Network Rail

Strategic Business Plan

Control Period 4

October 2007

Executive summary

The demand for both passenger and freight rail services has increased dramatically over the last decade. Last year alone, total passenger demand increased by more than eight per cent and freight demand has also continued to grow strongly.

Moreover, there is a clear consensus throughout the industry that demand growth from passengers and freight users will remain strong for the foreseeable future. Increasing congestion on roads and increasing environmental sensitivity mean that rail should be well placed to continue winning market share.

In delivering this plan, we therefore aim to build on the success which the industry as a whole has achieved over the last five years. Rarely before has the railway had such a great opportunity to continue to improve rail services for the benefit of passengers and freight users, our industry partners, taxpayers and the economy as a whole.

This plan represents a major challenge for all our people. It requires that Network Rail becomes the best at everything we do. We need world class infrastructure and operations, supported by the right processes and delivered by great people. This challenge provides an exciting opportunity for everyone in the business.

We are also very conscious that the plan cannot be delivered by Network Rail alone. We need to continue working closely with our industry partners focussed jointly on the best way of delivering what is expected of us.

Strategic context

Five years ago, in October 2002, Network Rail had just taken over the railway infrastructure in Great Britain and we were preparing for the 2003 interim review of access charges. Stronger cost controls were being put in place, reliability was poor and the railway was not recognised as being as safe as it actually was. Expenditure on the railway had increased substantially in the period following Hatfield and, although there was a relatively poor understanding of costs, there was an increasing recognition that this investment needed to continue if we were to begin addressing the legacy of under-investment in the railway. The scale and complexity of the challenge was daunting.

The last review was therefore necessary to place the business on a secure financial footing so that we could begin to address these problems together with our industry partners in Control Period 3 (CP3).

Change is a gradual process not just in the railway but elsewhere as well. Despite this, we are approaching the 2008 periodic review from a very different position compared to the last review. We always said that the early years of Network Rail were about stabilising the company while preparing for the further challenges ahead and we have now largely completed the first two phases of our three-phase transformation programme (“fix the basics”, “one way of doing things” and “be the best”).

We have kept pace with the challenging efficiency and reliability targets set by the Office of Rail Regulation (ORR). In doing so, we have continued to improve safety and the railway is now widely recognised as being the safest form of transport. Confidence in the railway has largely been restored and the growth in demand has now accelerated. We have invested substantially in renewal of the infrastructure and have made significant improvements in the condition of our assets. At the same time, we have become increasingly focussed on developing the network to meet the growing demand for rail services. We are working much more closely in partnership with train operators and we are more aware of the needs of passengers and freight users. We also have a vastly improved understanding of our costs and of what needs to be done to meet demand.

The 2008 periodic review therefore represents a great opportunity to build on the collective success of the last few years as we go into Control Period 4 (CP4) in April 2009. We can deliver a railway that contributes positively to the productivity, quality of life and environment in the UK. To achieve this, the review needs to provide the necessary funding to meet the continually growing expectations of passengers and freight users. It must provide challenging but realistic targets for continuous improvement in our efficiency and outputs. And it must provide clarity about what is expected, while allowing sufficient flexibility for the business, and the industry as a whole, to deliver these requirements in the most effective way. We accept the need to be held to account for the delivery of our commitments, but we believe that the ORR should focus primarily on whether we are delivering the required outputs and on where their judgement may be

brought to areas of disagreement with our customers and funders.

The High Level Output Specifications (HLOSs) and Statements of Funds Available (SOFAs) together with the associated strategies published by the Department for Transport (DfT) and Transport Scotland have provided a sound basis to build on this opportunity. Government in England and Wales is clear that the investment priority is the provision of capacity to tackle crowding and to accommodate anticipated growth in demand focussed particularly on the busiest services. In Scotland the industry is expected to bring forward proposals which contribute towards the three key strategic outcomes – improved journey time and connections, reduced emissions and improving quality, accessibility and affordability. Both governments have also committed substantial funds to facilitate these investments.

As well as providing a great opportunity for the railway and its users, this review highlights the tough challenges which we face. Despite the progress outlined above, we know that there is much more to be done to modernise the culture and processes both within Network Rail and across the industry. We face a number of issues, each of which, taken even in isolation, would represent a major challenge for any business.

First, on top of the 31 per cent target efficiency improvements in the current control period, government has assumed that we can achieve further savings of five per cent a year in most areas while absorbing continuing increases in real wages and other input prices. Even ignoring the impact of input price changes, this implies a total efficiency improvement of nearly 50 per cent over 10 years.

Second, the industry has already improved punctuality from around 78.7 per cent five years ago to 88.7 per cent today (a reduction of 47 per cent in the proportion of trains which are late or cancelled despite running more trains). We are now being asked to state how we could improve this to 92.6 per cent (a further reduction of 34 per cent) by the end of CP4 while also reducing the number of trains which are severely delayed.

Third, because of the growth in demand and increased confidence in the railway to deliver major projects, we are being asked to manage a major programme of enhancements worth up to £2 billion a year. This is on top of the base level of renewals which we need to invest to sustain the existing railway. Although we have gradually increased our focus on enhancements, this represents a further step change in the level of investment in improving the railway.

Fourth, another sign of success is that there is an increasing need to move towards a “seven-day railway”, particularly by reducing disruption at weekends and by offering more services during Sunday. Combined with growth in demand from freight, this reduces the time available to inspect, maintain and renew the network. We are being challenged as an industry to find ways of responding to this.

Each of these challenges requires fundamental changes in the way we do things, considerable investment in systems and training, and closer collaboration between Network Rail and train operators focussed on common objectives. Taken together the challenge is even greater than the sum of the parts.

We need to respond to these challenges in a way which builds on rail’s position as the safest and most sustainable form of transport. We also need to remain focussed on the long-term condition of the infrastructure and optimise the railway system as a whole taking account of the interaction of the infrastructure with rolling stock and operations.

We are committed to making the changes needed to meet these challenges. This Strategic Business Plan (SBP) represents our response. It builds on the Initial Strategic Business Plan (ISBP) published in June 2006. It responds directly to the HLOSs published by government in London and Edinburgh while also taking account of the reasonable requirements of our other customers and funders. Finally, it comprises our first major submission to the ORR’s 2008 periodic review.

This plan incorporates the result of extensive further analysis since the ISBP. It is the result of intensive engagement with our stakeholders, particularly train operators and our main funders. Much of this engagement with passenger operators has been through existing initiatives, such as the Route Utilisation Strategies (RUSs), but we have also held extensive discussions around the development of the SBP itself. We have been able to take account of the greatly improved understanding of freight requirements which was gained through the Freight RUS. We are now looking forward to building on the experience of producing these plans to engage in an ongoing dialogue with our industry partners on longer term planning issues so that we can

Figure 1 CP3 outperformance

	£m	
Income	660	Increased variable usage charges due to traffic growth and increased Schedule 8 payments from train operators reflecting improving train performance
RAB additions	655	Outperformance of ORR's target for the Asset Stewardship Incentive and the volume incentive resulting from incremental traffic growth
Controllable opex and maintenance	325	Controllable operating and maintenance costs that are lower than ACR2003
Non-controllable opex and possession costs	(250)	Increased non-controllable costs and payments to passenger train operators for possession costs
WCRM	(450)	Additional costs of the West Coast Route Modernisation Programme, including £200 million shown as contingency in 2007 Business Plan
Renewals	(435)	Track renewal costs are higher than ACR2003 and the telecoms programme cost is increased
"Other" renewals	(270)	Additional "other" renewals to support the continued transformation of the business
Outperformance (excluding interest)	**235**	
Interest saving	700	Partly due to favourable changes in market conditions
Outperformance (including interest)	**935**	
Investment deferred to CP4	465	Signalling, telecoms and IT renewals which are funded in CP3 but efficiently deferred to CP4
Additional investments	(225)	Potential investments focused on reducing the longer term cost of the railway
Outperformance fund	(200)	This will be spent or committed to capacity enhancement schemes during CP3
Net saving	**975**	Available for funding renewals deferred to CP4 and to increase financial headroom

together understand the most effective and affordable way of delivering the overall requirements of rail users and funders.

The plan is still subject to development. It will be reviewed in detail by ORR and we will continue to develop some areas in conjunction with train operators, suppliers, funders and other stakeholders. There may be choices to be made about whether further investment in some areas is regarded as a priority. We will publish a further update on our plans in April 2008 in advance of the ORR draft conclusions in Summer 2008 and final conclusions in October 2008. Unless the matter is referred to the Competition Commission, we will then publish our final business plan for the next control period in March 2009 and this plan will contain the key outputs against which we will be monitored over CP4.

The remainder of this summary sets out our plans under the following headings:

- maintaining and renewing the existing railway;
- making the railway even safer and greener;
- improving reliability;
- growing and improving rail services; and
- conclusions.

It is important that the rail network is developed and operated in a holistic way as a single network which has a range of users. Most aspects of this plan are therefore as relevant to freight operators as they are to passengers; and they are as relevant to Scotland as they are to England and Wales. Where appropriate, however, we explain the issues relating to these different customers or geographic parts of the network.

Maintaining and renewing the existing railway

Although the key priority for the railway is to provide additional capacity for new and improved services, this needs to build on a solid base. We therefore start by explaining our performance in CP3 and our plans for maintaining and renewing the existing railway in CP4.

CP3 efficiencies and financial performance

As explained in our 2007 Business Plan, we expect to outperform the overall regulatory targets set for the current control period. This means that we will have delivered the outputs which were expected of us within the funding that was provided to us over the period as a whole.

We have updated our assessment and Figure 1 shows that we expect outperformance of around £235 million over CP3. This excludes savings of

£700 million in interest which are partly due to market conditions. As a result of this success, we are reinvesting £200 million back into the railway.

In addition to this outperformance, we have deferred £465 million of renewals to CP4 but are planning to bring forward £225 million of investment to deliver future benefits. Overall, there is significant cash saving compared to the assumptions at the last review. Part of this saving can be used to pay for renewals which are efficiently deferred to CP4 and have already been funded in CP3. The remainder will increase the financial headroom between our Regulatory Asset Base (RAB) and the level of debt.

As well as focussing on the delivery of our targets over the period as a whole, we have clearly sought to achieve the best possible "exit rates" in terms of unit cost and performance at the end of the control period. These exit rates also represent the starting point for our assessment of costs over the next control period.

In some parts of the business, we were initially running ahead of the target rate of improvement set at the last periodic review but, as expected, it has become increasingly difficult to make continuing savings. Some of the savings were also achieved through scope efficiencies which do not necessarily reduce the unit cost of ongoing work. In addition, we have had to absorb significant increases in input prices in some areas (for example, increases in real copper and steel prices, which were not anticipated at the last review, have contributed around £25 million to our annual renewal expenditure) and we have faced external drivers of additional operating expenditure (for example, new responsibilities and increases in fees charged by British Transport Police and ORR have increased costs by around £40 million per year).

Figure 2 summarises the projected efficiencies compared to the assumptions made by ORR at the last review. Achieving the remaining reductions in this control period still represents a major challenge. However, the only area where it will certainly not be possible to achieve ORR's assumed level of efficiency is in track renewals. In this case, we expect to achieve savings of 23 per cent by the end of the period compared to 30 per cent assumed by ORR for these assets. Even in this area, however, if we adjust for changes in input prices and the mix of work categories, this implies an underlying improvement in unit costs which is much closer to the ORR assumption. These improvements have also been delivered in parallel with significant improvements in asset condition.

This therefore provides a sound basis for going forward into the next control period.

CP4 efficiencies and input prices

We are committed to making the changes necessary to meet the challenges we face. We have therefore sought to set ourselves a challenging target for the efficiencies which can be achieved in CP4. However, the importance of setting an achievable target should also be recognised by our stakeholders so that we have a reasonable chance of success by meeting – or even outperforming – this target. These targets must take account of the wider context, including those other areas where we are expected to improve. Targets which are seen as unrealistic would be demotivating and would risk undermining the progress which has already been achieved. By contrast, we are clearly motivated to outperform realistic targets to enable discretionary investment in the railway.

The ISBP included assumptions on the efficiency savings we would be able to achieve over CP4. At that stage, we had done some analysis in support of these assumptions and recognised the need to set the business a challenging target. We assumed that we would be able to achieve underlying efficiency savings in most areas of five per cent in the first two years declining to two per cent in the last year of CP4. However, we also recognised that it was unrealistic to assume such large savings in some areas – such as signaller costs – and we assumed a lower rate in these areas. We also netted off projected real

Figure 2 CP3 unit cost efficiency

Per cent	2004/05	2005/06	2006/07	2007/08	2008/09	ORR target
Controllable opex	16.0	24.0	25.0	26.1	28.9	29.7
Maintenance	10.0	19.0	26.0	30.3	34.8	34.1
Renewals	8.0	15.0	23.0	21.3	27.3	29.7
Total	10.3	18.2	24.3	25.1	29.9	30.7

Figure 3 CP4 efficiency and input prices

Per cent	2009/10	2010/11	2011/12	2012/13	2013/14	CP4
Efficiency						
Controllable opex	5.0	5.0	4.0	3.0	2.0	17.6
Maintenance	5.0	5.0	4.0	3.0	2.0	17.6
Renewals	5.0	5.0	4.0	3.0	2.0	17.6
Input prices						
Controllable opex	2.3	2.3	1.1	1.1	1.1	8.1
Maintenance	2.0	2.1	1.3	0.5	0.5	6.6
Renewals	0.9	1.4	0.8	0.1	0.2	3.5
Net impact						
Controllable opex - total	2.1	2.2	1.6	1.1	0.6	7.4
Controllable opex - excluding signallers, insurance and pensions	2.8	2.8	3.0	1.9	0.8	10.9
Maintenance	3.1	3.0	2.7	2.5	1.5	12.2
Renewals	4.1	3.7	3.2	2.9	1.8	14.8

increases in input prices based on an independent report prepared for us.

Since the ISBP, we have done extensive further work in this area. In the light of our analysis of the potential for underlying efficiency improvements, we have concluded that the assumptions included in the ISBP represent an appropriately challenging but realistic target. We have therefore prepared our plan on the basis of these assumptions. We have also obtained an update on the input price inflation forecasts and, although there are some areas where we believe this could understate inflationary pressures, we have applied these independent assumptions to our projections. The resulting efficiency and input price assumptions are summarised in Figure 3.

The main part of the work we did to reach these conclusions was based on a detailed understanding of the current cost base and a bottom-up assessment of the initiatives which can be undertaken to deliver future efficiency savings. This is combined with a "stretch" for initiatives not yet identified, offset by the effect of rising input costs.

Our bottom-up assumptions have built on our understanding of the business as well as on experience from other industries and railways in other countries. The delivery of these assumed savings represents an extremely challenging transformation of the business and we now need to do a great deal of further work to develop detailed delivery plans to achieve this. Moreover, our efficiency assumptions imply a significant stretch over and above these bottom-up assumptions. The detailed bottom-up assumptions inevitably result in varying rates of efficiency improvement in different parts of the business. Our assumptions therefore imply a greater degree of "stretch" in some areas – notably track renewals and operating costs – than in others. However, we are committed to achieving these savings provided that we are given the flexibility to manage them across the business as a whole.

Figure 4 shows that, given the savings we expect to deliver in CP3, these assumptions represent an overall efficiency saving of 42 per cent over ten years. If we are able to achieve this, it will represent an enormous improvement for the benefit of passengers, freight users and taxpayers. Moreover, we will have achieved this at the same time as delivering step changes in the traffic levels, reliability, investment and customer service. The scale of improvement across this number of fronts has no comparison to other regulated businesses.

We have also examined the plausible rate of efficiency improvement based on a more top-down assessment. This assessment has been used to triangulate against the bottom-up initiatives which have been identified and developed in detail. More importantly, it has helped to inform the bottom-up analysis by focussing attention on areas where there may be particular opportunities for improvement.

We particularly welcome the contribution to the efficiency debate of the various external studies relating to efficiency which have been produced as part of the periodic review process. Indeed we agree with many of the conclusions from these studies and we have already incorporated many of the implications into our plans.

We are conscious that ORR will also consider efficiency in terms of "catch-up" and "frontier-shift". In ORR's framework, catch-up relates to the reduction in any efficiency gap compared to other businesses; and frontier-shift represents the improvement in the costs of an already efficient business due, for example, to technological change. The ORR's initial assessment indicated a range of efficiency improvement of between two and eight per cent a year net of changes in real input prices. We consider this range is based on inappropriate assumptions for the reasons explained below.

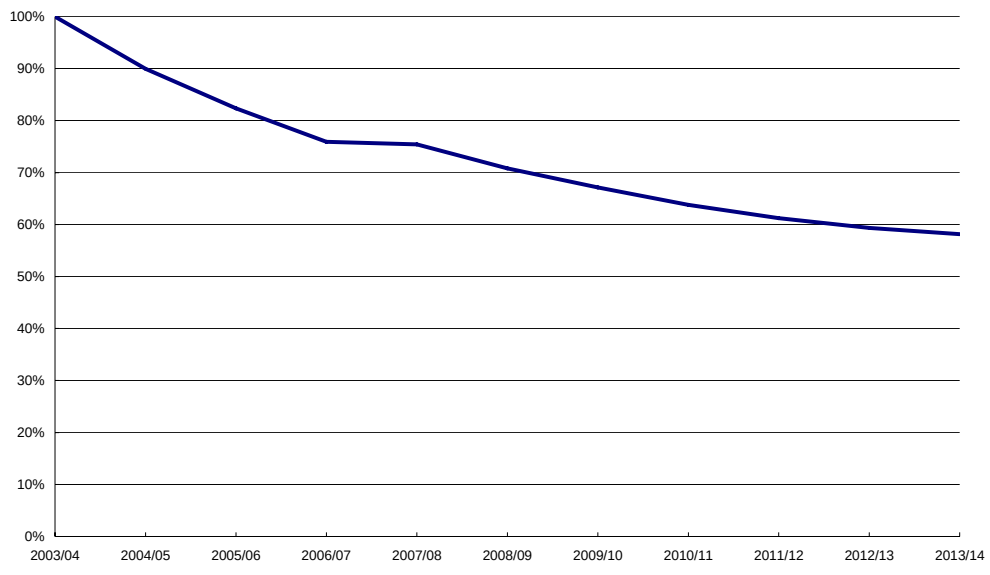
First, ORR assumes that a large proportion of the potential catch-up is achievable simply by reversing the expenditure increases which were observed in the aftermath of Hatfield. However, this increase was not primarily about reduced efficiency but about additional expenditure which was necessary to address previous underinvestment. For example, this period coincided with the removal of the artificial cost constraint which was imposed through the initial RPI-based maintenance contracts and when these caps were released, activity rates inevitably rose to catch-up on the previous shortfall. It also coincided with significant increases in renewal volumes (although some of these renewals have needed to be redone, for example because initially only rail was replaced without renewing the sleepers or ballast). Similarly there were substantial increases in pension contributions and insurance costs due to market conditions and other changes. Moreover, as we have gained greater control of these costs, we have also invested more – and will continue to invest more – in training and development of people, which has been neglected for many years, and in reinforcing our engineering capability.

Second, although we have acknowledged that there are important lessons from international benchmarking, we are concerned that this may be used in an oversimplified way to reach conclusions about the scale of savings which can be achieved. The difficulty in making genuinely like-for-like comparisons should not be underestimated and we believe that many of the comparators referred to by ORR are too different to make generalised conclusions. We have, however, responded to these comparisons in more detail.

Third, we reject the view, implied by ORR's consultants, that Network Rail is at a lower level of maturity than other regulated businesses and that it can therefore be expected to achieve savings in line with those achieved soon after their privatisations. There is no evidence to support this view which implies that there are easy savings to be achieved in CP4. Indeed, benchmarking of our asset management processes, for example, against other regulated businesses has concluded that we compare well with these other industries. We also note that the top end of ORR's efficiency assumptions bears little relation to the typical catch-up assumptions adopted by other regulators.

Fourth, the Retail Prices Index (RPI) already includes the impact of productivity improvements across the economy as a whole. Assuming there will be a significant saving from frontier-shift would therefore imply that, even after we have caught up with best practice in the economy as a

Figure 4 Ten year unit cost efficiency improvement



whole, we should be able to improve productivity in the railway significantly faster than in the economy as a whole. This is despite the fact that some of our input prices are likely to increase faster than elsewhere and we are not likely to benefit from technological or other major change. Network Rail does not therefore believe such an assumption would be realistic.

Fifth, even if the assumed level of savings was shown to be possible, it is unrealistic to assume that this could be achieved at the rate implied by ORR's range. The pace of change implied by these reductions combined with other improvements across the business is unrealistic. We note that most recent regulatory reviews have assumed annual savings of the order of 3 per cent a year and we do not believe there is evidence to support a higher rate of cost reduction particularly given the improved outputs which we aim to deliver and evidence of progress to date.

Even the assumed efficiency improvement of five per cent a year underlying the DfT's SOFA is significantly greater than our projections since it implies that input price pressures can be absorbed within this amount. On average, this amounts to a difference of around £220 million or 2.4 per cent a year. While we would obviously seek to improve efficiency as fast as possible and could potentially outperform realistic targets, we do not consider it is appropriate to assume such a high rate of improvement when setting our charges. In particular, we are concerned that unrealistic targets could destabilise the progress which the business and the industry has achieved.

CP4 expenditure requirements

Translating these efficiency improvements into what needs to be spent to operate, maintain and renew the infrastructure in a sustainable way requires an understanding about the volume and type of work which is needed. Our assessment is based on explicit whole-life, whole-system asset policies and other strategies. These are translated through the Infrastructure Cost Model (ICM) into detailed expenditure and output projections at an increasingly disaggregated level. The ISBP represented a major step forward in both these areas. Since then, we have focussed further on the development of these policies, particularly their justification, and on the improvement of the ICM so that these policies are fully reflected in our plans.

In our view, the development of the asset policies and ICM should enable a more focussed debate with ORR about the required level of expenditure in CP4. Any proposed changes in policies as a result of the review will need to be reflected in the ICM to assess the implications for our expenditure requirements. This will provide the baseline for our March 2009 business plan and the detailed workbanks for each year will draw down from these projections.

Figure 5 shows that total operating, maintenance and renewal expenditure is projected to reduce by £3.3 billion between CP3 and CP4. This partly reflects ongoing improvements in efficiency based on the assumptions discussed above. It also reflects the completion of the West Coast Route Modernisation (WCRM) programme although there are obviously significant ongoing renewals of the West Coast included within the relevant asset categories.

These reductions are offset by additional maintenance and renewal expenditure in some areas, for example, due to the cycle of condition-led renewal requirements (e.g. in signalling renewals), additional traffic and reduced engineering access time (which mainly impacts on maintenance and track renewal), and additional investment in drainage and to protect against severe weather. We have also provided for a significant increase in expenditure on stations and depots which remained well below the sustainable level of spend in CP3.

Our assessment of the required level of expenditure has increased since the ISBP. Excluding deferral and additional investment to deliver future savings which are discussed further below, this increase is around £200 million. This partly reflects further detailed analysis in some areas, particularly stations and depots (operational property). A choice will need to be made about whether there are sufficient funds to begin to address the previous underinvestment in stations to provide a sound base for the potential improvements which are discussed further below. Another major change is in signalling where the renewal plans now reflect the intention to adopt cab-based signalling but the reduced infrastructure costs are partly offset by the inclusion in our projections of cab fitment costs.

In addition to the base operating, maintenance and renewal requirements outlined above, our further analysis of asset policies and of what it will take to become world class has identified a number of further potential investments. These investments would deliver cost or performance

Figure 5 Operating, maintenance and renewal costs

£ million	CP3	CP4 ISBP	CP4 SBP	Explanation of changes in activity levels (with ongoing CP4 efficiency savings reducing all costs compared to CP3)
Controllable opex	4,240	3,854	3,771	
Non-controllable opex	1,632	2,115	1,842	• Increased costs of BTP, ORR and RSSB • EC4T costs significantly lower than ISBP reflecting market changes
Maintenance	5,868	4,765	4,819	• Increase since ISBP relating to implementation of new engineering access strategy on West Coast Main Line
Renewals				
Track	4,008	3,459	3,468	• Increases since ISBP in drainage, impact of new engineering access strategy on WCML, management of rolling contact fatigue caused by heavier trains • Offset by reductions on lightly used routes
Signalling	1,834	2,377	2,285	• Increasing volumes as equipment reaching its replacement date • Reduction since ISBP reflecting move to ERTMS implementation but cab fitment costs also included
Civils	1,769	2,067	1,979	• Following steady increase in CP3, renewal volumes maintained at higher level through CP4 • Increase in work to manage rainfall more effectively
Operational property	1,016	1,277	1,465	• Increase activity level to bring station/depot work to sustainable level • Further increase since ISBP as understanding of asset has developed
Telecoms	224	251	283	• Increased renewal of concentrators and cabling
FTN/GSM-R	802	258	473	• Lower costs as programme reaches completion • Increase since ISBP due to lower mast height and other scope changes • Cab fitment included as enhancements in ISBP
Electrification	406	573	467	• Increase in overhead line and switchgear renewals • Accelerated renewal of Great Eastern overhead line treated as an enhancement since ISBP
Plant and machinery	456	261	356	• Increased renewal of fixed plant offset by reduction in purchase of new on-track and other plant • Additional maintenance equipment and high output plant identified since ISBP
Other renewals	774	325	586	• Lower expenditure on corporate offices, training centres and other facilities than CP3 • Increase since ISBP reflects additional investment in IT and corporate offices
WCRM renewals	2,943	-	-	• Renewals on West Coast Main Line included in specific asset plans in CP4
Total renewals	**14,232**	**10,846**	**11,362**	
Total OM&R	**25,972**	**21,580**	**21,794**	
Discretionary investment	225		885	• Additional investment that provides railway benefits but not required to deliver HLOSs
Renewals deferred from CP3			240	• Signalling and telecoms
Total	**26,197**	**21,580**	**22,919**	

benefits over and above the base efficiency and performance assumptions in this plan. This includes, for example, additional investment in information systems and plant required to maintain the railway.

These potential investments have not yet been subject to full appraisal but we believe it is important that they are progressed further over the next few years so that we can proceed if a strong business case is established. In some cases, these investments will be important in achieving further improvements in CP5 as well as CP4. Some of these investments could be funded from outperformance of other targets. More generally, however, we propose that these investments should be treated as self-financing investments which can be added to the RAB during the period. We also believe it is important to have flexibility in this area to be able to use this approach to invest in other areas which deliver greater benefit to our customers and funders if the case can be shown.

A further increase in CP4 expenditure is due to work which has been efficiently deferred from CP3. This is partially offset by investment that is brought forward to deliver future benefits. The further elements of deferral since our March 2007 Business Plan relate to signalling and telecoms. In effect, however, this has already been funded in CP3 so no additional funding will be required for this investment in CP4.

Figure 6 shows the overall operating, maintenance and renewal expenditure in Scotland and England & Wales. In Scotland, the aggregate spend is broadly unchanged compared to the ISBP. However, there are significant reductions in maintenance and operating cost offset by increases in renewals.

An even safer and greener railway

Safety

The railway is safer now than it has ever been and is the safest form of transport in Britain. For example, Category 'A' Signals Passed at Danger (SPADs) and the incidence of broken rails have been reduced to their lowest ever levels.

Working on the railway is also getting safer and the Safety 365 campaign continues to be a success. The accident frequency rate measure for Network Rail employees and contractors has continued to decline over recent years.

Network Rail and train operators have clear and distinct accountabilities for the risk hazards on the rail network. The safety improvement plans for Network Rail and train operators are brought together by the Railway Safety & Standards Board (RSSB) in the annual Railway Strategic Safety Plan, which will be published in January 2008. The input to this process for the 2008 - 2010 plan has formed the starting point for the strategies to deliver the safety improvements proposed in the DfT HLOS for CP4 (since safety is not a devolved matter, this also covers Scotland).

Safety on the railway depends largely on the proper design, construction, maintenance and operation of the network. Most safety improvements will be achieved through more effective and efficient development and management of the network. The key areas of Network Rail operation that are expected to contribute to the reduction in train accident risk are:

- infrastructure asset strategies (particularly track and structures);
- improvements in management of weather related risks;
- improvements in irregular working; and
- level crossings management.

Figure 6 Operating, maintenance and renewal costs

£ million	CP3	ISBP	SBP E&W	SBP Scotland	SBP Total
Controllable opex	4,240	3,854	3,429	342	3,771
Non-controllable opex	1,632	2,115	1,690	152	1,842
Maintenance	5,868	4,765	4,356	463	4,819
Renewals	14,232	10,846	9,966	1,396	11,362
Discretionary investment	225	-	807	78	885
Renewals deferred from CP3	-	-	229	11	240
Total	26,197	21,580	20,477	2,442	22,919

The key areas of improvement in non-train accident risk to passengers are expected to result from a reduction in risk at stations through a reduction in slips, trips and falls; passenger assaults; and boarding and alighting risk. The largest element of risk at stations is slips, trips and falls. We will work with train operators to reduce this risk particularly in our role as landlord at stations.

Plans proposed by Network Rail and train operators are expected to reduce workforce safety risk by more than the government target by the end of CP4. The required improvements will be delivered through a combination of better processes and systems; improved communication of safety information; enhanced competence and leadership; improved physical controls; and improvements to safety culture.

Sustainability

Central to the success of a modern society and economy is an effective and efficient transport network. Network Rail is committed to playing its part towards this by contributing to the provision of an integrated, socially inclusive and environmentally sensitive railway which meets the demands of a growing economy.

Our plans are targeted at improving the sustainability of the rail network, by addressing the three interrelated pillars of sustainability which are used by many organisations:

- economic – improving the value provided by the railway to the economy;
- environment – minimising the impact that the railway has on the environment and the use of non-renewable resources in delivering rail services; and
- social – the provision of a safe railway that meets the expectations of society in terms of accessibility and social inclusion.

Improving economic sustainability is at the heart of many existing initiatives to deliver substantial efficiency and performance improvements in CP4. We are focussed on seeking to optimise the rail system over its whole life by examining the overall cost of the infrastructure, rolling stock and train operations. Improving the attractiveness and affordability of rail to its users and funders perhaps represents Network Rail's greatest contribution to the environmental challenge, since it facilitates modal shift from less environmentally-friendly transport modes. The Eddington report, for example, highlighted the productivity and environmental importance of rail freight.

However, the environmental challenges which society faces are considerable and all transport modes will come under increasing pressure to reduce their carbon footprint and use of non-renewable resources. For CO_2, we are focussing on emissions from both traction energy (i.e. the power to run trains) and non-traction energy (heating and lighting at stations and offices etc). For the latter, we are aiming to reduce emission levels by 20 per cent during the next control period through a series of energy efficiency improvements and increased use of renewable energy. Reducing traction energy emissions is not entirely within our direct control and we are working with train operators to develop plans and targets which are expected to be in place during 2008.

We are continuing to explore opportunities to source material from renewable supplies, including an increased use of Forestry Stewardship Council (FSC) certified wood. With waste we are planning to recover, recycle or reuse in excess of 60 per cent of waste generated at offices, stations and depots. This is in addition to the 90 per cent of track waste already recovered, recycled or reused.

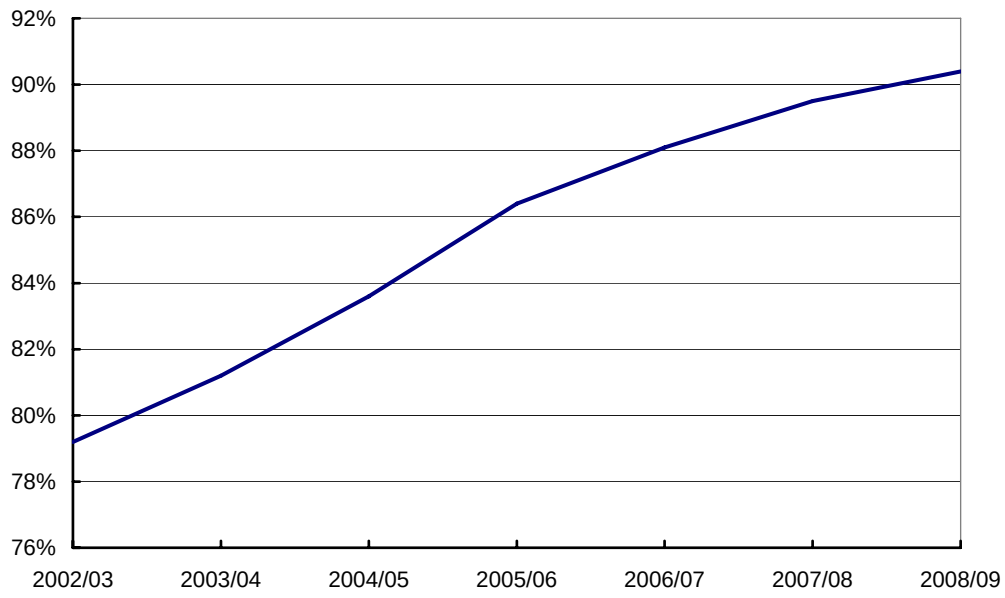
From a social context our plans are targeted at supporting passengers, the wider public and our own people. For passengers we aim to provide a great travel environment where passengers feel safe and secure. We are committed to providing our lineside neighbours with timely information of our planned maintenance and renewal activities. We have comprehensive plans in place to continue to support the health and general well being of our people.

Our objective is to integrate consideration of sustainability issues into decision making across the business rather than regarding this as a separate activity. The comprehensive series of performance metrics that we have developed will assist in this. Further details of our work in this area are provided through our Corporate Social Responsibility (CSR) report.

Improving reliability

Figure 7 illustrates the improvement in the Public Performance Measure (PPM) over the last five years and projected to the end of CP3. This shows that punctuality has improved from 78.7 per cent to 88.7 per cent over this period. Moreover, we anticipate a further improvement to 90.4 per cent by the end of CP3 (including 90.3 per cent in Scotland) based on the Joint Performance Improvement Plans (JPIPs) and recent discussions with train operators. This

Figure 7 Public Performance Measure (PPM)



represents a reduction of 54 per cent in the proportion of trains cancelled or arriving late over this period as a whole. The improvement in Scotland has been even greater.

A large proportion of this improvement has come from improvements in the reliability of train operators. However, Network Rail has also achieved the challenging reliability targets set by ORR, for example, through investment in the infrastructure, more effective maintenance and the introduction of integrated control centres.

We have analysed the potential sources of future performance improvement and discussed these with train operators. The initial analysis was largely done at a network-wide level based on generic initiatives but we have now undertaken further analysis at a local level to understand the position for each operator. In considering this issue we have taken account of:

- internal benchmarking which indicates the potential improvements from improving average area or delivery unit performance to the level achieved by the best today;
- improved incident management and reduction in late starts;
- commitments made by train operators as part of the franchise process and other proposed changes;
- structured timetable improvements to improve consistency and robustness of the timetable and improvements in short term planning without compromising train operator costs or revenues;
- management of risks such as cable theft, possession overruns and other disruption caused by major enhancements;
- performance benefits from capacity driven enhancement schemes;
- performance benefits from efficiency or asset condition driven investment or changes in business processes; and
- potential investment and other changes which could deliver further improvements in performance.

The results of the analysis to date are summarised in Figure 8. The first two lines show the current level of PPM by sector and the projected level for the end of CP3. The next two lines show the expected baseline improvements by Network Rail and the train operators. However, the next two lines show that this is partially offset by the impact of growth and major enhancements.

This shows that PPM in Scotland can be expected to reach the target level of 92 per cent by the end of the next control period without substantial further investment. This partly reflects the substantial progress made over the last few years in Scotland.

By contrast, in England & Wales, the challenge is potentially greater. We believe it is realistic for Network Rail and the rest of the industry to be challenged to achieve overall PPM in England & Wales of around 91.6 per cent by the end of CP4 without significant additional investment. This would be achieved partly by focussing particularly on those routes which are performing

Figure 8 CP4 train reliability

Per cent	LSE	Regional	Long distance	E&W	Scotland
Current PPM	89.3	88.5	85.1	88.6	89.4
Projected 2008/09 PPM	91.1	89.9	87.3	90.4	90.3
Network Rail baseline improvements	0.9	1.2	1.7	1.1	1.6
TOC franchise improvement	0.4	0.3	0.3	0.3	0.4
Timetable developments	0.5	0.6	1.1	0.6	-
Impact of traffic growth	(0.4)	(0.3)	(0.2)	(0.4)	(0.2)
Impact of major works	(0.6)	(0.2)	(0.3)	(0.4)	-
Projected 2013/14 PPM (without further investment)	91.9	91.4	89.9	91.6	92.1
HLOS forecasts	93.0	92.0	92.0	92.6	92.0
Current gap (requiring further investment)	1.1	0.6	2.1	1.0	(0.1)

relatively poorly today and we would therefore expect PPM for each operator to reach a minimum 90 per cent by the end of CP4 without significant additional investment.

While we will aspire to improve performance beyond these levels, this leaves a potential gap compared to the HLOS targets for England & Wales. We have concluded that significant investment would be required from Network Rail and the train operators in order to enable the industry to meet these targets. We have worked with train operators to assess the most cost-effective way of eliminating this gap and to assess the likely cost. The potential solutions for each route are set out in the relevant route plans. Our current view is that this could cost up to £400 million over the next control period based both on generic initiatives and local interventions.

Achieving these targets amounts to a reduction compared to today of 34 per cent in the proportion of trains arriving late or cancelled. The scale of the challenge is highlighted by the fact that the target level of PPM was only achieved on five per cent of weekdays in 2006/07. Given the inevitable seasonal variations in performance, daily PPM will need to be consistently over 94 per cent across the network as a whole.

We also recognise the importance of reducing severe delays and cancellations since these have a significant impact on passenger perception of reliability. Our approach will always be to operate the railway in the best interests of passengers on a day-to-day-basis rather than focussing on particular metrics. Subject to this, the analysis we have done to date suggests that the improvements specified by DfT can be achieved through improved processes and other planned initiatives.

This plan therefore aims to meet the reliability targets in the HLOS. In managing the delivery of these improvements, however, we believe that the priority should be given to:

- improving PPM on all routes to at least 90 per cent as soon as reasonably practicable; and
- reducing severe delays which particularly impact on the perception of performance on the railway.

We believe it will be important to retain an element of flexibility in this area. It remains unclear how highly passengers value continuous improvements in punctuality beyond around 90 per cent. In our view, the case for further improvement should therefore be kept under review as performance improves. In some cases, it may be preferable to provide additional services even if this results in a reduction in PPM. Moreover, since we have not included significant contingency in these projections it may not offer best value for money for the industry to invest substantially more than our current assumptions if the proposed interventions do not turn out to deliver the assumed improvement in punctuality.

We also plan to improve the level of delay to freight trains by around 25 per cent. We have consulted our freight customers and believe that the industry would benefit from a more rigorous approach to freight performance, with a particular focus on management of time-sensitive traffic. This will require an improved suite of measures for freight. Improvements in this area will have benefits to freight train operators and freight users, and also to the passenger railway.

We propose to develop our plans in this area further with train operators and to discuss these with ORR, DfT and Transport Scotland. We will provide an update on the results of this work as

part of our April 2008 update on the Strategic Business Plan. More fundamentally, we intend that these longer term improvement initiatives should be embedded in the JPIP process as we move into CP4.

A key enabler for the improvement in performance will clearly be improvements in the reliability of the infrastructure. In particular, the infrastructure at critical junctions will need to become much more reliable if we are going to achieve these targets and we aim to reduce dramatically the asset failure rates where this has a major impact on performance. Maintaining or improving asset condition for the long-term through more effective maintenance and through continued investment in the network is also fundamental to our plans for improving efficiency and sustainability whilst continuing to improve safety.

Substantial progress has been made in improving the Asset Stewardship Index over the last few years and we expect to see continued improvements in this area. This is expected to improve from 1.09 to 0.72 over CP3. We have refined this index so that it provides more of a measure of underlying asset condition going forward and to reflect more closely the indicators which will be used to manage ongoing business improvement.

Growing and improving rail services

Demand for rail services has increased by nearly 45 per cent between 1996/97 and 2006/07. Last year alone, total passenger demand increased by more than eight per cent to 47 billion passenger kilometres. For many peak services, standing is routine, with a significant number of passengers travelling on trains with loads at or above their capacity. This is a particular issue on some London and South East services, long distance services that also serve commuter markets, and commuting into major cities.

There is broad consensus in the industry that there will continue to be strong growth in passenger demand, as a result both of external factors such as economic growth, and of continuing improvements in train services and punctuality. At a UK level, all parties at least expect demand to increase by around 30 per cent over the next ten years; and operators in particular believe that growth could well be significantly higher than this. Road pricing could also generate additional demand but we have not taken account of this in the SBP since we would assume that funding to accommodate such growth would be provided as part of the relevant road pricing scheme.

Over the last ten years, freight moved over the network has increased by 50 per cent, measured in tonne kilometres. The main commodities responsible for this trend in recent years have been the transport of coal and the movement of deep sea containers. For all commodities, we anticipate that increasing congestion on roads and environmental issues will lead to rail being in an increasingly strong position to win market share. The Freight RUS projected overall growth in tonnes lifted of around 27 per cent over the ten years to 2014/15 and we believe that this remains valid.

As well as the increase in capacity requirements to meet the demand for passenger and freight services, there are increasing demands for improvements in rail services, for example, through reduced journey times, improved connectivity, better facilities at stations and more “seven day” operations.

Strategy for passenger growth

We have worked with train operators and funders to understand the best way for the industry as a whole to meet the required level of capacity. This work has built on the ongoing development of the RUSs and Route Plans as well as work done with DfT and Transport Scotland on the development of their plans.

The development of the growth strategies in this plan has therefore been informed by the application of the “toolkit” which has emerged as part of the RUS process. The generic capacity options considered as part of this toolkit include timetable solutions, train-lengthening, other rolling stock solutions, demand management, engineering access arrangements and infrastructure investment.

In order to accommodate the growth in demand, investment is required to enhance the capacity of the network, both in terms of additional rolling stock and greater infrastructure capacity. The proposed strategies for individual Strategic Routes are set out in more detail in the Route Plans which form one of the main supporting documents to the SBP.

These strategies imply a significant injection of additional rolling stock. In aggregate we, together with passenger train operators, have concluded that around 1700 to 1800 additional vehicles are required to meet the HLOS outputs over the next control period (1500 to 1600 in England & Wales

and around 200 in Scotland). This assessment assumes that each additional vehicle will deliver the same capacity as the vehicles currently deployed. We have also identified in the plan where on the network we believe this additional rolling stock is required.

Further vehicles may be justified if demand turns out to be greater than assumed. In addition, this plan does not include the financial cost of funding the new rolling stock; nor does it include the cost of depots or, generally, stabling for new rolling stock. We have not provided detailed plans for cascade of rolling stock which will be developed subsequently by the industry and its funders. The DfT has committed to publishing a rolling stock plan by January 2008 and the SBP will help inform this. We will also continue to work with Transport Scotland and the train operators on the implications of their rolling stock proposals for Scotland.

Infrastructure enhancement

As part of its HLOS, DfT specified a number of projects which it proposed to fund over the next control period. These comprise existing capacity schemes such as the King's Cross development, and the remaining elements of the West Coast Strategy including Stafford-Colwich remodelling. In addition, the HLOS included a requirement to progress the Thameslink programme, the Reading station area re-development, the Intercity Express Programme (IEP), and the Birmingham New Street station development. The total expenditure on baseline and other specified DfT schemes in CP4 which requires funding through the periodic review is £5,257 million including contingency.

In addition to these specified schemes, there are a number of other potential projects which would need to be funded by DfT through the review to meet its capacity specification. These include platform lengthening and power supply strengthening to support longer trains, key junction enhancements to support service changes, and station capacity schemes to deal with additional passenger throughput. These schemes have been identified through discussion with train operators but in most cases they are at a very early stage of development. The projected cost including contingency is £1,978 million.

DfT also made provision of £234 million for the continuation of the Network Rail Discretionary Fund (NRDF). This is intended to facilitate small scale improvements to the network. We believe that this approach has provided an effective stimulus to the delivery of enhancement on the back of renewal and closer working with train operators to identify opportunities for improvement. We strongly welcome its continuation. Since it is proposed that there should be no separate Safety & Environment fund in CP4, we would also expect to use the NRDF to fund a limited amount of investment in this area.

We have assumed a separate amount for funding of further development work in CP4 for capacity improvements which would be delivered in CP5 and beyond. In addition, the plan includes proposed enhancement options during CP4 that, although not necessary to deliver the HLOS outputs, we believe offer good value for money as increments to planned investments in CP4. These represent particular opportunities during CP4 such as accelerated renewals at Reading and enhancements to renewals such as at Crewe and Redhill and various line speed improvements. The estimated cost for these options is £267 million.

The main projects specified by Transport Scotland for delivery in CP4 are the Glasgow Airport Rail Link, Airdrie-Bathgate and Borders Rail. However, Network Rail's role in the latter is very limited, as this will be delivered separately. The total Network Rail element of cost for these schemes for funding in CP4 is therefore £318 million including contingency. Transport Scotland also provided £20 million for small projects.

In addition, Transport Scotland has included within "Tier 3" of its HLOS, a number of schemes which it is keen to develop and begin the implementation of during CP4. These schemes are at a very early stage of development but include amongst others, proposals for increasing capacity and improving journey times on routes such as the Edinburgh to Glasgow line, the Ayrshire routes, the Highland mainline and between Aberdeen and the central belt. It also includes development of a rolling programme of electrification of routes. Although the SBP only includes the costs associated with developing a plan to deliver the required outputs, we are looking forward to continue to work with Transport Scotland to obtain the necessary funding.

A key issue for the business, for the railway and for its funders concerns the treatment of risk associated with enhancements. Proper funding is required to enable us to bear these risks which also need to be managed by the party best able to do so. However, many of the proposed

projects are at a relatively early stage of development and setting a fixed price for the management of these risks may not offer best value for money to our customers and funders. We have developed a pain-gain sharing arrangement with DfT to incentivise efficient delivery of the Thameslink Programme without imposing excessive risk onto the business. We believe that arrangements should be introduced which are similar to those in other regulated infrastructure industries.

Freight

The Freight RUS identified the priorities for the development of the capability and capacity of the network for freight. This was principally driven by significant changes in the level or pattern of demand for two commodities: coal and deep-sea inter-modal traffic. Interventions to respond to these changes have been developed and address key constraints on the network. Larger scale interventions, such as gauge enhancement between Southampton and the West Coast and gauge and capacity enhancement between Nuneaton and Peterborough, have been taken forward through the award of Transport Innovation Fund (TIF) funding. We hope to be able to continue to use TIF to fund this type of investment.

Besides TIF funding, DfT announced in the White Paper that funding will be made available in CP4 to develop the concept of a Strategic Freight Network (SFN). The purpose of the SFN is to provide an enhanced core trunk network capable of accommodating more and longer freight trains, with a selective ability to handle wagons with higher axle loads and greater loading gauge. We believe that this provides an important opportunity to make better use of railway capacity and to provide improved services for both freight and passenger operators.

The DfT White Paper did not specify which parts of the network would be designated as SFN or which schemes should be progressed. We have agreed with stakeholders that we will consult with them to prioritise potential candidate schemes for SFN funding. To this end, we have established an SFN steering group with our industry partners.

Seven day railway

We are working with our customers and stakeholders to develop the concept of the "seven-day railway" with the aim of providing a railway when our customers want it and reducing disruption, particularly at weekends. This will provide additional train paths and improve the overall availability of the network for train operators, whilst delivering the engineering requirements for maintenance, renewal and enhancement of the infrastructure. Getting the balance right between running additional services and providing sufficient access to maintain the railway is crucial to meeting the growing and changing demand for rail travel in a safe and affordable way.

The delivery of more of a seven-day railway service is complex and requires participation of most industry members. Many of the planned improvements to the way Network Rail operates will also contribute to the delivery of a seven-day railway including better access planning, more reliable timetabling, and increased productivity of possessions, modular infrastructure, and more efficient maintenance. In particular, we consider that there are significant benefits to be achieved from improved discipline about when disruptive possessions are taken. We will also need to work with our suppliers to find more innovative ways of doing things.

We have already provided for the additional costs of managing within the reduced access on the West Coast Main Line as part of our base maintenance and renewal projections described above. These additional costs are being reviewed by ORR. There will be further incremental costs for Network Rail to facilitate the additional services associated with more of a seven-day railway service elsewhere on the network.

Our initial assessment is that the incremental cost compared to our baseline plans could be around £300 million. Much of this is capital investment which will have longer term value. Although we believe that the potential benefits are greater than this, it would clearly not be appropriate to commit to these investments until this has been demonstrated and further work is required with train operators in this area. One option would be to treat this item in a similar way to the Network Rail Discretionary Fund and we propose to discuss this with ORR, DfT and Transport Scotland to decide whether the estimated funding requirement in these areas should be combined.

Stations

We have been developing an overarching strategy for stations which recognises their key importance as gateways to the rail network and the need for the industry to improve the passenger experience of the station environment. Our vision is for stations that provide a safe, sufficient (i.e. serving the capacity

need) and inviting environment where all passengers can easily transfer between different modes of transport as part of a seamless and satisfying overall journey experience.

Our plans include proposals for the development of our major stations portfolio, funded by a mix of public and private funding. This includes proposals at King's Cross, Birmingham New Street, London Bridge, Waterloo, Victoria, Euston and Edinburgh Waverley. These will deliver a variety of benefits include additional pedestrian and platform capacity, improved ambience and facilities as well as wider economic and regeneration benefits.

The development of modular stations and other initiatives is helping to improve the affordability of improvements in stations. We hope that this will encourage local authorities and other third parties to invest further in this area to help improve services to passengers and we propose to work further with train operators to facilitate this.

DfT has announced a possible £156 million funding for a programme of improvements to stations which will deliver improvements to approximately 150 medium sized stations in England and Wales. The primary objective of the resulting National Stations Improvement Programme (NSIP) is to bring about a noticeable and sustainable improvement in the environment at stations for the benefit of passengers. The Access for All programmes will also continue with £197 million expenditure in the next control period and this is included with the baseline schemes.

We are committed to working closely with train operators to prioritise and integrate all available funding for work at stations and to leverage in third party funding. We believe that the NSIP programme can help substantially in facilitating this. We will also provide much greater transparency of our plans, disaggregated to each Station Facility Operator, so that this can provide the basis for more effective discussion with operators in this area. In addition, we are keen to explore different delivery options which could mean that operators deliver more of the required investment at stations.

Projected enhancement expenditure

Figure 9 summarises the resulting enhancement expenditure on the network. The main areas of expenditure are required to meet the capacity and performance improvements required by DfT and Transport Scotland. This also includes £779 million of projected expenditure which is funded by third parties. However, this is subject to further development and confirmation that the required funding is available.

Our plans do not include provision for London Crossrail. However, we have taken account of its impact in other aspects of our plan to avoid

Figure 9 CP4 enhancements

Type of project	CP4 total £m	Description
DfT Baseline	1,221	Projects assumed "committed" in the explicit funding in the DfT SoFA (e.g. West Coast)
DfT Specified	4,036	Projects and funds explicitly named in the DfT HLOS (e.g. Thameslink Programme and NRDF)
DfT HLOS	1,978	Projects NR considers are required to deliver the HLOS metrics (e.g. platform lengthening proposals). Includes proposed funds for development of CP5 schemes
DfT other	447	Projects not required to deliver HLOS outputs but offer value for money opportunities during CP4 plus CP5 scheme development funds for CP4
Performance projects	400	Projects to deliver 92.6 per cent PPM
Seven day railway	270	Projects to support move towards seven day railway
Total DfT funded	**8,353**	
Tier 2 schemes	318	TS HLOS specified projects (e.g. Airdrie – Bathgate, GARL & Borders)
Tier 3 schemes	13	Development of Tier 3 schemes
Small projects fund	20	
Seven day railway	30	Projects to support move towards seven day railway
Total Transport Scotland funded	380	
TIF projects	117	Round 1 TIF projects such as Peterborough – Nuneaton
Third party projects	779	
Total	**9,630**	

potential inconsistencies. We assume that the required funding for those parts of the project which are to be delivered by Network Rail will be provided in parallel to the periodic review process.

The DfT's White Paper confirmed the need to continue to review the case for potential new inter-urban lines, including use of existing disused alignments to provide additional north-south capacity in the long term. We have made no provision for this in our plan since this is a longer term issue. However, we are keen to continue working with operators and government to take this forward so that we can plan appropriately for the whole network.

Conclusions

Expenditure and income projections

Figure 10 summarises the total projected expenditure on operating, maintaining, renewing and enhancing the network in Scotland and in England & Wales over CP4 compared to CP3. This table excludes third party and TIF funded enhancements since these are outside the scope of the periodic review.

Figure 10 also shows our projected single till income from property rental, sales and development. This projected income is deducted from our expenditure to calculate the revenue we require from access charges and grants. This means that securing this single till income is clearly important for our customers and funders since it effectively pays for an element of our required expenditure and any outperformance can also be reinvested in the railway.

Due to challenging market conditions, the projected single till income is reduced slightly compared to CP3 and compared to the assumption in the ISBP. However, we also expect to be able to take the opportunity presented by commercial developments to deliver further improvements to the railway with a value in the order of £300 million effectively being funded by third parties. In addition, since there is significant uncertainty about the timing and scale of the London and Victoria development proposals the expected positive financial contribution from these plans has been excluded from our projections.

In aggregate, the table shows that our net expenditure would increase by around £2.5 billion (or £500 million in a year) in CP4 compared to CP3. This is in spite of the very substantial efficiency improvements in both periods and is attributable largely due to enhancement expenditure increasing by over 100 per cent. We will clearly wish to work closely with DfT and Transport Scotland as well as ORR as we continue to develop our plan and we recognise that it may be necessary to prioritise our expenditure within the available resources.

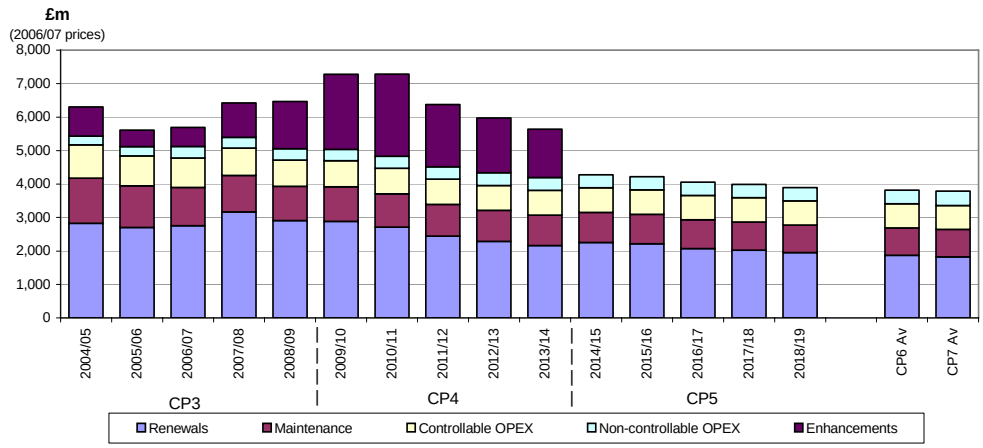
Figure 11 illustrates the long term trend in operating, maintenance and renewal expenditure. This shows that total expenditure is expected to continue falling significantly over the next two control periods as we address the remaining backlog of investment in the railway while improving our efficiency. The average level of controllable operating and maintenance expenditure in CP7 is £1.5 billion compared to £2.0 billion in CP3, and renewals expenditure in CP7 is £1.8 billion compared to £2.9 billion in CP3.

Taking account of the impact of demand growth implies an even greater reduction in the ongoing infrastructure cost per passenger or per freight tonne mile. However, we have not attempted to include an assessment of the cost of longer term enhancements to meet ongoing growth.

Figure 10 Total expenditure and single till income

£ million	CP3	ISBP	SBP E&W	SBP Scotland	SBP Total
Controllable opex	4,240	3,854	3,429	342	3,771
Non-controllable opex	1,632	2,115	1,690	152	1,842
Maintenance	5,868	4,765	4,356	463	4,819
Renewals	14,232	10,846	9,966	1,396	11,362
Discretionary investment	225	-	807	78	885
Renewals deferred from CP3	-	-	229	11	240
Enhancements	3,306	8,250	8,353	380	8,733
Single till income	(2,536)	(2,505)	(2,156)	(177)	(2,333)
Total	**26,967**	**27,424**	**26,674**	**2,645**	**29,319**

Figure 11 Long term expenditure



Financial projections and charges

The calculation of the required level of income from access charges and network grants derives from the assessment of expenditure and other income requirements outlined above. It also depends upon the assumed financial "building blocks" such as the allowed rate of return and depreciation or amortisation.

It is clearly essential that there is sufficient financial buffer to enable the business to manage risk. We have been working with ORR and government on the appropriate assumptions in this area. We will also need to discuss these assumptions further with rating agencies since they are clearly critical to our plans to raise finance without the need for a government guarantee and help us to build on the progress which has been made over the last five years.

For the purposes of this plan we have assumed a financial risk buffer of £250 million for Great Britain as a whole (split pro rata between England & Wales and Scotland) at the top end of the ORR range. This is less than five per cent of our operating, maintenance and renewal expenditure and is broadly equivalent to the level of efficiency savings assumed in the initial years of our plan.

As explained above, we have made separate allowance for contingencies in our proposed enhancement cost projections. We are keen to discuss with ORR, DfT and Transport Scotland how best to treat these costs without imposing unnecessary risks on the business or making the investment unaffordable for government.

We have assumed a real rate of return is 4.5 per cent in line with ORR's assumptions. This generates additional profits over and above the risk buffer which go into a ring-fenced fund. In England & Wales we assume that this fund is used for investments which are already included in this plan; in Scotland we assume that it funds some of the "Tier 3" enhancements which we will be developing further with Transport Scotland.

These assumptions lead to a gradual increase in the annual revenue requirement in the next control period as a result of increased depreciation and the return on the RAB. At the same time, the level of debt increases from £22 billion at the end of CP3 to £34 billion at the end of CP4 (£28 billion in 2006/07 prices). These changes reflect the substantial expenditure on enhancements which will also result in additional income to the industry as well as wider benefits to passengers or freight users and to the wider economy. Our debt as proportion of the RAB remains at around 70 per cent, well below the 85 per cent threshold in our licence. By way of comparison, net debt levels in the aggregate UK water sector are above our current level and are projected to increase significantly over the next few years.

As part of this plan we have also set out our initial assessment of the potential impact on our track access charges. Changes as a result of the review are generally passed on to government by franchised passenger train operators. However, this is not the case for freight and open access operators. Based on the traffic forecasts in this plan, our initial assessment is that freight income from usage charges in 2009/10 would be £93 million if based on efficiency assumptions for the end of CP3 or £81 million if based on efficiency assumptions for the end of CP4. Both these figures are well within the cap of £99 million set by ORR and both represent a significant reduction on current usage rates. If

the new freight-only charge proposed by ORR for ESI coal and spent nuclear fuel is introduced we estimate that this would add £3.1 million to charges in 2009/10, rising to £7.9 million by 2013/14. Charges in the early years of the control period would be constrained by the ORR caps, but are well within the overall cap for the end of CP4 of £15.3 million.

Achieving change

Success depends inescapably on our ability to manage change in a very demanding environment. Building leadership and management competencies is essential. But we also need to continue investing in training and development initiatives for all our people. For example, continuation of the award winning apprenticeship scheme and our graduate recruitment programme will play an increasing role in stimulating major cultural change throughout the business. At the same time, we need to recognise that the shortage of skills is a strategic issue for the industry as a whole and, in order to recruit the best people, the railway will need to be recognised as a great place to work.

It is clear that Network Rail cannot deliver this plan alone. We need to work in close partnership with the rest of the industry so that we can all achieve our objectives. Our ultimate customer is the passenger and freight user, and we believe that the industry needs to focus jointly on their requirements. At the same time, however, we must focus on the requirements of train operators, working with them to improve rail services and to provide an industry view to government and other funders on how best to achieve further improvement. To succeed, we also need an effective partnership with our suppliers so we can improve the efficiency of our processes and, hence, improve the affordability of continued improvement in railway services.

We are therefore looking forward to working with our people and our partners to build on the achievements of the last five years and successfully deliver our plans for the next five years.

1 The strategic context

Introduction

This document is Network Rail's 2007 Strategic Business Plan (SBP). It sets out Network Rail's proposed plans for the operation, maintenance, renewal and development of the rail network. These plans are produced as part of an overall strategy for the rail industry. The document's primary focus is on Control Period 4 (2009/10 – 2013/14) but it also includes high level projections over a longer period. The price base for the plan is 2006/07 prices.

As far as possible, Network Rail has developed the SBP in partnership with the rest of the industry, and in particular our customers, the train operators, as well as our major funders, the UK and Scottish governments through their officials at the Department for Transport (DfT) and Transport Scotland respectively. This includes both existing activities, such as the Route Utilisation Strategies and Route Plans, and specific initiatives in support of the SBP.

The SBP supersedes the Initial Strategic Business Plan published in June 2006. The plan will continue to be refined as part of the periodic review process leading to the development of our March 2009 Business Plan for the next control period.

The railway today

In developing plans for Control Period 4 (CP4) and beyond, we need to understand the position of the railway today.

Safety

The railway is now the safest form of transport in Britain. This has been delivered by achievements such as the reduction in the incidence of broken rails to the lowest on record and the introduction of TPWS and TPWS+ which dramatically reduce the risks if trains pass signals at red.

The railway is not just a safer place to travel but is also a safer place to work. We have achieved a step change in our workforce safety performance; many parts of our business have a safety performance record that compares favourably with the best in the world.

Reliability

The Public Performance Measure (PPM) increased by 1.7 percentage points to 88.1 per cent for the full year 2006/07. This is a reduction of 12 per cent in the number of trains cancelled or running late. The current moving annual average is now at 88.7 per cent, which is 1.2 percentage points better than the same time last year. By the end of Control Period 3, PPM is expected to reach 90.4 per cent. This trend of improving performance has been delivered against a background of continuous increases in the number of trains running on the network.

Demand growth

Demand for rail services has increased by nearly 45 per cent between 1996/97 and 2006/07. Last year alone, total passenger demand increased by more than eight per cent to 47 billion passenger kilometres.

Levels of crowding vary enormously across the rail network and by time of day. For many peak services, standing is routine, with a significant number of passengers travelling on trains at or above their capacity, even if standing room is also taken into account. This is a particular issue on some London and South East services, long distance services that also serve commuter markets, and commuting into major cities.

Over the last ten years, the amount of freight moved over the network has increased by 50 per cent, measured in tonne kilometres. The main commodities responsible for this trend in recent years have been the transport of coal and the movement of deep sea containers.

Utilisation of the network

As a result of this growth in rail services, the rail network is approaching the limits of its capacity in an increasing number of places. This is apparent in the degree to which network capacity is increasingly fully utilised, in the levels of crowding on an increasing number of trains and in the increasing pressure on capacity at key stations.

The Capacity Utilisation Index (CUI) map in Figure 1.1 identifies parts of the network where there are significant capacity constraints. The most severe are the approaches to London, followed by capacity constraints on the main north – south routes of the West Coast, East Coast and Midland Main Lines. Then there are a number of regional hotspots centred on Birmingham and Manchester, and on the North Transpennine corridor. In Scotland the key constraints are in the central belt, particularly on the approaches to Edinburgh and Glasgow.

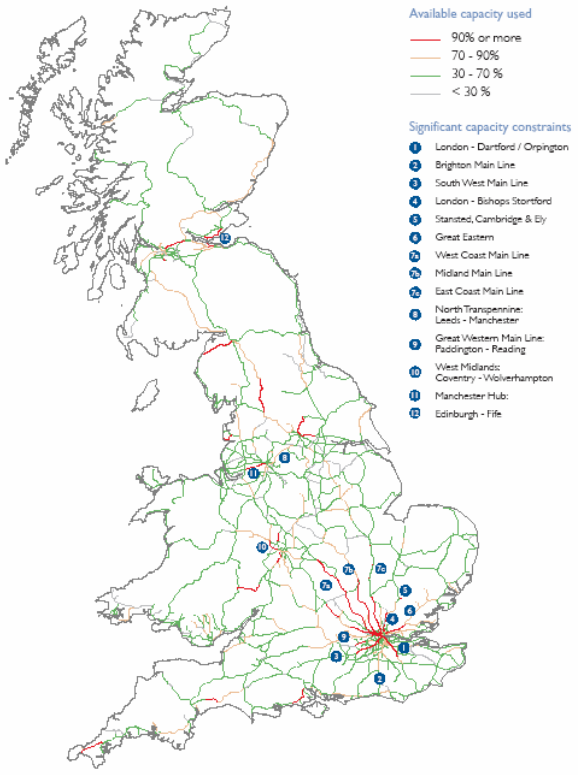
The map shows "plain-line" network utilisation in the peak hours. However, there are several other types of capacity constraint. Some key junctions constrain capacity due to the need to make conflicting movements. Similarly, the

number of platforms and/or track layouts at key stations can constrain capacity. Although capacity utilisation is usually lower outside the peak hours, it is not always practicable to use all of this capacity – in particular, lower utilisation during the "inter-peak" hours is essential to ensure that the timetable for the day as a whole is sufficiently robust. Access is also required for maintenance and renewals.

This high level of utilisation constrains the ability of the industry to respond to demand for additional services, where demand is greatest. In the past, it has often been possible to accommodate growth by running more trains, but the extent to which this is possible without enhancements to the network is becoming more limited and highly location specific. Even where additional capacity is available, the ability to use this for certain freight traffic is sometimes constrained by route capability including gauge.

On certain parts of the network, work is already underway to implement schemes to reduce capacity constraints, for instance at the West throat of Waverley station, doubling of the Bathgate branch line, extra platform capacity at King's Cross and the upgrade to the West Coast Main Line. There has also been substantial investment to enhance the gauge-clearance of key freight routes.

Figure 1.1 CUI map and key capacity constraints



Financial performance

The record growth in passenger numbers provides increased revenue for train operators. This, together with improving efficiency, is resulting in government projecting a reduction in the level of financial support provided to franchised operators during CP4. The profitability of freight and open access operators depends partly on the level of our charges and our improved efficiency will help reduce these charges.

Network Rail has largely completed the first two phases of the transformation programme to modernise the business. We have successfully delivered efficiency savings over the past few years despite the rising cost of materials and labour. By the end of the current control period we plan to have delivered a 31 per cent reduction in our unit costs compared to the start of the control period. We declared a profit for the first time in 2006/07, and because the company is not for dividend, this profit is ploughed back into the railway. In particular, we have used it to invest in small and medium sized enhancements on the railway such as doubling of Gretna - Annan.

Objectives of the plan

The objectives of the plan are:

- to set out a strategy for the industry and for Network Rail which delivers the High Level Output Specifications (HLOSs) for CP4 set by DfT and Transport Scotland;
- to meet any other reasonable requirements of our customers and funders; and
- to achieve these two objectives in a manner consistent with the long term strategies for the railway.

Long term strategy

An effective and efficient national rail network has a major role to play in supporting economic growth and in the provision of an integrated, socially inclusive and sustainable transport system. The Eddington report highlighted the importance of rail in helping to improve productivity. In addition, the environmental advantage that rail has over other forms of transport means that rail can help the UK meet its environmental challenges.

In respect of England and Wales, the Secretary of State for Transport published the White Paper "Delivering a Sustainable Railway" in July 2007 that set out plans for the growth and

development of the rail network. For England and Wales, the Government's ambition for the railway has been clearly defined, as a sustainable, modern railway that:

- can handle double today's freight and passenger traffic;
- is even safer, more reliable and more efficient than now;
- can cater for a more diverse, affluent and demanding population; and
- has reduced its own carbon footprint and improved its broader environmental performance.

Welsh Assembly Government's (WAG) draft Wales Transport Strategy sets out the vision for an effective, integrated transport system. The joint WAG and DfT Wales Rail Planning Assessment focuses on how railways can deliver wider social and economic objectives and will inform our Wales Route utilisation Strategy which is published in May 2008.

Scottish Ministers have published their National Transport Strategy and their plans for Scotland's Railways, which specify the strategic objectives and priorities for the rail network. For Scotland, the focus is on improving sustainable economic growth by improving journey times and connections, improving quality, accessibility and affordability and reducing emissions.

The High Level Output Specifications

The HLOSs from DfT and Transport Scotland have been expressed in different ways and the SBP must respond to both and set out robust plans for their delivery.

In the DfT HLOS the Secretary of State has set outputs for safety, reliability and capacity:

- the DfT HLOS specifies a reduction in safety risk for passengers and rail workers by the end of CP4 that applies across Great Britain as a whole;
- for reliability, it specifies sector based outcomes for the Public Performance Measure (PPM) and long delays and cancellations in England and Wales by the end of CP4;
- the DfT capacity specification sets out demand to be accommodated and load factors for London and other major urban areas in England and Wales; and
- in addition, it requires delivery of a number of specified schemes which would not be necessary to meet the above outputs in the short term.

The HLOS does not generally cover freight and its requirements are therefore addressed separately.

The Transport Scotland specification is in three tiers. Tier 1 requires Network Rail to maintain network capability and capacity as at the end of CP3 and work with the franchised train operator to improve PPM by the end of CP4 to a Moving Annual Average of 92 per cent.

Tier 2 identifies a number of enhancement projects that Transport Scotland wishes to see delivered in CP4 including Glasgow Airport Rail Link and Airdrie to Bathgate.

In addition, Transport Scotland has included within Tier 3 of its HLOS, a number of schemes that it is keen to develop and, in some cases, see implemented during CP4. These schemes are at a very early stage of development but include amongst others, proposals for:

- increasing capacity and improving journey times on key routes such as the Edinburgh to Glasgow line, the Ayrshire routes, the Highland mainline and between Aberdeen and the central belt; and
- a rolling programme of electrification of routes around Glasgow.

The implementation cost of these Tier 3 proposals will be significant. In line with Transport Scotland's HLOS requirements, only the costs associated with developing a delivery plan have been included within this Business Plan. Agreement to develop and deliver these schemes, and the associated funding required to do this, will be subject to further discussion with Transport Scotland.

A full statement of the DfT HLOS can be found at www.dft.gov.uk. A full statement of the Transport Scotland HLOS can be found at www.transportscotland.gov.uk.

Delivery of all the HLOS outputs will require the involvement of the whole industry, so we have sought to create substantial support from the industry for this plan.

Customer reasonable requirements

In developing our plan we have sought to understand and meet any other reasonable requirements of train operators, other providers of services relating to railways and funders. The full definition of the criteria we use to judge if a requirement is reasonable is set out in our

Business Planning Criteria and includes criteria relating to the availability of funding, the impact on existing commitments and the deliverability of the proposal.

Vision for the rail industry

Our vision for the industry is one where:

- passengers and freight users will rate rail as the best form of transport overall for reliability, safety, accessibility, convenience and value for money; and
- the 'GB railway' will be regarded by taxpayers as among the best in the world for reliability, safety and affordability.

This can only be achieved by understanding what our stakeholders want from us and excelling in what we deliver and how we work with them to meet their needs. Five key stakeholder groups have been identified:

- passengers and freight users;
- customers (train and freight operators);
- industry stakeholders (including funders, regulators, the two governments, Transport for London, local authorities and communities);
- suppliers; and
- our people.

Consultation with these stakeholders on their requirements and surveying their satisfaction helps us ensure that our plans remain aligned.

Our plans to achieve this vision and to meet the requirements of our stakeholders are based upon the delivery of a railway that has the following characteristics, with **safety** remaining our number one priority:

- **highly reliable** – delivering high levels of train performance that delight users, delivered consistently and are the best possible, given the funding and resources available;
- **seven-day** – available to meet user demand seven days every week and where early morning, late evening and weekend travel is not cancelled or replaced by bus services;
- **whole journey** – easy, comfortable and safe to use from the point at which the decision to travel by train is made, through to the point of departure from the destination station;
- **easily maintained** – a railway that is designed and installed using systems and components that require minimal levels of intervention and that can be easily maintained and replaced;
- **energy efficient and sustainable** – a railway that conveys growing numbers of people and freight, yet consumes low levels of energy and causes minimal damage to the environment;
- **affordable** – provides a high level of services yet requires a level of funding from government and users that represents excellent value;
- **improved capacity and capability** a railway that strives to increase network capacity and capability through the delivery of efficient renewals and enhancements and new ways of working;
- **integrated processes** – a railway that delivers consistently high quality, speed and simplicity; and
- **great people** – a railway delivered by great people within an environment that encourages them to excel.

Delivering this ambitious agenda is a major challenge. We need to become the best at what we do, and our transformation programme is aimed at putting in place the necessary building blocks by the start of the next control period to achieve this.

The need for flexibility

In developing the plan, there are many issues and uncertainties that we have made assumptions about. Many of the schemes proposed are in early stages of development and the plan for deployment of additional rolling stock is still being developed. As we approach the next control period, we will need to ensure that the plan is flexible and that we can adjust to changes in our assumptions. But we must also ensure that once committed to a course of action, the plan is robust to a range of possible scenarios.

The structure of the document

The rest of the document sets out the following:

- **Chapter 2: The demand for rail** – this explains the planning assumptions we have used for future rail demand, and the key drivers of this demand;
- **Chapter 3: The industry strategy** – this provides a summary of how we and the rest of industry propose to deliver the outputs required;
- **Chapter 4: Network Rail's policies and strategies** – this section sets out Network Rail's policies and strategies in relation to the management and operation of the railway;
- **Chapter 5: Efficiency and input prices** – this sets out the efficiency gains we believe are challenging but realistic over the next control period and our views on input price trends and external cost drivers;

- **Chapter 6: Our plan for CP4** – this sets out our forecasts of activity volumes and costs for operating, maintaining, renewing and enhancing the network and our forecast income from property and other activities;
- **Chapter 7: Expenditure and financing** – this sets out the financial assumptions and revenue requirements necessary to support the plan;
- **Chapter 8: Outputs** – this sets out the outputs that the plan will deliver, both at an industry level and for Network Rail's specific outputs;
- **Chapter 9: Options and sensitivities** – this explains the key assumptions and sensitivities and options for additional outputs or reductions in expenditure; and
- **Chapter 10: Summary of future developments** – this sets out the forward programme of activity within Network Rail to support and improve our understanding of the key issues set out in this document.

There is also a set of appendices to this document which summarise the forecasts of total expenditure, income and outputs together with disaggregated forecasts for England and Wales, and Scotland.

Supporting documents

As part of this submission we have provided ORR with supporting documentation that provides further detail and substantiation of elements of this plan. We have identified the supporting documents at the end of each relevant chapter. In some cases, these documents are also available on our website (www.networkrail.co.uk).

Comments

Comments on our Strategic Business Plan and further information on the plans as they develop will also be placed on our website where appropriate.

2 The demand for rail

In this chapter we describe how demand for rail travel has changed over the last 10 years, the current level of demand and our view of how demand will grow over the next 10 years.

The historic context

In describing the recent growth in rail travel, we look separately at changes in passenger and freight demand.

Passenger demand

Figure 2.1 shows that there have been considerable increases in rail patronage since privatisation. Passenger demand (measured by passenger trips or passenger kilometres) has increased by nearly 45 per cent between 1996/97 and 2006/07, with substantial growth in all market sectors. Last year alone, total passenger demand increased by more than eight per cent to 47 billion passenger kilometres.

There are a number of reasons for this growth in demand. A healthy economy and steady increases in employment have been reflected in strong growth of markets around Britain. Rail has cemented its position as first choice for travel into London (two thirds of rail trips start or end there); the number of people commuting into London has increased significantly, especially in the last year.

Commuting into major cities around Britain continues to rise at even faster rates than in London. The choice of rail for travelling to work in these cities has been influenced by changes to the structures of the buoyant city-region economies and changing local demographics. Major cities, such as Manchester and Bristol, have seen passenger numbers double over the last 10 years. Even large, well-established rail markets have seen substantial growth; Glasgow has seen patronage increase by more than 50 per cent. Similar rates of growth have occurred for rail travel on the key inter-urban corridors around Great Britain.

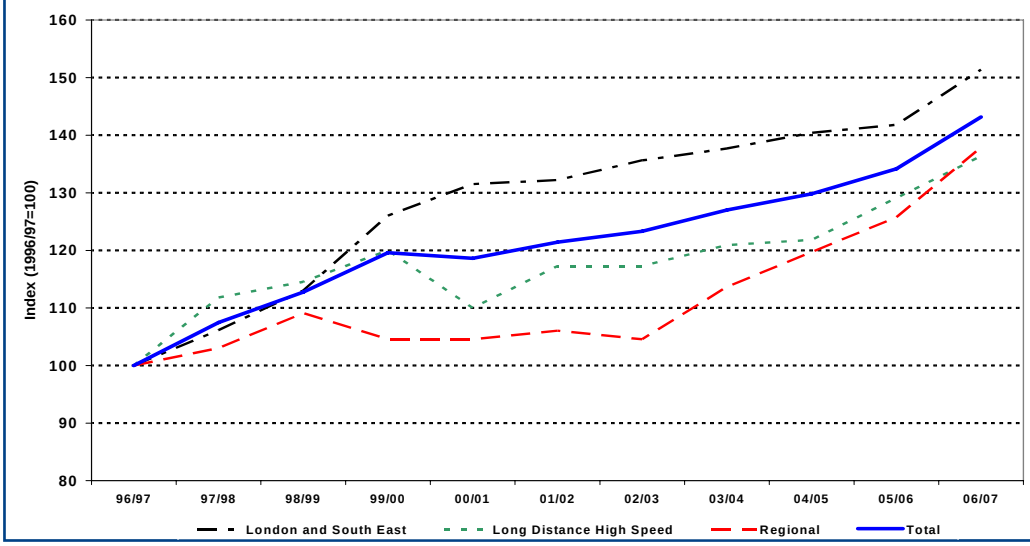
Rail's competitive position has also strengthened over the same period. Rising fuel prices and worsening road congestion have made car travel less attractive. Increasing concern about the impact of travelling by car on the environment may also have contributed to rising rail passenger demand. However, very long distance rail travel has faced stiffer competition from airlines.

Improvements in rail services and the initiatives of operators have helped to push demand higher still. Operators have delivered improvements in the quality of service offered, with increases in the frequency and speed of trains, as well as significant investment in new trains. Marketing and pricing initiatives have increased demand, and also helped to influence when people travel in order to make good use of available capacity.

Freight demand

Over the last 10 years, freight moved over the network (measured in tonne kilometres) has increased by 50 per cent. The main commodities contributing to this growth in recent years have been coal for electricity generation and the movement of deep sea containers.

Figure 2.1 Growth in passenger demand (Index 1996/97 = 100)



Coal traffic has increased by more than 50 per cent since 2001, driven by several factors. There has been a modest increase in the total amount of coal burned for electricity generation, as coal has become more competitively priced relative to alternatives, particularly gas. There has also been a trend towards burning more coal with a low sulphur content, which is less efficient and requires greater volumes. Finally – and most significantly – there has been a shift towards coal being hauled over longer distances (for example, coal is imported via the deep water port at Hunterston in Scotland and transported by rail to power stations in England).

The importation of goods from the Far East to satisfy domestic demand has been the primary driver of increases in the volume of containerised traffic on the railway over the last few years. The volume of deep sea containers imported into Britain has increased by more than five per cent a year on average over the last 10 years.

Rail is competitive for the trunk haul inland from the ports towards the containers' final destinations. Since privatisation, the rail share of this traffic has increased from 16 per cent to around 25 per cent.

