

# Section 10

## Operational performance

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## Introduction

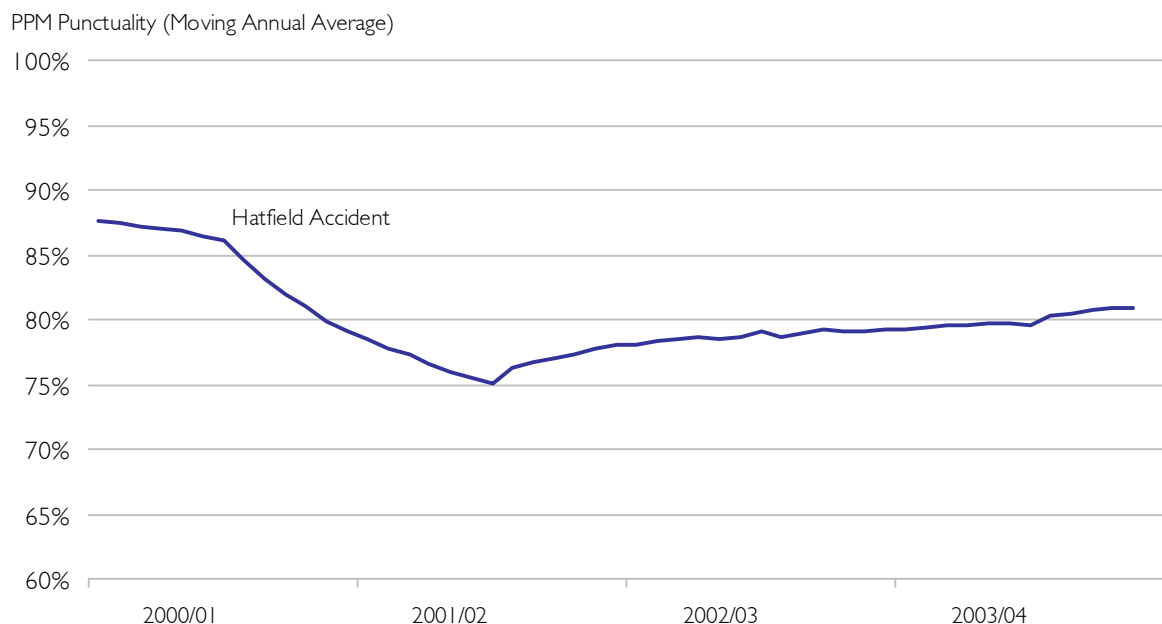
The delivery of improvements in train performance is one of our key priorities. This is being progressed by ensuring that infrastructure and network management caused delays are systematically reduced and by working with train operators to develop and implement cross-industry improvements.

Earlier sections have described how we are tackling the root-causes of disruption. This includes a co-ordinated programme of national and local asset reliability initiatives, our plans to deliver operational performance benefits, the development of improved timetables and organisational changes being made to improve the effectiveness of maintenance delivery and performance management. This section brings together these plans, focuses on the trends in recent performance, highlights our plans for improvements over the next 12 months and provides our projection for performance over the next ten years.

### Industry performance trends

The last year has seen encouraging signs of an improvement in both Network Rail and overall industry performance. The public performance measure (PPM) gauges overall industry punctuality. Over the last 12 months this has improved by around two percentage points to an estimated 81.1% – equivalent to a reduction in the number of late trains of around 10%. The trend in PPM over the last four years is illustrated below.

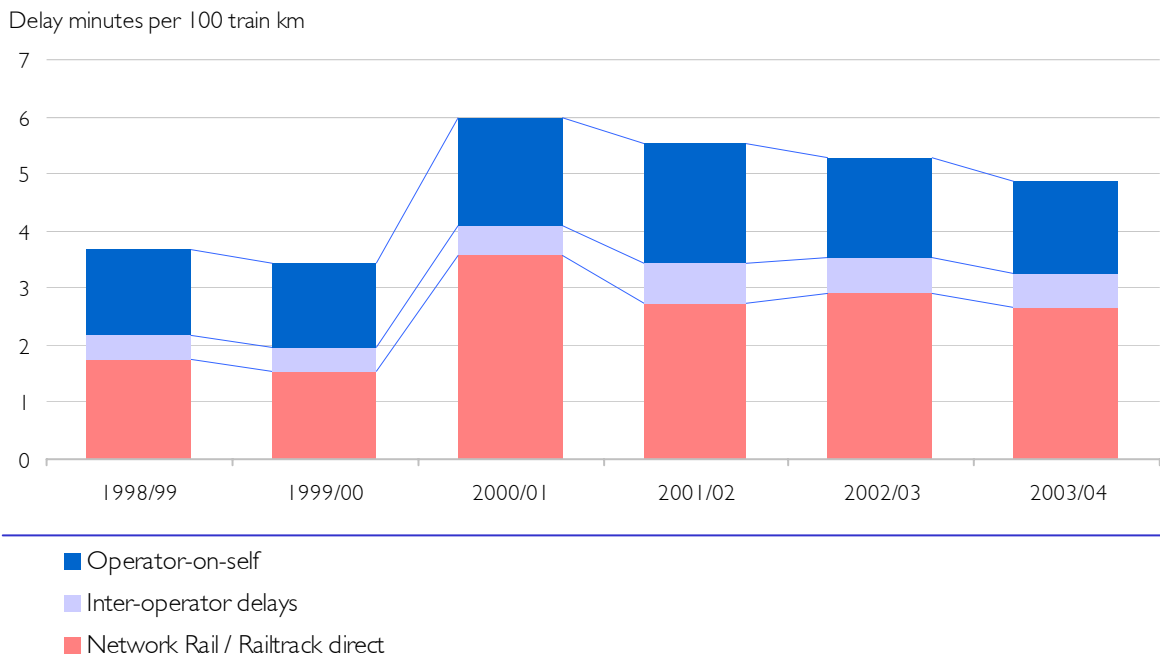
**Figure 10.1 Industry performance – PPM punctuality**



Source: SRA and Network Rail estimates (for latest periods)

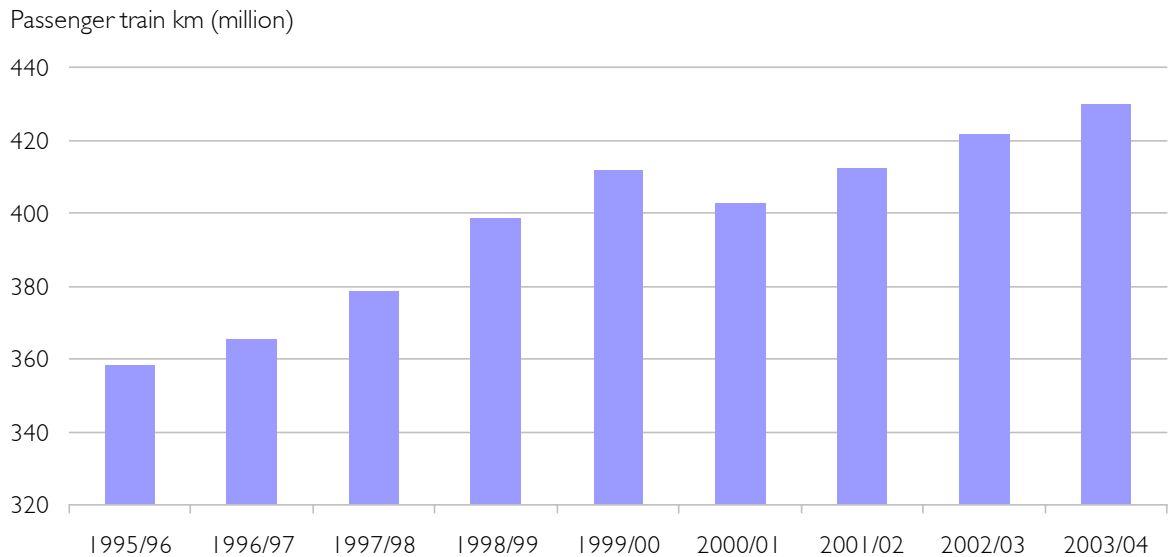
This improvement reflects a reduction in delays and cancellations caused by both Network Rail and train operators. This is illustrated in the chart below, which sets recent performance in the context of the trend in delays over the last five years. This also shows the extent of the outstanding gap compared to pre-Hatfield levels of delay.

