the loss of high output track renewal productivity and higher civils costs.

4.11 In order to manage the continuing overspend within the borrowing limit agreed with government, in every year so far during CP5 Network Rail has cut back on the volume of renewals it plans to deliver in the remaining years of the control period. The cumulative effect of these deferrals is that £3.7bn of renewals (at current costs) has now been deferred to CP6, which is 25% of the current budget for renewals during CP5 (£14.0bn).

4.12 This scale of deferral will cause deterioration in the overall condition of the network by the end of CP5, compared to what was allowed for in DP14. There will also be an impact on Network Rail's supply chain during the remaining years of CP5, and we are concerned about how Network Rail will address this in order to recover the deferred work during CP6, without deferring further renewals during CP6 and causing long-term deterioration. We intend to scrutinise Network Rail's plans in this area closely during PR18.

Maintenance activity based planning

4.13 At the beginning of CP5 Network Rail initiated a project called *Activity Based Planning*, to develop and implement a bottom-up maintenance planning process. The work has been led from the centre, but with significant input from and engagement with the routes. The approach is based on:

- the activity required to maintain each network asset;

- the labour, plant and materials required to deliver that maintenance; and
- their costs.

4.14 These have been assessed individually for each maintenance delivery unit, using its own records of time taken to complete standard jobs, time spent travelling to site, material costs, etc. The large number of maintenance standard jobs has been rationalised and standardised across routes and delivery units, and maintenance reporting is being restructured to differentiate between planned preventative activities, and fault-finding and fixing.

4.15 During the year, the project rolled out a planning tool implementing the approach. The tool is now being used by the routes and their maintenance delivery units to build up their plans for CP6. Some routes have also used it to validate their plans for the remainder of CP5. For the first time, managers can see how maintenance costs arise. The approach also generates a bottom-up requirement for the on-track machines used by maintenance, which will allow Network Rail to manage the supply of these resources more effectively to meet demand across the network as a whole.

4.16 We see this improved capability as a major step forward. We envisage it will promote wider adoption of risk-based maintenance and remote condition monitoring, as part of Network Rail's wider maintenance strategy to move towards an increasingly preventative maintenance regime.

ORBIS milestones

4.17 ORBIS stands for *Offering Rail Better Information Services*. It is an ambitious programme aimed at improving asset management capability through improved information management. It involves adopting consistent data specifications, providing simpler mobile data capture tools, replacing out-dated asset information systems, and providing improved decision support tools. For CP5 we set specific regulatory outputs based on key milestones in Network Rail's programme, to help ensure it delivers all the benefits expected.

4.18 Prior to this year Network Rail had met all of these milestones. However, in June 2016 it missed the milestone for replacing the existing Civils Asset Register and Reporting System (CARRS) with a new Ellipse-based asset management system for civils structures known as CSAMS. Then in December 2016 Network Rail missed the milestone to decommission GEOGIS, its legacy system covering information, including location, on track and structures assets. Network Rail is now expecting to achieve both milestones later in 2017. We will make an adjustment to Network Rail's 2016-17 financial performance to reflect these missed regulatory outputs.

Asset management capability

4.19 During CP4, we assessed Network Rail's asset management capability using AMCL's methodology known as AMEM. This is a benchmarking methodology reflecting best practice across a number of industry sectors including rail. It is aligned with what has since emerged as the international standard for asset management, ISO 55000. For CP5 we set Network Rail the objective of achieving excellence in asset management during CP5, as measured by AMEM, and we made this a regulated output to underline its importance. Our strategy was to ensure that Network Rail's capability had improved in time for PR18, so that the efficiency benefits would underpin its plans for CP6, and so we said the output should be achieved by January 2018 rather than at the end of CP5.

4.20 To confirm whether Network Rail is on course to achieve the output we also said that we would conduct an interim AMEM assessment partway into CP5. This assessment has now been completed. It found that progress towards achievement of the regulated output was mixed. One of six targets had already been achieved, but in general much more needed to be done to apply initiatives at route level. AMCL's view was that in some areas, the process of devolution had resulted in a loss of clarity about systems and processes, and the new arrangements had not yet settled in and become robust. Network Rail believed it understood where these shortfalls were, and had plans in place to achieve the regulated output in time for the CP6 SBP submission, due in December 2017.

Asset data quality

4.21 The development and application of asset policy, and the use of advanced decision support tools, are heavily reliant on Network Rail maintaining a comprehensive and reliable dataset of information about all the network assets and their condition. In PR13 we assessed the quality of Network Rail's asset data and found it variable, so for CP5 we set Network Rail the objective of delivering an improved asset dataset, and we made it a regulated output to be achieved by April 2017, to support the PR18 planning process. We said Network Rail should demonstrate A2 data quality for the core asset data used in asset management decision making, which means it should be maintained by an overarching information management system (A), and that the data itself should be appropriately accurate and reliable (2).

4.22 Network Rail has responded by developing an approach that sees asset information itself managed as an asset, to be maintained and renewed, with assurance arrangements analogous to the arrangements for physical network assets, including the appointment of a professional head. This is a best practice approach, and reflects the requirements of the international standard for data quality, ISO8000. This year Network Rail has been rolling out these arrangements in the routes, including organising the resources necessary to manage asset data quality at route level, and developing risk registers to focus action on priority areas.

4.23 We are currently assessing Network Rail's evidence that it achieved the A requirement in April 2017 and we expect to have reached a conclusion in August. We are also in dialogue about how it will demonstrate the accuracy and reliability of the data in its core asset dataset.

5. Developing the network

5.1 As reported in the previous monitors, Network Rail completed a re-planning exercise in November 2015 called the Hendy Review. The purpose was to establish a re-scheduled plan of England and Wales project milestones that would be deliverable and affordable in CP5. Network Rail reflected the outcome of the Hendy Review in a revised *Enhancements Delivery Plan (EDP)*, published in March 2016. This delivery plan, which is updated regularly, sets out Network Rail's obligations to its customers and rail users for enhancement projects in CP5. We continue to monitor progress against the EDP.

Delivery progress

5.2 We monitor Network Rail against two major milestones:

- the end of GRIP Stage 3 – this is the end of the development process where a single option for design and delivery is selected; and
- GRIP Stage 6/Entry into Service (EIS) – this is when construction is substantively complete and services can begin.

5.3 Network Rail delivered 13 of the 19 GRIP Stage 6/EIS milestones it planned to deliver since the March 2016 enhancements delivery plan was published. In the second half of the year, this includes the completion of works originally planned for Control Period 4 on the Midland Mainline to improve journey times between Sheffield and St. Pancras. Network Rail also completed East West Rail Phase 1 to enable journeys between London Marylebone and Oxford via Bicester.

5.4 Network Rail missed five GRIP Stage 6/EIS milestones in 2016-17. The three missed in the second half of the year are:

- Weather Resilience Fund - High Wind - LNE - a project to install light weight portals on the Overhead Lines to improve the resilience to high winds;
- Weather Resilience Fund - Coastal - SE - Enhanced Coastal Defences at Folkestone Warren; and
- Edinburgh to Glasgow Improvements Programme (EGIP) - Initial Phase Key Output 1 (commentary on this project can be found in our Scotland Monitor).

5.5 During 2016-17, Network Rail completed 14 (GRIP 3) development milestones on schedule, against a total of 22. The missed milestones in the second half of the year were:

- Northallerton to Newcastle Freight Loops
- Access to Assets in the Western Route

- South London High Voltage Grid (Wimbledon) upgrade (Phase 2)
- East Coast Main Line (ECML) traction power supply upgrade[7]

5.6 Four milestones were revised in the year following the change control process agreed between Network Rail its funders, stakeholders, and ORR (see below).

5.7 More information on Network Rail's performance against its milestones can be found here.

Projects at risk

5.8 As reported in previous monitors, the electrification of the Great Western mainline is the highest profile programme at risk in the England and Wales portfolio of enhancement projects. Both December 2016 milestones were completed on time for two Great Western projects. These were Route Wide Capability Works for Train Infrastructure Interfaces and Mainline Routes Gauge Capability. The routes involved were the core main lines between London Paddington, Bristol, Plymouth, Swansea and Worcester.

5.9 During the second half of the year, one new Great Western project started, the North Cotswolds Line platform extensions. Work comprises platform extensions at seven stations. This will facilitate use of these stations by the new Class 800 trains when running in 2 x 5-car formation.

5.10 Significant progress has been made in the last six months, with successful Christmas 2016 works and the installation of overhead line equipment through the Severn and Patchway tunnels. New trains have been able to use the test section between Tilehurst and Didcot for pre-service commissioning and acceptance trials.

5.11 In response to the deferral of approximately 15% of its scope (see last monitor) the Great Western electrification programme has revised its delivery milestones. We have carried out a validation exercise on the new programme and concluded that:

- the content of the next major delivery milestone in December 2017, electrification between Maidenhead and Didcot, is readily identifiable and will allow ORR and others confidence to determine whether the full scope of works has been delivered;
- the likelihood of on time completion is good, but there are significant difficulties left to overcome, such as shortage of possession access on this part of the route in the second half of 2017; and

[7] A change control for this milestone is currently under review.

- we sought a period of programme stability to test that Network Rail was delivering this programme efficiently. The calendar year 2017 provides a suitable baseline to demonstrate this is being achieved

5.12 EGIP has performed below expectations. Key Output 1 (delivery of the infrastructure required for electric train services to begin operation) a regulated milestone, was missed in March 2017. This is a major failure for Network Rail on its largest and most high profile project in Scotland and follows a year of poor productivity on site, complications with Network Rail's compliance to legal electrification standards and uncontrolled cost increases. (More detail on EGIP is included in the Scotland monitor).

5.13 The Gospel Oak to Barking Project failed to reach a significant milestone in February 2017 and did not reach its regulated milestone in June 2017. This is a significant failure for Network Rail as the infrastructure was returned into use with a temporary capability at one location below that which was available before the work started. Network Rail must now agree a strategy for taking possession of the railway to complete the works as planned which will cause freight and passenger services to be altered and passenger journeys to be affected. We will continue to monitor this situation closely.

Changes to future milestones

5.14 The EDP sets out Network Rail's obligations to funders and customers. Network Rail regularly updates this document so that customers can rely on it in the planning of their businesses.

5.15 Changes to the England and Wales enhancements portfolio require Network Rail and DfT approval at a portfolio board. This is part of a process that allows the effective management of project and portfolio baselines for outputs and funding. It supports transparent decision-making and allows the impact of change to be assessed. ORR approval is required for any change to Network Rail's obligations to its customers, as described in its regulated outputs in the EDP. Our decision letters and a breakdown of the reasons given for the change control can be found on our website.

Enhancements Improvement Programme (EIP)

5.16 It is approximately 18 months since Network Rail re-baselined a final version of the EIP, in response to our investigation and decision in October 2015 that the company was in breach of its licence regarding its management and delivery of enhancement projects. During the year, Network Rail has made good progress against its schedule of improvement activities. We are taking an independent view

of how the products have been embedded in the business and are sampling six projects and programmes across GB. We will report on this in our next Monitor.

5.17 Network Rail has said that it will take time for the benefits of EIP to be realised and it is therefore difficult at this time to say whether Network Rail's capability has improved. We are working with the company to understand how benefits should be evidenced and monitored to provide the required evidence that the EIP has had the desired effect of improving capability. We will report on the progress in our next Monitor.

5.18 The Independent Reporter has been carrying out assurance activities on some of the EIP workstreams. The resulting report is published alongside this monitor.

5.19 A summary of progress against each of the seven EIP workstreams is set out below.

Clienting and governing the enhancement portfolio

5.20 In England and Wales, DfT acts as client for the enhancements portfolio. In broad terms, the governance for the portfolio is via a series of programme boards which make decisions on changes to any outputs or cost. There is also a Portfolio Board which gives final approval to any changes and manages the affordability of the portfolio. Both the portfolio and the programme boards are chaired by the DfT. Similar arrangements are in place in Scotland with Transport Scotland acting as client.

Project sponsorship and transition management

5.21 This workstream will improve the competency of project sponsors across Network Rail. A new Head of Sponsorship is now in place and plans to enhance Network Rail's sponsorship capability are being implemented. Further plans to build on and improve the sponsorship discipline will continue beyond the timescales of the EIP.

Cost planning, estimating risk and value management

5.22 This workstream is essential to improving the quality of project estimates throughout the project lifecycle and should deliver more robust estimating to support the periodic review process. There has been some delay to the programme on resourcing and sourcing new software.

Project governance and gateway assurance

5.23 Network Rail has now started implementing peer reviews – short, focused reviews undertaken at key decision points in the GRIP project or programme lifecycle. These are undertaken by Network Rail staff who are independent from the project team and business unit responsible for the successful delivery of the

project/programme. As part of the reporting from the Independent Reporter we have seen evidence of the peer reviews taking place and actions being taken as a result.

Project portfolio monitoring

5.24 This workstream covers the implementation of a new project portfolio monitoring system. This system is intended to deliver new ways of monitoring project and programme performance for Network Rail projects. The aim is to change the emphasis from reactive reporting to proactively examining measures such as future schedule and detailed analysis of projects' safety performance.

5.25 The system was developed to include the functionality specified to meet the EIP requirements, so Network Rail is reporting this workstream as complete. Subsequently the company has added plans to increase the functionality of the system. It is planning to have it embedded in the organisation in October 2017.

Project delivery capability

5.26 Network Rail has created a programme, commercial and development function in its Investment Projects directorate. This function will provide a more structured approach to improving the capacity and capability of its people for these aspects of programme management. As part of this workstream, critical resource supply and demand modelling has also been completed. This will be essential in planning for the long-term workbank into the next control period.

Safety by design

5.27 Network Rail issued a *Safety by Design* policy in December 2016. The policy aims to reduce future safety risk when new infrastructure is designed. We have seen evidence of the application of the policy. However we remain concerned about how Network Rail will monitor the benefits of this workstream (which may take several years to materialise) to ensure that the policy is achieving the aims it set out to, and that any required amendments to the policy are captured at the earliest opportunity.

6. Expenditure and finance

Overall financial performance

6.1 We can consider Network Rail's financial performance in two different ways: firstly by providing a simple comparison of spend against its own budget (Table 1 below) and secondly by considering our regulatory performance measure (Table 2 below).

6.2 There are several ways in which key messages can be conveyed through the regulatory performance measure and these choices include:

- comparing either to Network Rail's annual budget or to our determination, as we do in our Annual Efficiency and Financial Assessment;
- showing the variances gross, or net of adjustments made in line with the RAB sharing mechanism; and
- including or excluding the adjustments made for missed regulatory outputs.