Other key markets for rail freight are bulk commodities such as construction materials, metals, and oil and petroleum products. Transport of construction materials has increased by around 35 per cent since 1999/00, with growth associated with large infrastructure projects, such as the building of Terminal 5 at Heathrow airport. Other markets have been relatively flat or suffered from falling volumes, though goods have been transported over greater distances.

Demand today

As we noted in the previous chapter, the rail network is approaching the limits of its capacity in an increasing number of places.

London and South East services

Levels of crowding vary enormously across the rail network and by time of day. Standing on some London and South East (L&SE) peak services has long been routine, with a significant proportion of passengers travelling on trains at or above their capacity, even if standing capacity is taken into account.

More than half a million people a day travel into London during the morning peak. Passenger numbers for L&SE services (i.e. excluding long distance services) are shown in Figure 2.2. The table is based on the number of passengers on each train at its busiest point, which is slightly greater than the number of passengers that travel into the terminal stations. The table shows that around 100,000 people (about 20 per cent of the total) stand during their journeys each day. On some routes, we estimate that standing typically starts about 45 minutes out of London on the busiest trains.

Train operators measure crowding and report it to DfT and ORR, and the latter publishes statistics for L&SE peak services expressed in terms of percentage of "passengers in excess of capacity", or PIXC for short. For services which run for less than 20 minutes non-stop into London, the capacity of the service includes a standing allowance which depends on the amount of space available but is typically around 40 per cent of the number of seats. The current planning standard, for each TOC, is that PIXC should be no more than three per cent across the morning and evening peaks combined, and no more than 4.5 per cent over either the morning or evening peak individually.

Figure 2.2 Peak weekday travel to London (services terminating 07:00– 09:59 maximum load, Autumn 2006)

TOC	Passengers	Seats	Load Factor (% of seats)	Standing Passengers
c2c	27,200	25,500	107	3,400
Chiltern	9,800	11,700	84	500
First Capital Connect	55,800	51,500	108	9,700
First Great Western	13,700	12,300	112	3,000
one	83,500	79,400	105	13,000
Silverlink	12,900	13,300	97	1,000
Southeastern	123,200	101,100	122	27,300
Southern	84,900	67,300	126	21,500
South West Trains	93,900	79,500	118	21,500
Total (excl long distance)	**505,000**	**441,600**	**114**	**100,800**

The annual train counts in autumn 2006 showed that five TOCs (First Capital Connect, First Great Western, one, Silverlink and South West Trains) had crowding worse than the standard as defined by this measure. These TOCs carry more than half of morning peak passengers travelling into London. The overall PIXC for all L&SE operators combined now exceeds the planning standard.

Figure 2.3 shows how demand and crowding are spread over the morning peak. Demand is highest on services arriving in London between 08:00 and 09:00. Despite seating capacity being higher in this hour than in adjacent hours, there are approximately 70,000 passengers standing in this hour. However, even in the shoulder peak hours of 07:00 to 08:00 and 09:00 to 10:00, approximately 30,000 people have to stand. Over the three hours, around 23,000 people are carried beyond the capacity of the trains on which they travel.

PIXC is only monitored on L&SE trains approaching London. This measurement of crowding usually takes place at the busiest point. This is, on many routes, at a station outside the terminus where passengers can change onto the underground. The HLOS defines capacity requirements in a slightly different way. The capacity requirement is set in terms of a load factor for trains arriving at terminal stations (or on calling at a mainline station such as London Bridge) and also includes Long Distance (inter-city) services.

Long distance services

Load factors on long distance services vary widely. Services that also serve commuter markets (e.g. Cross Country services into cities such as Manchester and Leeds, and services from Reading and Peterborough to London) are particularly heavily loaded, with passengers standing for considerable distances. For example, the Strategic Rail Authority's Great Western Route Utilisation Strategy (RUS) showed an average load factor in excess of 100 per cent for long distance services arriving in London between 08.00 and 09.00. This indicates that travelling conditions are similar to those experienced by passengers travelling on outer-suburban commuter services into London. Even outside the commuter peak hours, however, load factors on an increasing number of trains are approaching 100 per cent.

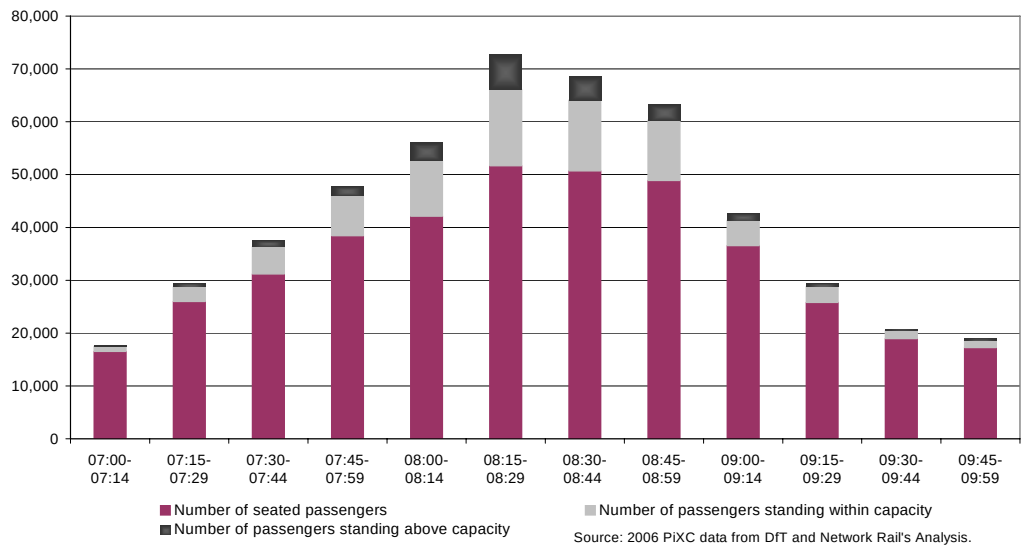
Train operators are responding to this by using discounted fares to attract passengers to less busy services. However, many passengers (in particular commuters and business travellers) have limited scope to change their times of travel. Without action to increase capacity during busier hours, further growth will be increasingly constrained, either indirectly via increased crowding levels (standing is not a realistic option for long distance passengers), or directly through increasing fares and/or ticket restrictions.

Regional services

Crowding on regional services is less widespread than on L&SE peak or long distance services. However, increasing patronage over the last decade has led to crowding problems, which are severe in some areas.

In particular, there has been significant growth in rail commuting into major cities. Rail has

Figure 2.3 Morning peak period demand and capacity to London



historically had a relatively low share of commuter traffic into most cities outside London, and this gives the potential for rail commuting to grow significantly faster than overall employment levels. For example, the SRA's West Midlands RUS identified that rail's share of commuting into Birmingham has increased from 12 per cent in 1991 to over 20 per cent in 2005.

This has resulted in significant peak crowding around urban areas. For example, work for the Yorkshire & Humber RUS has estimated that over 20,000 people travel into Leeds in the morning peak, of whom nearly 4,000 have to stand. More than 20,000 people travel by rail into Manchester in the morning peak, of whom approximately 2,500 have to stand. And even in cities where rail demand is much lower than this, individual trains can suffer from severe crowding.

Scotland

The needs of Scotland's rail passengers are particularly diverse. Passenger services range from those catering for millions of commuter journeys a year into Glasgow and Edinburgh to rural lifeline services which are characterised by considerable seasonal fluctuations in demand.

Rail passenger demand around Edinburgh and Glasgow has increased significantly in recent years. This reflects continued economic growth – in particular the growth in city centre employment in service based industries – and increasing road congestion.

Similar trends of increasing numbers of commuter journeys have been in evidence in other regional centres in Scotland. Rail passenger journeys into these regional centres have also increased, though at lesser rates than into Glasgow and Edinburgh as road is often a more competitive alternative around the smaller cities.

Station capacity

The growth of the last 10 years has put increasing pressure on the pedestrian capacity of key stations across the network.

Most major London terminals are at or near passenger handling capacity at peak times. Of the major regional stations, Birmingham New Street has the most acute crowding problems. An estimated 120,000 passengers use the station each weekday compared with just 60,000 when the station was constructed in the 1960s, and the high volumes of interchanging passengers pose a particular challenge to the management of the station. Other stations that experience peak congestion problems include Liverpool Central and a number of the central Manchester stations including both Piccadilly and Victoria. In Scotland, the major stations in Edinburgh and Glasgow are becoming increasingly congested.

The pressure on pedestrian capacity at stations increases overall journey times for passengers, as concourses and other areas become more congested. At peak times of day, it can lead to temporary closures of certain areas, for example the entrances to the London Underground. The need to maintain adequate pedestrian space can also lead to the removal of retail outlets, a share of the profits from which are used to subsidise the operational railway.

Future passenger demand

Drivers of growth

Demand over last 10 years has been driven by a number of factors, and we expect these same factors to continue to drive growth.

Economic growth has been perhaps the single biggest driver of demand for transport in the past, and we expect this to continue. Increased employment drives growth in commuting; demand for business travel is dependent on economic prosperity; and leisure travel is linked to levels of disposable income.

In terms of rail demand, the distribution of economic activity and housing is also important. Public sector planning policy aims to ensure that, where possible, new business, leisure and housing developments are well served by public transport, in recognition of the environmental, accessibility and other benefits that this brings.

Rail's main competitor for most journeys is the car. Between the 1950s and the 1980s, rail's competitive position against the car declined, as car ownership became more widespread and the costs of motoring (in real terms) fell.

Over the last 10 to 20 years, the decline in rail's competitive position has slowed and in some respects has reversed. The increase in car ownership is inevitably slowing, as more and more people own cars already. The costs of motoring have stayed broadly constant, albeit with variations because of changes in fuel prices. Road congestion has also become an increasingly significant factor contributing to growth in rail demand. We see these trends as likely to continue into the future.

National and local governments continue to consider congestion charging schemes, similar to that which operates in London; and, in the longer term, a possible national road pricing scheme. Such schemes might have very significant effects on rail demand, especially in the city-regions, although these effects might be not always be positive. For example, if road pricing were to be made revenue-neutral overall (by changes to fuel duty), with high charges for driving in the peak, this would imply a reduction in the overall costs of motoring in the off-peak, and might lead to a reduction in off-peak rail demand.

For longer distance journeys rail also competes with air. The success of low cost airlines over the last 10 years has suppressed rail demand for very long distance journeys, where airlines have a competitive advantage. For example, air carries five to six times as many passengers as rail between the south east and central Scotland. However, we expect that constrained airport capacity in the south east will reduce the scope for further growth in air traffic, at least at very cheap fares.

Growth forecasts

Long term forecasts of specific demand drivers, such as fuel prices and income, are subject to inherent uncertainty. The relationships between these drivers and rail demand are also not perfectly understood. Long term rail forecasts represent, therefore, scenarios based on the available views of the underlying drivers of demand.

The framework set out in the Passenger Demand Forecasting Handbook (PDFH) is widely used to predict growth in passenger demand. The PDFH is produced by industry parties, managed by ATOC, and contains the industry's standard approach to demand forecasting. The PDFH framework uses growth in employment and in GDP as the key economic drivers of rail demand. It takes into account competitive factors such as car ownership, the cost of motoring and road congestion.

There are some markets for which forecasts based on the PDFH are generally acknowledged to be too low. In particular, demand within the major urban areas outside London has grown very strongly over the last 10 years, well in excess of what the PDFH would have predicted, reflecting changes in the economic structure and employment patterns of the cities concerned.

We found this in the North West RUS for Manchester and Liverpool, and in the ECML RUS for Leeds and Newcastle. Current work in the Yorks & Humber RUS (around Leeds and Sheffield) and in the Wales RUS (around Cardiff) is identifying the same issue. For these areas the RUSs have developed or are developing bespoke forecasts in consultation with stakeholders.

The DfT's demand forecasts for the England and Wales HLOS use the PDFH framework, with adjustments for the major cities outside London. This gives forecast growth of about three per cent per year in passenger-kilometres, excluding the effect of train service improvements in stimulating further demand. Taking this into account gives a growth forecast of approximately 25 per cent by the end of CP4. Transport Scotland's HLOS is also based on growth of around three per cent per year.

During the preparation of this plan, it has become clear that train operators generally believe that growth is likely to be higher than this. This belief is based on a number of factors including gradually rising road congestion; greater awareness of rail's environmental benefits; ongoing improvements to rolling stock; and improved marketing of services. The nature of the franchising process, with competitive bids by prospective franchisees, is also such that operators are strongly incentivised to achieve high growth in demand. Operators believe that growth could be at or close to the current rates of six to seven per cent per year for some time. ATOC, for example, has suggested that this could lead to growth of around 40 per cent by the end of CP4.

We agree that there is some evidence to support a view that growth may exceed PDFH forecasts. Recent work for the Passenger Demand Forecasting Council concluded that much (though not all) of the rapid growth in 2006/07 might be explained as a "catch-up" from earlier years in which demand grew by less than predicted by the PDFH. However, the rapid growth appears to be continuing into 2007/08, and the longer this continues, the less plausible the "catch up" explanation becomes. It also appears that growth in demand between – as well as within – the major cities outside London has for some years been above what would have been predicted by the PDFH.

However, we do not believe that there is yet sufficient evidence to conclude that the PDFH framework should be abandoned, or replaced by forecasts based largely on projections of current growth. For the purposes of this plan we have

therefore adopted the demand forecasts from the DfT HLOS (for England and Wales) and the Transport Scotland HLOS (for Scotland). These forecasts are illustrated, at a high level, in Figure 2.4.

We recognise the potential risk to these forecasts if growth continues at its current rate. More generally, there is a risk that actual demand will turn out to be different to any forecast. However, we believe that this plan is generally robust to this risk, in that the interventions we are proposing either create the potential to accommodate growth beyond the HLOS forecasts, or are at least consistent with what would need to be done should growth exceed the forecasts. This is discussed in more detail below.

Robustness of the SBP to different demand forecasts

In developing this plan we have drawn on a wide range of sources:

- RUSs, where these exist or are in progress. The RUSs are based on demand forecasts that were made at the time of their development. Each RUS strategy and the demand forecasts underlying it are fully supported by the relevant Industry Stakeholder Management Group;
- route plans and discussion with train operators and other industry stakeholders in areas where RUSs are not yet underway; and
- specific enhancement plans (including those specified in the HLOSs) and the business cases for them. Each business case has a demand forecast, made during scheme development, underlying it.

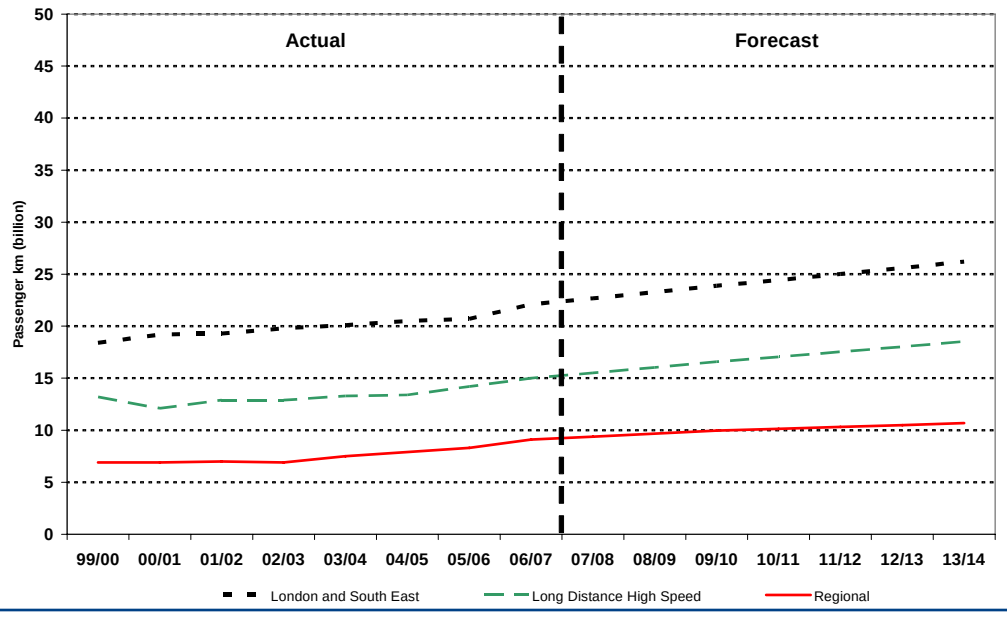
In one sense, therefore, no single demand forecast underlies the SBP. Rather, the strategy is implicitly based on a series of forecasts made at different times and with varying levels of detail. Inevitably these forecasts do not match in every detail.

The key issue is whether the differences between these forecasts – or indeed between these and any other forecasts – have a material effect on strategy. For example, is train and platform lengthening adequate to meet capacity requirements, or not?

We believe that the differences between the forecasts underpinning the various elements of this plan, and those used by the DfT and Transport Scotland in their HLOSs, do not materially affect the strategy that we propose. Around London and the major urban centres, for example, we are content that the differences between the forecasts are small and the reasons for them are well understood.

We also believe that, should growth be significantly higher than these forecasts, our strategy will still be robust. The interventions that we propose either create the potential to accommodate growth beyond the HLOS forecasts, or are at least consistent with what would need to be done should growth exceed the forecasts.

Figure 2.4 Background growth predicted by sector



For example, lengthening of platforms from eight-car to 10-car (as proposed on several routes around London) creates capacity to accommodate growth of 25 per cent, more than that predicted by the HLOS forecasts. And in delivering the platform extensions, we would generally seek to make "passive provision" for further extension to 12-car length, for example by ensuring that any signals that had to be moved, were moved to a position consistent with 12-car operation where this was reasonably practicable.

However, if growth does prove to be significantly higher than the HLOS forecasts, this would imply a need for further rolling stock (in addition to that provided for in this plan) if load factors were not to increase. It will therefore be important for the industry to retain some flexibility in procuring additional rolling stock, in order to be able to respond to different rates of growth in the medium term.

We therefore believe that our plan is robust in the face of uncertain future demand, and does not rely on any particular demand forecast turning out to be exactly right. However, a point forecast is needed in order to put together a strategic plan, for example to illustrate the potential effects on load factors and to estimate the amounts of rolling stock needed. For such purposes, as stated above, our plan uses the demand forecasts from the HLOSs.

Scotland

Our plan for Scotland is founded predominantly on demand forecasts from the Scotland RUS, for which detailed demand forecasts were made. These were used to establish the need for and the value of options in the RUS. At a broad level, we predicted underlying growth in passenger demand of around three per cent per year (with additional growth on specific routes in response to improvements in train services). Each of the major schemes specified in the Scotland HLOS is underpinned by a business case which uses more detailed estimates of underlying demand growth and the impact that the scheme is estimated to have in terms of driving demand higher.

It is inherently difficult to predict levels of future demand for rail travel in new markets, such as to Glasgow Airport, but clearly the introduction of a rail offer gives scope for medium term growth rates significantly above those predicted using the standard industry methodology.

Future freight demand

As part of the process of producing the Freight RUS, predictions of unconstrained freight growth to 2014/15 were produced. This was done by the Rail Freight Operators Association (RFOA) and the Rail Freight Group (RFG) with the Freight Transport Association (FTA) in conjunction with Network Rail and other stakeholders. The RFOA used a bottom-up approach to forecasting, identifying changes to specific flows using market intelligence whereas the RFG/FTA predictions were generated by the GB Freight Model which forecasts changes to market size and rail share by commodity.

Despite the two very different approaches similar predictions of unconstrained demand for rail freight were generated. Figure 2.5 sets out the core growth scenario adopted for the Freight RUS for each commodity compared to the base year (2004/05). The Freight RUS also considered alternative growth scenarios for coal and inter-modal traffic resulting in slightly different forecasts. We are doing further work in this area in support of the business case for various enhancements to network capacity and capability.

Figure 2.5 Rail freight forecasts 2014/15 (billion gross tonne kilometres)

Commodity	2004/05	2014/15
Coal	14.6	20.4
Intermodal	11.7	18.3
Construction	7.1	8.1
Metals	5.5	5.2
Chemicals & Petroleum	2.5	2.6
Channel Tunnel	1.3	3.1
Other	4.2	5.3
Total	46.9	62.9

For all commodities, we anticipate that increasing congestion on roads and environmental issues will lead to rail being in an increasingly strong position to win market share from road hauliers.

Containerised imports to the UK and expansion of port facilities will continue to drive growth of transport of maritime containers by rail. Domestic inter-modal traffic is anticipated to grow very strongly. This is partly due to planning policy which, we understand, encourages the development of rail linked warehousing.

A key assumption for forecasts of traffic volumes is that coal's place in the energy mix in the UK remains broadly similar to that today. Coal-fired power station owners have invested heavily in flue gas de-sulphurisation equipment in order to reduce the emissions from their power stations. The level of this investment suggests to us that they anticipate supplying a considerable share of the UK's energy needs throughout CP4, and beyond.

We recognise that predicting future freight volumes is inherently difficult and subject to considerable uncertainty. However, we are content that these unconstrained industry predictions are reasonable given the underlying assumptions, which we also think are reasonable.

Supporting documents

We are providing the following supporting documents to ORR:

- a more detailed paper on our view of current passenger demand; and
- a more detailed paper on our view of forecast passenger demand.

The Freight RUS incorporates our most recent freight demand forecasts and is available on our website. Further details of our forecasts for specific routes are contained in other published RUS documents.

3 The industry strategy

The challenge over the next control period is to deliver the outputs specified by government, as well as the reasonable requirements of our other customers and funders, in a cost-effective way for the entire industry. In doing so, we need to ensure that this is part of a coherent longer term plan that takes account of the impact of major projects such as the Intercity Express Project (IEP), ERTMS and Crossrail. The strategy must deliver a railway that is sustainable in the long run and that makes the required contribution to the UK in economic, environmental and social terms.

England and Wales

As set out in the DfT's White Paper and accompanying HLOS, the key improvements to be delivered between now and 2014 relate to safety, reliability and capacity. During the next control period, government is clear that for England and Wales the investment priority is capacity to tackle crowding and accommodate the anticipated growth in passenger demand, focused on improving the capacity of the busiest services.

The Railways Act 2005 gave WAG responsibility for passenger rail services in Wales and Borders from April 2006, with the power to specify the services and regulated fares for all trains that run within Wales, or to and from Wales, under the Wales and Border franchise. WAG has powers to fund the improvement in rail services and rail freight schemes. Rail services provide an important role in meeting the economic, social and environmental objectives of WAG in both urban and rural areas. WAG has funded a number of enhancements including the re-opened Vale of Glamorgan Line, re-opening of the Ebbw Valley Line and lengthening of platforms on the Cardiff Valleys network.

Scotland

For Scotland, the industry is expected to bring forward proposals to contribute towards three key strategic outcomes - improved journey times and connections, reduced emissions and improving quality, accessibility and affordability. In support of this Transport Scotland has specified delivery of the Airdrie to Bathgate, Glasgow Airport Rail Link and Borders Railway projects. We are discussing our role in the delivery of these projects with Transport Scotland.

Freight

Network Rail fully supports the freight industry in its aspiration to develop and expand the use of rail for freight, whether that be in the transport of the traditional rail markets of coal, steel or aggregates; or in the increasing volumes of imported containerised goods or the increasingly active market for domestic containerised products. A vibrant successful rail freight market will support, sustain and complement a successful UK economy and Network Rail wishes to play its full part in this.

Network Rail is committed to reducing delay to freight services and we will continue to work with our freight operators to increase the visibility of freight performance so that comparisons between freight and passenger reliability are more readily understood. There are a number of actions we believe will improve the level of service efficiency of our freight operators businesses and these are set out in our plan.

The Freight RUS identified the priorities for the development of the capability and capacity of the network for freight. Larger scale interventions, such as gauge enhancement have been taken forward through the application for Transport Innovation Fund (TIF) funding. Besides TIF funding, Government announced in the White Paper that funding will be made available in CP4 to develop the concept of a Strategic Freight Network (SFN). The White Paper did not specify which parts of the network would be designated as SFN or which schemes should be progressed. We have agreed with stakeholders that we will consult with them to prioritise potential candidate schemes for SFN funding. To this end, we have established an SFN steering group with our industry partners.

CP4 HLOS outputs

The CP4 industry outputs specified by the HLOSs are set out in Figure 3.1. Since the HLOSs do not generally relate to freight, their requirements are considered separately. However, it is clearly essential that the overall

Figure 3.1 HLOS reliability outputs

		HLOS	
Sector	Current PPM	2013/14 PPM	Reduction in significant lateness / cancellations
Long distance	85.1	92%	36%
London & the south east	89.3	93%	21%
Regional	88.1	92%	27%
Scotland	89.4	92%	-

requirements are considered holistically as part of the overall network.

Safety

The DfT HLOS specifies a three per cent reduction in the national level risk to passengers and rail workers between 2008/09 to 2013/14. This target applies to Scotland as well as England and Wales.

Reliability

The DfT and Transport Scotland HLOSs specify reliability outputs in terms of the Public Performance Measure (PPM) to be achieved by the end of CP4. The DfT HLOS also specified a reduction in cancellations and significant lateness (those trains 30 minutes or more late) to be achieved between 2006/07 and the end of 2013/14. These outputs represent a reduction of 34 per cent in the proportion of trains arriving late compared to the current moving annual average PPM.

Capacity

The DfT and Transport Scotland HLOSs specify capacity requirements in different ways.

It is made clear in DfT's HLOS that the Secretary of State's priority for investment in CP4 is to secure an increase in the carrying capacity of the franchised passenger railway to reflect the growth and to relieve crowding. Figure 3.2 provides a breakdown of the demand to be accommodated by the network by the end of CP4 across the strategic routes.

As DfT acknowledges in its HLOS, it is generally the demand for peak commuter services that determines the overall capacity required of the railway. The HLOS therefore specifies the DfT's view of growth in demand for peak services through the next control period, and the maximum average load factors within which it wishes to see this accommodated. This is set out for both the peak three hours and the high peak hour, as shown in Figures 3.3 and 3.4. This provides the industry with a clear statement of the capacity that DfT wishes to be delivered by the end of the next control period.

Figure 3.2 DfT capacity metric – total demand to be accommodated by Strategic Route

Routes	Annual passenger km forecast in 2008/09 (millions)	Additional passenger km to be accommodated by 2013/14 (millions)
1. Kent	3,350	333
2. Brighton Main Line and Sussex	4,681	536
3. South West Main Line	5,012	706
4. Wessex Routes	431	58
5. West Anglia	1,561	482
6. North London Line and Thameside	1,047	118
7. Great Eastern	2,775	319
8. East Coast Main Line	6,375	975
9. North East Routes	156	13
10. North Trans-Pennine, North and West Yorkshire	1,189	189
11. South Trans-Pennine, South Yorkshire and Lincolnshire	741	113
12. Reading Penzance	1,178	158
13. Great Western Main Line	4,327	637
14. South and Central Wales and Borders	328	29
15. South Wales Valleys	153	13
16. Chilterns	661	98
17. West Midlands	1,862	258
18. West Coast Main Line	5,737	913
19. Midland Main Line and East Midlands	2,655	498
20. North West Urban	1,141	157
21. Merseyrail	337	18
22. North Wales and Borders	223	26
23. North West Rural	153	12

Figure 3.3 DfT capacity metric - peak demand to be accommodated in major urban areas by end of CP4

	Peak three hours			High-peak hours		
City	Forecast demand in 2008/9	Extra demand to be met by 2013/14	Maximum average load factor at end CP4 (%)	Forecast demand in 2008/9	Extra demand to be met by 2013/14	Maximum average load factor at end CP4 (%)
Birmingham	32,000	4,600	48	15,400	2,400	55
Cardiff	8,500	900	39	4,000	600	43
Leeds	23,400	5,100	64	11,300	2,700	70
Manchester	22,100	4,100	45	10,700	2,200	49
Other urban areas	27,700	3,600	41	12,300	2,000	46

The load factors are calculated as the forecast passenger demand divided by train capacity, expressed as a percentage. Train capacity takes account of both seating and standing space.

The load factors specified in the HLOS set a cap on the average level of peak train crowding across the city. The load factor target for London terminals is an average across all of them, not a target for each one.

The DfT HLOS makes it clear that, subject to any overriding value for money considerations, the Secretary of State wishes to maintain or reduce current peak load factors over CP4 on services into most of the stations listed in the HLOS.

The DfT has clearly stated in its HLOS that it is at risk for the accuracy of the demand forecasts underpinning the HLOS metrics. The requirement is for the industry to develop strategies that deliver the capacity to achieve the specified load factors, on the basis that demand will be as shown in the HLOS.

The following sections provide a summary of the strategies for the next control period that have been developed in conjunction with the industry through the RUS programme and through specific discussions on the plans for CP4. The implementation of these strategies requires action by Network Rail, train operators and other industry partners, including rolling stock suppliers, as well as by funders.

There is no specific level of demand to be accommodated in the Transport Scotland HLOS. Transport Scotland has specified as part of their Tier 2 HLOS the implementation of a number of schemes which provide additional network capacity and capability:

- Glasgow Airport Rail Link;
- Airdrie – Bathgate; and
- Borders Railway

Our role in delivering these schemes is set out in Chapter 6. In addition there is a small projects fund to support capacity and other smaller scale projects. We will also be working with Transport

Figure 3.4 DfT capacity metric – peak demand to be accommodated at main London terminals by end CP4

	Peak three hours			High-peak hours		
London Terminals	Forecast demand in 2008/9	Extra demand to be met by 2013/14	Maximum average load factor at end CP4 (%)	Forecast demand in 2008/9	Extra demand to be met by 2013/14	Maximum average load factor at end CP4 (%)
Blackfriars	21,900	3,500		11,200	1,200	
Euston	23,800	3,400		10,600	1,600	
Fenchurch Street	26,000	2,500		13,900	1,600	
Kings Cross	18,300	2,300		8,000	1,100	
Liverpool Street	74,300	10,600		36,700	4,900	
London Bridge	127,600	12,600	67	65,200	7,800	76
Marylebone	9,100	1,000		4,600	600	
Moorgate	13,000	700		7,400	400	
Paddington	24,100	2,900		11,500	1,400	
St. Pancras	25,900	10,900		13,100	5,700	
Victoria	58,700	5,300		29,300	2,800	
Waterloo	74,300	9,200		36,800	4,900	

Scotland to development further projects which may enhance capacity, the implementation of which will be subject to future agreement.

Strategies to deliver HLOS outputs

The strategies for delivering the HLOS outputs need to be developed and delivered jointly by Network Rail and the train operators. We set out below the strategies for achieving the HLOS outputs which we have developed in conjunction with train operators.

Safety

Safety remains the highest priority for all involved in the running of the railway. The railway is safer now than it has ever been and is the safest form of transport in Britain. Since the introduction of TPWS, Category 'A' SPADs and the number of broken rails have been reduced to their lowest ever levels.

Working on the railway is also getting safer. The accident frequency rate measure for Network Rail employees and contractors has continued to decline over recent years.

Network Rail and train operators have clear and distinct accountabilities for the risk hazards on the rail network. The safety improvement plans for Network Rail and train operators are brought together in the publication by RSSB of the annual Railway Strategic Safety Plan. The input to this process for the 2008 - 2010 plan has formed the starting point for the strategies to deliver the safety improvements specified in the HLOS for CP4.

Safety on the railway depends largely on the proper design, construction, maintenance and operation of the network. Most safety improvements will be achieved through more effective and efficient development and management of the network through relevant asset strategies and their underpinning plans for CP4.

The key areas of Network Rail operation that are expected to contribute to the reduction in train accident risk are:

- infrastructure asset strategies (particularly track and structures);
- improvements in management of weather related risks;
- improvements in irregular working; and
- level crossings management.

The key areas of improvement in non-train accident risk to passengers are expected to result from a reduction in risk at stations through a reduction in:

- slips, trips and falls;
- passenger assaults; and
- boarding and alighting risk.

The current analysis shows an improvement in passenger safety risk by the end of CP4 that is slightly better than the HLOS target.

The largest element of risk is managed by train operators and the greatest hazard, measured by fatalities and weighted injuries (FWI), is at stations. It is noted that the projections in this plan are based on train operator's submissions for the Rail Strategic Safety Plan for the period 2008 to 2010.

Plans proposed by Network Rail and train operators are estimated to reduce workforce safety risk by more than the target of three per cent by the end of CP4. Improvements in respect of Network Rail and its contractor workforce will be delivered through:

- better processes and systems;
- improved communication of safety information;
- enhanced competence and leadership;
- improved physical controls; and
- improvements to safety culture

Detail on Network Rail's safety improvement plan can be found in Chapter 8 of this document.

Reliability

The starting point for the development of a plan to deliver improved performance in CP4 is the delivery of the 2008/09 Joint Performance Improvement Plans (JPIPs). The JPIPs represent a two-way commitment between Network Rail and train operators to improve performance with underpinning action plans that span the next three years. The railway in England and Wales is currently predicted to achieve a moving annual average PPM of 90.4 per cent at the end of CP3. This is based on achieving the JPIP plans (or, for train operators that are already exceeding the JPIP, a slightly higher level of performance). It is recognised that there are risks associated with delivery of the 90.4 per cent, and that any failure to reach this level by March 2009 will make the improvement required to achieve CP4 outputs even greater.

To develop a performance trajectory and underpinning action plans for CP4, we have adopted a process which is more strategic and at a higher level than the JPIP development

process. It has involved dialogue both on an individual basis with train operators and collectively with the industry through National Task Force (NTF) meetings.

The process to develop the CP4 trajectory has involved a mix of top down analysis to identify what is achievable and the bottom up identification of detailed schemes to achieve the target. The analysis has concluded that in order to improve performance in CP4 there needs to be a mixture of interventions:

- physical infrastructure schemes that prevent incidents from occurring;
- schemes that mitigate the effects of incidents that will still occur;
- process improvement schemes and other improvements, for example in infrastructure reliability, that use existing resources to deliver performance improvement;
- timetable development schemes; and
- TOC franchise commitments to improve performance.

We have discussed and agreed the options to be included in the plan for funding which the industry believes are the most appropriate to deliver the reliability outputs set by Government. We have identified with train operators a number of investment options to improve the reliability of the railway. These include investments in fencing, removal of temporary speed restrictions, enhanced overhead line electrification (such as that planned on the Great Eastern) and vegetation clearance.

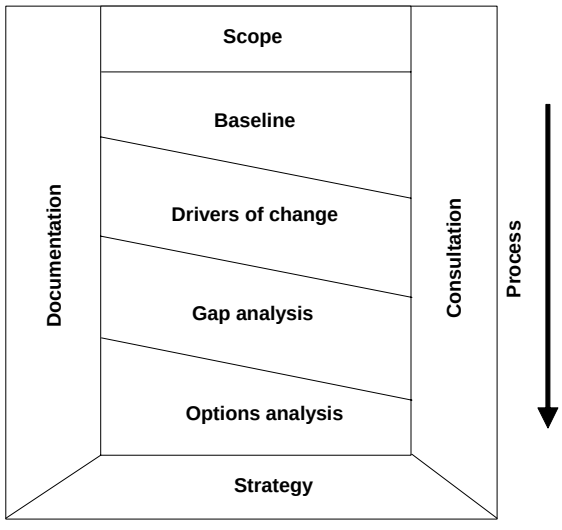
In developing these proposals, the industry has taken account of a number of risks and sought to include an appropriate level of contingency into the plans in light of the degree of uncertainty at this stage about what ultimately will be achieved by the initiatives. The key factors the plan has sought to take account of are:

- the risk to the achievement of the current JPIP trajectory;
- the impact of the proposed major projects on the railway's performance during their construction in CP4;
- the impact of the proposed longer trains;
- the impact of expected demand growth; and
- possible changes to engineering access and the move towards a seven-day railway.

The key areas of opportunity identified by our analysis are:

- structured analysis-driven action – this is to target each owner of a delay category with achieving the best five year performance of that category by the end of the control period (e.g. getting points failures to the same number of incidents as their five year low). This requires detailed management information to effectively target areas of variation and incentivise local management to address such failings;
- targeting very poor performing areas/routes to bring them to the level of other routes (e.g. expenditure on the "misery line" in the early nineties produced the current excellent performance of the Thameside route operated by c2c);
- further TOC improvements – it is recognised that the rate of improvement in TOC performance may begin to level off particularly as fleets approach their design failure rates;
- gaining a much better understanding of delay per incident where it has changed in the last six years;
- devising substantially improved ways of dealing with external events;
- further reducing TSRs on the network ;
- gaining a much better understanding of the related subjects of sub-threshold delay, right time running and the effect on performance and especially PPM; and
- improvements in timetabling have contributed 0.55 per cent PPM in the last year alone. This has come about from finding and eliminating detailed anomalies in the individual timetables. We will, with the aid of more sophisticated computer systems, be able to go even further and ultimately establish to what extent the timetable is a fair and consistent test of

Figure 3.5 RUS process and activity breakdown



performance. Work to date on a number of routes has indicated the opportunities for timetable-led performance improvements could be significant.

Further detail on Network Rail's plans for improving reliability can be found in Chapter 8.

Development of capacity strategies

The Route Utilisation Strategy process is the key industry planning tool for developing strategies to deliver effective and efficient use and development of the capacity available, consistent with the funding that is, or is likely to become, available.

The RUSs follow a consistent and systematic process in developing the future strategies for the network. This is shown in the diagram below.

The development of strategies has been informed by the application of the RUS "toolkit" and progress made with the RUS programme. The proposed strategies for individual strategic routes are set out in more detail in the Route Plans, a supporting document to this business plan.

Although the RUS process examines generic options through the application of the RUS "toolkit", the strategies adopted for each route will be different because:

- the requirements of each route and the markets served will be different;
- the current baseline and, therefore, the gaps to be addressed will vary across routes; and
- the feasibility, cost and value for money of options will be different on each route.

Understanding the baseline

The understanding of the baseline capacity and capability of the railway is the first critical step in understanding if the railway, in terms of both train services and infrastructure, can deliver the outputs required. There are a number of tools used within the process to determine the capacity of parts of the network including the use of the Capacity Utilisation Index (CUI) and the use of the Railsys model, which provides a more detailed and robust assessment of the capacity available. At the baseline stage it is most useful to consider the timetable "offer" for key traffic flows. In considering this, the capacity of a train can be expressed in a variety of ways. The simplest form is the number of seats, but this does not reflect the fact that some rolling stock designed for short journeys in busy areas has fewer seats and more standing space. This is a key factor to be understood in ensuring the options included in this plan, provide the necessary capacity. The DfT HLOS metrics seek to take account of the overall capacity of the rolling stock based on the number of passengers that can be accommodated, seated or standing, allowing for a standard provision of space per person.

Gap analysis

The gap analysis identifies mismatches between supply and demand, both currently and predicted in the future. In identifying the gaps it is important to consider the railway system – infrastructure and train service – as a whole, and to set it in the context of wider factors affecting the demand for transport. The RUS methodology identifies three possible generic gaps where the outputs of the railway system can exceed or fall short of requirements. These are:

- performance, as measured by reactionary delay;
- journey times; and
- capacity, both passenger and freight.

There are many inputs which combine to deliver the outputs. Ways to vary the inputs are part of the "toolkit" used to generate options. Before these options are considered generic gaps must be defined in relation to the specific circumstances in scope for each RUS or route.

Generic options

Once specific gaps have been identified, the development process creates a set of options for testing, which addresses one or a number of the identified gaps. Each gap identified is considered in light of a number of possible solution types, known as the "RUS toolkit", Figure 3.6.

The toolkit prompts analysis and debate with industry partners and stakeholders about what solutions might work in each situation identified as a gap, and serves to prevent the strategy from being driven by "solutions in search of a problem". Examples from the current toolkit to address capacity constraints are identified in the table below.

Each RUS has developed a long list of options, which is subject to filtering and preliminary evaluation. The preliminary evaluation stage is designed to rule out inappropriate options at an early stage.

Figure 3.6 The RUS toolkit – capacity options

	Generic solution	Example
A	**Timetable solutions**	
	Mix of services	Edinburgh - Aberdeen timetable re-cast
	Passenger trains stopping patterns	Glasgow - Paisley journey time
	Quantity of trains on particular route sections	North London Line frequency increase
	Routeing of longer distance trains	Felixstowe - Nuneaton freight route
	Options for amending timetables can potentially yield additional capacity for both passenger and freight services without infrastructure enhancement.	
	Changing the routeing of a train can free up capacity on the original route. However, in many cases this will result in an increased journey time for the diverted train. This option only works where diversionary routes have sufficient capacity and capability."	
B	**Train lengthening**	Manchester area peak
	These options potentially provide additional capacity relatively quickly, although they may require infrastructure works such as platform lengthening, track layout changes, power supply reinforcing and additional stabling. In certain circumstances it may be possible to utilise selective door opening (SDO) at difficult or lightly used stations to reduce the infrastructure costs.	
	Train lengthening options can also apply to freight trains, though this will often require increasing loop lengths, with 775m being the target on freight arteries. Gauge enhancement on routes where well wagons are used for high gauge intermodal traffic allows better use of existing length as a large proportion of the length of well wagons cannot be used for the load.	
C	**Rolling stock solutions**	
	Deployment of rolling stock	South West Main Line redistribution from contra-peak
	Internal design of passenger rolling stock	Specification of North London Line replacement stock
	Higher seating capacity rolling stock	IEP on East Coast Main Line
	These options are based on achieving an appropriate balance between seated and standing capacity (for short distance journeys) or first and standard class accommodation and catering facilities (for long distance services). They can be a relatively simple way of providing additional capacity.	
D	**Demand management arrangements**	South West Main Line peak demand initiative
	These options consider opportunities to influence demand where peak capacity is overloaded.	
E	**Engineering access arrangements**	Review of North London Line cyclic possessions
	This option is based on optimising engineering access to ensure that there is an appropriate balance between asset management policies (including safety) and the impact of engineering work on train services. Whilst there are standard industry processes for such issues, there may be specific issues of strategic relevance that need considering through a RUS. Increased levels of access for freight trains at night can assist with growth.	
F	**Increased quantum through additional infrastructure**	
	Track	Trent Valley four tracking
	Signalling	S&C / GSW headway improvements
	Stations	Waterloo three stage plan
	Station, depot & freight terminal locations	Salford Crescent relocation
	The provision of additional tracks, signalling, platforms, improved junctions or other infrastructure (including loops, enhanced gauge and route availability) may be an appropriate means of accommodating growth or dealing with an existing constraint.	

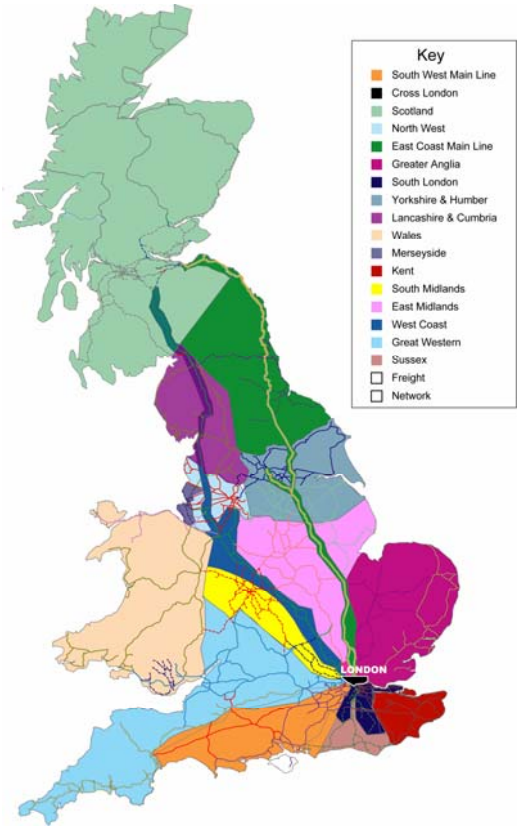
A number of short-listed options are taken forward for full appraisal that seeks to quantify as fully as possible the physical, financial and economic impacts. The appraisal methodology is consistent with appraisal frameworks specified by DfT and Transport Scotland as appropriate. To support this appraisal work, RUSs seek to capture implications for all industry parties and wider societal implications in order to understand which options maximise net industry and societal benefit, rather that of any individual organisation or affected group.

Building consensus

Network Rail leads and is responsible for the development of RUSs but the process adopted continues to emphasise the widest possible inclusion of industry and wider stakeholder groups.

Each RUS is overseen by an industry stakeholder management group (SMG) comprising TOCs, FOCs, ATOC, governments and other parties where relevant. Passenger Focus is now a member of each SMG. Transport for London and Passenger Transport Executives are members of appropriate SMGs.

Figure 3.7 RUS programme



The practice of organising wider stakeholder group meetings at intervals throughout the development of each RUS has continued and been augmented with the “Baseline Roadshows”, exhibitions of the baseline data displayed for explanation and discussion.

We have also continued the Local and Regional Government Conferences, which are held six-monthly in Birmingham. As appreciation of the openness of the process has increased, there has been a consequent increase in the requests for individual or bespoke briefings; every effort is made to meet these requests and the RUSs benefit from them.

After a RUS is published there is a 60 day period in which any objections to the RUS can be made to the ORR. After this period, if there are no objections, the RUS becomes established and will be taken into account by ORR when exercising its functions.

The RUS programme

The RUS programme has been prioritised jointly with industry and is shown in Figure 3.7. To date, five RUSs have been established and eight are underway. Timing of the remaining activity is being reviewed in discussion with stakeholders and ORR. We have used a considerable amount of data and analysis from the RUSs that are underway (but not yet complete and established) to inform the strategies contained in the Route Plans. Prior to Network Rail having responsibility for leading the RUS programme, a number of RUSs and other strategy developments (such as the West Coast Strategy) were completed by the Strategic Rail Authority. These have also helped to inform the strategies.

The proposed capacity strategies

The Route Plan documents supporting this Business Plan contain a description of the strategy for each route to deliver the outputs required in CP4. These strategies have been developed based on the application of the RUS toolkit to each route- specific situation and output requirement. As part of the development of the Strategic Business Plan, this assessment of outputs required and the options to deliver them has been undertaken specifically against the delivery of the HLOS outputs to ensure the strategies meet the output requirements. This assessment has been shared with train operators and is summarised later in this chapter.

Each route plan contains:

- a description of today's railway – the baseline;
- the outputs to be achieved that are relevant at a route level;
- the proposed strategy to deliver the outputs;
- the interventions required to deliver the strategy; and
- the Network Rail costs associated with delivering the strategy.

A summary of the proposed capacity interventions by route is set out in Figures 3.8 and 3.9. This summarises the service changes that will contribute to meeting the HLOS output requirements. Further plans to deliver enhanced capability are outlined in the freight section below. Some smaller-scale interventions are not included in these tables but are included in the relevant route plans.

The strategies are not uniformly developed to the same level of completeness for a number of reasons.

- as stated earlier, not all parts of the network have a completed RUS at this point in time. However significant coverage of the network is in progress;
- individual interventions, and in particular infrastructure enhancement proposals, are at various stages of definition and development. The GRIP (Guidance to Railway Investment Projects) process provides a consistent framework for the development and delivery of such proposals. Many of the interventions proposed are at an early stage of GRIP development. A programme for the development of the projects that underpin the strategies is set out in Chapter 6 of this document;
- the franchising process means that, at any particular point in time, the portfolio of franchises consists of individual franchises of various durations and varying degrees of certainty about the future outputs to be delivered. Uncertainty is most acute during the franchise bidding process when the future plans are subject to negotiation; and
- there are a number of proposals at various stages of development that will have a significant impact on the network and that the strategies need to take into account. These developments create uncertainties because the definition of scope of the proposals, their impacts and their possible timings are not yet fully defined or, in some cases, committed to. Examples of such proposals are the Thameslink programme, ERTMS, Intercity Express Programme (IEP) and Crossrail.

In light of these uncertainties, the delivery of the strategies will need to be flexible to respond to changing assumptions. As we approach the next control period, the delivery programme will be refined but it will become increasingly fixed as the industry begins to deliver the interventions proposed.

Figure 3.8 Strategic Routes 1 – 11: summary of proposed capacity interventions

Routes	Sector	Interventions
Route 1: Kent	Long Distance	1. Eurostar relocates from Waterloo to St Pancras
	London & South East	1. Integrated Kent Franchise new timetable 2. Thameslink Key Outputs 0 and 1, enabling 12 car services through the Thameslink core route 3. 12 car suburban operations on routes into Charing Cross and Cannon Street 4. South London Line 8 car operations to Victoria
Route 2: Brighton Main Line and Sussex	London & South East	1. Implementation of Brighton Main Line RUS providing additional capacity for the Brighton line and to Redhill 2. Thameslink Key Output 0 extending services to Blackfriars up the Thameslink core route 3. Main line and suburban timetable re-write enabling the East London Line service to operate and linking with Thameslink and South London RUS options 4. East London Line services extension to West Croydon and Crystal Palace 5. Thameslink Key Output 1 enabling 12 car services through the Thameslink core route 6. 12 car operations on the East Grinstead to Victoria line 7. 10 car suburban line operations to Victoria and London Bridge 8. Reinforcement of Uckfield services
Route 3: South West Main Line	London & South East	1. Eurostar relocates from Waterloo to St Pancras 2. Demand management through Smart technology 3. Run all suburban and more main line peak trains at maximum permitted length 4. 10 car operations on all suburban routes; introduced progressively starting with the Windsor line services
Route 4: Wessex Routes	London & South East	There are no capacity interventions planned for CP4, although projects expected to take place on Route 3 will produce benefits for services using the Wessex routes
Route 5: West Anglia	London & South East	1. 12 car operations on Liverpool Street to Cambridge and Stansted Airport services 2. Increased service frequency from Cheshunt via Southbury provided by a shuttle to Seven Sisters 3. 9 car operation of high capacity suburban stock on Liverpool St to Chingford, Enfield Town, Cheshunt and Hertford East services
Route 6: North London Line and Thameside	London & South East	1. Additional 12 car operations on the c2c main line 2. 12 car operations on the Tilbury Loop and Ockendon branch 3. North London Line train lengthening and capacity upgrade
Route 7: Great Eastern	London & South East	1. 7 additional morning peak trains on Great Eastern Main Line 2. Additional 12 car operations on the Great Eastern Main Line 3. 8 additional peak trains on Great Eastern inner services 4. Rolling stock replacement on Great Eastern Norwich
Route 8: East Coast Main Line	Long Distance	1. Additional hourly path and extra rolling stock included in the Inter City East Coast franchise
	London & South East	1. Increased 12 car operation on Outer suburban commuter services 2. Additional station capacity on First Capital Connect routes. 3. Shoulder peak train lengthening on Inner routes
	Regional: Inter Urban	1. 4 car operations on Trans Pennine Express peak services to/from Newcastle
	Regional: Commuter	See Route 9
Route 9: North East Routes	Regional: Commuter	1. Train lengthening for Northern Rail services in the Newcastle and Middlesbrough areas
Route 10: North Trans-Pennine, North and West Yorkshire	Long Distance	Included in Route 8
	Regional: Inter Urban	1. 4 car operations on Trans Pennine Express peak services to/from Leeds 2. Revised service patterns and improved journey times on various services across the route
	Regional: Commuter	1. Train lengthening for Northern Rail services in the Leeds area
Route 11: South Trans-Pennine, South Yorkshire and Lincolnshire	Regional: Inter Urban	1. East Midlands Trains and Northern inter-urban train lengthening 2. Improved journey times on various services across the route
	Regional: Commuter	1. Train lengthening for Northern Rail regional services in the Sheffield area

Figure 3.9 Strategic Routes 12 – 26: summary of proposed capacity interventions

Routes	Sector	Interventions
Route 12: Reading to Penzance	London & South East	1. Additional vehicles to strengthen the Bedwyn to Paddington peak service
Route 13: Great Western Main Line	Long Distance	1. The deployment of High Density High Speed Trains on Paddington to Bristol and South Wales routes to provide additional capacity
	London & South East	1. Introduction of additional vehicles for proposed half-hourly Reading to Paddington semi-fast service 2. Introduction of additional vehicles for strengthening Paddington peak arrivals 3. Additional capacity provided on Oxford services by franchise commitment to replace the rolling stock with High Density High Speed Trains
	Regional: Commuter	1. Additional vehicles to strengthen Bristol area services to 4 cars 2. Additional vehicles for new Ebbw Vale service 3. 4 car operations on the Maesteg to Cardiff and Cardiff to Gloucester lines
Route 14: South and Central Wales and Borders		Nil
Route 15: South Wales Valleys	Regional: Commuter	1. Additional vehicles for strengthening the Valleys services and half-hourly Vale of Glamorgan service
Route 16: Chilterns	Long Distance	1. Additional vehicles to lengthen the Birmingham Snow Hill to Marylebone services
	London & South East	1. Additional vehicles required to lengthen local services to Marylebone
Route 17: West Midlands	Long Distance	1. Additional vehicles to strengthen Intercity services 2. Additional vehicles to deliver the West Coast timetable alterations from December 2008
	Regional: Commuter	1. Additional electric vehicles to facilitate the proposed extension of cross-city services to Bromsgrove 2. Additional vehicles to support existing services and relieve overcrowding
Route 18: West Coast Main Line	Long Distance	1. Additional vehicles to lengthen the class 390 fleet to 11 car length 2. December 2008 timetable recast to improve services frequencies and network capacity utilisation
Route 19: Midland Main Line and East Midlands	Long Distance	1. New hourly Kettering to St Pancras service
	London & South East	1. Thameslink enabling various train lengthening and service increases
	Regional: Inter Urban	1. Additional vehicles for East Midlands Trains regional services at Nottingham and Leicester
	Regional: Commuter	1. East Midlands Trains and Cross Country inter-urban train lengthening
Route 20: North West Urban	Long Distance	1. Additional vehicles for Liverpool intercity services 2. Additional vehicles for Manchester intercity services 3. Additional vehicles to deliver the West Coast timetable alterations from December 2008
	Regional: Inter Urban	1. Additional vehicles in the Liverpool area 2. Additional vehicles in the Manchester area to support existing services and relieve overcrowding
Route 21: Merseyrail		Nil
Route 22: North Wales and Borders		Nil
Route 23: North West Rural		Nil
Route 24: East of Scotland	Regional: Inter Urban	1. Additional vehicles and services to Fife including the acceleration of Aberdeen/Edinburgh services by altering the stopping patterns 2. Increase in service level and additional vehicles facilitated by the Edinburgh to Glasgow Electrification
	Regional: Commuter	1. Opening of Stirling/Alloa/Kincardine route, including 6 car working
	Regional: Rural	2. Borders Railway new line extending services to Tweedbank every half hour
Route 25: Highlands	Regional: Inter Urban	1. The introduction of an hourly service between Perth and Inverness
	Regional: Rural	1. Completion of the Invernet project
Route 26: Strathclyde and South West Scotland	Long Distance	1. Additional vehicles for Glasgow intercity services
	Regional: Inter Urban	1. The introduction of an hourly semi-fast service between Edinburgh Waverley and Glasgow Central via Shotts 2. The introduction of an hourly semi-fast service between Edinburgh Waverley and Glasgow Central via Carstairs
	Regional: Commuter	1. Additional vehicles to facilitate the Glasgow South timetable recast (including the Kilmarnock line) 2. New line between Airdrie and Bathgate and the introduction of the 4 trains per hour service between Glasgow Queen Street and Edinburgh via Airdrie and Bathgate 3. New line between Paisley and Glasgow Airport and the introduction of the 4 trains per hour Glasgow Airport Rail Link service 4. Electrification and upgrading of the Rutherglen to Whifflet line

Rolling stock and depots

These strategies imply a significant injection of additional rolling stock. Figure 3.10 sets out a summary of the estimate of the total additional quantum of rolling stock required to support the implementation of the strategies. The table:

- shows the net additional rolling stock requirement, i.e. it excludes replacement of existing vehicles;
- excludes additional vehicles associated with committed plans, such as the domestic services on the Channel Tunnel Rail Link;
- assumes that the additional vehicles will deliver the same quantum of capacity as the vehicles currently deployed;
- in most cases shows the vehicles required to be in operation on a typical weekday. It makes no allowance for "spare" vehicles to cover maintenance, as this will depend on the reliability of, and leasing arrangements for, the additional rolling stock;
- includes all rolling stock for the Thameslink programme under Route 19 (Midland Main Line and East Midlands); and
- excludes the IEP programme.

In developing this plan, and the estimates of rolling stock required to implement it, our primary aim has been to deliver the capacity (and hence load factors) required by the DfT HLOS, and to support the requirements of the Transport Scotland HLOS. The load factors in the DfT HLOS are overall load factors for all routes into the relevant cities. Within these overall load factors we have attempted to ensure that, as far as practicable, capacity is added where it is most needed, and that crowding on individual routes should not worsen.

We have also taken into account, at a high level, operational constraints on the composition of the rolling stock fleet. For example, short distance suburban services often require a high degree of inter-working between different routes, in order to make efficient use of rolling stock and terminal capacity. It is therefore not always practicable to selectively lengthen services on an individual route; even if such a service can be timetabled, attempting to run a number of distinct sub-fleets can reduce timetable resilience and hence worsen performance.

Figure 3.10 Additional rolling stock required in CP4

Routes	Additional electric multiple units required	Additional diesel multiple units required
1. Kent	140	0
2. Brighton Main Line and Sussex	112	8
3. South West Main Line	199	0
4. Wessex Routes	0	0
5. West Anglia	110	0
6. North London Line and Thameside	48	0
7. Great Eastern	100	0
8. East Coast Main Line	42	0
9. North East Routes	0	9
10. North Trans-Pennine, North and West Yorkshire	28	85
11. South Trans-Pennine, South Yorkshire and Lincolnshire	0	13
12. Reading Penzance	0	2
13. Great Western Main Line	0	54
14. South and Central Wales and Borders	0	0
15. South Wales Valleys	0	26
16. Chilterns	0	12
17. West Midlands	32	37
18. West Coast Main Line	134	0
19. Midland Main Line and East Midlands	240	15
20. North West Urban	15	58
21. Merseyrail	0	0
22. North Wales and Borders	0	0
23. North West Rural	0	0
England and Wales total	1200	319
24. East of Scotland	12	32
25. Highlands	0	8
26. Strathclyde and South West Scotland	115	12
Total additional rolling stock in CP4	1327	371

In addition to the rolling stock shown in the table, we anticipate that a small number (perhaps of the order of 20-30) additional vehicles may be required during CP4 on routes away from the core inter-urban routes and the cities specified in the DfT HLOS, for example to relieve crowding issues around other towns and cities, or for Community Rail lines. Some of these requirements have been identified during the development of this plan; we expect others to be identified in future, for example by the ongoing RUS programme.

Both the DfT and Transport Scotland are developing rolling stock plans. This strategy sets out how the industry believes the additional capacity is best delivered and this will help inform both the DfT and Transport Scotland in developing their rolling stock plans.

The development of a coherent rolling stock plan for CP4 and beyond will need to focus on the key markets and the characteristics of the rolling stock required to serve them:

- the development of the IEP rolling stock for the long distance market, and the whole-system optimisation issues and the interface with ERTMS proposals;
- future commuter needs, and in particular the injection of additional capacity into the London commuter market. A specific dimension of this is the Thameslink programme;
- the future proposals for the replacement of Sprinter and Pacer trains and the development of a new generation regional train; and
- growth in demand created by the delivery of new journey opportunities in Scotland.

The deployment of this rolling stock and the consequential effect on the existing fleet and the rail infrastructure will require careful planning and co-ordination between train operators, Network Rail, suppliers and funders to ensure that:

- new rolling stock is deployed where its benefits can be maximised;
- rolling stock fleet characteristics match the markets they are serving;
- rolling stock fleets are as homogenous as possible in order to exploit economies and maximise compatibility and flexibility;
- the delivery timescales are aligned with those for market growth and the delivery of the necessary infrastructure enhancements;
- whole-system whole-life costs are minimised by optimising infrastructure and rolling stock compatibility;
- there is sufficient platform, power supply, berthing and depot capacity to accommodate the rolling stock;
- the performance risks with the introduction of new rolling stock are minimised;
- whole-system costs are minimised through systems design and through exploitation of opportunities such as selective door opening; and
- the development and deployment of rolling stock for CP4 is consistent with a longer term plan for rolling stock.

Today approximately 40 per cent of the UK network is electrified, the remainder of the network has to be operated by diesel powered trains and locomotives. Environmental legislation comes into force in 2012 setting tough emission targets for diesel engines. This, and concerns over the future cost of fossil fuels, may make the business case for further electrification of the network more attractive. We are looking with the rest of industry at opportunities for infill electrification as part of the Network RUS.

This plan sets out the quantity of new vehicles that the industry believes is required to deliver the HLOS outputs. The quantities of additional electric and diesel units included in this plan are based on the assumptions of adding to existing stock types that operate on each route today. In reality, the delivery of new rolling stock is likely to be different to this assumption. This is a strategic business plan and does not include detailed proposals for the cascade of rolling stock which will be developed by industry and funders through more detailed planning processes.

This plan does not include the financial cost of funding the new rolling stock nor does it include the cost of depots for the new rolling stock.

Infrastructure

This plan includes proposed enhancements to the infrastructure necessary to support the interventions identified earlier. In particular:

- major projects specified by funders such as the Thameslink programme, Reading station area re-development, the Intercity Express Programme (IEP), Airdrie – Bathgate and Glasgow Airport Rail Link;
- platform lengthening to support longer trains on commuter routes into cities such as Birmingham, Glasgow, Leeds, London and Manchester;
- power supply strengthening to support longer trains, particularly on the southern region;

- key junction enhancements to support service changes and performance improvements such as those at Reading and on the East Coast Main Line; and
- station capacity investment to accommodate greater through put of passengers such as Birmingham New Street.

Further detail on Network Rail's enhancement plans for CP4 can be found in Chapter 6.

Stations

We have been developing an overarching strategy for stations which recognises the key importance of stations as gateways to the rail network and the need for the industry to improve the customer experience of the station environment. Network Rail and train operators both contribute to this objective.

Our vision is for stations that provide a safe, sufficient (i.e. serving the capacity need) and inviting environment where all customers can easily transfer between different modes of transport as part of a seamless and satisfying overall journey experience.

The scope of the strategy includes all franchised and managed stations on the rail network, with the ambition to achieve an appropriate and consistent offer to passengers across six categories of stations. This strategy will evolve over time and its success is dependent on close working partnership with the train operators and other partners to ensure stakeholder requirements can be met.

The key elements of the strategy include:

- developing the right number of stations, correctly sized and situated, to accommodate growth and encourage use of the rail network;
- developing transport interchange plans, with stations at their core, aimed at delivering a safe, secure and seamless total journey experience for everyone wishing to use rail;
- developing asset policies and intervention regimes which aim to optimise asset life and deliver the most efficient and value for money station property portfolio;
- development of new and standardised station facilities aimed at offering a consistent, recognisable, high quality, value for money service for everyone wishing to use rail;
- developing sustainable stations aimed at reducing rail's overall carbon footprint and impact on the environment overall; and
- developing and enhancing stations by prioritising and integrating all station programmes of work and leveraging third party investment in stations.

Our plans include proposals for the development of our major stations portfolio, funded by a mix of public and private funding. These will deliver a variety of benefits including additional pedestrian and platform capacity, improved ambience and facilities as well as wider economic and regeneration benefits. This includes proposals at:

- King's Cross;
- Birmingham New Street;
- London Bridge;
- Waterloo;
- Victoria;
- Euston; and
- Edinburgh Waverley.

DfT has announced funding for a programme of improvements to stations which will deliver improvements to approximately 150 medium-sized stations in England and Wales. This is in addition to the continuation in CP4 of the Access for All programme.

The primary objective is to bring about a noticeable and sustainable improvement in the environment at stations for the benefit of passengers. Improvements will be made to increase personal safety, improve access and egress, enhance the overall presentation of the station and to improve information provision and other facilities.

The programme will concentrate on approximately 150 stations, chosen from the busiest 500 stations on the network measured in terms of arrivals and departures. The specific stations are being chosen to maximise the impact for the travelling public, based on the current level of customer satisfaction and footfall. Priority will be given to those stations where the maximum impact can be delivered, and this will be achieved through the leveraging of wider private and public sector funding opportunities where they are available. Speed of delivery will also be a consideration. Whilst it is anticipated that the majority of stations will be in categories A to D (excluding Network Rail managed stations), stations in category E are not precluded simply because of their classification.

The specification of each station will be compiled by the relevant local delivery group to reflect the particular needs of that station. However, in order to provide consistency, a design guide has been produced. Station improvements in the programme will include: seating, shelters and

CCTV; station signage, passenger information and clocks; and redecoration of buildings, removal or regeneration of derelict buildings, cleaning and graffiti removal and boundary railings.

Further efficiencies are expected as a result of close integration of works and Network Rail is open to increasing the volume of work undertaken through train operators where this is cost effective.

Freight

The Freight RUS identified the priorities for the development of the capability and capacity of the network for freight, principally driven by significant changes in the pattern of demand for two commodities, coal and deep sea intermodal traffic. Interventions to respond to these changes have been developed and address key constraints on the network. Larger scale interventions, such as gauge enhancement between Southampton and the West Coast and gauge and capacity enhancement between Nuneaton and Peterborough, have been taken forward through the application for Transport Innovation Fund (TIF) funding. This plan assumes these applications will be successful. Funding has been announced for gauge and capacity enhancement on the cross London route between Gospel Oak and Barking.

Besides TIF funding, Government announced in the White Paper that funding will be made available in CP4 to develop the concept of a Strategic Freight Network (SFN). The purpose of the SFN is to provide an enhanced core trunk network capable of accommodating more and longer freight trains and , where required, a selective ability to handle wagons with higher axle loads and greater loading gauge.

The White Paper did not specify which parts of the network would be designated as SFN or which schemes should be progressed. However, it does identify the following key characteristics which it would wish the SFN to embody. It should:

- complement and integrate with the passenger network;
- provide an enhanced core trunk network capable of accommodating longer and additional freight trains with both higher axle loads and enhanced loading gauge;
- provide appropriate diversionary routes and a seven-day railway capable of dealing with disruption;
- incorporate ‘acceptable freight routeing’ to help freight avoid congested parts of the network and where possible exploits or develops capacity and capability of alternative routes;
- minimise conflicts with passenger movements wherever possible;
- improve the performance of passenger services;
- give freight operators, customers, port owners and developers a more stable environment for planning freight; and
- be developed within the wider framework set out in the Government's Technical Strategy, which accompanies the White Paper, and in the context of the ongoing Network RUS.

In addition, work on the SFN could:

- identify further gauge enhancement for wider European containers and, with time, possible European gauge rolling stock direct from the continent to areas beyond London; and
- identify, and selectively safeguard, disused alignments.

The White Paper suggests that the investments could vary from small scale incremental enhancements to major infrastructure projects. The majority of the issues listed above have been addressed within the Freight RUS, which outlined the programme of enhancements to the network to meet the growth expected by the industry outlined in Chapter 2. The paper also makes reference to a list of schemes prioritised by the Rail Freight Operators Association.

We have agreed with its stakeholders that we will consult with them to prioritise potential candidate schemes for SFN funding. To this end, we have established an SFN steering group with our industry partners.

The SFN steering group will take the discussion of the SFN in the White Paper and develop this further to identify key criteria for identifying appropriate use of these funds.

Capacity and crowding impacts

In order to assess whether the strategies deliver the necessary capacity to meet the DfT HLOS metrics we have, for each specified urban area and London termini, undertaken the following analysis:

- quantified the total capacity provided today in the peak three hour and high peak, in terms of rolling stock carriages;

Figure 3.11 Projected load factors by end of CP4 based on HLOS demand forecasts

Per cent	Peak three hours		High-peak hours	
City	Maximum average load factor in HLOS	Projected average load factor at end CP4	Maximum average load factor in HLOS	Projected average load factor at end CP4
Birmingham	48	45	55	49
Cardiff	39	32	43	39
Leeds	64	56	70	59
Manchester	45	43	49	44
Other urban areas	41	40	46	46
London	67	63	76	73

- quantified the additional capacity provided in the peak three hour and high peak by the end of CP4, in terms of rolling stock carriages
- translated the number of carriages into total available capacity (seats and standing) using space planning assumptions consistent with those used by DfT and assuming that any additional rolling stock will have the same capacity as stock that operates on a particular route today; and
- used DfT's specified demand to be accommodated to calculate the overall load factors delivered consistent with the DfT metrics.

This analysis indicates that the strategies described in this chapter will deliver the DfT load factor outputs for each specified urban area and the average for London as a whole. The projected outputs, based on the demand forecasts in the HLOS, are shown in Figure 3.11.

The detailed analysis for each specified urban area and London is set out in a supporting document to this plan.

Community Rail

Network Rail is committed to supporting the Department for Transport's Community Rail Strategy. To that end, we wish to develop our relationship with community rail partnerships around England and Wales, facilitating their work to develop ridership and contributing to work to reduce costs across the network, including on community rail routes.

A number of workstreams will continue, including plans to make greater use of redundant buildings for community use and working with local groups to improve the railway environment.

There will also be work on standards and processes on the rural network which seeks to identify ways to reduce costs, and, where investment is warranted, to make that investment more efficiently by adopting standards appropriate to the community railway.

Work has already started on a pilot local route plan to identify how the community railway can exploit new passenger and freight opportunities.

Timetable development

The strategies set out in this plan will ultimately require changes to the timetable to bring together the train service, rolling stock and infrastructure interventions and balance the output requirements in terms of capacity and performance. A high level programme of work has been developed to support the necessary timetable development in CP4.

There are four broad areas of planning and analysis activity to be undertaken to deliver the timetable changes:

- technical modelling using RailSys to review and confirm planning values such as junction margins;
- development timetabling to produce pre-production timetables in order to test the feasibility of the interventions and as an input to performance modelling;
- performance modelling to test the impact of changes to the timetable and infrastructure during normal operations; and
- publication of the timetable on a twice-yearly basis (May and December). This is the timetable contractualised between Network Rail and the train operators in the form of track access agreements.

In order to develop a production timetable that makes efficient use of network capacity, meets the aspirations of train and freight operators and that delivers robust performance, proposals would generally be developed through one or more of the steps outlined above.

Sustainability

Central to the success of a modern society and economy is an effective and efficient transport network. The rail sector has a strong case to make regarding its contribution to this; supporting economic growth and contributing to the provision of an integrated, socially inclusive and sustainable transport system. In addition, the environmental advantage that rail has over other forms of transport means that rail can help Britain meet its demanding environmental challenges.

However, the challenges society faces are considerable and all transport modes will come under increasing pressure to reduce their carbon footprint and use of non-renewable resources. As a consequence, individual companies within the rail sector are actively developing or implementing plans, and details of Network Rail's plans are outlined in Chapter 4 of the plan. Some challenges, however, require cooperation between industry partners, for example reducing CO_2 as transport is a significant contributor and the fastest growing source of CO_2 emissions in Britain.

Rail transport, with the lowest CO_2 emissions when compared to cars, road freight and air transport, is in a unique position. In addition to the obvious benefits from emission reductions, the improvements in rail's environmental credentials encourage modal shift from less environmentally friendly forms of transport. This leads to even greater overall emission reductions. As the industry addresses another component of its sustainability agenda, improving the economic value it provides to society, this encourages increased investment to provide the capacity for increased modal shift.

A cross-industry group has been set up to examine the challenges the industry faces and develop a sustainability rail strategy that will ensure that society can maximise the environmental contribution from the rail industry. This over-arching strategy will provide guidance for industry partners as they develop their individual strategies, and will itself be updated as these strategies evolve. A key topic for this group relates to emissions; the reduction in CO_2 from the operation of trains – traction energy. It is expected that emission targets will be agreed with the DfT and Transport Scotland during the first half of 2008.

To support this work the cross-industry group is in the process of developing a set of performance measures which will be used to assess progress and provide comparison with other transport sectors.

The longer term

The strategy described in this chapter is designed to deliver the required outputs for CP4. We recognise this strategy must be consistent with a longer term view of how the railway should respond to meet the challenges of the future. The UK government in its white paper set out a long term ambition for the railway that:

- can handle double today's level of freight and passenger traffic;
- is even safer, more reliable and more efficient than now;
- can cater for a more diverse, affluent and demanding population; and
- has reduced its own carbon foot print and improved its broader environmental performance.

The National Transport Strategy for Scotland identified three strategic outcomes that the rail network can contribute to:

- improving journey times and connections;
- improving quality, accessibility and affordability; and
- reducing emissions.

We believe that to meet the challenges of the longer term requires a step change in the capability of network, particularly in the areas of performance, environmental performance and capacity. To deliver these outcomes we need to work with our industry partners and funders to develop a coherent long term strategy. A planning horizon for this of 2030 is convenient as it represents one cycle of main line renewal of infrastructure and trains.

In considering what this future might look like, the key trends we believe are relevant are:

- the drift of people towards urban living will continue;
- people will live longer and be more prosperous. As a result they will have the means and the time to travel more but, on average, they will be less agile. They will value more highly their time and security;
- freight shippers will have greater expectations of security, reliability and cost, and of real time information during transit;
- energy will cost more and transport systems will need to reduce their energy demand. Customers will take more note of how transport

modes address sustainability when choosing how to travel;
- road and air transport will, through research and development, develop technologies to maintain their attractiveness;
- the pool of younger skilled workers (the very people railways rely on for operation and maintenance) will reduce; and
- national and local Government financial support to any transport system will be focussed on societal benefit and value for money.

Some of these trends play to the strengths of rail, particularly the expected growth in demand for movement from people in existing centres. However, most require change to the railway system or its configuration if it is to prosper in the longer term. Even where rail has historically had a good record such as energy consumption, the status quo would be inadequate in the future as trains have been getting heavier per seat whilst cars have been getting lighter.

Our response to these overall challenges is to develop a longer term strategy in the context of four themes:

- to improve the door-to-door journey for users of the rail system including the challenge of re-engineering our stations to make them efficient and friendly interchanges;
- an easily maintained railway which by implication gives a step improvement in reliability;
- an energy efficient and sustainable railway by the application of new technologies and an approach of minimising whole-life costs for the system; and
- improved capacity and capability of the network by better utilisation of the current network (e.g. reduced performance allowances), moving to differentiated routes to improve utilisation and where necessary the tactical extension of the network.

We have started to make steps in all these areas. For example, we have started a programme of modular solutions for our station infrastructure. We have started to move from a “find and fix” to a “predict and prevent” maintenance regime and the use of train-based technology to monitor the infrastructure and, through our “Intelligent Infrastructure” project, equipping bridges and earthworks with automatic condition monitoring systems.

We believe we can deliver reduced journey time and lower energy consumption by making trains much lighter than they are today with better internal design and lighter materials. More radical steps include changing the way the system protects against train collision risk by using train protection technology controls rather than heavy crash resistant materials on the trains. Our civil engineers are also examining the use of modular bridges which can be installed at low cost and with little train service interruption. This could help us to eliminate some level crossings. Where this is impracticable, our signal engineers are developing dependable obstruction detection systems. We can reduce train bogie and suspension weight by improving track quality. This will create a virtuous circle of higher track quality, lower train weight, less energy consumption and reduced journey time.

Possibly the biggest challenge is to deliver greater capacity in an affordable way. To maximise existing capacity means improving operating practices, timetabling and punctuality. This means moving to a more uniform performance of trains (or families of vehicles), running to a more standardised service pattern. We need to re-think how we provide for expanding freight services, optimising capacity by increasing the speed at which freight trains operate, allowing passenger and freight services to be timetabled more efficiently where they share main line capacity.

To release further capacity within the existing network means addressing junction, station and route capacity. Our plans for CP4 start to tackle the most critical pressure points on the network in the short term. Further tactical enhancements beyond CP4 could include additional facilities, infill electrification and construction of short chords or links such as those to be examined as part of the development of the Manchester Hub concept, recently announced by the Secretary of State.

Further options for providing more capacity need to be examined for the longer term and also to respond to more aggressive demand growth than assumed in this plan, if it materialises. This could include further train lengthening of London commuter services. We will also continue to work to understand the challenge of expanding inter-urban capacity between cities such as London, Birmingham, Manchester and Leeds. This could include using disused alignment but options need to be considered alongside other modes and their benefits in terms of capacity provided, value for money and environmental benefits.

So, by around 2030 we will need to have created an on-time railway requiring limited maintenance, exploiting technology to achieve those aims at an affordable cost. Families of lighter trains will run between attractive interchanges which are accessible and rich in real time information. The network will be carrying double the passenger numbers and significantly more freight, with more trains on the network with improved system reliability. Where necessary, additional network capacity will be provided to enable this. All of this will be achieved within our sustainability objectives, ensuring rail contributes to the economic, environmental and social success of the UK.

One area which we believe warrants further detailed consideration now for the longer term relates to the commercial, economic and environmental impact of options for electrification. Using diesel trains as mini-power plants to generate traction power appears inefficient. There are also significant benefits in terms of acceleration and capacity. Any proposals would need to be planned over a much longer horizon than CP4 and we propose to work with train operators and government to explore these options.

Supporting documents

We are providing the following supporting documents to ORR:

- an update of the 26 Route Plans which describe the proposed strategy for each route;
- a paper summarising the strategy for freight;
- a paper setting out the analysis of the capacity provided by the strategies and the additional rolling stock for CP4 that these strategies require;
- a paper describing our approach to managing parts of the network that are designated as Community Rail; and
- a paper summarising proposals for the further development of the timetable during CP4.

4 Network Rail's policies and strategies

Introduction

This plan represents a major challenge for our organisation. It requires that Network Rail becomes the best at everything we do. This challenge provides an exciting opportunity for everyone in the business and success depends inescapably on our ability to manage change in a very demanding environment. Critical to the delivery of our plans for CP4, and for the further establishment of strong foundations for the longer term future of the rail industry, is the development of a number of key policies and strategies.

This chapter sets out how these initiatives are being developed and addresses:

- our world class initiative to deliver world class infrastructure and operations, supported by the right processes and delivered by great people;
- the further establishment of a robust asset management regime, founded on risk-based methodologies, utilising technology effectively and integrating asset management decisions over the life of the asset;
- our operating philosophy for the railway, identifying the operating requirements and the supporting technology;
- our plans for the development of an appropriate engineering access framework, essential to the delivery of a seven-day railway;
- our strategic sourcing strategy which is intended to transform our contracting and procurement capability; and
- progress on the development of our Infrastructure Cost Model (ICM).

In our 2007 Business Plan we explained that to achieve our goals and deliver our vision we have developed a change programme aimed at transforming the organisation into one that begins to feel and act world class. Every function has developed its own specific plans but there are three over-arching programmes. These are aimed at delivering world class infrastructure and operations, supported by the right processes and delivered by great people. These three elements each have specific cross-functional workstreams aimed at delivering the vision.

Our plans are now further developed, primarily through dialogue with our stakeholders, and in developing our revised business performance management framework.

Stakeholder consultation

Our initial plans were informed by discussions with our stakeholders. However, we have increased the level of dialogue to help us understand their aspirations. Communication and consultation are critical to the success of this programme in explaining what we are trying to achieve and through the influence of our stakeholders on our vision, objectives and workstreams.