**Figure 10.2 Passenger train delays (1998/99 – 2003/04)**



The recovery in performance has been achieved in spite of the challenge of significant growth in traffic on an already congested network. Since privatisation there has been a 20% increase in train kilometres on the network, as shown by the chart below. Growth in services run has continued over the last year, with an increase of around 2% compared to the previous year.

**Figure 10.3 Traffic volumes on the network**



## Performance summary 2003/04

We set ourselves an objective of improving Network Rail performance by 11% over the last year, with a 13.25 million minutes delay minutes target for 2003/04. In spite of some significant disruption caused by record summer temperatures we expect to end 2003/04 with total delays reducing to 13.7 million minutes – a reduction of one million minutes compared to the previous year. This represents an improvement in performance of around 9% for both passenger and freight trains, and is after allowing for overall traffic growth of approximately 2%.

The table below analyses our performance over the last two years by delay category, and includes the split between passenger and freight trains.

<b>Figure 10.4 Network Rail attributed delays per 100 train km<sup>1</sup> (minutes)</b>			
	2002/03 Actual	2003/04 Estimate	Change
<b>Total delays by affected service type</b>			
Passenger trains (franchised operators)	2.92	2.66	-9%
Freight trains	5.19	4.74	-9%
<b>Average delay (all major operators)</b>	<b>3.13</b>	<b>2.86</b>	<b>-9%</b>
<b>Total delays to all trains by cause</b>			
Track defects and TSRs <sup>2</sup>	0.54	0.44	-18%
Other asset defects <sup>3</sup>	1.00	0.96	-4%
Network management/other <sup>4</sup>	0.86	0.81	-7%
Autumn leaf-fall and adhesion <sup>5</sup>	0.11	0.10	-14%
Severe weather/structures <sup>6</sup>	0.22	0.15	-30%
External factors <sup>7</sup>	0.40	0.40	0%
<b>Total Network Rail delays</b>	<b>3.13</b>	<b>2.86</b>	<b>-9%</b>

1. Delay totals are based on all delays recorded for attribution of responsibility to Network Rail, divided by train kilometres run
2. Track defects and TSRs include broken rails, other track faults and speed restrictions for condition of track and rolling contact fatigue.
3. Other asset defects include points, track circuits, signal and signalling system failures, overhead power/3rd rail supply etc.
4. Network management/other delays include possessions, signalling errors, timetabling, dispute resolution and unexplained.
5. Autumn leaf-fall and adhesion include leaf-fall related delays and Network Rail's share of industry adhesion delays.
6. Severe weather/structures includes direct delays due to severe weather and all structures delays, which include weather related delays due to embankment instability risks, bridge scour and flooding. Heat-related speed restrictions are also shown within this category.
7. External factors include road-related incidents, fires, trespass and vandalism, security alerts, suicides and other external events.

### Performance trends 2003/04

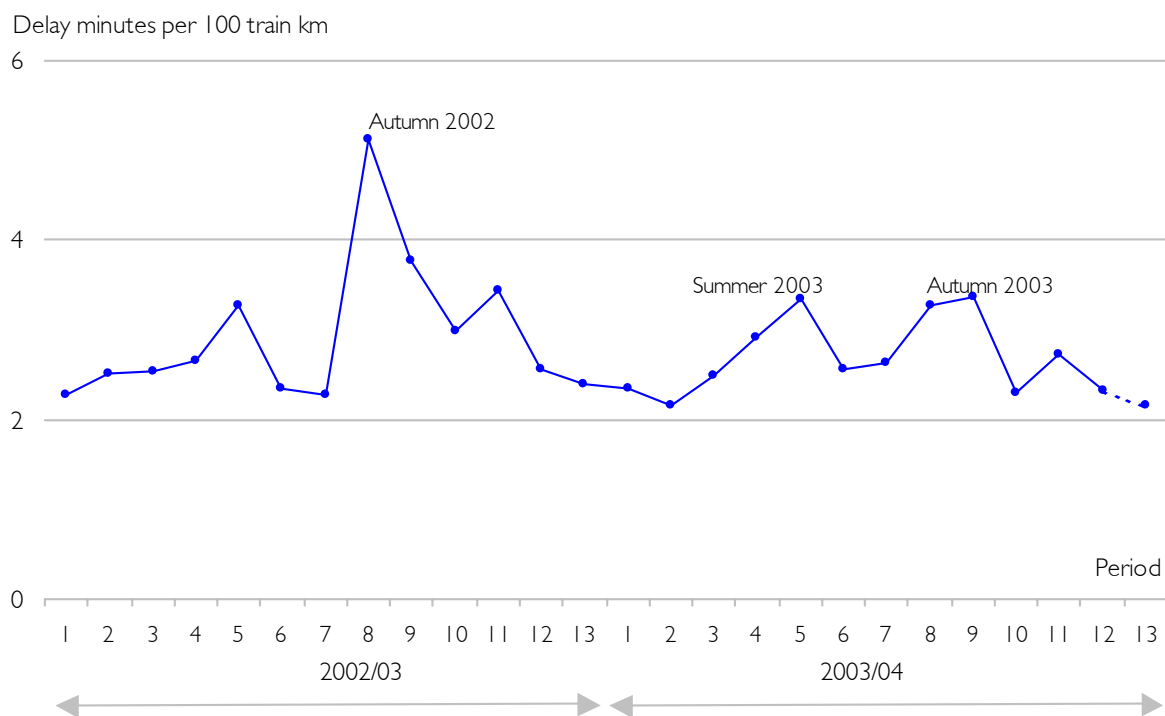
An analysis of trends during the year has once again highlighted the impact of unpredictable external conditions on the railway. The year started well, with a good improvement being achieved in the first two periods (covering April and May, 2003). However, the next four months were disappointing. The extreme temperatures recorded during July and August 2003 led to the imposition of a significant number of precautionary speed restrictions on the network. The high temperatures on the exceptionally hot summer days triggered an additional 250,000 minutes delay of track and signalling infrastructure faults, compared to conditions in an average summer. Part of this impact could have been avoided through better preparation for hot weather, and lessons have been learnt to ensure that similar weather conditions would not lead to a repetition of this scale of impact in the future.

By contrast, the autumn and winter were much improved compared to the previous year, with delays down by around 20%. Autumn delays arising from leaf-fall and poor rail adhesion improved by 12%, while delays from adverse weather conditions were dramatically better than the previous year (down by around 70%). While this partly reflects less extreme weather, it also as a result of a significantly better preparation and improved operational response than had existed previously. Although it is not possible to evaluate the relative contribution to this reduction in delay with any degree of accuracy, our initial analysis indicates that around 50% of the weather-related improvement was due to our actions. The rail network was also better prepared this year for the short period of widespread ice and snow, which reduced many roads (and air travel) to a standstill. Other aspects of performance, including average delay per incident, were also much improved in the second half of the year due to improvements in a number of areas which are discussed further below.