Expenditure and financial performance[8]

Table 1: Income and expenditure for Great Britain in 2016-17 – a simple comparison of all Network Rail income and expenditure

£m	Full Year 2016-17		
	Budget	Actual	Variance b/(w)
Turnover[9]	6,770	6,773	3
Schedule 4	(309)	(218)	91
Schedule 8	(104)	(187)	(83)
Operations	(559)	(557)	2
Support	(1,033)	(873)	160
Maintenance	(1,254)	(1,368)	(114)
Capex - Renewals	(3,238)	(2,773)	465
Capex - Enhancements	(3,901)	(3,878)	23
Financing costs	(1,749)	(1,797)	(48)
Total	**(5,377)**	**(4,878)**	**499**

6.3 In 2016-17, Network Rail underspent its own net budget by £499m. In the previous monitor we noted that Network Rail was forecasting it would underspend by £3m. The main reasons for the larger than expected underspend are:

- £465m lower renewals expenditure. Far lower volumes have been delivered than expected (the value of the renewals which have not been delivered is

[8] The numbers quoted in this section are taken mainly from Network Rail's Period 13 Finance Pack and include some later adjustments. There will be some differences between the numbers shown as the Actuals in the Monitor and those in Network Rail's final published statutory and regulatory accounts and our annual efficiency and finance assessment.

[9] Turnover includes the government grant, income from fixed and variable charges and 'other single till income' such as income from property, freight, stations and depots.

£800m) and this work will be delivered at a later date (see Table 2 below)[10]. Taking this into account the cost of the work Network Rail has done was £335m higher than expected (adjusted to £84m in line with the RAB sharing mechanism). This is largely due to less work being delivered by high output plant and higher costs for the work done; additional contractor claims; and delays to signalling projects. It has also not delivered its planned efficiency initiatives;

- an underspend against budget of £91m on schedule 4 costs largely due to the reduced renewal activity and benign weather generally, particularly during the winter; and
- £160m lower support costs than budgeted largely due to a favourable reassessment of insurance liabilities and group contingency not required. There was also a reduction in traction electricity charges. These lower charges are passed on to the train operators, also resulting in lower income.

6.4 There have also been some notable overspends:

- increased Schedule 8 compensation for delays (£83m) is largely due to asset failures (for example in signalling or in overhead supply lines) and including large one-off events such as flooding, landslips and fires. Examples are severe flooding in London in June 2016 (£10m), Storm Doris (£10m) and the landslip in Watford (£5m);
- higher maintenance costs (£114m) partly due to lower than planned efficiencies delivered by the routes; £22m from reactive maintenance which had been largely budgeted within renewals; higher costs of civils inspections mainly because of restricted access to sites; additional investment in performance improvement programmes; increased levels of maintenance needed because of the delay in renewals projects; and
- higher financing costs (£48m) mostly due to higher inflation.

Regulatory financial performance

6.5 As described in paragraph 6.1 above, we also use our regulatory performance measure to monitor Network Rail's performance. This measure provides a better calculation of Network Rail's performance because it:

- excludes certain types of income and expenditure that are not as controllable by Network Rail. These include network grant, fixed track access charges, traction electricity income and costs and business rates;

[10] Volumes here includes both work in progress and work commissioned on all asset types whereas volumes discussed in the Asset Management section of this monitor (Section 4) includes work commissioned only on some asset types for which volumes are reported. Therefore, the comments on volumes in this section are not directly comparable to those in the asset management section.

- ensures that Network Rail does not benefit by simply delaying work to a later date as it is just a timing difference, i.e. the work still needs to be done in the future;
- adjusts for the value of the output not delivered as Network Rail should not benefit by not delivering its outputs;
- adjusts the out/under performance on renewals and enhancements to be consistent with our RAB sharing mechanism[11]: and
- adjusts so that the comparison is made against PR13 rather than Network Rail's budgets.

6.6 Table 2 shows how the financial performance measure is calculated and the different parts of the calculation as described in paragraph 6.2 above.

Table 2: Financial performance measure for Great Britain in 2016-17

	£m	Variance to budget b/(w)	Timing b/(w)	Gross Financial (under)/out performance	Net Financial (under)/out performance	Notes
a	Turnover (Incl. Volume Incentive)[12]	16	2	14	14	
b	Schedule 4	91	81	9	9	
c	Schedule 8	(83)	(7)	(76)	(76)	
d	Operations	2	8	(6)	(6)	
e	Support[13]	136	100	36	36	
f	Maintenance	(114)	(49)	(65)	(65)	
g	Capex - Renewals	465	800	(335)	(335)	
h	Capex adjustment - Renewals				251	
i	Renewals (net)				(84)	g + h
j	Capex - Enhancements	23	163	(140)	(140)	
k	Capex adjustment - Enhancements				112	
l	Enhancements (net)				(28)	j + k
m	**Financial performance measure compared to Network Rail budget**			**(563)**	**(200)**	(a to h) + j + k
n	Network Rail budget compared to PR13 (gross)			(1,168)	(1,168)	
o	Capex Adjustment for renewals & enhancements				640	
p	Network Rail budget compared to PR13 (net)				(528)	n + o
q	**Gross FPM before adjustment for missed regulatory outputs**			**(1,731)**	**(728)**	m + p
r	Less: Adjustments for missed regulatory outputs	(110)		(246)	(246)	
s	**Total financial performance measure (FPM)**			**(1,976)**	**(974)**	q + r

[11] We do this by limiting the financial reward/penalty to generally 25% of the under/outperformance. For example in Table 2, the gross renewals underperformance is £335m, so we limit it to 25% by deducting 75% in the line "Capex adjustment - Renewals", i.e. £251m = £335m x 75%. The RAB sharing mechanism also applies to enhancements ("Capex adjustment – Enhancements") in Table 2.

[12] Excludes those elements of income not relating to Network Rail's performance: Network Grant, Fixed Access charges and charges for traction costs (EC4T) passed on to the train operating companies. The variance to budget for Turnover in this table is therefore different to the Turnover budget variance in Table 1

[13] Includes rates & industry costs but excludes others such as those electric for traction costs (EC4T) relating to train operating companies. Numbers therefore differ to the support costs in Table 1.

6.7 Network Rail's 'gross' underperformance, i.e. without the adjustments described in the third and fourth bullet points in paragraph 6.5 above, is £1,731m. This is because:

- Network Rail's gross financial performance for the full year is £563m adverse to its own budget. This is largely because, compared to its own budget, it has underperformed on Schedule 8 compensation payments (£76m), maintenance (£65m), renewals (£335m), and enhancements (£140m) as explained above; and
- Network Rail's 2016-17 budget was itself £1,168m worse, on a gross FPM basis (on a net FPM basis it was £528m worse) than our determination. This is mainly due to lower planned efficiencies and higher unit costs than previously assumed across most core business activities.

6.8 There are £246m of adjustments for its underdelivery of the PPM and CaSL train performance regulatory outputs and for missing two of nine outputs for ORBIS in 2016-17. Including these adjustments, the total gross underperformance is £1,976m as shown in Table 2 above.

6.9 The net underperformance compared to our determination and as the basis for REBS calculations, is £974m in 2016-17 as shown in Table 2 above. This is the Total gross FPM of £1,976 reduced by the three Capex adjustments (shown in rows h, k & o of the table).

6.10 One of the key issues in calculating the Financial Performance Measure is how Network Rail's deferral of volumes has been treated, particularly as the total value of volumes that have not been delivered in 2016-17 but will be delivered at a later date is £963m, (£800m on renewals and £163m on enhancements). The high level of deferrals increases the risk that asset performance (and hence network performance) deteriorates, increasing the whole life cost of the railway as additional maintenance (both planned and reactive) is required in the interim. The continuing high level of deferrals also makes it harder for Network Rail to adequately increase renewals volumes in the future to compensate.

6.11 As can be seen in Table 2 above, taking into account deferrals, the financial underperformance is mainly driven by renewals and enhancements as explained below:

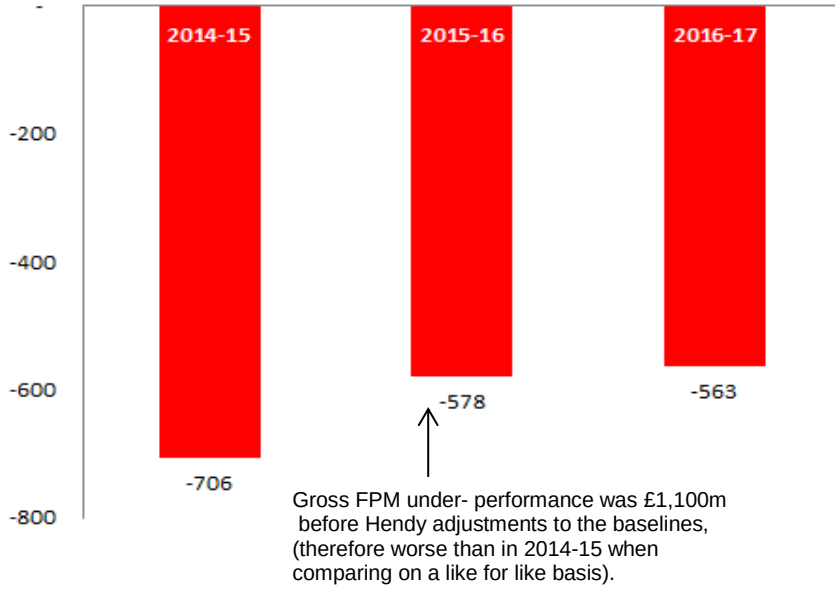
- the gross renewals underperformance of £335m was largely due to: less track work (£132m) being delivered by the high output plant where work could not be carried out. This led to additional contractor claims and reduced volumes and higher cost of work actually delivered; the impact of additional scope and emergency work on civils as well as higher rates (£114m); and signalling issues

including project delays (£38m). It has also not delivered its planned efficiency initiatives.

- enhancements underperformance was largely due to increased contract costs, supply chain constraints and access issues on Northern Hub (£80m), EGIP (£38m), East West Rail (£35m) and on the three projects electrifying the Shotts, Rutherglen-Coatbridge and Stirling-Alloa lines (collectively known as "the rolling programme of electrification" in Scotland (£15m))[14].

6.12 For each of the first three years of the control period, Network Rail has underperformed against budget. This has continued even after the Hendy review (Table 3).

Table 3: Gross FPM variance to budget for Great Britain during the first three years of CP5 (£m 2016-17 prices)



Efficiency[15]

6.13 Network Rail still needs to address the problems arising from cost escalation and delays across both renewals and enhancements projects. There is continuing underperformance in these key areas of the business.

6.14 Network Rail needs to focus on cost efficiency and effectiveness in order to address the challenges set out in the regulatory settlement and it needs to do this while delivering record levels of enhancement activity, high levels of renewals activity to

[14] Network Rail is currently forecasting to achieve the revised enhancements baselines to the end of CP5 as recommended in the Hendy Report for England and Wales. Forecast underspend in England and Wales compared to budget is £2m to the end of CP5 but £185m of expenditure has been deferred. So, for the work done, underperformance to the end of CP5 is expected to be £183m. For Scotland where the baseline remains the one set through the ECAM process, there is an overspend of £133m compared to budget, which includes £17m of work brought forward. So, for the work done, underperformance is expected to be £116m.Therefore, for Great Britain as a whole, underperformance to the end of CP5 is forecast to be nearly £300m.

[15] For more information see our consultation

improve long-term asset sustainability and, ultimately, the performance of the network. The cost effectiveness of renewals activity continues to be particularly challenging.

6.15 Network Rail's efficiency in 2016-17 for the core business was -5.0% for the control period to date[16]. Its forecast efficiency for the whole of CP5 is -1.5%. This is below our PR13 assumption of a 13.7% improvement by the end of the third year and a 19.4% improvement by the end of the fifth year of CP5[17]. We are making changes to the way we monitor Network Rail's efficiency and will report on this in the next monitor.

Network Rail's net debt, RAB, headroom and borrowing

6.16 Network Rail's net debt for Great Britain as at the end of 2016-17 is £44.8bn. This is £0.8bn better than budget largely due to lower capital expenditure on renewals (£465m) and movement on working capital (£265m).

Table 4: Great Britain as at the end of 2016-17: Net debt, RAB and Gearing against budget[18]

£m	Full Year 2016-17		
	Budget	Actual	Variance b/(w)
Net Debt	45,552	44,792	760
Closing RAB	61,904	61,753	(151)
Gearing (net debt/RAB)	73.6%	72.5%	(1.1pp)

6.17 Following the company's classification to the public sector by the Office of National Statistics (ONS), Network Rail agreed to borrow from DfT instead of issuing bonds. The amount of new borrowing available from DfT is limited to £30.9bn across CP5 for Great Britain, after this was increased by £0.7bn following the Hendy Review.

6.18 Compared to its forecast at the start of CP5, Network Rail has spent more than it expected on the renewals and enhancements work it delivered in 2014-15, 2015-16 and 2016-17. It is also planning to spend more in the remainder of CP5. This means there is pressure on its borrowing facility with DfT.

[16] The efficiency numbers include the effects of two changes to the calculation. Firstly, it now excludes some civils costs that were previously included as Network Rail were not sure of the regulatory treatment as they were civil adjustment mechanism related costs. We have also corrected the calculation of the renewals unit rates for the end of CP4, which is the baseline. As an indication of the materiality of these changes, last year we reported that OSMR efficiency for the first two years of CP5 was -8.0% and we now think it was -4.9%.

[17] Our measure of efficiency is a simple measure of the change over time in operations support, maintenance and renewals expenditure. This measure compares actual expenditure in 2016-17 with actual expenditure in 2013-14 (the last year of control period 4) adjusted for the level of activity undertaken and other issues.

[18] The decrease in the gearing ratio is 1.1 percentage points. This is the arithmetic difference between two percentages. In percentage terms the change is 1.1/73.6 = 1.4%. When compared to our determination, Net Debt is £1.5bn higher than in our determination and the closing RAB is also higher, by £1.7bn. As these changes are in approximately the same proportion as the ratio of the two set in the determination, the net gearing ratio is similar to that in the determination.

6.19 Network Rail's latest business plan for Great Britain includes financial headroom of £0.3bn, i.e. it thinks it will not need to use £0.3bn of the borrowing facility.

6.20 In our November monitor we noted the financial risks the company faces. These risks remain and include: given its recent performance, the company may not deliver its current planned efficiencies; movements in interest rates; inflation; and the amount of money it needs to set aside for funding the cost of its financial instruments[19]. In addition, asset disposal proceeds are uncertain and they are likely to be lower than originally forecast. This is putting more pressure on Network Rail's financial position. Network Rail needs to develop its contingency plans further to address these pressures.

6.21 In case some of these income and cost pressures materialise, Network Rail has plans to generate additional savings of £0.3bn in England & Wales, but they are not guaranteed. Network Rail has received additional grant funding of £0.3bn from DfT in 2017-18.

6.22 Network Rail has provided us with some high-level information on how it would deal with further pressures but we are concerned that it does not have a formal route-based plan in place for England & Wales to deal with these pressures, although it does have one for Scotland. We will therefore continue to engage with Network Rail on this issue and we will monitor closely its plan to deliver its efficiency savings in Great Britain.

6.23 We are making changes to the way we monitor Network Rail's efficiency for CP5 and we will report on this in the next monitor. As part of our work on PR18 we are consulting on the reasons why Network Rail has not delivered renewals efficiency improvements in CP5, and how ORR should change its approach to assessing Network Rail's plans for CP6. In addition we have commissioned an independent reporter study into the progress that Network Rail is making in developing these CP6 plans, to help provide greater assurance that its final plans will contain robust efficiency proposals across all areas of expenditure.