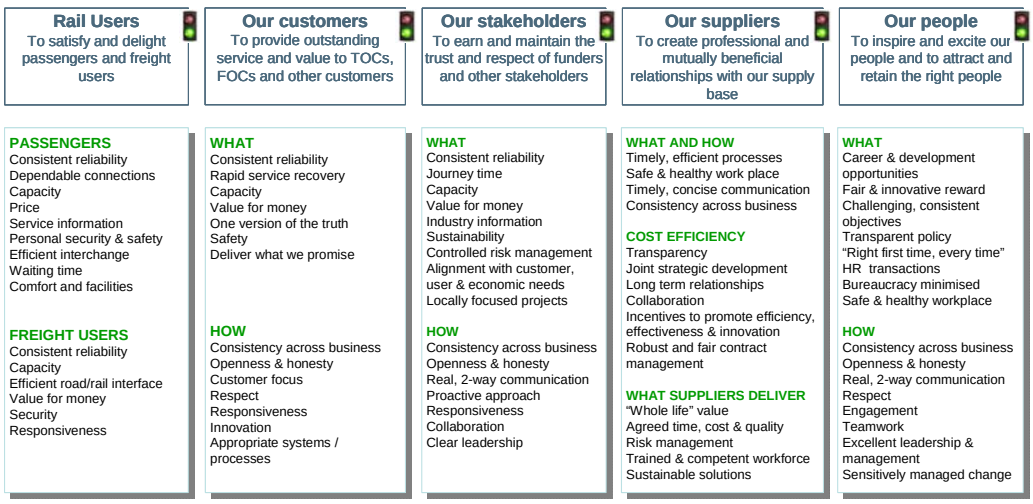
We have undertaken independent consultation with our people and externally with key stakeholders, specifically to inform the transformation programme. This has been supplemented with recent results from annual surveys, such as the MORI customer and supplier surveys and the national passenger survey carried out by Passenger Focus.

Consultation with our people, through focus groups and our annual engagement survey, has shown that across all staff there is a view of the company as improving and evolving, if slowly. "The people I work with" is frequently mentioned as a positive aspect of working for the company and many people appreciate what they see as strong leadership from the top. The key priorities identified for transforming us into a world-class company, in the eyes of our people are:

- listening to and respecting each other – treating all employees with equal respect and cultivating a blame free environment in which people can grow and challenge each other;
- training and development – we need to continue to invest in training and development in management, people and technical skills;
- bureaucracy – we need to remove excessive bureaucracy, streamline processes and procedures and cut costs;
- terms and conditions – these need to be seen as fair and consistent across the organisation, removing the variation which has arisen from privatisation and bringing maintenance in house; and
- performance management – good managers, who set high standards, for themselves and others, and hold people to account are essential.

Consultation with external stakeholders, conducted through in-depth interviews, revealed improving levels of advocacy. Almost all stakeholders have a positive view of our progress to date and are supportive of our vision for the industry. They particularly value the focus on engineering excellence and safety.

Figure 4.1 Stakeholder requirements



The key challenges they have set for us going forward are:

- maintaining momentum – we need to challenge ourselves and continue to raise our game;
- external focus – we need to become an externally-focussed, responsive organisation, acknowledging the different needs of different stakeholders, whilst considering the wider perspective;
- consistency – there are hugely different attitudes and behaviours exhibited by different parts and levels of the organisation;
- creating effective partnerships – involving stakeholders in early stages of the planning process, fully leveraging the skills of other industry players, communicating long term strategic vision and plans;
- striving for efficiency – a proactive approach to innovation, seeking early suggestions from others for solution to issues; and
- capacity – taking the lead in planning and communicating the strategy for changes in capacity.

Whilst the key findings are broadly consistent with the transformation programme it is crucial that we understand and address the issues for every one of our stakeholder groups. We have therefore focussed on the perspective of each in turn, drawing on all of the relevant research, in order to articulate their specific needs, summarised in Figure 4.1.

We have also assessed whether those needs are delivered by the transformation programme, amending the planned outputs for relevant workstreams where appropriate.

Having clearly understood our stakeholders and their respective needs, we are reviewing our current suite of surveys to check that all stakeholders are suitably represented and that these needs and wants are clearly addressed in the questions asked in the surveys.

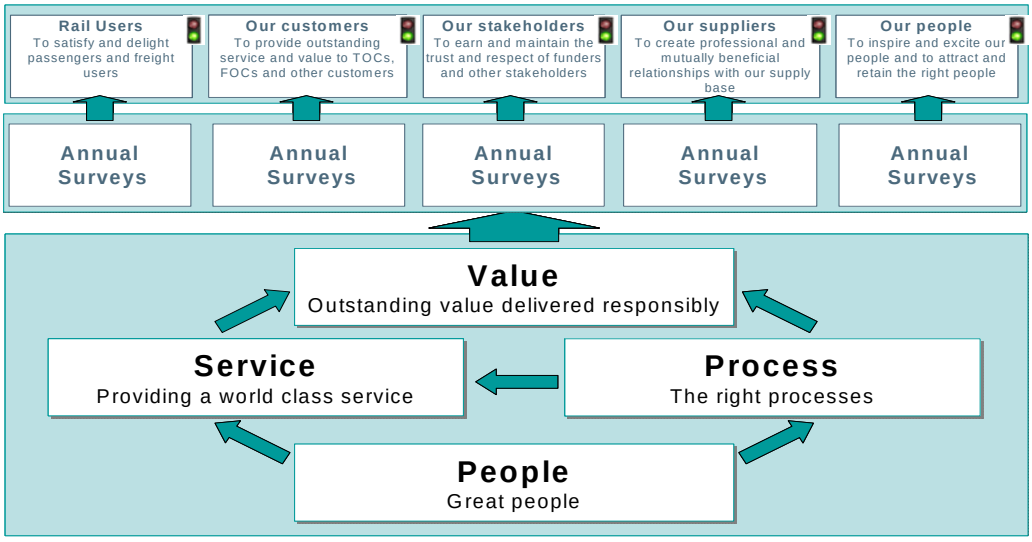
Measuring success

We need to lead, communicate, inform and learn from the right set of measures on the way to becoming world class. Our primary measure of success will be through external independent surveys of our stakeholders, such as MORI, Passenger Focus and Gallup, to check whether we are satisfying their needs and whether they perceive that we are doing so. These surveys are principally carried out annually and it is therefore essential that the key performance indicators (KPIs) we use to manage the business on a day-to-day basis adequately reflect the stakeholder needs we have identified through consultation.

The KPIs used in the current control period were chosen to address the 'fix the basics' and 'one way' phases of our recovery programme. We are developing a new performance measurement system that will enable senior management to manage the business effectively in line with the company's strategy, providing a framework for robust decision making which is meaningful throughout the organisation.

Progress to date has included development of a balanced scorecard of key performance indicators measuring four perspectives, as shown in Figure 4.2.

Figure 4.2 Our balanced scorecard



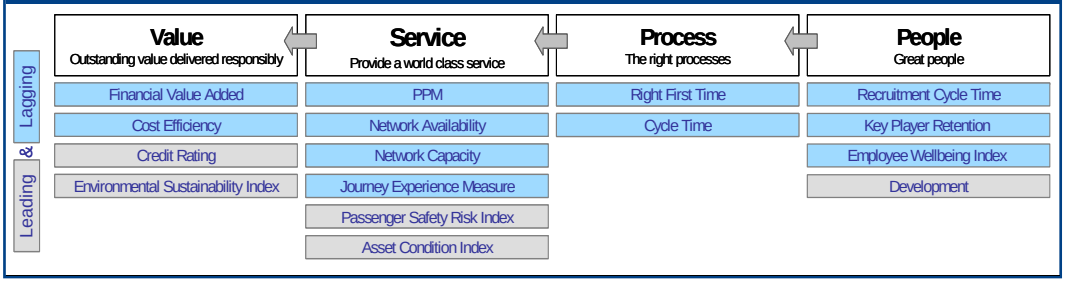
These relate to the service we provide, the value we deliver, the processes we use and the development of our people. For each of the perspectives we have analysed the related stakeholder needs, including the requirements set out in High Level Output Specifications. This analysis has been used to derive KPIs and lower level performance indicators (PIs) which measure progress towards our world class aims and we would expect that the performance demonstrated by the KPIs would then be reflected in the results of the annual stakeholder surveys. We have used a consultative approach across the business to maximise the quality of the KPIs. This has been a robust process which has included working with subject matter experts; testing proposals against corporate world class work streams; identifying best practice in other companies and wherever possible adopting an industry view. We will, however, need further discussions with our industry partners on some of these measures.

The KPIs are shown in Figure 4.3 and we aim to use these measures internally in 2008/09 and to report formally against them from the start of the next control period in April 2009. We have commenced development of the appropriate systems to provide this information and to embed it within our business management and review processes, including our management incentive arrangements. We have provided ORR with details of these proposals.

Sustainability

An effective and efficient national rail network has a major role to play in supporting economic growth and in the provision of an integrated, socially inclusive and sustainable transport system. In addition, the environmental advantage that rail has over other forms of transport means that rail can help Great Britain meet its environmental challenges. For Network Rail, sustainability is not something that is considered separately from other business drivers. Our vision for a more efficient, more responsive railway, that provides a better experience for our passengers, is more sympathetic to the needs of our lineside neighbours and is more conscientious in how we source our materials and minimise the resultant waste, is a vision for a sustainable railway.

Figure 4.3 Our KPIs



Assessment framework

Our asset management framework, described below, provides us with the primary mechanism by which the various business drivers are assessed and converted into actions that deliver our required outputs, including the delivery of a sustainable railway. It is important to note that in this context sustainability covers both:

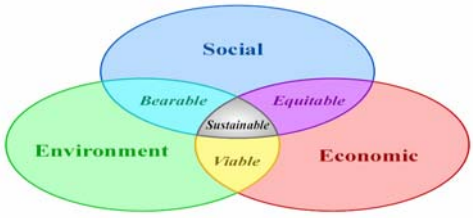
- mitigation – minimising the impact of our actions (CO_2 emissions, non-renewable materials etc); and
- adaptation – those actions necessary to ensure that our infrastructure can operate in a changing climate where key resources may becoming increasingly scarce.

To assess the impact of these plans, and to provide us with a means of communicating this with our stakeholders, we have adopted the three pillar approach, common to many organisations, considering:

- economic – the value provided by the railway to the economy;
- environment – the impact that the railway has on the environment and the use of non-renewable resources in delivering rail services; and
- social – the provision of a safe railway that meets the expectations of society in terms of accessibility and social inclusion.

Figure 4.4 shows the relationship between each of the pillars.

Figure 4.4 Three pillars of sustainability



Economic

Maximising the value provided by the railway to the economy is at the core of our overall strategy and there are three key measures in place:

- the economic value to society from the existing railway;
- the level of subsidy required to support the provision of existing services; and
- modal shift (due to the environmental advantage that rail has over other forms of transport).

Environment

Rail is acknowledged to have environmental advantages over other forms of transport. However, without continued action this competitive advantage could diminish, particularly as combustion engine technology improves and other sectors respond to their respective challenges. As a consequence our focus is on:

- climate change and energy efficiency – reducing greenhouse gases and combating climate change;
- sustainable consumption and production – achieving more with less; and
- natural resource protection and environmental enhancement – improving resource efficiency and enhancing our air, water, soils and biological reserves.

Social

For the social dimension of sustainability there are three defined groups that our plans are targeted at supporting: our passengers, the wider public and our own people. Key performance measures in place relate to:

- maintaining rail's position as the safest mode of public transport;
- responding to enquiries from the public and providing our lineside neighbours with timely information of our planned maintenance and renewal activities;
- providing a great travel environment by the quality of the facilities at stations and providing an environment where passengers feel safe and secure;
- making rail travel accessible to all; and
- the general health, engagement and diversity of our workforce.

Industry strategy

We are working closely with our industry partners to develop a sustainable rail strategy that will help define sustainability as a business driver and will help maximise the contribution from the rail industry. The intention of this over-arching strategy is to provide guidance for industry partners as they develop their individual strategies and to provide clarity to our funders and other stakeholders of the industry's plans to improve its contribution to Britain's sustainability agenda.

Asset management

The effective and efficient implementation of our corporate strategy and the achievement of our sustainability goals requires infrastructure that meets our customers' and funders' requirements

in terms of safety, capacity, capability, reliability and cost. A key business objective, therefore, is to optimise activities and expenditure on our assets in a way that provides demonstrable value for money to passengers and freight operators and to the ultimate customers of the railway – fare paying passengers, freight users and the taxpayer.

Our Business Planning Criteria sets out how we plan to achieve these aims and how we prioritise our actions. This plan is based upon the application of these criteria.

Our asset management strategy, and the investment planning and implementation process that underpins it, provides a structured approach to this challenge. This section sets out:

- the key elements of our asset management strategy and the framework that supports its delivery;
- the progress we have made in the development and implementation of this framework since the publication of the ISBP; and
- the core components of the asset polices for each of key asset groups and how these underpin our cost and activity plans for CP4.

The framework that underpins the implementation of this strategy is shown in Figure 4.5. Detailed expenditure and output forecasts as a result of the application of these policies can be found in Chapters 6 and 8 respectively.

Asset management strategy

Our asset management strategy defines a set of core principles that reflect the company's wider objectives and values, including:

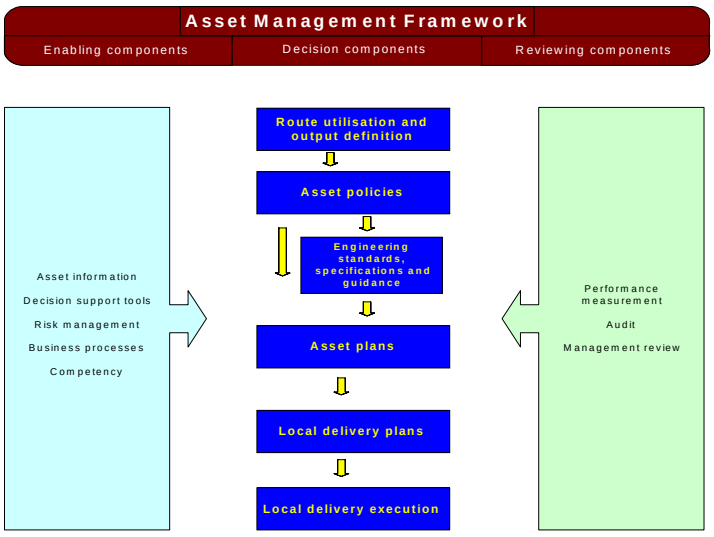
- maximising network value through the delivery of sustainable route outputs;
- minimising whole-life and whole-system costs;
- consideration of the likely impact of climate change on the environment within which these assets will operate over their life;
- the comprehensive application of a robust risk management process at every stage of decision making; and
- the publication of investment plans to enable key stakeholders to plan their own activities with a reasonable degree of assurance.

The route utilisation and output definition process delivers a specification of what is required for each of our key routes (in terms of capability, capacity, reliably etc.), principally as a result of the Route Utilisation Strategy (RUS) process described in Chapter 3. These outputs are delivered by the application of the inspection, maintenance, renewal and regimes, as set out in our asset policies.

The framework we operate is in three parts:

- the central axis comprises the complete set of asset management life-cycle decisions, incorporating all stages between the high level specification of the requirements of the infrastructure on the route to the delivery of specific work on individual assets;
- a set of enabling systems, tools and processes, which support asset management

Figure 4.5 Asset management framework



decision making and ensure that those responsible for their implementation have the appropriate competencies; and
- a set of review processes that are used to monitor the effectiveness of the asset management system through audit, measurement and review. This includes a feedback mechanism to facilitate further development and continuous improvement.

Technical policy

Our Asset Management Principles statement sets out the framework against which our policies are developed and maintained. Issues addressed include:

- the overarching requirement for a safe, reliable and affordable railway;
- asset management costs – and the need for these costs to be commensurate with the potential risks to business outputs;
- the need to consider obsolescence throughout the life of an asset or system;
- the requirement for clear economic and performance criteria for the major asset interventions that drive expenditure and deliver outputs;
- the delivery of capability and functional requirements as defined by the route or network specification;
- the replacement of "find and fix" reactive maintenance with "predict and prevent" active management; and
- the requirement to maintain adequate asset related information for internal and external stakeholders.

Route categories

A core component of our technical policy is the need to support the range of outputs across the network, as defined primarily by the RUS process. This is achieved by differentiating the network by route type, reflecting the volume and general nature of the traffic carried, as follows:

- primary and key L&SE routes are intensively used and support high speed traffic. Passenger revenues are high, as are the compensation payments for train delays. There is often a demand for increases in capacity and capability on these routes;
- other L&SE, all secondary routes and key freight trunk routes are characterised by lower line speeds, a broader range of passenger revenue and train delay penalties and generally a more limited demand for route capability enhancements; and
- rural and freight only routes are typically lower speed routes, lightly used, with low train service revenues and low train delay penalties, although freight services on some routes may have high axle weights.

The length of track in each route category is shown in Figure 4.6.

Figure 4.6 Track km by route category

Route category	Track km
Primary	10294
London and south east commuter routes	4152
Secondary	10719
Rural	3848
Freight only	2092
Total	31105

This approach provides an effective means of defining the differing reliability and performance requirements of, for example, highly intensive routes carrying inter-city traffic from those with a more infrequent service. This allows for asset policies to be differentiated, where appropriate, by the type and nature of traffic carried and make certain that decisions on routes with similar usage characteristics are managed in a consistent manner across the network.

Route-specific modifications are made to these policies where this improves the alignment between asset management activities on the route and the required outputs (for example, train service reliability), as defined by the RUS process.

Asset policies

Asset policies provide the pivotal link between our strategy for meeting our stakeholder/statutory requirements and how we manage our asset base. These policies set out the inspection, maintenance and renewal regimes that will deliver the required network and route outputs for the funding available. They also define the specification for new assets. Assets are designed, constructed, inspected, maintained and replaced in accordance with these policies and any subsequent guidance issued since the policies were last updated.

Functional asset policies

For each asset group a functional asset policy is in place. These policies identify the individual asset types covered and set out how each of the policy statements identified in the asset management principles is being addressed.

Policy assumptions and justifications
The policy justifications provide the rationale for the inspection, maintenance and renewal regimes. They provide an explanation of how these regimes support the implementation of the asset policies and the longer term impact of the implementation of these polices (in terms of likely changes to route reliability, asset condition, future whole-life costs etc). They also outline how we forecast the activity levels associated with the application of these policies, as used within the Infrastructure Cost Model.

Standards and work instructions
We supplement our asset policies, where appropriate, with standards, specifications and work instructions. These provide more specific information for determining the appropriate action on individual assets following routine inspection or asset failure.

Developing our asset management capability

In June 2006 we published the first generation of asset management policies centred on a risk-based methodology. This methodology was used to identify the risks to the delivery of our corporate objectives, and to manage these risks by:

- an initial fit-for-purpose asset or system design;
- an inspection regime to monitor asset condition and identify actual or potential defects that could compromise the performance of the asset;
- maintenance activities to address degradation identified at the time of inspection or to address predictable asset degradation; and
- renewal criteria that identify when the current asset or system should be replaced as ongoing maintenance is considered to be uneconomic.

Within the ISBP we acknowledged a need to enhance the implementation of this framework and committed to the development of a programme of improvement initiatives. In drawing up this programme we examined best practice within the company, in other businesses and the Institute of Asset Management's publicly available specification on good practice in asset management (BSI PAS 55). We also drew upon the results of a detailed assessment of our asset management capability by the independent reporter for asset management, Asset Management Consulting Limited (AMCL), appointed jointly by Network Rail and ORR.

AMCL's review included a detailed assessment of our asset policies and provided a view of our organisational strengths and weaknesses and the identification of internal areas of excellence and opportunities to improve the effectiveness of our asset management capability. One of its conclusions was that, in the opinion of AMCL, "Network Rail's maturity in asset management is at least comparable to that of other major infrastructure owners in the UK".

The first phase of this programme of improvement initiatives has now been completed and key deliverables and details of our longer term asset management and asset policies development programme are contained in detail in the supporting document, Asset Management Development. This work is summarised below, with relevant asset specific issues summarised later in this section.

Progress since June 2006

Considerable progress has been made in refining the content of our assets policies and where appropriate the outcome of this work is reflected in this submission.

Policy justifications
Our primary aim has been to provide additional quantitative data to support our activity and expenditure forecasts. This has been achieved by focusing our attention on those assets that require the highest levels of expenditure within the next control period. For each of these assets the degree of quantitative supporting data was assessed and where this was considered to be insufficient further analysis was undertaken. For some assets this exercise has resulted in a change to our asset policies – for example, a more thorough understanding of rail degradation has led to a reduction in the frequency of rail grinding. For other activities, the analysis has validated our existing approach.

Policy development
During this period we also took the opportunity to undertake a broader test of some of the underlying assumptions in our existing asset policies. The parameters that formed the basis of this analysis were deliberately challenging, to encourage a robust examination of our existing thinking. Two scenarios were considered:

- the achievement of significant improvements in reliability for marginal increases in whole-life costs; and
- considerable reductions in whole-life costs where this could be achieved without a marked impact on train service reliability.

As with the justification exercise, this work served to confirm much of our current approach and produced a variety of improvement opportunities. Examples of the latter include:

- the replacement of sleeper pads at half the predicted life of the sleeper can provide a significant extension in the expected life of the rail and sleepers;
- the acceleration of our component improvement programme on our overhead line system; and
- the redrafting of a number of standards and work instructions to provide greater clarity on the purpose and scope of maintenance activities, leading to an improvement in the quality of the work carried out and ultimately, lower whole-life asset management costs.

This exercise also provided us with information on the impact on whole-life costs of incremental changes in asset reliability for each asset group. This formed an important input into the consideration of the asset strategy options that underpin delivery of the HLOS, particularly performance improvement, and enabled us to understand the potential contribution from each asset group.

Risk-based maintenance

We remain committed to exploring the opportunities to improve the alignment between asset degradation and business output risk by the adoption of risk-based maintenance regimes. Our priority here has been the further development of our reliability centred maintenance initiative for our signalling assets, which is described in the signalling section below.

Achieving optimum asset condition

As stated above, our inspection, maintenance and renewal regimes are targeted at achieving a balance between asset expenditure and the risks to business outputs as a result of asset failure. For most assets there is an optimum asset condition in terms of risk and asset management costs. Assets whose condition is below this level generally require higher costs to achieve the same level of risk management than an asset at the optimum condition level.

The rail network has not yet reached the point where the majority of the assets on the network are at this optimum condition, although maintenance and renewal activity levels in recent years have considerably improved the situation. Our current policies are aimed at achieving this optimum condition level for the rail network. Towards the end of CP4 and during CP5 the gradual improvements in network condition as a result of these policies will generally allow asset management activity levels (and hence expenditure) to reduce as the risks to business outputs reduce.

Asset information

In August 2005 we published an update of our asset information strategy and our plans for the delivery of a robust asset register by September 2007. The programme was completed to schedule and the improved condition data has been used to inform our activity and cost forecasts.

From a relatively weak position two years ago, with major gaps in the coverage and quality of asset information and a lack of definition in the processes and procedures for maintaining and assuring data quality, we have now advanced to the point where:

- all infrastructure asset disciplines have systems in place that are populated with the core data necessary to support primary decisions on the maintenance and renewal of the infrastructure; and
- asset data management procedures are in place for all disciplines with existing systems and are being finalised for the new Civils systems, the Civils Asset Register and electronic Reporting System (CARRS) and the Operational Property Asset System (OPAS).

Asset Stewardship Index (ASI)

For each asset group we are developing a number of performance indicators that will be used to measure the effectiveness of our asset management regimes. Improvements in our understanding of asset degradation and in the quality of condition data available to us as a result of our efforts to improve data quality have enabled us to re-assess our approach to these measures.

As a consequence, for CP4 we have developed a revised set of measures with a greater emphasis on asset condition and the likely longer term cost implications of a variation in this condition. Building on this work we are also introducing a revised Asset Stewardship Index (ASI) to replace the Asset Stewardship Incentive Index (ASII) that is currently in operation. In addition to a greater emphasis on condition, rather than short term reliability, the new measure:

- provides a more comprehensive assessment, as all asset groups are included; and

- weights the measure by route type, where appropriate, reflecting our differentiated approach to asset management. For example, an improvement in the condition of an asset on a primary route would be considered more valuable to a similar improvement on a rural route.

It is important to note that the key purpose of the ASI is to help us understand the relative overall importance to the business of a movement in an individual asset measure. We will continue to monitor, and publish, the asset specific measures.

Standards

As discussed above, standards form an important part of our asset management framework, providing clarity on those actions necessary to deliver our asset policies. Following a proof of concept exercise completed in summer 2006 we have introduced a new, consensus based, standards management system. This sets out how standards are created, modified or withdrawn and how derogations from standards are managed. Proposed standard changes are developed by groups, consisting of technical experts and representatives drawn from across the company. The process is overseen by the Company Standards Group.

Our forward programme

Although we have made good progress in embedding a risk-based methodology for asset management within the business, a view shared by the independent reporter, we recognise that improvement opportunities remain.

To assist in this task Network Rail and ORR commissioned AMCL to identify best practice for each component of our asset management framework. We also asked them to identify what they believe would be a reasonable timescale for the achievement of this level of performance.

We have used the output of this exercise to refine the content and delivery timescales for our development plans. The principal elements of these plans include:

- providing clear route specifications to improve the alignment between asset management activities and the delivery of route outputs;
- extending the policy justification work to cover all key asset cost drivers;
- incorporating ideas and initiatives generated by our infrastructure and operations world class workstream discussed later in this chapter;
- improving the coverage and quality of asset failure data and subsequent analysis;
- the further differentiation of policies by route, where appropriate;
- the further development of the Corporate Network Model to improve data integration and to provide improved stakeholder access to our systems;
- completing the application of our integrated risk process across relevant elements of our asset management system; and
- the implementation of a comprehensive suite of indicators to improve our ability to monitor the effectiveness of the asset management framework.

In line with our world class agenda, we expect to have made considerable progress with these tasks prior to the commencement of CP4.

Technology and related issues

Our asset policies specify the design and future inspection and maintenance regimes for assets that will be installed during CP4. These assets have a life expectancy varying from 10 to 15 years for most electronic components, to more than 100 years for some structures. Although it can be relatively straightforward to amend a policy to take advantage of a change in technology or to reflect a change in legislation, such changes are very difficult to implement retrospectively and it can be many years before these changes are realised on a significant proportion of the infrastructure.

As a consequence, wherever possible we are seeking to ensure that we are informed about future risks and opportunities and engaged in appropriate actions to “future proof” our assets and polices wherever feasible.

New technology

Underpinning the development of asset management strategy is the exploration and exploitation of technological innovation. Improving what we do today and creating tomorrow’s railway requires significant technological innovation as an integral part of whole business improvement.

We are approaching these challenges through four principal routes: co-operation with our European rail colleagues; building relationships with suppliers and academia; exploiting our new fixed communication network; and exploiting technologies that are maturing in non-rail industries.

We are represented on all of the major consultative bodies across Europe that advise on research priorities and funding, including:

- European Rail Research Advisory Council;
- European Construction Technology Platform;
- International Rail Research Board (UIC);
- Platform for Technology and Research (UIC);
- Research Coordination Group (UIC); and
- Rail Research UK Council and Management Board.

We are working with universities throughout the UK on a number of research topics, including:

- zero tamping systems (railway formations that reduce or negate need for tamping);
- vehicle mounted microwave systems for ice removal;
- self monitoring fastener systems;
- automatic vehicle identification; and
- geo-thermal heating of points.

We are also exploring possibility of establishing a test track and associated test facilities either in the UK or in partnership with other European railways and suppliers. In addition to rolling stock testing, the facility would provide us with an ability to test infrastructure for reliability and performance (including noise and environmental issues) through accelerated duration and time testing.

Predict and prevent

Improved infrastructure monitoring is a key component of our strategy to exploit technology to improve the safety and value provided by the rail network. This is enabling us to move from a "find and fix faults" regime to "predict and prevent" asset management.

This is in part driven by the likelihood that as there will be fewer, more expensive, skilled workers available to industry in the future, we have to design every part of our system for low maintenance while improving reliability and safety integrity. We cannot afford to use scarce, skilled people for these repetitive tasks. Gathering performance data intelligently from remote condition monitoring of our assets will provide early visibility of equipment degradation and performance issues to facilitate a more proactive approach to maintenance and fault rectification.

A predict and prevent regime requires a robust understanding of current asset condition, the factors causing asset degradation and the nature of this degradation. This can only be achieved by regular and objective asset condition monitoring, delivered by automated systems. This understanding has underpinned our move into train-based technology and remote condition monitoring to measure the infrastructure, supported by centralised systems to diagnose trends and patterns.

At the core of our train-based technology is the New Measurement Train (NMT), introduced in 2003 and now operating a two weekly measurement cycle on key parts of the network, monitoring 250,000 kilometres of track every year at speeds of up to 125mph. The NMT is an important part of our inspection fleet, providing us with a live platform to evaluate and develop the performance of the world's most advanced railway monitoring systems, including:

- track geometry;
- ultrasonic surveys;
- train passing clearances;
- video inspection;
- overhead line; and
- radio surveys.

We are continuing to explore the benefits that can be derived from remote condition monitoring and the introduction of intelligent infrastructure.

Rolling stock

We are members of all of the system interface committees and are developing a growing understanding of the interaction between trains and our infrastructure. We are developing an enabling policy relating to our involvement with the specification of rolling stock. This is intended to consider both Network Rail owned rolling stock and that operated by train operators. The latter is particularly important as for a number of years the lack of integration between rolling stock specification and acceptance and network management has led to a situation that has inflated both rolling stock and network management costs. In part this has resulted from an inadequate consideration of train and network interfaces, poorly understood acceptance processes and late changes being required to the infrastructure or modifications to trains.

Two key issues that will drive rolling stock design in the future are the expectation of reduced journey times and a requirement to become more energy efficient. On the surface these are conflicting requirements, but they are actually achievable if we can make trains lighter. Lighter trains can deliver improved acceleration and braking, reducing journey times between stations using less energy, and causing less damage to

the infrastructure. There are four main ways of making trains lighter per seat:

- improved design, including a greater use of new materials (for example carbon fibre);
- extending the electrified system to remove the need for trains to carry around their own fuel;
- removing heavy crash resistance material from the train and transferring this protection to the infrastructure – modern train protection technology can control the train-train collision risk. In addition, if successfully introduced, the use of low cost modular bridges is likely to allow the cost effective removal of many level crossings; and
- reduce bogie and axle weight by improving track quality (a key factor in the design of the new Intercity Express train).

Our work with our industry partners on the Network RUS provides us with a robust framework to understand longer term rolling stock requirements and how we can balance passenger and freight user requirements with whole-system costs.

Climate change and adaptation

Irrespective of the underlying cause and likely impact of possible mitigation measures, the climate in Britain is changing and unless plans are put into place, these changes will impact on the performance and management costs of our infrastructure. The full impact of climate change and its possible effect on rail infrastructure is still uncertain, but is likely to include:

- the adverse effect of higher wind speeds on overhead line equipment (OLE);
- increased number of heat related speed restrictions;
- increased outage of electrical equipment due to more frequent lightning strikes;
- the deterioration of embankment and cuttings due to periods of intense rainfall interspersed with extended periods of drought;
- bridge scour due to periodic increases in water flow rates as a result of storm; and
- higher sea levels and increased frequency and severity of storms causing damage to sea defences.

As our asset management policies are based upon minimising whole-life costs, where we have some understanding of the likely impact of climate change this is taken into account when considering our system design and maintenance regimes. For example, our plans for CP4 include for a considerable increase in investment in drainage, reflecting the increased likelihood of flooding in the future.

Legislation

Changes in legislation can have a significant impact on the future cost of the railway. Consequently it is important that we have a thorough understanding of the implications of new legislation and, where appropriate, active participation in its development to minimise any unnecessary adverse impact on railway costs. We achieve this by a number of means, including:

- engagement with the Department for Environment, Food and Rural Affairs (Defra) in implementing the Environmental Noise Directive;
- monitoring of new legislation and areas of growing societal concern; and
- active participation in drafting Technical Specifications for Interoperability (TSIs), and participation in management committees.

Obsolescence

Rapid technological change, particularly in the IT and communication fields, creates a significant risk of component and system obsolescence. Addressing this is a challenge faced by many organisations. Following a review of the recommendations in a report, jointly commissioned by Network Rail and the National Audit Office, we have progressed a number of initiatives, including:

- updating our asset management principles, described above, to explicitly identify the requirement to consider obsolescence issues throughout the life of an asset or system;
- reflected this in asset policies for those assets where this is a particular issue; and
- purchased strategic spares for a number of systems where the production of these parts is likely to be discontinued in the near future.

A number of other initiatives are currently being developed and our April update will provide further details.

Track

The purpose of the track system is to convey the planned range and tonnage of traffic at the range of authorised speeds safely and reliably across the network. The asset portfolio comprises the rail, sleepers, ballast and switches and crossings and the associated formation and drainage. Also featured are management of the lineside and

other track assets including the cesses, vegetation and boundary measures.

Asset degradation

Track assets comprise a complex system and the deterioration of individual components has an adverse effect on the others. Degradation of the key track components is mainly due to the speed, volume, axle weight and bogie stiffness of traffic that runs over it, through two basic mechanisms: wear and fatigue. Additionally, environmental factors can dominate degradation. For example, timber sleepers on low density routes may require renewal due to rot rather than as a result of mechanical wear.

The other major influences on degradation of track components are the quality of their initial installation and the quality and quantity of maintenance of the track system and train wheel profiles over the life of the asset. If the maintenance regime is sub-optimal (which could be as a result of inadequate traffic access, skills or resources) then the degradation rate will increase significantly.

The potential impact on business outputs of failed or degraded track assets includes:

- a failure to maintain route capability;
- train service delays;
- increased risk of train derailment;
- increased cost of remedial work;
- shortened asset life; and
- increased whole-life costs.

Asset policy objectives

We manage these asset degradation risks by a comprehensive inspection, maintenance and renewal regime. To maintain an appropriate balance between business risk and the cost of our asset management regime, our inspection, maintenance and renewal activities for track assets are differentiated by the type and nature of traffic carried. Separate regimes are in place for each of the route categories described above.

Primary and key London and South East (L&SE) commuter routes

Our policies for these routes reflect the levels of safety required for high-speed operation and the reliability required to meet our business objectives. They support progressive improvement towards achievement of the following outputs:

- no broken rails from detectable defects;
- no condition of track speed restrictions imposed for longer than 48 hours;
- speed restrictions due to rail defects shall be minimised; and
- no immediate action geometry exceedences.

Other L&SE, all secondary and key freight trunk routes

As the impact of asset failure on business outputs is less than for primary and key L&SE routes, managing output risk consistently across the network allows for a lower level of asset performance on these routes. Nevertheless, our policies aim to reduce the number of defects or failures of the track system that cause delay to trains or safety risk. In particular, they support rectification of all condition of track speed restrictions.

Rural and freight only routes

As asset degradation or failure on these routes generally does not have a significant impact on business outputs, a less onerous inspection, maintenance and renewal regime is in place. Our policies aim to prevent an increase in the number of defects or failures of the track system that cause delay to trains or safety risk. Condition of track speed restrictions will be rectified if they cause unacceptable delays to trains.

Improving route value

Track renewals (often developed in conjunction with signalling renewals) can provide opportunities to improve the capacity and capability of a route for a relatively low incremental cost or to rationalise the network (where aspects of existing functionality are no longer required). Value improvement opportunities considered as part of asset renewal schemes include:

- plain lining track where there is no longer a requirement for a switch and crossing (S&C) unit;
- replacing an existing S&C unit with one with a higher operating speed;
- revisions to track layout to improve operational flexibility or reduce maintenance costs;
- provision of track infrastructure capable of supporting additional tonnage or higher linespeeds; and
- optimising track position to improve gauge capability, particularly on structures.

Longer term impacts of our policy

For primary and key L&SE routes our asset management regime will improve the overall condition and reduce ongoing maintenance costs of the track assets on these routes. Reliability and availability will be improved over time, for

example by reducing the incidence of broken rails and reducing track geometry deterioration rates. In addition, as the CEN60 grade 260 rail and G44 concrete sleepers specified in our renewals have a longer life than the existing rail and sleepers in use on these routes, there will be less disruption as a consequence of reduced rates of asset renewal in future. It should be noted, however, that it will be a number of years before this policy brings about a material change in the volume of track renewals required.

For secondary, other L&SE and key freight trunk routes, our policies will make minor improvements in the overall condition, performance and ongoing maintenance costs of the track assets on these routes during CP4, mainly by the continued renewal of jointed plain line track with continuously welded rail (CWR) and jointed S&C with modern fully welded designs. Our policies will also optimise the service lives of existing track by appropriate preventive maintenance, particularly for older concrete sleepers on CWR.

For rural and freight-only routes, the generally low rates of wear under the imposed traffic enable jointed construction to be sustained by the piecemeal replacement of rails and sleepers, where existing conditions are adequate. Limited renewal of jointed plain line track with CWR will be targeted at track that is in poor condition. Significant mileages of jointed track on timber sleepers will therefore remain for the foreseeable future, presenting a long term maintenance burden.

For all route types, partial S&C renewals can provide an optimum whole-life solution and will help to offset the peak in S&C renewal demand that is forecast for CP4 and CP5.

Policy developments since June 2006

Our priority for track assets has been consideration of the criteria underpinning the key costs drivers for rail, ballast and sleepers. Although for some activities an extended analysis of data is required, this work has now been substantially completed. The majority of the key costs drivers for the inspection, maintenance and renewal of rail, ballast and sleepers are now supported, where possible, with quantitative data. Key changes to be implemented as a result of this work include:

- modifications to our visual and track geometry inspection frequencies, under consideration for implementation in 2008;
- grinding intervals for straight track being extended to 45 equivalent million gross tonnes (EMGT), from 30 EMGT at present, but no change in the for interval for curved track;
- the renewal of all pre-1976 rail on high tonnage, high speed routes during CP4;
- the criteria governing the use of cascaded rail have been relaxed, enabling its increased use on some rural and freight only routes;
- the replacement of 5mm thick sleeper pads at the half life of the sleeper to extend the life of the rail and sleepers;
- fixed interval ballast cleaning on primary routes (at half the service life of the ballast);
- the use of modular S&C (reducing the cost by between 15 per cent and 30 per cent for each point end renewed, after full implementation); and
- revised criteria for the use of partial S&C renewal as an alternative to full renewal.

In parallel, a number of existing policy requirements have been re-examined and the policies amended accordingly.

It is estimated that this work has resulted in a reduction of approximately £200 million in track inspection, maintenance and renewal expenditure over the next control period. The revised expenditure and activity forecasts as a result of these initiatives have been reflected in this plan.

Further policy development

There are a number of track policy development initiatives that require further consideration. Work on these initiatives is currently underway and is generally targeted for completion by April 2008. These include:

- linespeed handback for primary routes;
- cyclical renewals for primary routes;
- installation of absolute track geometry / managed track position on primary routes;
- the use of head hardened rail on high wear curves and for the manufacture of S&C;
- the use of explosive depth hardened crossings for half sets of switches;
- the installation of undersleeper pads in plain line and S&C renewals ;
- the use of slab S&C (under consideration for installation at Bletchley); and
- complete the development of the (currently draft) strategy for the high output delivery of track renewal.

The proposed design of the Intercity Express train is likely to result in lower levels of wear on track infrastructure. However, it will operate

alongside existing passenger and freight trains and the requirement to maintain the track at a higher quality than at present may bring about some additional costs, both in raising the track quality to the required level and maintaining it at this level on an ongoing basis. It is important that these impacts are properly understood.

The introduction of particular new classes of rolling stock over recent years has led to increased rates of rail and wheel degradation. Extensive theoretical and practical research, working in collaboration with industry partners, has given us a sound understanding of the wheel/rail interface. This knowledge is being used to inform rail and wheel profile management regimes, and to influence rolling stock bogie designs; this has the potential to reduce locally high rail replacement rates in future.

Signalling

Signalling systems provide the main control and protection function for the railway, ensuring safe separation between trains and preventing conflicts. Signalling systems also facilitate control of the railway, enabling operators to implement the railway timetable and make regulation and routing decisions. Signalling systems provide the primary interface to the driver in the form of signals, indicators and in-cab information.

The signalling system comprises several key elements to provide the functions required:

- control;
- interlocking;
- train detection;
- train protection;
- signals and indicators; and
- points operating equipment.

Asset degradation

Although there are a multitude of mechanisms which may affect the signalling system there are essentially two types of degradation associated with signalling assets:

- ageing due to chemical and electro-chemical effects, such as degradation of interlocking and external wires and cables, silver migration affecting relays, rust affecting signal structures and location cases; and
- mechanical wear associated with mechanical signalling systems and components, such as interlocking frame wear, point machine wear, relay usage wear.

In extreme cases, these mechanisms can lead to failures which can compromise the safety of the signalling system and therefore require careful management. Most failures, however, are detected and result in the signalling system reverting to a safe state. This results in delays to trains as alternative, degraded modes of operation have to be implemented.

Asset policy objectives

We manage these asset degradation risks by applying an appropriate inspection and maintenance regime to each asset with the aim of providing the required level of service at minimum whole-life cost. The regimes applied vary between the different types of asset.

Inspection and maintenance

Maintenance frequencies are specified in our standards, with the intervals intended to maintain the designed safety and reliability of the asset by detecting and correcting deficiencies to signalling infrastructure before there is deterioration or failure. The intervals have been derived from best practice over a wide range of operating uses and environment and are suitable for network-wide application – however, we are reviewing the maintenance tasks and the task intervals on key assets on a national basis to determine optimum arrangements.

We have a comprehensive suite of maintenance standards for signalling (the Signalling Maintenance Specifications, or SMSs). These standards specify the tasks to be carried out in order to keep the equipment operable in a safe manner. The suite of SMSs is updated as new equipment comes into use on the network and maintenance processes are optimised.

Renewal

All signalling assets have their condition assessed using our SICA (Signalling Infrastructure Condition Assessment) tool. SICA is used to give an indicative asset condition from which engineers can prioritise site visits, peer reviews, further assessments and prepare detailed work-banks. We have been implementing actions to ensure SICA remains a robust tool and to this end work has been done to ensure SICA users are able to produce consistent results and that training and guidance is adequate to make the tool fit for purpose. Although SICA gives an overall indicative life of an interlocking area, it is necessary to review individual SICA elements to determine if a particular part of the signalling system is driving the renewal date and whether life extension

activities can provide a cost effective solution within the constraints of the delivery programme.

Improving route value

Signalling renewals (often developed in conjunction with track renewals) can provide opportunities to improve the capacity and capability of a route for a relatively low incremental cost or to rationalise the network (where aspects of existing functionality are no longer required). Value improvement opportunities considered as part of asset renewal schemes include:

- repositioning signals to reduce headways, resulting in an increase capacity;
- increasing capacity by replacing two and three aspect signalling with three or four aspect signalling;
- increasing operational flexibility by the introduction of bi-directional signalling;
- plain lining or the repositioning of switches and crossings to reduce renewal and ongoing maintenance costs and improve reliability; and
- signal box rationalisation, reducing operating costs.

Longer term impacts of policy

These policies will maintain signalling outputs generally at current levels, particularly in terms of asset condition. There will be some improvements in safety and reliability, for example due to the gradual elimination of legacy wiring degradation issues and the use of light emitting diodes (LEDs) in signals.

The current renewal policy reflects the use of conventional technology and applies to the majority of signalling activities in CP4 – however following acceptance of the industry business case for ERTMS, the migration towards this technology will continue through CP4 with the main benefits being realised from CP5 onwards. The long-term deliverability review of the signalling renewals workbank has highlighted that it is unlikely that the workbank volumes from CP5/6 onwards will be able to be delivered with conventional technology.

Policy development

The European Rail Traffic Management System (ERTMS) is a signalling and train control system in use in Europe and elsewhere and is required for full compliance with the high speed and conventional interoperability directives. Key characteristics of ERTMS include automatic train protection and in cab signalling, providing movement authority directly and continuously to the driver.

Considerable technical investigation and business case development for ERTMS has been undertaken since the publication of the ISBP. In December 2006 a cross industry consensus was achieved that a realistic and affordable ERTMS roll-out was possible if close integration with the signalling and rolling stock renewals programmes was achieved. The basis of this plan is that during CP4 there will be a migration towards ERTMS technology.

Since December 2006 the ERTMS roll-out plan has been further integrated with the conventional signalling plan including alignment with other discipline renewals and major enhancement programmes such as Thameslink.

The application of this policy is reflected in our CP4 plan and further details of these plans have been provided to ORR.

During this period we have also made progress on a number of initiatives currently underway to make changes to both the frequency and specification of maintenance activities. These initiatives operate under the generic programme name ROSE (Reliability Centred Maintenance for Signalling Equipment). In addition to delivering efficiency benefits, these initiatives also help to ensure that limited maintenance opportunities are utilised effectively. The benefits delivered during CP4 will increase progressively as the roll-out programme covers a broader spectrum of our assets.

Civils

The civils asset portfolio covers:

- bridges;
- earthworks;
- tunnels;
- coastal and estuarine defences;
- culverts; and
- retaining walls.

These assets share some common features:

- they have long lives and generally slow rates of deterioration;
- many of them date back to the original construction of the railway, or to major railway upgrading work carried out in the late nineteenth and early twentieth centuries;
- the assets are generally bespoke designs to suit their location and use, and reflecting the technology in use at the time of their construction;
- they are usually subjected to heavier loads than they were originally designed for; and

- they are capable, with appropriate maintenance, of being kept in service almost indefinitely.

Asset degradation

Environmental and other external factors have a significant impact on asset degradation, with this degradation resulting from:

- traffic;
- rainfall and the freeze/thaw cycle;
- flooding, storm damage, scour and surface water run-off; and
- corrosion of metallic structures and components.

Each of these defects may lead to a loss of strength or integrity which requires action for restoration or prevention of further loss. Eventually action has to be taken to restore the safety factors of the structure, and this is done by either repairing the defect or imposing speed or weight restrictions.

Asset policy objectives

We manage these asset degradation risks by a comprehensive inspection, maintenance and renewal regime. These are intended to deliver:

- maintained capability of the network;
- extension of the useful life of assets by the use of whole-life evaluation and the implementation of cost-effective maintenance strategies;
- avoidance of unplanned performance interruptions through loss of functionality; and
- sustained level of performance by the control of temporary speed restrictions.

Inspection

All assets are subject to inspection and examination regimes, which produce reports that are used to determine what maintenance and renewal work is needed. The inspection and examination regimes vary (in frequency and content) by asset types to reflect the different degradation characteristics and failure implications. So, for example tunnels are inspected and examined in a different way to coastal and estuarine defences.

Maintenance

We manage the risk of asset degradation by applying to each asset an appropriate maintenance and renewal policy. We have recently developed a policy planning tool, Civil Engineering Cost and Strategy Evaluation (CECASE) that allows complex policy scenarios to be examined. Different policies can be applied to individual groups of assets, enabling policy differentiation by, for example, route type or material type to be modelled. The development of CECASE identified a number of overlaps in the policies used in the ISBP. We have now redefined these policies to reflect more accurately the intended management regime and to provide a clearer differentiation between them. They are now defined as follows:

- policy A – return and maintain the asset to a sustainable state by the use of maintenance activities that will improve performance levels and extend its remaining life;
- policy B – maintain the asset condition and capability by carrying out interventions that achieve the lowest whole-life cost, without incurring condition led operational restrictions to the railway; and
- policy C – allow assets to deteriorate until interventions are essential to maintain safety standards or raise performance levels to an acceptable level for continued railway operations. When work is required it should restore an acceptable level performance and minimise the remaining whole-life cost of the asset.

Policy A would only be applied on a by exception basis, generally limited to grade 1 listed buildings or other such assets where allowing the asset to deteriorate to a condition where a complete renewal would be required is not an acceptable option.

Although policy B provides the minimum whole-life cost solution for managing the civils infrastructure portfolio, the selective use of policy C enables a balance to be achieved between delivering current route capability and train performance, lowest whole-life cost and the level of funding available. Consequently, for CP4 policies have been applied to the different categories of route as shown in Figure 4.7.

Figure 4.7 Policy by route category

Route category	Policy
Primary	B
London and south east	B
Secondary	B
Rural	C
Freight only	C

However, whilst this table details the overall generic policy approach at the route level; in some cases a more complex approach is required as rigid application of policy to individual assets could have a disproportionately negative effect on the performance of the route.

Renewal

For most assets, complete renewal is only considered as a last resort, with maintenance generally being the most cost-effective approach.

Improving route value

Major refurbishment (and the very infrequent replacement) of assets can provide opportunities to improve the capacity and capability of a route for a relatively low incremental cost or to rationalise the network (where aspects of existing functionality are no longer required). An example of a value improvement opportunity considered as part of asset renewal schemes is the strengthening of underbridges to increase axle loading capability and linespeed.

Longer term impacts of policy

The intention of this policy is to provide an overall asset condition across the network that remains constant over time. This continues our strategy of addressing the gradual degradation in the condition of structures that has existed for many years, partly as a result of natural deterioration and partly due to under-investment.

Improved prioritisation techniques have enabled us to make significant reductions in temporary speed restrictions on structures. As remedial work is completed on the high priority structures we will be able to address issues on a line of route basis, as this should deliver construction efficiencies and enable capability issues to be addressed along a whole route section.

The majority of our civils assets, in particular earthworks and embankments, were constructed many years ago, when asset deterioration was not well understood. The result is that many of our older structures are more vulnerable than those constructed more recently. For these assets, as renewal is rarely a viable option, the challenge is to identify innovative maintenance techniques to overcome existing design limitations. The use of modern techniques and material means that following the initial refurbishment, the ongoing maintenance costs can be considerably less than at present.

Our ability to deliver our policy for these assets may also be impeded by the availability of materials and labour, particularly during the construction period for the 2012 London Olympic and Paralympic Games.

Policy developments since June 2006

Our priority has been the continued development of CECASE, in particular:

- expanding the scope of CECASE to cover all key assets;
- improving its ability to model variations in the application of policies A, B and C across different asset groups; and
- the production of territory activity and expenditure targets based upon defined asset policy mixes, used to set territory budgets and targets.

A number of other initiatives have been progressed:

- a re-alignment of visual and detailed inspection frequencies to prioritise resources to asset types where detailed examination is the only effective means of determining defects;
- reconsideration of the preventative work programme for embankments;
- consideration of the likely effect of climate change and any required amendments to our earthworks and drainage policies; and
- revisions to our policy for the management of mineworkings.

Where appropriate the revised expenditure and activity forecasts as a result of this work have been reflected in this submission.

Further policy development

There are a number of initiatives that require further consideration. Work on these initiatives is currently underway, including:

- corrosion of critical location in bridges;
- further consideration of detailed inspection intervals by asset type; and
- improving the modelling capability of CECASE.

Operational property

The operational property assets comprise a diverse range of building types, sizes and age profiles, many of which are subject to heritage constraints. Together these properties form five portfolios:

- Network Rail managed stations;
- franchised stations;
- light maintenance depots (LMDs);
- lineside buildings (critical and non-critical / manned and unmanned); and
- maintenance delivery units (MDUs) and national delivery service (NDS) depots.

Operational properties are categorised according to their size, capacity and relative importance. The overall portfolio encompasses a wide variety of building fabric, building services, plant and equipment, external assets and mains utilities supplies. It includes active, redundant and mothballed property. Plant and equipment includes, for example, lifts, escalators and travellators, and train fuelling equipment.

Asset degradation

Rain, vegetation and vandalism are key drivers for the degradation of operational property. Additional drivers include wear and tear in usage, increased throughput and historical underinvestment. The degradation characteristics vary considerably for different assets. For many plant items, if not addressed, this can lead to complete failure. For other assets, such as platform surfaces, the deterioration is more gradual and rarely leads to complete failure. To be effective our asset management regimes must reflect this diversity.

Inspection

With some minor exceptions, all operational property assets are subject to inspection and examination regimes, which are used to determine the required maintenance and renewal work. The inspection and examination regimes vary (in frequency and content) by asset types to reflect the different characteristics and failure implications, as discussed above.

Maintenance and Renewal

We have defined a maintenance and renewal approach to manage the risk of asset degradation through CP4 and beyond. This features the application of one of three alternative policies, as follows:

- policy A – the renewal of complete assets which deliver enhanced functionality and business value;
- policy B – maintaining current levels of functionality and business value; and
- policy C – representing the minimum level of intervention to efficiently maintain health and safety and operability in the short-term.

The optimal application of these polices to individual assets has been determined, based upon consideration of asset characteristics and the criticality of those assets to broader business objectives. For example:

- for stations we have six categories. Category A are network hubs (e.g. Paddington) whilst category F are small unmanned stations. The assets on a category A station would be maintained to a mixture of policy A and B. For category F stations the maintenance regime would be predominantly policy C;
- LMDs would predominantly be maintained to policy B, reflecting their importance to the delivery of reliable train services;
- lineside buildings classed as critical, for example Integrated Electronic Control Centres (IECCs) and relay rooms would be managed to a mixture of policy A and B with others predominantly managed to policy C; and
- MDU and NDS depots would generally managed to policy B, with policy C applied on a by exception basis.

Subject to delivery constraints in early years, assets will be renewed according to the policy applied, when it is considered more economic, in whole-life cost terms, than the continued maintenance needed to meet the business requirement.

As the implementation of these policies would represent a relatively large increase in activity levels on our operational property portfolio, the immediate transfer to these regimes at the commencement of CP4 would be difficult to deliver and is likely to result in a short term increase in the unit cost of this work. As a consequence, we intend to phase in these regimes over the next control period, enabling us to ensure the work is delivered at an efficient cost with minimal unnecessary disruption.

Improving route value

Value improvement opportunities are considered alongside condition led maintenance and renewals schemes. These include:

- lengthening platforms to accommodate longer trains or addressing stepping distance issues as part of a platform renewal programme;
- enhancing the capability of equipment on an LMD; and
- the removal of redundant lineside or station buildings.

Longer term impacts of policy

The intention of this maintenance and renewal policy is to provide an overall asset condition across the network that remains generally constant over time. This continues our strategy of addressing the gradual degradation in the condition of our assets that has existed for many years, partly as a result of natural deterioration and partly due to under-investment.

Policy developments since June 2006

At the time of the production of the ISBP our operational property asset management regimes were primarily reactive, with variable inspection regime frequencies and bespoke maintenance and renewal solutions. Since then we have:

- worked with Building Research Establishment (BRE) to explore construction industry best practice in property asset management and updated our regimes in light of this research; and
- used our enhanced modelling capability and improved understanding of asset populations and condition to assign the appropriate policy (i.e. A, B or C) to each asset or asset group.

Further policy development

Our forward programme builds upon this work focusing primarily on improving the robustness of our understanding of the degradation of our portfolio of assets and the appropriate levels of intervention. Key initiatives include:

- benchmarking our asset management regimes against construction industry best practice;
- further research into asset behaviour and the impact of various remediation regimes;
- working in partnership with industry stakeholders to ensure business requirements are met;
- undertaking further development of standardisation and modularisation methodologies for application to property assets; and
- developing condition and performance measures for all property types.

Stations strategy

In addition, we have been developing an overarching strategy for stations which recognises their key importance as gateways to the rail network and the need for the industry to improve the customer experience of the station environment. Network Rail and train operators both contribute to this objective.

Our vision is for stations that provide a safe, inviting and sufficient (i.e. serving the capacity need) environment where all customers can easily transfer between different modes of transport as part of a seamless and satisfying overall journey experience. The key elements of the strategy include:

- consultation with our industry partners;
- developing the right number of stations, correctly sized and situated, to accommodate growth and encourage use of the rail network;
- developing transport interchange plans, with stations at their core, aimed at delivering a safe, secure and seamless total journey experience for everyone wishing to use rail;
- development of new and standardised station facilities aimed at offering a consistent, recognisable, high quality, value for money service for everyone wishing to use rail;
- developing sustainable stations aimed at reducing rail's overall carbon footprint and impact on the environment overall; and
- developing and enhancing stations by prioritising and integrating all station programmes of work and leveraging third party investment in stations.

This is a challenging task, and one that cannot be delivered immediately across the network. However, we believe it is achievable if the vision is shared across the industry and it is delivered in partnership.

The workstream has begun to establish the vision, objectives and key success criteria for the delivery of world class station services for customers. Trial erection of a modular station has been completed and delivery of a second is in progress.

Developing a joint programme

Key to delivering the strategy is the development of a jointly owned programme with train operators. We propose that this should be at a portfolio level with each Station Facility Owner (SFO). This will allow us to ensure jointly that, within the overall funds available within the industry, we can prioritise the programme to deliver the agreed strategy.

A key enabler to the development of a prioritised programme is the management and reporting of activities and costs at an SFO level in order to allow us to discuss the prioritisation of resources across the portfolio and between stations.

The development of a more joint programme will also facilitate further efficiencies through integration of works and Network Rail will be receptive to increasing the volume of work undertaken by train operators where this is cost-effective.

Station capacity

As growth in passenger demand continues a number of stations will become increasingly congested, on platforms and on concourses.

There will also be growing pressure on the ability to interchange at some locations especially in the peak periods. This will require us to simplify interchanging or it could potentially result in uncomfortable conditions for passengers, and stations having to limit access due to overcrowding.

Our strategy for addressing the capacity requirements at stations has primarily been developed through our programme of RUSs. Building on this programme and the studies carried out to date, the industry has come together to develop a Network RUS, and capacity is a key element of the stations workstream. Over the next 18 months as part of the work on the Network RUS, the issue of station capacity will be reviewed from a network perspective. This will help to set the direction for our longer term plans for addressing capacity requirements. It is envisaged that the Network RUS will be reviewed on an ongoing basis to take account of the changing environment and passenger demands and expectations.

Interchange

The importance of good quality and safe interchanges to encourage public transport usage is well understood. Passengers' experience of interchanging at stations is a vital aspect of their overall journey experience. In delivering our vision we will work with other parties to seek to improve access to stations by all modes, and we will concentrate on making improvements for those with restricted mobility or other particular needs.

Safety and security

The station environment contains risks which relate specifically to the railway environment and generic risks which are common with other areas where the public accumulate. The key risks specifically related to the train environment include train boarding and alighting, falls from platforms, and persons on the line. Generic risks which occur at stations include slips, trips and falls, assaults, crowding related incidents and terrorism threats.

A key challenge is to maintain the existing level of safety whilst at the same time accommodating a number of expected changes including increased passenger numbers, increased number of trains, and changing demographics, for example more elderly passengers.

It is important that management systems are in place to identify specific risks so that actions can be targeted locally and improve safety at an affordable cost. In the case of new stations, and those we plan to redevelop, it is vital to include safety improvements which mitigate risk due to increased patronage.

Managed stations

The managed stations form a unique portfolio of large complex stations, mainly situated in the heart of city centres. These stations are the busiest and most complex stations on the rail network. The majority of these stations are also of significant historical, architectural and engineering importance, many carrying listed status.

The overall strategy for stations also applies to managed stations. However, as both the owner and manager of these stations Network Rail proposes some additional strategic elements, which apply specifically to this group of stations.

In support of the holistic approach to management and development of these stations, an overall station plan is being developed for each station. This plan incorporates all the planned work, including all elements from inspection and planned preventative maintenance, renewals, retail, commercial development and third party enhancements, mapped out over the whole of CP4 and beyond, giving an indication of the work to be undertaken and the planned costs associated with the work.

Our expertise in the operation of the largest stations on the network is well established and we have developed a set of criteria that identify a very small number of stations where the managed stations approach may have industry merit. We consider that there are up to 15 additional stations which fulfil these criteria. We would only wish to take on additional managed stations if this is agreed with our partners, as we have done in the past, for example Liverpool Lime Street in 2003. If we were to do so we would expect to provide a fixed price and clearly define the services which we would intend to provide so that operators can plan their business.

DfT has announced funding for a National Stations Improvement Programme (NSIP) as well as the continuation of the Access for All programme. NSIP will deliver improvements to approximately 150 medium sized stations in England and Wales.

We will work jointly with the train operators and other stakeholders to develop prioritised and integrated station plans, beginning with all

stations within NSIP and all category A stations, including the managed stations.

Telecoms

There are four major components to our telecoms network:

- bearer network;
- radio networks;
- fixed lineside systems; and
- retail systems.

The bearer network comprises transmission systems, optical fibre cables, main copper cables and cable route. It provides circuits and services for signalling and electrification control systems, train radio systems, lineside communications, level crossing CCTV and customer information systems.

We operate four radio networks (three analogue and one digital) comprising base stations, antenna systems and control equipment. A new digital radio network based on GSM mobile telephony technology (GSM-R) is currently being rolled out and during CP4 the three analogue systems will be decommissioned.

Fixed lineside systems include:

- telephone concentrator systems and telephones located on the lineside and at signal posts to allow train drivers to contact signallers;
- telephone links from level crossings;
- CCTV systems for driver only operation trains; and
- voice recordings for recording safety critical communications.

Station Information and Surveillance Systems (SISS) systems consist of customer information systems, public address systems and clocks provided on station platforms and concourse areas as well as CCTV systems provided to monitor public safety and capture video images for security purposes.

Asset degradation

Telecoms assets are generally very reliable. However, they do degrade as a result of:

- mechanical damage;
- ageing and routine use;
- the result of third party intervention, including vandalism;
- exposure to dust and dirt and other environmental factors; and
- corrosion and oxidation.

The degradation or failure of telecom assets has the following potential impacts on safety and performance:

- failure of cable and transmission systems carrying signalling circuits could lead to signalling problems over a wide area and potentially severe train delays;
- failure of level crossing telephone systems increase the risk to the public and can cause train delays;
- failure of Driver Only Operation (DOO) CCTV systems could increase the risk to passenger safety and cause operational difficulties for train operating companies;
- failure of voice recorders in signal boxes and electrical control rooms would prevent the recovery of communications, crucial to incident or accident inquiries;
- failure of customer information systems will be disruptive to the public and could incur penalty payments; and
- failure of radio systems may lead to speed restrictions.

Asset policy objectives

We manage the risk of failure and subsequent loss of system functionality by both designing our telecoms networks to reduce the impact of isolated failures (for example, diverse routing) and by having inspection and maintenance regimes that are designed to keep the assets in working order at lowest whole-life cost. Depending on the asset being maintained we monitor its condition by carrying out physical on-site inspections, monitoring its performance remotely or a mixture of both. Some assets are subject to regular maintenance, while for others there are degradation modes that cannot be prevented by maintenance and a more reactive regime applies.

In addition, most assets are allocated a nominal life. A more thorough inspection and reliability review is carried out two years before this age is reached to establish actual asset condition and identify an asset specific renewal date.

Assets are replaced when one or more of the following criteria are reached:

- unacceptable safety/operational risk associated with the continued operation of the asset;
- systems become obsolete or are deemed unsupportable by the manufacturer;
- maintenance costs have become excessive compared to life cycle costs of renewal; and

- third-party support costs increase above an acceptable level.

Commercial, off-the-shelf-equipment is installed wherever possible. However, due to certain functional and ergonomic requirements there remains a limited requirement for bespoke equipment. Due to the relatively short life of telecoms equipment, obsolescence is driven by technology and industry trends.

Improving route value

The renewal of telecom assets provides a more limited opportunity to improve overall route value than, say, the renewal of track or signalling assets. However, where retail systems are life-expired and require replacing, enhancements to the facilities currently provided are considered (in terms of improved customer information or surveillance CCTV systems) as they can often be delivered for a relatively small incremental cost.

Longer term impacts of policy

These policies will generally maintain telecom outputs at current levels, in terms of safety and overall asset condition. The introduction of the GSM-R should provide a more robust platform that is less prone to failure.

The demand for skilled telecoms labour for the British Telecom 21st century network programme and telecoms work associated with enhancement schemes such as the 2012 London Olympic and Paralympic Games may reduce the number of skilled telecoms workers available for our work and lead to an increase in costs. This may impact on our ability to implement fully all aspects of telecom asset management policy.

Policy developments since June 2006

There are a number of initiatives that are currently underway that target improving the management of our telecom asset portfolio, and considerable progress has been made since June 2006, including:

- the further development and roll-out of our decision support tool (DST). The tool combines theoretical renewal information with condition assessment data in order to provide more robust renewal plans. The tool is being enhanced to provide asset condition data and trend analysis;
- options to enhance the capability of the FTN system to provide a converged internet protocol (IP) platform. Our CP4 plan includes for an upgrade to the original FTN specification and identifies options for further consideration;
- the development of a station information and surveillance systems (SISS) strategy, considering new and emerging technologies with a view to developing new standards, specifications, products and systems. The outputs from these workstreams will shape the future of SISS and harmonise the industry approach in terms of the system and product choices;
- we are working with our industry partners to identify what information should be available to the customer in and around the station environment to enable appropriate engineering solutions to be developed;
- opportunities to utilise wireless technologies to serve many of these “last mile” applications without the need for expensive (and vulnerable) copper infrastructure; and
- modifications to the specifications for telephone concentrators, partly as a result of the likely reduction in the number of signal post telephones.

Electrification and plant

The mechanical and electrical assets within the electrification and plant portfolio include:

- overhead line equipment (OLE) and conductor rails;
- high voltage and DC low voltage switchgear;
- grid supply points;
- power cables;
- transformers (power and booster) and transformer rectifiers;
- supervisory control and data acquisition (SCADA) systems;
- point heating;
- signalling power supplies;
- non traction high voltage and low voltage distribution systems;
- major plant installations (e.g. moving bridges or pumping installations); and
- a portfolio of small plant installations.

Asset degradation

Electrification and plant assets generally last for decades and, once initial post-installation failures have passed, have slow deterioration rates. Many assets associated with the provision of power to electric trains have been in existence since the time of initial railway electrification.

The failure modes of these assets vary according to the type of asset. However, there are some failure modes that are common to most electrification and plant assets:

- mechanical failure as a result of wear of moving components;

- mechanical failure as a result of corrosion;
- failure of the electrical insulation caused as a result of degradation;
- damage due to severe weather conditions such as wind and gales and ice accretion; and
- failures as a result of poor quality of design and construction.

Electrification and plant failures can result in:

- loss of control of signalling and points systems, leading to train delay and cancellation;
- loss of points heating, leading to delay and cancellation of trains;
- loss of ancillary systems such as customer information systems and surveillance CCTV;
- risk of injury from contact with exposed live electrical equipment; and
- catastrophic failure of oil-filled electrical distribution assets (switchgear and transformers), following disruptive fault resulting in injury or property damage.

Asset policy objectives

We manage these asset degradation risks by applying an appropriate inspection and maintenance regime to each asset with the aim of providing the required level of service at minimum whole-life cost. The regimes applied vary between the different types of asset, but they generally include:

- inspection activities, consisting of non-intrusive inspection/testing, high level intrusive inspection and dynamic recording using on train instrumentation;
- scheduled maintenance tasks; and
- prioritisation and removal of defects.

Where it is cost effective to do so, these risks are mitigated by providing a degree of redundancy in the system design, which allows services to be maintained even with the failure of one component. However, if this situation is allowed to exist for an extended period it can put a greater load on adjacent units accelerating their degradation.

Where renewal of any asset is necessary this is selected on the basis of the least whole-life cost solution that will meet the performance requirements for the relevant route.

Improving route value

The renewal of electrification and plant assets can also provide opportunities to improve the reliability, capacity and capability of a route or to rationalise the network (where aspects of existing functionality are no longer required) for a relatively low incremental cost. Value improvement opportunities considered as part of asset renewal schemes include:

- rationalisation and reconfiguration of overhead line layouts (tension lengths, sectioning and switching) to improve reliability and maintainability. OLE system renewal also provides opportunities to support additional train services, changes in rolling stock, or higher linespeeds;
- reconfiguration of signalling power supplies to provide increased performance and reliability as part of a route based signalling scheme (alternative in-feeds, auto changeover, increased rating of supplies etc); and
- the installation of remote monitoring of performance-critical assets (transformers, cables and power systems) to improve knowledge of asset condition, serviceability and degradation for key routes.

Longer term impacts of policy

These policies will generally maintain electrification and plant asset outputs at current levels, in terms of safety and overall asset condition. Some system reliability improvements will be delivered by the introduction of newer more reliable technologies, for example in transformer design.

Policy developments since June 2006

Our focus has been on reviewing the factors affecting the rate of the degradation of OLE contact wire and determining the optimum renewal point based on system design age, line speed and usage. We have also been exploring opportunities to improve the reliability of the infrastructure and identify possible cost reduction initiatives. Key changes to be implemented as a result of this work include:

- improved understanding of contact wire degradation leading to reduced level of renewal expenditure in CP4 of approximately £44 million;
- the acceleration of 26 campaign changes, with completion brought forward to CP4. The business case analysis has shown that this programme of work has a positive net present value of £37 million;
- independent research into the deterioration of catenary has confirmed that there is no requirement to include this within OLE campaign change programme;
- system and process changes to improve the availability of asset condition data for key electrification and plant assets;

- we have revised our approach to prioritising OLE campaign changes based upon route type;
- implemented trial for the provision of regenerative breaking capability on the DC network;
- traction power supply strategy aligned with RUS programme; and
- detailed business case analysis has confirmed the business benefits of bringing forward the route wide refurbishment and renewal of the Great Eastern OLE.

Where appropriate the revised expenditure and activity forecasts as a result of this work have been reflected in this submission.

Further policy development

There are a number of policy development initiatives that require further consideration. During CP4 we will work with our industry partners to investigate a number of technology opportunities, including:

- low cost switching technology to replace conventional DC circuit breakers;
- regenerated braking energy to supply non-traction loads (stations, depots and lighting);
- investigate low cost OLE and highly reliable OLE;
- improved pantograph design to improve service reliability; and
- the technical and economic feasibility of using geothermal points heating.

Operating strategy

Network Rail controls the operation of the network from a series of signalling centres, electrical control rooms and integrated control centres. Our activities include the signalling of trains, managing the electrical supply to the rail network, and facilitating engineering work to maintain, renew and enhance the network. In recent years, we have invested in the creation of integrated control centres. This has significantly improved joint working between Network Rail and the train and freight operators in the management and delivery of train operations, particularly at times of disruption.

Going forward into the next control period, our focus will be on safely improving train performance balanced with the continuing growing demand for additional capacity. We will optimise the use of the current network through improvements in the planning cycle, the deployment of modern technology achieved through asset renewals where defined in our asset management policies and joint improvement plans between Network Rail and the wider industry.

The renewal and modernisation of signalling centres and electrical control rooms is driven by asset condition, at which point opportunities to consolidate locations and adopt technological advancement is undertaken. Enhancements to the network also create opportunities to modernise these facilities, deploying modern technology that offers incremental safety and performance benefits. In the future this will include the initial deployments of the European Rail Traffic Management System (ERTMS), which will see a shift from lineside signalling to in-cab signalling. From an operational perspective the benefits of this will include automatic train protection; full bi-directional signalling; continuous target speed information to the driver; and the removal of lineside infrastructure. The deployment of GSM-R across the network offers secure digital communication between the signaller and driver. This will allow safety critical messages to be undertaken more effectively improving safety with an anticipated consequential improvement upon train performance.

The development of new automatic route setting for deployment within larger signalling centres will assist in the delivery of the train service through automating the routine activities of a signaller, allowing clear train prioritisation to be agreed between Network Rail and customers and enabling the signaller to concentrate on managing safety, disruption and non routine events.

Our emphasis will be to optimise the operational plan through a process of continuous planning and learning to the point of delivery. This will build upon the work already achieved in the implementation of the integrated train planning system (ITPS), the asset condition led renewal of systems with modern equivalents, and through a greater level of analysis of the operational railway compared to the base plan.

The full deployment of the ITPS functionality will simplify the timetable planning process and enable clearer, more robust timetables to be planned and amended. Future developments will seek to incorporate data currently held in other systems, both within Network Rail and the wider industry, to bring together all elements of the planning cycle into one common system. Additionally, ITPS will be able to routinely analyse the execution of the daily plan in the operational environment providing a feedback

loop to validate and enhance the base plan on a continual basis.

We are planning significant development of systems designed to support day-to-day operational delivery and improved customer information. This will be achieved through further developments in joint working between Network Rail, the train and freight operators and other stakeholders to upgrade existing life-expired systems with improved modern technology.

Engineering access strategy

For much of the last half century, rail travel in Britain has been in decline, with a focus on managing short term cost, sometimes at the expense of overall industry costs and benefits. However, the railway has been growing since 1994 and is predicted to continue to grow on a scale that has not been experienced before. This requires a change of approach.

At present the railway is not set up appropriately to deal with this current demand and future growth. There is significant demand for rail travel for seven days of the week. However, the industry currently offers a service that is likely to be significantly degraded and disrupted at weekends. We now need to respond to this demand and enable the rail industry to increase its share of the transport market. We therefore need to focus more effectively on the availability of the rail network for running train services, by developing an access strategy that will allow our customers to better meet demand for up to seven days a week. As we have outlined above, moving further towards a seven-day railway is one of the key objectives our world class transformation.

With strong demand for rail, there is growing evidence that there is an industry business case on many parts of the network to move from the current five day railway to one that operates reliably and without consistent disruption for up to seven days a week. Providing more of a seven-day railway will provide significant industry benefits with increased revenue through the fare box as well as social and environmental benefits for the economy. This is equally important for freight as well as passenger services. Our aim is to provide increased network availability for train services where these benefits outweigh any incremental cost of managing the infrastructure. In order to deliver a seven day a week railway, we need to develop the appropriate engineering access framework that optimises the whole industry business case. We will also need to manage network availability more proactively.

There is now a programme that has full engagement with nine train operating companies. As a result of this work, we have already agreed to include some additional train paths in the December 2007 timetable. A broad range of different projects will contribute to the final success of this project. For example, key enablers of a more effective regime are the development of improved planning and utilisation of possessions and the development of modular components. To date we have completed network trials for the new track occupancy permits and in recent trials halved the time for points installation from 54 hours to 27 hours.

We are developing an improved process for the planning of engineering access that takes account of the whole-industry trade off of costs and revenues in determining the frequency and duration of possessions. In developing engineering access plans, we will introduce more effective prioritisation of different engineering activities and more effective use of single line working. The objectives and targets to support this will be cascaded to all appropriate functions. The overall strategy will be consulted with the industry and agreed at the highest level.

We therefore believe that CP4 will be a transitional period during which we progressively implement more of the characteristics of a seven-day railway so that by the end of the control period we are providing a rail network that is available seven days a week where this is underpinned by customer demand and an industry business case. Our proposals are discussed further in Chapter 9.

Supplier strategy

An effective supplier base is critical to the success of Network Rail and we must create professional and mutually beneficial relationships with them. To achieve this, we have developed a strategic sourcing strategy to transform our contracting and procurement capability. The strategy is focused on supporting the achievement of efficiency savings by our delivery functions and maximising value from the supply base.

This strategy builds on the foundation work done over the last two years by a series of centrally led transformation initiatives. These include introducing the 'Requisition to Pay' system, developing our supplier account management, revising our standard suite of contracts and improving the supplier qualification and assurance process.

We have established four strategic aims:

- maximising value from supply markets;
- supporting delivery;
- delivering efficiencies; and
- improving capability.

Our supply market aim is to put in place sustainable and innovative commercial arrangements and relationships with the most appropriate suppliers. This needs to be achieved through structured processes based on deep market insight and a clear understanding of business requirements. We need to provide auditable measures of value delivered and simple and efficient buying channels for the business.

The strategic sourcing team needs to provide delivery functions with timely and efficient access to optimal sources of supply required to deliver their projects and business activities. This must be based on a deep understanding of what they want to achieve and in line with the overall corporate objectives and departmental standards.

The supply strategy must support effective and efficient delivery, maximising the value delivered to stakeholders from the investment provided by funders. We will minimise the whole-life cost of goods, works and services whilst streamlining and optimising the ways in which they are obtained. This will involve working with our suppliers to maximise value rather than by simply cutting costs and margins.

We have developed a supply chain charter shown in Figure 4.8. This outlines how we will work with our suppliers as one team, with one goal, to deliver best value on a sustainable basis.

Effective category management will enable the realisation of efficiencies through pooled, "joined-up" procurement of related works across the investment programme. There will be a further range of targeted improvement activities that will enhance our strategic sourcing capability, ultimately enabling the function to achieve best in class performance.

To achieve these strategic aims, we will develop the following:

- a category management structure fully deployed and leveraged across the business, consolidating spend and driving standardisation whilst operating advanced sourcing techniques;
- delivering auditable value from supply markets;
- integrated project procurement that provides end to end supply chain visibility, mitigates risk and makes the most appropriate sourcing decision for each work package;
- a single buying channel used by the business which will be automated and highly efficient with clear instructions on the appropriate ways to secure different types of goods, works and services;
- a strategic sourcing team, recognised both

Figure 4.8 Supply chain charter

Network Rail aims to:

- Provide the environment for the supply chain to effectively operate within; enabling world class supply chain practice, transparency, joint strategic development, and helping develop professional and long-term mutually beneficial relationships
- Act as a single customer with a fair, consistent and defined way of conducting business with the supply chain
- Provide a safe, reliable and efficient railway fit for the 21st century

Throughout the Network Rail supply chain, we expect us all to:

- Always provide a safe and healthy workplace for our employees and the public
- Work together within a collaborative "one **team**" delivery environment
- Deliver whole life best value through efficiency, effectiveness and innovation
- Deliver the work to the agreed time, cost and quality
- Deliver solutions that truly satisfy our stakeholders
- Define, inform and manage risks together
- Not blame, but work together to resolve, learn and improve
- Not tolerate continued poor performance
- Manage the requisition to pay process in a timely and efficient manner
- Treat all assets as if they were our own
- Abide by the principles identified within the RIA Value Improvement Programme Code of Practice
- Provide an appropriately trained and competent workforce
- Work together in eliminating waste and be environmentally smart
- Be decisive, and communicate in a timely, concise manner
- Give each other support and share information and ideas where appropriate
- Be **determined**, passionate and take **pride** in our work
- Value and harness the diversity of all our staff
- Always treat each other with **respect**, integrity, honesty and openness
- Promote and celebrate success
- Work together in making the rail industry a place where people want to come and work

internally and externally as a connected function that offers the best opportunities for high calibre strategic sourcing professionals; and
- seamless, ethical end-to-end supply chain processes.

Network Rail will remain committed to maximising value from its supply base whilst being viewed by the industry and suppliers as a company with clear procedures that is 'good to do business with'.

The infrastructure cost model

Our Infrastructure Cost Model (ICM) is a key enabler in supporting our asset management framework and improving our strategic planning capability. The model serves a number of purposes in improving the efficiency of our asset management:

- to provide a focus and an impetus for improved understanding of cost drivers, and to act as a vehicle where cost relationships can be quantified;
- to provide a single definitive source of information that supports more effective asset management decision-making and long term forecasting;
- to support the development of effective route planning capability;
- to promote more informed decision making around the timing and prioritisation of activity between routes; and
- to provide challenge to and context for the territory led short term work banks included in the business plan.

The ICM is used to estimate the costs of operating, maintaining and renewing the network for different specifications of usage and capability. It produces forecasts of activities, expenditure and network output measures over the long-term (up to 40 years), and can disaggregate these forecasts to segments of the network. In particular, we have disaggregated our expenditure and income projections between Scotland and England & Wales in order to understand their respective revenue requirements.

Wherever possible, activity and expenditure is forecast at strategic route section level based on the specific assets on the route and the level of traffic. The disaggregated projections are the sum of the relevant route sections. However, not all expenditure is directly attributable to route sections and some categories of expenditure need to be allocated to routes using the most relevant metrics. This is particularly the case for activities which are managed at network level.

Key inputs to the model include detailed asset information (including location, type and age mapped to a common definition of the network) current and forecast levels of traffic, unit costs of key activities and assumptions about trends in input prices and efficiency. The model predicts the level of maintenance and renewal activity associated with the application of our asset policies, using inputs including estimated asset service lives, activity frequencies and expected failure rates.

