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1. Executive Summary

An overview

The Annual Return 2016 reports on our achievements, developments and challenges during 2015/16. It is the formal means by which we report on our progress in delivering the outputs that were established by the Office of Rail and Road (the ORR) in its Final Determination for Control Period 5 (CP5), covering the period from 1 April 2014 to 31 March 2019.

The Annual Return follows the format agreed with the ORR and is prepared in accordance with Condition 12 of our network licence.

Where appropriate and possible, we have provided disaggregated data by the ten operating routes set out in the ORR's Final Determination; Anglia, East Midlands, Kent, London North East (LNE), London North Western (LNW), Scotland, Sussex, Wales, Wessex and Western. However, LNE and East Midlands and Kent and Sussex now operate as two routes (LNE & East Midlands and London South East (LSE)) meaning that for operating purposes we now have eight rather than ten routes. Consequently we have provided commentary for the combined LNE & East Midlands and LSE operating routes rather than at a more disaggregated level. For some measures we are only able to disaggregate data by our eight operating routes. For measures where route disaggregation is not appropriate or possible, data is disaggregated to England & Wales, Scotland and network-wide levels. Where a measure has been introduced or the reporting method has changed and data is unavailable, this is represented by a '-'.

Previous Annual Returns together with a summary of historical data are published on Network Rail's website [here](#).

Our 2016 Annual Report and Accounts are also published on our website and can be found [here](#).

We also provide annual financial performance information to the ORR. This information is designed to be relevant to the ORR and other persons for the assessment of access charges and to allow the financial performance of

Network Rail to be monitored against the ORR's Final Determination assumptions for CP5. Our 2016 Regulatory Financial Statements can be found [here](#).

This Executive Summary provides a high-level overview of our performance and key matters arising during 2015/16 and covers:

- our corporate scorecard
- shaping our future
- safety
- operational performance
- enhancements
- asset management
- digital railway
- sustainable development
- diversity and inclusion
- customer, passenger and lineside neighbour satisfaction
- transparency.

Later sections of this Annual Return provide more detailed information about our performance in 2015/16.

Contact us

If you have any questions or feedback about this Annual Return, please contact us at: annualreturn@networkrail.co.uk

To contact us about a safety concern, general queries or to make a complaint, please [visit our website](#) or call our 24 hour national helpline: **03457 11 41 41**.

You can find information on the [transparency](#) page of our website, or contact us at FOI@networkrail.co.uk or:

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MK9 1EN

Our Corporate Scorecard

How we performed in 2015/16

Table 1.1: Our corporate scorecard

Performance measure	Bonus weighting	Full-year Actuals			
Safety		Worse Than Target	Target	Better Than Target	
Workforce Safety – Lost Time Injury Frequency Rate (LTIFR)	5.0%	0.540	0.511	0.492	0.483
Workforce Safety – close calls	3.0%	70,000	80,000	90,000	140K
Workforce Safety – close calls closed within 28 days (%)	2.0%	40%	50%	58	60%
Passenger Safety – Train Accident Precursor Indicator Model (PIM)	5.0%	1.986	1.942		1.899
Level Crossing Risk Reduction – Level Crossing Risk Indicator Model (LCRIM)	5.0%	1.262	1.893	1.564	2.524
Train Performance					
Public Performance Measure (PPM)	12.0%	89.1	89.7%	90.0%	91.0%
Cancellation and Significant Lateness (CaSL)	6.0%	3.1	2.9%	2.8%	2.4%
Freight Delivery Metric (FDM)	2.0%	92.5%	94.3	94.5%	95.0%
Financial					
Financial Performance Measure (FPM) – Total Efficiency Generated (£m) excluding Enhancements	15.0%	-£200m	-149	£0	+£200m
Financial Performance Measure – Enhancements (£m)	5.0%	-210	-£100m	£0	+£100m
Investment					
Top Ten Infrastructure Project Renewals and Enhancement Milestones	5.0%	6	8	9	10
All Delivery Plan Enhancement Milestones (%)	5.0%	60%	80%	81	100%
Asset Management					
Composite Reliability Index (CRI)	7.5%	7.5%	8.4%		9.3%
Renewals (Seven Key Volumes)	7.5%	90%	100%	101	110%
Satisfaction					
Customer – Survey Results	5.0%	3.05	3.15	3.32	3.49
Passenger – Survey Results	5.0%	81.0%	81.5	83.3%	86.0%
Lineside Neighbours – Survey results of Network Rail favourability amongst Lineside Neighbours who experience work	5.0%	51	52.0%	53.0%	55.0%
 Below 'Worse Than Target'  Between 'Worse Than Target' and 'Target'  Between 'Target' and 'Better Than Target'  Above 'Better Than Target'					

Using a corporate scorecard has given Network Rail a much clearer view of overall business performance. We believe that the scorecard represents a step change in the transparency of our performance, both internally and externally.



Safety

Lost time injury frequency rate (LTIFR): Means time lost to injuries and fatalities among Network Rail employees and contractors employed by Network Rail per 100,000 hours worked. A lower figure represents better performance. We exceeded our ten per cent LTIFR reduction target of 0.511 although we did not meet our stretch target of 0.483. There were 684 lost time injuries over 2015/16, compared to 674 in 2014/15.

Close calls: Means the number of close calls reported for any occurrence that has the potential to cause injury or damage – this can be an unsafe act or an unsafe condition. A higher number represents better performance. 140,021 close calls were reported. This exceeded both the target of 80,000 in the year and the scorecard maximum of 90,000. 58 per cent of these calls were closed out within 28 days exceeding the target of 50 per cent but not the meeting the scorecard maximum of 60 per cent.

Passenger safety: This measure is based on the number of high-risk events that happen that are identified as precursors to a passenger safety incident. In 2015/16

our target was to reduce the passenger component of train accident risk (where Network Rail is the risk controller) by a further 10 per cent. We exceeded our target and stretch target. This measure is particularly affected by wet and windy weather that causes incidents such as trees on the line, landslips and flooding.

Level crossing risk reduction: A measure of benefits achieved through closures of level crossings, downgrade in status and crossing enhancements. Safety at level crossings remains a priority area for Network Rail. In 2015/16 we closed 76 level crossings and continued to develop and deploy risk reduction measures to enable and encourage safe use. However, the scorecard target was not achieved largely due to an increase in near-misses with pedestrians. Pedestrian safety continues to be a cause for concern.

Train performance

Public performance measure (PPM): Means the percentage of all passenger train journeys that arrive on time. For long distance journeys 'on time' means within 10 minutes of scheduled arrival time, and for regional and London & South East within five minutes of it. A higher figure represents better performance. At the end of 2015/16 national PPM stood at 89.1 per cent, below our target of 90 per cent.

Cancelled and significantly late (CaSL) trains: Measures how many passenger trains are cancelled or are significantly (more than 29 minutes) late. A lower figure represents better performance. At the end of 2015/16 CaSL stood at 3.1 per cent, 0.3 percentage points worse than our scorecard target.

Freight delivery metric (FDM): Is our indicator of how many freight services have arrived at their destination on time. A higher figure represents better performance. We outperformed our regulatory target for 2015/16 of 92.5 per cent but did not meet our scorecard target for the year of 94.5 per cent.

Financial performance measure

Excluding enhancements: This measures our financial stewardship of the day-to-day running of the railway network by comparing income, operational expenditure and renewals expenditure to the baseline set at the start of the year. The baseline is adjusted to reflect the capital works actually delivered in the year to create a like-for-like comparison. Our net financial performance in 2015/16 was £149 million lower than planned, mainly due to higher renewals costs across signalling, track and civils projects, lower than planned efficiencies in Network Operations and higher compensation to operators following weather events which were partly offset by additional income generated from our commercial property team. As agreed with the ORR, higher renewals and enhancement costs score for the

financial performance measure at broadly 25 per cent of the difference between actual costs and the baseline.

Enhancements: This Measures our financial performance in delivering enhancement programmes by comparing expenditure to baseline set at the start of the year. The baseline is adjusted to reflect the progress made in delivering programmes during the year to create a like-for-like comparison. Our net financial performance in 2015/16 was £210 million lower than planned, with significant increases in costs across a range of key programmes, notably Great Western Electrification, leading to underperformance being recognised. The baseline used to assess performance this year is significantly lower than the baseline set by the Hendy review and since adopted for regulatory reporting purposes. This means that enhancements performance is lower in this measure than that used to calculate the regulatory asset base, on which the railway network valuation is based.

Investment

Infrastructure Projects renewals and enhancement milestones: Relates to the top ten renewals and enhancements milestones of our Infrastructure Projects (IP) work. We have achieved nine of our top ten milestones, exceeding our target for this measure. The milestone we did not meet, the introduction of first deployment traffic management simulators, is now forecast to complete early in 2016/17.

All enhancement milestones: Our investment projects are managed using the Governance for Railway Investment Projects (GRIP) approach, which has milestones at stages 3 and 6 of the 8-stage project process. Our performance against our corporate scorecard was assessed at 81 per cent in May 2016. The majority of delays were during project development rather than delivery and did not affect completion dates or rail services. The only project completion milestone that was delayed was a project re-baselined as part of the Hendy Review.

Asset management

Composite reliability index: Is a measure of the short-term condition and performance of our assets including track, signalling, points, electrification, telecoms, buildings, structures and earthworks. A higher figure represents better performance. We achieved a CRI score of 14.6 per cent exceeding our target of 8.4 per cent and our stretch target of 9.3 per cent.

Renewals (seven key volumes): This measures our delivery of our seven key volumes for renewals: plain line track, switches and crossings, signalling and equivalent units, underbridges, total earthworks, wire runs and conductor rail. We achieved our overall target. Some key volumes, including our renewal of

conventional plain line track and earthworks, performed strongly but we faced challenges in the delivery of other key volumes including switches and crossings and signalling. These were respectively caused by resource constraints and delays to major work in a number of locations.

Satisfaction

Customer satisfaction: This is a measure of how well Network Rail engages with its key customers, principally passenger and freight train operating companies in each of our routes. It is measured through the third party 'Customer Satisfaction Survey'. A higher figure represents better performance. At 3.05 (out of five), customer satisfaction fell short of both our target of 3.32 and the scorecard minimum of 3.15.

Passenger satisfaction: This is measured through the National Rail Passenger Survey commissioned by Transport Focus twice a year, which provides a network-wide picture of passenger satisfaction with rail travel. The year-end result is the average of the two surveys. A higher percentage represents better performance. We did not meet our target of 83.3 per cent, but met the scorecard minimum of 81 per cent.

Lineside neighbour favourability: This measures Network Rail's reputation amongst lineside neighbours who have experienced work near their home or place of work in the past year. We ask them 'how favourable/unfavourable are you towards Network Rail?' A higher figure represents better performance. At 51 per cent, lineside neighbour favourability did not meet our target of 53 per cent or our scorecard minimum of 52 per cent.



Shaping our Future

A year of reviews

2015/16 was a year of reviews. The most far-reaching was Nicola Shaw's review into the future structure and financing of Network Rail. Dame Collette Bowe reported on the lessons learnt from the planning process for Network Rail's CP5 rail enhancement programme while Sir Peter Hendy reviewed our CP5 enhancement portfolio. The key findings from each review are summarised below.

Bowe Review

In June 2015, Dame Collette Bowe, a non-executive member of the Board of the Department for Transport (DfT), was asked by the Government to report on lessons learnt from the planning process for Network Rail's CP5 rail enhancement programme. [The Bowe Review](#) was published on 25 November 2015 and concluded that CP5 was in some respects materially different and more ambitious than Control Period 4 (CP4), and included a large programme of work unlike that undertaken in recent years, namely electrification. The review confirmed that there was no single cause for the cost and timescale escalations encountered. It highlighted key areas to focus on to increase the likelihood that future planning is more effective, and ensure plans are both deliverable and affordable, including:

- clarifying the organisational responsibilities of the DfT, Network Rail and the ORR, particularly in light of the reclassification of Network Rail, which has changed the context significantly, and ensuring that the necessary capabilities are in place
- ensuring significantly more robust programme governance and oversight of the planning process, with clarity around schemes at all stages of development, and considering whether bespoke arrangements for very complex elements of the enhancements programme should be more widely used
- incorporating the views and needs of end users, especially in respect of how enhancements are delivered
- much stronger focus on deliverability, including the implications throughout for the supply chain, and the availability of people with the right skills (in all three organisations).

Network Rail and the DfT have both agreed not to commit to projects until full scoping, development and costing has taken place.

Hendy Review

In July 2015, Sir Peter Hendy CBE was appointed as the new Chair of Network Rail by the Secretary of State for Transport. At the Government's request, Sir Peter Hendy reviewed Network Rail's CP5 enhancement portfolio for England & Wales. [The Hendy Review](#) systematically examined every element of this programme reviewing costs and timescales and establishing robust estimates of both. His report set out which works can be delivered in a timely and affordable way during CP5. The report confirmed that no projects would be cancelled and the majority of programmes and projects will go ahead for delivery by 2019. In order to fund the increase in cost we are planning to release £1.8 billion of investment through the sale of non-core and lower value assets, including the sale of our property assets. The Government was also able to increase the limit on Network Rail's government borrowing by a further £700 million. This extra investment secures a Railway Upgrade Plan that delivers better stations, faster, more frequent and longer trains and a safer more reliable railway for millions of passengers and businesses. The new Railway Upgrade Plan is a more robust and deliverable plan but it is not without its own risks and challenges which Network Rail will work to address.

Shaw Report

Nicola Shaw's report to Government on the longer term future shape and financing of Network Rail – [The Shaw Report](#) – was published in March 2016. Her report, recommended that the rail network should be held as a national asset and a key public service. Her recommendations around ongoing devolution of the business represented, in her words, 'an evolution, extension and validation of a direction of travel already set in motion by the company'.

We had already accelerated our strategy of devolving power to the routes. We need to make faster decisions, focused on the needs of customers who hold us to account. From 2016/17 we will have route based scorecards, devised with our train operating company customers to reflect what is really important to them.

The Shaw Report also highlights, and we support, the need to bring third party funding into railway projects. We foresee private and third party contributions from those who benefit from the economic growth that greater railway capacity brings, and also investment from suppliers into enhancements like the Digital Railway that will increase railway revenue from which they can be rewarded.

Safety

Everyone home safe every day

Keeping people safe on the railway is at the heart of everything we do. Safety is a core value and key to the success of Network Rail. From our group board to every employee in every depot, station, signal box and office, our safety vision is that everyone who comes into contact with the railway goes home safe every day. We strive to find new ways to keep ourselves, colleagues, passengers and the public safe in all the work we do.

While safety performance improved across Network Rail during the year, we still have more to do. Initiatives such as regular safety hours ensure that more safety conversations are taking place across each route, and close call reporting and the close out of subsequent investigations increased significantly over the year.

Safety Management

Passenger Safety – In the past nine years, there have been no passenger fatalities as a result of a train derailment or collision. We continue to be the safest major mixed-use railway in Europe and one of the safest in the world.

Workforce Safety – In the past year, there have been no employee on-duty fatalities. ‘Slips, trips and falls’ remain the most common causes of accidents to our employee and contractor workforce. The number of lost time injuries ([RIDDOR](#) reportable 7+ days) has increased in the past year by 10.1 per cent. Our national programmes delivered through the Home Safe Plan risk reduction workstreams will provide a step-change in the safety of our workforce and contribute towards our target of eliminating all workforce fatalities and major injuries.

Public Safety – In the past year, there has been a 13 per cent reduction in the number of suicides across the network. We have worked closely with [Samaritans](#) to prevent and reduce the number of suicides on the railway. In January 2015 this partnership was extended until 2020 to allow our collaboration to continue long-term. We have also implemented a new ‘alert’ process which warns route teams of potential suicides on the network. Our suicide prevention campaign material has been updated to promote help-seeking behaviour within communities.

Close Calls – A Close Call is anything that has the potential to cause injury or damage, and can be reported by any Network Rail employee or contractor at any time, as long as it is safe to do so. We exceeded our target of 80,000 Close Calls, with a total of 140,021 Close Calls made. Improvements to the Close Call process

have been identified across the business and amendments have been made to the mobile app reporting tool to reflect this feedback.

Level Crossing Safety – Safety at level crossings remains a priority area for Network Rail and we continue to invest in a wide range of programmes to promote this. We work with national and local organisations to make level crossings safer and to educate people on how to use them correctly. In the past year, we closed 76 level crossings and continued to develop and deploy risk reduction measures to enable and encourage safe use. Over the past five years there has been a sustained reduction in the number of near misses with vehicle users. This year saw a ten-month fatality free period which was the longest such period on record and demonstrates that we are improving safety at our level crossings.

Occupational Health and Wellbeing

Network Rail is committed to promoting and protecting the health and wellbeing of all our employees.

Developing a supportive culture of wellbeing – Network Rail continues to be committed to mental health charity Mind’s ‘Time to Change’ campaign to reinforce our view that discrimination related to mental health is not acceptable. We have worked to increase willingness to disclose mental health issues across the organisation by developing and releasing a series of real-life stories about employees who had experience of mental health issues. There have been several hundred supportive comments for the individuals concerned within the comments section of Network Rail’s intranet following each article.

Occupational Health Referrals – Our strategic commitments to health and wellbeing highlight how we have worked to increase managers’ understanding and appreciation of Occupational Health (OH). The benefits of referral to our OH services have been emphasised, particularly the availability of advice and guidance related to health.



Operational Performance

Planning and operating the railway

Before the start of CP5, operational performance levels were much lower than anticipated in the ORR's CP5 Final Determination. It became clear that a number of regulated performance outputs would not be met during the first two years of the control period. Network Rail and the ORR therefore agreed to take an input-based approach to monitoring national PPM and CaSL during the first two years of the control period. The ORR decided to monitor regulated outputs at operator level and for Scotland, but monitor delivery of input plans in England & Wales. The ORR monitors the delivery of our CP5 performance plan, which details the key activities Network Rail is taking to improve performance.

By the end of 2015/16, 287 activity milestones in our CP5 Performance Plan were completed in England & Wales. 229 of these were completed early or on time and 58 were completed late. 91 milestones are yet to be delivered and are planned to be included in the plan for the remainder of CP5. Of these, 69 are planned to be delivered on schedule. 22 are expected to be completed late. At the end of 2015/16, 35 milestones were placed on hold or de-scoped, either because of plan changes or because a scheme has been replaced by an alternative opportunity.

In Scotland the ORR monitors outputs, and not the inputs in the CP5 Performance Plan. Notwithstanding this, in Scotland 42 activity milestones in the CP5 Performance Plan were completed at the end of 2015/16. 29 of these were completed early or on time and 13 were completed late. Three milestones will be delivered late. During 2015/16, nine milestones were placed on hold or de-scoped, either because of plan changes or because a scheme has been replaced.

Operational performance in England & Wales

England & Wales PPM at the end of the year was 88.9 per cent, 0.7 percentage points worse than our scorecard target; CaSL was 3.1 per cent, 0.3 percentage points worse than our scorecard target. The biggest contributor to this was performance in the London & South East sector where, amongst other issues, the challenges of the Thameslink Programme and the need to continue to operate a full service despite a reduction in network capability caused particular challenges in terms of service delivery along the Brighton Main Line and elsewhere. PPM in the LSE sector ended 1.5 percentage points short of target at 87.8 per cent. Delivery in the other two market sectors also both finished short of target: Long Distance PPM finished at 87.6 per cent, 0.7 percentage points short of target, Regional PPM finished at 91.4 per cent, 0.6 percentage points short of target.



Operational performance in Scotland

At the end of 2015/16, Scotland PPM was 90.6 per cent, 1.4 percentage points worse than the regulatory target but 0.1 percentage points better than 2014/15. Operational performance was worse in the latter part of the year due to poor weather conditions including major storms in November and December. Specific performance challenges in 2015/16 included: storms and subsequent flooding, line closures due to strong tides, overcrowding and station overtime. We worked with Transport Scotland and train operators to provide an enhanced service to keep people moving during the closure of the Forth Road Bridge, which resulted in additional network congestion in December and January.

Freight performance

At 94.3 per cent FDM, freight outperformed its regulatory target by 1.8 percentage points. This target has been achieved against a backdrop of significant structural change in the freight traffic market. There has been an unprecedented decline in the coal sector, and growth in the intermodal and construction markets which operate on already congested areas of the national rail network. The year has also seen a number of particularly significant incidents; notably the cancellations ahead of planned industrial action in May 2015, and the widespread flooding in the north of England and Scotland in the second half of the year.

Enhancing the Railway

A growing railway to meet growing demand

Network Rail is undertaking a huge five year upgrade plan to deliver a bigger and better railway, with more trains, as well as enabling longer and faster train services through longer platforms and the electrification of key lines. The end result will see a much better service for passengers. In 2015/16, Network Rail delivered £3.5 billion of enhancements to upgrade the railway across Great Britain.

Our work means that by the end of CP5 there will be 170,000 more seats into London at rush hour (a 20 per cent increase compared to pre-2014 levels), and 30 per cent more into the cities of the north. We are driving economic regeneration through new lines in the Borders and Oxfordshire and through newly modernised stations including Birmingham New Street, Manchester Victoria, London King's Cross and London Bridge. Other major projects include Thameslink, Crossrail and the comprehensive modernisation and electrification of the Great Western Main Line.

In 2015/16 in terms of enhancement milestones, we have delivered a greater number of project commissionings on schedule, improving on our performance in 2014/15. However, there are areas where we did not meet our performance targets including where our costs have exceeded the budgets set.

During 2015/16 it was recognised that project spend had, in a number of areas, increased significantly from our original plans. This led to the commissioning of the Hendy Review which resulted in a significant re-profiling and re-costing of major elements of the CP5 enhancement portfolio in England & Wales. The revised plan, which in some instances now stretches into our next control period, CP6, gives an increased level of security and certainty to both our customers and the supply chain, and to the taxpayer, on the delivery schedule and costs of the programme. We recognise the importance of delivering to this commitment.

The Enhancements Delivery Plan (EDP) sets out the outputs, scope and key milestones for every project and ring-fenced fund that Network Rail is committed to deliver in CP5. An update to the EDP covering England & Wales was published in March 2016 to support the Hendy review of Network Rail's enhancements programme for CP5.

The [full Hendy report](#) and our updated [March 2016 EDP](#) can be found on our website.

Some highlights of 2015/16

Over the year we delivered nine out of our top ten infrastructure project milestones. This is a measure on our corporate scorecard and includes both enhancements and renewals project milestones. Nine out of ten of these milestones were enhancements-related, and of these, we completed eight of the nine. Completion of the Borders Railway and Reading area station redevelopment, outlined below, contributed to this achievement.

Another key milestone completed in 2015/16 was the upgrade work on the Winchburgh Tunnel in Scotland, which was completed on time and on budget. This was achieved in 44 days, with 80,000 hours of work, 2,000 tonnes of poured concrete and 200 newly laid slabs of track. Engineers worked around-the-clock to complete what the Transport Minister described as 'the most significant piece of engineering work on the line since the Victorian era'. This forms a major part of the Edinburgh Glasgow Improvement Programme, which will reduce journey times by 20 per cent and increase passenger capacity by 30 per cent between Scotland's two biggest cities when it completes in 2016.



We also completed re-signalling in the Stafford area of the West Coast Main Line, with 78 new signals installed. This has boosted the reliability of the equipment on this section of the line and means all platforms at Stafford stations are able to accommodate trains in either direction. This is a part of a £250 million package of works to improve capacity and performance on the busy West Coast Main Line.

As part of the government sponsored Thameslink Programme, we completed infrastructure works, with tracks outside London Bridge station cut and moved to the north. This allowed old track to be dug up and rebuilt in time for Christmas and the next major stage of rebuilding. New tracks on the line towards Waterloo East were also installed and now carry trains over the new Borough Market Viaduct.

September 2015 saw the completion of the both the Birmingham New Street Gateway and Borders Railway Projects.

The Birmingham New Street Project was one of the most complex and challenging construction projects anywhere in the country. The old 1960s dark and overcrowded station has been transformed with a new concourse for passengers, offering more space, light and better accessibility into and throughout the station. Over 170,000 people use Birmingham New Street every day, making it one of the busiest stations outside London with numbers set to increase. Birmingham New Street has the highest rate of mobility assistance requests of any Network Rail managed station. By engaging with different station users and specialist organisations, the new station was designed and operates at an industry beating standard for accessibility. Birmingham New Street was officially reopened by Her Majesty the Queen on 19 November 2015.



On 26 February 2016, Network Rail, in partnership with Atkins, won the 'Station Excellence' award at the Rail Business Awards for the new Birmingham New Street station.

In September 2015, the Scottish government-funded Borders Railway was officially opened by Her Majesty the Queen. At 30 miles, it is the longest new domestic railway built in Britain in over a century. It has re-established passenger services from Edinburgh through Midlothian to Tweedbank for the first time in over 40 years, connecting a number of previously isolated rural and semi-rural communities. The project was completed on time and on budget. The new line consists of seven new stations joined by 30 miles of new track. At its peak, more than 1,100 people were working on the project, refurbishing or building 137 bridges and laying track across almost 100,000 sleepers. In April 2016, Borders Railway was named the Royal Institution of Chartered Surveyors' Scottish infrastructure project of the year.



In addition to the progress on these major programmes, further scorecard milestones completed included; signalling commissioning from Marylebone to Oxford Parkway; gauge clearance from Bristol parkway to Plymouth, Reading to Westbury and Westbury to Cogload Junction via Castle Cary; GRIP 5 stage gate review on the Wessex Capacity Programme.

Bank Holiday working

The Bank Holiday periods are essential to allow us and our partners to carry out major enhancements, and we aim to do this with minimum disruption.

The high profile delays and consequent customer disruption experienced over Christmas 2014 prompted a large amount of work to improve our project and possession planning, especially across key Bank Holiday periods. This focus has resulted in the successful delivery of a series of major enhancement projects over Bank Holidays in 2015/16.

Over Easter 2015, £100 million of investment and improvement work was completed successfully, on time and on budget, across Britain's railway. London Bridge saw track, signalling and platform improvements as part of the £6.5 billion Thameslink Programme to transform north-south travel to and through London.

Work to redevelop Reading station and the surrounding track was also completed. Reading station is one of the busiest rail hubs in Britain, used by nearly 20 million passengers a year. The project commenced in 2011, and involved rebuilding the station, upgrading the railway in the area, including redesigning the complicated track layout, completing new depot connections and building a viaduct to the west of Reading. This has removed one of the worst bottlenecks on the network.



A bridge south of Watford Junction station was demolished and a new one installed enabling line speeds to be increased through the area. As part of a wider £81 million upgrade scheme, old track, signalling and junctions were also replaced.

Over the August Bank Holiday period, Network Rail successfully completed its biggest single track renewals project to date and the biggest on the Western route for 40 years, lowering and replacing ten kilometres of track in Bath and its surrounding area in preparation for a new fleet of faster, quieter and greener

electric trains. As part of the £50 million project, we also installed 11 new switches and crossings, enabling trains to move from one track to another. The new lower track has created the additional headroom needed for the overhead lines that will power the electric trains, while preserving Bath's historic architecture.

Over the August Bank Holiday, we installed new track at Ipswich tunnel on the Great Eastern Main Line to improve reliability, and overhead lines were upgraded at Brentwood.

Christmas 2015 saw more than 20,000 people complete more than 500 upgrade and maintenance projects across the country whilst also seeking to minimise disruption after high winds and severe flooding caused widespread damage to the rail network. This included severe damage to the sea wall at Dover resulting in the closure of the line between Dover Priory and Folkestone Central.

On the LNE route, work was carried out on more than 30 worksites including the upgrade of track and overhead lines, improvements at stations, bridge replacements and £100 million investment in signalling in the Lincolnshire area.

On the LNW route, all key possessions and works, including those at Banbury, Weedon, Stafford, Wolverhampton station, Birmingham New Street station, Crewe and Chester, were handed back on or ahead of time. At Preston, switches and crossings were upgraded and the replacement of a 150 metre stretch of track on the approach to the station was completed.

In Scotland, the Edinburgh Glasgow Improvement Programme (EGIP) commissioned a new signalling system on the line between the Anniesland branch and the up and down single lines, including the installation of new switches and crossings and signalling. Works also continued to prepare the main Edinburgh-Glasgow line for electrification, including the demolition of three bridges.

During the Easter 2016 Bank Holiday, Network Rail completed 450 engineering projects on time, despite challenging weather conditions brought about by Storm Katie on 28 March 2016. The £60 million Easter investment programme saw the successful construction of new station facilities, longer platforms, extra tracks, new junctions and the installation of thousands of new, more reliable equipment.

In Manchester, a major nine-day programme of work was started to improve the track layout at Manchester Victoria station as part of Network Rail's Northern Hub project. Between Reading and London, work was completed to make way for electric trains and Crossrail, and in Kent signals were upgraded to improve the reliability of the railway for passengers. In Scotland, work continued to replace 1,800 metres of ageing track leading up to Glasgow Queen Street station to allow faster, greener and longer trains to run between Glasgow and Edinburgh.

Asset Management

A better railway for a better Britain

In 2015/16, our Composite Reliability Index (CRI) score which measures the short-term condition and performance of our assets including track, signalling, points, electrification, telecoms, buildings, structures and earthworks was significantly better than target, reflecting improved performance across the majority of assets. We achieved a CRI score of 14.8 per cent exceeding our scorecard target of 8.4 per cent and our stretch target of 9.3 per cent.

Track reliability was in line with target, with the exception of service affecting track failures which fell one per cent short of target. Since a change to track maintenance standards to address the risk of derailments, Temporary Speed Restrictions (TSRs) have increased affecting train services. All routes outperformed targets for 'Poor Track Geometry' as a result of bespoke route plans responding to the national challenge to reduce repeat faults.

The reliability of our telecoms assets has been challenging since the start of CP5. There has been underperformance across all routes associated with the Global Systems for Mobile Communication Railway (GSM-R). National reliability improvement plans have been implemented in 2015/16.

In 2015/16, there were no train derailments as a result of earthwork failures. There has now not been a train derailment from an earthwork failure since 2012/13; the longest period since record keeping began. Earthworks assets are particularly sensitive to rainfall and 2015/16 saw the second wettest winter since records began. This has pushed the five-year moving average of earthwork failures to 123, well above the CP5 entry figure of 106.

Since the start of CP5, and as part of the Hendy re-plan, Network Rail has developed proposals to defer some renewals work to CP6 and beyond. Through this process we have been working closely with both the DfT and the ORR to develop a revised Delivery Plan for the remainder of CP5. Our own analysis suggests limited long run impact on sustainability, providing renewals spend is increased during CP6 and CP7 to compensate. Asset condition sustainability has remained relatively stable in 2015/16, despite some deferrals of renewals work. Throughout this Annual Return, we provide targets as stated in the 2014 Delivery Plan and revised targets included in the 2015 Business Plan.

Delivery of renewals in 2015/16 has varied by asset and route. However, overall delivery of renewals activity has increased in 2015/16 compared to 2014/15. Schemes throughout the year to improve planning and delivery of work have

positively impacted delivery of track renewals. A number of large signalling schemes have been commissioned throughout the year but some schemes have been deferred to 2016/17 following reviews of safety and deliverability. Within the overall buildings and civils portfolio there has been on-going workbank development throughout the year to achieve the best possible efficiency throughout CP5. Despite variable route results, overall volumes delivery for electrification and fixed plant assets has been in line with the 2015 Business Plan throughout the year, although some activity has been deferred to later in CP5 in order to deliver these works safely and efficiently.



Maintenance volume delivery in 2015/16 was variable across a range of reported activities. Due to the nature of maintenance activity, plans created at the start of a year do not always accurately reflect the actual maintenance requirements. There have been challenges in terms of available resource and access and the need to undertake unplanned reactive work. Notwithstanding this, more frequent use of the plain line pattern recognition train has driven early identification and intervention for some track maintenance activities. There are understood backlogs in delivery in some areas of the civils portfolio as well as delays to the sign-off of examinations.

The use of intelligent infrastructure and interpretation of data has led to a more preventative approach to maintenance, particularly within the signalling portfolio. This has had a positive effect on overall asset reliability.

Digital Railway

A vital enabler for national economic success

The Digital Railway Programme

With the railway already full on some major routes, and with passenger numbers set to grow significantly in the next twenty years, Britain needs a strategy to unlock capacity from existing infrastructure that allows regions to benefit from more trains, better connections and greater reliability. Digital technology enables this by allowing trains to run closer together. It will allow us to achieve more from what we already have. This is vital, too, for the freight industry and its users, who currently suffer from a shortage of pathways.

There is a fundamental barrier to this more productive and cost-effective railway: the constraints imposed by signalling designed for a pre-digital age.

Historically, the most effective way to keep trains separated safely from each other has been to divide tracks into fixed sections (blocks) and use signals to only allow a train to enter a block once the preceding train has vacated. Technology and innovation now offer us the opportunity to move beyond analogue signalling and train control – potentially unlocking up to 40 per cent more capacity from the existing network as demonstrated in a study of the South West Main Line.

Looking ahead for Digital Railway

In November 2015, the Digital Railway Programme delivered its [framework business case](#) and proposed rollout plan for an accelerated programme of digital infrastructure. The next stage of the business case will be published in autumn 2016, alongside the industry's advice for investment in CP6 (2019 – 2024). This will include a 25 year baseline option for a Digital Railway that is deliverable and based on proven technology, sustainable, and policy compliant. It will also assess the option to deliver a Digital Railway in a 15 – 20 year timeframe with greater benefits using an upgraded version of the technology.

Whilst the Digital Railway is underpinned by technology, it is a transformation programme that will impact all parts of Britain's railway industry – everything from driver training to the specification of rolling stock. We have established a cross-industry advisory group to lead the development of the programme. Chaired by Network Rail, the group includes senior leaders from the DfT, Rail Delivery Group, passenger train operators, freight train operators, Transport for London (TfL), Crossrail, the ORR, and the Rail Supply Group.

Enablers to the Digital Railway

Implementing the Digital Railway vision through an accelerated programme is vital to meeting the future growth in passenger demand and providing the capacity needed on the rail network for the benefit of passengers and freight users, and to connect homes and businesses across Britain.

However, modernisation beyond 2019 is currently unfunded. A commitment to additional future investment is needed now to transform the network and underpin economic growth across Britain.

Support from the Government and the rail industry for an accelerated rolling programme of digital modernisation of the railway will give confidence to our supply chain and provide the momentum needed to enable Britain's railway to provide more capacity, better connectivity and improved reliability.

For more information on the Digital Railway please visit: www.digitalrailway.co.uk.



Sustainability

Delivering a railway fit for the future

For Network Rail, sustainability means making sure that everything we build, manage, maintain or develop today leaves a positive legacy for future generations.

We believe that good management of our economic, social and environmental impacts is key to maintaining a strong and prosperous business. We aim to drive efficiency, build trust and create long term value for our stakeholders.

We are building momentum across our business, amongst our industry partners and across our supply chain to deliver our sustainable development priorities. We are giving direction and focus to existing initiatives, developing new ones and joining up activity across our business and industry.

We are committed to reducing both our carbon footprint and energy usage. We recognise that the carbon emissions embodied within the creation of materials and construction processes form part of our overall carbon footprint. In 2015/16 we identified ten projects to test the rail sector's adopted tool for measurement of embodied carbon. This will enable us to understand the opportunities to reduce embodied carbon during project planning and design and reduce our overall carbon footprint.

Network Rail is one of the largest land owners in Great Britain, managing 20,000 miles of railway and the land either side of the embankments. Our network extends to most of Great Britain, running through Areas of Outstanding Natural Beauty, Sites of Special Scientific Interest and also through towns and cities where people live and work. We need to balance our responsibilities towards sensitive ecological features and consideration for our 22 million lineside neighbours (people who live or work within 0.5 kilometres of a line).

In August 2015 we published our new Environmental Policy which can be found [here](#). Our policy commits us to improving our environmental performance and leaving a sustainable legacy for future generations. We are developing a new strategy which will allow us to drive this improvement in a focused and risk-based way.

From 2016/17, our approach to charitable giving is being revised in line with government requirements. We now support charitable activities with giving in kind (for example time, premises and spare advertising) rather than cash as well as continuing our successful employee fundraising and payroll giving support.



Diversity and Inclusion

A more open, inclusive and diverse organisation

Our aim to deliver a Better Railway for a Better Britain is underpinned by our knowledge that world class businesses are customer driven, accountable and take account of the diversity of the communities that they serve, and that to be effective they attract and retain talent and inspire all those that work there. Our approach is to nurture a long-term talent pipeline through apprenticeships, graduate programmes and to support continuous professional development. Our strategy 'Everyone' aims to improve diversity and inclusion within the business. More information is provided within the ['Sustainable Development' section of this Annual Return](#).

By creating a more open, diverse and inclusive organisation we will be safer and perform better. Implementing diversity and inclusion will make us more receptive to new ideas, creativity and innovation, and make sure that everyone is better engaged and able to contribute fully to the business. We believe that having a workforce with a wide range of expertise, approaches and backgrounds will increase our understanding of our passengers' needs and the potential barriers to access.

Key performance indicators to track performance have been developed and are currently being rolled out. These will be reviewed against diversity targets and the results will be published in early 2017. We use our membership of a number of benchmarking diversity organisations to help us understand how we compare with other businesses and sectors.

So far, over 3,500 managers have received inclusive leadership training, and there are currently 250 diversity champions, 50 trade union equality representatives, 35 workstreams and over 1,300 staff network members.

Positive results are beginning to be seen in a number of areas. For example, this year the resourcing workstream focused on improving graduate hires from under-represented groups. We developed a branding and outreach strategy to encourage applications, particularly from female engineers, and invested in selection tools to remove bias. As a result, 29 per cent of Network Rail's 2015/16 graduate intake were women (24 per cent in 2014/15) and 31 per cent were from Black, Asian or Minority Ethnic (BAME) groups (18 per cent in 2014/15). The percentage of female engineering recruits rose to 16 per cent in 2015/16 (six per cent in 2014/15).

At a company-wide level 15.4 per cent of our workforce is female (14.7 per cent in 2014/15) and 6.7 per cent of our workforce is from BAME groups (6.1 per cent in 2014/15).

Further details on the diversity of our board and senior management can be found in our Annual Report and Accounts which can be found [here](#).

Inclusive design

In October 2015 we launched 'Spaces and Places for Everyone', our inclusive design strategy. Developed in consultation with a range of internal and external parties, it describes how we will get better every day at offering more inclusive environments, from railways to workplaces. We want to see a railway that is more accessible, convenient and welcoming to as many people as possible. We care about our passengers and we want everyone to have a positive, seamless journey. Our vision means that our offices and depots will also be better able to accommodate our workforce.



Customers and Communities

Engaging with our stakeholders

Customer satisfaction

Customer satisfaction is an assessment of how well Network Rail engages with its direct customers; principally passenger and freight train operators. Customer satisfaction is measured through the 'Customer Satisfaction Survey' carried out by a third party which takes into account the customer satisfaction achieved in each of Network Rail's routes.

In 2015/16, customer satisfaction at 41 per cent improved slightly from the previous year (40 per cent). However, overall satisfaction remains somewhat short of the all-time high of 66 per cent achieved in 2012/13.

Safety remains the highest scoring attribute in the survey. 73 per cent of customers are satisfied with Network Rail. The key drivers for improving our satisfaction score identified by the survey included improvements to 'delivering what we say we will' and 'taking ownership of issues'.

There are two areas where customer satisfaction has declined with statistical significance, 'delivery of enhancement projects' and 'access planning'. These have mitigated the incremental gains that have occurred for the other measures included within the survey.

We have also developed a Customer Service Maturity Model that was implemented for the first time in 2014/15. This model enables a national view of customer service in our operating routes. More detail is provided later in this Annual Return.

Passenger Satisfaction

The National Rail Passenger Survey (NRPS) is commissioned by Transport Focus. Passenger opinions of train services are collected twice a year from a representative sample of journeys, from a representative sample of locations. The latest results reflect the spring 2015 survey, which took place between January and March 2016.

More than 50,000 passengers a year are surveyed to produce a network-wide picture of passengers' satisfaction with rail travel. Passengers' overall satisfaction and satisfaction with 30 specific aspects of service can then be compared over time.

The percentage of passengers satisfied with their overall journey was 80 per cent, unchanged from the spring 2015 survey. At a route level, London South East and Wessex routes were the worst performing at 73 per cent and 80 per cent satisfaction respectively (although results in Wessex did improve by two percentage points over the survey in spring 2015). The highest performing routes were Scotland at 88 per cent (unchanged from spring 2015) and LNW at 86 per cent (improved one percentage point on spring 2015).

The full result of the Transport Focus spring 2016 survey can be downloaded [here](#):

Network Rail owns and manages 18 of Britain's biggest and busiest stations and we are able to directly influence satisfaction at these stations. In the autumn 2015 survey, overall passenger satisfaction at our managed stations achieved 83 per cent, one percentage point worse than the spring 2015 survey.

The highest scoring station was London St. Pancras, which achieved 95 per cent satisfaction, the largest improvement in passenger satisfaction since spring 2015, of seven percentage points was at Birmingham New Street. The lowest scoring station (57 per cent satisfaction) was London Bridge where significant project work to deliver the Thameslink Programme is ongoing.

Lineside neighbour satisfaction

Around five million people's homes either back on to or face the railway, while 22 million people live or work less than 500 metres from the railway. We conduct an annual survey which measures Network Rail's reputation amongst lineside neighbours who have experienced work near their home or place of work in the past 12 months. At 50.2 per cent, lineside neighbour favourability did not meet our target of 53 per cent.

We are working to make it easier for our stakeholders to talk to and hear from us about what we are doing. We aim to give notice about all of works we plan to undertake. However, sometimes safety critical repairs need to be carried out at short notice.

Transparency

Being a more open, honest and accessible company

We believe that being transparent both in how we work as a company and how we work with our stakeholders is integral to our success as a business.

We know that being more transparent will help us become a more efficient and responsive organisation, and make us more accountable to our stakeholders. We've made a start but we recognise that there is more to be done and we are committed to making transparency part of everything we do at Network Rail.

During the course of 2015/16 our work has focussed on four core areas:

Proactive publication

As part of our existing transparency commitment we publish new information four times a year. The type of information we have previously published include details about our level crossings, executive directors' expenses and a breakdown of our annual expenditure. In 2015/16 we published 28 categories of new information taking us to almost 100 categories in total. We received more than 260,000 hits to the transparency categories on our webpage which can be found [here](#).

Freedom of Information

In March 2015, Network Rail became subject to the Freedom of Information (FOI) Act. We see FOI as a further opportunity for the company to be more open and accountable. In 2015/16 we received 1,538 requests for information at an average rate of 30 new requests each week. We have responded to 92 per cent of all requests within the statutory timescales. Minimum performance expectations are set at a benchmark of 85 per cent by the regulator (the Information Commissioner).

Open Data

The release of open data by organisations is increasingly becoming the norm and is an integral part of becoming more open and transparent. The railway industry as a whole continues to invest in making more, and better, data available to improve passenger journey planning. We have continued to work with technical developers throughout the year to build upon the 'real time' open data we currently provide from our operational train information. This data is used for mobile applications and websites and shows what is happening on the network at any given time.

We have more than 200 active users of our open data feeds. Feedback suggests that considerable appetite exists for ongoing releases of raw data including on historic performance and train cancellations. Developers want us to publish additional data feeds and we will be working with partners across the industry to explore more options.

Working with the industry

We have played a key role in the continued development of the industry approach towards transparency, providing leadership through the Rail Delivery Group (RDG) transparency sub-committee in particular. We actively benchmark our delivery against comparable organisations to drive continuous improvement and welcome challenge regarding our work. During the year we have hosted a number of events involving representatives across the sector, including challenge panels and stakeholder debates. These events are designed to promote closer working relationships, facilitate the sharing of ideas, as well as creating an environment where people can offer feedback and support.





2. Safety

This section reports our principal measures of the safety of passengers, public and workforce that come into contact with the rail network, as well as the health and wellbeing of Network Rail employees. The successes and challenges of initiatives to improve safety, health and wellbeing in 2015/16 are set out alongside the following measures:

Safety Management

- workforce safety
- passenger safety
- public safety
- Category A Signals Passed at Danger (SPADs)
- Close Calls
- Operational Close Calls (OCC)
- level crossing safety
- Safety Management System and Improvement.

Occupational Health and Wellbeing

- strategic commitments to health and wellbeing
- occupational health and wellbeing strategic dashboard
- respiratory health
- exposure to asbestos and lead
- Hand Arm Vibration Syndrome (HAVS)
- noise and audiometry
- psychological and musculoskeletal occupational health referrals
- employee sickness
- employers' liability.

Where appropriate, results are averaged over 13 four-week periods to provide a Moving Annual Average (MAA) performance figure, as at the end of 2015/16.

Measures of passenger, public and workforce safety are included in the Network Rail corporate scorecard, our performance against which is set out in the Executive Summary.



Safety Management

Safety management measures provide an indication of the overall safety of our passengers, workforce and the public with respect to the risks associated with all aspects of the design, construction, maintenance and operation of the railway.

Passenger Safety

Definition and reporting method

Passenger safety is measured by the Passenger Safety Indicator (PSI), which incorporates train accident risk data and the weighted number of personal injuries to passengers.

The first element of the PSI, train accident risk data, is taken from the Precursor Indicator Model (PIM). Produced by the Rail Safety and Standards Board (RSSB) every period, the PIM provides a guide to the current train accident risk profile and the trends in this profile. It calculates this using precursor events data from nine main areas (infrastructure operations, signals passed at danger, objects on the line, track, earthworks, signalling, structures, level crossings and train operators failure). The second element of the PSI is the weighted number (fatalities and weighted injuries (FWI) measure) of personal injuries to passengers, at station level crossings and Network Rail managed stations, as reported in Safety Management Information System (SMIS). This metric is normalised per billion passenger kilometres.

For all three measures reported in Table 2.1, a lower figure represents better performance.

Commentary

In 2015/16, Network Rail exceeded its target of 1.942, which was a reduction of 10 per cent from 2014/15, to reduce the passenger component of train accident risk, where the risk is within Network Rail's control. This was partly due to improved risk controls and less challenging external and environmental factors in 2015/16, resulting in a lower number of high risk precursor events.

In the past nine years, there have been no passenger or workforce fatalities as a result of a train derailment or collision. We are today the safest major mixed use railway in Europe and one of the safest in the world.

In 2015/16 there have been 32 Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) injuries to passengers which is a 25 per cent reduction compared to the previous year. 'Slips, trips and falls' both on

platforms and escalators are the largest primary causes of accidents at Network Rail managed stations. Our focus continues to be on managing crowd flows and influencing behaviour so that passenger injuries at managed stations are reduced. Improvements to passenger safety at stations throughout the year has been focussed on the passenger train interface, development of strategy and collaborative working with RSSB and industry partners on maintaining focus in key areas of the station.

Table 2.1: Passenger safety

	2014/15	2015/16
Fatalities and Weighted Injuries FWI MAA (PSI)	0.0892	0.0762
Train Accident Risk Component where Network Rail is the risk controller FWI MAA (PIM)	1.882	1.776
Personal Injuries to Passengers FWI	43	32



Public Safety

Definition and reporting method

Public safety reporting consists of all aspects of the interaction between the general public and the railway. This includes physical interaction with the railway as well as Network Rail's engagement with the public.

Commentary

During the year, there were 31 adult fatalities as a result of railway accidents, three of which occurred at level crossings. There were no child fatalities as a result of railway accidents for the third consecutive year. A child is considered a person under the age of 16.

In the past year, there has been a 13 per cent reduction in the number of suicides across the network. During 2015/16 the rail industry continued to deploy the methodologies it has developed and practised over the last five years, including the erection of fencing and staff training. In 2015/16, 1,137 life-saving interventions have been recorded across the industry, which is a 30 per cent increase from last year. In January 2015, our partnership with [Samaritans](#) was extended until 2020. The challenges presented by suicide on the network remain and therefore an 'escalation' process has been successfully introduced to address high risk areas in line with Public Health England guidance. A new 'alert' process warns route teams of potential suicides on the network and our suicide prevention campaign material has been updated to encourage individuals to seek help within communities. The biggest change to the programme in 2015/16 has been increased lobbying of local authorities, Directors of Public Health and Members of Parliament (MPs) to support our prevention work and play their part in preventing suicides in high risk locations.

When young people get onto our network, there is a danger to them and disruption to the rail network. We therefore work with schools across the country to educate young people on how to stay safe around our network.

Table 2.2: Public safety

	2011/12	2012/13	2013/14	2014/15	2015/16
Adult fatalities as a result of railway accidents	44	33	26	26	31
Child fatalities as a result of railway accidents	1	2	0	0	0
Suicides	251	247	279	287	251

Note: Previous years' figures have been updated to reflect the outcome of investigations and re-categorisation of incidents.

Workforce Safety

Definition and reporting method

Workforce safety is measured by the workforce fatalities and weighted injuries (FWI) measure. In addition, the Lost Time Injury Frequency Rate (LTIFR) has been recorded for 2015/16, which measures the number of personal injuries which have resulted in lost time; it is not weighted by the severity of the injury. Both measures use data reported in the SMIS for all employees and contractors working on Network Rail's infrastructure. FWI is normalised per one million hours worked and LTIFR is normalised per one hundred thousand hours worked.

RIDDOR 2013 came into force on 1 October 2013. The regulations require deaths, certain injuries, specific diseases and specific dangerous occurrences, which arise out of or in connection with work to be reported to the relevant authority; Network Rail reports these events to the ORR.

The accident statistics are reflected by the new categorisation from 2014/15. RIDDOR 2013 introduced the new category of 'Specified Injuries', replacing 'Major Injuries'. Injuries that were previously included in the 'Major' category are now included in other categories. The 'Specified' and 'Major' categories cannot be directly compared as they refer to different injury types.

For all workforce safety measures, lower figures indicate better performance.

Commentary

In 2015/16 there have been no workforce fatalities on Network Rail managed infrastructure. There has been a reduction in the Lost Time Injury Frequency Rate over the past year and our internal risk reduction target of 0.511 has been met.

In 2015/16, there were 71 'Specified Injuries', which is a 29 per cent reduction since 2014/15. The number of RIDDOR reportable 7+ days injuries has increased in the past year by 10.1 per cent. 'Slips, trips and falls' remain the most common causes of accidents to our workforce. Our national programmes delivered through the Home Safe Plan risk reduction workstreams will provide a step-change in the safety of our workforce and contribute towards our target of eliminating all workforce fatalities and major injuries.

Our focus on safety remains targeted on our vision of everyone going home safe, every day. The long term safety strategy we developed for CP5 and beyond sets a clear direction and many positive signs in this section demonstrate our strategy is working. With improvements in safety outcomes in all three areas of risk (workforce, passenger and public), safety performance demonstrated a clear improvement. In 2015/16, there have been no employee on-duty fatalities, we have

seen a 29 per cent reduction in the more serious workforce injuries, we have achieved our target for lost time injuries and reduced train accident.

For us, safety and improved performance go hand-in-hand. Structured continuous improvement – being better every day – is providing a focus on safety, both in the routes who hold devolved accountability for much of our safety performance and across the business. In 2015/16, significantly greater focus has been placed on visualisation of safety performance at both a route and national level. This helps encourage safety conversations and provide an understanding of our performance now as well as our plans for improvement.

We have strengthened our focus on occupational health risks and compliance, as well as supporting staff through resources to achieve better health and wellbeing outcomes.



Table 2.3: Workforce safety

	2011/12	2012/13	2013/14	2014/15	2015/16
Employee on-duty fatalities	2	2	3	1	0
Major injuries	102	104	120	-	-
Specified injuries	-	-	-	100	71
Lost time injuries (RIDDOR Reportable 3+ days)	124	-	-	-	-
Lost time injuries (RIDDOR Reportable 7+ days)	-	209	212	188	207
FWI (MAA)	0.141	0.149	0.157	0.120	0.079
Lost Time Injury Frequency Rate (LTIFR)	-	-	0.585	0.538	0.492

Note: The process of updating workforce accidents results in historic figures being amended once ongoing investigations have been resolved and further information is supplied by direct workforce and contractors. The 2014/15 figure for employee on-duty fatalities has been updated following the completion of an investigation that deemed one incident non-work related. Figures continue to be subject to change each year, for example, FWI (MAA) scores have varied with the reallocation of events.

Despite the significant progress made in 2015/16, we can and must continue to improve health and safety for our workers and reduce risk to those who use our railway.

In 2015/16, we reviewed the suite of projects that formed the Integrated Safety Plan to ensure that we focused on the right areas which had the greatest risks. This review involved a detailed analysis of the risks and benefits provided by each of the workstreams. As a result, the plan has been rationalised into a priority list of 21 projects, now known as the Home Safe Plan. The projects address key safety risks to passengers, public and workforce, health priority areas and process improvement for risk controls and an integrated management system. The Home Safe Plan has robust governance in place with established milestones and dedicated programme management resource.

Table 2.4: Home Safe Plan risk reduction workstreams

National CP5 risk reduction workstream	Description
Planning & Delivering Safe Work (PDSW) Programme	Provide clear, site-specific information on safety
Electrical Safety Delivery (ESD) Programme	Educate our workforce, improve business processes and enhance the infrastructure
Management of road risk	Develop and implement a Management of Occupational Road Risk (MORR) policy to strengthen our management of road risk
Fatigue risk management	Deliver a fatigue standard and three training modules for managers and drivers
Sentinel enhancements	Enable clear rules to be set out across the rail industry
Risk management including review of Work Activity Risk Assessments	Identify and specify controls for health and safety for our employees
Workforce safety safer trackside working	Provide engineering control system protection for track workers to enable safer work on the operating railway
Procuring for safety	Enable better evaluation of contractor performance by setting up clear standards for contractors to work against
Safety hour	Increase risk awareness and safety solution ownership
Manual handling	Investigate in detail the manual handling risks across the business
Business Critical Rules	Delivering a simplified Risk Control Framework using line of sight from risk to control, to contribute to our safety, performance and efficiency targets
Integrated Management System	To create a framework for our management system to meet International Asset Management and QHSE Standards.
Community Safety Strategy	Work to educate the public on railway safety
Prioritised Technologies for Level Crossings	Prioritise technological solutions to meet the safety need of emerging level crossing requirements
Level Crossing Risk Reduction	Closure of level crossings and deployment of technology to reduce level crossing risk
Platform Train Interface (PTI)	The development of strategies for optimising the Platform-Train interface
Identification and Monitoring Train Accident Risk Reduction Activities (Managed Service)	Programmes, Projects, Work streams and Business As Usual activities being undertaken that will reduce train accident risk and therefore create further Passenger Safety Benefit
Health and Wellness Respiratory	To develop and embed standards to support health surveillance programme for respiratory health issues
Health and Wellness Medical Standards	Review current medical standards and develop and embed new medical standards as deemed necessary
Health and Wellness Resilience	To embed the framework for Mental Wellbeing with a focus on improving employee personal resilience
Health and Wellness First Aid	Improve the way we assess First Aid needs within the business and particularly where access to emergency services is limited so that they adequately provide First Aid provision.

Category A Signals Passed At Danger (SPADs)

Definition and reporting method

A Category A Signal Passed At Danger (SPAD) is an instance where a stop signal has been passed despite equipment displaying correctly in sufficient time for the train to be stopped safely at the signal.

Commentary

Category A SPADs are a risk that involves train and freight operators as well as Network Rail. In 2015/16 the Rail Safety Standards Board (RSSB) formed an industry group focusing on SPAD risk, examining underlying causes and further risk reduction options. Within Network Rail's train accident risk reduction programme there are a number of workstreams aimed at reducing SPAD risk such as resignalling to modern standards, railhead treatment, lineside vegetation removal and improving safety critical communications.

There were 26 instances where the train reached the fouling point (the point on a pair of converging tracks where two trains would collide if allowed to approach together). This was a reduction from the 31 instances that occurred in 2014/15. Six of these instances resulted in derailment in comparison with four in the previous year.

Three of the 26 signals involved were fitted with the Train Protection Warning System (TPWS). We continue to work with the rail industry to reduce SPAD risk, providing leadership in the modernisation of safety cooperation arrangements.

Table 2.5 shows that there was a reduction in the number of Category A SPADs in 2015/16, with 282 Category A SPADs compared to 301 in 2014/15.

Table 2.5: Signals Passed At Danger

	2011/12	2012/13	2013/14	2014/15	2015/16
England and Wales	247	234	272	275	259
Scotland	29	15	18	26	23
Network-wide	276	249	290	301	282
Network-wide (Ranked A to D)	26	22	22	31	26

Note: Previous years' figures have been updated to reflect the outcome of investigations and re-categorisation of incidents. Category A is where an accident has happened. Category B - D is where a train has stopped or passed a conflict point.

Close Calls

Definition and reporting method

A close call is anything that has the potential to cause injury or damage, and can be reported by any Network Rail employee or contractor at any time, as long as it is safe to do so. A close call is not necessarily something which causes an immediate risk to the operational safety of the railway, and could occur in any location. The method to close a close call is heavily dependent on the type of close call raised. A close call can only be closed once the hazard has been investigated and removed. To encourage colleagues to report close calls, we set a target to report 80,000 close calls in 2015/16. For close calls closed (within 28 days) we set a target of 50 per cent. Both targets were exceeded and are shown in Table 2.6 below. The higher number of reports increases our ability to identify safety issues, make further valuable changes to the way we work and is a positive indication of our safety culture.

Commentary

There have been more reports about unsafe behaviour and complex, systemic issues that require mitigation of risks related to strategy and process. This shows that there has been a significant increase in awareness and reporting. We continue to focus on the risks identified through close calls by actively reviewing the close calls reported and using these to drive safety conversations which inform corporate level decision making. Improvements to the close call process have been identified and implemented across the business. For example we have improved the categorisation of close calls so that we can monitor trends and identify hazards to enable mitigation. To reflect feedback from our employees, we have made amendments to the mobile application which is used to report close calls.

Table 2.6: Close calls

		2014/15	2015/16
Close Calls reported	Target	40,000	80,000
	Actual	71,237	140,021
Close Calls closed within 28 days (%)	Target	50.0	50.0
	Actual	47.0	58.5

Note: Close-out is currently only recorded for non-Infrastructure Projects close calls. This is due to close calls made by employees within our Infrastructure Projects (IP) function being managed by contractors in their areas. The system that the contractors use to manage the close calls made differs from the system we use.

Operational Close Calls

Definition and reporting method

An Operational Close Call (OCC) is any unsafe behaviour or condition that poses an immediate threat to the safe operation of the railway. Historically, OCCs were referred to as 'Irregular Working'. If left unresolved an OCC may lead to a safety incident, and therefore require immediate action. Incidents are reported through the Route Control Centres (RCCs) and are recorded in the SMIS.

Events categorised as potentially significant or severe are attributed to one of the four key performance indicators below. A lower figure represents better performance in Table 2.8.

Table 2.7: Categories of OCCs

Category	Definition
Protection	An OCC involving the work group (e.g. Controller of Site Safety (COSS) or a lookout) which results in incorrect or inadequate implementation of a line blockage, working outside of the protection limits or removal of protection. This includes near misses with staff whilst red zone working (areas where trains are still running), staff being slow to clear the line, or a failure to have a safe system of work in place.
Possession	An OCC involving implementation of a possession (i.e. Person In Charge of a Possession (PICOP), Engineering Supervisor, Nominated Person) which results in the incorrect placement of protection, inadequate or incorrect protection arranged, or irregularity in the removal of protection. Isolation placed incorrectly (i.e. outside of possession limits or prior to the possession being taken, trolleys placed outside of possession limits).
Operating	Any OCC as a result of an operator (e.g. a signaller or controller) giving permission for protection to be laid with a train not yet having passed the site of work; signalling a train into a possession / line blockage, vehicles or pedestrians trapped between gates at a level crossing or given permission to cross when the line is not clear; failure to caution trains; miscommunication when the signaller is in the lead; two trains in section; train routed into an isolated section, switching incident.
On Track Machine or Plant / Engineering Train / Equipment	Any OCC involving on track plant or engineering trains or involving incorrect use or placement of equipment or materials, for example unauthorised movements within possessions, machines or plant overturning, unsafe operation of machines or plant, equipment or materials fouling the running line, irregularities involving scaffolding on operational infrastructure.

Commentary

Events categorised as potentially significant or potentially severe are attributed to one of the four categories of OCC. The OCC category with the largest proportion of potentially significant and potentially severe events continues to be protection, although the MAA of protection events has reduced by 47 per cent in the last year.

More detailed analysis of these events has been conducted and has been included in the periodic Safety, Health and Environment Performance (SHEP) report and shared with risk specialists. We are currently working on a number of initiatives and continue to embed an inclusive and mature safety culture across our organisation.

Table 2.8: OCCs reported network-wide

	2011/12	2012/13	2013/14	2014/15	2015/16
OCC MAA England and Wales	22.65	22.69	25.23	34.99	20.92
OCC MAA Scotland	0.81	0.69	1.15	1.39	0.62
OCC MAA network-wide	23.46	23.38	26.38	36.38	21.54
Potentially significant	244	206	231	333	209
Potentially severe	61	98	112	140	71

Note: Due to data refreshing, figures are different to those reported in the Annual Return 2015.

Level Crossing Safety

Definition and reporting method

With more than 6,300 level crossings and one of the busiest rail networks in the world, this is one of our critical risks which remains a priority area for Network Rail. We work with national and local organisations to make level crossings safer and to help people use them correctly. The data in this report includes:

- incidents where a motorised vehicle is struck by, or strikes, a train
- incidents where a pedestrian or user of a non-motorised vehicle is struck and fatally injured by a train
- near misses (non-fatal incidents) with a motorised vehicle, non-motorised vehicle or pedestrian.

Commentary

Over the past five years there has been a sustained reduction in the number of near misses with road vehicles. In 2015/16 there were four collisions with road vehicles which is a reduction compared to previous years. There were three accidental adult fatalities at level crossings in the past year, all of which were pedestrians. The final two periods of 2014/15, as well as 10 periods in 2015/16

when there were no fatalities, totalled a consecutive period of 12 months without a fatality which is the longest such period on record.

There was an increase in near misses reported at level crossings in 2015/16. The MAA of reported incidents where users did not follow the intended procedure at level crossings increased by 3.7 per cent to 26.08 since 2014/15. The number of pedestrians struck by trains is the lowest it has been since the end of 2011/12.

Closing level crossings remains an important part of our strategy for the rest of CP5. We closed 76 level crossings in the year and continued to develop and deploy risk reduction measures to enable and encourage safe use. Improved tools for understanding patterns of use and narrative risk assessments are helping us to target action for the greatest risk reduction. We have developed a long-term risk reduction strategy for level crossings which involves improved engagement with users and local communities.

The cumulative benefits achieved from level crossing closure and implementation of risk reduction measures since the end of CP4 is 1.564 Fatalities and Weighted Injuries (FWI) per year as calculated by the All Level Crossing Risk Model (ALCRM). This equates to a safety benefit of 12.4 per cent of the CP4 exit FWI (12.623) per year.

Table 2.9: Level crossing safety

	2011/12	2012/13	2013/14	2014/15	2015/16
Level crossing error or deliberate misuse (MAA) England and Wales	29.07	27.00	25.39	24.30	25.23
Level crossing error or deliberate misuse (MAA) Scotland	1.85	1.31	1.69	0.85	0.85
Level crossing error or deliberate misuse (MAA) Network-wide	30.92	28.31	27.08	25.15	26.08
Collisions with road vehicles	10	10	10	7	4
Train striking pedestrian	3	4	6	9	3
Near miss with road vehicle	110	95	95	76	73
Near miss with non-vehicle users	279	259	241	235	258

Note: Suicides are not included in the figure for 'Train striking pedestrian'. Figures have been updated from the Annual Return 2015 due to data refreshing.



Safety Management System and Improvement

Definition and reporting method

In 2015/16, as part of the Home Safe Plan, we will develop an Integrated Management System (IMS). This four year programme will consolidate all existing management systems (including the current Health and Safety Management System) into a single consolidated framework (the IMS). The intended benefits of the IMS include a framework that removes duplicated work and complexity of current arrangements. This will ultimately improve Network Rail's performance for safety as well as other business objectives.

In 2015/16, Network Rail has implemented two significant organisational changes under the Common Safety Method on Risk Evaluation and Assessment (CSMRA) regulation; these changes were conducted in line with the Network Rail Safety Validation process. These include the formation of an alliance between Network Rail and Abellio ScotRail, and the creation of a new organisational structure within our National Supply Chain (NSC) function.

Network Rail and Abellio ScotRail Limited formed an alliance called the ScotRail Alliance. The Assessment Body for this was the Network Certification Body (NCB) Ltd. The ScotRail Alliance aimed to achieve a more cost effective and efficient way of operating the national rail network in Scotland and to sustain and, where required, improve the outputs for passenger benefit.

In order to implement new activities related to the operation of on track machines on our infrastructure, a new organisational structure was created within our NSC function and there was a Transfer of Undertakings (Protection of Employment) (TUPE) of external staff from Amey Colas.

Occupational Health and Wellbeing

Network Rail is committed to promoting and protecting the health and wellbeing of all our employees. We aim to address:

- the effect that work has on health, ensuring that employee health and wellbeing is not adversely affected by work
- the effect that health has on work, ensuring that the right support is available to anyone in Network Rail who has a health concern.

Strategic Commitments to Health and Wellbeing

Network Rail's Occupational Health (OH) and wellbeing strategy contains four strategic long-term aims and areas of focus:

- managing a healthy workplace
- providing opportunities for promoting wellbeing
- developing a supportive culture of wellbeing
- providing guidance, competencies, policies and processes.

Managing a Healthy Workplace

In 2015/16, we completed the first phase of development of a consolidated health data reporting system which will bring together a wide range of health and wellbeing measures. This system will allow us to identify the key areas of risk, develop improved trending capabilities and enable us to monitor the benefits of interventions implemented. This enables us to have a greater focus on the health and wellbeing of our employees and provide the necessary support that they may require.

Network Rail completed its first comprehensive review of employee psychological wellbeing using anonymous data gathered from the Online Wellbeing Assessment to enable the development of risk profiles for a wide range of issues.

Network Rail recognises the impact of specific health issues on our employees and work to provide the appropriate support, prevention methods and equipment where possible. We recognise the impact of common musculoskeletal conditions and have therefore sourced a preferred supplier of physiotherapy interventions.

As part of our work to reduce vibration and noise exposure, we have developed an ambitious plan to reduce vibration and noise exposure caused by small plant equipment, so that at least 80 per cent of small plant equipment achieves a vibration emission of less than 2.5m/s^2 within the next five years. The key activities within this plan have been implemented, including the retrofitting of anti-vibration

handles onto a range of small plant that were found to have unacceptably high vibration emission levels. This should minimise the risk of Hand Arm Vibration Syndrome (HAVS) to at risk employees.

Network Rail has committed to the Institute of Occupational Safety and Health (IOSH) 'No time to lose' campaign to raise awareness of the need to control and reduce the risk of occupational respiratory hazards. We can therefore adequately and effectively manage employees' exposure to occupational respiratory hazards, specifically silica and asbestos.

Providing Opportunities for Promoting Wellbeing

As part of our occupational health and wellbeing strategy, we have committed to improving the health awareness of our employees.

We installed 13 mobile health kiosks across the business for a six month period, visiting 75 of our largest buildings. In total, 3,000 employees used the kiosks to measure their Body Mass Index (BMI), body fat levels, blood pressure, heart rate, pulse and cardiovascular risk in 2015/16.

We launched an online health and wellbeing portal in April 2014 to provide employees and contractors with access to high quality occupational health and wellbeing resources. On average, 2,500 individuals have accessed the portal each month with a total of over 20,000 individual searches.

To better understand the physical, mental and social health and wellbeing of our employees, we have partnered with organisational psychologists Robertson Cooper Ltd to further develop their clinically proven stress and mental wellbeing survey into a two-way online wellbeing assessment. This provides each individual respondent with a personalised nine-page report on their health and wellbeing.

Between 1 September and 31 October 2015, more than 8,000 employees completed the online wellbeing assessment, seeing an increase of 6.3 per cent in the number of assessments compared to the previous year. The aim to reach all employees is being addressed for the 2016 assessment with the assessment being available on phones and tablets. This is specifically focused on improving accessibility for trackside employees.

Developing a Supportive Culture of Wellbeing

We continue to focus on improving the awareness and understanding of key occupational health risks. Educational materials are available to support and develop employees' understandings of health and wellbeing within their teams. Routes and functions have arranged workshops with external training organisations and charities to improve line manager capabilities in supporting the mental health of their team members.

Network Rail continues to be committed to mental health charity Mind's 'Time to Change' campaign to reinforce its view that discrimination related to mental health is unacceptable.

We have worked to increase openness and awareness around mental health issues across the organisation by developing and releasing a series of real-life stories about employees who had experience of mental health issues. This proved to be a very powerful approach and there have been several hundred supportive comments for the individuals concerned within the comments section of Network Rail's intranet following each article.

The approach has been recognised recently in the Event and Visual Communication Association (EVCOM) Screen Awards and we have received two Gold Awards for the 'Depression Video' working in collaboration with The Edge Picture Company.

Providing Guidance, Competencies, Policies and Processes

A key strategic commitment in 2015/16 was the embedding of health-specific skills and knowledge across Network Rail's routes so that local ownership of the health and wellbeing agenda could be achieved.

We have developed an innovative web-based improvement framework system which enables routes and business functions to assess their performance maturity in relation to a number of occupational health and wellbeing issues and to develop more structured local plans for improvement.

Occupational Health Management

Definition and reporting method

Any employee health data received is held on our internal Oracle data system against individual employee records. Definitions of each metric are included in Table 2.11 below.

Commentary

The controls and initiatives that form part of the strategy 'Everyone Fit for the Future' have had a positive impact within Network Rail. Our occupational health and wellbeing strategic dashboard details the scores for a number of key metrics. The number of employees who are diagnosed with new and/or worsening occupational health conditions has fallen by 45 per cent in the past year. We continue to have a higher proportion of our employees reporting high levels of positive psychological wellbeing (66 per cent) compared to the general working population of 59 per cent.

Table 2.10: Occupational health and wellbeing strategic dashboard

		2013/14	2014/15	2015/16	Strategic 2024 target
Safety critical workers assessed as 'fit for role'	%	98	99	99	99
Compliance with health surveillance programmes	%	36.0	64.4	50.1	100.0
Diagnoses of new and / or worsening occupational health conditions	No.	526	172	95	Zero
Proportion of employees not excessively troubled by workplace pressures	%	58.2	77.6	79.9	>90
Proportion of employees reporting high levels of positive psychological wellbeing	%	62.8	65.3	66.1	69.6
Average days lost to employee absence	No.	7.27	7.90	8.00	7.11

Note: The 'diagnosis of new and / or worsening OH conditions' figure is comprised of a) new and / or worsening hand arm vibration syndrome diagnoses and b) new and / or worsening diagnoses of HSE Category 2, 3 or 4 hearing impairment. HSE Categories do not allow for differentiation between age-related versus noise-induced hearing loss and it is therefore not currently possible to categorically assign hearing impairment identified to work related versus non-work related. Future work to refine classification of hearing impairment will allow for better refinement of diagnoses caused by working practises.

Table 2.11: Definitions of the metrics used by the OH dashboard

Metric	Definition
Fitness for work	'Fitness to work' is assessed through competency specific medical assessments and health surveillance programmes to identify health conditions that may indicate an individual is unable to discharge their duties safely, sufficiently or that the specific task may exacerbate a health condition if continued. 'Fitness to work' includes those deemed 'fit to work with restrictions' but not employees deemed 'temporarily unfit' or 'unfit'. Data is sourced from our external occupational health service provider.
Compliance with health surveillance programmes	Health surveillance refers to a programme of health assessments (either questionnaire or face-to-face assessment) that are designed to identify the potential signs of an occupational-related health condition at an early stage. Compliance refers to the proportion of individuals who take part in the annual surveillance programme compared to the number identified as required to take part. Data for this is sourced from a combination of our external occupational health service provider and from our internal Human Resources Shared Services function.
New and / or worsening occupational health conditions	The number of work-related occupational health conditions (excluding work-related stress or acute musculoskeletal conditions) that are attributed to exposure to a workplace hazard. Data for this is sourced from our external occupational health service provider.
Employees breaching identified safety thresholds for occupational health hazards	The number of individuals exceeding an exposure limit for an identified occupational health hazard.
Employees not excessively troubled by workplace pressures	Workplace pressures are based on the Health and Safety Executive Management Standards approach to workplace stress but modified to align with Robertson Cooper Ltd.'s 'Six Essentials' approach. Employees are defined as not being troubled excessively if they score, on average, less than 3 out of a scale of one (not troubled at all) to six (extremely troubled) over the range of Six Essentials categories. Data is sourced using the Online Wellbeing Assessment developed with Robertson Cooper Ltd.
Employees meeting physical activity guidelines	The proportion of employees who report completing at least 150 minutes of moderate physical activity or 75 minutes of vigorous physical activity per week over the previous four weeks. Data is sourced using the Online Wellbeing Assessment developed with Robertson Cooper Ltd and compared to data from the Health Survey for England.
Employees reporting high levels of positive psychological wellbeing	High psychological wellbeing refers to those with a high sense of purpose and regular positive emotions at work, as defined by Robertson Cooper Ltd. Data is sourced using the Online Wellbeing Assessment.
Employees identified as having low risk of cardiovascular disease	Individuals who are assessed as having a cardiovascular risk of <10 per cent within the next ten years. Data is sourced from the use of mobile health kiosks using the Q-RISK2 algorithm.
Average days lost to employee absence	The average number of day's absence per employee. Data is sourced from Human Resources Shared Services. The comparable baseline is the average number of days absent per employee per year within public sector organisations 2015/16 CIPD absence report (6.9 days per employee per year).

Table 2.12: Occupational health and wellbeing strategic dashboard by route

	Safety critical workers assessed as 'fit for role'	Compliance with health surveillance programmes	Diagnoses of new and / or worsening occupational health conditions	Proportion of employees not excessively troubled by workplace pressures	Proportion of employees reporting high levels of positive psychological wellbeing	Average days lost to employee absence (per employee)
	No.	%	No.	%	%	No.
Anglia	71	52.9	2	73.3	64.7	9.1
LNE & East Midlands	73	48.6	12	76.7	64.8	9.7
LNW	144	43.6	7	73.1	64.9	10.8
LSE	94	43.5	0	74.5	63.5	8.1
Scotland	42	49.8	4	73.9	65.3	10.2
Wales	47	52.6	2	79.6	67.6	8.8
Wessex	19	78.0	7	67.9	65.7	7.0
Western	68	52.3	0	81.6	68.2	7.0
Other	323	71.5	1	83.9	65.9	5.2

Respiratory Health

During 2015/16, a total of 24 employees were identified to require respiratory health surveillance with our occupational health service provider, which was a reduction compared to 2014/15. Work has continued in 2015/16 to identify employees who require health surveillance through an updated Control of Substances Hazardous to Health (COSHH) risk assessment and updates to our COSHH risk assessment system, Sypol. The selection of respiratory products used to monitor respiratory health is being refined in order to be able to report on compliance for this specific type of health surveillance.

In 2015/16 we signed the Institute of Occupational Safety and Health (IOSH) 'No Time to Lose' campaign pledge to enhance and support the strategic long-term aims. Currently no data is available to analyse the diagnosis by type, however the new OH provider has been informed of this requirement. We have continued to work with cross-industry representatives to support the Ballast Dust Working Group (BDWG) with the vision to provide a consistent industry wide approach to

protecting employees from being exposed to respirable crystalline silica (RCS) in ballast dust.

Table 2.13: At risk workers who have completed respiratory health surveillance

		2014/15	2015/16
At risk employees	No.	-	-
Screened employees	No.	27	24
Screened employees fit to work	%	100	100

Note: Currently no data is available for the number of at risk employees.

Exposure to Lead

As with 2014/15, and reflecting the fact that our employees do not routinely work with lead, there were no individuals subject to biological monitoring for lead levels in 2015/16.

Additionally, there were no individuals whose blood levels exceeded the Action or Suspension Level under Control of Lead at Work (CLAW).

Exposure to Asbestos

No employees are licensed to work with asbestos or under medical surveillance for Notifiable Non-Licensed Work because Network Rail does not undertake work which is classified as licensable under the 2012 Control of Asbestos Regulations. Despite this, during 2015/16 there were 19 workers who reported accidental or incidental exposure to asbestos and attended a follow-up medical assessment, which is fewer than the 26 cases reported in 2014/15. The figure reported in the Annual Return 2015 has increased due to additional analysis of the data.

Table 2.14: Number of records and surveillance for exposure to asbestos

		2013/14	2014/15	2015/16
Total number of workers who have reported accidental/ incidental exposure to asbestos	No.	21	26	19
Number of workers under medical surveillance for Notifiable Non-Licensed Work (NNLW) under the Control of Asbestos Regulations 2012	No.	-	0	0



Noise

Table 2.15 shows that a total of 4,366 noise and hearing loss assessments were completed relating to pre-placement assessments, competency specific medical assessments and health surveillance assessments during 2015/16.

Results from the audiometry assessments show that 87.1 per cent of individuals assessed had acceptable hearing capability and that this level has remained relatively stable over the past year. The proportion of individuals deemed to have mild hearing impairment has reduced slightly in the past year.

We are addressing noise as a potential workplace hazard. Noise exposure considerations are being embedded within our engineering plans for reducing small plant-based hazards and implementing effective control measures. Audiometry compliance data across the routes remains high for the noise competence specific medicals, with slightly reduced numbers for noise surveillance medicals in comparison.

Table 2.15: Audiometry screenings and diagnoses

		2013/14	2014/15	2015/16
At risk employees under health surveillance for noise exposure	No.	-	-	5,505
Employees screened for audiometry	No.	5,890	6,235	6,114
Screened employees diagnosed	HSE Category 1 (acceptable)	No. 2,875 % 88.8	5,437 87.2	5,340 87.3
	HSE Category 2 (mild impairment)	No. 255 % 7.9	602 9.7	552 9.0
	HSE Category 3 (poor hearing)	No. 104 % 3.2	184 3.0	213 3.5
	HSE Category 4 (rapid hearing loss)	No. 2 % 0.1	12 0.2	9 0.2
New cases of hearing loss diagnosed	HSE Category 2 (mild impairment)	No. - % -	46 0.7	20 0.5
	HSE Category 3 (poor hearing)	No. - % -	20 0.3	6 0.1
	HSE Category 4 (rapid hearing loss)	No. - % -	11 0.2	3 0.1

Note: Audiometry data for the Wessex route is collated from a different source using different criteria to the other routes. It has therefore not been included in this table.

Hand Arm Vibration Syndrome

Definition and reporting method

Hand Arm Vibration Syndrome (HAVS) can occur through use of hand-held power tools. HAVS is reported against the Stockholm scale for classification of HAVS using Stage 0 to Stage 4 identifying vascular and neurological components. New diagnosis of Stage 1 and above or a worsening stage is recorded in SMIS and RIDDOR reported. Stage 0 refers to employees that do not have HAVS.

Commentary

In 2015/16, the compliance rate for the HAVS health surveillance programme was 50.6 per cent, which has decreased compared to previous years. This is being addressed by the new occupational health service provider, with the expectation that the compliance figures will significantly increase throughout the remainder of the year.

At most stages, the percentage of employees diagnosed with HAVS has fallen slightly. The numbers of employees screened deemed 'fit to work' has decreased slightly to 98.9 per cent, which suggests that the control measures in place remain effective.

Table 2.16: Fitness to work of employees working with vibrating hand tools

		Fit to work	Fit with restrictions	Unfit permanently	Unfit temporarily	Total
Stage 0	no.	2,164	-	-	-	2,164
	%	96.7	-	-	-	96.7
Stage 1	no.	38	0	1	0	39
	%	1.7	0.0	0.0	0.0	1.7
Stage 2 Early	no.	12	4	3	5	24
	%	0.5	0.2	0.1	0.2	1.1
Stage 2 Late	no.	0	0	5	0	5
	%	0.0	0.0	0.2	0.0	0.2
Stage 3	no.	0	0	4	1	5
	%	0.0	0.0	0.2	0.0	0.2
Stage 4	no.	0	0	0	0	0
	%	0.0	0.0	0.0	0.0	0.0
Total	no.	2,214	4	13	6	2,237
	%	99.0	0.2	0.6	0.3	100.0

Table 2.17: HAVS screening and diagnoses

			2013/14	2014/15	2015/16
At risk employees		No.	-	6,571	7,249
Screened employees		No.	-	4,233	3,670
Health Surveillance Compliance Rate		%	36.0	64.4	50.6
Screened employees fit to work		%	-	99.1	98.9
Screened employees diagnosed (early stages)	Stage 0	No.	3,537	4,088	2,164
		%	97.3	96.6	96.7
	Stage 1	No.	52	82	39
		%	1.4	1.9	1.7
	Stage 2 early	No.	27	31	24
		%	0.7	0.7	1.1
Screened employees diagnosed (late stages)	Stage 2 late	No.	13	12	5
		%	0.4	0.3	0.2
	Stage 3	No.	8	20	5
		%	0.2	0.5	0.2
	Stage 4	No.	0	0	0
		%	0	0	0
New	Stage 1	No.	25	36	15
	Stage 2 early	No.	14	13	12
	Stage 2 late	No.	7	4	1
	Stage 3	No.	6	9	1
	Stage 4	No.	0	0	0
Stable	Stage 1	No.	27	40	24
	Stage 2 early	No.	10	12	11
	Stage 2 late	No.	4	4	3
	Stage 3	No.	2	2	1
	Stage 4	No.	0	0	0
Worsened	Stage 1	No.	-	0	0
	Stage 2 early	No.	3	6	1
	Stage 2 late	No.	2	4	1
	Stage 3	No.	0	5	3
	Stage 4	No.	0	0	0

Note: Figures have been updated from the Annual Return 2015 due to data refreshing.