The network suffered from some major external impacts during the year; with the London electricity supply cuts and a number of major fires adjacent to the railway causing significant disruption over this same period. The West Coast upgrade also led to significantly more delays than expected, particularly in the North West region.

The figure below compares performance over the last two years, illustrating this seasonal variance.

**Figure 10.5 Network Rail delays to passenger trains 2002/03 – 2003/04**



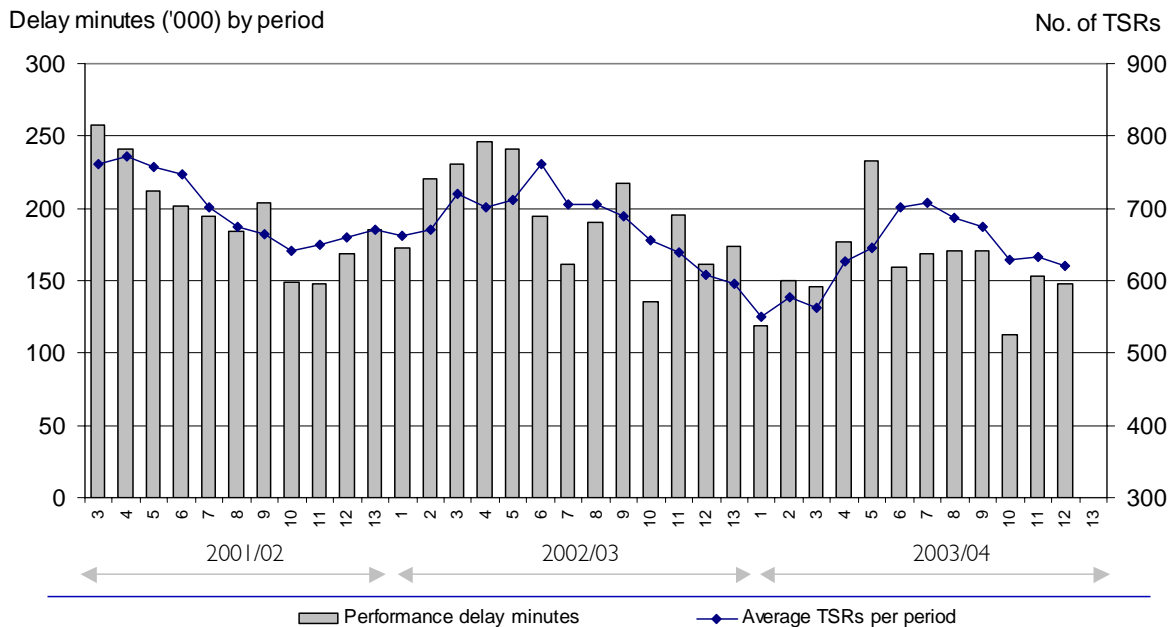
## Sources of performance improvement in 2003/04

The improvement in train service reliability during the year is primarily due to a number of factors:

- track TSR delays down by around 34%;
- severe weather delays down by nearly 30%, even after allowing for the impact of the extreme summer temperatures;
- autumn leaf-fall and rail adhesion delays down by 12%; and
- reductions in other network management delays, including timetabling.

Track TSR delays fell as a result of both a reduction in the number of speed restrictions in place and effective targeting, allowing the removal of high impact speed restrictions from busy routes. The trend in total TSRs and the delay minutes caused is illustrated below:

**Figure 10.6 Delay minutes and numbers of speed restrictions on the network**



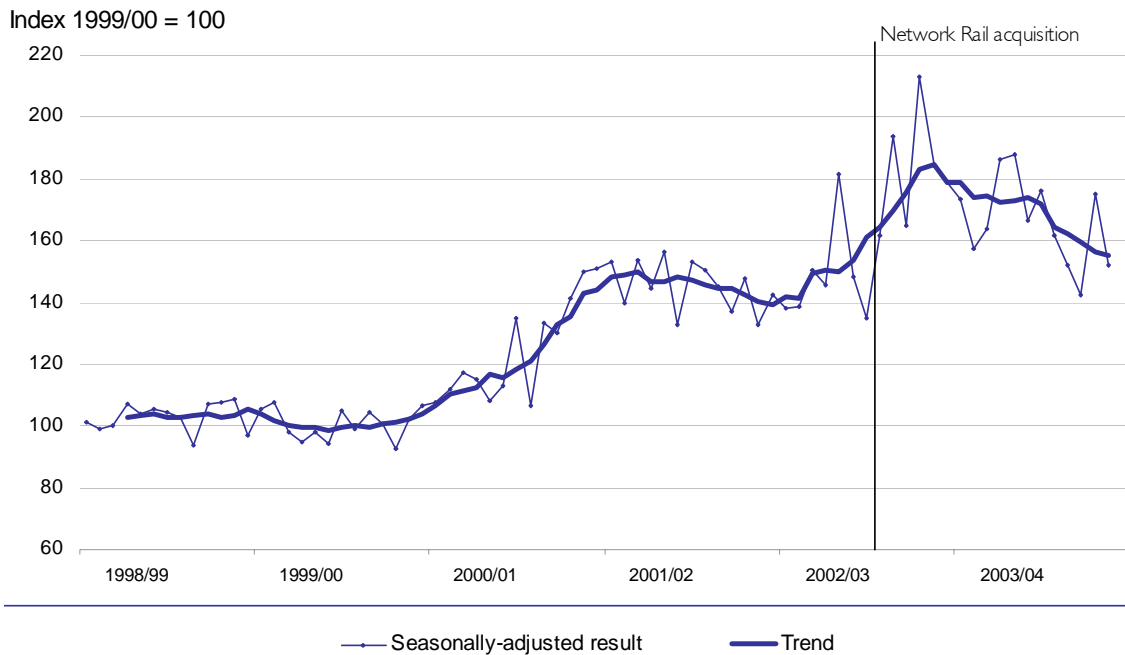
The weather was also relatively benign for much of the year, with relatively low rainfall levels leading to less incidents of flooding and the absence of major storms across the country. As a consequence weather-related delays fell by around 30% compared to the previous year. If the impact of extreme temperatures during the summer is excluded this improvement increases to 40%.

Delays arising from other asset failure categories (including points, track circuits, signal and signalling system failures, overhead power/3rd rail supply) improved slightly compared to 2002/03. This improvement was most noticeable in the second half of the year, when delay per incident showed a significant improvement. For the full year, there was a reduction in the numbers of incidents combined with a broadly unchanged average delay per incident. Delays due to points and track circuit failures (which account for just over 50% of this group) fell by 8% compared to the previous year.

External categories have also shown an improvement in recent months. Network Rail has little or no control over the incidence of these events, but there has been a significant improvement in the average delay per incident for this specific category compared to autumn/winter 2002/03. Overall external delays are little changed this year. However, this level of delay did include a number of major incidents such as the London electricity cuts and fires adjacent to the infrastructure.

Over the last five years the numbers of signalling and other non-track asset failures have remained broadly unchanged. However, a substantial increase in the total delay has been caused by escalation in the average delay per incident for most categories of infrastructure. This has been a significant constraint on returning performance to pre-Hatfield levels. Delay per incident increased further during 2002/03, in part due to changes in safety and operational procedures. However, the trend through 2003/04 was encouraging, particularly when allowance is made for seasonal effects. This is illustrated in the chart below, which shows a generally improving trend in delay per incident, reflecting the greatly enhanced operational focus on managing delay per incident, both by Network Rail and train operators.