6.24 As well as agreeing the maximum amount of borrowing across CP5 for Great Britain with DfT, it also agrees an amount for each year. For 2016-17, Network Rail borrowed £6.1bn from DfT which was lower than their agreement, mainly due to lower collateral payments than expected.

6.25 In order to further improve the performance and resilience of Thameslink, DfT has provided a £0.25bn additional grant to Network Rail[20]. Network Rail can also apply to draw down £0.45bn from a treasury fund over the next few years to pay for work on the digital railway.

[19] Prior to reclassification, Network Rail borrowed directly from the financial markets. To reduce its exposure to interest rate, currency and inflation fluctuations, Network Rail took out a range of financial instruments. Many of these require Network Rail to set money aside in the form of collateral, and this amount varies as markets move.

[20] In addition, Network Rail will fund £50m of work which will make the total spend on this project £0.3bn.

Asset disposals

6.26 Network Rail continues to look at the option of disposing of a number of its property related assets. Its objective, in line with the Hendy report, is to raise extra funds to support the railway enhancement programme without compromising the safe and efficient operation of the railway. Any proposals must work legally and commercially. They must also deliver value for money, satisfy any relevant policy issues and demonstrate value for money.

6.27 The company is also still considering options to deliver sustainable growth and a better long-term management and operating model at its 18 major stations. We have had a number of detailed working-level discussions with Network Rail and its advisers to explore the regulatory implications of the options.

6.28 Under its network licence, Network Rail will need our consent for disposing of certain assets and we will consider the regulatory implications of its proposals as they develop.

Route level analysis of financial performance

6.29 This section provides a simple comparison of route expenditure compared to Network Rail's budget in the year 2016-17. The data is not normalised to reflect differences in characteristics of routes, such as length of track, electrification, geography and types of services. Therefore, this analysis cannot be used to draw conclusions about the relative performance of the routes. But it can highlight particular issues at a route level or the differing impact of challenges faced across Network Rail.

Table 5: Route level expenditure against budget[21]

Full Year 2016-17 Variances						
£m	Operations	Support	Maintenance	Renewals	Enhancements	Total variances
Anglia	(2)	0	3	42	(153)	(110)
LNE/EML	(5)	1	(49)	28	61	35
LNW	(3)	1	(9)	34	121	145
Scotland	0	0	(2)	12	(55)	(46)
S. East	9	(3)	(29)	23	(14)	(15)
Wales	0	(1)	(3)	11	25	32
Wessex	1	1	(2)	(1)	29	29
Western	1	1	(9)	33	117	142
Total	1	0	(100)	181	130	212
Central Units	1	160	(14)	284	(106)	324
Grand Total	2	160	(114)	465	23	536[22]

[21] A positive variance reflects an underspend against budget. A negative variance relects an overspend.

[22] Adding to this total the -£48m variances on finance costs, and the £11m variance on turnover and on schedules 4 & 8, equals the variance of £499m shown in Table 1.

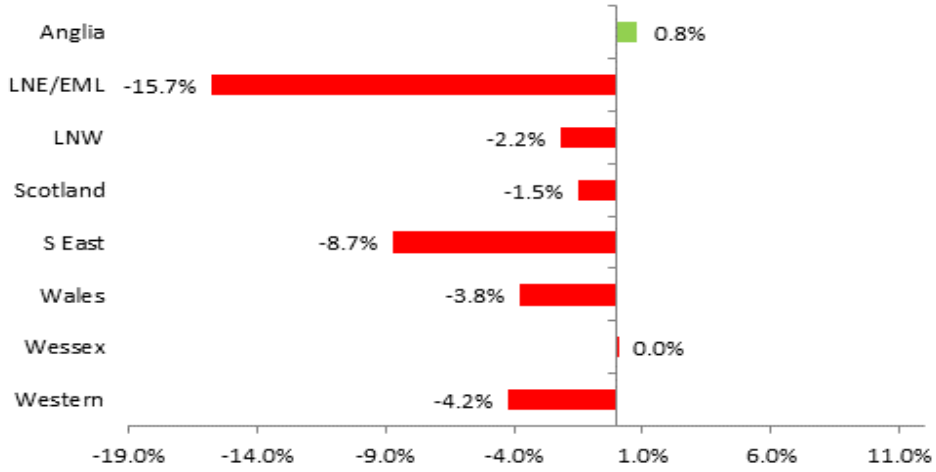
Note: The numbers for the routes in this table exclude Network Rail's central business units' allocations to routes. These are included in the Central Units row. Variances shown here as quantified amounts, are expressed in percentages in the charts on the following pages.

Route level analysis

Current year expenditure against budget

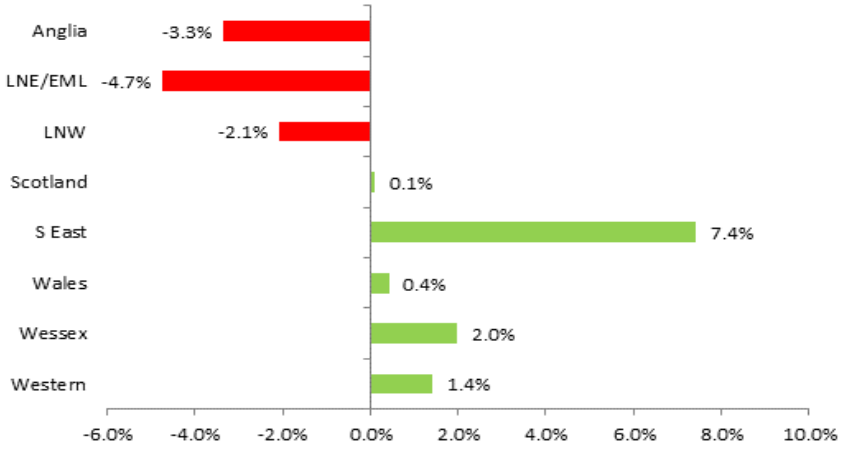
6.30 The charts below show, on a percentage basis, the actual expenditure of each route compared to its budget, before the allocation of central unit costs.

Chart 1: Operations, support and maintenance



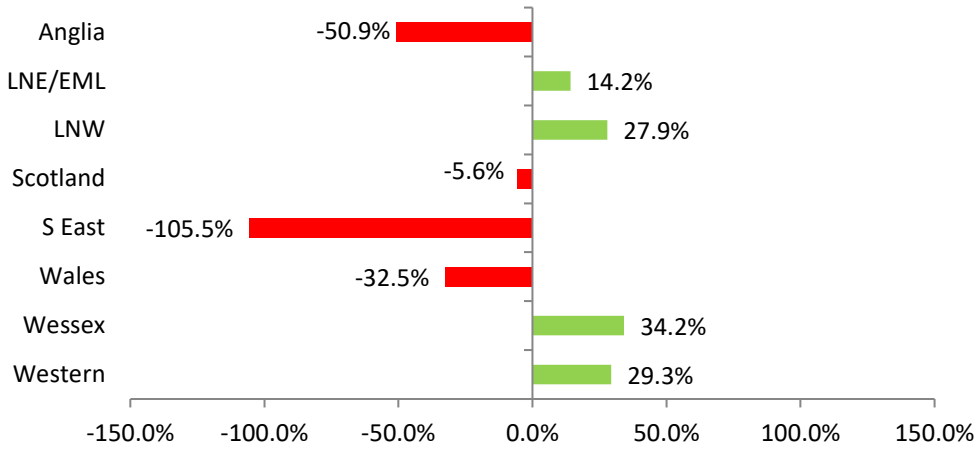
6.31 Network Rail has spent more than its operations support and maintenance (OSM) budget on most routes in 2016-17. This is largely due to overspend on Maintenance (see Chart 4 below). Anglia has underspent its OSM budget and this too is due to an underspend in maintenance (see Chart 4).

Chart 2: Operations



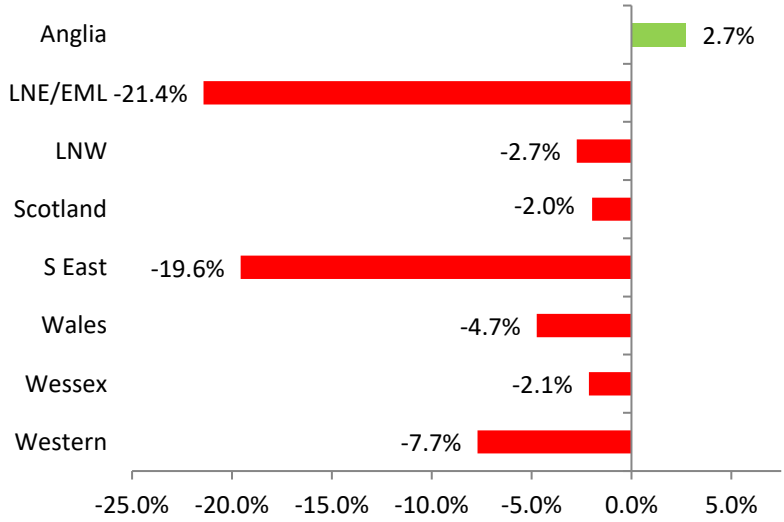
6.32 A budget for maintenance spend of £9m was incorrectly allocated to operations causing an underspend in South East and contributing to the overspend for South East shown in Chart 4 below.

Chart 3: Support



6.33 The large percentage overspends in support costs are relatively small in monetary terms. For Anglia the variance is £0.4m, for Wales £0.7m and the largest for South East is £2.8m. Partly this is because, at the route level, there is less consistency in the budgets about the classification of costs between maintenance and support.

Chart 4: Maintenance

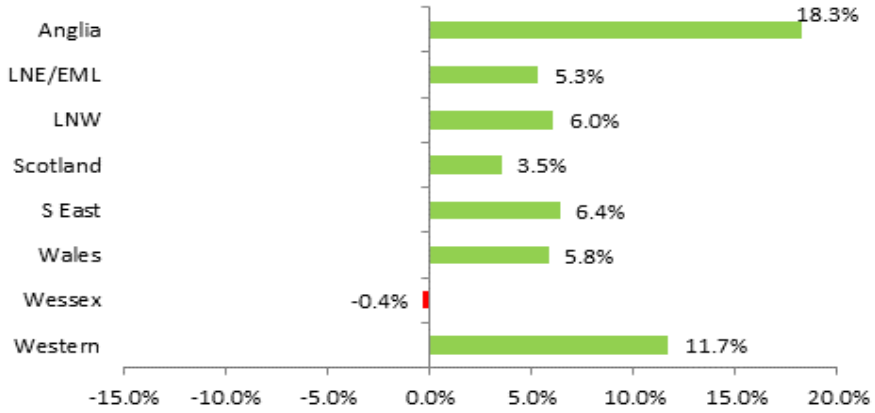


6.34 The largest route variances in monetary terms (see Table 5 above) are all in maintenance, with civils and building costs originally planned within renewals contributing to the large percentage changes in LNE/EML, South East and Western. Delays to renewals projects also contributed as more maintenance work was

needed to maintain performance and there were higher costs of civils inspections because of restricted access to sites.

6.35 Anglia's underspend in maintenance (£3m) is due to a difference in classification: reactive maintenance expense on buildings and civils was classified during the year as renewals and not maintenance as budgeted.

Chart 5: Renewals

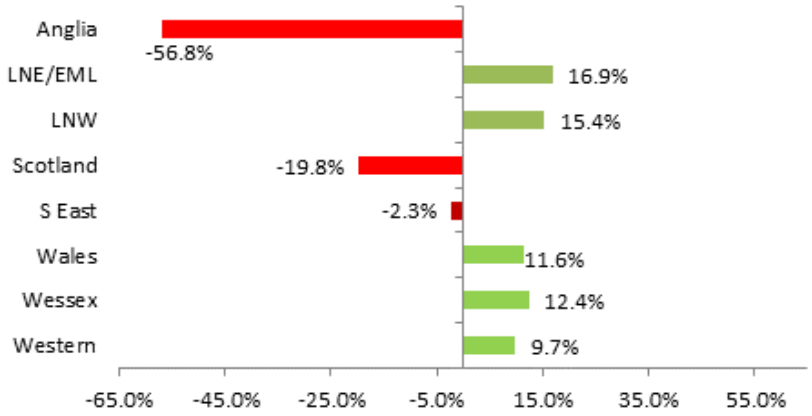


6.36 Chart 5 shows variances on renewals before adjusting for deferrals. In general the reason for the underspends is the high level of deferrals across the routes. Once we have taken account of volumes not being delivered, all routes in the chart are underperforming on the work done.

6.37 Anglia, LNE and LNW have each deferred around 25% of their renewals budget, South East, Wessex and Western between 15%-20%, and Scotland and Wales have deferred around 10%.

6.38 LNE, LNW and Wessex have the highest percentage of underperfomance with negative FPM in the region of -16% to -21% of budgeted renewals. Anglia, South East and Western have a negative FPM of around -8% and Scotland and Wales have a negative FPM of around -5% of their renewals budget.

Chart 6: Enhancements



6.39 Chart 6 shows that most routes are underspending their budgets e.g. Thameslink (£18m on LNE/EML), West Coast power supply upgrade (£13m on LNW) and Great Western Electrification (£60m on Western). However, the Anglia route has overspent by 56.8% (£153m), mainly due to the re-profiling of the Cross-Rail East works between Shenfield and Liverpool Street (£104m) where work has been brought forward and the spend in 2016-17 is nearly three times more than budgeted. No increase is expected in the overall cost of the project, consequently no underperformance has been recognised. Most of the remaining variances in Anglia are from overspend in three third-party projects which are in Network Rail's budget, though not in our determination. These are Cambridge North Station, £10.5m; Hackney Wick Station, £12m; and Gospel Oak-Barking OLE, £23.5m.

6.40 In Scotland where the projects are still governed by the ECAM efficient spend baselines, there is an overspend of nearly 20% of the budget (£55m). This is mainly in EGIP (£27m) where there has been underperformance as well as work being brought forward to meet milestone targets in early 2017-18; and also in the Rolling Programme of Electrification (£33m). The large volume of re-design and re-delivery has led to significant increases in scope and costs of both these projects[23]. Overall Scotland is reporting £56m underperformance in enhancements (before RAB adjustment).

[23] This is due to initial designs being found to be non-compliant with the minimum legal requirements for electrical clearances.

Current year financial performance

6.41 Table 6 below is a route-level breakdown of the net financial performance shown in Table 2, i.e. it shows the total FPM of £200m by route and central units[24].