Occupational Health Referrals

Definition and reporting method

Referrals to Occupational Health (OH) occur when a line manager makes a formal referral to our third-party OH provider. Referral may lead to a telephone or face-to-face assessment by an occupational health advisor or physician who would determine the classification of the condition. Table 2.18 below shows referrals to OH, including categorisation.

Commentary

In the past year, musculoskeletal concerns formed a greater proportion of referrals submitted to OH compared to that of psychological referrals during the same period. There has been an increase in psychological referrals which may be a reflection of a greater willingness to declare these conditions following the cultural initiatives listed in our strategic commitments to health and wellbeing.

The strategic commitments to health and wellbeing highlight how Network Rail has worked to increase managers' understanding and appreciation of OH. The benefits of referral to our OH services have been emphasised. Key activities have included regular communications on our intranet relating to the benefits of early referrals, as well as the development and distribution of presentations and educational materials.

Table 2.18: Referrals to Occupational Health

		2012/13	2013/14	2014/15	2015/16
Total management referrals to OH	No.	4,045	4,938	5,503	4,605
	%				
Psychological referrals to OH	No.	897	874	1,050	1,313
	%	22.2	17.8	19.1	28.5
Musculoskeletal referrals to OH	No.	1,164	1,810	1,531	1,870
	%	28.8	36.7	27.8	40.6
Other referrals to OH	No.	1,984	2,254	2,922	1,422
	%	49.1	45.7	53.1	30.9

Table 2.19 shows that this year a lesser proportion of referrals for psychological concerns were submitted compared to that of musculoskeletal referrals during the same period. This was also evident in 2014/15. There was an increase in the proportion of musculoskeletal health concerns in the upper limb

(nine percentage points) with back conditions decreasing within the same year (6.4 percentage points). The decrease in referrals related to psychological concerns may be a reflection of a greater self-awareness and being guided by the cultural initiatives listed in our strategic commitments to health and wellbeing.

Table 2.19: Psychological and musculoskeletal referrals

		2013/14	2014/15	2015/16
Psychological Referrals	No.	874	1,050	1,313
	%	100	100	100
Stress	No.	343	377	414
	%	39.2	35.0	31.5
Anxiety	No.	150	280	318
	%	17.2	26.0	24.2
Depression	No.	231	307	461
	%	26.4	28.5	35.1
Other	No.	150	86	120
	%	17.2	10.5	9.1
Musculoskeletal Referrals	No.	1,810	1,531	2,360
	%	100	100	100
Back (including lumbago, sciatica and scoliosis of spine)	No.	590	566	722
	%	33.3	37	30.6
Upper Limb (including neck, shoulders and arms)	No.	388	305	681
	%	21.9	19.9	28.9
Lower Limb (including ankles, knees and hips)	No.	583	434	636
	%	32.9	28.3	26.9
Other	No.	210	226	321
	%	11.9	14.8	13.6

Data from our OH service provider shows that psychological referrals which appear to be caused or exacerbated by the workplace (deemed occupational) have increased by 3.9 percentage points compared to the previous year, with an overall increasing trend since 2011/12. This is partly due to the proactive management of occupational health through the greater support provided by our OH provider. The same trend was less pronounced in regards to musculoskeletal referrals (deemed occupational) with an increase of 0.4 percentage points from 2014/15 to 2015/16.

Table 2.20: The workplace and Occupational Health

		2011/12	2012/13	2013/14	2014/15	2015/16
Psychological Referrals						
Psych. Referrals - Occupational in Nature	No.	74	82	75	91	166
	%	9.9	9.1	8.5	8.7	12.6
Psych. Referrals - Occupational Element	No.	76	54	41	79	227
	%	10.2	6.0	4.7	7.5	17.3
Psych. Referrals - Non-Occupational in Nature	No.	588	761	754	880	920
	%	79.9	84.9	86.3	83.8	70.1
Musculoskeletal Referrals						
MSK Referrals - Occupational in Nature	No.	56	105	105	144	160
	%	4.0	9.0	6.2	8.2	8.6
MSK Referrals - Occupational Element	No.	39	32	151	129	203
	%	5.0	2.8	8.6	9.6	10.9
MSK Referrals - Non-Occupational in Nature	No.	863	1,027	1,487	1,258	1,507
	%	91.0	88.2	85.2	82.0	80.6
Rate of Work-Related Psychological Conditions per 100,000						
Network Rail	No.	439	398	339	497	1,065
UK (HSE Statistics)	No.	1,330	1,420	1,560	-	-
Rate of Work-Related Musculoskeletal Conditions per 100,000						
Network Rail	No.	278	401	749	802	984
UK (HSE Statistics)	No.	1,690	1,460	1,690	-	-

Note: Disaggregated figures for 2013/14 and earlier may not match totals given in other tables due to a number of management referrals being classified by occupational health service providers as 'unknown'. This is largely due to a further review being required or a failure to record the classification of the referral by the attending clinician. Network Rail determines whether a condition is work-related through assessment with a healthcare professional, whereas HSE base theirs on the results of the Labour Force Survey. Despite these differences in methodology, the approach gives some indication of comparison with the wider general public.

Employee Sickness

Definition and reporting method

Referrals to OH following a sickness related absence occur when a line manager makes a formal referral to our third-party OH provider. Referral may lead to a telephone or face-to-face assessment by an occupational health advisor or physician who would determine the classification of the condition and make recommendations to facilitate a successful return to work.

Commentary

LNW had the highest number of sick days per employee, with 'other' employees in non-route business units taking the least sick days. These figures will be monitored for trends during the course of CP5.

Table 2.21: Employee sickness by route 2015/16

	Sick days per employee per year		% Male employees long-term sick (MAA)		% Female employees long-term sick (MAA)		% All employees long-term sick (MAA)	
	2014/15	2015/16	2014/15	2015/16	2014/15	2015/16	2014/15	2015/16
Anglia	8.7	9.1	1.6	1.8	1.5	0.9	1.6	1.7
LNE & East Midlands	9.8	9.7	2.0	2.0	1.9	1.5	2.0	1.9
LNW	10.9	10.8	2.4	2.3	2.0	1.8	2.3	2.2
Scotland	10.5	10.2	2.2	2.2	2.1	1.9	2.2	2.2
South East	7.4	8.1	1.2	1.5	1.4	1.7	1.2	1.5
Wales	6.9	8.8	1.4	2.0	0.5	1.0	1.3	1.9
Wessex	7.2	8.6	1.2	1.7	0.6	0.3	1.1	1.5
Western	7.5	7.0	1.4	1.2	1.3	0.9	1.4	1.2
Other	4.4	5.2	0.7	1.1	0.9	0.9	0.8	1.1
Network-wide	7.9	9.3	1.5	1.9	1.6	1.4	1.3	1.8

Note: The number of sick days per employee per year is calculated by multiplying the MAA by 13. These two measures include short and long-term sickness. 'Other' refers to any employee not belonging to a route (e.g. supporting functions) as well as Infrastructure Projects employees.

Employer Liability

Definition and reporting method

Network Rail purchased employers' liability insurance as required by statute. The insurance provides cover for death, bodily injury or disease sustained by employees during the course of their employment in circumstances where Network Rail is legally liable. However, the change to our status with reclassification in September 2014 means the company now self-insures for this risk.

Commentary

Table 2.22 provides the status of claims at 31 March 2016. The number of open claims reported is a snapshot of those which remain open for consideration at the end of 2015/16. This includes claims opened prior to 2015/16 and some which have been open for a number of years whether or not any compensation has been or will be paid in the future. Table 2.22 also includes the number of claims opened during 2015/16 and closed during the same period.

We took over the liability for open and potential claims predating the company's existence. An open claim does not guarantee compensation will be paid. A claim will be rejected when Network Rail has no liability, but it may be open prior to that and remain open for a subsequent period. Similarly claims closed within 2015/16 are those which have reached a stage where no further work is required. 'Closed' is not an indication of whether a claim has been accepted or rejected.

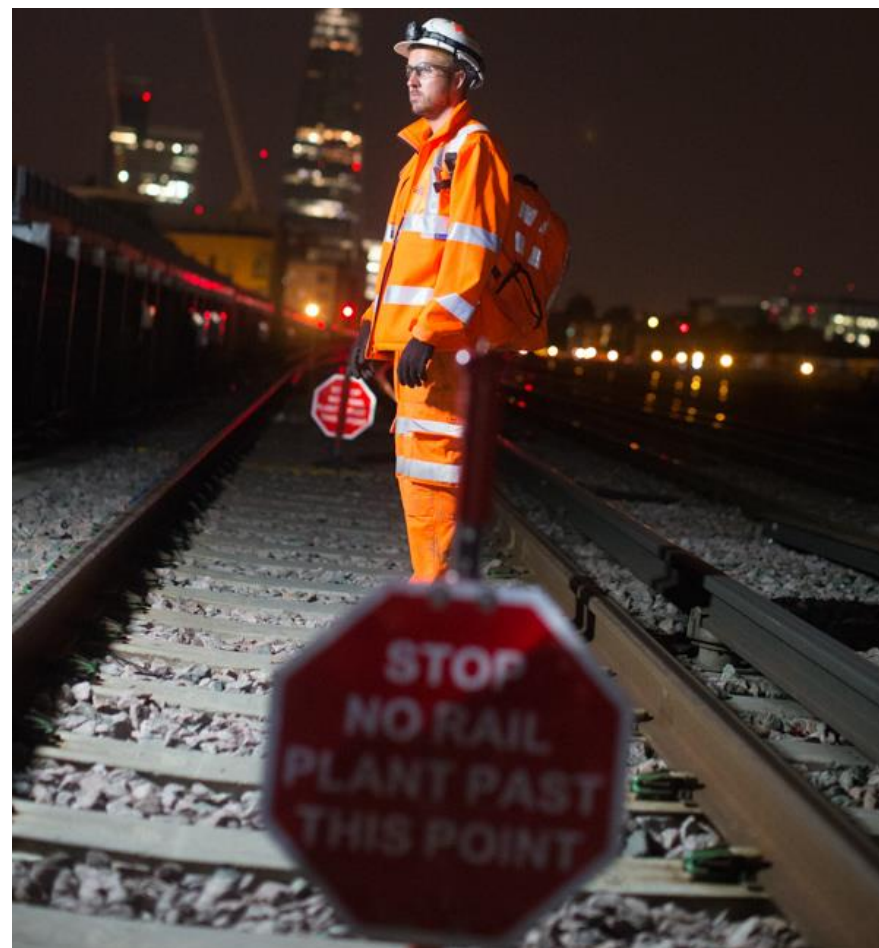
Table 2.22: Employer Liability Claims

		2011/12	2012/13	2013/14	2014/15	2015/16
Open	Health	-	-	-	-	64
	Safety	-	-	-	-	261
	Total	471	461	374	355	325
Opened (during each year)	Health	-	-	-	-	56
	Safety	-	-	-	-	142
	Total	-	215	226	180	198
Closed (during each year)	Health	-	-	-	-	64
	Safety	-	-	-	-	163
	Total	244	232	304	197	227

Note: Data reported has been updated since the publication of the Annual Return 2015.

Health and Safety Regulation

In 2015/16, 11 health and safety enforcement notices were issued. Of these notices, four were prohibition notices and seven were improvement notices. Two of the prohibition notices concerned manual lifting of troughing. The third was issued in Cardiff which prohibited manually lifting an item of plant by two or fewer people. The final notice prohibited the use of an access point with unsuitable steps and restricted clearance. There were no prosecutions of Network Rail during the year.



3. Operational Performance

Train operating performance in 2015/16 has continued to be challenging. Although the number of incidents causing delays has reduced, and asset reliability is trending to historic highs, in England and Wales service performance has deteriorated over the year; however Scotland has maintained performance levels. Many factors are impacting performance, including: increased congestion resulting in worse delays for given initial incidents; unprecedented levels of upgrade works in association with Thameslink, Crossrail, electrification and other enhancement schemes across the country; and, for some train operators, shortages of traincrew and issues with trains.

The weather has not, compared to recent years, been particularly severe. There have nevertheless been more extreme infrastructure-damaging incidents than normal, for example the ongoing line blockages near Dover and between Carlisle and Settle, and in early 2016 on the West Coast Main Line at Lamington.

All regulatory targets for passenger train services, and many train operator performance strategy targets, were missed. Performance in the first half of the year overall was broadly on target, but dropped below target for much of the second half year. There is a range of reasons for the variance explored further below.



Input-based performance monitoring approach

Performance levels at the start of CP5 were lower than anticipated in the ORR's Final Determination. It was clear before the start of the control period that a number of regulated performance outputs would not be met during the first two years of CP5. The ORR decided to monitor the delivery of milestones in the CP5 performance plan for England & Wales as a whole, and to monitor the regulated outputs for Scotland and individual train operators.

Table 3.1: Delivery of CP5 Performance Plan Milestones

	England & Wales	Scotland
Complete		
Delivered on time	161	24
Delivered early	68	5
Delivered late	58	13
On Going		
Forecast on time	69	0
Forecast late	22	3
On hold or abandoned	71	9

Key Performance Factors in 2015/16

Infrastructure

Network Rail's infrastructure is now performing at historic 'best ever' levels. The number of infrastructure incidents improved by seven percentage points in 2015/16. However, the delay arising from such incidents increased by two percentage points reflecting the long-term trend of increasing susceptibility to any initial disruption. This is caused by a more congested infrastructure, meaning there is less time available to recover incidents between services.

In CP5, we are undertaking the biggest investment since the Victorian era, delivered through enhancements programmes which continue to affect train services. The effects include:

- reduced infrastructure availability to enable construction and maintenance work
- increased risk to operational equipment due to major construction work in close proximity
- repeated commissioning of new equipment
- regular significant timetable change offset by a reduction in possession overrun incidents causing delay by about 20 percentage points although the possibility of such incidents occurring remains a significant risk

There has also been an impact on performance resulting from increased Temporary Speed Restrictions (TSRs) on the network over the past two years. TSRs are imposed so that the railway can continue to operate as safely as possible, the increase is primarily the result of:

- tightening of track maintenance standards. To address the risk of derailment of freight trains, our routes are working to address the root cause of the issues to reduce delays of this nature
- providing sufficient warning to level crossing users of approaching trains.

Weather

The most significant weather events in 2015/16 were the winter storms that predominantly affected the north, west and coastal areas of the network. This included significant flooding and rough seas blocking major routes including:

- the West Coast Main Line (Carlisle and Lamington)
- the Dover to Folkestone line, following the collapse of the Dover sea wall
- Settle to Carlisle and Newcastle to Carlisle lines

Successive storms and exceptional high winds caused reliability issues with overhead electrical power equipment. There was serious disruptive impact due to the formation of ice on the conductor rail over areas of Kent on 12 February. This is unusual, with the previous incident of comparable impact occurring in 2010. Autumn conditions were broadly average. Even though the industry's mitigation programme was highly successful (overall number of delay minutes was less than average) the impact on PPM was higher than recent averages.

Passenger Growth

Although headline passenger growth slowed slightly compared to 2014/15, the network is becoming increasingly congested, which leads to increasing knock-on effects from delay incidents. The effects of this can be relieved only through our continuing work to introduce new capacity to the network

Station dwell time (the time each train spends at each station stop, which is influenced mainly by passenger numbers leaving and boarding the train and by platform and train door layouts) was in excess of that built into the assumptions in timetables. Passengers' patterns changed more than had been expected following some timetable changes. Response actions were required to help mitigate the performance impact of these differences.

Industry Issues

Performance on 'good days' has fallen for a number of operators. We define 'good days' based on our daily operation of the railway and the quality of the timetable, including its resilience to cope with minor delay incidents. Worsening trends are symptomatic of the industry challenge of effectively managing the processes and providing for passenger growth. A cross-industry programme is being created through the industry's 'National Task Force' to address the challenge

There was an increase in the impact of external incidents including fatalities, external objects and animals on the line. This occurred despite increased interventions by railway staff with vulnerable people, and other mitigation measures that were put into place.

A number of train operators have had performance problems due to traincrew availability, including further impact from industrial relations issues. Lack of traincrew availability causes proportionately more cancellations than delay, in comparison to other causes of delay, resulting in a higher impact on PPM and CaSL.

Passenger Train Performance

This section reports the following measures of performance:

- Public Performance Measure (PPM)
- Cancelled and Significantly Late (CaSL)
- delay minutes
- right time performance
- average lateness
- journey time.

Public Performance Measure

The Public Performance Measure (PPM) is the percentage of trains arriving on time at their final destination. 'On time' means within ten minutes of scheduled arrival time for long distance sector services, and within five minutes for 'Regional' London and South East (LSE) sector, and Scotland services. PPM is measured for all trains across the network, including trains that have been delayed by incidents caused by external factors (such as vandalism, extreme weather and suicides).

Cancelled and Significantly Late

A train is counted as being Cancelled and Significantly Late (CaSL) if it is cancelled (at origin or en route), the originating station is changed, it fails to make a scheduled stop at a station, or it arrives at its terminating station 30 minutes or more after its scheduled arrival. CaSL is not a regulated measure for Scottish train operators.

Delay Minutes

Delay minutes (DM) are delays attributed to incidents which disrupt operation of the railway. Network Rail takes responsibility ('Network Rail-on-TOC delay') for delays caused by infrastructure and operational incidents such as signal failures and overrunning engineering works, and incidents caused by external factors such as trespass, fatalities and severe weather. Operators take responsibility for delays caused by fleet, passenger action and station management incidents either on self ('TOC-on-Self delay') or caused by other operators ('Operator-on-TOC delay'). Delay due to some causes (for example autumn leaf-fall and consequent slippery rails) is recognised as a cross-industry challenge and attributed accordingly.

Investigation of the causes of delay and allocating responsibility involves thorough analysis. This process ('delay attribution') focuses on determining the cause of the incidents that had the most impact. Individual delays of less than three minutes ('subthreshold delay') are rarely investigated individually. The data collection system holds attributed delays 'in dispute' until cause is agreed: the totals

presented in these tables include all attributed delays and adjustments to allow for likely final attribution of cause for delay 'in dispute' based on historic cause resolution trends.

Right Time Performance

Right time performance measures the percentage of trains arriving at their terminating station early or not more than 59 seconds later than schedule.

Average Lateness

This measure reports the average lateness of a passenger as they alight from their train. For each train, this is calculated by multiplying the number of passengers expected to alight at each station by the punctuality to the nearest minute (rounded up) at those stops. If the train is cancelled, it is calculated by multiplying the number of expected passengers by 1.5 times the service frequency on that route. Measurement of average lateness was introduced at sub-operator level in 2015/16.

Journey Time

This metric is a calculation of the average speed (in miles per hour) of passenger trains scheduled to operate on a sample day. The calculation aggregates the distance the trains are planned to run, and the end-to-end advertised journey times of the trains including any intermediate station stops.



England & Wales

England & Wales PPM at the end of the year was 0.7 percentage points worse than target; CaSL was 3.1 per cent, 0.2 percentage points worse than target. The biggest contributor to this underperformance was the LSE sector. The challenges of the Thameslink Programme, particularly the reconfiguration of London Bridge station and the surrounding infrastructure, and the need to continue to operate a full service despite a reduction in network capability affected service delivery to Govia Thameslink Railway (GTR) along the Brighton Main Line and across the South East route. PPM for LSE ended 1.5 percentage points short of target. Delivery in the other two market sectors, 'Long Distance' and 'Regional' both finished short of target; 'Long Distance' PPM was 0.7 percentage points short of target, whilst 'Regional' PPM was 0.6 percentage points short of target.

Performance was worse than target for all types of delay ('delay groups') except for 'Severe Weather, Autumn & Structures' (a Network Rail delay group). The worst performing Network Rail delay groups compared to target were 'Network Management/Other' (this includes issues with the coordination of train services, signalling equipment and engineering works) and 'External' (issues include trespass and suicides) whilst the worst operator delay groups were 'Traincrew', 'Operator-on-TOC' (delay caused by one operator to another) and 'Fleet' (train failures). Compared to 2014/15 all delays groups were worse except for 'Non-Track Assets' (Network Rail assets other than the track itself e.g. signalling and electrical supply equipment), 'Operator-on-TOC' and 'Stations and Operations' delay groups.

Table 3.2: Train performance against target – England & Wales

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM						
Target	%	92.0	92.3	92.6	91.0	89.6
Actual	%	91.8	90.7	89.8	89.6	88.9
CaSL						
Target	%	2.5	2.4	2.3	2.4	2.9
Actual	%	2.3	2.7	3.0	2.9	3.1
Right time performance	%	71.4	69.1	67.2	65.9	65.3
Average lateness	mins: secs	02:06	02:22	02:31	02:29	02:35
Journey time	mph	-		39.43	39.57	39.56

Table 3.3: Delay Minutes (millions) – England & Wales

Attribution	2011/12	2012/13	2013/14	2014/15	2015/16
Network Rail-on-TOC	6.54	7.08	7.67	7.20	7.72
TOC-on-self	3.05	3.14	3.04	3.29	3.62
Operator-on-TOC	1.23	1.31	1.46	1.57	1.44
Total	10.82	11.52	12.17	12.07	12.79

Table 3.4: Train performance against target – Geographic Sectors

		2011/12	2012/13	2013/14	2014/15	2015/16
London South East						
PPM	%	91.9	91.1	89.6	89.0	87.8
CaSL	%	2.2	2.5	3.1	3.1	3.4
Right time performance	%	70.4	68.4	66.5	64.7	63.6
Average lateness	mins: secs	01:46	01:56	02:07	02:14	02:22
Journey time	mph	-	-	34.27	34.33	34.5
Delay minutes	millions	2.79	2.95	3.45	3.40	3.49
Regional						
PPM	%	92.5	91.1	91.0	91.6	91.4
CaSL	%	2.0	2.5	2.3	2.1	2.1
Right time performance	%	76.7	74.4	73.1	73.1	72.6
Average lateness	mins: secs	01:53	02:08	02:11	02:02	02:02
Journey time	mph	-	-	32.15	32.15	31.39
Delay minutes	millions	1.74	2.0	2.05	1.81	2.07
Long Distance						
PPM	%	89.1	87.0	86.9	87.4	87.6
CaSL	%	4.0	4.9	4.9	4.4	4.6
Right time performance	%	59.7	54.8	51.7	49.6	51.3
Average lateness	mins: secs	04:13	04:58	05:02	04:44	04:36
Journey time	mph	-	-	63.26	63.37	63.1
Delay minutes	millions	2.01	2.13	2.18	1.99	2.16

Scotland

From 2015/16 Scotland performance formally comprises Abellio ScotRail and Caledonian Sleeper following the re-letting of the former First Scotrail franchise. Scotland PPM at the end of the year was 90.6 per cent, 1.4 percentage points worse than the regulatory target. Performance was comparatively worse in the latter part of the year, primarily due to the impact of major storms. Performance was slightly better than 2014/15 but failed to meet target in all delay groups except delays caused by 'Severe Weather', 'Autumn & Structures', 'Operator-on-TOC' and 'Fleet' problems.

Key reasons for the shortfall against the performance target were:

- storms, the subsequent flooding and line closures due to strong tides
- overcrowding, excess dwell time at stations and network congestion during operation of an enhanced service during closure of the Forth Road Bridge
- informal industrial action by traincrew.

Table 3.5: Train performance against target – Scotland

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM						
Target	%	91.7	91.9	92.0	92.0	92.0
Actual	%	90.7	93.9	91.4	90.5	90.6
CaSL	%	2.7	1.5	2.1	2.4	2.4
Right time performance	%	55.6	60.0	58.0	57.8	56.5
Average lateness	mins: secs	02:14	01:38	01:56	02:03	02:01
Journey time	mph	-	-	36.83	36.59	36.80

Table 3.6: Delay Minutes – Scotland

Attribution	2011/12	2012/13	2013/14	2014/15	2015/16
Network Rail-on-TOC	483,000	382,000	449,000	479,000	476,000
TOC-on-self	289,000	254,000	280,000	317,000	334,000
Operator-on-TOC	69,000	68,000	81,000	86,000	85,000
Total	840,000	705,000	810,000	882,000	895,000

Note: includes all delay to Scotland-funded franchised operators.

Table 3.7: Attributable Delay Minutes impacting Abellio ScotRail

Attribution	Target	Actual
Abellio ScotRail	280,000	311,000
Network Rail	416,000	461,000
Other Operators	85,000	85,000
Industry Delay	781,000	854,000

Table 3.8: Scotland – Train Service Reliability

Sector		2011/12	2012/13	2013/14	2014/15	2015/16
Arrivals at Key Passenger Stations						
Right time performance	%	60.0	61.4	55.8	58.1	57.4
Arrivals within 5 minutes	%	94.0	94.8	94.0	93.8	93.7
Top 100 Busiest Trains						
Right time performance	%	40.8	42.9	43.5	44.4	44.1
Arrivals within 5 minutes	%	86.7	88.7	87.7	87.8	87.7



Anglo-Scottish Services

The High Level Output Specification (HLOS) submitted by the Scottish Government sets a requirement that where maintenance, renewal or enhancement activity is required on cross-border routes, at least one of those routes should be made available to timetabled services for the passage of scheduled sleeper, passenger, and freight services between Edinburgh or Glasgow and London without the need for change. Network Rail has committed to this in the Strategic Business Plan (SBP) for Scotland, noting that on certain dates (particularly English bank holidays) the volume of work may make it difficult to keep at least one cross-border route available to timetabled services. It has committed to advise such instances to Transport Scotland.

Definition and reporting method

The WCML is categorised as 'clear' when planned journey time between Euston and Glasgow does not exceed four hours and 30 minutes; the ECML is likewise categorised when planned journey time between King's Cross and Edinburgh does not exceed five hours. Both of these definitions are derived from the HLOS.

Commentary

On the evening of 4 December the Overhead Line came down north of Newcastle on the ECML, to allow time for repairs Virgin East Coast Trains were scheduled to run via Carlisle on the following day, 5 December. On the afternoon of 5 December the West Coast Mainline was blocked due to flooding at various locations in Cumbria and the Borders, the route from Newcastle to Carlisle also became blocked due to flooding at Haltwhistle this resulted in no services crossing the English-Scottish border after 15:30 on 5 December 2015. The ECML re-opened on 6 December allowing a cross border service to resume via Berwick.



Table 3.9: Train service reliability – Anglo-Scottish services

			2011/12	2012/13	2013/14	2014/15	2015/16
Caledonian Sleeper	PPM	%	89.7	90.6	90.0	89.9	86.0
	Right Time	%	74.4	79.1	77.9	77.3	73.8
Cross Country	PPM	%	89.6	86.8	86.7	88.8	89.5
	Right Time	%	52.2	46.2	41.7	41.8	42.4
FTPE	PPM	%	92.2	90.2	89.5	86.8	86.0
	Right Time	%	68.4	63.6	60.2	48.0	49.9
VTEC	PPM	%	86.6	83.9	84.2	88.6	85.2
	Right Time	%	67.0	61.1	54.9	60.6	55.9
VTWC	PPM	%	85.9	83.6	85.8	84.7	86.0
	Right Time	%	55.4	49.4	52.0	50.5	54.0

Table 3.10: Anglo-Scottish cross border availability matrix

Status for weekends in 2014/15			
	ECML clear all weekend	ECML clear from noon Sunday and/or journey time exceeded less than an additional 90 minutes	ECML journey time exceeded additional 90 minutes or involved bus replacement service
WCML clear all weekend	35 (67%)	3 (5%)	4 (8%)
WCML clear from noon Sunday and / or journey time exceeded less than an additional 90 minutes	1 (2%)	1 (2%)	0 (0%)
WCML journey time exceeded additional 90 minutes or involved bus replacement service	4 (8%)	0 (0%)	4 (8%)

Franchised Passenger Operators

Abellio Greater Anglia

The performance of Abellio Greater Anglia (AGA) services was variable throughout 2015/16, ending the year 1.1 percentage points worse than the performance strategy target of 90.4 per cent. CaSL was 2.8 per cent, 0.5 percentage points worse than target.

Throughout the first half of the year, performance was broadly aligned to target. However, performance during the second half of the year was relatively poor. Autumn performance was negatively affected by leaf fall, which caused adhesion issues (the presence of leaves causes trains to lose grip – adhesion, with a consequent need to drive more cautiously, with a resulting impact on performance) and ‘wheel flats’ (a fault to the shape of the wheel due to skidding) which particularly affected the availability of the AGA diesel fleet, leading to service cancellations. The reduced availability, and increased passenger congestion on remaining services, had a further impact on performance across the route.

In addition to seasonal resilience challenges, in May 2015, West Anglia Inner services were transferred from AGA to London Overground Rail Operations Limited (LOROL) and Great Eastern Inner services from AGA to TfL Rail. Performance in these service groups had historically been strong within AGA. As a result of these transfers, the net performance across AGA services deteriorated. Prior to the transfer, the interaction, and potential conflict of service management, between AGA, LOROL and TfL Rail on the Anglia route was recognised as a risk. In order to address this risk, we developed and agreed service management plans before the transfer, resulting in a smooth delivery of the new arrangement of services.

Table 3.11: Abellio Greater Anglia – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	89.8	91.3	90.6	89.9	89.3
CaSL	%	2.6	2.2	2.4	2.6	2.8
Delay Minutes	No.	486,000	377,000	402,000	454,000	438,000
Right time performance	%	70.2	70.7	69.0	66.7	65.9
Average lateness	mins: secs	02:03	01:43	01:46	02:06	02:47
Journey time	mph	-	-	42.8	42.2	42.11

Table 3.12: Abellio Greater Anglia – Sub-Operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
GE Outer	PPM	%	90.0	91.9	90.9	88.8	89.4
	CaSL	%	2.2	1.9	2.0	2.5	2.4
	CaSL	No.	2,538	2,221	2,291	2,909	2,872
	Average lateness	mins secs	-	-	-	-	02:21
	Journey time	mph	-	-	41.61	41.63	41.78
Intercity	PPM	%	86.4	88.3	88.4	84.3	85.3
	CaSL	%	4.5	3.9	3.8	4.8	4.6
	CaSL	No.	1,186	1,007	999	1,263	1,216
	Average lateness	mins secs	-	-	-	-	04:56
	Journey time	mph	-	-	59.53	59.51	59.45
Rural	PPM	%	91.7	92.1	89.0	90.1	89.2
	CaSL	%	1.6	1.6	2.2	2.1	2.6
	CaSL	No.	1,467	1,471	1,983	1,990	2,427
	Average lateness	mins secs	-	-	-	-	02:47
	Journey time	mph	-	-	41.77	39.19	39.19
Southend and metro	PPM	%	92	92.6	92.4	90.4	90.5
	CaSL	%	1.9	1.6	1.7	2.1	2.1
	CaSL	No.	1,163	991	1,011	1,234	1,234
	Average lateness	mins secs	-	-	-	-	02:01
	Journey time	mph	-	-	39.35	39.33	39.44
Stansted Express	PPM	%	86.2	89.6	90.6	91.1	88.7
	CaSL	%	3.8	2.8	2.8	2.7	3
	CaSL	No.	2,034	1,462	1,437	1,457	1,646
	Journey time	mph	-	-	45.57	45.37	45.51
West Anglia Outer	PPM	%	88.9	90.5	91.2	91.9	89.9
	CaSL	%	3.4	3.1	3.1	3.1	3.4
	CaSL	No.	2,505	2,563	2,572	2,634	2,967
	Average lateness	mins secs	-	-	-	-	02:43
	Journey time	mph	-	-	36.08	36.24	36.19

Abellio ScotRail

Abellio took over operation of ScotRail services (excluding the sleeper services) from First Group at the beginning of 2015/16. In the first part of the year, operational performance was on target for Abellio ScotRail. Levels of all measures of performance declined in the second half of the year, primarily due to the impact that major storms had on our infrastructure. At the end of 2015/16, performance for the majority of measures showed an improvement from 2014/15, although failed to meet performance strategy targets.

Several storms that hit Britain in late 2015 and early 2016 caused damage to our infrastructure, meaning that train services were not able to run safely over certain parts of the network. As a result of the storms and strong tides, we experienced coastal and inland flooding on the infrastructure, structural damage to our bridges, and damage to overhead line equipment. To deliver the essential repairs to the network, we implemented some temporary speed restrictions and undertook emergency engineering works.

In addition to these issues, train services were affected by the closure of the Forth Road Bridge in December 2015. As road traffic was no longer able to access the bridge, we worked with Abellio ScotRail and Transport Scotland to deliver the most effective solution possible to keep the public moving. We enhanced services in the east of Scotland to meet increased passenger demand, which meant reducing services in other parts of the country to provide the trains required. Increased passenger numbers and over-crowding delayed journeys as trains spent longer in stations while passengers boarded and alighted from trains. All of these changes to the timetable, in conjunction with the previously described storm damage, resulted in poor performance over the winter months.

We implemented major timetable changes to facilitate engineering works at Winchburgh tunnel near Edinburgh in June 2015 and at Glasgow Queen Street from March 2016. The Joint Network Rail: Abellio (the ScotRail Alliance) continued to develop during the course of the year, with specific focus on cross-industry opportunities to improve performance through integrated operational control and better timetables. This alliance enabled us to implement the required timetable changes smoothly.

In order to address these types of issues in the future, we have developed a performance improvement plan. As part of this plan, we have introduced 'on time' groups to develop ownership of the train service, provide regular review and implement improvements. We have also developed seasonal mitigation plans to minimise the disruption caused by severe weather events in the future.

Table 3.13: Abellio ScotRail – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	90.7	93	91.4	90.5	90.6
CaSL	%	2.7	1.5	2.1	2.4	2.4
Delay Minutes	No.	483,000	382,000	449,000	479,000	461,000
Right time performance	%	55.6	60.0	58.0	57.8	56.4
Average lateness	mins secs	02:14	01:38	01:56	02:03	02:00
Journey time	mph	-	-	36.47	36.28	36.56

Table 3.14: Abellio ScotRail – Sub-Operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
East coast suburban	PPM	%	91.3	93.2	93.2	93.0	91.4
	CaSL	%	3.2	2.0	2.1	2.3	2.3
	CaSL	No.	2,142	1,352	1,606	1,929	2,214
	Average lateness	mins secs	-	-	-	-	02:03
	Journey time	mph	-	-	33.66	34.37	35.55
Express	PPM	%	88.7	89.4	88.8	87.8	88.1
	CaSL	%	2.6	1.8	2.1	2.5	2.3
	CaSL	No.	2,190	1,490	1,805	2,198	1,992
	Average lateness	mins secs	-	-	-	-	02:07
	Journey time	mph	-	-	51.90	51.76	51.72
Rural	PPM	%	88.8	90.2	88.1	85.4	86.4
	CaSL	%	2.7	2.1	2.5	3.5	3.3
	CaSL	No.	1,090	843	1,037	1,518	1,440
	Average lateness	mins secs	-	-	-	-	03:37
	Journey time	mph	-	-	42.27	41.25	40.68
Strathclyde	PPM	%	91.1	93.7	91.8	90.9	91.2
	CaSL	%	2.6	1.3	2.0	2.3	2.3
	CaSL	No.	13,669	6,875	10,829	12,286	12,073
	Average lateness	mins secs	-	-	-	-	01:50
	Journey time	mph	-	-	31.25	31.10	31.54

Arriva Trains Wales

Train performance for Arriva Trains Wales (ATW) was above target in the first half of the year. However a poor third quarter lead to the PPM at the end of 2015/16 being 92.2 per cent, 0.5 percentage points worse than performance strategy target, while CaSL met target.

The reliability of our track, signalling, telecoms and points assets were all worse than target in 2015/16. Services were affected by a TSR in the Severn tunnel, caused by a cyclic top fault. This track had been scheduled for renewal in 2015/16, but was deferred to allow access for the Great Western Route Modernisation Programme. There is a high frequency of traffic at the TSR location which further impacted performance. Cyclic top faults and reduced level crossing sighting also resulted in TSRs across the ATW routes. As a result, we introduced a fortnightly TSR board where each TSR is discussed in detail, progress towards removal is monitored and the sites 'at risk' of a TSR are assessed with a view to prevention. There has been continued issues with telecoms asset reliability following the introduction of GSM-R in 2014/15, accounting for approximately 85 per cent of service affecting telecoms failures in Wales. National initiatives are underway to address behavioural issues and roll out updated software.

Despite these issues, we have been able to contain the impact of the majority of incidents by focussing on the management of service during disruption. We have built a collaborative working arrangement with ATW to manage these services effectively, reduce knock-on impacts to other services and help to reduce the overall delay minutes and cancelled services.



We have continued to deliver our performance improvement action plans in 2015/16. We worked to improve the control of major project works that impact on the day to day running of train services and focussed on tactical fleet improvements. A key focus of the asset management strategy has been on earthworks and drainage as the extremely wet weather has led to a worse than target performance of earthwork assets.

Improvements in service management capability have also been introduced. Operational delivery was focused on the active management of passengers at stations, helping to address issues of dwell time so that trains are not delayed leaving the stations whilst large numbers of passengers board and alight the trains. The importance of this increased following the changes to the timetable that were introduced in May. This was particularly important as we welcomed 40,000 additional passengers to Cardiff Central Station for the Rugby World Cup, the Six Nations and other entertainment events. The updated timetable has improved the service patterns overall but has increased congestion on the network.

Table 3.15: Arriva Trains Wales – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	94.2	93.3	93.1	93.0	92.2
CaSL	%	2.1	2.6	2.6	2.6	2.7
Delay Minutes	No.	287,000	322,000	332,000	289,000	345,000
Right time performance	%	87.2	85.5	84.4	83.8	81.5
Average lateness	mins secs	02:17	02:33	02:40	02:18	02:32
Journey time	mph	-	-	33.53	33.45	33.95

Table 3.16: Arriva Trains Wales – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Regional and inter-urban	PPM	%	91.3	90.7	90.4	90.5	88.7
	CaSL	%	2.4	2.9	2.9	2.3	2.8
	CaSL	No.	3,585	4,225	4,292	3,325	4,287
	Average lateness	mins secs	-	-	-	-	03:05
	Journey time	mph	-	-	39.79	39.58	39.63
Valley lines	PPM	%	96.5	95.4	95.3	95.0	95.2
	CaSL	%	1.8	2.4	2.5	2.9	2.6
	CaSL	No.	3,219	4,163	4,250	5,060	4,642
	Average lateness	mins secs	-	-	-	-	01:47
	Journey time	mph	-	-	20.51	20.48	21.13

c2c

c2c performance was better than target for the majority of the year. CaSL finished the year 0.2 percentage points above the performance strategy target of 1.1 per cent. PPM was unable to meet the year-end target because a particularly poor last period contributed to the end of year score of 96.7 per cent, 0.3 percentage points below target.

A big contributor to missing the PPM target was power supply failures in the East London area. When there are power failures the signals turn black. Our signalling systems are designed to fail safe and if the train driver cannot see a green or yellow signal they must stop the train, normally bringing significant delays to train services until the power supply is restored.

A major event that impacted performance for c2c was that a substantial revision of the timetable was implemented in December 2015. This was a known risk to performance as a previous major timetable change had to be reversed, and the old timetable reinstated as train services could not be delivered in line with passenger expectations. Performance held up relatively well this time but c2c needed to make a number of amendments to the timetable to accommodate greater change in passenger use than had been expected. The changing passenger patterns resulted in severe overcrowding on some services. Trains needed to wait at stations for longer periods of time to allow passengers to board and alight trains safely. This caused delays to the service itself and impacted on other services as trains were not travelling at their allotted times. Despite this, delays to c2c were the lowest they have been since 2012/13.

Table 3.17: c2c performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	96.8	97.5	96.7	96.9	96.7
CaSL	%	1.3	0.9	1.5	1.3	1.3
CaSL	No.	1,520	1,052	1,661	1,447	1,502
Delay Minutes	No.	38,000	24,000	36,000	33,000	29,000
Right time performance	%	83.8	84.6	83.4	84.5	80.4
Average lateness	mins secs	00:44	00:35	00:44	00:43	00:49
Journey time	mph	-	-	35.23	35.24	36.61

Caledonian Sleeper

Performance for Caledonian Sleeper services was 6.0 percentage points worse than target of 92 per cent as set out in the performance strategy. The Caledonian Sleeper has been operated as a standalone franchise since March 2015 having previously been operated by First Scotrail. Retrospective analysis of previous performance delivered to similar services has been undertaken, where possible, to allow for historical comparison of performance.

Based on this analysis the five performance metrics have all deteriorated. Right time performance is the punctuality target in the franchise rather than PPM. Delivery of this has reduced by 3.5 percentage points and the lowest score in the past five years. Performance planning for the route is aligned to improving the right time arrivals of trains, as this is a key focus for passengers that travel on the services.

Included within the new franchise agreement is the introduction of new rolling stock which aims to address the fleet issues that have contributed to some of the poor performance. Delays caused by fleet issues pose further risk of knock-on delays as there are fewer trains available to restore services in times of disruption.

Flooding of the West Coast Main Line at Carlisle and Lamington, and bank slips caused diversions of the service on the East Coast Main Line during the early part of the winter season. These diversions had a performance impact for Caledonian Sleeper services as the availability of the network had to be rearranged, further congesting the route and making it more difficult to recover from delay incidents.

Table 3.18: Caledonian Sleeper performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	89.7	90.6	90.0	89.9	86.0
CaSL	%	7.2	7.1	7.0	7.0	10.4
CaSL	No.	155	150	149	149	210
Delay Minutes	No.	-	-	-	-	15,000
Right time performance	%	74.4	79.1	77.9	77.3	73.8
Average lateness	mins secs	-	-	-	-	11:40
Journey time	mph	-	-	50.13	49.40	50.23

Chiltern Railways

Chiltern Railways performance met the performance strategy target for CaSL, recording a score of 1.4 per cent. PPM ended the year 0.6 percentage points below target by recording a score of 94.4 per cent. Performance was close to target for the majority of the year and was broadly in line with previous year's performance. A major contributor to the PPM failure was a particularly poor period nine, which had a significant impact on the annual score. This was in part due to the evacuation of London Marylebone station in December following a fire on a train that pulled into a platform. Services had to be suspended out of Marylebone whilst the incident was dealt with, having a significant impact on train running in the area.

In our work to enhance and maintain the network we have to undertake engineering work. This is often completed overnight so as to avoid disruption to services. This means that services in the morning are reliant upon us completing the planned work in the timescales allotted. There were occasions when our possessions of the track overran and impacted upon Chiltern Railway's morning services that had a large impact both in the delay and cancellation of services.

In October we opened the first new rail link from a major British city to London in more than 100 years. The new service from Oxford Parkway to London Marylebone allows passengers an alternative to travelling into London Paddington via Reading. This led to an increase in passengers using services on the Chiltern lines that impacted the ability to run the services to the standards passengers expect. Performance plans for how to operate the railway with the introduction of the new services had to be strengthened to raise performance levels closer to the target.

Table 3.19: Chiltern Railways – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	93.0	94.9	94.9	95.0	94.4
CaSL	%	1.7	1.4	1.6	1.6	1.4
Delay Minutes	No.	114,000	97,000	86,000	81,000	103,000
Right time performance	%	80.7	86.3	85.9	85.8	83.5
Average lateness	mins secs	02:02	01:43	01:44	01:41	01:39
Journey time	mph	-	-	45.93	46.27	47.28



Table 3.20: Chiltern Railways – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
London-Birmingham/ Oxford and Branches	PPM	%	92.5	94.9	94.6	94.7	94
	CaSL	%	1.9	1.6	1.7	1.7	1.6
	CaSL	No.	1,812	1,592	1,756	1,688	1,664
	Average lateness	mins secs	-	-	-	-	01:50
	Journey time	mph	-	-	48.0	48.55	49.73
Met and Wycombe	PPM	%	94.5	95.2	95.7	95.8	95.9
	CaSL	%	0.9	0.9	1.2	1.1	0.8
	CaSL	No.	245	239	337	302	219
	Average lateness	mins secs	-	-	-	-	01:13
	Journey time	mph	-	-	37.10	37.07	36.47

CrossCountry

CrossCountry performance was at its best level for both PPM and CaSL in the last four years, however PPM did not meet the performance strategy target. PPM was 89.5 per cent, 0.5 percentage points below target whilst CaSL was above target by 0.3 percentage points ending the year at 3.9 per cent. Performance was slightly worse than target but mostly better than 2014/15, especially during the latter part of the year.

Performance for CrossCountry is more susceptible to issues due to the nature of their operations. Running across multiple routes means that their trains can be impacted by incidents nearly anywhere on the network. Performance in 2015/16 is the best it has been in the last four years due in part to the increased focus on a national route. A large number of passengers using CrossCountry services interchange onto other train services which means that a right time performance is key to their passenger needs otherwise people will be in danger of missing connections. Right time train performance has consistently improved since 2013/14, but not to the level that our customers need.

Reading is one of the busiest parts of the rail network and its complicated track layout restricted the number of trains that could be run. Our work at Reading station and its surrounding area removed one of the biggest bottlenecks on the Western route, enabling passengers to benefit from faster, smoother journeys into and through Reading station. This has helped to reduce reactionary delay that Cross Country services experience in the area.

Table 3.21: CrossCountry – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	89.6	86.8	86.7	88.8	89.5
CaSL	%	4.2	5.5	5.2	4.5	3.9
Delay Minutes	No.	464,000	532,000	534,000	414,000	436,000
Right time performance	%	52.2	46.2	41.7	41.8	42.4
Average lateness	mins secs	04:05	05:14	05:10	04:29	04:20
Journey time	mph	-	-	55.67	55.79	57.09

Table 3.22: CrossCountry – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Nottingham - Cardiff and Birmingham - Stansted airport	PPM	%	93.1	91.3	91.5	93.2	93.6
	CaSL	%	2.8	3.4	2.9	2.5	1.9
	CaSL	No.	1,352	1,666	1,413	1,215	933
	Average lateness	mins secs	-	-	-	-	03:19
	Journey time	mph	-	-	48.07	48.05	48.08
South West - North/East Scotland, Manchester - Bournemouth, Newcastle - Reading and Manchester – Bristol	PPM	%	86.4	82.6	82.4	85.0	85.7
	CaSL	%	5.5	7.7	7.3	6.2	5.7
	CaSL	No.	2,977	4,162	3,974	3,411	3,073
	Average lateness	mins secs	-	-	-	-	04:42
	Journey time	mph	-	-	58.65	58.80	59.32



East Midlands Trains

Performance for East Midlands Trains (EMT) met the performance strategy targets for both PPM and CaSL. PPM met target at 92.8 per cent, while CaSL reached 2.0 per cent which is 0.1 percentage point off target. Performance was better than target in the early part of the year, and stabilised in line with target in the latter part of the year.

For the most part delivery of actions plans has been good. This has included journey time improvement and asset improvement programmes. Across our track assets, all three measures of reliability have exceeded targets. Service affecting track failures continued to improve from previous years to be ahead of target by five per cent in LNE and 26 per cent in East Midlands. The main focus was the removal of temporary speed restrictions, which have been a challenge in recent years following a line speed increase on the Midland Main Line. We have focussed on earlier intervention and targeting of critical assets to achieve this removal.

Major disruption due to external events including fatalities and disruption to EMT services that are attributed to other train operators continue to be a concern. Reactionary delays continue to impact upon EMT performance. Services running through the Thameslink core are particularly susceptible to delays from other operators whose performance has in part been impacted by construction work involved in the Thameslink Programme. The interface between EMT services and other operators at the south end of the route is a risk to performance that will continue to require management, as any delays here can be spread across the rest of the network used by EMT.

Table 3.23: East Midlands – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	93.5	92.5	91.3	92.1	92.8
CaSL	%	2.0	2.4	2.6	2.0	2.0
Delay Minutes	No.	234,000	263,000	297,000	261,000	254,000
Right time performance	%	77.4	75.0	69.7	69.5	72.2
Average lateness	mins secs	02:10	02:34	03:10	03:01	02:51
Journey time	mph	-	-	50.56	50.55	50.16

Table 3.24: East Midlands – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Long Distance (including Liverpool-Norwich)	PPM	%	94.2	92.6	90.8	91.1	91.9
	CaSL	%	2.4	2.9	3.4	2.7	2.7
	CaSL	No.	1,718	2,016	2,443	1,929	1,910
	Average lateness	mins secs	-	-	-	-	03:14
	Journey time	mph	-	-	61.40	61.37	61.35
Regional	PPM	%	92.9	92.3	91.6	92.9	93.5
	CaSL	%	1.7	2.0	1.9	1.5	1.4
	CaSL	No.	1,446	1,706	1,648	1,275	1,224
	Average lateness	mins secs	-	-	-	-	01:37
	Journey time	mph	-	-	34.88	35.09	34.74



First TransPennine Express

Performance for First TransPennine Express (FTPE) was below the performance strategy target for both PPM and CaSL. PPM ended the year at 87.8 per cent, 2.7 percentage points worse than target. CaSL was 5.8 per cent which is 1.8 percentage points worse than target. CaSL for FTPE was the worst in both absolute terms and variance to the performance target.

Performance was broadly on target for the first half of the year due to benefits being experienced from earlier improvement programmes. These included a focus on the management of services and how best to recover in times of disruption so that reactionary delays were minimised, focusing on a right time railway and engagement with operators. However, there was a significant downturn in delivery during the autumn which brought the whole year score down significantly and was only partially recovered during the early part of 2016.

The West Coast Main Line north of Carlisle had to be closed for several days after eight feet of water flooded the railway over a weekend in early December. The weather meant that we had to carry out extensive safety checks and repairs, including rebuilding a host of electrical and signalling equipment. Impact was felt for passengers travelling on the Anglo-Scottish cross border services operated by FTPE between Manchester and Glasgow/Edinburgh, which had to be re-routed during the winter period.

Additional train services were added into the timetable and the impact of this was greater than had been forecast. The train service pattern causes congestion of the North Transpennine route between Leeds and Manchester on the Huddersfield line. Any delays experienced in this part of the network can cause knock on disruption, especially as these services enter terminal stations which include a variety of other train operators.

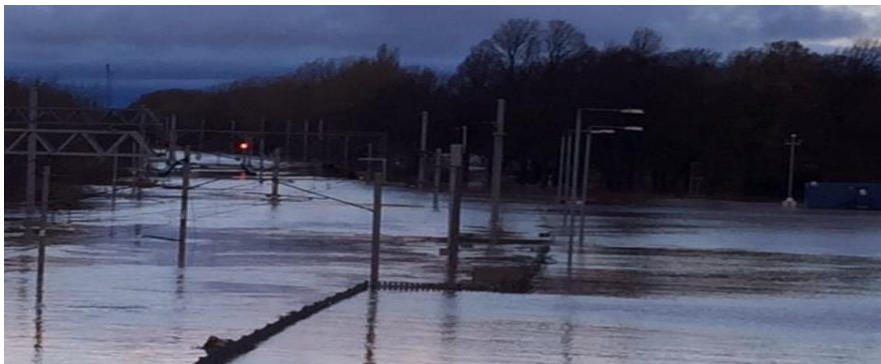


Table 3.25: First TransPennine Express – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	93.3	91.7	90.4	88.6	87.8
CaSL	%	2.7	3.5	4.6	4.3	5.8
Delay Minutes	No.	238,000	280,000	278,000	318,000	339,000
Right time performance	%	68.4	64.1	60.2	50.3	51.5
Average lateness	mins secs	02:21	02:56	03:20	03:49	04:04
Journey time	%			47.05	49.29	49.20

Table 3.26: First TransPennine Express – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
North Trans- Pennine	PPM	%	91.9	89.9	89.6	86.5	86.5
	CaSL	%	3.2	4.1	4.6	4.7	5.8
	CaSL	No.	1,529	1,961	2,190	2,766	3,470
	Average lateness	mins secs	-	-	-	-	03:45
	Journey time	mph			46.73	49.81	49.66
North West Trans- Pennine	PPM	%	94.3	93.6	91.1	90.1	89.2
	CaSL	%	2.4	2.8	4.5	4.0	5.3
	CaSL	No.	975	1,118	1,808	1,662	2,253
	Average lateness	mins secs	-	-	-	-	04:38
	Journey time	mph	-	-	51.19	52.93	52.51
South Trans- Pennine	PPM	%	95.1	92.6	91.2	92.6	88.4
	CaSL	%	2.1	4.0	5.3	3.4	7.5
	CaSL	No.	282	580	887	478	1,047
	Average lateness	mins secs	-	-	-	-	04:22
	Journey time	mph	-	-	40.23	39.92	40.58

Govia Thameslink Railway (Including performance of Southern services 01/04/15 to 20/07/15)

Govia Thameslink Railway (GTR) performance missed the performance strategy target by 4.3 percentage points, ending the year at 81.5 per cent. The CaSL target was also missed, 5.3 per cent, which was 1.1 percentage points worse than target.

Major changes at London Bridge station are underway, designed to cater for long-term growth of passenger numbers. This includes the creation of a new concourse, additional platforms and a robust new track and signalling systems to offer more reliable journeys to passengers. Whilst this work is being undertaken there has been a reduction in network capability of the Southern network, however we continue to operate a full timetable for services. This has been one of the main causes of poor performance. The reduction in availability of network meaning that initial delays are difficult to recover from, which then have further knock-on effects to other services and operators, especially for services using the Thameslink core.

There have also been incidents throughout the year of overcrowding at London Bridge station. This caused increased dwell times at stations to ensure that passengers could board and alight from trains safely. Increasing dwell times have been a contributor to poor performance throughout the year.

In light of the poor performance experienced in 2014/15 a range of initiatives were put in place to address this impact of which were felt going into 2015/16. As a result of this targets for GTR were strengthened when the former Southern services were integrated at the end of July.

The main cause of poor performance was the reduction in network capability on the Southern network to enable construction of the Thameslink Programme at the same time as continuing to operate a full service. In comparison, services on the Great Northern routes out of London King's Cross and Moorgate saw better performance, though still below historic highs.

Major recovery/improvement programmes were developed and delivered in 2015/16. They included:

- the Brighton Main Line Recovery Programme
- LSE Route Performance Improvement Programme
- an over-arching strategically focussed programme targeting better operation of the railway.

Many of the programmes delivered benefits, however these were not enough to address the performance shortfall. A major change to the timetable was implemented in December 2015 including a major enhancement of services into London Victoria (in part to accommodate services diverted from London Bridge).

The change towards introduction of the full Thameslink service in 2018 was initiated, which included several focussed performance improvements.

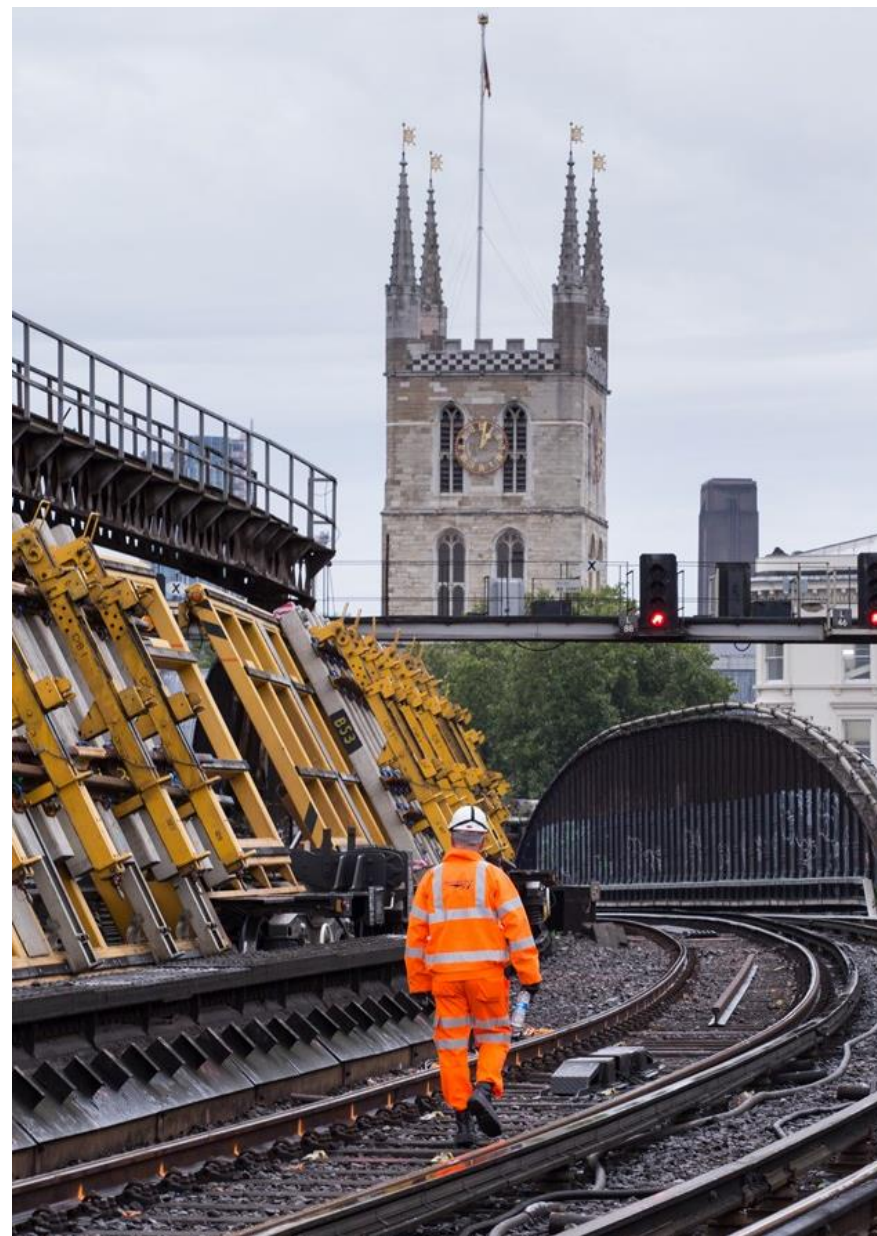
Table 3.27 Govia Thameslink Railway – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	90.0	88.1	85.9	83.8	81.5
CaSL	%	3.0	3.4	4.4	4.6	5.3
Delay Minutes	mill.	0.96	1.03	1.25	1.34	1.49
Right time performance	%	74.0	69.1	64.3	62.9	52.1
Average lateness	mins secs	02:11	02:28	02:50	02:46	03:18
Journey time	%			34.91	34.91	34.09



Table 3.28: Govia Thameslink Railway – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Gatwick Express	PPM	%	87.5	83.5	82.7	82.4	75.9
	CaSL	%	2.5	3.0	3.3	2.7	5.9
	CaSL	No.	1,389	1,608	1,687	1,424	3,103
	Average lateness	mins secs	-	-	-	-	03:44
	Journey time	mph	-	-	50.94	50.48	50.56
Great Northern	PPM	%	90.2	88.7	85.3	89.1	85.3
	CaSL	%	2.8	2.8	4.0	2.6	3.3
	CaSL	No.	4,586	4,614	6,521	4,459	5,767
	Average lateness	mins secs	-	-	-	-	02:28
	Journey time	mph	-	-	43.37	43.11	42.66
Southern Mainline and Coast	PPM	%	89.1	86.9	85.5	84.0	81.1
	CaSL	%	3.1	3.7	4.7	4.2	5.4
	CaSL	No.	12,494	14,623	18,762	16,675	21,566
	Average lateness	mins secs	-	-	-	-	04:04
	Journey time	mph	-	-	36.33	36.47	35.79
Southern Metro	PPM	%	91.5	90.1	86.7	82.2	81.7
	CaSL	%	2.6	3.0	4.8	5.7	5.8
	CaSL	No.	8,362	9,463	14,222	16,472	17,048
	Average lateness	mins secs	-	-	-	-	02:50
	Journey time	mph	-	-	23.12	23.05	22.00
Thames-link	PPM	%	89.8	88.1	86.7	82.2	80.5
	CaSL	%	4.0	4.1	4.0	5.5	6.1
	CaSL	No.	8,318	8,712	8,579	12,358	15,532
	Average lateness	mins secs	-	-	-	-	03:25
	Journey time	mph	-	-	36.32	35.30	34.14



Great Western Railway

PPM for Great Western Railway (GWR) was 89.5 per cent, 1.6 percentage points worse than the performance strategy target. The end of year for CaSL was 2.6 per cent, 0.3 percentage points below target. Early year performance was disappointing, but experienced improvement in the second half of the year, although not enough to reach target.

The improvement was initiated by a programme to strengthen infrastructure performance in the London Paddington to Reading corridor; this was started in the early autumn. Infrastructure had caused delays earlier in the year and contributed to Network Rail delay groups being worse than target. The programme produced tangible improvements despite continued major project work including Crossrail and the electrification of the Great Western Main Line.

Progress continues on Great Western Electrification with major advances in the construction of overhead line equipment. Preparing the railway for electrical power was a major feature of the year in the Western route, with bridge reconstructions and track lowering taking place across the region. This was all completed whilst delivering continuing improvement to train service performance since 2013/14.

Reading is one of the busiest parts of the rail network and one of the biggest bottlenecks on the Western route. Its complicated track layout constricted the number of trains that could be run. Previously there were issues with delays spreading around the network, after trains travelled through the Reading area. Our work at Reading station and its surrounding area have removed this, enabling passengers to benefit from faster, smoother journeys into and through Reading station.

The Rugby World Cup in autumn 2015 posed a significant risk to services due to the increased demand to travel, particularly between London and the Cardiff which was hosting fixtures at the Millennium Stadium. Overcrowding was experienced both at the stations and on services that had impacts on both performance and passenger experience for those using the route. Western route mobilised additional resources to help manage passengers so that trains could depart and arrive at stations safely and promptly. The event was successfully handled through our collaborative working with the train operators and other external agencies.

Table 3.29: Great Western Railway – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	90.6	89.1	87.9	88.9	89.5
CaSL	%	2.3	3.1	3.4	3.0	2.6
Delay Minutes	No.	661,000	734,000	850,000	739,000	724,000
Right time performance	%	71.1	69.6	66.8	67.4	68.4
Average lateness	mins secs	03:07	03:49	04:12	03:52	03:17
Journey time	mph	-	-	43.09	43.15	43.24

Table 3.30: Great Western Railway – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
High speed	PPM	%	85.4	82.8	81.8	83.6	85.9
	CaSL	%	4.7	6.4	6.3	5.9	4.5
	CaSL	No.	3,357	4,638	4,555	4,242	3,351
	Average lateness	mins secs	-	-	-	-	04:32
	Journey time	mph	-	-	58.90	59.12	58.89
London and Thames Valley	PPM	%	91.2	89.6	88.6	88.8	88.9
	CaSL	%	1.7	2.5	2.7	2.6	2.4
	CaSL	No.	4,485	6,521	6,918	6,863	6,148
	Average lateness	mins secs	-	-	-	-	02:36
	Journey time	mph	-	-	36.75	36.88	36.93
West	PPM	%	91.8	91.0	89.2	91.0	91.7
	CaSL	%	2.3	2.7	3.4	2.3	2.2
	CaSL	No.	3,952	4,787	6,083	4,247	4,052
	Average lateness	mins secs	-	-	-	-	02:37
	Journey time	mph	-	-	34.14	34.07	34.13

London Midland

Performance for London Midland missed performance strategy targets for both PPM and CaSL. PPM was 0.1 percentage points below target with the end of year outturn being 88.1 per cent, this showed an improvement since 2014/15 but remained slightly short of the target. The CaSL for London Midland ended the year at 2.9 per cent, 0.3 percentage points worse than target.

Performance was broadly on target in the first half of the year, and good levels of performance were seen at the end of the year due to increased collaboration between Network Rail and London Midland. This helped to mitigate a poor autumn period for performance. A main issue in autumn is leaf fall. The leaves can then be compressed by passing trains which creates a Teflon-like layer on the rails. Train drivers have to brake earlier when approaching stations and signals to avoid overshooting, and need to accelerate more gently to avoid wheel spin. This is an industry wide issue, but for an operator such as London Midland that operates local services with many station stops there is a significant impact on performance.

Birmingham New Street station re-opened in September after a five-year £750 million transformation. The importance of the station as a transport hub meant that we completed the construction work in two phases to reduce the impact of the work on passengers. The station remained fully operational with services running throughout the work but with one platform normally out of use at any moment in time. The re-opening of the station removed this restriction resulting in a positive impact on performance.

Table 3.31: London Midland – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	90.5	86.0	85.9	88.0	88.1
CaSL	%	2.4	4.1	3.5	2.8	2.9
Delay Minutes	No.	396,000	512,000	520,000	429,000	428,000
Right time performance	%	69.6	62.7	60.9	63.3	64.7
Average lateness	mins secs	02:20	03:17	03:05	02:52	02:54
Journey time	mph	-	-	37.47	37.46	37.50

Table 3.32: London Midland – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
LSE	PPM	%	87.6	83.1	84.0	83.7	84.2
	CaSL	%	3.3	4.7	4.2	3.8	3.9
	CaSL	No.	3,101	4,500	4,224	3,725	4,005
	Average lateness	mins secs	-	-	-	-	03:08
	Journey time	mph	-	-	49.24	49.35	49.30
Regional	PPM	%	91.3	86.9	86.5	89.4	89.4
	CaSL	%	2.2	4.0	3.2	2.5	2.5
	CaSL	No.	7,356	12,974	10,371	7,983	8,104
	Average lateness	mins secs	-	-	-	-	02:47
	Journey time	mph	-	-	27.68	27.54	27.39



London Overground

London Overground Rail Operations Limited (LOROL) performance missed the performance strategy target for both PPM and CaSL. PPM was 94.4 per cent, 1.7 percentage points worse than target while CaSL was 0.4 percentage points below target with an end of year outturn of 2.2 per cent. Performance was consistently worse than target throughout 2015/16.

LOROL took over the running of West Anglia inner services from AGA in May 2015. The service group had historically performed at lower levels than other LOROL services. We are working together to improve the West Anglia services by improving the reliability of the infrastructure at critical junctions and in the approaches to Liverpool Street station.

There were issues with fleet reliability that required a service improvement programme to help address the initial delays as well as the knock-on impact and ability to recover from disruption when there were fewer trains available to fulfil the timetable. There was also a requirement to more positively manage the East London Line to better integrate services with GTR services also running in the Forest Hill to Croydon corridor. Further action was taken after the major change to the timetable for services in the area in December 2015.

Prior to the transfer of the West Anglia inner services, the interaction, and potential conflict of service management, between AGA, LOROL and TfL on the Anglia route was recognised as a risk. In order to address this risk, we developed and agreed service management plans before the transfer, resulting in a smooth delivery of the new arrangement of services.

Preparations for the blockade of the Gospel Oak to Barking line in early 2016/17 were the major focus at the end of the 2015/16. The expanded concession was re-let during 2015/16 with the new concession being due to start operation in autumn 2016.

Table 3.33: London Overground – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	95.7	96.1	95.8	95.0	94.4
CaSL	%	1.9	1.6	1.8	1.8	2.2
Delay Minutes	No.	146,000	104,000	114,000	127,000	141,000
Right time performance	%	83.8	81.8	81.0	77.5	76.7
Average lateness	mins secs	00:56	00:57	01:04	01:07	01:16
Journey time	mph	-	-	18.43	18.46	18.44

Table 3.34: London Overground – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Anglia Services	PPM	%	93.5	94.7	94.7	94.6	94.0
	CaSL	%	2.3	1.5	1.6	1.8	2.1
	CaSL	No.	2,854	1,869	1,957	2,223	2,676
	Average lateness	mins secs	-	-	-	-	01:37
	Journey time	mph	-	-	22.22	22.14	21.17
East London Railways (including West Croydon services)	PPM	%	98.0	97.3	96.6	93.9	93.5
	CaSL	%	1.2	1.5	1.6	2.0	2.4
	CaSL	No.	1,749	2,382	2,966	3,775	4,662
	Average lateness	mins secs	-	-	-	-	01:23
	Journey time	mph	-	-	16.5	16.5	16.70
North London Railways (including London – Watford)	PPM	%	95.4	96.0	95.6	96.4	95.7
	CaSL	%	2.3	1.7	2.2	1.6	1.9
	CaSL	No.	4,116	3,092	4,059	2,924	3,472
	Average lateness	mins secs	-	-	-	-	01:04
	Journey time	mph	-	-	18.52	18.65	18.39



Merseyrail

Performance for Merseyrail was relatively stable throughout the year. The CaSL target in the performance strategy was outperformed by 0.1 percentage points, recording an end of year outturn of 1.9 per cent. PPM however was unable to meet target, and fell short by 0.7 percentage points, with an end of year outturn of 95.3 per cent.

There were adhesion issues in the autumn caused by high winds, rain and leaf fall. Leaves on the track can be compressed by passing trains which creates a Teflon-like layer on the rails. Train drivers have to brake earlier when approaching stations and signals to avoid overshooting, and need to accelerate more gently to avoid wheel spin. This is an industry wide issue, but for an operator such as Merseyrail that operates local services with many station stops there is a significant impact on performance. These issues experienced in autumn were a repeat of 2014/15, which reiterated the need for the performance plan to be strengthened. A ten point plan for improvement was agreed between Network Rail and Merseyrail in the latter part of the year to address the autumn shortcomings



Table 3.35: Merseyrail – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	95.2	95.4	95.8	95.6	95.3
CaSL	%	2.1	2.2	1.8	1.9	1.9
Delay Minutes	No.	51,000	54,000	51,000	61,000	66,000
Right time performance	%	71.5	74.7	72.0	70.3	68.5
Average lateness	mins secs	00:55	00:55	00:50	00:52	00:55
Journey time	%	-	-	22.73	22.72	22.72

Table 3.36: Merseyrail – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Northern line	PPM	%	95.8	95.7	96.2	95.6	95.7
	CaSL	%	1.7	2.0	1.4	1.8	1.6
	CaSL	No.	2,249	2,606	1,828	2,327	2,115
	Average lateness	mins secs	-	-	-	-	01:00
	Journey time	mph	-	-	24.57	24.56	24.55
Wirral line	PPM	%	94.3	95.0	95.1	95.7	94.5
	CaSL	%	2.8	2.6	2.5	2.2	2.5
	CaSL	No.	2,144	1,958	1,900	1,664	1,901
	Average lateness	mins secs	-	-	-	-	00:50
	Journey time	mph	-	-	20.84	20.84	20.84



Northern

Northern performance met the CaSL target in the performance strategy of 1.7 per cent. However PPM was worse than target by 0.8 percentage points recording an end of year outturn of 90.7 per cent. Performance was on target during the first half of the year but fell below in the second half.

Additional train services for FTPE were added into the timetable, and the impact of this was greater than had been forecast. The train service pattern causes congestion of the North Transpennine route between Leeds and Manchester via Huddersfield. The train services using this route enter terminal stations which include Northern and other train operators that can lead to Operator-on-TOC delays. Reactionary delays are difficult to recover due to the amount of train services in the timetable.

There were significant challenges on the routes from Newcastle to Carlisle and Settle to Carlisle. Services were disrupted following the flooding and subsequent landslips in December. A section of track at Eden Brows on the Settle to Carlisle line was closed in February after aerial surveys and ground monitoring revealed the embankment had moved so much that it was no longer safe to run trains. The project to stabilise the embankments includes major earthworks, and Northern Rail passengers have had to travel by bus replacement services between Appleby and Carlisle whilst the work is planned and delivered.

Major tunnel boring work started in April to widen the Farnworth Tunnel, near Bolton, to make room for overhead power lines. Trains had to run on a single line through the tunnel during the work. The significant risk posed by the changes to service arrangements was effectively managed, even though the work had to be slightly prolonged due to problems in tunnelling.

Table 3.37: Northern – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	91.8	90.7	91.0	90.9	90.7
CaSL	%	1.7	2.0	1.8	1.8	1.7
Delay Minutes	No.	736,000	824,000	799,000	727,000	811,000
Right time performance	%	75.1	72.4	72.5	71.2	70.4
Average lateness	mins secs	01:42	01:55	01:49	01:52	01:50
Journey time	mph	-	-	31.71	31.75	31.65

Table 3.38: Northern – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Lancashire and Cumbria	PPM	%	90.4	87.6	87.3	88.3	86.3
	CaSL	%	2.1	2.8	2.7	2.5	2.7
	CaSL	No.	1,585	2,193	2,072	1,883	2,042
	Average lateness	mins secs	-	-	-	-	03:06
	Journey time	mph	-	-	31.45	31.04	30.71
Manchester and Liverpool	PPM	%	91.8	90.4	90.5	89.2	89.3
	CaSL	%	1.7	2.1	1.8	2.0	1.9
	CaSL	No.	5,094	6,237	5,569	6,009	5,885
	Average lateness	mins secs	-	-	-	-	02:08
	Journey time	mph	-	-	28.78	28.99	29.12
South and East Yorkshire	PPM	%	90.8	90.3	89.7	92.1	92.9
	CaSL	%	1.9	2.0	2.1	1.6	1.5
	CaSL	No.	2,369	2,361	2,618	1,994	1,797
	Average lateness	mins secs	-	-	-	-	01:25
	Journey time	mph	-	-	35.51	35.66	35.73
Tyne, Tees and Wear	PPM	%	92.7	91.3	92.6	92.8	91.6
	CaSL	%	2.4	2.5	2.1	2.2	2.0
	CaSL	No.	1,528	1,593	1,320	1,433	1,310
	Average lateness	mins secs	-	-	-	-	02:12
	Journey time	mph	-	-	33.56	33.19	33.32
West and North Yorkshire	PPM	%	92.5	91.9	92.9	92.7	92.4
	CaSL	%	1.5	1.6	1.2	1.2	1.3
	CaSL	No.	3,737	4,073	3,244	3,262	3,510
	Average lateness	mins secs	-	-	-	-	01:29
	Journey time	mph	-	-	32.15	32.33	31.99

Southeastern

Performance for Southeastern did not meet the performance strategy targets for PPM and CaSL. PPM was 86.9 per cent, 3.6 percentage points worse than target and CaSL was 0.9 percentage points below target with a yearend outturn of 3.6 per cent. Performance fell short of target for the majority of the year and passengers experienced particularly low levels of performance in autumn and the early part of winter. The London South East (LSE) route is Network Rail's busiest and most congested, with peak demand forecast to increase across the route by 20 per cent in the next ten years.

Major changes at London Bridge station are underway, designed to cater for long-term growth of passenger numbers. This includes the creation of a new concourse, additional platforms and a robust new track and signalling systems to offer more reliable journeys to passengers. Whilst this work is being undertaken there has been a reduction in network capability, however we continue to operate a full timetable of services. The reduction in availability of network has meant that initial delays are difficult to recover from, which then have further knock-on effects to other services.

There have also been incidents throughout the year of overcrowding at London Bridge station, causing increased dwell times at stations so that passengers could board and alight from trains safely. Increased dwell time has been a contributor to poor performance throughout the year and initiatives have been put in place to manage the overcrowding and benefits have been felt. A specific ten point plan for improvement was agreed with Southeastern in the latter part of the year. This focuses on infrastructure reliability, timetable and service management improvements, and a reduction in externally caused delays.

Table 3.39: Southeastern – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	91.7	91.1	89.0	89.3	86.9
CaSL	%	2.4	2.4	3.3	2.8	3.6
Delay Minutes	No.	417,000	533,000	632,000	582,000	706,000
Right time performance	%	65.7	64.6	61.6	60.9	58.6
Average lateness	mins secs	01:26	01:37	01:56	02:12	02:36
Journey time	mph	-	-	32.54	32.79	32.54

Table 3.40: Southeastern – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Mainline and high speed	PPM	%	90.4	90.0	87.6	89.0	85.9
	CaSL	%	2.4	2.5	3.6	2.4	3.7
	CaSL	No.	5,867	6,280	8,883	5,684	8,208
	Average lateness	mins secs	-	-	-	-	02:55
	Journey time	mph	-	-	41.40	41.38	41.30
Metro (including other rural)	PPM	%	92.4	91.6	89.9	89.5	87.5
	CaSL	%	2.5	2.4	3.1	3.0	3.5
	CaSL	No.	10,495	10,371	13,434	12,723	14,350
	Average lateness	mins secs	-	-	-	-	02:26
	Journey time	mph	-	-	23.39	23.11	22.75



Stagecoach South West Trains

Stagecoach South West Trains (SSWT) performance outperformed the performance strategy target for CaSL by 0.3 percentage points, with an end of year outturn of 2.8 per cent. While PPM was 90.1 per cent, missing target by 0.5 percentage points. Performance was broadly on target except for a poor end to the year which made overall performance worse than target. A lead contributor to this was external issues such as the management of trespass and suicides on the network. The reliability of our infrastructure improved by 15 per cent compared to 2014/15, there was also a reduction in the number of infrastructure failures on the route.

Performance is managed through an alliance between Network Rail and SSWT, with an improvement programme based on strategic plans for dealing with asset reliability, subthreshold delays and response to external events. SSWT services continue to need active management of services, with interventions from controllers needed much earlier than on other areas of the network, to manage the impact of passenger growth. One of the interventions used to run train services faster is to implement a 'skip stop' timetable, where services operate with fewer station stops to help maintain the flow of trains on the main routes into and out of London Waterloo station. This does have a negative impact on passengers as it can reduce the amount of services that they can choose to travel on, but the intention is that by doing this more people arrive at their destination having experienced less delays to their journey. The 'skip stop' timetable has more of an impact upon CaSL than other metrics as missing out a station is formally classed as a cancellation.

The redevelopment of London Waterloo station commenced towards the end of 2015/16. The project involves the strengthening of bridges on the approach to the station as well as changes to the track layout and platforms. Significant changes to the timetable are required during the works to allow the longer trains to run to London suburban stations. The development works posed, and will continue to pose, a performance risk which will need to be managed.

Table 3.41: Stagecoach South West Trains – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	92.3	91.4	89.7	90.1	90.1
CaSL	%	2	2.3	2.8	2.7	2.8
Delay Minutes	No.	543,000	566,000	679,000	631,000	639,000
Right time performance	%	70.7	67.8	65.7	65.9	66.7
Average lateness	mins secs	01:44	01:50	01:53	01:56	01:59
Journey time	mph	-	-	34.32	34.22	33.43

Table 3.42: Stagecoach South West Trains – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Mainline	PPM	%	91.1	90.3	88.1	88.6	87.7
	CaSL	%	2.4	2.6	3.2	2.8	3.2
	CaSL	No.	4,343	4,847	5,912	5,183	5,954
	Average lateness	mins secs	-	-	-	-	02:29
	Journey time	mph	-	-	43.93	43.87	43.20
Other rural	PPM	%	95.7	94.7	90.4	95.1	94.6
	CaSL	%	1.3	2.4	5.8	1.5	1.5
	CaSL	No.	465	1,119	2,670	709	711
	Average lateness	mins secs	-	-	-	-	02:11
	Journey time	mph	-	-	31.51	31.28	31.21
Suburban (including Waterloo - Basingstoke terminators, Farnham/Alt on services)	PPM	%	92.3	91.4	90	90	90.6
	CaSL	%	2	2.2	2.8	2.9	2.7
	CaSL	No.	7,204	7,849	9,789	10,189	9,782
	Average lateness	mins secs	-	-	-	-	01:49
	Journey time	mph	-	-	26.53	26.42	25.91

TfL Rail

PPM performance for TfL Rail outperformed target by 0.7 percentage points, the year-end outturn being 94.0 per cent. However CaSL was 2.6 per cent, 0.5 percentage points worse than target. Performance was better than target for the majority of 2015/16, sometimes substantially so. Some of the contributors to the outperformance of PPM were active management of stations and passenger flows, management of the fleet led to fewer issues with train failures disrupting services as well as an increased amount of response staff to deal with issues when they occurred.

TfL Rail took over operation of the Great Eastern inner services from AGA at the end of May 2015 as the first stage of change towards full operation of Crossrail services in 2019. Significant attention was paid to the development of a 'Metro' style train service that is expected by the passengers of these routes, where the key focus of the service is on high frequency and consistency.



Table 3.43: TfL Rail performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	93.0	94.0	93.3	91.7	94.0
CaSL	%	2.7	2.3	2.6	3.0	2.6
Delay Minutes	No.	2,214	1,870	2,196	2,480	2,164
Right time performance	%	80.3	80.8	77.7	80.9	80.9
Average lateness	mins secs	-	-	-	-	01:12
Journey time	mph	-	-	27.89	27.88	27.98



Virgin Trains East Coast

Performance for Virgin Trains East Coast (VTEC) was worse than the performance strategy target for both PPM and CaSL. The end of year outturn for PPM was 85.2 per cent, 1.3 percentage points below target while CaSL missed target by 0.4 percentage points with a year-end score of 5.5 per cent. Performance was worse than target and declined throughout the year, the record levels of performance experienced in 2014/15 could not be maintained.

Weather had a particularly worse than expected impact as high winds moved overhead line out of gauge, then causing dewirements as the train pantograph (which transfers the power from overhead line to the train) comes 'off' the overhead line and hits the equipment. The dewirements cause delay for the train that causes pulls down the wires, as damaged may be caused to the pantograph which transfers the power from the overhead line to the train. There are also knock-on impacts to other services in the area as they are not able to travel through the affected section of the track whilst the power supply is unavailable.

At the start of January the LNE route signed an alliance with VTEC that commits us to working even more closely together in order to deliver a better service to customers on the East Coast Main Line. As part of the alliance work will be completed on infrastructure upgrades to enable the introduction of new trains, a movement to digital signalling, the transformation of stations on the route and collaborative working to manage and prevent delays. External incidents continue to be a risk to performance, a fatalities management plan has now been put in place.