**Figure 10.7 Delay per incident in non-track categories of asset failure**

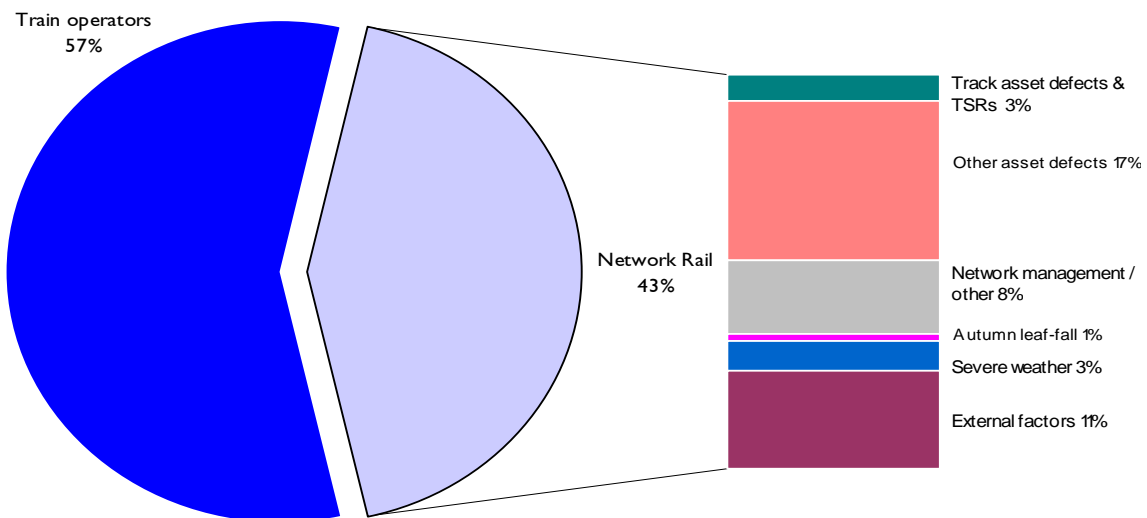


### Cancellations

Cancellations due to Network Rail causes have fallen by approximately 20% between 2002/03 and 2003/04. Even excluding the more benign weather conditions, cancellations attributable to us per 1000 trains fell by around 8% - slightly better than the equivalent reduction in delay minutes. Cancellations caused by train operators also fell during the year.

With the exception of track circuit and signalling system failures (within the other asset defects category), the improvement was broadly spread across most categories of cancellations, with track-related causes, points failures, weather, and autumn all showing significant reductions in cancellations. The chart below shows the split of cancellations during the year:

**Figure 10.8 Breakdown of passenger train cancellations (2003/04 year to date)**



## TOC-on-TOC and TOC-on-self

For the purposes of the financial arrangements provided by the performance regimes, Network Rail acts as the clearing house for compensation for delays to train operators, where the cause of these delays is attributable to another train operator. This is known as TOC-on-TOC delay. In order to compensate us for this, we receive compensation for the impact on the TOC that has caused the delay (TOC-on-Self). An example of TOC-on-TOC delay is a train suffering mechanical failure at a busy location where it remains stuck for a time, blocking a running line and affecting other train services. While we have a role to play in co-ordinating the management and mitigation of such incidents when they occur, and can work with operators at the planning stage to minimise the risks, we have relatively little control over the overall level of TOC-on-TOC delay.

Delays attributed to each of these causes is summarised below. This highlights the fact that the improvements this year are shared across the industry, with a slightly higher rate of improvement by Network Rail.

<b>Figure 10.9 Industry delays per 100 train km<sup>1</sup> (minutes to franchised operators)</b>			
	2002/03 Actual	2003/04 Estimate	Change
Network Rail	2.92	2.66	-9%
TOC-on-TOC	0.65	0.62	-4%
TOC-on-Self	1.71	1.58	-7%
Total	5.28	4.86	-8%

# Performance plan 2004/05 – 2008/09

## Performance improvement strategy

Our performance improvement strategy focuses on a combination of specific prioritised initiatives, targeted renewals, and a range of improvements to the overall effectiveness of the entire company. Wherever possible, this approach is carried through in collaboration with train operators to ensure that cross-industry opportunities are exploited.

The key elements of our national performance improvement programme have been described in earlier sections, and can be summarised as follows:

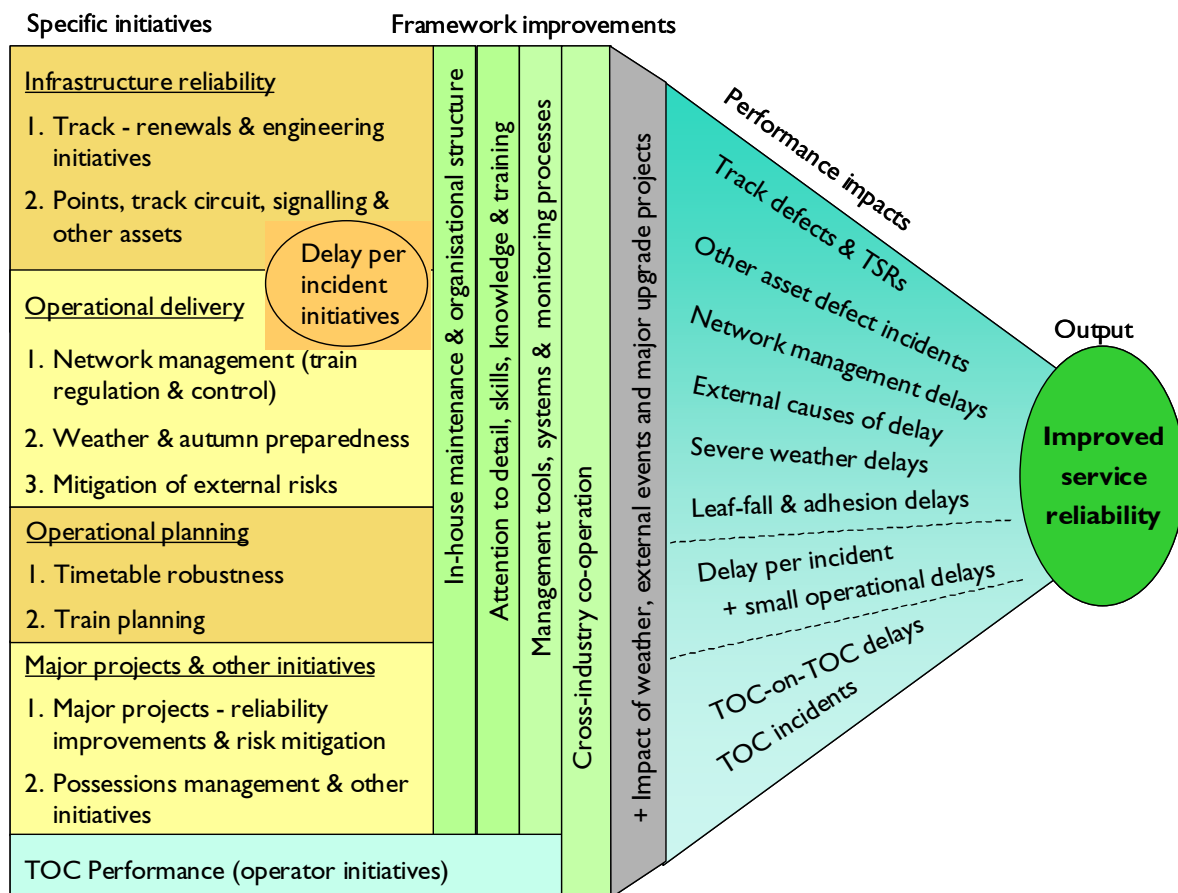
- asset reliability improvements (track, signalling and other assets);
- delay per incident and other operational management improvements;
- mitigation of seasonal weather and external risks (such as crime, bridge strikes and fires);
- improved timetable robustness and train planning; and
- other initiatives include possessions management improvements and the mitigation of risks from major projects.