The second version of the ICM has been used to produce the activity and expenditure forecasts contained in this plan. A number of improvements have been made to the model during the last year, informed by our experience in developing and using Version 1 of the model, the independent audit undertaken in 2006 by AMCL, and feedback from stakeholders. Particular areas of development include new functionality for:

- integrating the forecasting of income, with income from variable access charges driven by forecast traffic; and
- calculation of the fixed track access charges to recover the net revenue requirement.

Improvements have also been made to the model in a number of areas including:

- alignment with development of our asset policies;
- increased detail and transparency of activities and expenditure; and
- improvements in accuracy of asset information and other inputs.

The development of the ICM is a long-term activity and we will continue to work to improve it. The precise scope and timing of improvements to the ICM will be influenced by the business priorities and the industry priorities for PR2008 but is likely to include:

- further improvements to the modelling of the interactions between maintenance and renewal activities;
- improvements in the modelling of relationships between activity and network outputs at a disaggregated level; and
- incorporation of further developments in the understanding of cost causation and improvements in the availability of asset condition and other key input data.

World class transformation programme

The world class transformation programme will drive the development of our policies and strategies in a number of areas. We therefore describe below the initiatives under the headings of: world class infrastructure and operations; supported by the right processes; and delivered by great people. Further details will be provided to ORR in a supporting document. We will also continue to discuss our plans with our industry partners and other stakeholders.

World class infrastructure and operations

Providing a world class service

The over-arching purpose of this workstream is to set the goals for, and pilot solutions to, providing a world class service. We have been working with stakeholders to understand their needs in specific areas and translate them into meaningful measures that are underpinned by clear action plans.

We are currently piloting our approach to fast-track delivery of the right time railway, working in a new way with our customers and other stakeholders on a single route. Once we have successfully completed this pilot, we will roll out the approach across the network. This roll out programme will be structured around a definition of the network consistent with the overall vision and built on a segmentation of the network based on customer requirements with outputs and action plans differentiated by long distance, commuter, rural and freight routes.

Delivering value

In delivering these outputs, our aim is to be recognised as world leaders in project and programme management providing good value infrastructure. In doing so, we aim to become the delivery partner of choice for renewals and enhancements to the railway, being invisible to the users of the railway, except in terms of the final result.

We have identified a number of workstreams to improve our delivery of projects in order to minimise the disruption to the network and drive down costs through the development of modular products, and the establishment of standardised and simplified design and construction activities. Trials have already been completed for modular switches and crossings and stations, with trials planned shortly for underbridges. As part of this approach we wish to improve our customer service and stakeholder management to ensure there are no surprises to stakeholders when we undertake disruptive activity. We have already begun to see results with complaints from lineside neighbours dropping over the last six months.

We are in the process of optimising our supply chain, ensuring it is fit-for-purpose, delivering lower operating costs, improving productivity and being more responsive and flexible. This will allow us to provide safe, reliable and high quality delivery across the product range, giving us greater understanding of the cost drivers of the supply chain and eradicating waste. We are currently focusing on the major supply chains in the Maintenance, National Delivery Service and Infrastructure Investment functions.

If we are to use the supply chain efficiently we need to improve the resource planning in contractor organisations. Providing stability in the supply chain by improving our own planning will improve contractor efficiency and enable us to deliver efficiencies. Allied to this we are examining the supply of materials to the business with the aim of creating a materials service which provides the optimum materials at the optimum time and price and that work is never disrupted by the supply chain.

We have begun to increase the productivity of our maintenance delivery units through the application of “lean” techniques to eliminate waste, and simplify and speed up processes. This has been supported by the application of best practices for matching work group size and skills to the activity being planned. We have also been examining the boundaries between the activities undertaken by maintenance units and our project delivery function with a view to driving out cost and improving local control.

We continue to develop a modern, high performance portfolio of flexible and reliable plant and equipment to underpin our maintenance activities. Opportunities exist to reduce cost and improve performance through continued investment in rail vehicles, on-track machines and other plant and equipment. Work has started to design a rail fleet asset management system and to develop plans for transferring maintenance, repair and overhaul of the fleet to a workshop at Beighton.

The right processes

Many of the processes and tools we use today for planning, timetabling, managing train movements and operating the infrastructure have their roots buried in the past. The problem is that many were originally designed for a different age.

Since we took over the network, there has been a strong focus on challenging how we do things, their costs and driving efficiency through the business. This challenging behaviour continues as we seek to identify further opportunities for cost savings during the rest of the current control period and into the next.

In developing our world class transformation programme and our efficiency plans, there are several closely related areas of work including internal and external benchmarking of our processes and bottom up planning of specific initiatives aimed at delivery of efficiencies. The transformation programme allows us to take the delivery of efficiencies further by examining more radical opportunities in the next control period.

Improved integration

In order to be more efficient, we need to have integrated processes that are effective across the entire organisation and the rest of the rail industry and that these processes deliver effective and timely decision-making, every time, quickly and easily through appropriate and timely management information. This is aimed at significantly reducing the time it takes to do everything, leading to greater empowerment and ability to innovate. This will require greater investment in technology and greater accountability.

We wish to work with the industry and the ORR to improve the industry contractual and regulatory framework to provide the opportunity for Network Rail and our partners to optimise whole-life and whole-industry costs and outputs. The intention is that the framework will improve the alignment of incentives along the value-chain, address major constraints, and provide a basis for informed decision making.

We have begun to improve our strategic and business planning processes including our budgeting and financial forecasting and our authorisation processes. This will reduce the cycle times for the production of our annual business plans, the speed at which decisions are made in the authorisation process and improve the quality of those decisions. An improved financial modelling capability was introduced in September and a new, streamlined investment approval process is currently being briefed out.

We have also continued to improve our underlying planning tools such as our Infrastructure Cost Model (ICM), and our demand traffic forecasting processes and tools.

We are reviewing our end-to-end processes to develop and deliver enhancements. The programme will identify the shape and operating processes, skills and procedures required to sustain a higher level of output. This will deliver increased customer satisfaction, lower costs and reduced time to deliver schemes. Significant progress has already been made, with a new fast track process for smaller enhancements successfully completed for at least one project in each route.

Our project delivery capability, including the processes, tools systems and methods, is being reviewed to ensure we can repeatedly achieve excellence in this activity. Our project development process will be improved to differentiate between projects with different requirements. The aim is to get the right level of overhead effort in the planning and reporting of projects.

Within our engineering activity we are working to shift the emphasis away from checking and compliance to providing solutions with a greater focus on customers' needs. As part of this we will also seek to improve our response times to our customers.

We will also improve the alignment between maintenance and other corporate processes to improve performance by simplifying processes, making them more easily understood and implemented. A new root cause analysis process is undergoing trial and we are continuing to strengthen links between various parts of the business.

The transformation programme for our Contracts and Procurement function includes the strategic sourcing project. The objective is to deploy a strategic sourcing framework across the company that will deliver a standard way of working for contracts and procurement professionals, leading not only to greater efficiencies but also extracting greater value from our suppliers.

As the company has evolved so must its human resource policies and processes. There is a need for greater effectiveness and more control. The key processes to be improved are payment, recruitment, training, organisation change, performance management and resource planning. Early progress has already delivered a 40 per cent reduction in maintenance payroll errors.

We have completed our review of the health and safety management system, which was approved in May 2007. We continue work on developing the appropriate key performance indicators and supporting processes.

We continue to work with our suppliers to define occupational health and safety systems and processes most likely to safeguard their employees and others while working on our infrastructure or providing services to us.

Better systems

A key element of the right processes is having the right tools and data to inform decision making. Also critical are the systems that allow our people to receive the right pay at the right time and that, when they arrive at work each day they have the rights tools to do their job. These tools must work properly and reliably.

Underpinning all our process improvement workstreams is the creation of excellent information services capability and excellent information technology systems.

We need to improve the quality and timeliness of the information provided to decision-makers. We have set a target to reduce the time it takes to generate periodic reports from 10 to three days, with improvement in data quality releasing time to support decision-making. We have already reduced reporting times and the number of accounting entries required at period end.

We have also completed roll-out of on line recruitment and purchasing to approximately 6,000 users, employee self-service for personal data to over 19,000 employees and implemented a new case management system within legal services.

We have been reviewing our toolkit for the development of projects which will enable us to have greater confidence in the management of risk in delivering customer and stakeholder outputs. Through this review we would also aim to shorten the time to develop and implement projects.

The Engineering function has been working with the Infrastructure Investment and Information Management functions to develop common systems, based on a common approach to resource management.

Delivered by great people

To become world class, we have to address not only what we do but also the way we do it.

Network Rail will only ever be as good as its people. Unless we recruit well and provide training and coaching for our people, we will not succeed. The right values and behaviours of our people and the quality of the leadership and management of the organisation are fundamental to our success.

Values and behaviours

We have completed independent research with our people, running 37 focus groups across the whole organisation, to explore what our people expect from work and what they aspire to deliver for customers and the wider industry. We have launched a revised set of core values:

- determination – we are determined to improve the rail service for customers;
- respect – we respect the environment, our communities and all the people we work with;
- teamwork – we are all part of the same team and every contribution matters; and
- pride – we take pride in a job well done.

To be a world class company, our people must live and breathe these values and behaviours.

We have established a corporate-wide workstream tasked with identifying and delivering key actions to develop the right people across the company who live and breathe our values. We have begun to implement mechanisms to reinforce our behaviours including revised performance management and recognition processes. We have already seen a 40 per cent increase in nominations for our annual You Make The Difference awards.

We will retain, reward and recruit the right people. We will develop great people who are accountable, engaged and sought after by others. We have revised our recruitment mechanisms and have developed a strong and attractive recruiting brand.

Our training and development programmes have been reviewed to reinforce our core values, and we have been working with our people through conferences, events, line management and other communication channels to promote the values at all levels, emphasising the need for our leaders to act as role models. Our innovative apprenticeship programme has recently won the premier national award for people development.

The mental and physical health and well being of our employees is seen as a key contributor to carrying out their duties safely and in making decisions that are safe. We are developing new

ways of educating our employees in the best ways to keep themselves fit and healthy. The accident frequency rate continues to improve and is at historically low levels.

Leadership, management and skills development

Success depends inescapably on our ability to manage change in a very demanding environment. Building leadership and management competencies is essential. Great managers are key to recruiting good people, developing and coaching people and providing direction and inspiration. We continue to put a real focus on continuous improvement in leadership and management development, delivering dynamic and stimulating leadership development activity, and extending our talent pool for roles in the company. But we also need to continue investing in training and development initiatives for all our people.

Our leadership model, shown in Figure 4.9, is at the centre of everything we do. We developed the model with experts who understand leadership behaviour and how it impacts on business effectiveness. At the core of this model are our three educational programmes:

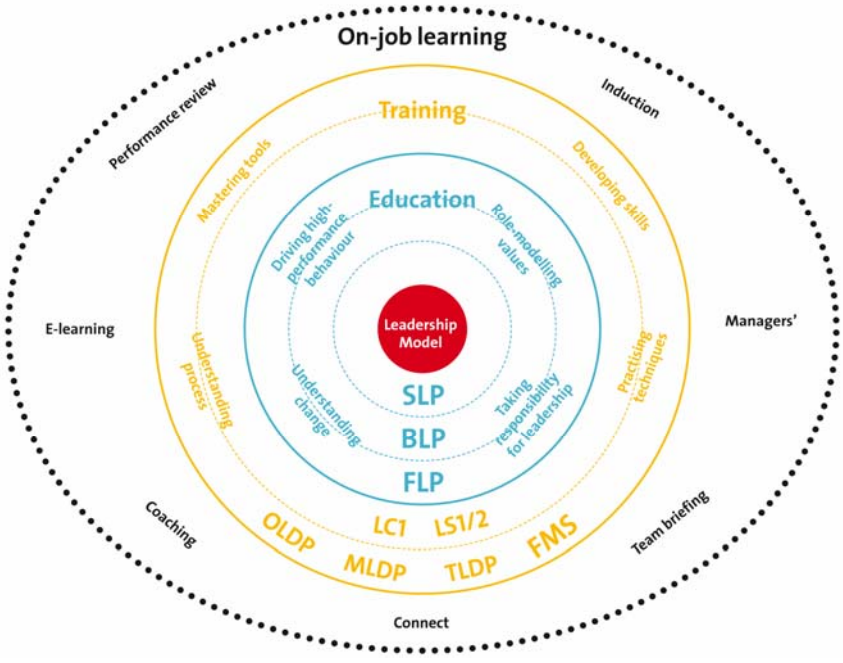
- senior leaders programme;
- business leaders programme; and
- frontline leaders programme.

Led by Warwick University and based at our leadership centre at Westwood, the courses are aimed at helping people understand, practice and demonstrate effective leadership skills. Complementing these courses are our leadership skills and leadership communications programmes. In 2008 we will be launching Leadership Skills 2, being delivered to over 3,000 managers over the following 15 months. This is targeted at all managers in the business and its aim is to help managers develop a more performance-focused way of working. The tools and techniques acquired from these programmes enable managers to develop further their skills.

We also have functional specific courses, for example our operations, maintenance and team leader development programmes (OLDP, MLDP and TLDP). These programmes continue to be refined to ensure that they are delivering what our people need. In addition, in 2008 a generic programme will be launched for all first-line managers. Called Foundation Management Skills (FMS) the courses will focus on the basic requirements of management.

Skills training plays an important part of model, with Paddock Wood, the first of our new training centres, having opened in May 2007. The centre has been purpose built to meet the needs of those learning the skills and competencies needed to maintain the railway. It shares the look and feel of the Westwood leadership development centre in Coventry, but has a more practical, hands-on set of equipment and courses

Figure 4.9 Leadership model



on offer. On-site facilities include a 50-metre indoor replica railway track, classrooms for both theory and practical work and an outdoor practical training area – all overseen by a team of experienced trainers. We will be opening five further training centres in the next 12 months.

We currently have 611 people going through our national award winning apprenticeship scheme and have recently recruited 135 graduates through our graduate recruitment programme. These programmes play an increasingly important role in stimulating major cultural change throughout the business. In order to recruit the best people, the railway will need to be recognised as a great place to work

Supporting documents

We are providing the following supporting documents to ORR:

- Business Planning Criteria;
- asset management strategy, asset management principles and asset management development;
- asset policies for each asset category together with supporting justification documents;
- ICM functional specification;
- operating strategy;
- stations strategy;
- paper summarising our progress on the world class programme;
- procurement strategy; and
- seven-day railway.

5 Efficiency and input prices

Introduction

In developing the Strategic Business Plan, ORR has challenged Network Rail to develop its own view of the scope for further improvement in its efficiency. We have focused primarily on a bottom up approach to developing efficiency savings targets, complemented by cross-checking with top down approaches.

During CP3, we have made significant progress in reducing our costs through delivery of a wide range of efficiency savings over the past five years. This plan provides an opportunity to build on that progress with further improvements during CP4.

In reaching our conclusions, we believe that we have set a challenging target. The importance of setting an achievable target should also be recognised so that we have a reasonable chance of success by meeting, or outperforming, the target. These targets also need to take account of the wider context, including the other areas where we are expected to improve. Targets which are seen as unrealistic would be demotivating and would risk undermining the progress which has already been achieved. By contrast, we are clearly motivated to outperform realistic targets to enable discretionary investment in the railway.

The main part of our work in developing efficiency targets going forward is based on a detailed understanding of the current cost base, and a bottom-up assessment of the initiatives which can be undertaken to deliver future efficiency savings. This is combined with a "stretch" for initiatives not yet identified, offset by the effect of rising input costs.

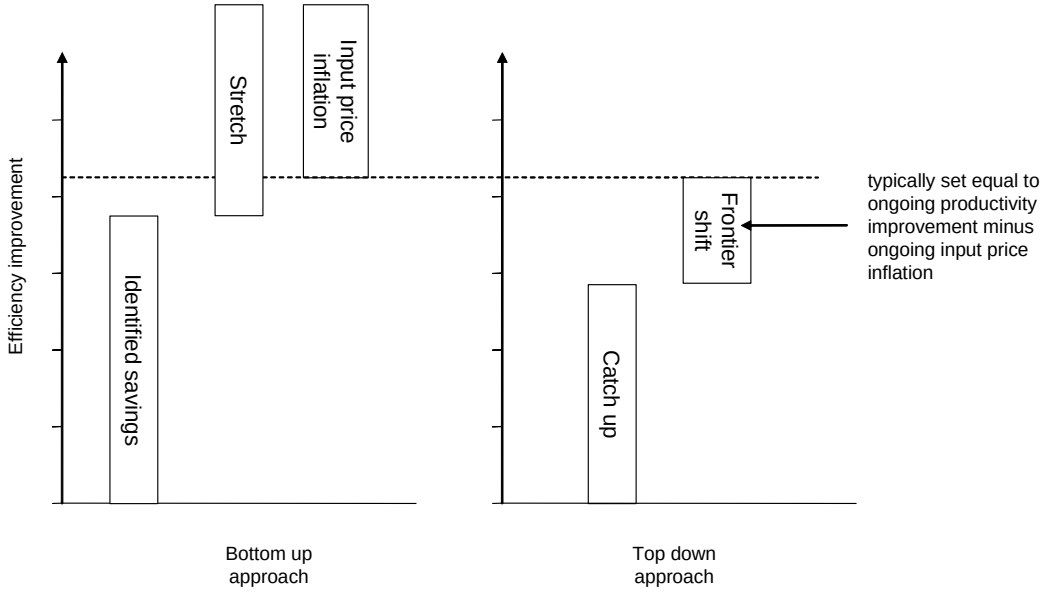
However, we have also examined what plausible efficiency targets could be based on a top-down assessment. This assessment has been used to triangulate against the bottom-up initiatives which have been identified and developed in detail.

ORR will review our proposed efficiency savings and form its own view of what represents an appropriate target for CP4. In doing so, we recognise that ORR will also consider efficiency in terms of catch-up and frontier-shift. In ORR's framework, catch-up relates to reduction in any efficiency gap compared to other businesses, and frontier-shift represents the improvement in the costs of an already efficient business, for example, through technological change.

These alternative perspectives on efficiency are illustrated in Figure 5.1, which recognises that we and ORR may be looking at the scope for efficiency savings in very different ways. Inevitably, the results of top-down and bottom-up assessments of efficient expenditure will not match exactly. Reconciling these differing views to reach appropriate efficiency savings targets is a judgement that should be reached having considered, in the round, the full range of information available.

We welcome the contribution to the efficiency debate of the various external studies relating to

Figure 5.1 Assessing efficiency



efficiency which have been produced as part of the periodic review process, and we have taken their findings into account in developing this submission. We recognise that our efficiency is particularly important to freight operators since this impacts on the charges which they face, and we welcome their engagement on potential ways of improving efficiencies.

The structure of this chapter therefore covers:

- the context for the development of these plans, reflecting the significant progress that has been made over the last five years;
- a description of how we have developed our assessment of the potential for delivering further efficiency savings during CP4, taking into account our specific improvement plans and a number of independent reviews of our costs;
- a top down assessment of efficiency, including examination of ORR's initial assessment of the potential for catch-up and frontier-shift, and the interaction between the effects of input price inflation and frontier-shift;
- a review of a range of independent studies including those commissioned by ORR and EWS; and
- an overall conclusion and assessment of the impact of alternative efficiency assumptions.

Context

In assessing the scale of efficiency savings that we can achieve in CP4, it is important to understand the progress we have made over the last five years and the context in which we have developed our plans.

Understanding the business and its costs

Over the last five years we have developed a much greater understanding of the business and the key drivers of costs. Most significantly, through bringing maintenance in-house, we have a vastly improved understanding of our maintenance costs. This has enabled us to achieve significant cost savings during CP3. In addition, we now have a far greater ability to analyse and model our costs and their drivers, and are building a comprehensive database of costs incurred which can then be used as the basis for future estimating.

This progress can be seen in the development and use of the Infrastructure Cost Model (ICM) and Oracle Financial Analyser (OFA) which now enables us to develop consistent, long term projections of the cost of maintaining, renewing and operating the network at a level disaggregated by geography and cost type. We believe that this is commensurate with the activity-based costing approach taken by some other large asset intensive infrastructure companies.

Over the past few years, we have recognised the need to learn from best practices and analytical techniques applied in other railways and in other industries. We have embraced techniques such six sigma to analyse our processes and identify opportunities for delivering improvements including efficiency savings. We are regularly meeting other railways, particularly in western Europe, to share ideas on the most efficient and effective way to manage the infrastructure. We have summarised in a separate supporting document a range of discussions that we have had with other railways over the last two years. We have also been working closely with our suppliers to identify opportunities for improvement, for example recent Joint Value Improvement Programmes (VIP) in Civils and Signalling assets, and technical conferences designed to promote innovation with our contractors.

The improvement in our understanding of the business and our approach to managing the infrastructure is illustrated by the increasing demand from other railways to visit us and learn from what we have been doing. For example, the Japanese railways have visited our new Engineering Support Centre at Derby to understand how we have developed our approach for the automation of monitoring where we are regarded as world class.

As a result of our improved understanding, we are able to identify more specific opportunities for delivering further efficiency savings. In ACR2003, we applied broad efficiency profiles to our costs, principally based on high level, top-down analysis. For this plan, we have been able to develop much more specific expenditure assumptions to underpin our efficiency targets. This is in addition to the more explicit assessment of activity levels through the asset policies and infrastructure cost model.

Incentivising success

We continue to be focused on delivering improvements throughout the business. In CP3, we have been striving to outperform the targets set by ORR. In developing our annual business plans we have also set targets that are more challenging than ORR's targets, for example in respect of asset stewardship measures and

performance. This focus on outperforming, rather than simply achieving, ORR's targets has enabled the creation of the Outperformance Fund of £200 million to deliver additional capacity improvement and other investment schemes. We will continue to set ourselves stretching targets so that we can continue to deliver improvements in all areas.

When we published our Initial Strategic Business Plan, we did not have sufficient evidence to develop a robust view of what we could achieve in CP4. We therefore included some "reference efficiency assumptions" in our plan. In developing these assumptions, we sought to make a reasonable assumption of what might represent a challenging but realistic assumption for CP4. We are therefore disappointed that ORR has stated in its Advice to Ministers (February 2007) that these reference assumptions represent the minimum level of savings that we might be able to achieve in CP4. We have made clear to ORR that we did not seek to include a level of efficiency that we were totally confident that we could deliver and that this treatment misinterprets the ISBP. Moreover, ORR applied these figures in a different way (by including signallers' costs and not taking account of input price trends) which meant that ORR's minimum was significantly more challenging than our reference assumption.

We have continued with our approach of developing our own view of robust and stretching efficiency assumptions for the Strategic Business Plan which challenge both what we do and how we do it. Through the periodic review process, we will be open and transparent, sharing the detail of our efficiency plans with ORR. Throughout the review we have involved ORR in the development of evidence to underpin our assumptions, particularly through regular engagement on independent studies that have been commissioned. This plan represents our view of the efficiency savings that it is realistic to assume can be achieved in CP4.

We will not be able to achieve success in isolation – we will need help, especially from our suppliers. They in turn need to be confident that the targets are achievable and that working with us will allow their businesses to succeed. Without a healthy supply chain we will not be able to achieve our future ambitions and targets.

ORR will carry out a detailed review of our efficiency assumptions as part of the periodic review process. When the review has been concluded, ORR will monitor our progress delivering efficiency savings during CP4. But it will be important that ORR steps back and allows Network Rail space to deliver its planned improvements with flexibility to deliver the required outputs in the most efficient way. An intrusive level of regulation would stifle Network Rail's ability to focus on driving through these improvements.

Improving on many fronts

While we have been achieving significant efficiency savings during CP3, we have also delivered many other improvements across the business. We have improved asset condition (as measured through the ASII) by 34 per cent. We have reduced the number of delay minutes and have set a target to be ahead of the ORR's target at the end of CP3. The level of both passenger and workforce safety has improved through CP3. The level of customer satisfaction is increasing although it is still at a disappointing level. It should therefore be recognised that delivering efficiency savings has been part of a much larger transformation of the business, which represents a major change in the overall performance of Network Rail.

While delivering these improvements, there have been some major changes to the industry and our role within it. We have taken over responsibility for developing Route Utilisation Strategies. There is a much broader agenda incorporating the development of enhancements to provide additional capacity. We are working more closely with train operators to manage performance, including the creation of Integrated Control Centres.

We have put enormous effort into improving the capability and abilities of our employees through new and innovative training schemes, and increasing the level of engineering capability in the company. These additional costs had been identified during ACR2003, but we subsequently recognised that there had been a sustained under investment in the development of our people. We have now put in place a programme to reverse that trend which will enable us to help our people to continue driving improvements.

We have absorbed these additional activities into our organisation with no additional funding. Without these additional responsibilities, the level of outperformance in CP3 would have been even greater.

Looking forward to CP4, we will continue delivering these activities. We also need to increase our "agility" so that we can respond

effectively in increasing the capacity of the network and improving the working in partnership with train operators to improve industry wide outputs and cost. While we recognise this is at least partly complementary with continuing to reduce costs, it will not be achieved by simply slashing costs. We need to ensure that we have sufficient funding in the short-term to support the capability required to deliver this wider agenda.

The improvements in efficiency have also been achieved despite a number of pressures on our cost base. During CP3, the cost of many raw materials, particularly steel and copper, have increased by much more than RPI. We have delivered additional scope in areas such as fencing and drainage within track renewals. We have responded to some extreme weather conditions, particularly flooding, which has resulted in increased costs to reinstate parts of the network that have been badly damaged. We have seen increased levels of traffic on the network. However, much of the additional traffic onto the network has caused accelerated degradation through aspects such as heavier axle weight and stiffer suspension. Therefore the additional revenues we have received in terms of increased variable track access charges need to be reassessed in the light of the extra wear costs in addition to those costs resulting solely from the increase in traffic. As part of the joint work on efficient engineering access, we are beginning to provide operators with increased access to run trains while absorbing any incremental costs.

We are planning to continue improving in many areas throughout CP4. In setting efficiency targets, ORR needs to take into account this broad range of improvement and to recognise the increased challenges. In particular, we are aiming to:

- achieve substantial further improvement in performance which necessitates improvement in the quality of work and underlying processes across large parts of the business;
- move further towards a seven-day railway which will clearly require additional funding but also represents a major change in the way the industry operates;
- deliver or facilitate a major programme of enhancements on the railway; and
- continue to improve our responsiveness to all our customer requirements across the business and working closely in partnership with train operators to improve services to passengers and freight users.

In our view, any one of these challenges compares with that faced by most other businesses. When taken together it is clear that comparing any one element (such as the scale of cost reduction) with that in most similar businesses gives a misleading picture of both what the railway has achieved and the pace at which it is realistic to expect further change on all these fronts over the next control period.

Progress achieved in CP3

The challenge set in ACR2003 was to achieve efficiencies of 30 per cent for renewals and controllable operational expenditure (opex) and 35 per cent in maintenance, giving an overall challenge of around 31 per cent. The profile of these savings was set as a continual level of improvement for maintenance (eight per cent per annum) and a decreasing level of improvement for renewals and opex (eight per cent for the first three years thereafter decreasing to five per cent).

Figure 5.2 compares the efficiencies we have achieved against those assumed in ACR 2003.

By the end of CP3 we expect to have achieved efficiency savings that are consistent with the targets set by ORR in all areas except for track renewals. These savings have been achieved while absorbing increasing material and labour costs and carrying out a number of additional activities. It has also been achieved at the same time as delivering significant improvements across many other areas of the business. As we move towards the end of this control period, it is becoming more challenging to identify and deliver significant savings, reflecting the increasing maturity of the business.

Figure 5.2 CP3 efficiency delivered and forecast

Per cent	2004/05	2005/06	2006/07	2007/08	2008/09	ORR target
Controllable opex	16.0	24.0	25.0	26.1	28.9	29.7
Maintenance	10.0	19.0	26.0	30.3	34.8	34.1
Renewals	8.0	15.0	23.0	21.3	27.3	29.7
Total	**10.3**	**18.2**	**24.3**	**25.1**	**29.9**	**30.7**

In the following sections, we set out more detail of the efficiency savings that are being achieved in CP3.

Controllable operating expenditure

We have continued through 2006/07 to make savings made in opex principally due to the continued work to reduce agency staff, contractors and consultants and the general management of their costs. However, the run-rate of this reduction is decreasing as we appoint more permanent employees and reduce our reliance on agency staff and contractors.

During CP3 we have taken on significantly more activities which were not anticipated during ACR2003. As a result our operating expenditure has increased by around £50 million over the level funded for CP3. These costs have been absorbed internally whilst still delivering the required efficiency profile. However, going forward these are incorporated into the cost base for which we are funded. These activities split broadly into two parts – industry driven and internally driven – and are explained below.

Industry driven additional activities

The additional activities we now undertake are largely a result of changes to the structure of the industry resulting from the Railways Act 2005. The largest of these changes are listed below:

- we absorbed part of the industry planning function, which included developing and enhancing the RUS process and increasing the level of stakeholder communication (approximately £3 million per year)
- the requirement for industry performance reporting has been addressed by the creation of JPIPs (approximately £1 million per year);
- the impact of more disaggregation of management and information, for example the requirement to report separately for Scotland, and increased liaison with the Welsh Assembly and Transport for London, has imported around £1.5 million of expenditure per annum.

Internally driven

We have taken on significant additional cost in our commitment to training and development. This includes the apprentice training scheme and engineering conversion courses, and the development of Westwood, our leadership development centre, and regional maintenance training centres. These actions have been necessary to improve the capability of our people and contribute towards the long term sustainability of the company. We have also greatly enhanced our engineering capability.

Non-controllable operating expenditure

There have been a number of elements resulting from the Railways Act 2005 which have also impacted on our non-controllable opex, these are listed below:

- we now pay 100 per cent of the ORR licence fee, compared with approximately 30 per cent in ACR2003, and this fee has increased from £5.5 million to £12.6 million per annum;
- we are now required to make greater use of the industry reporters at an increased cost of around £0.5 million per annum;
- BT police costs have increased dramatically from around £35 million to £60 million per annum; and
- our membership fee to RSSB is no longer passed through the railway safety levy to the train operating companies but borne entirely by Network Rail.

Maintenance

We have achieved substantial efficiency improvements since the creation of the in-house maintenance team in May 2004. By the end of last year a total overall saving in maintenance costs of £353 million had been delivered, a reduction of 25 per cent from our costs in the last year of CP2. We anticipate a further £75 million savings in the remaining two years of the control period.

The in-sourcing of maintenance eliminated the profit and corporate overheads being paid to the infrastructure maintenance contractors and allowed the restructuring of the maintenance function. This has eliminated the duplication of roles which existed in the multiple organisations that previously delivered maintenance. Since in-sourcing we have continued to refine our structure to achieve the optimum for effective delivery and control, reducing the number of maintenance areas from 18 to 16, and the number of maintenance delivery units from 53 to 46. This has reduced overhead costs, and provided more consistent sizing of areas and delivery units across the business.

We have created a combined planning team to produce an integrated tamping plan for maintenance and renewals work. This allowed us to reduce the number of tampers from 136 to 86 and to increase the average machine utilisation from around 120 shifts per annum to 169 shifts per annum. We have also in-sourced contracts for litter picking, and station and building maintenance.

A major focus of our efficiency activities for the remainder of CP3 and beyond will be to improve the productivity of the maintenance workforce. We have started a programme to improve the productivity of our front line staff. Early wins have enabled us to reduce our subcontractor headcount without detriment to outputs.

As part of the productivity programme we have introduced new processes to track and measure productivity. Once embedded, they will enable us to benchmark across the business, and identify opportunities for improvement.

Productivity improvements will release direct labour from the maintenance workforce. This resource may be deployed by reducing our reliance upon contingent labour contractors, thereby reducing unit cost, and providing an effective delivery route for simple renewal activities, such as re-railing.

We are continuing to deliver efficiency improvements and remain committed to delivering the full 35 per cent efficiency improvement target required by the end of CP3. These savings have not reduced the quality of work output and all measures within the Asset Stewardship Incentive Index have continued to improve, and already exceed the targets set in ACR2003.

Renewals

We have achieved renewals efficiencies, which include both unit cost (how we do it and how much it costs) and scope (what we do) efficiencies. This is on top of scope efficiencies which are already reflected in the activity levels implied by the infrastructure cost model as a result of our work on asset policies. The use of innovative delivery and contracting mechanisms, high output plant and equipment, technology development, and better planning are major contributors to these efficiencies. There have been some additional costs imported to date through input price inflation and changes to standards and the effects of these to 2006/07 are shown in Figure 5.3. However, overall across the aggregate portfolio we are on target broadly to achieve the target set in ACR2003. Figure 5.4 illustrates the resulting 10 year efficiency improvement

Track

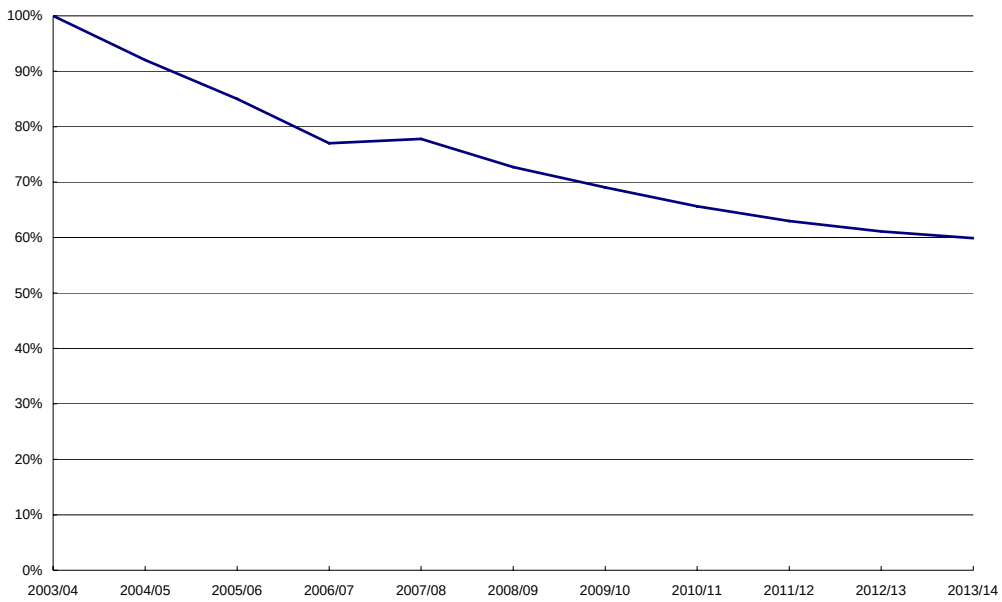
The impact of increased levels of non-core renewals, for example, drainage and fencing have altered the CP3 efficiency profile for track renewals with the result that we have achieved around 13.9 per cent efficiency against a target of 22.1 per cent (to end 2006/07). The target efficiency profile was further impacted by the increasing complexity of renewals compared to the baseline against which our CP3 plans were prepared, and significant wage and materials price inflation particularly in steel and concrete. This control period has also seen the redevelopment of a number of engineering specifications with a focus on reducing whole-life costs; this can in some instances increase the initial capital cost of projects. An example of this is the change to the inboard mounting of switches and crossings drive systems to allow tamping to continue through a switch and crossing, therefore reducing unproductive time.

The impact of these effects has been to reduce our planned base efficiency profile. However, when normalised to take account of these changes the efficiency delivered through the track renewals programme would be around 18 per cent to 2006/07; and forecast to deliver 22 per cent by 2007/08 and 29 per cent by 2008/09 against targets of 26 per cent and 29.7 per cent respectively.

Figure 5.3 Effect of input prices and work mix changes on cumulative efficiency to 2006/07

Per cent	Reported renewals efficiency	Impact of work/scope mix changes and input price inflation	Gross efficiency saving
Track	13.9	5.1	19.0
Signalling	25.8	12.6	38.4
Telecoms	32.5	(0.6)	31.9
Electrification	36.1	12.4	48.5
Plant	17.5	0.0	17.5
Operational Property	35.5	3.8	39.3
Civils	26.6	1.5	28.1
Total	**23.0**	**3.3**	**26.3**

Figure 5.4 Ten year renewals efficiency improvement



Civils

The efficiencies which have been delivered through the first half of CP3 have outperformed the targets set through ACR2003. However, the rate of improvement has slowed in the last year and we are now forecasting to finish in line with the overall target. There has been around one per cent impact from input prices change and 0.5 per cent from standards changes respectively.

The improvements delivered to date have been largely built around changes to planning, contracting strategy and design processes, including:

- starting to use more standardised designs;
- refining the approval process and its duration;
- changes to contract types, including increased competitive tendering and more appropriate use of framework contacts;
- earlier development of workplans allowing increased time for tendering;
- increased summertime productivity; and
- better supplier engagement and sharing of best practice.

Many of these areas will provide the basis for further improvements through CP4. However, the efficiency profile illustrates that a number of significant improvements were made early in the control period and, as a result, the later efficiencies are becoming more difficult to achieve.

Signalling

The delivery of signalling efficiency savings in CP3 to date has been on target. During CP3 we have driven efficiencies through:

- a complete overhaul of the supply chain and the creation of “hub and spoke” contracts;
- in-sourcing of scheme development;
- improving processes and methods in the early stages of scheme identification and design to remove wasted effort and unnecessary expenditure; and
- starting to develop tools and processes to accelerate the design and development process – Signalling Tools And Methods Process (STAMP)

There has also been some significant impact from input price inflation, primarily driven by copper prices, and cost increase due to changes in standards. These costs have, so far, been absorbed through CP3. In achieving the overall efficiency savings in CP3 we have absorbed around an additional 12.6 per cent of cost increases.

Electrification and plant

The efficiency savings during the early years of CP3 have generally been significantly better than target. However, these have been obtained on relatively small proportions of the total planned CP3 spend. By the end of 2006/07 only around 40 per cent of the total electrification and plant spend had been delivered, leaving 60 per cent to be delivered in the final two years. Achieving efficiency on fixed plant has become more

difficult due to the disparate nature of this part of the portfolio and the difficulty of achieving consistent unit rates particularly on points heating work. We have also absorbed around a 12 per cent increase in input prices. This has been driven largely by increases in the raw material price of copper and labour inflation. However, we are forecasting to exit CP3 on target.

Telecoms

Delivery of remaining CP3 renewals programme will be focused on the delivery of FTN/GSM-R and maintaining a steady state condition across the rest of the telecoms portfolio. A number of delivery initiatives that influence the way we do things combined with key emerging policies will start to introduce changes to the technical solution deployed in response to the operational requirements and this will start to improve efficiencies during the remainder of CP3 and flow through into CP4. The policy for lineside communications post GSM-R is likely to deliver a reduction in lineside telephones. This will commence implementation towards the end of CP4 and will start to realise efficiencies in CP5 and CP6.

Significant activity has taken place within CP3 on the refinement and adaptation of the Guide for Railway Investment Projects (GRIP) to suit telecoms renewals projects. This has developed further with the production and roll out of the telecoms GRIP tool. This sets GRIP stage criteria commensurate with the level of risk/complexity of the particular project. It delivers efficiencies by simplifying significantly the volume and extent of stage documentation and associated costs required for telecoms projects.

The Value Improvement Programme has been used to drive benefits through better understanding of the asset needs and improved relationships with suppliers. We are also carrying out more design work earlier so as to understand better the design and construction risks, and involve the contractors earlier to maximise the benefit of lower contractor and consultant rates.

We have also established a dedicated development and delivery team focussed solely on telecoms assets, improved the packaging of works, and increased the levels of individual responsibility in the team in order to help keep the work varied and interesting and the team highly motivated.

Operational property

Through CP3 to date operational property has consistently outperformed against its efficiency target, during which time we have absorbed input price inflation of around one per cent above RPI. It has been possible to accelerate the delivery of efficiencies in order to exceed the targets required in the early years of the control period. However, we expect efficiencies to be harder to achieve in the later years of the control period.

Through 2007/08 a new in-house design department is being established to provide a design services on a number of projects. This team will reduce dependency on outside contractors and allow greater control over the final design solution, generating benefits in whole-life asset costs for the business. Standardisation in design is also being pursued to remove repetition and generate further improvements in whole-life costs.

Framework agreements will continue to be used. New five year agreements are being put in place and these will commence delivery in 2008/09. This will provide for the first time consistent framework arrangements across all aspects of the asset. We are also putting in place a number of call-off contracts for small simple schemes which will become operational 2008/09.

Looking forward to CP4

Deriving our efficiency projections

In developing our view of the levels of efficiency that we will be able to achieve in CP4, we are building on the improvements already made, identifying new initiatives, and assessing the potential for further initiatives that may arise through the control period.

Our continued aim of improving value for money focuses on three areas:

- scope – ensuring that we do exactly what is necessary to deliver the outputs and do not over-specify or over-deliver;
- planning and process – improving the way we plan and carry out activities and organise our resources; and
- price – minimising the price we pay per unit through maximising the effectiveness of the whole supply chain.

The identification of these improvement initiatives has been driven at two levels:

- specific initiatives for each asset category where we have, or are developing, clearly defined plans; and
- top down analysis where we have taken a high level overview informed largely by external

studies to form our view of a stretch target (i.e. to assess what might be possible while recognising that there is uncertainty as we do we do not have specific plans in place).

These efficiency profiles must be viewed in the light of increasing input price pressures arising from, for example, construction industry inflation driven by work to support the 2012 Olympic and Paralympics Games, and a general continuing trend in construction driven by a buoyant UK and world economy.

Developing specific efficiency plans

For CP4 we have developed our efficiency plans on the basis of specific initiatives which will present us with an ongoing challenge through the control period. The key initiatives are focussed around better processes, less rework, improved procurement, assets specific initiatives, and achieving best practice through using internal benchmarking comparisons.

The assumptions which underpin each set of initiatives have been recorded in a common format. These include the use of common categories of efficiency type, sources of data and methods of calculation.

The efficiency plans have been subject to intense scrutiny and challenge to ensure that they are sufficiently stretching. Some of the efficiency initiatives are already in the early stages of development. However, some others are unlikely to deliver any real impact upon our cost base until early in CP4, and similarly many of our CP4 initiatives will not have major impact until CP5. More detail is included in the individual efficiency models and commentaries which we have provided to ORR as supporting documents.

Benchmarking

In order to provide further evidence of the level of savings that may be achievable, we have commissioned a number of benchmarking studies. LEK has carried out internal benchmarking of our renewal costs to assess the opportunity arising from the identification of internal best practices. We have also commissioned external consultants to benchmark our activities against general UK best practice and costs, including finance, human resources and corporate office costs. In other areas we have engaged directly with other railway network operators, for example benchmarking maintenance against European operators.

We have also drawn from benchmarking studies which have been commissioned by others, such as European signalling benchmarking, conducted for ORR by Lloyds Register Rail and comparative studies of track renewals costs, commissioned by EWS. In these cases we have engaged with both the sponsors and providers of these studies and are actively assessing their recommendations.

We have compared the results of these benchmarking studies with the savings resulting from the specific initiatives. In many cases the opportunities identified through benchmarking have been incorporated into the bottom up specific initiative plans. Where the benchmarking results have not been incorporated into the specific initiatives, the results have been taken into account when developing our top down view of the potential for efficiency savings.

Top down analysis

Recognising that it is not possible to identify all the specific efficiency initiatives that we deliver in CP4, we have developed a view of the further “stretch” that we believe that could be achieved. This view has been informed by the external consultancy and benchmarking studies, both commissioned by us and carried out on behalf of external organisations.

Within the specific initiatives it is important to recognise that many are not supported by detailed plans and therefore already include some level of stretch. For maintenance, the level of stretch incorporated in the specific initiatives is quite extensive (around 35 per cent of the total). For renewals, a smaller element of stretch has been incorporated in the specific initiatives (principally the inclusion of potential savings identified through the procurement and internal benchmarking studies). In the following sections of this chapter, we have identified where benchmarking results have been specifically incorporated into our efficiency initiatives.

Having taken into account the level of stretch included within the specific initiatives, we have considered benchmarking and other top down analysis in forming our view of any additional stretch. This overall top down view of efficiency has then been included in this plan.

Input prices

The efficiency profile specifically excludes the effect of input price inflation. We have separately commissioned an independent report to assess the impact of input price inflation trends on our CP4 expenditure and have reflected the

conclusions in our plan. The impact of input price changes is described in more detail later in this chapter.

Maintenance efficiencies

Maintenance covers the continuing correct operation of all of our assets – from enabling the fault free operations of track and signalling to maintaining the fabric and facilities at stations. Our overall aim is to provide an utterly reliable railway. This is a long-term aim but ultimately we will achieve this aim by intervening in advance of things going wrong, doing the work right first time and preventing failures; at an efficient and sustainable level of cost.

Ongoing efficiencies during CP4 will result from two strategies: reviewing and reducing what we will do (scope efficiency) and improving the efficiency of how we will do it (process and price efficiency). Key elements of this will be the move from a "find and fix" regime to one of "predict and prevent", and a continued drive to improve productivity. Our top five maintenance efficiency initiatives are shown in Figure 5.5.

What we will do

There is potential to reduce maintenance costs by reducing the volumes of our activities. This can be done by extending the intervals between routine maintenance and inspection using a risk-based approach so as not import risk to the railway. The volume of work required can also be reduced without detriment by tackling the root causes of reactive work.

To help enable this we will be introducing remote condition monitoring on a more widespread basis. This will increase our knowledge of asset degradation and alert local staff who will be able to plan remedial works in a more efficient manner.

Reducing inspection frequencies

Our strategy is to review the inspection and maintenance frequencies for assets. For signalling we will do this by carrying out risk assessment of the particular asset types using the ROSE (Reliability Centred Maintenance on Signalling Equipment) process. For track assets, the embedding of train-borne inspection will provide us with high quality, consistent information. This should enable us to ultimately reduce the frequency of pedestrian inspection to levels similar to those used on European networks.

Tackling root cause of reactive work

Building on the move to a "predict and prevent" regime from one of "find and fix" will mean that we work in a better planned, less reactive environment, which will provide greater opportunity to tackle the root causes of problems. For example, we are currently carrying out a study of the impact of enhancing our maintenance of trackside drainage. Current analysis suggests that by spending more time on maintaining and enhancing drainage we will be able to significantly reduce volumes of work associated with slurried ballast removal; maintaining track geometry; and replacing damaged track components.

How we will do it

Improved front line productivity

Our biggest single opportunity for efficiency improvement is in the way we manage, package, plan and deliver our work. We have introduced a Delivery Unit Improvement Programme, focussing on improving the productivity of the front line worker.

To gain the maximum benefit at the earliest opportunity there are two approaches to this programme. Half of our 46 delivery units will receive the full "supported" project, which puts a support team of project, technical and behavioural specialists into the delivery units for 16 weeks to identify the specific areas for improvement. The second approach, used for the remainder, puts a smaller support team into the delivery units and uses coaching techniques to implement the lessons learned from the supported projects. The use of two approaches will allow quicker and more effective roll-out

Figure 5.5 Maintenance – top five specific initiatives and indicative savings

Per cent	2009/10	2010/11	2011/12	2012/13	2013/14	CP4
Productivity	3.0	4.6	5.3	5.8	6.3	5.0
OTM efficiency	0.1	0.3	0.5	0.7	0.9	0.5
ROSE	1.0	1.5	2.6	3.3	3.7	2.4
Overhead reduction	0.2	0.9	1.5	1.9	2.2	1.3
Patrolling	0.1	0.5	0.9	1.5	1.9	0.9
Total	**4.4**	**7.8**	**10.8**	**13.2**	**15.0**	**10.1**

across the country.

We are also using lean and six sigma techniques with the front line staff to identify and eliminate waste from our day-to-day processes. This feeds into our productivity improvement, and is also used to improve the planning norms within our Ellipse works scheduling tool. It will take us a further two years to complete the programme with up to five projects running simultaneously.

Reduced functional overheads

We are also critically reviewing our functional overhead structure. Further efficiencies may arise from the creation of the combined Infrastructure Group, and system and process rationalisation.

Tamping

By packaging and planning our on-track machine work more effectively, there is scope to build upon efficiencies already delivered and to further reduce our hired-in tamping fleet during CP4. This will occur through improved planning, increased sharing of on-track machines between Infrastructure Maintenance and Infrastructure Investment and the in-sourcing of OTM operations.

Ultrasonic test trains

We are currently rolling out the use of train-mounted ultrasonic rail testing methods. This will be completed through CP4 and will be supplemented by the introduction of road-rail testing. This will mean that the plain line in all main running lines will be tested automatically. Plain line in loops and all S&C will continue to be tested manually.

Unsupervised Geometry Monitoring Systems (UGMS) mounted in service trains will ultimately enable a move towards condition-based track maintenance, and video recognition is the future of fully automated track inspection regimes.

Insourcing of train-borne inspection and rail grinding activities

Our National Delivery Service manages train-borne inspection and rail grinding activities on our behalf. This work is delivered using a variety of contractors who run the trains and analyse the initial data output. These contracts expire during CP4 and we expect to in-source this activity.

Efficient management of possessions

We are currently trialling a new method of protecting staff called Track Occupancy Permit (TOP), which uses enhanced communication over the new GSM-R network to set up safe systems of work. It will only rarely require the use of handsignallers at the possession limits, so will reduce labour requirements. It will also enable workforce productivity efficiencies through quicker take up and hand back of possessions.

Intelligent infrastructure

Remote condition monitoring (RCM) of critical assets will start to be rolled out across a wider asset population during CP4. This will permit operational data from assets to be automatically analysed to identify deviation from trends and alert local staff to the variation. They will then be able to plan corrective actions and carry them out in a controlled manner before they fail. It is expected that the majority of the benefit from intelligent infrastructure in CP4 will improve train performance rather than drive maintenance efficiencies as initially the same number of incidents may be responded to but the response will be in advance of the asset failure.

RCM is also a key enabler to some of the ROSE savings, particularly remote monitoring of cables in location cabinets, and this will be a key enabler to future savings in CP5.

Embedded scope efficiency

The opportunity for scope efficiency, for example, the adoption of reduced frequency inspections and improving our approach to tackling the root causes of faults, is fully addressed throughout the maintenance efficiency initiatives.

Benchmarking maintenance

We have been involved in a number of benchmarking studies with European railways, and also with the maintenance companies responsible for the London Underground.

UIC

The UIC lasting infrastructure costs benchmarking study (LICB) provides a long term overview of maintenance and renewals costs comparing networks' data normalised as far as possible for factors such as traffic mix, traffic levels and switch density. We have been involved since its inception and continue to participate in its various benchmarking studies.

The UIC has also undertaken a maintenance/ renewal optimisation study, which made a detailed comparison of maintenance regimes and intervention limits and highlighted differences between maintenance policies. The final report is still awaited but we have been taking cognisance of the emerging findings in our maintenance efficiency planning for CP4 and in the developing asset policies.

These studies would seem to indicate that overall our track quality is lower than in some other European countries resulting in a need for higher levels of maintenance inspection and intervention driving higher maintenance costs. This is entirely consistent with the historic levels of underinvestment in renewals which preceded the privatisation of British Rail and carried on through the tenure of Railtrack.

During CP3 we have been starting to address these levels though increased renewals and our aim is to improve the overall track quality such that the interventions required and subsequent levels of inspection can be reduced while maintaining the correct levels of safety and track quality. In order to help achieve this we continue to work with European railway networks to understand better the differences and identify best practice which we can implement onto the UK network.

The benchmarking undertaken by UIC has been a significant factor in influencing the level of savings we believe can be taken out of our maintenance activities through reduced inspection and higher quality renewals which require reduced maintenance intervention.

Comparison to SNCF and SBB

We have undertaken a comparison of network infrastructure and maintenance outputs between France (SNCF) and Switzerland (SBB), driven by the high level indicators from the LICB study. This has provided useful information relating to the comparability of network data sets and improved our understanding of the comparison of similar key performance indicators.

Deutsche Bahn

We have built up a good working relationship with various contacts at Deutsche Bahn. The most recent benchmarking visit was undertaken in June 2007 to a section of the Regionalnetze (similar in traffic to our rural / non electrified commuter routes). The aim was to look in detail at maintenance activities and performance on a sample route. A key element in the philosophy is to tailor the infrastructure to the traffic needs of the route in question. This approach includes:

- adjusting engineering processes and standards, for example the frequency of inspections;
- capital investments tailored to local need with low-cost, innovative solutions pursued;
- adoption of a small scale operating unit (a sub-network) reporting to a regional profit centre;
- a single point of contact in each sub-network for both maintenance and operations; and
- devolving authority as far as practicable.

Although the track infrastructure itself was renewed quite recently the standards and maintenance frequencies applied appeared to deliver consistently good performance at a competitive cost. We are considering applying these standards back-to-back against our existing standards at a trial site in order to assess their potential for future use generally on the UK network.

Analysis of this benchmarking study has been used to support the stretch level of productivity we have modelled.

Metronet & Tubelines

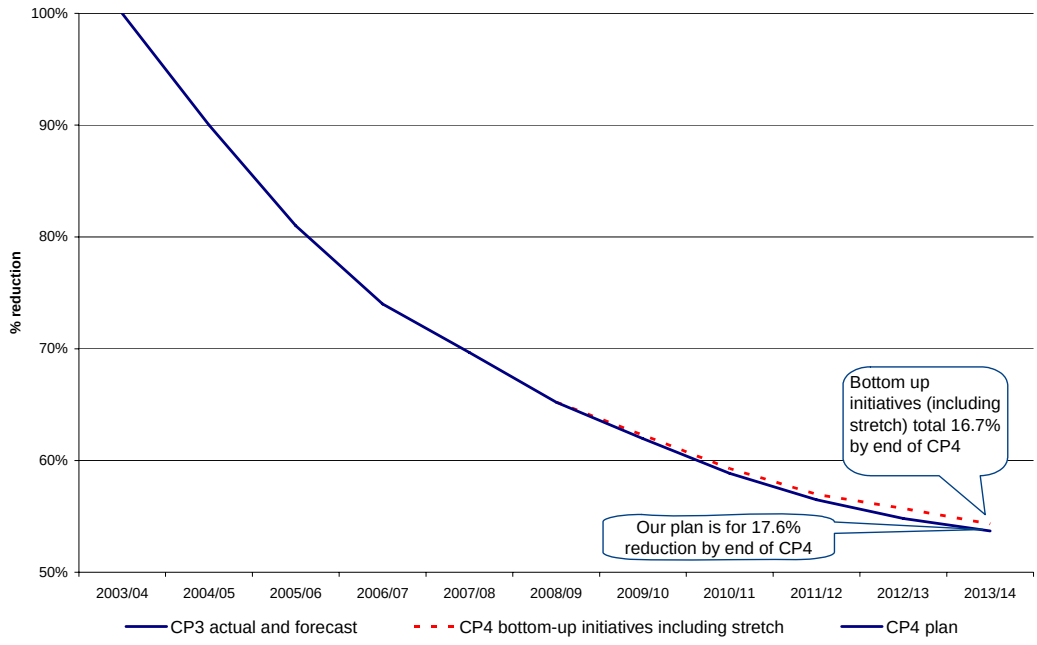
From early in 2007 we have been working with Tubelines and Metronet to undertake a limited scale benchmarking exercise with the aim of producing data on a comparable basis in order to assess the initial differences and the wider industry benefits which may accrue from a wider study. This exercise has covered elements of both maintenance and renewals.

From a maintenance perspective the study has focused initially on track and signalling assets as these were thought to be the areas for which the greatest level of comparable data could be produced. Work was carried out to address comparability of cost, performance and condition metrics, and building on that to identify the structural factors which may impact on cost. However, due to the recent failure of Metronet, it has withdrawn from this study. Tubelines has also temporarily halted work on the study, although we remain optimistic that we will recommence data comparison work at some time in the future.

Stretch

Using bottom up initiatives and drawing from our experience in CP3, the specific initiatives that we have identified would deliver savings of 16.7 per cent. This includes a significant level of embedded stretch – around 35 per cent of this total saving. Taking this into account, and the wider top down analysis, we have concluded that there is very limited opportunity for a further stretch. We have therefore included an additional 0.9 per cent saving in reaching overall efficiency savings of 17.6 per cent by the end of CP4, which is shown in Figure 5.6.

Figure 5.6 Maintenance efficiency



Renewals efficiencies

Renewals to assets on the network are carried out when their condition has deteriorated to a level where it is more economic in whole-life cost terms to renew the asset than to continue to maintain it. The rules governing the calculation of whole-life cost and the preferred method and type or renewals are laid out in the Asset Policies and the Asset Policy Justifications. This section explains how we have generated efficiency plans applicable to the individual asset types and, at a high level, what those efficiency plans are. More detail is contained in the individual asset investment plans, which are supporting documents to this Strategic Business Plan.

Efficiencies common to all assets

Many of the efficiency plans are asset specific and are described later in the chapter. In addition to these are a number of generic opportunities applicable across all our investment programmes which are explained below.

Unit cost analysis (LEK internal benchmarking)

The unit cost benchmarking study conducted by LEK has been of considerable value in informing the potential to drive efficiency. The analysis has differentiated variances between unit cost performance as attributed either to structural factors or internal efficiency factors.

The variances associated with efficiency factors are, in principle, available as efficiency going forward by pursuing various strategies, such as best practice exchange, standardisation, competition and incentivisation. These variances reflect differences across a spectrum of internal practice, for example, asset management policy, planning, procurement and external practice.

Variances attributed to structural factors may also be capable of some reduction through effective management attention to minimise the impact of these constraints, although this is likely to be of smaller value and take longer.

It is generally unlikely to be practicable to achieve the full efficiency suggested by Best Demonstrated Practice (BDP) in all cases, so a range of 50 to 75 per cent of BDP, or second BDP forms a more realistic target. However, we recognise that BDP will evolve continuously and we intend to continue using this approach to help drive forward further business efficiencies.

Programme management

We are developing and delivering processes and systems to improve our programme management capability by optimising the deployment of resources, both internal and supplier, to our investment demands. This will include development and implementation of a sales and operation planning process, improved utilisation and mobility of resources, programme management benchmarking and process definition and an organisation review to establish appropriate structure for this part of our business.

Project management productivity & effectiveness

Project management is a core competency. During CP3 we have set about a significant programme of improvement known as the Project Management Framework (PMF). As part of this, we implemented a methodology for benchmarking our performance and capability both internally and externally.

Opportunities exist to drive further improvements in productivity and effectiveness during the remainder of CP3 and into CP4. This programme of change will drive benefits in three key areas:

- project management productivity;
- project management effectiveness; and
- project process right-sizing

Project management productivity hinges upon the right-sizing of teams in line with current territory best practices. This is supported by a range of initiatives to improve productivity of project management and programme controls teams.

Project management effectiveness requires increasing compliance with defined project management best-practices and improvements in competency to ensure maximum benefit from adoption of new project management processes

Project process right-sizing maximises the scope for further right-sizing of process to reflect the level of risks involved and the benefits accruing in terms of reducing time and cost.

ERP Programme

Network Rail has pursued a wide ranging IT systems development and consolidation strategy during CP3 - the Enterprise Resource Programme (ERP). This has provided direct efficiency benefits in many areas, as well as acting as an enabler to unlock other benefits as part of our overall procurement and project management approach. The key system implementations which have had, or will have a significant efficiency benefit are:

- investment management systems (OP, P3E, RIB and ARM);
- i-procurement; and
- Planning Development Framework (PDF).

Corporate contract and procurement initiatives

A number of corporate contract and procurement initiatives are currently being developed and implemented which act as enablers to support investment efficiency. These include:

- Project Clarity. This reviewed the current operational model and contracts and procurement capability, and will lead to improvements in the future capability.
- Project Synergy. This has reviewed the logistics chain for commodity procurement; and
- Strategic Sourcing. This will lever economies of scale through centralised procurement of common value streams.

We have also reviewed and updated our existing supplier contract suite to bring our contract forms into line with industry norms, generate terms which are better aligned with current procurement strategy, and will realise a more appropriate allocation of risk between the parties.

World class programme

The Network Rail world class transformation programme is wide ranging and will offer significant benefits to our stakeholders. A number of elements of this will have a potential impact upon investment activity and its costs in CP4, and these are summarised below.

The 2030 railway concept is aimed to achieve industry rather than solely Network Rail benefit. It comprises a number of long term initiatives driven by engineering considerations for the future. Several of the projects within the programme are developed to the stage where potential impacts may arise during CP4, for example the Track Occupancy Permit (TOP) initiative. Others include:

- increased use of modular designs across most asset groups. (this may import cost in the short term (CP4) as the whole-life business cases is may involve higher initial capital cost); and
- initiatives to improve the weather resistance of the infrastructure.

Two longer-term 2030 initiatives which may start to incur costs but are unlikely to deliver any significant benefits in CP4 are the full deployment of intelligent infrastructure and asset configuration to enhance operating capacity and facilitate maintenance. The former involves remote condition monitoring is subject to a long lead time to develop the engineering solutions. The latter, to include walkways and other layout changes, will commence with establishing a

revised set of principles and then changes to standards.

The capability workstream of the world class programme in Infrastructure Investment builds on the work already started under the Project Management Framework (PMF). The scope of this workstream is broader and includes design tools and more general process improvements. The workstream intent is to deliver Value for Money assets on a whole-life basis through efficient products and process.

Finally, service excellence aims to change attitudes at 'the customer coalface', and engender a greater service excellence culture at local level.

Asset specific efficiencies

This section explains the efficiency initiatives that will be undertaken on an asset specific basis. The initiatives are aligned into seven efficiency categories. Any risks to the efficiency initiatives where significant and quantifiable have been included to generate a net position.

In order to assess the risk levels and the likely outcome of the initiatives we have used quantified risk assessment (QRA) techniques to generate three estimates:

- best case (i.e. a 20 per cent probability of being better than the efficiency shown);
- adverse case (80 per cent probability of being better than the efficiency shown), and
- a mean forecast for the initiatives for each asset group.

We note that the QRA mean tends to be slightly different to the sum of the efficiency categories. This is due to the iteration process used in generating the QRA. The tables throughout this section illustrate the efficiency profile across each category and the QRA of the initiatives and risks. Figure 5.7 shows the likely range from our combined bottom-up renewals initiatives.

Track

Track is categorised into three types:

- primary and key London and south east (P&LSE) – required to provide high levels of availability and reliability, with limited track access time available for maintenance;
- secondary London and south east and trunk freight – required to provide high levels of reliability and availability at lower linespeed and generally lower tonnages than P&LSE; and
- rural and freight only – required to provide levels or reliability and availability to enable timetables services to operate effectively, typically at light tonnages and lower linespeeds.

Figure 5.8 shows the efficiency initiatives by generic type and Figure 5.9 shows the output of a quantified risk analysis carried out of these efficiency initiatives. Around 40 per cent of the

Figure 5.7 Bottom-up renewals efficiency initiatives

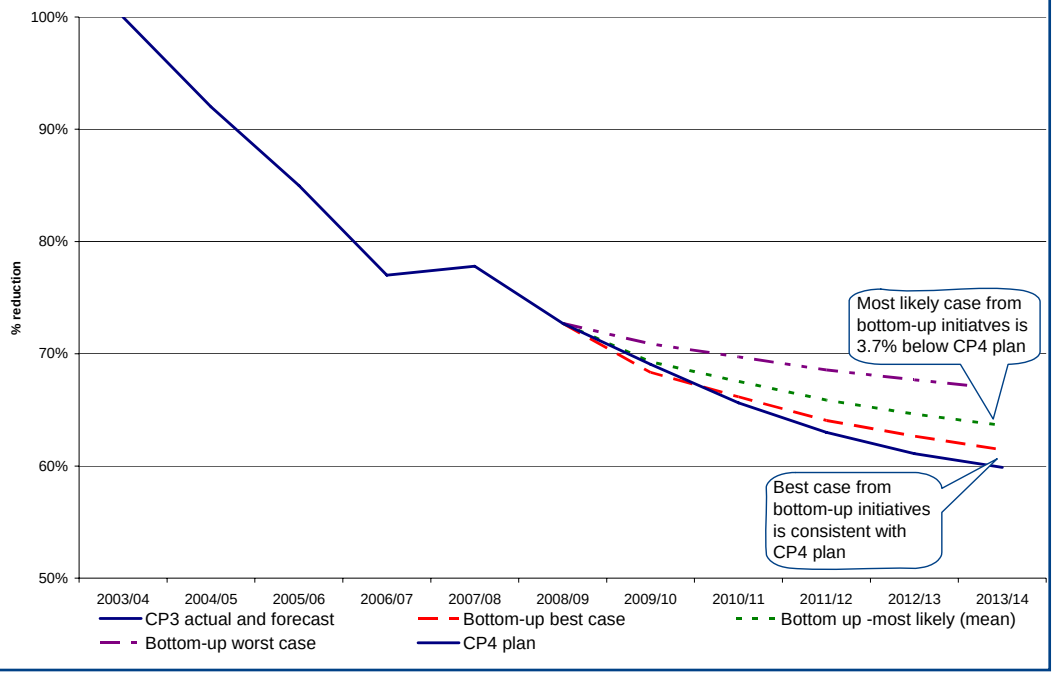


Figure 5.8 Track renewals efficiencies (including risk) by type

Per cent change	09/10	10/11	11/12	12/13	13/14
Scope: volume change	0.1	0.1	0.2	0.3	0.3
Scope: activity mix	0.2	0.2	0.2	0.2	0.2
Planning	0.5	0.5	0.5	0.5	0.5
Process: internal productivity	0.7	1.1	1.4	1.4	1.4
Process: supplier productivity	0.8	1.1	1.6	2.7	3.5
Price: procurement	0.4	1.0	1.3	1.6	1.9
Price: cost/schedule/risk control	0.0	0.0	0.0	0.0	0.0
Sum of initiatives (cumulative)	**2.7**	**4.1**	**5.3**	**6.6**	**7.8**
Year on year change	**2.7**	**1.5**	**1.2**	**1.4**	**1.3**

Figure 5.9 Track QRA probability

QRA output (cumulative per cent change)	2009/10	2010/11	2011/12	2012/13	2013/14
Best case - 20% probability of better than…	3.9	5.4	6.6	7.7	8.6
Mean forecast	3.3	4.7	5.7	6.9	7.8
Adverse case - 80% probability of better than...	2.8	4.0	4.9	6.0	7.0

cost of track renewals is materials and haulage costs. Our costs are already very competitive in these areas, and in some cases we have long term contracts. These provide protection against cost increases but limit the opportunity for efficiency through their duration. The highest volumes of renewal are required on the primary routes, and again the efficiency opportunities possible are, to some extent constrained, by the access available. However, there are two major initiatives currently underway which will impact CP4. These are the reduction in the number of suppliers from six to four and modular switches ad crossings.

The reduction from six suppliers to four aims to:

- improve management of the track renewals process;
- deliver an even safer and more reliable railway;
- improve the ability to plan and coordinate track renewals;
- provide our suppliers with longer-term security and the confidence to invest in their people and processes;
- increase the quality of the work being delivered and increases efficiencies; and
- produce stronger working relationships between Network Rail and suppliers.

By geographically aligning the delivery of switches and crossings (S&C) and plain-line track, we will develop an improved ability to plan and coordinate our track renewals work.

The modular S&C programme is designed to enable prefabricated switches and crossings to be installed in an eight hour time window instead of the current 54 hours which the existing processes require. This is an ambitious programme and its impact on our future costs is considerable. However, it requires significant capital investment in both the manufacturing facility and logistics and supply chain, and in process change, where in many instances the way we do things will need to be redesigned from first principles.

The other identified efficiency initiatives that will occur in CP4 specifically are explained below.

The end-to-end process improvement programme will see the process for delivering engineering specifications being accelerated and the quality and consistency of the outputs being significantly improved. This will be delivered by optimising the whole process from maintenance delivering their activities' and identifying condition issues, through track engineering specifying the type and level of renewal required, through to the planning, packaging and delivery of the track renewals. It will require changes to behaviours and improvements to existing control processes, and will impact at central, territory and function level.

We are also planning structured reviews of engineering specifications to deliver optimised worksite packaging, linked to a review of resource availability against demand. This will allow us to match better availability and demand and increase our resource utilisation. Allied to this we are building on the internal benchmarking undertaken to enable us to work with our contractors on the basis of a robust set of KPIs.

In addition to improving the utilisation and performance of our high output renewals trains, we are developing improved medium output solutions, such as medium output ballast cleaners and Slinger trains for use where high output equipment cannot be utilised.

Project 8/200 is a challenge to ourselves and our contractors to deliver 200 yards of track renewals in a single eight hour possession and for this to become the standard for track renewals. This is consistent with the industry requirement for greater access to the track for train operators, which can only be facilitated by shorter possessions, the seven-day railway, which is discussed elsewhere in this Plan.

Our supply chain strategy builds upon all of these initiatives. It seeks to build on clarity of scope to maximise the opportunities for standardisation and "lean" manufacturing techniques, and reducing inventory holdings through more just in time delivery. There are also opportunities for improved supplier relationships to facilitate greater integration of management teams, reducing levels of "man marking" and generating further savings.

Civils

The efficiency initiatives identified for CP4 focus heavily on the processes surrounding the development of a robust and well defined workbank and reducing to an absolute minimum the amount of change that is allowed to take place to the workbank. This requires high quality remits to be provided earlier; better prioritisation of the work required and more accurate estimating. Addressing these areas will deliver efficiencies through better provision for sourcing opportunities and reduction in abortive work. Figure 5.10 shows the efficiency initiatives by generic type and Figure 5.11 shows the output of a quantified risk analysis carried out of these efficiency initiatives.

Several initiatives cover areas that were also identified through the LEK internal benchmarking study; these impact on both price and scope of renewals. In respect of price we are working to assess the complete list of structural factors and differences to framework contracts that identify those territories delivering best practice – these factors will then be used as the basis of challenge in less we'll performing units. In the short term we plan to optimise turnover to use fully the overhead allocations of each part of the framework contract, following that we will redefine, if necessary, the optimum turnover for a framework contract and revise the overhead organisation accordingly. We are also reducing the level of reimbursable contracts we will let in the future in favour of increased levels of target cost contracts.

In respect of scope improvements we believe that significant efficiencies can be derived from driving consistency of how we design, plan, and deliver similar work items between territories. While it is accepted that on occasion there are structural factors which change the way a specific work item may be treated, an improved common approach would permit economies of scope and scale and support fully moves towards more

Figure 5.10 Civils efficiencies (including risk) by type

Per cent change	09/10	10/11	11/12	12/13	13/14
Scope: volume change	0.0	0.2	0.3	0.4	0.3
Scope: activity mix	0.9	2.0	3.6	4.6	4.9
Planning	0.6	1.3	1.8	2.2	2.4
Process: internal productivity	0.9	1.2	1.4	1.5	1.6
Process: supplier productivity	1.0	1.3	1.3	1.4	1.5
Price: procurement	1.9	2.5	3.6	3.9	4.1
Price: cost/schedule/risk control	0.0	-0.1	-0.2	-0.3	-0.4
Sum of initiatives (cumulative)	**5.3**	**8.5**	**11.9**	**13.7**	**14.6**
Year on year change	**5.3**	**3.4**	**3.7**	**2.0**	**1.1**

Figure 5.11 Civils QRA probability

QRA output (cumulative per cent change)	2009/10	2010/11	2011/12	2012/13	2013/14
Best case - 20% probability of better than…	6.3	9.8	13.7	15.9	17.0
Mean forecast	5.3	8.4	11.8	13.6	14.5
Adverse case - 80% probability of better than...	4.4	7.1	9.9	11.4	12.1

common design and modular solutions.

The present arrangements of using consultants for design work can encourage "over-designing" in order to protect the consultancy from any future liability claims. In order to reduce this risk and support fully the increased levels of commonality described above we are setting up an in-house design facility.

The LEK benchmarking report also compares delivery costs of each of the framework contracts to identify best practice in these areas. In the main, the best practice opportunities identified have been allocated against issues within specification and scoping, although the report has identified specific opportunities to reduce overhead costs. We have included this in our efficiency plan.

The A.T. Kearney procurement study identified a further three initiatives which had not originally been included within the efficiency model. However, following review we have now included plans identified through this study to optimise the balance between usage of the framework arrangements versus competitive tendering. Our plan already addresses the second initiative identified by A.T. Kearney relating to providing suppliers with better visibility of the workbank. The third initiative, which related to strategic purchasing, has also been included.

Signalling

Figure 5.12 shows the efficiency initiatives by generic type and Figure 5.13 shows the output of a quantified risk analysis carried out of these efficiency initiatives. We are determining ways in which we can test and commission new installations in eight hour possessions. Much of the improvement that will permit this comes from radically redesigning both the systems we design, and the way we test and commission installations. With regard to equipment design we are developing "plug and play" couplers for signalling components. This supports a drive towards greater standardisation and modular solutions, including modular level crossings. In addition to quicker installation this will enable more off-site pre-installation factory based soak testing. Increased pre-installation testing will also reduce the commissioning time required. Further to this we are also developing a system whereby electronic PDAs are used for the collection of date from systems being tested and commissioned. This is clearly dependant on common interfaces and supports fully the development of the "plug and play" technology.

The creation of a national testing team will permit better coordination to meet the testing and commissioning workload, and the updating of the signalling works testing handbook will help ensure a further standardisation of how we design, test and commission systems, to reflect the emerging technology changes described above. All of the areas described will both drive efficiency and support the seven-day railway initiative.

The standardisation described above will help enable increased volumes of "free issue" materials to be provided to contractors, resulting in greater economies of scale, increased just-in-

Figure 5.12 Signalling efficiencies (including risk) by type

Per cent change	09/10	10/11	11/12	12/13	13/14
Scope: volume change	1.6	1.6	1.6	1.5	1.6
Scope: activity mix	0.0	0.0	0.0	0.0	0.0
Planning	0.1	0.2	0.2	0.2	0.2
Process: internal productivity	1.3	2.9	4.3	5.9	7.7
Process: supplier productivity	0.9	1.6	2.2	3.0	3.6
Price: procurement	0.2	0.7	1.4	2.1	3.6
Price: cost/schedule/risk control	1.0	1.5	1.6	2.0	1.5
Sum of initiatives (cumulative)	**5.0**	**8.4**	**11.3**	**14.7**	**18.2**
Year on year change	**5.0**	**3.6**	**3.2**	**3.9**	**4.0**

Figure 5.13 Signalling QRA probability

QRA output (cumulative per cent change)	2009/10	2010/11	2011/12	2012/13	2013/14
Best case - 20% probability of better than…	6.1	10.2	13.9	17.4	20.4
Mean forecast	5.1	8.7	11.8	14.9	17.7
Adverse case - 80% probability of better than...	4.1	7.3	9.7	12.5	14.9

time provision of materials and reduced overheads.

Through CP4 we will continue to develop the Signalling Tools and Methods Programme (STAMP) process improvements in the design stages and plan to drive out efficiencies from projects through improving processes in GRIP stages 5-8. The Large Investment Major Business Opportunity (LIMBO) project will use "lean" manufacturing techniques to eliminate bottlenecks and wastage through the removal of non-value adding activities.

One of our primary aims is to continue to reduce the volume of SEUs required during renewals on all type A and B schemes by reducing the scope of the scheme where there is potential to remodel the layout and remove redundant functionality.

The LEK internal benchmarking study examined signalling Type A (over five years duration and typically in excess of 150-200 SEU) and Type B (up to four years duration and typically up to 150-200 SEU) signalling renewals projects. By removing any structural factors LEK were able to compare schemes on a like-for-like basis. Their analysis illustrated a 14 per cent spread in the cost of type A schemes and a 10 per cent spread in the cost of type B schemes between the best and worst performing. This gave us further evidence of the quantum of improvement which may be available and this has been included in addition to our original calculation of the efficiency for this initiative. As a result we developed a number of initiatives, many of which now form part of the world class workstrean and all of which are all recorded in the signalling efficiency model. These include additions to the LIMBO initiative, which includes embedding best practice through a value improvement programme in association with the Railway Industry Association (RIA).

The A.T. Kearney procurement report made a number of recommendations which have been included fully in the bottom-up asset efficiency plans and form part of the stretch. The only exception to this is the suggestion of target pricing for all future projects. There is currently a well documented and robust unit pricing strategy which has been in existence now for a number of years and is well understood both internally and externally by the wider signalling industry. It is believed that as the existing approach is currently well embedded, and given the wide range of change to the way we will carry out signalling renewals in the future, a change to target pricing at this time may import more risk that it may deliver efficiency. However, we will continue to monitor our pricing policy and refine it as appropriate.

Electrification and plant

The efficiency initiatives for electrification and plant fall into four broad areas:

- focussing on improving the quality of engineering as the essential precursor to efficient delivery;
- procurement initiatives focussed on producing high quality tender information to an engaged

Figure 5.14 Electrification & plant efficiencies (including risk) by type

Per cent change	09/10	10/11	11/12	12/13	13/14
Scope: volume change	0.6	1.2	1.7	2.2	2.7
Scope: activity mix	0.7	1.3	1.9	2.9	3.8
Planning	0.2	0.2	0.3	0.3	0.3
Process: internal productivity	1.7	2.1	2.2	2.2	2.2
Process: supplier productivity	1.7	2.1	2.5	2.8	2.8
Price: procurement	2.2	3.3	3.6	4.7	5.2
Price: cost/schedule/risk control	-2.1	-0.4	1.2	0.9	0.6
Sum of initiatives (cumulative)	**4.9**	**9.8**	**13.4**	**15.9**	**17.7**
Year on year change	**4.9**	**5.1**	**4.0**	**2.8**	**2.1**

Figure 5.15 Electrification & plant QRA probability

QRA output (cumulative per cent change)	2009/10	2010/11	2011/12	2012/13	2013/14
Best case - 20% probability of better than…	7.5	13.0	17.3	21.0	24.8
Mean forecast	2.5	6.6	9.8	12.6	15.4
Adverse case - 80% probability of better than...	-2.6	0.1	2.1	4.1	5.8

supplier base;
- improved installation initiatives focussed on each of the work types; and
- other initiatives to improve internal process and reduce cost and time spent in developing and delivering projects.

Figure 5.14 shows the efficiency initiatives by generic type and Figure 5.15 shows the output of a quantified risk analysis carried out of these efficiency initiatives. We are identifying opportunities for making best use of current and emerging technologies to reduce whole-life costs. This includes increased purchases of off the shelf equipment commonly used elsewhere in preference to bespoke solutions, and simplifying and accelerating on-site works through improved installation methods involving greater off-site and prefabrication work. This will result in improved productivity, faster delivery, and fewer and reduced duration outages. Central to this initiative is the need to simplify and minimise the specification and design tasks. Particular attention will be paid to high repetition, lower cost items such as lighting, points heating, pumping, cable renewals, principal supply points and uninterruptible power supplies.

Much of our improvement through CP4 will be delivered through improved quality, flow, and predictability of tenders, which will be partially facilitated by an increasingly robust challenge to source lower cost solutions where available. This will include reducing non-value adding activity in the planning stages of projects, and developing a better understanding of risk and value management. We will roll these out as national best practice which will allow us to present more consistent and focussed work scopes to the market well in advance when tenders are due.

The LEK internal benchmarking work has helped us to focus on the variations between Territories which will permit alignment to best practice, wider rollout of resource loaded plans and better resource allocation.

Telecoms

The efficiency initiatives relating to telecoms renewals through CP4 will package together more effectively similar projects into larger delivery packages. This may be by repeatable work item type, for example similar sub assets in a particular year; or by RWI mix, for example by a particular area or location line of route. Figure 5.16 shows the efficiency initiatives by generic type and Figure 5.17 shows the output of a quantified risk analysis carried out of these efficiency initiatives.