Table 3.44: Virgin Trains East Coast – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	86.6	83.9	84.2	88.6	85.2
CaSL	%	5.5	6.7	5.8	3.7	5.5
Delay Minutes	No.	236,000	252,000	248,000	180,000	223,000
Right time performance	%	67	61.1	54.9	60.6	55.9
Average lateness	mins secs	06:34	07:21	06:30	04:58	06:47
Journey time	mph	-	-	80.32	80.39	80.52

Table 3.45: Virgin Trains East Coast – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Anglo - Scottish services	PPM	%	85.5	82.2	83.1	87.2	83.6
	CaSL	%	6.3	7.6	6.2	4.4	6.5
	CaSL	No.	1,632	1,988	1,622	1,159	1,718
	Average lateness	mins secs	-	-	-	-	07:11
	Journey time	mph	-	-	80.74	80.79	81.04
London - Leeds and North East (including Lincoln)	PPM	%	87.6	85.6	85.3	90.1	86.9
	CaSL	%	4.9	5.9	5.5	3.1	4.4
	CaSL	No.	1,157	1,402	1,302	731	1,066
	Average lateness	mins secs	-	-	-	-	06:08
	Journey time	mph	-	-	79.54	79.64	79.58



Virgin Trains West Coast

Virgin Trains West Coast (VTWC) was slightly, 0.2 percentage points, short of the PPM target in the performance strategy with an end of year outturn of 86.0 per cent. CaSL was 4.7 per cent, 0.9 percentage points short of target. Performance was on target for the majority of the year but poor performance in latter part of the year resulted in overall performance being worse than target.

The West Coast Main Line north of Carlisle had to be closed for several days after eight feet of water flooded the railway over a weekend in early December. The weather meant that we had to carry out extensive safety checks and repairs, including rebuilding a host of electrical and signalling equipment. Impact was particularly felt for passengers travelling on Anglo-Scottish cross border services.

Several sections of railway flooded when the River Avon burst its banks, including two tunnels south of Rugby which required continuous pumping to remove the water away from the area so that essential safety checks could be completed. Temporary speed restrictions had to be put in place which impacted the performance of VTWC train services through the affected area.



Table 3.46: Virgin Trains West Coast – Whole TOC Performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	85.9	83.6	85.8	84.7	86.0
CaSL	%	4.5	5.0	4.9	5.0	4.7
Delay Minutes	No.	416,000	470,000	451,000	438,000	448,000
Right time performance	%	55.4	49.4	52.0	50.5	54.0
Average lateness	mins secs	04:52	05:27	05:04	05:02	04:42
Journey time	mph	-	-	79.99	79.67	79.69

Table 3.47: Virgin Trains West Coast – Sub-operator Performance

			2011/12	2012/13	2013/14	2014/15	2015/16
Anglo – Scottish services	PPM	%	80.5	78.9	81.3	78.5	78.0
	CaSL	%	6.8	7.5	7.0	8.6	8.4
	CaSL	No.	1,674	1,820	1,754	2,053	2,095
	Average lateness	mins secs	-	-	-	-	06:31
	Journey time	mph	-	-	78.85	78.89	78.87
London – North West	PPM	%	87.1	84.6	87.1	86.4	88.4
	CaSL	%	3.9	4.5	4.4	4.0	3.6
	CaSL	No.	2,123	2,450	2,377	2,138	1,945
	Average lateness	mins secs	-	-	-	-	04:07
	Journey time	mph	-	-	82.69	82.44	82.43
London – West Midlands	PPM	%	87.7	85.5	86.9	87	88.8
	CaSL	%	3.9	4.1	4.2	4.0	3.4
	CaSL	No.	1,285	1,315	1,235	950	815
	Average lateness	mins secs	-	-	-	-	03:46
	Journey time	mph	-	-	74.48	73.15	73.27

Non-Franchised Passenger Operators

First Hull Trains

Performance for First Hull Trains was better than target for both PPM and CaSL. The PPM end of year outturn was 85.3 per cent, beating target by 1.3 percentage points, while CaSL was 1.0 percentage point better than the target with a yearend outturn of 5.7 per cent.

Performance was above target for the majority of the year, outperformance of targets especially towards the end of the year mitigated the overall impact of the periods of worse than target performance. The high levels of performance have contributed towards First Hull Trains achieving the highest overall satisfaction score in the National Rail Passenger survey published in January 2016.

Although performance was above target levels, it has reduced in the last year. Contributors to this have included an increase in track related faults that delay the services and issues with overhead line power supply caused by severe weather.

Table 3.48: First Hull Trains performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	81.7	81.7	82.0	88.2	85.3
CaSL	%	7.2	8.0	7.2	4.7	5.7
Delay Minutes	No.	18,000	18,000	22,000	15,000	16,000
Right time performance	%	50.0	50.9	48.8	58.3	46.1
Average lateness	mins secs	07:17	07:32	07:08	05:04	06:04
Journey time	mph	-	-	78.12	78.81	78.13

Grand Central

The PPM and CaSL targets were both outperformed for Grand Central, PPM was 86.6 per cent and CaSL was 4.5 per cent. This represented outperformance of 2.6 and 3.0 percentage points respectively. Although this performance was above the targeted levels it was worse than the previous year.

Grand Central and First Hull Trains operate along the same route south of Doncaster, and their delays are often subject to similar incidents on their approach to London King's Cross. Track related faults and the impact of weather both had increasing impacts upon services. Storm Katie hit at Easter 2016, causing overhead wire equipment to move out of gauge which was subsequently brought down by a passing train in the St Neots area.

Table 3.49: Grand Central performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	84.1	81.4	80.7	88.2	86.6
CaSL	%	7.2	7.7	7.5	4.0	4.5
Delay Minutes	No.	28,000	32,000	35,000	27,000	30,000
Right time performance	%	52.8	47.3	40.4	48.0	45.1
Average lateness	mins secs	06:35	07:19	07:31	04:44	05:27
Journey time	mph	-	-	68.81	69.54	70.72

Heathrow Express

Performance for Heathrow Express (HEX) was worse than target for both PPM and CaSL. PPM for HEX was 91.8 per cent, 3.1 percentage points behind the performance strategy target. The end of year outturn for CaSL 1.9 per cent, which was 0.8 percentage points worse than target.

The agreed performance strategy set out the initiatives that Network Rail and HEX collectively believed would deliver the agreed PPM and CaSL trajectories. Despite this, performance outputs were not at targeted levels with problems for asset reliability on the route out of London Paddington. Performance was also affected by delays during two-track railway operation for weekend engineering works in connection with the Crossrail Programme, and reliability concerns for both HEX and the other operators on the route.

Table 3.50: Heathrow Express performance

		2011/12	2012/13	2013/14	2014/15	2015/16
PPM	%	95.3	93.3	93.8	92.6	91.8
CaSL	%	0.9	1.7	1.2	1.6	1.9
Delay Minutes	No.	21,000	23,000	24,000	26,000	28,000
Right time performance	%	77.4	73.9	72.4	70.2	68.6
Journey time	mph	-	-	44.90	44.88	45.02

Freight Train Performance

Rail freight is vital to Britain's economic success. Whether it is taking lorries off the roads and drastically reducing congestion or transporting goods that we consume every day, the UK relies on rail freight to provide a faster, greener, safer and more efficient way of transporting goods than roads. It contributes £870 million to the economy and plays a big part in reducing congestion and carbon emissions.

This section reports the following measures of performance

- Freight Delivery Metric
- Freight Delay Minutes.

Definition and reporting method

Freight performance is measured using the Freight Delivery Metric (FDM). This is the percentage of freight trains that have successfully arrived at destination within 15 minutes of scheduled time, or the total delay attributed to Network Rail is less than 15 minutes. Some cancellation and other service disruption incidents also count as FDM failures. This is underpinned by a measure of freight delay minutes per 100 kilometres attributed to Network Rail. Delay minutes per 100 kilometres is a key diagnostic indicator of the prime causes of disruption.

Delays attributed to Network Rail typically relate to the performance of the railway infrastructure, timetabling and operation of the network. This group also includes events with external causes which affect the operation of the railway such as cable theft or poor weather. Delays attributed to operators typically relate to train operations, fleet reliability or train crew resourcing.

We have a regulated target to maintain performance at 92.5 per cent throughout CP5.

The network has been divided in Strategic Freight Corridors (SFCs) in order to report performance based on the routes that our customers use. FDM by SFC was first reported in period 3 of 2014/15. Prior to this, cancellation and service variation data was not captured at SFC level and therefore no data is available prior to 2014/15 in Table 4.47. Only 11 periods of data are available for 2014/15.

Commentary

Network Rail outperformed its 2015/16 regulatory target by delivering 94.3 per cent FDM against the target of 92.5 per cent. This was a 0.2 percentage point decline on the year-end position for 2014/15. This target has been achieved against a backdrop of significant structural change in the freight traffic market. There has been an unprecedented decline in the coal sector which was previously shown

high levels of FDM performance, and growth in the intermodal and construction markets which operate on already congested areas of the national rail network. The year has also seen a number of particularly significant incidents; notably the cancellations ahead of planned industrial action in May 2015, and the widespread flooding in the north of England and Scotland in the second half of the year.



Table 3.51: Freight Delivery Metric (%) – network-wide

	2013/14	2014/15	2015/16
Network-wide (actual)	93.3	94.5	94.3
Network-wide (target)	92.5	92.5	92.5

Table 3.52: Freight Delivery Metric (%) – Strategic Freight Corridor

Strategic Freight Corridor	2014/15	2015/16
SFC01 - Scotland	97.20	96.48
SFC02 - Scotland to North West/Daentry/West Mids	92.30	88.68
SFC03 - Scotland to Tyne/Tees/Yorks/East Mids	93.40	90.95
SFC04 - Felixstowe/Thameside to Mids/N.West/Scot	90.30	89.90
SFC05 – Felixstowe/Thameside to Yorks	90.50	89.77
SFC06 - Immingham/Tyne to Yorks/Mids	95.70	97.39
SFC07 - Southampton to West Mids/North West	89.90	91.22
SFC08 - South Wales to London	91.80	93.47
SFC09 - South Wales to West Mids/North West	93.20	92.89
SFC10 - Somerset to London / South East	92.20	94.21
SFC11 - East Mids/Peak Forest to London/South East	91.00	91.59
SFC12 - Ch Tunnel to Daentry/W. Mids/Wembley	92.60	94.01
SFC901 - Yorks local	96.80	97.71
SFC902 - Southampton to Yorks	89.00	93.50
SFC903 - South Wales to North East	94.70	94.69
SFC904 - South Wales and West Locals	96.50	95.58
SFC905 - North West and Cross Pennines	96.10	95.49
SFC906 - South East Local	94.40	94.51
SFC907 - Mids Local	95.90	95.03
SFC908 - Mail Traffic	95.10	92.41

Table 3.53: Freight Delay Minutes per 100 train kilometres– network-wide

	2013/14	2014/15	2015/16
Network-wide	3.79	3.30	3.47



Network Availability

The principal regulatory measures of the availability of the network to run trains taking disruptive engineering possessions into account are the Possession Disruption Indices for passenger and freight services (PDI-P and PDI-F).

The Possession Disruption Index for both passenger and freight services is regulated by the ORR.

Possession Disruption Index for Passenger

Definition and reporting method

Possession Disruption Index for Passengers (PDI-P) estimates the economic value of the excess journey time experienced by passengers when disruptive possessions are taken. PDI-P measures the disruption experienced by the customer and is expressed as an index, baselined against 2007/08 values.

Commentary

Following franchise changes at the end of March 2015 the Network Availability Reporting System (NARS) was unable to report PDI-P figures. The original coding used within NARS to derive PDI-P data did not handle the impact of franchise changes effectively. A project was setup to update NARS and reporting recommenced in January 2016. During this project an error was detected in the range of data used to calculate PDI-P. This error is not considered to be material as it impacts both the target and actual reported number in equal measure. On this basis, we have agreed with the ORR that we will continue to report against the existing target for the remainder of CP5. This error has existed since the PDI-P measure was created. Reporting in CP4 (2009 - 2014) and CP5 (2014 - 2019) has included this error.



The moving annual average (MAA) for PDI-P ended 2015/16 at 1.10, worse than our target which was set at 0.81. It should be noted that the 2015/16 financial year contained two Easter Bank holidays – a key period for undertaking railway improvement works. In most financial years, the impact of Easter engineering works only occurs once. Other influences were the significant enhancement portfolio overall and some key specifics e.g. a possession at Acton Wells, (originally two blockades of three and four days) which was re-planned at short notice to create a ten day blockade over the Christmas holiday period.

Since December 2015, PDI-P has been significantly higher than expected. Network Rail has identified that this is likely caused by the combined effect of changes in service group weighting and changes to the parameters within Track Access Agreements, following re-franchising. The ORR has been informed and Network Rail is working to understand the full impact of this issue. However, we believe that it represents a significant challenge in terms of our ability to report actual results against equivalent targets.

Table 3.54: PDI-P – network-wide

	2011/12	2012/13	2013/14	2014/15	2015/16	CP5 exit target
PDI-P	0.54	0.64	0.69	0.71	1.10	0.58

Possession Disruption Index for Freight

Definition and reporting method

PDI-F measures the proportion of track kilometre available for freight operators to run services. PDI-F is weighted by the level of freight traffic operated over each section of track and is baselined against 2007/08 levels.

Commentary

The PDI-F MAA ended 2015/16 at 0.85, a three per cent improvement on the same period in 2014/15 and 18 per cent ahead of our target of 1.04. The underlying access footprint for maintaining the railway has generated a stable PDI-F result this year, with future renewal and enhancement volumes likely to impact the remaining years in CP5.

Table 3.55: PDI-F – network-wide

	2011/12	2012/13	2013/14	2014/15	2015/16	CP5 exit target
PDI-F	0.85	0.79	0.87	0.88	0.85	0.73

Key Performance Indicators

In addition to the regulated measures PDI-P and PDI-F, we have developed other measures of Network Availability which are reported in this section:

- working timetable compliance at weekends
- rail replacement bus hours at weekends
- late changes to engineering works
- number of planned disruption mitigation interventions
- possession notification discount factor
- delay minutes due to engineering overruns
- cancellation minutes due to engineering overruns
- unplanned Temporary Speed Restrictions (TSRs).

Working Timetable Compliance at Weekends

Definition and reporting method

This measures the percentage of train schedules that ran as scheduled or were disrupted (cancelled or replaced) by buses versus the permanent timetable that is scheduled to operate each weekend by franchised passenger train operators.

A higher number represents better performance.

Commentary

The MAA ended 2015/16 at 81.1 per cent which is lower than the 83.7 per cent reported in 2014/15. In the past year, we have seen a deterioration in the working timetable compliance at weekends as a result of the large volumes of railway improvement plans being delivered throughout the year. These projects include the Thameslink Programme, Crossrail, Northern Hub, Great Western Electrification Programme, Manchester Victoria remodelling, Banbury remodelling, Cardiff Area Signals Renewals, Bathampton blockade, Farnworth Tunnel and the Christmas Railway Upgrade.

Table 3.56: End of year MAA working timetable compliance at weekends

		2014/15	2015/16
Percentage of train schedules that ran as scheduled or were disrupted (cancelled or replaced) by buses at weekends (end of year MAA)	%	83.7	81.1

Rail Replacement Bus Hours at Weekends

Definition and reporting method

This measure reports the number of hours of replacement bus services in operation at weekends.

A lower number represents better performance.

Commentary

The total number of rail replacement bus hours at weekends reported for 2015/16 was 192,975 hours. This is an increase of 18.4 per cent compared to 2014/15 which reported a total of 163,019 hours. The increase reported is a result of the large volumes of railway improvement works being delivered throughout the year, which led to an increasing reliance on bus replacement services.

Table 3.57: Annual rail replacement bus hours at weekends

	2013/14	2014/15	2015/16
Rail replacement bus hours at weekends	166,891	163,019	192,975



Late Changes to Possessions

Definition and reporting method

This measures the number of new, cancelled, curtailed or extended disruptive possessions that were agreed between the Confirmed Period Possession Plan (CPPP) and the Weekly Operating Notice (WON) as approved as part of the Engineering Access Planning (EAP) process.

Commentary

During 2015/16, there was an average of 94 late notice changes to disruptive possessions per period. The volume of disruptive late changes to possessions has increased in comparison to the 74 reported in 2014/15. This is partly due to the severe weather seen across the country which caused longer term disruption. At times there was a need to cancel possessions at late notice to allow for repair work to be undertaken. Re-planning work for major projects and raising additional requests for access to the network has also contributed to the increasing trend. One area where there has been a reducing trend in late notice change requests is in the South East. This has been attributed to the trial of the Informed Period Possession Plan process which the Industry Access Programme (IAP) is planning to roll-out on a wider basis.

Table 3.58: Late changes to possessions

	2014/15	2015/16
Number of new, cancelled, curtailed or extended disruptive possessions (end of year MAA)	74	94



Number of Planned Disruptive Mitigating Interventions

Definition and reporting method

This measure reports the number of mitigations in place to allow passengers to travel by rail and avoid bus replacement services. Examples of a mitigation intervention include bidirectional signalling or the use of a single line whilst work is underway on our network. These interventions allow us to work on parts of the network without stopping the operation of the railway.



Commentary

During 2015/16, there was an average of 165 planned disruption mitigation interventions per period. This was a four per cent improvement compared to 2014/15, when 159 mitigation interventions were reported on average per period. This shows the continued commitment to use interventions where possible to minimise disruption to rail users.

Table 3.59: Number of Planned Disruptive Mitigating Interventions

	2013/14	2014/15	2015/16
Number of planned disruptive mitigating interventions (end of year MAA)	145	159	165

Possession Notification Discount Factor

Definition and reporting method

In order to deliver enhancements, renewals and maintenance of the network, we need access to the track and other infrastructure.

Disruptive engineering works are categorised according to the three notification timescale bands:

- early notification engineering works are those planned more than 26 weeks in advance
- mid-range notification engineering works are those planned between 26 and 22 weeks in advance
- late notice are planned less than 22 weeks in advance.

This measure reports the percentage of late notice disruptive passenger possessions only.

The CPPP gives formal notification to train operators on the proposed timetable. This is provided to train operators 22 weeks in advance of the scheduled train running time and allows them to plan their services accordingly. Changes made to the timetable after this date impact train operators' service plans.

A lower number of engineering works planned in the late notification timescale band shows better performance.

Commentary

During 2015/16, an average of 9.49 per cent of possessions were planned less than 22 weeks in advance per period, 3.25 percentage points worse than the 6.24 per cent in 2014/15. The MAA increased towards the later part of the year as a result of the severe weather conditions causing major flooding and power failures, which resulted in disruption to planned maintenance work. Ongoing work at Farnworth Tunnel and the accumulation of urgent repair works at Blanaeu Ffestiniog, Lamington viaduct, Farnley and Dover also occurred during the latter part of the year.

Table 3.60: Late change notification payments

		2013/14	2014/15	2015/16
Late change notification payments (end of year MAA)	%	8.84	6.24	9.49

Delay Minutes due to Possession OVERRUNS

Definition and reporting method

Measures the number of delay minutes per 100 train kilometres due to possession overruns.

Commentary

In 2015/16, there was an average per period of 0.031 delay minutes per 100 train kilometre due to possession overruns. The measure shows significant improvement in comparison to the same period in 2014/15, which reported an average of 0.045 delay minutes per 100 train kilometre per period. Although there remains risk of performance impact from work during possessions leading to delays, especially as a result of the high volume of enhancements and renewals work currently underway, we have seen a reduction in the performance impact of possessions in the last year. This is in line with the stronger controls applied to possession management which were implemented following the King's Cross and Paddington overruns at Christmas 2014.

Table 3.61: Delay minutes due to possession overruns

	2013/14	2014/15	2015/16
Number of delay minutes per 100 train km (end of year MAA)	0.048	0.045	0.031



Cancellation Minutes due to Possession Overruns

Definition and reporting method

Measures the number of cancellation minutes per 100 train kilometre caused by possession overruns.

Commentary

In 2015/16, there was an average of 0.012 cancellation minutes per 100 train kilometres due to possession overruns per period. The measure shows significant improvement compared to 2014/15, which reported 0.028 cancellation minutes per 100 train kilometres. The cancellation of services as a result of work during possessions continues to be a risk, especially as a result of the high volume of enhancements and renewals work currently underway. However, we have seen a reduction in the performance impact of possessions in the last year in regards to cancellation minutes which is in line with the stronger controls applied to possession management.

Table 3.62: Cancellations minutes due to possession overruns

	2013/14	2014/15	2015/16
Number of cancellation minutes per 100 train km (end of year MAA)	0.027	0.028	0.012

Unplanned Temporary Speed Restrictions

Definition and reporting method

This measure reports on the number of Unplanned Temporary Speed Restrictions (TSRs) in place.

Commentary

The MAA ended 2015/16 at 205 unplanned TSRs, an increase when compared to the same period in 2014/15 of 165 unplanned TSRs.

Track related TSRs contributed to 62 per cent of the total unplanned TSRs on the network, with Cyclic Top faults accounting for 32 per cent of track related TSRs. Cyclic top TSRs rose by 165 per cent to a high point in February, with 129 TSRs, compared to 46 TSRs at the start of 2015/16. This was a result of a clarification in track standards which required speed restrictions to be imposed for certain severe cyclic top faults until a robust repair had been completed. A TSR for at least seven days must be imposed for severe cyclic top faults in high track category areas, whereas on lower category track a TSR will be required for at least 14 days for severe cyclic top faults. This clarification was made to remove misinterpretation of

the standard. In January, the number of repeat cyclic top faults across the network started to fall to 45 TSRs at the end of the year, following additional focus on addressing the underlying causes of deteriorating track.

Earthworks and structures were affected in winter 2015/16 by the wet weather and flood damage from rivers. Earthworks TSRs increased by over 100 per cent to 29 TSRs in 2015/16, compared to the 14 TSRs imposed in the previous year. This is a result of the wet weather that we experienced during the winter. Actions taken over the last two years have identified risk locations and implemented preventive actions to minimise risk and impact at known locations.

Level crossing TSRs have risen by 42 per cent since the start of the year as a result of a tightening of risk assessment standards at user worked and farm crossings, relating to the sighting of trains on approach to the level crossings. In 2015/16, the main increases in level crossing TSRs have been seen in Wales, LNW and Anglia. New lower cost technology has been implemented on a number of level crossings to reduce the risk at levels crossings and to remove TSRs. An example of this new technology is VaMos, which is a miniature stop light overlay system that alerts level crossing users of a train in locations where sighting is limited. However, the majority of work related to level crossing TSR removal is still a result of vegetation clearance which improves sighting from level crossings. There are still a number of at risk locations to undergo annual inspections and risk assessment, which could see a further rise in TSRs.

The performance impact on criticality 3, 4 and 5 routes has increased, predominantly as a result of cyclic top and level crossing TSRs, which have risen almost two-fold on these routes. Criticality 1 routes have remained broadly static throughout the year. This is a result of less renewals work occurring on lower criticality routes, in line with Network Rail's track policy.

Table 3.63: Unplanned Temporary Speed Restrictions

	2013/14	2014/15	2015/16
Number of Unplanned Temporary Speed Restrictions (TSRs) (end of year MAA)	156	165	205

4. Enhancing the Railway

Network Rail is undertaking a huge five year upgrade plan to deliver a bigger and better railway, with more trains, as well as enabling longer and faster train services through longer platforms and the electrification of key lines. The end result will see a much better service for passengers. In 2015/16, Network Rail delivered £3.5 billion of enhancements to upgrade the railway across Great Britain.

Our work means that by the end of CP5 there will be 170,000 more seats into London at rush hour (a 20 per cent increase compared to pre-2014 levels), and 30 per cent more into the cities of the North. We are driving economic regeneration through new lines in the Borders and Oxfordshire and newly modernised stations including Birmingham New Street, Manchester Victoria, London King's Cross and London Bridge. Other major projects include Thameslink, Crossrail and the comprehensive modernisation and electrification of the Great Western Main Line.

In 2015/16 in terms of enhancement milestones, we have delivered a greater number of project commissionings on schedule, improving on our performance in 2014/15. However, there are areas where we did not meet our performance targets including where our costs have exceeded the budgets set.

During 2015/16 it was recognised that project spend had, in a number of areas, increased significantly from our original plans. This led to the commissioning of the Hendy review, which resulted in a significant re-profiling and re-costing of major elements of the CP5 enhancement portfolio. In addition, Dame Collette Bowe reported on the lessons learnt from the planning process for Network Rail's CP5 rail enhancement programme. As a result of these reviews we are comprehensively revising the way we manage enhancement programmes. A summary of the reviews of the planning and delivery of our enhancements projects that occurred in 2015/16 and the changes to the way we manage our projects is described in more detail below.

Bowe Review

In June 2015, Dame Collette Bowe, a non-executive member of the Board of the Department for Transport (DfT), was asked by the Government to report on lessons learnt from the planning process for Network Rail's CP5 rail enhancement programme. The review was published on 25 November 2015 and concluded that CP5 was in some respects materially different and more ambitious than CP4, and included a large programme of work unlike that undertaken in recent years, namely electrification. The review confirmed that there was no single cause for the cost and timescale escalations encountered. It highlighted key areas to focus on to

increase the likelihood that future planning is more effective, and ensuring plans are both deliverable and affordable, including:

- clarifying the organisational responsibilities of the DfT, Network Rail and the ORR, particularly in light of the reclassification of Network Rail, which has changed the context significantly, and ensuring that the necessary capabilities are in place
- ensuring significantly more robust programme governance and oversight of the planning process, with clarity around schemes at all stages of development, and considering whether bespoke arrangements for very complex elements of the enhancements programme should be more widely used
- incorporating the views and needs of end users, especially in respect of how enhancements are delivered
- much stronger focus on deliverability, including the implications throughout for the supply chain, and the availability of people with the right skills (in all three organisations).

Network Rail and the DfT have both agreed not to commit to projects until full scoping, development and costing has taken place.

Hendy Review

In July 2015, Sir Peter Hendy CBE was appointed as the new Chair of Network Rail by the Secretary of State for Transport. At the Government's request, Sir Peter Hendy reviewed Network Rail's CP5 enhancement portfolio. [The Hendy Review](#) systematically examined every element of the enhancement programme reviewing costs and timescales, and establishing robust estimates of both. His report set out which works can be delivered in a timely and affordable way during the period. The report confirmed that no projects have been cancelled and the majority of programmes and projects will go ahead for delivery by 2019. In order to fund the increase in cost, Network Rail is planning to release £1.8 billion of investment through the sale of non-core and lower value assets, including the sale of our property assets. The Government was also able to increase the limit on Network Rail's government borrowing by a further £700 million. This extra investment secures a Railway Upgrade Plan that delivers better stations, faster, more frequent and longer trains and a safer more reliable railway for millions of passengers and businesses. The new Railway Upgrade Plan is a more robust and deliverable plan but it is not without its own risks and challenges which we will work to address.

Enhancement Improvement Programme

From the start of 2015, Network Rail's Major Projects Delivery Committee (MPDC) reviewed the way we develop and deliver projects. The work followed the challenges, unforeseen cost increases and delays in the delivery of major CP5 projects in the first year of CP5. The result was the Enhancement Improvement Programme (EIP), which will strengthen the rail industry's ability to successfully deliver major projects.

The EIP is more than just a Network Rail programme. It aims to work across the whole industry, with a different cultural approach to how Network Rail works with others in the industry, by being more formal and transparent about project definition, assurance, budget/scope approval and subsequent change management, supported by appropriate governance and assurance processes more clearly aligned to industry best practice.

The ongoing EIP is focused on enabling an improved performance across a number of critical areas of project delivery including early planning, cost estimating, reporting, measurement and resource capability and planning. We are putting in place a stronger governance model that enables industry integration, joint decision making and clearly defined roles and responsibilities.

This will also be supported by the introduction of the need for two separate key decision points in the life of a project; the decision to develop and the final investment decision to deliver it. We are ensuring greater formality, rigour and transparency around the gateway process that governs how projects progress through their different stages and are working to improve the reliability of our cost estimates and quantification of the risk and uncertainty surrounding them.

We recognise the impact our project and programme management capability has on the successful and efficient delivery of enhancements and renewals work and the operation of the railway, and this capability improvement is a key part of the EIP. The programme management capability enabler P3M3 (Project, Programme, and Portfolio Management Maturity Model) was introduced for CP5 as the metric to measure our programme management capability. The definition of P3M3 is included [here](#). We have undertaken a number of P3M3 assessments to better understand and assess our capabilities that need additional development in order to successfully deliver the CP5 portfolio. As shown in Table 4.4, phase two of the P3M3 assessment plan was completed in December 2015. Following the initial assessments to understand Network Rail's existing capability, improvement planning and delivery has and continues to take place in order to define a focused structured improvement programme across the organisation.



The ORR's investigation

During the course of 2015/16, the ORR undertook an investigation to establish whether Network Rail was doing everything reasonably practicable to meet its licence obligations in relation to the delivery of enhancement projects. In October 2015, the ORR concluded that Network Rail was in breach of its licence obligations following the identification of systemic weaknesses in Network Rail's ability to plan and deliver enhancements projects. No further action was taken as the ORR concluded that Network Rail was taking all necessary steps to secure compliance with its licence obligations notably through the development of its EIP.

Enhancements Delivery Plan

The Enhancements Delivery Plan (EDP) sets out the outputs, scope and key milestones for every key project that Network Rail is committed to deliver in CP5. An update to the EDP covering England and Wales was published in March 2016 to support the Hendy Review of Network Rail's enhancements programme for CP5. Our updated March 2016 EDP can be found [here](#).

Highlights of 2015/16

Projects that completed their development stages

North of England electrification, in the Manchester area

Our investment will see over 300 kilometres of the rail network electrified, improving connections between towns and cities including Manchester, Liverpool, Preston and Blackpool. In conjunction with other improvements on the network, this will enable more trains with additional seats to run.

Great Eastern Mainline Capacity Improvement (Bow Junction)

This project will remodel Bow Junction on the Great Eastern Mainline and will work towards providing additional capacity. This project will be completed in CP6 (2019-2024) and will aid the goal of 24 mainline trains per hour in the peak arriving into London Liverpool Street.

London Waterloo station and the Wessex Capacity Improvement Programme

London Waterloo is Britain's busiest railway station, and the lines into Waterloo serve more than half a million journeys every day. Network Rail plans to deliver a bigger London Waterloo station, using the former Waterloo International Terminals, extending platforms one to four to allow longer ten-car trains to run to London suburban stations.

Projects that were completed and entered into service

Borders Railway

In September 2015, the Scottish Government-funded Borders Railway was brought into service and is, at 30 miles, the longest new domestic railway built in Britain in over a century. It will re-establish passenger services for the first time in over 40 years from Edinburgh through Midlothian to Tweedbank, opening up a number of isolated rural and semi-rural communities. The project was completed on time and on budget. The new line consists of seven new stations joined by 30 miles of new track. At its peak, more than 1,100 people were working on the project, refurbishing or building 137 bridges and laying track across almost 100,000 sleepers. In April 2015, Borders Railway was named the Royal Institution of Chartered Surveyors' Scottish Infrastructure project of the year. Her Majesty the Queen officially opened Borders Railway on 9 September 2015.

Birmingham New Street Gateway project

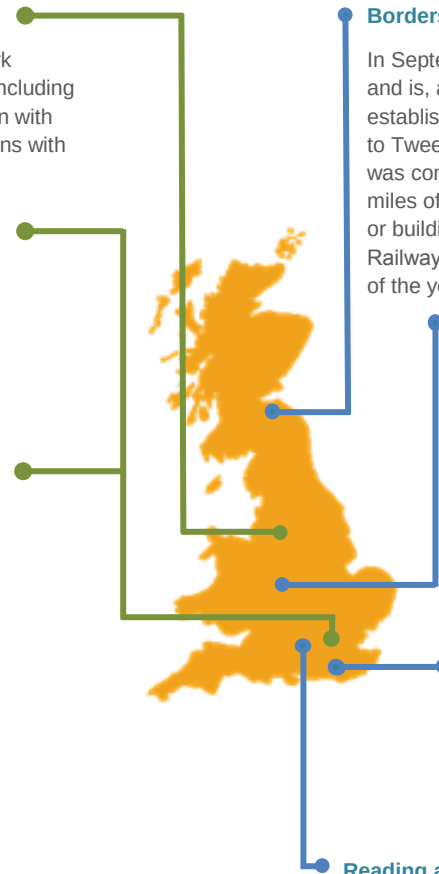
This was one of the most complex and challenging construction projects anywhere in the country and was completed in September 2015. The old 1960s dark and overcrowded station has been transformed with a new concourse for passengers, offering more space, light and better accessibility into and throughout the station. Over 140,000 people use Birmingham New Street every day, making it one of the busiest stations outside London with numbers set to increase. Birmingham New Street has the highest rate of mobility assistance requests than any other managed station. By engaging with different station users and specialist organisations, the new station was designed and operates at an industry beating standard for accessibility. Birmingham New Street was officially reopened by Her Majesty the Queen on 19 November 2015.

Three Bridges depot and power supply, a part of the Thameslink Programme

In October 2015 Transport Secretary Patrick McLoughlin formally opened Siemens' and Govia Thameslink Railway's (GTR) new, purpose-built Three Bridges train depot in Crawley, West Sussex. This marked a major milestone for the Thameslink Programme, which will transform journeys for passengers. The depot is a result of extensive collaboration between GTR, Siemens and Network Rail.

Reading area station redevelopment

In April 2015, the work to redevelop Reading station and the surrounding track was completed. Reading station is one of the busiest rail hubs in Britain, used by nearly 20 million passengers a year. The project commenced in 2011, and has involved rebuilding the station, upgrading the railway in the Reading area, including redesigning the complicated track layout, completing new depot connections and building a viaduct to the west of Reading. This scheme has removed one of the worst bottlenecks on the rail network.



Further Highlights of 2015/16

Over the year we delivered nine out of our top ten infrastructure project milestones. This is a measure on our corporate scorecard and includes both enhancements and renewals project milestones. Nine out of ten of these milestones were enhancements-related, and of these, we completed eight of the nine. Completion of the Borders Railway and Reading area station redevelopment, outlined above, contributed to this achievement.

Another key milestone completed in 2015/16 was the upgrade work on the Winchburgh Tunnel in Scotland, which was completed on time and on budget. This was achieved in 44 days, with 80,000 hours of work, 2,000 tonnes of poured concrete and 200 newly laid slabs of track. Engineers worked around-the-clock to complete what the Transport Minister described as ‘the most significant piece of engineering work on the line since the Victorian era’. This forms a major part of the Edinburgh Glasgow Improvement Programme, which will reduce journey times by 20 per cent and increase passenger capacity by 30 per cent between Scotland’s two biggest cities when it completes in 2016.



We also completed the re-signalling in the Stafford area of the West Coast Main Line, with 78 new signals installed. This upgrade has boosted the reliability of the equipment on this section of the line and means all platforms at Stafford stations are able to accommodate trains in either direction. This is a part of a £250 million package of works to improve capacity and performance on the busy West Coast main line.

As part of the government sponsored Thameslink programme, Network Rail completed infrastructure works, with tracks outside London Bridge station cut and moved to the north. This allowed for the old track to be dug up and rebuilt in time for Christmas and the next major stage of rebuilding. New tracks on the line towards Waterloo East were also installed and now carry trains over the new Borough Market Viaduct.

Further scorecard milestones completed included; signalling commissioning from Marylebone to Oxford Parkway; gauge clearance from Bristol Parkway to Plymouth, Reading to Westbury and Westbury to Cogload Junction via Castle Cary; GRIP 5 stage gate review on the Wessex Capacity Programme.

Bank Holiday working

The Bank Holiday periods are essential to allow us and our partners to carry out major enhancements, and we aim to do this with minimum disruption.

The high profile delays and consequent customer disruption experienced over Christmas 2014 prompted a large amount of work to improve our project and possession planning, especially across key Bank Holiday periods. This focus has resulted in the successful delivery of a series of major enhancement projects over Bank Holidays in 2015/16.

Over Easter 2015, £100 million of investment and improvement work was completed successfully, on time and on budget, across Britain’s railway. London Bridge saw improvements to track, signalling and platforms as part of the £6.5 billion Thameslink Programme to transform north-south travel to and through London.

At Watford, a bridge south of Watford Junction station was demolished and a new one installed enabling line speeds to be increased through the area. As part of a wider £81 million upgrade scheme, old track, signalling and junctions were also replaced.

Over the August Bank Holiday period, Network Rail successfully completed its biggest single track renewals projects to date and the biggest on the Western route for 40 years, lowering and replacing ten kilometres of track in Bath and its surrounding area in preparation for the arrival of a new fleet of faster, quieter and greener electric trains. As part of the £50 million project, we also installed 11 new switches and crossings, enabling trains to move from one track to another. The new lower track has created the additional headroom needed for the overhead lines that will power the new fleet of electric trains to run underneath, while simultaneously preserving Bath’s historic architecture.

The August Bank Holiday also saw installation of new track at Ipswich tunnel on the Great Eastern Main Line in order to improve reliability, and overhead lines were upgraded at Brentwood.

Christmas 2015 saw more than 20,000 people complete more than 500 upgrade and maintenance projects across the country whilst also seeking to minimise disruption after high winds and severe flooding caused widespread damage to the rail network. This included severe damage to the sea wall at Dover resulting in the closure of the line between Dover Priory and Folkestone Central.

On the LNE Route, work was carried out on more than 30 worksites with projects including the upgrade of track and overhead lines, improvements at stations, bridge replacements and £100 million investment in signalling in the Lincolnshire area.

On the LNW Route, all key possessions and works, including those at Banbury, Weedon, Stafford, Wolverhampton station, Birmingham New Street station, Crewe and Chester, were handed back on or ahead of time. At Preston, switches and crossings were upgraded and the replacement of a 150 metre stretch of track on the approach to the station was completed.

In Scotland, the Edinburgh Glasgow Improvement Programme (EGIP) commissioned a new signalling system on the line between the Anniesland branch and the Up and Down Single lines, including the installation of new switches and crossings and signalling. Works also continued to prepare the main Edinburgh-Glasgow line for electrification, including the demolition of three bridges.

During the Easter 2016 Bank Holiday period, Network Rail completed 450 engineering projects on time, despite the very challenging weather conditions brought about by Storm Katie that battered Great Britain on 28 March 2016. The £60 million Easter investment programme saw the successful building and construction of new station facilities, longer platforms, extra tracks, new junctions and the installation of thousands of new, more reliable equipment.

In Manchester, a major nine-day programme of work was started to improve the track layout at Manchester Victoria station as part of Network Rail's Northern Hub Programme. Between Reading and London, work was completed to make way for electric trains and Crossrail, and in Kent signals were upgraded to improve the reliability of the railway for passengers. In Scotland, work continued to replace 1,800 metres of ageing track leading up to Glasgow Queen Street station to allow faster, greener and longer trains to run between Glasgow and Edinburgh.



Milestones due in 2015/16

The tables below report the date the milestone was completed against the regulated output target date as set out in the March 2015 EDP.

We have used the EDP that was in place between March 2015 and June 2015 (prior to the re-planning exercise) as the baseline against which we are reporting our delivery of regulated outputs. Network Rail's initial obligation for each project is to develop it to GRIP 3 (Governance of Railway Investment Project stage 3). At this stage there will be a further funding submission to the ORR for each project. In line with the March 2015 EDP, once GRIP 3 is completed and funding is established, the GRIP 6 milestone is set to be the regulated obligation.

Reporting on delivery of our regulated outputs in 2015/16 is complex due to the re-planning exercise during the Hendy Review. This exercise led to several projects and programmes being re-phased, some projects were merged together, whilst others were split into separate projects. In next year's Annual Return, reporting of delivery will reference the March 2016 EDP as its baseline.

Each milestone is assigned a status with the following definitions:

- **Regulated output** – a regulated milestone. For the Annual Return 2016 we are using the definition of a regulated output that is in line with that used in the March 2015 EDP. A project that is in its early stages this is the GRIP 3 completion milestone. Once GRIP 3 funding is completed and funding is established, the regulated output becomes GRIP 6.
 - **GRIP 3** – option selection – this stage examines the different engineering options available for delivering the project and selects a single option to be developed
 - **GRIP 6** – constructing, testing and commissioning – this stage focusses in the physical work associated with delivering a project, and end with completion/commissioning
- **Complete** – a past milestone completed on time
- **Missed** – a milestone that was not completed on time
- **Re-planned** – a milestone that has been changed as part of the 2015 re-planning exercise
- **Revised** – a milestone that has been changed via the regulatory change control process due to changes outside of Network Rail's control, or six months in advance of the milestone date.

Table 4.1 provides an overview of our delivery of the regulated outputs milestones against the March 2015 EDP (prior to the re-planning exercise). Further detail of all GRIP 3 and 6 milestones due in 2015/16 is provided in Table 4.2 and Table 4.3.

Our performance against our 2015/16 corporate scorecard outturn was assessed at 81 per cent in May 2016. Note that this assessment of our performance differs slightly from the methodology used for regulatory purposes (which includes assessment of the milestones that were re-planned or revised in 2015/16).

Table 4.1: Overview of delivery of regulated output milestones 2015/16

2015/16 Milestone Status	Number of regulated output milestones					
	GRIP 3		GRIP 6		All	
	No.	%	No.	%	No.	%
Complete	15	43	12	63	27	50
Missed	5	14	1	5	6	11
Re-planned	14	40	6	32	20	37
Revised	1	3	0	0	1	2
Total	35	100	19	100	54	100

Table 4.2: March 2015 EDP GRIP 3 milestones due in 2015/16

EDP Reference	Project Name	Milestone	Date	Date Met	Status
W006	Oxford Corridor Capacity Improvements - Phase 1	GRIP 3 Complete	April 2015	April 2015	Complete
W003	Thames Valley Branch Lines and Southcote Jn to Basingstoke Electrification - Thames Valley Branches	GRIP 3 Complete	April 2015		Missed
W001b	South Wales Main Line Electrification	GRIP 3 Complete	April 2015		Missed
A002	Anglia Traction Power Supply Upgrade - West Anglia traction power upgrade	GRIP 3 Complete	April 2015	April 2015	Complete
W004	Thames Valley Electric Multiple Unit Capability Works	GRIP 3 Complete	April 2015	April 2015	Complete
S004	London Victoria Station Capacity Improvements	GRIP 3 Complete	April 2015	April 2015	Complete
W002a	Intercity Express Programme: Western Capability - Route wide (provisions of 125mph OLE Acton to Stockley)	GRIP 3 Complete	May 2015	May 2015	Complete
EM001	MML Long-Distance High-Speed Services Train Lengthening - Phase 1	GRIP 3 Complete	June 2015	June 2015	Complete
W002a	Intercity Express Programme: Western Capability - Route wide (gauge capacity works all routes)	GRIP 3 Complete	June 2015		Missed
WX001	Waterloo (Overall programme)	GRIP 3 Complete	June 2015		Missed
WX003	Reading, Ascot to London Waterloo Train Lengthening	GRIP 3 Complete	June 2015	June 2015	Complete
W008	Bristol Temple Meads Station Capacity (incl. Midland Shed)	GRIP 3 Complete	June 2015		Missed
A004	Great Eastern Main Line Capacity Improvement (Bow Junction)	GRIP 3 Complete	August 2015	August 2015	Complete
LNE001	Northern Programme (Yorkshire) - Calder Valley (Bradford Mill Lane Capacity)	GRIP 3 Complete	August 2015	August 2015	Complete
CR007	Acton (GWML) to Wilesden (WCML) Electrification (Acton West to Acton Wells)	GRIP 3 Complete	September 2015		Re-planned
S001	Sussex Power Supply Upgrade	GRIP 3 Complete	September 2015	September 2015	Complete
W001b	South Wales Main Line Electrification	GRIP 3 Complete	September 2015		Re-planned
W001a	Great Western Electrification - Bristol Temple Meads and Bristol Parkway to Cardiff - Complex issues	GRIP 3 Complete	September 2015		Re-planned
ES003	Electric Spine Development Programme - Leicester Capacity (Kilby Bridge to Glen Parva)	GRIP 3 Complete	September 2015		Re-planned
K001	Kent Traction Power Supply Upgrade - Outer Kent resilience	GRIP 3 Complete	September 2015	September 2015	Complete
WX001	Waterloo	GRIP 3 Complete	September 2015		Re-planned
W009	West of England Diesel Multiple Unit Capability Works	GRIP 3 Complete	October 2015		Re-planned
CR003	East West Rail Phase 2	GRIP 3 Complete	November 2015		Re-planned

EDP Reference	Project Name	Milestone	Date	Date Met	Status
ES003	Electric Spine Development Programme - Oxford-Bletchley	GRIP 3 Complete	November 2015		Re-planned
W005	Western Rail Access to Heathrow	GRIP 3 Complete	November 2015		Re-planned
CR007	Acton (GWML) to Wilesden (WCML) Electrification (Acton Wells to WCML)	GRIP 3 Complete	December 2015		Re-planned
W003	Thames Valley Branch Lines and Southcote Junction to Basingstoke Electrification - Thames Valley Branches	GRIP 3 Complete	December 2015		Re-planned
LNE004	Stevenage and Gordon Hill Turnbacks	GRIP 3 Complete	December 2015	February 2016	Complete
A003	West Anglia Main Line Capacity	GRIP 3 Complete	December 2015	December 2015	Complete
WX002	South London HV Grid (Wimbledon) Upgrade	GRIP 3 Complete	December 2015	December 2015	Complete
W003	Thames Valley Branch Lines and Southcote Junction to Basingstoke Electrification - Southcote Junction to Basingstoke	GRIP 3 Complete	December 2015		Re-planned
ES003	Electric Spine Development Programme - MML (Bedford-Kettering)	GRIP 3 Complete	February 2016		Re-planned
ES003	Electric Spine Development Programme - Leicester Capacity (Leicester station area)	GRIP 3 Complete	March 2016		Re-planned
SC009	Aberdeen to Inverness Improvements Phase 1 (with AIP)	GRIP 3 Complete	March 2016	March 2016	Complete
SC012	Motherwell Re-signalling Enhancements - Part 1 (Motherwell North - Carfin/Holytown)	GRIP 3 Complete	March 2016		Revised

Table 4.3: March 2015 EDP GRIP 6 milestones due in 2015/16

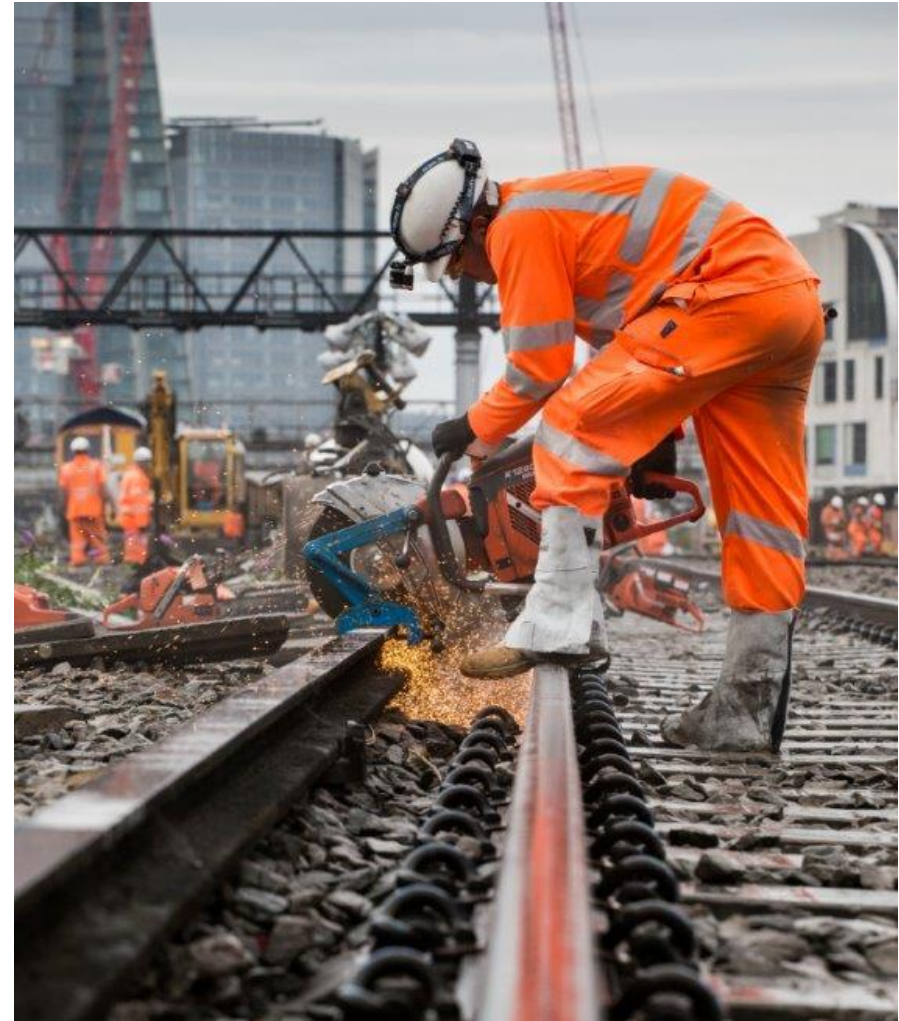
EDP Reference	Project Name	Milestone	Date	Date Met	Status
CR002	Reading Station Area Redevelopment Key Output 4: West Country grade separation	GRIP 6 Complete	April 2015	April 2015	Complete
CR005	North of England Programmes (LNW) - Phase 2 c - (NW Electrification Phase 2 Configuration State 5) (Ordsall Lane – Manchester Victoria)	GRIP 6 Complete	April 2015	April 2015	Complete
S005	Balcombe to Copyhold Bi-directional Signalling Upgrade	GRIP 6 Complete	April 2015	April 2015	Complete
W011	Westerleigh Junction to Barnt Green Linespeed Improvement	GRIP 6 Complete	April 2015		Missed
SC006	2013 Advance Route Clearance Programme (Other Routes)	GRIP 6 Complete	June 2015	June 2015	Complete
SC007	Borders Railway	GRIP 6 Complete	June 2015	June 2015	Complete
EM002	St Pancras - Sheffield Linespeed Improvements	GRIP 6 Complete	July 2015		Re-planned
LNW007	Chiltern Main Line Lengthening - High Wycombe DOWN platform	GRIP 6 Complete	August 2015	August 2015	Complete
CR002	Reading Station Area Redevelopment : Non Key Output 4 deliverables: Recoveries & speed restriction removals	GRIP 6 Complete	September 2015	September 2015	Complete
LNW005	Birmingham New Street Gateway Project	GRIP 6 Complete	September 2015	September 2015	Complete
K001	Kent Traction Power Supply Upgrade - Gravesend - Gillingham 12 car	GRIP 6 Complete	December 2015		Re-planned
EM002	St Pancras - Sheffield Linespeed Improvements	GRIP 6 Complete	December 2015		Re-planned
WL002	Barry - Cardiff Queen Street Corridor - Phase 5 - Cardiff Central	GRIP 6 Complete	January 2016		Re-planned
K003	East Kent Re-signalling Phase 2: Enhancements	GRIP 6 Complete	February 2016	February 2016	Complete
CR005	North of England Programmes (LNW) - Huyton and Roby Stage 2 - (Northern Hub - Configuration State 5)	GRIP 6 Complete	February 2016		Re-planned
CR003	East West Rail Phase 1 – Including Oxford	GRIP 6 Complete	March 2016		Re-planned
CR003	East West Rail Phase 1 – Excluding Oxford	GRIP 6 Complete	March 2016	March 2016	Complete
LNE002b	Intercity Express Programme (IEP) - East Coast Power Supply Upgrade ECML Power Supply Upgrade Phase 1 - Corey's Mill to Welwyn	GRIP 6 Complete	March 2016	March 2016	Complete
SC013	ECML (North) - WCML (Carstairs) Gauge Enhancement	GRIP 6 Complete	March 2016	March 2016	Complete

Programme Management Capability

The initial P3M3 assessment plan was divided into two phases and both are now complete.

Table 4.4: Programme Management Capability Milestones

Milestone	Description	Date	Status
Start Phase 1 P3M3 Assessment	Appoint assessors, agree assessment strategy, train business leads and issue survey.	January 2014	Complete
Commence development of improvement plans for Phase 1	Complete P3M3 assessment, agree focus areas and commence business improvement planning.	April 2014	Complete
Agree Phase 1 P3M3 improvement measures with the ORR	Agree the improvement monitoring mechanism with business and the ORR based on the business improvement plans developed.	June 2014	Complete
Integrate Phase 1 improvement plans into existing change programme	Embed the agreed improvement plans into business as usual activities in the devolved organisations.	June 2014	Complete
Start Phase 2 P3M3 Assessment	Appoint assessor(s), agree assessment strategy and issue survey	January 2015	Complete
Complete Phase 2 P3M3 Assessment	Complete the P3M3 assessment of routes and GBS	December 2015	Complete



5. Asset Management

Management of the railway infrastructure is fundamentally about delivering the outputs valued by our customers, funders and other key stakeholders in a sustainable way. To deliver a safe and reliable railway we focus on the whole life management of our assets.

Network Rail is one of the largest asset management organisations in Britain with a diverse portfolio of assets including more than 30,000 bridges and tunnels, 2,500 stations and 30,000 kilometres of track. We believe that the effective management of these assets requires a robust understanding of their behaviour and appropriate actions to mitigate asset degradation and failure.

Improving Asset Management Capability

As an infrastructure manager, asset management is a major component of our business. In CP5, we have undertaken a number of initiatives to improve our asset management capability. This includes major investments in our systems and people, setting targets for our technical skills and capabilities within asset management, and improving the quality of our asset data.

Asset Stewardship

In order to assess our overall stewardship of the railway, we focus on four key measures of asset management.

- asset reliability – is an assessment of the performance of our assets over the past year, and the work we are doing to continually improve resilience
- asset sustainability – measures the long term performance of our asset base, and is directly impacted by the work we do to renew the railway
- renewals volumes – working to deliver cost effective solutions to keep passengers moving through renewing our assets at the most effective time
- maintenance volumes – engineering work on the network to maintain the infrastructure and keep our assets working effectively.

Network Capability

The capability of our network is assessed through the linespeed, electrification, gauge and route availability. We provide a summary of the large and small changes to the capability of the network throughout the year.



Improving Asset Management Capability

Offering Rail Better Information Services

Definition and reporting method

Network Rail is facing the challenge of meeting increased demand on Britain's railway. The Offering Rail Better Information Services (ORBIS) programme is a major investment that is set to change the way in which asset information is collected, stored and utilised. The programme is designed to place quality data at the heart of our decision making to deliver better, safer and more efficient ways of working.

For each regulated output of the ORBIS programme, critical sub-milestones have been agreed and tracked internally to provide confidence in the delivery of the programme. The regulated outputs are managed within the ORBIS Governance Framework and their status is reported to the ORBIS Programme Board on a periodic basis.

Commentary

The national roll out of Signalling Decision Support (SDS) completed this year is expected to deliver benefits of £39 million. Whilst we have produced the electrical power specification, agreement of it has been delayed due to a misalignment between specification and asset policy for condition data. There was a proposal to use a risk based approach for contact systems, where the specifications are limited to running lines only. This is dependent upon a sufficient portion of the network being measured by inspection fleet and the approach will be reviewed with the ORR before a final decision is made. The milestones relating to electrification and plant were met in 2015/16, but there are further adjustments to be made before the decision support tool is in full use.

Additionally, ORBIS has reported the following benefits from capability delivered during 2015/16:

- Operational property breakthrough Decision Support Tool has delivered capability unlocking £11.2 million of benefits
- Geo-RINM Viewer delivery has unlocked £18.9 million of benefits.

The following milestones are due to be delivered in 2016/17:

- 'Asset hierarchies established and Ellipse designated as master system for Civils' – June 2016
- 'GEOGIS track system decommissioned' – December 2016.

The sub-milestones for these future regulated outputs of ORBIS are tracking to schedule.

The Civils Strategic Asset Management Solution (CSAMS) milestone was missed in 2015/16 and the ORR was briefed. The re-baselined plan for delivery by the end of July will not be achieved following further delays due to an unresolved software issue. The impact of this is that we are unable to deploy CSAMS prior to Geotechnical and Structures seasonal work. The CSAMS plan is currently being reviewed to resolve schedule and anticipated final cost challenges prior to review with the business to determine optimal deployment dates.



Table 5.1: ORBIS Milestones

Milestone	Description	Target date	Progress
Track Linear Asset Decisions Support (LADS) will bring together disparate track data sources to enable NR to target work more efficiently	National roll-out complete	May 2014	Closed Confirmation received from the ORR this milestone is complete.
Signalling Signalling Decision Support (SDS) will bring together disparate signalling data sources to enable Network Rail to target work more efficiently	Data specification complete, including for core data	January 2015	Closed Confirmation received from the ORR this milestone is complete.
	National roll-out complete	September 2015	Closed Confirmation received from the ORR this milestone is complete.
Electrification & Plant Electrification & Plant Decision Support (E&PDS) will bring together disparate E&P data sources to enable Network Rail to target work more efficiently.	Data specification complete, including for core data	April 2015	Closed Confirmation received from the ORR this milestone is complete.
	National roll-out complete	December 2015	Closed Confirmation received from the ORR this milestone is complete.
Structures Ellipse replaces CARRs (Civils Asset Register & Reporting system) as the master system for Civils Structures.	Data specification complete, including for core data	June 2014	Closed Confirmation received from the ORR this milestone is complete.
	Asset hierarchies established and Ellipse designated as master system for Civils	June 2016	Delayed CSAMS Deployment to the tunnels community for all routes (release 1) will not be delivered for June 2016. Network Rail is upgrading its core asset management system and delays in this programme have impacted the CSAMS regulated output. Network Rail is putting together a revised Delivery Plan for the output.
Geographic and Infrastructure System (GEOGIS) decommissioned	GEOGIS will be replaced by strategic Asset Management Platform systems	December 2016	On schedule The project is on schedule to deliver the ORR regulated milestone.
Fault and Incident data capture app rollout complete.	Fault and Incident data capture app rollout complete.	August 2014	Closed Confirmation received from the ORR this milestone is complete. Minor Enhancement identified by users for Human Readable Code. This is planned for deployment in autumn 2016.

Asset Management Excellence Model

Definition and reporting method

The Asset Management Excellence Model (AMEM) measures an organisation's asset management capability by assessing its maturity in a range of core activities. A score of over 70 per cent is needed to reach the 'excellent' category. Network Rail has a regulated target to reach 72 per cent by January 2018.

AMEM-Lite is a method for self-assessing asset management capability by operating route. This approach allows measurement of every aspect of route asset management capability, and provides more detail in specific areas.

A higher percentage indicates better performance.

Commentary

The overall level of maturity across core activities was independently assessed at the end of CP4. The assessment showed good progress in a number of areas of asset management capability and provided a baseline to set CP5 targets against (Table 5.2). Further independent assessments are planned to be completed in August 2016 and January 2018.

The overall independent assessments are complemented by self-assessments (AMEM-Lite) which are conducted at route level to identify current capability, progress, and areas for improvement. In order to track progress between assessments, we have developed an improvement roadmap that incorporates the key milestones for all contributing projects and programmes. This is managed in parallel with an enterprise risk record to provide assurance that we are on track to deliver our plans.

Initial actions of our improvement roadmap focus on proportionally lower scoring areas of our asset management capability. The roadmap was independently assessed in 2015; the resultant report confirmed that full implementation of the milestones is expected to deliver the CP5 target of 72 per cent.

There has been further progress through the first two years of CP5 and we have continued to deliver against the improvement roadmap targets we set ourselves. During 2015/16, we aligned our asset management policies and strategy. This work is critical in supporting the delivery of our CP5 target. Our maintenance strategy is also being aligned to the overall asset management policies. This will allow important improvements to our work planning, scheduling and delivery co-ordination which will be a key focus in 2016/17.

In support of the policy work throughout the year, our requirements for climate change, sustainable development and reliability have all been rolled out across the business during 2015/16. A toolset for industry access planning has also been deployed and configuration management improvements have been fully embedded.

We now have new cost and reliability data to inform intervention designs and further improve asset policy. The initial version of our Railway Infrastructure Network Model (RINM) is now in place and will be developed further throughout the remainder of CP5. ORBIS enabled decision support tools have also been brought into full use throughout our routes. Whilst these tools are in use, opportunities remain to use them more broadly and more often. Supporting routes to use these tools more comprehensively is a key focus for us during the next year.

Improvement in asset management competencies has had organisation-wide impact, with training being rolled out to approximately 400 employees across the Network Rail covering introduction, further awareness and Continuing Professional Development. Our improvement roadmap includes a clear plan to continue with asset management knowledge sharing. This includes close internal collaboration to promote a company-wide focus on the subject and develop a culture change to enable further organisational improvements.

Table 5.2: AMEM by core group – network-wide

		May 2013 Score	March 2014 Score	August 2016 Target	January 2018 Target
Asset Management Strategy & Planning	%	65.8	67.3	69.6	72.0
Asset Management Decision-Making	%	58.7	60.4	67.8	72.0
Lifecycle Delivery Activities	%	69.2	71.4	72.0	72.0
Asset Knowledge Enablers	%	60.7	66.9	69.7	72.0
Organisation & People Enablers	%	67.3	69.2	72.0	72.0
Risk & Review	%	60.8	61.8	68.0	72.0

Asset Data Quality

Definition and reporting method

Asset Data Quality is assessed using confidence grading of data reliability (the process and governance for producing the data: A, best governance, down to D, poorest governance) and a grading of accuracy and completeness (the best score being 1 and the worst 6). We have a target to reach an overall 'A2' confidence grade by April 2017.

The accuracy and completeness element of confidence grading is reported in Table 5.3, while the commentary below provides progress update on the initiatives underway to deliver our target. .

Accuracy and completeness is reported using a number of data checks:

- Completeness check – is there a field in the master source system to store the relevant attribute data?
- Validity check 1 – Is the data populated in the master source system and field?
- Validity check 2 – Does the data pass system-acceptable rules?
- Validity check 3 – Does the data pass attribute-specific business rules?

Data quality scores in this section represent the percentage of data entries that pass all completeness and validity checks applied. The relationships between numeric grades and data quality scores are as follows:

1	2	3	4	5	6
>99%	95-99%	90-95%	75-90%	50-75%	<50%

The numeric measure of accuracy and completeness within the confidence grade is based upon a lowest value method. Attribute level accuracy is aggregated to a system level result based on the lowest value within that attribute. As such, the accuracy measure represents the lowest single result of any attribute that forms part of the system. This assessment is undertaken on a statistically significant sample size that provides a 95 per cent confidence of accuracy.

Commentary

Our confidence in meeting the 'A2' confidence grade by April 2017 has improved in 2015/16. All the initiatives developed to deliver this are in progress and on plan:

- Asset Data Governance – this project is running to schedule and is expected to deliver the quality management system for data by August 2016. Application of this management system will enable us to achieve 'A' grade governance by April 2017.
- Core Asset Information Specifications – specifications for all assets except for electrical power have been agreed between Network Rail and the ORR. The delayed production of the electrical power specification is due to a misalignment between specification and asset policy for condition data. We are also proposing to use a risk based approach for contact systems, where the specifications are limited to running lines only. This is dependent upon a sufficient portion of the network being measured by inspection fleet and the approach will be reviewed with the ORR before a final decision is made.
- High Level Route Plans – these have now been produced, supported by our Asset information Services team and ORBIS in clarifying centrally lead data improvement initiatives
- Exchange of Asset Information – a recent internal audit has reiterated the need to strengthen controls of how data is exchanged between enhancement programmes and routes. As such, ORBIS has introduced this initiative to enable us to meet 'A' grade confidence. Project funding was approved by the ORBIS board in 2015/16 and the project is forecast to be delivered on time.
- Data Quality Reports – these are now being produced for all asset types. They provide an indication of the maximum possible accuracy of data on the assumption that all asset information is recorded within our systems. An independent review in 2013 indicated high levels of completeness in systems. Following this, the internal audit described earlier highlighted delays in the exchange of information rather than an absence of it, providing confidence that completeness is still meeting the levels measured in 2013.

There is a risk that the improvements to the measurement of data accuracy will be delayed as a number of systems still require configuration to store core data. This may lead to routes having insufficient time make necessary improvements before April 2017. The configuration of systems is an activity that is undertaken by Network Rail and plans will be developed to address this risk.

Our reports in 2015/16 have indicated that there are significant improvements are required in order to achieve our target of 'A2' confidence by April 2017. The

greatest concern is the electrical power asset base where currently only 15 per cent of the required attributes are at a level that indicates level 2 is achievable.

Actions have been taken in Anglia to verify and improve data quality within track systems and awareness briefings have been delivered on updated data management processes. Monitoring of compliance to new processes demonstrated a 97 per cent compliance rate. We have worked with the ORBIS team to develop the Signalling Decision Support Tool (DST). The DST has been tested at Clacton, demonstrating alignment of information from the existing assessment of the assets. There has been work to update the structures route availability database and assign ownership within the Civils Asset Register and Electronic Reporting System (CARRS).

LNE & East Midlands' approach to improving and sustaining accurate asset-related data is driven by the key principal of treating data as an asset in its own right. The specification for Route Asset Management Plans (RAMPs) requires clear definition of the data to be collected, maintained and its required format. This helps to develop robust actions plans to keep the asset at the required performance level.

In Kent and Sussex, the principle of the data quality improvement plan is to target the attributes with the worst data quality first, electrical power being the greatest challenge. Several of the interventions required are desktop exercises that can be carried out alongside the development of more robust processes.

In LNW, there are approximately 300,000 core attributes which require population or correction. Our analysis has determined that more than 50 per cent of these can be rectified without a site survey being required. Our approach to data quality improvement is to assign responsible asset owners; the Route Asset Managers (RAMs), with additional support throughout the route. A large proportion of track quality issues relate to the way that data is recorded in GEOGIS, our track system. The GEOGIS replacement solution being developed as part of the ORBIS programme will address this issue. Signalling data quality is currently the highest scoring asset in LNW. Focus has been on updating a specific field that was not previously widely used in the system.

In Scotland, some data has been adversely affected by asset information for new assets on the Scottish Borders Route not being fully populated. Improvement of this will be undertaken as a desktop exercise.

In Wales, improvement plans are built on existing assurance regimes and the implementation, where necessary, of additional assurance. These include self-assurance, supervisor and manager inspections, engineering verification, asset data confidence assessment, internal and external reviews.

Wessex route is developing policy providing guidance on the management of data in line with those that support physical assets. The track RAM is working with the centre to understand the information driving the data quality scores and develop improvement plans for 2016/17. Data quality for structures assets has continued to improve during CP5. A data improvement plan is in place and exception reports have been run to provide a targeted list of activity improvements. Signalling exception reports have also been issued and work has started to improve accuracy and completeness of data. Improvements have been mainly targeted at interlocking names, starting in the locations with the majority of exceptions.

In Western, geographic coverage of assets through Remote Condition Monitoring (RCM) continues to extend the availability of data. Technicians have examined trends to provide improved information on which to base interventions. Assurance regimes within our contracts require a focus on the quality of data at hand back.

Table 5.3: Asset Data Quality – network-wide

	% of core attributes profiled	Distribution of attributes by numeric grade					
		1	2	3	4	5	6
Track	100	10	7	5	3	1	9
Plain line	100	6	4	1	1	1	4
Switches & Crossings	100	4	3	4	2	0	5
Signalling	100	49	1	5	2	1	2
Interlocking	100	6	0	0	2	0	0
Signals	100	5	1	5	0	0	0
Train Detection Equipment	100	13	0	0	0	0	1
Point Operating Equipment	100	13	0	0	0	1	0
Level Crossings	100	12	0	0	0	0	1
Structures	100	8	10	6	1	0	8
Underline Bridges	100	5	3	5	0	0	4
Overline Bridges	100	3	7	1	1	0	4

Intelligent Infrastructure

During 2015/16 we focussed on completion of the installation and commissioning of Phases 3 and 3a, initiation of CP5 'Tranche 1' and the technical development of a busbar monitoring solution for 'Tranche 2'. The success of this initiative has led to the completion in 2015 of a consultancy project with Sydney Trains and an international benchmarking visit from the Norwegian national railway.

Both phases 3 and 3A were successfully completed during the year, meeting the project target of 95 per cent of the original scope. The five per cent tolerance allows for scope variation since project start (for example, decommissioning of an asset which was originally in scope) and local technical issues (for example, a lack of GPRS signal at a specific location).

Project development for 'Tranche 1' continued to deliver a Remote Condition Monitoring (RCM) solution for High Performance Switch System (HPSS) points machines and High Voltage Impulse (HVI) track circuits and both technical solutions were granted product acceptance certificates. Remits, including detailed scope for each asset type, have been signed off by all routes. Installation will commence in early 2016/17.

Within 'Tranche 2', development of an RCM solution for signalling power busbars was undertaken during 2015/16, including a comprehensive hazard and operability assessment for individual solutions from three suppliers. A detailed project plan has been developed which includes a 12 month trial of the products to allow verification of the solution through all seasons. The trial of approximately 400 installations will commence in 2016/17, with full rollout commencing in the following year.

The Intelligent Infrastructure programme helps to move our maintenance towards 'predict and prevent' by detecting deterioration in asset condition prior to failure thus reducing the potential for service affecting failure. The resulting reduction in unplanned maintenance visits delivers safety benefit and an opportunity to reduce routine maintenance. Over 40,000 assets have been fitted with RCM since the programme started in CP4 delivering an improvement to overall asset reliability. Benefits delivery remains a major focus with a process of structured continuous improvement being introduced during the year.

The reduction in delay for assets fitted with RCM was 35 per cent at year-end, five percentage points better than our target of 30 per cent. This resulted in a calculated reduction in delay minutes of 571,000 for the year, compared to 543,000 minutes in 2014/15. Detail of delivery achieved by the programme is detailed in the table below.



Table 5.4: Asset fitment volumes

Asset	2015/16 Target	2015/16 Actual
Phase 3 and 3A		
Points	102	102
Track Circuits	456	456
Others	13	13
Tranche 1		
HPSS Points	400	10
Track Circuits	500	195
Tranche 2		
Busbars	0	0
Tranche 3		
Level Crossings	0	0

Asset Stewardship

Asset Condition Reliability

Track

Asset condition reliability of track is assessed according to three measures:

- rail breaks and immediate action defects per 100 kilometres
- track geometry (poor track geometry)
- track failures (service affecting).

For all measures of track reliability, lower results represent better performance.

We also report on other measures of track condition in this section, including categories of broken and defective rails, discrete track geometry faults, and the overall condition of track geometry.



Broken and defective rails

A rail break is defined as a rail on Network Rail running lines, including welds, which, before removal from the track, has a fracture through the cross section, or a piece broken out of it, rendering it unserviceable. A defective rail is one with any fault requiring repair or replacement to make it fit for purpose in accordance with Network Rail standards. Defective rails are categorised as isolated defects (with a length of less than one yard) or continuous defects (with a length of more than one yard). An immediate action rail defect requires the immediate imposition of an emergency speed restriction due to its severity.

Nationally, rail breaks and immediate action defects per 100 kilometres were 45 per cent better than target in 2015/16, representative of outperformance of target in every route, most significantly in Anglia, Kent and Scotland.

Anglia teams focused on the eradication of repeat track geometry faults in switches and crossings. Early interventions to rectify these have reduced cracking in units by approximately 30 per cent. Analysis of broken rails in Kent has shown that they are predominantly evident in two categories; within tunnels due to corrosion of the rail foot, and outside tunnels due to corrosion pits within the rail foot. A combined strategy between the track, earthworks and structures teams has been developed to address these issues. Scotland route has continued to deploy the Ultrasonic Test Unit (UTU) across the route to drive improved performance together with local initiatives to focus on Vertical Longitudinal Splitting (VLS) removal and enhanced intervention at adjustment switches to avoid broken rails. This approach has resulted in the number of broken rails in Scotland reaching a record low in 2015/16.

Table 6.5: Rail breaks and immediate action defects per 100 kilometres

Measure	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
England & Wales	3.87	4.07	3.72	2.80	3.74	2.41
Scotland	3.30	4.41	6.06	2.59	6.64	1.51
Network-wide	3.34	4.18	4.04	2.78	4.13	2.28

Table 5.5: Broken Rails

		2011/12	2012/13	2013/14	2014/15	2015/16
England & Wales	Primary	64	96	61	51	58
	Secondary	43	47	41	24	32
	Rural	3	7	4	6	5
	Total	110	150	107	81	95
Scotland	Primary	7	5	4	2	3
	Secondary	8	16	13	14	11
	Rural	2	3	2	1	0
	Total	17	24	19	17	14
Network-wide	Primary	71	101	65	53	61
	Secondary	51	63	54	38	43
	Rural	5	10	6	7	5
	Total	127	177	125	98	109

Note: Due to data refreshing, figures are different to those in the Annual Return 2015.

Table 5.6: Immediate action rail defects per 100 kilometres

		2013/14	2014/15	2015/16
England & Wales	Primary	4.11	3.26	2.52
	Secondary	2.69	1.91	1.93
	Rural	2.72	1.41	1.75
	Total	3.32	2.44	2.17
Scotland	Primary	1.63	1.75	0.63
	Secondary	1.51	1.13	1.06
	Rural	21.09	5.55	2.04
	Total	5.59	2.16	1.18
Network-wide	Primary	3.96	3.17	2.40
	Secondary	2.47	1.76	1.77
	Rural	6.34	2.23	1.81
	Total	3.63	2.40	2.03

Note: The figure for 2014/15, England and Wales, Primary has been updated following identification of an error.

Table 5.7: Continuous rail defects (yards)

		2011/12	2012/13	2013/14	2014/15	2015/16
England & Wales	Defects identified	76,585	127,022	153,587	144,578	136,828
	Defects removed / repaired	68,699	123,976	141,671	138,235	133,662
	Defects remaining at 31 March	65,858	76,996	88,912	95,255	104,139
	Defects identified	15,415	17,995	14,165	11,012	12,594
Scotland	Defects removed / repaired	14,451	7,280	23,907	10,479	12,194
	Defects remaining at 31 March	35,292	45,335	35,593	36,126	10,849
	Defects identified	92,000	145,017	167,752	155,590	149,422
	Defects removed / repaired	83,150	131,256	165,578	148,714	145,856
Network-wide	Defects remaining at 31 March	101,150	122,331	124,505	131,381	114,988

Table 5.8: Continuous rail defects by operating route (yards)

	Defects identified	Defects removed / repaired	Defects remaining at 31 March
Anglia	13,664	13,301	16,512
East Midlands	4,811	4,774	1,918
Kent	8,560	10,659	11,510
LNE	29,412	28,671	23,245
LNW	26,457	24,875	20,276
Scotland	12,594	12,194	10,849
Sussex	7,044	6,415	6,395
Wales	26,878	26,372	8,667
Wessex	5,784	4,306	3,888
Western	14,218	14,289	11,728
Network-wide	149,422	145,856	114,988

Track geometry

Measures of track geometry assess the lateral and vertical alignment of track on Network Rail running lines. Track geometry is measured by recording vehicles on a cyclical basis, with the frequency of measurement being determined by the type of traffic, tonnage and line speed of a particular track section, which categorises the track as primary, secondary or rural. Track with the heaviest, highest frequency and highest speed of traffic is determined as 'primary', followed by secondary and rural. Track recoding vehicles provide measurements of standard deviation of a particular section of track.

The purpose of track geometry measurement and reporting is to support track maintenance teams in the management of track condition. At the end of each four week period, measures are calculated from the national dataset which incorporates the most recent measurement result for each section of track. As this can only be updated when a recording run takes place, the dataset will lag behind the actual condition of the track. It therefore might not identify assets going into any problem phase (when there has been deterioration that has not yet been measured) or moving into the recovery phase (when geometry that has been restored is yet to be re-measured). Changes in the condition of track are first seen in the statistics for primary track (heavy, more frequent traffic) which has the highest frequency of recording. With higher proportions of secondary and rural track (lighter, less frequent traffic), Scotland is particularly affected by this lagging effect.

In certain periods of 2015/16, results for Good Track Geometry (GTG), Poor Track Geometry (PTG) and Level 2 (L2) exceedences per 100 kilometres reached all-time best performance levels. Results for 2015/16 show continued improvements from both the end of CP4 and the first year of CP5.

While the majority of routes continue to perform at record levels and surpass our internal targets for CP5, there is evidence of some routes that are improving results less significantly in CP5.

In 2015/16, it was identified that greater visibility of disaggregated data and statistical analysis is required to promote robust implementation plans where key areas of the network still require improvement in track geometry performance. We are working collaboratively with the ORR to develop enhanced background statistical information to support the existing track geometry measures. Route teams and central teams are collaborating in order to produce robust implementation plans to continue to drive down the risks associated with track geometry issues such as derailment.

Poor Track Geometry

PTG assesses the alignment of track on our running lines. PTG represents the proportion of track where alignment is categorised as 'very poor' or 'super red'. Track sections categorised as 'super red', the worst category, carry additional weighting in the calculation compared to 'very poor'. PTG in this report is the year-end position.

Nationally, PTG was 0.31 percentage points better than target for 2015/16. This was a result of all routes outperforming targets. Successful improvement initiatives across the network have been based on detailed analysis of overall track quality to inform and influence route maintenance strategies and deliver the most effective interventions. The most substantial outperformance was seen in LNW and Scotland.

There has been a national focus on reducing repeat faults, which has helped to improve overall PTG results in 2015/16. In addition, continued improvement in LNW and Scotland has been supported by data within the LADS tool and prioritisation of resources within route asset management plans. In depth analysis of the sections of track with the poorest track quality has provided asset information on which to base improvement plans and reduce the likelihood of recurrence in areas of poor track quality.

Table 5.9: Poor Track Geometry (PTG)

			2011/12	2012/13	2013/14	2014/15	Target	2015/16
England & Wales	Primary	%	2.48	2.27	2.29	2.14	-	2.10
	Secondary	%	2.59	2.49	2.35	2.17	-	1.93
	Rural	%	3.51	2.69	2.63	2.43	-	2.37
	Total	%	2.62	2.39	2.35	2.18	2.31	2.07
Scotland	Primary	%	1.74	1.64	1.34	1.26	-	1.07
	Secondary	%	2.16	2.20	2.11	1.54	-	1.57
	Rural	%	3.75	4.02	3.53	3.51	-	2.20
	Total	%	2.29	2.32	2.13	1.77	2.38	1.54
Network-wide	Primary	%	2.43	2.22	2.23	2.08	-	2.03
	Secondary	%	2.51	2.43	2.30	2.04	-	1.86
	Rural	%	3.56	2.95	2.81	2.65	-	2.34
	Total	%	2.58	2.38	2.32	2.12	2.31	2.00

Good Track Geometry

GTG represents the proportion of track where the lateral and vertical alignment is categorised as 'good' or 'satisfactory'. The alignment values that need to be achieved for these categories vary with line speed. The threshold values are specified in Network Rail standards. Sections of track that are categorised as 'good' are weighted higher than 'satisfactory', which can result in a result greater than 100 per cent. For GTG, a higher result represents a better performance.

In 2015/16, GTG improved and now stands 2.12 percentage points better than the end of CP4. This is evident across the majority of routes. National GTG reached an all-time peak in period 12 of 2015/16 with a score of 139.89 per cent. Use of the Plain Line Pattern Recognition (PLPR) fleet has increased frequency of measurement and allowed early detection and intervention where required. In 2015/16, the fleet embarked on a plan to record the condition of 15,000 kilometres of track on a four weekly frequency.

Scotland is the most improved route since the end of CP4 (5.46 percentage point improvement) and since last year (2.98 percentage point improvement). The second most improved route since the end of CP4 is East Midlands with an improvement of 4.31 percentage points. There has been a 2.77 percentage point improvement from 2014/15 in LNW.

Table 5.10: Good Track Geometry (GTG)

			2011/12	2012/13	2013/14	2014/15	2015/16
England & Wales	Primary	%	137.00	138.90	138.40	138.30	138.60
	Secondary	%	138.60	139.90	139.60	140.50	142.70
	Rural	%	127.80	133.40	132.70	138.40	137.10
	Total	%	136.70	138.80	138.33	139.91	139.96
Scotland	Primary	%	139.50	139.40	140.80	142.80	142.40
	Secondary	%	142.00	140.80	139.90	143.50	145.00
	Rural	%	95.60	97.50	96.40	94.90	110.30
	Total	%	134.50	134.10	133.50	135.98	138.96
Network-wide	Primary	%	137.20	138.90	138.60	138.90	138.80
	Secondary	%	139.30	140.10	139.70	141.40	143.10
	Rural	%	121.70	126.40	125.40	128.10	131.80
	Total	%	136.50	138.10	137.70	138.80	139.82

Track Geometry Faults

Discrete track geometry faults are detected by recording trains. This report includes discrete faults within four principal parameters:

- vertical alignment – the alignment of the rail top of both rails
- horizontal alignment – the centre line between the two rails
- gauge – the distance between the rails
- twist – the relative vertical position across the opposite corners along a three metre section of track.

The size of a track geometry fault and the characteristics of its location (e.g. line speed) determine the fault severity. The full population of track geometry faults covers a wide range, from serious twist and gauge faults that require an immediate response (block the line or reduce speeds) to relatively minor alignment anomalies on low speed track that require only review and monitoring. Reporting of L2 faults includes the most recent measurement for each section of track in the last 450 days. This report represents the year-end position for each year.

This section reports all Level 2 (L2) track geometry faults. L2 faults have two categories of severity, Intervention Level (IL) and Immediate Action Level (IAL). IAL faults are the most severe and have stricter rectification time scales defined in Network Rail standards. IAL geometry faults also include ones that are so severe they pose a derailment risk therefore the running line is blocked to traffic. The IAL fault statistics presented in Table 5.11 below cover twist and gauge faults only. It does not include any cyclic top figures or combination cyclic top/twist and cyclic top/alignment figures. For track geometry faults, a lower result represents a better performance.

In 2015/16, there was focus on the reduction of repeat geometry faults; faults that reoccur within 10 yards of a previous fault within a set period of 450 days. Analysis was available to routes throughout 2015/16 and additional tools are being developed to provide greater granularity. Each route produced bespoke plans to respond to the national challenge of reducing repeat twist faults by 50 per cent and vertical alignment, horizontal alignment and wide gauge faults by 10 per cent. Whilst not reported in the L2 data set, a national reduction target of 50 per cent for repeat cyclic top faults was also set. Increased frequency of measurement using the PLPR fleet has provided additional visibility on repeat faults allowing necessary intervention as soon as possible.