This section brings together these improvements into a single, comprehensive performance plan for 2004/05 and subsequent years. In 2003 we implemented a nationally coordinated programme that brings a more focused commitment to achieving sustainable performance improvements. It is based on a structured and rigorous appraisal of the root-causes of failure, with project teams focusing on the priority areas of points, track circuits, signalling, weather and seasonal impacts, and operations. This approach forms the major new part of our overall performance improvement approach. It is, however, being progressed alongside a number of national initiatives that are capable of being implemented almost immediately and other area-based initiatives being developed across a wide range of categories of delay. In addition, a number of initiatives are being progressed to provide some fundamental improvements to the overall operating framework, including:

- bringing maintenance in-house and changes in the organisational structure, which are expected to lead to significant benefits once the initial transitional phase is complete;
- the renewed focus on basic operating disciplines, including the attention to detail in all aspects of operational management and maintenance, and learning the lessons from the structured reviews carried out after all major incidents;
- the development of improved monitoring systems and processes, better access to data and more robust analytical tools;
- better cross-industry co-operation, ranging from developing more robust Rules of the Plan and better regulation rules, through to improving service recovery following an incident; and
- industry joint boards, or projects coordinated through the National Task Force and its sub-groups. These industry forums are becoming increasingly crucial in the delivery of delay per incident initiatives, other operational delivery improvements, and improved control and train regulation procedures. Cross-industry co-operation is being further promoted through industry participation in a joint performance review being led by government.

Our overall approach to performance improvement is illustrated below:

**Figure 10.10 Summary of our performance improvement strategy**



The impact of the initiatives (summarised on the left hand side of the above chart) through to the various categories of performance impact (on the right hand side) is illustrated below. This highlights the complex inter-action of initiatives through to outputs. In particular, it should be noted that most initiatives have some impact on all drivers of delay: delay per incident, network management delays and small delays (below the threshold for attribution to root-cause, but still impacting on performance).

**Figure 10.11 Impact of performance initiatives**

Initiatives (Xs) \ Performance Impacts (Ys)	Infrastructure reliability			Operational delivery				Operational planning		Other	
	Track TSRs and faults	Other assets - points, track circuits, signalling etc	Delay per incident initiatives	Control initiatives	Signalling & train regulation	Severe weather & seasonal preparedness	External risk mitigation	Timetable robustness	Timetable errors (eg short term planning)	Major project risk management	Possessions management & other
Infrastructure incidents	⊕	⊕								○	○
Network management delays	△	△	△	○	⊕	△	△	△	⊕	△	○
Weather, autumn & external delays					⊕	⊕					
Delay per incident	○	○	⊕	⊕	△	○	○	○		○	
Small delays (not attributed to specific cause)	○			△	△	○		⊕	○	○	△

Key: Impact of initiatives	
⊕	Strong
○	Medium
△	Weak

## Performance planning processes and the 2004/05 performance plan

The impact of specific initiatives and improvements in the operating framework are brought together in our overall planning process. This process also allows for known risk areas and opportunities from severe weather, external events and major upgrade projects. These either pose a risk for future years' performance or have been distorting performance levels in the last year.

Our planning process starts by developing a baseline against which a robust improvement plan can be generated. Using the 2003/04 actual results as a start point, an assessment was made of underlying trends, drawing in part on the outputs from our statistical forecasting process. Significant one-off incidents or circumstances that are unlikely to recur are netted off, but are offset by known risks where either conditions in the last year were relatively favourable (such as the risk of flooding compared to the relatively dry weather in 2003/04), or for major projects and service changes.

Our area and regional teams, together with input from the nationally sponsored initiatives, have developed the detailed improvement plans for 2004/05. The schemes generally comprise both initiatives capable of early implementation and a wider range of improvement projects generated from root-cause analysis at the local level. These plans are subject to a detailed review process to test the robustness of each initiative. In addition, the planned savings from the national initiatives have been reviewed at regional level, and those improvement schemes that are sufficiently far advanced have been included in our plans.

The national initiatives focus on a limited number of major opportunities that are applicable across the network, and these initiatives are supported by a highly rigorous project management process and statistical analysis. Many of the new national initiatives tackle generic root causes to generate sustainable long-term solutions. They inevitably have longer lead times than the local schemes. Our plan therefore represents a balance between local schemes capable of immediate delivery, with nationally coordinated initiatives. For 2004/05, the majority of the improvements are still expected to come from a combination of local initiatives and improvements in operational performance management. Subject to certain criteria on the robustness of the savings identified to individual operators, information on schemes in the planning system and forecasts for each operator are provided to train operators as part of the Local Output Commitment process. They are summarised at network level in the remainder of this section.

## Performance forecast 2004/05

Following on from the improvement of around one million minutes achieved in 2003/04, we expect to deliver a further substantial improvement in performance in 2004/05. A small net decrease in traffic is expected on the network in 2004/05 compared to 2003/04, primarily as a result of the reduction in Royal Mail services. However, as these services operate mainly at night and incur relatively few delays, the impact of increased congestion elsewhere on the network means the net effect will be an increase in delay. As a consequence, we are targeting to reduce delay minutes to 12.3 million (around 12.2 million before the impact of changes in traffic levels). This is an improvement of 1.4 million minutes (or around 1.5 million on a like-for-like basis) and is concurrent with the target set out in the Regulator's final conclusions.

Achieving this target represents a major challenge for the company. The scale of the challenge is increased since the forecast level of delay for 2003/04 is approximately 450,000 minutes more than that assumed by the Regulator when the target for 2004/05 was originally set. The reduction in delay minutes noted above is equivalent to a real performance improvement of around 10%, expressed in terms of delay per train km to normalise for traffic growth. However, we are determined to meet this target and an unprecedented amount of effort has gone into the development of plans to achieve this.

The experience of recent years has highlighted the complexity of train performance as a dynamic system, and demonstrated that performance forecasts inevitably carry a significant margin of uncertainty. This has been born out by statistical analysis, which has demonstrated the volatility of performance results. On the basis of this and recognising the scale of the improvement being targeted over the coming year, the 90% confidence limit for the 2004/05 forecast is estimated at 12% above the central forecast. While there is some degree of uncertainty over external conditions, such as the weather, we nevertheless expect to deliver a substantial improvement in underlying performance compared to the 2003/04 levels.

**Figure 10.12 Forecast delays per 100 train km (minutes)**

	2003/04 estimate	2004/05 forecast	Change
<b>Total delays by affected service type</b>			
Passenger trains	2.66	2.39	-10%
Freight trains <sup>1</sup>	4.74	4.45	-6%
<b>Average delay<sup>2</sup></b>	<b>2.86</b>	<b>2.58</b>	<b>-10%</b>
<b>Total delays by cause</b>			
Track defects and TSRs	0.44	0.42	-4%
Other asset defects	0.96	0.84	-12%
Network management/other	0.81	0.71	-12%
Autumn leaf-fall and adhesion	0.10	0.09	-11%
Severe weather/structures	0.15	0.13	-13%
External factors	0.40	0.38	-5%
<b>Total Network Rail delays</b>	<b>2.86</b>	<b>2.58</b>	<b>-10%</b>

For definitions and notes, see previous table

1. The lower rate of improvement shown for freight is largely due to a changing mix of services, with a reduction in mail services operating on the network.
2. The relatively low number of freight trains on the network compared to passenger traffic means that, when expressed as a whole number, the change in average delay appears the same as the change in passenger delay.