Building on advances in CP3 the continuing development of the GRIP management tool tailored for telecoms projects will enable the production of a limited suite of stage gate documents, further simplifying the process and documentation. This also leads to greater use of in-house project management, commercial, and engineering resources in the production and delivery of GRIP Stages 1-4 elements of work. These include survey works; option selection; reference design; AIP documentation; GRIP stage 4 estimating, risk assessment and recording; stakeholder management; and testing

Figure 5.16 Telecoms efficiencies (including risk) by type

Per cent change	09/10	10/11	11/12	12/13	13/14
Scope: volume change	0.3	0.7	1.3	1.7	2.5
Scope: activity mix	0.8	1.5	1.7	1.9	1.5
Planning	0.1	0.3	0.4	0.5	0.6
Process: internal productivity	1.2	1.7	2.1	2.5	2.6
Process: supplier productivity	0.3	0.3	0.3	0.3	0.3
Price: procurement	0.3	2.2	3.2	3.2	3.3
Price: cost/schedule/risk control	0.4	0.9	1.3	1.5	1.7
Sum of initiatives (cumulative)	**3.4**	**7.5**	**10.3**	**11.5**	**12.5**
Year on year change	**3.4**	**4.2**	**3.0**	**1.3**	**1.1**

Figure 5.17 Telecoms QRA probability

QRA output (cumulative per cent change)	2009/10	2010/11	2011/12	2012/13	2013/14
Best case - 20% probability of better than…	4.4	9.3	13.0	15.5	16.3
Mean forecast	3.6	7.6	10.0	12.0	12.7
Adverse case - 80% probability of better than...	2.8	5.9	7.0	8.5	9.0

and commissioning strategy.

Dependent on the emerging telecoms policy on the future lineside communications strategy the rollout of GSM-R may result in a potential reduction in line-side SPT requirement of up to 70 per cent, with the result that future telecoms renewal functionality could be met with a combination of life extension or smaller concentrator replacements. However, benefits from this will not be realised in CP4.

We are developing nationally applicable specifications and work scopes for each RWI type, embracing the use of new technology which will enable functionality to be delivered with reduced levels of fixed assets such as cables and conduits. This initiative supports the direct purchase of key telecoms equipment which will deliver both economies of scope and scale.

Telecoms project delivery is relatively immature in comparison with other assets, such as civils and track renewals, and the use of framework contracts is a comparatively recent development both in Network Rail and wider supply chain. The development of this type of contract and longer term relationships should lead to closer ways of working, reduced man marking, improved management of risk and delivery process efficiencies.

Operational Property

Figure 5.18 shows the efficiency initiatives by generic type and Figure 5.19 shows the output of a quantified risk analysis carried out of these efficiency initiatives. We are working to identify and develop a five year core workbank programme that will cover 80 per cent of the total spend for CP4. This will be used to provide a base set of renewals to be delivered, allowing more robust forward planning for resources and enabling the development of early scope agreement with robust remits; these in turn will support the increase in the use of standard designs and modular solutions. The five year core workbank will also allow better linking into possessions taken by other assets, and where feasible we plan to create 'high street working environment' sites using normal working hours, extend where seasonally possible.

Provision of much increased levels of pre-specified information within contracts, greater levels of off-site fabrication, and the use of call-off contracts for standard equipment will also be used to generate greater process efficiency.

In order to enhance further our asset knowledge CP4 will see the completion of surveys for the operational property portfolio. We will seek to make more effective development stage investigations where interventions are necessary, which will incur less expenditure through the delivery phase of the project.

We will work more closely with heritage and planning agencies when planning work on heritage and listed buildings.

Figure 5.18 Operational property efficiencies (including risk) by type

Per cent change	09/10	10/11	11/12	12/13	13/14
Scope: volume change	0.0	0.0	0.0	0.0	0.0
Scope: activity mix	0.0	0.0	0.0	0.0	0.0
Planning	0.3	0.4	0.5	0.5	0.5
Process: internal productivity	1.6	2.0	3.6	5.1	7.0
Process: supplier productivity	2.8	3.6	4.4	4.5	4.6
Price: procurement	1.1	1.6	1.7	1.7	1.7
Price: cost/schedule/risk control	0.7	0.9	1.1	1.5	1.9
Sum of initiatives (cumulative)	**6.5**	**8.5**	**11.3**	**13.3**	**15.7**
Year on year change	**6.5**	**2.2**	**3.0**	**2.3**	**2.8**

Figure 5.19 Operational property QRA probability

QRA output (cumulative per cent change)	2009/10	2010/11	2011/12	2012/13	2013/14
Best case - 20% probability of better than…	10.4	12.3	16.0	18.4	20.4
Mean forecast	7.0	8.5	11.3	12.9	14.4
Adverse case - 80% probability of better than...	3.7	4.8	6.5	7.4	8.4

We also are developing improved delivery management strategies. These include plans to:

- create new processes to assist contractors in obtaining contactor assurance case and driving the potential for further competition by removing the need for the assurance case where it is not specifically required; and
- reduce waste and cost for site materials (both new and existing) through reduction in usage and implementation of specific strategies for waste treatment management.

The LEK internal benchmarking study analysed unit cost differences for platform refurbishment work. No significant differences were identified between the programme unit costs for this work type, representing around £17 million of the annual portfolio. However LEK suggest that an introduction of a whole-life asset management policy across all the portfolio could generate some moderate savings, at a high level of cost input, over a five year period. A comparison between footbridge refurbishment works delivered by different asset project teams showed unit costs variation of around 6 per cent. We are now undertaking further investigation of the working methods and factors influencing cost. Embedding the benchmarking technique jointly designed by LEK and Network Rail will form the backbone of future cost and performance benchmarking efficiency initiatives.

The A. T. Kearney procurement study identified two opportunities in line with previously identified areas. These were:

- reduction of business plan change; and
- benefits of a new consistent contract framework.

The latter is forecast to lead to a procurement advantage of up to around one per cent. Both of these areas are included in the efficiency model.

Risk

There are a number of risks which may impact on the delivery of our efficiency initiatives. Many of these are generic and cannot be easily quantified, for example, the impact associated with potential legislation, environmental change, catastrophic event or change programmes. The latter is particularly pertinent to organisational or cultural change which may take longer than anticipated to embed and may risk a knock-on effect to the profile of benefits that accrue from the initiative.

External risks, such as raw material inflation or tightening of employment markets are addressed through the input price inflation adjustments and not taken into account through the individual asset models.

Embedded efficiencies

During CP3 considerable attention has been given to ensuring that the scope of renewal schemes are aligned with current and future business needs, rather than simply the like-for-like renewal of existing infrastructure. Although this “right-sizing” has resulted in considerable investment savings, there is little quantification of these savings. This in part because the variance analysis we use compares actual investment with budget provision. In many cases the opportunity to right-size the infrastructure was considered when the budget for the scheme was initially drawn up. This focus will continue in CP4 and will result in activity reductions during CP4 but, as above this should be considered as a mechanism to achieve the identified efficiency profile.

For this Strategic Business Plan, in simple terms, the ICM contains all of the activity levels and unit costs. Our cost forecasts are based on the product of these. Efficiency is applied in the ICM by varying these unit costs – for example, as a result of a change in labour productivity or due to a change in our procurement strategy. However, this approach does not reflect fully the efficiencies that are embedded within the model, particularly in the renewals activity levels.

In addition to the efficiency initiatives that have been explained elsewhere in the SBP there are two other key sources of efficiency that will be reflected in reduced activity levels that will be modelled through ICM. These are:

- asset management policy changes following detailed review; and
- project scope changes.

It is important that these savings are considered with the primary unit costs savings to obtain a more complete picture of the savings that are being proposed for CP4.

With regard to the asset policies, there are a number of key differences between the polices in place for CP3 and those proposed for CP4. This is due to the move to minimising whole-life, whole-system costs and as a result of the detailed analysis of some of the key cost drivers. For some assets this has resulted in a reduction in the activity levels modelled in the ICM for CP4.

For others, the move to whole-life costing has resulted in an increase in the short term cost but will deliver an overall reduction in activities over the life of the assets.

For track and electrification works, we have reduced activity levels by more than £160 million compared to those included in the ISBP for CP4. This equates to almost two per cent of maintenance and renewal expenditure. It is substantially harder to determine a figure for other assets as there is likely to be less activity change in CP4. However, on the basis of work completed so far in respect of civils we believe that there may be up to an additional one per cent reduction in gross whole-life costs.

It is worth noting that asset policies are live and our intention is to implement any changes as soon as is practicable. However, the need to change standards and work instructions etc. together with the lead times between specification and delivery means that there will be only a marginal impact in CP3 as a result of any changes to policy being identified in the latter part of CP3. Therefore it is prudent to assume that any changes identified so far, including those described above, will only start to deliver full benefits in CP4.

We are still refining some of our policies and when complete we anticipate a small further reduction in activity levels. As this policy work will not be completed until after the final conclusions we believe that these embedded asset policy changes will form part of our efficiency stretch and therefore contribute to our overall efficiency profile. It is also important to note that many of the further changes we will make in this area will impact in CP5 rather than CP4.

Benchmarking renewals

Network Rail has sponsored and undertaken a number of internal and external benchmarking studies as part of the preparation for the CP4 submission. These studies have been useful in three ways:

- assessing scale of potential for improvement;
- identifying specific opportunities; and
- assisting in quantification of specific opportunities.

The internal cost benchmarking studies have been very valuable in providing the ability to corroborate the overall scale of potential improvement in relation to achieving best current practice. Where we have been able to fully normalise data for structural factors, then the residual variation should reflect best practices, and in principle be capable of replication. In practice we have not always been able to fully normalise, and in some cases we have therefore assumed that some margin above apparent lowest unit cost, or the second best demonstrated practice is a more realistic target for others. We have therefore not used this benchmarking data in an absolute way to set our efficiency plans, but instead it has provided a means to calibrate the overall level of achievement to be expected from certain elements of our bottom up plans.

In addition, the benchmarking has also provided a useful resource to help quantify specific opportunities or activities. For example, comparison of relative levels of overhead between suppliers and between internal management units has been helpful in assessing potential for challenge and rationalisation of existing organisations.

As part of developing our asset plans, particularly in signalling and track assets, we have conducted various international visits. The opportunities identified have informed the development of our plans, both in terms of content and lessons learned for effective implementation. We are continuing to undertake these benchmarking visits, including attending ORR arranged “better practice” overseas trips. We have also consulted extensively with our supply base, which includes contractors with a wide range of international experience.

A number of these studies have allowed us to identify differences from normal Network Rail practice and thereby achieve some level of breakthrough in performance. This is true to a greater extent in relation to external studies, where in some cases there has been a greater range of variation identified and this reflects more radically different approaches, for example, the greater use of Single Line Working, and protecting of worksites using signalling systems, as observed in overseas possessions management practice.

Where the outputs from these studies and external influences have not been directly included in our plans they have been used to inform and quantify the level of stretch we have applied on top of the initiatives’ output.

Figure 5.20 provides a reconciliation of the extent to which the various benchmarking studies have been reflected as part of our CP4 efficiency plans. Where bottom-up initiatives are either a

Figure 5.20 Incorporation of benchmarking studies into renewals efficiency initiatives

Efficiency Plans			Bottom up initiative values	Benchmarking studies					
Asset	Initiative reference	Initiative title		LEK Cost Benchmarking	ATK Procurement	LRR Possessions	Project Management	LRR Signalling	EWS / LRR Track
			Efficiency contributions as % of total programme spend (most likely); asset values exclude central initiatives	BDP saving contributions as % of total programme spend	ATK forecast as % total programme spend				
Civils			14.1%	25% on bench/m works = 11% on programme	8.3%			Not applicable	Not applicable
	CIV-E-001/2	Robust 3 yr workbank	2.1%						
	CIV-E-003	Optimise framework delivery	1.5%						
	CIV-E-004	Optimise framework contracts	0.5%						
	CIV-E-005	Possession optimisation	0.0%						
	CIV-E-006	8 hour underbridge	0.3%						
	CIV-E-007	SEC/Minor Works link-up	0.2%						
	CIV-E-008	In-house design	0.2%						
	CIV-E-009	Reduce internal staff costs	0.5%						
	CIV-E-010/11/12/13	Consistent Engineering spec	5.2%						
	CIV-E-014	Seasonal Working	1.7%						
	CIV-E-015	Sub-contracting influence	0.8%						
	CIV-E-016	Optimise framework v competed	0.4%						
	CIV-E-017	In-house design	0.8%						
E&P			24.2%	1%	6.5%			Not applicable	Not applicable
	E&P 1	Engineering Scope Efficiency	2.5%						
	E&P 2	Distribution (Innovation)	0.2%						
	E&P 3	Distribution (Modularisation)	1.7%						
	E&P 4	Protection (5 minutes isolation)	0.1%						
	E&P 5	Protection (better use of technology)	0.6%						
	E&P 6	Contact systems (Neutral Section Development)	0.01%						
	E&P 7	Plant Accelerated Development	0.5%						
	E&P 8	Plant (UPS)	0.1%						
	E&P 9	Plant (Review of Points Heating system)	0.3%						
	E&P 10	Engineering process led activities	5.0%						
	E&P 11	Procurement and Contracting strategy (Distribution)	0.9%						
	E&P 12	Improved tenders	3.1%						
	E&P 13	Improved Contract Management	1.0%						
	E&P 14	Improved Project Engineering	1.4%						
	E&P 15	Improved Project Planning	0.2%						
	E&P 16	Improved application of GRIP	0.1%						
	E&P 17	Knowledge Management	0.2%						
	E&P 18	Distribution Installation Initiatives	1.8%						
	E&P 19	OLE Installation Initiatives	0.5%						
	E&P 20	Fixed Plant Installation Initiatives	0.5%						
Operational Property			13.51%	1%	3.30%			Not applicable	Not applicable
	EST 01	Reduced BP change	1.1%						
	EST 02	Improvements to design	5.8%						
	EST 03	Improved asset knowledge	0.4%						
	EST 04	Optimise access regime	3.1%						
	EST 05	Improve approach to Heritage buildings	0.03%						
	EST 06	In-house design team	0.2%						
	EST 07	Reduce waste	1.5%						
	EST 08	New supplier entrants	1.1%						
	EST 09	Platform construction best practice	0.4%						
Signalling			17.2%	15%	6.80%			10 - 30% relative to continental BDP	Not applicable
	SIG1	National design team	0.4%						
	SIG2	Updated SWTH	0.6%						
	SIG3	Auto testing using PDAs	0.2%						
	SIG4	Plug couplers	0.3%						
	SIG5	Reduce outside testing costs	0.9%						
	SIG6	8 Hour commissionings	1.1%						
	SIG7	LIMBO 5-8	3.6%						
	SIG8	Standard designs	1.3%						
	SIG9	Bulk ordering	2.4%						
	SIG10	RAMS monitoring	0.0%						
	SIG11	STAMP	1.8%						
	SIG12	Modular level xings	1.8%						
	SIG13	Scope efficiency	1.5%						
	SIG14	Next generation SSI	1.2%						
Track			8.4%	8%	4.20%			Not applicable	
	Track 1	Project Flo	0.7%						
	Track 2	Flo Indirects	1.3%						
	Track 3	8/200 Direct	0.8%						
	Track 4	High Output Initiatives	0.4%						
	Track 5	Minor Works	0.2%						
	Track 6	NDS Haulage Efficiencies	0.3%						
	Track 7	Reactive	0.2%						
	Track 8	8/200 Indirect	0.4%						
	Track 9	Modular S&C	2.8%						
	Track 10	NDS Rail Efficiencies	0.5%						
	Track 11	NDS S&C efficiency	0.7%						
Telecoms			16.5%	NA	6.80%	Not applicable		Not applicable	Not applicable
	TEL1/2	Works packaging	0.8%						
	TEL3	In house GRIP 1-4 works	1.9%						
	TEL4	GRIP tool	1.2%						
	TEL5	Lineside communications	4.6%						
	TEL6	National specification/workscope	1.0%						
	TEL7	Bulk buying of telecoms materials	0.8%						
	TEL8	Better defined scope - lower risks	1.8%						
	TEL9	Adoption of new technology	1.2%						
	TEL10	Project Management Maturity	3.3%						
Enhancements			TBD	NA					
Central Initiatives (all assets)			2.20%						
	CEN 03	SOP - supplier resourcing	0.20%						
	CEN 04	Track Operating Permit	0.30%						
	CEN 06A	Project management productivity	0.20%						
	CEN 06B	Project Mgt compliance / competency	0.30%						
	CEN 06C	Project Mgt process optimisation	0.40%						
	CEN 08	ERP Planning Development Framewo	0.10%						
	CEN 08	iProcurement Req to Pay systems	0.50%						
	CEN 14	SOP - internal resources	0.20%						

very close match to, or have been included as a result of, the benchmarking studies this has been identified by shading. Where available we have included the efficiency identified against each asset from each benchmarking study.

Stretch

In arriving at our overall aggregate efficiency profile we have applied a stretch to the efficiency initiatives explained through this section. We note that in all cases the bottom-up efficiency initiatives have incorporated some degree of bottom-up stretch already where it has been apparent from benchmarking studies that the delivery of additional efficiency, although not originally forecast, may be feasible.

The specific initiatives are expected to deliver overall savings of 12.5 per cent. We recognise that the level of stretch embedded in these initiatives is less than for maintenance. We also recognise that we will continue to review our asset policies and this should lead to the identification of potential scope efficiencies.

We have therefore concluded that we should include a further stretch of 5.1 per cent for all renewals. As a result we have concluded we can achieve overall savings of 17.6 per cent in this plan, although we recognise that this will in practice vary between asset categories.

Non-controllable operational expenditure

Non-controllable operating expenditure is an area in which we can generally only seek to influence efficiencies through challenging other organisations rather than drive the efficiencies specifically. Expenditure forecasts for non-controllable operational expenditure are explained in Chapter 6.

Controllable operational expenditure

It is not feasible to assess the impact on operational expenditure using an activity specific modelled basis for a period some two to seven years into the future. Therefore, we have made a top-down assessment of what levels of efficiency we believe it is possible to deliver from the addressable areas of operational expenditure. Figure 5.21 shows our top down projection for opex efficiencies.

Some significant areas of operational expenditure cannot be assessed by the more usual types of efficiency analysis. Pension costs, for example, are driven by actuarial review and headcount, therefore our ability to drive cost out is limited; insurance costs are heavily influenced by the insurance market and the level of risk the company is willing to expose itself to through its market placed and self-insurance arrangements; and the cost of actually operating the railway on a day-to-day basis is determined by the physical input required to operate the infrastructure control systems we currently employ. For these areas we have developed specific cost profiles for CP4.

Where we have developing specific long-term plans which impact other areas of operational expenditure we included an assessment of their likely quantum in devising our top down assessment. These schemes will continue to evolve through the remainder of CP3 and in some cases may change significantly between now and when they start to deliver efficiencies.

The world class programme of work will radically reassess our processes and how we go about carrying them out. This is expected to generate significant operational expenditure efficiencies. Some of the areas we believe may provide good potential sources of operational expenditure reduction and which may be included in the world class programme include:

- maximising synergies between the Maintenance, Engineering and Infrastructure Investment functions;
- maximising technology to enable more flexible working arrangements;
- increased volumes of small simple renewals delivered in-house using the existing maintenance staff;
- maximising the benefits of moving towards a “predict and prevent” maintenance system;
- rationalisation of corporate accommodation;
- examining changes to our train control strategy; and
- changes commensurate with a “lighter touch” regulatory regime.

There are still improvements that can be made outside of the world class programme, although

Figure 5.21 Operational expenditure efficiency

Per cent	2009/10	2010/11	2011/12	2012/13	2013/14	CP4
Controllable opex	5.0	5.0	4.0	3.0	2.0	17.6

those which have been identified are largely included in our plans for CP3. For example, within information management we are evaluating our current organisation structure to move to a target operating model. This review will radically reassess our IM processes and their implementation, and is expected to generate significant efficiencies.

The areas for which we have developed specific cost profiles (pensions, insurance, and signallers' costs) have been excluded from the application of the efficiency profile in the calculation of overall operational cost.

Benchmarking operational expenditure

We commissioned benchmarking studies into three of the largest areas of operational expenditure which are not rail industry specific – Finance; HR; and IM – and are therefore more easily benchmarked against external organisations. We were generally rated in the top 50 per cent of the companies analysed. The overall conclusion of these studies was that the level of cost efficiency that can be leveraged from our major corporate services is minimal. However, there are some clearly identified improvements to the level of effectiveness that these functions could deliver and this should help achieve savings elsewhere. This sentiment has been carried through into the activities being pursued through our world class work programme.

The results of the benchmarking studies are summarised below.

Finance and human resources

This study was carried out by KPMG during summer 2006. The core finance function of 402 FTE staff and around £19.5 million of associated costs were assessed.

KPMG assessed the finance function to be low cost compared with other large private sector organisations and the headcount mainly in the first quartile. Some areas were identified as "demonstrating elements of leading practice". However, opportunities for increased effectiveness were identified in some others, notably in transaction processing and an increase in the level of financial analysis.

The exercise on human resources benchmarked core HR function of 326 full time equivalent (FTE) staff and around £12.7 million of associated costs (excluding competence and training) for 2006/7. The study concluded that costs were low compared to other large private sector organisations and ratio of HR employees to total employees is around the average. Again there were areas identified in which effectiveness could be improved, some of these centred around the continuing development of the shared service centre and rationalisation of complex terms and conditions following the in-sourcing of many employees. Plans to address all of these areas are being developed as part of the world class programme.

IM support services

This benchmarking study was carried out in summer 2006 by Compass Ltd and covered Distributed Computing, IT Help Desk, Enterprise Operation Services, Network Services and Application Support Services. The expenditure associated with these services is around £45 million in 2006/07. Network Rail's overall cost was assessed as being in excess of seven per cent lower than that of the reference group. Since the completion of the study changes have been implemented which outsource distributed computing and enterprise operation systems.

Corporate accommodation occupancy

IPD Occupiers run an annual UK benchmarking service which examines a number of office based benchmarks such as attribution of occupancy costs per occupant; internally occupied space per full time employee and per workstation, and total occupancy costs per metre squared. This study compared Network Rail against these benchmarks and analysed them on an individual building and a company wide basis. On all of the measures, Network Rail's results were better than the IPD top 25 benchmark measure.

Input prices

In the ISBP, we suggested that expected changes to input prices in excess of RPI needed to be offset against any efficiency profile we were to achieve. In support of this was a study conducted by LEK in 2006. This argued that, on the basis of available forecasts and historic evidence, our planned expenditure portfolio was likely to be detrimentally impacted by changes to input prices in excess of RPI. This study has now been refreshed for the Strategic Business Plan and still shows that input price change remains a significant risk to our efficiency profile.

The LEK input prices study refresh included an assessment of CP3, based on actual data and short term forecasts to the end of the control period. The conclusion is that for CP3 Network Rail's expenditure profile has been subject to average input price inflation of 1.1 per cent above RPI per annum, effectively increasing the level of

efficiency we achieved by around five per cent in aggregate across our total expenditure. Given this evidence we remain convinced that input price inflation will continue to present a significant risk to our expenditure and efficiency profiles through CP4. Figure 5.22 shows the input price effect by category across the control period and the compound annual growth rate (CAGR).

A number of other asset intensive industries, notably the gas industry, have also carried out work in this area. The approach used differed but the overall result was similar in that it demonstrated that RPI was not an appropriate measure of cost drivers in an asset intensive environment. It is important that it is addressed in fully transparent manor such that we can plan for and manage effectively any residual risk. In its Advice to Ministers, ORR made no allowance for our bottom-up analysis of the impact of real increases in input costs. It suggested that input price inflation might be dealt with separately from the setting of cost reduction targets. We welcome ORRs recognition of this as an important issue and we are keen to take this forward. This issue has also been considered by the Competition Commission in its recent review of BAA.

The LEK study, completed August 2007, again used a number of different sources and interviews with leading experts in the field. It concluded that overall Network Rail was forecast to experience compound annual inflation of between 1.7 per cent and 6.2 per cent through CP4, with a median case expectation of around 1.0 per cent above RPI. This is made up of a median case of around 2.1 per cent above RPI for labour, which accounts for 61 percent of our total expenditure and a median case of around 0.8 per cent below RPI for materials, which make up 39 per cent of total expenditure. The inflation in materials exhibited a wide range of variation across the assets, with below RPI inflation in technology driven areas being offset by above RPI inflation in copper, steel and concrete, although it was noted that the trend in copper prices was decreasing.

The study went on to point out that although we are the principle buyer in some markets, for example signalling and track related industries, the majority of the inflation is subject to inflationary pressures outside our control. Labour prices are forecast to continue to be influenced by major construction projects, such as the 2012 London Olympics. It is likely other major construction projects in the UK will continue to exert pressure on labour prices.

In the ISBP we took account of the forecast input price inflation as an overlay to our expenditure projections. In its response to the ISBP ORR said it was not currently minded to accept input price inflation as a variable, but rather it was an element for which we were remunerated through the risk premium. While we accept that the input price inflation figures we use in the SBP are based on a forecast for CP4 and as such may change through the control period.

In addition, there have been changes in materials inflation forecasts since the LEK report was published, especially for copper prices, which would bring about an additional 0.2 per cent to 0.4 per cent per year price pressure across the control period. Network Rail, therefore, needs to deal with both the magnitude and the volatility of materials price inflation.

Figure 5.22 Input price inflation relative to RPI

Per cent	2009/10	2010/11	2011/12	2012/13	2013/14	CAGR CP4
Track	1.1	2.2	1.0	0.5	0.4	**1.0**
Signalling	0.5	0.9	1.0	(0.1)	0.4	**0.5**
Telecoms	1.4	1.3	0.6	0.2	0.1	**0.7**
Electrification	(1.9)	0.1	0.5	(0.7)	(0.1)	**(0.4)**
Plant and machinery	0.5	0.2	(0.2)	(0.5)	(0.6)	**(0.1)**
Civils	1.7	1.8	1.0	0.3	0.3	**1.0**
Operational property	1.8	1.6	0.8	0.3	0.3	**1.0**
Other R&E	(3.1)	(3.1)	(3.1)	(3.1)	(3.1)	**(3.1)**
Maintenance	2.0	2.1	1.3	0.5	0.5	**1.3**
Operational costs labour	2.3	2.3	1.1	1.1	1.1	**1.6**
Overall	**1.4**	**1.7**	**1.0**	**0.4**	**0.5**	**1.0**

Top-down analysis

As well as developing specific plans for efficiency savings based on bottom-up analysis, we have also considered the level of savings that might be indicated by high-level, top-down analysis. At the beginning of this chapter we outlined the key components of a top-down approach, incorporating catch-up and frontier-shift. The ORR has developed an initial view of top-down efficiency savings based on a report prepared in December 2005 by its consultants, LEK / Oxera.

In this section, we review the conclusions of the ORRs consultants and develop our own view of the potential top-down savings. We have also considered the targets set by other regulators in recent reviews and explain how changes in input prices are reflected within top-down analysis.

LEK /Oxera approach

ORR's consultants estimated that that we could make savings of between two per cent and eight per cent per year during CP4. This analysis used 1996/97 costs as the starting point and was based on an assessment of:

- the average change in real unit cost reductions for other network operators;
- costs incurred by US Class 1 railways;
- the potential for additional catch up savings; and
- the change in the efficiency frontier for other network operators.

The analysis resulted in a range of between two and eight per cent savings per annum. However, we note that the consultants appeared to take no view on the probability of outcomes within this range. We have reviewed the key components of the analysis to assess the assumptions that seem plausible.

The low case was principally based on efficiency frontier improvements from the end of CP3 together with a level of catch-up. The size of the range principally results from the significant level of catch-up (two to five per cent per annum) in the high case in addition to the underlying efficiency improvements from other industries.

Catch-up

It is assumed that the spend levels at the start of CP3 included significant levels of inefficient expenditure following the cost increases following Hatfield. It was also assumed that this can be subsequently eliminated in addition to the challenging CP3 efficiency targets.

We have carried out specific analysis of the cost increases incurred following Hatfield. The consultant's report assumes that the full increase in opex and maintenance costs was due to inefficiency, but recognises that renewals volumes needed to increase. We have provided ORR with a further supporting paper which shows that we agree that 100 per cent of renewals increases were necessary but we also consider at least 55 per cent of opex and 45 per cent of maintenance increases in costs to be fully justified by other changes. This includes increased insurance and pensions costs due to market conditions, and a significant increase in the underlying levels of maintenance activity. We also recognise that there was a significant increase in renewals costs in 2001/02, but this was reversed in the following year. As a result, we believe that the potential level of catch-up is no greater than 0.4 per cent. Moreover, the conservative assumptions we have adopted suggest that this should be regarded as the upper bound estimate implied by this approach.

We note that, in delivering the challenging CP3 efficiency targets, we believe that we have addressed any unjustifiable expenditure during this control period as this is the most obvious area to be addressed and that it is unrealistic to assume that this remains available as an efficiency target for CP4.

It should also be recognised that efficiency initiatives do not necessarily impact immediately on our costs and there is a lag before they have an impact on costs. This needs to be recognised in assessing the extent of catch up as there will be a further lag effect for CP4 initiatives, as some of the savings will actually be achieved in CP5.

Frontier-shift

The consultants appear to have assumed that we can achieve a further four per cent annual improvement based on the efficiency improvements achieved by other industries. We have two specific concerns with this analysis.

First, it relies on comparison with the annual real unit operation efficiency of 5.7 per cent achieved by National Grid (NGC), which we believe does not provide an appropriate comparison to Network Rail. The significant improvement in NGC's real unit operating costs is significantly affected by an increase in its output volume but does not require significantly increased cost to maintain. The same is not true of Network Rail, where our efficiency targets are set with reference to volumes of engineering activity. (The same could be argued of the distribution

businesses which achieved annual improvements of 3.8 per cent.) By removing NGC from the analysis, this reduces the average efficiency savings to around 3.2 per cent. We also note that the consultants made an adjustment for improved outputs for the water industry but have made no adjustment to reflect the significant output improvements achieved by Network Rail.

Second, real unit operating expenditure does not measure capital expenditure. Earlier reviews have acknowledged that lower efficiency savings tend to be achieved within capital expenditure. It appears that regulators in other industries have set targets for capital expenditure that are around 1.5 per cent lower than for opex and maintenance.

We therefore believe that the average annual efficiency achieved by other industries is around 2.5 per cent compared to four per cent proposed by ORR's consultants. We also consider that these savings represent both frontier-shift and catch-up (as usually defined) achieved by other companies so there is an element of overlap with the catch up savings which may be applied.

Summary

Based on the above analysis, we believe that a more appropriate range of efficiency savings is between 2 and 3.2 per cent. We have provided a more detailed paper to ORR that describes this analysis of the consultants' report.

Changes in input prices and productivity

In common with other regulators, ORR has previously recognised that the indexation of costs and revenues in line with RPI automatically requires a regulated company to match the rate of productivity improvement and input price inflation achieved by the firms whose goods and services are found in the RPI basket. It therefore follows that a company will only be able to reduce costs in real terms if it is able to outperform the productivity improvements and/or input cost control achieved by these other firms.

ORR has assumed that Network Rail can achieve at least 1.5 per cent improvement in through frontier shift. Recognising that RPI includes improvements in productivity, we are unclear why ORR believes Network Rail should be able to outperform the general level of productivity in the economy as a whole on top of so called catch up efficiency improvements.

Any assumptions about frontier shift implicitly include assumptions about productivity and input prices. We have provided detailed evidence of the expected increase in input prices during CP4. This analysis should be taken into account, together with productivity improvements implicit within the RPI, in reaching conclusions on any incremental frontier shift to be achieved by Network Rail.

A potential area for further analysis is to understand better the potential changes in the individual components of RPI compared to our cost base. Further details relating to this issue are included in papers published in December 2005 and April 2007 by First Economics.

Other regulators' efficiency targets

In considering ORR's initial assessment of potential efficiency targets for CP4, we have reviewed the efficiency targets set by other regulators. These targets are mainly focused on opex (including maintenance) as other regulators do not generally apply the same year-on-year efficiency targets to capital investment. The key aspects of other regulators' assumptions are the level of catch-up and the rate of frontier-shift, together with the impact of any one off or exceptional costs.

Figure 5.23 summarises the efficiency targets set by other regulators in reviews carried out since 2004. It shows that in five of the seven reviews carried out since 2004 the companies involved have ended up with an annual efficiency target of around three per cent. For the other two, the targets were considerably lower. This compares to our average bottom up efficiency savings (net

Figure 5.23 Overall efficient targets (per cent, real terms)

Review	Catch-up	Frontier shift	Total
Ofgem, electricity DNO review, 2004	~1.5 on average	1.5	~3.0 on average
Ofwat, 2004	~1.5 on average	0.6 to 1.0	~1.4 on average
CAA, NATS, 2005	-	-	2.0 to 3.0
Postcomm, Royal Mail, 2006	-	-	3.0
Ofgem, transmission review, 2006	~1.5 on average	1.5	~3.0 on average
CAA, airports review, 2007	1.0	0	1.0
Ofgem, gas distribution review, 2007	~1.7 on average	1.6	~3.3 on average

of input prices) of 2.4 per cent.

However, we recognise that it is important to consider the key components of other regulators' decisions, as well as the overall target. BAA and British Gas's successor companies can be found to be 10 per cent or more away from their industry's efficiency frontier some 20 years after their respective privatisations. We recognise that it is reasonable to expect Network Rail to achieve similar savings. But in taking this into account, it is important to recognise that Network Rail is also a mature business and that opportunities for improvement are unlikely to be greater than other infrastructure companies. This is illustrated, for example, by AMCL's recent report assessing our asset management capability which states that "Network Rail's maturity in asset management is at least comparable to that of other major infrastructure owners in the UK".

It is also important to take account of the scale of the challenges across the whole business, including performance improvement and delivery of a major programme of enhancements. In addition it is essential that ORR considers the realistic rate of change as well as the apparent level of any inefficiencies.

External studies

As referred to earlier in the chapter, there have been a range of external studies, commissioned by Network Rail and by other parties, assessing the potential for efficiency savings. In this section, we provide an overview of how we have taken each of these studies into account. In broad terms, we have already included many of the identified opportunities in the bottom-up savings, although in some cases we do not agree with the scale of savings identified by the relevant consultant. We have provided ORR with a supporting document that provides a more detailed response to each study.

Top-down studies

There are a number of papers and studies that have been developed over the last few years that provide an assessment of the overall level of efficiency that might be achievable in CP4.

LEK / OXERA analysis

As noted in the previous section, ORR commissioned LEK and Oxera to identify potential efficiency savings in CP4. The consultants concluded that we could achieve annual savings of between two and eight per cent.

As we set out above, we believe that the top-end of this range is based on some unrealistic assumptions. On the basis of our alternative analysis, we believe that it is more plausible to show that the top end of the range implied by their approach is below four cent. We also note that the consultants appeared to take no view on the probability of outcomes within this range.

Union Internationale des Chemins de fer (UIC)

Over the past ten years, the UIC has carried out comparative analysis of infrastructure costs between a number of European railways. The results indicate a significant gap between Network Rail and the lowest cost railway. It is difficult to understand the precise causes of these apparent gaps as the analysis is based on high level data. While the analysis has normalised the data for some structural factors, there remain considerable differences between railways that have not been taken into account. There are also considerable differences in the way information is captured. For example, maintenance, renewal and enhancement activities are not treated consistently in all countries; there are differences in the accounting treatment of expenditure; and changes in exchange rates may also have a significant effect.

One area which is not immediately obvious from this analysis is the very long term trends (i.e. in excess of 10 years) and what these may indicate. For example, the GB network is currently addressing the legacy of many years of systematic under-investment in the years leading up to the Hatfield accident. It is possible that some countries may currently be investing at unsustainably low levels and could be approaching a step increase in costs similar to that which occurred on the UK network around 2000. Indeed, there is some evidence to suggest that this is the case.

We recognise the importance of obtaining a more detailed understanding of these differences and, as we described in the bottom up analysis, increasingly we are carrying out detailed benchmarking of our activities with other European railways. These are much more useful than high-level comparisons since we are able to understand what drives real differences and learn from each other.

We also note that the Institute of Transport Studies at Leeds University is currently exploring how to apply econometric techniques to the UIC data. Some initial results have been produced

but substantial further data is required to enable more complete normalisation.

First Economics analysis of RPI

As we have outlined, First Economics have prepared papers which indicate that outperforming RPI is increasingly difficult for regulated network industries and that regulators should take account of input price inflation when determining efficiency assumptions.

LEK US Class 1 railroads study

EWS commissioned LEK to compare the cost of track renewals between US Class 1 railroads and Network Rail. The analysis was based on identifying major differences between the railways and attempting to make incremental cost adjustments to reflect these differences.

However, we do not believe that the differing costs can be readily analysed in an incremental way in this case. The railways in the US and Britain are entirely different. In particular, the overall tonnage conveyed tends to be higher but significantly lower speeds which causes less degradation than lower tonnage at higher speeds; the track uses a much higher percentage of wooden sleepers which lend themselves more easily to individual renewal; and there is a much lower frequency of trains in the US - on some of our primary routes a train passes once every four minutes, while in the US there may be almost one hour between trains. The lower frequency of traffic enables the US railroads to use highly mechanised maintenance to be carried out between trains, which in turn facilitates a piecemeal approach to renewals. In addition, it enables the network to be optimised for freight rather than as a mixed network.

We therefore do not believe that conclusions can be drawn from this analysis on the overall scale of savings. We recognise the importance of learning from other railways, but believe that European railways provide a more appropriate comparison. We also recognise that we must challenge costs in many of the areas identified by LEK and this is discussed further below.

ORR bottom-up studies

LRR possessions study

This study commissioned by ORR examined the different possessions regimes being used across a number of railway infrastructure companies in countries:

- ProRail, Strukton and BAM in the Netherlands;
- SBB and Sersa in Switzerland;
- DB Netz in Germany; and
- Railcorp in Australia.

The overall conclusions of the study were that the way in which possessions are structured and taken is dependant on what sort of a railway is being operated and the level of service that is required. Key elements of good practice drawn out were the need for exceptional quality of planning at both possession and project level; simple and predictable possessions management; active management to remove risk and minimise contingency as far as possible, and the application of the appropriate level of mechanisation. The findings of this study are all being considered in the planning of efficient engineering access and the seven-day railway, which is discussed as an option in this plan.

LLR Signalling unit costs

Lloyds Register Rail was commissioned by ORR to benchmark the cost of Network Rail's signalling renewals costs against those of a number of European railways. The report presented a very small number of schemes which were compared against the Network Rail schemes. Those schemes that were benchmarked fell broadly into two price groups – those which were a similar scale, scope and complexity to the original schemes which underpin the Network Rail SEU cost, and those which were much less complex. This latter group of schemes were clearly identified as outliers in the data.

The treatment of costs is not consistent across different railways. It should be noted that 33 per cent of the analysis for other railway administrations is based on forecast rather than final costs and so subject to uncertainties and potential overrun of costs and use of any contingencies which are not visible here. And there is no reference to the scope of service provided to the client (e.g. nearly all European railway administrations carry out final testing and commissioning themselves and it is not included in the contract costs). The SEU rate used in the comparison was £271,000 per SEU. This was the rate used in our Signalling Medium Term Funding submission and was reset to £267,000 per SEU in the ORR final conclusion to that review. This is based on a price which included 2003/04 levels of efficiency.

The broad conclusion from this analysis was that Network Rail's resignalling schemes were more expensive than those against which we were benchmarked. However, if the signalling efficiencies achieved to date and our efficiency

trajectory for the remainder of CP3 are taken into account then the difference is significantly reduced and we are broadly in line with the prices at the upper end of the sample.

More significantly, this study used a very small sample of widely different projects and therefore no firm conclusions can be drawn from the work other than there are differences which need to be investigated further. It is equally non-committal on reflecting any clear view of Network Rail's unit costs. We note that during the presentation all of the points raised above were discussed with BSL. During the discussion we were unable to identify any new areas that may deliver cost savings which were not already under active consideration in our efficiency plans.

Bottom up studies

A T Kearney procurement benchmarking

A T Kearney was engaged to undertake an independent bench-marking review of our procurement capability and strategy. This established that Network Rail is "average" in terms of capability supply chain management capability. This puts us at the lower end of a comparable reference group of asset-intensive companies.

Their approach involved close analysis of our delivery and efficiency plans and detailed discussions with our asset and contractual teams. Once their initial findings crystallised these were cross checked and fed back into the asset and procurement teams. In many instances, the initiatives raised by the A T Kearney team were subsequently included in our bottom-up efficiency models.

We have included in our supporting documents an analysis of which of the initiatives have been included in the bottom up models and therefore which contribute to the efficiency stretch.

LEK internal benchmarking

We commissioned LEK to carry out a study benchmarking our internal activities between different geographical areas and delivery units. This covered elements of both maintenance and renewals. The analysis differentiated variances between unit cost performance as attributed either to structural factors or internal efficiency factors. In principle, these efficiency factors are available over the whole spectrum of internal practice. We are using this benchmarking work as the basis of future monitoring and ongoing improvement plans.

LEK input prices

The LEK input prices study, completed August 2007, used the same methodology as the earlier study conducted for the ISBP. It drew from a number of different sources and interviews with leading experts in the field. It concluded that overall Network Rail was forecast to experience compound annual inflation of between 1.7 per cent and 6.2 per cent through CP4, with a median case expectation of around 1.0 per cent above RPI. This is made up of a median case above RPI for labour, which accounts for 61 per cent of our total expenditure and a median case below RPI for materials, which make up 39 per cent of total expenditure.

Given this evidence we remain convinced that input price inflation will continue to present a significant risk to our expenditure and efficiency profiles through CP4.

HR, finance and IM benchmarking

In 2006, we commissioned KPMG to benchmark our human resources and finance functions against best practice companies. The overall conclusion was that the level of costs in these functions is reasonable (i.e. that they are efficient) but that resources should be used more effectively to provide an efficient service to the rest of the business. However, while we have not made specific assumptions for each function, our opex efficiency assumption implies that we can achieve further efficiencies in these functions.

We also commissioned a report by Compass in 2006, to review much of our information management function. This also concluded that there were limited efficiency savings to be achieved, although again this plan implies further efficiency in CP4.

Nortrack track maintenance and renewals benchmarking

EWS and Network Rail jointly commissioned Nortrak to compare track maintenance and renewal practices between Britain and Canada. The work was carried out by a former Canadian National track engineer.

The report proposed a number of potential improvements in our approach, most of which are reflected in our bottom up efficiency plans and some of which are already being rolled out on some parts of the network. For example, we are adapting the Canadian track occupation permit system with a view to better utilisation of shorter possessions; and are currently working with the Railway Safety & Standards Board to

develop the concept for implementation in the UK.

However, the report made a number of conclusions with which we do not agree: particularly that we renew assets prematurely; that there is insufficient focus on preventative maintenance; and that we are doing too little to reduce expenditure. We also note that the report was based on visits to three sites only and it is therefore necessary to be cautious in drawing network-wide conclusions from such a small sample.

With regard to the conclusion that Network Rail is renewing track assets prematurely, this conclusion was principally based on an assessment of switch and crossing (S&C) renewal at Innerwick. We have re-examined the supporting evidence and are convinced that given the condition, linspeed and location of this S&C this renewals was not carried out prematurely. As part of the supporting documentation we have provided further evidence to support this view.

The assertion that there is not enough focus on preventative maintenance links back into the comparison between unlike railway networks, as described in the comparison with US Class 1 railroads, above, and traffic type and volume. The balance between preventative maintenance and renewals is enshrined in the asset policies and is mainly determined by the degradation characteristics of the asset, the traffic mix and the type of route. Lightly used low tonnage routes are likely to have significantly less renewal undertaken as the delivery of the outputs will be mainly through maintenance. However, high traffic routes will suffer significantly higher rates of wear and have greater restrictions on access; therefore apparently higher levels of renewals may be appropriate in these circumstances.

Our plans to reduce expenditure were not specifically examined through this study, but we have a number of initiatives described elsewhere in the Strategic Business Plan. These include the rationalisation of the track renewals contracting supply base, redesign of many aspects of the end to end planning and development process, application of six sigma analysis to conventional S&C renewal, and the full implementation of modular S&C delivery.

Finally, the study suggested that more effective use of resources could result from increased use of systems such as bi-directional signalling. Such systems cannot easily and economically be introduced on a stand-alone or piecemeal basis, and are subject to long gestation periods if included as part of a major signalling renewal. However, where there are clear cases for such enhancements they are fully considered in our plans.

LLR track renewals costs

Lloyds Register Rail was commissioned by EWS to review our track renewal costs and to identify opportunities for reducing costs. Again, the report proposed a number of potential improvements in our approach, such as the implementation of a track occupancy permit system and modular S&C renewals, most of which are reflected in our bottom up efficiency plans.

However, the report also suggested that we could achieve overall savings of up to 33 per cent in plain line track renewals costs and 10 per cent in S&C renewals (non-modular). In making this conclusion we believe LLR started from the position of our efficiencies delivered to 2006/07 rather than our projected outturn efficiency for the end of CP3. In doing this we believe that the analysis effectively double-counts a significant level of efficiency to be delivered in the last two years of CP3.

We have examined the LLR analysis for category 4 and 11 works which account for around 70 per cent of our track renewals, rather than for a specific territory. For category 11 works the difference between the LLR view and our own post efficient proposals are negligible. However, in the category 4 works calculation there appears to be a significant underestimate in the volume of rail required for the renewals, and the cost of some of the plant and follow up work, such as tamping, appear to have been excluded. Therefore although we do not agree with the quantum of savings articulated in the report we are in broad agreement that the activities suggested are either already being implemented or actively investigated. Correcting for this and the apparent double count would reduce the claimed 33 per cent efficiency for CP4 to around 10 per cent, which is broadly consistent with the track initiatives identified earlier in this chapter.

DTM Consulting

DTM Consulting was commissioned by EWS to assess the cost of managing freight only lines. This was based on costs included in the first version of the infrastructure cost model which underpinned the Initial Strategic Business Plan.

We recognise that there were a number of assumptions that needed further development and have addressed the concerns raised in the second version of the ICM which underpins this plan. In particular, this plan now reflects fully the actual differentiation in our asset policies between freight only lines and other route categories. We are also considering the benefits of having dedicated teams looking after freight-only lines.

However, there are some areas where we do not agree with the analysis, particularly for staff costs which appear to be lower than those which we experience, we therefore think that there may be an insufficient allowance made for sickness, leave or training.

Conclusion

We have developed our efficiency assumptions on the basis of detailed analysis of the opportunity for efficiency savings during CP4. We have then assessed the extent to which we can apply a further stretch, taking into account the extent to which we have identified specific action plans to deliver the bottom up savings. As a result we have concluded that we can deliver efficiency savings which average 17.6 per cent across our costs during CP4, and this reflects that some areas will exceed this target while others may not reach it. We consider that this represents a realistic but challenging target.

We have also commissioned a report which indicates that input prices will increase by an average of one per cent per annum during CP4. As a result, our overall costs will reduce by 2.4 per cent per annum during CP4.

We consider that this is broadly consistent with our top down analysis of the potential savings, which indicates that savings of between two and three per cent savings could be achieved. It is also similar to targets set in recent reviews by other regulators.

In determining the CP4 efficiency targets, it is important that ORR takes into account the full range of outputs we are being asked to deliver, including the significant improvement in train performance, network availability, our responsiveness to customers and the greatly increased enhancement programme. There is a limit on the extent of change that can realistically be delivered over CP4 and this should be taken into account in considering the rate at which efficiency savings can be achieved.

Figure 5.24 summarises our efficiency and input price assumptions. This shows the net reduction in cost over the period as a whole is expected to be 12.5 per cent.

Supporting documents

We are providing the following supporting documents to ORR for the specific initiatives that we have identified:

- summary of maintenance efficiency savings together with further individual supporting papers;
- summary renewals investment plans, supported by plans for individual assets, efficiency models identifying the individual savings; and
- a summary of operating costs efficiency savings together with specific supporting papers for insurance, pensions, and information management opex and renewals.

Figure 5.24 CP4 efficiency and input prices

Per cent	2009/10	2010/11	2011/12	2012/13	2013/14	CP4
Efficiency						
Controllable opex	5.0	5.0	4.0	3.0	2.0	17.6
Maintenance	5.0	5.0	4.0	3.0	2.0	17.6
Renewals	5.0	5.0	4.0	3.0	2.0	17.6
Input prices						
Controllable opex	2.3	2.3	1.1	1.1	1.1	8.1
Maintenance	2.0	2.1	1.3	0.5	0.5	6.6
Renewals	0.9	1.4	0.8	0.1	0.2	3.5
Net impact						
Controllable opex - total	2.1	2.2	1.6	1.1	0.6	7.4
Controllable opex - excluding signallers, insurance and pensions	2.8	2.8	3.0	1.9	0.8	10.9
Maintenance	3.1	3.0	2.7	2.5	1.5	12.2
Renewals	4.09	3.7	3.2	2.9	1.8	14.8

We are also providing the following supporting documents to ORR for relating to benchmarking activities:

- internal benchmarking of renewals carried out by LEK;
- procurement efficiency review (A T Kearney);
- review of input price inflation (LEK);
- a review of project maturity model;
- benchmarking of our human resource and finance costs; and
- commentaries on independent studies commissioned by ORR and EWS.

6 Our plan for CP4

Introduction

This chapter summarises our expenditure and income projections for CP4. It is based on delivering the safety, capacity and reliability outputs specified in the HLOSs, while meeting the other reasonable requirements of our customers and funders. The chapter describes:

- activity volume and expenditure in summary and by asset;
- the proposed enhancement projects; and
- income projections.

The projections are based on the efficiency and input price assumptions described in Chapter 5. Translating these efficiency improvements into what needs to be spent to operate, maintain and renew the infrastructure in a sustainable way requires an understanding about the volume and type of work which is needed. Our assessment is based on explicit whole-life, whole-system asset policies and other strategies, which we outlined in Chapter 4. These policies and strategies are translated through the Infrastructure Cost Model (ICM) into detailed expenditure and output projections at an increasingly disaggregated level. This is supplemented with specific enhancement plans developed though discussion with our stakeholders.

Further details, including disaggregated information for England and Wales and Scotland are contained in the appendices. We have also provided the functional specification for the ICM to ORR as a supporting document to this plan. In addition, we have provided ORR with a summary of the key input data and more detailed output schedules.

Operating costs

The forecast total Network Rail controllable and non-controllable operating costs (opex) are shown in Figure 6.1. Over CP4, total controllable opex is forecast to reduce in line with the efficiency assumptions. Non-controllable opex is forecast to increase over CP4 due to an increase in electric traction costs and an increase in cumulo rates.

Forecast expenditure has been based on a combination of bottom-up analysis linking cost drivers and unit costs, specific cost profiles for known expenditure, and the application of our efficiency assumptions to the base year costs. For both controllable and non-controllable costs, we have used 2007/08 as the base year. We have provided ORR with a detailed description of

Figure 6.1 Operating costs by type

£m (2006/07 prices)	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	CP4 average
Controllable							
Signaller staff costs	174	177	180	181	181	182	180
Non-signaller staff costs	498	484	473	458	448	443	461
Pensions	124	115	118	118	121	123	119
Subtotal - staff costs	**797**	**776**	**771**	**757**	**750**	**748**	**760**
Employee related costs	55	67	63	58	56	51	59
Consultants/contractors/agency	85	83	81	79	78	77	79
Insurance and claims	93	92	91	91	91	91	91
Accom, office, corp prop expenses	96	93	86	85	85	85	87
IT costs	40	38	36	35	33	33	35
Other	87	83	80	76	74	72	77
Subtotal - other controllable	**456**	**455**	**437**	**424**	**417**	**409**	**428**
Other operating income	-90	-85	-81	-78	-75	-74	-79
Own work capitalised / labour recoveries	-380	-371	-362	-353	-348	-345	-356
Total controllable	**783**	**775**	**764**	**750**	**744**	**738**	**754**
Non-controllable							
Railway safety	9	9	9	9	9	9	9
ORR fee	19	19	18	18	18	18	18
BT police	66	66	66	66	66	66	66
EC4T	171	179	182	188	196	201	189
Cumulo rates	69	69	87	91	91	91	86
CIRAS fee	0	0	0	0	0	0	0
Total non-controllable	**334**	**342**	**362**	**373**	**381**	**385**	**368**
Total OPEX	**1,117**	**1,117**	**1,126**	**1,122**	**1,124**	**1,123**	**1,123**

our current opex costs in a separate supporting document.

Controllable operating costs

There are five major components of controllable opex: signaller costs, pensions, insurance, information management and corporate property expenses. In total these account for around £490 million (60 per cent) of controllable opex. The remainder relates to the cost of operating the network and corporate functions.

Signaller staff costs

Signalling staff costs are expected to increase slightly over CP4. Planned resignalling, box rationalisation and efficiency initiatives are expected to reduce headcount by around 100 people over CP4. The savings from these initiatives are offset by forecast real staff cost increases.

Insurance

The forecast for the insurance cost for CP4 has been calculated from the sum of the cost of the external market and captive insurance portfolio vehicles. This takes into account the base year costs, projections in the insurance market premiums, claims cost inflation and projected efficiencies from a strategic review of the insurance portfolio.

Insurance costs are forecast to fall slightly over CP4 as a result of the strategic review despite cost pressures from claims cost inflation and changes in market premiums. There are two key risks to this forecast. First, the forecast insurance costs do not include any allowance for TOC catastrophe liability cost or additional claims handling costs. If these materialise, we believe that they could increase total insurance cost by more than £5 million per year. Second, significant changes in the insurance market conditions, for example due to a terrorist attack, could lead to substantially higher costs than forecast.

Corporate property expenses

Corporate property expenses cover the accommodation costs for all of our offices including, territory, route, project, maintenance delivery and training offices and amount to a net cost of approximately £38 million in 2007/08. In developing our CP4 expenditure plans, we have forecast the total office space that is required for our people and the unit cost of the associated offices – rent, rates, landlord service charge, facilities management, utilities and other – together with forecast efficiencies.

The forecast cost includes the impact of additional office space needed to accommodate the larger investment programme over CP4 and revisions to the overall office space portfolio in line with our accommodation strategy.

The calculated costs assume no input price inflation and no major change in the market price of accommodation or utility costs.

Further details of the costs, strategy and risks is given in the corporate property supporting document.

Information management

The Information Management function provides information, tools and services to support our day-to-day operation. The forecast IM cost over CP4 has been calculated as the sum of the underlying base year opex and efficiency profile together with the incremental cost associated with new business change driven projects.

Relative to 2007/08, total IM operating cost is forecast to reduce by £11 million (17 per cent) to £54 million per year by the end of CP4.

The principal risk over CP4 is the absorption of additional opex costs (approximately £12 million over CP4) in the underlying IM expenditure to support the underlying and business change projects for which an allowance has not been included in the efficiency challenge.

Further details of the costs, strategy and risks is given in the Information Management supporting document.

Pensions

We operate two discrete pension schemes: a defined benefit scheme and a defined contribution scheme covering all eligible staff.

The pension cost has been calculated based on a bottom up forecast that is driven by the forecast change in total headcount (operating, maintenance and project delivery), the change in the contribution rate and salary inflation together with forecast financial statistics from the pension actuary. For CP4, the pension cost has been included as the total cash cost of the schemes.

The annual cash cost of the pension scheme is forecast to increase by £20 million over the period largely as a result of increased contribution rates. The cash cost has been included in our calculation even though the accounting costs may differ slightly.

There are two key risks over CP4 for which no allowance has been included in the forecasts. Firstly, the level of company contribution for both the defined contribution and defined benefit scheme is scheduled to be reviewed at the end of 2007. No allowance for an increase above existing levels has been included in the forecasts. Secondly, the forecast adopts a small reduction in headcount in line with the efficiency initiatives. If the efficiency challenge is not fully realised and headcount is higher than forecast, the pension cost will be underestimated.

Further details of the schemes, assumptions and cost forecasts is given in the pensions supporting document.

Other opex costs

The remainder of our opex costs reflect the costs of operating the network and the corporate functions. This represents approximately £320 million in 2007/08 with staff costs representing approximately £140 million.

As we stated in Chapter 5, we recognise that we will need to make significant changes to deliver efficiency savings. We are currently developing more specific plans to transform our processes through our world class transformation programme. Recognising that we do not yet know the scale of savings that can be achieved through process transformation and other changes, we have taken a top down view of the opex savings that can be achieved rather than developing forecasts for each individual function. We have applied the opex efficiency assumption to total controllable opex, excluding insurance, signallers and pensions.

Full details of the base year opex costs are presented in the supporting document.

Other operating income

These refer to the recovery of specific costs from TOCs and other third parties. Operating income is forecast to reduce over CP4 in line with the efficiency initiatives reducing the associated costs. Forecast income is set to reduce by £24 million per year, from £98 million in 2007/08 to £74 million in 2013/14.

2012 Olympic and Paralympic Games

We are currently developing a Network Rail operational plan with the Olympic Delivery Authority (ODA) to address works required to deliver our part in the Olympic Transport Plan during the London 2012 Olympic and Paralympic Games. We estimate that the incremental costs associated with this for Network Rail is in the order of £11 million in the areas of station management, operational planning, operations and our presence in the Olympic Transport Control Centre. Work will continue over the next few months to refine these costs across the various Network Rail functions involved and appropriate agreements will be put in place between ourselves and the ODA for funding these costs.

We have also included indicative costs of £0.8 million relating to the incremental operational costs likely to be incurred by Network Rail during the building of the Olympic Park. These include, for example, additional costs we are likely to incur due to restricted access to our railway infrastructure located within the Olympic Park.

Non-controllable operating costs

Further details on the cost forecast are given in the non-controllable opex supporting document.

Electric traction costs

Electric traction costs (EC4T) have been calculated on a regional basis based on forecast total power consumption and the unit costs of usage, transmission and distribution. EC4T costs are forecast to increase by £54 million per year by the end of CP4 reflecting the net effect of energy efficiency schemes including regenerative braking, changes in traffic volumes and the forecast cost of electricity. Approximately £33 million of this increase is due to higher energy costs and £21 million is from increased traffic.

We have significantly reduced the forecast since the ISBP reflecting the current purchasing arrangements and the current market conditions. However, there clearly remains a risk that these costs could vary given the volatility of the electricity market. We estimate that expected EC4T costs could be in the range of £183 million to £232 million per annum by the end of CP4.

Changes in these costs are automatically offset for the most part by changes in the EC4T income which is detailed in the income section below.

Cumulo rates

Cumulo rates, which are the business rates that we pay on our network assets, are assessed by the Valuation Office on a rolling five year cycle based on our income/expenditure position. The next formal assessment is expected to be completed in April 2010.

Current discussions, taking place ahead of the formal valuation process, suggest an increase in the cost liability reflecting an improvement in the

income/expenditure position of the company compared to the last valuation. The updated estimates are marginally lower than the ISBP forecast.

ORR fees

ORR fees during CP4 are expected to fall by around two per cent per year reflecting reducing regulation costs. The costs of the Reporters and of the Access Disputes Resolution Committee are assumed to remain constant in real terms.

British Transport Police

British Transport Police (BTP) costs are forecast to fall by the end of CP3 and remain constant in real terms during CP4. This assumes no significant change in the level of policing activity required over and above that already included in the BTP business plan.

Railway Safety Standards Board

Forecast supplied by the RSSB show costs are expected to remain broadly flat over CP4. This assumes no change in the level of activity requested by stakeholders.

Maintenance

Figure 6.2 summarises our planned maintenance expenditure across CP4. Our forecasts for CP4 are based on the current year budget and the assumed profile of efficiency savings described in the previous chapter. The efficiency savings are expected to come from a range of sources, including improvements in productivity, reductions in overheads, changes in the volumes of some activities and changes in methods of working. Other specific factors affecting the CP4 forecasts are identified where relevant below.

A specific allowance of £35 million per annum has been made to cover the estimated impact on costs of the new access regime for the WCML that will take effect in 2008. This estimate will be refined in the coming months.

Track maintenance

Track maintenance activities include:

- inspection and testing - regular manual track patrolling, train-borne track geometry inspection, train-borne and manual ultrasonic rail testing;
- track geometry - tamping, stoneblowing and manual correction for plain line and S&C;
- rail - rail changing due to defects or sidewear, weld repairs, grinding to manage the rail profile and control rolling contact fatigue, lubrication and replacement of insulated block joints;
- sleepers - spot resleepering and replacement of pads and insulators to maximise component lives;
- ballast - removal of wet beds and ballast profiling; and
- S&C - component replacement and repair.

Key off-track activities include the management of vegetation, inspection and maintenance of fencing and drainage, maintenance of level crossing surfaces and management of track access points.

Signalling maintenance

Signalling maintenance activity consists of planned maintenance based on standards and reactive work to investigate and rectify faults. Planned maintenance makes up the majority of the expenditure in any given year. The frequencies of planned maintenance interventions depend on the type of asset but are generally undertaken on an annual and quarterly basis. The largest elements of maintenance expenditure relate to point-operating mechanisms (particularly clamp locks and point machines) and track circuits. Other key asset types include colour light signals, Automatic Warning System (AWS), Train Protection Warning System (TPWS) and treadles.

Electrification and plant maintenance

Electrification maintenance activity consists of planned maintenance based on standards and reactive work to rectify faults. Planned maintenance makes up the majority of the expenditure in any given year. Maintenance costs are dominated by overhead line equipment (OLE) which accounts for more than half of the electrification maintenance total. Within OLE, the largest elements of cost relate to non-intrusive visual inspections and high level intrusive inspections. The key elements of fixed plant maintenance relate to points heaters, signalling supply points and lighting but the forecasts also cover operational HV distribution, pumping installations LV power distribution and other fixed plant.

Telecoms maintenance

Our telecoms maintenance forecasts reflect the additional maintenance expenditure required on FTN/GSM-R assets as the project progresses through CP4, offset by reductions in contract costs no longer required following introduction of the new assets. The contract cost savings relate to a reduction in operational voice charges paid to British Telecom and Global Crossing, savings in dark fibre rentals from Global Crossing and the

gradual decommissioning of legacy radio networks such as National Radio Network and Cab Secure Radio.

Our legacy transmission and copper cable network continue to support Global Crossing circuits which they provide to the TOCs for carrying information such as booking office telephones and other TOC system information. We are in the process of examining the options around transferring these circuits to FTN, but this submission does not include any capital expenditure in relation to this transfer. Our maintenance forecasts in CP4 reflect an ongoing maintenance responsibility and assume that at least one third of the legacy equipment can be decommissioned during CP4. However, we have not included any element for renewal of the legacy equipment carrying these services.

Civils inspections

Our forecasts for civils inspections cover the following:

- visual inspection of each of our structures on an annual basis;
- detailed structural examinations on a six-yearly cycle (except coastal defences and tunnels which are carried out annually and underwater examinations which are three-yearly);
- structural assessment of around 1,200 structures per annum using a risk-based approach; and
- earthworks examinations following a risk-based approach whereby, typically, poor condition earthworks are examined yearly, marginal condition earthworks every five years and those in serviceable condition every ten years.

Other maintenance

Other significant elements of maintenance expenditure include:

- infrastructure monitoring - the costs of the operation and maintenance of train-borne inspection and testing equipment, together with associated data processing and analysis. This includes ultrasonic testing trains and other train-borne equipment including structure gauging, radio surveys, video surveys and overhead line monitoring (the MENTOR coach);
- operational property utilities - the costs of utility supplies to our managed stations, depots, signal boxes and other operational buildings, together with the associated administration and the operation of the Property Action Line;
- NDS indirects – the allocation to maintenance of a share of the costs of running network infrastructure trains that move key materials from source (such as ballast from quarries) to our local distribution centres, together with associated overheads; and
- operation of strategic plant – including autumn and winter railhead treatment (£18.6 million), sandite (£11.7 million) and breakdown and recovery services (£1.8 million).

Indirect maintenance costs

The staff and support costs for all staff above the level of section manager in the maintenance organisation are classified as indirect costs. They cover a wide range of activities including:

- HQ, territory, area and depot level management teams;
- finance and contract management;
- area asset engineers and their teams ;
- services (welding, ultrasonic testing etc);
- access planning; and
- visual impact works.

Our cost projections in the SBP exclude the cost of cleaning up effluent or oil spillage in CP4 because we are assuming that we will be able to directly recover these costs (or 75 per cent of the costs) from operators causing the spillage through Part E of the Network Code or through

Figure 6.2 Maintenance expenditure

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Track	426	398	380	367	363	**1,934**
Signalling	125	122	118	115	113	**594**
Electrification and plant	50	48	47	46	45	**236**
Telecoms	68	61	54	54	53	**290**
Civils inspections	39	37	36	35	34	**181**
Other	114	111	108	105	103	**541**
Indirects	183	178	173	168	166	**868**
WCML access overlay	35	35	35	35	35	**175**
Total	**1,040**	**989**	**951**	**925**	**913**	**4,819**

the provisions in the Stations Access Conditions.

Renewals

Our forecasts of renewal expenditure over CP4 are summarised in Figure 6.3, which also shows total expenditure in CP3.

In the following sections we detail the forecast activity volumes and expenditure for CP4, together with an explanation for any significant changes relative to CP3 and the ISBP. The plan has been reviewed for deliverability on an asset by asset basis and at an overall portfolio level. Where deliverability is considered to be a constraint, more detail has been included in the relevant section below. We also identify any key strategic issues.

Track renewals

Figures 6.4 and 6.5 summarise planned track expenditure and activity volumes in CP4, showing the average rate of renewal activity across CP4.

The level of track renewal planned for CP4 is substantially lower than that undertaken in CP3, during which large volumes of work were undertaken on the WCRM project. We expect the CP4 level of activity to be maintained during CP5, with lower levels of activity required in the longer-term as a result of the installation of longer lasting components.

Our track renewal forecasts are largely based on service life assumptions that determine the expected life as a function of the type of component and the level of traffic. Since the ISBP these have been subject to independent review by the Reporters in an assessment that also covered the process by which workbanks are developed, visiting a large number of planned renewal sites and broadly endorsing that suitability of the works being proposed. Many of the recommendations made by the Reporters are consistent with our asset policy developments and are reflected in this plan.

The forecast plain line volumes provide for up to 120 kilometres per year of half-life ballast cleaning on primary routes in order to extend overall track system life. On routes where more than half of the expected life has already been exceeded and ballast cleaning has not been carried out, stoneblowing would be used to ensure the expected service life is achieved.

Our forecasts reflect developments in our track asset policies, particularly in the increased differentiation between route categories compared to the ISBP. We have reviewed all our tertiary routes (rural and freight-only) and classified them as either being suitable for continuous maintenance through tactical rail and sleeper replacement where overall condition is satisfactory, or as requiring significant levels of renewal activity because component condition has deteriorated to the point where continuous maintenance will be insufficient. For some routes which have already been largely converted to CWR we plan to carry out further renewals to complete the conversion when this is justified by asset condition.

We have made specific provision for additional re-railing and S&C renewal work as a result of the impact of new rolling stock on commuter routes south of London. Early experience of the operation of new fleets of heavier trains with stiffer suspension shows a significant increase in the level of rolling contact fatigue and other track defects. The Wheel Rail Interface Systems Authority (WRISA) is leading detailed research work reviewing the interaction of track and wheel profiles with a view to optimising whole industry

Figure 6. 3 Summary of renewals

£m (2006/07 prices)	CP3	2009/10	2010/11	2011/12	2012/13	2013/14	CP4
Track	**3,982**	741	712	689	668	657	**3,468**
Signalling	**1,974**	490	486	463	470	508	**2,415**
Civils	**1,744**	434	428	393	368	355	**1,979**
Operational property	**1,073**	291	292	298	297	287	**1,465**
Telecoms	**1,020**	292	235	160	113	57	**856**
Electrification	**397**	87	99	105	91	85	**467**
Plant and machinery	**457**	119	79	52	52	53	**356**
IT and other	**998**	163	148	109	103	73	**596**
Discretionary investment	**-**	265	236	173	127	84	**885**
WCRM renewals	**2,708**	-	-	-	-	-	**-**
Total	**14,353**	**2,881**	**2,715**	**2,442**	**2,288**	**2,160**	**12,487**

Figure 6.4 Track expenditure

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Plain line	499	479	463	450	442	**2,332**
S&C	181	176	172	165	161	**856**
Off-track	42	41	39	38	37	**198**
Other	19	16	15	15	16	**82**
Total	**741**	**712**	**689**	**668**	**657**	**3,468**

Figure 6.5 Track volumes

		2009/10	2010/11	2011/12	2012/13	2013/14	Total	% of network renewed (CP4 annual average)
Rail	Km	928	914	910	912	918	**4,582**	3.1%
Sleepers	Km	697	697	697	697	697	**3,484**	2.4%
Ballast	Km	752	752	752	752	752	**3,759**	2.6%
S&C	Equiv. units	446	451	454	449	446	**2,245**	2.4%

costs.

Plain line volumes are approximately nine per cent lower than we forecast in the ISBP, partly as a result of the asset policy developments. However, unit costs are higher by around five per cent. This is largely because while the ISBP assumed that unit costs would be reduced in line with the 30 per cent CP3 efficiency target, it is now clear that the CP3 savings will be closer to 23 per cent. As discussed elsewhere in this plan, we believe the simple unit rate comparison understates the true efficiency performance when factors such as significant rises in steel prices and changes in the mix of work are taken into account. In addition, NDS indirect costs, which add about five per cent to unit rates, were omitted from the ISBP in error.

The overall level of forecast plain line activity has been smoothed over the control period to facilitate efficient delivery. The overall level of plain line activity is lower than that being delivered in CP3.

We plan to procure an additional high output track renewal system in CP3 to meet the demands for delivering renewal work on primary routes while trying to reduce disruption due to engineering access. We are also developing medium term plans to optimise the use of all high output equipment on primary routes over CP4, with each system being used in intensive campaigns on one stretch of route for a number of weeks. Further work is required to refine these plans and the impact on forecast volumes and unit costs.

For S&C renewals, our initial assessment of the volumes of condition-renewal combined with the expected requirements of the enhancement portfolio produced a level of complete renewals in excess of what can be delivered efficiently. We therefore propose to carry out a significantly higher level of refurbishment or partial renewal activity to extend unit life for 10 years or more in order to maintain appropriate levels of performance until full renewal can be completed. The modular S&C project will steadily reduce S&C unit costs and increase the overall delivery capability during CP4.

Other expenditure covers off track activities including drainage and fencing and specific track renewal activities including renewal of slab track in tunnels, longitudinal timbers supporting track on bridges and track in depots and sidings. We are planning to significantly increase the level of stand alone drainage activity carried out (additional to that included in the scope of track renewal jobs). Since the ISBP was prepared we have completed extensive drainage surveys as a basis for developing medium term workbanks to address a legacy of underinvestment and ensure that the appropriate level of activity is maintained. This increased expenditure on drainage will improve the overall integrity of the track formation and deliver whole-life benefits in extended component lives and reduced geometry deterioration.

Signalling renewals

The planned signalling expenditure and activity volumes are shown in Figures 6.6 and 6.7. The plan is based upon full ERTMS roll-out over the long term, in line with the agreed industry strategy.

We recognise that £130 million of the planned expenditure reflects deferral of work from CP3 to CP4 and was therefore funded by ACR2003. We are therefore not seeking further funding for this amount as part of the periodic review.

The plan reflects deferral of conventional resignalling on the routes identified for early fitment of ERTMS. However, conventional resignalling still dominates in CP4 pending completion of the ERTMS trial and migration schemes and commencement of full ERTMS roll-out. The plan contains 5,577 signalling equivalent units (SEUs) of conventional resignalling and 393 SEUs of ERTMS resignalling over CP4, a total of 5,970 SEUs, as well as the renewal of around 250 level crossings.

Excluding the West Coast Route Modernisation programme, this level of activity is a significant ramp up from the levels undertaken in CP3 and represents a move towards steady state levels of investment. Although we believe that the long-run unit rate for ERTMS infrastructure fitment will be around 60 per cent of the cost for conventional resignalling, the trial and migration schemes carry a significant premium to this, such that the effective unit rate for ERTMS infrastructure fitment in CP4 is higher, on average, than the cost for conventional resignalling.

Our plans for CP5 reach an average of around 2,400 SEUs per annum, in line with levels of activity required to maintain steady state, on the assumption that signalling systems have, on average, a 35 year asset life. In CP5, the majority of expenditure relates to full roll-out of ERTMS, rather than migration schemes and can therefore be delivered at the lower unit rate.

The plan includes a sequence of ERTMS 'migration schemes', following on from the ERTMS trial scheme on the Cambrian lines due to be commissioned in 2008. The migration programme will build on the Cambrian project to complete technical development and the production of new and amended industry processes as well as developing a sufficiently competent delivery organisation and supply chain.

The migration programme starts with the East Suffolk Line between Ipswich and Lowestoft. This mostly single track, 44-mile long route has many similarities with the Cambrian Lines including sharing the same Radio Electronic Token Block (RETB) train control technology. Work is expected to be complete in 2011. Passenger services are provided by 'One Trains' and it is proposed to retrofit ERTMS equipment to their whole diesel multiple unit fleet. The 'One

Figure 6.6 Signalling expenditure

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Full resignalling - conventional	252	225	220	208	181	**1,086**
Partial resignalling - conventional	12	21	17	15	22	**86**
ERTMS trial	5	0	0	0	0	**5**
ERTMS migration	1	5	10	33	57	**107**
ERTMS full rollout	0	0	1	2	12	**15**
ERTMS train fitment	23	26	17	23	53	**142**
ERTMS development costs	14	13	6	6	6	**46**
Level crossings	34	44	47	41	35	**201**
Minor works / life extension	111	107	104	101	99	**522**
Mechanical locking refurbishment	5	13	8	9	11	**45**
Other (safety, central costs)	32	32	32	32	32	**160**
Total	**490**	**486**	**463**	**470**	**508**	**2,415**

Figure 6.7 Signalling volumes

	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Existing SEUs renewed - conventional	1,291	987	1,372	828	1,100	**5,577**
Existing SEUs renewed - ERTMS	0	0	36	0	357	**393**

Trains' diesel fleet also serves the routes between Norwich and Great Yarmouth and Lowestoft. Therefore, once the trains are fitted with ERTMS equipment, the next step is to expand the infrastructure fitment to these routes. It is envisaged that works on site would begin in 2011 and be complete in 2013. The third stage links the East Suffolk and Norwich to Great Yarmouth/Lowestoft area to Peterborough via Ely. On-site works would begin in 2013 and be completed in 2015.

In conjunction with the third stage of the Anglia migration programme described above, it is proposed to begin fitment on the East Coast Main Line, initially at Hitchin, using a resignalling opportunity to fit ERTMS infrastructure alongside the existing lineside signals. It would then be possible to renew the signalling systems from Knebworth to London King's Cross and the Hertford Loop using ERTMS without lineside signals.

We have also developed a resignalling strategy for the Great Western Main Line (GWML) following consideration of a number of co-dependent projects that have a major impact on the route. These include the Automatic Train Protection (ATP) replacement project, the Intercity Express Programme (IEP), Reading remodelling and Crossrail (including an extension of the electrified area).

The key conventional resignalling schemes are summarised in Figure 6.8.

A key element of the plan is alignment of the signalling renewal requirements with our enhancement plans. We have undertaken a high level review of the enhancements plans to take into account the interaction between the respective plans in terms of scope, costs and timings.

Over CP4, the plan includes the renewal of around 180 level crossings on a stand alone basis as well as around 70 as part of resignalling schemes. There remains a significant challenge to drive down the cost of level crossing renewals and as part of this challenge we plan to exploit the use of partial level crossing renewal wherever this is a viable option.

The plan includes £44 million for mechanical locking refurbishment over CP4. We have planned on the basis of continuous life extension rather than complete renewal, in line with our asset policy, because we believe that this normally provides a better business case where no major alteration is required. There are two exceptions to this. Firstly, where a mechanical signal box is a fringe to an existing power signalled area and the power signalling is to be renewed, there can sometimes be a case for abolishing the mechanical signal box and extending the power signal box area. Secondly, where there is a positive business case based on an enhancement proposal, a mechanical signal box may be resignalled. Where either of these two situations arise, we have included the required expenditure in our resignalling forecasts.

On a like-for-like comparison, our minor works forecasts remain broadly consistent with ISBP. However, expenditure relating to cable routes has, in this plan, been included within our telecoms forecasts in order to mirror the change in responsibility for these assets. Similarly, expenditure relating to the signalling power distribution network has been included within our

Figure 6.8 Key conventional resignalling schemes

Project	CP4 SEUs	
Cardiff	687	Renewal of interlockings installed in the early 1960s. The resignalled layout will see a reduction in the required volume of signal infrastructure and corresponding S&C units.
Newport Phase 1	548	Renewal of interlockings installed in the early 1960s. The scheme is also linked to track renewals and station realignment.
East Kent	442	Replacement of a significant amount of the Kent area infrastructure, with control established at Gillingham. The renewal will facilitate the smooth operation of the Integrated Kent Franchise. There are also strong links to some S&C renewals in the Rochester area.
South Erewash	336	Renewal of interlockings installed in the late 1960s. Life extension work has already been undertaken ahead of this resignalling project.

plant forecasts.

'Other' expenditure includes £60 million for safety-driven expenditure such as signals passed at danger (SPAD) mitigation and level crossing risk reduction, and a further £100 million to cover support contracts for obsolescence management, initiatives such as national upgrades to Integrated Electronic Control Centres (IECCs), and other development activities.

Careful consideration of deliverability issues has been a key part of the development of the plan. The timing of specific projects has been influenced by issues relating to both human resources and engineering access, to develop a smooth profile of work that is both realistic and efficient in its use of resources. These deliverability issues have been considered across the renewals and enhancement portfolio together to achieve a consistent plan.

The key human resource constraints are in signalling design, and testing and commissioning. We plan to continue to develop signalling designs in-house, building on the strategic in-sourcing of signalling designers which started in 2003. The scale and complexity of our renewal and enhancement plan requires detailed knowledge of the existing infrastructure and close interaction between multiple stakeholders and we believe that our in-house design teams are best placed to manage this. In CP4, we also intend to develop the industry's testing and commissioning capacity by recruiting testing and commissioning engineers from other safety critical industries and converting them through intensive training courses to the signalling profession. This will be similar to the successful design conversion courses that have been introduced during CP3.

Civils

The planned civils expenditure is shown in Figure 6.9. We have included all of this expenditure within our renewals projections, which is consistent with the treatment of ACR2003. However, it is noted that around £40 million per year is treated as maintenance expenditure in our financial accounts.

Building on the Structures Annual Cost Profile (SACP) model developed in 2003, the Civil Engineering Cost And Strategy Evaluation (CECASE) modelling has now delivered updated and improved information to support the management of our civils assets. CECASE produces long term forecasts of the total expenditure that would be incurred in managing each different type of civils asset in accordance with each of the civils asset policies. CECASE is a more flexible tool than SACP, and enables us to consider the expenditure and activity volumes that result from the application of different management policies to different assets on the network.

The key improvements delivered through this work are:

- improved asset data including latest Structures Condition Marking Index (SCMI) data;
- increased range of policies and better policy definition;
- a big increase in the number of sample studies used to underpin the modelling process;
- detailed improvements to the modelling process; and
- updated base data for costs.

It was recognised in ACR2003 that civils expenditure needed to increase through CP3 in order to reach steady state levels in CP4 and

Figure 6.9 Civils expenditure

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Underbridges	176	170	165	161	158	**831**
Major structures	42	48	25	10	7	**132**
Overbridges	69	67	65	63	62	**325**
Footbridges	9	9	9	8	8	**43**
Culverts	11	10	10	10	9	**49**
Earthworks	73	71	68	67	65	**344**
Retaining walls	4	4	4	4	4	**21**
Coastal / estuarial	4	4	4	4	4	**21**
Tunnels	26	28	27	27	23	**131**
Other	18	17	16	16	15	**82**
Total	**434**	**428**	**393**	**368**	**355**	**1,979**

beyond. This plan represents a continuation of these higher levels of expenditure, and the overall level of expenditure in the plan is consistent with the ISBP base case.