For L2 faults per 100 kilometres, Wessex is the most improved route since the end of CP4 while Sussex made the most improvement in 2015/16. LNW showed the

most improvement in repeat geometry faults, specifically twist, since the end of CP4 with LNE also delivering an improvement since the end of CP4.

For IAL faults, primary track remained stable with the majority of the limited gains being on secondary and rural routes. IAL faults per 100 kilometres has fallen by approximately 30 per cent since the end of CP4, including improvements in both twist and gauge faults as a result of the targeted campaigns on repeat faults.

Schemes during 2015/16 that have contributed to this success are:

- repeat geometry fault targeting with a concerted effort in the reduction of repeat twist faults
- alarm level reporting (AL) which will assist the routes in planning intervention earlier and concentrating mechanised plant to rectify faults in clustered AL fault areas, prior to the development of IL or IAL faults
- update of the maintenance standards on the management of cyclic top addressing Rail Accident Investigation Branch (RAIB) recommendations.



In 2015/16, there has been continued development of the Track Infrastructure Geometry Reporting (TIGER) system. TIGER will utilise the existing Rail Defect Management System (RDMS) architecture to monitor L2 faults from detection through to close out. It will link faults with treatments to establish effectiveness of rectification works. This is estimated to become available in 2017/18.

These successes require further refinement to provide detailed drill down to identify routes and track sections that are not improving. Additional analysis tools to accomplish this for L2 fault trends are being made available to assist in generating improved robust maintenance plans and bring less successful routes in line with their counterparts. As part of the roll out of this fault drill down analysis to improve maintenance strategy for track geometry faults, separation of IL and IAL faults will become more visible from 2016/17 onwards.

Table 5.11: L2 Track Geometry Faults per 100 kilometres

		2011/12	2012/13	2013/14	2014/15	2015/16
England & Wales	Primary	30.90	28.90	27.30	30.40	24.25
	Secondary	42.00	42.80	37.40	36.40	31.55
	Rural	65.70	67.10	59.60	58.00	38.62
	Total	40.20	39.70	35.80	37.19	29.60
Scotland	Primary	20.50	17.50	15.20	23.20	16.01
	Secondary	41.20	39.70	34.20	28.80	35.08
	Rural	96.30	82.60	83.80	68.20	53.43
	Total	48.50	44.20	40.99	37.70	35.62
Network-wide	Primary	30.30	28.20	26.50	29.60	23.69
	Secondary	41.90	42.20	36.80	33.70	32.21
	Rural	71.80	70.20	64.50	60.90	41.24
	Total	41.30	40.30	36.50	37.00	30.43

Note: The calculation method has been updated for 2015/16.

Table 5.12: L2 exceedances

		2012/13	2013/14	2014/15	2015/16
England & Wales	Primary	3,195	3,032	3,363	2,867
	Secondary	4,520	3,955	3,720	3,238
	Rural	2,143	1,920	1,929	1,849
	Total	9,858	8,907	9,012	7,954
Scotland	Primary	130	113	173	139
	Secondary	954	826	698	831
	Rural	659	693	559	549
	Total	1,743	1,632	1,430	1,519
Network-wide	Primary	3,325	3,145	3,536	3,006
	Secondary	5,474	4,781	4,418	4,069
	Rural	2,802	2,613	2,488	2,398
	Total	11,601	10,539	10,442	9,473

Note: The calculation method has been updated for 2015/16.

Table 5.13: Immediate action level track geometry faults per 100 kilometres

2015/16		
England & Wales	Primary	0.44
	Secondary	0.40
	Rural	0.71
	Total	0.48
Scotland	Primary	0.00
	Secondary	0.29
	Rural	0.29
	Total	0.23
Network-wide	Primary	0.41
	Secondary	0.38
	Rural	0.63
	Total	0.44

Note: The calculation method has been updated for 2015/16.

Cyclic top faults occur as a result of an interaction between vertical alignment that is not in fault condition and certain freight trains with suspension types susceptible to resonance. Such resonance can promote freight wagons' suspension to react enough to derail the train. Where the vertical alignment irregularities are evenly spaced, this promotes susceptible wagons to cumulatively increase the vertical suspension movements until the rail wheel becomes unloaded enough to derail. Unlike the track geometry fault measurements reported above which are discreet and occur at specific locations, cyclic top occurs over a length of track. Measurement of vertical alignment is used to calculate the reaction of susceptible suspension. This is classified according to exceedence limits and fault severity. Cyclic top is often more challenging to repair than discrete faults as the root cause can require significant intervention measures.

The Rail Accident Investigation Branch (RAIB) made recommendations concerning the derailment at Gloucester in 2013, which was due to cyclic top. These were addressed and incorporated into changes to our track geometry standards concerning the management of cyclic top. This changed the existing requirement of imposing an emergency speed restriction (ESR) (for freight traffic only) into a critical requirement. Additionally, the critical requirement called for the speed restriction to remain in place for a settlement period between seven and 14 days until a robust repair could be demonstrated.

As a result of the track geometry standards changes, 2014/15 saw a significant increase in emergency speed restrictions being imposed and remaining in place for longer periods than historically reported.



Additional analytical tools have been developed during 2015/16 to incorporate cyclic top into repeat fault statistics. The total number of cyclic top faults reduced by 19.8 per cent over 2015/16, while those requiring an ESR reduced by 14.6 per cent. The proportion of cyclic top faults requiring ESR is approximately 34 per cent. The reduction in figures demonstrates commitment by all routes to the campaign to reduce repeat cyclic top faults along with repeat traditional faults and is on track to achieve a 50 per cent reduction in repeat cyclic top faults by the end of CP5.

Table 5.14: Cyclic top faults

		2014/15	2015/16
England & Wales	Non-ESR	1,663	1,269
	Requires ESR	771	646
	Total	2,434	1,915
Scotland	Non-ESR	159	149
	Requires ESR	79	80
	Total	238	229
Network-wide	Non-ESR	1,822	1,418
	Requires ESR	850	726
	Total	2,672	2,144

Track failures

Service affecting track failures are the number of track failures causing train delays on Network Rail's infrastructure. Data is taken from a train running system, which compares scheduled and actual train running times, and includes failures caused by Temporary Speed Restrictions (TSRs) as a result of track condition.

In total, the number of service affecting track failures in 2015/16 improved from 2014/15, but was a slight under-performance against target.

Although several routes outperformed target, the national result reflects the most substantial under-performance in LNW and Wales. TSRs have been a key cause of track failures in both routes. Since the change to track maintenance standards to address the risk of derailments as a result of cyclic top, TSRs are a requirement upon cyclic top detection.

In LNW, there has been an increased focus on the removal of wet track beds to improve overall track reliability, while in Wales; a fortnightly TSR board has been introduced to identify actions towards removal of the speed restriction. Both routes will continue to undertake root cause analysis and adjust maintenance regimes to improve track performance next year.

The most significant outperformance against target was in Wessex and Kent. In Wessex, the combined effect of renewals schemes and a focus on the root causes of speed restrictions resulted in a 24 per cent outperformance against target.

The track team in Kent has focussed on the early intervention and detection of emerging rail defects. Additionally, a focus on the removal of wet beds and re-ballasting has addressed cyclic top defects and limited the requirement for service affecting speed restrictions. At year-end, the total number of track failures in Kent was 23 per cent lower than target.

Table 5.15: Track failures (service affecting)

	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
England & Wales	5,067	4,972	5,579	5,141	4,864	4,969
Scotland	453	373	383	366	381	324
Network-wide	5,520	5,345	5,962	5,507	5,245	5,293



Signalling and Points

Asset condition reliability for signalling and points is reported in Table 5.16 below. The reliability of each asset is measured by the total number of signalling or points failures causing train delays. Data is taken from a train running system, which compares scheduled and actual train running times. A lower figure represents better performance.

National performance for both signalling and points exceeded target, while at route level, results were more variable.



For signalling failures, the best performing routes compared to target were LNW and Wessex, while Anglia, Kent, Sussex and Wales missed target.

Better than target performance in LNW can be partially attributed to re-signalling schemes that were brought into service at Wolverhampton (May 2015) and Stafford (August 2015). The route has also made good use of intelligent infrastructure in 2015/16. Engineers in Rail Operating Centres (ROCs) are also developing more advanced analysis of data when monitoring alarms, leading to preventative works. Work has continued to improve the reliability of axle counters, and this has delivered benefit in reducing service affecting failures in 2015/16.

Signalling reliability in Wessex was better than target, and has improved since 2014/15. Route signalling reliability meetings have provided focus on specific issues from previous years, and joint campaigns between Delivery Unit teams and Route Asset Management teams have helped to reduce failure numbers.

Overall asset condition reliability for points was better than target in 2015/16. The national result was driven by good reliability performance in East Midlands, LNE and Wessex. Points asset condition reliability in East Midlands and LNE has reached a record level as a result of focussed minor works to improve performance on critical assets based on traffic patterns, and in particular remove deficiencies in design and setup. Improvement has also been seen following a change in the freight traffic profile; in particular the reduction in coal traffic within the route. Initiatives in Wessex are progressing and the benefits are becoming especially evident across points assets.

Table 5.16: Signalling and Points service affecting failures

		2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
England & Wales	Signalling failures	15,786	15,082	15,118	14,539	14,466	13,996
	Point failures	4,602	4,527	3,930	3,543	3,919	3,148
Scotland	Signalling failures	1,882	1,751	1,854	1,721	1,795	1,718
	Point failures	560	493	451	465	430	422
Network-wide	Signalling failures	17,668	16,833	16,972	16,260	16,261	15,714
	Point failures	5,162	5,020	4,381	4,008	4,349	3,570

Telecoms

Telecoms asset condition reliability is measured by the total number of telecoms failures on our infrastructure that cause train delays. Data is taken from a train running system which compares details of scheduled and actual train running times. A lower figure represents better performance.

Due to the unexpected issues caused by the introduction of GSM-R, route targets were adjusted in the 2015 Business Plan (BP). Adjusted targets are shown in Table 5.17.

Table 5.17: Telecoms failures (service affecting) targets

Route	2015/16 DP Target	2015/16 BP Target
Anglia	183	308
East Midlands	69	129
Kent	105	473
LNE	310	315
LNW	219	520
Scotland	203	224
Sussex	97	162
Wales	181	379
Wessex	103	129
Western	119	449
England & Wales	1,386	2,864
Network-wide	1,589	3,088

The number of telecoms failures causing delay in 2015/16 exceeded the 2014 Delivery Plan (DP) target by 104 per cent and the 2015 Business Plan target by five per cent. The main reason for underperformance across in 2015/16 is attributed to asset failures associated with GSM-R. Root cause analysis has identified two issues as the most frequent causes of failure. There has been an unexpected slow adoption of the latest versions of GSM-R software, accounting for a high proportion of failures. Additionally, interference from public Mobile Network Operators (MNOs) has affected GSM-R reliability during 2015/16. This is related to the wider introduction of 3G and 4G services in the 900MHz band. Interference from MNOs can cause gaps in compliant coverage of GSM-R which can result in reduced communication capability on the network, and lead to incidents of delay.

While performance did not meet Delivery Plan and Business Plan targets, the number of service affecting telecoms failures in 2015/16 represents a 20 per cent improvement from 2014/15, demonstrating the progress of our interventions to improve the reliability of telecoms assets throughout 2015/16.

A number of national reliability improvement plans have been implemented throughout 2015/16 including Project Artemis; a programme to specifically target GSM-R failures. The primary focus is the behavioural impacts of the users of GSM-R. The move towards the latest version of GSM-R train cab mobile software and Project Artemis have delivered improved reliability throughout the year, with a reduced number of telecoms failures affecting services in the second half of 2015/16.

Other improvement plans focus on level crossing telephones, telephone concentrators, interference infills and enhancement of British Telecom (BT) maintenance arrangements for some high risk level crossing telephones.



Alongside these national programmes, route specific actions have been taken to improve the reliability of our telecoms assets.

Across our routes, a strategy has been developed to deliver Fixed Telephone Network (FTN) conversions from legacy systems. This has reduced the number of failures and incidents related to FTN throughout 2015/16. There has also been focus on improving key locations that are most affected by MNO interference to GSM-R coverage, as well as deployment of updated software and training within routes.

In East Midlands and LNE, the overall reliability of non-GSM-R telecoms assets has improved following the upgrade of telephone handsets in a number of key areas that were identified to have a high failure rate.

In addition to failures from GSM-R issues in Scotland, failures attributed to Radio Electronic Token Block (RETB) systems on the Far North Line and on the West Highland Line were also higher than expected in 2015/16. We have identified that running legacy systems alongside next generation RETB systems has contributed to the increase in failures. This is expected to improve from September 2016 when the project to fully deploy next generation equipment on the Far North Line is due to complete. The West Highland Line is currently operated fully on next generation equipment, with an unresolved interference issue at Loch Sloy which is being investigated.

In Western, significant contributors to improved performance include the introduction of mandatory spare lineside phones and a series of master classes on maintenance for technicians.

In LNW and Scotland, removing GSM-R failures from the overall route statistics shows that lineside telephones are the cause of the majority of other failures. We have renewed telephones and cables at 40 level crossings in LNW and 60 in Scotland throughout the year. We will target our worst performing crossings in 2016/17.

Table 5.18: Telecoms failures (service affecting)

	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
England & Wales	942	1,329	2,232	3,765	2,864	2,859
Scotland	235	188	181	298	224	384
Network-wide	1,177	1,517	2,413	4,063	3,088	3,243

Safety related telecoms failures

This measure reports the total number of Safety Related Telecoms Failures (SRTFs) which are ranked 20 and above. The data is compiled from the Fault Management System (FMS). Network Rail standards define the process by which all telecoms failures should be assessed for the impact on the safety of the operational railway, its staff and members of the public. If all the information known about the failure at the time of the report indicates that there is an impact on safety, then it is defined as a SRTF.

This measure is reported for the first time in the Annual Return 2016. A lower figure represents better performance.

The total number of SRTFs in 2015/16 was 1,185. This represents a 25 per cent reduction from the 2014/15 result of 1,573.

A major driver for the reduction is the improved performance of level crossing telephones due to the implementation of Project Artemis. This is a programme led by the central Network Rail Telecoms team to specifically target Global System for Mobile Communications Railway (GSM-R) failures by liaising with TOCs and Network Operations teams. As the project has progressed, the primary focus has become the behavioural impacts of the users of GSM-R.

There was noted improvement in results from period 10 onwards due to the switch-off of the previous Network Rail telecoms system, the National Radio Network (NRN). This is as a result of the full implementation of GSM-R which enables direct and continuous digital communication between train drivers and signallers across the network. It means a safer, faster and more efficient railway.

A number of reliability improvement plans have been implemented throughout 2015/16 including Project Artemis (GSM-R), Level Crossing Telephones, Telephone concentrators and British Telecom maintenance arrangements. Actions taken under these improvement plans have helped to deliver the reduction the number of SRTFs.

Table 5.19: Safety Related Telecoms Failures (SRTFs)

	2014/15	2015/16
England & Wales	-	853
Scotland	-	332
Network-wide	1,573	1,185

Electrical Power

Reliability of electrical power is measured by the total number of train delay incidents caused by electrical power failures, and only includes failures on Network Rail infrastructure. Figures are reported according to the category of electrical power failure; AC traction power, DC traction power and non-traction power supplies.

This data is compiled from a train running system which compares details of scheduled and actual train running times. Results in this report are not comparable with Annual Returns prior to 2015 due to a change in the disaggregation. A lower figure represents better performance.

Nationally, the reliability of all categories of electrical power assets was better than target. AC traction power failures were 30 per cent better than target, DC traction power failures were 10 per cent better than target and non-traction failures were 59 per cent better than target.

For AC traction power failures, the best performing routes compared to target were Anglia, East Midlands and Scotland.

Anglia has focussed on maintaining standards compliance in the management of defects. This has been a long term initiative which started in 2011 and has been gradually refined as particular processes have come under route control. The most recent drive has been on vegetation management where a weekly report is used to understand the number of live defects which may affect OLE. East Midlands has continued to improve the asset reliability and performance of OLE. This improvement has been supported by defect removal from the infrastructure together with a focus on a vegetation control programme. Currently a dedicated working group is targeting vegetation control to develop better management control of high risk areas. Key drivers of improvement in Scotland include an increased focus on root cause analysis and sustained investment, from CP4 into CP5, in the renewal of known defective components.

For DC traction power failures, outperformance against target was seen in Kent, LNW and Wessex.

In Kent, more awareness and better detection of emerging lug failures, and the extensive introduction of 'doubling-up' of traction current cables have all contributed to reducing the number of failures. In LNW, the cause of short circuit trips on underground sections was identified as insulator contamination due to routine jet washing of track and sleepers. The jet washing has been suspended and alternatives are being explored. This has led to a reduction in failures of this type. Wessex has benefited from a number of proactive interventions. There has

been a replacement of the mark one version of the lug connection system, with the installation of revised designs to address shortfalls that had been identified in the original design. This, coupled with 'doubling-up' the cables, has led to a reduction in the number of cable failures. In 2015/16, Wessex has also received the first delivery of direct connection lugs, made to a specification developed by Wessex, Kent and Sussex routes. These lugs will undergo type testing followed by trial installation in 2016/17.

Non-traction operational power supply failures outperformed the national target for 2015/16. The most significant out performance at a route level was seen in East Midlands, Wales and Western.



Reliability of non-traction power supplies in Wales has benefitted from a significant amount of signalling power renewals in recent years linked to signalling renewal schemes. Western has focussed on signalling power cable testing and renewal of poor performing cable, while improvement in East Midlands is due to high levels of reactive minor work interventions to maintain and improve asset condition.

Nationally, two key reliability issues in AC traction power systems are related to OLE neutral sections and swivel brackets. A neutral section is designed to ensure that two electrical feeder sections of OLE are kept electrically separate. A swivel bracket allows along-track movement of the contact wire as it expands and contracts as the ambient temperature rises and falls.

To better understand the causes and reduce the likelihood of fatigue on neutral sections an analysis model for dynamic solutions has been generated. A model of the current set-up of neutral sections is running alongside six different solution simulations, from which appropriate improvement solutions will be chosen.

Working closely with the maintainer, a refurbished swivel bracket hinge has been developed to improve reliability and is nearing completion of product acceptance. Once complete, a physical trial of the hinge will take place at approximately 200 locations. The successful conclusion of this trial will result in full product acceptance and will allow all routes to refurbish these hinges.

A key DC traction reliability issue relates to the traction current cable connector, the lug, which connects the traction current cable to the conductor rail, or to a lineside isolating switch. These lugs, particularly when connected to the conductor rail, have been identified as a weak point in the system. Extensive research, development and testing of this interface have been undertaken. Recently, vibration testing (simulating the conditions that a lug may face in situ) of a number of different types of lug has been completed. This has provided valuable insight into the lugs' mechanical performance, and has identified likely failings. As a result, the quality of stock components provided by the manufacturer has been improved, with improved reliability expected in 2016/17. In addition, a trial is currently underway on an alternative method of connection between lug and conductor rail.

For non-traction power supply, which predominantly supplies power to signalling systems at 650V, research and development has taken place to improve the safety, reliability, maintainability and availability of 650V signalling power supply (SPS) equipment. In 2015/16 we created a new set of inspection and maintenance work instructions detailing inspection, response and testing requirements.

To improve safety and reliability, the 'Class 2' concept has been further developed. 'Class 2' equipment provides protection against electric shock by intrinsic construction of equipment. 'Class 2' systems do not require an earth wire. Under certain fault conditions they can continue to operate the power supply of signalling systems that allow us to run the timetable. New standards and product specifications have been prepared. We have worked with the supply chain and technology companies to develop a range of products which have been installed in locations across the network.

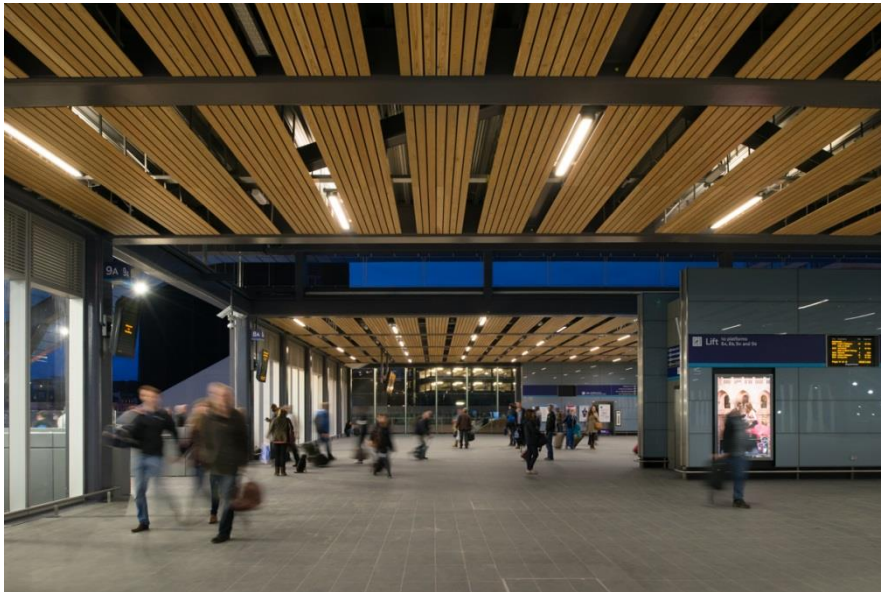


Table 5.20: Electrical Power Asset Condition Reliability

		2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
England & Wales	AC traction power failures	948	862	806	803	1,001	713
	DC traction power failures	250	339	319	286	328	294
	Non traction operational power supply failures	439	448	483	230	535	220
Scotland	AC traction power failures	78	65	132	56	86	49
	DC traction power failures	-	-	-	-	-	-
	Non traction operational power supply failures	51	56	42	33	41	14
Network -wide	AC traction power failures	1,026	927	938	859	1,087	762
	DC traction power failures	250	339	319	286	328	294
	Non traction operational power supply failures	490	504	525	263	576	234

Buildings

Buildings asset condition reliability is measured by the total number of reactive faults requiring urgent intervention. Each reported fault is categorised by location, severity and the risk the fault poses; either '2 hour' or '24 hour' faults. All '2 hour' faults require attendance on site within two hours, immediate investigation and to be made safe. All '24 hour' faults require attendance on site within 24 hours, investigation of the fault and to be made safe. A lower figure represents better performance.



The asset reliability score across the operational property portfolio has continued to improve in 2015/16. A 23 per cent reduction in the number of faults was achieved network-wide, and the majority of route results were better than target. All route teams have implemented an improved approach to planned preventative maintenance regimes to identify and correct potential faults before reaching the point where a report is required. This is based on 'deep dive' analysis of historical fault items to determine fault trends and locations, and ensure our planned maintenance works are addressing the most appropriate asset risks. In addition, targeted minor work expenditure in recent years has allowed an improved level of resilience in the asset portfolio providing a forward efficiency and preventing urgent faults.

The most positive results against our 2014 Delivery Plan target were seen in Anglia, East Midlands, Kent and Wessex.

Anglia has maintained consistently high performance for buildings reliability in 2015/16, exceeding target and improving performance from the previous year. The route has undertaken significant stakeholder liaison with external stakeholders, including train operators using our buildings assets for the operation of services, to identify local risks so they can be addressed prior to a fault occurring. The team has continued to undertake regular reviews to monitor maintenance and works delivery, as well as delivery of enhancements, to maintain the current levels of performance. These reviews are designed to address the current risks, and provide analysis to prevent future faults.

In East Midlands, the number of reactive faults has reduced throughout 2015/16. This has been achieved through a continued focus on areas of repeat fault reporting and intervention designed to resolve the underlying causes. During 2016/17 and through the remainder of CP5, the deployment of the Enhanced Decision Support Tool for buildings is expected to enable interventions to be more targeted.

In both Kent and Sussex, there has been a focus on collaborative working with stakeholders, including operatives and users of specific assets within the buildings portfolio. This has contributed to the reduced number of buildings faults in 2015/16, and helped to outperform our targets.

Wessex route has focussed on analysis of the root causes of buildings faults since the start of CP5 to develop targeted intervention prior to a reportable fault occurring. As a result, the number of re-active faults for buildings has been reducing for the past two years and the target has been exceeded for 2015/16.

Table 5.21: Buildings reactive faults (2 & 24 hour)

	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
England & Wales	6,020	6,219	6,308	5,464	6,167	4,198
Scotland	559	607	475	371	590	306
Network-wide	6,579	6,826	6,783	5,835	6,757	4,504

Station Stewardship Measure

The Station Stewardship Measure (SSM) is an average condition score of stations where Network Rail is the operator or landlord, in each of the station categories A to F in England & Wales, and across all stations in Scotland.

A condition score is calculated by assessing, by visual and detailed inspection, the asset remaining life of elements within the station lease area. The percentage of remaining life for each element is then converted to a score according to this scale.

1 >76%	2 46-75%	3 16-45%	4 1-15%	5 0%

The condition of each element within a station is assessed through a survey before being uploaded into our Operational Property Asset System (OPAS) following checks by the asset management teams within the routes. The SSM scores are based on validated OPAS examination data generated automatically by the OPAS system. A lower SSM figure indicates a better station condition.

SSM targets have been exceeded for all station categories in England & Wales and Scotland. Compared to 2014/15, there has been a marginal deterioration in the SSM results for station categories A and D. Condition has been maintained or marginally improved in all other categories.

The scale of changes to SSM in 2015/16 is less than one per cent across the rolled up asset category. This represents an expected level of depreciation as a result of station usage. Results indicate that station conditions are relatively stable and provide reasonable confidence that the CP5 targets are achievable.

In 2013/14, the ORR published a report with recommendations for improving SSM and shaping a new stewardship measure to be called SSM+. Following this report, we have completed actions on some of the recommendations for the improvement of the SSM. These include the upgrading of OPAS to allow a number of defects to be recorded on each asset, updates to the asset life expectancy, provision of updated asset manuals to inspectors and re-inspection of assets after significant investments have been carried out. The next phase of the SSM+ development programme is to constitute a governing authority to include representatives of Network Rail and the ORR. The governing group will review the proposed SSM+ requirements to ensure they are still suitable and relevant for inclusion, and that only interventions with responsibility and accountability sitting within Network Rail will be included in the new measure. A technical delivery team within Network Rail,

reporting to the governing authority, will be responsible for the implementation, testing and embedment of SSM+ before the start of CP6.

Table 5.22: Station Stewardship Measure

	2011/12	2012/13	2013/14	2014/15	2015/16
Category A (England & Wales)					
Target (CP5)	-	-	-	2.24	2.24
Actual	2.26	2.21	2.16	2.05	2.07
Category B (England & Wales)					
Target (CP5)	-	-	-	2.34	2.33
Actual	2.37	2.34	2.32	2.29	2.28
Category C (England & Wales)					
Target (CP5)	-	-	-	2.40	2.40
Actual	2.43	2.40	2.36	2.35	2.35
Category D (England & Wales)					
Target (CP5)	-	-	-	2.40	2.39
Actual	2.41	2.39	2.35	2.33	2.34
Category E (England & Wales)					
Target (CP5)	-	-	-	2.40	2.40
Actual	2.43	2.39	2.36	2.35	2.35
Category F (England & Wales)					
Target (CP5)	-	-	-	2.48	2.47
Actual	2.47	2.47	2.44	2.43	2.43
Scotland					
Target (CP5)	-	-	-	2.33	2.33
Actual	2.28	2.33	2.23	2.21	2.20

Note: The figures exclude Abellio Greater Anglia and Virgin Trains East Coast results as these are presented separately below.

Some stations that we own are managed and maintained by train operating companies. The results for these stations are not included in the SSM results reported in Table 5.22 above. Abellio Greater Anglia (AGA) and Virgin Trains East Coast (VTEC) have provided Network Rail with data and commentary regarding their stewardship of the stations for which they are accountable. This information is provided below..

Abellio Greater Anglia (AGA)

A change to the franchise arrangement in CP4 led to AGA taking full repair and renewal responsibilities for the stations in Anglia, in accordance with the requirements of its Operating Licence and Franchise Agreement.

AGA is required to carry out an annual independent audit on the condition of these stations. Arup undertook this review in January 2016. The audit was based on a sample of 23 stations of different sizes spread throughout the franchise network.

The SSM results provided by AGA (Table 5.23) indicate that since the start of the year the SSM for category B, D, E and F stations have improved whereas the SSM results for Category C have remained constant.

The Arup report notes that the condition assessments being reported by AGA (as shown in Table 5.23 are worse than is actually the case. Given that AGA is projecting a more pessimistic view, Arup do not consider that the SSM results reported by AGA are hiding any deterioration of the assets or any systemic deliberate intention to mask the true state of the assets. Instead, the variation is driven by differences of opinion in terms of asset life expectancy and the asset assessments not keeping pace with the pace of investment taking place at the stations.

Table 5.23: SSM for Abellio Greater Anglia

		Category B Station	Category C Station	Category D Station	Category E Station	Category F Station
2015	Period 1	2.47	2.43	2.46	2.45	2.53
	Period 2	2.43	2.44	2.46	2.45	2.51
	Period 3	2.43	2.44	2.46	2.45	2.51
	Period 4	2.42	2.43	2.46	2.45	2.51
	Period 5	2.42	2.43	2.46	2.46	2.52
	Period 6	2.47	2.43	2.46	2.45	2.53
	Period 7	2.42	2.43	2.46	2.45	2.51
	Period 8	2.42	2.43	2.46	2.45	2.51
	Period 9	2.42	2.43	2.46	2.44	2.51
	Period 10	2.42	2.43	2.43	2.44	2.50
2016	Period 11	2.42	2.43	2.43	2.44	2.50
	Period 12	2.42	2.43	2.43	2.44	2.48
	Period 13	2.42	2.43	2.43	2.43	2.48

Virgin Trains East Coast (VTEC)

VTEC was awarded the East Coast franchise on 1 March 2015 and took ownership of nine stations under a 99 year Full Repairing and Insuring Lease (FRI) from 1 July 2015. This was in accordance with the VTEC Operating Licence and Franchise Agreement.

VTEC is required to carry out an independent audit on the condition rating of our stations every two years in accordance with their Franchise Agreement, with 2016 being the first year. Our Franchise Agreement states that we must have the audits completed by 31 July 2016 and every two years thereafter.

VTEC has instructed Arup to carry out audits of all nine stations that are bound by the 99 year FRI, which will verify or differentiate the measure of the average SSM scores per station category as shown in the Table 5.24 below. Within Table 5.25 VTEC has detailed the SSM score when the franchise started against the predicted figures for 2016 which were detailed in the VTEC Station Asset Management Plan (SAMP 2) and the actual figures for 2016 which will be verified when the audits are completed.

The SSM shown in Table 5.24 show the average station condition score for category A, B and C stations as the current most accurate figures based on our recent annual conditions surveys.

Given that VTEC became the recipient of the stations under the 99 year FRI from 1 July 2015, and therefore not in situ for a full year, shown below are the target SSM ratings set by the ORR as detailed in Table 5.25.

Table 5.24: SSM targets for Virgin Trains East Coast

Station Category	2015/16	2016/17
Category A Station	2.24	2.24
Category B Station	2.33	2.33
Category C Station	2.40	2.39

Table 5.25: SSM for Virgin Trains East Coast

Station Category	At franchise start using 2014 Atrium Extract figures as per SAMP 2	Predicted 2016 figures as per SAMP 2	Current Actual 2016
Category A Station	2.04	2.35	2.04
Category B Station	2.14	2.36	2.03
Category C Station	2.08	2.12	2.09

Light Maintenance Depot Stewardship Measure

A Light Maintenance Depot (LMD) services and stables rolling stock units, sets and locomotives. They range in size and the facilities they offer. The Light Maintenance Depot Stewardship Measure (LMDSM) assesses the overall condition of LMDs where Network Rail has responsibility for the maintenance, repair and renewals of assets. Scores are based on the remaining life of elements within LMDs according to the following scale.

1 >76%	2 46-75%	3 16-45%	4 1-15%	5 0%

Assessments of structural blocks are undertaken annually, and all blocks and elements are assessed every five years. The results of inspections are aggregated to reach an overall LMDSM score. Depots leased on a full repairing basis are excluded from the calculation. A lower figure represents a better condition.

All results for 2015/16 were better than target. In England & Wales, there has been a slight deterioration in results from 2014/15 due to marginally reduced asset conditions recorded at certain LMDs within the network. These include Shrub Hill LMD, Bournemouth West LMD and Birkenhead North LMD. Our delivery of LMD renewals volume was below target in 2015/16, mainly due to the delay of the Cardiff Canton Depot Scheme. Improvement in Scotland has been driven by the recent inclusion of Polmadie LMD (Glasgow) results into the reporting cycle.

Table 5.26: Light Maintenance Depot Stewardship Measure

	2011/12	2012/13	2013/14	2014/15	2015/16
England & Wales					
Target	-	-	-	2.40	2.39
Actual	2.40	2.38	2.37	2.34	2.36
Scotland					
Target	-	-	-	2.43	2.43
Actual	2.66	2.45	2.38	2.12	2.07
Network-wide					
Target	-	-	-	2.41	2.40
Actual	2.43	2.39	2.37	2.31	2.32



Structures

Asset condition reliability of structures is measured by the number of open work items in CARRS that have been assigned a risk score ≥ 12 according to the Network Rail standard. A risk score of 12 equates to an item that is 'probable' to lead to a railway line or road closure; or, 'likely' to result in a reduction of linespeed unless addressed within 12 months. This metric captures all work items that are delivered through structures maintenance teams and relate to the asset groups of 'bridge', 'tunnel' and 'wall'. A lower figure represents better performance.

In 2015/16, nationally, the reliability of structures was better than target and better than 2014/15.

The forecast for structures reliability in Anglia was revised at the beginning of 2015/16 as the initial forecast did not take account of emerging items and the timeframe required to close these. This timeframe is driven by items such as design and access. The 2015/16 target was met as a result of regular workbank reviews, focussed intervention on high risk defects and efficient close out of works, with route processes requiring contractor hand back of files within 28 days of completing on site.

In East Midlands and LNE, focus has been on targeted minor works interventions to reduce the number of items with a risk score greater than 12.

In 2015/16 the number of open work items in LNW with a risk score greater than or equal to 12 was reduced to 203, against the 2015/16 target of 475. The overall reduction in 2015/16 resulted from a continuation of the process that requires all emerging work items with a risk score greater than or equal to 12 to be instructed for intervention. This process is enacted so a new backlog of work items does not develop.

Scotland has continued to focus on tracking and closing out high priority minor work items. This focus will continue with a view to further improve this figure by the end of CP5.

In Wales, prioritisation was given to open work items with a risk score greater than 20, all of which have now been actioned and closed. The Route Asset Management team is collaborating with the Route Programmes team to focus on the close out of items with a risk score greater than or equal to 12, with prioritisation given to remaining backlog and overdue items.

Throughout 2015/16 in Wessex, the processes for managing work items have been defined and the measure is now mature. In the route, funding is authorised specifically to close out higher risk work items. This focus has led to exceeding the

target for 2015/16. This strategy will continue into 2016/17, but will also address lower risk scores to reduce those that pass the risk score threshold of 12.

Western route has continued analysis on open work items to focus delivery on timely actions for their removal. As a result, compared to 2014/15, there has been a lower occurrence of open work items with a risk score greater than 20. Additionally, any emerging items are dealt with quickly and effectively. The priority one defects (more than two years old, with a risk score greater than 20 and a response time requirement of less than 28 days), remain at manageable levels. Across the route, there remain a number of backlog items that require revalidation to achieve the most effective design and access. The volume of outstanding defects has reduced over the year. Open work items, generated on a monthly basis, are considered against a suitable timescale for delivery which has resulted in approximately 65 open jobs at any one time throughout 2015/16.

Table 5.27: Number of open work items with a risk score ≥ 12

	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
England & Wales	-	-	4,521	1,744	2,414	1,155
Scotland	-	-	98	90	96	75
Network-wide	-	-	4,619	1,834	2,510	1,230



Earthworks

The measure of earthworks asset condition reliability is the average number of earthworks failures across five years. Earthworks failures are defined as slopes in a state of collapse (for example, rock fall or soil slip, slide or flow in an embankment, cutting or natural slope). This measure was reported as a moving five-year average for the first time in the Annual Return 2015.

In 2015/16, there were 163 reportable earthwork failures under the definition in place since the start of CP5. There were no train derailments as a result of earthwork failures in 2015/16. There has now not been a train derailment from an earthwork failure since 2012/13. This is the longest period without any train derailments from geotechnical failures since 1994/95 when record keeping commenced.



In 2015/16, we experienced the second wettest winter since records began, the wettest being 2013/14. The resulting high failure count in 2015/16 impacted the five-year moving average which now stands at 122.6. This is worse than the target five-year moving average of 101 at the end of 2015/16. As this measure is particularly sensitive to rainfall, the second wettest winter on record has pushed the

five-year moving average well above the CP5 entry figure. The routes with the poorest performance against target were East Midlands, LNE and LNW.

In East Midlands and LNE, earthworks assets have been significantly impacted by the extremely wet weather conditions of the last year, particularly during winter. In LNE, this resulted in a number of significant failures including on the Newcastle to Carlisle route, which led to its closure for an extended period. In East Midlands, the most significant issue was at Chimney Corner where the earthwork asset had been impacted by work on the adjacent land. Work to improve drainage capability has been completed and assisted routes in managing performance in other areas during the exceptionally high levels of rainfall experienced.

In LNW, the result was largely due to a number of storm events hitting the northern part of the route between December and February. Performance throughout the year was dominated by storm events in Lancashire and Cumbria with multiple amber and red weather alerts due to rainfall. There was also a failure of an embankment slope at Eden Brow in February 2016 which, although only a single event, closed a major secondary line which will remain shut for the foreseeable future.

Over 85 per cent of failure incidents in LNW were directly related to extreme weather during the year, compared with averages between 50 to 60 per cent in previous years. The main earthwork asset failures on the route were those of cutting assets that failed due to inadequate surface water drainage. The identification of such sites is an ongoing challenge. Newly developed asset management tools have been introduced to help identify potential risk locations. There was one incident solely involving rock slopes reported in LNW. This is a reflection on the work undertaken so far in CP5 to mitigate the risk from such assets.

In addition to several national improvement initiatives, the Lancashire and Cumbria delivery unit has started to develop a simple tilt meter system that can be used on sites that may be affected by extreme weather.

Table 5.28: Earthworks failures (five year moving average)

Measure	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
England & Wales	59.8	64.6	83.6	82.0	81.0	101.4
Scotland	17.0	23.4	22.0	18.8	20.0	21.2
Network-wide	76.8	88.0	105.6	100.8	101.0	122.6

Asset Condition Sustainability

Track

The sustainability of track assets is measured by the percentage of used life for plain line rail, switches and crossings (S&C), sleepers and ballast. A lower percentage represents better sustainability. Used life for track assets is based on the average service life established from the type of asset. In reality, there are other influences on track deterioration such as the local environmental and geological conditions, train designs and wheel set conditions. There are also variable requirements for the useful life of the asset, such as line performance requirements and track access for maintenance. This means that the actual track service life can vary.

The calculation of the average service life for plain line rail, S&C and sleepers is based on the annual tonnage that has passed over the asset through its lifetime and the assets' characteristics that affect the rate of wear and fatigue on the asset. The used service life for each asset is accumulated year on year from its installation, dependent on the traffic running over it. Ballast sustainability is defined by the percentage of the ballast void (the space between ballast stones) that is filled up with dust and fines. This can be a result of wear and fatigue on the asset, such as erosion due to traffic. This gives an indication of the average life of the asset. It is then possible to calculate the used life of that asset.

During 2015/16, there was slight improvement in sustainability for plain line rail. Notwithstanding this, the previously forecast level of improvement throughout CP5 has been affected by under-delivery of full renewals in the first two years of CP5. There has been deterioration of sustainability in sleepers, where the forecast levels of improvement have also been affected by under-delivery of renewals volumes.

Ballast life improved throughout the year due to more ballast cleaning activity, further aided by a reduction in the number of dirty wagons that foul the track running on the network. S&C used life improved more substantially than other track assets due to heavy and medium refurbishments, although, as renewals have not been in line with original forecasts, this has still not met target.

Used life by route criticality follows the same pattern as forecast, with higher criticality routes (heavier, more frequent traffic) improving and the lowest ones (lighter, less frequent traffic) remaining stable or slightly deteriorating. The shortfall against the Delivery Plan target is greater on the higher criticality routes because the majority of renewals works were planned for these areas. A shortfall in the

delivery of renewals volumes has been heightened by the higher traffic volumes using them.

In the longer term, the forecasts for the end of CP5 have been revised to account for re-forecast volumes. The reduced forecasts for renewal and refurbishment volumes, in the last two years of CP5 in particular, mean that plain line used life is likely to be approximately 0.5 percentage points higher than the 2014 Delivery Plan target by the end of CP5. S&C used life, while still improving, is forecast to be three percentage points worse than originally forecast in the 2014 Delivery Plan.

Track sustainability indicators at the end of 2015/16 are worse than target. Due to planned reductions in renewal volumes throughout CP5, plain line track is likely to get older, on average. This is not expected to impact track performance in the short term but will make it less resilient to adverse conditions in the long term. Maintenance strategies have been developed to counteract the effect of this on the performance of the network. S&C used life is still forecast to improve to the end of the control period, albeit at a reduced rate than the previously forecast.

Table 5.29: Track Used life (%)

	Measure	2014/15	2015/16 Target	2015/16 Actual
England & Wales	Rail	49.9	47.7	49.9
	Switch & Crossings	51.6	51.9	51.0
	Sleepers	60.7	59.3	61.1
	Ballast	48.6	46.6	48.4
Scotland	Rail	61.5	58.6	60.5
	Switch & Crossings	50.1	48.2	48.4
	Sleepers	73.7	70.9	72.7
	Ballast	55.5	55.3	54.5
Network-wide	Rail	51.5	49.2	51.3
	Switch & Crossings	51.5	51.5	50.7
	Sleepers	62.5	60.9	62.7
	Ballast	49.5	47.8	49.2

Signalling

The sustainability of signalling assets is measured in terms of average remaining life of Network Rail signalling infrastructure. Signalling Infrastructure Condition Assessment (SICA) is a process by which signalling assets are graded according to their condition. The process requires the inspection of signalling assets in the form of either primary or secondary inspections.

Primary inspections are performed every five years from commissioning until predicted remaining life is less than ten years. Once predicted remaining life of the asset is less than ten years, secondary inspections are performed every three years until predicted remaining life is less than three years. Following this point, secondary inspections are performed annually. Secondary inspections encompass all elements of primary inspections and some additional elements.

Inspections are performed on a sample of the signalling infrastructure within the area of the railway controlled by an interlocking, and a condition grading is assigned to the assets. Condition grading is primarily based upon the remaining life of the equipment in a signalling interlocking area, and to a lesser extent the condition of line side signalling. Network Rail uses the SICA tool to assess the remaining life of these assets, which applies algorithms and weightings based on the criticality of each asset to the overall signalling system. For the first time in 2016, Network Rail is reporting signalling remaining life according to asset type.



We have revised the calculation method that was used to provide forecasts in the 2014 Delivery Plan to more accurately represent the full asset portfolio, as the previous method of calculation did not capture the condition of some assets.

Forecasts have been agreed with the ORR and updated to reflect the new calculation method (Table 5.30). A higher result represents better asset sustainability.

Table 5.30: Signalling Condition Index (SICA Remaining Life) – target updates

	DP14 target	Updated target
Anglia	12.38	13.88
East Midlands	13.67	13.68
Kent	15.33	17.98
LNE	12.03	13.96
LNW	12.59	13.60
Scotland	10.56	11.32
Sussex	13.87	16.86
Wales	16.50	17.38
Wessex	11.40	13.10
Western	14.69	17.60
England & Wales	13.70	14.84
Network-wide	13.33	14.44

The Signalling Condition Index (SICA Remaining Life) for 2015/16 is 14.87, three per cent better than the internal target of 14.44. This reflects the overall signalling renewal volumes that were delivered in 2015/16 which was four per cent higher than the forecasted workbank volume.

The biggest variances between the 2015/16 target and actual at a route level can be seen in Wales and Western. In both routes, there has been a large reduction in 2015/16 renewals volumes targets between the 2014 Delivery Plan and 2015/16 Business Plan. This has resulted in an actual remaining life score lower than target.

Results for signalling asset condition sustainability in Kent and Sussex are also lower than target for 2015/16. There was under-delivery of renewals volumes across the signalling asset portfolio in both routes, affecting the average age of the asset base.

In Kent, the Medway Valley element of the East Kent Phase Two Scheme was deferred due to an unexpected increase in costs. As a result, delivery of renewals volumes in Kent was lower than expected affecting the overall age and remaining life of the asset base. In Sussex, the most significant shortfall in renewals volume

is as a result of the West Sussex Signalling Scheme having been deferred to later in CP5.

The signalling condition index results across all other routes are in line with targets for 2015/16. The total delivery of signalling renewals volumes across these routes showed increased delivery for all conventional volumes and targeted component renewals. In Western, an additional 14 units have been delivered as part of the Bristol Area Signalling Renewal and Enhancement Project relating to associated scope with the Intercity Express Programme. In LNE, there again has been an additional seven units delivered in relation to the North Lincolnshire Scheme.

Table 5.31: Signalling Condition Index (SICA Remaining Life)

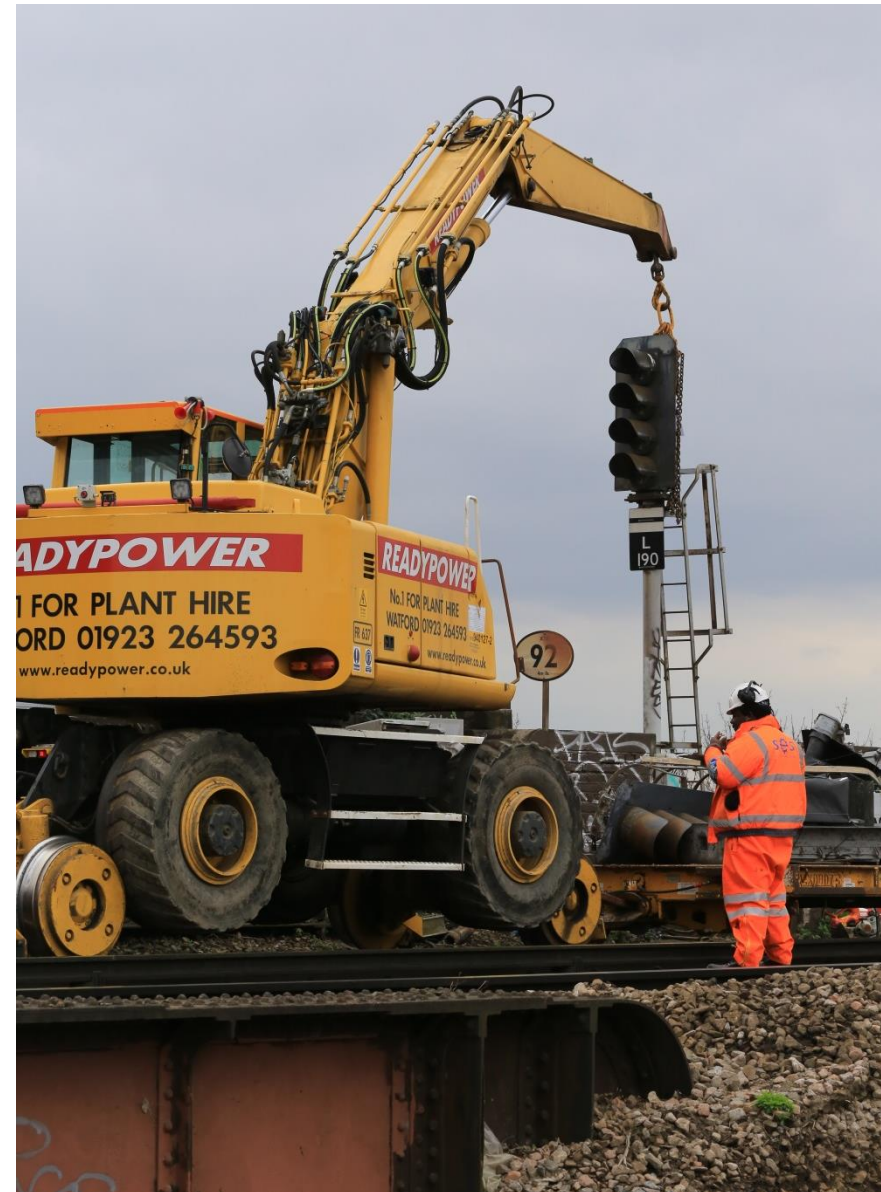
	2014/15	2015/16 Target	2015/16 Actual
England & Wales	12.89	14.84	14.99
Scotland	10.42	11.32	13.97
Network-wide	12.60	14.44	14.87

As this is the first year in which signalling remaining life is being reported by asset type, there are no historic results to compare the 2015/16 results against. There is also no target at this level of disaggregation.

The results disaggregated by asset type reflect the overall move towards computer based signalling equipment.

Table 5.32: Signalling remaining life

	2015/16
Mechanical	10.17
Electro-mechanical	12.14
Computer based	18.54
Network-wide	14.87



Telecoms

This measure represents the remaining life of telecoms assets as an overall percentage. The remaining life percentage is based on a cross section of the asset base. Remaining life percentage is calculated based on all of the telecoms assets included in the nationally recognised regulated volumes.

Sustainability of telecoms assets is measured by calculating the remaining life of an asset as a percentage of total life as determined by the Telecoms Asset policy. Data is taken from an asset database containing information on all route based telecoms assets, their condition, expected renewal dates and expected life, known as the Decision Support Tool.



The national telecoms remaining life is 58.55 per cent against a target of 57.30 per cent at the end of 2015/16. During CP4 there were a large number of FTN and GSM-R assets installed as an EU requirement prior to the introduction of the European Rail Traffic Management System (ERTMS). These assets still have a high percentage of asset life remaining, increasing the overall sustainability for telecoms assets. Within the telecoms portfolio, assets with lower percentages of remaining life have been identified and are due to be renewed in CP5.

Throughout 2015/16, sustainability of telecoms assets has been monitored internally and our overall renewals strategy adjusted to ensure delivery of efficiency in the timing of asset replacement, without introducing risk of increased maintenance costs and possible operational impacts of failures.

The percentage of asset remaining life is calculated based on total life as defined in the Network Rail asset policy. Actual condition is inspected at specified intervals in the asset lifecycle, and where they are deemed to be in good, reliable condition, renewal will be re-prioritised.

We are changing the way we operate our railway in the future which will change the overall asset portfolio for telecoms. The National Operating Strategy, including the Signal Box Closure programme and the introduction of ROCs, will require different equipment to be used. To accommodate this change, routes will, in some circumstances, plan to life extend older assets until these changes come into effect. This is expected to impact the results reported for sustainability of telecoms assets in CP5, until new telecoms systems are in place.

In some cases, asset renewal that was due to be completed as part of CP5 enhancement schemes has been re-planned for future control periods due to funding constraints. As a result, there is a requirement to identify renewals funding. During this process, the percentage of asset life remaining is expected to decline.

Table 5.33: Telecoms Remaining Life (%)

Measure	2014/15	2015/16 Target	2015/16 Actual
England & Wales	63.92	57.60	58.56
Scotland	63.24	55.30	58.49
Network-wide	63.83	57.30	58.55

Electrical Power

Asset condition sustainability for electrical power assesses the remaining life of three main asset types in the electrical power portfolio; conductor rail, Overhead Line Equipment (OLE) and SPS cable. The remaining life is the time until the asset must be replaced, as a percentage of the total life of the asset. The calculation method for each asset type is set out below. For all assets, a higher result represents better asset sustainability.

The remaining life of a distinct section of conductor rail (measured in kilometres) is the percentage of the maximum allowable wear that remains. The maximum allowable wear varies according to the type of conductor rail and the electrical protection characteristics. The calculation is:

Conductor Rail

$$\text{Remaining life \%} = \frac{\text{maximum allowable wear \%} - \text{actual wear \%}}{\text{maximum allowable wear \%}} \times 100$$

The remaining life for a wire run of OLE is the percentage of the Asset Technical Life (ATL) that remains. The Asset Technical Life is the point at which, on average, the asset would, based on engineering judgement, reach the end of its useful life. ATL reflects differences in versions of asset type, and utilisation. The calculation is:

Overhead Line Equipment (OLE)

$$\text{Remaining life \%} = \frac{\text{asset technical life} - \text{effective age}}{\text{asset technical life}} \times 100$$

For a given SPS cable, remaining life is a percentage of the ATL that remains. The ATL is the average age at which the asset would reach the end of its useful life, based on engineering standard and reflecting differences in cable types. Current age is a parameter for condition and is the difference between the current year and the year of installation of the cable. The calculation is:

Signalling Power Supply Cable

$$\text{Remaining life \%} = \frac{\text{asset technical life} - \text{current age}}{\text{asset technical life}} \times 100$$

The CP5 forecast for remaining life of conductor rail has increased from 66.1 per cent to 66.2 per cent. The primary reason for this stability is that total national renewals volumes planned for the remainder of CP5 have remained largely unchanged. The variance between the 2015/16 result and the Delivery Plan target is due to the phasing of renewals volumes within the sustainability model. At a route level, sustainability in Sussex has increased as a result of an 11 kilometre increase to planned CP5 renewal volumes. Asset sustainability in Kent has decreased following a reduction in planned CP5 renewal of 16 kilometres.

The remaining life for OLE is slightly worse than target for 2015/16, while the end of CP5 forecast has decreased from 54.9 per cent to 54.6 per cent. This is primarily due to decreased levels of planned interventions throughout the rest of CP5. This is most evident in East Midlands and LNW. LNW's planned interventions for CP5 have reduced from 34 mid-life refurbishments to zero. East Midlands route has reduced planned OLE interventions from 36 re-wires to zero.

The remaining life of SPS cables has been modelled for the first time in 2015/16 due to the availability of asset information. As this measure had not been modelled previously, there were no targets included in the 2014 Delivery Plan. Over the next year the sustainability measure for SPS cables will be analysed and tracked. The modelling method is subject to further updates to the asset inventory and there may be improvement in further model development. Nationally, the remaining life aligns with other electrical power assets such as OLE, although there is more variability at a route level.

Table 5.34: Electrical Power Remaining Life (%)

		2014/15	2015/16 Target	2015/16 Actual
England & Wales	Conductor Rail	67.6	65.1	66.4
	Overhead Line Equipment	57.1	57.0	56.4
	Signalling Power Supply Cable	-	-	57.9
Scotland	Conductor Rail	-	-	-
	Overhead Line Equipment	62.9	61.7	62.8
	Signalling Power Supply Cable	-	-	33.4
Network-wide	Conductor Rail	67.6	65.1	66.4
	Overhead Line Equipment	58.0	57.7	57.2
	Signalling Power Supply Cable	-	-	55.2

Buildings

The asset condition sustainability measure for buildings is the weighted percentage of remaining life of elements within critical blocks of stations and LMDs. The percentage of asset life remaining is calculated by dividing the remaining life of the asset by the asset life expectancy. The asset life expectancy is defined in Network Rail asset policy according to the type of asset and its average usage. The remaining life of assets is assessed via yearly and five yearly examinations. The results for each element of buildings assets are recorded in OPAS as part of the regular operational property inspection regime. These values are then weighted by the cost of full renewal of the elements baseline during business planning.

Stations remaining life has exceeded target in all routes. At a national level in 2015/16, there has been a reduction in stations sustainability of 0.5 percentage points. This is a result of a 0.2 percentage point reduction in England and Wales and a 1.2 percentage point reduction in Scotland. Results varied between routes with improved condition scores in East Midlands, LNW, Wessex and Wales. The improvement in LNW is driven by the completion of some large schemes within the route such as Manchester Victoria and Birmingham New Street. In Wessex, the CP5 renewals workbank is concentrated on years one and two, therefore a large portion of CP5 works have been completed and improved results for 2015/16. The largest reduction in sustainability is in LNE, reflecting changes to the funding profile for renewals volumes within the route. This deterioration in sustainability has been assessed and is considered manageable for the remainder of CP5.

At a national level, the LMD sustainability measure has been maintained in 2015/16, and has outperformed Delivery Plan target. Route specific changes to sustainability values vary, the largest increase being in Scotland. This has been driven by the inclusion of Polmadie LMD, an asset in relatively new condition, to the reporting cycle.

The calculation procedure has been updated since the publication of our CP5 Delivery Plan, resulting in a more representative estimate of asset remaining life. Previously, asset remaining lives reported from surveys were extrapolated from the survey date to present, with the implicit assumption that no work was done in the meantime, thus significantly reducing the remaining life by the number of years since the survey was carried out. Now, the residual life recorded in the survey is used unchanged; 60 per cent of critical assets were resurveyed during the last year (a much higher fraction than in CP4), so this is considered to be a better, more up-to-date value. However, this has meant that the previous targets set in the CP5 Delivery Plan are inconsistent with the improved calculation method; therefore they have been adjusted in the tables.

Table 5.35: Buildings Asset Condition Sustainability – target updates

		DP14 target	Updated target
Anglia	Stations - % Remaining Life	36.7	47.3
	Light Maintenance Depot (LMD) - % Remaining Life	29.3	44.8
East Midlands	Stations - % Remaining Life	44.1	61.5
	Light Maintenance Depot (LMD) - % Remaining Life	56.8	63.9
Kent	Stations - % Remaining Life	34.8	45.9
	Light Maintenance Depot (LMD) - % Remaining Life	41.7	38.4
LNE	Stations - % Remaining Life	40.5	65.7
	Light Maintenance Depot (LMD) - % Remaining Life	52.6	59.7
LNW	Stations - % Remaining Life	38.7	54.4
	Light Maintenance Depot (LMD) - % Remaining Life	58.2	63.3
Scotland	Stations - % Remaining Life	40.8	57.0
	Light Maintenance Depot (LMD) - % Remaining Life	43.6	51.2
Sussex	Stations - % Remaining Life	37.8	49.1
	Light Maintenance Depot (LMD) - % Remaining Life	36.4	40.2
Wales	Stations - % Remaining Life	30.4	41.9
	Light Maintenance Depot (LMD) - % Remaining Life	43.1	46.4
Wessex	Stations - % Remaining Life	34.6	47.9
	Light Maintenance Depot (LMD) - % Remaining Life	42.9	43.4
Western	Stations - % Remaining Life	32.8	45.6
	Light Maintenance Depot (LMD) - % Remaining Life	35.7	42.8

Table 5.36: Buildings Asset Condition Sustainability

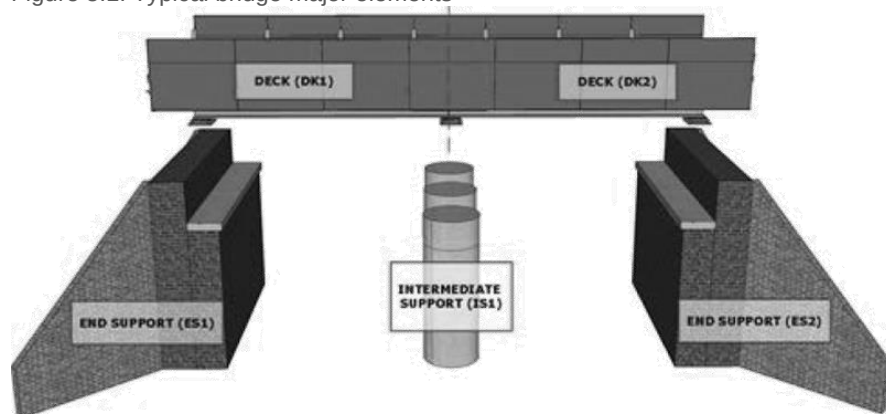
	Measure	2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
England & Wales	Stations - % Remaining Life	54.8	37.8	52.9	54.6
	Light Maintenance Depot (LMD) - % Remaining Life	51.6	44.1	50.0	50.4
Scotland	Stations - % Remaining Life	57.7	40.8	57.0	56.5
	Light Maintenance Depot (LMD) - % Remaining Life	54.7	43.6	51.1	58.8
Network-wide	Stations - % Remaining Life	55.4	37.3	53.5	54.9
	Light Maintenance Depot (LMD) - % Remaining Life	52.2	44.1	50.3	52.2

Structures

Asset Condition Sustainability of structures is split into two parts; average condition of major deck elements and Tunnel Condition Monitoring Index (TCMI).

The average condition of major deck elements assesses Network Rail owned overbridges and underbridges. Footbridges, third party bridges and major structures are excluded. The purpose of this measure is to help provide assurance that we are managing our bridges sustainably. Major deck elements attract a large amount of investment, and typically degrade faster than the substructures. In Figure 5.1, 'DK1' and 'DK2' contribute to this measure.

Figure 5.1: Typical bridge major elements



The TCMI scoring system incorporates all salient tunnel lining defect types that contribute to overall condition. Following each detailed examination of a tunnel, all structurally significant defects generate a condition score for the tunnel, which is then used to calculate TCMI.

Across the national portfolio, TCMI is better than target, but shows a slight decline from previous years. Throughout 2015/16, focus has been on building a more complete and mature data set relating to TCMI scores. This is due to continue throughout CP5 to allow a better understanding of underlying trends and their cause. There have been a number of deviations from planned renewals volumes, most notably in Kent, LNW and Wales, which has impacted the average condition of assets.

The long term trend of the average condition of major deck elements shows a gradual decline throughout CP4. In CP5 the score has begun to stabilise with a national condition score of 64.7 at the end of 2015/16; 0.1 percentage points worse than target. At this time, 6.9 per cent of the scores are yet to be received. As these are received, the accuracy of the results will improve and this will be reflected in future Annual Returns. In Scotland, the portfolio has improved since the start of CP4 to 63.1. The improved civils asset management system is due to be implemented in CP5 to give greater confidence in sustainability scores. New data requirements at the hand-back of assets following interventions will also give a more accurate view of condition score, with immediate realisation of condition uplifts that, historically, would only be captured during a detailed examination.

Across the structures portfolio, shortfall of overbridge renewals volumes was largely attributable to East Midlands, LNE and Sussex as a result of deferrals. This work has been re-prioritised based on asset condition. The biggest shortfalls in underbridge renewals were seen in East Midlands, LNE and LNW where there were deferrals to CP6. Throughout 2015/16, there have been changes to the renewals funding profile which will impact on workbank and intervention mix for the remainder of CP5. Overall sustainability during this period has been a key consideration in 2015/16. The use of enhanced inspection regimes and targeted minor works is a preferred mitigation approach for the remainder of CP5. The targets shown were developed at the start of CP5. Reforecasting is currently underway as part of asset policy development, which is not yet reflected in this measure.

Table 5.37: Structures Asset Condition Sustainability

	Measure	2014/15	2015/16 Target	2015/16 Actual
England & Wales	Average condition of major deck elements	64.88	65.00	64.90
	Tunnel Condition Monitoring Index (TCMI)	85.84	83.60	85.61
Scotland	Average condition of major deck elements	63.11	62.80	63.10
	Tunnel Condition Monitoring Index (TCMI)	91.73	85.30	91.57
Network-wide	Average condition of major deck elements	64.68	64.80	64.70
	Tunnel Condition Monitoring Index (TCMI)	86.54	83.70	86.32

Earthworks

Earthworks Condition Score (ECS) is a weighted average of earthwork asset portfolio condition. The CP5 Earthworks Policy aims to sustain ECS by offsetting asset degradation with condition improvements (renewal and refurbishment) and condition maintenance intervention activities at the lowest whole-life cost.

All routes implement an examination regime in accordance with the Network Rail standard, Examination of Earthworks. Data is collected using electronic handheld units, and then uploaded into our Earthworks Examination Database. Periodically and at year-end information is extracted from the database, including the calculated ECS, and any issues are resolved with routes as necessary.

In the 2014 Delivery Plan the projected national ECS for CP5 entry was 1.75, based on forecasted position at the time. Annual delivery targets were then calculated based on this forecast. The actual CP5 entry position for national ECS was 1.80. This position demonstrated a less sustainable portfolio position than originally forecast. At the end of 2014/15, national ECS (1.76) showed an improved portfolio condition, compared to the CP5 entry figure. Analysis has confirmed previously that the principal reason for the improved portfolio condition in the first year of CP5 was the continued influence of adding earthwork assets into the portfolio as the full asset register approaches completion.

The national ECS score at the end of 2015/16 was 1.75. This is in line with Delivery Plan target and shows a minor improvement in the last 12 months. The delivery of condition-improving and condition-maintaining intervention activities has been significantly better in 2015/16 than 2014/15, which represents a greater proportion of the improvement than continued growth of the asset register.

A large element of the additional volume in 2015/16 has followed stabilisation of delivery frameworks and a generally reduced level of emergency, resource-sapping, work. A significantly improved area of volumes delivery was embankments renewals, where six routes have reported positive variances.

Rock cuttings renewal delivery was significantly above plan in 2015/16. This is largely due to increased volume in Scotland, although a number of routes have outperformed against plan. This has been a result of the absorption of 2014/15 activity and the additional works.



Soil cuttings maintenance is above target on a national basis with outperformance in LNE, Scotland, Sussex, Wales and Western primarily driving this result.

The impact of reduced funding availability has affected LNW most predominantly, where a full review was instigated into intervention mix, scheme prioritisation, value derived from contractual frameworks and scheme by scheme scope.

Table 5.38: Earthworks Condition Score

Measure	2014/15	2015/16 Target	2015/16 Actual
England & Wales	1.75	1.80	1.74
Scotland	1.82	1.55	1.78
Network-wide	1.76	1.75	1.75

Drainage

Drainage Condition Score (DCS) is the weighted average of drainage asset portfolio condition. Routes implement an inspection regime in accordance with the Network Rail standard, Railway Drainage Systems Manual, with collected data being uploaded into our Drainage Inspection Database. Periodically and at year-end a report is extracted from the database, including the calculated DCS for Track and Earthworks/Structures and any issues are resolved with routes as necessary. DCS is determined separately for drainage assets attributed to track and those attributed to earthworks (off-track) and structures combined. A lower DCS represents better condition.



For both track and earthworks/structures DCS, national and England & Wales 2015/16 figures are considerably better than forecast. This has been driven by large variations in the Anglia and Sussex routes between 2015/16 forecasts and actuals.

Analysis has determined that improvement cannot be directly correlated to drainage intervention activities, which were under-delivered in 2015/16. The principal reason for the improved portfolio condition is the influence of adding drainage assets generally in favourable condition into the portfolio that had previously not been attributed with a structural condition grade (and therefore excluded from DCS calculations). The measure is anticipated to continue to show volatility as electronic recording of drainage assets and structural condition grades is completed using the Network Rail My Work App.

In February 2015, the ORR issued an improvement notice in relation to our management of drainage assets. We worked to address the ORR's concerns and undertook a ten point improvement plan throughout 2015/16. We have also further developed our overall drainage strategy and built a road map to achieve reliability and sustainability of our drainage assets in the most efficient way possible. We have been reporting our progress to the ORR throughout this process.

Through 2015/16, we worked to improve the quality and quantity of information about our drainage assets. This will enable us to deliver our overall sustainability strategy through future control periods.

Table 5.39: Drainage Condition Score

Measure		2014/15	2015/16 Target	2015/16 Actual
England & Wales	Track Drainage - Condition Score	1.38	1.65	1.40
	Earthwork/Structure Drainage - Condition Score	1.53	1.83	1.55
Scotland	Track Drainage - Condition Score	2.00	2.04	2.00
	Earthwork/Structure Drainage - Condition Score	1.27	1.34	1.28
Network-wide	Track Drainage - Condition Score	1.48	1.73	1.49
	Earthwork/Structure Drainage - Condition Score	1.49	1.72	1.51

Renewals Volumes

In 2015/16, following 2014/15 shortfalls and an identified lack of access and resources to undertake the level of work projected, a central risk adjustment overlay was included on a national basis to mitigate for known deliverability risk. In addition, our Business Plan for 2015 was updated to reflect delivery challenges. As such, the tables in this section include both the Delivery Plan targets set in 2014 (DP 2014) and the Business Plan targets set in 2015 (BP 2015).

Track and Off Track

In 2015/16, delivery of renewals across the plain line track portfolio was three per cent above target. This reflects delivery of an additional 100 kilometres against plan in the total conventional plain line portfolio. This was partially offset by shortfalls in the refurbishment workbank and the high output programme.

Several routes over-delivered within the conventional workbank, most significantly LNE and Wessex. In LNE, increased outturn is linked to recovery of deferred work from 2014/15 and accelerated delivery of 2016/17 volumes. Project Delta, an improvement programme focussed on targeted activity across core assets in Wessex, has delivered additional volume which was not fully quantified at the time of the budgeting. Alongside route delivery, we introduced a central risk adjustment overlay of 100 kilometres following delivery challenges in 2014/15. Over-delivery in the conventional workbank has been partially offset by smaller shortfalls across a number of routes, notably LNW, due to adjustments to the workbank mix and access and resource constraints.

Delivery of high output renewals was lower than target, predominantly due to shortfalls in LNE and LNW, offset slightly by delivery in East Midlands. In LNE, the derailment of a gantry crane and poor ground conditions led to shortfalls, while works within the LNW programme have been delayed due to late design completion and infrastructure access issues. Delivery in East Midlands was over target following the completion of deferred 2014/15 works. The central risk adjustment has also reduced the overall impact of shortfalls.

Plain line refurbishment was four per cent short of target. At a route level there were several areas of underperformance; most notably LNW with a 98 kilometre shortfall due to access issues at Baron Wood and Blisworth. Renewals in LNE have also been lower than anticipated; primarily because the Mobile Maintenance Train intended to support refurbishment works has been unavailable. There was some accelerated delivery in Scotland, while volumes in Anglia have been supplemented by the delivery of 2014/15 rollover work. This position has been further enhanced by the national risk overlay that was included in the baseline.

S&C volume delivery showed a three per cent favourable variance to target. Full S&C volume was 11 per cent lower than target which has been more than offset by additional delivery within the S&C refurbishment workbank. Full S&C under-delivery represents shortfalls of 13 per cent in complete renewals and a six per cent in abandonments. In Anglia and Wales, S&C renewals and abandonments were due to be completed as part of wider re-signalling schemes. Several schemes, including Cardiff Area Signalling Renewals and Norwich Yarmouth and Lowestoft Resignalling, have been delayed, affecting volumes delivered in 2015/16. The majority of the shortfall in East Midlands and LNE has been caused by a change in volume mix to deliver overall efficiency. This has been partially offset by accelerated delivery of 2016/17 volumes in LNW and the inclusion of Banbury remodelling works which were not within the baseline.



Across the S&C refurbishment portfolio, the most significant variances sit within LNE, LNW and Western. In LNE, there have been a number of issues securing possessions on the East Coast Main Line as well as resourcing, particularly in relation to 'rail vac' machines which were unavailable following the identification of a potential safety risk. Shortfall was partially offset by delivery of deferred 2014/15 volumes in Sussex.

Table 5.40: Track and off track renewals volumes – Total

		England & Wales					Scotland			Network-wide			
		2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line													
Conventional													
Steel Relay	km	13	0	42	27	16	14	14	11	29	14	42	38
Complete Renewal	km	124	143	160	133	17	37	25	19	140	180	144	152
Complete (formation)	km	20	29	27	23	2	8	10	12	22	37	29	35
Rail Renewal	km	241	212	290	321	37	27	24	29	277	239	278	350
Single Rail	km	38	24	41	45	13	9	10	17	52	33	44	62
High Output													
Automated Ballast Cleaning	km	0	183	60	2	0	0	0	0	0	183	60	2
Rail Sleeper Relay	km	145	190	180	121	0	0	0	0	145	190	153	121
Heavy Refurbishment	km	232	155	215	48	0	0	0	0	232	155	183	229
Refurbishment													
Heavy Refurbishment	km	78	80	78	42	2	7	5	6	80	88	67	48
Medium (concrete)	km	77	147	221	142	30	63	70	84	107	211	247	226
Medium (other)	km	114	112	139	130	25	34	35	40	139	146	148	170
Switches & Crossings													
S&C delivered													
Abandonment (Point Ends)	No.	33	81	97	74	6	11	14	14	39	92	94	88
Full Renewal (Point Ends)	No.	208	287	266	213	23	31	16	19	231	318	266	232
Refurbishment													
Heavy Refurbishment (Point Ends)	No.	149	307	341	203	21	30	36	41	170	337	297	244
Medium (Point Ends)	No.	249	364	399	430	11	38	34	36	260	429	344	466
Off Track													
Fencing	km	571	745	913	816	226	215	215	161	797	960	1,128	977
Slab track	km	0	0	0	0	0	0	0	0	0	0	0	0

Table 5.41: Track and off track renewals volumes – Route Criticality 1

		England & Wales				Scotland				Network-wide			
		2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line													
Conventional													
Steel Relay	km	0	0	0	1	0	0	0	0	0	0	0	1
Complete Renewal	km	23	26	18	12	0	0	0	0	23	26	18	12
Complete (formation)	km	7	12	10	7	0	0	0	0	7	12	10	7
Rail Renewal	km	17	38	26	3	0	0	0	0	17	38	26	3
Single Rail	km	12	18	17	0	0	0	0	0	12	18	17	0
High Output													
Automated Ballast Cleaning	km	0	122	0	0	0	0	0	0	0	122	0	0
Rail Sleeper Relay	km	56	140	0	44	0	0	0	0	56	140	0	44
Heavy Refurbishment	km	61	18	0	71	0	0	0	0	61	18	0	71
Refurbishment													
Heavy Refurbishment	km	5	21	9	5	0	0	0	0	5	21	9	5
Medium (concrete)	km	1	6	0	0	0	0	0	0	1	6	0	0
Medium (other)	km	7	2	0	0	0	0	0	0	7	2	0	0
Switches & Crossings													
S&C delivered													
Abandonment (Point Ends)	No.	4	10	0	2	0	0	0	0	4	10	0	2
Full Renewal (Point Ends)	No.	32	65	52	40	0	0	0	0	19	65	52	40
Refurbishment													
Heavy Refurbishment (Point Ends)	No.	7	27	36	1	0	0	0	0	7	27	0	1
Medium (Point Ends)	No.	40	66	66	0	0	0	0	0	40	66	7	0
Off Track													
Slab track	km	0	0	0	0	0	0	0	0	0	0	0	0

Table 5.42: Track and off track renewals volumes – Route Criticality 2

		England & Wales				Scotland				Network-wide			
		2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line													
Conventional													
Steel Relay	km	0	0	0	0	0	0	0	0	0	0	0	0
Complete Renewal	km	39	41	41	30	5	22	5	7	44	63	46	37
Complete (formation)	km	6	10	7	5	1	5	3	2	7	15	10	7
Rail Renewal	km	104	56	61	5	35	8	23	1	139	64	96	6
Single Rail	km	7	4	11	0	13	4	10	0	20	8	21	0
High Output													
Automated Ballast Cleaning	km	0	42	0	0	0	0	0	0	0	42	0	0
Rail Sleeper Relay	km	37	3	152	33	0	0	0	0	37	3	152	33
Heavy Refurbishment	km	83	44	223	109	0	0	0	0	83	44	223	109
Refurbishment													
Heavy Refurbishment	km	11	3	0	0	0	3	0	0	11	6	0	0
Medium (concrete)	km	9	15	0	0	30	0	70	0	39	15	70	0
Medium (other)	km	21	2	0	0	25	0	35	1	45	3	5	1
Switches & Crossings													
S&C delivered													
Abandonment (Point Ends)	No.	4	10	0	7	1	7	14	4	5	17	14	11
Full Renewal (Point Ends)	No.	94	94	102	66	8	26	16	5	102	120	118	71
Refurbishment													
Medium (Point Ends)	No.	48	35	32	0	20	17	34	0	68	52	66	0
Heavy Refurbishment (Point Ends)	No.	79	61	0	9	11	11	36	0	90	72	1	9
Off Track													
Slab track	km	0	0	0	0	0	0	0	0	0	0	0	0

Table 5.43: Track and off track renewals volumes – Route Criticality 3

		England & Wales				Scotland				Network-wide			
		2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line													
Conventional													
Steel Relay	km	5	0	3	4	1	1	0	0	0	1	3	4
Complete Renewal	km	34	45	44	30	5	13	17	9	38	58	60	39
Complete (formation)	km	4	5	7	6	1	3	5	7	6	8	12	13
Rail Renewal	km	50	49	149	3	0	4	0	0	50	53	149	3
Single Rail	km	15	1	9	0	0	3	0	0	15	4	9	0
High Output													
Automated Ballast Cleaning	km	0	2	0	0	0	0	0	0	0	2	0	0
Rail Sleeper Relay	km	44	25	28	39	0	0	0	0	44	25	28	39
Heavy Refurbishment	km	26	38	30	47	0	0	0	0	26	38	30	47
Refurbishment													
Heavy Refurbishment	km	36	30	34	2	2	3	4	3	38	34	38	5
Medium (concrete)	km	19	15	89	0	0	6	0	0	19	20	89	0
Medium (other)	km	46	47	72	4	0	1	0	2	46	48	72	6
Switches & Crossings													
S&C delivered													
Abandonment (Point Ends)	No.	4	12	49	2	3	4	0	6	7	16	49	8
Full Renewal (Point Ends)	No.	74	96	67	48	8	4	0	13	82	102	67	61
Refurbishment													
Medium (Point Ends)	No.	54	105	184	0	0	7	0	0	54	112	184	0
Heavy Refurbishment (Point Ends)	No.	82	95	249	13	0	11	0	13	82	106	249	26
Off Track													
Slab track	km	0	0	0	0	0	0	0	0	0	0	0	0

Table 5.44: Track and off track renewals volumes – Route Criticality 4

		England & Wales				Scotland				Network-wide			
		2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line													
Conventional													
Steel Relay	km	3	0	3	5	1	2	5	3	4	2	7	8
Complete Renewal	km	17	11	37	26	7	2	4	4	24	12	41	30
Complete (formation)	km	2	2	3	3	0	0	3	3	2	2	6	6
Rail Renewal	km	49	51	1	2	0	6	0	0	49	57	2	2
Single Rail	km	2	1	0	0	0	0	0	0	2	1	0	0
High Output													
Automated Ballast Cleaning	km	0	17	0	0	0	0	0	0	0	17	0	0
Rail Sleeper Relay	km	18	22	0	5	0	0	0	0	8	22	0	5
Heavy Refurbishment	km	61	47	21	3	0	0	0	0	61	47	21	3
Refurbishment													
Heavy Refurbishment	km	18	15	7	4	0	0	0	1	18	15	8	5
Medium (concrete)	km	29	90	103	0	0	32	0	0	29	122	103	0
Medium (other)	km	19	35	0	0	0	1	0	1	19	36	0	1
Switches & Crossings													
S&C delivered													
Abandonment (Point Ends)	No.	8	32	0	0	2	0	0	4	10	32	0	4
Full Renewal (Point Ends)	No.	9	24	0	3	7	1	0	0	16	25	0	3
Refurbishment													
Medium (Point Ends)	No.	33	102	53	0	1	0	0	0	34	108	53	0
Heavy Refurbishment (Point Ends)	No.	28	101	61	0	0	1	0	3	28	107	61	3
Off Track													
Slab track	km	0	0	0	0	0	0	0	0	0	0	0	0

Table 5.45: Track and off track renewals volumes – Route Criticality 5

		England & Wales				Scotland				Network-wide			
		2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16	2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line													
Conventional													
Steel Relay	km	5	0	35	12	14	11	9	9	19	11	44	21
Complete Renewal	km	10	19	9	8	0	0	0	0	10	20	9	8
Complete (formation)	km	0	0	0	0	0	0	0	0	0	0	0	0
Rail Renewal	km	21	17	1	2	0	9	0	0	22	27	1	2
Single Rail	km	2	1	0	0	0	1	0	0	2	2	0	0
High Output													
Automated Ballast Cleaning	km	0	0	0	0	0	0	0	0	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Refurbishment	km	0	7	0	0	0	0	0	0	0	7	0	0
Refurbishment													
Heavy Refurbishment	km	8	10	4	1	0	1	0	0	8	11	4	1
Medium (concrete)	km	19	22	0	0	0	26	0	0	19	48	0	0
Medium (other)	km	21	25	12	0	0	31	0	5	21	57	0	5
Switches & Crossings													
S&C delivered													
Abandonment (Point Ends)	No.	13	18	3	1	0	0	0	0	13	18	3	1
Full Renewal (Point Ends)	No.	11	6	0	12	0	0	0	0	11	6	0	12
Refurbishment													
Medium (Point Ends)	No.	7	38	26	0	0	0	0	0	7	38	26	0
Heavy Refurbishment (Point Ends)	No.	20	41	20	0	0	10	0	0	20	51	20	0
Off Track													
Slab track	km	0	0	0	0	0	0	0	0	0	0	0	0

Civils

In 2015/16, although the overall delivery of renewals volumes within our civils portfolio has improved from 2014/15, we did not achieve our targets across several assets. Improvement has been driven by greater stability in the framework agreed with our contractors within some routes, as well as schemes developed through the Civils Adjustment Mechanism and associated policy work. There have been fluctuations by asset type and route which are, in part, representative of the evolving deliverable workbank. The Hendy re-plan will impact on the workbank in the remainder of CP5, but volume delivery in 2015/16 has also been affected as routes have given consideration to risk mitigation and scheme selection. Resource and access constraints have also affected renewals throughout the portfolio. Some under-delivery has been offset by a mitigating corporate risk overlay, introduced to the budgeting process following delivery challenges in 2014/15.