As with previous years' plans, significant reductions in delay will result from improved infrastructure reliability as a consequence of the planned asset renewals and maintenance activities, and the benefits of targeted initiatives focusing on critical locations, junctions and assets. Details of a selection of the key activities in each asset category are described below and the underlying engineering-led initiatives are described in more detail in Section 9. However, in this year's plan there is an increased focus on the opportunities that can be delivered by improving the operation of the network. Improved network management, incident response and service recovery are expected to contribute significant benefits, summarised below and with further details in Section 7.

## Infrastructure reliability

### Track faults and speed restrictions

Track faults and speed restrictions continue to represent one of the largest causes of delays on the network.

Our main initiatives include:

- significant investments in prediction and prevention technology to improve track quality, prevent failures occurring and reduce the risk of TSRs being imposed on the network. These include the high speed New Measurement Train, ultrasonic rail testing trains, other new on-train measuring equipment, and wheel condition monitoring equipment;

- additional rail grinding trains and equipment being commissioned, in addition to the seven grinding trains now in action, to avoid the risk of delays due to rolling contact fatigue; and
- continued development of the decision support tools which help inform the renewals and maintenance planning.

We forecast that this will lead to a further net improvement of 4% (95,000 delay minutes) in our track-related delays. This is the net impact based on improvements of around 150,000 less allowances for a number of specific risks. This improvement needs to be set in the context of the 18% improvement seen over the last year, and the wider balance between track renewals requirements and expenditure levels.

During 2003/04 the extraordinarily hot weather, when temperature records were broken, led to significant delays, particularly due to track speed restrictions. Improved mitigation steps will be in place for Summer 2004 (including a Summer preparedness conference) to ensure that excessive temperatures do not lead to this level of delay.

### Points failures

Points failures remain a high priority category for improvement. The main initiatives from our national performance action plan include:

- 100 critical junction refurbishment and the five junctions projects: high intensity asset stewardship process to improve frontline-delivery of solutions at critical junctions. (Estimated additional savings from 100 junctions project: 2004/05 41,000 minutes.);
- reliability analysis: It is apparent from failure mode analysis that the “reliability gap” between failure thresholds and the normal operating environment is frequently too small. Modest perturbations in this environment erode the design tolerance and results in failure. (Estimated cumulative savings: 2004/05 23,000 minutes; 2005/06 115,000 minutes.);
- points drive assemblies: drive and backdrive assemblies are a major source of failures across the points systems. An initiative is underway to improve asset availability. (Estimated cumulative savings: 2004/05 20,000 minutes; 2005/06 24,000 minutes.);
- points obstructions: are a root cause of points failures across the network. There is a significant opportunity to remove many of the sources of obstruction from the track-bed environment, and improve the inspection regime to greatly reduce the level of delay minutes attributable to this failure mode. Focus is primarily on ballast, snow/ice, sand and coal, and assessing opportunities to enhance controls over loading, transportation and release of ballast, sand and coal. (Estimated cumulative savings: 2004/05 17,000 minutes; 2005/06 37,000 minutes.); and
- slide chairs and stock rail bolts: - two complementary projects seeking to reduce incidence of points failure due to broken, dry/seized and uneven slide chairs, and loose or broken stock rail bolts on slide chairs. (Estimated cumulative savings: 2004/05 8,000 minutes; 2005/06 28,000 minutes.)
- other points improvements – the national performance project team is sponsoring the improved provision of S&C spares and the application of the new risk based maintenance approach. In addition, the use of event recording as a form of remote condition monitoring is being promoted; this uses existing equipment and data, but seeks to make use of it in real time. Significant savings are possible from these initiatives.

When combined with Area initiatives (which total 94,000 minutes for 2004/05 and a further 14,000 minutes in 2005/06), the overall impact of performance improvement initiatives identified (excluding those targeting delay per incident) generates a cumulative saving of 213,000 minutes in 2004/05 and 379,000 minutes by 2005/06.

## Track circuits

The main national initiatives in this area include:

- insulated block joint failures – this work will focus on the failure of the insulated rail joint. (Estimated cumulative savings: 2004/05 24,000 minutes; 2005/06 41,000 minutes.);
- Ti2I track circuit failures – we are focusing on the failure modes of the Ti2I track circuit. This includes transmitter unit failures, tail cable connections and maintenance training. (Estimated cumulative savings: 2004/05 15,000 minutes; 2005/06 25,000 minutes.);
- improving rail bonding – we are assessing the electrical implications of poor bonding and/or clamping and tamper damage. (Estimated cumulative savings: 2004/05 8,000 minutes; 2005/06 22,000 minutes.);
- no fault found - a detailed analysis to understand the modes of each failure is being carried out. This is expected to lead to additional projects or an increase in scope of other projects. (Estimated cumulative savings: 2004/05 5,000 minutes; 2005/06 27,000 minutes.); and
- rail/ballast installation issues – an exploration of the reasons for the track circuit system to short circuit due to poor ballast conditions and foreign objects. (Estimated cumulative savings: 2004/05 5,000 minutes; 2005/06 15,000 minutes.)

When combined with Area initiatives (which total 107,000 minutes in 2004/05 and a further 20,000 minutes in 2005/06), the overall impact of performance improvement initiatives identified generates a cumulative saving of 164,000 minutes in 2004/05 and 257,000 minutes by 2005/06.

## Signals and signalling system failures

Signals and signalling equipment reliability initiatives include:

- signal colour lights - no fault found: of all delay attributed to colour light signals the most common cause of failure is attributed to 'no fault found'. An initiative is underway to understand the root-cause in order to be able to reduce the frequency of these incidents occurring. (Estimated cumulative savings: 2004/05 23,000 minutes; 2005/06 54,000 minutes.);
- signal power cables - focusing on the issues surrounding testing of signalling power cables (estimated cumulative savings 2004/5 5,000 minutes, 2005/6 20,000 minutes);
- other signal and signalling system initiatives - include consideration of enhanced maintenance and the targeting of known problem assets (e.g. software and equipment cooling systems in hot weather). We are also looking at improvements to power supplies (e.g. installation of uninterruptible power supplies) and the installation of signal and signalling system-monitoring equipment. Selective equipment renewal and improvement is also being considered (e.g. long-life signal lamps). (Estimated cumulative savings: 2004/05 89,000 minutes; 2005/06 103,000 minutes.); and
- other signalling equipment (including cable faults etc): we are planning improvements through improved maintenance and targeted renewals of equipment (such as hot axle box detectors, signalling cables and power supplies). Other specific measures include lightning strike protection and rodent deterrent measures. (Estimated cumulative savings: 2004/05 14,000 minutes; 2005/06 16,000 minutes.)

The overall impact of performance initiatives identified (excluding those targeting delay per incident) generates a cumulative saving of 130,000 minutes in 2004/05 and 193,000 minutes by 2005/06.

### Overhead line, 3<sup>rd</sup> rail power, level crossings and fencing

Reliability initiatives for these other categories of non-track assets include:-

- overhead line equipment and 3<sup>rd</sup> rail electrification systems are benefiting from enhanced maintenance and improved attention to detail, renewals activity and the use of monitoring equipment to detect faults and prevent dewirements. Electrification systems are generally benefiting from enhanced maintenance, improved line access, and better availability of emergency spares;
- level crossing reliability is being targeted with measures to tackle individual crossings that have caused delay, together with improvements to CCTV and data logger monitoring equipment;
- delays caused by animals on the line are being tackled through the replacement and upgrade of fencing, together with improved inspection and maintenance. Improvements in operational processes, and the training of key staff in the prevention and management of animal incursions are backing this up.