Table 6: FPM - Route level net (under)/outperformance (before allocation of central unit costs)

	FPM Full year income variances		FPM Full year cost variances		
£m b/(w)	FPM variances (Turnover, schedules 4 & 8)	FPM (under)/out performance as % of actual income	FPM variances (OSM, Renewals, Enhancements)	FPM (under)/out performance as % of actual cost	Total Net FPM: full year
Anglia	(18)	(21%)	(10)	(1.3%)	(28)
LNE/EML	(6)	(2%)	(55)	(4.7%)	(61)
LNW	(9)	(3%)	(73)	(4.4%)	(82)
S. East	(4)	(3%)	(24)	(1.9%)	(28)
Scotland	6	4%	(23)	(2.8%)	(17)
Wales	7	16%	(7)	(1.4%)	0
Western	(3)	(2%)	(11)	(0.7%)	(14)
Wessex	(15)	(17%)	(7)	(1.3%)	(22)
Total	**(42)**	**(3%)**	**(210)**	**(2.6%)**	**(252)**
Central Units[25]	(11)	0%	63	3.2%	52
Overall Total	**(53)**	**(1%)**	**(147)**	**(1.8%)**	**(200)**

6.42 The overall net underperformance of £200m is largely due to:

- £76m Schedule 8 payments reflecting longer than expected delays. Anglia (-13%), Wessex (-16%) and South East(-18%)[26] were the routes most affected due to asset failures, for example in signalling or in overhead supply lines and also various infrastructure incidents such as flooding, landslips and fires including large one-off events such as the severe flooding in London, Storm Doris and a landslip in Watford.

- £147m underperformance on OSM, renewals and enhancements, of which the largest elements are in:

  - LNE/EML (-5%, maintenance and renewals) see paragraphs 6.34 and 6.39 above;

  - LNW (-4%, renewals and enhancements). There has been significant underperformance on the Northern Hub project due to increases in signalling costs and increases in costs due to access issues; and

  - Scotland's underperformance (-3%) includes the EGIP and Rolling programme of electrification enhancement projects (see paragraph 6.40).

[24] Table 6 is net of the RAB sharing mechanism, which reduces the underperformance for Renewals and Enhancements. Without the adjustment the net underperformance of -£200m would be -£563m.

[25] There was £1.3bn of expenditure in the Central Units including traction electricity costs (which are recovered through income), business rates and other industry costs as well as centrally managed capital projects such as IT, ORBIS and Plant & Machinery.

[26] South East's Schedule 8 underperformance (£26m) is not apparent in Table 6 as it is largely offset by a £27m outperformance from Schedule 4.

7. The railway in Wales

Health and safety

7.1 Like the rest of the network, Wales has seen a slowing in what have been generally positive trends on safety performance. During 2016-17, Network Rail met all its commitments on train accident risk reduction volumes, apart from Road Vehicle Incursion targets. We understand however that this relates to just one site and agreement has been reached with the local authority to address the problem. There was also a data/reporting issue on another measure – Signal Overrun Assessment Tool (SORAT) assessments[27].

7.2 When normalised by hours worked, Wales has the highest number of close calls reported. Network Rail interprets this as a positive reflection of an open culture rather than any indication that conditions are worse than other routes.

7.3 As part of the level crossing risk reduction programme legal consent has been secured for the closure of Pilkins and Ystrad Fawr crossings. However, the risk is still present as these crossings will remain physically open until a diversionary bridge has been constructed. The bridge is due to be completed and the crossings closed next year.

Assets

7.4 Assets in Wales have different characteristics, challenges and management history. The unique environment of the Severn Tunnel, for example, has driven considerable additional re-railing volumes to try to manage rolling contact fatigue. Our inspections suggest that Network Rail's asset management teams respond well often bringing a new and innovative approach to stewardship of their portfolios.

Track

7.5 In the course of our inspection activity we found:

- use of track recording vehicles could be improved – especially to underpin more extensive use of risk-based maintenance (RBM);
- adoption of RBM across Wales was patchy – although this is partly attributable to the prevalence of ageing track assets which are unsuitable for RBM;

[27] Wales appears to have more than 100 overdue assessments. In fact 38 are subject to a derogation (the signal is about to be decommissioned or upgraded) and 60 of the assessments have been completed but have yet to be registered on the system.

- where RBM has been adopted, it has not always been carried out as thoroughly or extensively as the process requires and the full benefits have not always been realised; and
- track renewal deferral decisions were inspected as part of a national project. In common with other parts of the network, we found that original renewal decisions had been justified – so deferrals would be expected to have an impact. We found that Network Rail could not always demonstrate a robust approach to mitigating the effects of deferral. In particular, the impact on maintenance was not fully assessed.

Signalling assets

7.6 Asset condition varied across the route. Recent renewal and enhancement activity as part of Cardiff area re-signalling and preparation for electrification has brought modern equipment to that part of the route, and removed many higher risk assets such as single-cut cables. In contrast, deferrals such as Newport-Shrewsbury bring the challenge of maintaining ageing assets beyond original plans.

Civils

7.7 Midway through the year the route appeared to be struggling to comply with required actions to reduce the risk from scour at bridges. However, closer scrutiny revealed that the bulk of the apparent backlog was due to data issues and poor communication between the route and Network Rail's centre. The action plan is back on track.

7.8 There has been underdelivery of underbridge renewals volumes but this is more as a result of problems securing road closures than difficulties with the assets themselves. Earthworks renewals volumes have also been below forecasts for the year.

7.9 We saw no evidence of inadequate risk control due to renewal deferrals. Network Rail in Wales has expressed interest in remote condition monitoring at one or more earthwork site at risk of failure. This is despite the route not being part of formal RCM trials. We saw evidence of a move towards more renewal and refurbishment (de-vegetation and netting) of rock cuttings – on a risk basis. We understand that more of this type of work is planned for next year. Examinations of earthworks are generally up to date. Dedicated vegetation gangs have been created for both earthworks and structures – to prepare sites prior to examination. We note however, that vegetation was still reported as a reason why examinations could not be carried out as planned.

7.10 Wales has been at the forefront of developing drainage management good practice. The MyWork drainage app is in use across Wales and users have suggested improvements. As a result of adopting this app the accuracy and granularity of information within Ellipse has been improved, resulting in a more thorough and reliable inspection regime. Wales route scored very well in a recent Network Rail drainage audit.

Off track

7.11 Wales route has been a pioneer in developing a risk-based, properly resourced approach to off-track asset management. 2016-17 saw the delivery of a new management structure for off-track, with drainage (see above) integrated into it.

7.12 Poor-condition fencing is one of a number of risks in respect of off-track assets. We have observed that MDU staff are starting to use the MyWork app for fencing and the intention is that this will lead to a 'cleaner', more accurate, asset register in Ellipse, aiding better management of fencing. Similarly, management of lineside vegetation raises challenges for the route. The MDUs have a Temporary Non Compliance (TNC) because they require three years to meet the relevant vegetation standard. We are pressing for vegetation management plans, which may include the use of new technology, to put vegetation management onto a more sustainable footing.

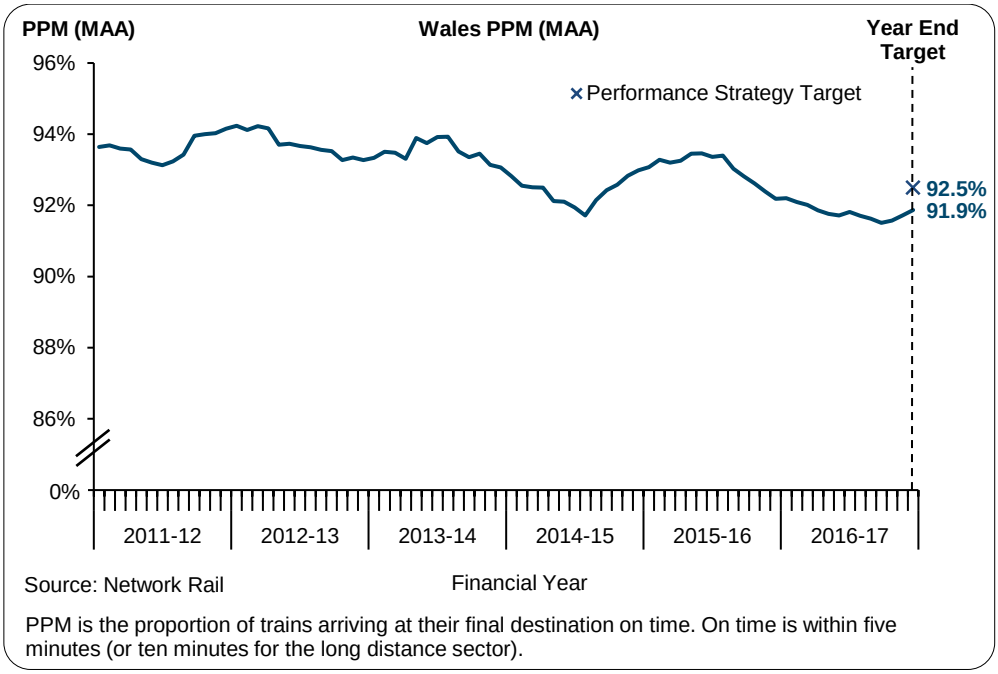
Construction issues

7.13 We meet Network Rail's central Infrastructure Projects team regularly and carry out joint site inspections. These often highlight basic improvements that could be made in site safety and in the interface with maintenance functions. We have promoted better adoption of *Construction, Design and Management* (CDM) regulation requirements.

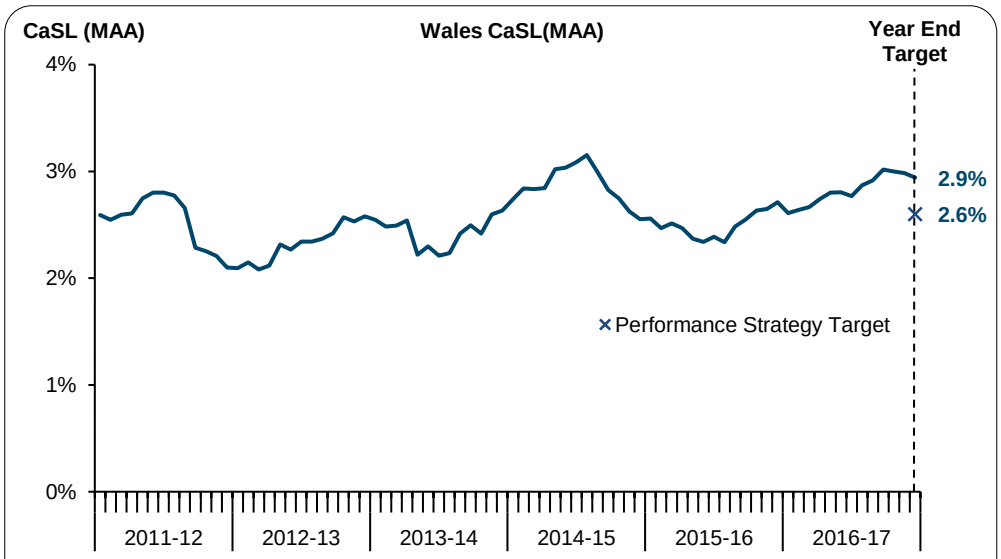
7.14 Manual handling issues in Wales have recently been the subject of ORR enforcement action. This action complements some national improvement notices, and we note that the route is playing an active part in finding innovative, effective solutions that can be rolled out nationally.

Train performance

7.15 Arriva Trains Wales' (ATW's) Public Performance Measure (PPM) Moving Annual Average (MAA) was 91.9% at the end of 2016-17, 0.6pp worse than the performance strategy target. CaSL MAA was 2.9%, 0.3pp above (i.e. worse than) the performance strategy target.



PPM is the proportion of trains arriving at their final destination on time. On time is within five minutes (or ten minutes for the long distance sector).

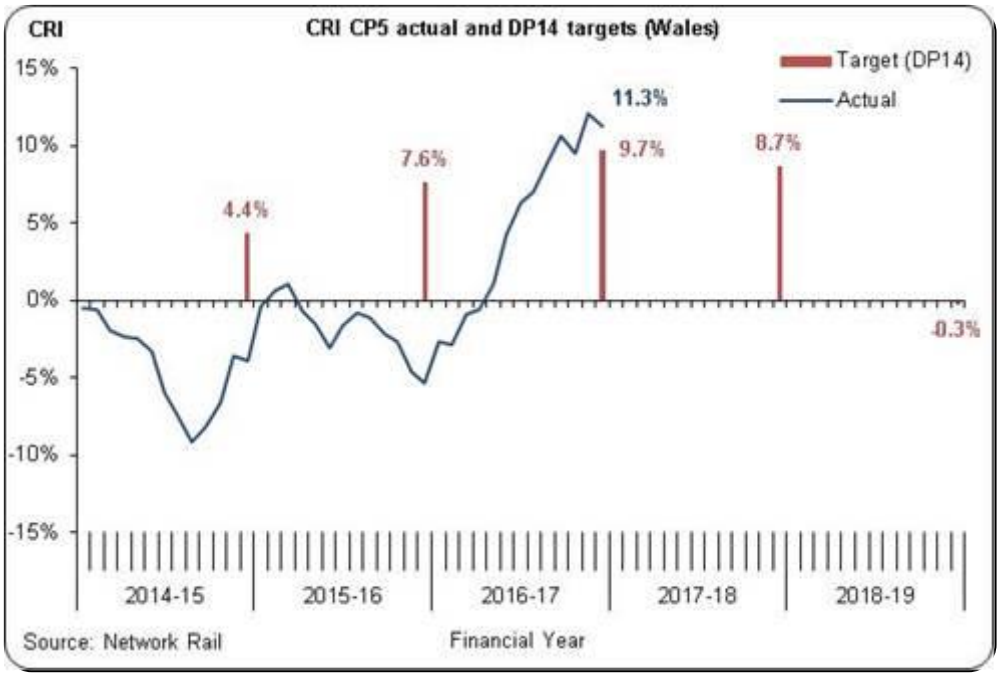


CaSL is the proportion of trains which fail to run at all or fail to call at all booked stops or arrive at their final destination 30 minutes or more later than planned.

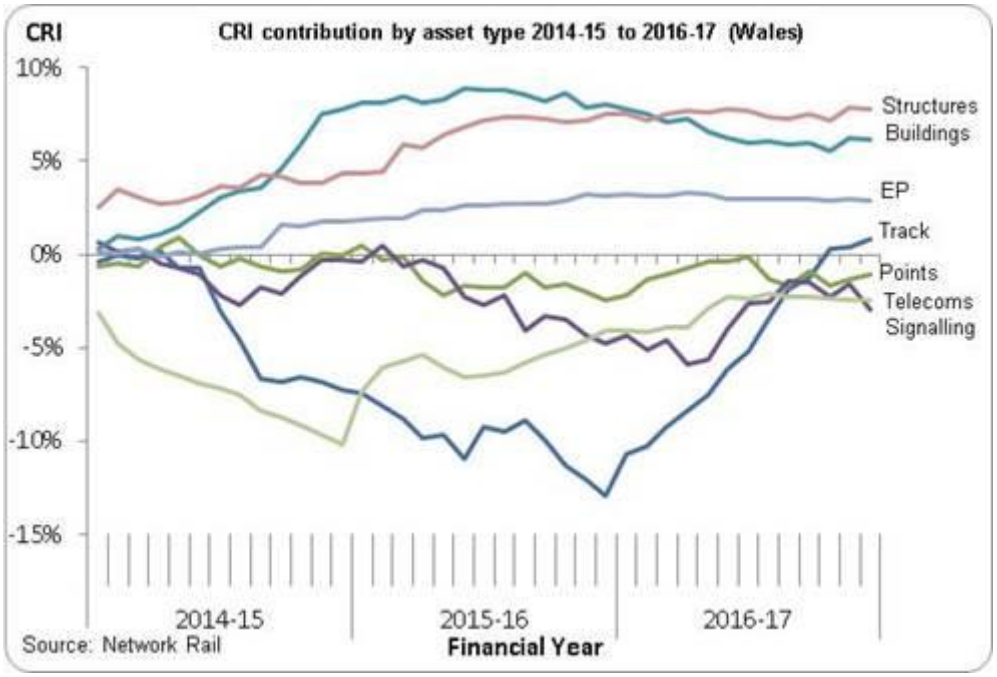
7.16 For England and Wales, we monitor Network Rail's delivery of the PPM and CaSL targets agreed with the operator in the local Performance Strategies. One of the ways we do this is by using the Network Rail Scorecards, which provide route based information based on targets agreed with the operators. Although behind target for PPM and CaSL, performance for Arriva Trains Wales (ATW) was within the thresholds specified in the Final Determination.