Delivery of underbridge renewals was 12 per cent below target for 2015/16, primarily due to shortfalls in East Midlands, LNE and LNW. Additional volume delivery in Scotland as well as the corporate risk overlay helped to offset this shortfall. Internal resource challenges in East Midlands and LNE, leading to delays in finalising contractor agreements, have resulted in the deferral of a number of underbridge renewals, while the pause of the Midlands Main Line Electrification programme has impacted specific works in East Midlands. Deferrals in LNW have resulted from access challenges across the route, including access to a Site of Special Scientific Interest at Eskmeals Viaduct. In Scotland, completion of 2014/15 deferred volumes and efficiency opportunities taken in the year have resulted in over-delivery, partially offsetting the national under-delivery.

Across the structures portfolio, the overbridge variance is the most significant with an under-delivery of 67 per cent compared to target. This is largely attributable to under-delivery in Sussex where an increase in anticipated costs has resulted in deferred work. A re-evaluation of the renewals of the Ebury, Eccleston and Elizabeth Overbridges, all in the Victoria area, showed significantly higher final costs than the available budget. As a result, work items have been re-prioritised based on asset condition; waterproofing of Elizabeth and Eccleston bridges will take place next year to manage the short term asset condition risk more cost-effectively. Although not as significantly as Sussex, East Midlands and LNE overbridge renewals were also under target for 2015/16. Better than anticipated asset condition, resource challenges and future access opportunities have all resulted in deferrals.

Renewals across the remainder of the structures portfolio including tunnels, footbridges, coastal defences and retaining walls were below target. A number of routes were below target for these assets, most significantly Kent, LNE, LNW and

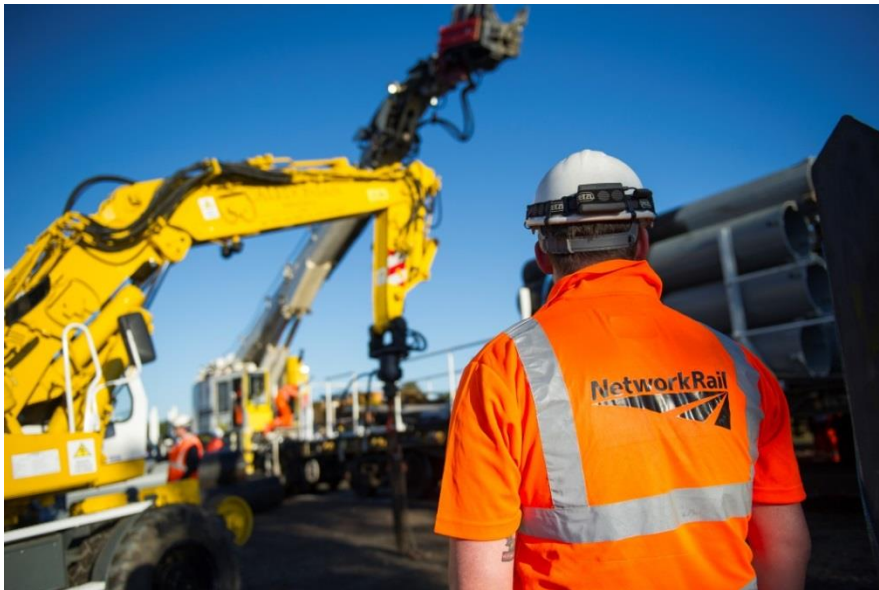
Wales, as a result of programme scope changes, internal resource issues and identified access efficiencies later in CP5.



Total renewals for earthworks assets were four per cent over target for 2015/16. A large element of the additional volume is following stabilisation of delivery frameworks as well as a reduced level of emergency works. Due to a more proactive rather than reactive approach taken for earthworks renewals, there has been a reduced level of emergency works across the network which has led to increased volumes due to focus on delivering both planned work and recovery of 2014/15 volumes rather than resource-sapping emergency works. A significantly improved area of volume delivery was embankment renewals, where six routes have reported positive variances.

Embankments maintenance and refurbishment were both below target. The most significant under-delivery across these activities was in LNW, Scotland, Sussex and Wales. Resource and access issues affected delivery in LNW, as well as some delays in sign-off of specific works. Under-delivery in Scotland was due to works completed ahead of schedule in 2014/15, while Sussex continues to adopt a targeted approach to work, resulting in a constantly evolving workbank. Wales has experienced difficulties obtaining the necessary resource and therefore focussed on delivery of lower level interventions utilising internal resource.

Rock cuttings maintenance fell 41 per cent below target. Resource challenges and deferrals related to the Hendy re-plan have impacted delivery in LNW and Wales. Additional work delivered in Kent as part of the continuation of the CP4 vegetation strategy which impacted rock cuttings and has helped to offset under-delivery. Conversely, rock cuttings renewal was 153 per cent above target, largely due to additional volume delivered in Scotland following an extension of scope across the workbank. A number of routes have outperformed against target due to the delivery of 2014/15 rollover volumes. Further to this, there was over-delivery in Western linked to the vegetation programme which was given access and resource to drive uplift in works, and LNW delivered additional renewals due to additional condition-driven, reactive interventions



Soil cuttings maintenance and renewal activities were above target, driven by over-delivery in LNE, Scotland, Wales and Western. Over-delivery in Scotland and Wales was a result of increased scope across the workbank, while Western delivered additional work due to its vegetation programme. Following delays in securing a contractor in 2014/15, LNE delivered rollover works in 2015/16. Soil cuttings refurbishment was 24 per cent below target, with the most significant

variances in LNW, Wales and Western following the Hendy re-plan and review of workbank prioritisation. These variances have been partially offset by favourable delivery in LNE, where 2014/15 rollover was delivered this year.

The impact of reduced funding availability following the revision of business planning targets through the Hendy review has affected in year delivery in LNW most predominantly, and to a lesser extent Anglia, Kent and Sussex where funding in some routes has been reduced to support other assets. As a result, a full review of the earthworks work bank has been instigated to ensure the best use of funding available through CP5 is being spent with a review of intervention mix, scheme prioritisation, value derived from contractual frameworks and scheme by scheme scope.

Variances across the buildings portfolio are representative of a growing need to package work effectively and look more widely across the renewals and enhancements portfolio for alignment opportunities.

All renewals volumes related to managed stations were lower than target. Contractor resource issues in Anglia resulted in deferrals, while initial tenders in Sussex have revealed higher than anticipated costs for a number of canopies projects, which have been deferred to 2016/17 as a result. Franchised stations buildings renewals volumes were above target for 2015/16, driven by outperformance of target in LNW as a result of completion of 2014/15 schemes. Franchised stations platforms delivery was below target in 2015/16 due to shortfalls across the majority of routes, most notably LNW where works have been re-phased so that the majority of activity will take place next year. Franchised station canopies delivered were below target, predominantly due to shortfalls in Wales where Cardiff Queen Street station canopy was deferred into next year following access challenges related to Six Nations and Rugby World Cup fixtures.

Delivery of LMD renewals was below target, mainly due to the delay to one scheme. At Cardiff Canton Depot in Wales, the planned timeframe to tender was insufficient and the design sign-off was not completed in time. Renewal of lineside buildings was higher than target, driven by additional reactive work in LNW linked to asset condition requirements, plus the completion of works at the Alexandra Palace generator room, in LNE, which had been delayed from 2014/15. Maintenance Delivery Unit (MDU) renewal volume was below target due to under-delivery in LNE, where the majority of the 2015/16 workbank was due to be delivered, and there have been delays in the design stage of multiple projects.

Table 5.46: Civils renewals volumes – England & Wales

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Structures					
Underbridges	m ²	53,624	122,370	137,068	91,573
Overbridges (incl BG3)	m ²	9,426	31,801	39,385	11,663
Tunnels	m ²	16,073	73,267	34,150	28,646
Culverts	m ²	4,432	2,686	3,461	4,560
Footbridges	m ²	544	2,260	4,760	1,649
Coastal & Estuary Defences	m ²	6,999	3,812	3,655	3,459
Retaining Walls	m ²	3,350	5,868	13,410	7,288
Earthworks Total	Earthwork assets	1,576	2,669	3,772	3,263
Embankments - Maintenance	Earthwork assets	595	-	933	801
Embankments - Refurbishment	Earthwork assets	178	-	644	514
Embankments - Renewal	Earthwork assets	83	-	154	134
Rock Cuttings - Maintenance	Earthwork assets	65	-	408	207
Rock Cuttings - Refurbishment	Earthwork assets	56	-	168	122
Rock Cuttings - Renewal	Earthwork assets	41	-	77	121
Soil Cuttings - Maintenance	Earthwork assets	372	-	663	899
Soil Cuttings - Refurbishment	Earthwork assets	123	-	576	366
Soil Cuttings - Renewal	Earthwork assets	63	-	148	99
Track Drainage					
Renewal	lm	5,829	6,453	12,818	11,305
Refurbishment	lm	15,605	32,613	93,216	98,864
New Build	lm	2,467	799	2,621	2,599
EW Drainage					
Renewal	lm	1,566	6,094	31,150	7,320
Refurbishment	lm	1,017	1,264	3,497	1,184
Maintenance	lm	2,755	22,477	26,359	19,101
New Build	lm	5,410	5,227	4,196	5,616
Franchised Stations					
Buildings	m ²	22,575	3,290	7,504	8,968
Platforms	m ²	51,901	68,729	59,918	28,636
Canopies	m ²	45,801	19,523	31,753	15,492
Train Sheds	m ²	7,753	5,680	3,680	11,800
Footbridges	m ²	1,326	5,122	5,804	5,230
Lifts & Escalators	No.	4	6	11	14
Managed Stations					
Buildings	m ²	6,432	5,550	5,779	1,892
Platforms	m ²	217	800	100	100
Canopies	m ²	265	1,193	2,406	527
Train Sheds	m ²	0	0	6,718	2,184
Footbridges	m ²	120	0	0	0
Lifts & Escalators	No.	3	0	4	1
Light Maintenance Depots					
Buildings	m ²	232	6,946	68,207	9,245
Depot Shed	m ²	32,450	4,450	11,855	17,809
Lineside Buildings					
Buildings	m ²	5,356	3,027	6,425	6,744
MDU					
Buildings	m ²	7,397	8,201	27,299	4,920

Table 5.47: Civils renewals volumes – Scotland

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Structures					
Underbridges	m ²	10,860	21,109	23,866	25,560
Overbridges (incl BG3)	m ²	1,285	2,261	2,468	2,284
Tunnels	m ²	1,360	1,766	1,766	1,766
Culverts	m ²	333	773	701	591
Footbridges	m ²	424	421	454	472
Coastal & Estuary Defences	m ²	330	700	700	700
Retaining Walls	m ²	75	133	487	697
Earthworks Total	Earthwork assets	727	439	621	729
Embankments - Maintenance	Earthwork assets	146	-	150	111
Embankments - Refurbishment	Earthwork assets	60	-	134	24
Embankments - Renewal	Earthwork assets	16	-	1	20
Rock Cuttings - Maintenance	Earthwork assets	33	-	42	25
Rock Cuttings - Refurbishment	Earthwork assets	56	-	41	29
Rock Cuttings - Renewal	Earthwork assets	79	-	18	89
Soil Cuttings - Maintenance	Earthwork assets	185	-	170	359
Soil Cuttings - Refurbishment	Earthwork assets	115	-	41	50
Soil Cuttings - Renewal	Earthwork assets	37	-	24	22
Track Drainage					
Renewal	lm	0	0	0	2,080
Refurbishment	lm	0	0	3,372	130
New Build	lm	0	0	0	0
EW Drainage					
Renewal	lm	10	1,480	915	585
Refurbishment	lm	210	336	17	12
Maintenance	lm	0	2,906	1,716	1,395
New Build	lm	1,697	0	0	190
Franchised Stations					
Buildings	m ²	0	573	342	0
Platforms	m ²	2,580	1,900	2,300	815
Canopies	m ²	5,339	229	1,713	3,230
Train Sheds	m ²	460	2,300	1,024	4,800
Footbridges	m ²	0	672	426	303
Lifts & Escalators	No.	0	67	0	0
Managed Stations					
Buildings	m ²	280	265	240	809
Platforms	m ²	0	0	0	0
Canopies	m ²	0	0	0	0
Train Sheds	m ²	0	0	0	0
Footbridges	m ²	0	0	0	0
Lifts & Escalators	No.	0	7	0	0
Light Maintenance Depots					
Buildings	m ²	11	0	0	0
Depot Shed	m ²	8,433	0	0	0
Lineside Buildings					
Buildings	m ²	0	265	1,605	1,440
MDU					
Buildings	m ²	3,750	56	56	0

Table 5.48: Civils renewals volumes – network-wide

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Structures					
Underbridges	m ²	64,484	143,479	132,734	117,133
Overbridges (incl BG3)	m ²	10,711	34,062	41,853	13,947
Tunnels	m ²	17,433	75,033	35,916	30,412
Culverts	m ²	4,765	3,459	4,162	5,151
Footbridges	m ²	968	2,681	5,214	2,121
Coastal & Estuary Defences	m ²	7,329	4,512	4,355	4,159
Retaining Walls	m ²	3,425	6,001	13,897	7,985
Earthworks Total	Earthwork assets	2,304	3,108	3,842	3,992
Embankments - Maintenance	Earthwork assets	741	-	973	912
Embankments - Refurbishment	Earthwork assets	238	-	688	538
Embankments - Renewal	Earthwork assets	99	-	121	154
Rock Cuttings - Maintenance	Earthwork assets	98	-	395	232
Rock Cuttings - Refurbishment	Earthwork assets	112	-	178	151
Rock Cuttings - Renewal	Earthwork assets	120	-	83	210
Soil Cuttings - Maintenance	Earthwork assets	557	-	743	1,258
Soil Cuttings - Refurbishment	Earthwork assets	238	-	546	416
Soil Cuttings - Renewal	Earthwork assets	100	-	114	121
Track Drainage					
Renewal	lm	5,829	6,453	12,818	13,385
Refurbishment	lm	15,605	32,613	96,588	98,994
New Build	lm	2,467	799	2,621	2,599
EW Drainage					
Renewal	lm	1,576	7,574	32,065	7,905
Refurbishment	lm	1,227	1,599	3,514	1,196
Maintenance	lm	3,032	25,383	28,075	20,496
New Build	lm	7,107	5,227	4,196	5,806
Franchised Stations					
Buildings	m ²	22,575	3,863	7,846	8,968
Platforms	m ²	54,481	70,629	62,218	29,451
Canopies	m ²	51,140	19,752	33,466	18,722
Train Sheds	m ²	8,213	7,980	4,704	16,600
Footbridges	m ²	1,326	5,794	6,230	5,533
Lifts & Escalators	No.	4	73	11	14
Managed Stations					
Buildings	m ²	6,712	5,815	6,019	2,701
Platforms	m ²	217	800	100	100
Canopies	m ²	265	1,193	2,406	527
Train Sheds	m ²	0	0	6,718	2,184
Footbridges	m ²	120	0	0	0
Lifts & Escalators	No.	3	7	4	1
Light Maintenance Depots					
Buildings	m ²	243	6,946	68,207	9,245
Depot Shed	m ²	40,883	4,450	11,855	17,809
Lineside Buildings					
Buildings	m ²	5,356	3,292	8,030	8,184
MDU					
Buildings	m ²	11,147	8,257	27,355	4,920

Signalling

Across the signalling portfolio, delivery of full conventional volume, partial conventional volume and targeted component renewals was above target, while modular activity fell short of target by 72 per cent.

Delivery of full conventional volumes, from a route perspective, has been varied with a number of deviations from plan in 2015/16. There were shortfalls across Kent and LNW which was offset by over-delivery in LNE, Wessex and Western. In LNE and Western, additional renewals have been delivered following a re-classification of activity (from modular volume), relating to Bristol Area Signalling Renewal and Enhancements programme and the North Lincolnshire Scheme.

Across the partial conventional workbank, there was under-delivery in LNW, Sussex and, to a lesser extent, Western. These shortfalls are due to the deferrals of specific programmes including the Bromsgrove Corridor Re-signalling Scheme, the West Sussex Re-signalling Scheme and the Swindon Area Re-signalling Scheme. This has been offset by the national deliverability adjustment as well as over delivery in Kent and LNE, most notably within the North Lincolnshire Scheme where efficiency and volume outturn has been higher than anticipated.

Delivery of targeted component renewals exceeded target, largely as a result of increased delivery in LNW and Sussex where additional, targeted works were delivered. In Sussex, this work was completed to improve performance on the Brighton Mainline.

Modular volume activity in 2015/16 was 72 per cent below target which, from a route perspective, is a result of deviations in East Midlands and LNE. In East Midlands, an element of the East Nottinghamshire Modular Re-signalling Scheme

has been deferred to next year as a result of access issues and increased costs. In LNE, the adverse variance is as a result of re-classification of activity, as described above.



Level crossing renewal volumes were below target, with deviations to plan across multiple routes. In Kent, the Medway Valley element of the East Kent Phase Two Scheme was deferred due to increased costs. In LNE, there is a lack of resource in the route and as a result, a number of level crossing renewals have been deferred.

Table 5.49: Signalling renewals volumes

		England & Wales				Scotland				Network-wide			
		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual	2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual	2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Full Conventional re-signalling	SEUs	516	1,231	1,139	993	4	0	0	0	520	1,231	954	993
ERTMS re-signalling	SEUs	0	2	0	0	0	0	0	0	0	2	0	0
Partial Conventional re-signalling	SEUs	169	886	495	414	0	31	0	0	169	917	393	414
Targeted Component renewal	SEUs	7	79	6	35	0	8	3	8	7	87	9	42
Modular re-signalling	SEUs	0	365	68	19	0	0	0	0	0	365	68	19
Level Crossing Renewals	No.	30	103	84	45	5	3	0	0	35	106	84	45

Electrification and Plant

Delivery of renewals volumes in 2015/16 met or exceeded target for key metrics including OLE wire runs and conductor rail volumes. In other areas some metrics haven't fallen substantially below target which can be attributed, in some instances, to the reactive nature of some of the required interventions for these assets.

Nationally, delivery for OLE re-wire runs was in line with target. There was a shortfall of one wire run in LNE due to insufficient materials resourcing with contractors. This was counterbalanced by accelerated delivery in Anglia of one wire run that was originally planned to be delivered in 2016/17.

The variance in mid-life refurbishment is due to an overstated volume amount within the initial delivery plan. Upon further inspection, the work being undertaken for the funding prescribed does not equate to full a full mid-life refurbishment intervention. Work of this nature was never envisaged to retain asset condition or sustainability in CP5.

The 32 per cent shortfall in structures renewals volumes is due to under-delivery in Anglia, East Midlands and LNW. Anglia experienced access constraints where priority was given to works within the Crossrail programme making it difficult to secure a prolonged possession on the Great Eastern Project. In East Midlands, the Midland Mainline Electrification project was paused during the year, resulting in shortfall of structures volumes delivery. In LNW, three structures were renewed ahead of schedule and reported last year, while the remaining four have been deferred to 2016/17 due to possession availability and contractor resource issues.

At the end of 2015/16, delivery of conductor rail renewals volumes was better than target with an additional 63 per cent delivered nationally. This is predominantly due to Sussex having outperformed by 124 per cent. Over-delivery in Sussex is a result of the rollover of deferred 2014/15 work in addition to 2015/16 work. This additional volume has been partially offset by an under-delivery of two kilometres in LNW where difficulties attaining a possession have led to Euston-Watford renewals being deferred into 2016/17.

There has been under-delivery across the DC distribution portfolio, predominantly due to re-phasing of work in Kent and Sussex. This is due to work bank prioritisation considering access, resource, efficiency opportunities and costs against asset condition and performance to make best use of the funding available through CP5. We identified a safety concern within work practices in Wessex and immediately stopped all associated work until safety measures can be put in place. This safety stand down resulted in a further shortfall in delivery.

High voltage (HV) switchgear renewal (AC) volumes fell short of target with only 25 per cent of the baseline delivered in 2015/16. This is primarily due to deferred volumes in LNE where work at Finsbury Park has been deferred into 2016/17 due to contractor and access issues. Three booster transformer volumes planned in Anglia were not delivered due to condition being better than original assessment.

There have also been deferrals of work across the DC distribution portfolio. A portion of planned renewal of HV Switchgear (DC) has been deferred due to the safety stand down in Wessex, contributing to a national shortfall of 89 per cent.



Delivery of low voltage (LV) cables in Kent has fallen short of target due to work being re-profiled to future years of CP5. At the end of the year, LV switchgear renewals are three units below target and transformer rectifier volume delivery is seven units below target. Both of these metrics were affected by shortfalls in Kent where work has been re-profiled to later in CP5. LV cables delivery ended 25 per cent short of target, similarly due to work in Kent being re-profiled to future years to promote efficiency. This reduction has been offset by acceleration within Wessex where activity has been transferred between Network Rail delivery teams. This came following recognition of a more efficient means of delivery. Each period, we hold Asset Technical Review meetings in which route teams report on best practice, to enable such efficiencies to be shared across the network. Additionally, reactive work in relation to LV cables was lower than expected due to asset

condition and performance, allowing resources to be redirected and deliver accelerated volumes.

At year-end, there was a 52 per cent shortfall in the delivery of point heaters renewal. In LNW, where the majority of the shortfall was evident, works at Crewe have been completed but, due to resource availability, there has been a delay in final sign off of the renewal of the asset. Some works have been deferred to 2016/17 due to delays in finding new Distribution Network Operator (DNO) suppliers. Resource challenges in East Midlands resulted in a 15 unit shortfall. In Wessex, 34 units have now been de-scoped as a result of funding constraints.

The SPS cables portfolio ended the year 222 kilometres behind target due to shortfalls in Anglia, LNW and Western. Anglia was unable to deliver any planned works due to the continued impact of belatedly securing a framework contractor. This was slightly offset by additional renewals in Wessex which were carried out due to improved asset information provided through the Intelligent Infrastructure programme. In LNW, 89 kilometres of cable have been deferred to later in CP5 due to contractor resource availability. In Western, there was a 57 kilometre shortfall, predominantly due to the deferral of the Gloucester North Cable Renewal Scheme following an internal delay to the receipt of designs. Signalling supply points is 241 units behind target due to a misalignment of volume in LNW's budgeting process.

Table 5.50: E&P renewals volumes – network-wide

		England & Wales				Scotland				Network-wide			
		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual	2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual	2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Contact Systems													
OLE Re-wiring	wire runs	21	48	29	29	37	1	26	25	58	49	54	54
Mid-life Refurbishment	wire runs	0	67	0	0	0	0	0	0	0	67	0	0
Structure Renewals	No.	81	154	170	115	0	3	0	0	81	157	170	115
Conductor rail													
Renewals	km	26	26	39	41	0	0	0	0	26	26	25	41
AC distribution													
HV Switchgear Renewal	No.	21	8	24	6	0	0	0	0	21	8	24	6
Booster Transformers	No.	0	20	3	0	0	2	0	0	0	22	3	0
DC distribution													
HV Switchgear Renewal	No.	2	36	27	3	0	0	0	0	2	36	27	3
HV Cables	km	6	20	35	20	0	0	0	0	6	20	35	20
LV Switchgear Renewal	No.	65	72	51	48	0	0	0	0	65	72	51	48
LV Cables	km	22	16	49	37	0	0	0	0	22	16	49	37
Transformer Rectifiers	No.	8	2	9	2	0	0	0	0	8	2	9	2
Fixed plant													
Signalling Power Cable	km	20	229	248	69	0	27	43	0	22	256	291	69
Principle Supply Point Renewal	No.	12	16	343	101	10	0	2	3	22	16	345	104
Rail Heating													
Points Heating Renewal	Point end	71	148	313	151	0	3	0	0	71	151	313	151

Telecoms

In 2015/16, delivery of telecoms renewals was variable; renewal of operational communications exceeded target by 392 per cent while Station Information and Surveillance Systems (SISS) renewals was 61 per cent below target.

The shortfall on CIS volumes is predominantly due to under-delivery in LNE, LNW and Scotland. In LNE and Scotland, 175 volumes relating to Virgin Trains East Coast have been deferred to later in CP5 due to questions over ownership following re-franchising. In LNW, CIS and public address volumes were due to be delivered at Manchester Piccadilly. Estimates for this work were higher than expected, leading to a full tender process and project deferral. Additional CCTV renewals volumes are due to delivery in LNW where the CCTV project with London Midland delivered 150 volumes of CCTV that were omitted from the initial budget.

There has been over-delivery across the operational communications portfolio, predominantly in PABX concentrators in relation to the Hi-Path Project in LNE

which was not included in the budget due to uncertainties over deliverables at the time the plan was developed. This has been partially offset by under delivery in Scotland where changes have been made across the whole workbank so that Infrastructure Projects teams can deliver the planned volumes for CP5.

Additional Driver Only Operated (DOO) mirrors were delivered in LNW in relation to the Chiltern DOO Mirrors Project, which had previously been omitted from the budget. This over delivery has been partially offset by under delivery across both the processor controlled concentrators (100 per cent) and, to a lesser extent, DOO CCTV (44 per cent). Under-delivery of processor controlled concentrators relates to the SEA Small Concentrator Renewals Scheme. The future of this scheme is currently being discussed among delivery teams after compliance requirement changes which made delivery inefficient.

Table 5.51: Telecoms renewals volumes

		England & Wales				Scotland				Network-wide			
		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual	2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual	2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Station Information and Surveillance Systems													
Customer Information Systems	No.	112	742	192	20	0	6	15	0	112	749	207	20
Public Address	No.	296	4,017	984	294	511	43	0	0	807	4,060	984	294
CCTV	No.	151	2,426	0	151	54	0	0	0	205	2,426	0	151
Clocks	No.	0	27	8	8	0	0	0	0	0	27	8	8
Operational Comms													
PABX Concentrator	No.	0	997	0	1,088	0	82	82	0	0	1,079	82	1,088
Processor Controlled Concentrator	No.	21	206	82	0	0	0	1	0	21	206	83	0
Driver-Only Operation: CCTV	No.	9	0	65	35	0	11	11	0	9	11	76	43
Driver-Only Operation: Mirrors	No.	0	83	15	31	0	7	7	0	0	90	22	31
Public Emergency Telephone System	No.	22	0	0	13	0	3	3	0	22	3	3	13
Human Machine Interface Large	No.	0	12	0	11	0	0	0	0	0	12	0	11
Human Machine Interface Small	No.	0	0	0	0	0	0	0	0	0	0	0	0
Radio System	No.	0	0	0	3	0	0	0	73	0	0	0	76
Power Systems	No.	7	2	0	0	0	1	0	46	7	3	0	46

Maintenance Volumes

Maintenance plans for CP4 and CP5 were largely based on resource requirements rather than the volume of activity needed to achieve asset reliability targets. The forecast accuracy of maintenance volumes is therefore variable but a number of programmes are working to improve this. The programmes including activity based planning, ORBIS (decision support tools), whole-life cost models and better asset management are working together to augment asset count & condition data, information regarding constraints such as access to assets and our understanding of criticality to produce sustainable maintenance plans.

Track and Off-Track

The volume of track maintenance delivered in 2015/16 is broadly consistent with the CP5 Delivery Plan forecast. There has been an increased emphasis on reducing maintenance 'backlog' and subsequently volumes delivered often exceed forecast. The improved focus has also resulted in revisions being made to internal volume targets. A number of internal Maintenance Normalised Tasks (MNT) targets are different to the targets set in the CP5 Delivery Plan.

Due to an emerging view of asset condition, plain line stoneblowing targets were revised internally to 1,572 kilometres compared to a Delivery Plan target of 3,459 kilometres. We delivered 96 per cent of the revised target. Precautions for hot weather, machine breakdowns and shorter access windows have contributed to the targeted being marginally missed. Plain line grinding exceeded target by 86 per cent.

Implementation of vehicle-based eddy-current testing is progressing well and will be embedded into business as usual for the 2017/18 financial year. Eddy current test equipment is now fitted to all of our UTU fleet to provide new train based surface crack measuring technology to better understand the length and depth of Rolling Contact Fatigue (RCF) across the network. The data is now being routinely collected and will be used to improve the asset records using the new surface crack measuring equipment. The improved data will be used to better prioritise the removal of more severe RCF before actionable ultrasonic defects are detected. In addition to this a review is underway to seek to increase the effectiveness of our grinding on both plain line and S&C. The benefits of improved knowledge gained from the new eddy current surface crack measuring equipment will be used to further improve our rail management policies and standards.

S&C maintenance volumes are variable. Crossing renewals, point end maintenance and half-sets volumes are broadly consistent with CP5 delivery plan forecasts. However, activities requiring on-track machines are significantly lower than delivery plan. Point-end tamping, stoneblowing and grinding have been under-delivered. Variation is the product of a number of factors including high demand of S&C capable machines for renewal and enhancement schemes, access constraints and machine reliability issues. Wessex, Western and Anglia are reviewing this with a view to reducing the impact.

Wet-bed removals exceeded forecast by 18 per cent, both by mechanical and manual methods. Preventative maintenance in Kent, Sussex and Western contributed to more activity in this area. Rail changing has been over-delivered by 22 per cent, in part due to reactive maintenance of defects being higher than forecast as a result of inspection increasingly becoming automated. Mechanical and manual ballast re-profiling has over delivered by approximately 46 per cent. This is largely explained by the ongoing preparation for automated inspection of Continuous Welded Rail plain line track which requires ballast re-profiling for the vehicle-based inspection to be successful. Replacement of pads and insulators is a recognised activity for extending the life of sleepers and bearers, and was over-delivered by 105 per cent. As such, opportunities to over deliver have been taken to drive the lowest-whole life cost.

A mixture of over and under delivery of off-track maintenance is evident. National drainage volumes are 34 per lower than forecast. The shortfall is in part the result of resource issues and restrictions/delays in obtaining the Road Rail Vehicles (RRV) to deliver drainage activity in Anglia and LNE routes. Fences and boundary repair volumes were 32 per cent below forecast. This is the result of less reactive work volumes were required than expected. Vegetation management volumes including dangerous trees, manual treatment and mechanised removal have been over delivered with the exception of vehicle-based treatment. There has been an increased focus on vegetation management across all routes, with improvement plans now in place. The availability of data gathered from an aerial survey will be available at the end of 2016/17 is likely to result in material change to Delivery Plan volumes and will need to be revisited.

Table 5.52: Track and Off Track maintenance volumes – England & Wales

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	4,253	5.948	2,933
	Plain Line Stoneblowing (km)	MNT005	1,346	3.077	1,564
	Manual Wet bed removal (bay)	MNT006	23,140	17,162	21,633
	Mechanical Wet bed remover (bay)	MNT012	11,057	9,675	11,151
	S&C Tamping (point end)	MNT007	3,157	4,062	2,353
	Rail Changing - AI-Thermic Weld - Standard Gap (weld)	MNT044	15,743	13,068	17,871
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	92,880	74,039	91,516
	Mechanical re-profiling of Ballast (Mile)	MNT017	2,556	2,577	5,992
	Manual re-profiling of Ballast (rail yard)	MNT020	2,144,626	1,466,746	2,199,344
	Replace Pads & Insulators (sleeper)	MNT029	416,540	363,500	824,575
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	1,738,623	1,039,805	1,358,401
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	421,069	201,466	410,177
	S&C Renew Crossing (crossing)	MNT120	580	597	779
	S&C Maintenance (point end)	MNT122	351,075	398,942	336,581
	S&C Renew half set of Switches (H/S Switch)	MNT123	606	694	679
	S&C Stoneblowing (point end)	MNT124	227	913	235
	Rail grinding plain line (Mile)	MNT309	4,497	8,917	17,248
	Rail grinding S&C (point end)	MNT310	1,098	3,201	2,249
Off Track	Fences & Boundary Walls (yard)	MNT072	470,646	828,305	581,011
	Drainage (Yard)	MNT073	305,383	796,363	542,488
	LX Management - Off Track (Each)	MNT075	14,773	14,793	13,669
	Vegetation Removal of Boundary Trees (No.)	MNT081	31,880	27,465	40,683
	Vegetation Management by Train (Mile)	MNT082	1,746	7,970	4,171
	Vegetation Management Manual (Sq yard)	MNT170	5,594,219	4,763,224	6,225,825
	Vegetation Management Mechanised (Mile)	MNT171	12,758	2,334	11,239

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Table 5.53: Track and Off Track maintenance volumes – Scotland

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	451	612	349
	Plain Line Stoneblowing (km)	MNT005	154	382	155
	Manual Wet bed removal (bay)	MNT006	1,307	2,004	1,064
	Mechanical Wet bed remover (bay)	MNT012	1,072	696	981
	S&C Tamping (point end)	MNT007	320	399	264
	Rail Changing - AI-Thermic Weld - Standard Gap (weld)	MNT044	1,530	2,728	1,867
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	9,740	11,906	12,848
	Mechanical re-profiling of Ballast (Mile)	MNT017	1,796	182	96
	Manual re-profiling of Ballast (rail yard)	MNT020	95,960	122,688	116,606
	Replace Pads & Insulators (sleeper)	MNT029	47,210	88,000	99,676
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	81,135	91,817	68,361
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	100,883	45,000	79,931
	S&C Renew Crossing (crossing)	MNT120	70	75	72
	S&C Maintenance (point end)	MNT122	77,036	34,015	78,393
	S&C Renew half set of Switches (H/S Switch)	MNT123	26	79	73
	S&C Stoneblowing (point end)	MNT124	0	69	0
	Rail grinding plain line (Mile)	MNT309	71	1,256	1,696
	Rail grinding S&C (point end)	MNT310	212	216	248
Off Track	Fences & Boundary Walls (yard)	MNT072	112,843	189,574	110,329
	Drainage (Yard)	MNT073	69,957	151,754	80,682
	LX Management - Off Track (Each)	MNT075	2,164	2,849	3,320
	Vegetation Removal of Boundary Trees (No.)	MNT081	6,154	13,139	5,483
	Vegetation Management by Train (Mile)	MNT082	1	1,177	4
	Vegetation Management Manual (Sq yard)	MNT170	468,389	171,156	445,614
	Vegetation Management Mechanised (Mile)	MNT171	207	26	390

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing

Table 5.54: Track and Off Track maintenance volumes – network-wide

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	4,704	6,559	3,282
	Plain Line Stoneblowing (km)	MNT005	1,500	3,459	1,719
	Manual Wet bed removal (bay)	MNT006	24,447	19,165	22,697
	Mechanical Wet bed remover (bay)	MNT012	12,129	10,371	12,132
	S&C Tamping (point end)	MNT007	3,477	4,461	2,616
	Rail Changing - AI-Thermic Weld - Standard Gap (weld)	MNT044	17,273	15,797	19,738
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	102,620	85,946	104,364
	Mechanical re-profiling of Ballast (Mile)	MNT017	4,352	2,759	6,088
	Manual re-profiling of Ballast (rail yard)	MNT020	2,240,586	1,589,434	2,315,950
	Replace Pads & Insulators (sleeper)	MNT029	463,750	451,500	924,252
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	1,819,758	1,131,622	1,426,762
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	521,952	246,466	490,108
	S&C Renew Crossing (crossing)	MNT120	650	673	851
	S&C Maintenance (point end)	MNT122	428,111	432,957	414,974
	S&C Renew half set of Switches (H/S Switch)	MNT123	632	774	752
	S&C Stoneblowing (point end)	MNT124	227	982	235
	Rail grinding plain line (Mile)	MNT309	4,568	10,173	18,944
	Rail grinding S&C (point end)	MNT310	1,310	3,417	2,497
Off Track	Fences & Boundary Walls (yard)	MNT072	583,489	1,017,879	691,340
	Drainage (Yard)	MNT073	375,340	947,117	623,170
	LX Management - Off Track (Each)	MNT075	16,937	17,642	16,989
	Vegetation Removal of Boundary Trees (No.)	MNT081	38,034	40,601	46,166
	Vegetation Management by Train (Mile)	MNT082	1,747	9,147	4,176
	Vegetation Management Manual (Sq yard)	MNT170	6,062,608	4,934,380	6,671,439
	Vegetation Management Mechanised (Mile)	MNT171	12,965	2,361	11,629

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Electrical Power

The volume of electrical power maintenance delivered in 2015/16 was generally higher across all MNTs than forecast in the CP5 Delivery Plan. The five electrical power MNTs are the product of 929 standard jobs, which are a mix of planned and reactive work types. As such, the rolled up numbers only provide a guide to our effective maintenance within the year and do not accurately reflect the performance strategy for each asset type. Our asset reliability results for 2015/16 demonstrate the improvements to our maintenance delivery strategy delivered by the use of intelligent infrastructure and reactive maintenance.

Conductor rail maintenance, DC traction power, OHL components and points heating volumes all exceed forecast. SPS maintenance was 10 per cent lower than the forecast volume.

Over-delivery of OLE components was in part due to LNE recovery of a maintenance backlog carrying over from 2014/15 and more reactive works than originally forecast. In LNW, a focus on asset reliability revealed an underlying issue with certain components within the asset portfolio. Maintenance work was carried out to rectify this issue. Higher than forecast volume of conductor rail maintenance were predominantly driven by additional activity in Kent, Sussex and Wessex. In these routes, there has been a higher rate of emerging, reactive work than anticipated, resulting in higher levels of maintenance delivered across the conductor rail portfolio. In Kent and Sussex, asset management teams for electrical power and signalling worked together to deliver maintenance of SPS. This resulted in over-delivery compared to target. Wessex installed intelligent infrastructure fault monitoring units to all systems to detect developing faults. This led to investigation and repair before a failure occurred, resulting in a slight underperformance against maintenance volumes target, but an outperformance for asset reliability. Delivery of OLE components in Scotland was lower than Delivery Plan target in 2015/16 due to a combination of factors. These factors were overestimated levels of OLE defects and proposed new electrification assets at standard job level.

We have invested in the use of intelligent infrastructure and Remote Condition Monitoring (RCM) to provide up to date information on the condition of assets. This has allowed us to focus on identification of faults and early maintenance intervention prior to failure, particularly across non-traction and points heating

assets. This has resulted in mixed performance compared to target, but in all cases the overall reliability of assets has been improved in year.



Table 5.55: Electrical Power maintenance volumes – England & Wales

			2014/15	DP 2014 Target	2015/16 Actual
Electrical Power	Maintain Conductor Rail (Various)	MNT206	67,986	47,641	77,998
	Maintain DC Traction Power Supplies (Each)	MNT209	36,837	33,909	41,325
	Maintain OLE Components (Various)	MNT211	330,212	151,577	338,337
	Maintain Points Heating (Each)	MNT212	126,246	131,613	134,835
	Maintain Signalling Power supplies (No.)	MNT213	28,325	35,475	33,782

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Table 5.56: Electrical Power maintenance volumes – Scotland

			2014/15	DP 2014 Target	2015/16 Actual
Electrical Power	Maintain Conductor Rail (Various)	MNT206	0	0	0
	Maintain DC Traction Power Supplies (Each)	MNT209	1,213	0	2,102
	Maintain OLE Components (Various)	MNT211	19,591	44,751	21,876
	Maintain Points Heating (Each)	MNT212	6,394	8,546	7,278
	Maintain Signalling Power supplies (No.)	MNT213	4,569	6,316	3,473

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Table 5.57: Electrical Power maintenance volumes – network-wide

			2014/15	DP 2014 Target	2015/16 Actual
Electrical Power	Maintain Conductor Rail (Various)	MNT206	67,986	47,641	77,998
	Maintain DC Traction Power Supplies (Each)	MNT209	38,050	33,909	43,427
	Maintain OLE Components (Various)	MNT211	349,803	196,328	360,212
	Maintain Points Heating (Each)	MNT212	132,640	140,160	142,113
	Maintain Signalling Power supplies (No.)	MNT213	32,894	41,790	37,254

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Buildings and Civils

Maintenance volumes for buildings are reported under two different categories of examinations; 'visual examinations' and '5 yearly examinations'.

Nationally, delivery of 'five yearly examinations' of buildings has exceeded target in 2015/16, while 'visual examinations' were 26 per cent worse than target. We have delivered a backlog of operational property examinations throughout the year. In addition, in order to proactively identify and rectify faults within our operational property portfolio, routes have developed asset management strategies based on root cause analysis. This has driven an increase in examinations compared to 2014/15 in order to monitor the condition of our assets and reduce the number of reported faults, which has successfully improved our asset reliability for buildings in 2015/16.

In Scotland, examination volumes have exceeded target by 19 per cent. There has been an increased focus on assets that have had repetitive failures. Increased site scoping and examinations have been key drivers in developing a strategic targeted workbank in the route.

Anglia has undertaken external stakeholder liaison, including with train operators, to identify local risks. We continued to undertake regular maintenance delivery reviews, so that minor faults were addressed before becoming reportable. These reviews are designed to address the current risks.

Structures maintenance volumes relate to seven categories of examination (Table 5.60). Our two primary controls for maintenance of structures assets are examination and assessment. Delivery of structures maintenance was generally below target in 2015/16, with only one measure exceeding target; underwater examinations. While some shortfall is a result of backlogs from previous years, we have also identified delays in the sign-off of examinations.

Although still below target, the number of ancillary structures examinations in 2015/16 was an improvement from 2014/15. In 2014/15 all routes refined the process for this type of examination which has continued to deliver improvements in 2015/16.

Throughout the year, there has been national and route level focus on building a more mature data set for our structures assets through examinations and assessments. Due to the delay within the process for signing off examinations, a number of results are yet to be signed off and therefore are not included in this report.

Within the load carrying assessments portfolio, delivery of maintenance volumes was 100 per cent below target for 2015/16. This is due to the under-delivery of some levels of load carrying assessments, which, in line with the Network Rail standard, are now only being completed when they are required for compliance or asset management decision making. In addition, there were resourcing challenges across the network.

At the hand-back of assets, following interventions, we have introduced new data requirements to provide an up-to-date assessment of the asset condition.



Table 5.58: Buildings and civils maintenance volumes – England & Wales

			2014/15	DP 2014 Target	2015/16 Actual
Buildings	Visual examinations Buildings (each)	MNT226	9,662	12,889	8,968
	5 yearly examinations (each)	MNT227	519	620	452
Civils	Visual Examinations (Civils) (No.)	MNT226a	49,611	54,703	42,362
	Tunnel Examinations (No. minor elements)	MNT220	108,567	110,193	83,526
	Detailed Examinations (No.)	MNT221	7,700	9,279	7,251
	Underwater Examination (No.)	MNT222	1,396	1,124	1,096
	Ancillary Structure examination (No. detailed)	MNT223	634	1,305	1,084
	Hidden critical element examinations (No.)	MNT224	739	953	689
	Load carrying assessment (No. spans)	MNT225	6,775	9,255	2,459

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Table 5.59: Buildings and civils maintenance volumes – Scotland

			2014/15	DP 2014 Target	2015/16 Actual
Buildings	Visual examinations Buildings (each)	MNT226	352	1,214	1,447
	5 yearly examinations (each)	MNT227	182	480	847
Civils	Visual Examinations (Civils) (No.)	MNT226a	10,535	11,030	10,974
	Tunnel Examinations (No. minor elements)	MNT220	8,833	9,084	9,052
	Detailed Examinations (No.)	MNT221	1,301	1,655	1,530
	Underwater Examination (No.)	MNT222	94	82	153
	Ancillary Structure examination (No. detailed)	MNT223	199	203	161
	Hidden critical element examinations (No.)	MNT224	92	150	148
	Load carrying assessment (No. spans)	MNT225	111	1,287	261

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Table 5.60: Buildings and civils maintenance volumes – network-wide

			2014/15	DP 2014 Target	2015/16 Actual
Buildings	Visual examinations Buildings (each)	MNT226	10,014	14,103	10,415
	5 yearly examinations (each)	MNT227	701	1,100	1,299
Civils	Visual Examinations (Civils) (No.)	MNT226a	60,146	65,733	53,336
	Tunnel Examinations (No. minor elements)	MNT220	117,400	119,277	92,578
	Detailed Examinations (No.)	MNT221	9,001	10,934	8,781
	Underwater Examination (No.)	MNT222	1,490	1,206	1,249
	Ancillary Structure examination (No. detailed)	MNT223	833	1,508	1,245
	Hidden critical element examinations (No.)	MNT224	831	1,103	837
	Load carrying assessment (No. spans)	MNT225	6,886	10,542	2,720

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Anglia

The reliability of the majority of our assets in Anglia has exceeded target in 2015/16.

The number of rail breaks and immediate action defects in 2015/16 was 30 per cent better than target and a 17 per cent improvement from 2014/15. While overall defect and serious defect numbers have continued to improve, the number of broken rails in 2015/16 increased. This was primarily a direct result of the challenging maintenance environment around resources, budget and track access. The increase in wet track beds and the associated lack of drainage maintenance is now being addressed. Additionally, the route focus on the reduction of geometry faults and associated track voiding is expected to reduce the occurrence of corrosion pits within the rail which causes rail breaks. This issue currently accounts for approximately 30 per cent of broken rails.

PTG was 0.25 percentage points better than target, although showed slightly worse performance compared to 2014/15. Track Maintenance Engineer (TME) plans to target 'super red' and 'very poor' track sections through the use of S&C stoneblowers had a positive effect on PTG within S&C. Through the implementation of sprinter tamping in 2016/17, this improvement is also expected in plain line. The implementation of route and TME specific action plans to target repeat geometry faults delivered an associated improvement in PTG towards the end of the year, although the final result was a 0.3 percentage points worse than 2014/15.

The number of service affecting track failures in 2015/16 was one per cent worse than target. The primary focus in Anglia was the reduction of incidents on track route criticality one and two (heavy, more frequent traffic). This was achieved by 25 per cent and 50 per cent respectively. Continued focus on early identification and removal of the primary causes of speed restrictions, typically repeat geometry faults and defective S&C units has resulted in stability in our track reliability compared to 2014/15, and driven the improvement on criticality one and two track.

The track team in Anglia has also been working to verify and improve the data quality within our corporate track data system. Assessment of compliance to updated processes for data quality within Infrastructure Projects and works delivery teams showed a 97 per cent compliance rate. A similar action was undertaken within maintenance delivery units, including awareness briefings on the new processes for updating asset data in both GEOGIS and Ellipse.

In 2015/16, signalling reliability in Anglia was less than one per cent worse than target. During the year we analysed signalling failures and created improvement

plans. This has led to three key focuses to improve reliability in 2016/17. It has been identified that failures of level crossing infrastructure are diverse, both in cause and location, but some trends have been identified with the reliability of treadles and relays which will be addressed. Train detection will also be addressed, with a focus on improving track connections and fittings. Module replacement is also expected to deliver future reliability improvement.



With regard to signalling data quality, we have been working with ORBIS to develop the Decision Support Tools (DST). These have been tested at Clacton as a trial data and asset assessment, and the DST aligned to the existing assessment of the asset.

The reliability of points in 2015/16 was three per cent below target. This was particularly evident in the Romford area; however reliability in the Tottenham and Ipswich areas has been in line with targets. Failures in the Romford area have significantly affected service due to the busy location. During the year analysis has been carried out and failures across the three types of points in Anglia are now understood, allowing the creation of targeted improvement plans. The primary focus is the ownership of maintenance of points, focussing more on maintaining the switch as a system through collaboration between track and signalling

functions. In addition, we plan to fit slide chair rollers across criticality one track to reduce the possibility of failures due to insufficient lubrication.

Of the total service affecting telecoms failures in Anglia, 80 per cent were attributed to GSM-R in 2015/16. The Delivery Plan target of 183 was missed by 78 per cent, while the adjusted target of 308 was missed by six per cent, although there was an improvement of 35 per cent since 2014/15. Analysis has identified national GSM-R software issues and Mobile Network Operator interference at key sites as the most frequent reasons for failure. Performance improvement schemes have been implemented at key locations and junctions which have suffered with the greatest interference. A national improvement programme has been implemented to specifically address the behavioural impacts of users of GSM-R.

Within Anglia, there have also been initiatives to identify repetitive failures of user worked level crossings and lineside telephony. We have developed a strategy to migrate systems to FTN which has proved successful reducing the number of failures and incidents throughout 2015/16. This strategy, which removes key operational services from legacy systems and cables, is being accelerated to provide more resilient fibre-based bearers.

Across electrical power assets, the reliability of all asset types was better than target in 2015/16. Anglia has focussed on the management of defects with OLE which will affect the performance of the asset. The most recent performance improvement is a result of vegetation management. A weekly report is used to understand the number of live vegetation management defects which may affect OLE. These, in conjunction with weekly reviews of asset performance, have been used to set priorities and drive reliability improvement. The ongoing renewals on the Great Eastern Main Line are expected to continue to contribute to improvements.

The buildings team in Anglia have maintained a consistently high performance, with faults in 2015/16 being 49 per cent better than target. We have engaged with external stakeholders, including train operators, to identify and address local risks prior to the requirement for a fault to be raised. We undertake regular reviews to monitor the performance of the maintenance and works delivery teams as well as delivery on Infrastructure Projects to maintain the current high levels of performance. During 2015/16 we undertook thorough analysis of historical fault

items to identify trends and assess our planned preventative against the relevant risks.

The reliability of structures, measured by the number of open work items with a risk score greater than or equal to 12, was eight per cent worse than target in 2015/16. We will continue to focus on regular workbank reviews, focussed intervention on high risk defects and rapid close out of works with the contractor issuing hand back files within 28 days of completing on site. In 2015/16, proposed funding levels for structures were reduced for the remainder of CP5. As a result of this, it is expected that further reactive work will be required for the safe operation of the railway.

Work has been undertaken to improve the data quality of the Anglia structures asset stock including a full update of the route availability database and the introduction of processes to identify owners and maintainers within data in CARRS.

The five year moving average for earthworks failures was three per cent better than target for 2015/16. The team has focused on the delivery of the renewal, refurbishment and maintenance works in the Business Plan. The successful delivery of these is directly linked to earthworks reliability. Works have been planned with regard to the current earthwork risk profile. A workbank of delivery of drainage works was also delivered and a number of sites have monitoring systems to allow intervention prior to asset failure. Despite the wet weather in 2015/16, we have delivered target due to the proactive approach taken. Earthworks funding for the remainder of CP5 was revised in 2015/16. As such, we will move towards a risk-based asset management approach for the safe operation of the railway.

We continued a number of long-term renewals projects, targeting improved reliability of the Great Eastern Main Line. Since early 2015 the high output ballast cleaner has renewed 65 kilometres of track ballast between Shenfield and Norwich, improving the drainage on the line and providing a solid foundation for smoother journeys. We also continued renewal of OLE between London Liverpool Street and Shenfield, this year completing nearly 20 kilometres of new auto-tensioned cabling to improve reliability. We have worked collaboratively with local authorities on our ongoing level crossing closures programme. In autumn 2015 two public exhibitions were held to identify preferred options among local communities and we are now pursuing the closure of a number of individual level crossings, including Gipsy Lane in Suffolk, where there was a fatality in 2011.

Table 5.61: Asset Condition Reliability - Anglia

Principal Asset	Description	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
Track	Rail Breaks and Immediate Action defects per 100km	2.64	4.09	5.89	4.66	5.49	3.87
	Track geometry (Poor Track Geometry) (%)	3.61	2.65	2.69	2.16	2.71	2.46
	Track failures (service affecting)	652	632	781	730	723	730
Signalling	Signalling failures (service affecting)	1,667	1,482	1,455	1,261	1,363	1,369
Telecoms	Telecoms failures (service affecting)	162	181	481	497	183	325
Electrical Power	AC traction power failures (service affecting)	469	382	300	262	375	193
	DC traction power failures (service affecting)	4	5	2	2	4	1
	Non traction operational power supply failures (service affecting)	39	49	50	21	50	21
Buildings	Buildings - Re-active Faults (2 & 24) (attention with 2hrs, fix within 24hrs) (attention within 24hrs, fix within 7 days)	636	642	607	490	793	402
Structures	Number of open work items with a risk score $\geq$ 12	-	-	293	80	75	81
Earthworks	Earthwork failures (5 year moving average)	1.2	1.2	3.8	3.4	4.0	3.8
Points	Point failures (service affecting)	385	414	362	283	332	321

Table 5.62: Asset Condition Sustainability – Anglia

Principal Asset	Description	2014/15	2015/16 Target	2015/16 Actual
Track	Track - % Used Life – Rail	50.8	47.0	51.4
	Track - % Used Life - Switches & Crossings	57.9	55.8	57.2
	Track - % Used Life – Sleepers	63.8	62.1	64.0
	Track - % Used Life – Ballast	49.5	44.6	48.6
Signalling	Signalling Condition Index (SICA Remaining Life)	15.54	13.88	15.31
Telecoms	Telecoms - Remaining Life (%)	58.3	52.6	57.9
Electrical Power	EP - Remaining Life - Conductor Rail (%)	51.5	50.3	50.2
	EP - Remaining Life - Overhead Line Equipment (OLE) (%)	50.1	50.8	50.7
	EP - Remaining Life - Signalling Power Cable (%)	-	-	56.7
Buildings	Stations - Remaining Life (%)	48.9	47.3	48.1
	Light Maintenance Depot (LMD) - Remaining Life (%)	48.1	44.8	43.2
Structures	Average condition of major deck elements	70.0	70.3	69.7
	Tunnel Condition Monitoring Index (TCMI)	84.7	82.5	83.1
Earthworks	Earthworks - Condition Score	1.63	1.70	1.61
Drainage	Track Drainage - Condition Score	1.43	2.42	1.35
	Earthwork/Structure Drainage - Condition Score	1.42	2.22	1.40

Table 5.63: Track and off track renewals – Anglia - Total

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	1	0	0	0
Complete Renewal	km	12	18	18	14
Complete (formation)	km	1	4	3	2
Rail Renewal	km	20	17	20	25
Single Rail	km	0	1	1	0
High Output					
Automated Ballast Cleaning	km	0	19	60	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	17	66	0	63
Refurbishment					
Heavy Refurbishment	km	10	1	1	8
Medium (concrete)	km	0	9	2	5
Medium (other)	km	0	6	1	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	18	17	1
Full Renewal (Point Ends)	No.	35	39	27	20
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	29	34	20	12
Medium (Point Ends)	No.	8	55	30	19
Off Track					
Fencing	km	116	48	47	40
Slab track	km	0	0	0	0

Note: Change to steel relay in 2014/15 due to data refreshing.

Table 5.64: Track and off track renewals – Anglia – Criticality 1

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	7	7	4
Complete (formation)	km	0	2	2	2
Rail Renewal	km	0	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	2	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	2	0	0
Full Renewal (Point Ends)	No.	0	9	0	8
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	12	0	0
Medium (Point Ends)	No.	0	14	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.65: Track and off track renewals – Anglia – Criticality 2

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	6	0	0
Complete (formation)	km	0	1	0	0
Rail Renewal	km	17	3	0	0
Single Rail	km	0	1	0	0
High Output					
Automated Ballast Cleaning	km	0	19	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	17	38	60	63
Refurbishment					
Heavy Refurbishment	km	10	0	0	0
Medium (concrete)	km	0	4	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	5	0	0
Full Renewal (Point Ends)	No.	17	23	26	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	29	10	0	0
Medium (Point Ends)	No.	8	15	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.66: Track and off track renewals – Anglia – Criticality 3

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	1	0	0	0
Complete Renewal	km	0	0	6	2
Complete (formation)	km	0	0	0	0
Rail Renewal	km	3	8	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	2	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	2	16	0
Full Renewal (Point Ends)	No.	13	4	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	1	0	0
Medium (Point Ends)	No.	0	5	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.67: Track and off track renewals – Anglia – Criticality 4

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	1	6	4
Complete (formation)	km	0	1	1	1
Rail Renewal	km	0	6	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	28	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	1	0	0
Medium (other)	km	0	3	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	2	0	0
Full Renewal (Point Ends)	No.	5	3	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	11	0	0
Medium (Point Ends)	No.	0	11	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.68: Track and off track renewals – Anglia – Criticality 5

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	1	0	0	0
Complete Renewal	km	0	3	2	3
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	1	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	0	3	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	7	0	1
Full Renewal (Point Ends)	No.	0	0	0	12
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	0	10	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.69: Track and off track renewals – Anglia – no route criticality

		BP 2015 Target	2015/16
Plain Line			
Conventional			
Steel Relay	km	0	0
Complete Renewal	km	0	0
Complete (formation)	km	0	0
Rail Renewal	km	17	25
Single Rail	km	1	0
High Output			
Automated Ballast Cleaning	km	0	0
Rail Sleeper Relay	km	0	0
Heavy Refurbishment	km	0	0
Refurbishment			
Heavy Refurbishment	km	1	8
Medium (concrete)	km	2	5
Medium (other)	km	1	0
Switches & Crossings			
S&C delivered			
Abandonment (Point Ends)	No.	1	0
Full Renewal (Point Ends)	No.	1	0
Refurbishment			
Heavy Refurbishment (Point Ends)	No.	20	12
Medium (Point Ends)	No.	30	19
Off Track			
Fencing	km	47	40
Slab track	km	0	0

Table 5.70: Civils renewals volumes – Anglia

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Structures					
Underbridges	m ²	64,484	8,174	6,691	8,082
Overbridges (incl BG3)	m ²	10,711	870	782	915
Tunnels	m ²	17,433	600	200	50
Culverts	m ²	4,765	98	520	355
Footbridges	m ²	967	288	117	43
Coastal & Estuary Defences	m ²	7,329	0	0	0
Retaining Walls	m ²	3,425	160	80	0
Earthworks Total	Earthwork assets	2,303	205	170	191
Embankments - Maintenance	Earthwork assets	741	-	48	61
Embankments - Refurbishment	Earthwork assets	238	-	31	67
Embankments - Renewal	Earthwork assets	99	-	21	23
Rock Cuttings - Maintenance	Earthwork assets	98	-	0	0
Rock Cuttings - Refurbishment	Earthwork assets	112	-	0	0
Rock Cuttings - Renewal	Earthwork assets	120	-	0	6
Soil Cuttings - Maintenance	Earthwork assets	557	-	70	0
Soil Cuttings - Refurbishment	Earthwork assets	238	-	0	27
Soil Cuttings - Renewal	Earthwork assets	100	-	0	7
Track Drainage					
Renewal	lm	5,829	364	364	78
Refurbishment	lm	15,605	106	104	0
New Build	lm	2,467	16	16	9
EW Drainage					
Renewal	lm	1,576	708	364	0
Refurbishment	lm	1,227	195	104	96
Maintenance	lm	3,032	200	200	50
New Build	lm	7,107	19	16	10
Franchised Stations					
Footbridges	m ²	1,326	0	0	0
Train Sheds	m ²	8,213	0	0	0
Canopies	m ²	51,140	291	2	0
Platforms	m ²	54,481	3,365	0	0
Buildings	m ²	22,575	200	4,000	1.317
Lifts & Escalators	No.	4	0	0	0
Managed Stations					
Footbridges	m ²	120	0	0	0
Train Sheds	m ²	0	0	0	0
Canopies	m ²	265	0	0	0
Platforms	m ²	217	0	0	0
Buildings	m ²	6,712	5,100	0	0
Lifts & Escalators	No.	3	0	0	0
Light Maintenance Depots					
Buildings	m ²	243	1	7,639	828
Depot Shed	m ²	40,883	0	0	0
Lineside Buildings					
Buildings	m ²	5,356	225	0	0
MDU					
Buildings	m ²	11,147	0	3,000	375

Table 5.71: Signalling renewals volumes – Anglia

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Full Conventional re-signalling	SEUs	0	0	0	0
ERTMS re-signalling	SEUs	0	0	0	0
Partial Conventional re-signalling	SEUs	0	0	0	0
Targeted Component renewal	SEUs	7	1	0	2
Modular re-signalling	SEUs	0	154	0	0
Level Crossing renewals	No.	0	11	2	1

Table 5.72: Electrification and Plant renewals volumes – Anglia

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Contact Systems					
OLE re-wiring	wire runs	16	22	11	12
Mid-life Refurbishment	wire runs	0	0	0	0
Structure Renewals	No.	78	141	146	115
Conductor rail					
Renewals	km	0	0	0	0
AC distribution					
HV Switchgear Renewal	No.	0	0	0	0
Booster Transformers	No.	0	3	3	0
DC distribution					
HV Switchgear Renewal	No.	0	0	0	0
HV Cables	km	4	0	0	0
LV Switchgear Renewal	No.	0	0	0	0
LV Cables	km	0	0	0	0
Transformer Rectifiers	No.	0	0	0	0
Fixed plant					
Signalling Power Cable	km	0	18	32	0
Principle Supply Point Renewal	No.	2	7	6	0
Rail Heating					
Points Heating Renewal	Point end	32	28	9	0

Table 5.73: Telecoms renewals volumes – Anglia

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Station Information and Surveillance Systems					
Customer Information Systems	No.	0	0	0	0
Public Address	No.	0	0	0	0
CCTV	No.	0	350	0	0
Clocks	No.	0	0	0	0
Operational Comms					
PABX Concentrator	No.	0	0	0	0
Processor Controlled Concentrator	No.	0	0	0	0
Driver-Only Operation: CCTV	No.	9	0	65	32
Driver-Only Operation: Mirrors	No.	0	0	15	0
Public Emergency Telephone System	No.	0	0	0	0
Human Machine Interface Large	No.	0	0	0	0
Human Machine Interface Small	No.	0	0	0	0
Radio System	No.	0	0	0	0
Power Systems	No.	0	0	0	0

Table 5.74: Maintenance volumes – Anglia

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	630	650	551
	Plain Line Stoneblowing (km)	MNT005	149	299	72
	Manual Wet bed removal (bay)	MNT006	2,326	531	1,544
	Mechanical Wet bed remover (bay)	MNT012	580	744	324
	S&C Tamping (point end)	MNT007	126	208	146
	Rail Changing - AI-Thermic Weld - Standard Gap (weld)	MNT044	2,211	662	2,270
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	11,363	3,516	11,127
	Mechanical reprofiling of Ballast (Mile)	MNT017	248	144	74
	Manual reprofiling of Ballast (rail yard)	MNT020	345,677	52,942	227,550
	Replace Pads & Insulators (sleeper)	MNT029	36,195	55,755	49,111
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	129,686	49,974	135,304
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	29,033	16,911	42,587
	S&C Renew Crossing (crossing)	MNT120	52	27	80
	S&C Maintenance (point end)	MNT122	35,409	31,347	35,583
	S&C Renew half set of Switches (H/S Switch)	MNT123	49	34	48
	S&C Stoneblowing (point end)	MNT124	43	111	31
	Rail grinding plain line (Mile)	MNT309	0	915	1,680
	Rail grinding S&C (point end)	MNT310	0	762	278
Off Track	Fences & Boundary Walls (yard)	MNT072	35,402	23,407	46,378
	Drainage (Yard)	MNT073	50,144	145,084	145,105
	LX Management - Off Track (Each)	MNT075	3,753	1,118	557
	Vegetation Removal of Boundary Trees (No.)	MNT081	8,147	1,230	2,981
	Vegetation Management by Train (Mile)	MNT082	11	1,273	2
	Vegetation Management Manual (Sq yard)	MNT170	1,588,841	161,132	1,461,396
	Vegetation Management Mechanised (Mile)	MNT171	725	329	216
Electrical Power	Maintain Conductor Rail (Various)	MNT206	0	40	8
	Maintain DC Traction Power Supplies (Each)	MNT209	2,242	35	2,362
	Maintain OHL Components (Various)	MNT211	90,016	32,400	58,592
	Maintain Points Heating (Each)	MNT212	13,264	14,454	12,805
	Maintain Signalling Power supplies (No.)	MNT213	2,212	1,542	3,119
Civils	Visual Examinations (Civils) (No.)	MNT226a	3,963	3,561	3,513
	Tunnel Examinations (No. minor elements)	MNT220	1,418	1,641	813
	Detailed Examinations (No.)	MNT221	663	624	647
	Underwater Examination (No.)	MNT222	335	130	76
	Ancillary Structure examination (No. detailed)	MNT223	10	158	132
	Hidden critical element examinations (No.)	MNT224	56	43	6
	Load carrying assessment (No. spans)	MNT225	700	821	94
Buildings	Visual examinations Buildings (each)	MNT226	751	834	74
	5 yearly examinations (each)	MNT227	122	91	33

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

LNE & East Midlands

For operating purposes, LNE & East Midlands is now one route. Consequently we have provided commentary for the combined LNE & East Midlands operating route. Data for each measure is provided separately.

In LNE & East Midlands, reliability of the majority of assets met or exceeded target in 2015/16.

Across our track assets, all three measures of reliability have exceeded targets. Rail breaks and immediate action defects per 100 kilometres have steadily improved over recent years, out-performing the 2015/16 targets by 36 per cent and 35 per cent in LNE and East Midlands respectively. We have focussed on earlier intervention and targeting of critical assets to achieve this.



PTG outperformed target by 0.11 percentage points in LNE and 0.47 percentage points in East Midlands. A key driver of improvement in PTG, as well as rail breaks and immediate action defects, was the route policy to intervene earlier on dip angles on higher speed lines than required by the Network Rail standard. Additionally, there has been increased focus on 'super red' sections of track and repeat geometry faults to improve PTG.

Service affecting track failures continued to improve from previous years to be ahead of target by five per cent in LNE and 26 per cent in East Midlands. The main focus was the removal of TSRs, which have been a challenge in recent years following a line speed increase on the Midland Main Line. Changes to the flow of freight traffic, particularly at Port of Tyne, have increased the track deterioration

rate and the frequency of incidents. The route renewals team have been directly aligned to track section managers to lead to a better understanding of known risk locations, and refine the renewal Delivery Plan. For the first time in 2015/16, LNE & East Midlands had a combined on track machines plan. This reduced conflicts early and improved confidence in maintenance plans.

The number of service affecting signalling failures exceeded target by two per cent and six per cent in LNE and East Midlands respectively. This was a result of targeted minor works upgrades to critical assets alongside delivery of large scale re-signalling programmes such as East Nottinghamshire and North Lincolnshire. Intelligent infrastructure has also delivered benefits to the management of track circuit assets. There has been concern with the reliability of obstacle detector equipment, axle counter equipment and signal light engine modules, particularly in cold weather. This has been offset by considerable success from our level crossing upgrade programme and continued deployment of full light emitting diode signal technology along key corridors. Improvement programmes for the obstacle detector level crossings are underway and the deployment of improved light engine modules in 2016 is expected to deliver continued improvement.



The reliability of points has continued to improve significantly during the year, exceeding target by 22 per cent in LNE and 37 per cent in East Midlands. We have focussed on minor works to improve performance on critical assets and, in

particular, remove deficiencies to design and setup. Where traffic patterns introduce heavy usage, programmes have been implemented to undertake routine minor component replacement to improve reliability and extend asset life. A major factor in the scale of improvement has been the change in freight traffic profile and in particular the reduction in coal traffic within the Route.

The deployment of GSM-R has significantly impacted telecoms reliability for the past two years resulting in LNE missing target for 2015/16. The telephone infrastructure in particular has improved following the upgrade of telephone handsets in a number of areas. As targeted improvements are undertaken with GSM-R network in association with Project Artemis, reliability has started to show improvement throughout the year.

LNE & East Midlands continued to improve its OLE reliability and exceeded target. This has been supported by significant minor works investment to deliver targeted campaign changes to the infrastructure, vegetation control programmes to reduce asset risk, and recovery of maintenance backlog. Major incidents have mainly occurred during or immediately following severe weather events with high winds. Strategies for improving resilience to these are being explored. In particular, during the year a prototype head span to portal conversion was undertaken at Potters Bar to test one option to enhance resilience.

DC traction assets are limited to the Northern City Line. Upgrade work has been undertaken to reduce future failure risk and provide more capacity.

Non-traction power supply failures have reduced significantly and reliability in 2015/16 was better than target, with high levels of minor works interventions to improve condition. Models have been developed for the signalling power systems which are assisting in the understanding of the asset insulation monitoring readings which are provided by intelligent infrastructure.

Across the buildings portfolio, the number of '2 hour' and '24 hour' faults has reduced and exceeded target through a continued focus on areas of repeat reporting and resolution of underlying causes. During the next year the deployment of the Enhanced Decision Support Tool for buildings will enable interventions to be better targeted.

The numbers of structures with a risk score greater than or equal to 12 has remained at a stable level and significantly. Reliability was 23 per cent better than target in LNE, and 59 per cent better than target in East Midlands. This has been achieved by targeted minor works interventions to reduce risk items. It is likely that

the need to manage in this manner will continue due to escalating costs within Delivery Plan and subsequent reductions in volume.

Our earthworks asset has been significantly impacted by the extremely wet conditions in 2015/16. The most significant issues were at Chimney Corner where the earthwork had been impacted by work on the adjacent land, and on the Newcastle to Carlisle route where the line was closed for an extended period. There was also a much publicised landslip near Hexham. After major reconstruction work, we delivered the railway back to train operators at the planned time. Work that has been completed in year to improve drainage capability has assisted in managing performance in other areas.



In January 2016, the railway in North Lincolnshire was closed for 17 days while we replaced 100 year old signalling and undertook major bridge reconstructions. Improvements in power supply on the East Coast main line and early work on the Midland Main Line route upgrade continued alongside the opening of Leeds station southern entrance.

LNE & East Midlands' approach to improving and sustaining accurate asset data is driven by the key principal of treating data as an asset in its own right. The specification for every asset management plan has been adjusted to require the inclusion of clear definitions of required data collection, maintenance and format of the data in order to assess performance levels of the asset and help develop robust actions plans to keep the asset working to the required performance level.

Table 5.75: Asset Condition Reliability – LNE

Principal Asset	Description	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
Track	Rail Breaks and Immediate Action defects per 100km	4.30	3.94	4.38	2.48	4.40	2.80
	Track geometry (Poor Track Geometry) (%)	2.62	2.60	2.58	2.41	2.30	2.19
	Track failures (service affecting)	1,535	1,340	1,546	1,499	1,193	1,372
Signalling	Signalling failures (service affecting)	3,182	3,106	3,405	3,349	2,972	2,935
Telecoms	Telecoms failures (service affecting)	252	247	261	392	310	483
Electrical Power	AC traction power failures (service affecting)	192	192	175	206	192	155
	DC traction power failures (service affecting)	4	10	13	5	8	14
	Non traction operational power supply failures (service affecting)	105	118	98	61	95	66
Buildings	Buildings - Re-active Faults (2 & 24) (attention with 2hrs, fix within 24hrs) (attention within 24hrs, fix within 7 days)	-	-	1,089	865	947	663
Structures	Number of open work items with a risk score $\geq$ 12	-	-	839	430	538	414
Earthworks	Earthwork failures (5 year moving average)	10.0	8.8	8.6	8.8	8.0	12.2
Points	Point failures (service affecting)	773	978	682	727	764	590

Table 5.76: Asset Condition Sustainability – LNE

Principal Asset	Description	2014/15	2015/16 Target	2015/16 Actual
Track	Track - % Used Life - Rail	54.3	51.1	54.2
	Track - % Used Life - Switch & Crossings	53.7	53.1	53.3
	Track - % Used Life - Sleepers	63.6	60.5	63.8
	Track - % Used Life - Ballast	51.2	49.1	50.5
Signalling	Signalling Condition Index (SICA Remaining Life)	12.96	13.96	15.16
Telecoms	Telecoms - Remaining Life	67.9	57.5	62.2
Electrical Power	EP - Remaining Life - Conductor Rail	-	-	67.3
	EP - Remaining Life - Overhead Line Equipment (OLE)	58.5	58.0	58.8
	EP - Remaining Life - Signalling Power Cable	-	-	48.2
Buildings	Stations - % Remaining Life	69.1	65.7	65.9
	Light Maintenance Depot (LMD) - % Remaining Life	61.1	59.7	58.4
Structures	Average condition of major deck elements	64.2	64.1	64.2
	Tunnel Condition Monitoring Index (TCMI)	89.81	83.70	89.43
Earthworks	Earthworks - Condition Score	1.53	1.71	1.53
Drainage	Track Drainage - Condition Score	1.43	1.50	1.43
	Earthwork/Structure Drainage - Condition Score	1.53	1.50	1.53

Table 5.77: Track and off track renewals – LNE – Total

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	2	0	3	7
Complete Renewal	km	27	24	35	33
Complete (formation)	km	3	1	4	4
Rail Renewal	km	82	65	55	75
Single Rail	km	6	0	5	1
High Output					
Automated Ballast Cleaning	km	0	35	0	0
Rail Sleeper Relay	km	2	133	114	60
Heavy Refurbishment	km	103	48	74	48
Refurbishment					
Heavy Refurbishment	km	25	18	18	8
Medium (concrete)	km	4	30	54	55
Medium (other)	km	29	39	57	55
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	5	22	64	21
Full Renewal (Point Ends)	No.	35	49	25	50
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	62	90	84	66
Medium (Point Ends)	No.	75	62	108	96
Off Track					
Fencing	km	108	230	190	228
Slab track	km	0	0	0	0

Table 5.78: Track and off track renewals – LNE – Criticality 1

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	1
Complete Renewal	km	1	7	1	2
Complete (formation)	km	1	0	0	0
Rail Renewal	km	9	25	0	0
Single Rail	km	1	0	0	0
High Output					
Automated Ballast Cleaning	km	0	13	0	0
Rail Sleeper Relay	km	2	112	0	22
Heavy Refurbishment	km	0	1	0	0
Refurbishment					
Heavy Refurbishment	km	1	2	0	0
Medium (concrete)	km	0	4	0	0
Medium (other)	km	6	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	4	0	0
Full Renewal (Point Ends)	No.	7	28	52	26
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	1	7	0	0
Medium (Point Ends)	No.	22	10	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.79: Track and off track renewals – LNE – Criticality 2

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	7	3	11	10
Complete (formation)	km	0	0	1	1
Rail Renewal	km	45	27	0	5
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	21	0	0
Rail Sleeper Relay	km	1	3	114	28
Heavy Refurbishment	km	56	0	74	46
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	1	0	0	0
Medium (other)	km	5	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	4	0	1
Full Renewal (Point Ends)	No.	12	9	52	15
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	4	11	0	9
Medium (Point Ends)	No.	23	17	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.80: Track and off track renewals – LNE – Criticality 3

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	1	2
Complete Renewal	km	15	13	8	6
Complete (formation)	km	1	1	2	2
Rail Renewal	km	13	6	55	1
Single Rail	km	4	0	5	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	10	0	9
Heavy Refurbishment	km	11	34	0	0
Refurbishment					
Heavy Refurbishment	km	22	15	18	0
Medium (concrete)	km	3	0	54	0
Medium (other)	km	18	39	57	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	3	4	25	0
Full Renewal (Point Ends)	No.	16	9	12	6
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	45	23	84	0
Medium (Point Ends)	No.	30	6	108	0
Off Track					
Slab track	km	0	0	0	0

Table 5.81: Track and off track renewals – LNE – Criticality 4

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	2	0	2	4
Complete Renewal	km	4	0	12	11
Complete (formation)	km	0	0	1	1
Rail Renewal	km	15	5	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	7	0	1
Heavy Refurbishment	km	36	13	0	2
Refurbishment					
Heavy Refurbishment	km	1	0	0	0
Medium (concrete)	km	0	26	0	0
Medium (other)	km	1	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	2	4	0	0
Full Renewal (Point Ends)	No.	0	3	0	3
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	12	43	0	0
Medium (Point Ends)	No.	0	24	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.82: Track and off track renewals – LNE – Criticality 5

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	0	3	2
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	1	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	6	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	6	0	0
Medium (Point Ends)	No.	0	5	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.83: Track and off track renewals – LNE – no criticality breakdown

		BP 2015 Target	2015/16
Plain Line			
Conventional			
Steel Relay	km	0	0
Complete Renewal	km	0	1
Complete (formation)	km	0	0
Rail Renewal	km	0	69
Single Rail	km	0	1
High Output			
Automated Ballast Cleaning	km	0	0
Rail Sleeper Relay	km	0	0
Heavy Refurbishment	km	0	0
Refurbishment			
Heavy Refurbishment	km	0	7
Medium (concrete)	km	0	55
Medium (other)	km	0	55
Switches & Crossings			
S&C delivered			
Abandonment (Point Ends)	No.	0	20
Full Renewal (Point Ends)	No.	0	0
Refurbishment			
Heavy Refurbishment (Point Ends)	No.	0	57
Medium (Point Ends)	No.	0	96
Off Track			
Fencing	km	190	228
Slab track	km	0	0

Table 5.84: Civils renewals volumes – LNE

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Structures					
Underbridges	m ²	5,912	33,641	21,269	20,830
Overbridges (incl BG3)	m ²	975	2,859	4,835	1,991
Tunnels	m ²	5,880	4,270	10,676	3,199
Culverts	m ²	483	950	263	2,740
Footbridges	m ²	84	273	29	74
Coastal & Estuary Defences	m ²	0	0	0	0
Retaining Walls	m ²	32	2,521	36	4,554
Earthworks Total	Earthwork assets	97	607	136	475
Embankments - Maintenance	Earthwork assets	3	-	33	48
Embankments - Refurbishment	Earthwork assets	19	-	16	99
Embankments - Renewal	Earthwork assets	3	-	15	17
Rock Cuttings - Maintenance	Earthwork assets	23	-	0	23
Rock Cuttings - Refurbishment	Earthwork assets	11	-	2	13
Rock Cuttings - Renewal	Earthwork assets	13	-	4	7
Soil Cuttings - Maintenance	Earthwork assets	4	-	27	146
Soil Cuttings - Refurbishment	Earthwork assets	15	-	26	112
Soil Cuttings - Renewal	Earthwork assets	6	-	13	10
Track Drainage					
Renewal	lm	3,874	0	0	1,071
Refurbishment	lm	360	0	0	53,580
New Build	lm	2,467	0	0	1,752
EW Drainage					
Renewal	lm	79	1,170	812	0
Refurbishment	lm	260	170	83	0
Maintenance	lm	-	9,676	4,997	0
New Build	lm	-	0	0	0
Franchised Stations					
Footbridges	m ²	160	302	100	759
Train Sheds	m ²	7,753	0	5,584	0
Canopies	m ²	38,660	253	2,228	4,550
Platforms	m ²	5,313	2,343	0	2,581
Buildings	m ²	14,695	1,249	60	1,212
Lifts & Escalators	No.	-	0	1	0
Managed Stations					
Footbridges	m ²	120	0	0	0
Train Sheds	m ²	-	0	0	0
Canopies	m ²	-	0	0	0
Platforms	m ²	-	0	0	0
Buildings	m ²	58	450	0	1,535
Lifts & Escalators	No.	-	0	0	0
Light Maintenance Depots					
Buildings	m ²	140	418	300	210
Depot Shed	m ²	-	0	750	15,000
Lineside Buildings					
Buildings	m ²	160	343	70	8
MDU					
Buildings	m ²	4,857	8,201	160	1,675

Table 5.85: Signalling renewals volumes – LNE

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Full Conventional re-signalling	SEUs	85	425	172	179
ERTMS re-signalling	SEUs	0	0	0	0
Partial Conventional re-signalling	SEUs	3	27	0	3
Targeted Component renewal	SEUs	0	25	0	0
Modular re-signalling	SEUs	0	79	12	0
Level Crossing Renewals	No.	7	43	32	23

Table 5.86: E&P renewals volumes – LNE

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Contact Systems					
OLE Re-wiring	wire runs	5	26	18	17
Mid-life Refurbishment	wire runs	0	0	0	0
Structure Renewals	No.	2	2	0	0
Conductor rail					
Renewals	km	0	0	0	0
AC distribution					
HV Switchgear Renewal	No.	4	0	4	0
Booster Transformers	No.	0	0	0	0
DC distribution					
HV Switchgear Renewal	No.	2	0	0	0
HV Cables	km	0	0	0	0
LV Switchgear Renewal	No.	0	0	0	0
LV Cables	km	0	0	0	0
Transformer Rectifiers	No.	4	0	1	1
Fixed plant					
Signalling Power Cable	km	0	31	45	45
Principle Supply Point Renewal	No.	8	1	10	7
Rail Heating					
Points Heating Renewal	Point end	4	38	5	5

Table 5.87: Telecoms renewals volumes – LNE

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Station Information and Surveillance Systems					
Customer Information Systems	No.	0	160	160	0
Public Address	No.	20	0	0	0
CCTV	No.	0	0	0	0
Clocks	No.	0	2	0	0
Operational Comms					
PABX Concentrator	No.	0	0	0	1,088
Processor Controlled Concentrator	No.	7	0	0	0
Driver-Only Operation: CCTV	No.	0	0	0	2
Driver-Only Operation: Mirrors	No.	0	0	0	1
Public Emergency Telephone System	No.	11	0	0	13
Human Machine Interface Large	No.	0	0	0	11
Human Machine Interface Small	No.	0	0	0	0
Radio System	No.	0	0	0	0
Power Systems	No.	0	0	0	0