The overall impact of performance initiatives identified (excluding those targeting delay per incident) generates a cumulative saving of 39,000 minutes in 2004/05 and 52,000 minutes by 2005/06.

### Delay per incident initiatives

The key factors causing the increase in the average delay per incident are now much better understood across the industry. This reflects analysis by Network Rail, discussion in the cross-industry National Task Force forum, industry route studies, and the study by AEA commissioned by the Regulator. Our actions to deliver improvements in delay per incident include:

- national initiatives to deliver long-term sustainable improvements in incident duration and response using the Six Sigma methodology (described below);
- a range of other initiatives for rapid implementation emerging from both national and area based analysis;
- network management initiatives (as described in Section 7);
- reductions in TSRs on key congested routes (as described in Section 9); and
- Rules of the Plan Review and timetable reviews (as described in Section 6);

The impact of these initiatives as part of the performance plan for the coming years is summarised below.

It is recognised that many of the opportunities to reduce delay per incident require a cross-industry approach. We are working closely with industry partners to improve the operational management of the train service in the event of disruption, to minimise delays and ensure a rapid return to normal running. Workshops have been held, attended by senior managers from passenger and freight operators, identifying approximately 60 operational issues for possible further detailed work. In many cases specific work is already underway which will continue to be pursued. Further priorities have been identified to allow the preparation of actions plans by the most appropriate party.

Issues over driving styles and increased congestion levels are being dealt with in discussion with train operators and can, in part, be mitigated through more robust timetables emerging from the Rules of the Plan Review. The weaknesses in service recovery are being addressed through Service Recovery 2003, and the robustness of the timetable is being improved through the structural review of the timetable described in section 6.

While it appears that safety-related standards and procedural changes in recent years have had an impact on train service performance, the extent of this impact has not been readily quantified across the network. We have recently commenced a series of workstreams to address this. One of these covers operational standards in the broadest sense, including operational rules as set out in the Rule Book and other specified operations publications. This work originated from discussions at National Task Force - Operations Group and is being undertaken on a cross-industry basis.

Area initiatives provide the majority of the delay per incident savings in the 2004/05 plans. In total these are estimated to contribute at least 85,000 minutes of savings in infrastructure failure categories. These include:

- the creation of merged control operations, described in Section 7;
- improved response to incidents, including additional mobile operations managers, review of rapid response plans, training and focus on rapid response; and
- other initiatives including installation of equipment to minimise delay, control room training and competency, co-location of maintenance fault controls and improved contingency plans.

In addition, there is a major focus on the management of the train service during incidents, improving train service alterations around partial and full blockages and processes for the imposition of ESRs. Early results confirm the critical impact of communications in a fast moving complex environment during an incident. Detailed process mapping to enable measurement is underway with train operators.

The emerging recommendations from our national initiatives are being progressed through a combination of detailed workstreams, and projects capable of early implementation. A significant number of actions are being progressed in the immediate future, including:

- we will be rolling out standard incident timing point definitions, data collection and monitoring processes across the network; evaluation is currently underway for introducing the new timing points;
- we will also be formulating a policy to allow a standard short margin (proposed to be ten minutes) for initial diagnosis of faults where otherwise the signaller would be reluctant to stop trains;
- improved communications, including the co-location of infrastructure fault control with our operational train controls and procedures to allow nominated signallers to report faults direct to fault control;
- ensuring that access to the track is not unnecessarily constrained, particularly at critical junctions – access arrangements for all critical assets are being reviewed to ensure there is an access gate within 100 metres where possible, and account is to be taken of rapid response access when implementing new fencing;
- accelerating the call out process for bridge examiners, using a newly trialled protocol, and fully exploiting the bridge examination competency process; and
- operational standards and processes are being evaluated, including the way in which safety processes are carried out, and a review of some issues concerning red zone prohibitions.

These current national initiatives are expected to lead to estimated cumulative savings of 49,000 minutes for 2004/05 and 172,000 minutes for 2005/06 at constant incident rates.

Other nationally coordinated network management improvement actions (as described in Section 7) contribute towards improvements in delay per incident. Their impact, where quantifiable, is included in the area-based plans.

## Network management

### Train regulation and control

A significant range of operational delivery initiatives are underway and are expected to contribute to improved performance in the coming years. These were outlined in Section 7. These include radical changes to the control environment (including co-location and integration with train operator and infrastructure fault controls), improvements to the effectiveness of train regulation and reductions in delays caused by possessions, signalling errors, and unexplained causes. Central to this programme is improving the skills and effectiveness of our front line signalling and control teams, through improved training, support and technology.

Area initiatives include:

- renewed focus on service recovery, briefings of control staff and the creation of merged control operations; and
- local initiatives targeting specific causes of signalling and regulation errors.

The main national initiatives include:

- signaller operations – focus is on improvements in route setting and clearing signals through a reduction in the following causes of incidents: wrong regulation; signaller error - including wrong route setting; and operating errors. (Estimated cumulative savings: 2004/05 14,000 minutes; 2005/06 39,000 minutes.); and
- improved delay attribution – leading to a better identification of root-causes allowing remedial actions to be taken and a reduction in the number of disputes.

On the basis of these and other management actions, we are planning to deliver an improvement of 210,000 minutes from operational causes (such as signalling and regulation errors) and attribution problems in 2004/05.

## Weather and seasonal preparedness

An extensive range of measures to tackle weather and other seasonal risks (such as poor adhesion in the autumn leaf-fall season) is described in Section 7.

National and area initiatives in this category include:

- autumn leaf-fall and adhesion preparedness, including additional use of Sandite machines, increased vegetation management, additional response staff (Estimated savings: 2004/05 61,000 minutes);
- tunnel drainage schemes, installation of pumps, and improvements to drainage and culverts at locations liable to flooding (Estimated savings: 2004/05 6,000 minutes);
- lightning protection;
- track stressing improvements and use of reflective paint as precaution for high temperatures.
- flooding, snow, river scour and other severe weather: a number of projects identifying the scope for prevention and mitigation. (Estimated cumulative savings from national initiatives: 2004/05 17,000 minutes; 2005/06 38,000 minutes.); and
- earth subsidence – focusing on reducing delay minutes by identifying the precursors to earthslips and subsidence and improving network availability in the event that incidents occur. (Estimated cumulative savings from national initiatives: 2004/05 10,000 minutes; 2005/06 16,000 minutes.)

These management actions are expected to generate an underlying improvement of 138,000 minutes for the autumn and weather related categories in 2004/05. Our plans will enable us to sustain the improvements already achieved this year even under more adverse weather conditions.

### Mitigation of external risks

The Network is inevitably vulnerable to external events. The range of measures to combat these risks is described in Section 7. Our area initiatives are expected to contribute 91,000 minutes of savings, of which a significant share reflects reductions in delay per incident. These include:

- bridge strike prevention and mitigation measures, including training in response measures, improved signage and investment in bridge protection beams and monitoring equipment (Estimated savings: 2004/05 39,000 minutes);
- trespass and vandalism prevention and mitigation, through improved fencing, local route-crime and education initiatives and installation of CCTV (Estimated savings: 2004/05 36,000 minutes); and
- improved response to all external incidents through measures including controller training and co-location and the benefit of additional mobile operations managers.

Assuming no major external events (such as the London power cuts) we would add a further expected improvement of around 25,000 minutes in 2004/05.

### Operational planning

A significant range of timetable planning initiatives are underway and are expected to contribute to improved performance in the coming years. These are set out in Section 6 and include both national and regional initiatives including:

- an improvement in timetabling accuracy to reduce reactionary delay to TSRs and delays arising from the short term planning process (which particularly affects freight services) and engineering possessions. (Estimated cumulative savings: 2004/05 15,000 minutes; 2005/06 28,000 minutes.); and
- regional schemes focusing on resolving particular known timetable and schedule errors.