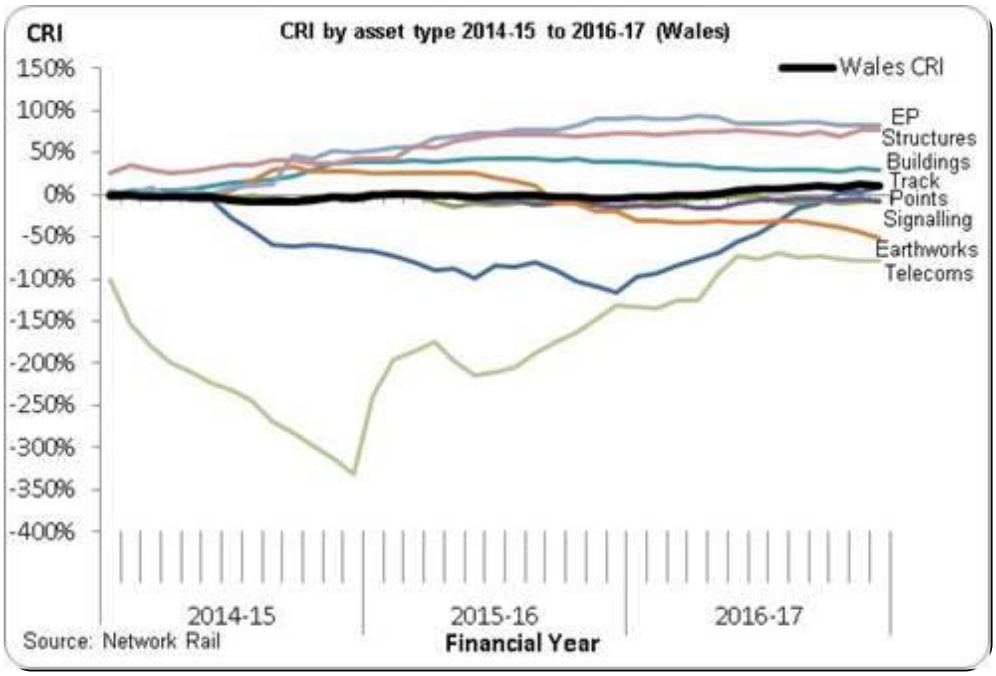
Asset management

7.17 The CRI measure of asset performance in Wales finished the year at 11.3%, which is a significant improvement after two years of poor performance, although still behind the network average of 15.8%.



7.18 The improvement was driven by a recovery in track performance, with the track contribution to overall CRI improving from -12.9% in the previous year to 0.9% this year (see chart below). The track CRI itself reached 7.9% by year end, up from -117% (see chart on page 67 below). There was also a partial recovery in telecoms, signalling and points, offset by a decline in buildings and earthworks.





Developing the network

7.19 The final phase of the Cardiff Area Signalling Renewal scheme was delivered over the Christmas/New Year period. The works were concentrated on the Cardiff Central area and included the opening of new platform 8 at that station. This project will enable an increase in the train service frequency to 16 trains per hour through the central core, following a previous increase to 14 trains per hour in November 2014.

Expenditure and financial performance

7.20 We consider Network Rail's financial performance in two different ways; firstly by providing a simple comparison of Network Rail's expenditure against its own budget (Table 1 below) and secondly, by considering our regulatory performance measure (Table 2 below).

7.21 There are several ways in which key messages can be conveyed through the regulatory performance measure and these choices include:

- comparing either to our CP5 determination, as we do in our Annual Efficiency and Financial Assessment, or to Network Rail's annual budget;
- showing the variances gross, or net of adjustments made in line with the RAB sharing mechanism; and
- including or excluding the adjustments made for missed regulatory outputs.

Expenditure

Table 1: Income and expenditure in Wales in 2016-17 – a simple comparison of Network Rail income and expenditure.

	Full Year 2016-17		
	Budget	Actual	Variance b/(w)
Turnover	348	347	(1)
Schedule 4	(24)	(10)	14
Schedule 8	(2)	(1)	1
Operations	(30)	(30)	0
Support	(37)	(31)	6
Maintenance	(67)	(71)	(4)
Capex - Renewals	(222)	(200)	22
Capex - Enhancements	(208)	(190)	18
Financing Costs	(87)	(88)	(1)
Total	**(329)**	**(274)**	**55**

7.22 In 2016-17, Network Rail in Wales spent £55m less than its budget largely because of:

- £22m lower renewals expenditure. Lower volumes have been delivered than expected (the value of the renewals that have not been delivered is £31m) and this work will be delivered at a later date (see Table 2 below). Taking this into account, the cost of work Network Rail has done was £9m higher than expected (adjusted to £2m in line with the RAB sharing mechanism). This is largely due to an overspend on track including additional work on track renewals during the Severn Tunnel electrification blockade and rising costs on signalling, including on Port Talbot re-signalling.

- £18m lower enhancements expenditure. This was mainly caused by lower than expected cash-funded enhancements (£8m) due to delays on third-party funded level crossing work. Network Rail is expecting to catch up on this work and deliver it at the budgeted cost in the future. Work on the South Wales Main Line has been moved to 2017-18 (£6m). No outperformance or underperformance has been recognised for Wales enhancements during 2016-17.

Regulatory financial performance

7.23 As described in paragraph 7.20 above, we also use our regulatory performance measure to monitor Network Rail's performance. This measure provides a better calculation of Network Rail's performance because it:

- excludes certain types of income and expenditure that are not as controllable by Network Rail. These include network grant, fixed track access charges, traction electricity income and costs and business rates;

- ensures that Network Rail does not benefit by simply delaying work to a later date as it is just a timing difference, i.e. the work still needs to be done in the future;

- can adjust for the value of the output not delivered as Network Rail should not benefit by not delivering its outputs;

- can adjust the out/under performance on renewals and enhancements to be consistent with the RAB sharing mechanism policy: and
- can adjust so that the comparison is against PR13 rather than Network Rail's budgets.

7.24 Table 2 shows how the financial performance measure is calculated and the different parts of the calculation as described in paragraph 7.20 above.

Table 2: FPM for Wales in 2016-17 – a comparison of income and expenditure used in our FPM calculation

£m	Variance	FPM neutral incl. timing b/(w)	Gross (under) / out performance	Net (under) / out performance
Turnover (Incl. Volume Incentive)[28]	(4)	(1)	(3)	(3)
Schedule 4	14	7	7	7
Schedule 8	1	0	1	1
Operations	0	0	0	0
Support [29]	12	13	(2)	(2)
Maintenance	(4)	1	(2)	(2)
Capex - Renewals	22	31	(9)	(9)
Capex adjustment - Renewals				7
Renewals (net)				(2)
Capex - Enhancements	18	18	0	0
Capex adjustment - Enhancements				0
Enhancements (net)				0
Capex - Net Total				(2)
Financial performance measure compared to Network Rail budget			**(7)**	**0**
Network Rail budget compared to PR13 (gross)			(78)	(78)
Capex Adjustment for renewals & enhancements				48
Less: Network Rail budget compared to PR13 (net)				(30)
Gross FPM before adjustment for regulatory outputs			**(85)**	**(30)**
Less: Adjustments for missed regulatory outputs	(4)		(4)	(4)
Total financial performance measure (FPM)			**(89)**	**(34)**

7.25 Network Rail's regulatory financial underperformance for the 2016-17 year is £34m. This is mainly due to lower efficiencies and higher unit costs than planned.

[28] Excludes those elements of income not relating to Network Rail's performance: Network Grant and Fixed Access charges. Numbers therefore differ to the Turnover costs in Table 1.

[29] Includes rates & industry costs. Numbers therefore differ to the support costs in Table 1.

7.26 This financial underperformance is made up of a number of components, including the following:

- Network Rail's gross financial performance for 2016-17 is £7m adverse to Network Rail's own budget. The largest area of underperformance, compared to its own budget, is track renewals arising from additional work including the Severn Tunnel electrification blockade and rising costs on signalling, including work on Port Talbot re-signalling;
- Network Rail's 2016-17 budget is itself £78m worse, (on a gross[30] FPM basis) than our determination. This is due to lower efficiencies and higher unit costs than assumed in our determination across most core business activities; and
- Network Rail has estimated that we will make a £4m adjustment to financial performance for its underdelivery of the regulatory outputs in 2016-17.

Efficiency

7.27 In Wales, Network Rail has reported a decline in efficiency of -7.8% on OSMR (Great Britain -5.0%) for the control period to date compared to our PR13 determination of 10.1% for Great Britain as a whole[31]. This combines 8.0% efficiency gains for operations, support and maintenance (Great Britain 6.8%) but a 20.5% decline in efficiency for renewals (Great Britain -17.1%) due mainly to the re-signalling issues described above.

7.28 By the end of CP5 Network Rail Wales expects to achieve efficiency of 16.0% on OSMR (i.e. it will exit CP5 16.0% more efficient than it started CP5). This compares favourably to the position for Great Britain overall and reflects different levels of activity on different asset types and different baselines specific to this route. But it is lower than our 19.5% assumption.

Expenditure (excluding central unit cost allocations)

7.29 Central unit costs, such as various HQ costs and some property costs are allocated to the routes. In 2016-17, these central costs of £1.3bn in Great Britain, came to approximately 14% of the total route expenditure. These include traction electricity costs (though not for Wales) which are recovered through income, business rates and other industry costs as well as centrally managed capital projects such as IT, ORBIS and plant & machinery.

[30] In net FPM terms it was £30m worse.

[31] Our measure of efficiency is a simple measure of the change over time in operations support, maintenance and renewals expenditure. This measure compares actual expenditure in 2016-17 with actual expenditure in 2013-14 (the last year of control period 4) adjusted for the level of activity undertaken and other issues.

7.30 Earlier tables show figures after these allocations. But to be more comparable with other routes, Table 3 looks at Wales's expenditure comparable to Network Rail's budget before the allocation of central unit costs.

Table 3: Wales expenditure compared to budget – before allocation of central costs in 2016-17

£m	Full year 2016-17			
	Budget	Actual	Variance	Variance (%)
Operations	(30)	(30)	0	0%
Support	(2)	(3)	(1)	(33%)
Maintenance	(65)	(68)	(3)	(5%)
Renewals	(195)	(183)	11	6%
Enhancements	(214)	(189)	25	12%
Total	**(505)**	**(473)**	**32**	**6%**

8. Y Rheilffyrdd yng Nghymru

Iechyd a diogelwch

8.1 Fel gweddill y rhwydwaith, bu arwydd o arafu yng Nghymru hefyd ynghylch tueddiadau cadarnhaol fel arfer ynghylch perfformiad diogelwch. Yn ystod 2016-17, bu i Network Rail fodloni eu holl ofynion yn ymwneud â lleihau perygl o ddamweiniau tren, heblaw am eu targedau Tresbasiad Cerbydau Ffordd. Rydym yn deall fodd bynnag fod hyn yn berthnasol i un safle yn unig ac mae cytundeb wedi ei sefydlu gyda'r awdurdod lleol i fynd i'r afael â'r broblem. Bu hefyd problem ynghylch data/cofnodi ynghylch mesur arall - asesiadau Adnodd Asesu Signalau yn Gor-redeg (SORAT)[32].

8.2 Wrth normaleiddio hyn gyda'r nifer o oriau wedi eu gweithio, cafodd y nifer uchaf o ddamweiniau posib agos iawn eu cofnodi yng Nghymru. Mae Network Rail yn dehongli hyn fel nodwedd gadarnhaol o ddiwylliant agored yn hytrach nag unrhyw arwydd fod amodau yn waeth na'r rheilffyrdd eraill.

8.3 Fel rhan o'r cynllun lleihau risg ar groesfannau gwastad, fe dderbyniwyd caniatâd cyfreithiol ar gyfer cau croesfannau Pilkins ac Ystrad Fawr. Fodd bynnag, mae risg yn dal i fod yna oherwydd bydd y croesfannau yn dal ar agor mewn gwirionedd nes caiff pont gwrthdyniadol ei hadeiladu. Mae disgwyl y bydd y bont yn barod, ac felly bod modd cau'r croesfannau, y flwyddyn nesaf.

Asedau

8.4 Mae gan asedau yng Nghymru wahanol nodweddion, heriau a hanes rheoli. Bu i amgylchedd unigryw Twnnel Hafren, er enghraifft, olygu gwaith ail-dracio ychwanegol sylweddol er mwyn ceisio rheoli 'rolling contact fatigue'. Mae ein harchwiliadau yn awgrymu fod timau rheoli asedau Network Rail yn ymateb yn dda ac yn aml yn rhoi gweithdrefn newydd ac arloesol ar waith ynghylch stiwardiaeth eu portffolios.

Traciau

8.5 Yn ystod ein hymchwiliad bu inni ddarganfod:

- Buasai modd gwella'r defnydd o gerbydau cofnodi traciau - yn enwedig i danategu mwy o ddefnydd o Waith Cynnal a Chadw ar Sail Risgiau (RBM);

[32] Mae'n debyg fod dros 100 asesiad hwyr yng Nghymru. A dweud y gwir, mae 38 yn amodol ar ran-ddirymiad (caiff y signal ei ddi-gomisiynu neu ei uwchraddio) ac mae 60 o'r asesiadau wedi eu cwblhau ond heb eu cofrestru ar y system hyd yn hyn.

- Bu mabwysiadu Gwaith Cynnal a Chadw ar Sail Risgiau yn anghyson yng Nghymru - mae hyn yn rhannol oherwydd cyffredinrwydd hen asedau traciau sy'n anaddas ar gyfer Gwaith Cynnal a Chadw ar Sail Risgiau.
- Lle mae Gwaith Cynnal a Chadw ar Sail Risgiau ar waith, dydy'r gwaith heb fod mor drylwyr neu eang â gofyniadau'r broses ac ni chafodd y buddion llawn eu cyflawni; a
- fe gafodd penderfyniadau oedi ynghylch adnewyddu traciau ei ymchwilio fel rhan o brosiect cenedlaethol. Yn gyffredin â rhannau eraill o'r rhwydwaith, bu inni weld y cafodd penderfyniadau gwreiddiol ynghylch adnewyddu eu cyfiawnhau - felly roedd disgwyl i oedi gael effaith. Bu inni weld nad oedd Network Rail bob amser yn cynnig gweithdrefn gadarn ynghylch lliniaru'r effeithiau yn sgil oedi. Yn benodol, ni chafodd yr effaith ar waith cynnal a chadw ei asesu'n gyflawn.