Table 5.88: Maintenance volumes – LNE

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	991	1,242	434
	Plain Line Stoneblowing (km)	MNT005	247	909	409
	Manual Wet bed removal (bay)	MNT006	4,877	4,500	3,908
	Mechanical Wet bed remover (bay)	MNT012	3,096	2,500	4,770
	S&C Tamping (point end)	MNT007	689	870	504
	Rail Changing - AI-Thermic Weld - Standard Gap (weld)	MNT044	3,114	3,500	2,875
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	17,284	20,000	17,212
	Mechanical reprofiling of Ballast (Mile)	MNT017	624	555	358
	Manual reprofiling of Ballast (rail yard)	MNT020	197,433	275,000	172,639
	Replace Pads & Insulators (sleeper)	MNT029	118,133	46,457	144,483
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	342,164	250,000	258,117
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	64,515	25,000	44,503
	S&C Renew Crossing (crossing)	MNT120	101	123	164
	S&C Maintenance (point end)	MNT122	49,320	75,000	41,539
	S&C Renew half set of Switches (H/S Switch)	MNT123	113	120	212
	S&C Stoneblowing (point end)	MNT124	0	110	0
	Rail grinding plain line (Mile)	MNT309	1,730	2,567	3,728
	Rail grinding S&C (point end)	MNT310	134	300	292
Off Track	Fences & Boundary Walls (yard)	MNT072	64,660	250,000	50,899
	Drainage (Yard)	MNT073	64,365	140,000	110,638
	LX Management - Off Track (Each)	MNT075	3,454	4,100	2,706
	Vegetation Removal of Boundary Trees (No.)	MNT081	1,130	1,500	1,139
	Vegetation Management by Train (Mile)	MNT082	6	50	55
	Vegetation Management Manual (Sq yard)	MNT170	602,245	800,000	800,344
	Vegetation Management Mechanised (Mile)	MNT171	399	369	4,635
Electrical Power	Maintain Conductor Rail (Various)	MNT206	5	50	460
	Maintain DC Traction Power Supplies (Each)	MNT209	1,122	0	950
	Maintain OHL Components (Various)	MNT211	68,569	45,300	110,392
	Maintain Points Heating (Each)	MNT212	29,498	29,500	28,245
	Maintain Signalling Power supplies (No.)	MNT213	4,348	6,500	4,989
Civils	Visual Examinations (Civils) (No.)	MNT226a	6,998	8,548	7,381
	Tunnel Examinations (No. minor elements)	MNT220	29,352	27,895	11,541
	Detailed Examinations (No.)	MNT221	1,551	1,545	1,191
	Underwater Examination (No.)	MNT222	40	130	146
	Ancillary Structure examination (No. detailed)	MNT223	56	172	164
	Hidden critical element examinations (No.)	MNT224	153	150	29
	Load carrying assessment (No. spans)	MNT225	1,727	1,366	120
Buildings	Visual examinations Buildings (each)	MNT226	3,536	3,534	4,104
	5 yearly examinations (each)	MNT227	96	93	80

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Table 5.89: Asset Condition Reliability – East Midlands

Principal Asset	Description	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
Track	Rail Breaks and Immediate Action defects per 100km	4.64	3.90	4.81	2.75	3.78	2.46
	Track geometry (Poor Track Geometry)	2.41	2.20	1.98	1.71	2.20	1.73
	Track failures (service affecting)	295	380	434	426	377	352
Signalling	Signalling failures (service affecting)	789	783	735	782	629	725
Telecoms	Telecoms failures (service affecting)	68	72	82	125	69	92
Electrical Power	AC traction power failures (service affecting)	63	46	63	54	149	38
	DC traction power failures (service affecting)	1	0	0	0	0	0
	Non traction operational power supply failures (service affecting)	58	40	35	10	40	9
Buildings	Buildings - Re-active Faults (2 & 24) (attention with 2hrs, fix within 24hrs) (attention within 24hrs, fix within 7 days)	-	-	163	193	240	140
Structures	Number of open work items with a risk score $\geq$ 12	-	-	372	150	270	110
Earthworks	Earthwork failures (5 year moving average)	0.6	0.6	1.0	1.0	1.0	1.4
Points	Point failures (service affecting)	167	183	203	192	188	119

Table 5.90: Asset Condition Sustainability – East Midlands

Principal Asset	Description	2014/15	2015/16 Target	2015/16 Actual
Track	Track - % Used Life - Rail	47.7	48.7	46.9
	Track - % Used Life - Switch & Crossings	39.9	44.3	39.1
	Track - % Used Life - Sleepers	54.5	59.1	54.9
	Track - % Used Life - Ballast	43.9	48.1	44.0
Signalling	Signalling Condition Index (SICA Remaining Life)	14.02	13.68	14.39
Telecoms	Telecoms - Remaining Life	67.7	62.1	59.85
Electrical Power	EP - Remaining Life - Conductor Rail	-	-	-
	EP - Remaining Life - Overhead Line Equipment (OLE)	52.3	53.0	54.0
	EP - Remaining Life - Signalling Power Cable	-	-	61.8
Buildings	Stations - % Remaining Life	64.0	61.5	65.9
	Light Maintenance Depot (LMD) - % Remaining Life	65.8	63.9	64.0
Structures	Average condition of major deck elements	63.3	63.5	63.4
	Tunnel Condition Monitoring Index (TCMI)	90.3	84.1	90.3
Earthworks	Earthworks - Condition Score	1.35	1.69	1.36
Drainage	Track Drainage - Condition Score	1.23	1.30	1.26
	Earthwork/Structure Drainage - Condition Score	1.23	1.30	1.25

Table 5.91: Track and off track renewals – East Midlands – Total

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	2	0	0	1
Complete Renewal	km	9	8	9	6
Complete (formation)	km	1	3	1	2
Rail Renewal	km	24	29	52	48
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	71	0	2	12
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	1	1	2	3
Medium (concrete)	km	4	8	8	9
Medium (other)	km	7	10	8	7
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	6	0	8	8
Full Renewal (Point Ends)	No.	26	14	24	14
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	26	25	21	21
Medium (Point Ends)	No.	32	54	56	56
Off Track					
Fencing	km	12	36	70	20
Slab track	km	0	0	0	0

Table 5.92: Track and off track renewals – East Midlands – Criticality 1

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	4	1	0
Complete (formation)	km	0	1	0	0
Rail Renewal	km	1	4	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	1	0	0
Medium (concrete)	km	0	1	0	0
Medium (other)	km	0	2	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	6	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	3	8	0	0
Medium (Point Ends)	No.	6	28	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.93: Track and off track renewals – East Midlands – Criticality 2

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	8	4	7	5
Complete (formation)	km	1	2	0	0
Rail Renewal	km	19	9	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	28	0	2	5
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	2	1	0	0
Medium (other)	km	3	1	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	6
Full Renewal (Point Ends)	No.	26	8	24	14
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	8	5	0	0
Medium (Point Ends)	No.	20	11	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.94: Track and off track renewals – East Midlands – Criticality 3

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	2	0	0	1
Complete Renewal	km	0	0	2	1
Complete (formation)	km	0	0	1	1
Rail Renewal	km	0	0	52	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	42	0	0	8
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	2	0
Medium (concrete)	km	0	0	8	0
Medium (other)	km	0	0	8	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	8	2
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	18	0
Medium (Point Ends)	No.	0	1	54	0
Off Track					
Slab track	km	0	0	0	0

Table 5.95: Track and off track renewals – East Midlands – Criticality 4

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	1	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	3	14	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	1	0	0	0
Medium (concrete)	km	2	5	0	0
Medium (other)	km	1	6	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	6	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	15	1	0	0
Medium (Point Ends)	No.	6	2	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.96: Track and off track renewals – East Midlands – Criticality 5

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	2	1	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	3	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	11	0	0
Medium (Point Ends)	No.	0	12	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.97: Track and off track renewals – East Midlands – no criticality breakdown

		BP 2015 Target	2015/16
Plain Line			
Conventional			
Steel Relay	km	0	0
Complete Renewal	km	0	0
Complete (formation)	km	0	1
Rail Renewal	km	0	48
Single Rail	km	0	0
High Output			
Automated Ballast Cleaning	km	0	0
Rail Sleeper Relay	km	0	0
Heavy Refurbishment	km	0	0
Refurbishment			
Heavy Refurbishment	km	0	3
Medium (concrete)	km	0	9
Medium (other)	km	0	7
Switches & Crossings			
S&C delivered			
Abandonment (Point Ends)	No.	0	0
Full Renewal (Point Ends)	No.	0	0
Refurbishment			
Heavy Refurbishment (Point Ends)	No.	0	21
Medium (Point Ends)	No.	0	56
Off Track			
Slab track	km	0	0

Table 5.98: Civils renewals volumes – East Midlands

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Structures					
Underbridges	m ²	165	9,895	21,269	8,409
Overbridges (incl BG3)	m ²	143	2,482	4,835	1,177
Tunnels	m ²	400	6,200	10,676	17,189
Culverts	m ²	0	38	263	0
Footbridges	m ²	35	298	29	339
Coastal & Estuary Defences	m ²	0	0	0	0
Retaining Walls	m ²	0	220	36	230
Earthworks Total	Earthwork assets	3	177	136	11
Embankments - Maintenance	Earthwork assets	0	-	33	1
Embankments - Refurbishment	Earthwork assets	1	-	16	3
Embankments - Renewal	Earthwork assets	1	-	15	4
Rock Cuttings - Maintenance	Earthwork assets	0	-	0	0
Rock Cuttings - Refurbishment	Earthwork assets	0	-	2	1
Rock Cuttings - Renewal	Earthwork assets	0	-	4	2
Soil Cuttings - Maintenance	Earthwork assets	0	-	27	0
Soil Cuttings - Refurbishment	Earthwork assets	1	-	26	0
Soil Cuttings - Renewal	Earthwork assets	0	-	13	0
Track Drainage					
Renewal	lm	0	0	0	0
Refurbishment	lm	0	0	0	0
New Build	lm	0	0	0	175
EW Drainage					
Renewal	lm	1	330	812	0
Refurbishment	lm	10	35	83	0
Maintenance	lm	0	5,917	4,997	0
New Build	lm	0	0	0	0
Franchised Stations					
Footbridges	m ²	0	145	60	0
Train Sheds	m ²	0	0	0	0
Canopies	m ²	608	528	2,228	0
Platforms	m ²	2,821	8,019	5,584	0
Buildings	m ²	0	100	100	1,124
Lifts & Escalators	No.	0	0	0	0
Managed Stations					
Footbridges	m ²	0	0	0	0
Train Sheds	m ²	0	0	0	0
Canopies	m ²	0	0	0	0
Platforms	m ²	0	0	0	0
Buildings	m ²	0	0	0	0
Lifts & Escalators	No.	0	0	0	0
Light Maintenance Depots					
Buildings	m ²	0	5,000	300	12
Depot Shed	m ²	6,500.00	0	750	89
Lineside Buildings					
Buildings	m ²	0	40	70	0
MDU					
Buildings	m ²	850.00	0	160	0

Table 5.99: Signalling renewals volumes – East Midlands

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Full Conventional re-signalling	SEUs	0	0	0	0
ERTMS re-signalling	SEUs	0	0	0	0
Partial Conventional re-signalling	SEUs	0	112	8	8
Targeted Component renewal	SEUs	0	9	1	0
Modular re-signalling	SEUs	0	0	56	19
Level Crossing Renewals	No.	0	3	9	4

Table 5.100: E&P renewals volumes – East Midlands

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Contact Systems					
OLE Re-wiring	wire runs	-	0	0	0
Mid-life Refurbishment	wire runs	-	56	0	0
Structure Renewals	No.	-	7	17	0
Conductor rail					
Renewals	km	-	0	0	0
AC distribution					
HV Switchgear Renewal	No.	-	0	0	0
Booster Transformers	No.	-	1	0	0
DC distribution					
HV Switchgear Renewal	No.	-	0	0	0
HV Cables	km	-	0	0	0
LV Switchgear Renewal	No.	-	0	0	0
LV Cables	km	-	0	0	0
Transformer Rectifiers	No.	-	0	0	0
Fixed plant					
Signalling Power Cable	km	-	10	10	0
Principle Supply Point Renewal	No.	-	0	0	0
Rail Heating					
Points Heating Renewal	Point end	-	16	15	0

Table 5.101: Telecoms renewals volumes – East Midlands

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Station Information and Surveillance Systems					
Customer Information Systems	No.	94	0	0	3
Public Address	No.	246	0	0	0
CCTV	No.	0	268	0	1
Clocks	No.	0	9	0	0
Operational Comms					
PABX Concentrator	No.	0	0	0	0
Processor Controlled Concentrator	No.	0	0	0	0
Driver-Only Operation: CCTV	No.	0	0	0	0
Driver-Only Operation: Mirrors	No.	0	0	0	0
Public Emergency Telephone System	No.	4	0	0	0
Human Machine Interface Large	No.	0	0	0	0
Human Machine Interface Small	No.	0	0	0	0
Radio System	No.	0	0	0	0
Power Systems	No.	0	0	0	0

Table 5.102: Maintenance volumes – East Midlands

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	361	410	224
	Plain Line Stoneblowing (km)	MNT005	91	200	82
	Manual Wet bed removal (bay)	MNT006	1,443	1,300	1,732
	Mechanical Wet bed remover (bay)	MNT012	321	750	821
	S&C Tamping (point end)	MNT007	151	230	140
	Rail Changing - AI-Thermic Weld - Standard Gap (weld)	MNT044	936	1,080	1,519
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	3,734	4,000	3,682
	Mechanical reprofiling of Ballast (Mile)	MNT017	116	200	133
	Manual reprofiling of Ballast (rail yard)	MNT020	127,942	110,000	253,233
	Replace Pads & Insulators (sleeper)	MNT029	22,574	15,000	130,296
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	120,326	86,000	82,494
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	27,092	7,500	18,252
	S&C Renew Crossing (crossing)	MNT120	16	39	37
	S&C Maintenance (point end)	MNT122	18,005	25,000	17,836
	S&C Renew half set of Switches (H/S Switch)	MNT123	16	34	18
	S&C Stoneblowing (point end)	MNT124	21	80	22
	Rail grinding plain line (Mile)	MNT309	749	920	1,072
	Rail grinding S&C (point end)	MNT310	160	390	158
Off Track	Fences & Boundary Walls (yard)	MNT072	15,477	101,115	21,859
	Drainage (Yard)	MNT073	12,301	40,000	11,591
	LX Management - Off Track (Each)	MNT075	752	966	473
	Vegetation Removal of Boundary Trees (No.)	MNT081	1,005	500	1,952
	Vegetation Management by Train (Mile)	MNT082	0	1,500	38
	Vegetation Management Manual (Sq yard)	MNT170	236,327	176,000	186,334
	Vegetation Management Mechanised (Mile)	MNT171	251	160	176
Electrical Power	Maintain Conductor Rail (Various)	MNT206	2	0	0
	Maintain DC Traction Power Supplies (Each)	MNT209	110	0	73
	Maintain OHL Components (Various)	MNT211	2,747	5,708	2,914
	Maintain Points Heating (Each)	MNT212	8,876	8,670	9,352
	Maintain Signalling Power supplies (No.)	MNT213	1,257	1,542	1,176
Civils	Visual Examinations (Civils) (No.)	MNT226a	2,227	2,672	2,099
	Tunnel Examinations (No. minor elements)	MNT220	8,608	8,091	5,265
	Detailed Examinations (No.)	MNT221	324	314	234
	Underwater Examination (No.)	MNT222	46	44	51
	Ancillary Structure examination (No. detailed)	MNT223	37	8	32
	Hidden critical element examinations (No.)	MNT224	44	44	21
	Load carrying assessment (No. spans)	MNT225	550	363	20
Buildings	Visual examinations Buildings (each)	MNT226	879	880	977
	5 yearly examinations (each)	MNT227	26	23	22

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

LNW

PTG continues to improve on LNW. This is a result of targeting resources on repeat defects and the poorest track quality areas. Use of the LADS tool to aid decision making for on track machine planning has enabled a more targeted approach and better utilisation of available plant.

During the year, track failures have been worse than target due to an increased number of TSRs, cracked crossing and reported bumps. The number of TSRs being applied due to cyclic top has increased following change in the track maintenance standards to address the risk of derailments. The number of bumps on higher criticality routes has increased which has resulted in an increased focus on removal of wet beds at the earliest opportunity to reduce the risk of a bump being reported.

Signalling reliability in LNW was better than target in 2015/16. Re-signalling schemes were brought into service at Wolverhampton in May 2015 and Stafford in August 2015, contributing towards the improved reliability. We have also seen benefits from the use of intelligent infrastructure. Technicians are becoming more skilled at interpreting data from monitoring equipment leading to preventative interventions prior to faults occurring. LNW was a cautious adopter of new LED light engines, preferring instead to renew the complete heads with LED. This has benefitted signalling reliability as LNW has not seen the amount of light engine failures experienced by other routes. Work has continued on improving reliability of axle counters in the south of LNW Route, and this has paid dividends in reducing service affecting failures this year.



Points reliability in LNW was better than target. Intelligent infrastructure has been used to target highlighted problem areas. We have improved alignment of signalling and track teams to manage S&C assets with joint intervention leading to effective maintenance. Point operating equipment re-servicing and tubular stretcher bar renewal continues to be delivered to assist in S&C reliability, and recovery of older and obsolete point operating mechanisms has been successful this year.

There were 657 service affecting telecom's failures in 2015/16, worse than the target of 520, although the number of service affecting failures has decreased from 2014/15. The majority of the failures were attributed to GSM-R; 597 instances of delay which equates to 91 per cent for the failures. GSM-R failure numbers continue to be investigated at a national level via Project Artemis.

Leaving GSM-R out of the failure statistics shows a different picture for telecoms failures causing delay, with lineside telephones (signal post telephones, level crossing telephones or concentrator equipment) being the cause of the majority of the other failures. Renewal of telephones and tail cables at 40 level crossings has taken place throughout the year and we will target our worst performing crossings throughout 2016/17. Migration of services from legacy cables and transmission systems to new, more reliable, FTN will continue throughout 2016/17. The nature of the design of FTN ensures that services are provided with circuit diversity improving resilience and reducing incidents of delay associated with telecom services.

The reliability of AC Traction Power in LNW was better than target. Dropper failures were one of the main trends affecting 2015/16 reliability. To mitigate, a zero tolerance policy to broken droppers have been implemented. The use of the short circuit analysis tool identified the worst performing electrical sections as new sections introduced by North West Electrification Project. The main causes for this have been identified as reduced clearances and overbridges and missing split pins causing detached registration arms following installation. Remedial works were carried out in March 2016 to increase clearances and apply secondary insulation as appropriate. All registration arms were checked for missing split pins on the phase two footprint. Where split pins were missing or displaced, repairs were undertaken within 24 hours.

LNW is actively conducting infrastructure inspections following faults identified during scheduled helicopter thermal surveys. We are replacing all components which have a heat signature to prevent the asset from failing at a later stage. There has been a significant increase in mechanically independent registration swivel

bracket failures. We are in the process of surveying and confirming the presence of cir-clips, and fit them where necessary as immediate mitigation against the failure. A new swivel bracket has been product approved and a plan is being progressed to replace approximately 8,000 units through the remainder of CP5, for completion in CP6.

In the south of the route, there were several incidents relating to the compatibility of the pantograph and the OLE which caused approximately 19,000 minutes of delay in 2015/16. Prioritised plans have been initiated to identify the route that trains have taken prior to incidents to help narrow down fault location. An overhead line equipment geometry analysis is being carried out to identify compliance in the OLE setup.

DC traction power reliability was better than target. Analysis identified a root cause of some failures as insulator contamination due to routine jet washing of track and sleepers. The jet washing has been stopped and additionally, conductor rail insulator renewals planned in polluted areas.

Non-traction power service affecting failures have decreased since 2014/15 due to targeted interventions undertaken by maintenance teams. Most insulation monitors are now remotely monitored by the intelligent infrastructure system and alarms on low readings are proactively investigated with cables replaced before failure. This has reduced the number of failures.



The reliability of buildings in 2015/16 was better than target. Analysis of fault data at franchised and managed stations continues to show a high trend in roof and surfacing failures, which is linked to seasonal fluctuations and certain assets types

and locations. We have completed recent investments in key sites to reduce reactive faults, including historically poor train sheds. A wider programme of planned preventative maintenance on our lineside assets has commenced and led to a reduction in faults in 2015/16.

Across the structures portfolio, there has been a reduction in the number of open work items with a risk score greater than or equal to 12. This is a result of the continuation of the process that instructs delivery for emerging work items with a risk score greater than or equal to 12, to reduce the opportunity for a backlog of work items to develop.

The number of earthworks failures increased in 2015/16, largely due to storm events hitting the northern part of LNW between December and January. The vast majority of our failure incidents (more than 85 per cent) were directly related to extreme weather, compared with averages between 50 and 60 per cent in previous years. Significant failures were caused by inadequate surface water drainage. The identification of such sites is an ongoing challenge in terms of gathering existing drainage location and condition information and using newly developed asset management tools to help identify any potential at risk locations.

The storms also demonstrated that the ongoing asset improvement and resilience work undertaken on drainage and earthwork assets in CP4 and CP5 is having an effect, as previous high risk locations did not fail during these events. Failures also highlighted improvements in processes such as the extreme weather action plan that have allowed a far lower effect on the safe operation and use of railway infrastructure than was previously the case.

The year was dominated by the failure of an embankment slope at Eden Brow in February 2016 which although, only a single event has closed a major secondary line which will remain shut for the foreseeable future. This has subsequently caused ongoing disruption over northern parts of the network.

The use of Remote Condition Monitoring (RCM) has not been as widespread or embedded into business as usual processes as was hoped 12 months previously. Due to problems in identifying suitable trial sites for equipment and product acceptance issues delays have occurred. As well as several national initiatives in terms of different forms of RCM, including cameras and acoustic cables, we have started to develop a simple tilt meter system that can be used on sites that may be affected by extreme weather.

The introduction of the CP5 earthworks asset policy has allowed the development of a bottom up work bank for the route, greatly assisting in the prioritisation of sites over CP5, while also allowing the route to develop business cases to treat earthworks at risk in extreme weather as part of the existing work bank.

Table 5.103: Asset Condition Reliability – LNW

Principal Asset	Description	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
Track	Rail Breaks and Immediate Action defects per 100km	3.89	4.04	2.73	2.18	2.78	2.01
	Track geometry (Poor Track Geometry)	1.87	1.78	1.66	1.54	1.77	1.48
	Track failures (service affecting)	1,011	908	771	647	774	838
Signalling	Signalling failures (service affecting)	4,162	3,874	3,880	3,497	3,940	3,259
Telecoms	Telecoms failures (service affecting)	119	190	203	691	219	667
Electrical Power	AC traction power failures (service affecting)	217	221	251	268	258	306
	DC traction power failures (service affecting)	37	51	56	42	56	53
	Non traction operational power supply failures (service affecting)	126	121	132	55	147	40
Buildings	Buildings - Re-active Faults (2 & 24) (attention with 2hrs, fix within 24hrs) (attention within 24hrs, fix within 7 days)	1,850	1,830	1,711	1,590	1,680	1,418
Structures	Number of open work items with a risk score $\geq$ 12	-	-	1,542	427	475	203
Earthworks	Earthwork failures (5 year moving average)	11.2	16.6	18.6	17.8	17	26.6
Points	Point failures (service affecting)	1,396	1,152	1,034	945	1,071	806

Table 5.104: Asset Condition Sustainability – LNW

Principal Asset	Description	2014/15	2015/16 Target	2015/16 Actual
Track	Track - % Used Life - Rail	43.80	42.5	44.4
	Track - % Used Life - Switch & Crossings	44.60	48.2	44.9
	Track - % Used Life - Sleepers	54.50	52.5	55.5
	Track - % Used Life - Ballast	42.00	39.7	42.2
Signalling	Signalling Condition Index (SICA Remaining Life)	11.36	13.60	15.32
Telecoms	Telecoms - Remaining Life	66.19	57.6	56.17
Electrical Power	EP - Remaining Life - Conductor Rail	60.50	59.8	58.5
	EP - Remaining Life - Overhead Line Equipment (OLE)	59.40	58.5	58.3
	EP - Remaining Life - Signalling Power Cable	-	-	61.5
Buildings	Stations - % Remaining Life	55.60	54.4	56.4
	Light Maintenance Depot (LMD) - % Remaining Life	65.00	63.3	65.4
Structures	Average condition of major deck elements	64.34	64.6	64.3
	Tunnel Condition Monitoring Index (TCMI)	84.43	83.3	84.43
Earthworks	Earthworks - Condition Score	1.84	1.84	1.80
Drainage	Track Drainage - Condition Score	1.35	1.30	1.35
	Earthwork/Structure Drainage - Condition Score	1.69	1.70	1.69

Table 5.105: Track and off track renewals – LNW – Total

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	2	0	5	4
Complete Renewal	km	24	25	26	22
Complete (formation)	km	9	14	12	8
Rail Renewal	km	28	35	65	55
Single Rail	km	16	18	28	18
High Output					
Automated Ballast Cleaning	km	0	94	36	0
Rail Sleeper Relay	km	62	27	89	19
Heavy Refurbishment	km	61	20	125	73
Refurbishment					
Heavy Refurbishment	km	7	25	18	11
Medium (concrete)	km	27	45	113	20
Medium (other)	km	1	0	0	1
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	8	4	3	5
Full Renewal (Point Ends)	No.	22	42	10	21
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	15	33	86	20
Medium (Point Ends)	No.	12	82	55	65
Off Track					
Fencing	km	171	91	326	299
Slab track	km	0	0	0	0

Table 5.106: Track and off track renewals – LNW – Criticality 1

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	14	8	7	6
Complete (formation)	km	5	9	8	4
Rail Renewal	km	7	3	23	0
Single Rail	km	8	18	17	0
High Output					
Automated Ballast Cleaning	km	0	94	0	0
Rail Sleeper Relay	km	54	27	0	18
Heavy Refurbishment	km	57	17	0	71
Refurbishment					
Heavy Refurbishment	km	3	19	9	5
Medium (concrete)	km	1	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	4	4	0	2
Full Renewal (Point Ends)	No.	12	15	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	3	0	0	1
Medium (Point Ends)	No.	12	0	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.107: Track and off track renewals – LNW – Criticality 2

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	4	9	6	2
Complete (formation)	km	4	4	3	3
Rail Renewal	km	1	0	8	0
Single Rail	km	2	0	7	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	8	0	36	1
Heavy Refurbishment	km	3	0	89	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	1	0	0	0
Full Renewal (Point Ends)	No.	3	12	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	5	0	0	0
Medium (Point Ends)	No.	0	0	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.108: Track and off track renewals – LNW – Criticality 3

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	1	0	2	2
Complete Renewal	km	2	2	4	2
Complete (formation)	km	0	1	1	1
Rail Renewal	km	4	18	34	0
Single Rail	km	4	0	4	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	2	0	2
Refurbishment					
Heavy Refurbishment	km	0	1	1	0
Medium (concrete)	km	7	0	10	0
Medium (other)	km	1	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	3	13	3	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	4	13	53	13
Medium (Point Ends)	No.	0	39	22	0
Off Track					
Slab track	km	0	0	0	0

Table 5.109: Track and off track renewals – LNW – Criticality 4

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	1	0	1	1
Complete Renewal	km	2	1	6	3
Complete (formation)	km	0	1	0	0
Rail Renewal	km	6	8	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	3	6	3	4
Medium (concrete)	km	12	45	103	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	3	2	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	3	20	13	0
Medium (Point Ends)	No.	0	43	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.110: Track and off track renewals – LNW – Criticality 5

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	2	2
Complete Renewal	km	2	5	3	2
Complete (formation)	km	0	0	0	0
Rail Renewal	km	10	7	1	2
Single Rail	km	2	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	4	0
Medium (concrete)	km	7	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	3	0	3	0
Full Renewal (Point Ends)	No.	1	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	20	0
Medium (Point Ends)	No.	0	0	26	0
Off Track					
Slab track	km	0	0	0	0

Table 5.111: Track and off track renewals – LNW – no criticality breakdown

		BP 2015 Target	2015/16 Actual
Plain Line			
Conventional			
Steel Relay	km	0	0
Complete Renewal	km	0	8
Complete (formation)	km	0	0
Rail Renewal	km	0	53
Single Rail	km	0	18
High Output			
Automated Ballast Cleaning	km	0	0
Rail Sleeper Relay	km	0	0
Heavy Refurbishment	km	0	0
Refurbishment			
Heavy Refurbishment	km	0	1
Medium (concrete)	km	0	20
Medium (other)	km	0	1
Switches & Crossings			
S&C delivered			
Abandonment (Point Ends)	No.	0	3
Full Renewal (Point Ends)	No.	7	21
Refurbishment			
Heavy Refurbishment (Point Ends)	No.	0	6
Medium (Point Ends)	No.	0	65
Off Track			
Fencing	km	326	299
Slab track	km	0	0

Table 5.112: Civils renewals volumes – LNW

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Structures					
Underbridges	m ²	15,964	32,692	33,697	20,642
Overbridges (incl BG3)	m ²	5,515	5,315	5,646	3,293
Tunnels	m ²	7,392	18,939	10,510	4,137
Culverts	m ²	348	666	226	109
Footbridges	m ²	-	303	847	378
Coastal & Estuary Defences	m ²	278	1,212	3,255	1,265
Retaining Walls	m ²	1,897	743	5,468	360
Earthworks Total	Earthwork assets	600	496	1,257	503
Embankments - Maintenance	Earthwork assets	179	-	183	75
Embankments - Refurbishment	Earthwork assets	31	-	209	46
Embankments - Renewal	Earthwork assets	21	-	27	39
Rock Cuttings - Maintenance	Earthwork assets	30	-	161	35
Rock Cuttings - Refurbishment	Earthwork assets	7	-	30	21
Rock Cuttings - Renewal	Earthwork assets	5	-	21	43
Soil Cuttings - Maintenance	Earthwork assets	282	-	326	100
Soil Cuttings - Refurbishment	Earthwork assets	36	-	212	100
Soil Cuttings - Renewal	Earthwork assets	9	-	88	44
Track Drainage					
Renewal	lm	-	0	0	8,099
Refurbishment	lm	-	0	0	1,542
New Build	lm	-	0	0	663
EW Drainage					
Renewal	lm	1,083	0	5,542	4,533
Refurbishment	lm	91	0	2,226	762
Maintenance	lm	1,730	0	6,266	9,499
New Build	lm	1,144	0	4,180	5,209
Franchised Stations					
Footbridges	m ²	112	376	100	340
Train Sheds	m ²	-	600	0	11,800
Canopies	m ²	1,447	706	1,615	855
Platforms	m ²	11,498	16,000	15,832	1,178
Buildings	m ²	25	60	689	4,011
Lifts & Escalators	No.	4	0	3	0
Managed Stations					
Footbridges	m ²	-	0	0	0
Train Sheds	m ²	-	0	0	0
Canopies	m ²	-	0	0	0
Platforms	m ²	202	0	0	0
Buildings	m ²	-	0	0	0
Lifts & Escalators	No.	-	0	0	0
Light Maintenance Depots					
Buildings	m ²	2	0	0	0
Depot Shed	m ²	-	0	3,843	7
Lineside Buildings					
Buildings	m ²	160	0	504	3,135
MDU					
Buildings	m ²	1,067	0	670	1,615

Table 5.113: Signalling renewals volumes – LNW

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Full Conventional re-signalling	SEUs	140	359	571	455
ERTMS re-signalling	SEUs	0	0	0	0
Partial Conventional re-signalling	SEUs	29	61	96	31
Targeted Component renewal	SEUs	0	16	3	18
Modular re-signalling	SEUs	0	0	0	0
Level Crossing Renewals	No.	4	10	7	3

Table 5.114: E&P renewals volumes – LNW

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Contact Systems					
OLE Re-wiring	wire runs	0	0	0	0
Mid-life Refurbishment	wire runs	0	11	0	0
Structure Renewals	No.	3	3	7	0
Conductor rail					
Renewals	km	0	6	2	0
AC distribution					
HV Switchgear Renewal	No.	17	8	20	6
Booster Transformers	No.	0	16	0	0
DC distribution					
HV Switchgear Renewal	No.	0	1	0	0
HV Cables	km	0	2	4	0
LV Switchgear Renewal	No.	0	0	0	0
LV Cables	km	3	1	2	1
Transformer Rectifiers	No.	0	0	0	0
Fixed plant					
Signalling Power Cable	km	0	93	89	0
Principle Supply Point Renewal	No.	2	2	253	15
Rail Heating					
Points Heating Renewal	Point end	0	25	193	113

Table 5.115: Telecoms renewals volumes – LNW

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Station Information and Surveillance Systems					
Customer Information Systems	No.	0	30	15	0
Public Address	No.	0	747	690	0
CCTV	No.	151	402	0	150
Clocks	No.	0	9	0	0
Operational Comms					
PABX Concentrator	No.	0	0	0	0
Processor Controlled Concentrator	No.	0	201	0	0
Driver-Only Operation: CCTV	No.	0	0	0	0
Driver-Only Operation: Mirrors	No.	0	83	0	30
Public Emergency Telephone System	No.	0	0	0	0
Human Machine Interface Large	No.	0	0	0	0
Human Machine Interface Small	No.	0	0	0	0
Radio System	No.	0	0	0	0
Power Systems	No.	0	0	0	0

Table 5.116: Maintenance volumes – LNW

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	808	1,629	762
	Plain Line Stoneblowing (km)	MNT005	217	773	251
	Manual Wet bed removal (bay)	MNT006	3,837	5,029	3,605
	Mechanical Wet bed remover (bay)	MNT012	1,494	1,907	995
	S&C Tamping (point end)	MNT007	929	1,075	783
	Rail Changing - Al-Thermic Weld - Standard Gap (weld)	MNT044	3,185	2,042	3,814
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	13,951	13,553	14,070
	Mechanical reprofiling of Ballast (Mile)	MNT017	968	891	4,862
	Manual reprofiling of Ballast (rail yard)	MNT020	688,892	364,328	631,188
	Replace Pads & Insulators (sleeper)	MNT029	103,250	91,444	196,982
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	366,958	309,825	316,806
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	129,039	0	124,004
	S&C Renew Crossing (crossing)	MNT120	138	177	148
	S&C Maintenance (point end)	MNT122	133,580	134,826	130,023
	S&C Renew half set of Switches (H/S Switch)	MNT123	91	226	87
	S&C Stoneblowing (point end)	MNT124	38	93	20
	Rail grinding plain line (Mile)	MNT309	0	2,374	4,256
	Rail grinding S&C (point end)	MNT310	0	271	478
Off Track	Fences & Boundary Walls (yard)	MNT072	130,480	201,990	196,555
	Drainage (Yard)	MNT073	54,581	182,281	46,074
	LX Management - Off Track (Each)	MNT075	2,187	2,348	2,097
	Vegetation Removal of Boundary Trees (No.)	MNT081	11,114	7,654	18,663
	Vegetation Management by Train (Mile)	MNT082	527	5	21
	Vegetation Management Manual (Sq yard)	MNT170	1,054,008	1,081,964	964,919
	Vegetation Management Mechanised (Mile)	MNT171	6,079	178	355
Electrical Power	Maintain Conductor Rail (Various)	MNT206	6,363	2,048	8,351
	Maintain DC Traction Power Supplies (Each)	MNT209	12,306	17,539	13,936
	Maintain OHL Components (Various)	MNT211	163,541	67,677	157,996
	Maintain Points Heating (Each)	MNT212	32,736	23,453	33,008
	Maintain Signalling Power supplies (No.)	MNT213	8,842	10,072	10,544
Civils	Visual Examinations (Civils) (No.)	MNT226a	13,130	12,480	8,536
	Tunnel Examinations (No. minor elements)	MNT220	27,714	31,111	31,111
	Detailed Examinations (No.)	MNT221	1,940	2,359	1,277
	Underwater Examination (No.)	MNT222	245	350	360
	Ancillary Structure examination (No. detailed)	MNT223	272	463	194
	Hidden critical element examinations (No.)	MNT224	283	400	400
	Load carrying assessment (No. spans)	MNT225	1,699	2,895	833
Buildings	Visual examinations Buildings (each)	MNT226	366	3,223	386
	5 yearly examinations (each)	MNT227	97	169	92

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

LSE – Kent & Sussex

For operating purposes, Kent and Sussex are now combined to form the LSE route. Consequently we have provided commentary for the LSE operating route. Data is provided for Kent and Sussex separately.

Rail breaks and immediate action defects per 100 kilometres were 41 per cent better than target in Kent and 23 per cent in Sussex. Analysis has shown that broken rails in LSE fall predominantly into two categories; within tunnels due to corrosion of the rail foot and outside tunnels due to corrosion pits within the rail foot. We have developed a combined tunnel strategy with the route structures team to address water ingress within tunnels and reduce the accelerated corrosion of the rails. In conjunction with the earthworks team, we are addressing the drainage issues to reduce the time the rail remains in contact with the water. Further work has been undertaken to clear ballast from beneath the rail to improve drainage. Corrosion pits within the rail foot are being targeted with re-padding to reduce the opportunity for corrosion pits to propagate.

PTG was better than target in LSE; by 0.23 percentage points in Kent and 0.24 percentage points in Sussex. There has been a focus on wet track bed removal through refurbishment of plain line track and implementation of a rough ride reporting process, which has improved PTG. The underlying issues affecting PTG are being addressed and further improvements are expected in 2016/17. We have set internal targets to drive continuous improvement

The total number of service affecting track failures in 2015/16 across the LSE route was better than target. In Kent, the target was exceeded by 23 per cent, while in Sussex performance was under target by four per cent. We have focussed our interventions on addressing rough rides and repeat fault locations, as well as removing or mitigating emerging rail defects before a track failure occurs. While a continued focus on wet track bed removal will reduce the occurrence of rough rides, analysis shows that many cyclic top faults have a deeper root cause. This issue can be resolved by re-ballasting. The volume of re-ballasting that is needed to alleviate this problem requires the use of the High Output Ballast Cleaner, which is due to begin delivering works in LSE in early 2016/17. Localised targeted interventions have been undertaken using ballast undercutters that have reduced the number of rough ride service affecting incidents.

The reliability of points in the South East was better than target in 2015/16 despite problems encountered at London Bridge. We failed to meet target for signalling reliability as a result of the introduction of new equipment. There were particular issues with the continued failure of light engines. In addition, we experienced

challenges following the introduction of new track circuit at London Bridge as part of Thameslink, new axle counters as part of the East Sussex Re-signalling Scheme and a software error affecting the monitoring equipment at London Victoria.

Of the telecoms failures in 2015/16, GSM-R issues were the cause of 82 per cent in Kent and 73 per cent in Sussex. Analysis has identified national GSM-R software issues as the highest reason for failure. The new software version has now been rolled out across the route. Further improvements have been developed with the next version of software; however, the business case for this is still in its embryonic stages. Our central telecoms team has led a national improvement programme specifically looking at changing the behaviours of GSM-R users. Another area of focus for performance improvement has been in relation to key concentrator installations at Three Bridges ROC which have been identified for renewal during CP5. Due to the life extension of Three Bridges Power Signal Box, telecoms are stabilising the asset until full migration into the ROC. This should lead to improvements where reliance has previously been on ageing voice assets.

We have also developed a strategy prioritising delivery of cable degradation improvement works which will see reductions in cable failures. The FTN migration strategy to remove key operational services from legacy transmission systems is being accelerated to provide more resilient fibre based bearers. This was demonstrated with the recent Lewisham data ring migration project.

The number of DC traction power failures was better than target for 2015/16. The over-delivery was due to more awareness and better detection of emerging lug failures, and the extensive introduction of 'doubling-up' of traction current cables.

Non traction operational power supply failures (service affecting) were worse than target for 2015/16. No specific asset deterioration over previous years was noted; however introduction of Insulation Monitoring is improving the detection of defective signalling distribution failures which should improve in future years.

The number of '2 hour' and '24 hour' building faults was 43 per cent better than target in Kent and 59 per cent better than target in Sussex. This has been driven through ongoing engagement with our stakeholders, including train operators, to identify and rectify faults before they reach a level that requires reporting.

In 2015/16, the reliability of structures was 71 per cent better than target in Kent and 36 per cent better than target in Sussex, representing our continued focus on improving the risk scores across the structures portfolio.

Table 5.117: Asset Condition Reliability – Kent

Principal Asset	Description	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
Track	Rail Breaks and Immediate Action defects per 100km	4.29	4.69	4.18	3.09	4.47	2.63
	Track geometry (Poor Track Geometry)	4.00	3.59	3.69	3.22	3.52	3.29
	Track failures (service affecting)	312	348	433	388	378	292
Signalling	Signalling failures (service affecting)	1,270	1,213	1,155	1,061	1,174	1,234
Telecoms	Telecoms failures (service affecting)	66	70	63	536	105	303
Electrical Power	AC traction power failures (service affecting)	4	4	4	2	3	1
	DC traction power failures (service affecting)	47	55	57	47	65	56
	Non traction operational power supply failures (service affecting)	24	32	28	24	28	35
Buildings	Buildings - Re-active Faults (2 & 24) (attention with 2hrs, fix within 24hrs) (attention within 24hrs, fix within 7 days)	543	588	650	576	516	351
Structures	Number of open work items with a risk score $\geq$ 12	-	-	486	191	339	51
Earthworks	Earthwork failures (5 year moving average)	3.4	4.4	17.8	17	17	19.6
Points	Point failures (service affecting)	380	403	340	296	377	276

Table 5.118: Asset Condition Sustainability – Kent

Principal Asset	Description	2014/15	2015/16 Target	2015/16 Actual
Track	Track - % Used Life - Rail	53.9	49.4	54.1
	Track - % Used Life - Switch & Crossings	55.0	54.4	52.5
	Track - % Used Life - Sleepers	65.9	64.7	66.7
	Track - % Used Life - Ballast	54.6	51.9	55.3
Signalling	Signalling Condition Index (SICA Remaining Life)	15.88	17.98	16.64
Telecoms	Telecoms - Remaining Life	56.6	53.3	51.3
Electrical Power	EP - Remaining Life - Conductor Rail	70.7	68.4	70.1
	EP - Remaining Life - Overhead Line Equipment (OLE)	71.8	70.5	71.8
	EP - Remaining Life - Signalling Power Cable	-	-	61.6
Buildings	Stations - % Remaining Life	47.3	45.9	45.2
	Light Maintenance Depot (LMD) - % Remaining Life	40.7	38.4	39.3
Structures	Average condition of major deck elements	68.1	68.8	68.1
	Tunnel Condition Monitoring Index (TCMI)	85.44	83.8	85.37
Earthworks	Earthworks - Condition Score	1.78	1.79	1.81
Drainage	Track Drainage - Condition Score	1.19	1.20	1.33
	Earthwork/Structure Drainage - Condition Score	1.54	1.20	1.61

Table 5.119: Track and off track renewals – Kent – Total

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	9	12	13	12
Complete (formation)	km	0	3	0	0
Rail Renewal	km	20	21	30	27
Single Rail	km	1	1	1	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	4	11	11	5
Medium (concrete)	km	10	9	11	16
Medium (other)	km	1	1	1	2
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	5	0	4	1
Full Renewal (Point Ends)	No.	22	40	35	30
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	4	20	41	23
Medium (Point Ends)	No.	38	29	42	49
Off Track					
Fencing	km	13	67	40	41
Slab track	km	0	0	0	0

Table 5.120: Track and off track renewals – Kent – Criticality 1

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	0	0	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.121: Track and off track renewals – Kent – Criticality 2

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	5	6	7	6
Complete (formation)	km	0	2	0	0
Rail Renewal	km	4	8	24	0
Single Rail	km	0	1	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	3	0	0
Medium (concrete)	km	2	5	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	3	0	0	0
Full Renewal (Point Ends)	No.	14	0	0	6
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	4	8	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.122: Track and off track renewals – Kent – Criticality 3

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	2	4	4	3
Complete (formation)	km	0	1	0	0
Rail Renewal	km	7	7	0	0
Single Rail	km	1	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	2	4	9	0
Medium (concrete)	km	5	1	11	0
Medium (other)	km	0	0	1	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	8	40	30	24
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	4	8	0	0
Medium (Point Ends)	No.	22	12	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.123: Track and off track renewals – Kent – Criticality 4

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	2	1	2	2
Complete (formation)	km	0	0	0	0
Rail Renewal	km	9	5	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	1	0	0
Medium (concrete)	km	2	1	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	12	37	0
Medium (Point Ends)	No.	8	8	34	0
Off Track					
Slab track	km	0	0	0	0

Table 5.124: Track and off track renewals – Kent – Criticality 5

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	2	3	0	0
Medium (concrete)	km	2	1	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	2	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	4	1	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.125: Track and off track renewals – Kent – no criticality breakdown

		BP 2015 Target	2015/16
Plain Line			
Conventional			
Steel Relay	km	0	0
Complete Renewal	km	0	0
Complete (formation)	km	0	0
Rail Renewal	km	6	26
Single Rail	km	0	0
High Output			
Automated Ballast Cleaning	km	0	0
Rail Sleeper Relay	km	0	0
Heavy Refurbishment	km	0	0
Refurbishment			
Heavy Refurbishment	km	2	4
Medium (concrete)	km	0	16
Medium (other)	km	0	2
Switches & Crossings			
S&C delivered			
Abandonment (Point Ends)	No.	4	1
Full Renewal (Point Ends)	No.	5	0
Refurbishment			
Heavy Refurbishment (Point Ends)	No.	8	23
Medium (Point Ends)	No.	4	49
Off Track			
Fencing	km	40	41
Slab track	km	0	0

Table 5.126: Civils renewals volumes – Kent

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Structures					
Underbridges	m ²	1,899	7,457	5,724	4,737
Overbridges (incl BG3)	m ²	197	625	742	398
Tunnels	m ²	0	35,100	2,142	250
Culverts	m ²	57	59	226	419
Footbridges	m ²	134	237	180	18
Coastal & Estuary Defences	m ²	50	700	0	30
Retaining Walls	m ²	0	517	0	0
Earthworks Total	Earthwork assets	55	121	217	226
Embankments - Maintenance	Earthwork assets	6	-	22	4
Embankments - Refurbishment	Earthwork assets	2	-	24	2
Embankments - Renewal	Earthwork assets	10	-	12	3
Rock Cuttings - Maintenance	Earthwork assets	5	-	22	83
Rock Cuttings - Refurbishment	Earthwork assets	12	-	13	19
Rock Cuttings - Renewal	Earthwork assets	7	-	37	22
Soil Cuttings - Maintenance	Earthwork assets	5	-	16	69
Soil Cuttings - Refurbishment	Earthwork assets	3	-	71	7
Soil Cuttings - Renewal	Earthwork assets	5	-	0	17
Track Drainage					
Renewal	lm	105	5,089	5,421	708
Refurbishment	lm	0	197	0	0
New Build	lm	0	682	74	0
EW Drainage					
Renewal	lm	8	360	932	40
Refurbishment	lm	60	35	8	0
Maintenance	lm	798	651	0	5,726
New Build	lm	405	0	0	160
Franchised Stations					
Footbridges	m ²	703	1,250	2,250	1,215
Train Sheds	m ²	0	0	0	0
Canopies	m ²	828	380	7,378	2,777
Platforms	m ²	8,122	4,184	2,713	4,506
Buildings	m ²	65	0	1,690	176
Lifts & Escalators	No.	0	0	0	0
Managed Stations					
Footbridges	m ²	0	0	0	0
Train Sheds	m ²	0	0	0	0
Canopies	m ²	0	0	0	0
Platforms	m ²	0	700	0	0
Buildings	m ²	126	0	0	0
Lifts & Escalators	No.	3	0	3	0
Light Maintenance Depots					
Buildings	m ²	90	0	0	0
Depot Shed	m ²	0	0	485	0
Lineside Buildings					
Buildings	m ²	5,036	230	160	0
MDU					
Buildings	m ²	420	0	0	0

Table 5.127: Signalling renewals volumes – Kent

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Full Conventional re-signalling	SEUs	0	281	276	221
ERTMS re-signalling	SEUs	0	0	0	0
Partial Conventional re-signalling	SEUs	0	22	12	20
Targeted Component renewal	SEUs	0	2	1	0
Modular re-signalling	SEUs	0	0	0	0
Level Crossing Renewals	No.	1	15	17	6

Table 5.128: E&P renewals volumes – Kent

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Contact Systems					
OLE Re-wiring	wire runs	0	0	0	0
Mid-life Refurbishment	wire runs	0	0	0	0
Structure Renewals	No.	0	0	0	0
Conductor rail					
Renewals	km	0	7	18	15
AC distribution					
HV Switchgear Renewal	No.	0	0	0	0
Booster Transformers	No.	0	0	0	0
DC distribution					
HV Switchgear Renewal	No.	0	6	12	3
HV Cables	km	0	18	19	6
LV Switchgear Renewal	No.	0	44	22	10
LV Cables	km	0	7	32	11
Transformer Rectifiers	No.	0	1	8	0
Fixed plant					
Signalling Power Cable	km	0	3	0	0
Principle Supply Point Renewal	No.	0	0	71	53
Rail Heating					
Points Heating Renewal	Point end	0	0	17	0

Table 5.129: Telecoms renewals volumes – Kent

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Station Information and Surveillance Systems					
Customer Information Systems	No.	0	60	0	0
Public Address	No.	0	1,562	0	0
CCTV	No.	0	758	0	0
Clocks	No.	0	3	0	0
Operational Comms					
PABX Concentrator	No.	0	230	0	0
Processor Controlled Concentrator	No.	0	5	0	0
Driver-Only Operation: CCTV	No.	0	0	0	0
Driver-Only Operation: Mirrors	No.	0	0	0	0
Public Emergency Telephone System	No.	0	0	0	0
Human Machine Interface Large	No.	0	0	0	0
Human Machine Interface Small	No.	0	0	0	0
Radio System	No.	0	0	0	0
Power Systems	No.	0	2	0	0

Table 5.130: Maintenance volumes – Kent

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	271	459	196
	Plain Line Stoneblowing (km)	MNT005	85	245	61
	Manual Wet bed removal (bay)	MNT006	1,572	833	1,174
	Mechanical Wet bed remover (bay)	MNT012	635	640	919
	S&C Tamping (point end)	MNT007	139	216	138
	Rail Changing - Al-Thermic Weld - Standard Gap (weld)	MNT044	1,281	1,590	1,562
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	6,569	7,150	7,858
	Mechanical reprofiling of Ballast (Mile)	MNT017	19	103	30
	Manual reprofiling of Ballast (rail yard)	MNT020	167,578	277,000	214,261
	Replace Pads & Insulators (sleeper)	MNT029	23,574	9,900	63,863
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	134,330	92,334	97,554
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	4,162	5350	5,679
	S&C Renew Crossing (crossing)	MNT120	66	65	92
	S&C Maintenance (point end)	MNT122	10,278	24344	9,595
	S&C Renew half set of Switches (H/S Switch)	MNT123	54	65	74
	S&C Stoneblowing (point end)	MNT124	6	50	9
	Rail grinding plain line (Mile)	MNT309	333	383	1,184
	Rail grinding S&C (point end)	MNT310	147	180	172
Off Track	Fences & Boundary Walls (yard)	MNT072	19,955	24449	22,174
	Drainage (Yard)	MNT073	13,735	27046	14,445
	LX Management - Off Track (Each)	MNT075	586	730	546
	Vegetation Removal of Boundary Trees (No.)	MNT081	817	1688	1,101
	Vegetation Management by Train (Mile)	MNT082	0	2208	3,826
	Vegetation Management Manual (Sq yard)	MNT170	273,940	209703	225,453
	Vegetation Management Mechanised (Mile)	MNT171	0	172	16
Electrical Power	Maintain Conductor Rail (Various)	MNT206	30,941	15281	22,810
	Maintain DC Traction Power Supplies (Each)	MNT209	5,591	4631	6,134
	Maintain OHL Components (Various)	MNT211	12	123	88
	Maintain Points Heating (Each)	MNT212	9,465	7753	9,340
	Maintain Signalling Power supplies (No.)	MNT213	340	4186	475
Civils	Visual Examinations (Civils) (No.)	MNT226a	4,603	5006	3,305
	Tunnel Examinations (No. minor elements)	MNT220	10,631	11250	11,250
	Detailed Examinations (No.)	MNT221	486	568	536
	Underwater Examination (No.)	MNT222	113	37	20
	Ancillary Structure examination (No. detailed)	MNT223	6	31	26
	Hidden critical element examinations (No.)	MNT224	53	100	6
	Load carrying assessment (No. spans)	MNT225	712	1213	26
Buildings	Visual examinations Buildings (each)	MNT226	1,102	168	1,150
	5 yearly examinations (each)	MNT227	30	43	26

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Table 5.131: Asset Condition Reliability – Sussex

Principal Asset	Description	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
Track	Rail Breaks and Immediate Action defects per 100km	4.45	5.69	5.34	4.63	4.63	3.56
	Track geometry (Poor Track Geometry)	5.35	4.91	4.81	4.48	4.48	4.22
	Track failures (service affecting)	233	258	209	243	249	239
Signalling	Signalling failures (service affecting)	863	880	920	943	885	931
Telecoms	Telecoms failures (service affecting)	55	75	156	222	97	168
Electrical Power	AC traction power failures (service affecting)	0	0	1	0	0	0
	DC traction power failures (service affecting)	59	92	68	75	74	70
	Non traction operational power supply failures (service affecting)	14	12	26	13	25	13
Buildings	Buildings - Re-active Faults (2 & 24) (attention with 2hrs, fix within 24hrs) (attention within 24hrs, fix within 7 days)	493	601	694	497	700	249
Structures	Number of open work items with a risk score $\geq$ 12	-	-	62	51	75	32
Earthworks	Earthwork failures (5 year moving average)	5.4	6.4	5.6	5.8	6.0	6.4
Points	Point failures (service affecting)	206	204	256	182	235	170

Table 5.132: Asset Condition Sustainability – Sussex

Principal Asset	Description	2014/15	2015/16 Target	2015/16 Actual
Track	Track - % Used Life - Rail	62.6	56.3	63.3
	Track - % Used Life - Switch & Crossings	67.9	70.1	66.7
	Track - % Used Life - Sleepers	71.5	70.8	72.7
	Track - % Used Life - Ballast	60.7	60.2	61.7
Signalling	Signalling Condition Index (SICA Remaining Life)	16.79	16.86	15.37
Telecoms	Telecoms - Remaining Life	56.6	51.0	51.3
Electrical Power	EP - Remaining Life - Conductor Rail	62.0	59.1	60.6
	EP - Remaining Life - Overhead Line Equipment (OLE)	-	-	-
	EP - Remaining Life - Signalling Power Cable	-	-	47.7
Buildings	Stations - % Remaining Life	50.7	49.1	48.3
	Light Maintenance Depot (LMD) - % Remaining Life	41.6	40.2	40.5
Structures	Average condition of major deck elements	68.2	68.0	68.1
	Tunnel Condition Monitoring Index (TCMI)	86.5	83.5	86.4
Earthworks	Earthworks - Condition Score	1.92	1.74	1.96
Drainage	Track Drainage - Condition Score	1.35	2.90	1.49
	Earthwork/Structure Drainage - Condition Score	1.53	2.50	1.70

Table 5.133: Track and off track renewals – Sussex – Total

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	9	0
Complete Renewal	km	5	9	2	7
Complete (formation)	km	1	1	34	1
Rail Renewal	km	8	15	7	19
Single Rail	km	1	2	51	5
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	7	1	1	1
Medium (concrete)	km	0	2	6	7
Medium (other)	km	2	9	6	3
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	3	3	2
Full Renewal (Point Ends)	No.	11	19	25	25
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	15	11	10
Medium (Point Ends)	No.	42	21	19	42
Off Track					
Fencing	km	5	20	28	19
Slab track	km	0	0	0	0

Table 5.134: Track and off track renewals – Sussex – Criticality 1

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	0	0	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.135: Track and off track renewals – Sussex – Criticality 2

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	3	7	5	4
Complete (formation)	km	0	1	2	1
Rail Renewal	km	3	7	29	0
Single Rail	km	1	2	4	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	2	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	2	0	0
Medium (other)	km	1	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	11	19	25	25
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	6	0	0
Medium (Point Ends)	No.	20	10	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.136: Track and off track renewals – Sussex – Criticality 3

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	1	2	1
Complete (formation)	km	0	0	0	0
Rail Renewal	km	1	1	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	2	0	0
Refurbishment					
Heavy Refurbishment	km	6	0	1	0
Medium (concrete)	km	0	0	6	0
Medium (other)	km	0	2	6	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	2	0	0
Medium (Point Ends)	No.	16	5	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.137: Track and off track renewals – Sussex – Criticality 4

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	2	1	1	1
Complete (formation)	km	0	0	0	0
Rail Renewal	km	3	4	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	4	0	0
Refurbishment					
Heavy Refurbishment	km	1	1	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	2	6	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	3	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	3	11	0
Medium (Point Ends)	No.	5	4	19	0
Off Track					
Slab track	km	0	0	0	0

Table 5.138: Track and off track renewals – Sussex – Criticality 5

		2014/15	DP 2014 Target	BP 2015 Target	2015/16
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	1	1	1
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	3	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	1	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	0	1	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	4	0	0
Medium (Point Ends)	No.	1	2	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.139: Track and off track renewals – Sussex – no criticality breakdown

		BP 2015 Target	2015/16
Plain Line			
Conventional			
Steel Relay	km	0	0
Complete Renewal	km	0	0
Complete (formation)	km	0	0
Rail Renewal	km	6	18
Single Rail	km	3	5
High Output			
Automated Ballast Cleaning	km	0	0
Rail Sleeper Relay	km	0	0
Heavy Refurbishment	km	0	0
Refurbishment			
Heavy Refurbishment	km	0	0
Medium (concrete)	km	0	7
Medium (other)	km	0	3
Switches & Crossings			
S&C delivered			
Abandonment (Point Ends)	No.	3	2
Full Renewal (Point Ends)	No.	0	0
Refurbishment			
Heavy Refurbishment (Point Ends)	No.	0	10
Medium (Point Ends)	No.	0	42
Off Track			
Fencing	km	28	19
Slab track	km	0	0

Table 5.140: Civils renewals volumes – Sussex

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Structures					
Underbridges	m ²	441	6,793	1,392	1,725
Overbridges (incl BG3)	m ²	1,000	17,775	14,110	1,548
Tunnels	m ²	0	0	500	1,490
Culverts	m ²	0	0	0	197
Footbridges	m ²	0	392	436	51
Coastal & Estuary Defences	m ²	0	0	0	0
Retaining Walls	m ²	1,000	0	0	700
Earthworks Total	Earthwork assets	45	134	80	169
Embankments - Maintenance	Earthwork assets	4	-	61	11
Embankments - Refurbishment	Earthwork assets	0	-	5	10
Embankments - Renewal	Earthwork assets	10	-	4	8
Rock Cuttings - Maintenance	Earthwork assets	0	-	3	5
Rock Cuttings - Refurbishment	Earthwork assets	2	-	0	13
Rock Cuttings - Renewal	Earthwork assets	3	-	0	14
Soil Cuttings - Maintenance	Earthwork assets	4	-	7	98
Soil Cuttings - Refurbishment	Earthwork assets	21	-	0	8
Soil Cuttings - Renewal	Earthwork assets	1	-	0	2
Track Drainage					
Renewal	lm	0	0	3,113	68
Refurbishment	lm	0	0	702	1,523
New Build	lm	0	0	231	0
EW Drainage					
Renewal	lm	170	241	927	2,217
Refurbishment	lm	20	206	0	50
Maintenance	lm	0	49	0	1,745
New Build	lm	175	0	0	0
Franchised Stations					
Footbridges	m ²	240	2,738	1,452	2,224
Train Sheds	m ²	0	0	3,100	0
Canopies	m ²	0	5,620	3,734	746
Platforms	m ²	13,417	18,330	10,724	9,346
Buildings	m ²	7,790	0	61	736
Lifts & Escalators	No.	0	0	0	0
Managed Stations					
Footbridges	m ²	0	0	0	0
Train Sheds	m ²	0	0	2,184	2,184
Canopies	m ²	0	1,049	2,406	527
Platforms	m ²	0	0	0	0
Buildings	m ²	6,182	0	1,545	7
Lifts & Escalators	No.	0	0	0	0
Light Maintenance Depots					
Buildings	m ²	0	0	0	8,195
Depot Shed	m ²	0	3,700	0	0
Lineside Buildings					
Buildings	m ²	0	2,009	4,018	1,168
MDU					
Buildings	m ²	0	0	0	0

Table 5.141: Signalling renewals volumes – Sussex

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Full Conventional re-signalling	SEUs	70	0	21	20
ERTMS re-signalling	SEUs	0	0	0	0
Partial Conventional re-signalling	SEUs	1	74	25	0
Targeted Component renewal	SEUs	0	19	1	14
Modular re-signalling	SEUs	0	0	0	0
Level Crossing Renewals	No.	9	4	3	1

Table 5.142: E&P renewals volumes – Sussex

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Contact Systems					
OLE Re-wiring	wire runs	0	0	0	0
Mid-life Refurbishment	wire runs	0	0	0	0
Structure Renewals	No.	0	0	0	0
Conductor rail					
Renewals	km	17	2	6	13
AC distribution					
HV Switchgear Renewal	No.	0	0	0	0
Booster Transformers	No.	0	0	0	0
DC distribution					
HV Switchgear Renewal	No.	0	0	0	0
HV Cables	km	2	0	12	13
LV Switchgear Renewal	No.	59	19	29	38
LV Cables	km	0	3	2	0
Transformer Rectifiers	No.	3	0	0	1
Fixed plant					
Signalling Power Cable	km	0	4	5	0
Principle Supply Point Renewal	No.	0	6	3	26
Rail Heating					
Points Heating Renewal	Point end	0	18	29	29

Table 5.143: Telecoms renewals volumes – Sussex

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Station Information and Surveillance Systems					
Customer Information Systems	No.	0	128	0	0
Public Address	No.	0	864	294	294
CCTV	No.	0	648	0	0
Clocks	No.	0	0	0	0
Operational Comms					
PABX Concentrator	No.	0	767	0	0
Processor Controlled Concentrator	No.	0	0	82	0
Driver-Only Operation: CCTV	No.	0	0	0	0
Driver-Only Operation: Mirrors	No.	0	0	0	0
Public Emergency Telephone System	No.	0	0	0	0
Human Machine Interface Large	No.	0	12	0	0
Human Machine Interface Small	No.	0	0	0	0
Radio System	No.	0	0	0	0
Power Systems	No.	0	0	0	0

Table 5.144: Maintenance volumes – Sussex

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	301	267	169
	Plain Line Stoneblowing (km)	MNT005	184	160	50
	Manual Wet bed removal (bay)	MNT006	1,379	180	588
	Mechanical Wet bed remover (bay)	MNT012	957	604	416
	S&C Tamping (point end)	MNT007	241	282	168
	Rail Changing - AI-Thermic Weld - Standard Gap (weld)	MNT044	1,712	763	1,896
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	9,944	5,295	12,454
	Mechanical reprofiling of Ballast (Mile)	MNT017	22	93	25
	Manual reprofiling of Ballast (rail yard)	MNT020	183,593	85,000	249,128
	Replace Pads & Insulators (sleeper)	MNT029	29,655	46,800	41,021
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	107,595	80,000	88,195
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	2,977	1,800	3,029
	S&C Renew Crossing (crossing)	MNT120	48	38	51
	S&C Maintenance (point end)	MNT122	10,926	2,800	11,132
	S&C Renew half set of Switches (H/S Switch)	MNT123	106	40	36
	S&C Stoneblowing (point end)	MNT124	14	50	14
	Rail grinding plain line (Mile)	MNT309	310	266	752
	Rail grinding S&C (point end)	MNT310	136	168	120
Off Track	Fences & Boundary Walls (yard)	MNT072	25,367	33,053	12,228
	Drainage (Yard)	MNT073	32,708	20,000	40,746
	LX Management - Off Track (Each)	MNT075	1,174	749	2,874
	Vegetation Removal of Boundary Trees (No.)	MNT081	426	700	686
	Vegetation Management by Train (Mile)	MNT082	119	700	0
	Vegetation Management Manual (Sq yard)	MNT170	171,687	220,000	305,368
	Vegetation Management Mechanised (Mile)	MNT171	0	70	0
Electrical Power	Maintain Conductor Rail (Various)	MNT206	10,100	15,222	18,775
	Maintain DC Traction Power Supplies (Each)	MNT209	6,116	4,064	10,283
	Maintain OHL Components (Various)	MNT211	28	0	42
	Maintain Points Heating (Each)	MNT212	4,832	9,370	10,126
	Maintain Signalling Power supplies (No.)	MNT213	596	1,618	2,638
Civils	Visual Examinations (Civils) (No.)	MNT226a	2,523	1,802	1,290
	Tunnel Examinations (No. minor elements)	MNT220	5,824	6,088	6,088
	Detailed Examinations (No.)	MNT221	380	283	238
	Underwater Examination (No.)	MNT222	24	38	6
	Ancillary Structure examination (No. detailed)	MNT223	4	32	65
	Hidden critical element examinations (No.)	MNT224	31	54	25
	Load carrying assessment (No. spans)	MNT225	153	296	169
Buildings	Visual examinations Buildings (each)	MNT226	868	887	892
	5 yearly examinations (each)	MNT227	40	35	37

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Scotland

In 2015/16, we exceeded reliability targets for all assets except for telecoms and earthworks in Scotland. There were particular challenges related to cases of extreme weather in Scotland. Notably, storms in December led to damage to and closure of the Lamington viaduct on the West Coast Main Line, affecting the main route between Manchester and Scotland. While our engineers worked around the clock, we worked closely with train operators to keep passengers moving across the border.

The number of rail breaks and immediate action defects per 100 kilometres in Scotland was 77 per cent better than target. This was a result of the continued deployment of UTU track recording across the route to drive improved detection and intervention. In addition, local initiatives to focus on the removal of vertical longitudinal splitting and enhanced intervention at adjustment switches have reduced the frequency of broken rails.

PTG in Scotland has continued the improving trend in 2015/16, exceeding target by 0.84 percentage points. This is a result of an increased focus on L2 faults and super red section of track. This has been driven by targets set in the Route Asset Management Plans (RAMPs) for both overall and repeat L2 faults.

The number of service affecting track failures was four per cent better than target in 2015/16. This is due to an ongoing focus on early detection of rail defects. The deployment of the PLPR recording train has produced a general reduction in failures.

Signalling reliability was one per cent better than target. A significant number of failures throughout 2015/16 were due to LED Light Engine issues. It has been established that there is a recognised design defect leading to these issues and an upgraded version is due for release in the near future. This is expected to further improve the reliability of our signalling assets.

The reliability of our points assets was one per cent better than target in 2015/16. This is a result on a number of initiatives including remote condition monitoring, the roll out of tubular stretcher bars, an ongoing correction of underlying track defects and detailed plans for new installations.

In 2015/16, 41 per cent of service affecting telecoms failures in Scotland were due to GSM-R issues, leading to overall reliability 71 per cent worse than our internal target of 224. Failures due to RETB systems on the Far North Line and the West Highland line were also higher than target, causing 30 per cent of failures. Other failures across the route included level crossing telephone failures, signal post telephone failures, signal post telephone concentrators, signalling services over telecoms circuits and level crossing CCTV.



Failures related to GSM-R continue to be investigated at a national level within via Project Artemis with a dedicated team working with the Scotland route to address performance issues with the GSM-R network. GSM-R interference from other MNOs continues to be a risk. Interference from MNOs can cause gaps in compliant coverage which can result in incidents of delay. As MNOs continue to roll out fourth generation mobile technology there will be further risk that their systems will cause interference with GSM-R. As a result of this risk the strategic solution is to develop and roll out an in-train cab software filter and, in the shorter term, to remedy coverage issues by deployment of line side repeater infill solution.

On RETB systems; running the legacy and next generation systems in tandem has contributed to the increase in failures. This will improve once the next generation equipment project has completed in September 2016 on the Far North Line. The West Highland Line is already operated fully on next generation equipment, with an unresolved interference issue at Loch Sloy which is being investigated.

Leaving GSM-R and RETB out of the failure statistics shows lineside telephones being the cause of the majority of the other failures. Renewal of telephones and tail cables at has taken place at 60 level crossings throughout the year and we will target our worst performing crossings throughout 2016/17. Migration of services from legacy cables and transmission systems to new, more reliable, FTN will continue throughout 2016/17. The nature of the design of FTN ensures that services are provided with circuit diversity hence improving resilience and reducing incidents of delay associated with telecom services.

The reliability of AC traction assets in 2015/16 was 43 per cent better than target. Key drivers of this include an increased focus on root cause analysis, and sustained investment, from CP4 into CP5, in the renewal of known defective components. The reliability of non-traction power supply assets in Scotland outperformed target by 66 per cent. Increased investment in renewals projects has delivered, in the main, new 'Class 2' IT power distribution systems to lineside equipment. This has been identified as a key driver of improvement. Investment in remote condition monitoring equipment has also allowed intervention to repair or renew damaged equipment, prior to serious failure, on a more frequent basis.

The reliability across the Scotland buildings portfolio continues to improve year on year through targeted minor works and strategic investment. In 2015/16, the reliability of buildings assets in Scotland was 48 per cent better than target. Despite the challenging weather our assets have proved to be resilient and able to perform. Several factors have contributed to performance in 2015/16 including the continued development of detailed minor work plans with the effective management and implementation of the works. Targeted minor work expenditure over the past four years has allowed us to address faults and build in a level of resilience into a

larger portion of our portfolio. Effort has been made throughout the year to reduce the number of faults by identifying underperforming and repeat failing assets. This coupled with site scoping visits has created a strategic targeted workbank with key renewal schemes to improve the reliability of our assets.



Across our structures portfolio, asset reliability was 22 per cent better than target. This is a result of the continued focus on tracking and closing out the highest priority minor work items.

The five year average of earthworks failures at the end of 2015/16 was six per cent worse than target. In accordance with asset policy, renewals and refurbishment work is targeted at assets susceptible to failure. We have also established a highly efficient in-sourced maintenance team which has been very effective in delivering high volumes of earthworks and drainage routine maintenance. There were 25 failures across the route in 2015/16. This is mainly due to the extremely wet months of December and January, when storms Desmond, Eva and Frank caused significant disruption.

Table 5.145: Asset Condition Reliability – Scotland

Principal Asset	Description	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
Track	Rail Breaks and Immediate Action defects per 100km	3.30	4.41	6.06	2.59	6.64	1.51
	Track geometry (Poor Track Geometry)	2.29	2.32	2.13	1.77	2.38	1.54
	Track failures (service affecting)	453	373	383	366	381	324
Signalling	Signalling failures (service affecting)	1,882	1,751	1,854	1,721	1,795	1,718
Telecoms	Telecoms failures (service affecting)	235	188	181	298	203	384
Electrical Power	AC traction power failures (service affecting)	78	65	132	56	86	49
	DC traction power failures (service affecting)	0	0	0	0	0	0
	Non traction operational power supply failures (service affecting)	51	56	42	33	41	14
Buildings	Buildings - Re-active Faults (2 & 24) (attention with 2hrs, fix within 24hrs) (attention within 24hrs, fix within 7 days)	559	607	475	371	590	306
Structures	Number of open work items with a risk score $\geq$ 12	-	-	98	90	96	75
Earthworks	Earthwork failures (5 year moving average)	17.0	23.4	22.0	18.8	20.0	21.2
Points	Point failures (service affecting)	560	493	451	465	430	422

Table 5.146: Asset Condition Sustainability – Scotland

Principal Asset	Description	2014/15	2015/16 Target	2015/16 Actual
Track	Track - % Used Life – Rail	61.50	58.60	60.50
	Track - % Used Life - Switch & Crossings	50.10	48.20	48.40
	Track - % Used Life - Sleepers	73.70	70.90	72.70
	Track - % Used Life - Ballast	55.50	55.30	54.50
Signalling	Signalling Condition Index (SICA Remaining Life)	10.42	11.32	13.97
Telecoms	Telecoms - % Remaining Life	63.24	55.30	58.49
Electrical Power	EP - % Remaining Life - Conductor Rail	-	-	-
	EP - % Remaining Life - Overhead Line Equipment (OLE)	62.90	61.70	62.80
	EP - % Remaining Life - Signalling Power Cable	-	-	33.40
Buildings	Stations - % Remaining Life	58.70	57.00	56.50
	Light Maintenance Depot (LMD) - % Remaining Life	54.70	51.20	58.80
Structures	Average condition of major deck elements	63.11	62.80	63.10
	Tunnel Condition Monitoring Index (TCMI)	91.82	85.30	91.57
Earthworks	Earthworks - Condition Score	1.90	1.55	1.78
Drainage	Track Drainage - Condition Score	2.00	2.04	2.00
	Earthwork/Structure Drainage - Condition Score	1.27	1.34	1.28

Table 5.147: Track and off track renewals – Scotland – Total

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	16	14	14	11
Complete Renewal	km	17	37	25	19
Complete (formation)	km	2	8	10	12
Rail Renewal	km	37	27	24	29
Single Rail	km	13	9	10	17
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	2	7	5	6
Medium (concrete)	km	30	63	70	84
Medium (other)	km	25	34	35	40
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	6	11	14	14
Full Renewal (Point Ends)	No.	23	31	16	19
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	21	30	36	41
Medium (Point Ends)	No.	11	38	34	36
Off Track					
Fencing	km	226	215	215	161
Slab track	km	0	0		0

Table 5.148: Track and off track renewals – Scotland – Criticality 1

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	0	0	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.149: Track and off track renewals – Scotland – Criticality 2

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	5	22	5	7
Complete (formation)	km	1	5	3	2
Rail Renewal	km	35	8	23	1
Single Rail	km	13	4	10	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	3	0	0
Medium (concrete)	km	30	0	70	0
Medium (other)	km	25	0	35	1
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	1	7	14	4
Full Renewal (Point Ends)	No.	8	26	16	5
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	20	17	36	0
Medium (Point Ends)	No.	11	11	34	0
Off Track					
Slab track	km	0	0	0	0

Table 5.150: Track and off track renewals – Scotland – Criticality 3

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	1	1	0	0
Complete Renewal	km	5	13	17	9
Complete (formation)	km	1	3	5	7
Rail Renewal	km	0	4	0	0
Single Rail	km	0	3	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	2	3	4	3
Medium (concrete)	km	0	6	0	0
Medium (other)	km	0	1	0	2
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	3	4	0	6
Full Renewal (Point Ends)	No.	8	4	0	13
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	7	0	13
Medium (Point Ends)	No.	0	11	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.151: Track and off track renewals – Scotland – Criticality 4

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	1	2	5	3
Complete Renewal	km	7	2	4	4
Complete (formation)	km	0	0	3	3
Rail Renewal	km	0	6	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	1
Medium (concrete)	km	0	32	0	0
Medium (other)	km	0	1	0	1
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	2	0	0	4
Full Renewal (Point Ends)	No.	7	1	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	1	6	0	3
Medium (Point Ends)	No.	0	6	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.152: Track and off track renewals – Scotland – Criticality 5

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	14	11	9	9
Complete Renewal	km	0	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	9	0	0
Single Rail	km	0	1	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	1	0	0
Medium (concrete)	km	0	26	0	0
Medium (other)	km	0	31	0	5
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	0	10	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.153: Track and off track renewals – Scotland – no criticality breakdown

		BP 2015 Target	2015/16 Actual
Plain Line			
Conventional			
Steel Relay	km	0	14
Complete Renewal	km	0	25
Complete (formation)	km	0	10
Rail Renewal	km	0	24
Single Rail	km	0	10
High Output			
Automated Ballast Cleaning	km	0	0
Rail Sleeper Relay	km	0	0
Heavy Refurbishment	km	0	0
Refurbishment			
Heavy Refurbishment	km	0	5
Medium (concrete)	km	0	70
Medium (other)	km	0	35
Switches & Crossings			
S&C delivered			
Abandonment (Point Ends)	No.	0	14
Full Renewal (Point Ends)	No.	0	16
Refurbishment			
Heavy Refurbishment (Point Ends)	No.	0	36
Medium (Point Ends)	No.	0	34
Off Track			
Fencing	km	215	215
Slab track	km	0	0

Table 5.154: Civils renewals volumes – Scotland

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Structures					
Underbridges	m ²	53,624	21,109	23,866	25,560
Overbridges (incl BG3)	m ²	9,426	2,261	2,468	2,284
Tunnels	m ²	16,073	1,766	1,766	1,766
Culverts	m ²	4,432	773	701	591
Footbridges	m ²	544	421	454	472
Coastal & Estuary Defences	m ²	6,999	700	700	700
Retaining Walls	m ²	3,350	133	487	697
Earthworks Total	Earthwork assets	1,576	439	621	729
Embankments - Maintenance	Earthwork assets	595	-	150	111
Embankments - Refurbishment	Earthwork assets	178	-	134	24
Embankments - Renewal	Earthwork assets	83	-	1	20
Rock Cuttings - Maintenance	Earthwork assets	65	-	42	25
Rock Cuttings - Refurbishment	Earthwork assets	56	-	41	29
Rock Cuttings - Renewal	Earthwork assets	41	-	18	89
Soil Cuttings - Maintenance	Earthwork assets	372	-	170	359
Soil Cuttings - Refurbishment	Earthwork assets	123	-	41	50
Soil Cuttings - Renewal	Earthwork assets	63	-	24	22
Track Drainage					
Renewal	lm	5,829	0	0	2,080
Refurbishment	lm	15,605	0	3,372	130
New Build	lm	2,467	0	0	0
EW Drainage					
Renewal	lm	1,566	1,480	0	585
Refurbishment	lm	1,017	335	915	12
Maintenance	lm	2,755	2,906	17	1,395
New Build	lm	5,410	0	1,716	190
Franchised Stations					
Footbridges	m ²	22,575	573	342	0
Train Sheds	m ²	51,901	1,900	2,300	815
Canopies	m ²	45,801	229	1,713	3,230
Platforms	m ²	7,753	2,300	1,024	4,800
Buildings	m ²	1,326	672	426	303
Lifts & Escalators	No.	4	67	0	0
Managed Stations					
Footbridges	m ²	6,432	265	0	809
Train Sheds	m ²	217	0	0	0
Canopies	m ²	265	0	0	0
Platforms	m ²	-	0	0	0
Buildings	m ²	120	0	0	0
Lifts & Escalators	No.	3	0	0	0
Light Maintenance Depots					
Buildings	m ²	232	0	0	0
Depot Shed	m ²	32,450	0	0	0
Lineside Buildings					
Buildings	m ²	5,356	265	1,605	1,440
MDU					
Buildings	m ²	7,397	56	56	0

Table 5.155: Signalling renewals volumes – Scotland

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Full Conventional re-signalling	SEUs	4	0	0	0
ERTMS re-signalling	SEUs	0	0	0	0
Partial Conventional re-signalling	SEUs	0	31	0	0
Targeted Component renewal	SEUs	0	8	3	8
Modular re-signalling	SEUs	0	0	0	0
Level Crossing Renewals	No.	5	3	0	0

Table 5.156: E&P renewals volumes – Scotland

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Contact Systems					
OLE Re-wiring	wire runs	37	1	25	25
Mid-life Refurbishment	wire runs	0	0	0	0
Structure Renewals	No.	0	3	0	0
Conductor rail					
Renewals	km	0	0	0	0
AC distribution					
HV Switchgear Renewal	No.	0	0	0	0
Booster Transformers	No.	0	2	0	0
DC distribution					
HV Switchgear Renewal	No.	0	0	0	0
HV Cables	km	0	0	0	0
LV Switchgear Renewal	No.	0	0	0	0
LV Cables	km	0	0	0	0
Transformer Rectifiers	No.	0	0	0	0
Fixed plant					
Signalling Power Cable	km	0	27	43	0
Principle Supply Point Renewal	No.	10	0	2	3
Rail Heating					
Points Heating Renewal	Point end	0	3	0	0

Table 5.157: Telecoms renewals volumes – Scotland

	2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Station Information and Surveillance Systems				
Customer Information Systems	0	6	15	0
Public Address	511	43	0	0
CCTV	54	0	0	0
Clocks	0	0	0	0
Operational Comms				
PABX Concentrator	0	82	82	0
Processor Controlled Concentrator	0	0	1	0
Driver-Only Operation: CCTV	0	11	11	8
Driver-Only Operation: Mirrors	0	7	7	0
Public Emergency Telephone System	0	3	3	0
Human Machine Interface Large	0	0	0	0
Human Machine Interface Small	0	0	0	0
Radio System	0	0	0	73
Power Systems	0	1	0	46

Table 5.158: Maintenance volumes – Scotland

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	451	612	349
	Plain Line Stoneblowing (km)	MNT005	154	382	155
	Manual Wet bed removal (bay)	MNT006	1,307	2,004	1,064
	Mechanical Wet bed remover (bay)	MNT012	1,072	696	981
	S&C Tamping (point end)	MNT007	320	399	264
	Rail Changing - AI-Thermic Weld - Standard Gap (weld)	MNT044	1,530	2,728	1,867
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	9,740	11,906	12,848
	Mechanical reprofiling of Ballast (Mile)	MNT017	1,796	182	96
	Manual reprofiling of Ballast (rail yard)	MNT020	95,960	122,688	116,606
	Replace Pads & Insulators (sleeper)	MNT029	47,210	88,000	99,676
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	81,135	91,817	68,361
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	100,883	45,000	79,931
	S&C Renew Crossing (crossing)	MNT120	70	75	72
	S&C Maintenance (point end)	MNT122	77,036	34,015	78,393
	S&C Renew half set of Switches (H/S Switch)	MNT123	26	79	73
	S&C Stoneblowing (point end)	MNT124	0	69	0
	Rail grinding plain line (Mile)	MNT309	71	1,256	1,696
	Rail grinding S&C (point end)	MNT310	212	216	248
Off Track	Fences & Boundary Walls (yard)	MNT072	112,843	189,574	110,329
	Drainage (Yard)	MNT073	69,957	151,754	80,682
	LX Management - Off Track (Each)	MNT075	2,164	2,849	3,320
	Vegetation Removal of Boundary Trees (No.)	MNT081	6,154	13,136	5,483
	Vegetation Management by Train (Mile)	MNT082	1	1,177	4
	Vegetation Management Manual (Sq yard)	MNT170	468,389	171,156	445,614
	Vegetation Management Mechanised (Mile)	MNT171	207	26	390
Electrical Power	Maintain Conductor Rail (Various)	MNT206	0	0	0
	Maintain DC Traction Power Supplies (Each)	MNT209	1,213	0	2,102
	Maintain OHL Components (Various)	MNT211	19,591	44,751	21,876
	Maintain Points Heating (Each)	MNT212	6,394	8,546	7,278
	Maintain Signalling Power supplies (No.)	MNT213	4,569	6,316	3,473
Civils	Visual Examinations (Civils) (No.)	MNT226a	10,535	11,030	10,974
	Tunnel Examinations (No. minor elements)	MNT220	8,833	9,084	9,052
	Detailed Examinations (No.)	MNT221	1,301	1,655	1,530
	Underwater Examination (No.)	MNT222	94	82	153
	Ancillary Structure examination (No. detailed)	MNT223	199	203	161
	Hidden critical element examinations (No.)	MNT224	92	150	148
	Load carrying assessment (No. spans)	MNT225	111	1,287	261
Buildings	Visual examinations Buildings (each)	MNT226	352	1,214	1,447
	5 yearly examinations (each)	MNT227	182	480	847

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Wales

In 2015/16, the majority of assets in Wales exceeded target. The number of service affecting track, signalling and points failures were all worse than target.