These performance initiatives are estimated to generate a cumulative saving of 20,000 minutes in 2004/05 and 44,000 minutes by 2005/06.

In addition, we anticipate significant benefits over the next few years from the programme of timetable and Rules of the Plan reviews, together with the longer-term route capacity utilisation studies. These are described in Section 6 and are being progressed in close co-operation with train operators and the SRA. The performance impact assessment of these timetable reviews is currently underway.

### Major projects and other initiatives

#### Major projects

The introduction of new trains on Southern poses a number of performance risks to the industry. For Network Rail, the largest risks are assessed to arise from the associated power supply upgrade works. These are being implemented in a way that seeks to minimise the operational risks, by:

- where possible, achieving road access to site to allow green zone working; also where possible, work is being carried out in a way that can be left at the end of each possession with no operational impact. Where this is not the case, risks are being managed through normal signalling management processes;
- during the period of installation of equipment and the introduction of new trains a number of electrical supply pinchpoints have been identified. For these interim works have been carried out to mitigate these risks. In addition, new procedures have been instigated to restrict the current draw on the supply through limiting the acceleration of trains at key pinchpoints, through new signs and operational guidance to train drivers; and
- new equipment inevitably poses performance risks following installation. However, industry-standard equipment is being installed which has a good reliability record and the substations commissioned so far have performed well. As further risk mitigation, the project will be ensuring additional standby support to deal with any initial teething problems.

The introduction of the new timetable on the West Coast Main Line presents significant performance risks from September 2004 onwards. The measures taken through timetabling processes and modelling are described in Section 6. Risks remain through the changes to operating procedures and residual works being carried out on the route; these risks are being managed through normal processes, and allowance is made in area performance plans for these risks.

#### Possessions management and other initiatives

A range of initiatives to improve possessions management are planned at area level, including improved planning and training, monitoring of critical possessions, and response to over-runs. (Estimated savings: 2004/05 21,000 minutes). Revised track inspection arrangements using new technology to reduce the need for taking daytime possessions have resulted in an opportunity for a significant reduction in such delays, particularly on the West Coast Main Line. (Estimated savings: 2004/05 52,000 minutes). Other initiatives include improved indicator boards for speed restrictions and a number of other localised infrastructure improvements. In addition we are continuing to work closely with freight operators on a number of freight performance issues.

### 2004/05 to 2008/09 performance forecasts

Detailed planning is now commencing for years two and three of the five-year planning horizon. Increasingly, the new national initiatives will deliver a larger share of performance improvements from 2005/06 onwards, as the transition to a more efficiently coordinated approach to performance improvement occurs.

We are planning to achieve the performance levels set out in the Regulator's final conclusions (see below). When combined with our current growth assumptions, together with an assumption for train operator performance provided by the SRA for 2004/05 to 2006/07 and an illustrative assumption that thereafter train operators' performance improves at a similar rate to ours, this leads to the following projections for performance expressed as Network Rail delays per 100 train km and industry PPM punctuality:

**Figure 10.13 5 year plan scenario: summary**

	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
Total Network Rail delay (million minutes)	13.7	12.3	11.3	10.6	9.8	9.1
Delays to franchised operators (Delay minutes per 100 train km)*	2.66	2.39	2.17	2.02	1.86	1.72
Punctuality PPM	81.1%	82.8%	84.9%	86.6%	88.3%	89.7%

\* Note: the projections for delay per 100 train km are consistent with the targets for total delay minutes set out in the Interim Review final determination, with current assumptions for growth in train kilometres.

For 2004/05, schemes are in place to meet the vast majority of the expected total improvement. Further work is continuing to develop additional initiatives, and validate the extent to which any apparent gap (currently evaluated at around 175,000 minutes) is already covered by benefits (currently unquantified) of the framework improvements outlined above.

For future years, this level of detail is not currently available for the scale of improvement being targeted. This will become available over the next year, and as our processes for planning longer-term improvements improve. We are nevertheless confident in our longer-term improvement processes, and in the capacity of our area teams to develop enough initiatives and underlying process improvements to meet the targeted performance improvement levels. A significant share of these additional savings are expected to arise from exploiting the opportunities in-house maintenance affords, the benefits of timetable reviews for reducing delay per incident and small operational delays.

Our current assessment of benefits from national and area initiatives already identified (excluding maintenance effectiveness opportunities and timetable reviews) split by category of delay, and the balance of improvements still to be quantified or identified, are summarized as follows:

**Figure 10.14 5 year plan scenario: cumulative improvements by category of delay**

Delay minutes ('000s)	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
<b>Target real improvement required</b>						
Total Network Rail delay minutes	13,700	12,300	11,300	10,600	9,800	9,100
- Net cumulative improvement		1,400	2,400	3,100	3,900	4,600
- Additional delay minutes arising out of expected growth in train mileage		101	375	482	574	635
Total improvement required		1,501	2,775	3,582	4,474	5,235
<b>Source of improvement</b>						
Identified improvement activities <sup>1</sup> :-						
- Track defects and TSRs		149	164	172	172	172
- Points and track circuits		437	761	771	771	771
- Other asset defects		219	349	395	395	395
- Network management/other		294	449	484	484	484
- Autumn leaf-fall and adhesion		61	93	129	129	129
- Severe weather/structures		77	106	135	135	135
- External factors		91	104	112	112	112
Other opportunities (net of risks) <sup>2</sup>		(3)	61	65	65	65
Total benefits identified		1,326	2,088	2,263	2,263	2,263
Other benefits (to be identified / quantified) <sup>3</sup>		175	687	1,319	2,210	2,972

Note:

1. Including improvements from initiatives covering infrastructure reliability, delay per incident, network management, mitigation of weather and external risks, operational planning and possessions management.
2. Adjustments for atypical weather and external events, risks and opportunities from major projects and changes in operational processes, including track patrolling.
3. Benefits from in-house maintenance, timetable reviews and other performance improvements (to be identified).

# Long term performance (2008/09 to 2013/14)

Given the issues described above our forecasts of longer term performance assume:

- total delay minutes (including growth) will improve by some 2% pa (200,000 minutes per annum) to around 8.1 million minutes in ten years time; and
- PPM punctuality will improve to pre-Hatfield levels by 2006/07 and reaches 90% by 2009/10, based on an assumption for train operator performance provided by the SRA for 2004/05 to 2006/07 and an illustrative assumption thereafter that train operators will improve at the same rate as Network Rail’s own delays.

These are shown in more detail in the table below:

<b>Figure 10.15 10 year plan scenario: summary</b>				
	2003/04	2004/05	2008/09	2013/14
Total Network Rail delay minutes (including growth)	13.7 m	12.3 m	9.1 m	8.1 m
Network Rail delays to franchised operators (Delay minutes per 100 train km)	2.66	2.39	1.72	1.48
Punctuality PPM	81.1%	82.8%	89.7%	91.7%

By 2013/14, based on the assumptions described above, we project a scenario of a reduction in delay minutes per 100 train km of 44% compared to 2003/04. The chart below shows a projection for Network Rail delays to passenger trains based on the ten-year plan described above. The confidence range shown reflects an assessment of the asymmetric risks around the scenario presented and illustrates the range of total delay minutes that could occur in any particular year. We are working internally, and through cross-industry forums, to improve the quantitative understanding of trends in performance, and the various input-output and system relationships which exist. This will improve our ability to forecast performance with a greater degree of accuracy.

**Figure 10.16 Network Rail delays to passengers train – 10 year scenarios**