Asedau Signal

8.6 Bu i gyflwr yr asedau amrywio ar hyd y traciau. Yn sgil gwaith adnewyddu a gwella fel rhan o'r gwaith adnewyddu ar y signalau yn ardal Caerdydd a pharatoi ar gyfer trydaneiddio cafodd offer modern ei osod yn y rhan hwnnw o'r daith. Hefyd bu iddyn nhw gael gwared ar lawer o asedau risg uwch fel ceblau toriad-unigol. Yn gyferbyniad i hyn bu'r oediadau fel Casnewydd-Amwythig yn golygu'r her o gynnal a chadw hen asedau am yn hirach na'r cynlluniau gwreiddiol.

Asedau Peirianneg Sifil

8.7 Hanner ffordd trwy'r flwyddyn mae'n debyg yr oedd y llwybr yn trafferthu i gydymffurfio gyda gwaith gofynnol er mwyn lleihau risg o sgwriad wrth pontydd. Fodd bynnag, yn dilyn craffu manylach, daeth i'r amlwg fod y rhan fwyaf o'r ôl-groniad yn sgil trafferthion data a chyfathrebu gwael rhwng y llwybr a chanolfan Network Rail. Mae'r cynllun gweithredu ar waith unwaith eto.

8.8 Bu diffyg yn y gwaith adnewyddu is bontydd ond mae hyn fwy oherwydd problemau gyda threfnu cau ffyrdd yn hytrach na thrafferthion gyda'r asedau eu hunain. Bu cyfanswm y gwaith adnewyddu gwrthgloddiau yn is na'r rhagolygon ar gyfer y flwyddyn hefyd.

8.9 Ni fu inni sylwi ar unrhyw dystiolaeth o waith rheoli risgiau annigonol yn sgil oedi gyda gwaith adnewyddu. Bu i Network Rail yng Nghymru ddatgan diddordeb mewn monitro cyflwr o bell un neu fwy safle cloddwaith mewn peryg o risg. Mae hyn er gwaethaf nad ydy'r llwybr yn rhan o'r profion Monitro Cyflwr o Bell. Bu inni weld tystiolaeth o fwy o waith adnewyddu ac adfer (clirio llystyfiant a rhwydo) toriadau cerrig - ar sail risg. Rydym ar ddeall fod mwy o waith o'r fath hwn wedi ei drefnu ar gyfer y flwyddyn nesaf. Mae archwiliadau o gloddwaith yn gyfredol yn gyffredinol. Trefnwyd criwiau llystyfiant ymroddgar ar gyfer cloddwaith a strwythurau - er mwyn

paratoi safleoedd cyn archwiliadau. Rydym yn datgan fodd bynnag y cafodd llystyfiant ei gofnodi eto fel rheswm pam nad oedd modd cynnal archwiliadau fel y cynlluniwyd.

8.10 Bu Cymru ar y blaen gydag ymarfer da ynghylch datblygu gwaith rheoli draeniau. Mae'r app draenio MyWork ar waith ledled Cymru a bu i ddefnyddwyr awgrymu gwelliannau. O ganlyniad i fabwysiadu'r app hwn, bu i gywirdeb a thrylwyredd gwybodaeth Ellipse wella gan ofalu fod trefn ymchwilio mwy dibynadwy a thrylwyr. Bu i lwybr Cymru ennill sgôr uchel mewn archwiliad draenio gan Network Rail.

Oddi ar y Traciau

8.11 Bu llwybr Cymru yn arloesol gyda datblygu gweithdrefn ar sail risg gydag adnoddau digonol ynghylch rheoli asedau oddi ar y traciau. Yn 2016-17 bu strwythur rheoli newydd ar gyfer gwaith oddi ar y traciau, gyda draenio (gwelwch uchod) yn rhan ohono.

8.12 Mae gwaith ffensio gwael yn un o'r nifer o risgiau yn ymwneud ag asedau oddi ar y traciau. Bu inni sylwi fod staff Uned Darparu gwaith Cynnal a Chadw wedi dechrau defnyddio'r app MyWork ar gyfer ffensio a'r bwriad ydy y bydd hyn yn golygu cofrestr asedau 'fwy trefnus' a mwy cywir yn Ellipse a fydd yn help i reoli ffensio yn well. Yn debyg, mae rheoli llystyfiant ger y traciau yn golygu heriau ar gyfer y llwybr. Mae gan yr Unedau Darparu gwaith Cynnal a Chadw Diffyg Cydymffurfio Dros Dro (TNC) oherwydd mae angen tair blynedd arnyn nhw i fodloni'r safon llystyfiant perthnasol. Rydym yn mynd ati i ofalu fod cynlluniau rheoli llystyfiant, mae'n bosib y bydd yn ymwneud â thechnoleg newydd, er mwyn gofalu fod gwaith rheoli llystyfiant yn fwy cynaliadwy.

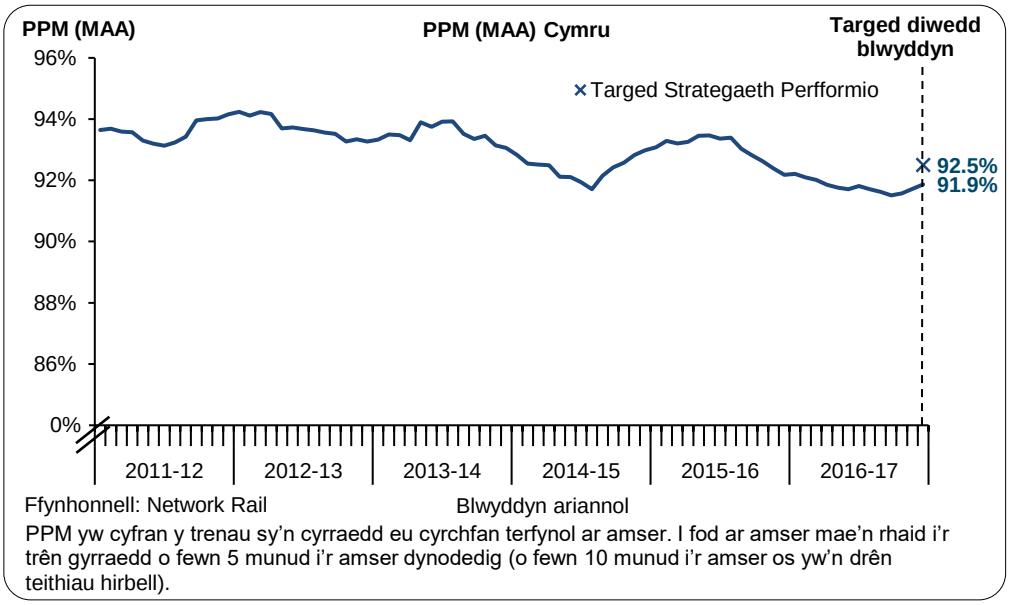
Materion Adeiladu

8.13 Rydym yn cyfarfod gyda thîm Prosiectau Isadeiledd canolog Network Rail yn rheolaidd ac yn cynnal arolygon safle ar y cyd. Mae'r rhain yn aml yn tynnu sylw at welliannau sylfaenol y gellir eu cyflawni fel rhan o waith diogelwch ar y safle ac yn y rhyngwyneb gyda gweithrediadau cynnal a chadw. Bu inni hyrwyddo mwy o ymdrech i fabwysiadu gofynion rheoleiddio *Adeiladu, Dylunio a Rheoli* (CDM).

8.14 Bu'n rhaid i ORR gymryd camau gorfodi yng Nghymru yn ddiweddar ynghylch materion codi a chario. Mae'r camau yn ategu at rai rhybuddion gwella cenedlaethol, ac rydym yn ymwybodol fod y llwybr yn chwarae rhan weithredol yn dod o hyd i ddatrysiadau arloesol ac effeithiol y gellir eu defnyddio yn genedlaethol.

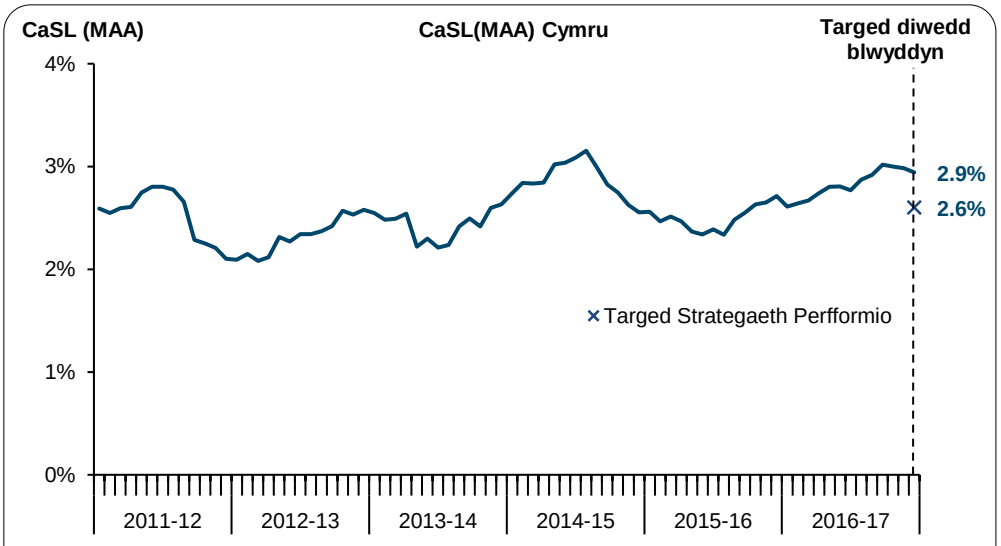
Perfformiad trenau

8.15 Bu Cyfartaledd Symud Blynyddol (MAA) Mesur Perfformiad Cyhoeddus (PPM) Trenau Arriva Cymru (ATW) yn 91.9% ar ddiwedd 2016-17, 0.6 pwynt canran yn waeth na tharged y strategaeth perfformio. Roedd Cyfartaledd Symud Blynyddol (MMA) Trenau a Ganslwyd neu a oedd yn Arbennig o Hwyr (CaSL) yn 2,9%, sef 0.3 pwynt canran yn uwch (hynny ydy yn waeth) na tharged y strategaeth perfformio.



Ffynhonnell: Network Rail Blwyddyn ariannol

PPM yw cyfran y trenau sy'n cyrraedd eu cyrchfan terfynol ar amser. I fod ar amser mae'n rhaid i'r trên gyrraedd o fewn 5 munud i'r amser dynodedig (o fewn 10 munud i'r amser os yw'n drên teithiau hirbell).



Ffynhonnell: Network Rail Blwyddyn ariannol

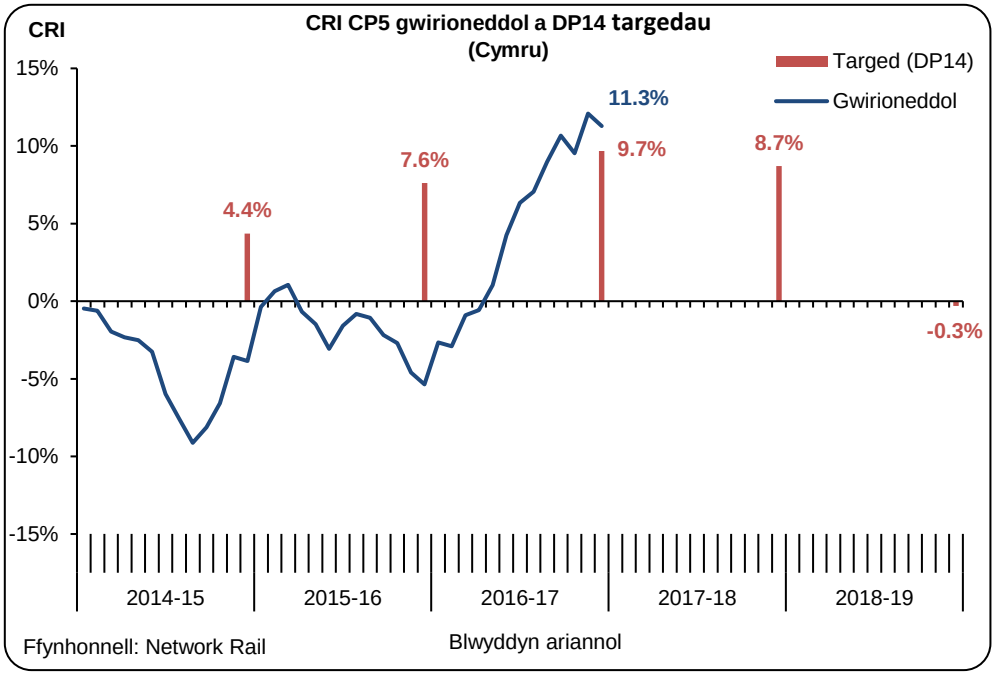
CaSL yw cyfran y trenau nad ydynt yn rhedeg o gwbl, nad ydynt yn aros wrth bob arhosfan a drefnwyd, neu sy'n cyrraedd eu cyrchfan terfynol 30 munud neu fwy yn hwyrach nag a gynlluniwyd.

8.16 Ar gyfer Lloegr a Chymru, rydym yn monitro targedau Mesur Perfformiad Cyhoeddus (PPM) a Threnau a Ganslwyd neu a oedd yn Arbennig o Hwyr (CaSL) wedi eu cytuno gyda'r gweithredwr yn y Strategaethau Perfformiad lleol. Un o'r ffyrdd rydym yn mynd ati i wneud hyn ydy gan ddefnyddio Cardiau Sgorio Network Rail sy'n cynnig gwybodaeth am y llwybrau ar sail targedau wedi eu cymeradwyo

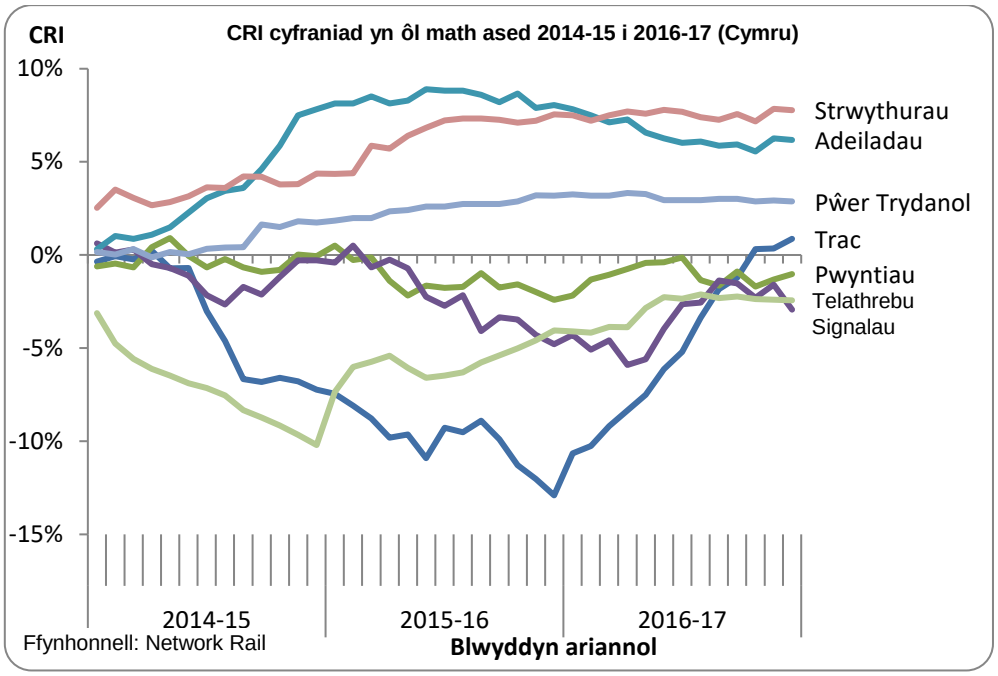
gyda'r gweithredwyr. Er bod Trenau Arriva Cymru heb gyrraedd ei dargedau Mesur Perfformiad Cyhoeddus na nifer y Trenau a Ganslwyd neu a oedd yn Arbennig o Hwyr, roedd ei berfformiad o fewn y trothwy sydd wedi'i nodi yn y Dyfarniad Terfynol.