The number of rail breaks and immediate action defects in 2015/16 was 13 per cent better than target. The most frequent cause of broken rails has been old aluminothermic welds and bolthole defects, with a growing trend of failure related to corrosion of the rail foot. The number of immediate action defects continued to show long term improvements, reflecting the success of including earlier mandated removal timescales within route policy.

PTG in Wales was 0.15 percentage points better than target. This is a result of the national focus on the reduction of L2 faults and repeat faults.

The number of service affecting track failures was 86 per cent worse than target. The root cause of this problem is a cyclic top TSR affecting criticality one track in the Severn Tunnel. A track renewal at this site has been deferred until 2017 to allow access for the Great Western Route Modernisation electrification works in the tunnel. Elsewhere throughout the route unplanned TSRs and rough riding reports have impacted on track reliability. We now hold a fortnightly 'TSR Board' where each TSR is discussed in detail, progress towards removal is monitored and sites at risk of a TSR discussed with a view to prevention. At the periodic route reliability group all service affecting delays are discussed and strategic actions developed to improve performance.

The reliability of our signalling assets was 10 per cent worse than target in 2015/16. An issue with axle counters has been identified as a key contributor to this. A new firmware has been jointly developed and installed which resolves heat issue and several other failure modes.

The number of points failures in 2015/16 was 10 per cent worse than target. We have launched analysis to better understand if there are common causes contributing to under-performance, and why our remote condition monitoring process is not providing us with an actionable intervention to prevent failure. We have re-introduced joint point teams in the Cardiff area and this has been successful in reducing the number of failures.

There were three non-traction power supply failures in 2015/16, 89 per cent better than target. It should be noted that there were no outages of distributed signalling power during the year.

Asset reliability across the buildings portfolio in Wales was one per cent better than target. We have targeted renewals at locations identified as having higher frequency of reactive defects.



Overall telecoms reliability was nine per cent better than target in 2015/16. Since the introduction of GSM-R in Wales in April 2014, it has been the main contributor to service affecting telecoms failures. Project Artemis is targeting GSM-R failures nationally. The majority of the issues identified were found to be either behavioural between signaller and driver or a lack of signage. Improvements have been made by increasing awareness through briefings and additional signage, resulting in a reduction of service affecting GSM-R failures throughout the year. Level crossing telephones failures are the second biggest contributor to telecoms reliability.

Structures reliability was 69 per cent better than target in 2015/16. This is a result of review and prioritisation of open work items. We are actively working with our contractors to focus on the delivery of remaining items.

The five year moving average for earthworks failures was 7.6 at the end of 2015/16; 27 per cent worse than target as a result of severe wet weather over the winter months. We have implemented an improved reporting tool and increased resources within the earthworks and drainage teams.

Table 5.159: Asset Condition Reliability – Wales

Principal Asset	Description	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
Track	Rail Breaks and Immediate Action defects per 100km	2.08	2.08	1.67	1.55	2.16	1.87
	Track geometry (Poor Track Geometry) (%)	1.58	1.40	1.46	1.57	1.58	1.43
	Track failures (service affecting)	138	134	165	243	132	245
Signalling	Signalling failures (service affecting)	1,137	1,038	869	907	888	978
Telecoms	Telecoms failures (service affecting)	119	130	155	612	181	345
Electrical Power	AC traction power failures (service affecting)	0	1	0	0	0	0
	DC traction power failures (service affecting)	0	0	0	0	0	0
	Non traction operational power supply failures (service affecting)	24	26	28	14	28	3
Buildings	Buildings - Re-active Faults (2 & 24) (attention with 2hrs, fix within 24hrs) (attention within 24hrs, fix within 7 days)	192	203	262	162	216	159
Structures	Number of open work items with a risk score $\geq$ 12	-	-	294	170	246	77
Earthworks	Earthwork failures (5 year moving average)	7.6	5.6	5.8	4.2	6.0	7.6
Points	Point failures (service affecting)	270	200	185	180	167	196

Table 5.160: Asset Condition Sustainability – Wales

Principal Asset	Description	2014/15	2015/16 Target	2015/16 Actual
Track	Track - % Used Life - Rail	55.30	55.30	55.30
	Track - % Used Life - Switch & Crossings	56.80	46.90	56.80
	Track - % Used Life - Sleepers	71.40	72.20	72.00
	Track - % Used Life - Ballast	53.60	54.80	53.20
Signalling	Signalling Condition Index (SICA Remaining Life)	10.73	17.38	11.51
Telecoms	Telecoms - % Remaining Life %	73.21	66.60	72.18
Electrical Power	EP - % Remaining Life - Conductor Rail	-	-	-
	EP - % Remaining Life - Overhead Line Equipment (OLE)	-	-	-
	EP - % Remaining Life - Signalling Power Cable	-	-	62.80
Buildings	Stations - % Remaining Life	43.30	41.90	45.10
	Light Maintenance Depot (LMD) - % Remaining Life	48.00	40.20	48.10
Structures	Average condition of major deck elements	61.22	61.50	60.90
	Tunnel Condition Monitoring Index (TCMI)	80.65	82.50	79.18
Earthworks	Earthworks - Condition Score	1.97	2.00	1.96
Drainage	Track Drainage - Condition Score	1.58	-	1.64
	Earthwork/Structure Drainage - Condition Score	1.58	-	1.67

Table 5.161: Track and off track renewals – Wales – Total

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	12	0
Complete Renewal	km	3	0	6	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	21	0
Refurbishment					
Heavy Refurbishment	km	0	0	21	0
Medium (concrete)	km	0	0	27	0
Medium (other)	km	0	0	17	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	34	0
Full Renewal (Point Ends)	No.	0	0	14	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	37	0
Medium (Point Ends)	No.	0	0	32	0
Off Track					
Fencing	km	68	148	125	68
Slab track	km	0	0	0	0

Table 5.162: Track and off track renewals – Wales – Criticality 1

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	0	0	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.163: Track and off track renewals – Wales – Criticality 2

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	1	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	2	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	2	5	0	0
Medium (concrete)	km	0	7	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	4	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	23	0	0
Medium (Point Ends)	No.	0	9	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.164: Track and off track renewals – Wales – Criticality 3

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	0	0	1
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	3	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	17	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	2	21
Refurbishment					
Heavy Refurbishment	km	11	8	0	0
Medium (concrete)	km	12	7	0	0
Medium (other)	km	1	10	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	18	0	0
Full Renewal (Point Ends)	No.	0	15	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	1	3	0	0
Medium (Point Ends)	No.	2	5	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.165: Track and off track renewals – Wales – Criticality 4

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	5	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	2	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	7	21	1
Refurbishment					
Heavy Refurbishment	km	6	5	0	0
Medium (concrete)	km	11	6	0	0
Medium (other)	km	9	10	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	5	5	0	0
Full Renewal (Point Ends)	No.	10	6	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	5	7	0	0
Medium (Point Ends)	No.	11	10	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.166: Track and off track renewals – Wales – Criticality 5

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	12	10
Complete Renewal	km	5	0	1	1
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	2	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	7	1	0
Refurbishment					
Heavy Refurbishment	km	6	5	0	0
Medium (concrete)	km	11	6	0	0
Medium (other)	km	9	10	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	5	5	0	0
Full Renewal (Point Ends)	No.	10	6	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	5	7	0	0
Medium (Point Ends)	No.	11	10	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.167: Track and off track renewals – Wales – no criticality breakdown

		BP 2015 Target	2015/16 Actual
Plain Line			
Conventional			
Steel Relay	km	0	0
Complete Renewal	km	5	5
Complete (formation)	km	0	0
Rail Renewal	km	0	14
Single Rail	km	0	6
High Output			
Automated Ballast Cleaning	km	0	0
Rail Sleeper Relay	km	0	0
Heavy Refurbishment	km	0	0
Refurbishment			
Heavy Refurbishment	km	19	2
Medium (concrete)	km	27	25
Medium (other)	km	17	19
Switches & Crossings			
S&C delivered			
Abandonment (Point Ends)	No.	37	34
Full Renewal (Point Ends)	No.	32	14
Refurbishment			
Heavy Refurbishment (Point Ends)	No.	8	5
Medium (Point Ends)	No.	23	24
Off Track			
Slab track	km	0	0

Table 5.168: Civils renewals volumes – Wales

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Structures					
Underbridges	m ²	6,243	7,870	10,466	10,882
Overbridges (incl BG3)	m ²	0	710	714	456
Tunnels	m ²	0	2,100	3,795	0
Culverts	m ²	0	284	568	137
Footbridges	m ²	0	190	1,647	666
Coastal & Estuary Defences	m ²	6,611	200	400	560
Retaining Walls	m ²	0	530	1,998	1,217
Earthworks Total	Earthwork assets	18	282	561	574
Embankments - Maintenance	Earthwork assets	0	-	152	184
Embankments - Refurbishment	Earthwork assets	1	-	143	30
Embankments - Renewal	Earthwork assets	0	-	1	3
Rock Cuttings - Maintenance	Earthwork assets	1	-	81	24
Rock Cuttings - Refurbishment	Earthwork assets	4	-	5	7
Rock Cuttings - Renewal	Earthwork assets	4	-	10	11
Soil Cuttings - Maintenance	Earthwork assets	0	-	61	262
Soil Cuttings - Refurbishment	Earthwork assets	2	-	74	46
Soil Cuttings - Renewal	Earthwork assets	6	-	35	7
Track Drainage					
Renewal	lm	0	0	0	0
Refurbishment	lm	8,449	6,312	6,312	5,666
New Build	lm	0	0	0	0
EW Drainage					
Renewal	lm	0	513	1,398	530
Refurbishment	lm	85	216	711	276
Maintenance	lm	0	2,366	3,495	2,081
New Build	lm	182	0	0	237
Franchised Stations					
Footbridges	m ²	0	151	626	0
Train Sheds	m ²	0	5,080	580	0
Canopies	m ²	156	1,504	9,228	925
Platforms	m ²	292	2,347	2,512	80
Buildings	m ²	0	605	600	0
Lifts & Escalators	No.	0	1	0	0
Managed Stations					
Footbridges	m ²	0	0	0	0
Train Sheds	m ²	0	0	0	0
Canopies	m ²	0	0	0	0
Platforms	m ²	0	0	0	0
Buildings	m ²	0	0	0	0
Lifts & Escalators	No.	0	0	0	0
Light Maintenance Depots					
Buildings	m ²	0	0	60,000	0
Depot Shed	m ²	0	750		0
Lineside Buildings					
Buildings	m ²	0	0	1,010	0
MDU					
Buildings	m ²	203	0	874	1,255

Table 5.169: Signalling renewals volumes – Wales

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Full Conventional re-signalling	SEUs	114	48	99	99
ERTMS re-signalling	SEUs	0	2	0	0
Partial Conventional re-signalling	SEUs	0	0	0	0
Targeted Component renewal	SEUs	0	0	0	0
Modular re-signalling	SEUs	0	132	0	0
Level Crossing Renewals	No.	2	6	0	0

Table 5.170: E&P renewals volumes – Wales

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Contact Systems					
OLE Re-wiring	wire runs	0	0	0	0
Mid-life Refurbishment	wire runs	0	0	0	0
Structure Renewals	No.	0	0	0	0
Conductor rail					
Renewals	km	0	0	0	0
AC distribution					
HV Switchgear Renewal	No.	0	0	0	0
Booster Transformers	No.	0	0	0	0
DC distribution					
HV Switchgear Renewal	No.	0	0	0	0
HV Cables	km	0	0	0	0
LV Switchgear Renewal	No.	0	0	0	0
LV Cables	km	0	0	0	0
Transformer Rectifiers	No.	0	0	0	0
Fixed plant					
Signalling Power Cable	km	0	0	0	0
Principle Supply Point Renewal	No.	0	0	0	0
Rail Heating					
Points Heating Renewal	Point end	4	4	0	0

Table 5.171: Telecoms renewals volumes – Wales

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Station Information and Surveillance Systems					
Customer Information Systems	No.	0	0	0	0
Public Address	No.	14	0	0	0
CCTV	No.	0	0	0	0
Clocks	No.	0	0	0	0
Operational Comms					
PABX Concentrator	No.	0	0	0	0
Processor Controlled Concentrator	No.	0	0	0	0
Driver-Only Operation: CCTV	No.	0	0	0	0
Driver-Only Operation: Mirrors	No.	0	0	0	0
Public Emergency Telephone System	No.	0	0	0	0
Human Machine Interface Large	No.	0	0	0	0
Human Machine Interface Small	No.	0	0	0	0
Radio System	No.	0	0	0	0
Power Systems	No.	0	0	0	0

Table 5.172: Maintenance volumes – Wales

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	152	130	63
	Plain Line Stoneblowing (km)	MNT005	176	127	482
	Manual Wet bed removal (bay)	MNT006	3,525	1,584	3,868
	Mechanical Wet bed remover (bay)	MNT012	553	0	517
	S&C Tamping (point end)	MNT007	184	265	43
	Rail Changing - Al-Thermic Weld - Standard Gap (weld)	MNT044	892	838	910
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	4,197	4,041	6,716
	Mechanical reprofiling of Ballast (Mile)	MNT017	143	179	261
	Manual reprofiling of Ballast (rail yard)	MNT020	102,671	30,079	105,749
	Replace Pads & Insulators (sleeper)	MNT029	18,303	18,144	45,692
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	83,831	16,290	74,238
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	54,724	52,800	52,294
	S&C Renew Crossing (crossing)	MNT120	21	0	20
	S&C Maintenance (point end)	MNT122	36,100	37,793	37,066
	S&C Renew half set of Switches (H/S Switch)	MNT123	10	21	19
	S&C Stoneblowing (point end)	MNT124	12	116	49
	Rail grinding plain line (Mile)	MNT309	115	230	1,312
	Rail grinding S&C (point end)	MNT310	150	300	120
Off Track	Fences & Boundary Walls (yard)	MNT072	96,314	66,000	128,798
	Drainage (Yard)	MNT073	12,001	20,427	33,683
	LX Management - Off Track (Each)	MNT075	1,808	1,493	3,361
	Vegetation Removal of Boundary Trees (No.)	MNT081	3,558	2,000	8,973
	Vegetation Management by Train (Mile)	MNT082	81	0	229
	Vegetation Management Manual (Sq yard)	MNT170	300,004	336,010	713,667
	Vegetation Management Mechanised (Mile)	MNT171	353	751	751
Electrical Power	Maintain Conductor Rail (Various)	MNT206	0	0	0
	Maintain DC Traction Power Supplies (Each)	MNT209	0	30	68
	Maintain OHL Components (Various)	MNT211	2	0	0
	Maintain Points Heating (Each)	MNT212	7,610	7,368	3,820
	Maintain Signalling Power supplies (No.)	MNT213	2,456	2,471	2,367
Civils	Visual Examinations (Civils) (No.)	MNT226a	5,611	8,002	6,737
	Tunnel Examinations (No. minor elements)	MNT220	8,535	8,016	54
	Detailed Examinations (No.)	MNT221	815	1,765	1,463
	Underwater Examination (No.)	MNT222	164	180	204
	Ancillary Structure examination (No. detailed)	MNT223	49	177	138
	Hidden critical element examinations (No.)	MNT224	45	25	74
	Load carrying assessment (No. spans)	MNT225	310	792	276
Buildings	Visual examinations Buildings (each)	MNT226	169	355	179
	5 yearly examinations (each)	MNT227	23	55	59

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Wessex

With the exception of telecoms and earthworks assets, the performance of our infrastructure in Wessex was better than target in 2015/16. Throughout 2015/16, Wessex route has delivered work in association with Project Delta. This is a performance improvement programme within Wessex which consists of additional targeted activity across a number of core assets, designed to improve asset performance across the route. As well as delivering additional track renewals work, our points and signalling reliability have improved following targeted interventions.

The number of rail breaks and immediate action defects per 100 kilometres was 37 per cent better than target. This is due to performance schemes to remove emerging faults and conduct weld repairs, along with a targeted re-railing programme driven by analysis of defect clusters.

PTG was one percentage point better than target which is primarily driven by the large volume of high output track renewals across the route, a focus on the correction of repeat L2 faults, removal of wet track beds and targeted tamping work. Our interventions in 2015/16 have continued to prove effective in improving track geometry. This can be partially attributed to updated track recording software allowing thorough analysis of track condition and targeted interventions.

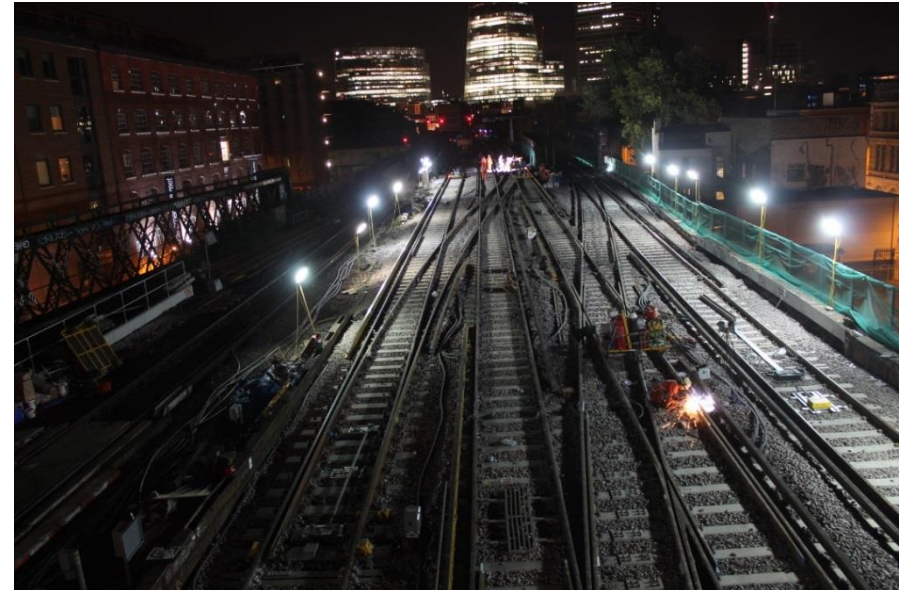
The number of service affecting failures was 24 per cent better than target. This was primarily driven by a mixture of renewal schemes, performance improvement schemes to deliver wet bed removal and L2 fault correction. We have also focussed on effective interventions to allow the removal of speed restrictions.

Points reliability was 33 per cent better than target and signalling performance showed a nine per cent improvement from 2014/15. Our local signalling reliability meetings have focussed on specific items that have caused reliability issues in previous years. We have learnt valuable lessons around light engines and employed appropriate mitigation measures including LED signal head replacements. We have not had any major re-signalling schemes commissioned in 2015/16, meaning that new relay rates are not impacting asset performance. Across the asset base, delivery of additional signalling renewals has provided benefit to reliability and sustainability of our assets, although the renewal of Sheet Level Crossing has been deferred to CP6 due to deliverability challenges.

Telecoms reliability in Wessex was 78 per cent better than target in 2015/16. The national issues that have been seen since the introduction of with GSM-R represented a significant portion of service affecting telecoms failures across the route. Project Artemis, led by our central Network Rail telecoms team is seeking to

address the root cause of the issues, and new GSM-R software is being rolled out to improve reliability.

Delivery of electrification renewals in Wessex was impacted by a safety stand down in 2015/16. We identified a safety concern in work processes at a renewal site and implemented a safety stand down until the issue could be resolved.



The number of DC traction power supply failures in Wessex remains higher than 2011/12, however following a number of proactive interventions, the downward trend since 2013/14 is continuing and the 2015/16 result was 20 per cent better than target. The primary cause for the deterioration between 2011/12 and 2013/14 was the failure of conductor rail cable lugs which connect the traction supply cables to the conductor rail and hookswitches. Intervention to replace the MK1 version of the lug connection system, with installation of revised designs to address shortfalls in the original design, coupled with renewal in modern equivalent form (doubling the cables), has shown benefit in reducing the number of cable failures. This programme will continue in 2016/17 and the remainder of CP5. Further diagnostic mechanical testing of the cable lugs has been completed which has led to a further set of alterations to the design to make the connection even more resilient. We have also received the first delivery of direct connection lugs, made to a

specification developed by Wessex and LSE route. These lugs will undergo type testing shortly followed by trial installation.



The reliability of non-traction power supply in 2015/16 was 65 per cent better than target but some of the incidents were sudden and severe in terms of impact on performance. The failures were predominantly related to issues with signalling power distribution systems and were largely due to undetected degradation of cable or location cabinet switchgear insulation. This was found to be a result of rodent damage or mechanical damage to the cable, causing the protection to operate and de-energise the system. To mitigate against this, we have installed earth fault monitoring units to all systems, and connected the units to the intelligent infrastructure remote conditioning monitoring system. These units detect developing earth faults on the system allowing proactive fault investigations and repair or replacement to take place before a service affecting failure occurs. We have renewed approximately 12 kilometres of signalling power distribution cable

using the enhanced glass fibre reinforced cable and repaired defects in other cables using the information provided by Intelligent Infrastructure. However, there are further systems and cables currently under investigation due to falling insulation resistance levels. Anti-rodent measures are also being fitted to a number of high risk location cabinets to address the risk of infestation within the power enclosure.

The number of '2 hour' and '24 hour' re-active faults for buildings has been reducing for the past two years, out-performing target by 14 per cent in 2015/16. Throughout the year, analysis has been undertaken to focus on causes for repeat faults and deliver appropriate interventions to help continue the improvement for the remainder of the control period. The renewal of the Honiton tunnel has been deferred to the end of CP5, although the overall sustainability of our structures assets has remained stable in Wessex.

Since 2013/14, the initial improvement in the reliability of structures was largely a result of data cleansing. In 2015/16, we have defined the processes for managing these work items. In Wessex, funding has been authorised specifically to close out higher risk work items. This focus has led to 2015/16 performance exceeding target by 54 per cent. This focus is continuing, but now also addressing lower risk scores to reduce those that pass the risk score threshold of 12.

The number of earthwork failures in Wessex increased during 2015/16. The five year average of earthworks at the end of the year was 7.8, 30 per cent worse than target. In 2012/13 we experienced exceptional levels of rainfall. While this caused a number of failures at that time, it also heavily saturated the majority of our earthwork assets. Earthworks have since remained at a higher risk of failure. This has been compounded by a reduction in funding and re-prioritisation of the workbank, leading to a number of deferred renewal sites. To mitigate against failure, a deferred renewal plan has been developed to manage deferred sites. In some instances the examination frequency has been increased, and in others remote condition monitoring has been installed to monitor high risk assets. In addition, a desktop exercise is being carried out to identify the presence and condition of crest ditches on soil cuttings. Absence or poor quality of crest drainage often leads to earthwork failure. By identifying sites without the appropriate drainage, intervention can be achieved with low cost maintenance solutions.

Table 5.173: Asset Condition Reliability – Wessex

Principal Asset	Description	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
Track	Rail Breaks and Immediate Action defects per 100km	5.23	4.56	3.74	3.84	3.72	2.35
	Track geometry (Poor Track Geometry)	3.47	2.97	3.04	2.57	3.28	2.38
	Track failures (service affecting)	594	675	876	647	775	589
Signalling	Signalling failures (service affecting)	1,279	1,302	1,182	1,274	1,198	1,165
Telecoms	Telecoms failures (service affecting)	51	84	472	279	103	183
Electrical Power	AC traction power failures (service affecting)	0	0	0	0	0	0
	DC traction power failures (service affecting)	98	126	123	115	125	100
	Non traction operational power supply failures (service affecting)	30	26	55	20	55	19
Buildings	Buildings - Re-active Faults (2 & 24) (attention with 2hrs, fix within 24hrs) (attention within 24hrs, fix within 7 days)	491	583	613	585	456	390
Structures	Number of open work items with a risk score $\geq$ 12	-	-	427	146	251	115
Earthworks	Earthwork failures (5 year moving average)	4.4	4.4	5.8	6.8	6.0	7.8
Points	Point failures (service affecting)	360	349	331	224	297	199

Table 5.174: Asset Condition Sustainability – Wessex

Principal Asset	Description	2014/15	2015/16 Target	2015/16 Actual
Track	Track - % Used Life - Rail	48.50	45.90	48.40
	Track - % Used Life - Switch & Crossings	54.70	53.20	52.40
	Track - % Used Life - Sleepers	63.50	61.10	63.40
	Track - % Used Life - Ballast	54.10	48.90	54.40
Signalling	Signalling Condition Index (SICA Remaining Life)	12.34	13.10	14.94
Telecoms	Telecoms - % Remaining Life	52.62	42.90	48.05
Electrical Power	EP - % Remaining Life - Conductor Rail	69.60	66.20	67.90
	EP - % Remaining Life - Overhead Line Equipment (OLE)	-	-	-
	EP - % Remaining Life - Signalling Power Cable	-	-	42.90
Buildings	Stations - % Remaining Life	49.80	47.90	52.50
	Light Maintenance Depot (LMD) - % Remaining Life	45.10	43.40	44.70
Structures	Average condition of major deck elements	66.91	66.90	66.80
	Tunnel Condition Monitoring Index (TCMI)	83.29	82.90	83.99
Earthworks	Earthworks - Condition Score	1.70	1.70	1.74
Drainage	Track Drainage - Condition Score	1.71	1.70	1.71
	Earthwork/Structure Drainage - Condition Score	1.91	1.90	1.95

Table 5.175: Track and off track renewals – Wessex – Total

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	2	0	21	0
Complete Renewal	km	9	31	24	15
Complete (formation)	km	3	2	1	0
Rail Renewal	km	43	5	5	36
Single Rail	km	2	1	0	10
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	5	30	21	24
Heavy Refurbishment	km	24	14	30	24
Refurbishment					
Heavy Refurbishment	km	3	6	5	2
Medium (concrete)	km	8	7	0	2
Medium (other)	km	2	2	12	10
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	6	0	0
Full Renewal (Point Ends)	No.	33	17	22	22
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	5	40	58	26
Medium (Point Ends)	No.	13	27	32	69
Off Track					
Fencing	km	25	47	32	26
Slab track	km	0	0	0	0

Table 5.176: Track and off track renewals – Wessex – Criticality 1

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	0	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	0	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	0	0	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.177: Track and off track renewals – Wessex – Criticality 2

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	2	6	5	2
Complete (formation)	km	0	0	0	0
Rail Renewal	km	10	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	6	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	4	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	10	0	0	6
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	2	3	0	0
Medium (Point Ends)	No.	4	0	32	0
Off Track					
Slab track	km	0	0	0	0

Table 5.178: Track and off track renewals – Wessex – Criticality 3

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	5	14	11	9
Complete (formation)	km	2	2	1	0
Rail Renewal	km	19	3	4	1
Single Rail	km	2	1	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	2	15	21	20
Heavy Refurbishment	km	2	1	30	24
Refurbishment					
Heavy Refurbishment	km	3	5	2	1
Medium (concrete)	km	4	3	0	0
Medium (other)	km	0	1	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	2	0	0
Full Renewal (Point Ends)	No.	22	17	22	16
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	1	30	58	0
Medium (Point Ends)	No.	6	22	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.179: Track and off track renewals – Wessex – Criticality 4

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	2	5	9	4
Complete (formation)	km	1	0	0	0
Rail Renewal	km	10	2	1	1
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	3	15	0	4
Heavy Refurbishment	km	22	7	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	3	0
Medium (concrete)	km	1	0	0	0
Medium (other)	km	0	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	5	0	0
Full Renewal (Point Ends)	No.	1	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	2	4	0	0
Medium (Point Ends)	No.	3	1	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.180: Track and off track renewals – Wessex – Criticality 5

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	2	0	21	0
Complete Renewal	km	0	5	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	4	0	0	0
Single Rail	km	0	0	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	1	0	0
Medium (concrete)	km	0	5	0	0
Medium (other)	km	1	1	12	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	3	0	0
Medium (Point Ends)	No.	0	4	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.181: Track and off track renewals – Wessex – no criticality breakdown

		BP 2015 Target	2015/16 Actual
Plain Line			
Conventional			
Steel Relay	km	0	0
Complete Renewal	km	0	0
Complete (formation)	km	0	0
Rail Renewal	km	0	34
Single Rail	km	0	10
High Output			
Automated Ballast Cleaning	km	0	0
Rail Sleeper Relay	km	0	0
Heavy Refurbishment	km	0	0
Refurbishment			
Heavy Refurbishment	km	0	1
Medium (concrete)	km	0	2
Medium (other)	km	0	10
Switches & Crossings			
S&C delivered			
Abandonment (Point Ends)	No.	0	0
Full Renewal (Point Ends)	No.	0	0
Refurbishment			
Heavy Refurbishment (Point Ends)	No.	0	26
Medium (Point Ends)	No.	0	69
Off Track			
Fencing	km	32	27
Slab track	km	0	0

Table 5.182: Civils renewals volumes – Wessex

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Structures					
Underbridges	m ²	7,511	7,833	9,208	9,722
Overbridges (incl BG3)	m ²	183	454	485	360
Tunnels	m ²	1,127	1,672	1,672	1,400
Culverts	m ²	41	493	699	603
Footbridges	m ²	113	181	62	0
Coastal & Estuary Defences	m ²	-	1,700	0	1,244
Retaining Walls	m ²	248	463	77	77
Earthworks Total	Earthwork assets	73	169	142	164
Embankments - Maintenance	Earthwork assets	8	-	28	37
Embankments - Refurbishment	Earthwork assets	5	-	13	17
Embankments - Renewal	Earthwork assets	15	-	33	10
Rock Cuttings - Maintenance	Earthwork assets	6	-	2	6
Rock Cuttings - Refurbishment	Earthwork assets	0	-	8	5
Rock Cuttings - Renewal	Earthwork assets	0	-	2	0
Soil Cuttings - Maintenance	Earthwork assets	38	-	37	84
Soil Cuttings - Refurbishment	Earthwork assets	0	-	15	2
Soil Cuttings - Renewal	Earthwork assets	1	-	4	3
Track Drainage					
Renewal	lm	0	1,000	0	1,281
Refurbishment	lm	670	26,000	68,738	31,005
New Build	lm	0	100		0
EW Drainage					
Renewal	lm	225	480	0	0
Refurbishment	lm	0	70	0	0
Maintenance	lm	0	2,608	0	0
New Build	lm	1,400	5,208	0	0
Franchised Stations					
Footbridges	m ²	0	0	40	310
Train Sheds	m ²	0	0	0	0
Canopies	m ²	602	5,647	3,733	3,721
Platforms	m ²	9,313	12,789	12,972	10,700
Buildings	m ²	0	0	150	232
Lifts & Escalators	No.	0	3	0	7
Managed Stations					
Footbridges	m ²	0	0	0	0
Train Sheds	m ²	0	0	0	0
Canopies	m ²	265	0	0	0
Platforms	m ²	0	0	0	0
Buildings	m ²	0	0	0	350
Lifts & Escalators	No.	0	0	0	0
Light Maintenance Depots					
Buildings	m ²	0	1,527	0	0
Depot Shed	m ²	0	0	0	0
Lineside Buildings					
Buildings	m ²	0	180	320	1,145
MDU					
Buildings	m ²	0	0	0	0

Table 5.183: Signalling renewals volumes – Wessex

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Full Conventional re-signalling	SEUs	107	0	0	5
ERTMS re-signalling	SEUs	0	0	0	0
Partial Conventional re-signalling	SEUs	0	5	0	0
Targeted Component renewal	SEUs	0	3	0	0
Modular re-signalling	SEUs	0	0	0	0
Level Crossing Renewals	No.	5	2	4	2

Table 5.184: E&P renewals volumes – Wessex

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Contact Systems					
OLE Re-wiring	wire runs	0	0	0	0
Mid-life Refurbishment	wire runs	0	0	0	0
Structure Renewals	No.	0	0	0	0
Conductor rail					
Renewals	km	9	12	13	14
AC distribution					
HV Switchgear Renewal	No.	0	0	0	0
Booster Transformers	No.	0	0	0	0
DC distribution					
HV Switchgear Renewal	No.	0	29	15	0
HV Cables	km	0	0	0	1
LV Switchgear Renewal	No.	0	9	0	0
LV Cables	km	13	6	12	25
Transformer Rectifiers	No.	0	1	0	0
Fixed plant					
Signalling Power Cable	km	10	6	6	19
Principle Supply Point Renewal	No.	0	0	0	0
Rail Heating					
Points Heating Renewal	Point end	31	0	38	4

Table 5.185: Telecoms renewals volumes – Wessex

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Station Information and Surveillance Systems					
Customer Information Systems	No.	0	364	0	0
Public Address	No.	0	844	0	0
CCTV	No.	0	0	0	0
Clocks	No.	0	0	0	0
Operational Comms					
PABX Concentrator	No.	0	0	0	0
Processor Controlled Concentrator	No.	0	0	0	0
Driver-Only Operation: CCTV	No.	0	0	0	0
Driver-Only Operation: Mirrors	No.	0	0	0	0
Public Emergency Telephone System	No.	0	0	0	0
Human Machine Interface Large	No.	0	0	0	0
Human Machine Interface Small	No.	0	0	0	0
Radio System	No.	0	0	0	0
Power Systems	No.	0	0	0	0

Table 5.186: Maintenance volumes – Wessex

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	399	753	256
	Plain Line Stoneblowing (km)	MNT005	44	168	54
	Manual Wet bed removal (bay)	MNT006	1,040	725	1,959
	Mechanical Wet bed remover (bay)	MNT012	2,294	1,430	1,093
	S&C Tamping (point end)	MNT007	430	396	208
	Rail Changing - Al-Thermic Weld - Standard Gap (weld)	MNT044	988	1,104	853
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	14,667	8,685	9,762
	Mechanical reprofiling of Ballast (Mile)	MNT017	175	253	71
	Manual reprofiling of Ballast (rail yard)	MNT020	144,993	127,000	134,496
	Replace Pads & Insulators (sleeper)	MNT029	24,742	80,000	78,209
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	274,606	79,982	107,600
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	23,095	36,300	16,251
	S&C Renew Crossing (crossing)	MNT120	82	79	111
	S&C Maintenance (point end)	MNT122	18,127	25,312	12,322
	S&C Renew half set of Switches (H/S Switch)	MNT123	95	88	115
	S&C Stoneblowing (point end)	MNT124	27	120	17
	Rail grinding plain line (Mile)	MNT309	120	500	1,520
	Rail grinding S&C (point end)	MNT310	60	230	268
Off Track	Fences & Boundary Walls (yard)	MNT072	48,741	55,245	50,169
	Drainage (Yard)	MNT073	54,186	144,085	94,164
	LX Management - Off Track (Each)	MNT075	466	1,399	307
	Vegetation Removal of Boundary Trees (No.)	MNT081	4,728	9,888	1,272
	Vegetation Management by Train (Mile)	MNT082	2	2,204	0
	Vegetation Management Manual (Sq yard)	MNT170	872,906	361,388	936,967
	Vegetation Management Mechanised (Mile)	MNT171	4,272	47	4,997
Electrical Power	Maintain Conductor Rail (Various)	MNT206	20,573	15,000	27,563
	Maintain DC Traction Power Supplies (Each)	MNT209	8,713	7,610	7,211
	Maintain OHL Components (Various)	MNT211	111	0	1,224
	Maintain Points Heating (Each)	MNT212	11,580	13,205	11,144
	Maintain Signalling Power supplies (No.)	MNT213	233	1,199	345
Civils	Visual Examinations (Civils) (No.)	MNT226a	3,505	4,180	3,663
	Tunnel Examinations (No. minor elements)	MNT220	3,329	3,605	3,423
	Detailed Examinations (No.)	MNT221	444	563	576
	Underwater Examination (No.)	MNT222	238	85	18
	Ancillary Structure examination (No. detailed)	MNT223	9	69	59
	Hidden critical element examinations (No.)	MNT224	0	47	71
	Load carrying assessment (No. spans)	MNT225	729	591	613
Buildings	Visual examinations Buildings (each)	MNT226	177	1,204	1,065
	5 yearly examinations (each)	MNT227	49	43	67

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Western

The reliability of the majority of assets in Western route was better than target in 2015/16. The only measure for which performance was worse than target was service affecting track failures.

Across the track portfolio, rail breaks and immediate action defects per 100 kilometres were 66 per cent better than target, while we failed to meet target for service affecting track failures by six per cent. The number of rail breaks remained consistent with 2014/15. The overall risk profile in relation to rail breaks is good with half of breaks occurring where linespeed was 25 miles per hour or less. A total of three breaks were on high speed route sections, one being a weld and the other two associated with underfoot pit corrosion of the rail. These have prompted investigations into underlying faults and, as a result, rail-pad condition will be addressed through the CP5 renewals and refurbishment programme. The numbers of immediate action rail defects continues to fall in line with the national trend. Initiatives driving this performance include a focus on detection techniques, proactive re-railing and rail grinding.

The number of service affecting track failures has continued to show a steady decline, although we failed to meet target in 2015/16. This was mainly due to 11 failures on criticality one route in period 12. Condition of track temporary speed restrictions has been a focus throughout the year. Prediction and prevention of cyclic top faults to further address temporary speed restrictions is a priority for 16/17.

We exceeded target for signalling reliability by one per cent in 2015/16. Poor reliability of axle counters in the Reading area has been addressed through implementation of Defect Recording Analysis and Corrective Action System processes in conjunction with the Crossrail team. Track circuit reliability has been improved through the introduction of dedicated depot teams. The number of track circuits is reducing significantly year on year as projects make progress on replacement. These factors, with LED signal head replacements, have contributed to improved asset reliability. We have progressed well with signalling renewals, particularly in relation to the Bristol Area Signalling Renewal and Enhancement Project.

The overall reliability of points has continued the improving trend, out-performing the 2015/16 target by three per cent. The re-instatement of points reliability teams during the year has made a significant contribution to the performance in this area. Targeted interventions dealing with the root cause of failures have yielded positive results so far and this approach will be sustained to continue improvement.



Telecoms assets have outperformed reliability target, largely reflecting the success of Project Artemis in Western, through which GSM-R related failures have significantly reduced. The introduction of mandatory of spare lineside phones and master classes on faulting and maintenance have also contributed to the improvement.

Electrical power asset performance overall was above target in 2015/16. The non-traction power supply system has benefitted from a continued focus on 650V signalling power cable testing and the reactive renewal of poor performing cable. As a result of this, performance was 46 per cent above target.

The reliability of the AC traction power system was 17 per cent better than target in 2015/16 in terms of service affecting failures. This result followed a poorer start to the year due to an increased level of system tripping with no fault found and two

significant infrastructure failures. The level of project work and infrastructure change in the route will continue to be a challenge in the coming year. The two significant incidents and lessons learned following investigation have resulted in the development of performance improvement initiatives in conjunction with the train operator.

The Buildings target was achieved in the year due to a number of initiatives: the Operational Property Help Desk (OPHD) is well briefed on what faults can be accepted as '2 hour' and '24 hour' faults and quarterly meetings are held with the OPHD team to review; fault data is reviewed every period to highlight any trends and recurrences are acted on; and continuous improvement meetings are held with the Train Operating Company Property helpdesk to ensure they are dovetailed with OPHD practices.

Western has maintained detailed analysis in 2015/16 to focus on the delivery on timely removal of work items. As a result there was a consistent low occurrence of higher risk defects (risk score greater than 20), and emerging items are dealt with quickly and effectively. Priority one defects (more than two years old, with a risk score greater than 20 and a response time of less than 28 days) remain at manageable levels. There remains a backlog of work items that require review of design and access to reduce the backlog of items.



The 2015/16 target for earthworks reliability in Western was achieved for two main reasons; effective targeted interventions and relatively low levels of adverse weather rain over the winter period. An increased knowledge of the asset base and a maturity of the earthwork policy have allowed effective targeted interventions to be completed on vulnerable assets in CP5. Since 2013, we have undertaken a sustained campaign of renewal and refurbishment on soil cutting assets classified as 'very high risk' during times of adverse weather. Furthermore, increased collaborative working within the route has allowed early interventions to take place on sites of concern; this process has been particularly effective on embankment assets. Western route was affected by adverse weather less than other parts of the country during the winter of 2015/16. Storms Imogen and Katie caused no significant damage or failures of earthwork assets in the route. We will continue to remain vigilant and ensure resilience measures are incorporated into interventions works completed in the future.

Our vegetation clearance programme has delivered benefits across our earthworks renewals workbank, with soil cuttings maintenance being significantly above target.

Table 5.187: Asset Condition Reliability – Western

Principal Asset	Description	2011/12	2012/13	2013/14	2014/15	2015/16 Target	2015/16 Actual
Track	Rail Breaks and Immediate Action defects per 100km	3.55	4.78	3.22	2.90	3.95	1.33
	Track geometry (Poor Track Geometry) (%)	2.16	2.08	2.02	2.23	2.20	1.93
	Track failures (service affecting)	297	297	364	318	293	312
Signalling	Signalling failures (service affecting)	1,441	1,407	1,517	1,465	1,417	1,400
Telecoms	Telecoms failures (service affecting)	50	280	359	411	119	293
Electrical Power	AC traction power failures (service affecting)	3	16	12	11	24	20
	DC traction power failures (service affecting)	0	0	0	0	0	0
	Non traction operational power supply failures (service affecting)	22	27	32	12	67	14
Buildings	Buildings - Re-active Faults (2 & 24) (attention with 2hrs, fix within 24hrs) (attention within 24hrs, fix within 7 days)	616	533	519	506	620	426
Structures	Number of open work items with a risk score $\geq$ 12	-	-	206	99	145	72
Earthworks	Earthwork failures (5 year moving average)	16.0	16.6	16.6	17.2	16.0	16.0
Points	Point failures (service affecting)	665	644	537	514	487	471

Table 5.188: Asset Condition Sustainability – Western

Principal Asset	Description	2014/15	2015/16 Target	2015/16 Actual
Track	Track - % Used Life - Rail	45.50	43.30	44.00
	Track - % Used Life - Switch & Crossings	49.50	50.10	48.80
	Track - % Used Life - Sleepers	52.60	51.30	52.10
	Track - % Used Life - Ballast	44.20	41.90	43.90
Signalling	Signalling Condition Index (SICA Remaining Life)	10.06	17.60	14.27
Telecoms	Telecoms - % Remaining Life	78.42	71.80	68.02
Electrical Power	EP - % Remaining Life - Conductor Rail	-	-	-
	EP - % Remaining Life - Overhead Line Equipment (OLE)	75.40	74.00	75.40
	EP - % Remaining Life - Signalling Power Cable	-	-	68.20
Buildings	Stations - % Remaining Life	47.40	45.60	47.40
	Light Maintenance Depot (LMD) - % Remaining Life	44.20	42.80	43.50
Structures	Average condition of major deck elements	59.73	60.00	60.10
	Tunnel Condition Monitoring Index (TCMI)	86.26	84.60	86.23
Earthworks	Earthworks - Condition Score	2.15	1.93	2.13
Drainage	Track Drainage - Condition Score	1.13	-	1.11
	Earthwork/Structure Drainage - Condition Score	1.07	-	1.07

Table 5.189: Track and off track renewals – Western – Total

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	3	0	2	5
Complete Renewal	km	20	17	21	17
Complete (formation)	km	1	0	3	5
Rail Renewal	km	15	17	28	22
Single Rail	km	12	3	0	5
High Output					
Automated Ballast Cleaning	km	0	19	0	2
Rail Sleeper Relay	km	5	0	7	6
Heavy Refurbishment	km	27	0	0	0
Refurbishment					
Heavy Refurbishment	km	3	0	2	2
Medium (concrete)	km	0	18	0	2
Medium (other)	km	62	26	38	34
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	4	1	0	2
Full Renewal (Point Ends)	No.	13	46	27	17
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	1	17	15	20
Medium (Point Ends)	No.	16	37	36	10
Off Track					
Fencing	km	54	58	54	76
Slab track	km	0	0	0	0

Table 5.190: Track and off track renewals – Western – Criticality 1

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	4	0	2	1
Complete (formation)	km	1	0	0	0
Rail Renewal	km	1	5	3	3
Single Rail	km	3	1	0	0
High Output					
Automated Ballast Cleaning	km	0	15	0	0
Rail Sleeper Relay	km	0	0	0	3
Heavy Refurbishment	km	3	0	0	0
Refurbishment					
Heavy Refurbishment	km	1	0	0	0
Medium (concrete)	km	0	0	0	0
Medium (other)	km	2	0	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	0	0	0
Full Renewal (Point Ends)	No.	0	7	0	6
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	0	14	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.191: Track and off track renewals – Western – Criticality 2

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	5	0	1	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	4	1	0	0
Single Rail	km	4	1	0	0
High Output					
Automated Ballast Cleaning	km	0	1	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	8	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	2	0	0
Medium (other)	km	12	1	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No.	0	1	0	0
Full Renewal (Point Ends)	No.	1	23	27	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No.	0	0	0	0
Medium (Point Ends)	No.	0	0	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.192: Track and off track renewals – Western – Criticality 3

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	9	11	8	4
Complete (formation)	km	0	0	2	2
Rail Renewal	km	4	5	4	1
Single Rail	km	4	1	0	0
High Output					
Automated Ballast Cleaning	km	0	2	0	0
Rail Sleeper Relay	km	0	0	7	3
Heavy Refurbishment	km	13	0	0	0
Refurbishment					
Heavy Refurbishment	km	1	0	0	0
Medium (concrete)	km	0	2	0	0
Medium (other)	km	26	5	0	4
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No	1	0	0	0
Full Renewal (Point Ends)	No	12	15	0	2
Refurbishment					
Heavy Refurbishment (Point Ends)	No	1	5	0	0
Medium (Point Ends)	No	8	18	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.193: Track and off track renewals – Western – Criticality 4

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	0	0	0	0
Complete Renewal	km	0	1	0	0
Complete (formation)	km	0	0	1	1
Rail Renewal	km	2	3	0	0
Single Rail	km	1	1	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	5	0	0	0
Heavy Refurbishment	km	3	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	4	0	0
Medium (other)	km	13	10	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No	0	0	0	0
Full Renewal (Point Ends)	No	0	1	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No	0	5	0	0
Medium (Point Ends)	No	4	4	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.194: Track and off track renewals – Western – Criticality 5

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Plain Line					
Conventional					
Steel Relay	km	2	0	0	0
Complete Renewal	km	2	5	0	0
Complete (formation)	km	0	0	0	0
Rail Renewal	km	5	3	0	0
Single Rail	km	0	1	0	0
High Output					
Automated Ballast Cleaning	km	0	0	0	0
Rail Sleeper Relay	km	0	0	0	0
Heavy Refurbishment	km	0	0	0	0
Refurbishment					
Heavy Refurbishment	km	0	0	0	0
Medium (concrete)	km	0	10	0	0
Medium (other)	km	8	10	0	0
Switches & Crossings					
S&C delivered					
Abandonment (Point Ends)	No	3	0	0	0
Full Renewal (Point Ends)	No	0	0	0	0
Refurbishment					
Heavy Refurbishment (Point Ends)	No	0	7	0	0
Medium (Point Ends)	No	4	1	0	0
Off Track					
Slab track	km	0	0	0	0

Table 5.195: Track and off track renewals – Western – no criticality breakdown

		BP 2015 Target	2015/16 Actual
Plain Line			
Conventional			
Steel Relay	km	2	5
Complete Renewal	km	10	12
Complete (formation)	km	0	1
Rail Renewal	km	21	18
Single Rail	km	0	5
High Output			
Automated Ballast Cleaning	km	0	2
Rail Sleeper Relay	km	0	0
Heavy Refurbishment	km	0	0
Refurbishment			
Heavy Refurbishment	km	2	2
Medium (concrete)	km	0	2
Medium (other)	km	38	31
Switches & Crossings			
S&C delivered			
Abandonment (Point Ends)	No.	0	2
Full Renewal (Point Ends)	No.	0	9
Refurbishment			
Heavy Refurbishment (Point Ends)	No.	15	20
Medium (Point Ends)	No.	36	10
Off Track			
Slab track	km	0	0

Table 5.196: Civils renewals volumes – Western

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Structures					
Underbridges	m ²	11,232	8,015	8,609	6,544
Overbridges (incl BG3)	m ²	0	711	3,222	1,525
Tunnels	m ²	1,274	4,386	1,755	931
Culverts	m ²	2,507	98	440	0
Footbridges	m ²	0	98	80	80
Coastal & Estuary Defences	m ²	60	0	0	360
Retaining Walls	m ²	0	714	860	150
Earthworks Total	Earthwork assets	477	478	955	950
Embankments - Maintenance	Earthwork assets	291	-	342	380
Embankments - Refurbishment	Earthwork assets	20	-	133	240
Embankments - Renewal	Earthwork assets	18	-	28	27
Rock Cuttings - Maintenance	Earthwork assets	0	-	129	31
Rock Cuttings - Refurbishment	Earthwork assets	20	-	108	43
Rock Cuttings - Renewal	Earthwork assets	9	-	0	16
Soil Cuttings - Maintenance	Earthwork assets	39	-	72	140
Soil Cuttings - Refurbishment	Earthwork assets	45	-	143	64
Soil Cuttings - Renewal	Earthwork assets	35	-	0	9
Track Drainage					
Renewal	lm	1,850	0	0	0
Refurbishment	lm	0	0	0	5,548
New Build	lm	0	0	0	0
EW Drainage					
Renewal	lm	0	2,292	20,361	0
Refurbishment	lm	0	337	0	0
Maintenance	lm	0	1,011	0	0
New Build	lm	0	0	0	0
Franchised Stations					
Footbridges	m ²	70	160	475	382
Train Sheds	m ²	0	0	0	0
Canopies	m ²	3,500	4,594	3,835	1,918
Platforms	m ²	1,125	1,358	1,525	245
Buildings	m ²	0	1,076	0	160
Lifts & Escalators	No.	0	2	8	7
Managed Stations					
Footbridges	m ²	0	0	0	0.
Train Sheds	m ²	0	0	0	0
Canopies	m ²	0	144	0	0
Platforms	m ²	15	100	100	100
Buildings	m ²	0	0	234	0
Lifts & Escalators	No.	0	0	1	1
Light Maintenance Depots					
Buildings	m ²	0	0	0	0
Depot Shed	m ²	25,950	0	2,776	2,713
Lineside Buildings					
Buildings	m ²	0	0	0	0
MDU					
Buildings	m ²	0	0	0	0

Table 5.197: Signalling renewals volumes – Western

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Full Conventional re-signalling	SEUs	0	118	0	14
ERTMS re-signalling	SEUs	0	0	0	0
Partial Conventional re-signalling	SEUs	137	585	354	352
Targeted Component renewal	SEUs	0	4	0	0
Modular re-signalling	SEUs	0	0	0	0
Level Crossing Renewals	No.	2	9	10	5

Table 5.198: E&P renewals volumes – Western

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Contact Systems					
OLE Re-wiring	wire runs	0	0	0	0
Mid-life Refurbishment	wire runs	0	0	0	0
Structure Renewals	No.	0	1	0	0
Conductor rail					
Renewals	km	0	0	0	0
AC distribution					
HV Switchgear Renewal	No.	0	0	0	0
Booster Transformers	No.	0	0	0	0
DC distribution					
HV Switchgear Renewal	No.	0	0	0	0
HV Cables	km	0	0	0	0
LV Switchgear Renewal	No.	0	0	0	0
LV Cables	km	0	0	0	0
Transformer Rectifiers	No.	0	0	0	0
Fixed plant					
Signalling Power Cable	km	12	66	62	5
Principle Supply Point Renewal	No.	0	0	0	0
Rail Heating					
Points Heating Renewal	Point end	0	19	7	0

Table 5.199: Telecoms renewals volumes – Western

		2014/15	DP 2014 Target	BP 2015 Target	2015/16 Actual
Station Information and Surveillance Systems					
Customer Information Systems	No.	18	0	17	17
Public Address	No.	16	0	0	0
CCTV	No.	0	0	0	0
Clocks	No.	0	4	0	8
Operational Comms					
PABX Concentrator	No.	0	0	8	0
Processor Controlled Concentrator	No.	14	0	0	0
Driver-Only Operation: CCTV	No.	0	0	0	0
Driver-Only Operation: Mirrors	No.	0	0	0	0
Public Emergency Telephone System	No.	7	0	0	0
Human Machine Interface Large	No.	0	0	0	0
Human Machine Interface Small	No.	0	0	0	0
Radio System	No.	0	0	3	3
Power Systems	No.	7	0	0	0

Table 5.200: Maintenance volumes – Western

			2014/15	DP 2014 Target	2015/16 Actual
Track	Plain Line Tamping (km)	MNT004	340	753	278
	Plain Line Stoneblowing (km)	MNT005	153	168	105
	Manual Wet bed removal (bay)	MNT006	3,141	725	3,256
	Mechanical Wet bed remover (bay)	MNT012	1,127	1,430	1,296
	S&C Tamping (point end)	MNT007	268	396	223
	Rail Changing - Al-Thermic Weld - Standard Gap (weld)	MNT044	1,424	1,104	2,172
	Rail Changing - CWR - Renew (Defects) (rail yard)	MNT045	11,171	8,685	8,637
	Mechanical reprofiling of Ballast (Mile)	MNT017	241	253	178
	Manual reprofiling of Ballast (rail yard)	MNT020	185,847	127,000	211,099
	Replace Pads & Insulators (sleeper)	MNT029	40,114	80,000	74,918
	Manual Correction of PL Track Geometry (CWR) (track yard)	MNT036	179,127	79,982	198,093
	Manual Correction of PL Track Geometry (Jointed) (track yard)	MNT037	86,432	36,300	103,578
	S&C Renew Crossing (crossing)	MNT120	56	79	76
	S&C Maintenance (point end)	MNT122	39,330	25,312	41,486
	S&C Renew half set of Switches (H/S Switch)	MNT123	72	88	70
	S&C Stoneblowing (point end)	MNT124	66	120	74
	Rail grinding plain line (Mile)	MNT309	1,140	500	1,744
	Rail grinding S&C (point end)	MNT310	311	230	364
Off Track	Fences & Boundary Walls (yard)	MNT072	34,250	55,245	51,952
	Drainage (Yard)	MNT073	11,362	144,085	46,042
	LX Management - Off Track (Each)	MNT075	593	1,399	748
	Vegetation Removal of Boundary Trees (No.)	MNT081	955	9,888	3,916
	Vegetation Management by Train (Mile)	MNT082	1,000	2,204	0
	Vegetation Management Manual (Sq yard)	MNT170	494,261	361,388	631,377
	Vegetation Management Mechanised (Mile)	MNT171	679	47	93
Electrical Power	Maintain Conductor Rail (Various)	MNT206	2	15,000	32
	Maintain DC Traction Power Supplies (Each)	MNT209	637	7,610	308
	Maintain OHL Components (Various)	MNT211	5,186	0	7,089
	Maintain Points Heating (Each)	MNT212	8,385	13,205	16,996
	Maintain Signalling Power supplies (No.)	MNT213	8,041	1,199	8,129
Civils	Visual Examinations (Civils) (No.)	MNT226a	7,051	4,180	5,838
	Tunnel Examinations (No. minor elements)	MNT220	13,156	3,605	13,981
	Detailed Examinations (No.)	MNT221	1,097	563	1,089
	Underwater Examination (No.)	MNT222	191	85	215
	Ancillary Structure examination (No. detailed)	MNT223	191	69	274
	Hidden critical element examinations (No.)	MNT224	74	47	57
	Load carrying assessment (No. spans)	MNT225	195	591	308
Buildings	Visual examinations Buildings (each)	MNT226	1,814	1,204	141
	5 yearly examinations (each)	MNT227	36	43	36

Note: Figures reported here may vary from the Annual Return 2015 due to data refreshing.

Network Capability

This section reports on the linespeed, gauge, route availability and electrification capability of the network. We also include information on Network Changes that have taken place throughout the year, and current discrepancies between the actual and published capability of the network.

Linespeed, electrification and route availability capabilities are reported as track kilometres. This is the combined length of all tracks on an operating route. Gauge capability is reports as route kilometres, which is the length of operating route, regardless of the number of tracks. Capability results reported only include running lines. Sidings and depots are excluded.

- Linespeed measures the length of running track in specified speed bands
- Gauge measures the length of operating route in kilometres in specified gauge bands defined in the Railway Group Standard: 'Requirements for the Application of Standard Vehicle Gauges'. Gauge band W6 in this report is W6A in the Railway Group Standard
- Route Availability (RA) is used to check the compatibility of the weight of trains with the strength of underbridges. This measure reports the length of operating route in kilometres in specified route availability bands RA1 to RA10. Vehicles are able to utilise the capability of the infrastructure where the vehicle RA is less than or equal to the route RA. If not, it is necessary to consider more detailed information on the loading characteristics of the vehicle and detailed information on the strength of individual bridges to check compatibility.
- Electrification measures the length of electrified track in kilometres in the following electrification categories:

Nationally, there has been an increase of 74 kilometres of operating lines in 2015/16. The majority of new track is in LNW and Scotland. The opening of the Scottish borders railway in September 2015 represents the major addition to operating track in Scotland, while double tracking between Bolton and Blackburn has resulted in 10 kilometres of new track in LNW. In Wales, there is three kilometres of new track to extend the line between Ebbw Vale Parkway and Ebbw Vale Town stations

As a result of a boundary change, some operating lines that were previously included in LNE are now included in East Midlands route.

In CP5 Network Rail is undertaking a significant programme of new overhead line at 25kV AC electrification as well as major enhancement schemes, such as

Thameslink, which will have an impact on the electrified track lengths during the control period. East Midlands Route has seen an approximate increase of 15 kilometres of overhead line at 25kV AC. In Western, there has been an increase of overhead line at 25kV AC as a result of the Crossrail programme installing new wire runs and extending platform 14 at London Paddington. In LNE and East Midlands, there has been an increase of overhead line at 25kV AC.



Table 5.201: Linespeed capability (km of track in each speed band) – network-wide

	Speed Band (mph)	2011/12	2012/13	2013/14	2014/15	2015/16
England & Wales	Up to 35	3,124	3,125	3,104	3,105	3,102
	40-75	14,365	14,348	14,309	14,283	14,279
	80-105	6,496	6,512	6,503	6,556	6,563
	110-125	2,857	2,854	2,936	2,936	2,942
	Total	26,842	26,839	26,852	26,880	26,886
Scotland	Up to 35	437	452	454	455	458
	40-75	2,363	2,363	2,356	2,356	2,405
	80-105	1,200	1,200	1,209	1,209	1,223
	110-125	221	221	221	221	221
	Total	4,221	4,236	4,240	4,240	4,307
Network-wide	Up to 35	3,561	3,577	3,558	3,560	3,560
	40-75	16,728	16,711	16,665	16,639	16,684
	80-105	7,696	7,712	7,712	7,764	7,787
	110-125	3,078	3,075	3,157	3,157	3,163
	Total	31,063	31,075	31,092	31,120	31,194



Table 5.202: Gauge capability (km of track in each gauge band) – network-wide

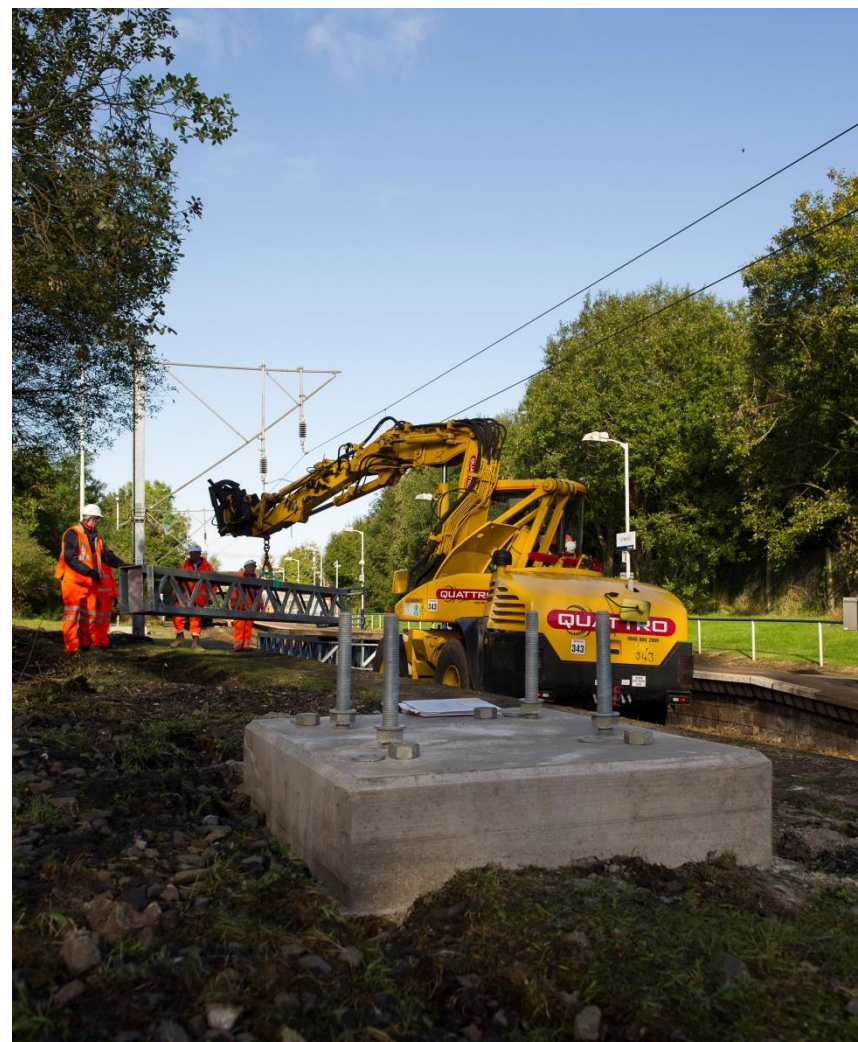
	Gauge Band	2011/12	2012/13	2013/14	2014/15	2015/16
England & Wales	W6	5,461	5,451	5,448	5,389	5,323
	W7	2,188	2,120	2,126	2,044	1,944
	W8	2,997	3,075	2,806	2,917	2,831
	W9	947	947	771	766	762
	W10 & W6	-	-	-	-	-
	W10 & W8	163	162	178	180	180
	W10 & W9	1,178	1,178	1,290	1,290	1,160
	W12	135	136	448	488	869
	Total	13,069	13,069	13,067	13,073	13,069
Scotland	W6	101	115	117	117	164
	W7	896	896	897	897	895
	W8	1,147	1,147	1,145	1,147	1,147
	W9	359	359	360	360	225
	W10 & W6	-	-	-	-	-
	W10 & W8	-	-	-	-	-
	W10 & W9	170	171	171	171	171
	W12	-	-	-	-	135
	Total	2,673	2,688	2,690	2,690	2,737
Network-wide	W6	5,562	5,566	5,565	5,505	5,487
	W7	3,084	3,016	3,023	2,940	2,839
	W8	4,144	4,222	3,951	4,063	3,978
	W9	1,306	1,306	1,131	1,126	987
	W10 & W6	-	-	-	-	-
	W10 & W8	163	162	178	180	180
	W10 & W9	1,348	1,349	1,461	1,460	1,331
	W12	135	136	448	488	1,004
	Total	15,742	15,757	15,757	15,763	15,806

Table 5.203: Route Availability capability (km of track in each RA band) – network-wide

Route availability band		2011/12	2012/13	2013/14	2014/15	2015/16
England & Wales	RA0	60	66	65	70	70
	RA1	19	18	17	18	18
	RA2	-	-	-	-	-
	RA3	32	32	32	32	32
	RA4	273	237	239	239	239
	RA5	475	475	477	475	477
	RA6	867	867	869	869	868
	RA7	1,907	1,906	1,914	1,913	1,908
	RA8	21,000	21,020	21,022	21,037	21,049
	RA9	2,142	2,151	2,151	2,161	2,157
	RA10	67	67	66	69	69
	Total	26,842	26,839	26,852	26,882	26,887
Scotland	RA0	3	10	11	11	10
	RA1	-	-	-	-	-
	RA2	-	-	-	-	-
	RA3	37	37	38	38	103
	RA4	-	-	-	-	-
	RA5	934	934	934	934	933
	RA6	7	7	7	7	7
	RA7	228	77	77	77	77
	RA8	882	890	891	891	890
	RA9	4	4	4	4	4
	RA10	2,126	2,277	2,278	2,278	2,283
	Total	4,221	4,236	4,240	4,240	4,307
Network-wide	RA0	63	76	76	81	80
	RA1	19	18	17	18	18
	RA2	-	-	-	-	-
	RA3	69	69	70	70	135
	RA4	273	237	239	239	239
	RA5	1,409	1,409	1,411	1,410	1,410
	RA6	874	874	876	876	875
	RA7	2,135	1,983	1,991	1,990	1,985
	RA8	21,882	21,910	21,913	21,928	21,939
	RA9	2,146	2,155	2,155	2,165	2,161
	RA10	2,193	2,344	2,344	2,348	2,352
	Total	31,063	31,075	31,092	31,120	31,194

Table 5.204: Electrification capability (km of electrified track) – network-wide

		2011/12	2012/13	2013/14	2014/15	2015/16
England & Wales	25 kV AC Overhead Line Equipment (OLE)	6,739	6,750	6,777	6,867	6,894
	Third rail 650/ 750V DC	4,469	4,473	4,476	4,462	4,460
	Dual AC OLE/Third rail DC	35	34	35	35	39
	1,500V DC OLE	39	39	39	39	39
	Total electrified	11,282	11,296	11,327	11,403	11,432
	Non-electrified	15,560	15,543	15,525	15,478	15,455
	Total	26,842	26,839	26,852	26,880	26,887
Scotland	25 kV AC Overhead Line Equipment (OLE)	1,495	1,514	1,560	1,631	1,631
	Third rail 650/ 750V DC	0	0	0	0	0
	Dual AC OLE/Third rail DC	0	0	0	0	0
	1,500V DC OLE	0	0	0	0	0
	Total electrified	1,495	1,514	1,560	1,631	1,631
	Non-electrified	2,726	2,722	2,680	2,609	2,676
	Total	4,221	4,236	4,240	4,240	4,307
Network-wide	25 kV AC Overhead Line Equipment (OLE)	8,234	8,264	8,337	8,498	8,525
	Third rail 650/ 750V DC	4,469	4,473	4,476	4,462	4,460
	Dual AC OLE/Third rail DC	35	34	35	35	39
	1,500V DC OLE	39	39	39	39	39
	Total electrified	12,777	12,810	12,887	13,034	13,063
	Non-electrified	18,286	18,265	18,205	18,087	18,131
	Total	31,063	31,075	31,092	31,120	31,194



Network Change

A Network Change is a change which is likely to have a material effect on the operation of the network or on the trains that operate on the network. Network Changes can either be:

- physical - e.g. changes to the layout, configuration or condition of the network
- operational - e.g. the introduction of a speed restriction on a section of track or a change to the way Network Rail maintains track.

Operational changes are only classed as Network Changes if they last, or are likely to last, for more than six months.

In this section, we report on both permanent and short term Network Changes (STNCs). The information is taken from the internal processes used for monitoring Network Changes.

The industry's Network Capability Steering Group provides a forum for engagement between Network Rail and a range of industry stakeholders. A number of stakeholders have raised concerns informally about our compliance with our network capability obligations. A number of discrepancies between actual and published capability exist and we are working to address concerns. In cases where STNCs have expired, we will be consulting with the industry in order to rectify these issues. Table 5.206 provides the latest position on discrepancies between actual and published capability.



Table 5.205: Permanent Network Change

	Permanent Network Changes	Established	Withdrawn
Anglia	12	9	1
LNE / East Midlands	42	22	7
Kent	3	3	0
LNW	28	13	0
Scotland	25	25	11
Sussex	18	13	2
Wales	12	5	7
Wessex	14	11	1
Western	10	8	2
Network-wide	198	138	31

Note: Major projects can also generate Network Changes. Where this is the case, details of these can be found on our website.

Table 5.206: Short Term Network Change

	Total	2015	2016	2017	2018	2019
Anglia	1	0	0	1	0	0
LNE / East Midlands	16	6	3	2	3	2
Kent	7	0	3	4	0	0
LNW	5	5	0	0	0	0
Scotland	26	5	4	11	3	2
Sussex	5	0	1	4	0	0
Wales	0	0	0	0	0	0
Wessex	2	0	1	1	0	0
Western	1	0	0	0	1	0
Network-wide	60	30	13	11	2	2

Table 5.207: Discrepancies between actual and published capability

Discrepancies between actual and published capability	
England & Wales	Newcastle to Carlisle (Whitchester Tunnel – 35 miles 69 chains). The STNC has now expired and an extension has yet to be secured. Freight operators have expressed a view that a full Network Change should be issued proposing to single the track through the tunnel so that the published gauge can be achieved. Network Rail has discounted this option in the immediate future as it would decrease capacity and have an adverse effect on performance. The recommended option in the last STNC is the 'permanent confirmation of the existing clearances' but this option has been rejected by the freight operators. We are working to find an appropriate solution
	Horsforth to Harrogate (St. James Drive [Bridge No. 39]; Tewit Footbridge [Bridge No. 40]). The STNC has expired and an extension has yet to be secured. Although no commercial freight traffic currently operates on this route, we are working to rectify the issue
	Wincobank to Horbury (via Barnsley). The STNC has expired and an extension has yet to be secured. Although no commercial freight traffic currently operates on this route, we are working to rectify the issue
	Hull to Seamer (Argyle Street [Bridge No.2]). The STNC has expired and an extension has yet to be secured. Although no commercial freight traffic currently operates on this route, we are working to rectify the issue
	River Deben Bridge A STNC is currently under external consultation. The change relates to a speed reduction for freight traffic only from 55mph to 20mph and is due to the renewal of the asset being deferred
	Bridge BME2 1976 River Stour/Power Station One existing STNC is planned to be extended in 2016/17 to align to the programme for strengthening the structure. External consultation is underway
	PED5-49 Mexborough East Jn to Doncaster (River Don [Bridge No. 49]) Pending implementation of interim strengthening measures. This is being programmed at the time of publication
	SBA2 53:16 Welshpool to Aberystwyth (Caerws Viaduct [Bridge No. 53 16]) Due to permitted use of Class 67 Locos in the Sectional Appendix for which the structure does not have adequate capability. The STNC process is being initiated to amend the Sectional Appendix
	WPH2 17A/19 Burnaby Road Published capability RA7, evaluated as RA4. Formal consultation is planned for early in 2016/17. The renewals workbank has been reprioritised with plans to replace the deck in 2017/18, at which point the STNC will be withdrawn
	WEY E30/154 Yetminster River STNC to restrict RA6, 7 and 8 traffic to 20 mph has expired. Strengthening works have been deferred due to reprioritisation and the STNC requires extension. Consultation with stakeholders is ongoing
Scotland	Crewe North Jn to Chester East Jn Permanent Network Change has been circulated to confirm route as published. This has been disputed and the route is appointing a sponsor to work through the dispute
	Tapton Jn to Sheffield North STNC expired and the proposed extension dated 9 January 2014 was rejected by freight operators. We are working to find an appropriate solution
	Droitwich Spa – Smethwick Jn (via Hartlebury) Feasibility work carried out in CP4 established that track lowerings and realignment would be insufficient as the tunnel requires correction by the structures team. Recent financial review has resulted in the work being deferred to CP6
Scotland	Girvan to Stranraer (Townend footbridge [Bridge No. 82]). The STNC has expired and a permanent network change is in consultation. Network Change amendment notice to be drafted and issued for consultation by end of August 2016

6. Sustainable Development

In our CP5 Delivery Plan, we committed to developing a range of sustainable development key performance indicators (KPIs) to report against in CP5. This section reports our performance against these KPIs and some additional measures:

- scope 1 and 2 non-traction carbon dioxide emissions
- carbon reduction commitment footprint
- embodied carbon
- waste management
- environmental incidents
- Sites of Special Scientific Interest (SSSIs)
- timber
- workforce diversity and inclusion
- workforce age profile
- charity of choice fundraising
- volunteer leave
- apprentices.

Additionally this section will report on the ScotRail Alliance and its work towards achieving its Corporate Social Responsibility goals and objectives.

Environmental Performance

We are becoming more energy efficient and are reducing our carbon emissions in line with our commitment to reduce our carbon footprint and our energy usage.

We need a secure supply of energy to run our network reliably, safely and efficiently. This includes energy created through self-generation from renewable sources. Through better management of our energy we will play our part in delivering the UK's carbon emission reduction targets and mitigate climate change.

Scope 1 and 2 Non-Traction Carbon Dioxide Emissions

Definition and reporting method

Scope 1 emissions are carbon emissions from known sources under Network Rail's operational control and cover use of natural gas, road vehicle fuel, gas oil, LPG and sulphur hexafluoride gas. Scope 2 emissions are carbon emissions generated from electricity use under Network Rail's operational control.

Energy use is translated into carbon emissions through the use of standardised emissions factors. Emissions factors used to compile this data are the most recent (2015) [government conversion factors](#) for company reporting.

Commentary

Our target is to reduce carbon dioxide equivalent (CO₂e) emissions during CP5 by 11 per cent against the 2013/14 CP4 exit baseline.

We are committed to reducing our carbon footprint and our energy usage. We are developing a carbon and energy efficiency strategy and plan which will set out route level targets and strategies to achieve this. Table 6.1 sets out the network-wide targets and actual emissions in CP4 exit baseline year 2013/14, 2014/15 and 2015/16. In 2015/16 we reduced non-traction CO₂e emissions by 6.4 per cent compared to the previous year. This demonstrates our positive actions to reverse the increase that was reported in the first year of CP5, which was partly due to an increased reporting portfolio. We are developing energy and carbon reduction plans with our business units in order to reduce our use of energy and therefore reduce our CO₂e emissions, and have taken steps to actively encourage focus on energy reduction.

All of our carbon reporting is due to be subjected to a full review, following which the baseline, targets and performance to date may be republished.

Table 6.1: Carbon dioxide emissions

	CO ₂ emissions (tonnes)	2013/14	2014/15	2015/16	% change
England & Wales	Scope 1 & 2 CO ₂ e emissions – CP5 Delivery Plan target	227,534	217,621	214,977	-1.2
	Scope 1 & 2 CO ₂ e emissions – Actual	266,294	270,189	253,156	-6.3
Scotland	Scope 1 & 2 CO ₂ e emissions – CP5 Delivery Plan target	30,714	29,220	28,712	-1.7
	Scope 1 & 2 CO ₂ e emissions – Actual	32,156	31,188	28,831	-7.6
Network -wide	Scope 1 & 2 CO ₂ e emissions – CP5 Delivery Plan target	258,247	246,840	243,689	-1.3
	Scope 1 & 2 CO ₂ e emissions – Actual	298,450	301,378	281,987	-6.4

Note: Figures are different to those reported in the Annual Return 2015. This is due to emissions from our leased estate, for which we are not the main utility bill-payer, being excluded from the data reported pending a full review. The basis for previous assumptions at the end of CP4 in this area is unknown and presents a significant risk of double-counting, the assumptions of which are being re-baselined. Once the review is completed, a revised dataset will be included in the Annual Return 2017.

The annual average carbon emissions factor for traction electricity that we supply to train operators, both market-based and location-based, is reported in Table 6.2. Market-based results are reported according to the Greenhouse Gas (GHG) emissions reporting protocol to allow for the purchase of zero or low carbon energy. Location-based results are reported according to the GHG emissions reporting protocol as a comparator to market-based emissions and represent UK grid mix electricity.

As part of our carbon management approach we have worked with our energy supplier to ensure that for all power we do not generate ourselves, the electricity we use is matched by an equivalent amount from a low-carbon source of generation, predominantly nuclear power. This is in line with the criteria set out by the World Resources Institute (WRI) for 'market based' calculations in its new guidance on reporting emissions and helps further demonstrate how we are committed to keeping up with global best practice in carbon management. This has contributed to the annual average carbon emissions factor for traction electricity that we supply to Train Operating Companies (TOCs) (market based) falling to zero tonnes CO₂.

Table 6.2: Carbon footprint reduction

Metric	Definition	Units	2013/14	2014/15	2015/16
Carbon footprint reduction *	The total carbon emissions from the electricity we procure at our manned sites.	t CO ₂ e	-	221,320	205,286
	The total carbon emissions from the gas we procure at our manned sites.	t CO ₂ e	-	10,305	11,299
Carbon intensity of electricity, traction and non-traction	The annual average carbon emissions factor for traction electricity we supply to train operating companies (market-based)	t CO ₂ e / kWh	0.45	0.21	0.00
	The annual average carbon emissions factor for traction electricity we supply to train operating companies (location-based)	t CO ₂ e / kWh	0.45	0.49	0.46

Note: *Includes some operational supplies such as points heating and signalling supplies. 2013/14 data not available due to the reporting method changing this year.

Embodied Carbon

Embodied or capital carbon refers to carbon dioxide emitted during the manufacture, transport and construction of building materials, together with end of life emissions. Embodied carbon forms part of our overall carbon footprint.

The rail sector is learning how to measure the scale of environmental, social and commercial benefit from reducing embodied carbon. We are a part of an industry-wide approach to calculate and report embodied carbon led by the Rail Safety and Standards Board (RSSB). In 2015/16 we identified ten projects (listed below) to test the rail industry's tool for measurement of embodied carbon. This will allow us to identify opportunities to reduce embodied carbon during project planning, design and delivery, and to measure the benefits compared to conventional approaches.

- Great Western Route Modernisation (GWRM) Main Project (Great Western & Crossrail)
- Oxford Corridor (Great Western & Crossrail)
- Crossrail 1 West (Great Western & Crossrail)
- Filton Bank (Great Western & Crossrail)
- East West Rail Phase 2 (Central & Wales)
- Shotts Electrification/H2M Electrification (Scotland & Northeast)
- East Coast Main Line Power Supply Upgrade (Scotland & Northeast)
- Brighton Main Line Upgrade (Southern)
- Gatwick Station (Southern)
- Wessex Capacity (Southern).



Waste Management

We are not reporting Network Rail waste data for 2015/16 while a project is undertaken to implement waste data system improvements within the Infrastructure Projects business. For any waste data requirements please contact sustainabledevelopment@networkrail.co.uk.

Environmental Incidents

Definition and reporting method

Environmental incidents are reported in line with the [Environment Agency's environmental impact categorisation methodology](#) (categories 1 to 4).

Our close call system enables all of our employees and contractors to report anything that has the potential to cause injury or damage. Whilst the vast majority of close calls relate to safety, close calls can be made in regards to environmental issues.

Commentary

The improved reporting of environmental incidents has resulted in an increase in the number of Category 4 (negligible) environmental incidents in the past year (Table 6.3). This has coincided with a decline in the number of major and significant impacts environmental impact incidents (Category 1 and 2).

In 2015/16, there has been a reduction in the number of environmental incidents as a result of our work and that of infrastructure contractors. It is thought that as the number of environmental close calls made continues to rise, we will continue to see a decrease in environmental incidents as a consequence.

The number of environmental close calls has increased significantly in the past year. This is due to the increase in awareness of environmental close calls within Network Rail and with our contractors, as well as improvements to the reporting system including better categorisation of the close calls. The environmental categories that had an increase of more than 200 per cent in the number reported were chemical storage, controlled water, diesel fume exposure, noise and vegetation.

Table 6.3: Environmental incidents and close calls

Metric	Definition	2013/14	2014/15	2015/16
Environmental Incidents	Environmental incidents caused by activity of Network Rail or its infrastructure contractors	-	677	666
	Category 1 (major impact) environmental incidents	-	4	3
	Category 2 (significant) environmental incidents	-	40	6
	Category 3 (minor) environmental incidents	-	417	132
	Category 4 (negligible) environmental incidents	-	216	525
Environmental Close Calls	Environmental events without environmental impact	3,600	2,790*	6,625
	Percentage of Close Calls closed out within one month of logging	25	66	51

Note: *Categories of environmental close call reporting were revised in 2015/16 which is why this figure is different to the data reported in the Annual Return 2015. These [categories](#) are set out by the Environment Agency.

Sites of Special Scientific Interest

Definition and reporting method

Site Management Statements for all Sites of Special Scientific Interest (SSSIs) in England have been approved by [Natural England](#). This enables Network Rail to undertake certain routine activities without the need to inform Natural England, and enables essential maintenance of the railway to continue whilst meeting legal obligations.

The requirements set by the ORR for reporting the condition of SSSIs are different in Scotland. The number of features within SSSI sites that we manage in Scotland is determined by [Scottish Natural Heritage](#) (SNH). SNH reports the number of features within the SSSIs that are in a particular condition, Natural England assesses based on the complete site on our property.

In CP5 we are reporting on all SSSIs on our property in England and Scotland. We aim to report on the SSSIs in Wales in the future.



Commentary

Table 6.4 sets out the reporting requirements relating to SSSIs. In both England and Scotland, there has been an increase in the percentage of sites in favourable or recovering condition.

Table 6.4: Sites of Special Scientific Interest

Metric	Definition	2013/14	2014/15	2015/16
Sites of Special Scientific Interest	The % of sites in England in favourable or recovering condition	79.2	78.7	83.7
	The number of impactable features within SSSI sites in Scotland that Network Rail manages	41	54	54
	The % of impactable features within SSSIs in Scotland that Network Rail manages in favourable or recovering condition	82.0	93.0	94.4

Timber

We report our timber sourcing performance in calendar years, to align with [World-wide Fund for Nature Global Forest and Trade Network \(WWF - GFTN\)](#) reporting requirements. In 2015 we continued to face challenges in collecting data for the purchase of responsibly sourced timber and the related chain of custody evidence. During 2015 the most comprehensive volume reporting was for rail sleepers and bearers, timber merchant contracts, and constructional timber used on our projects. However, not all timber is reported effectively which has led to a level of under reporting from our construction activities. The 2015 figures in Table 6.5 exclude data from timber fencing materials, furniture and stationery products as the data provided are not reliable.