We described our asset policies for civils assets in Chapter 4. The plan is based on the application of policy B to primary, London and south east commuter and secondary routes and policy C to rural and freight routes. In order to create a realistic, deliverable profile of expenditure through CP4 and beyond, we have averaged the CECASE results for the remainder of CP3 and the next five control periods. We believe that, with careful management, this combination of policies can be applied to our civils assets whilst maintaining asset condition and serviceability.

We have continued to develop detailed site specific maintenance strategies for our major structures in order to improve our understanding of the required scope of work and refine our estimates. Our plans in CP4 are dominated by work to grit-blast and paint the Forth Bridge (£51 million) and the Tay Bridge (£36 million). Other major works include around £14 million for major repairs, painting and waterproofing or renewal of Loughor Viaduct. A feasibility study which is currently in progress will determine the precise work that is required. We also plan to spend around £6 million on grit-blasting, painting and minor steel repairs at the Royal Albert Bridge and another £6 million on repairs and painting at the Blackfriars Bridge, to tie in with the major enhancement works being carried out by the Thameslink programme.

The forecasts for tunnels consist of three different work types, as follows (CP4 total expenditure shown in brackets):

- sensitive tunnels (£68 million) – remediation work to around 60 tunnels which are currently subject to sensitive examination;
- programmed works (£64 million) – works to other tunnels to maintain steady-state condition levels; and
- hidden shaft investigations (£22 million) – completion of investigations to identify hidden construction shafts and remediate an anticipated 10 per cent.

The tunnels forecasts are broadly consistent with CP3 levels of expenditure.

The overbridges forecasts include updated forecasts for Bridgeguard 3, a national programme to assess and strengthen overbridges to allow for the increased weights of road vehicles. Network Rail's liability is for 24 tonne capacity and we are responsible for strengthening any bridge that falls below this capacity. If the highway authority requires the bridge to be strengthened to 40 tonne capacity it is responsible for funding the difference in cost required to achieve this. Producing accurate forecasts for Bridgeguard 3 is extremely difficult because each scheme requires detailed development and negotiation with the highway authority to understand and allow for their aspirations for traffic capacity. Each joint scheme has to be set to an agreed programme that fits the budget priorities of the highway authority and the number of highway authorities involved (over 30 in London alone) compounds this difficulty. Our forecasts are based on current rates of spend projected forward until 2015 with an estimated, staged reduction in activity allowing for completion of the programme in 2023. This is considered to be realistic because there will be a few strengthening or replacement schemes within the large metropolitan areas that will have to be planned many years ahead.

Other expenditure includes around £13 million to complete further work to establish the risks associated with ancient mine workings. In CP4, we plan to complete around 350 desk studies and 100 ground investigations. The forecast includes a small allowance to undertake some remediation work at a limited number of high risk sites.

We have also made a provision for culvert clearance. This is additional to the core culvert forecasts, modelled in CECASE, which cover the costs of repairs and maintenance to the structures themselves but do not include any provision for clearance of silt build-ups. Currently, we carry out only a small number of clearances each year to allow examinations to take place, and these works do not form part of a planned programme of work. However, the increase in recent years in the number of intense rainfall events has led us to review this approach.

It is proposed that in future, we will operate an inspection-led programme of de-silting and clearance in order to ensure functionality of the drainage system. We believe that this will lead to a general improvement in weather resilience - reducing flooding and improving embankment performance. We have assumed that, in the long-run, de-silting and clearance will be required at each culvert on average once every 15 years. In order to achieve efficient delivery, we plan to ramp up activity gradually such that we reach the

steady-state position in CP5. We estimate CP4 expenditure will be around £54 million - half of the long-run average.

We have also undertaken further work to estimate the impact of traffic growth on the required expenditure on our civils assets. The key asset areas affected are metallic underbridges and embankments. This work has concluded that the forecast traffic growth over CP4 will add around £7 million to our forecasts and this has been included in our plan.

Operational property

The planned level of expenditure across our operational property portfolios is summarised in Figure 6.10.

Throughout CP3 the portfolio has been managed with comparatively low levels of investment, with activity being driven predominantly by health and safety, statutory and operational functionality imperatives, rather than efficient whole-life costs. Our plans for CP4 are for substantially higher levels of activity than in the current control period. The level of activity and expenditure is also significantly higher than in our ISBP which featured less mature policy application and early preliminary views on unit costs and activity volumes which have now been refined. The higher level of investment proposed will generate a higher quality output at stations, so there are choices to be made about the appropriate level of investment.

Managed stations

Our forecasts for managed stations reflect detailed workbanks for each station that have been developed in accordance with our policies for stations as detailed in Chapter 4. They include major refurbishment works at a number of stations as well as ongoing renewals activity. The major projects are:

- Edinburgh Waverley: major refurbishment of the station including replacement of the roof, refurbishment of the main station buildings, renewal of the concourse, platforms, footbridges and walkways, repairs to external walls and resurfacing of the car park. These activities had previously been deferred pending a decision on the possible commercial redevelopment of the station, which has now been abandoned;
- King's Cross: the renewal elements of major redevelopment of the station (also involving major enhancement works) include refurbishment of the main and suburban train shed roofs, platform repairs and refurbishment of the Eastern Range;
- Paddington: structural repairs to 'Span 4' of the train shed, addressing extensive renewals and repairs that had previously been deferred pending a decision on the possible commercial development of area, which has now been abandoned; and
- Victoria: complete the refurbishment of the roof of the Eastern concourse, low-level canopies and mechanical and electrical services.

Franchised stations

Development of our asset policies for franchised stations was described in Chapter 4. In association with this policy development we have fully reviewed our assessments of the rates of activity and expenditure that are necessary to deliver these policies and associated outputs. Our activity-based modelling focuses on key assets that account for the large majority of costs including platforms, roofs, footbridges and lifts and escalators.

We have also fully updated our unit cost data for all activities, drawing on a detailed study by Franklin & Andrews which has been validated by our estimating team.

Over the past two years we have compiled a central asset register which forms the core of our asset management system. The Operational Property Asset System (OPAS), the initial functionality of which is currently coming on line will, in the fullness of time, provide us with a powerful asset management tool. Work is

Figure 6.10 Operational property expenditure

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Managed stations	133	108	80	61	35	**416**
Franchised stations	115	137	166	187	201	**806**
Light maintenance depots	7	8	10	11	12	**47**
Lineside buildings	16	19	24	27	28	**114**
NDS depots	8	7	7	1	1	**23**
MDU buildings	12	12	11	11	11	**58**
Total	**291**	**292**	**298**	**297**	**287**	**1,465**

Figure 6.11 Franchised stations by element

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Platforms	15	18	22	25	27	**108**
Roofs & roof drainage	19	22	27	30	33	**131**
Footbridges	18	22	27	30	32	**129**
Lifts & escalators	3	3	4	5	5	**20**
Electrical CCTs	16	19	23	26	28	**112**
Car parks, etc.	5	6	7	8	9	**36**
Facilities & accommodation	12	14	17	20	21	**84**
Inspections	3	4	5	6	6	**24**
Other stations costs	23	27	33	37	40	**161**
Total	**115**	**137**	**166**	**187**	**201**	**806**

ongoing on the development of system functionality; it is planned that full system capability will be available towards the end of 2008. The asset data collection has informed this plan by providing a more accurate and comprehensive asset inventory to underpin the modelling work.

Figure 6.11 summarises the planned station expenditure by key element. The major assets, accounting for nearly 70 per cent of total expenditure, are roofs and associated drainage, platforms, footbridges, electrical circuits and accommodation. The expenditure forecasts also include the costs of regular inspections and structural examinations.

The resulting forecasts of the activity and expenditure required across the operational property portfolio to maintain a non-deteriorating infrastructure are substantially than higher than those set out in the ISBP, and represent an increase of around 50 per cent over CP3. This reflects the long period of under-investment in this area and is consistent with the independent assessment of requirements contained in the Corderoy report for ORR. The ISBP acknowledged that the work undertaken to that date was just the first step in developing more robust plans and highlighted the need for more robust unit costs as well activity rates. A substantial amount of work has been done to improve the robustness of the assumptions including a review by the Buildings Research Establishment.

As the implementation of these policies would represent a relatively large increase in activity levels on our entire stations portfolio, the immediate transfer to these regimes at the commencement of CP4 would be difficult to deliver and would be likely to result in a short term increase in the unit cost of this work. As a consequence, we intend to phase in these regimes over the next control period, enabling us to deliver the work at an efficient cost with minimal unnecessary disruption. We have therefore profiled our expenditure to reach the forecast required long-run level by the end of CP4. There is still a large increase in station expenditure at the start of CP4 as the King's Cross and Edinburgh Waverley schemes get underway.

Details of the level of spend and by Station Facility Owner (SFO) are contained in the appendices. It is hoped that this will provide the basis for discussion with operators to prioritise and integrate our plans. This should also provide a strong foundation for the National Stations Improvement Programme (NSIP).

Other buildings

We have extended the same forecasting principles to our lineside buildings and light maintenance depots, applying appropriate assumptions on asset management activities and unit costs to improved knowledge of our asset inventory. There are more than 5,500 significant lineside buildings with the main areas of expenditure being signal boxes, relay rooms, p-way cabins and electrical substations.

Forecast expenditure on NDS depots covers the rationalisation of around 1,100 locations for servicing our fleet into around 200, and the renewals necessary to ensure these sites are fit for purpose. These works are expected to cost around £22 million over the first three years of CP4. The plan also provides for minor works at all locations.

For our maintenance depot buildings we have assumed that expenditure throughout CP4 would be in line with average expenditure in the latter years of CP3. We are steadily increasing our knowledge of the condition of these buildings and the associated work requirements, responsibility for which was taken on when maintenance was brought back in house.

There appears to be a case for further expenditure on some of these buildings to help deliver improved efficiency or outputs. These issues are covered separately in the discretionary investment section below.

In common with stations, the implementation of these policies represents a large increase in activity in the next control period. We have therefore profiled the expenditure in the same manner as stations.

Telecoms renewals

The forecasts for telecoms expenditure continue to be dominated by the FTN/GSM-R programme. The planned telecoms expenditure and volumes are shown in Figures 6.12 and 6.13.

The plan represents a reduction in expenditure levels since CP3, largely as a result of the FTN/GSM-R programme reaching completion in the fourth year of CP4. The plan is around £350 million higher than the ISBP in CP4. £124 million of this is the result of the costs for GSM-R cab mobile fitment, previously classified as enhancement in the ISBP, now being classified as renewal expenditure. The remainder is primarily the result of increases in our CP4 forecasts for the core FTN/GSM-R programme through to completion in 2013.

The CP4 numbers reflect the latest projections for the final cost of £1,426 million which reflects the following:

- a change of approach to mast site selection and limits to mast heights (now 15 metres in the majority of cases), made in recognition of the impact on our line-side neighbours as well as the views of public and local authorities;
- the removal of copper cable based transmission from the engineering design. Instead, we will install fibre optic cables which provide much greater capacity and are less prone to theft; and
- an upgrade to the GSM-R switch purchased by Network Rail in 2000 for the West Coast Route Modernisation project to ensure continued operation beyond 2012, when software support and spares would otherwise no longer be available.

However, we recognise that £100 million of this cost increase reflects deferral of work from CP3 to CP4 and was therefore funded by ACR2003. We are therefore not seeking further funding for this amount as part of the periodic review.

The following key assumptions have been

Figure 6.12 Telecoms volumes

		2009/10	2010/11	2011/12	2012/13	2013/14	Total
Large concentrators	Number	7	2	9	4	4	**26**
Small concentrators	Number	39	81	24	21	48	**213**
DOO CCTV	Systems	52	198	79	33	1	**363**
PETS	Number	97	42	35	52	13	**239**
Voice recorders	Number	103	0	0	0	0	**103**

Figure 6.13 Telecoms expenditure

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
FTN/GSM-R	230	171	107	65	0	**573**
SISS - CIS	8	8	7	7	7	**37**
SISS - PA	1	1	1	1	1	**4**
SISS - CCTV	3	3	2	2	2	**12**
Other SISS	2	2	2	2	2	**10**
Large concentrators	14	4	12	6	6	**43**
Small concentrators	10	20	8	6	12	**55**
DOO CCTV	3	11	4	2	0	**20**
PETS	3	1	1	2	0	**7**
Voice recorders	2	0	0	0	0	**2**
Cables and routes	10	10	12	16	16	**64**
Other	5	5	4	3	11	**28**
Total	**292**	**235**	**160**	**113**	**57**	**856**

applied when determining the programme cost profile:

- RETB radio bearer systems (which use similar components and radio frequencies to National Radio Network (NRN) equipment) can remain in operation in Scotland beyond 2012, pending development of a suitable replacement for the RETB signalling system. There is a risk that earlier renewal may be required due to interference from European digital video broadcasting (DVB). We are currently carrying out testing to understand this risk more fully;
- we will retain the Permitted Development Rights for construction of radio masts for operational purposes on our land;
- the GSM-R system trial in Strathclyde will demonstrate to the satisfaction of both the users and HMRI that the system functionality, operation and performance are fit for purpose for introduction into service as a train radio system for operation in the UK and that migration of users from existing systems onto GSM-R can be carried out safely;
- the condition of the existing cable routes and copper cables proves to be consistent with projected levels of renewal;
- Cab Secure Radio (CSR) can remain in operation until end of 2010. There is a risk that CSR may be required to be replaced ahead of the current programme driven by either risk of interference from European UHF radio transmitters, component availability or escalating cost of maintenance; and
- the NRN can remain in operation in certain geographic areas until end of 2013 to allow completion of train radio changeover following infrastructure fitment. There is a risk that NRN may be required to be replaced ahead of the current programme driven primarily by the increasing difficulty of maintaining the equipment and the potential for interference from European DVB.

A change in any one of these may have a significant impact on the overall project costs and phasing of expenditure.

There are two further options to be considered in relation to FTN/GSM-R as well as a further option known as “FTNe”. These are described in the discretionary investments section of this document.

In order to provide a better match with our portfolio of renewals, we have revised our definitions of telephone concentrators such that ‘large’ now only applies to concentrators with greater than 128 lines (previously 32). We have also improved our understanding of the costs of concentrators in order to apply appropriate unit rates to the work.

The plans for DOO CCTV renewal represent a big increase compared to the levels of activity undertaken in CP3, as we ramp-up renewal of the majority of the asset base whilst making incremental changes to bring the system in line with current standards.

The ownership and management of station information and surveillance systems (SISS) assets on franchised stations has been an issue since rail privatisation. SISS assets include customer information systems (CIS), public address (PA) systems, security CCTV systems and clocks. There is some ambiguity over asset ownership and disparate systems have been deployed across the rail network. A number of TOCs have installed additional SISS assets on their stations as part of their franchise commitments or as station enhancements funded by third parties.

A debate is required within the industry to resolve where the liability for renewal of these assets rests. Pending resolution of this issue, our plan represents a continuation of recent levels of expenditure consistent with the ISBP and it does not therefore include provision for renewal of these assets. We have developed forecasts of what we believe to be the full renewals requirement of SISS assets, including the additional assets installed by TOCs. The additional expenditure required is included in the discretionary investments section.

The security CCTV forecasts include £12 million in CP4 for the renewal of security CCTV systems installed between 2003 and 2005 at our managed stations in London. Additional work is being undertaken in CP3 to enhance the CCTV at the managed stations outside London and renewal costs for the new assets created by this work have been included in CP5 and beyond.

Our forecasts for cables and routes now include expenditure on cable routes, previously included in the ISBP signalling minor works forecasts.

‘Other’ expenditure includes £6 million during CP4 for the GSM-R network Nortel support contracts and system upgrades. This consists of ongoing support contracts and a five-yearly system upgrade to maintain the GSM-R network in a supportable condition. These figures are our best current estimates but will be dependent on agreement of contract deliverables.

Electrification renewals

The planned electrification expenditure and activity volumes are shown in Figures 6.14 and 6.15.

Although the plan represents an increase in expenditure levels compared to CP3, the plan is around £110 million lower than the ISBP in CP4. This is primarily the result of lower forecasts for DC distribution assets, as well as re-classification of the Great Eastern overhead line equipment (OLE) replacement project as enhancements expenditure.

In CP5, expenditure levels reduce significantly compared to CP4, to a total of around £290 million. This is primarily the result of lower expenditure on OLE campaign changes, as explained below, as well as lower expenditure on distribution and SCADA equipment.

Our plans for overhead line equipment (OLE) reflect the recent changes to our asset policy associated with our campaign change

Figure 6.14 Electrification expenditure

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
OLE						
OLE	19	16	14	11	2	**63**
OLE structures painting	0	1	5	5	5	**16**
Conductor rail	5	5	5	5	4	**24**
AC distribution						
AC HV switchgear	10	10	11	7	11	**47**
AC grid supply points	9	9	8	0	0	**25**
Booster transformers	2	1	1	1	1	**7**
AC HV cabling	0	0	0	0	0	**1**
Protection relay	4	4	4	4	4	**19**
AC other activity	4	5	4	4	4	**22**
DC distribution						
DC HV switchgear	5	8	9	11	12	**43**
DC HV cabling	5	8	11	11	14	**49**
LV switchgear	4	7	9	8	8	**37**
Transformer rectifiers	0	6	6	6	6	**24**
LV cabling	5	5	5	5	5	**26**
DC grid supply points	0	0	0	0	0	**1**
DC other activity	3	3	3	2	2	**13**
SCADA	12	10	11	10	7	**49**
Total	**87**	**99**	**105**	**91**	**85**	**467**

Figure 6.15 Electrification volumes

		2009/10	2010/11	2011/12	2012/13	2013/14	Total
OLE							
OLE - campaign A	Wire runs	1,044	1,183	1,012	874	219	**4,331**
OLE - rewire	Wire runs	49	0	0	0	0	**49**
OLE - structure painting	Number	17	460	4,772	4,757	4,864	**14,870**
Conductor rail							
Conductor rail	Km	41	41	41	41	41	**207**
AC distribution							
AC HV switchgear	Number	101	110	120	92	121	**545**
AC GSP transformer	Number	6	7	6	0	0	**19**
AC GSP cable	Km	12	12	11	0	0	**35**
AC GSP switchgear	Number	9	10	9	0	0	**28**
Booster transformers	Number	65	65	65	65	65	**325**
DC distribution							
DC HV switchgear	Number	52	95	104	119	130	**500**
DC HV cabling	Km	19	32	42	45	55	**194**
LV switchgear	Number	83	147	178	176	177	**761**
Transformer rectifiers	Number	0	25	25	26	24	**100**
LV cabling	Km	125	125	125	125	125	**627**

programme. Each individual campaign change item represents a component part of the system or inherent design flaw proven to lead to premature failure thereby causing unacceptable operating delays. Through cost benefit analysis, we have identified that there are clear business benefits in completing 26 of the list of 70 campaign changes types as early as possible and the plan reflects delivery of these by the end of CP4. The revised policy results in £57 million of expenditure over CP4.

OLE contact wire is renewed when the factor of safety reduces to between 1.5 and 2 or, depending on the type of contact wire, when the wear of the cross-section ranges between 33 and 50 per cent. Over the last year, we have undertaken further study of historical contact wire wear measurements to improve our understanding of wear rates. The study has concluded that the wear rates are slower than previously anticipated and that the expected life contact wire could be extended by ten years. This deferral of renewals has resulted in a new forecast of £4 million over CP4, a reduction of around £44 million compared to the ISBP. The net effect of these changes to the OLE campaign change and re-wiring forecasts is broadly neutral.

Our plans for replacement of the OLE on the Great Eastern line are described in the enhancements section of this document. This represents an acceleration of our plans compared to what was assumed in ACR2003. These plans were included in the base case expenditure in the ISBP because we believe that this acceleration reduces the whole-life cost whilst delivering earlier reliability improvements on the route. However, this was excluded from the initial assessment provided by ORR and we have therefore treated it as an enhancement.

We have revised our plans for supervisory control and data acquisition (SCADA) systems as we continue to develop our Central Master Station (CMS) strategy. Review of the project scope and a re-profiling of expenditure between CP3 and CP4, has resulted in a new forecast of £49 million over CP4. The CMS strategy will result in a completely new SCADA system architecture and changes to the geographical location of master stations and associated infrastructure.

There are two further electrification options to be considered. These are described in the discretionary investments section of this document.

Plant and machinery renewal

Our forecasts of plant and machinery expenditure are shown in Figure 6.16.

Total expenditure in CP4 is around £180 million lower than CP3, primarily due to investment which we have brought forward into CP3 to deliver further benefit in CP4 and beyond. The plan is, however, around £100 million higher than the ISBP, largely as a result of revised forecasts for fixed plant but also changes to our National Delivery Service (NDS) and high output plant requirements.

Our forecasts for fixed plant have been developed significantly over the last year, as we have focussed on developing our knowledge of these assets. We now have much greater granularity within our plans, with forecasts developed for around 50 asset groups and summarised in eight groupings as follows: points heaters, signal power trackside distribution; signalling supply points; operational HV distribution; pumping installations; lighting; LV power distribution and other fixed plant. The overall level of expenditure is significantly higher than in CP3. The largest portion of fixed plant

Figure 6.16 Plant and machinery expenditure

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Fixed plant						
Point heaters	10	7	7	9	7	**40**
Signalling supply points	7	6	7	7	13	**40**
Signalling power dist. network	7	5	6	6	5	**29**
Fixed plant other	9	7	6	9	14	**45**
Depot plant	9	9	8	8	7	**41**
NDS fleet	18	7	2	2	2	**32**
Maintenance-owned fleet	1	0	4	0	0	**5**
High output plant	52	27	7	6	2	**94**
Intelligent infrastructure	6	12	5	4	2	**30**
Total	**119**	**79**	**52**	**52**	**53**	**356**

spend relates to signalling supply points, on which we plan to spend around £40 million over CP4. Expenditure relating to the signalling power distribution network, previously classified as signalling expenditure, is now included within our fixed plant forecasts.

The forecasts of expenditure on depot plant are based on a detailed workbank for CP4 covering all our light maintenance depots. The major elements are the renewal of carriage washers, wheel lathes, shore supplies, lubrication systems and fuelling systems.

The plans for intelligent infrastructure cover expenditure on new systems for the monitoring of power supplies, track circuits, bridges, wheel impact and points condition. The forecasts also cover the renewal of our existing systems, such as points heater monitoring, hot axle box detectors, relay event logging and pantograph monitoring.

The National Delivery Service (NDS) fleet forecasts cover expenditure on assets such as stoneblowers, multi-purpose vehicles, wagons and snowploughs. We are planning to spend around £8 million on life-extension of Multi-Purpose Vehicles, around £8 million on life-extension of stoneblowers, and a further £9 million on the renewal and life extension of various types of wagons.

The plans for maintenance-owned fleet cover expenditure related to assets owned by our maintenance function. The plan includes around £4 million expenditure on the renewal of existing road rail vehicles and rail mounted maintenance machines such as access platforms, trailers and trolleys. We also plan to spend around £1 million on the purchase of new road vehicles and trailers. Further expenditure is included in the discretionary investments section of this document and the plans for moving towards a seven-day railway. However, these items are closely related.

We propose to purchase an additional high output track renewal system and high output ballast cleaner together with associated wagons at a cost of around £60 million. This will support the delivery of track renewal work on primary routes within constrained engineering access regimes. Expenditure would be spread between CP3 and CP4 with expenditure of £35 million expected to be incurred in CP4. Our CP4 plans also provide for the procurement of additional high output ballast cleaners and for the half-life refurbishment of the existing high output renewal equipment.

Information technology

Our forecast expenditure on Information Technology is presented in Figure 6.17.

Over CP4, total expenditure on information technology is forecast to be £430 million. This represents core expenditure to maintain existing systems. Full details of all the projects can be found in the Information Management supporting document with the three key components of spend summarised below.

System replacements and upgrades

The principal system replacements and upgrades include:

- integration of Ellipse and Enterprise Asset Management Tools (£27million);
- replacement of legacy train management systems (£25 million);
- enhancement of train reporting (£24 million); and
- the development of asset management tools (£16 million).

Technology and licence renewals

The principal technology refreshes and licence renewals include: Oracle upgrade (£20 million); Oracle licence (£16 million); Midrange renewals and capacity upgrades to accommodate growth (£19 million).

Business driven change projects

These refer to business improvement projects to improve overall operational performance and to support new technology. The principal projects include the development of Operations and Customer Services (OCS) controls toolset (£38 million) and the merging of planning control and

Figure 6.17 Information technology

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
System replacements and upgrades	41	39	25	15	15	**134**
Technology and licence renewals	21	29	13	24	14	**100**
Business driven change projects	39	44	47	42	23	**195**
Total	**101**	**112**	**85**	**81**	**52**	**430**

signalling (£34 million).

Discretionary investments

We have identified a number of further potential investments that would deliver cost or performance benefits over and above the base efficiency and performance assumptions in this plan. These investments have not yet been subject to full appraisal but we believe it is important that they are progressed further over the next few years so that we can proceed if a strong business case is established. Other potential investments may also justify treatment in this way and we believe it is important for the business to have the flexibility to invest to reduce future costs. These costs are shown in Figure 6.18.

SISS strategy

As described in the telecoms section, our core plan of £63 million over CP4 represents a continuation of recent levels of expenditure, consistent with the ISBP. We have, however, also developed forecasts of the full renewals requirement of SISS assets, including the additional assets installed by TOCs. These forecasts total £165 million over CP4, and we have therefore included the additional expenditure as discretionary investment. This requires further consideration with operators.

Maintenance-owned fleet

We are developing plans to buy a fleet of 30 tampers over CP4, followed by a further five per annum through CP5 and beyond. An alternative option would be to continue to lease these assets.

NDS fleet

This represents the purchase of rail grinders (£35 million), autohoppers (£24 million) and stoneblowers (£2 million), as well as the renewal of ultrasonic testing trains (£10 million) and stoneblowers (£2 million). An alternative option would be to lease these assets.

Faster isolations

We are about to commence two projects to examine the various ways in which isolation processes can be improved to provide for faster isolations without impacting on safety. One of these projects will focus on all areas of the OLE-electrified railway, and the other will focus on the third rail electrified railway.

For OLE, the initial focus will be on the West Coast Main Line. The principles developed for West Coast will be transferable to other OLE electrified routes. For third rail, the project will be focused on the South East Territory but will be expanded to include Merseyrail and Northern City Lines.

The work will examine the isolation process, the equipment used, and the roles and competencies of the human resources involved, in order to identify innovative opportunities to enable isolations to be planned, applied and cleared faster than is the case today. The primary benefit of this will be to extend the amount of time available to carry out maintenance and renewals when working within isolated areas of electrified railway. It is therefore linked to our plans to move towards a seven-day railway as well as reducing long term costs.

We anticipate there being a business case for roll-out of the developed solution on around 10 per cent of the network, and this is reflected in our forecast for CP4.

Regenerative braking

Over the last year, we have been leading a cross-industry working group investigating the technical and economic feasibility of increasing the regenerative braking capability of the electrified network. Regenerative braking is a system that allows energy to return to the traction

Figure 6.18 Discretionary investment

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
SISS strategy	15	13	25	33	15	**102**
Maintenance-owned fleet	0	19	19	22	22	**83**
NDS fleet	34	20	6	14	0	**74**
Faster isolations	7	20	26	0	0	**53**
Regenerative braking	2	11	11	3	0	**27**
GSM-R - freight-only branches	6	9	8	2	0	**25**
GSM-R - signalling circuits interface	5	5	5	5	0	**21**
FTNe core application	21	9	2	2	2	**34**
IM projects	26	26	18	5	5	**80**
Other discretionary investment	149	103	52	40	40	**386**
Total	**265**	**236**	**173**	**127**	**84**	**885**

supply system for re-use when the train's brakes are applied, reducing energy losses, increasing electrical capacity, and reducing stray currents. We are on course towards making the whole AC OLE electrification network capable of absorbing regenerated braking energy by the end of 2008 as part of our existing commitments funded through ACR2003.

The position with the DC third rail network is more complex and we have been working with our industry partners to examine technical solutions which can provide the required capability at a viable cost.

A key part of facilitating regenerative braking on the DC third rail network involves segregating Network Rail's power supply system from London Underground's system. Within the London area, Network Rail operates with a nominal voltage of 660V to maintain compatibility with LUL rolling stock. Regenerative braking will increase this voltage above 750V and hence five additional substations will be provided to allow the entire Network Rail network to operate at these voltage levels without impacting the London Underground system. Modifications will be carried out at around a further 100 substations. The work is scheduled to begin in the Wimbledon area, progressing on to Putney before moving out to the rest of London and the South East.

GSM-R coverage of freight-only branch lines

In ACR2003, the SRA decided that freight-only branch lines should be removed from the programme scope to limit the funding requirement for CP3. At the same time, the SRA commissioned an investigation by RSSB of the potential for differential standards regarding driver to signaller communications requirements to be established. RSSB's final report, published in September 2006, provided no conclusive argument for reduced functionality on any lines, given that it only addressed safety justifications and did not take operational or performance issues into account. A number of safety recommendations call for a single national system of driver to signaller communications and the only viable alternative to GSM-R without introducing a second system is roaming to public GSM. Since this will neither support full GSM-R functionality or provide consistent coverage and availability in the types of rural area where such an alternative is suggested, it is proposed to reintroduce provision of GSM-R on these lines to the programme's scope. This is consistent with the DfT's recent paper "The Rail Technical Strategy".

FTN/GSM-R - signalling circuits interface development

The completion of the FTN network provides the opportunity to transfer existing signalling services from legacy Network Rail telecoms infrastructure and bought in telecoms service providers onto the FTN transmission network. However, with a few exceptions, these existing signalling services are incompatible with the FTN network. These existing services are currently provisioned over point-to-point copper cable or point-to-point transmission infrastructure. The FTN is an 'open' network and the majority of the legacy signalling links do not have the security of individual addressing capability within their transmission protocol. To enable these legacy systems to be provisioned over the FTN it is necessary to develop units which provide the necessary interface between the legacy service and the FTN. The programme team are working with equipment manufacturers to develop these interface units for legacy signalling services. Based on the work undertaken to date we believe the procurement, design and installation of the required equipment will cost around £21 million in CP4.

FTNe core application

FTN was scoped and designed based on the technology available in early 2002. Its primary use is to support GSM-R voice communications, rather than data communications. Recent technological developments have led to the convergence of voice and data communications such that it is now viable to use the fibre optic backbone provided by FTN to support data communications by deploying internet protocol technology.

FTNe provides an enhanced layer to FTN to enable the transition from a network that supports only standard telecoms interfaces to one that supports internet-protocol interfaces and has been sized to meet the current identified business growth and current project needs.

The project consists of the following:

- a core network to provide data connectivity to our maintenance depots, corporate offices, managed stations (and stations where Network Rail has responsibility for CIS) and key signal boxes; and
- an interface for other data intensive applications such as SCADA systems for control of electric traction switching stations.

We have also included £9 million over CP4 for additional maintenance costs associated with FTNe. It should be noted that the work to develop FTNe is at the feasibility stage and therefore the costs shown are initial estimates only.

There are three further potential options regarding FTNe. Again, the costs for these are initial estimates only and further work is required to refine these between now and April 2008.

- Connections to franchised stations (£70 million). This relates to the provision of FTN connectivity at franchised stations to service the operational needs of the TOCs (as described in the DfT's Technical Strategy) and as a potential backbone for modern Customer Information Systems, smart ticketing and other data-rich applications required on stations, such as high definition CCTV to support emerging aspirations from national security initiatives championed by the British Transport Police and security agencies.
- Replacement of broadband connections (£8 million). This is an option to replace public telephony broadband connections with IP network connections at around 1000 locations such as small signal boxes, to enable the delivery of data-rich applications in the future.
- Connections for intelligent infrastructure (£4 million). This involves connection of Intelligent Infrastructure monitoring applications to the IP network, where data rates cannot be economically by using other services.

Information technology options

These refer to additional investment to deliver overall improvements in train performance, planning and customer experience for the GB rail industry as a whole. The investment include three projects:

- "Wider World" TOC systems to link with the development of the train management systems (£27 million);
- multi-modal transport planning to deliver integrated transport planning £11.7 million); and
- enhanced train to shore communication to improve reliability and performance (£39 million).

Further details of the projects and costs are given in the Information Management supporting document. In each case, further development is required before we can conclude whether to proceed.

Other renewals

These are a series of specific renewals projects covering traditional assets but also environmental driven investment. The principal renewals projects include:

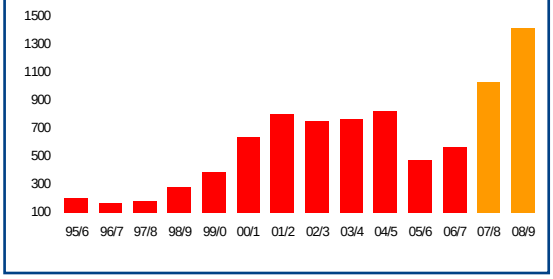
- maintenance delivery unit department (MDU) buildings (£165 million)
- carbon efficiency improvements (£34 million);
- waste management improvements (£19 million);
- East of England recycling depot (£16 million); and
- absolute track geometry project (£15 million).

Enhancements

Enhancement projects are proposals that will generally increase the capacity or capability of the rail network. The scope of any such change may include all the components of the railway system. Very often changes to the output of the system will be delivered by changes to services and/or rolling stock and/or infrastructure change and there will be trade-offs between the various combinations of these to deliver the required outputs.

Network Rail is uniquely positioned to work with partners to deliver enhancement programmes so that the UK has a railway fit to deliver the outputs required. Network Rail has the capability and expertise to manage each stage of project development from inception through to implementation and ongoing stewardship. The scale of the enhancements agenda is considerable but Network Rail continues to develop its capacity and capability to match this agenda. We currently have over 900 schemes in various stages of development and of varying size and complexity from constructing new lines such as Airdrie – Bathgate, and track doubling such as the Trent Valley through to delivering small scale but important improvements through the Network Rail Discretionary Fund. Figure 6.19 illustrates the growth in enhancement activity

Figure 6.19 Enhancement expenditure £ million



Network Rail is delivering in the current control period.

Combined with current renewals volumes, this means that Network Rail is delivering significantly greater volumes of activity compared to historic levels.

The proposed enhancement schemes for CP4 have been refined since the ISBP to take account of the outputs specified in the HLOSs, discussions with train operators on how best to deliver the outputs, further progress of the RUS programme and project-specific development and refinement.

The following section provides a summary of the major enhancement projects included in the ISBP. The projects have been categorised into the following types of projects:

- DfT baseline projects – projects included in the ISBP as committed. This includes the remaining elements of the West Coast strategy, King's Cross re-development and the Access for All programme;
- DfT specified projects – other projects, besides the baseline projects, that DfT explicitly specified in its HLOS. This includes the Thameslink Programme, Birmingham New Street, Reading station, ERTMS, Intercity Express Programme etc;
- DfT HLOS projects – projects that Network Rail and train operators believe are required to support the strategies to deliver the HLOS metrics, such as platform lengthening, power supply upgrade and junction improvements;
- DfT enhancements to renewals - the plan includes opportunities within CP4 to enhance the capability of the network at the time of doing renewals work. Many smaller scale opportunities can be funded by NRDF but we have made provision for a number of larger schemes;
- DfT options - the plan also includes proposed enhancement options during CP4 that, although not necessary to deliver the HLOS outputs, we believe should be considered for funding in CP4;
- Transport Scotland projects – those specified and funded by Transport Scotland such as Airdrie – Bathgate and Glasgow Airport Rail Link (GARL) as well as development of further possible enhancements;
- Transport Innovation Fund (TIF) projects – schemes assumed to be funded from TIF such as Willesden–Gospel Oak–Barking capacity, Felixstowe Nuneaton gauge and Southampton–West Coast Main Line gauge; and
- Third party schemes – those projects funded by others, such as Olympics-related schemes.

Project development

The enhancements described in this section are at various stages of project development. The Guide to Railway Investment Projects (GRIP) describes how Network Rail manages and controls projects that enhance or renew the national rail network. It covers the project process from inception through to the post-implementation realisation of benefits. Within the overall GRIP framework there is a specific process for the development of enhancement projects so that they can be delivered in an efficient and consistent manner, with clearly defined roles and responsibilities and outputs for each stage.

Figure 6.20 summarises the current level of development of the projects for which we are seeking funding from DfT and Transport Scotland.

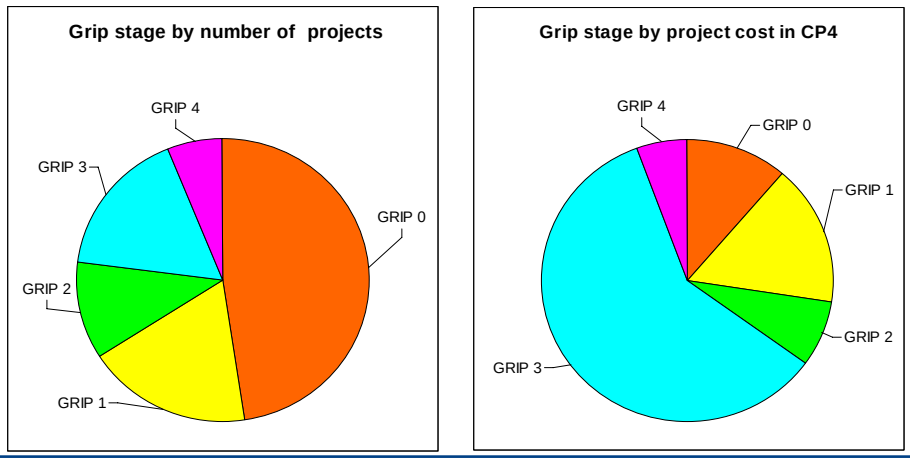
Figure 6.21 provides a guide to project stages within GRIP and an indication of the level of robustness of scope definition and cost estimation during the development stages of the project life-cycle.

Cost and risk

A key issue for the business, for the railway and for its funders concerns the treatment of risk associated with enhancements. Proper funding is required to enable us to bear these risks which also need to be managed by the party best able to do so. However, many of the proposed projects are at a relatively early stage of development and setting a fixed price for the management of these risks may not offer best value for money to our customers and funders.

The enhancement projects have cost estimates with confidence limits commensurate with their GRIP stage as explained below. Projects at an early stage of development prior to GRIP stage 3 will have an expected cost but no quantified risk assessment. Each of these cost estimates has been reviewed and a confidence limit assigned to the point estimate. The portfolio of schemes at this stage of development has been modelled, in terms of risk and uncertainty, using these confidence limits to determine the range of expected outcomes. We have assessed the projects in early GRIP stages as a portfolio and sought to take account of the correlation between risks across the portfolio. The overall cost

Figure 6. 20 CP4 enhancements – current stage of GRIP development



included in the plan is based on the point estimate cost of these projects excluding risk and contingency plus an overall portfolio level of contingency based on having an 80 per cent level of confidence (referred to as the "p80") of delivering the portfolio within the estimated cost.

For those schemes that have yet to be developed under the GRIP framework, assumptions have been made concerning delivery methods and reflected within the cost estimates. Where possible, these are based on similar schemes previously delivered by Network Rail.

Where projects are more advanced and have a quantified risk assessment we have used these assessments in our costings. Again we have used the 80 per cent level of confidence to determine the funding sought. These cost estimates also have allowances included within them for input price inflation. This allowance has been based on the same analysis used to support the renewals expenditure.

Where applicable, prices used in the costing of enhancements have used current unit rates which are inclusive of efficiencies achieved to date. Further efficiencies in contracting and work type will continue to be identified and reviewed as part of the development process. More detail on our analysis of input price inflation is set out in Chapter 5.

Figure 6.21 Summary of GRIP stages, project definition & cost estimates

GRIP Stage		Definition	Cost estimate	Confidence level
1	Output definition	Development remit	High level based on previous historical rates or estimate templates	± 40%
2	Pre-feasibility	Functional specification & high level option assessment	Based on unit rates or estimate templates	± 30%
3	Option selection	Project design specification & option selection report	Based on unit rates or estimate templates	± 20%
4	Single option development	Reference design	Based on unit rates or resourced based rates	± 15%
5	Detailed design	Detailed design	Based on unit rates or resourced based rates	± 10%
6	Construction, testing & commissioning			
7	Scheme handback			
8	Project close out			

Figure 6.22 CP4 Enhancements – capital expenditure summary (£m)

Type of project	CP4 total	Description
DfT projects	8,353	DfT projects including specified projects , projects required to deliver the HLOS outputs plus options to deliver further outputs
Transport Scotland projects	380	Transport Scotland HLOS specified projects and project development funding
TIF projects	117	Projects funded from TIF
Third party projects	779	Projects funded by Third Parties e.g. Olympics 2012
CP4 total	**9,630**	

Figure 6.23 CP4 Enhancements expenditure by year and funder

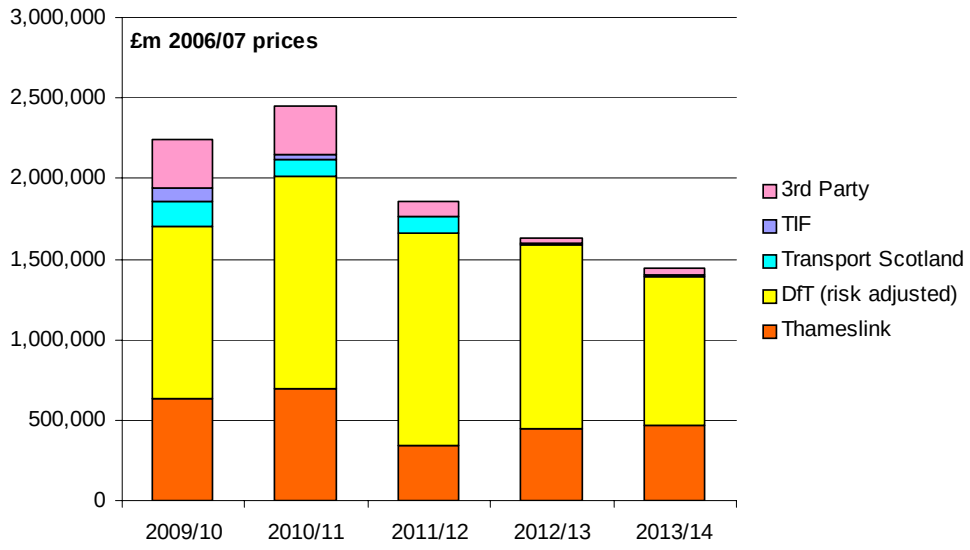


Figure 6.24 CP4 Enhancement expenditure by strategic route

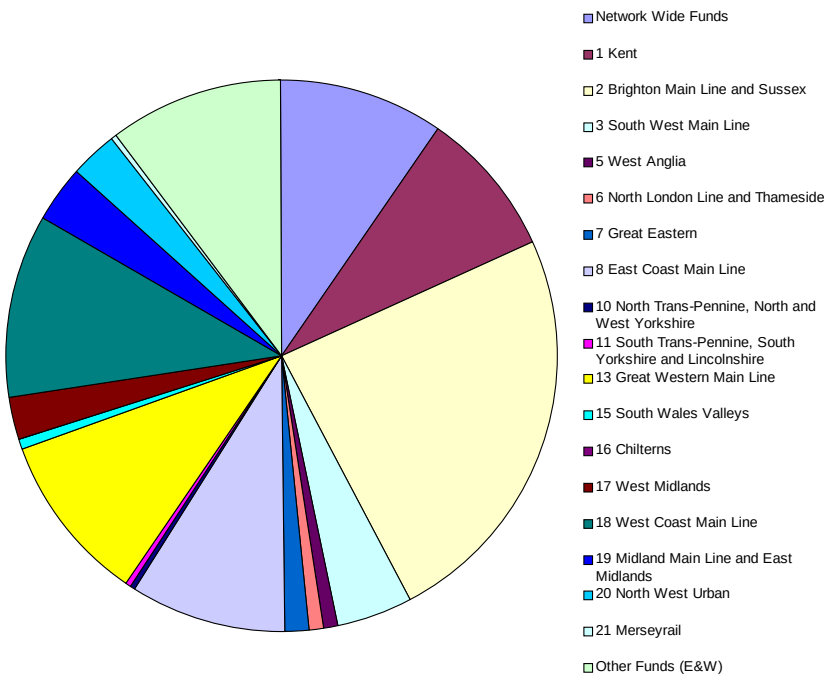


Figure 6.22 sets out a summary of the capital cost estimates of the portfolio of projects. The table sets out the costs in CP4 of the projects. Some of the projects will have costs during CP3 and CP5. The costs represent Network Rail costs net of third party contributions, where relevant.

Figure 6.23 shows the annual phasing of costs during CP4. Much of the profile of expenditure is determined by the phasing of expenditure associated with the Thameslink programme and other major investments in CP4 such as Reading, Birmingham New Street and the West Coast related schemes.

Figure 6.24 shows the CP4 expenditure across the strategic routes. In this graph we have allocated spend for the Thameslink programme, Access for All, and NSIP to strategic routes.

CP4 Enhancements

Set out in Figures 25 and 25 are two maps that show the geographical distribution of the proposed projects to be funded by DfT and Transport Scotland with a more detailed map of the London area. The maps exclude a portfolio of numerous smaller scale but important projects including:

- approximately 150 improvement projects under the National Stations Improvement Programme;
- approximately 50 stations currently proposed for the Access for All programme in CP4;

Figure 6.25 DfT enhancement projects in CP4 £ milions

Project	CP4 total
Baseline projects	
Access for All Programme	197
King's Cross	153
Stafford / Colwich Remodelling	483
Bletchley Milton Keynes	116
Power Supply Upgrade	272
Total DfT baseline projects	**1,221**
Other specified projects	
Thameslink Programme	2,589
Birmingham New Street	134
Reading Station	455
Intercity Express Programme (IEP)	260
National Stations Improvement Programme (NSIP)	156
Network Rail Discretionary Fund (NRDF)	234
Strategic Freight Network	208
Total DfT specified projects	**4,036**
HLOS output projects	
Capacity schemes	1,324
Performance schemes	368
Risk adjustment	287
Total DfT HLOS output projects	**1,978**
Other projects	
Redhill remodelling	25
West Croydon track capacity	15
Reading – Oxford Road Junction to Southcote Junction	47
Reading – Plat 1-8 Renewals	31
Reading - station concourse	26
Didcot – Oxford area capacity upgrade	38
Crewe remodelling	10
Bolton Corridor package	10
Buxton remodelling	5
Manchester Hub	60
Development funds for CP5 schemes	180
Total other projects	**447**
DfT Performance	
Projects required to deliver 92.6 PPM	400
DfT seven day railway	
Projects to support move towards a seven day railway	270
Total DfT enhancements in CP4	**8,353**

Figure 6.26 National map of major enhancements projects for CP4

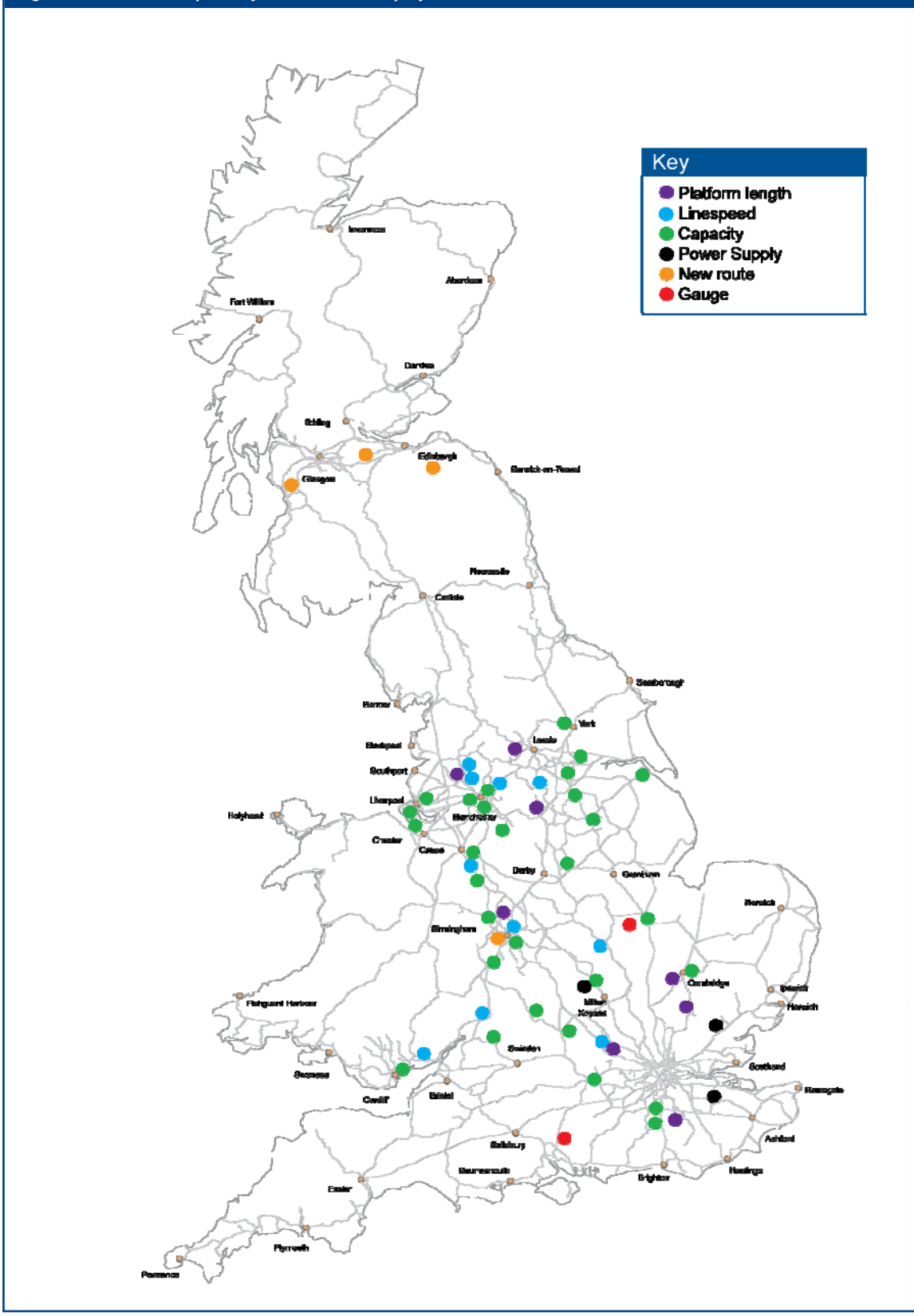
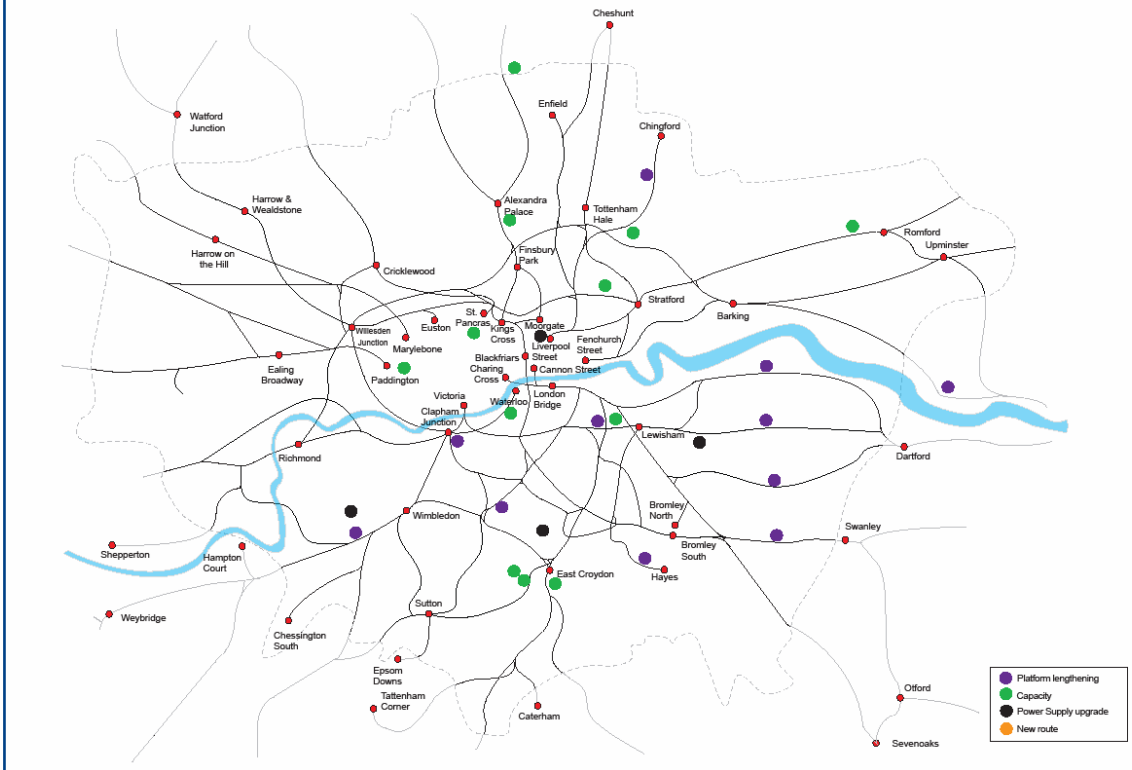


Figure 6.27 Map of major enhancement projects across the London area for CP4



- £234 million of NRDF expenditure on smaller scale schemes in CP4; and
- £20 million of small projects expenditure in Scotland in CP4.

We would also expect to deliver a significant volume of third party funded projects on a wide range of proposals such as station improvements, car parks, interchanges facilities, freight connections, and commercial property proposals.

Figure 6.28 provides a further breakdown of the projects to be funded by DfT.

DfT baseline projects

This category includes projects that were included in the ISBP as committed schemes.

Access for All

The purpose of this project is to provide, for each station in scope, an unobstructed and obstacle free 'accessible route' within the station, from at least one station entrance (usually the main one) and all drop-off points associated with that entrance, to each platform and between platforms served by passenger trains.

Funding is provided by DfT but the programme also includes stations in Scotland. The stations at which this is to be provided are agreed with DfT and Transport Scotland each year to provide a minimum of three years rolling workload at any time.

King's Cross

The project enhancements include a new Western concourse with a significant increase in the footprint of the structure. A new mezzanine level will be created within the Western concourse to provide retail and leisure facilities. The train shed and platforms will be refurbished and their roofs strengthened, painted and reclad. Work beneath the station will take place to widen the service tunnels and modernise facilities.

West Coast

The DfT has agreed with Network Rail the remaining elements of the West Coast Strategy (published by the Strategic Rail Authority in 2002) which are required to enhance the capacity of the West Coast Main Line. The three key elements are:

- Stafford - Colwich;
- Bletchley Milton Keynes; and
- Auto Transformers.

The objective of the Stafford - Colwich project is to resolve the capacity issues at Stafford in the least disruptive manner to the railway and to provide improved functionality and capability, improved reliability and improved maintainability. A range of options have been selected for further development following appraisal of a number of options involving DfT, Network Rail and train operators. However, further consultation will be needed and a Transport and Works Order would be required for the project. The assumed completion date for the project is December 2014. The project will also include the renewal of life expired signalling in Stafford station.

The Milton Keynes element of the project is planned for completion in December 2008. Detailed design has commenced for the works at Bletchley. These works include

- 12 car platform lengths on fast and slow lines;
- a bi-directional loop connected to the slow lines
- relay a new junction at Bletchley South with 60mph crossovers
- enhancement of Stone sidings;
- reversing facilities at Bletchley; and
- concentration of train control functions at Rugby.

The Auto Transformer (AT) project will deliver an AT system from North Wembley to Carstairs. The work has been divided into three phases. The first phase removed pre-existing power supply system non-compliances and implemented upgrades in time for the introduction of the September 2004 timetable. Phase two is required to meet the power demand for the 2008 timetable. Phase three is to implement the AT supply across the balance of the route.

Further DfT specified projects

These projects are explicitly specified in DfT's HLOS document for development and delivery in CP4.

Thameslink programme

The Thameslink programme is the most significant project proposed in terms of scope and cost. The principal infrastructure features of the full scheme are:

- an increase in the number of tracks west of London Bridge from two to four, and the segregation of services on the eastern approach to the station, allowing up to 18 Thameslink trains per hour (tph) to pass through the station and up to 24 tph through the core section between Blackfriars and St Pancras, in each direction;
- extension of platforms to accommodate 12 car trains on most of the routes intended to be used by Thameslink services;
- upgrade of an existing connection between the East Coast Main Line (ECML) and the Thameslink route which will allow Great Northern services to continue to destinations south of the Thames;
- a significant redevelopment of London Bridge station;
- reinstatement of double track at Tanners Hill to allow greater operational flexibility; and
- other interchange improvements, particularly with London Underground at Farringdon and Blackfriars.

Birmingham New Street station

Birmingham New Street is one of the biggest and busiest rail stations in the UK, and the hub of the local and national rail network in the West Midlands. We are working in partnership with DfT, Birmingham City Council, Advantage West Midlands and Centro to progress the development of Birmingham gateway project. The proposals would provide a significantly larger concourse area with more than double the vertical access capacity between the concourse level and platforms, including direct access to each platform. The scope of works includes enhancement to the ramp access to the Pallasades, provision of additional concourse access, new escalator, lift and stair access and the formation of a new public square on Queens Drive.

The retail levels above the station will be re-configured to allow an area of natural daylight to penetrate to concourse level from the new roof and from the sides of the station footprint.

Reading station area

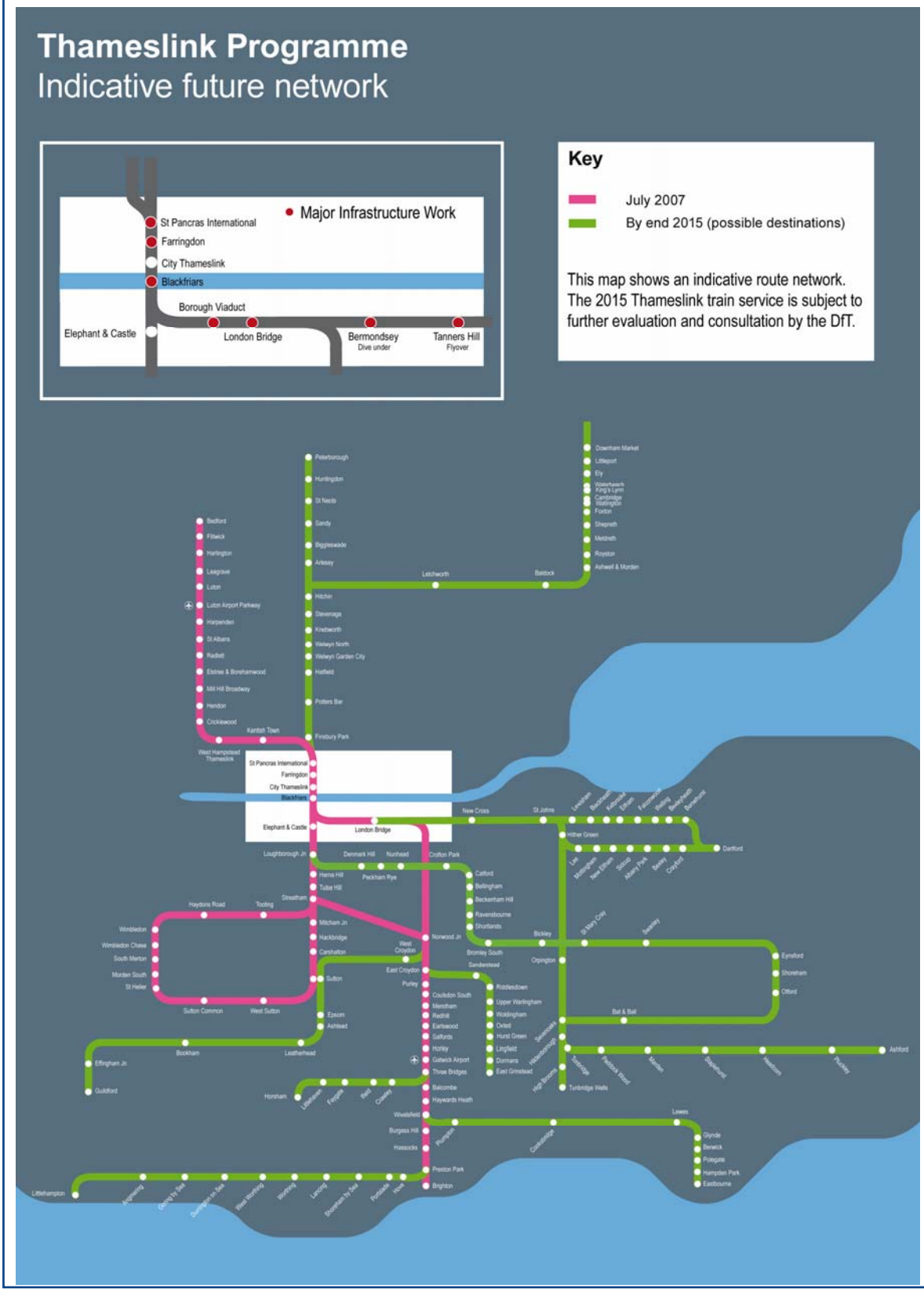
Reading station, with around 17 million users per annum, is one of the busiest in the country outside London. It acts as a hub station catering for passengers interchanging between services and as an origin / destination in its own right. The platform configuration and track layout in the area are a critical constraint to capacity and have a detrimental effect on performance.

The scope of the programme consists of a series of discrete projects, split into three phases, to provide:

- a new signalling control centre for the Thames Valley;

-

Figure 6.28 Thameslink programme



- five new platforms and associated infrastructure (e.g. canopies, lifts, escalators, retail and passenger facilities at the north end of Reading Station);
- renewal of the signalling in the main station area (Reading Main), Reading Spur, Reading West and the partial renewal of signalling on the Berks & Hants line between Oxford Road Junction and Woodborough;
- re-control of the remainder of the signalling on the Reading area to the new signalling centre;
- a new train care depot to the north of the current triangle site with direct access to the relief lines in the site currently occupied by the high output ballast cleaner;
- an alternative location for the high output ballast cleaner facilitates the building of the new Intercity Express Programme depot on the site;
- grade separation of the main lines at the west end of Reading station; and
- two additional lines linking Oxford Road Junction with the relief and main lines heading to the east.

In order to exploit delivery efficiency a number of renewals work schemes are to be delivered in parallel to the redevelopment including station canopies, platform surfaces and station buildings. These are presented as options in this plan later in this section.

Intercity Express Programme (IEP)

The IEP programme supports the development of a compatible train design based on optimisation of costs on a whole-life whole-system basis. The deployment plan requires the introduction of pilot trains on the East Coast Mainline (South) in mid 2012 followed by the pre-series trains introduction in 2014. The trains will be a mix of full length (260m) and half length (130m) trains. Also, the trains will be a mix of self powered, dual (self and electric power) and electric power. The next IEP fleet introduction will be on Great Western starting in 2016. These will be self powered trains.

To facilitate the introduction of the IEP, Network Rail is assessing the implications for issues such as gauging, platforms, power and two pan operations. This includes a gauging assessment for optimum vehicle size and an assessment of platform works required to facilitate for up to 260m train length including the possibility of selective door operation (SDO) application and splitting / joining at a limited number of locations. In terms of power supply, the IEP trains are expected to be more efficient but the overall service may need more power subject to train design, power draw, train operation mix and timetable.

Although the work is ongoing, it has been identified that for the East Coast and Great Western routes, some infrastructure works are required to introduce the IEP trains. These are in the following areas:

- platform length extensions at a number of the stations (with SDO operation at others);
- gauging work on these and diversionary routes;
- power upgrade works;
- work for two pan operation at 125mph; and
- possible bridge resonance and aerodynamics work (to be fully assessed once train design is known).

Work will also be required to improve track geometry quality before the IEP fleet is introduced. This is incremental to the core track renewal plans for CP4.

No assessment of depot related work has been made as this is dependant on the maintenance strategy and depot plans of the train service provider.

National Stations Improvement Programme (NSIP)

The Secretary of State has provided possible additional funding to deliver improvements in CP4 at approximately 150 medium sized stations in England and Wales. However this funding is subject to confirmation following review by ORR. The primary objective would be to bring about a noticeable and sustainable improvement in the environment at stations for the benefit of passengers. Improvements will be made to increase personal safety, improve access and egress, enhance the overall presentation of the station and to improve information provision and other facilities.

The programme will concentrate on approximately 150 stations, chosen from the busiest 500 stations on the network measured in terms of arrivals and departures. The specific stations are being chosen to maximise the impact for the travelling public, based on the current level of customer satisfaction and footfall. Priority will be given to those stations where the maximum impact can be delivered, and this will be achieved through the leveraging of wider private and public sector funding opportunities where they are available. Speed of delivery will also be a consideration. Whilst it is anticipated

that the majority of stations will be in categories A to D (excluding Network Rail managed stations), stations in category E are not precluded simply because of their classification.

The specification of each station will be compiled by the relevant local delivery group to reflect the particular needs of that station. However, in order to provide consistency, a design guide has been produced. Station improvements in the programme will include:

- seating, shelters and CCTV;
- station signage, passenger information and clocks ; and
- redecoration of buildings, removal of derelict buildings, cleaning and graffiti removal and boundary railings.

Details of the stations which are currently being considered for NSIP funding are listed in the appendix appendices of this document. However, this is subject to modification in the light of further developments, in particular the willingness of other parties to provide additional funding.

Network Rail Discretionary Fund (NRDF)

The NRDF is a mechanism for funding minor schemes which are either linked to renewals or stand alone schemes which have a positive whole-industry business case. For a scheme to be eligible for this fund, it must meet criteria determined by the DfT:

- it must provide a business case with good value for money as defined by DfT appraisal criteria; and
- the amount to be logged to the RAB for each scheme must not exceed £5 million (without the prior agreement of ORR, and following discussion with DfT or Transport Scotland).

The fund is not generally intended to support enhancements where the financial benefits to individual stakeholders, or a group of stakeholders, are sufficient to warrant their funding the scheme directly. Therefore, where the benefits accrue wholly to a single third party, it would generally be funded as a third party scheme. Similarly, where a scheme would generate sufficient additional income or cost savings for Network Rail, we would progress the scheme using our own funds.

The DfT has made provision in the SOFA for £45 million in each year of CP4, and this has been reflected in the Strategic Business Plan. Candidate schemes for each route for CP4 are identified in the Route Plans and a consolidated list of candidate schemes for CP4 is included as an appendix to the project summaries supporting document.

DfT HLOS output projects

These enhancements are required to underpin the strategies to deliver the HLOS outputs and have been developed through RUSs and specific discussions with train operators. An explanation of the approach to the development of the strategies is set out in Chapter 3 of this document.

Capacity projects

These are infrastructure schemes necessary to deliver capacity improvements in CP4.

The key infrastructure works supporting the strategies seek to provide additional capacity to facilitate the delivery of the proposed trains service changes. These can be categorised into investments in:

- platform lengthening;
- power supply;
- junction capacity;
- station capacity;
- route capacity; and
- line speed improvements.

Platform lengthening

Platform lengthening is required to support the lengthening of train services as proposed in the route plans. The routes on which it is proposed to lengthen platforms, in addition to the works to support the Thameslink programme and IEP, are:

- strategic route 1 to facilitate 12 car operation Dartford – Rochester, Greenwich and Woolwich route, Hayes, Sevenoaks, Sidcup and Bexleyheath routes;
- strategic route 2 to facilitate 12 car operation Oxted to East Grinstead, 10 car suburban services to Victoria and London Bridge;
- strategic route 3 to facilitate 10 car suburban services;
- strategic route 5 to facilitate 12 car West Anglia outer services and 9 car inner services;
- strategic route 6 Tilbury Loop;
- strategic route 8 at Royston, Ashwell, Baldock, Letchworth, Knebworth, Welwyn Garden City and Welwyn North;
- strategic route 10 including York / Selby – Leeds, Huddersfield – Leeds, Sheffield – Barnsley – Leeds, Knottingley – Leeds and Sheffield – Moorthorpe – Leeds;

- strategic route 11 including Manchester – Sheffield, Doncaster – Scunthorpe / Adwick and Sheffield – Lincoln, Sheffield – Morpeth – Leeds;
- strategic route 16 including Kings Sutton and Sudbury;
- strategic route 17 including the Cannock line, Cross City line, Coventry line, Wolverhampton line, Walsall line, Stratford line, Leamington line and Stourbridge line; and
- strategic route 20 including Atherton corridor, Bolton corridor, Calder Valley, Chat Moss, CLC corridor, Hadfield Line, Marple corridor, St Helens corridor, Stalybridge and Stockport.

Power supply upgrade

Approximately 40 per cent of the rail network is electrified and 60 per cent of all traffic is electrically powered. The lengthening of trains will require the power supply to be strengthened as a result of more electrical multiple units being introduced. The exact details of the type of trains are yet to be determined but it is assumed that they are new build, with characteristics similar to new rolling stock such as Pendolinos, Desiros and Electrostars, for the purposes of estimating the scope of the power supply upgrades required.

The supply of power for electric trains falls into two groups:

- 25kV ac overhead supply, provided by overhead cables and principally covering the West Coast, East Coast and Great Eastern main lines and associated feeder routes; and
- 750V dc third rail supply which is confined to the South East and Merseyside.

Enhancement works are proposed to the 25kV supply on strategic routes 5, 6, 7 and 8. Enhancement works are proposed to the 750V dc supply on strategic routes 1, 2 and 3 in addition to the significant power supply upgrade delivered by the Thameslink programme, principally on strategic route 2.

Junction capacity schemes

Junction specific schemes have been identified to increase capacity at key points on the network in order to deliver capacity without damaging performance of the network.

Hitchin grade separation

The proposal is to grade separate the junction by means of a flyover from the down slow line to the down Cambridge line. In addition, the up side junction would be remodelled to allow trains to access the up fast line before the station. This proposal requires a TWA order.

Shaftholme junction re-modelling

The proposed options are to relocate the Shaftholme junction north of the existing Joan Croft junction as a parallel junction or provide a grade separated junction. In addition the existing junction at Applehurst will be modified to allow parallel movements between Applehurst and the Askern lines. The scheme requires a TWA order. TIF funding is being sought for this proposal but the plan does not assume it is TIF funded.

Station capacity schemes

Set out below are the schemes proposed to address capacity at stations in addition to the DFT specified schemes and the major schemes which may be funded by the third parties such as Euston and Victoria stations.

Gatwick Airport station

This scheme would address passenger congestion and provide lifts and escalators to all platforms. It also facilitates future growth in passenger numbers on the route and in connection with any expansion of the airport.

It would require infrastructure works to provide a new station concourse between the two existing footbridges, replacing the existing southern station footbridge. Widening of platforms 5 and 6 would enable provision of lifts and escalators, with minor track layout changes to suit. There could be passive provision for an additional platform 7 and a new down fast line if required as well as passive provision for the extension of the new concourse to interchange with buses and taxis.

It is assumed third parties will contribute to the funding of this scheme.

West Croydon

The scheme involves the development of railway land between London Road and Station Road with new egress arrangements to West Croydon tram stop and bus station. Improved station facilities including the ticket office, platforms, DDA access to platforms, station canopies and concourse are proposed.

It is assumed third parties will contribute to the funding of this scheme.

East Croydon

East Croydon station is heavily congested especially on the platform ramps and concourse. The ambition is to deliver an enhanced station

facility at East Croydon that incorporates additional passenger and track capacity as part of an overall development of the station area while exploiting commercial property opportunities.

It is assumed third parties will contribute to the funding of this scheme.

Waterloo

A three stage strategy for the development of Waterloo station has been agreed between DfT and Network Rail. The first stage allows a limited number of domestic train services to utilise elements of the Waterloo International Terminal (WIT) from December 2008, following the vacation of the facility by Eurostar services in November 2007.

Stage two enables the use of the entire WIT facility, providing at least 10-car capability to all platforms at Waterloo.

Beyond CP4, stage 3 proposes to re-develop the entire Waterloo site, integrating the WIT into a new enhanced facility with at least 12-car capability to all platforms and a significantly enlarged concourse, to provide appropriate capacity for the longer term. The proposal will seek to maximise commercial property opportunities.

Clapham Junction station capacity

The proposals at Clapham Junction are driven by passenger congestion issues. There are two aspects to the scheme. The first is station capacity work to the station building, implementing the strategy of moving the access points to the overbridge from the underpass. This is critical if the station is to continue to operate with the growth predicted. The other aspect of the scheme relates to platform straightening and lengthening on the Sussex side.

This proposal does not address the operating constraints that are identified in the South West Main Line RUS. These will be addressed as part of a longer term strategy for the route.

Cambridge island platform

The construction of an island platform is required to permit the operation of additional 12 car trains. It will also ease capacity by providing additional through platforms.

Peterborough station re-development

The proposals are responding to expected growth in commuter, long distance and freight traffic as well as development opportunities around the station.

The proposals include platform lengthening for Thameslink and long distance services including IEP trains, creation of a new island platform to increase capacity and remove conflicts, freight loops and remodelling of sidings. A new footbridge is being considered as part of commercial development opportunities for the Station Quarter area.

It is assumed third parties will contribute to the funding of this scheme.

Paddington station

At Paddington station the upgrade of Span 4 in 2009 will facilitate options for lengthening and reconfiguring platforms including the potential for accommodating all platforms within the main shed.

Nottingham station

This project aims to improve capacity on the station and improve customer facilities. This major redevelopment will be undertaken in conjunction with a major signalling renewal which will deliver additional capacity and performance benefits.

It is assumed third parties will contribute to the funding of the Nottingham Station redevelopment scheme.

Liverpool James Street

The scheme is designed to improve access between street level and platform level to increase the capacity of the station.

Salford Central

This is a capacity scheme that would allow trains that currently go to Manchester Victoria from Liverpool to additionally call here, closer to the passengers' ultimate destination. This would reduce dwell time at Victoria, freeing up capacity and improving performance, whilst incidentally alleviating passenger crowding at Victoria which would be beneficial during the disruption associated with works at Victoria.

Salford Crescent

The stations current design restricts both passenger and operational capacity. The project would intend to re-locate the station to Windsor Bridge North junction, creating four platforms which allows cross service interchange with services to and from the Bolton and Wigan directions.

Liverpool Central
The scheme is designed to increase access and circulation space, as well as improve the platform environment, in order to handle more passengers.

Route capacity
In addition to specific junction and station capacity works, there are a number of proposals to increase capacity along sections of route, which will provide additional capacity to facilitate both a growth in traffic and a more resilient and reliable network.

North London Line
The project seeks to deliver more capacity between Stratford to Clapham Junction via Willesden and Gospel Oak to Barking. The principal elements of physical scope will include re-signalling Willesden High Level to Stratford, enhancing signalling capacity on the Gospel Oak- Barking route, re-configuring and enhancing track layout between Dalston and Camden Road, and re-configuring of the traction power arrangements to largely eliminate DC traction and enhance supply security. Other discreet elements include enhanced functionality at Channelsea Curve, Stratford (freight regulating loop), Willesden High Level (new turn-back siding) and Latchmere curve and junction (doubling).

The major funding partner for this project is TfL.

Capacity relief to the East Coast Main Line
Options are being examined to improve capacity on the two track section on the East Coast Main Line (ECML) between Peterborough and Doncaster using dynamic loops or an upgrade of a parallel route for use as a primary freight route. The ECML RUS is currently examining the GN/GE Joint Line between Peterborough and Doncaster via Spalding, Lincoln and Gainsborough as the alternative route option. TIF funding is being sought for this proposal but the plan does not assume it is TIF funded.

Alexandra Palace – Finsbury Park
This scheme aims to increase capacity in the Finsbury Park station area to the north through the creation of additional Up peak paths. The scheme will reinstate the disused east side platform, upgrade existing platforms, provide a higher speed crossover, modify signalling and provide six car platforms at Alexandra Palace, Hornsey and Harringay stations.

Barry – Cardiff Queen Street
To deliver 16 trains per hour each way requires significant infrastructure capacity enhancement at both Central and Queen Street stations together with enhancement at Cogan Junction and the City Line between Radyr and Canton. Further enhancement involving recommissioning a currently disused third platform face at Barry Town may also be required.

Performance Schemes
These schemes have been identified as contributing to the delivery of the HLOS performance metric by addressing particularly performance black spots on the network, over and above the schemes identified above that are required to deliver the HLOS capacity metric. This includes various line speed improvements that can enable performance, capacity and journey time benefits.

Cotswold Line
The purpose of the Cotswold Line Redoubling scheme is to address the constraints of single line sections of the route from Wolvercote Junction to Ascott-Under-Wychwood; from Moreton-in-Marsh to Evesham and from Evesham to Norton Junction.

Swindon – Kemble
The project proposes to redouble 12 miles of the Swindon to Kemble secondary route between Swindon and Kemble stations, providing infrastructure capability for four trains per hour between Swindon and Kemble in each direction.

Sheffield – Leeds
The scheme is proposed to raise the line speed for all traffic. Various line speed increases are proposed to provide capacity benefits on the Sheffield to Leeds via Barnsley route. This includes remodelling of the junction at Horbury which is a major constraint in terms of capacity and line speed on this route.

Westerleigh – Barnt Green
The proposal is to improve line speeds on the Great Western Main Line from Barnt Green to Westerleigh Junction (68 track miles) up to a maximum of 110 mph where feasible. This scheme will piggy back onto the high output track renewal due to be delivered in CP4.

Severn Tunnel Junction to Cardiff
Line speed improvements will create additional capacity on the relief lines, freeing up capacity and improving performance on the main line.

Chiltern line
A number of line speed opportunities will be pursued where they are straightforward or can be delivered in conjunction with planned renewals.

West Midlands
A number of routes are being examined which could benefit from line speed improvement in order to aid capacity, which includes Soho East Junction to Perry Barr, Kingbury junction to Whiteacre Junction and Kings Norton to Landor Street.

Midland Main Line
Line speed improvements on the fast lines between St. Pancras and the East Midlands and Sheffield are being examined. The project aims to bring journey times down by up to eight minutes between London and Nottingham and Sheffield and will be delivered in conjunction with signalling renewals, level crossing upgrades and junction re-modelling.

Liverpool – Manchester - Leeds
The project involves track, signalling and structures alterations between Liverpool and Manchester via Chat Moss and Manchester to Leeds via Diggle to deliver journey time improvements.

North West
A number of locations have been identified in the North West RUS that would benefit from higher line speeds.

Other projects
Also included in the plan are projects that provide an opportunity in CP4 to enhance the capability of the network. Although not required to deliver the HLOS outputs, they are incremental to planned enhancements or renewals, and as such they present an opportunity to deliver an enhancement more efficiently than as stand alone projects.

Redhill
Redhill is a key junction between the Brighton Main Line and branches to Guildford and Tonbridge. The track layout causes slow speeds into and out of the station. The project proposes to remodel the layout concurrent with the planned track renewal to simplify the layout, increase line speeds and improve the capacity of the station in terms of train paths available. Additional platform capacity would also be provided.

West Croydon
Proposed track works to enhance capacity co-ordinated with planned renewals work and station works to increase passenger capacity and improve the interchange with the tram.