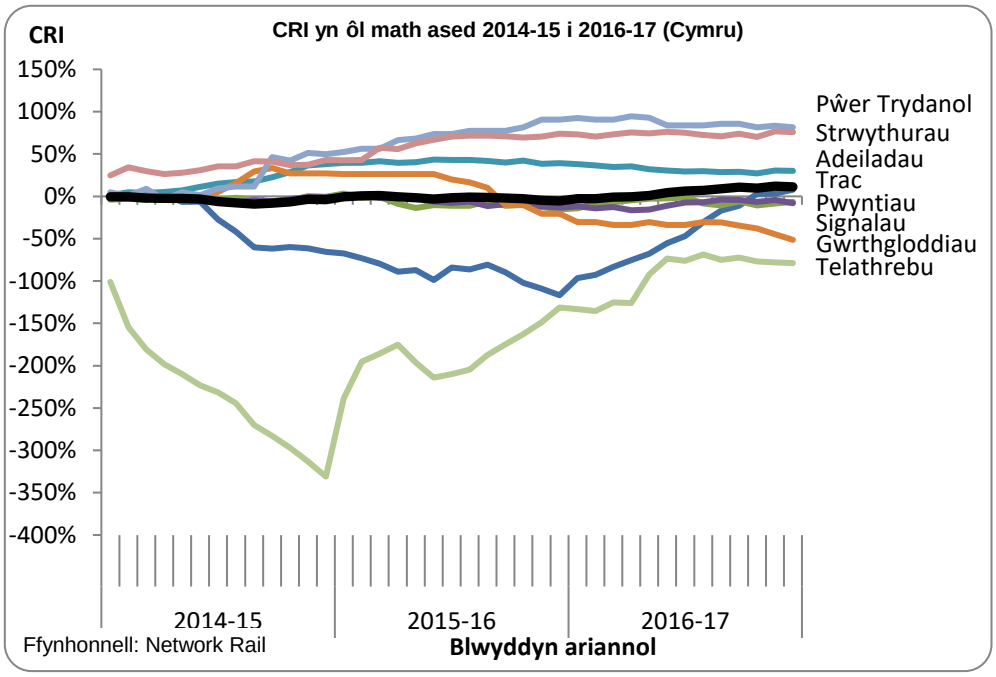
Rheoli asedau

8.17 Bu mesur Mynegai Dibynadwyedd Cyfansawdd (CRI) perfformiad asedau yng Nghymru yn 11.3% erbyn diwedd y flwyddyn sy'n welliant sylweddol yn dilyn dwy flynedd o berfformiad gwael ond dydy o dal heb gyrraedd y cyfartaledd rhwydwaith o 15.8%.



8.18 Bu'r gwelliant yn sgil adferiad mewn perfformiad traciau, gyda'r cyfraniad traciau i'r Mynegai Dibynadwyedd Cyfansawdd yn gwella o -12.9% y llynedd i 0.9% eleni (gwelwch y siart isod). Bu i Fynegai Dibynadwyedd Cyfansawdd y traciau gyrraedd 7.9% erbyn diwedd y flwyddyn sy'n gynnydd o -117% (gwelwch y siart ar dudalen 77 isod). Bu hefyd adferiad rhannol mewn telathrebu, signalau a phwyntiau, wedi eu gosod yn erbyn gostyngiad mewn adeiladau a gwaith tir.





Datblygu'r rhwydwaith

8.19 Cafodd cam olaf cynllun Adfer Signalau Ardal Caerdydd ei weithredu yn ystod cyfnod y Nadolig / Y Flwyddyn Newydd. Bu'r gwaith yn canolbwyntio ar ardal Caerdydd Canolog ac fel rhan o'r gwaith fe agorwyd platfform 8 newydd yn yr orsaf honno. Bydd y prosiect hwn yn fodd o gynyddu amledd yn y gwasanaeth trenau i 16 trên yr awr trwy'r craidd canolog yn dilyn cynnydd blaenorol i 14 trên yr awr ym mis Tachwedd 2014.

Gwariant a pherfformiad ariannol

8.20 Rydym yn dwyn i ystyriaeth perfformiad ariannol Network Rail mewn dwy ffordd; yn gyntaf gan gynnig cymhariaeth syml o wariant Network Rail yn erbyn ei gyllideb ei hun (Tabl 1 isod) ac yn ail, drwy ystyried ein mesur perfformiad rheoleiddiol (Tabl 2 isod).

8.21 Mae sawl ffordd y gallwn gyfleu negeseuon allweddol drwy'r mesur perfformiad rheoleiddiol ac ymysg y dewisiadau mae'r canlynol:

- cymharu un ai gyda'n penderfyniad CP5 fel y gwnawn ni yn ein Hasesiad Effeithiolrwydd a Chyllid Blynyddol, neu gyda chyllideb flynyddol Network Rail;
- yn dangos gros yr amrywiannau, neu net yr addasiadau wedi eu gweithredu yn cydymffurfio gyda mecanwaith rhannu RAB; a
- chynnwys neu hepgor yr addasiadau ar gyfer allbynnau rheoleiddiol coll.

Gwariant

Tabl 1: Incwm a gwariant yng Nghymru yn 2016-17 - cymhariaeth syml o incwm a gwariant Network Rail.

	Blwyddyn gyflawn 2016-17		
	Cyllideb	Gwirioneddol	Amrywiant (b/w)
Trosiant	348	347	(1)
Cynllun Atodol 4	(24)	(10)	14
Cynllun Atodol 8	(2)	(1)	1
Gweithredu	(30)	(30)	0
Cefnogaeth	(37)	(31)	6
Cynnal a Chadw	(67)	(71)	(4)
Capex - Adnewyddu	(222)	(200)	22
Capex - Gwelliannau	(208)	(190)	18
Costau Ariannu	(87)	(88)	(1)
Cyfanswm	**(329)**	**(274)**	**55**

8.22 Yn 2016-17, bu i Network Rail yng Nghymru wario £55m yn llai na'i gyllideb, yn bennaf oherwydd:

- gwariant gwaith adnewyddu £22m yn llai. Bu cyfeintiau llai na'r disgwyl (bu gwerth y gwaith adnewyddu heb ei weithredu yn £31m) ac fe gaiff y gwaith hwn ei gwblhau yn hwyrach ymlaen (gwelwch Dabl 2 isod). Gan ddwyn hyn i ystyriaeth, bu cost gwaith Network Rail yn £9m yn fwy na'r disgwyl (wedi ei addasu i £2m i gydymffurfio gyda mecanwaith rhannu RAB). Mae hyn yn bennaf oherwydd (£8m) ar draciau gan gynnwys gwaith ychwanegol ar adnewyddu traciau yn ystod gwarchae trydaneiddio Twnnel Hafren a chostau cynyddol ar arwyddo (£5m), gan gynnwys £2m ar waith ail-arwyddo ym Mhort Talbot.
- £18m yn llai o wariant ar welliannau. Roedd hyn yn bennaf oherwydd gwelliannau, wedi eu hariannu gydag arian parod, is na'r disgwyl yn sgil oedi

ynghylch gwaith croesfan wastad wedi ei ariannu gan gyrff trydydd-parti. Mae Network Rail yn disgwyl dal fyny efo'r gwaith a chynnal y gwaith am y gost a gofnodwyd yn y gyllideb yn hwyrach eleni (£8m). Cafodd gwaith ar Brif Linell De Cymru ei symud i 2017-18 (£6m). Ni fu allberfformiad nac ychwaith tanberfformiad ynghylch gwaith gwelliannau yng Nghymru yn ystod 2016-17.

Perfformiad ariannol rheoleiddiol

8.23 Fel y disgrifwyd ym mharagraff7.21uchod, rydym hefyd yn defnyddio ein mesur perfformiad rheoleiddiol er mwyn monitro perfformiad Network Rail. Mae'r mesur hwn yn cynnig cyfrifiad gwell o berfformiad Network Rail oherwydd y canlynol:

- Mae'n hepgor mathau penodol o incwm a gwariant nad oes modd i Network Rail eu rheoli cymaint. Mae'r rhain yn cynnwys grant rhwydwaith, costau mynediad traciau sefydlog, incwm trydan tracsiwn a chostau a chyfraddau busnes;
- Mae'n gofalu nad ydy Network Rail yn elwa o oedi rhag gwneud gwaith tan ddyddiad hwyrach oherwydd gwahaniaeth amser ydy o'n unig, h.y. mae dal angen cwblhau'r gwaith yn y dyfodol;
- Mae'n medru addasu ar gyfer gwerth yr allbwn heb ei gwblhau gan na ddylai Network Rail elwa drwy beidio â chynnig ei allbynnau;
- Mae'n medru addasu'r all/tanberfformiad ar waith adnewyddu a gwelliannau i gydymffurfio gyda pholisi mecanwaith rhannu RAB: ac
- Mae'n medru addasu fel bod y gymhariaeth yn erbyn PR13 yn hytrach na chyllidebau Network Rail.

8.24 Mae Tabl 2 yn ymdrin â'r gwahanol ffyrdd o gyflwyno'r mesur perfformiad ariannol fel y disgrifwyd ym mharagraff 8.20 uchod.

Tabl 2: Mesur Perfformiad Ariannol (FPM) ar gyfer Cymru yn 2016-17 - cymhariaeth o incwm a gwariant a ddefnyddwyd yn ein cyfrifiad Mesur Perfformiad Ariannol.

£m	Amrywiant	Mesur Perfformiad Ariannol niwtral yn cynnwys amser b/(w)	Gross (Tanberfformiad) / allberfformiad	Net (Tanberfformiad) / allberfformiad
Trosiant (yn cynnwys Cymhelliant Cyfaint)[33]	(4)	(1)	(3)	(3)
Trefnlen 4	14	7	7	7
Trefnlen 8	1	0	1	1
Gweithrediadau	0	0	0	0
Cefnogaeth [34]	12	13	(2)	(2)
Cynnal a Chadw	(4)	1	(2)	(2)
Capex - Adnewyddu	22	31	(9)	(9)
Addasiad Capex - Adnewyddu				7
Adnewyddu (net)				(2)
Capex - Gwelliannau	18	18	0	0
Addasiad Capex - Gwelliannau				0
Gwelliannau (net)				0
Capex - Cyfanswm Net				(2)
Mesur perfformiad ariannol o gymharu gyda chyllideb Network Rail			**(7)**	**0**
Cyllideb Network Rail o gymharu gyda PR13 (gros)			(78)	(78)
Addasiad Capex ar gyfer adnewyddu a gwelliannau				40
Llai: Cyllideb Network Rail o gymharu gyda PR13 (net)				(30)
Gros Mesur Perfformiad Ariannol cyn addasiad ar gyfer allbynnau rheoleiddiol			**(85)**	**(30)**
Llai: Addasiad ar gyfer allbynnau rheoleiddiol coll	(4)		(4)	(4)
Cyfanswm Mesur Perfformiad Ariannol (FPM)			**(89)**	**(34)**

8.25 Mae tanberfformiad ariannol rheoleiddiol Network Rail ar gyfer y flwyddyn 2016-17 yn £34m. Mae hyn yn bennaf oherwydd effeithiolrwydd is a chostau uned uwch na'r disgwyl.

8.26 Mae'r tanberfformiad ariannol hwn yn gyfuniad o sawl elfen, gan gynnwys y canlynol:

- Mae perfformiad ariannol gros Network Rail ar gyfer 2016-17 yn £7m yn groes i gyllideb Network Rail ei hun. Y maes lle bu'r mwyaf o danwariant, o gymharu

[33]Yn hepgor yr elfennau incwm sydd ddim yn berthnasol i berfformiad Network Rail: Grant Rhwydwaith a chostau Mynediad Sefydlog. Mae'r rhifau felly yn amrywio i'r costau Trosiant yn Nhabl 1.

[34] Yn cynnwys cyfraddau a chostau diwydiant Mae'r rhifau felly yn amrywio i'r costau cefnogi yn Nhabl 1.

â'i gyllideb ei hun ydy adnewyddu traciau (£8m) yn deillio o waith ychwanegol gan gynnwys gwarchae trydaneiddio Twnnel Hafren a chostau cynyddol ar arwyddo (£5m), yn cynnwys gwaith gwerth £2m ar ail-arwyddo Port Talbot.

- Mae cyllideb 2016-17 Network Rail ei hun yn £78m yn waeth, o ran gros[35] nag ein penderfyniad. Mae hyn yn sgil effeithiolrwydd llai a chostau uned uwch nag inni eu tybio yn ein penderfyniad ynghylch y rhan fwyaf o waith busnes craidd; a

8.27 Bu i Network Rail amcan y byddwn yn gwneud addasiad o £2m i'n perfformiad ariannol am y tanddarpariaeth o'r allbynnau rheoleiddiol Mesur Perfformiad Cyhoeddus (PPM) yn 2016-17.

Jhgjhgjhg Effeithiolrwydd

8.28 Yng Nghymru, bu i Network Rail ddatgan gostyngiad yn yr effeithiolrwydd o -7.8% ar Weithrediadau, Cefnogaeth, Cynnal a Chadw ac Adnewyddu (OSMR) (Prydain Fawr -5.0%) ar gyfer y cyfnod rheoli hyd yn hyn o gymharu â'n penderfyniad PR13 o 10.1% ar gyfer Prydain Fawr yn ei chyfanrwydd[36]. Mae hyn yn cyfuno'r enillion effeithiolrwydd o 8.0% ar gyfer gweithrediadau, cefnogaeth a gwaith cynnal a chadw (Prydain Fawr 6.8%) ond gostyngiad o -20.5% mewn effeithiolrwydd ar gyfer gwaith adnewyddu (Prydain Fawr -17.1%) yn bennaf oherwydd trafferthion ail-arwyddo yn ardal Caerdydd fel y soniwyd amdanyn nhw uchod.