During 2016 we are continuing to seek improvements in the timber reporting across our construction activities, and from the fencing, stationery and furniture supplier categories. The increase in volumes reported in 2015, compared to 2014, reflects our improved reporting of timber. We have an ongoing project to update our Contract Requirements Environment & Social (CRES), last updated in 2011, for design and construction/works delivery activities which are due for publication in 2017. This will provide an opportunity to tighten the contractual commitments for our design and construction suppliers to procure responsibly sourced timber, and provide us with volume data and certification evidence. We are also incorporating enhanced timber reporting requirements into procurement and supplier management activities, for a number of key framework contract renewal activities.

Table 6.5: Responsible timber sourcing

	Definition		2013	2014	2015
Responsible timber sourcing	The volume of timber procured by Network Rail and its infrastructure contractors by Wood Raw Material Equivalent (WRME)*	m ³	17,840	22,144	59,268
	The percentage by volume of timber that is sourced responsibly through checked and certified schemes, with chains of custody	%	44	68	74

Note: The verification of supplier certification claims has not yet been completed, so the stated 2015 certification percentage is provisional. Data here is restated from 2014/15 published reporting due to a change in measurement methodology.

* Wood Raw Material Equivalent (WRME) is the volume of tree timber required to manufacture a given volume of processed timber product and is calculated using standard industry conversion factors for different timber product types. WRME is always much higher than the volume of actual product used because of manufacturing wastage.

Diversity and Inclusion

We want to be a company where each individual is able to succeed and everyone is encouraged to reach their full potential. We will achieve this when we have a culture that promotes safety, openness, diversity and inclusion based on mutual respect.

Our aspiration is that the way we behave – and the things that we do, demonstrate our commitment to diversity and inclusion, and will be evident across the entire business, as a conscious feature of how we run Network Rail.

To support our approach and implement best practice we use our membership of a number of diversity and inclusion organisations who provide benchmarking activities. We use these benchmarks to understand how we compare with other businesses and sectors and to gauge our progress and areas for development.

In this section of the report we share headline data about the composition of our workforce based on: age, gender, race/ethnicity, disability and sexual orientation.

Workforce Diversity and Inclusion

Definition and reporting method

Diversity and inclusion Key Performance Indicators (KPIs) to track performance have been developed and are currently being rolled-out. These KPIs will be reviewed against the milestones in our strategy and the results will be published in early 2017.

Commentary

We seek to employ people who reflect the diversity of society. We value people and their contributions, irrespective of age, gender, disability, sexual orientation, race or ethnicity, and religion or belief.

In our diversity and inclusion strategy, '[Everyone](#)' we describe our aim to create a more open, diverse, inclusive and safe organisation. It details our commitment to increasing these features of our business through our network of diversity champions, trade union equality representatives, sponsors, local programme work-stream leads and staff networks. So far, over 3,500 managers have received inclusive leadership training; there are currently 325 diversity and inclusion champions; 50 trade union equality representatives; 36 work-streams and over 1,469 staff network members.



In 2015/16 we have begun to see positive results in a variety of areas. One example this year is in the resourcing work-stream, which has focused on improving graduate recruitment from traditionally under-represented groups. We developed a branding and outreach strategy to encourage applications, particularly from female engineers, and invested in selection tools to remove bias. These selection tools include the development of a behaviourally focused Situational Judgement Tests (SJT) which assesses applicants in relation to typical work scenarios that they may encounter at Network Rail. This type of test has been found to show less bias compared to traditional psychometric tests and also provides strong validity as the results are often meaningful to the applicant.

As a result of this and other efforts, 29 per cent of Network Rail's 2015/16 graduate intake were women, up from 24 per cent in 2014/15; and 31 per cent of the graduate intake were from black, Asian and Minority Ethnic (BAME) backgrounds, up from 18 per cent in 2014/15. The percentage of female engineering recruits rose to 16 per cent in 2015/16, up from 6 per cent in 2014/15; while the 2015/16 percentage of BAME engineering recruits was 44 per cent, up from 31 per cent in 2014/15.

In October 2015 we launched 'Spaces and Places for Everyone', our inclusive design strategy. Developed in consultation with a range of internal and external parties, it describes how we will get better every day at offering more inclusive environments, from stations to workplaces.

We want to see a railway that is more accessible, convenient and welcoming to as many people as possible. We care about our passengers and we want everyone to have a positive, seamless journey. Our vision means that our offices and depots will be better able to accommodate our diverse workforce.

The progress we have made towards becoming a more open, diverse and inclusive organisation has been recognised on both a company and individual and company level. The importance of diversity and inclusion was acknowledged in the Shaw Report as a significant part of the future success for the rail industry. One member of the diversity and inclusion team was awarded an MBE for her work in making the railway more accessible, and another member of the team was shortlisted for a lifetime achievement award for Excellence in Diversity. Our Director of Diversity and Inclusion was voted one of the top 50 most influential people in the public sector from the black Asian and minority ethnic community and our Finance Director in IP was included in the top 100 leading ethnic minority executives.

Table 6.6: Workforce diversity and inclusion

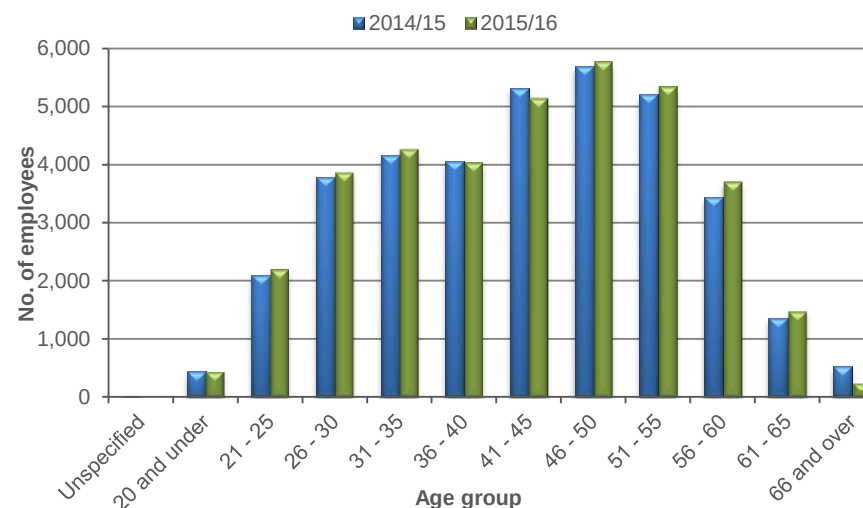
Metric	Definition	2013/14	2014/15	2015/16
	Total employees working for Network Rail	34,401	36,059	36,560
	% of workforce that is female	14.0	14.7	15.4
	% of workforce that is Black, Asian and Minority Ethnic	5.9	6.1	6.7
Diversity & Inclusion	% of workforce completing question about disability	-	29.0	34.3
	% of workforce that is disabled (of employees who completed the question)	3.9	3.0	2.8
	% of workforce completing question about sexual orientation	-	16	16
	% of workforce that is lesbian, gay or bisexual (of employees who completed the question)	0.7	4.1	4.2

Age Profile of our Workforce

The age profile of our workforce generally reflects the UK population. Network Rail needs to plan ahead for the skills gap that an ageing population will produce, especially in engineering and design. We have increased our graduate intake this year, to include 56 engineering graduates across a range of disciplines. We continue to run an advanced engineering apprenticeship scheme with 207 new apprentices in 2015/16, and a further 50 apprentices across a range of levels and programmes related to human resources, project management and finance.

We continue to invest in the development of our employees across the business covering vocational skills, higher education, professional development and leadership. In support of this we have opened two new training centres in Basingstoke and Swindon. The training centre in Basingstoke is part of our work with Stagecoach South West Trains and provides railway training and development to engineers, train drivers and signallers.

Figure 6.1: Workforce age profile



Social Performance

Many people use and are impacted by our network. We are committed to work in a conscientious way so that we maximise the wider social benefits of our network. We want to be a national example of best practice in community investment and to share the socio-economic opportunities created by the way we do business.

This section reports the following measures of social impact:

- volunteer leave
- charitable investment
- apprentices.

Volunteer Leave

We encourage our employees to volunteer within local communities through raising the profile of volunteering opportunities, both with our charity of choice and local charities. Our employees are allowed to volunteer their time charitably or to support community engagement activities for up to five days a year.

In 2015/16, the number of hours employees spent volunteering in local communities increased by five per cent since last year. Over 29 per cent of our volunteers' time was spent with projects that enabled them to be a caring neighbour, such as hospices and charities for disabled and homeless people. Network Rail volunteers also used their technical skills to support railway heritage (22 per cent of the total hours donated) and gardening, vegetation and wildlife projects to connect communities to the environment (15 per cent of the total hours donated).

Table 6.7: Volunteer leave

Definition		2013/14	2014/15	2015/16
Volunteer leave	Total number of employees participating in volunteering	752	815	825
	Hours volunteer leave donated by Network Rail employees	7,518	10,997	11,512
	Monetised value of leave donated by Network Rail employees (£s)	110,139	161,106	168,643

Charitable Investment

In 2015/16 we contributed the equivalent of over £1.8 million to our employee selected charity of choice partner, CLIC Sargent. In addition, over £1.1 million was collected through bucket collections at Network Rail managed stations for a wide variety of charities.

From 2016/17 onwards, our approach to charitable giving is being revised in line with the DfT requirements as a result of reclassification. We now support with giving in kind (through time, premises and spare advertising hoardings as examples) rather than cash, as well as continuing our successful employee fundraising and payroll giving support.

We will be selecting a new charity partner aligned to our 'caring for communities' focus in 2016/17. Our employees will vote for our next charity partner later this year, with this chosen charity remaining our partner for the remainder of CP5.

Table 6.8: Charitable investment

Definition	2013/14	2014/15	2015/16
Sum of the monetised investment in Charity of Choice (2013/14 Action for Children, 2014/15 CLIC Sargent) through donations, fundraising, volunteering time, value of gifts in kind and leverage such as payroll giving (£s)	1,251,110	1,838,909	1,840,464
Total charitable donations made by travelling public, at Network Rail managed stations (£s) *	390,153	864,965	1,144,630

Note: *Figures have been revised in the past year to reflect further charitable donations after the cut-off date. Data based on reported collections for 2015/16 received by 28 May 2016 and therefore the reported number will be restated in the Annual Return 2017.

Apprentices

We run an advanced engineering apprenticeship scheme which recruited 207 new apprentices in 2015/16, and a further 50 apprentices across a range of levels and programmes related to human resources, project management and finance.

Table 6.9: Apprentices

Definition	2013/14	2014/15	2015/16
Number of new Network Rail Apprentices	207	204	207
Total number of Network Rail Apprentices	603	591	614

ScotRail Alliance

The ScotRail Alliance is a close working relationship between Abellio ScotRail and Network Rail Scotland route. While remaining separate companies, both organisations work to achieve common aims and objectives led by a single managing director and senior management team. Working together as one team, the ScotRail Alliance looks after both track and trains to deliver for our customers.

One of the key deliverables from the ScotRail Alliance is our commitment to carbon reduction. Scotland has ambitious carbon emissions reduction targets and the railway contributes to delivering them. The planned electrification of the Edinburgh to Glasgow line, investment in energy saving initiatives at our stations and depots and our Environmental Innovation Fund, demonstrate our key plans to help achieve the carbon reduction targets.



Our commitment to communities

We provide connections between communities across Scotland, with our services depended upon by our passengers, with a total of 95 million passenger journeys made each year from our 358 stations.

Our ScotRail in the Community Programme encompasses the Adopt a Station Scheme, Community Rail Partnership and our wider social initiatives. Through these programmes we have been engaging with communities in support of our social, environment and economic objectives. Volunteers also play a major part in looking after stations with clubs, schools and individuals all contributing their time across the network. Our employees continue to volunteer their time, through coffee mornings and sponsored cycle as examples, to raise money for our charity of choice and local charities.

Since the formation of the ScotRail Alliance in 2015, we have been continually working to improve our services for our employees and our customers. Key achievements to date include:

- £475 million invested in faster, longer, greener trains
- the Border's railway opened in 2015, which is Great Britain's longest new domestic railway in 100 years
- we became a living wage employer in March 2016
- developed our employment opportunities, with 66 new drivers recruited in 2015/16 and new starters from our apprenticeship and graduate schemes
- engaging children with the local railway through travelling classrooms
- 250 rail tickets awarded to volunteers to recognise their work
- 259 stations have been adopted by local communities, seven more than last year
- £12,500 was raised in 2015/16 for local charities
- we piloted our £40,000 Biodiversity Fund, running a workshop for 200 volunteers
- 15 grants awarded as part of the £40,000 Cultural and Arts fund.

We continue to recognise the importance of the health and wellbeing of our passengers, introducing a bike and go cycle scheme that encourages cheap and convenient cycle hire from our stations. The first scheme was launched in Stirling

on the first day of the ScotRail franchise, with the scheme being rolled out across nine more stations.

We continue to work closely with Transport Scotland and the Department for Transport (DfT) to deliver major accessibility schemes to a value of £10 million, maximising the number of passengers who can use our services.

Our Commitment to Scotland

We are investing £742 million to modernise and upgrade the Scottish rail network between Edinburgh and Glasgow. We are committed to operating a sustainable railway for our passengers, in support of the Scottish Government National Outcomes.

Reducing our energy usage and carbon dioxide emissions is a key part of our carbon and energy strategy. The challenges we face in achieving our targets include:

- rolling stock longevity and energy efficiency
- procurement of new rolling stock takes time
- passenger growth.

We have continued to work to overcome these challenges, including:

- large scale electrification between Edinburgh and Glasgow
- use of electric trains, which have zero emissions at the point of use
- installation Driver Advisory Systems
- reduction of diesel units and using sleep mode on electric units
- investment of £2.5 million on LED lighting at stations and depots
- the Energy Audit has highlighted a number of potential interventions that we will invest in over the next three years.

Our Commitment to our people

Investing in and developing our workforce is a major strategic objective. We intend to spend £1 million annually on staff training over the duration of the franchise. We continue to help line managers have supportive conversations around diversity and inclusions with their teams. Addressing the age and gender imbalance (at the end of 2015/16, 83 per cent of the ScotRail Alliance workforce was male) is key to our sustainability and ability to innovate. We recognise that addressing this must be an area of focus and we will be taking positive action to attract more females in the coming year.

Further information on how the ScotRail Alliance is achieving its Corporate Social Responsibility goals and objectives can be found in the ScotRail Annual Corporate Social Responsibility (CSR) Report available [here](#).



7. Customers and Communities

Network Rail owns and manages Britain's railway. We do not operate trains, but we do make sure they can run safely and reliably through our work to maintain and enhance the railway infrastructure. In this section we report on the satisfaction of our customers, passengers and the communities in which we work.

Customer satisfaction is an assessment of how well Network Rail engages with its customers; principally passenger and freight train operators. We also have a wide variety of other stakeholders: the travelling public, our lineside neighbours, and the communities that we serve, who will always be important in our decision making.

We care about the people who live alongside our tracks and infrastructure and we do our best to limit disruption caused by the work we do. Lineside neighbour satisfaction is important to us, and to drive focus on this we added it to our corporate scorecard at the start of 2015/16.

We manage 18 of Britain's biggest and busiest stations. Railway stations are where people's journeys start and finish, and we want all passengers to have the best possible experience at our stations. As well as our internal records, the bi-annual National Rail Passenger Survey (NRPS) allows Network Rail to understand levels of satisfaction among the travelling public.

Customers and Passengers

Until 2014/15, customer satisfaction was solely measured through the Annual Customer Satisfaction Survey (ACSS). This provides feedback from senior management of passenger and freight train operating companies at a fixed point each year. At the beginning of CP5, we identified the need to provide a more regular, route-based measure of customer satisfaction. To complement the annual survey, we undertook the first Customer Service Maturity Measure (CSMM) assessment in January 2015. We also make use of the information from the [National Rail Passenger Survey \(NRPS\)](#) which is conducted bi-annually by Transport Focus. The use of these three measures has created an approach to customer satisfaction that can be tracked throughout the year:

- an annual snapshot of feedback directly from customers
- assessment of metrics defined by the routes and their customers
- the survey of the travelling public

Annual Customer Satisfaction Survey

Definition and reporting method

During autumn 2015, Network Rail procured an independent market research company to survey the satisfaction levels of senior managers and directors from both passenger and freight train operators. The ACSS included a range of topics from overall satisfaction to more specific questions about Network Rail activities and behaviours. For each question, respondents were asked to score Network Rail on a scale of one to five, where one is very dissatisfied and five is very satisfied.

Commentary

In 2015/16, satisfaction levels showed a small improvement over the previous year's results, as shown in Table 7.1, but remained some way short of the all-time high of 66 per cent (2012/13). A particular issue of concern in the 2014/15 survey was that the number of respondents who were dissatisfied outweighed the number that was satisfied. The latest survey has seen a shift to more respondents being satisfied than dissatisfied.

The response rate, 69 per cent, was broadly in line with the 70 per cent achieved in 2014/15. A high response rate is an indicator of customer engagement, and maintaining a high response rate remained a priority for the 2015/16 survey.

The key drivers for improving our satisfaction score identified by the survey included improvements to 'delivering what we say we will' and 'taking ownership of issues'. Safety remains the highest scoring attribute in the survey, with 73 per cent of customers that responded satisfied with Network Rail's safety culture,

Customer satisfaction has declined for 'delivery of enhancement projects'. This reflects the challenges that Network Rail has faced in the first two years of CP5. There have been two reviews of our enhancements undertaken in 2015/16. These were conducted by Dame Colette Bowe and Sir Peter Hendy in response to internal and external concerns about our delivery. A robust baseline for enhancement expenditure has been developed and we have agreed a new way of planning projects with the Department for Transport (DfT). For further details about these reviews see the Enhancements section. Delivery of our revised plans is expected help regain the confidence of customers. This has negated some of the incremental gains that have occurred for the other measures included within the survey.

Table 7.1: Annual customer satisfaction survey results

		2011/12	2012/13	2013/14	2014/15	2015/16
Satisfied / very satisfied	%	43	66	58	40	41
Neither	%	27	15	19	19	22
Dissatisfied / very dissatisfied	%	30	19	23	41	37
Satisfaction score	mean	3.12	3.55	3.41	3.00	3.05

Three Key Measures of ACSS

Definition and reporting method

A range of measures have been surveyed in the past, some have now been removed entirely and others have evolved into other measures. There are three key measures that we have been consistently surveyed and tracked against since 2008:

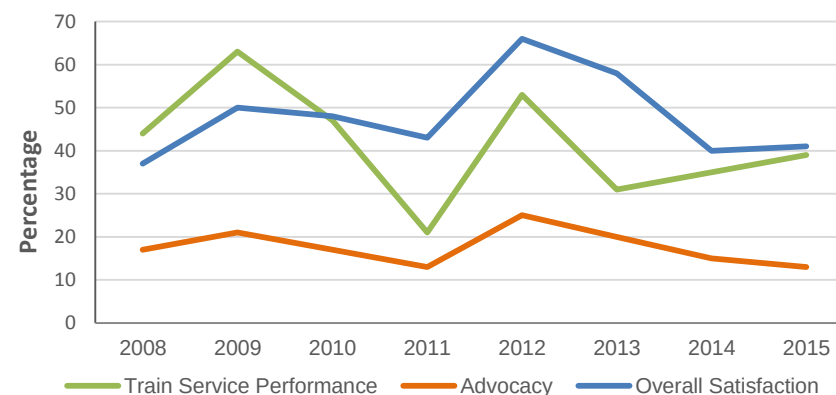
- train service performance - measures the respondent's satisfaction with Network Rail's part in overall train performance
- advocacy - calculated based on the response to five statements focused on how the respondent would portray Network Rail to others
- overall satisfaction - a separate question for the respondent rather than a calculation of the other scores they have given.

Commentary

The results are based on the respondent's experience during the year between autumn 2014 and autumn 2015. Despite the operational performance challenges that we have faced this year, customers' satisfaction with train service performance increased for the second year in succession. This measure often reflects overall satisfaction so the consistent improvement evident since 2013/14 is positive for the rail industry as a whole.



Figure 7.1: Three key measures of ACSS



Customer Service Maturity Measures

Definition and reporting method

Each route has developed a suite of measures to capture customer service attributes that are the most important to their customers. This approach allows the framework to measure several components of satisfaction, giving flexibility to measures that are appropriate to route based needs, whilst ensuring enough consistency to enable a national view of customer service. The attributes are measured on a scale of one to five, with one being the lowest and five being the highest level of satisfaction. The scores for each route are an average of the scores for each measure. All measures have the same weighting in the final calculation. The dates of the assessments have been reviewed this year, going forward they will be issued every three months. The last assessment of each year will be issued in April so as to capture the end of the financial year.

The CSMMs are updated using data sources which are bespoke to each individual route and customer. These include, but are not limited to:

- safety measures, including at managed stations
- train performance data
- scores from the ACSS
- the status of milestones linked to agreed customer objectives
- scores from the NRPS.

Commentary

At the end of 2015/16 six of our eight operating routes posted improved scores compared to the beginning of the year.

The biggest reduction in score over 2015/16 was in Western, where there was a 0.21 reduction. This reduction was driven in part by reducing scores for safety, both at managed stations and more widely and a worse score for the use of unplanned temporary speed restrictions on the route. The biggest increase was in Anglia where the score improved by 0.52 over the course of the year. The biggest increases in measures for Anglia was seen for the capacity allocation process, how Network Rail coordinates the requests to run train services into the timetable, and for improving opportunities for collaboration with customers.

Table 7.2: Annual customer satisfaction survey results

Route	Benchmark	May 2015	Aug 2015	Jan 2016	Apr 2016	CP5 Trajectory
Anglia	2.65	2.42	2.58	3.06	2.94	3.71
LNE & East Midlands	2.67	2.74	2.76	2.90	2.76	4.33
LNW	2.48	2.48	2.44	2.68	2.88	4.20
LSE	2.42	2.63	2.83	2.63	2.71	4.58
Scotland	3.57	3.62	3.57	3.71	3.76	4.57
Wales	2.95	3.15	3.25	3.10	3.10	*
Wessex	2.31	2.53	**	-	2.88	4.06
Western	3.00	3.04	3.17	2.79	2.83	4.00

Note: *A different approach was taken by Wales Route which adopted the target to have no more than two individual attributes with a score of 2.0 at the end of CP5. **Due the split of the Wessex Alliance after the May 2015 CSMM update there was no further updates until the new CSMMs were agreed with the train operators.

National Rail Passenger Survey

Definition and reporting method

The NRPS is commissioned by Transport Focus, which collects passenger opinions of train services twice a year from a representative sample of journeys. The latest results reflect the spring 2016 survey, which took place between January and March 2016.

More than 50,000 passengers a year are consulted to produce a network-wide picture of passengers' satisfaction with rail travel. Passengers' overall satisfaction as well as their satisfaction with 30 specific aspects of service can be compared over time. The full result of the spring 2016 survey, and surveys dating back to 2011, can be downloaded from [the Transport Focus website](#).

The results from the survey provide a picture of the rail industry as a whole. Not all measures are within Network Rail's control. The measures are created to reflect passenger experience and therefore include measures that are directly influenced by train operators.

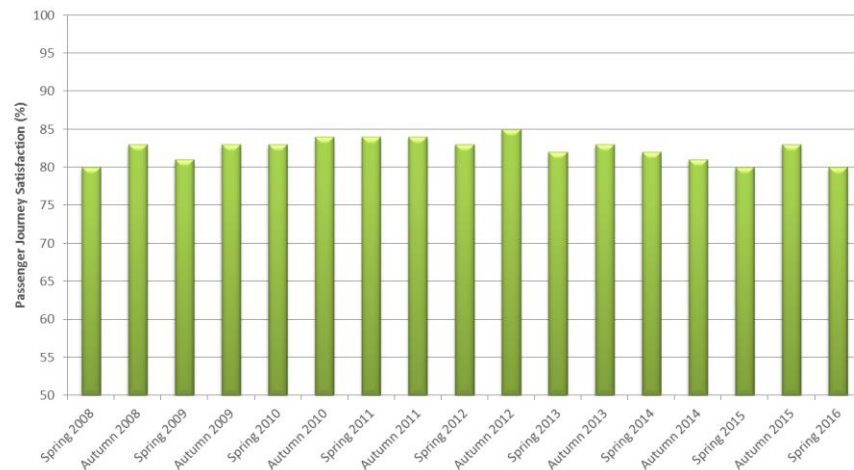
Commentary

As shown in Figure 7.2, the percentage of passengers satisfied with their overall journey was to 80 per cent, maintain the score from the spring 2015 review whilst three percentage points lower than autumn 2015. At route level, Network Rail's LSE and Wessex routes, were the worst performing at 73 per cent and 80 per cent satisfaction respectively, although Wessex did improve by two percentage points over spring 2015. The highest performing routes were Scotland at 88 per cent (maintaining the score received in spring 2015) and LNW at 86 per cent (improved one percentage point on spring 2014).

'How well a train company deals with delays' remains a low scoring area, with 34 per cent satisfied at a national level. This was four percentage points worse than the autumn 2015 survey but in line with the spring 2015. Network Rail continues to work closely with train operators to improve Passenger Information During Disruption (PIDD).

Passenger feedback was the most positive for long-distance journeys, with 88 per cent of passengers satisfied with their overall journey. This result was one percentage point higher than the autumn 2015 survey. The worst performance was seen for London and the South East with 78 per cent, three percentage points worse than autumn 2015.

Figure 7.2: Passenger journey satisfaction



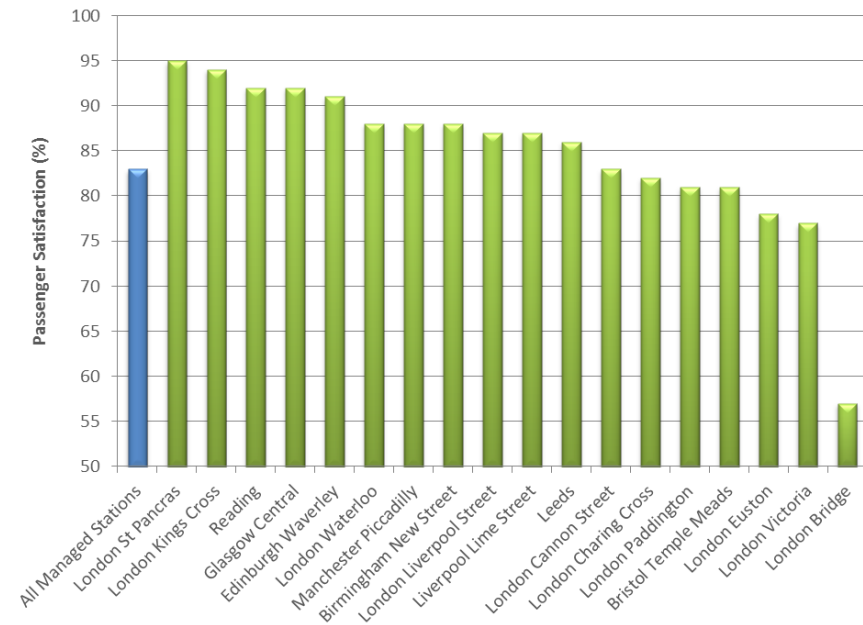
National Rail Passenger Survey (Managed Stations)

Network Rail owns and manages some of Britain's biggest and busiest stations and we are able to directly influence satisfaction at these stations. Overall passenger satisfaction at managed stations was 84 per cent. This is one percentage point higher than the autumn 2014 survey.

As shown in Figure 7.3, the highest scoring station was London St. Pancras which achieved 95 per cent satisfaction (consistent with spring 2015). The lowest scoring station was London Bridge, where 57 per cent of passengers were satisfied. Significant project work continues at London Bridge to deliver the Thameslink Programme. Birmingham New Street station reopened following the spring 2015 survey and recorded the largest improvement, seven percentage points, in comparison to the spring 2015 survey.

Stations that have recently been upgraded, including Reading and London King's Cross, continue to show high levels of satisfaction against other managed stations and against previous satisfaction levels at these stations.

Figure 7.3: Passenger Satisfaction at Network Rail Managed Stations



Communities

Around five million people's homes either back on to or face the railway, while 22 million people live or work less than 500 metres away from the railway. We receive both positive and negative contact from the communities and people that we come into contact with. We are working to make it easier for stakeholders to talk to, and hear from, us about what we are doing. Contact from the public is helping us to direct our focus onto the issues that are important to our stakeholders. We aim to give notice about all of our work, although sometimes safety critical repairs need to be carried out at short notice.

Lineside Neighbour Metric

Definition and reporting method

The lineside neighbour metric is calculated based on responses to a wider survey that we undertake. The public perception tracker survey is an 18 minute online questionnaire administered weekly to a representative sample of the adult (over 16 years of age) population of Great Britain. Respondents are asked to recall what they have seen or heard about Network Rail, and open questions are asked to gain qualitative data. Between 1,000 and 1,150 interviews are completed in any month. This provides a statistically robust sample size so that we can analyse results by key groups, such as passengers, route travelled on, and lineside neighbours.

Commentary

In 2015/16 the Lineside Neighbour Metric was included on our corporate scorecard, this helped drive focus on the issue. We have found there to be three key themes in the answers provided by respondents which align to the contacts that we receive into our national helpline;

- the behaviour of our workers
- the pre-notification of when work is to be undertaken, this includes respondents perception of this
- how vegetation is managed.

Table 7.3: Lineside neighbour metric

	2014/15	2015/16
Anglia	56	55
LNE & East Midlands	57	50
LNW	54	53
LSE	57	56
Scotland	47	44
Wales	50	39
Wessex	45	44
Western	52	53
Network-wide	52	51

Methods of Contact

Definition and reporting method

Our national helpline is the central point for all contact from the public. We encourage all types of contact, positive or negative. In this section we have not distinguished between compliments, complaints or requests for work as all of these can help us to interact more effectively with the communities that we work in.

The reported figures in this section are from our internal system which logs a variety of metrics for contact and how it is dealt with.

Commentary

We want to make it as easy as possible for our customers and communities to contact and provide feedback to us. In CP5 we have introduced two new ways of contacting our central team;

- web form – an online form is included on our website. This is submitted to our central team who will then either respond directly to the contact or allocate it to the responsible person within the business for response
- live chat - an instant messaging service is hosted on our website. This is available seven days a week to help record and resolve contacts from the public.

Contact by telephone to our helpline, which is open 24 hours a day, has consistently been the most used method of contact. The newly introduced methods will give our customers more ways to contact us.

Table 7.4: Method of contact into National Helpline

	2013/14	2014/15	2015/16
Calls	183,463	168,378	165,884
Emails	22,746	19,827	6,670
Letters	4,118	4,122	3,097
Web form	-	2,918*	11,544
Live chat	-	-	124**

Note: *Our Web form was launched in January 2015. **Our Live chat service was launched in March 2016.



Handling of Contact

Commentary

As soon as a contact is received by our national helpline, a filtering process begins so that customers receive the correct information and resolution to their queries as soon as possible and by the right people.

In 2015/16, our Interactive Voice Response (IVR) system handled more than a third of all contacts before they were actioned by our central team. The IVR includes options such as enquires about train times and ticketing. If selected this redirects the user to more appropriate sources of information from other areas of the industry.

More than a quarter of contacts are handled by our helpline on their first call to Network Rail. The majority of centrally closed contacts are requests for information and queries relating to one of our 18 managed stations.

Table 7.5: Handling of contacts (numbers of calls)

	2013/14	2014/15	2015/16
Handled by automated phone messaging (IVR)	79,114	71,791	69,287
Calls abandoned by Customer	4,763	4,115	4,200
Resolved by the helpline	46,646	43,238	53,460
Existing Enquiry	24,456	21,365	12,250
Resolved by local teams	61,415	59,890	54,234

Stakeholder Journey

Commentary

Based on the complexity of what our stakeholders require we manage the contacts that we receive centrally. We have a team of 37 people at the National Helpline centre in Hull available to help with queries 24/7. The central team help to re-direct people to an appropriate source of information when the request is related to other parts of the rail industry, resolve contacts when the information is held centrally and direct issues to the appropriate areas of the business to resolve.

Table 7.6 shows the journey that a stakeholder's contact goes through to either be dealt with centrally, or transferred to the routes for further action to be taken. Of the 188,804 contacts received into our Central Team 23 per cent were allocated to the route for further action.

Table 7.6: Stakeholder journey (number of contacts)

	2013/14	2014/15	2015/16
Initial Contact	210,327	195,245	187,319
Remaining after automated messaging	132,578	125,117	119,517
Remaining after Calls Abandoning	127,815	121,002	115,317
Remaining after cases resolved by helpline	81,169	77,764	61,857
Remaining after Existing enquiries handled	56,713	56,399	49,607
Remaining after Central Team Handled	36,130	43,722	43,883

Reasons for Contact

Commentary

Each of the contacts into our National Helpline is assigned to a category within our company database. Consistently, the highest volume of contact is related to non-Network Rail issues outside of our control (e.g. ticket information and refund requests), it is important that these can be re-directed from the centre so that the people on the frontline can focus on the issues that are impacting the communities that we work alongside. Our employees are trained to direct queries to the appropriate part of the railway industry.

Aside from non-Network Rail issues and information requests the category that we are contacted about most is 'Railway Work'. Lineside neighbour satisfaction is important to us, and to drive focus on this we added it to our corporate scorecard at the start of the 2015/16. This was to improve the visibility of the way that we work so that we can continue to build our relationship with our lineside neighbours.



Table 7.7: Contact categories (number of contacts)

	2013/14	2014/15	2015/16
Non-Network Rail issues	18,426	16,825	18,265
Information Request	17,503	15,307	16,214
Railway Work	15,084	17,281	16,167
Stations (Network Rail Managed)	12,640	12,031	11,375
Vegetation	11,993	12,045	11,232
Safety	6,214	5,836	6,807
Infrastructure	2,028	2,591	4,557
Level Crossings	3,289	3,341	3,650
Crime	2,953	3,106	2,941
Animals & Wildlife	1,821	2,172	2,086
Asset Protection or 3 rd Party Works	1,738	1,839	1,902
Special Requests	2,701	1,815	1,756
Noise (Non-Work related)	1,774	1,678	1,629
Stations (Non-Network Rail Managed)	1,351	1,272	1,222
Major Projects & Enhancements	608	1,557	1,235
Flooding or Pollution	1,186	1,114	1,120
Claims	659	503	479
Train Performance	310	453	281
Legal Notices	12	55	41
Other	0	0	51
Total	102,290	100,821	102,959

Age of Active Cases

Commentary

Reporting on the age of those cases awaiting resolution maintains our focus on responding to our customers in good time. There are cases that have been open a long time, often because the issue is difficult to resolve. For us to be able to reach our future target we will need to work to close the older issues, as well as the new contact that we are receiving.

In 2015/16 we reduced our average age of cases by over 50 per cent, from 88 days in 2013/14 to 43 days in 2015/16. An ambitious target of 29 days (20 working days) has been set for 2016/17. All routes have shown an improvement in the average age of open cases. There are four routes (East Midlands, LNE, Scotland and Wessex) that have already met the target that we have set ourselves. These routes have led the way in driving customer service by ensuring cases are addressed as soon as possible and the customer expectations are managed in regards to when work will be completed.

Table 7.8: Age of active cases (days)

	2013/14	2014/15	2015/16
Anglia	72	88	67
LNE & East Midlands	50	43	18
LNW	97	104	47
LSE	66	81	35
Scotland	63	66	29
Wales	160	188	77
Wessex	119	151	14
Western	60	95	43
Network-wide	88	95	43

Active Cases

Commentary

We are committed to improving contact with our customers. Over the past two years, we have targeted our routes to reduce the number of active cases open at year-end. An increased focus on customer service and allocated funds in the routes so that action could be undertaken to address requests for work has helped us beat target in all of the routes in 2015/16 as shown in Table 7.9.

Table 7.9: Active service requests

	2013/14	2014/15	2015/16
Anglia	199	317	215
LNE & East Midlands	706	538	228
LNW	1,423	944	564
LSE	416	479	293
Scotland	348	244	226
Wales	500	204	174
Wessex	104	280	51
Western	208	227	176



Closure of Cases

Commentary

It is important that when people contact us, we respond to them in a timely manner.

It is not always possible to answer the question, or provide the information requested, in line with the timescales that we set ourselves. If this is the case we need to explain what we are doing, and how long we expect it to take.

If the contact is about work to be undertaken we need to either to confirm that work they have requested has been planned or completed, or to explain why it is not being done.

Table 7.10 shows the improvement in average turnaround time from 71 days in 2013/14 to 40 days in 2015/16. We have set a target to achieve an average turnaround of 29 days (20 working days) by the end of 2016/17.

Table 7.10: Average turnaround of closed cases (days)

	2013/14	2014/15	2015/16
Anglia	115	63	56
LNE & East Midlands	41	39	38
LNW	64	32	30
LSE	59	56	38
Scotland	39	37	33
Wales	112	85	47
Wessex	62	43	43
Western	111	49	34

Twitter Activity

Definition and reporting method

Data about our Twitter presence comes from our social media management system that we use to track our Twitter interactions. There are two measures that we track:

- followers – people who have subscribed to our Twitter updates. This means that they receive all of our contact directly to their profile
- mentions – any Tweet that is posted by someone that includes a reference to our username [@networkrail](#).

Commentary

Contact through Twitter has increased significantly since Network Rail launched the service in 2012 and it is recognised as a legitimate customer service channel in its own right. We try to reply to every tweet but, due to high volumes, this is not always possible. During times of major disruption we may not be able to reply to individual questions, but we will provide regular updates to all our followers.

As well as reacting and replying to messages we receive from followers, we have used this channel to inform people about our improvement programmes and other national initiatives. We also share photographs to illustrate some of the infrastructure problems we face and provide more information about the railway.

Throughout the year we have been using Twitter to inform people of the work that we are doing to upgrade the railway. The 'Christmas Works' campaign drove an increase of 2,470 new followers in less than two weeks. This proactive campaign to inform led to positive interactions with our followers.

Table 7.11: Twitter activity

	2013/14	2014/15	2015/16
Followers	50,121	69,899	116,049
Mentions (inclusion of @networkrail in a Tweet)	-	68,383	92,206

8. Transparency

We believe that being transparent in how we work as a company and how we work with our stakeholders is integral to our success as a business. We know that being more transparent will help us become a more efficient and responsible organisation, and make us more accountable to our stakeholders through:

- facilitating informed public debate about our company and the future of the railway
- developing a better understanding of how and why we make decisions, and how we spend public money.

Our ultimate aim is to make transparency part of everything we do. We want to enable people outside of Network Rail to find information about us more easily, and to feel empowered to ask where it is not currently available.

Our Strategy

We have identified four core areas of activity for delivery throughout CP5:

1. **Proactive publication:** we publish relevant information which increases understanding of our company, our work and our role in the wider rail industry, without being asked
2. **Freedom of Information:** we aim to respond to all requests for information within 20 working days (in line with our statutory responsibilities under the Freedom of Information Act)
3. **Open data:** we make raw data available for developers to use when they build mobile applications and websites
4. **Working with the industry:** we work closely with our partners to increase transparency for the whole industry, for the benefit of passengers and the wider public.

We report below on our progress during 2015/16 against each of these core areas of activity.

Proactive Publication

Proactive publication remains at the core of the transparency programme. For many people, the most important practical means of accessing information held by us is through information which is made available on a proactive basis, rather than through making requests for information. As part of our existing transparency

commitment we proactively publish new information at least twice a year, and continually refresh datasets to keep them up to date and relevant.

During 2015/16 we published 28 categories of new information on our webpages, taking us to almost 100 categories in total which can be viewed using the following link: [transparency pages](#). We received more than 260,000 total hits to the transparency categories on our webpages.

Freedom of Information

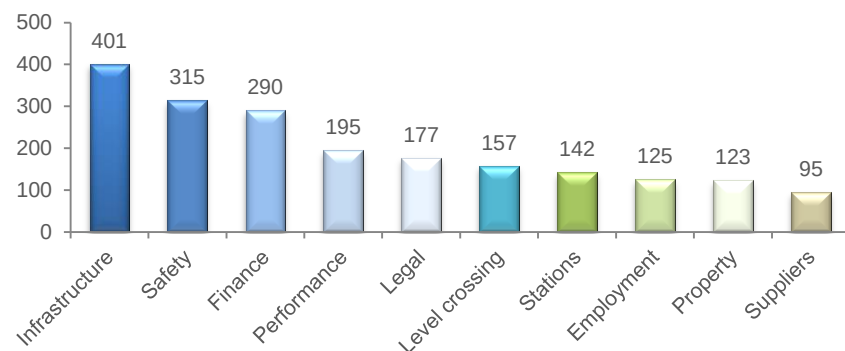
In March 2015, we became subject to the Freedom of Information (FOI) Act. We see FOI as a further opportunity for the company to be more open and accountable. In 2015/16 we received 1,538 requests for information at an average rate of 30 new requests each week. In 2015/16, we have responded to 92 per cent of all requests within the statutory timescales. Minimum performance expectations are set at a benchmark of 85 per cent by the regulator (the Information Commissioner).

Figure 8.1: Received/closed FOI requests during 2015/16



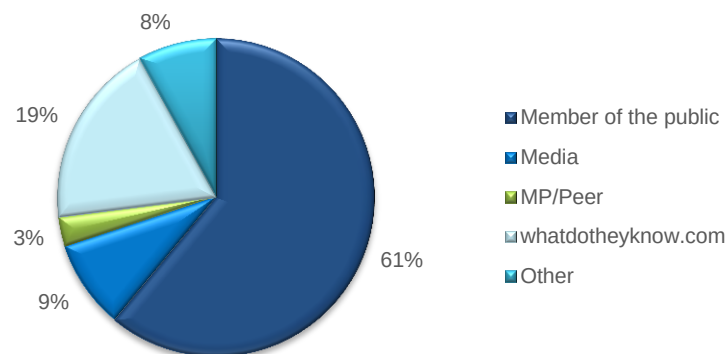
We have been asked about a wide range of topics over the course of 2015/16 including train performance, safety, delivery of programmes and projects, and company expenditure (especially on subjects such as salaries, incentive plans, costs of travel, and areas of discretionary spend). The number of requests received by the top ten most popular key words is shown in Figure 8.2.

Figure 8.2: 2015/16 top ten key words from FOI requests received



As shown in Figure 8.3 the requests we have received originate from a range of interested parties, with a significant proportion from our lineside neighbours, members of local communities, and people who have a general interest in the railway.

Figure 8.3: 2015/16 FOI requests received by type of requestor



Open Data

The release of open data by organisations is increasingly becoming the norm and is an integral part of becoming more open and transparent. The railway industry as a whole continues to invest in making more, and better, data available to improve passenger journey planning. We have continued to work with technical developers throughout the year to build upon the 'real time' open data we currently provide from our operational train information. This data is used for mobile applications and websites and shows what is happening on the network at any given time.

We have more than 200 active users of our open data feeds. Feedback suggests that considerable appetite exists for ongoing releases of raw data including on historic performance and train cancellations. We will work with partners across the industry to explore more options over the course of the next year in response to demand from developers for us to publish additional data feeds.

Working with the Industry

We have played a key role in the continued development of the industry approach towards transparency, providing leadership through the Rail Delivery Group (RDG) transparency sub-committee in particular. We actively benchmark our FOI delivery against comparable organisations, such as Transport for London (TfL) and the Ministry of Justice (MoJ), to drive continuous improvement. We compare well against these organisations, especially in our FOI delivery and strategic plans for our transparency work.

We welcome challenge regarding our work and find ways to seek feedback. For example, during the year we have hosted a number of events involving representatives across the sector, including two challenge panels and an external stakeholder debate. These events are designed to promote closer working relationships, facilitate the sharing of ideas, as well as to create an environment where people can offer feedback and support.

9. Innovation, Research and Development

The Secretary of State's HLOS included a ring-fenced fund to support research and development (R&D) and innovation. In accordance with the final determination, and in order to ensure there is transparency around the use of the funding allocated to these areas, we publish details below of how this fund has been used.

Innovation Fund

Fund reference code: F009a

Objective

The objective of the Innovation Fund is to support delivery of the Rail Technical Strategy (RTS). RTS sets out the rail industry's vision for the future of the railway. It supports the rail industry to develop, demonstrate and introduce new technologies and innovation including technical, business model, operational, process and supply chain innovation to improve the performance and the economic value of the railway and the industry itself.

Governance

Expenditure against this fund is managed by the Technical Strategy Leadership Group which is a cross industry body and sub-committee of the RSSB Board. Network Rail's formal accountability for the Innovation Fund is limited to ensuring the funds are administered to the terms set out in the CP5 Delivery Plan. Risk and return on investment is viewed as a portfolio to spread risk and optimise potential industry benefit. The Innovation Fund is complementary to the Strategic R&D Fund and is governed through common industry and Network Rail groups to achieve an efficient integrated and co-ordinated R&D programme.

Progress

A programme of innovation activity costing £20 million has been initiated from the Innovation Fund. Since the Hendy review no new activity has been initiated.

Details of programmes, including anticipated benefits, are set out in Table 9.1 below showing authorised investments from this fund.

Hendy Review

The January 2016 update to the Enhancements Delivery Plan revised the CP5 fund value from £52 million to £18.9 million in 2012/13 prices. £14.2 million has been accrued for CP5 to 2015/16 financial year-end.



Table 9.1: F009a Innovation Fund

Portfolio	Project	Description	Status	Budget* (£m)	End Date	Anticipated Benefits
Command, Control, Communication	FuTRO Demonstrators	The Future Traffic Regulation Optimisation (FuTRO) Programme aims to develop a long term vision where train position and speed management will deliver a high capacity, on-time railway	Ongoing	1.6	September 2016	A building block to increasing railway capacity and on-time performance
People	Route Knowledge	The aim of the programme is to review and optimise the driver route learning process	Complete	0.214	December 2017	Reduce driver training time
Energy	Aesthetic OLE	The Aesthetic Overhead Line Electrification (OLE) Programme is demonstrating new sustainable designs which are less visually obtrusive	Ongoing	0.15	December 2016	Reduced environmental impact and improved customer satisfaction. Reduced cost to HS2
Rolling stock	Predictable and Optimised Braking	Competition co-funded with the DfT to develop novel technical solutions which can provide predictable and optimised breaking in all conditions	Ongoing	1.5	May 2017	Improve performance and potentially capacity of the railway through predictable braking
Rolling stock	PowerTrain	Competition co-funded with the DfT seeking novel technical solutions which can provide improved energy efficiencies for self-powered vehicles	Ongoing	0.92	March 2017	Facilitate the development of EU compliant self-propelled energy efficient vehicles
Rolling stock	Radical train	The Radical Train Programme was designed to encourage the rail vehicle supply chain to demonstrate innovative ideas which could not be taken forward without external investment.	Ongoing	1.7	June 2017	Technologies that could reduce track damage, improve energy efficiency and demonstrate the application of advanced materials.
Innovation	Testing Vouchers	Testing Voucher Scheme gives innovators up to five days access to the Rail Alliance proving ground facility at Long Marston	Complete	0.54	December 2015	Reduce cost and timescales of bring innovation to market through improved access to railway test facilities
Innovation	Centres of Excellence feasibility study	Review the existing rail testing, trialling, modelling and simulation capability and capacity in Britain and using industry forecasts perform a gap analysis and develop business cases for enhancing capacity and capability in key areas	Complete	0.072	October 2015	Accelerate number and time for innovative products to be delivered to the market by reducing barriers to entry
Innovation	Accelerating Innovation in Rail 2 (AIR2) Customer Experience	Competition co-funded with Innovate UK to support business innovation in digital technologies that improve the customer experience in British and international rail markets	Ongoing	2.2	September 2017	Enhance Customer Experience
Infrastructure	Avoidance of Bridge Reconstruction	To facilitate overhead electric lines to pass beneath existing bridges and tunnels where insufficient space currently exists	Ongoing	0.03	December 2017	Reduced cost to electrification programmes by reducing the need to replace structures.

Portfolio	Project	Description	Status	Budget* (£m)	End Date	Anticipated Benefits
Customer experience	Customer Experience Prize	The Customer Experience Programme focusses on developing integrated digital solutions and services, for both passenger and freight customers.	Ongoing	0.34	October 2016	Provision of real time Multi-modal transport applications including train loading data for both train operator and customer use.
Europe	European Programme	The European Programmes activity consists of two primary workstreams: to bring together the British supply chain in order to bid via European calls for funding through the Horizon2020 framework programme and the Shift2Rail JU; and to influence the direction of European research to align with British rail sector objectives.	Ongoing	0.3	NSED**	Development of the European Programme to leverage the benefit to the British rail network
Innovation	Change Programme	The rail industry has overcome inhibitors to innovation, including the misalignment of risk and reward, to become dynamic and attractive to entrepreneurial talent.	Ongoing	1.9	NSED**	Transformation of the British rail industry both terms of industrial maturity and ability to generate/adopt innovation and the associated skill base within its work force.
Strategy	RTS Programme	Long term strategy development work, which includes: generation and update of the RTS; completing the portfolio and benefits mapping work; facilitation of RTS portfolio groups; programme prioritisation; development of the RTS capability Delivery Plan; and linkage with the IIA and other industry activities e.g. Digital Railway.	Ongoing	1.25	NSED**	Delivery of the technical strategy and vision for the British rail industry and supporting architecture to inform programmes of activity and priority.

Note: *Budget from Innovation Fund only – projects may additionally include contributions from other funds and funders. ** Non Scheduled End Date (NSED) – These are ongoing industry wide programme where F009a has contributed. These programmes are ongoing and currently have no scheduled end date. Establishment of the Future Rail and wider industry Innovation Programme (inclusive of Programme management, operations, and closure cost options) has been excluded from the table above but contains a budgetary provision of £6 million.

Strategic Research and Development Fund

Fund reference code: F009b

Objective

The objective of the Strategic Research and Development Fund is to support delivery of the Network Rail Technical Strategy (NRTS) which sets out Network Rail's contribution to realising the industry's Rail Technical Strategy. It supports the research, development, demonstration and introduction of new technologies and innovation, working closely with industry, to improve the performance and economic value of the railway.

Governance

The fund is governed and directed by the Research and Technology (formerly Technology and Innovation) Board within Network Rail. Risk and return on investment is viewed as a portfolio to spread risk and optimise potential reward. A key principle is that risk is shared through co-investment where possible with a requirement to at least match the level of investment from the Strategic R&D Fund at the portfolio level. The Strategic Research and Development Fund is complementary to the Innovation Fund and is governed through common industry and Network Rail groups to achieve an efficient integrated and co-ordinated R&D programme.

Progress in 2015/16

Value from the fund in CP5 is achieved by bringing new technologies towards readiness for deployment. Benefits from the fund will be realised through more efficient outputs in CP6. Alongside progress with specific projects, the primary area of focus has been to establish the Multi-Annual Action Plan, in collaboration with other members of the €920 million Shift2Rail EU Public Private Partnership, to initiate the programme. Shift2Rail is the primary European public R&D investment dedicated to rail in the period to 2020. Details of progress for authorised projects including allocated budget, status of project, target end date and anticipated benefits are set out in Table 9.2.

The January 2016 update to the Enhancements Delivery Plan (EDP) revised the CP5 fund value from £52 million to £14.3 million (£50 million to £13.5 million in 2012/13 prices). £30.5 million has been committed for CP5 to 2015/16 financial year-end. Our commitment includes the authorised projects plus Shift2Rail and programme management and development from April 2016 to March 2019.

Alternative sources of funding are currently being explored to meet the gap in funding and a review of investment allocation has been undertaken against priority challenges and established priorities for investment should further funding become available.

Table 9.2: F009b Strategic R&D fund authorised projects

Portfolio	Project	Description	Start Technology Readiness Level†	End Technology Readiness Level†	Status	Budget* (£m)	End Date	Anticipated Benefits
Infrastructure	Autonomous Intelligent Systems	Partnership with industry and the Engineering and Physical Sciences Research Council (EPSRC) to fund novel research in autonomous intelligent systems	2	3	Ongoing	0.216	March 2017	Improved decision support tools for asset management
Infrastructure	Fibre Optics Rockfall Detection	A new Distributed Acoustic Sensing (DAS) system for detection of rock fall and landslips on or near the line	5	7	On Hold	0.166	-	Improved safety and reduced disruption
Infrastructure	iSMART (slope stability)	Modelling infrastructure slopes under a range of current and future environmental scenarios	1	3	Ongoing	0.015	December 2016	Risk based management of earthworks

Portfolio	Project	Description	Start Technology Readiness Level†	End Technology Readiness Level†	Status	Budget* (£m)	End Date	Anticipated Benefits
Infrastructure	Remote Condition Monitoring competition	Challenge-led competition to reduce cost and maximise track availability by non-disruptive inspection and targeted timely maintenance interventions	3	7	Ongoing	1.2	March 2017	Increased maintenance efficiency, safety and performance benefits
Infrastructure	Seedcorn Yr 1 & Yr 2	Generation of concepts (typically £50k investment) across the business and preparation for subsequent tranches of the Strategic R&D fund	Not applicable	Not applicable	Ongoing	2.5	March 2019	Creating a managed pipeline of ideas
Infrastructure	Self-powered, wireless operated Distant signal (SWORD)	SWORD is developing an independently powered signal with wireless communications that optimises whole life cost	6	8	Ongoing	0.4	March 2017	Reduced capital cost of conventional 'distant' signals
Infrastructure	Strategic University Partnerships 1 & 2	Strategic Partnerships with selected Universities to develop rail relevant research	1	4	Ongoing	1.59	December 2017	Research focused on strategic business needs
Infrastructure	Strategic University Partnership - Nottingham Whole Lifecycle Costing	Strategic partnership with Nottingham University to quantify asset degradation, the effect of asset interventions and failure relationships over the whole lifecycle for critical infrastructure assets	1	4	Ongoing	1.45	March 2019	Cost efficiency and improved reliability through better targeted maintenance, repairs and renewals
Infrastructure	Climate Change Adaptation (TRaCCA)	TRaCCA is a rail industry research programme managed by RSSB looking at the impact of increased extreme weather events on the UK rail network	1	3	Complete	0.051	December 2015	Improved robustness of rail system in inclement weather
Infrastructure	Track 21	EPSRC funded project to explore new techniques for the design, construction and maintenance of ballasted railway track making it fit for a 21st century railway	2	5	Complete	0.043	August 2015	Reduction in whole-life costs and environmental impacts through enabling the maintenance requirements of ballasted track to be reduced

Portfolio	Project	Description	Start Technology Readiness Level†	End Technology Readiness Level†	Status	Budget* (£m)	End Date	Anticipated Benefits
Infrastructure	Asphalt Track System Development	Develop the materials, construction and monitoring knowledge needed to construct a high performance ballast-less track system constructed from asphalt mixes suitable for either placing over a strong or weak sub-grade	2	6	Ongoing	0.915	January 2017	Improves the whole life cost of the rail system, through less intensive maintenance requirements. Reduces the consumption of natural resources and reduces the need for lineside workers.
Infrastructure	Wet rails	Project to enhance understanding of the influence of water on wheel slide	3	6	Ongoing	0.1	August 2016	Improve autumn performance
Infrastructure	Instrumented Pantograph	This is Phase 1 of a research and development project to prove the technology of the Instrumented Pantograph and pantograph cameras in passenger service	5	8	Ongoing	0.345	December 2016	Increased maintenance efficiency, safety and performance benefits
Infrastructure	Programmable Logic Controller for Signal & Level Crossing	The development of a business, safety and engineering case for the introduction of Programmable Logic Controllers (PLCs) into level crossings	7	9	Ongoing	0.445		Reduced cost of LX renewals
Command, Control & Communications	Combined Positioning And Signalling System (ComPASS)	Developing solutions to enable the railway to continue to operate following failure of the primary signalling system	2	5	Ongoing	1.2	December 2017	Improved recovery from perturbation
Command, Control & Communications	EUlynx Membership	Developing common interface standards to save signalling system costs by creating competitive markets and enabling a modular approach to upgrade and replacement	7	9	Ongoing	0.12	November 2017	Whole life cost efficiencies
Command, Control & Communications	EUlynx Participatation	Developing common interface standards to save signalling system costs by creating competitive markets and enabling a modular approach to upgrade and replacement	2	5	Ongoing	1.068	March 2018	Whole life cost efficiencies
Command, Control & Communications	Eulynx Interlockiing Interface	Developing common interface standards to save signalling system costs by creating competitive markets and enabling a modular approach to upgrade and replacement	2	5	Ongoing	0.79	March 2017	Whole life cost efficiencies

Portfolio	Project	Description	Start Technology Readiness Level†	End Technology Readiness Level†	Status	Budget* (£m)	End Date	Anticipated Benefits
Command, Control & Communications	Leeds PhD	'An Optimisation Of Railways Operations From An Economic Perspective'. The PhD will focus on the economic cost and quality, capacity, the industry structure, carbon and climate change	1	3	Ongoing	0.025	March 2017	Understanding the trade-off between KPIs/business drivers. Establishing outlines for optimising operations for economic benefit
Infrastructure	Bridge Reconstruction Avoidance	Solutions to avoid or reduce bridge reconstruction works to accommodate overhead electrification	5	9	Ongoing	1	March 2017	More cost efficient and less disruptive overhead line electrification schemes
Information	Support for Accelerating Innovation in Rail (AIR) II	Providing support and data to AIR funded innovation programmes. There are two calls AIR1 is general rail topics and AIR2 contributes to the digital railway	4	5	Ongoing	0.025	December 2016	Generate pool of potential rail system solutions
Information	Cyber Security Trials (formerly Telecoms Capacity Enhancement)	Scoping and options project for a system level test facility to avoid product development and early trials being conducted on the operational railway infrastructure	4	6	Complete	0.05	February 2015	Accelerating innovation whilst avoiding risk to the operational railway
Whole System Approach	Capacity4Rail	CAPACITY4RAIL looks for the future railway system with increased capacity and high competitiveness. The technical and economical assessment of technologies, roadmaps and migration scenarios, necessary to meet the target system will support the cost effective implementation of necessary technologies	1	4	Ongoing	0.229	November 2017	Increased rail usage and capacity
Innovation	Transforming Innovation Capability	Increase the innovation maturity of Network Rail to Level 2 (a competent innovation organisation). Deliver committed Business Plan milestones. Establish the capability for consistently successful R&D in Network Rail. Increase industry confidence and engagement in research & development in Network Rail	Not applicable	Not applicable	Ongoing	1.775	March 2017	This programme will increase the business' 'innovation maturity' level and deliver 'investor in innovation' accreditation with consequential reputational benefits

Portfolio	Project	Description	Start Technology Readiness Level†	End Technology Readiness Level†	Status	Budget* (£m)	End Date	Anticipated Benefits
Programme Management & Development	Horizon 2020 Shift2Rail Bid	Bids for European funding in 2014/15, in particular a bid on behalf of the GB Rail Industry to become a Founding Member of the €1bn Shift2Rail EU Public Private Partnership leading the Infrastructure Programme	Not applicable	Not applicable	Ongoing	0.928	September 2016	Successful bid for R&D Programme valued at €270M
Programme Management & Development	T&I Programme Development	Establishment of resources (T&I Team) and a programme of work to develop the Strategic R&D portfolio and lead the transformation journey for NR for with industry	Not applicable	Not applicable	Ongoing	2.835	March 2016	Network Rail can lead an effective and efficient R&D portfolio that fits within the Future Railway R&D plans

Note: † Technology Readiness Levels are indicative and typically relate to the least developed aspect of the solution that is being progressed.

* Budget from Strategic R&D Fund only – projects may additionally include contributions from other funds and funders.

10. Key Regulatory Matters

Christmas 2014 Engineering Overruns

In February 2015, the ORR concluded that Network Rail had breached its network licence following the identification of failings in the planning and delivery of engineering works at King's Cross and Paddington stations. These failings resulted in disruption to passengers over Christmas 2014 and were highlighted in the Annual Return 2014. The ORR decided not to impose an enforcement order because Network Rail agreed to take, and was taking, all such steps as necessary for the purpose of securing compliance with its network licence. In addition to implementing the recommendations that came out of Network Rail's own review, we also fully accepted the recommendations made by the ORR. These recommendations were implemented in advance of the Christmas 2015 engineering works.

Operational Performance in 2014/15

In April 2015 the ORR commenced an investigation to establish whether Network Rail had done everything reasonably practicable to meet its licence obligations in terms of performance delivery for ScotRail (against its regulated performance targets) and for Southern and Govia Thameslink Railway (GTR) (against their performance strategy targets). The ORR's investigation was focussed on operational performance in 2014/15.

In August 2015, the ORR concluded that Network Rail had breached its licence for delivery of performance to ScotRail and with regard to its delivery of performance for Southern and GTR in 2014/15. Having identified these breaches the ORR considered whether it was appropriate to impose any financial penalties on Network Rail. In relation to delivery of performance for ScotRail, the ORR determined that the imposition of a penalty would not be appropriate. In reaching this conclusion the ORR specifically noted that whilst the breach had some residual impact on services and passengers, the activities that Network Rail was undertaking to ensure the identified breaches were addressed meant that these issues were effectively mitigated operationally in 2014/15.

In relation to Network Rail's delivery for Southern and GTR, the ORR proposed to impose a fine of £2 million on Network Rail. The ORR concluded that it was appropriate to propose this fine because of the significant impact to performance and passengers during the year as a consequence of the breaches, especially around the issues associated with no timetabling at London Bridge.

Network Rail subsequently offered to fund a package of performance improvements schemes costing a total of at least £4.1million. As a result the ORR concluded that its proposed £2 million penalty should be mitigated to zero.

Delivery of Enhancements Projects

During 2015/16, the ORR undertook an investigation to establish whether Network Rail was doing everything reasonably practicable to meet its licence obligations in relation to the delivery of enhancement projects. In October 2015, the ORR concluded that Network Rail was in breach of its licence obligations following the identification of systemic weaknesses in Network Rail's ability to plan and deliver enhancements projects. The ORR decided not to impose an enforcement order because Network Rail agreed to take, and was taking, all such steps as necessary for the purpose of securing compliance with its licence obligations notably through the development of its Enhancements Improvement Programme (EIP).

Operational Performance in 2015/16

Operational performance improved on some routes 2015/16, but overall we are still not where we need to be. Adverse weather caused landslips and significant flooding across a number of locations, negatively impacting our performance and causing disruption to fare paying customers. With the exception of freight, regulated performance targets in England & Wales and Scotland were missed.

In April 2016, the ORR sought formal representations from Network Rail regarding its delivery of performance in Scotland and for four train operating companies in England and Wales (GTR, Southeastern, TransPennine Express, Heathrow Express,). In 2015/16, operational performance in Scotland did not achieve the regulated PPM target and these train operators fell short of the PPM and / or CaSL performance thresholds set out in the ORR's CP5 Final Determination. In May 2016, and having considered the representations made by Network Rail and its customers, the ORR decided not to commence a formal investigation at this time regarding delivery to these operators as it was satisfied that Network Rail has identified the key issues to improve performance and is working hard to address them. The ORR will continue to closely monitor Network Rail's delivery of performance in 2016/17.

11. Corporate Governance

The key governance changes impacting Network Rail during 2015/16 were:

- Richard Parry-Jones stepped down as Chair on Network Rail on 15 July 2015. Sir Peter Hendy was appointed as the new Chair with effect from 16 July 2015
- Paul Plummer, Group Strategy Director, resigned on 1 November 2015, and Patrick Butcher, Group Finance Director, resigned on 24 February 2016
- Jeremy Westlake was appointed as the company's Chief Financial Officer on 24 February 2016
- Rob Brighouse was appointed a non-executive director on 1 January 2016
- The appointment of Richard Brown to the Board of Network Rail by the Secretary of State as Special Director
- The establishment of the Critical Infrastructure Projects Delivery committee (CIPD) and the Major Projects Delivery Committee (MPDC) in January 2015
- The Secretary of State's decision to remove the company's public members from 1 July 2015.

The CIPD was established to review and assure the board on the delivery of critical infrastructure projects in the lead up to Easter 2015 under Janis Kong's leadership, and then the Christmas and New Year 2015/16 period. It met 11 times during 2015/16 and has since been disbanded in its formal capacity, although members of the board and executive management have continued the practice of reviewing major programmes of enhancement works over the bank holiday periods.

The MPDC was established to review the methodology and processes for defining the scope of major projects. This included the cost estimation and delivery processes and performance, as well as the process by which project funding was sought and approved and how performance was monitored and communicated internally and externally. It met 18 times during 2015/16. The committee, whilst no longer led by Malcolm Brinded, continues to meet quarterly under the leadership of Francis Paonessa, Managing Director, Infrastructure Projects. Non-executive directors continue to attend meetings in an advisory capacity and to provide independent challenge.

The removal of public members

On 25 June the Secretary of State announced a change to the membership model of Network Rail. From midnight on 1 July 2015, the public members, who, until that date comprised 46 individuals providing a secondary governance role to hold the board of directors to account for its strategic leadership and management of Network Rail, ceased their membership leaving the special member, the Secretary of State, the sole member of Network Rail Limited (the parent company of Network Rail Infrastructure Limited).

The role of public members was similar to the role of shareholders in public limited companies except that public members had no financial interest in Network Rail. Public members were appointed annually by an independent panel for a three year term.

The Secretary of State also appointed a Special Director to the board (Richard Brown), who is responsible for communicating the views of the Secretary of State and the DfT's wider strategic statutory and fiduciary interests to the board, whilst acting in accordance with his duties as a non-executive director.

12. Confidence Grades

Data Reporting

The Annual Return 2016 reports on Network Rail's stewardship of the rail network in 2015/16. Where possible, five years of historical data is provided so that trends in performance can be observed. A historical record of our stewardship of the rail network, which provides information dating back to 1997/98, is published [on our website](#). Where possible, information disaggregated by operating route is provided. A map of the routes is provided in this section.

As a result of data refreshing, some of the figures reported in previous years have been restated. Where figures have been updated we have provided an explanation for this.

Scope of Reporting against Targets

The targets included within this Annual Return are based on either regulatory targets as set out in the ORR's CP5 Final Determination or as provided in Network Rail's CP5 Delivery Plan (DP14) as published 31 March 2014. We also report on our performance against the targets as set out in our 2015/16 corporate scorecard. We report on operational performance referencing the performance strategy targets for 2015/16 agreed with our customers.

Most asset condition information is based on assessments of a sample of assets. As more surveys are conducted each year, the reliability of the data reported for each asset category will improve.

Independent Reporters and Confidence Reporting

Since October 2002, Network Rail together with the ORR has employed Independent Reporters. The role of the Independent Reporters is to provide independent technical audit services to the ORR and Network Rail. As part of their role Independent Reporters review the quality, accuracy and reliability of the data and related processes that we use for reporting on our performance and provide a confidence grade for each measure and area that has been reviewed. This confidence grade provides an indication of the accuracy and reliability of the measure.

In 2015/16 the confidence grading system was slightly modified as the description of the system reliability bandings were updated. An explanation of the previous confidence grading system can be found in the Annual Return 2015. As confidence

grades in this Annual Return also include confidence grades awarded by a previous Independent Reporter and those from reviews prior to 2015/16, the majority of confidence grades will be based on the previous system. The modified confidence grading system is very similar to the previous one but the system reliability band descriptions have been revised to make the description clearer.

Table 12.1 and Table 12.2 provide an explanation of the data accuracy and system reliability grading systems. Table 12.3 provides a summary of all confidence grades awarded by the Independent Reporters for all measures or information that have been reviewed prior to the start of CP5.

Table 12.4 and Table 12.5 provide a summary of all confidence grades awarded by the Independent Reporters since the start of CP5. Some of these confidence grades are very old and may no longer be relevant as improvements have been made to those measures. The confidence grades awarded are therefore not necessarily indicative of the data accuracy and system reliability grading systems but we have included them for completeness as no further reviews have been carried out for those measures. Measures that have not been reviewed (and therefore do not have a confidence grade) do not appear in the table. For all confidence grade assessments undertaken in CP5, the date of the assessment is highlighted. In Table 12.4 the 'Date of Assessment' means the date when the Independent Reporters issued the draft report. The final report was not available ahead of publication timelines for the Annual Return. In Table 12.5 the 'Date of Assessment' means the date when the Independent Reporters issued the final report.

Table 12.1: Accuracy grading system

Accuracy band	Description
1*	Data used to calculate the measure is accurate to within 0.1 per cent
1	Data used to calculate the measure is accurate to within 1 per cent
2	Data used to calculate the measure is accurate to within 5 per cent
3	Data used to calculate the measure is accurate to within 10 per cent
4	Data used to calculate the measure is accurate to within 25 per cent
5	Data used to calculate the measure is accurate to within 50 per cent
6	Data used to calculate the measure is inaccurate by more than 50 per cent
X	Data accuracy cannot be measured

Note: Accuracy is a measure of the closeness of the data used in the system to the true values. Accuracy is defined at the 95 per cent confidence level - i.e. the true value of 95 per cent of the data points will be in the accuracy bands defined above.

Table 12.2: System reliability grading system

System reliability band	Description
A	Sound textual records, procedures, investigations or analysis properly documented and recognised as the best method of assessment.
B	As A but with minor shortcomings. Examples include old assessment, some missing documentation, some reliance on unconfirmed reports, some use of extrapolation.
C	Extrapolation from limited sample for which Grade A or B data is available.
D	Unconfirmed verbal reports, cursory inspections or analysis.

Note: System reliability is a measure of the overall reliability, quality, robustness and integrity of the system that produces the data. Some examples of the potential shortcomings include old assessment, missing documentation, insufficient internal verification and undocumented reliance on third-party data.

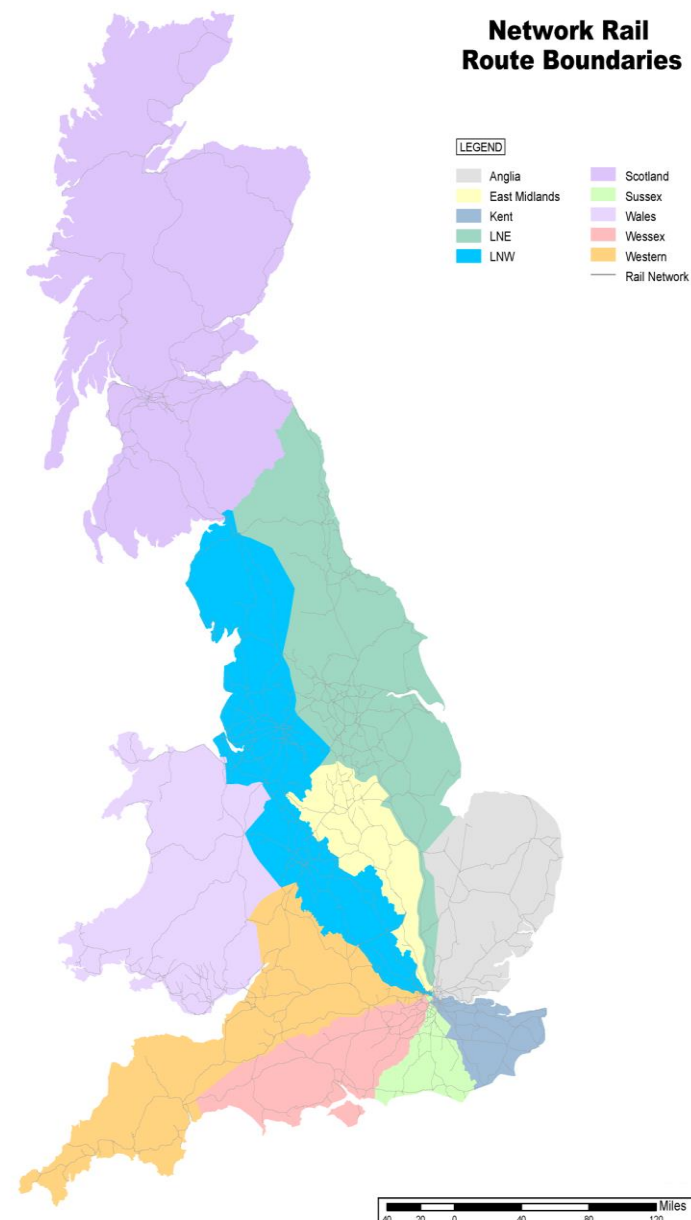


Table 12.3: Summary of confidence grades awarded prior to CP5

Measure / Information	Confidence grade
Safety and sustainable development	
Workforce Safety	B2
Passenger Safety	B3
Percentage of at risk employees that have been screened for Noise Induced Hearing Loss (NIHL)	D6
No. of referrals to OH (Occupational Health) providers due to musculoskeletal condition	B2
No. of referrals to OH providers due to stress related absence	B2
Infrastructure wrongside failures	A1
Category A SPADs	A1
Level Crossing Misuse	A3
Irregular Working	B3
Criminal Damage	B3
Operational performance and Stakeholder relationships	
Public Performance Measure (PPM)	A1
Delays to passenger train services	A1
Delays to freight train services	A3
Asset failures (Track/ non-track delay minutes)	A1
Right time performance	C2
Cancellations & Significant Lateness (CaSL)	A2
Customer satisfaction	A1
Network capability and availability	
Linespeed capability	B2
Gauge capability	B2
Route availability value	B2
Electrified track capability	B2
Network availability – Possession Disruption Index – Passenger	B2
Network availability – Possession Disruption Index – Freight	A1
Asset management	
Broken rails	A1
Rail defects	A2
Track Geometry – Good Track Geometry (M3)	B2
Track geometry quality – Poor Track Geometry (M3)	A1
Track geometry faults	A1
Track buckles	A2
TSRs (Temporary Speed restrictions)	B2
Earthwork failures	A2
Earthwork condition	B2
Bridge condition	C3
Signalling asset condition	B2
Alternating current traction power incidents causing train delays	B2
Electrification condition – AC traction contact systems	C4
Electrification condition – DC traction contact systems	C4
Station Stewardship Measure	B2
Light Maintenance Depot Stewardship Measure	C2

Table 12.4: Confidence grades for Asset Measurement Indicators awarded in CP5

Measure / Information	Assessment Date	Clarity of evaluation process	Robustness of source data correction process	Review and assurance of final outputs	Overall grade
Immediate action geometry faults per 100km	July 2016	C	A	B	C
L2 exceedances	July 2016	A	A	A	A
Rail breaks and immediate actions defects per 100km	July 2016	C	A	A	C
Track failures (service-affecting)	July 2016	B	A	A	B
Signalling failures (service-affecting)	July 2016	B	A	A	B
Points failures (service-affecting)	July 2016	B	A	A	B
Telecoms failures (service-affecting)	July 2016	B	A	A	B
DC traction power failures (service-affecting)	July 2016	B	A	A	B
Non-traction operational power supply failures (service-affecting)	July 2016	B	A	A	B
Buildings – reactive faults (2 & 24)	July 2016	A	A	A	A
Structures – number of open work items with a risk score ≥ 12	July 2016	A	A	A	A

Table 12.5: Confidence grades for renewals volumes awarded in CP5

Measure / Information	Assessment Date	Confidence grade
Track (Plain Line)	May 2016	C3
Track (Switches & Crossings)	May 2016	C2
Civils (Earthworks)	May 2016	C2
Civils (Others)	May 2016	C4
Buildings	May 2016	C2
Fencing	May 2016	C5
Electrification & Plant	May 2016	C1
Non-electrification	May 2016	C1*
Signalling	May 2016	C1*
Telecoms	May 2016	B1*

13. Glossary

Acronym	Description	Acronym	Description	Acronym	Description
A		CRC	Carbon Reduction Commitment	FMS	Fault Management System
ACSS	Annual Customer Satisfaction Survey	CRES	Contract Requirements Environment & Social	FOI	Freedom of Information
AGA	Abellio Greater Anglia	CRI	Composite Reliability Index	FTN	Fixed Telephone Network
AL	Alarm Level	CSAMS	Civils Strategic Asset Management Solution	FTPE	First TransPennine Express
ALCRM	All Level Crossing Risk Model	CSMM	Customer Service Maturity Model	FWI	Fatality Weighted Index
ALE	Asset Life Expectancy	CSMRA	Common Safety Method on Risk Evaluation and Assessment	G	
AMEM	Asset Management Excellence Model	D		GEOGIS	Geographic and Infrastructure System
ARL	Asset Remaining Life	DCS	Drainage Condition Score	GFTN	Global Forest and Trade Network
ASR	Abellio Scotrail	DfT	Department for Transport	GRIP	Governance for Railway Investment Projects
ATL	Asset Technical Life	DM	Delay Minutes	GSM-R	Global Systems for Mobile Communication Railway
ATW	Arriva Trains Wales	DNO	Distribution Network Operator	GTG	Good Track Geometry
B		DOO	Driver Only Operated	GTR	Govia Thameslink Railway
BDWG	Ballast Dust Working Group	DST	Decision Support Tool	GWR	Great Western Railway
BMI	Body Mass Index	E		GWRM	Great Western Route Modernisation
BT	British Telecom	E&PDS	Electrification & Plant Decision Support	H	
C		EAP	Engineering Access Planning Unit	HAVS	Hand Arm Vibration Syndrome
CARRS	Civils Asset Register & Reporting System	ECML	East Coast Main Line	HLOS	High Level Output Specification
CaSL	Cancelled and Significantly Late	ECS	Earthworks Condition Score	HPSS	High Performance Switch System
CIS	Customer Information System	EDP	Enhancements Delivery Plan	HST	High Speed Train
CLAW	Control of Lead at Work	EMT	East Midlands Trains	HV	High Voltage
CO ₂	Carbon Dioxide	ERTMS	European Rail Traffic Management System	HVI	High Voltage Impulse
COSHH	Control of Substances Hazardous to Health	ESD	Electrical Safety Delivery	I	
CP4	Control Period 4	ESR	Emergency Speed Restriction	IAL	Immediate Action Level
CP5	Control Period 5	EVCOM	Event and Visual Communication Associations	IL	Intervention Level
CP6	Control Period 6	F		IMS	Integrated Management System
CPPP	Confirmed Period Possession Plan	FDM	Freight Delivery Metric	IOSH	Institute of Occupational Safety and Health

Acronym	Description	Acronym	Description	Acronym	Description
IP	Infrastructure Projects	NRN	National Radio Network	RAM	Route Asset Manager
IT	Isolated Terra	NRPS	National Rail Passenger Survey	RCC	Route Control Centre
IVR	Interactive Voice Response	NSC	National Supply Chain	RCM	Remote Condition Monitoring
K		O		RCS	Respirable Crystalline Silica
KPI	Key Performance Indicator	OCC	Operational Close Call	RDG	Rail Delivery Group
L		OH	Occupational Health	RDMS	Rail Defect Management System
L2	Level 2	OLE	Overhead Line Equipment	RETB	Radio Electronic Token Block
LADS	Linear Asset Decisions Support	OPAS	Operational Property Asset System	RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
LED	Light Emitting Diode	OPHD	Operational Property Help Desk	RINM	Railway Infrastructure Network Model
LM	London Midland	ORBIS	Offering Rail Better Information Services	ROC	Rail Operating Centre
LMD	Light Maintenance Depot	ORR	Office of Rail and Road	RSSB	Rail Safety and Standards Board
LMDs	Light Maintenance Depots	P		S	
LMDSM	Light Maintenance Depot Stewardship Measure	PARL	Percentage Asset Remaining Life	S&C	Switches and Crossings
LNE	London North Eastern	PDI-F	Possession Disruption Index - Freight	SBP	Strategic Business Plan
LNW	London North Western	PDI-P	Possession Disruption Index - Passenger	SDS	Signalling Decision Support
LOROL	London Overground Rail Operations Ltd	PDSW	Planning & Delivering Safe Work	SFC	Strategic Freight Corridor
LSE	London & South East	PIDD	Passenger Informational During Disruption	SHEP	Safety, Health and Environmental Performance
LTIFR	Lost Time Injury Frequency Rate	PIM	Precursor Indicator Model	SICA	Signalling Infrastructure Condition Assessment
LV	Low Voltage	PLPR	Plain Line Pattern Recognition	SISS	Station Information and Surveillance Systems
M		PP	Percentage point	SMIS	Safety Management Information System
MAA	Moving Annual Average	PPM	Public Performance Measure	SNH	Scotland National Heritage
MNO	Mobile Network Operation	PSI	Passenger Safety Indicator	SPAD	Signal Passed at Danger
MoJ	Ministry of Justice	PTG	Poor Track Geometry	SPS	Signalling Power Supply
MORR	Management of Occupational Road Risk	R		SRTF	Safety Related Telecoms Failure
MPSB	Multi-Purpose Stoneblower	RA	Route Availability	SSM	Station Stewardship Measure
N		RAIB	Rail Accident Investigation Branch	SSSI	Site of Special Scientific Interest
NARS	Network Availability Reporting System	RAMP	Route Asset Management Plan	SSWT	Stagecoach South West Trains

Acronym	Description
T	
TCMI	Tunnel Condition Monitoring Index
TfL	Transport for London
TIGER	Track Infrastructure Geometry Reporting
TME	Track Maintenance Engineer
TOC	Train Operating Company
TPWS	Train Protection Warning System
TSR	Temporary Speed Restriction
TUPE	Transfer of Undertakings
U	
UTU	Ultrasonic Test Unit
V	
VLS	Vertical Longitudinal Splitting
VTEC	Virgin Trains East Coast
VTWC	Virgin Trains West Coast
W	
WCML	West Coast Main Line
WON	Weekly Operating Notice
WRI	World Resources Institute
WWF	Worldwide Fund for Nature

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