Optional schemes in CP4

Oxford Road Junction to Southcote Junction
A business case for an additional third track between Oxford Road Junction and Southcote Junction is being developed. It is evident that this scheme is necessary when developing the business case for the main enhancement programme which demonstrated that capacity utilisation for the section between Oxford Road junction and Southcote junction would remain high at 85 per cent after the full Reading programme of works were implemented. Modelling work is being undertaken to look at the effects of this enhancement on the capacity utilisation for this area to see what improvement is gained from the added investment.

Reading station area - platform renewals
The main Reading station area redevelopment programme concentrates all its station enhancements on platforms 9 and above, but includes a new north south transfer deck with connections to all platforms. This scheme therefore includes the accelerated renewals of platforms 1-8 ‘like for like’ to the same modern equivalent form as for platforms 9 and above as part of the overall Reading programme under the same broad output specification.

Oxford area
Upgrade of freight loops to passenger use, provision of additional south facing bay platform, an enhanced Wolvercote junction and realignment of the Bicester line connection would provide additional capacity and performance benefits.

Manchester Hub
The DfT announced proposals on 4 October 2007 for increasing rail capacity for Manchester and across the north of England. We will begin a detailed study on how best to increase the number of trains that are able to run through Manchester. This will enable more and faster trains to operate across the north of England, particularly key services between Liverpool, Manchester, Leeds and Newcastle. The increased capacity could also potentially allow faster and more direct services to Manchester Airport, and more freight traffic to connect with ports across the north of England.

Infrastructure proposals under review will be enhanced capacity of Manchester Victoria, a chord to allow trains to run between Piccadilly and Victoria stations in Manchester, and a flyover south of Piccadilly station to allow trains from the Ardwick direction to use the station.

Crewe remodelling

Discussions continue with stakeholders to develop and examine various options at Crewe to rationalise and re-model the layout. Options being examined include the possible reinstatement of double track between Alsager and Crewe.

Bolton corridor package

This project seeks to increase capacity, improve performance and reduce journey times along the Bolton corridor through the removal of permanent speed restrictions, restrictive signals and new loops for slower traffic. This scheme will increase line speed between Salford Crescent and Euxton junction, and between Preston and Poulton.

It will also provide a new platform five at Bolton with appropriate alterations to track and signalling so that slow trains can be passed by faster trains at Bolton, or if it should be demonstrated to be adequate, provide new platforms on the Westhoughton line at Lostock with an appropriate alteration to stopping patterns for the same purpose.

Buxton remodelling

This project seeks to remodel the Buxton area to improve operational flexibility at the station and allow better freight access to the Dowlow line.

This project involves relocating the trailing crossover to the Manchester side of Buxton junction which would provide freight access. A suitable facing crossover would allow passenger trains direct access to the second platform and free up the station throat of passenger trains awaiting a platform. The consequent freight traffic may mean additional work to improve headways and speeds on the rest of the line to maximise the benefits of the scheme.

Project development

The plan includes funds to develop future enhancement proposals that are proposed to be delivered beyond CP4.

Performance initiatives

We have included expenditure of £400 million to support delivery of the HLOS performance trajectory. We provide details of this investment in Chapter 8 of this document.

Seven day railway initiatives

We have included expenditure of £270 million in our plan to support making progress towards a seven-day railway. We provide details of this investment in Chapter 9 of this document.

Transport Scotland projects

Transport Scotland has specified a number of major projects for implementation in CP4 as well as the development of further proposals which may be implemented subject to further discussion.

As described earlier we have applied input price inflation to project costs. An explanation of the assumptions used for this can be found in Chapter 5. We have applied this factor to Airdrie-Bathgate and GARL. For Ardrie-Bathgate the cost in 2006/07 prices is estimated at £140 million in CP4. Adding an allowance for input price inflation increases the cost estimate to £145 million. For GARL the cost in 2006/07 prices is estimated at £163 million in CP4. Adding an allowance for input price inflation increases the cost estimate to £170 million.

Airdrie – Bathgate

The rail line will be double track, electrified and built along the route of the original railway. Two new depots are to be provided. There will be improved car parking facilities at Airdrie, Livingston North and Uphall stations, with new facilities and stations at Drumgelloch, Caldercruix, Armadale and Bathgate.

The following improvements to the existing rail network are needed to make the service work effectively:

- electrifying the existing railway from Bathgate to Haymarket East junction;
- upgrading a single junction at Newbridge to a double junction;
- upgrading to double track the line between Airdrie and Drumgelloch;
- upgrading to double track the line between Bathgate and Newbridge, which includes doubling the single track between Carmondean and Cawburn junctions; and
- upgrading to passenger standard the existing freight line into Bathgate.

Glasgow Airport Rail Link (GARL)

The key project components are:

- construction of 1.9 kilometres of new double track railway from Glasgow Airport to a double junction with the existing Inverclyde lines at Paisley St James;

- construction of new double platform station at Glasgow Airport;
- remodelling of the existing Wallneuk and Arkleston junctions east of Paisley Gilmour St;
- construction of an additional third track between Arkleston Junction and Shields Junction (7.2km); and
- extension of the existing Up loop facility at Elderslie.

It is assumed in the plan that this project is combined with the Paisley corridor signalling renewals to ensure it is delivered with minimum disruption and to exploit synergies.

The GARL project is not being delivered in its entirety by Network Rail. A substantial element of the scope, comprising the airport branch line civils work, will be delivered by Strathclyde Partnership for Transport (SPT). In addition, enabling works including the relocation of the airport fuel farm will be delivered by BAA, as will the passenger link between the airport station and the terminal building. For these reasons, Network Rail does not retain full control of GARL project delivery and this is dependent on others delivering scope elements to agreed programme dates.

Borders

The plan assumes that our role in delivering this project is one of asset protection only and that the scheme will be delivered by a third party. The phasing of the funding required is based on the current published programme.

Small projects fund

The small projects fund is provided to fund minor enhancements which are either linked to renewals or are stand alone schemes which have a whole industry business case. Transport Scotland has specified it should be targeted particularly at providing additional capacity on the network associated with the growth in passenger numbers and freight tonnage.

Project development

In addition, Transport Scotland has included within Tier 3 of its HLOS, a number of schemes which it is keen to develop and begin the implementation of during CP4. These schemes are at a very early stage of development but include amongst others, proposals for increasing capacity and improving journey times on routes such as the Edinburgh to Glasgow line, the Ayrshire routes, the Highland mainline and between Aberdeen and the central belt. It also includes development of a rolling programme of electrification of routes. Although this plan only includes the costs associated with developing a plan to deliver the required outputs, we are looking forward to continuing to work with Transport Scotland to obtain the necessary funding. Once we have agreed the priority of the various projects within the Tier 3 with Transport Scotland, we will agree a detailed programme with them for taking these projects forward.

Seven day railway initiatives

We have included expenditure of £30 million in our plan to support making progress towards a seven-day railway. We provide details of this investment in Chapter 9 of this document.

Transport Innovation Fund

In the 2004 White Paper, 'The Future of Transport', the Secretary of State announced the creation of the Transport Innovation Fund (TIF). The fund supports costs of proposals to combine demand management measures, such as road pricing, with measures to encourage modal shift and also schemes that are beneficial to national economic productivity. Rail can potentially contribute to both types of proposals. We have worked with DfT and other stakeholders to develop proposals to be funded by TIF on the basis of the productivity criteria. We anticipate that rail schemes will start to come forward from stakeholders funded through TIF congestion funding, but so far funding has been secured for TIF productivity schemes.

Funding was announced in July 2007 for the

Figure 6.29 Transport Scotland Fund

£ million	CP4 total
Airdrie - Bathgate	145
Glasgow Airport Rail Link	170
Borders	3
Tier 3 project development	13
Small projects fund	20
Seven day railway	30
CP4 total	**380**

Gospel Oak - Barking and Tottenham and Hampstead lines to enable high-cube containers from ports in the south east, including the new development at London Gateway, to be carried along the route.

Other proposals that have been submitted and are awaiting confirmation of TIF funding are:

- Peterborough – Nuneaton W10 gauge enhancements;
- Southampton – West Coast W10 gauge clearance;
- Olive Mount Chord; and
- Humber ports capacity.

Willesden - Gospel Oak - Barking: gauge and capacity

The scope of the scheme is to enhance the gauge from W8 to W10 standard to enable more cost effective high cube (9'6") container traffic to use the Tottenham and Hampstead and Barking to Gospel Oak routes and provide capacity on the Gospel Oak – Barking route to permit four freight and four passenger trains per hour to operate compared to the current maximum of three passenger and two freight trains per hour, allowing paths for both the expected growth in container traffic from ports on the Thames estuary and TfL's planned higher frequency local passenger service.

Peterborough – Nuneaton W10 gauge clearance

This scheme consists of three distinct elements, gauge enhancement between Peterborough and Nuneaton, signalling headway improvements at Kennet and provision of a new North Chord at Nuneaton. Gauge enhancement is expected to be achieved by a number of potential solutions including track slewing and lowering and structural alterations. It will be necessary to reconstruct some bridges along the route, old brick arches will be replaced with new pre-cast concrete arched beams or steel girders. It will also be necessary to lower track at a number of locations and it may be necessary to carry out minor alterations to some station platforms, canopies and electrified overhead lines.

Southampton-West Coast Main Line W10 gauge clearance

The project involves work on circa 50 separate structures including tunnels, over bridges station platform alterations and canopy trims. Southampton tunnel is the most challenging structure on the route and proposals for gauge enhancement to this structure are currently in the course of being finalised.

Olive Mount Chord

This scheme provides for the re-instatement of Olive Mount Chord to connect the Chat Moss Lines to the Bootle Branch, provision of W10 gauge on the Bootle branch and the provision of W10 gauge on the Chat Moss Route.

Humber Ports Capacity

This scheme is made up of the following elements some of which will be completed in CP3:

- Hull Docks Branch upgrading (complete spring 2008);
- Brigg Line upgrade(spring 2008);
- Wrawby Junction Line speed improvements (early 2008);
- Cottam Chord (2011);
- Killingholme Loop (2011); and
- Selby Bi Di (2010).

Other TIF applications

We are aware of other TIF applications containing rail elements which have been made by Regional Development Agencies and other bodies. These are also awaiting confirmation and we look forward to working with the successful applicants once the funding and scope of their specific schemes are better understood.

Third party schemes

Third parties have a significant and valued role to play in investing in the network. For the purposes

Figure 6.30 Transport Innovation Fund (TIF) projects £million

Project	CP4 total
Willesden – Gospel Oak – Barking: gauge and capacity	7
Peterborough – Nuneaton W10 gauge clearance	70
Southampton – West Coast Main Line W10 gauge clearance	33
Olive Mount Chord	0
Humber Ports	7
CP4 total	**117**

of preparing this plan we have included schemes that we believe have a funding commitment for substantive implementation from a third party or proposals that would require a contribution from Network Rail to proceed during the control period. Wholly third party funded schemes that do not have a funding commitment have not been included at this stage explicitly in the plan but we expect that further schemes will be developed and committed to over time and we look forward to developing these with funders. In our deliverability assessment we have taken into account a likely level of third party funded schemes that are not yet identified in this plan. This is especially key for those stakeholders who have significant funds available to enhance railway assets but whose plans for CP4 are not yet fully developed.

A number of schemes for which we are seeking funding from government through the periodic review also depend on other parties contributing to the funding of their implementation. These include:

- Birmingham New Street;
- Reading Area re-development;
- Waterloo re-development (stage 3);
- West Croydon station;
- East Croydon station;
- Peterborough station;
- Cambridge station;
- Nottingham station;
- Manchester Victoria station; and
- North London Line.

We are also exploring opportunities with private-partner investors to develop significant station improvements at the following stations:

- Victoria;
- Euston;
- London Bridge;
- Battersea Park;
- Cannon Street;
- Fenchurch Street;
- Leeds;
- Maidstone East; and
- Clapham Junction.

Some of the more significant third party schemes are detailed below.

2012 Olympic and Paralympic games

We are working with TfL and the Olympic Delivery Authority to deliver a number of heavy rail projects in advance of the 2012 Olympics including the North London Line capacity, Stratford Regional station, extension of Stratford Platform 10a, and the Lea Interchange, as well as the implementation of infrastructure associated with the East London Line Extension project.

It may be necessary to undertake various works at stations around London to enable them to safely manage the increased passenger numbers using them during the London 2012 Olympic and Paralympic games. It is intended that as far as possible, operational measures will be implemented to manage this and capital works will only be undertaken where this is not possible. The possible scope required is based on the station capacity assessment undertaken for the bid in 2005 for which indicative cost estimates were around £8 million. We are currently updating this study based on new demand data for London stations provided by the Olympic Delivery Authority. This will enable us to make decisions regarding works required as well as developing event plans for each of our major stations during the Games.

It may also be necessary to undertake additional works to deliver enhanced performance and undertake maintenance in reduced timeframes during the Games. We currently estimate these works to be in the region of £8 million.

BAA Stansted

In accordance with the 'Future of Air Transport White Paper' published in December 2003, BAA is developing proposals to make better use of the existing single runway and terminal, and for the construction of a second runway and associated facilities at London Stansted Airport. BAA plans to submit a planning application, including a transport assessment and rail strategy, for the second runway and associated facilities in December 2007, consistent with passenger demand growth to 68 million passengers per annum by 2030.

BAA's proposed rail strategy supports the extension of trains to 12-car on the West Anglia mainline in line with the forecast growth in passenger demand. BAA has also proposed additional infrastructure featuring approximately five miles of third track north of Tottenham Hale, to provide additional rail capacity for the non-airport passengers who would be displaced as the Stansted Express becomes more dedicated to serving the airport. This 'minimum infrastructure option' is under discussion between DfT, BAA, Network Rail and TfL, but its lack of a robust business case and its forecast impact on operational performance suggest that it may not be supported by Network Rail, TfL and DfT.

The DfT is therefore considering an alternative proposal involving a possible 4-track solution on the West Anglia Main Line between Tottenham Hale and Cheshunt. This more costly option would have significantly higher benefits than the BAA three-track scheme in terms of the capacity provided. This is to be reviewed alongside an alternative £600 million four-track option between Coppermill Junction and Broxbourne, described in the current draft of the Greater Anglia RUS. The DfT is aiming to have prepared an outline business case for a four-track option by the end of 2007, with a view to reaching agreement with BAA, Network Rail and TfL early in 2008, on the best way forward for enhancing the West Anglia Main Line. The work to deliver the infrastructure enhancement would be focused on CP5.

BAA AirTrack

The AirTrack project is a major rail initiative designed to provide improved access to Heathrow Airport from the south and west, with new Airport links from South London and important centres such as Guildford, Woking and Reading. A rail based approach is seen as a potential solution to the long term access issues at Heathrow, where the volume of demand is set to increase further following the completion of Terminal 5 with the potential for even greater growth following the recent Airports White Paper.

The infrastructure requirements will include approximately three miles of new track between Staines and the new Terminal 5 at Heathrow, plus associated enhancements to power and signalling. A new station will be required at Staines High Street, and a new chord is to be constructed linking the Reading line with the Windsor line at Staines. There will also be a requirement for additional rail infrastructure to provide capacity improvements at a number of key pinch points on the route, including Staines, Virginia Water, Woking, Barnes-Twickenham corridor and Waterloo. The infrastructure options are currently undergoing analysis at GRIP stage two.

More detail on individual schemes has been provided to ORR in the Project Summaries document.

Crossrail

The Prime Minister announced an agreement to a funding deal for the Crossrail project on 5 October 2007. Our plan is consistent with the assumption that the project will be operational by 2017. This plan does not include the costs associated with delivering the Crossrail project including the works Network Rail is expected to undertake as part of the project. These works are described further below.

The Crossrail project is jointly sponsored by the Department for Transport (DfT) and Transport for London (TfL) and has so far been developed by their joint-venture company, Cross London Rail Links Ltd (CLRL).

In July 2007 it was agreed between Network Rail, the DfT, TfL and CLRL that the ongoing design and development (and the eventual construction) of the works on the Network Rail network (the “On Network Works”) will transfer into Network Rail ownership between October 2007 and May 2008.

Crossrail is the proposal for a new railway connecting Heathrow Airport and Maidenhead (to the west of London) to Shenfield and Abbey Wood (to the east of London) via an underground cross-city route from Paddington in the west to Whitechapel in the east. This core tunnel section is intended to be able to offer a frequency of 24 trains per hour during the morning and evening peaks, significantly easing the pressure on other surface and underground lines.

A portal at Royal Oak on the Great Western Main Line will allow eastbound trains to enter the central Crossrail tunnel prior to arriving at a new sub-surface station at Paddington. New stations will also be constructed at Bond Street, Tottenham Court Road, Farringdon, Liverpool Street and Whitechapel. To the east of Whitechapel the central tunnel will divide, with one line heading north east to emerge at Pudding Mill Lane (allowing trains to continue on to Shenfield via Stratford) and the other line heading south east via the Isle of Dogs and Woolwich to emerge at Plumstead (and allowing trains to continue on to Abbey Wood in Kent).

To facilitate the level of services anticipated by the Crossrail project, significant work will need to be undertaken on our network. This work will include major track alterations and re-modelling. The flyover at Airport Junction will be extended and a grade separated junction will be built adjacent to Acton West Yard. The Great Western Main Line will need to be electrified between Airport Junction and Maidenhead. There will also need to be a significant number of station developments and platforms extensions along the route. We will continue to work with TfL and our industry partners to seek the best use of overall capacity on the network.

Programme and milestones

Figure 6.28 provides a summary of the indicative timescales for project development and construction phases for the key projects and programmes proposed to be delivered in CP4. These timescales will be subject to further development and refinement.

All schemes within the submission will be developed within the requirements of our GRIP framework. However, it has been recognised that, based on an agreed criteria, not all schemes require the full application of the GRIP framework.

In order to accelerate the front-end development of schemes, recent initiatives have identified many areas where projects can be subject to fast-track development. This fast-track process has been documented and rolled-out to the internal Network Rail enhancement community with external roll-out planned for the near future. Based on current known scope and risk, the fast-track processes have been assumed but as project specific outputs become more clearly defined, the fast-track process will present further opportunities to enable delivery timescales to be achieved.

Deliverability and resources

The overall deliverability review of the enhancements programme has been undertaken as part of a broader assessment of the SBP and an assessment of the capability of the supply chain to support the delivery of the renewals and enhancements plans for each asset category.

To support this deliverability review, an assessment has been made of the volumes of enhancement activity by asset types in order to allow an overall assessment of work volumes for enhancements and renewals. These volumes are either based on known quantification or estimated based on similar scheme requirements.

A supply chain strategy for this programme of enhancements is being prepared. The packaging of schemes into work banks will be formed around the delivery of major projects such as Thameslink and Birmingham New Street, major programmes of work such as platform lengthening and power supply and a smaller group of discrete and localised projects that do not benefit from packaging into larger programmes.

We have implemented a supplier account management process with the key elements of our supply chain which account for 80 per cent of our external spend. Reviewing the capacity and the business plans of these suppliers we believe there is capacity in the market for both the planned renewal and enhancement expenditure. To ensure we secure the appropriate capacity and capability we will become a more market focused client in order to prepare the supply chain to be ready for work once it receives investment approval. This means:

- using category management to give specific markets (signalling, civils, power etc) very early warning of work volumes;
- sharing our investment plans with suppliers at the earliest opportunity, by publishing them on our website;
- preparing tender lists and sharing design and programme information earlier in the procurement process;
- having shorter tender lists, to reduce the estimating and engineering resource needed in the bid process; and
- creating networks of suppliers for the programmes of work, which allows us to work more closely with the supply chain for repeatable activity.

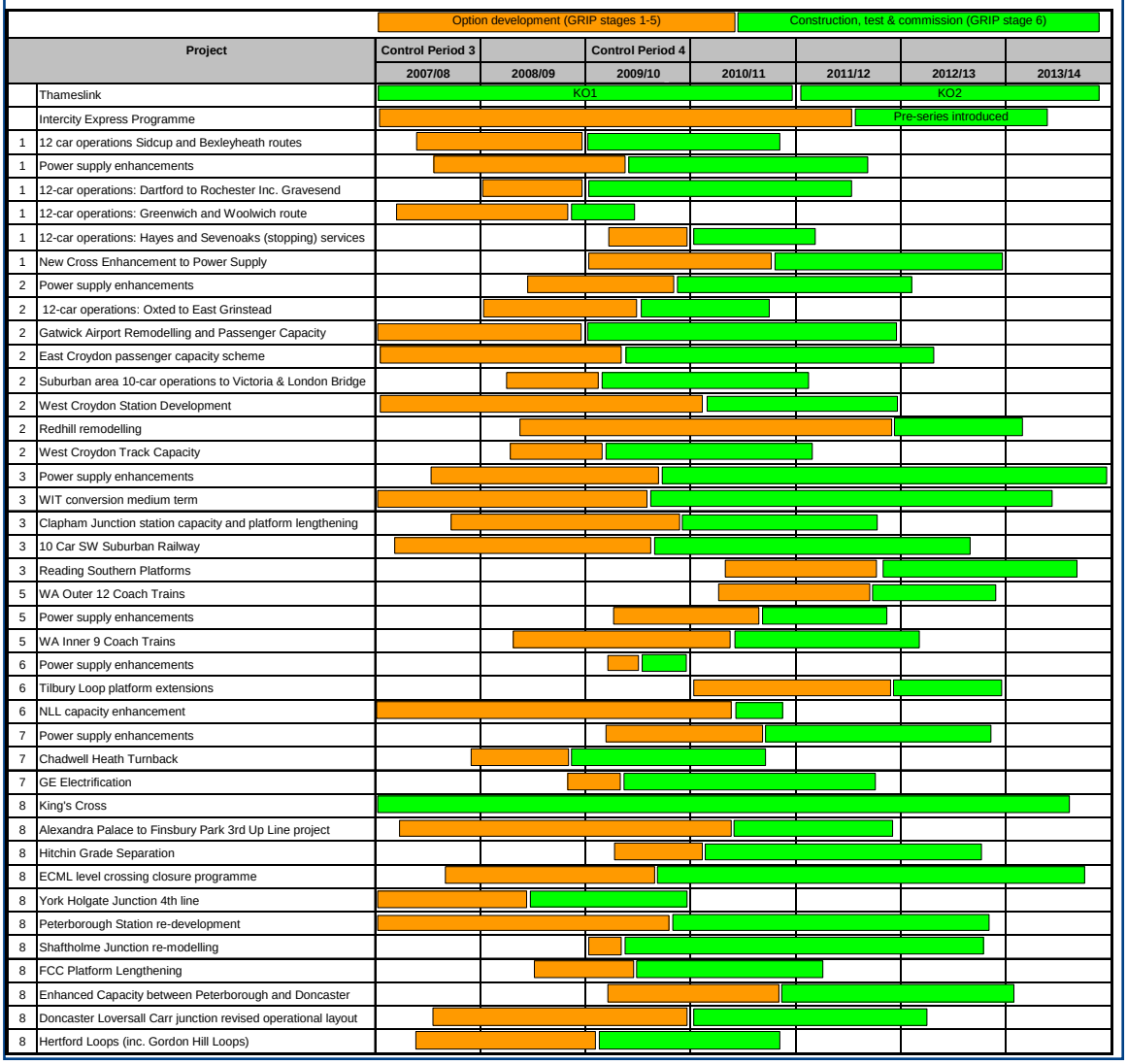
By implementing these five initiatives, we will grow the capacity of specific markets to improve security of supply for the enhancement programme. With strategic use of tendering for bespoke projects and closer supplier involvement for programmes of work we will also create a suitable environment to drive efficiency for this programme.

We will explain the CP4 enhancements programme at a supplier conference in November 2007.

Synergies

A high level review has been undertaken to develop the renewals and enhancements plans in a manner that takes account of the interaction between them in terms of scope, costs and timings. Where projects are sufficiently well defined, such as the Thameslink programme, the asset renewals plans have been adjusted to take account of the planned volumes of work being delivered by the project in terms of overall volumes and specific scope.

Figure 6.31 Major enhancements indicative programme summary: Thameslink, IEP and Strategic routes 1- 8



As projects are developed further through the GRIP framework, the scope definition, resource requirements and timescales will be firmed up. This will enable further examination of synergies and dependencies in order to deliver both the renewals and enhancements proposals as efficiently as possible. This integrated planning of renewals and enhancements will however create dependencies and risks, for example on the delivery of enhanced outputs being dependent on the timing of renewals and vice versa, where integrating condition-led renewals will require confidence as to the commitment to, and timing of, proposed enhancements.

There are also dependencies between enhancement schemes to deliver the required outputs. For example, to deliver longer trains on a particular route may require additional rolling stock, longer platforms, power supply reinforcement, junction and station capacity upgrades as well as timetable changes.

The project summaries supporting document sets out the dependencies for each enhancement project.

Figure 6.20 Major enhancements indicative programme summary: Strategic routes 9 - 26

	Project	Control Period 3		Control Period 4				
		2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
10	West Yorkshire - Platform lengthening							
10	Stabling for Northern (West Yorkshire)							
11	South Yorkshire - Platform lengthening							
11	Stabling for Northern (South Yorkshire)							
11	Sheffield - Leeds linespeed increases							
13	Reading Station Area Redevelopment							
13	Paddington station capacity enhancement							
13	Severn Tunnel Jct to Cardiff linespeed							
13	Cotswold Line re-doubling options							
13	Swindon - Kemble redoubling							
13	Westerleigh - Barnt Green linespeed upgrade							
13	Reading Station Area - Oxford Road Junction to Southcote Junction							
13	Didcot - Oxford area capacity upgrade							
13	Reading Station - Platform 1-8 Renewals							
13	Reading Station Concourse							
15	Barry - Cardiff Queen St corridor							
16	Chiltern Platform Lengthening							
16	LSI Chilterns							
17	Birmingham New Street Gateway Project							
17	Extension of cross city services to Redditch							
17	Extension of cross city services to Bromsgrove							
17	Platform lengthening							
17	Route 17 Round Oak to Walsall reopening							
17	LSI West Midlands							
18	Stafford/ Colwich Remodelling							
18	Bletchley Milton Keynes							
18	Power supply upgrade (AT)							
18	Crewe remodelling / resignalling							
19	Nottingham station masterplan							
19	East Midlands resignalling: Nottingham station area							
19	MML St Pancras - Sheffield LSI							
20	Platform lengthening							
20	Stabling for northern							
20	Salford Crescent New Station							
20	Salford Central New Platforms							
20	NW RUS LSI							
20	TPE Route Enhancements – Linespeed Improvements							
20	Bolton Corridor Package							
20	Buxton Remod							
20	Manchester Hub							
21	Liverpool James Street							
21	Liverpool Central Passenger Capacity							
24	Borders Rail							
26	Airdrie - Bathgate							
26	Glasgow Airport Rail Link							

Income

Track access charges

Previous sections have described the process used to identify the efficient costs of delivering our required outputs. In this section we describe our charging policy, setting out how we propose to recover these efficient costs. The approach to charging impacts on usage / funding decisions and the design of rolling-stock and therefore plays an important role in minimising whole-system costs over time.

CP4 is the first occasion where Network Rail has responsibility for proposing charges. We have done so in a manner that is consistent with ORR's guidance – particularly in relation to the balance between cost-reflectivity and complexity. The ICM has been a key input and along with our other workstreams has allowed a better understanding of the cost relationships at a disaggregated level. The proposed charges described in this plan are indicative and are also subject to review by ORR. For some charges we present options and invite stakeholder input to assist us form the proposals.

The remainder of this section summarises our process, findings, and proposals for each of the charges under consideration. Further information underpinning our proposals has been provided to ORR in a separate supporting document. This additional material addresses the various requirements and guidance set out by ORR in the PR2008 process to-date.

Variable usage charge (including freight)

Variable usage charges are intended to recover the additional wear and tear costs of operating further trains on the network, for a given capability. We have assessed this marginal cost relationship using ICM model runs, based on the way costs change with usage assumptions.

We propose a charging methodology based on vertical forces (as currently) *and* tangential forces. Tangential forces, those that impact on the surface of the rail, are important factors in rolling contact fatigue. Including a term to account for these forces provides the right signals for long-term rolling stock development and delivers cost-reflectivity. The development of the methodology for tangential forces has been discussed and reviewed with industry at a number of points throughout the process.

Charges have been calculated on a pence-per-mile basis for each vehicle currently operating on the network. A full list of these is available in the Structure of Charges supporting document. We will use the methodology to calculate charges to apply to any new vehicles unless the vehicle characteristics and/or technology are radically different to existing vehicles, in which case we would undertake a bespoke review to confirm whether the formulae could be directly applied or whether some modification were necessary.

Based on the traffic forecasts in this plan, we expect income from the new variable usage charges in 2009/10 to be £208 million for passenger services and £93 million for freight. These forecasts represent a reduction compared with the forecasts based on current charge rates of £240 million and £100 million respectively. The reduction for freight is less marked because current freight charges (set at the 2001 review) were based on a greater assumption for efficiency than those for passenger; freight was based on a 10-year efficiency assumption but passenger was only based on a 5-year efficiency assumption. The figures presented in this plan assume no differential efficiency assumptions for freight and passenger (see below) and are based on an average rate of £1.81 per thousand gross tonne kilometres for passenger trains and £1.75 per thousand gross tonne kilometres for freight trains. The slightly higher rate for passenger trains reflects various factors including the relatively greater impact from the new term for tangential forces.

The indicative charges for CP4 given above use the long term steady state cost projections at efficiency levels for the end of CP3. The impact of alternative efficiency forecasts are shown below.

Figure 6.32 Indicative usage charges based on alternative efficiency assumptions

£m/year	End CP3 efficiency	Mid CP4 efficiency assumption (8% reduction)	End CP4 efficiency assumption (12.5% reduction)	End CP5 efficiency for freight and end CP4 for passenger (similar approach to ORR determination at last review)
Passenger	208	191	182	182
Freight	93	86	81	73
Total	301	277	263	255

We are proposing that the variable cost of wear and tear on electrification assets is recovered via an additional variable charge. This would be a change from CP3, where these costs are currently recovered via a mark-up on EC4T rates. We have estimated that the total maintenance and renewal cost to be recovered is about £9 million per annum which is significantly lower than the £28 million currently recovered. This is primarily because ORR had assumed that distribution costs were variable at the previous review, whereas our assessment is that this is not the case. The supporting document discusses charging options for the electrification asset usage charge.

Route-based charging

Variable usage charges are currently based on a network average for each individual vehicle. Our analysis has shown cost-variation across the network. However, we still have reservations about the merits of adopting route-based charges. In particular, there would be practical issues for the industry and it is questionable how much this would change behaviour.

It is also important to note that our assessment of cost variability takes the capability of the network as given and it is likely that changes in required capability are a more significant driver of cost in many instances than changes in traffic. If a route-based approach was to be adopted, however, we would propose a system of charging that reflects the two main drivers of cost variation, route type and curvature.

The supporting document provides an assessment of the potential charges with and without a route-based approach. Further discussion with the rest of the industry and ORR is required before deciding which approach to adopt.

Freight-only line charge

The Government's *Future of Rail* White Paper indicated that freight should pay the full costs of freight-only lines, not just the variable costs that they currently pay. ORR is responsible for the ultimate proposal as this is a new charge. It concluded that the new charge to recover the fixed costs of freight-only lines would only be levied on two market segments, coal for the electricity supply industry (ESI coal) and spent nuclear fuel.

Following stakeholder discussion the definition of what constitutes a freight-only line has been clarified. In particular Government has confirmed that through lines should be excluded as they provide operational benefits to the mixed-use network. We have used this definition and data on traffic in 2006/07 to produce a list of freight-only lines carrying ESI coal and spent nuclear fuel as shown in the supporting document.

The supporting document also describes how we have assessed the total cost of each line and apportioned this to the two commodities, and then deducted the variable cost to give the resulting fixed cost to be recovered by the new charge. Our estimates for the cost to be recovered are £7 million for ESI coal and £0.9 million for spent nuclear fuel. The actual charge levied will be limited by the caps set by ORR as below.

ORR consulted on options to recover these costs and recently concluded that freight-only line costs should be recovered through a network-wide mark-up on usage charges for ESI coal and spent nuclear fuel. The impact of this decision is that by the end of the control period usage charges would be higher than they would otherwise be by the following mark-up factors:

- + £0.4 per 1000 gross tonne kilometres for ESI coal;
- + £3.6 per 1000 gross tonne kilometres for spent nuclear fuel.

Coal spillage charge

In the summer, we published a consultation paper on the coal spillage charge. The paper described the current charge (a 20 per cent mark up on wagons carrying coal), the problems caused by coal spillage (points failures, track circuit failures, reduced life of points, rail and ballast) and options for revisions to the charge to improve its incentive properties. Most respondents said that they would like further

Figure 6.33 Freight only line charges

£ million	2009/10	2010/11	2011/12	2012/13	2013/14
ESI coal cap	2.8	5.6	8.4	11.2	13.9
ESI coal indicative charge	2.8	5.6	7.0	7.0	7.0
Spent nuclear cap	0.3	0.6	0.8	1.1	1.4
Spent nuclear indicative charge	0.3	0.6	0.8	0.9	0.9

discussion on the options when more cost information was available. We agree with this view and have now carried out some costing.

Our estimate is that the annual cost impact on points and ballast amounts to about £7 million. This is slightly higher than the current charge (about £5 million per year) that was set by ORR at the 2001 freight charges review. We recommend that there is further industry discussion on the appropriate way forward before any decisions are taken. Options to improve the incentive properties of the charge are described in the supporting document. For the purposes of the charges presented in this SBP we have simply assumed that the current mark up on the variable charge remains in place.

Electric traction charge

Network Rail procures electricity on behalf of operators. Previously TOCs charges were uplifted annually according to a published electricity price index, the Moderately Large Users Index (MLUI). Historically this index lagged the market and furthermore, it was unclear as to the contractual mix of the underlying price data that was used to construct the index. Network Rail and ATOC established an industry working group to examine the issue.

A short-term solution was devised. It was agreed to move to a system in which we recover our actual procurement costs. Procurement decisions would be discussed and agreed with ATOC and the franchised passenger operators in advance.

We are currently working on a longer term solution with our electricity supplier, British Energy, which provides flexibility to operators so that they can manage their individual risks without imposing risk on Network Rail. In essence, operators would make price fixing decisions for electricity via Network Rail or possibly with Network Rail's supplier.

We understand that freight operators may wish to retain the MLUI based process for their tariff at least the short to medium term. We expect to implement the final agreed solution at the beginning of CP4.

Currently, freight operators are excluded from the 'wash-up', however for CP4 we propose that they should be included, so that the regime is fair and sends the correct signals in terms of energy efficiency. However, where a freight operator installs a meter on the train and is billed on that basis, we would exclude that operator from the 'wash-up' process.

Based on advice from our supplier British Energy, our own analysis and the published rates for the transmission and distribution element, we have developed three scenarios for the tariff in CP4 to provide some indication of the possible range of future costs. We report the results of these scenarios in the Structure of Charges supporting document.

The longer term vision is for operators to purchase direct from a supplier in order to drive cost and energy efficiency. To achieve this, we believe that trains will need to be metered and changes made to the industry settlements system.

For regenerative breaking we propose to continue with the concept of a discount mechanism in the price list. However, there should be a differentiation between AC and DC and within these categories where appropriate, so as to properly reward operators for investing in regenerative braking equipment.

We estimate that passenger income from EC4T in CP4 will be £878 million and freight income will be £26 million.

The industry focus has now moved to the area of electricity volumes. A study of the end-to-end processes has been jointly commissioned by Network Rail and ATOC to address the industry's concerns in this area. It is expected that the consultants will report back to the industry EC4T working group in early November 2007.

The EC4T asset charge will be a separate variable usage charge for CP4 and will no longer form part of the electricity for traction charge.

Capacity charge

The capacity charge reflects the likely additional Schedule 8 costs of new traffic on the network due to its impact on reactionary delay. The capacity charge is required irrespective of whether Network Rail is performing worse than or better than benchmark. Where performance is worse than benchmark, the capacity charge compensates Network Rail for its additional penalty payment and where it is better than benchmark, the charge should compensate Network Rail for its reduced bonus.

We have undertaken a substantial exercise to re-calibrate the charge and improve its cost-reflectivity, without compromising our ability to bill

the charges. This has included updating the raw tariff with new data and underlying relationships.

We wish to remove the simplification to a tariff per service group which was formally introduced during ACR2003 and are proposing a geographically based charge comprising 614 sections. These sections are based on the dimensions of the ICM with a different tariff for each direction in order to maintain cost reflectivity. We also propose to differentiate by 6 time-bands.

Currently, the CC term, which is part of the passenger capacity charge, is recovered via the fixed charge. For CP4 we propose to recover the full amount through the capacity charge itself, giving operators greater visibility.

In 2006/07, passenger operators were billed £140 million (when the CC term is added to the capacity charge). Based on the revised capacity charge we have estimated that for 2009/10, the passenger capacity charge will amount to £127 million, which is a reduction of 9.3 per cent. Whilst further modelling needs to be done to determine a more precise estimate for freight income, our preliminary estimate show a figure of around £20 million for CP4.

Fixed charge

The challenge for the fixed charge is to introduce greater cost-reflectivity so that franchised TOCs pay for the costs that more closely relate to their operations. A corollary of this is that we can provide funders with more accurate information on which to base their decisions. However, it will generally be necessary to examine the cost implications of specific choices rather than using fixed charges as a proxy for this since the actual implications of such choices will depend on the precise question under consideration.

Our proposed methodology builds on the strengths of the 'avoidable-cost' approach developed by AEAT in conjunction with ORR. Our proposal utilises the information within the ICM around cost relationships at a disaggregated level – calculations are performed for each of the 300 individual SRSs. The charge for each franchised TOC reflects three components:

- allocation to TOCs of any *directly attributable* costs, including station costs (see below);
- ring-fencing and allocation to TOCs of specific enhancements; and
- using appropriate metrics to allocate remaining joint / common costs. Some costs are attributable within a given SRS and are allocated on that basis, other costs (for example HQ costs) are allocated across the network as a whole.

We are completing the calculation of the FTAC for each franchised TOC and will make this available shortly.

We have also provided input to the forthcoming ORR consultation around the treatment of 'increments and decrements' that analyses the circumstances under which FTAC may be changed as a result of PTE service specifications.

Stations costs and charging

In keeping with the over-arching objectives for the structure of charges a key challenge for stations is improving cost-reflectivity. Reinforcing this, the strong message we have received through our industry consultation is that transparency around costs and spend at each station is critical.

We agree with this and our vision is to create a much greater transparency at the Station Facility Operator (SFO) level on our expected expenditure and outputs. This would be set out in our March 2009 Business Plan, to give our customers an expectation of activity at the portfolio level. Any modification would be transparent with explanations of any variances. Disaggregated spend would be reported in the Annual Return. This could provide the foundation for more effective dialogue with each SFO to jointly prioritise and integrate work at the relevant stations.

Associated with this proposed approach is a radical simplification of station charges, whereby we would set the stations long term charge (LTC) to zero and incorporate costs per Station Facility Owner portfolio within the Fixed Track Access Charge. Our main aims are to levy charges at a more meaningful level and achieve simplification where possible. This proposal achieves those aims, while limiting the level of change needed to the structure of existing contracts, which we consider important while the industry is working towards the Stations Code. The proposal would mean that beneficiaries at stations would not contribute towards costs. This is reflective of the nature of stations costs, where up to the point where capacity is reached, additional usage can be met at very low additional cost. While the LTC would be set to zero, we would put in place mechanisms to ensure that payment for enhancements would continue to be made by the sponsor.

As explained earlier in this chapter, our projected stations expenditure by SFO is summarised in an appendix to this plan and other details are contained in the supporting documents. Over the next year we plan to develop our cost reporting and coding procedures, which will require assessment of how best to approach reporting of packaged works. The aim of this is to be able to report expenditure at stations aggregated for each SFO, and overall station expenditure disaggregated by eight main work categories in our Annual Return.

Under this proposal, station costs would be included in the first component of the build-up of a fixed charge to each franchised TOC. We believe this delivers greater reflectivity, enhances transparency, and reduces complexity and administrative burden for all parties involved. However, we recognise that at least some operators have significant reservations about this approach and they would currently prefer to make the current long term charges more cost reflective. We therefore consider that ongoing discussion is needed with train operators, ORR and funders regarding this proposal.

For the purpose of the financial projections in this plan we have assumed that there will be no stations long term charge.

We are also separately working on agreement with train operators at our managed stations for the treatment of the QX charge, which is a non-regulated station charge.

Open access

As well as franchised passenger operators and freight operators, there are a number of open access operators using our network, including Eurostar, Hull Trains and Heathrow Express.

We have assumed that the majority of open access operators will offer broadly similar services in CP4 as have been offered in CP3. There are two key exceptions to this: Eurostar and Grand Central Trains. We have assumed for CP4 that Eurostar open access income ceases (with the exception of a very small amount for minor usage around Ashford), and that we will receive around £1 million per year from Grand Central Trains becoming fully operational by the start of the control period. We note that we are starting negotiations with London Underground, whose contract expires in 2008. We have assumed that the impact of a replacement contract will remain broadly neutral.

As a result we have included £19 million of open access income in each year of CP4, which is around £3 million higher than the 2008/09 plan.

Incentive regimes

Schedule 4 to the Track Access Agreement requires us to pay compensation to the franchised passenger operators when we restrict access to sections of the track to allow for engineering work to be carried out.

The Schedule 4 regime is currently being reviewed and we have therefore not developed specific cost projections for the purposes of this plan. However, we have included a simple provision of £100 million per year to reflect the potential cost of the revised regime. We will update this in April 2008.

The Schedule 8 regime is designed to compensate operators for the delays that we cause. The mechanism is designed so that if we cause delay in excess of the performance targets set we will provide compensation to the operators, but if we are able to reduce delay below our regulatory targets we will receive payments from operators for doing so.

In considering the regime in CP4 we have assumed that our plan will exactly achieve the performance targets that will be set. As such, we expect the Schedule 8 regime will be neutral in each year of the control period and we have thus

Figure 6.34 Single till income

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Freight income	(99)	(103)	(107)	(111)	(115)	**(534)**
Open access income	(19)	(19)	(19)	(19)	(19)	**(94)**
Station income (incl. QX)	(78)	(78)	(78)	(78)	(78)	**(391)**
Depots income	(46)	(46)	(46)	(46)	(46)	**(231)**
Property income	(190)	(188)	(187)	(190)	(187)	**(943)**
Property sales	(26)	(25)	(34)	(18)	(24)	**(128)**
Other income	(2)	(2)	(2)	(2)	(2)	**(12)**
Total	**(461)**	**(463)**	**(474)**	**(465)**	**(471)**	**(2,333)**

assumed no net Schedule 8 cost/income in CP4.

As part of the current regulatory regime we receive an access charge supplement from franchised passenger operators to cover the payments that we expect to make under the passenger's charter arrangements. However, we have seen recently that a number of train operators have been removing themselves from the passenger charter access charge supplement arrangements due to our continued outperformance of the Schedule 8 benchmarks. We have therefore assumed that all operators will have stopped paying the access charge supplement before the end of CP3, and have therefore assumed no income (and no cost to Network Rail) for this in our CP4 projections.

Other single till income

Single till income covers all other sources of income including our freight and other open access income, stations and depots income, property income, property sales, and other income. Our projections of other single till income are included in Figure 6.35. In the following sections we set out how we have calculated our projections for each of these areas.

Depot income

Our depots income is generally consistent with that assumed in the ISBP. We do not expect that there will be any significant change in the level of depot lease income for most depots. However, our forecast for depot income in CP4 does reflect a slight reduction of around £10 million in since ISBP. This due to the closure of depots at Ramsgate and Ashford and the termination of some plant leases. Overall we forecast that we will receive around £46 million of depot income in each year of CP4 giving a total of around £231 million.

As discussed earlier in this chapter we are proposing that the stations long term charge is abolished and that the costs are recovered instead through the Fixed Track Access charges.

Property

Our property portfolio remains core to our business. Our overall strategy is based on the active management to maximise the value of our estate obtaining a secure income base, while at the same time reviewing the estate and identifying other opportunities that will further enhance our income through the economic use of our surplus property estate. This includes developing station and rail facilities that are world class, delivered faster, and where possible self funding. We will dispose of assets where this represents the best value option. However, we plan to retain 20 per cent of the value of development and sales sites as an income stream. Figure 6.36 shows property income broken into its constituent parts.

Since the ISBP our projections have been examined in detail by independent property experts Lambert Smith Hampton (LSH). LSH broadly agree that our projections represent a fair and realistic estimate of the likely value that may be achieved from our property portfolio, given current knowledge and understanding of the market and the wider economy. Our latest projection is that we will receive around £190 million of commercial property income in 2009/10. This income will remain broadly flat through the control period. In total we expect to receive around £943 million across the five years of CP4. Our projections are approximately £185 million lower that those set out in ISBP. This reflects changes in the commercial property market and the wider economy that have occurred since June 2006, and the crystallising impact of a number of managed station redevelopment schemes. The factors which influence our projections are set out in the following sections.

Commercial lettings and retail income

Income growth for these portfolios is primarily driven by a mix of investment and organic growth. Investment projects for these mature portfolios are typically small-scale, and are generally based on improving the exploitation of retail space or changing the tenant mix and, in

Figure 6.35 Property income

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Managed stations retail income	(59)	(57)	(56)	(60)	(56)	**(288)**
Managed stations concessions	(9)	(10)	(11)	(12)	(12)	**(54)**
Managed stations other property income	(4)	(4)	(4)	(4)	(3)	**(18)**
Managed stations advertising	(17)	(18)	(17)	(16)	(16)	**(83)**
Property rental income	(87)	(86)	(85)	(84)	(84)	**(425)**
Other advertising	(14)	(15)	(15)	(15)	(16)	**(75)**
Total	**(190)**	**(188)**	**(187)**	**(190)**	**(187)**	**(943)**

the case of commercial lettings, railway arch refurbishment programmes.

In respect of commercial lettings income the base for the ISBP was the 2005/06 forecast. Due to changing market conditions the current forecast for the end of 2008/09 is lower than this assumed starting point. In addition lower levels of growth are now also being forecast. The latest growth forecasts based on the Investment Property Forum (IPF) indicate nominal organic growth, weighted for our portfolio to be around 1.7 per cent in CP4. We are forecasting steady annual growth in nominal terms of around 2.3 per cent. There is likely to be some growth from increased return on investment, but a counter impact from the effect of some station developments and other rail projects. However, we anticipate that the combined effect of investment and organic growth will be insufficient to offset inflation in real terms. Therefore, we are currently forecasting a reduction of £97 million in total rental income from £521 million to £435 million through CP4.

Organic growth within our station retail portfolio is projected to continue, although, we are now forecasting a decreasing trend. This is based on forecasts of slowing in the economy and a reduction in consumer spending. However, it is likely that these figures will be reduced by the installation of revenue protection barriers, congestion relief schemes and development schemes at the managed stations. Our Plan assumes a loss of around £12 million of retail income per annum through CP4, including around £4 million at Euston and £5 million at Waterloo. Overall, we are forecasting a reduction in retail income from around £393 million in the ISBP to around £342 million.

We continue to look to exploit opportunities which may arise from the Olympics, the regeneration of Stratford, and the opening of CTRL Phase 2. As opportunities occur we will include any potential income in our subsequent business plans.

Station development

As mentioned elsewhere in this document we are currently producing a station development programme. Our current view is that the station development programme will have a significant negative impact on retail income in the short-term as developments are undertaken and retail units have to be taken out of service. We have reflected this in our income projections for CP4 and CP5. As explained below, however, there are substantial railway and longer term benefits.

The station development programme is designed to release value from the property estate and capture much of this value in the form of rail benefits (hypothecated gains). This kind of benefit does not generally provide specific financial benefits but rather makes provision for an enhancement to our asset base as part of the development scheme. Therefore benefits from these hypothecated gains are treated as a cost to the development. It is too early to fully quantify the value of the anticipated hypothecated gains over CP4. However, they are anticipated to be significant. For those schemes that are currently being developed it is estimated to be in the region of £180 million. The potential Planning Gain Supplement (PSG) poses a threat to the continued improvements in value from our activities in this area. The PSG effectively is a tax levied on any increased value that arises as a result of planning consent being granted. In the case of hypothecated gains it is likely that any developer would factor in the potential cost of PSG into the overall cost of the scheme, resulting on a lesser value of railway benefit being ultimately provided by the scheme. We are discussing the potential impact of any implementation of PSG with ORR and government.

In addition to the main stations development programme, two other specific schemes currently under development are major remodelling at Euston and Victoria. These schemes are required to accommodate growth and provide improved facilities for customers. The benefits from the schemes at Euston consist entirely of rail benefits, which are therefore not included in our net sales projections. Victoria also includes a net cash benefit of £56 million on top of the rail benefits. The benefits and cash elements from these schemes are shown in Figure 6.23 . The planning and development of these are at a very early stage and we are recommending that because of the size of the benefits and the current level of uncertainty in delivering these projects within the initial indicative timescales their benefits are treated as ringfenced. If the benefits and cash are realised in whole or in part in CP4 these would be made available for investment in the railway.

In October 2007 we identified sites at Twickenham, Guildford, Wembley cutting, Walthamstow, Enfield, Epsom, Maidstone East and Paddington Enterprise House as development sites. We are currently seeking partners to enter with us into joint ventures to invest in sustainable developments at these sites. It is envisaged that these developments

Figure 6.36 Euston and Victoria income

£m (06/07 prices)		CP3	CP4	CP5	Total
Euston	Cash				0.0
	Costs	(1.6)	(2.2)	(0.1)	(3.9)
	Net	(1.6)	(2.2)	(0.1)	(3.9)
Rail Benefits		95.6	143.4		239.0
Victoria	Cash		59.2	51.3	110.5
	Costs	(1.6)	(2.6)	(0.1)	(4.2)
	Net	(1.6)	56.5	51.3	106.3
Rail Benefits		50.0	25.0		75.0

will boost the local communities and further develop passenger transport facilities at these localities.

We also expect that our station development programme will have a positive impact on our longer term income. At this stage of the programme development it is too early to be able to quantify this in any meaningful way due to the uncertainty of the scope of developments. On this basis we have not factored any increase into our projections as a result of this programme.

Advertising and other income

Our overall assumption on advertising income in the ISBP was based on the 10-year concession recently agreed with Maiden (since taken over by Titan). The concession was based on a minimum guaranteed rent for both station and roadside advertising. The trigger for exceeding the minimum level is set at an extremely challenging level and would require very high performance on the part of Titan. A general tightening in the advertising market has led to Titan renegotiating their contract. As a result our, forecast advertising income has reduced by around £39 million through CP4.

The telecoms market is showing little sign of recovery and we are now forecasting no income growth in this area in CP4, as a result income will be lower than that assumed in ISBP. It is expected that there will be further reduced utilisation of the cable network, and a further reduction in payphone usage as mobile phone usage saturates the voice market, therefore a reduction in income may occur as CP4 progresses. It should be noted that under our internal accounting guidelines we treat telecoms income as "other operating income", and our projections for this are therefore included in our projections of operating costs which are outlined earlier in this chapter.

Property sales

Our property sales strategy is based on maximising sales income subject to protecting longer-term rental income, station clusters and station development opportunities. As a guiding principle we will retain around 20 per cent of the value of sales and development sites as income. Generally the majority of our large and easily disposable sites will have been sold by the end of CP3. Future sales will be more dependent on more complex planning and operational issues and longer gestation periods, and may require increasing levels of support from stakeholders. Therefore our projected sales in CP4 and beyond will be significantly lower than in CP3.

Our current estimate is that we will receive around £25 million of property sales and development income in 2009/10 which remains broadly constant to 2013/14, generating a total of around £127 million across the five years of CP4. This is significant increase of around £40 million from ISBP, which has been driven by the changing of phasing and specific disposals planned for the period and movements in the market over the last 18 months.

At this early stage of the station development programme for CP4 it is assumed that much of the value of our contribution to station developments will be realised in the form of rail benefits (i.e. modern stations capable of handling future capacity demands). As a result, there will be neither a cash surplus nor a funding gap requirement as a result of this programme. However, any outperformance would be available to fund ongoing investment in the railway.

Other income

We also receive income from the passenger franchised operators for providing services on their behalf (e.g. litter clearance and insurance). Our latest projection is that we will continue to receive around £6 million per year for this, a total of £29 million across the control period.

Disaggregation of Scotland and England & Wales

We have disaggregated our expenditure and income projections between Scotland and England & Wales in order to understand their respective revenue requirements. The disaggregated expenditure and income projections are included in the appendices. This section briefly describes the methodology.

Our expenditure and income projections have been derived from the ICM which applies forecasting methodologies consistently across the whole network. Wherever possible, activity and expenditure is forecast at strategic route section level based on the specific assets on the route and the level of traffic. The national projections are then the sum of the relevant route sections. The same applies to income from variable charges, which is linked to traffic on relevant route sections.

However, not all expenditure and income is directly attributable to route sections and some categories need to be allocated to routes using the most relevant metric. This is particularly the case for operating costs and maintenance activities which are managed at network level.

Operating costs have been allocated in accordance with current regulatory accounting guidelines. For each nationally managed function these use the most appropriate metric to allocate costs, the main metrics being train kilometres, headcount and total M&R expenditure. These metrics result in allocations to Scotland of around 9 to 9.5 per cent.

In line with our 2007 Business Plan, we have allocated nationally managed maintenance costs in proportion to existing area budgets for direct activity, which gives Scotland a 9.3 per cent share of these costs. This applies to, for example, the costs of the Civils inspection regime, railhead treatment and property utility supply costs.

The large majority of forecast renewal costs are attributed directly to relevant route sections. For renewal expenditure that is not built up in this way we have used train kilometres as the default metric for allocating costs estimated at national level unless there is an obvious alternative. This approach results in a 9.8 per cent share of the relevant costs being allocated to Scotland. This applies to, for example, the renewal costs of mobile plant which can be used anywhere on the network.

Changes from ISBP and BP07

A summary of the changes in forecast expenditure is set out in the appendices, showing variances for England & Wales and Scotland. The most significant changes to core OM&R forecasts, described above, are:

- a reduction in non-controllable operating costs, largely due to lower forecasts of traction electricity;
- increased activity and expenditure on operational property, reflecting a more robust assessment of the activity required to address the legacy of under-investment; and
- increased expenditure on the FTN / GSM-R project largely resulting from changes in mast heights and the transfer of cab fitment costs previously classified as enhancements.

We have also identified a number of potential further investments that would deliver cost or performance benefits over and above the base efficiency and performance assumptions in this plan.

Since our 2007 Business Plan we have revised our signalling renewals expenditure forecasts, deferring £130 million of expenditure from CP3 to the start of CP4. This has already been funded in CP3 so no additional funding will be required for this investment in CP4.

Supporting documents

We are providing the following supporting documents to ORR:

- the Infrastructure Cost Model;
- a detailed analysis of our current operating costs;
- a cost estimating price book for the CP4 enhancements;
- a risk analysis report for the CP4 enhancements; and
- a deliverability assessment for the CP4 enhancements.

7 Expenditure and financing

We have used the established building block methodology to calculate the potential impact of our expenditure and other income projections for our required revenues in CP4. These calculations are applied separately to England & Wales and Scotland.

This methodology involves taking our expenditure projections for operation costs, maintenance and Schedule 4 and 8; calculating the expected value of the Regulatory Asset Base (RAB) in each year based on our projected renewal and enhancement expenditure; and calculating the associated value of the regulatory return and the relevant amortisation charge. Adding these elements together enables us to calculate a gross revenue requirement across CP4. From this we net off the single till income which we would expect to receive to derive the net revenue required from franchised passenger train operators. Finally, we estimate the amount of variable charge income that we would expect to receive from franchised passenger train operators. Taking this income away from the net revenue requirement we end up with an estimate of the amount of funding that we would need to receive in the form of fixed track access charges from franchised passenger train operators and network grants from DfT and Transport Scotland.

The projected expenditure and income is described in the previous chapter and summarised in Figure 7.1 below. This chapter therefore describes the financial assumptions, the resulting calculation of our revenue requirement and the implications for our financial position

Financial assumptions

Figure 7.2 shows the calculation of the assumed opening RAB. This is based on the assumptions made at the last review adjusted to take account of subsequent events. These adjustments include the agreement to defer an element of our income in the current control period in return for an increase in the RAB, additional enhancements which it has been agreed should be added to the RAB, and the addition of the expected regulatory incentive adjustments as a result of improved asset condition and volume growth. We have not included any adjustment to the RAB for the items of expenditure which have been deferred from CP3 to CP4 since we have not included this deferral in our expenditure projections in calculating our income requirement so we will not be paid twice for this work (although this expenditure is clearly taken into account in assessing our debt and financial ratios).

Figure 7.2 Regulatory asset base

	£bn
At 31 March 2007	25,271
Renewals and enhancements in ACR03	5,154
Amortisation	(3,136)
Deferred revenue	3,415
Volume incentive	356
Asset stewardship incentive index	339
Signalling interim review	326
Additional enhancements	1,105
At 31 March 2009	32,830

It is clearly essential that there is sufficient financial buffer to enable the business to manage risk. We have been working with ORR and government on the appropriate assumptions in this area. We will also need to discuss these assumptions further with rating agencies since they are clearly critical to our plans to raise finance without the need for a government guarantee and help us to build on the progress which has been made over the last five years.

For the purposes of this plan we have assumed an annual financial risk buffer of £250 million for Great Britain as a whole (split pro rata between England & Wales and Scotland) at the top end of

Figure 7.1 Total expenditure and single till income

	CP3	ISBP	SBP (E&W)	SBP Scotland	SBP Total
Controllable opex	4,240	3,854	3,429	342	3,771
Non-controllable opex	1,632	2,115	1,690	152	1,842
Maintenance	5,868	4,765	4,356	463	4,819
Renewals	14,232	10,846	9,966	1,396	11,362
Discretionary investment	225	-	807	78	885
Renewals deferred from CP3	-	-	229	11	240
Enhancements	3,306	8,250	8,353	380	8,733
Single till income	(2,536)	(2,505)	(2,156)	(177)	(2,333)
Total	26,967	27,424	26,674	2,645	29,319

the ORR range. This is around four per cent of our operating, maintenance and renewal expenditure and is broadly equivalent to the level of efficiency savings assumed in our plan. We will provide further analysis to ORR in support of our assumed risk buffer.

We have made separate allowance for contingencies in our proposed enhancement cost projections. In general we have included P80 estimates of the costs of major projects and have analysed the P80 cost across the portfolio of other projects which are to be funded by the review. This represents the estimated cost at which there is an 80 per cent probability of the actual costs being less than this. We are keen to discuss with ORR, DfT and Transport Scotland how best to treat these costs without imposing unnecessary risks on the business or making the investment unaffordable for government. For the Thameslink Programme we have established an explicit pain-gain sharing arrangement. For all other renewal and enhancement expenditure covered by the review, we believe that there is considerable merit in adopting an approach which is consistent with other regulated infrastructure businesses whereby the RAB is adjusted on a five year rolling basis to take account of variances between actual and assumed expenditure.

Our interest costs are modelled taking account of our actual mix of debt, including index-linked debt and the way in which we expect to raise new debt in future. Our policy is to hedge all foreign currency exposure and to fix a high proportion of our interest costs for the entire control period. Interest costs also include the FIM fee paid to government in return for the current guarantee. However, we expect to raise new debt without the guarantee and this is taken into account in our projections.

Following discussion with ORR and government we have treated tax as a cost in the same way as other expenditure (rather than including an allowance for this in the rate of return). Due to carried forward tax and losses and allowances we do not expect to pay significant corporation tax during CP4. However, this is likely to change in CP5 and if this was brought forward it would have a significant impact on the required level of income.

Our ability to achieve and maintain an investment grade rating will depend on how the ORR chooses to approach the overall financial and risk framework for Network Rail. For the moment, we have assumed a real post-tax rate of return of 4.5 per cent in line with ORR's assumptions. A return at this level would generate additional profits over and above the risk buffer which go into a ring-fenced fund. In England & Wales we assume that this fund is used for investments which are already included in this plan; in Scotland we assume that it funds some of the "tier 3" enhancements which we will be developing further with Transport Scotland. Clearly this funding is not certain since it depends on the business achieving the efficiency targets set out in this plan.

There is also a possibility that we may be able to reinvest our profits particularly if we are able to beat these targets. If so, we would discuss with our customers and funders how such reinvestment should be prioritised before we reach a conclusion. We would expect this to focus on delivering longer term benefits for rail users.

We have assumed that all renewal and enhancement expenditure is included in the RAB, although we understand that DfT and Transport Scotland may wish to consider cash funding for an element of these enhancements. We have assumed that £300 million of the initiatives to deliver performance improvements and the move towards a seven-day railway will be operating rather than capital expenditure. We also assume that all expenditure is depreciated in line with the assumptions made at the last review. Given the scale of enhancement expenditure, this results in an increasing amortisation charge. However, this is clearly offset by additional industry revenue and wider economic benefits. The amortisation charge, excluding that associated with CP4 enhancements, is broadly equivalent to the estimated steady state level of renewals for the existing network.

Revenue requirement

The calculation of the revenue requirement for England & Wales and Scotland respectively is shown in Figure 7.3 and Figure 7.4. This shows that the overall CP4 revenue requirement for England & Wales is £24.5 billion and for Scotland it is £2.8 billion. This is above the amounts implied by the ORR's initial assessment mainly because of the enhancements required by the HLOSs, the further work on the required level of renewals in some areas, and our assumptions on efficiency.

The underlying expenditure assumptions will, of course, be subject to review. As part of this, there are areas where a choice may need to be

Figure 7.3 England & Wales revenue requirement

£ million (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	CP4
Maintenance	999	951	917	896	885	4,646
Controllable opex	705	695	682	676	671	3,429
Non-controllable opex	315	332	342	349	353	1,690
Schedule 4 costs	90	90	90	90	90	450
Return on RAB	1,286	1,494	1,581	1,646	1,697	7,704
Amortisation	1,612	1,688	1,743	1,796	1,843	8,682
Tax	8	16	16	15	13	68
Gross revenue requirement	**5,014**	**5,266**	**5,371**	**5,468**	**5,552**	**26,671**
Other single till income	(424)	(422)	(433)	(423)	(430)	(2,132)
Net revenue requirement	**4,589**	**4,842**	**4,939**	**5,045**	**5,122**	**24,538**

Figure 7.4 Scotland revenue requirement

£ million (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	CP4
Maintenance	102	98	94	90	89	473
Controllable opex	70	69	68	67	67	342
Non-controllable opex	27	31	31	32	32	152
Schedule 4 costs	10	10	10	10	10	50
Return on RAB	145	171	180	186	188	870
Amortisation	207	211	215	216	216	1,065
Tax	1	1	5	6	5	19
Gross revenue requirement	**562**	**591**	**603**	**607**	**607**	**2,971**
Other single till income	(35)	(36)	(35)	(35)	(35)	(177)
Net revenue requirement	**527**	**555**	**568**	**572**	**572**	**2,794**

made about how to prioritise the available resources. It should also be noted that the calculated revenue requirement includes allowance for:

- our proposed discretionary investments, although the potential benefits in CP4 and beyond have not yet been assessed and are not therefore included in these calculations;
- the potential options, including EEA and other enhancements, which are expected to deliver additional revenue or other benefits elsewhere in the industry; and
- the contingencies associated with risk on enhancements and the impact of real input price inflation, the treatment of which requires further discussion with ORR and government.

The revenue requirements will therefore continue to be reviewed during the iterative periodic review process.

Financial projections

The assumptions explained above mean that the level of debt would increase from £22 billion at the end of CP3 to £34 billion at the end of CP4 (£28 billion in 2006/07 prices). These changes reflect the substantial expenditure on enhancements which will also result in additional income to the industry as well as wider benefits to passengers or freight users and to the wider economy. Our debt as a proportion of the RAB remains at below 70 per cent, well below the 85 per cent threshold in our licence. By way of comparison, net debt levels in the aggregate UK water sector and the energy sector are similar to our current levels and are also projected to increase significantly over the next few years.

The resulting financial projections are contained in the appendices. We are continuing to develop our proposals for raising debt without the government guarantee. We will continue to discuss this and the implications for the review with the rating agencies, ORR and government. Our current hedging policies have not changed since publication of the 2007 Business Plan.

Our ability to raise these levels of debt will require us to achieve and maintain a robust investment grade rating. For us to do so, rating agencies and investors will need to be satisfied that our revenues provide adequate cover for our costs, that the risks we face as a business are proportionate and that our regulatory framework is robust and predictable.

8 Outputs

This chapter describes the expected outputs that we will deliver based on the activity and expenditure projections included in Chapter 6. We set out how we intend to contribute to the delivery of the industry HLOS outputs specified by DfT and Transport Scotland. We also set out further outputs that we expect to deliver as infrastructure manager.

The key outputs are discussed in the following areas:

- safety;
- environment;
- reliability and punctuality;
- capacity and capability;
- asset stewardship;
- stations;
- network availability; and
- measuring success through stakeholder surveys and our balanced scorecard.

We are keen to provide greater transparency about our plans and to do so at a more disaggregated level. Changes to our plans should also be transparent. However, it is important to recognise the need for an element of flexibility so that we are able to deliver the required outputs in the most cost-effective way for the industry as a whole and without inadvertently increasing overall costs by setting fixed targets at a more disaggregated level. It should also be noted that there is a range of uncertainty around a number of the key outputs some of which can be influenced significantly by external events.

Safety

Safety performance on our railway has continued a long term improving trend. Fatal train accidents have consistently reduced, with no passenger fatalities from train accidents in 2005 and 2006. Following the introduction of Train Protection Warning System (TPWS), the risk from Signals Passed at Danger (SPADs) reduced by more than 90 per cent between 2002 and 2006. Rail safety performance is now better than other modes of transport in UK against a number of measures. Workforce accidents have also continued to reduce. These improvements have continued against a trend of rising passenger numbers and increasing numbers of trains.

However, recent accidents, including the train derailment in Cumbria, with one passenger fatality (February 2007) and a track worker fatality at Ruscombe (April 2007), serve as reminders of the ongoing challenge to maintain and improve, so far as reasonably practicable, safety on our railway.

Over the last ten years, the industry has developed a comprehensive model of system safety risk on Britain's mainline railway. The safety risk model, maintained by the Rail Safety & Standards Board (RSSB), is used to assess the safety risk on the mainline network from all of the hazardous events that can give rise to fatality or injury. The risk is expressed as fatalities and weighted injuries per year for each of the population groups at risk; passengers, workforce and public.

The DfT HLOS includes two safety targets for CP4, both based on output measures from the industry safety risk model:

- passenger safety risk – measured as fatalities and weighted injuries normalised per million passenger kilometres – with a target to reduce this risk by 3 per cent during CP4; and
- workforce safety risk – measured as fatalities and weighted injuries normalised per million employee hours – with a target to reduce this risk by 3 per cent during CP4.

These are industry targets to be delivered by Network Rail and train operators working in cooperation. Both targets are based on risk, rather than actual performance, measured through the industry safety risk model.

These targets do not encompass all of Network Rail's health and safety responsibilities. Under the Health & Safety at Work Act, 1974, we have a duty to continue to reduce, so far as is reasonably practicable, health and safety risks to any person affected by our undertaking. Therefore our plans also cover risks outside the scope of the HLOS targets, including health risks and risks to the public.

This section:

- sets out our approach to managing health and safety improvements during CP4;
- describes our structured plans for health and safety improvements;
- shows how these will contribute to delivery against the targets; and
- describes how we will monitor performance against the targets.

Managing health and safety improvements

Safety on the railway depends largely on the proper design, construction, maintenance and operation of the network. Most safety improvements will come from more effective and efficient development and management of the network, rather than from "add-on" safety initiatives. The health and safety plan for CP4 is therefore based to a large extent on the impact that our asset and route strategies will have on overall safety performance.

Our asset policies aim to deliver a safe and reliable railway through the proactive management of our assets. These asset policies specify the design and future inspection and maintenance regimes for assets that will be installed during CP4. This takes into account safety and legislative issues, including the overarching requirement to reduce health and safety risks so far as is reasonably practicable.

In developing these policies, and specific route based plans, consideration has been given to key risk areas identified through a systematic approach to risk assessment.

The safety plans are structured by the type of risk including each infrastructure asset such as track, level crossings, railway crime, weather, signals passed at danger, stations and workforce health and safety. We have provided ORR with further detail on each of these areas in a separate supporting document.

Each year the RSSB publishes a Railway Strategic Safety Plan, based on the individual safety plans of Network Rail and train operators. This shows collectively how the industry plans to address key safety risks on the mainline railway and the projected impact on risk over a three year period. The plans described here were used to support Network Rail's input to the Railway Strategic Safety Plan covering the period 2008 to 2010.

During the summer, we consulted train operators on progress with the development of our plans and on the development by train operators of their own plans. We worked with train operators and RSSB to analyse the likely impact of train operator plans on the risk projections for CP4, based largely on their submissions to the Railway Strategic Safety Plan for 2008 to 2010.

Passenger safety risk

The passenger risk profile on the mainline network comprises risk from train accidents and non-train accidents.

Train accident risk is characterised by very infrequent accidents which have the potential for high casualty rates. Although this risk category accounts for only five per cent of total risk to passengers, it represents 25 per cent of total fatality risk to passengers, due to the potential high consequence of these accidents. This aspect also gives train accident risk a high public profile. It is clearly of particular strategic importance to Network Rail and the rest of the industry.

Nevertheless, passengers are far more likely to suffer injury arising from individual accidents on stations or on board trains than in train accidents.

Passenger risk at stations represents 70 per cent of total passenger risk, with slips, trips, falls, assaults and platform / train interface accidents accounting for the greatest part of this risk. The 17 stations managed directly by Network Rail carry 26 per cent of total passenger risk, reflecting the high proportion of passenger journeys that start or finish at one of these stations.

Passenger risk on trains, excluding train accidents, represents 26 per cent of total passenger risk, the major contributors being assaults, contact with objects (including cuts from sharp edges), and slips, trips and falls.

Reducing train accident risk

Around 78 per cent of train accident risk to passengers is under the control of Network Rail. It is anticipated that our plans will reduce this by around seven per cent during CP4, with the main contributors being:

- infrastructure asset strategies (particularly track and structures);
- improvements in management of weather related risks;
- improvements in irregular working;
- improved management of level crossings.

The other 22 per cent of train accident risk to passengers is under the control of train operators. Based on analysis of train operator plans submitted in support of the industry Railway Strategic Safety Plan for 2008 to 2010, it is anticipated that this will reduce by around six per cent during CP4, with the main contributors being:

- improvements in irregular working;
- improved traction and rolling stock maintenance; and
- improved management of signals passed at danger (SPADs).

Overall, train accident risk to passengers is projected to reduce by 6.7 per cent during CP4.

Network Rail managed stations

Risk to passengers at Network Rail's 17 managed stations accounts for 26 per cent of total passenger safety risk. It is anticipated that our plans will reduce this by four per cent during CP4. This projection takes into account the significant increase in passenger numbers during CP4 and the limited degree of control over passenger behaviour, which accounts for the greatest proportion of this risk. Plans to reduce passenger risks at Network Rail managed stations include:

- implementation of slips, trips, and falls reduction schemes including lighting surveys, application of consistent design standards for stairs, standard signage and improvements to cleaning arrangements;
- reduction in passenger assaults through identification of "at risk" areas with improved controls, more widespread installation of CCTV, maintaining secure stations accreditation and working closely with BTP to continually reduce these risks;
- reduction in boarding and alighting risks through initiatives drawing attention to the platform/train gap, and increased provision of yellow lines and accompanying signage or station announcements;
- station capacity modelling and enhanced crowd management processes to allow better control during periods of high train service demand; and
- trial of improved signage warning of the hazards of crossing tracks at stations.

During CP4 significant enhancements are being planned to a number of principal stations such as Birmingham New Street, London Bridge, Cannon Street, King's Cross, and Euston. It is expected that these enhancements will bring with them corresponding safety improvements as the latest standards and best practice will be applied within the design.

Train operator managed stations

Risk to passengers at stations managed by train operators accounts for 44 per cent of total passenger safety risk. Train operator plans to reduce passenger risk at their leased stations include:

- reduction in passenger slips, trips and falls, through targeted action at stations with highest numbers of incidents; and
- reduction in passenger assaults, through better communication of information to passengers and targeted use of police community support officers and CCTV.

Network Rail retains landlord responsibilities at the stations leased to train operators. This includes ongoing maintenance and renewals activities. We are working with train operators to introduce improvements to these contractual relationships through the introduction of a new Stations Code. During CP4 we will also implement a number of enhancement projects that will have a positive impact on passenger safety risk at train operator managed stations. These include:

- Thameslink which will affect 50 of our busiest stations;
- Reading area redevelopment;
- National Stations Improvement programme;
- Access for All programme; and
- train lengthening programme.

It is anticipated that the above plans will reduce risk to passengers at stations managed by train operators by five per cent over CP4. Again, the trajectory allows for the projected increase in passenger numbers and the limited degree of control over passenger behaviour.

"On-board" passenger risk

The risk to passengers on board trains accounts for 26 per cent of passenger safety risk, excluding train accident risk. It is anticipated that train operator plans will reduce this by one per cent over CP4. Again, this allows for the projected increase in passenger numbers and the limited degree of control over passenger behaviour. The main contributors to this are:

- reduction in passenger assaults, through better communication of information to passengers and use of police community support officers and on board CCTV; and
- reduction in injuries due to contact with objects on board, through improved design of rolling stock interiors during refurbishment.

Overall passenger risk

There is inevitably some uncertainty about the precise impact of the above initiatives on the safety risk metric. However, the overall reduction

in passenger risk during CP4 is projected to be better than the HLOS passenger safety target of three per cent.

Workforce safety risk

Risk to Network Rail employees and its contractors accounts for 48 per cent of workforce safety risk. Slips, trips and falls, contact with objects and manual handling are the major contributors. The risk of track workers being struck by trains or electrocuted, accounts for 18 per cent of this risk. However, due to the high consequence of these incidents, they represent 83 per cent of total fatality risk to track workers.

Train operator workforce risks account for 52 per cent of total workforce safety risk on the network. This risk is split evenly between risk to staff in stations and risk to staff on trains. It is noted that this excludes risk to train operator employees in yards, sidings depots and other locations outside of stations and controlled infrastructure.

The major contributors to train operator workforce risk at stations are assaults, slips, trips and falls and boarding and alighting. On trains, the major contributors are contact with objects, assault and slips, trips and falls. Train accident risk and trackside risk when leaving the train are also significant contributors.

It is anticipated that our plans outlined above will reduce workforce safety risk for Network Rail and its contractors by more than the three per cent target during CP4. This will be delivered by:

- better processes and systems;
- improved communication of safety information;
- enhanced competence and leadership;
- improved physical controls; and
- improvements to safety culture.

Based on analysis of train operator plans submitted in support of the industry Railway Strategic Safety Plan for 2008 to 2010, it is anticipated that train operator workforce safety risk will also reduce by more than the three per cent target during CP4, with the main contributors being:

- reduction in staff assaults, both on board and at stations, through better communication of information to passengers and enhanced training of staff; and
- reduction in staff slips, trips and falls at stations, through targeted action at stations with highest numbers of incidents.

Public safety

Network Rail has a legal duty to continue to reduce risks to the public so far as is reasonably practicable. The biggest risks to the public arise from the behaviour of a small proportion of the public who place themselves at risk through trespass and misuse of level crossings. We will continue with our programmes to manage railway crime and level crossing misuse through our strategy of enabling, engineering, education and enforcement.

Health

We have management arrangements in place to comply with legislative occupational health requirements, such as our alcohol and drugs policy in respect of those undertaking safety critical duties. Furthermore, due to the link between good workforce health and increased productivity, we have a general policy to promote good health, which goes beyond legislative requirements.

Monitoring safety performance

The industry performance against the HLOS safety targets will be measured by the output of the safety risk model at the start and finish of CP4. The safety risk model is currently only updated every eighteen months, and it is therefore anticipated that there will be only two interim runs of the safety risk model during CP4.

Throughout CP4, RSSB will report the actual fatalities, major and minor injuries, weighted accordingly, as a moving annual average on a quarterly basis.

For the passenger safety metric, RSSB will report on a passenger safety index comprising an element of train accident risk, based on the output of the precursor indicator model (PIM), and non-train accident risk based on the moving annual average for actual fatalities and injuries. These will be weighted accordingly.

We will monitor similar metrics, covering Network Rail's contribution to passenger risk, based on the PIM output (excluding TOC contribution) and passenger non-train accident risk on Network Rail managed stations.

Environment

The economic benefits delivered by an effective transport system are generally well understood, as are the relative competitive strengths that rail has over other major forms of transport. These include energy efficiency and environmental impact, factors that society increasingly values. However, whilst this bodes well for the future of rail transport, these factors will come under increasing public scrutiny and it is vital that we have in place plans to minimise the environmental impact of our operations.

Our plans for CP4 build on the success we have achieved over recent years and progress many of the initiatives we set out in our 2006 Corporate Responsibility Report. This report is currently being updated and will be reissued later this year. We are forecasting outputs over a number of key environmental measures, as summarised in Figure 8.1.

Figure 8.1 Environment targets

Activity	Target
Reduction in carbon emissions from non-traction energy	20%
Non-sleeper wood products FSC certified	80%
Office paper from recycled sources	100%
Infrastructure management materials from recycled or reclaimed sources	10%
Non-track waste recovered or recycled	60%
SSSIs classed as favourable or recovering	100%
Reduction in water usage	5%

Carbon emissions

In 2006/07 Network Rail's non-traction energy consumption was approximately 484 million kWh of electricity and 63 million kWh of gas. This equates to 270,000 tonnes of CO_2 emitted. Approximately one third of this is associated with the large managed stations, the balance arising from our operational activities. We have carried out a detailed review of our energy consumption and identified a number of initiatives that we believe will enable us to achieve a 20 per cent reduction in carbon emissions by the end of CP4 compared to emissions in 2006/07. These include:

- energy awareness among our employees;
- the implementation of intelligent control systems on building heating and lighting systems; and
- increased use of renewable energy.

Emissions as a result traction electricity equates to approximately three million tonnes carbon dioxide per annum. Reducing these emissions is not entirely within our direct control and we are working with train operators to develop plans and targets which are expected to be in place during 2008. We will provide details of our proposed targets in our April update.

Sustainable materials and waste

Although material consumption is clearly a necessary part of our plans to meet the growing demand for rail services, we are committed to reducing the amount used and the subsequent waste wherever possible. Our philosophy is "recover, recycle or reuse", and we have set ourselves the following challenging targets for the end of the next control period:

- currently 90 per cent of our wooden sleepers are provided from Forestry Stewardship Council (FSC) certified forests. We would like to extend this so that 80 per cent of non-sleeper wood and wood products are also FSC certified;
- 100 per cent of office paper to be from recycled sources;
- 10 per cent of materials for infrastructure management to be from recycled or reclaimed sources;
- 60 per cent of non-track waste is recover, recycled, or reused (we are currently achieving a level of 90 per cent for track waste); and
- 80 per cent of office furniture is recycled or re-used.

Biodiversity

Network Rail has areas of its land designated as sites of special scientific interest (SSSIs). Our commitment to Natural England is to achieve favourable or recovering status for 21 of these by 2010. We will then maintain these sites in this condition and explore ways of improving the condition of the other less accessible SSSIs.

Environmental incidents

We use risk assessment and pollution prevention techniques to help avoid environmental incidents, but if they do occur, we report them and carry out appropriate actions to mitigate any environmental impact. We are currently reviewing the way we measure our performance on this task and how we set targets on incident management and close-out. We will provide details of these targets in our April update.