8.29 Erbyn diwedd CP5 mae Network Rail Cymru yn disgwyl cyflawni effeithiolrwydd o 16.0% ar Weithrediadau, Cefnogaeth, Cynnal a Chadw ac Adnewyddu (OSMR) (H.y. bydd yn gadael CP5 yn 16.0% yn fwy effeithlon ers cychwyn CP5). Mae hyn yn llai na'n amcan ni o 19.5%

Gwariant (ac eithrio dyraniadau cost uned ganolog)

8.30 Caiff costau uned canolog, fel amryw gostau HQ ac eiddo eu dyrannu i'r llwybrau. Yn 2016-17, bu'r costau canolog o £1.3biliwn ym Mhrydain Fawr yn oddeutu 14% o gyfanswm gwariant y llwybr. Mae'r rhain yn cynnwys costau trydan tracsiwn (ond nid ar gyfer Cymru), caiff eu hadennill drwy incwm, cyfraddau busnes a chostau diwydiant eraill hefyd fel prosiectau cyfalaf caiff eu rheoli yn ganolog fel prosiectau Cyfrifiadureg, ORBIS a pheiriannau.

8.31 Mae'r tablau blaenorol yn dangos y ffigyrau ar ôl dyraniadau hyn. Ond i fod yn fwy cymaradwy â llwybrau eraill, mae Tabl 3 yn ymdrin â gwariant Cymru o gymharu gyda chyllideb Network Rail cyn dyrannu'r costau uned canolog.

[35] yn nhermau Mesur Perfformiad Ariannol roedd £30m yn waeth.

[36] Mae ein mesur effeithiolrwydd yn fesur syml o'r newid dros amser mewn gwariant ynghylch gweithrediadau, cynnal a chadw a gwaith adnewyddu. Mae'r mesur hwn yn cymharu gwariant gwirioneddol yn 2015-16 gyda gwariant gwirioneddol yn 2013-14 (y flwyddyn olaf o gyfnod rheoli 4) wedi ei addasu ar gyfer lefel y gwaith a materion eraill

Tabl 3 : gwariant Cymru o gymharu gyda'r gyllideb - cyn dyrannu'r costau uned canolog yn 2016-17.

£m	Blwyddyn gyflawn 2016-17			
	Cyllideb	Gwirioneddol	Amrywiant	Amrywiant (%)
Gweithrediadau	(30)	(30)	0	0%
Cefnogaeth	(2)	(3)	(1)	(33%)
Cynnal a Chadw	(65)	(68)	(3)	(5%)
Adnewyddu	(195)	(183)	11	6%
Gwelliannau	(214)	(189)	25	12%
Cyfanswm	**(505)**	**(473)**	**32**	**6%**

9. Glossary

Term	Explanation
Alliances	The term 'alliances' is currently being used to describe a wide range of different relationships from project-based partnerships through to potentially long-term and comprehensive commercial arrangements covering a wide range of activities carried out by Network Rail routes and train operators. The common factor is that Network Rail and a train operator reach agreement to work together more closely and share the benefits of doing so, within the framework of their existing individual accountabilities and responsibilities. As currently being discussed, alliances do not involve the creation of new legal entities such as formal joint ventures
AMEM	Asset Management Excellence Model
Business Critical Rule	Business Critical Rules provide an overall structure for determining what Network Rail must do and who needs to do it. They are being designed from risk-based principles - understanding the things that can go wrong and what must be done to prevent them
Cancellations and Significant Lateness (CaSL)	The proportion of trains which arrive at final destination greater than 30 minutes from planned arrival, or full/part cancelled or missed calls
CAPEX	Refers to the funds used by Network Rail to acquire or upgrade physical assets on the railway and related infrastructure in order to maintain or increase the scope of their operations. Such expenditure is referred to as Renewals (of existing infrastructure e.g. works that will provide long term benefits such as replacing a section of track) or Enhancements (upgrading existing or building new infrastructure, e.g. electrification of a railway line).
CARRS	Civils Asset Register and Reporting System

CDM	Construction (Design and Management) Regulations 2015
CEFA	Civil Engineering Framework Agreement
Central technical authority	
Civils	A term describing only those responsible for structures such as bridges
Composite Reliability Index (CRI)	It provides an indication of the contribution of asset reliability to the safety and performance of the railway.
Control Period	A control period is the period to which an access charges review (e.g. a periodic review) applies. Control periods are typically five years in length, but maybe shorter or longer depending on what the regulator decides as part of the review. • CP6 covers from 1 April 2019 to 31 March 2024 • CP5 covers from 1 April 2014 to 31 March 2019 • CP4 covers from 1 April 2009 to 31 March 2014 • CP3: 1 April 2004 to 31 March 2009 • CP2: 1 April 2001 to 31 March 2004 • CP1: from the privatisation of Railtrack to 31 March 2001
CSAMS	Civils Strategic Asset Management Solution
DPI	Delay per incident
DfT	Department for Transport
Earthworks	Natural earth slopes and earth-related structures such as cuttings and embankments
East West Rail	Planned project to connect East Anglia with Milton Keynes and Oxford.
ECAM	Enhancements cost adjustment mechanism

Eddy Current Testing	A system using electromagnetism to detect and assess discontinuities in metal; adapted specialist technology to categorise maximum crack length and depth in every metre of rail.
EDP	Enhancements Delivery Plan
EGIP	Edinburgh to Glasgow Improvements Programme
EIP	Enhancements Improvement Programme
EIS	Entry into service
Ellipse	Computer based asset management system used by Network Rail to record and prioritise the maintenance work required to be done and when.
Enhancements	Schemes to change to network outputs, usually involving construction, that improves network capacity or capability (e.g. enabling higher speeds, allowing heavier loads) relative to the level of network outputs funded at the last relevant periodic review. Usually outputs are required at specific times (in contrast to most renewals).
Final Determination	Our final determination sets out our overall package of decisions for the periodic review 2013 (PR13).
Fixed Track Access Charges	The fixed track access charge (FTAC) recovers Network Rail's net revenue requirement. The net revenue requirement is the revenue that we determined in a periodic review is required by Network Rail to run its business, after accounting for the income received from short-run variable track access charges, regulated station charges, other single till income and the network grant. The FTAC is only paid by franchised passenger train operators.

FPM	Financial Performance Measure
Freight Delivery Metric (FDM)	This measure tracks the punctuality of freight services at destination as well as taking into account Network Rail caused delays.
Gauge	Distance between the inner running faces of two rails on the same track. Also used to describe the "envelope" through which train profiles must fit; this is the structure gauge.
Gearing	Gearing refers to the level of a company's debt related to its equity capital, usually expressed in percentage form. It is a measure of a company's financial leverage and shows the extent to which its operations are funded by lenders versus shareholders.
GEOGIS	"Geographic and Infrastructure Systems" - A major database of railway infrastructure assets containing information on the physical location of track, buildings and structures.
Green Zone	An area of protection for workers, which separates work on the railway line from train movements. The simplest way of arranging such a zone is to stop movements of all trains on all lines at the location concerned. Fencing off the work area may be an acceptable alternative but requires reduced speed operation.
GRIP	Guide to railway investment projects. A Network Rail formal procedure through which every investment project on Network Rail's network must pass. It consists of a number of stages; at the end of these a review is carried out and if the project cannot meet the pass criteria it is stopped or held until it does.

GSM-R	Global system for mobile communications - railway. An international wireless communications standard for railway communication.
GTR	Govia Thameslink Railway
GWEP	Great Western Electrification Programme
HAVS	Hand Arm Vibration Syndrome
HCE	Hidden Critical Elements -
High Output Track renewal	A system for renewing track in part or as a whole far more quickly than has been possible in the past.
HSE	Health and Safety Executive
IMS	Incident Management System
Independent Reporter	A consultant whose role is to provide ORR with independent, professional opinions and advice relating to Network Rail's (as the railway licence holder) provision or contemplated provision of railway services, with a view to ORR relying on those opinions or advice in the discharge by ORR of its functions.
Intercity Express Programme (IEP)	An initiative of the Department for Transport (DfT) to procure new trains to replace the InterCity 125 fleet on the East Coast Main Line and Great Western Main Line. There are to be two variants: the Class 800, which are electric/diesel-electric hybrids and the Class 801, which are electric only.
Investments	Investments cover all enhancements but also include major projects such as route upgrades or renewals.

Linear Asset Decision Support tool	System used to consolidate Network Rail's complex engineering data and provide insight from that data to engineers, enabling them to make better decisions on managing the track.
Linespeed	The maximum safe speed for a train to travel on any section of railway line taking into account infrastructure limitations.
LNE/EM	London Northeast / East Midlands Route
LNW	London Northwest Route
LSR	Life Saving Rules
LTIFR	Lost time Injury Frequency Rate
MDU	Maintenance Delivery Units
MOU	Memorandum of understanding
Moving Annual Average (MAA)	Moving annual average - the average of the last 13 four-week time periods.
Network Grant	A proportion of Network Rail's income in the past has been paid directly by DfT and Transport Scotland in the form of network grants. Over CP5, more than 60% of Network Rail's income is forecast to come from network grants.
Network Licence	Network Rail operates under a network licence. This licence contains a set of conditions under which Network Rail must operate. As the operator and owner of the national rail infrastructure, it has a key role to play in railway safety and improving railway performance

	and efficiency. The network licence is a tool we have for holding Network Rail to account.
Network Rail managed stations	Managed stations are the stations at which Network Rail is the station facility owner. There are currently 18 managed stations, these are all large stations. A list of the managed stations is available on the Network Rail website.
NTQP	Night time quiet period
ONS	Office of National Statistics
Operational Property	Buildings, land and structures in use as part of the operational railway.
OPEX	Operating expense: as distinct from CAPEX (capital expenditure), OPEX refers to ongoing costs incurred by Network Rail to maintain the railway infrastructure. Examples of OPEX include routine safety checks on the railway tracks or repairing signalling when it fails.
ORBIS	Offering Rail Better Information Services. A Network Rail initiative, its aim is to make information available in all forms including a mobile access and a local view to avoid site visits.
Overhead Line Equipment (OLE)	An assembly of metal conductor wires, insulating devices and support structures used to bring traction supply current to suitably equipped traction units. The conducting wires are normally strung between masts or poles in some form of catenary arrangement but simple systems may have a single trolley wire.
Performance Strategy	Jointly prepared plans agreed between Network Rail and a train operator to improve performance.

Plain Line Pattern Recognition (PLPR)	Technology used to monitor the condition of the track
Plain Line Track	Track without switches and crossings
Planning and Delivering Safe Work (PDSW)	PDSW is a wholesale reform of how infrastructure projects are planned and delivered safely and, ultimately, it makes clear who is responsible.
Possession Disruption Index (PDI)	'Possession disruption index – passenger' (PDI-P) and 'Possession disruption index – freight (PDI-F)': a graph indicating the level of disruption caused by possessions over a period of time. Network Rail needs to restrict access to the network to carry out many of its maintenance and renewals activities. These restrictions of access are referred to as possessions. Possessions are considered to be 'disruptive' if they impact on the running of passenger or freight operators' normal timetabled services.
Possessions	Network Rail needs to restrict access to its network to carry out many of its maintenance and renewals activities. These restrictions of access are referred to as possessions.
PPE	Personal Protective Equipment
Public Performance Measure (PPM)	The Public Performance Measure (PPM) is the percentage of trains arriving at their final destination within 5 minutes of their scheduled arrival time (within 10 minutes for long distance services).
RAB	Regulatory asset base: The Office of Rail and Road's calculation of the value of Network Rail's assets.

RBM	Risk Based Maintenance
Regulated Outputs	These are outputs that we determine as part of our periodic review that Network Rail is required to deliver over the relevant control period.
Relay Room	A building housing safety critical electrical and electronic signalling equipment such as relays that interface with trackside equipment such as points and signals.
Renewals	Major capital works or replacement of the network in order to maintain its required capability. These may be required at specific times but are more often carried out according to Network Rail's own timetable
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013.
Right Time	Performance measure measuring train arrival within one minute of the scheduled time
RM3	Rail Management Maturity Model: the tool we use to assess an organisation's ability to achieve excellence in controlling health and safety risks.
ROC	Route Operating Centres
Rolling contact fatigue	General term covering all types of damage incurred at the wheel rail interface.
Route availability	A code used to indicate which rolling stock can use which routes.
RPI	Retail Price Index

Safety Management System (SMS)	In essence, it is a formal arrangement for a safer working environment. All operators and duty holders are now required to have arrangements in place for managing safety risks. A safety management system defines roles and responsibilities, sets arrangements for safety mechanisms, involves workers in the process and ensures continuous improvement.
Schedule 4	Schedule 4 (the possessions regime) is the part of passenger and freight operators' track access contract with Network Rail that sets out arrangements for compensation to the operator in the event of planned disruption to their services.
Schedule 8	Schedule 8 (the performance regime) is the part of passenger, freight and charter operators' track access contract with Network Rail that sets out arrangements for compensation in the event of unplanned disruption to services.
Scour	The removal of material from a bed or bank of a watercourse or material from a beach by current or wave action. This is a particular problem where the removed material was providing support or restraint to a structure such as a bridge pier or retaining wall, ultimately leading to its collapse.
Section Manager	A supervisory post responsible for the day to day maintenance of the track within a permanent way section or area or division.
Single-cut cables	The provision of controls in only the feed or return side of a circuit, used only where there is no risk of false feeds or faults to earth.
SORAT	Single Overrun Asset Tool

Switches and Crossings (S&C)	Track consisting of switches (an assembly of two movable rails – the switch rails) and two fixed rails (the stock rails) and crossings (an assembly that permits the passage of wheel flanges across other rails where tracks intersect.
SWML	South West Mainline
SWT	Southwest Trains
Temporary Non Compliance (TNC)	An approved time-bound derogation from a requirement in a company standard.
Temporary Speed Restriction (TSR)	Temporary speed restriction imposed for safety reasons. This can arise from the poor condition of track, structures, earthworks, hot weather effects, or following track relaying until the track bed is stabilised.
TOC	Train operating companies: run the (passenger and freight) trains and services on the network.
Track Geometry	The horizontal and vertical alignment of the track.
Train Accident Precursors Indicator Model (PIM)	RSSB's Precursor Indicator Model (PIM) provides a measure of the underlying risk from train accidents by tracking changes in the occurrence of accident precursors
Train Regulation	The itinerary for any of the driver, guard and/or train manager of a train.
Tubular Stretcher Bars	The function of a stretcher bar is to keep the two rails in a railway switch a defined distance apart at all times and to ensure that both rails move simultaneously as a coupled pair when commanded

Twist Faults	Where particular misalignments between the heights of rails which can cause the risk of train derailment.
Underbridge	Bridges that allow passage under the railway.
Whistle Board	A white circular sign with a grey edge and black W in the centre that indicates to a train driver that they must sound the horn or whistle. This is often used to provide warning to users of accommodation, footpath and occupation crossings.

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