Water efficiency

Our efforts over recent years have contributed significantly to a reduction in our water usage, with current consumption approximately 1,000,000m^3 per annum. Although this makes further reductions challenging we are committed to address this and our current view is that we will achieve a further five per cent reduction by the end of CP4. We are doing further work on this and will report on progress in the April update.

Punctuality and reliability

Research shows the importance of punctuality and reliability to the travelling public and freight users. In particular, the extent to which people or goods are severely delayed has a significant impact on their confidence in using rail.

These messages are reflected in the HLOSs which specify levels of Public Performance Measure (PPM) and significant lateness. This is against the background of a growing railway combined with delivery of significant number of large enhancement schemes. The specified level of PPM (92.6 per cent) is above the level of performance reflected in most train operators' current franchise commitments. It is also higher than the industry has experienced since PPM was introduced as a measure of punctuality at the time of privatisation.

As punctuality and reliability improve, it will also become important to consider the relative value of improving it further compared with other factors, such as crowding and journey time, in order to decide the best focus for the industry's resources.

CP3 performance

Figure 8.2 shows that PPM measured on a moving annual average for each period has improved over the last five years from 78.7 per cent to 88.7 per cent. It is now 0.4 percentage points ahead of the joint industry target. This improvement represents a reduction of 47 per cent in the proportion of trains cancelled or arriving at their destination late. Although the rate of improvement in PPM has slowed in the last year, we are forecasting a further improvement to 90.4 per cent by the end of CP3.

This significant improvement in PPM has been in all sectors and by most TOCs. None is currently operating at less than 80 per cent and many exceed 90 per cent. It is illustrated by performance during the last 12 months in which over 90 per cent PPM has been achieved on 226 days compared to 172 days in the previous year.

In Scotland, PPM is currently 89.4 per cent compared with 80.6 per cent five years ago. The improvement in performance has been due to the focus of both First ScotRail and Network Rail on improving the underlying robustness of the rolling stock, infrastructure, timetable and operating control.

The larger proportion of this progress is due to improvements by train operators. Delay caused by train operators is now below the level

Figure 8.2 Period and moving annual average PPM

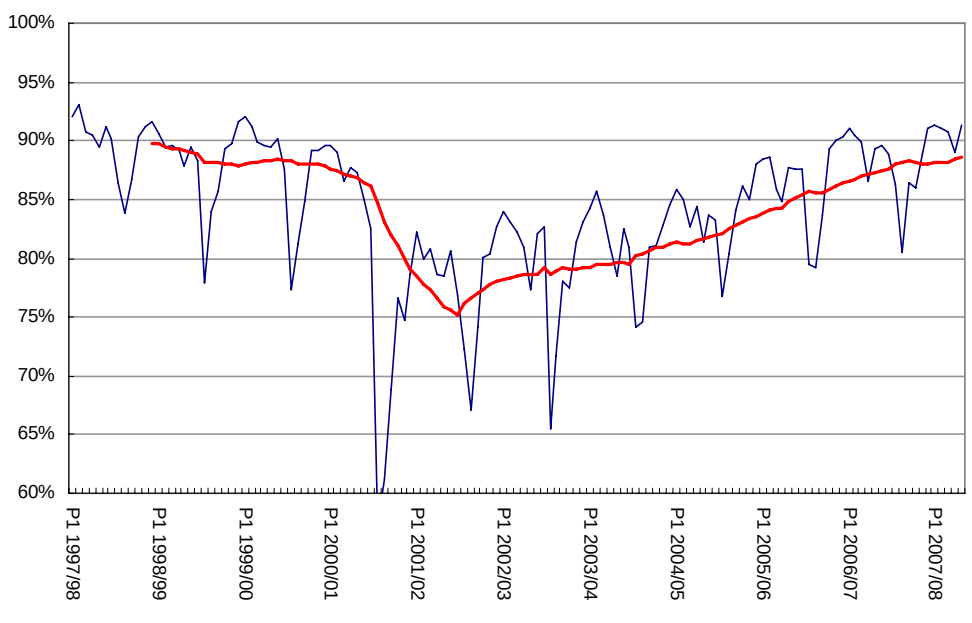
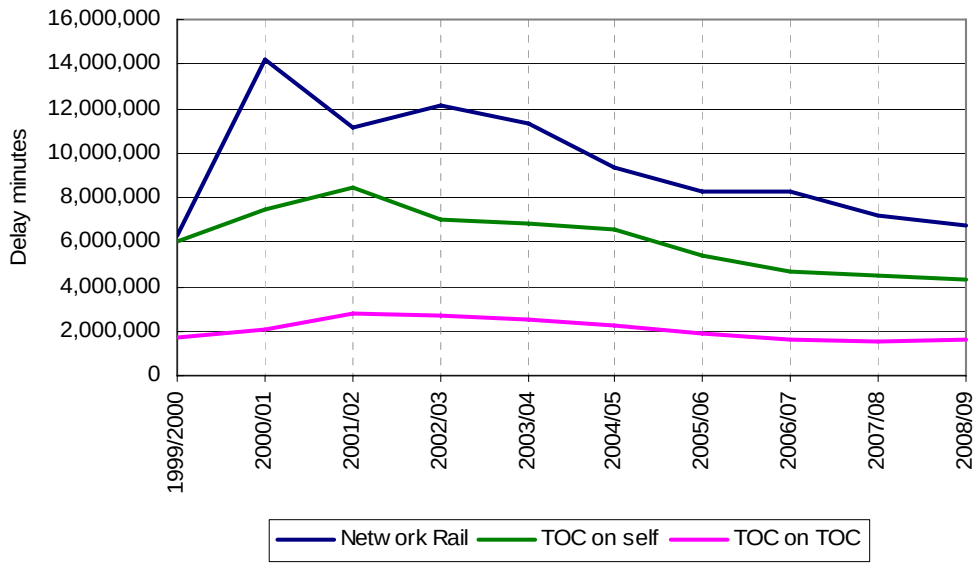


Figure 8.3 CP3 delay minutes



achieved in 1999/2000. We are also delivering improvements and have achieved the challenging delay minute targets set by ORR for each year of CP3 although our rate of progress has declined recently. Further reductions in delay during CP3 are therefore principally expected to result from initiatives by Network Rail and are reflected in the JPIPs. This is illustrated in the figure 8.3which shows the expected reduction in delay for the remainder of CP3. The reductions will be achieved from a range of actions including:

- investment in the infrastructure;
- more effective maintenance;
- better designed timetables;
- further development of Integrated Control Centres;
- further improvements in the management of external events and more variable weather; and
- specific detailed joint initiatives working at a local level.

We also expect the performance of the TOCs to continue to improve.

As we make improvements in the basic infrastructure and its operation, Network Rail's delays are increasingly dominated by the impact of external events and weather. There has been a steady improvement of more than six per cent per year in delays caused to passenger trains by Network Rail infrastructure and operations over the last two years. However, there has been little overall reduction in the amount of delay caused by external incidents and severe weather. We have continued to reduce the impact of autumn and recent winters have been more benign. But this has been offset by the consequences of high winds and more intense local rainfall together with a large increase in cable theft.

We have also made improvements in the freight market. Figure 8.4 shows that we have reduced the level of delay to freight trains caused by Network Rail by 23 per cent over the last five years. This has been achieved at the same time as accommodating significant increases in freight traffic over the same period.

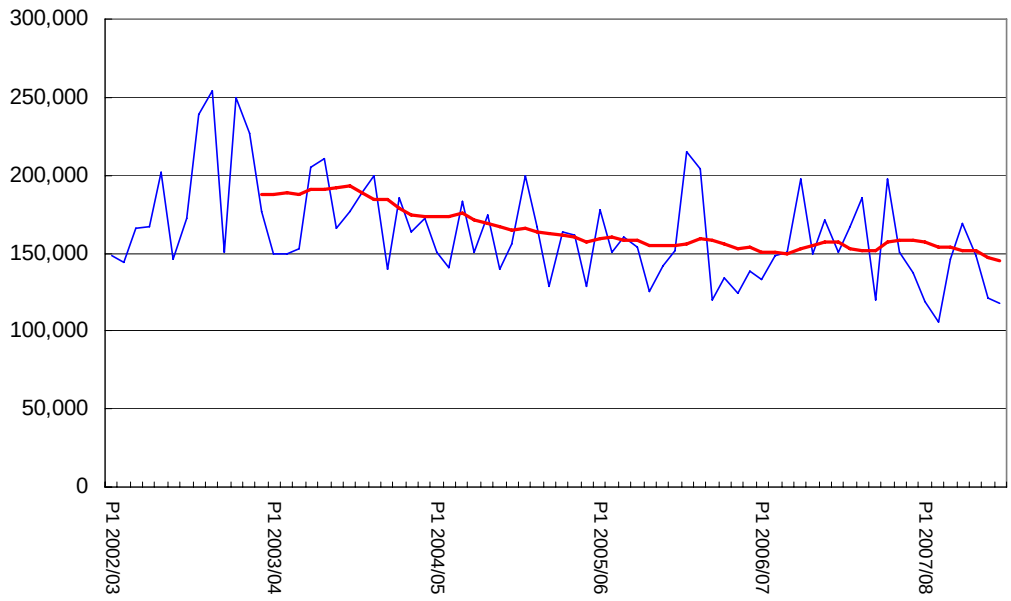
Developing CP4 projections

In developing our projections for CP4 we have worked with individual train operators and have sought to reflect their aspirations and concerns in our improvement plans. We have also reviewed the overall plans with National Task Force (NTF).

We started by carrying out detailed analysis of performance over the last five years. We have examined each key factor that causes delay to develop an assessment of the opportunity for further improvement. The analysis has included internal benchmarking in which we have examined variations in performance across different areas of the business. The principal issues identified through this analysis were:

- the importance of timetable quality;
- the requirement to further reduce delay per incident;
- significant variations in performance of assets in different areas;
- the challenge of reducing full cancellations;

Figure 8.4 CP3 freight performance



- continued seasonal variation; and
- reducing the number of repeat failures of individual assets.

We have also improved our understanding of the relationship between delay minutes and PPM as it moves above 90 per cent. The industry is now delivering a higher level of PPM than traditional performance modelling based on delay minutes alone would predict. This reflects an improved focus on a myriad of very small delays below the threshold level that the industry currently monitors

Next, we have assessed the impact on performance of further growth in the number of passengers and trains, and an increase in the amount of major engineering work associated with network enhancements. We have provided ORR with our detailed analysis in a separate supporting document.

This work also reflects the level of performance improvement that the train operators expect to achieve. For franchised train operators it has been assumed that they will at least achieve the level of performance reflected in their existing franchise commitments. We have jointly identified the actions required by Network Rail to support these commitments.

Based on this analysis, we have identified a range of initiatives to deliver further increases in PPM covering the three main categories of:

- improving our management of operational performance;
- reducing the impact of asset failures; and
- improving the robustness of the timetable.

We have then used our performance model (which has also been used by DfT, Transport Scotland and ORR in their Network Modelling Framework) to assess the overall impact on PPM of these plans.

Performance trajectory

We summarise the basis of our performance projections in Figure 8.5. The following sections describe the basis for each component of these projections. We have developed detailed projections for each sector and for each train operator and these are included in the appendix to this document.

CP4 starting point

As we described above, we have assumed that by the end of CP3 the industry will have achieved PPM of 90.4 per cent in England and Wales and 90.3 per cent in Scotland. This continued improvement is underpinned by JPIPs, except for a number of new franchises starting in late 2007.

Network Rail baseline improvements

Based on our ongoing maintenance and renewal plans, we believe that we can continue to achieve an improvement in delay minutes of around 6.4 per cent in the underlying performance of Network Rail's infrastructure and operations. This is based on continuous business improvement, including further benefits

Figure 8.5 CP4 performance

Per cent	LSE	Regional	Long distance	E&W total	Scotland total
Current PPM	89.3	88.5	85.1	88.6	89.4
Projected 2008/09 PPM	91.1	89.9	87.3	90.4	90.3
Network Rail baseline improvements	0.9	1.2	1.7	1.1	1.6
TOC franchise improvement	0.4	0.3	0.3	0.3	0.4
Timetable developments	0.5	0.6	1.1	0.6	-
Impact of traffic growth	(0.4)	(0.3)	(0.2)	(0.4)	(0.2)
Impact of major works	(0.6)	(0.2)	(0.3)	(0.4)	-
Projected 2013/14 PMM (without further investment)	91.9	91.4	89.9	91.6	92.1
HLOS forecasts	93.0	92.0	92.0	92.6	92.0
Current gap (requiring further investment)	1.1	0.6	2.1	1.0	(0.1)

from our asset renewal and maintenance plans, and investment in information systems and innovation, all supported by the implementation of an improved performance management process with an associated focus on benchmarking, target setting and clearer responsibility.

The planned enhancements to the network principally increase capacity rather than provide significant performance improvements. However, as we outlined in Chapter 6, there are a number of projects that will help improve performance on key routes. We have assessed that these schemes will increase national PPM by around 0.1 percentage points with a much greater increase on the Great Western and East Coast main lines.

As a result we have assumed that PPM will improve by 1.1 percentage points in England & Wales and by 1.6 percentage points in Scotland.

Continuous delivery of good performance to key services is also a requirement for the freight businesses and we recognise the need to work with freight operators to better understand and deliver this requirement. Most of the planned actions will generate significant improvement in freight delay as a result of fewer infrastructure failures and better incident management. We are therefore forecasting that freight delay will fall by 16.5 per cent over the next five years.

Achieving this level of improvement is also dependent on no change in the impact of severe weather which has been the largest performance risk over recent years. We have assumed it will be broadly similar to the last five years and have not included any further contingency.

TOC franchise improvement

We have assumed that TOCs will meet the performance commitments within their franchise agreements. This will normally be delivered through a reduction in TOC-on-self delay and cancellations. In addition to TOC franchise commitments, we have included any improvements specifically identified by each TOC. Several TOCs have plans that are more ambitious than their existing commitments to support further revenue growth. In general, we have assumed that each TOC will reduce TOC-on-self delay minutes by 0.5 per cent per year during CP4.

Timetable developments

Highly accurate timetables are critical to performance. They are particularly important in making incremental improvements in PPM when it is above 90 per cent as they can significantly reduce sub threshold delays. Major timetable changes are proposed over the next few years for several routes, including Great Western, Trans Pennine, East Coast, Brighton Mainline, North London Line, West Coast, CrossCountry and North Kent. We will work with the operators on these routes to use this opportunity to carry out a fundamental timetable review with the aim of improving overall route performance.

Our analysis has identified that throughout last year PPM was less than 70 per cent on more than individual 900 train paths. We have carried out similar analysis for each TOC to assess where the timetabled paths do not appear to be robust. As a result we are proposing to work with TOCs to understand the underlying causes so that we can resolve these within the industry's usual timetable planning cycle. Where the cause is controlled by Network Rail, we would initially seek to resolve the issue (for example, through removal of a permanent speed restriction) rather

than amend journey times. Indeed through the use of timetable planning software, we believe that most of these issues can be resolved without extending journey times. However, there will probably be some instances where the industry will need to decide between improving performance and retaining the current journey time.

We believe that timetable changes will result in an improvement of 0.6 percentage points in overall PPM in England & Wales. This is supported by improvements achieved by Arriva Trains Wales, First ScotRail and Central Trains following recent timetable restructuring projects.

In Scotland, the impact of the major infrastructure enhancement schemes will require a further recast of the timetable around Glasgow and Edinburgh to achieve greater timetable resilience.

Impact of traffic growth

As we described in Chapter 2, we are forecasting passenger demand growth of around 25 per cent by the end of CP4. As passenger numbers increase and the network becomes increasingly full, we expect there to be some deterioration in performance as there will be less scope to recover from the impact of incidents. There will also be some deterioration due to longer station dwell times. This will be offset to some extent by the introduction of longer trains and improving the layout and management of stations.

We have used our performance model to estimate the impact of running more trains based on our traffic forecasts. We have also estimated the impact of introducing longer trains using Railsys simulation modelling work, which suggests that longer trains may increase lateness at destination by up to 10 seconds as a result of the impact on network congestion due, for example, to the longer time required to pass through junctions. As a result of this analysis, we have made an overall assumption that there will be deterioration of 0.2 percentage points.

In addition, our analysis suggests that the impact of growth will be most significant on south London routes where peak performance is already heavily influenced by passenger numbers. We expect the detrimental impact of the continuing growth in passenger numbers will now broaden out into the “shoulder” peak. We have therefore assumed a deterioration of a further 0.2 percentage points in LSE, increasing the total deterioration on LSE to 0.4 percentage points. There is also some impact of growth on urban services in the regional sector for which we have assumed a deterioration of 0.1 percentage ponts.

Impact of major works

During CP4, the level of engineering work, including the significant increase in capacity enhancements, will temporarily reduce the capacity and flexibility of the network. Based on discussions with TOCs, we have included a contingency of 0.2 percentage points for the effect of this disruption in England & Wales. However, we have not included any allowance for disruption caused by the construction of Crossrail.

We currently estimate that the Thameslink programme in particular will cause LSE performance to fall by a further 0.4 percentage points, although there will continue to be uncertainty over the impact until the full scope of the programme is finalised. In the first phase of the project, the main impact will be caused by the increase in trains running through the core section (Blackfriars to Kentish Town) and the risks associated with joining trains operated by different TOCs. We have used this work to estimate the impact of the second phase but further work is required with TOCs to develop a full performance plan to cover the duration of the work. There is also a deterioration of 0.1 percentage points on long distance services, largely due to the impact of the Reading area development.

Further work is required in Scotland to assess the potential impact on performance of the Tier 2 and possible Tier 3 schemes.

Further investment

Based on our work to date we believe it is realistic for Network Rail and the rest of the industry to be set the challenge achieving overall PPM in England & Wales (including the cross-border inter-city flows to / from Scotland) of around 91.6 per cent by the end of CP4. Further increases will require significant additional investment specifically on performance improvement as opposed to asset renewal or capacity enhancement.

While we will aspire to improve performance beyond these levels, this leaves a potential gap compared to the HLOS targets for England & Wales. We have worked with train operators to assess the most cost-effective way of eliminating this gap and to assess the likely cost. The potential solutions for each route are set out in the relevant route plans.

We have currently developed a list of potential initiatives that totals nearly £600 million over CP4, which are shown in Figure 8.6. However, we would not expect to require all these initiatives to achieve the required outputs. We recognise that with value engineering, innovation and proper portfolio management this would reduce to up to £400 million. For the purposes of this plan we have assumed that all the additional investment is in England & Wales. However, some expenditure may be required on the East Coast or West Coast main lines in Scotland. Although our analysis suggests that First Scotrail performance would be in line with the HLOS outputs, this is subject to further work on the Tier 2 and Tier 3 projects. These initiatives will also improve the reduction in freight delay to 25 per cent.

A key element of the increased costs would be to influence renewals activity to focus better on scope for performance improvement at marginal cost. This takes many forms including campaign renewals in advance of life expiry when performance risk becomes too high (e.g. cables); enhanced renewals (e.g. higher quality installation, increased functionality such as more motorised switches) and discrete additional renewals (e.g. line speed improvements, enhanced fencing, component renewals). As it is difficult to predict with certainty which specific assets will fail it is important that this is done on a campaign basis where the likelihood of failure is managed as a portfolio.

We are able to deploy extra resource to prepare better for, and respond to, incidents. In particular we consider that there is significant scope to reduce the time taken to get to faults by mobile operations managers and other response teams. In a wider context, benefits are expected from a range of improved forecasting, advice to drivers and contingencies. This is the industry's approach to autumn preparedness, but similar approaches can be applied to other weather events; reducing the impact of trespass, fatalities and fires; and reducing regulation incidents.

We believe that improved communications and availability of experts will deliver performance benefits. Core projects such as FTN/GSM-R form a key part of this improvement, but other focus would be on providing tools for predicting delays enabling scenario testing as a precursor to service management decisions, improved access to experts and getting better detail, real time of incident locations to improve response.

One of the reasons for long distance operators failing PPM is the number of cancellations owing to not being able to move a failed train or provide an additional set once the scheduled set is the "wrong" side of a line blockage. Extra rescue locomotives or even utility sets for use at key locations can be provided to reduce such failures.

Another key operator focussed issue is the management of yards – especially freight yards – to improve right time arrival onto the network. We have had some success in the last year focussed on specific locations (e.g. Acton yard, Cardiff Canton); the plan for CP4 would be to roll out the initiative across the network.

Underlying these additional initiatives, needs to be a sound focus on delivery of the basics (e.g. a right time railway approach) and higher quality processes to enable cross functional and industry delivery.

Significant lateness

The introduction of a significant lateness and cancellation measure within the HLOS focuses the plan on both the reduction in the number of severe incidents (such as route closures and

Figure 8.6 Potential performance improvement initiatives

	Capex £m	Opex £m
Communications and expertise	16	11
Improved response	20	42.5
Infrastructure enhancements for performance benefits	275	12.5
Infrastructure functionality	5	2.5
Operational incident avoidance	27	56
Performance management of yards	10	0
Right time railway	1	2
Timetables	5	0
Train service recovery	1	100
Other	2	3
Total	362	231

train failures) and the importance of keeping the train service running whenever possible. We have developed our projections on the basis of our understanding of the relationship significant lateness and cancellations, and the delay categories. Six categories of delay currently account for more than 60 per cent of significant lateness and cancellations. The categories for which Network Rail is responsible are delay caused by severe weather, overhead line, points and trespass and vandalism, while train operators are responsible for delays relating to their fleet and train crew.

Our plan for improving severe lateness and cancellations has been developed by seeking to focus our improvements plans on those initiatives that deliver improvements in both PPM and severe lateness. In developing our projections for severe lateness and cancellations, we have considered the effect of introducing remote condition monitoring so that we can replace key assets before they fail, the appropriate placement of repair teams and rescue locomotives, enhanced flexibility within the network to keep trains running and better control tools to minimise the disruption caused to late running trains. Achieving the improvements in severe lateness and cancellations is also dependent on train operator improvements.

As a result we are forecasting that severe lateness and cancellations will reduce by 24 per cent in England & Wales by the end of CP4.

While our plan assumes we will deliver the reduction in significant lateness and cancellations, we are currently uncertain how this will interact with franchise commitments, service recovery and Schedule 8 in making decisions on the operational railway.

Delivery of PPM improvements

This plan therefore aims to meet the reliability targets in the HLOS. In managing the delivery of these improvements, however, we believe that the priority should be given to:

- improve PPM on all routes to at least 90 per cent as soon as reasonably practicable; and
- reduce severe delays which particularly impact on the perception of performance on the railway.

We believe it will be important to retain an element of flexibility in this area. It remains unclear how highly passengers value continuous improvements in punctuality beyond around 90 per cent. In our view, the case for further improvement should therefore be kept under review as performance improves. In some cases, it may be preferable to provide additional services even if this results in a reduction in PPM. Moreover, since we have not included significant contingency in these projections it may not offer best value for money for the industry to invest substantially more than our current assumptions if the proposed interventions do not turn out to deliver the assumed improvement in punctuality.

Future developments

Over the coming months, we will continue to work with TOCs as we develop the JPIPs for 2008/09. In particular, we will develop in more detail the plans to deliver improvements in CP4 and aim to develop a process for continuous development of a long term performance plan.

We will also carry out further analysis on the performance impact of major projects, including Thameslink, Reading and Birmingham New Street.

We will continue to update the National Task Force on our progress and are planning an industry performance conference in the first quarter of 2008 to review performance improvement plans and to share best practice. We will continue to develop our research and to use benchmarking analysis to identify the optimal level of performance on each route.

We will provide an update on our performance projections and the initiatives that are required to deliver them in April 2008.

Network capacity

The DfT and Transport Scotland HLOSs specify a number of enhancements to the network. In addition, our plan includes a programme of other enhancements necessary to deliver the capacity and reliability output measures specified in the HLOSs. Set out later in this chapter is a table that summarises the impact on the network infrastructure of the proposed programme of enhancements in terms of capacity and capability.

Network capability

The 2003 access charges review concluded that we should maintain the capability of the network for broadly the existing use at April 2001 throughout CP3, subject only to network changes authorised under the established industry processes. This relate to the size of the network, the proportion that is electrified, the number of stations and facilities provided at them, and the maximum speeds or axle loads on any route.

The capability of the network is published in the Sectional Appendices. We have identified a number of routes where there was a discrepancy between the actual and the published capability. Since then we have undertaken a programme to verify the capability of the whole network. In March 2006 we published our Infrastructure Capability programme which encompassed a recovery plan and an improvement plan. The recovery plan aims were to:

- resolve discrepancies between actual and published capability as identified on 30 September 2005 on 70 specific routes;
- undertake a verification of published capability in order to identify any further discrepancies; and
- develop and implement a new mechanism (short-term network change) in the Network Code to enable temporary reductions to capability in order to achieve efficiencies where there are short-term reductions in traffic levels.

Completion of the recovery plan was achieved on 30 September 2007.

Our improvement plan for the measurement of network capability aims to develop a new definition for capability, improve internal processes related to data accuracy and to determine and implement a improved approach to publishing capability information more consistent with operators needs in terms of delivering and planning their businesses. This plan has been developed into an extended programme which has been shared with our customers and ORR. In line with this programme, the baseline measures for the proposed capability metrics will be published by the end of June 2008, except those for gauge and length limits which will be published by the end of 2008.

It is proposed by ORR that we should maintain the capability of the network as at April 2009, as published in the documents used to describe network capability at that time, subject to network changes and to the proposed enhancements described in Chapter 6 of the SBP.

Figure 8.7 provides a qualitative assessment of the impact of these enhancements on the capacity and capability of the network at a strategic route level.

Tonnage capability

Capability is currently defined in terms of axle load, line speed and gauge but not in terms of gross tonne kilometres on a route. Significant changes in traffic can have a disproportionate impact on the maintenance and renewal of the routes affected. We are therefore proposing a new definition of capability that would include gross tonnage so that we can identify where such a step change in activity could be required. We have populated this measure for the network and have compared this to the anticipated changes in traffic on the network for CP4. Where we have identified where traffic changes are greater than the implied tonnage capability measure we are undertaking analysis to understand if there are any significant planning and financial implications. We are discussing with the industry and ORR appropriate mechanisms for planning for and recovering the net costs of significant changes. We intend to have completed this analysis and set out proposed processes by the end of 2007.

Asset stewardship measures

The relationships between asset management activities and the condition and reliability of the assets on the network are complex and difficult to predict with any degree of certainty. Reliability is clearly dependent on the absolute volume of maintenance and renewal activity carried out, the quality of work and the extent to which it is accurately targeted. Various external factors, the impacts of which are not completely controllable, are also important; weather being the most significant. In fact, for some assets, as we improve their condition these external factors will become a more significant component in the overall cause of failure.

Figure 8.7 Impact of CP4 enhancements on infrastructure capacity and capability by strategic route

Route	Capacity & capability changes
Route 1:Kent	1. Enables 12 car operation through the Thameslink core 2. Enables 12 car suburban operations into Charing Cross & Cannon St 3. Enables 8 car services on the South London Line to Victoria
Route 2: Brighton Main Line and Sussex	1. Enables East London Line services to West Croydon and Crystal Palace 2. Enables 12 car East Grinstead to Victoria services 3. Enables 10 car services on suburban routes into Victoria and London Bridge 4. Thameslink works (see route 1)
Route 3: South West Main Line	1. Enables 10 car operations on the suburban lines into Waterloo 2. Enables 9'6" high containers to be conveyed on conventional wagons
Route 4: Wessex Routes	
Route 5: West Anglia	1. Enables 9 car operation on the lines to Chingford, Enfield Town, Cheshunt and Hertford East 2. Enables 12 car operation on the Liverpool Street to Cambridge/Stanstead Airport services 3. Enables 9'6" high containers to be conveyed on conventional wagons
Route 6: North London Line and Thameside	1. Enables 12 car operations on the Tilbury Loop and Ockendon branch 2. Enables longer and more frequent trains on the North London Line 3. Enables 9'6" high containers to be conveyed on conventional wagons
Route 7: Great Eastern	1. Enables all Great Eastern outer peak services to call at Stratford and enables additional high peak services on the Great Eastern main Line 2. Enables additional high peak services on the Great Eastern inner lines
Route 8: East Coast Main Line	1. Enables train lengthening on outer suburban services 2. Enables train lengthening on services between Doncaster and Leeds 3. Enables increased long distance services
Route 9: North East Routes	
Route 10: North Trans-Pennine, North and West Yorkshire	1. Enables train lengthening on services across Route 10 2. Enables higher linespeeds
Route 11: South Trans-Pennine, South Yorkshire and Lincolnshire	1. Enables train lengthening on the services serving Sheffield 2. Enables 9'6" high containers to be conveyed on conventional wagons and provides a W10 diversionary route for the East Coast Main Line 3. Enables higher linespeeds on the Barnsley and Hope Valley routes
Route 12: Reading to Penzance	
Route 13: Great Western Main Line	1. Enhanced capacity on the Cotswold line 2. Enhanced capacity Swindon - Kemble 3. Enables higher linespeeds between Severn Tunnel and Cardiff 4. Enables higher linespeed between Barnt Green & Westerleigh Jn
Route 14: South and Central Wales and Borders	
Route 15: South Wales Valleys	1. Provides remodelled track layout throughout the Cardiff area and additional platforms at Cardiff Central and Queen Street
Route 16: Chilterns	1. Enables train lengthening 2. Enables higher linespeeds
Route 17: West Midlands	1. Provides increased capacity between Water Orton West and Castle Bromwich 2. Enables train lengthening on services in the West Midlands area 3. Provides an enhanced station environment with expanded facilities and additional passenger capacity
Route 18: West Coast Main Line	1. Enables train lengthening on various routes 2. Provides an enhanced junction layout with linespeed capability
Route 19: Midland Main Line and East Midlands	1. Enables train lengthening on the East Midlands regional service routes 2. Enables higher linespeeds between Sheffield and London
Route 20: North West Urban	1. Enables train lengthening on the North West Urban routes 2. Provides improved station facilities and environment and allows more through trains to operate at Manchester Victoria 3. Enables higher linespeeds
Route 21: Merseyrail	1. Increase in passenger capacity
Route 22: North Wales and Borders	1. Enables journey time improvements on the London to North Wales services and Wrexham to Bidston line
Route 23: North West Rural	1. Enables reduction in journey times and increases capacity 2. Enables reduction in journey times and increases capacity
Route 24: East of Scotland	1. New rail link to allow new serviced between Galashiels & Tweedbank
Route 25: Highlands	
Route 26: Strathclyde and South West Scotland	1. New electrified line between Glasgow and Edinburgh via Airdrie to Bathgate 2. New electrified line to Glasgow Airport

During the last twelve months we have continued to improve our understanding of the relationships and updated the suite of asset stewardship measures we use to monitor the condition and reliability of the network. A key component of our work in improving our asset management polices, described in Chapter 4, was the identification of output measures that better represent our improving understanding of asset behaviour over time and how this can be influenced by targeted maintenance activities. Our ability to achieve this has been facilitated by improvements in the quality of information we have available to us on asset configuration and condition. Where appropriate, we are using these revised measures to forecast, and subsequently monitor, the condition and reliability of our infrastructure. Our revised Asset Stewardship Index, which combines a number of these measures across all asset groups, forms a key component of our suite of KPIs.

The forecasts for these measures during CP4 and beyond are included in the appendices to this document and are summarised in Figure 8.8. Where a new measure is being introduced, and where a comparison is sensible, we have provided a forecast of the existing measure up to the end of CP3.

Figure 8.8 Key output measures

Output measure	At end of CP4
Good track geometry	135.6%
Poor track geometry	2.20%
Geometry faults per 100km	20% reduction over control period
Rail breaks per 100km	0.78
Points and track circuit failures	10,469
Signalling failures	16,205
Civils assets subject to special investigation	15% reduction over control period

Some of these measures are only just being implemented and we do not yet have a baseline against which we can forecast actual condition or reliability. However, we can provide with a degree of confidence the relative change we expect to achieve as a result of our asset management plans. We will provide further details on the development of these measures in our April update. We will also provide further details of the weighting mechanism we will be applying to these measures, as explained in Chapter 4, to reflect the volume and nature of traffic that may be affected by deteriorating asset condition or failure.

In this plan, our forecasts for CP4 generally assume continuing incremental improvements on the levels forecast for CP3. However, for some assets we are forecasting more dramatic reductions in failure rates. We will continue to challenge ourselves and we are working to achieve further step changes in asset performance where possible. This will enable us to deliver further improvements in operational performance and capacity. Improved asset performance will also help drive efficient maintenance and renewals as, for example, we will be able to reduce the level of reactive and repeat work. This in turn will support many of our goals, including the move towards delivering a seven-day railway.

For track assets, we expect a slight further improvement in our track geometry quality measures in CP4. However, we are generally targeting our activities at maintaining existing track geometry quality as we believe that further improvements would be particularly expensive and bring about little benefit in terms of passenger ride comfort or reduced whole-life asset management costs. This is also true for rail breaks as we believe that following the substantial reductions in the incidence of broken rails over recent years further significant reductions are unlikely to be cost-effective. The actual incidence of broken rails will clearly be highly dependent on the weather.

We are, however, focussing our attention on reducing the number of individual geometry faults and are forecasting a 20 per cent reduction on primary and secondary routes over CP4, with the majority of the reduction being achieved on primary routes. We believe this will deliver worthwhile benefits from a reduction is safety and performance risk, and reduction in triggers for rolling contact fatigue, rail end damage points failures, and bad riding for new rolling stock. The overall reduction is lower in Scotland reflecting the fact that Scotland has a lower proportion of primary routes than in England & Wales and that track geometry indicators are generally higher there than elsewhere on the network.

Considerable attention has been given in recent months to assessing maintenance working practices and identifying good practice in each of our territories. We have set ourselves challenging targets to implement these good practices across the whole organisation. As a result, for signalling and for points and track circuits we are forecasting a reduction in failure rates of approximately 13 and 19 per cent respectively over CP4. This is addition to the

challenging targets we have set ourselves for the remainder of CP3.

We plan to invest considerably more in our stations and depots in CP4 than we did in CP3. However, due to the current condition of many of the assets at these facilities and, as we explained in Chapter 4, the necessity to phase in this increase in expenditure, we will see only a small improvement in the condition of the larger stations (categories A and B) during CP4. For the smaller stations (categories C to F) there will be a continued gradual decrease in condition during CP4. It will be early in CP5 before the average condition levels at these stations starts to recover.

Our detailed analysis of our electrification and plant asset management policies has resulted in an acceleration of our overhead line component replacement programme. As a result we are now forecasting a considerable reduction in power supply incidents causing train delays, down by approximately 22 per cent over the next control period. However, this does assume that we undertake the proposed Great Eastern Main Line overhead line work that is included as an enhancement in CP4. Although we are currently predicting a gradual improvement in the condition of our sub-station and contact systems we have identified a number of possible opportunities to deliver improved condition, and hence better overall reliability. Our April update will contain details of the progress we have made on this.

For our civils asset portfolio we have introduced a new measure, assets subject to special investigation or inspection. We believe this provides a better measure of changing condition of our civils assets, due to the inertia in the change in any conventional condition assessment. At present approximately 1200 assets are subject to special investigation and we are forecasting that this will reduce to just over 900 by the end of CP4. We expect to see a moderate reduction on the number of TSRs as a result of the condition of civils assets. In future we will use the severity index as our measure, as this takes account of the severity of the speed restriction and the length of track affected.

We believe that the generally improving trajectory of target output measures shown in the appendices is realistic and achievable. It also underpins the proposed improvements in train performance. Development of version 3 of the Infrastructure Cost Model over the coming year will lead to a greater ability to model the critical input-output relationships and this will, in turn, inform our future plans.

Stations

As well managing the overall condition of our stations, we also use the station facility index to monitor the facilities provided at stations. However, it is widely accepted that the current measure is of little use. We are working to develop a replacement measure and will discuss options with the ORR and other stakeholders in developing a proposal. An appropriate measure for station facilities will need to recognise that facilities at stations are not always the responsibility of single party.

We measure satisfaction of passengers at managed stations and are considering development of a portfolio wide stations satisfaction measure. The National Passenger Survey provides a starting point for this measure and we are discussing with Passenger Focus the possibilities of developing the NPS survey or a new measure to guide our development of stations over the next control period and beyond. This will be vital in measuring the success of improved accessibility, facilities and enhancements through the Access for All and National Stations Improvement Programme (NSIP). It is intended to discuss suitable criteria with ORR and other stakeholders over the coming months.

There are other measures which focus on the manageable elements of station quality used in the industry. For example, the second generation of franchise agreements incorporated a framework of key performance indicators, covering areas such as the station environment and security, with financial penalties for the operator should it fail to achieve agreed targets. Similarly, sections of the network which operate within Passenger Transport Executives areas have developed their own station condition regimes such as SQUIRE ('Station Quality Incentive Regime'). These regimes, although seen as effective, are not always consistent with our current measures. We are therefore seeking to develop measures that align more closely with these other industry measures.

The core test in determining the success of the NSIP programme is the delivery, in accordance with plans, of tangible and lasting improvements that lead to improvements in passengers' perception of the station. It is important that effective measures are developed and introduced to be able to monitor and demonstrate the effectiveness of the programme. Such

measures are still under discussion. It is intended that passenger perception will be measured before and after the planned works using passenger surveys, specifically the Passenger Focus National Passenger Survey (NPS), and other methods such as focus groups. We are working with Passenger Focus to develop a plan for success measurement, including detailed arrangements for the NPS, commencing in March 2008. Any additional measures will need to be funded by the programme, it is therefore important that these are cost effective and do not detract from the overall achievement of this programme.

Network availability

We are currently working with the rest of the industry to develop a network availability measure to enable us to measure and monitor the impact on our customers and users of the disruption caused by engineering works. This will also help us to demonstrate our progress in moving towards a seven-day railway.

Together with ORR, we have commissioned Steer Davies Gleave to develop a specification for a network availability key performance indicator. As a result of this work, we are proposing three separate metrics for the planned impact of possessions on passenger and freight operators and a combined measure to understand the potential financial impact on the Industry. These will be supplemented by further performance indicators to measure related issues such possessions over-runs.

The proposed passenger measure will be derived at service group level to measure the impact of extended passenger journey time, weighted to take account of average number of daily passenger journeys, total journey length of passenger trains and time of day of passenger journeys.

For freight traffic, the proposed measure will also be derived at service group level based on the total track availability, weighted by the level of freight traffic. Modification to reflect traffic profiles through the day is being investigated. The combined metric will be based on the level of revenue at risk as a result of possessions. We will provide our projections for these measures in April 2008.

We also use a number of supporting performance indicators to provide further information on our management of engineering access. These include measuring:

- the effect of disruption caused by engineering work using undiscounted Schedule 4 and the number of possession overruns;
- the effectiveness of the planning process using discounted Schedule 4 and the number of late disruptive possessions;
- the amount of access required in both number of possessions and hours of engineering access;
- monitoring the programme of improvements to improve possession productivity.

Measuring success

As described in Chapter 4, we will measure our performance in CP4 through external independent surveys of our stakeholders, together with a balanced scorecard of key performance indicators (KPIs), which reflects the stakeholder needs.

The Remuneration Committee is reviewing how we should take account of these measures in the Management Incentive Plan for CP4 and we propose to discuss this further with ORR and our other stakeholders.

Stakeholder surveys

Today we have a number of regular stakeholder surveys that give us powerful insights into our performance, stakeholder preferences and trend changes. These surveys are summarised in Figure 8.9. In addition we commission a number of one off research pieces, for example, we recently commissioned Opinion Leader Research to carry out a series of focus groups of segments of our employees to understand in depth the relative perceptions of all segments of Network Rail.

The existing surveys have grown organically with each survey providing valuable insights to one or more areas of our business. However, we are now reviewing whether these surveys are appropriate for measuring our performance in CP4. We have defined the framework that we will use, breaking down each of the five stakeholders into smaller segments where their needs are significantly different from each other. For example, we are separating rail users into passengers, station only users and freight users. This will enable us for each of these smaller stakeholder segments to define:

- the needs and wants which we should check that we are achieving with the respective stakeholders on a regular basis;
- the most appropriate method and frequency to achieve this (e.g. annual telephone survey); and

Figure 8.9 Stakeholder surveys

Stakeholder Group	Current Regular Survey	Source
Rail users	Rail passengers – National Passenger Survey	Bi-annual survey commissioned by NPS
	Station Users Key performance Indicator Study – Pragma	Annual survey commissioned by Network Rail
	Freight users survey – Ipsos MORI	Annual survey commissioned by Network Rail – planned to begin in 2008
Our customers	Customer Satisfaction Survey – Ipsos MORI	Annual survey commissioned by Network Rail
	Commercial Property Perception Survey – Ipsos MORI	Annual survey commissioned by Network Rail – planned to begin 2008
Our stakeholders	Third Party Funders Perception Study – Ipsos MORI	Annual survey commissioned by Network Rail
	Survey of Britain's MPs – Ipsos MORI	Annual survey multi-sponsored (including Network Rail)
	Survey of Britain's Transport Journalists – Ipsos MORI	Annual survey multi-sponsored (including Network Rail)
Our suppliers	Supplier Perception Study – Ipsos MORI	Annual survey commissioned by Network Rail
Our people	Employee engagement – Gallup	Annual survey run by Gallup

- any further insights that we should obtain about each respective stakeholder segment (e.g. changes in preferences).

We will review the relative cost and value of each component to create an annual research plan by April 2008 which will cover the breadth of our stakeholders. We will then ensure that we maximise the benefits from each piece of research.

We continue to use the new customer satisfaction survey. Annual surveys of customer satisfaction are undertaken amongst the train and freight operating community by independent pollsters. The index is based on a comprehensive range of some 16 measurements of customer perception of Network Rail service delivery, covering such issues as satisfaction, business understanding, anticipation of needs, trust, and delivery of promises. Each attribute is scored on a one to five scale (where five represents a high level of satisfaction) and a composite average is generated from results for all customers, weighted by their use of the network.

The target is based on steady growth in the index through CP3 and CP4, as the Network Rail transformation programme delivers continuous improvement across the basket of measures. Relationship management teams within Network Rail are tasked to deliver a company-wide focus on customer issues and are accountable for delivering improvements to the index.

Balanced scorecard

We have identified 16 key performance indicators that we will use to monitor the overall performance of the business during CP4. While we are planning to use these measures internally from next year, most of the measures are currently being developed. The table below provides a brief summary of the KPI and the reason for its use. There are further performance indicators below these KPIs.

Additional information on the KPIs and PIs in our emerging balanced scorecard is contained in the supporting documents.

Network planning and timetabling

We have been developing proposals for upgrading the systems that underpin the access planning and timetable development processes. The integrated train planning systems (ITPS) programme will lead to an enhanced capability and enable the delivery of an effective, customer focused and user friendly process for delivering access planning information and services. The work started at the end of 2005, and we are now approaching the first phase of implementation. We are keen to meet stakeholders reasonable needs and, therefore, following ORR's review of stakeholder expectations (for which the emerging themes were presented by ORR at the Rail Industry Planning Conference in June 2007), we will consult with customers in November 2007 on our plans to improve access planning and timetabling outputs and service levels which comprise the ITPS.

Supporting documents

We are providing the following supporting documents to ORR:

- details of our performance analysis;
- details of our plans to deliver safety improvements;
- details of our plans for environment are included in the supporting document on sustainability;
- further details of our emerging plans for a balanced scorecard.

Figure 8.10 Balanced scorecard KPIs

Proposed KPI	Definition	Rationale
Value		
Financial Value Added	Value added in control period over and above regulator's determination	Good Network Rail financial performance
Cost Efficiency	Annual cost of Network Rail, normalised by capacity provided and adjusted by renewals and enhancement activity	Savings made by Network Rail through unit cost and scope efficiencies
Credit Rating	Unsupported credit rating (by S&P, Moody & Fitch)	How the market perceives Network Rail as an investment – this is a good proxy for the longer term financial stability
Environmental Sustainability Index	Index of environmental measures taken from the Global reporting Index (GRI) for corporate social responsibility	Network Rail is minimising its impact on the environment
Service		
PPM	Percentage of trains that arrive 'on time' at their destination (10 mins for long distance, 5 mins for shorter)	Punctuality on the network; are we getting passengers to their destinations at the scheduled time
Journey Experience Measure	Index of measures for trains and stations (managed and unmanaged)	Network Rail and TOCs are measuring the things important to their passengers and station users
Network Capacity	Combination of 'seat kilometres' for passengers and 'freight tonnes kilometres'	Network Rail and TOCs are giving passengers an increased opportunity to travel where and when they want through more trains without enduring over-crowding
Network Availability	Average operator revenue at risk due to possessions	Network Rail are minimising the disruption to passengers travelling when they want and freight journeys taking place when required (i.e. 7 day railway)
Passenger Safety Risk Index	Index of Network Rail equivalent fatality measures that mirror the HLOS passenger risk model which is calculated from actual non-train measures and modelled risk of train measures	Network Rail are minimising the risk of passengers being injured
Asset Condition Index	Index of inspections and asset failures across Network Rail's key assets	Network Rail is keeping its assets in good condition to help ensure strong future performance (financial, safety etc)
Process		
Right First Time	Index of output quality measures for Network Rail's key processes	Network Rail are improving the quality of their key processes
Cycle Time	Index of cycle times for Network Rail's key processes	Network Rail are significantly reducing the time it takes for their key processes
People		
Recruitment Cycle Time	Average time taken from the requirement being raised to offer acceptance – segmented by professional services, operational etc	Network Rail has a very efficient recruitment process to give it the best chance of recruiting the right people
Development	% of Q12 5 scores (for questions 3,5,6,11 and 12)	Network Rail is developing its people
Key Player Retention	% of key players retained	Network Rail is retaining a high proportion of its key players
Employee Wellbeing Index	Index of health/sickness measures and a weighted employee safety measure	Network Rail has a healthy workforce and is a safe place to work

9 Options and sensitivities

In previous chapters we have identified areas of expenditure which provide long term benefits for the railway but are not required to deliver the HLOSs. In this chapter we summarise these areas of expenditure. We also identify investments that we believe should be considered for "early start" funding. Finally, we summarise the impact of alternative assumptions and key risks to the plan.

Incremental investment

The key areas of incremental expenditure that deliver longer term railway benefits include:

- discretionary investment totalling £885 million, included in Chapter 6;
- enhancement options totalling £442 million, included in Chapter 6;
- performance initiatives totalling £400 million, included in Chapter 8; and
- initiatives to support the move towards a seven-day railway totalling £300 million, detailed in this chapter.

We have also explored the opportunities for reducing expenditure during CP4. We provided a detailed report assessing the impact of alternative asset policies. In particular, we considered a number of options to reduce the overall cost of delivering the CP4 plan by deferring work to future control periods.

Discretionary investment

We have identified potential investments totalling £885 million over CP4 that would deliver cost or performance benefits over and above the base efficiency and performance assumptions in this plan. These investments have not yet been subject to full appraisal but we believe it is important that they are progressed further over the next few years so that we can proceed if a strong business case is established. Other potential investments may also justify treatment in this way and we believe it is important for the business to have the flexibility to invest to reduce future costs.

Enhancement options

We have identified potential enhancements totalling £442 million during CP4 that, although not necessary to deliver the HLOS outputs, we believe they should be considered for funding in CP4. This includes funding of £180 million to develop schemes during CP4 for delivery in CP5.

Performance initiatives

In Chapter 8 we have summarised the analysis carried out to show that we believe the plan supports delivery of overall PPM in England & Wales (including cross-border inter-city flows to / from Scotland) of around 91.5 per cent by the end of CP4. We have then included additional investment of £400 million specifically on performance improvement to improve performance to the levels included in the DfT HLOS. This has been based on a list of potential initiatives that totals nearly £600 million over CP4, which we recognise will be reduced with value engineering, innovation and proper portfolio management.

Seven day railway

One of the largest planned corporate initiatives is the move towards a seven day operational railway. Through our continuing discussions with our customers we have identified there is increased pressure for a less disruptive train service and a move towards a more demand led timetable that offers services up to seven days a week.

Firstly operators want to be able to operate the full working timetable and to reduce the amount of disruption caused to the customer through cancelled services and the replacement of train services by buses. There is considerable evidence to suggest passengers desire an undisrupted journey and will suffer a slightly longer journey in favour of a bus replacement service with the additional inconvenience that brings.

Operators have asked us to propose solutions that will enable them to provide an undisrupted service on seven days of the week and are supporting us in this work. They tell us that there is demand for more services than is currently offered, particularly at the weekends, and earlier and later trains in the week. This is valuable business to our customers. Running a reliable service on only five days a week, against the increased demand for weekend travel, is becoming a growing reputational issue for Network Rail and the rail industry. Both freight and passenger operators have appointed consultants who have validated their claims of increased longer term demand.

The freight operators are experiencing an increase in demand particularly from deep sea (intercontinental) intermodal and imported coal and the importance of maintaining through routes for over night freight traffic is increasing.

Moving towards a seven-day railway will require engineering work to be undertaken almost entirely within maximum eight hour possessions, with adjacent lines routinely open to traffic, thereby allowing a half-capacity railway to remain open. This has significant potential impact upon our investment activity, much of which is currently undertaken in longer possessions at weekends, as well as on maintenance activities.

As part of this change, we intend to challenge ourselves to re-engineer many of our most disruptive construction processes, so that we are able to undertake them in shorter possessions. However, some work can only be undertaken with additional mechanisation requiring significant investment in additional capital plant.

For many work-types the need to break activity down into a number of shorter possessions, with additional set-up and set-down phases, will also impact significantly upon efficiency. However, in allowing more work to be undertaken mid-week, the seven-day railway will, in principle, allow renewals works to be undertaken across the whole week leading to improved utilisation of resources and less reliance upon contingent labour, offsetting some additional costs.

It is worth noting that until very recently the debate was about taking longer possessions in order to reduce costs. We have therefore changed direction completely and there is a consensus that industry value will be increased by reducing access even if this means higher maintenance and renewal costs. This will only be possible if these additional costs can be funded and it should be recognised that some of the proposed changes represent a significant challenge for Network Rail and the industry as a whole. This relatively recent change in direction also means that there remains some uncertainty about the precise outputs that will be delivered from the proposed initiatives. However, Network Rail is committed to driving forward on this initiative with the rest of the industry.

What we plan to do and why

At present the railway is not set up appropriately to deal with this current demand and future growth. The challenge taken up by Network Rail is to respond to the growth and command a larger share of the transport market.

Current practices are set up to offer a service at the weekend that is likely to be degraded and disrupted. We need to change the basic availability of the rail network to an access configuration that will better meet user demand for up to seven days per week. At the same time there is an opportunity to simplify the possession access arrangements for the railway.

Developing the infrastructure and simplifying engineering and planning processes to meet this growing demand will allow the UK railway to command a larger share of the transport market and meet customer needs. To build on these further, passengers need to be given the option of booking their rail journey up to a year in advance of the date of travel. This will require a rolling 52 week plan of engineering work, a major process change.

The provision of reliable services throughout the week will improve the competitiveness of rail against other transport modes and contribute towards satisfying the demand for travel. Substantial benefits can be found for the economy, society and the environment by carrying more passengers and freight by rail. The Railway boasts reduced carbon dioxide emissions, improved safety, less serious injuries and fatalities and less congestion, but also tangible financial savings and social benefits that can benefit the British society as a whole.

ATOC has commissioned a review of the likely additional revenue benefits from the introduction of a seven-day railway. An interim report has been issued covering the long term revenue benefit as a result of additional Sunday services which is estimated to be up to £130 million per annum. In addition there is expected to be a growth revenue of £20 million and a non-financial benefit of £60 million.

For the freight companies a study has been undertaken that anticipates the long term revenue benefit to the freight operators to be £105 million by 2015, increasing to £210 million by 2030.

The vision for a seven-day railway has been developed building on:-

- a theoretical analysis of the demands and requirements called the concept document. This outlines the theoretical case for change and the principal concepts being developed to support the seven-day railway. It lists all the benefits that the industry and the public can expect and focuses on the seven-day railway dependencies and requirements;
- the industry wide efficient engineering access studies work. This helped to develop Network Rail's understanding of how to make the transition from theory to delivery. It built up a

picture of the changes to the costs and revenue as a result of moving to an access regime that more closely met customer demand without major network enhancements;
- the Sustainability Strategy Steering Group report on the access regime to be implemented on the West Coast Man Line from December 2008. This was the first implementation of seven-day railway principles and detailed new potential methodologies for renewals activities and changes to the delivery of the maintenance regime needed for implementation;
- incremental cost analysis. This assessed the additional financial impact of the seven-day railway by function and by main activity; and
- long term revenue projection provided by passenger and freight customers. This has reinforced the industry view that moving towards a demand led seven-day railway has substantial revenue benefits.

The emerging results and Network Rail's world class aspirations established that stepped changes in the packaging of engineering access and in the methods used for delivering the work would increase the availability of the network and improve reliability of the services provided throughout the full seven day week. This created the correct environment to see realistic possibilities in the industry-wide desire to run more of a seven-day railway.

Seven day railway programme

The implementation programme is at a very early stage of development with a number of required concepts not yet supported by defined programmes. To support this we have developed a dependency map detailing the interdependencies between projects.

In preparation for CP4, Network Rail needs to reduce the number of services that are disrupted for engineering works. Central to our plans to cleanse current processes of inefficient practise is reviewing the performance of the current working timetable (WTT). At present we run 60 per cent of the weekday WTT services at weekends. We then disrupt between 10 per cent and 20 per cent of that weekend service. Before we can run more trains we need to run consistently no less than 95 per cent of the WTT services. To achieve this we have a stepped recovery plan in place with objectives set for each route. This puts us in a stronger position on which to build a legitimate case for running more of a seven-day railway.

Half capacity / full capacity

The strategy for moving towards a seven-day railway is based on the principle of operating a half capacity railway at times of low demand. When the half capacity timetable is in operation engineering possessions will be available based on a nominal eight hour window. This assumes that only half of the network is available for running commercial services from 11pm to 5am each day, with the second half being used for engineering work. To summarise, this means four tracks to two tracks, two tracks to single line worked track.

This will allow a fixed timetable to be created that will not be diminished on a regular basis. The strategy will provide additional train paths and improve the overall availability of the network for rail operators, whilst delivering sufficient engineering access to deliver the engineering requirements for maintenance and renewals.

Operational and engineering efficiencies

To compliment this change Network Rail has developed a suite of operational and engineering efficiency initiatives to prevent locking in inefficient behaviour to a revised access strategy. The following are Network Rail's key operational efficiency initiatives:

- single line working (SLW). The use of SLW to enable through services to operate, avoid bus substitution and the complete closure of a route is an essential component of the seven-day railway concept. We need to reinvigorate SLW and understand what can be done, where, and how best to use SLW efficiently;
- track occupancy permit (TOP). Based upon overseas practices, this will offer a step change reduction in the time required for setting up and handing back a possession. The present process is time consuming and TOP is quick and easy, but it relies on strong technological support from GSM-R and changes to some safety-critical rules; and
- isolations. There are a number of initiatives in place aimed at improving the efficiency of taking electrical isolations.

There are also a number of engineering efficiency initiatives:

- modular switches and crossings (S&C). This well developed project aims to reduce S&C renewals from 54 hours to eight hours, with an average cost reduction of 25 per cent and a guaranteed standard quality throughout the network that can increase safety, as well as reduce maintenance;

- high output methodology. Our high output track relaying and ballast cleaning technology has delivered significant quantities of midweek plain line renewals in eight to 11 hour possessions. Network Rail is equal to or best in class at high output deployment and it has become 'business as usual'. There is a business case for the purchase of more high output kit currently being evaluated;
- plain line 8/200. We aim to develop a standard unit of plain line rail, sleeper and ballast (RSB) track renewal. All future work will be based on repeating multiples of this unit either within single of separate possessions. The drive will be to reduce delivery time. The starting point is 200 yards of RSB which is planned to be delivered in eight hours, with SLW, all work completed, the track returned to traffic at 80 mph or line speed, 80 per cent track quality with no follow up work and improved unit costs for the end to end supply chain; and
- plug and play. We aim to reduce the time taken in testing and commissioning signalling renewals by using equipment and processes that allow quicker testing and commissioning of new signalling installations through independent testing of trackside and interlocking equipment. This will avoid disruptive possessions.

The engineering process needs to be redesigned and adjusted to the needs of an increasingly seven-day railway with the main guidelines being:

- a reduction in people, meetings and time required before the work start;
- linking people and functions involved in the process with people accountable for it; and
- taking into account the fixed possessions hours and a T-52 weeks lock down before the start of the possession.

The continued development of these initiatives, such as SLW and the continued squeezing of track access into the eight hour window will open up new opportunities both for timetable amendments and the engineering process. In order to monitor our performance, we have a suite of possession KPIs that are produced for the industry on a periodic basis. This will be reinforced by the new measures of availability.

Network Rail has developed the December 2008 seven-day railway timetable for overnight and the mid week period. The new integrated train planning system (ITPS) will aid Network Rail in producing a full capacity / half capacity timetable.

Cost and revenue

We have undertaken an initial assessment of the incremental costs and revenues associated with the introduction of a seven-day railway.

This is based on the known costs of track installations, switches and crossing installations, signalling installations and other known asset types and formed this into an indicative programme that meets our customers' aspirations. Clearly, over time, the exact nature of these schemes will be adjusted through consultation with our customers to meet specific needs for increasingly seven-day railway running. We will set up a robust cross-industry business case authorisation process to refine each scheme prior to commissioning. These costs necessarily include increases to the maintenance costs as a result of the changed access regime, changes to Infrastructure Investment delivery costs and allowances for additional enhancement works for infrastructure works such as bi-directional signalling and additional crossovers.

We have already provided for the additional costs of managing within the reduced access on the West Coast Main Line as part of our base maintenance and renewal projections described above. These additional costs are being reviewed by ORR.

We have currently developed a list of potential initiatives that totals nearly £560 million over CP4. However, we would not expect to require all these initiatives to achieve the required outputs. We recognise that with value engineering, innovation and proper portfolio management this would reduce to up to £300 million.

Much of this is capital investment which will have longer term value. Although we believe that the potential benefits are greater than this, it would clearly not be appropriate to commit to these investments until this has been demonstrated and further work is required with train operators in this area. One option would be to treat this item in a similar way to the Network Rail Discretionary Fund and we propose to discuss this with ORR, DfT and Transport Scotland to decide whether the estimated funding requirement in these areas should be combined.

We summarise in Figure 9.1 the principal areas of incremental expenditure and provide an overview of these activities below.

Figure 9.1 Seven day railway schemes

£ million	Capex	Opex
Investment in integrated engineering planning process	10	
New methods and equipment for patrolling and inspection	12	
Junction lighting, access points and fixed warning systems	35	
Investment and modifications to plant for revised working arrangements	65	
Maintenance staffing costs (including training of additional staff)	5	58
Isolation arrangements		10
Single line working arrangements		20
Intelligent infrastructure	5	3
8/200 track renewals		4
Signalling, electrification and plant, civils and earthworks, telecommunications and estates additional costs	10	113
Remodelling and additional crossovers to facilitate the operation of single line working	75	5
Additional bi-directional signalling	75	
Modifications to power supply and earthing for both overhead and third rail electrified systems	55	
Total	347	213

Streamlining and integrating the engineering planning process will need to be integrated with the timetable planning process.

New methods and new equipment will be required for patrolling and inspection. This includes the provision of motorised trolleys for "design patrolling", lookout operated warning system equipment for providing advance warning to patrolmen

A number of schemes are proposed that will enable maintenance activities to be undertaken at night and to improve the efficiency of the maintenance work. These include the provision of fixed lighting at key junction layouts, additional line side access points to reduce the time taken to access the site of work and the provision of fixed warning systems to enable safe working whilst train services are still able to operate.

Modifications to plant and machinery to permit safe operation under single line working conditions. When appropriate new plant will be specified for operation with the adjacent line open and this will add to the cost of the plant. Additional switch and crossing (S&C) tamping machines will be required because of the more limited opportunities that exist with the seven-day railway for all line possessions that are required for S&C tamping.

Increased maintenance labour costs as more staff will be working at night. This will be mitigated by the new term and conditions currently under negotiation. Additional staff will be required as working with the adjacent line is less efficient than with both lines under possession.

Minimising the time taken to take the electrical isolation in order to maximise the working time available in a possession on electrified lines. Additional resources are to be provided for this.

Intelligent infrastructure will be required to ensure that the train performance meets its targets under a seven-day railway regime.

A method of delivering plain line track renewals in much shorter possessions is being developed. There are some additional costs with delivering track renewals using this methodology under a seven-day railway access regime.

The much shorter weekend possessions available under the seven-day railway will add significantly to the cost of some signalling, electrification and plant, civils and telecommunications renewals activities.

There are a number of enhancement schemes proposed to facilitate the delivery of the seven-day railway. These include the provision of additional crossovers at locations where single line working is required and the provision of bi-directional signalling, again to permit efficient single line working.

Modification to the overhead line and repositioning of the conductor rail to permit maintenance activities to take place when the adjacent line is open and the current live.

We have provided a separate supporting document to ORR that provides further detail on the move towards a seven-day railway.

Early start

As the final conclusions of PR2008 will not be published until October 2008, ORR has recognised that until we have clarity on the level of funding available and the required outputs there is a risk that we may delay investment. To reduce this risk ORR has proposed that it will provide "early start" decisions on our revenue allowance in February 2008 and asked us to identify expenditure in the first year of CP4 (2009/10) that we consider should qualify for the early start programme.

We reviewed our plans for CP4 to identify where we need certainty of funding in order to proceed with the investment in 2009/10. We have particularly considered very large projects that we expect to require GRIP stage 4 approval – the point at which we commit to the full costs of the scheme – before October 2008. We believe that "early start" funding is appropriate for individual projects, particularly enhancements, rather than overall programmes of work for an asset portfolio. We also believe that it is important to provide early confirmation that our future signalling renewals will be based on the implementation of ERTMS. We have identified a number of signalling renewals that we believe require "early start" funding. The total planned CP4 expenditure for these projects is summarised in Figure 9.2.

Figure 9.2 Potential early start schemes

	CP4 £m
Enhancements	
Thameslink	2,589
Birmingham New Street	134
North London Line	54
King's Cross station development	153
Bletchley – Milton Keynes	116
Reading area redevelopment	456
10 car suburban railway of South West main line	166
Airdrie – Bathgate	145
Signalling renewals	
Nottingham	38
Walsall – Bescot	52
Wolverhampton	45
Cardiff	111

We note that a number of significant schemes are already underway which will have significant further expenditure during CP4. These include, for example, FTN/GSM-R and Newport resignalling.

In addition we believe that the "early start" funding should provide for the continuation of the Network Rail Discretionary Fund, the National Stations Improvement Programme and for the Access for All programme.

We have separately provided ORR with the GRIP documents to provide further information on each of these schemes.

Risks and sensitivities

In developing plans for the period to 2013/14, there is clearly a risk that actual outcomes may be significantly different from the key assumptions made in this plan. In this section, we summarise the impact of these key risks.

Efficiency

In Chapter 5, we summarised our efficiency and input price assumptions for CP4. ORR will clearly challenge our efficiency assumptions. We have therefore considered the incremental impact on our plan of:

- applying our assumed efficiency profile to all controllable operating costs;
- being required to absorb the impact of increasing input prices;
- assuming annual efficiency of five per cent; and
- assuming annual efficiency of eight per cent.

Figure 9.3 shows the impact of a change from our stated efficiency profile. The implication of applying our efficiency profile to those elements of controllable opex and renewals that currently use a different profile is a reduction in opex of around £180 million and a reduction in renewals expenditure of around £30 million over the control period. If our efficiency profile was accepted without the provision for input price inflation this would result in a shortfall of around £900 million. Applying the profile on which the England & Wales SOFA is based (five per cent per year) we would be left with a shortfall of around £1.25 billion, and using the top end of the ORR's range, eight per cent per year, would leave us with a shortfall of around £3 billion.

If the efficiency targets are higher than our assumptions, we do not believe that we will be able to deliver these savings by simply reducing the scope and cost of operating, maintaining and renewing the network. We would need to take more significant steps to reduce our costs, potentially including changes which would reduce outputs.

There could also be a significant impact on our ability to build success with our suppliers as we would look for ways to make significant savings rather than maintaining a move towards a

Figure 9.3 Impact of alternative efficiency assumptions

£ million in CP4	Applying our efficiency profile to all costs	Removing our input price inflation	Apply efficiency assumption of 5% pa	Apply efficiency assumption of 8% pa
Controllable opex	180	340	400	700
Maintenance	-	220	310	720
Renewals	30	330	550	1,550
Implied impact on SBP	**210**	**890**	**1,260**	**2,970**

consistent, well planned programme of work. Without a healthy supply chain we will not be able to achieve our future ambitions and targets. An unrealistic target would also act as a disincentive to managers and could potentially undermine our ability to raise debt that is not supported by the government guarantee.

A failure to agree on the appropriate level of efficiency savings would lead to a period of further uncertainty while we challenge our existing plans. However, we recognise that reaching agreement on a challenging but realistic target is a critical element of a robust regulatory regime.

Enhancement risk

In Chapter 5, we included a portfolio of enhancement projects. For each project, we have included an assessment of risk, based on our GRIP process, which provides an 80 per cent level of confidence (referred to as the "p80") of delivering the portfolio within the estimated costs.

A key issue for the business, for the railway and for its funders concerns the treatment of risk associated with enhancements. Proper funding is required to enable us to bear these risks which also need to be managed by the party best able to do so. However, many of the proposed projects are at a relatively early stage of development and setting a fixed price for the management of these risks may not offer best value for money to our customers and funders. We have developed a pain-gain sharing arrangement with DfT to incentivise efficient delivery of the Thameslink Programme without imposing excessive risk onto the business. We believe that similar arrangements should be introduced as part of the regulatory process for dealing with other investments.

Financial assumptions

In Chapter 7, we outlined the financial assumptions that we have made in developing this plan. In particular, we have assumed a rate of return of 4.5 per cent and an annual risk buffer of £250 million.

Other risks

We have not included any contingency for the impact of potential future UK or European legislation, including, for example, amendments impact to the interoperability directives.

10 Summary of future developments

In support of the periodic review process we will be providing further updates to our Strategic Business Plan. The key steps remaining in the periodic review process are shown in Figure 10.1.

Figure 10.1 Key periodic review milestones

Nov 07	ORR launch public consultation on SBP
Dec 07	ORR complete initial matching process
Feb 08	ORR publish assessment of SBP
Apr 08	Network Rail updates SBP
Jun 08	ORR draft determination
Oct 08	ORR final determination
Dec 08	Final access charges approved
Mar 09	Network Rail publishes CP4 business plan

We will be updating elements of the plan in April 2008. The key areas of further development are described in the following sections.

Industry strategies

Performance

Over the coming months, we will continue to work with TOCs as we develop the Joint Performance Improvement Plans (JPIPs) for next year. In particular, we will develop in more detail the plans to deliver improvements in CP4 and aim to develop a process for continuous development of a long term performance plan.

We will also carry out further analysis on the performance impact of major projects, including Thameslink, Reading and Birmingham New Street. As far as possible, we aim to include performance mitigation initiatives within the project plans.

We will continue to update National Task Force (NTF) on our progress and are planning an industry performance conference in early January to review performance improvement plans and share best practice. We will continue to develop our research and use benchmarking analysis to identify the optimal level of performance on each route.

We will provide an update on our performance projections, and the initiatives required to deliver them, in April 2008.

Capacity

The capacity strategies for each route imply a significant injection of additional rolling stock. In this plan we have provided a high level view of the quantum of additional rolling stock based on a simplifying assumption that existing rolling stock units on each route can be incrementally increased.

Both the DfT and Transport Scotland are developing rolling stock plans and our assessment, made with the train operators, of where new rolling stock needs to be deployed will help inform these plans. The deployment of this rolling stock and the consequential effect on the existing fleet and the rail infrastructure, including depots, will require careful planning and co-ordination between train operators, Network Rail, suppliers and funders. We look forward to developing a robust strategy through ongoing joint work including the Network RUS.

A high level review has been undertaken to develop the renewals and enhancements plans in a manner that takes account of the interaction between them. As projects are developed further through the GRIP framework, the scope definition, resource requirements and timescales will be firmed up. This will enable further examination of synergies and dependencies in order to deliver both the renewals and enhancements proposals as efficiently as possible.

As the rolling stock plan for CP4 is firmed up we will also be able to ensure alignment between the rolling stock and infrastructure delivery programmes.

We have initiated industry discussions on the Strategic Freight Network. In our April update we intend to provide further detail as a result of these discussions and also set out our proposed plans for investment to facilitate this using the funding referred to in the HLOS.

We are continuing to develop plans for small scale enhancements using the Network Rail Discretionary Fund (NRDF). We propose to continue developing schemes for delivery in CP4 so that we are able to make early progress on their delivery once the required funding is approved. The same applies to the National Stations improvement Programme (NSIP) and the Access for All Programme.

We expect to engage closely with ORR and its consultants on the enhancement plans and will review our plans in the light of these discussions.

We will also continue to engage with train operators, DfT and Transport Scotland to achieve the required outputs in the most cost-effective way. We will also continue to develop each of the major schemes and will identify any emerging issues in our April update.

Network Rail strategies and policies

Performance measurement

Our analysis of what our key stakeholders demand of us has allowed us to derive a set of Key Performance Indicators (KPIs) and lower level performance indicators which allow us to measure our progress towards our world class aims. We would expect that the performance demonstrated by the KPIs would then be reflected in the results of the annual stakeholder surveys.

We aim to use these measures internally in 2008/09 and to report formally against them from the start of the next control period in April 2009. We have commenced development of the appropriate systems to provide this information and to embed it within our business management and review processes, including our management incentive arrangements.

Asset management

We have made good progress in embedding a risk-based methodology for asset management within the business. This has been acknowledged by the independent reporter. We recognise that improvement opportunities remain. The principal elements of our development plans include:

- providing clear route specifications to improve the alignment between asset management activities and the delivery of route outputs;
- extending the policy justification work to cover all key asset cost drivers;
- the further differentiation of policies by route, where appropriate;
- the further development of the Corporate Network Model to improve data integration and to provide improved stakeholder access to our systems;
- completing the application of our integrated risk process across relevant elements of our asset management system; and
- the implementation of a comprehensive suite of indicators to improve our ability to monitor the effectiveness of the asset management framework.

In line with our world class agenda, we expect to have made considerable progress with these tasks prior to the commencement of CP4.

In the plan we have also identified asset specific policy development issues that require further consideration. This is a continuous process and we will keep the policies under review. The world class pilot study, for example, has identified a number of ideas which will require further consideration. We will also keep these policies under review in the light of discussions with ORR. The development of the asset policies and the ICM provides the opportunity for a more focused discussion with ORR than was possible in the past on the required activities to sustain the required outputs. The ICM may therefore need to be refined in the light of these discussions.

Efficiency and input prices

We will continue to develop our efficiency plans for the next control period. Indeed, if we are going to deliver the challenging targets we have set for ourselves for the initial years, we will need to take steps now in order to implement these. We will also be doing further work to satisfy ourselves that the efficiency savings assumed for the latter years are challenging and realistic. We will continue to work with other railways and businesses from other industries to understand how we can improve efficiency and we also expect to engage closely with ORR and its consultants on these matters. We will therefore keep our plans and assumptions under close review.

The analysis done for us by LEK on input price trends was undertaken before the decision to proceed with Crossrail. In addition, we have concerns about the assumptions in some areas and ORR has raised a number of issues. This analysis will therefore need to be reviewed with ORR and LEK.

Our plans for CP4

Our long term plans will continue to develop in the light of the issues outlined above. Moreover, we will continue to develop our detailed short term delivery plans consistent with this Strategic Business Plan.

We will continue to review the overall internal and external capabilities required to deliver this plan. In particular, we will improve our understanding for the categories of expenditure that are most likely to experience resource issues and of the regional pressure in the London area.

The development of the ICM is a long-term activity and we will continue to work to improve it. The precise scope and timing of improvements to the ICM will be influenced by our business priorities and the industry priorities for the periodic review process. However, the priorities are likely to include:

- further improvements to the modelling of the interactions between maintenance and renewal activities;
- improvements in the modelling of relationships between activity and network outputs at a disaggregated level; and
- incorporation of further developments in the understanding of cost causation and improvements in the availability of asset condition and other key input data.

Outputs

Network capability

Our improvement plan for the measurement of network capability aims to develop a new definition for capability, improve internal processes related to data accuracy and to determine and implement an improved approach to publishing capability information more consistent with operators needs in terms of delivering and planning their businesses. This plan has been developed into an extended programme which has been shared with our customers and ORR. In line with this programme, the baseline measures for the proposed capability metrics will be published by the end of June 2008, except those for gauge and length limits which will be published by the end of 2008.

Capability is not currently defined in terms of gross tonne kilometres on a route. By the end of 2007 we intend to have completed our analysis of any implications of instances where projected traffic changes are greater than the implied tonnage capability measure.

Network availability

We are currently developing a network availability measure to enable us to measure and monitor the impact on our customers and users of the disruption caused by engineering works. This will also help us to demonstrate our progress in moving towards a seven-day railway.

We are proposing three separate metrics for the planned impact of possessions on passenger and freight operators and a combined measure to understand the potential financial impact on the industry. These will be supplemented by further performance indicators to measure related issues such possessions over-runs. We will provide our projections for these measures in April 2008.

Improved planning

The work undertaken in the last few years represents a major step forward both for the business and the industry in terms of long term planning. It will be important to use this opportunity to build a longer term and more continuous dialogue on these matters.

Within the business, the review will provide stable and secure funding and clarity about the required outputs for the next five years. Improved planning processes will help the business to plan for the longer term while maintaining a clear focus on delivering short term efficiencies and other improvements. We will therefore be developing our plans in this area in parallel with the review.

Across the industry, the review has intensified the discussion with out industry partners, government and other stakeholders about what is required of the industry and how best to deliver it. This discussion has built on the Route Plans and the RUSs as well as the JPIP process. We propose to discuss further with our partners how we can continue to improve this process and build on the momentum which has been achieved.

Appendices

Appendix 1 Network total operating expenditure, maintenance and renewal projections

£m (2006/07 prices)	Control period 3					Control period 4					Total		Control period averages				
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	CP3	CP4	CP3	CP4	CP5	CP6	CP7
Operating expenditure																	
Controllable opex	994	899	878	814	784	775	764	750	744	738	4,368	3,770	874	754	730	719	717
Non controllable opex	263	275	343	320	337	342	362	373	381	385	1,538	1,842	308	368	395	412	426
Total opex	**1,257**	**1,174**	**1,221**	**1,134**	**1,121**	**1,117**	**1,126**	**1,122**	**1,124**	**1,123**	**5,906**	**5,613**	**1,181**	**1,123**	**1,125**	**1,131**	**1,143**
Maintenance	**1,352**	**1,241**	**1,146**	**1,094**	**1,025**	**1,040**	**989**	**951**	**926**	**914**	**5,859**	**4,819**	**1,172**	**964**	**858**	**820**	**820**
Renewals (non-WCRM)																	
Track	645	827	897	843	770	741	712	689	668	657	3,982	3,468	796	694	579	479	474
Signalling	194	294	436	478	572	490	486	463	470	508	1,974	2,415	395	483	526	480	424
Civils	279	307	377	393	388	434	428	393	368	355	1,744	1,979	349	396	351	338	336
Operational property	182	232	241	223	195	291	292	298	297	287	1,073	1,465	215	293	315	248	248
Telecoms	213	138	182	249	239	292	235	160	113	57	1,020	856	204	171	73	65	82
Electrification	28	54	82	111	122	87	99	105	91	85	397	467	79	93	58	64	61
Plant and machinery	82	69	84	109	114	119	79	52	52	53	457	356	91	71	75	74	78
Other renewals	91	91	96	391	329	163	148	109	103	73	998	596	200	119	91	83	77
Discretionary investment	0	0	0	0	0	265	236	173	127	84	0	885	0	177	38	38	43
Total	**1,713**	**2,012**	**2,395**	**2,795**	**2,729**	**2,881**	**2,715**	**2,442**	**2,288**	**2,160**	**11,645**	**12,487**	**2,329**	**2,497**	**2,104**	**1,869**	**1,822**
Renewals (WCRM)																	
Total	**1,111**	**690**	**361**	**368**	**179**	**0**	**0**	**0**	**0**	**0**	**2,708**	**0**	**542**	**0**	**0**	**0**	**0**
Total renewals	**2,824**	**2,702**	**2,756**	**3,163**	**2,908**	**2,881**	**2,715**	**2,442**	**2,288**	**2,160**	**14,353**	**12,487**	**2,871**	**2,497**	**2,104**	**1,869**	**1,822**
Total O, M and R	**5,433**	**5,117**	**5,123**	**5,391**	**5,054**	**5,038**	**4,831**	**4,515**	**4,338**	**4,197**	**26,118**	**22,919**	**5,224**	**4,584**	**4,088**	**3,820**	**3,786**

Appendix 2 England and Wales operating expenditure, maintenance and renewal projections

£m (2006/07 prices)	Control Period 3			Control Period 4					Total	Control period averages				
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	CP4	CP3	CP4	CP5	CP6	CP7
Operating expenditure														
Controllable opex	797	740	712	705	695	682	676	671	3,429	750	686	664	654	653
Non controllable opex	317	294	310	315	332	342	349	353	1,690	307	338	362	378	391
Total opex	**1,114**	**1,034**	**1,022**	**1,019**	**1,027**	**1,024**	**1,025**	**1,024**	**5,119**	**1,057**	**1,024**	**1,027**	**1,032**	**1,044**
Maintenance	**1,038**	**996**	**930**	**941**	**893**	**859**	**838**	**827**	**4,356**	**988**	**871**	**776**	**744**	**745**
Renewals (non-WCRM)														
Track	813	769	710	672	640	616	597	583	3,108	764	622	513	414	403
Signalling	404	409	510	464	449	428	435	475	2,251	441	450	462	419	351
Civils	312	325	323	345	340	312	301	291	1,589	320	318	285	274	272
Operational property	227	194	177	242	231	244	244	255	1,216	199	243	280	221	221
Telecoms	136	213	205	251	206	137	98	53	745	185	149	62	57	68
Electrification	72	106	114	76	91	95	84	79	425	97	85	54	59	56
Plant and machinery	80	100	106	107	71	47	48	48	321	96	64	67	66	69
Other renewals	96	353	299	147	134	99	93	66	539	250	108	82	76	70
Discretionary investment	0	0	0	236	215	160	117	79	807	0	161	34	36	39
Total	**2,140**	**2,471**	**2,445**	**2,542**	**2,377**	**2,139**	**2,016**	**1,928**	**11,002**	**2,352**	**2,200**	**1,838**	**1,621**	**1,550**
Renewals (WCRM)														
Total	**333**	**359**	**178**	**0**	**0**	**0**	**0**	**0**	**0**	**290**	**0**	**0**	**0**	**0**
Total renewals	**2,473**	**2,830**	**2,623**	**2,542**	**2,377**	**2,139**	**2,016**	**1,928**	**11,002**	**2,642**	**2,200**	**1,838**	**1,621**	**1,550**
Total O, M and R	**4,625**	**4,860**	**4,575**	**4,501**	**4,296**	**4,021**	**3,879**	**3,779**	**20,477**	**4,687**	**4,095**	**3,641**	**3,397**	**3,338**

Appendix 3 Scotland operating expenditure, maintenance and renewal projections

£m (2006/07 prices)	Control period 3			Control period 4					Total	Control period averages				
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	CP4	CP3	CP4	CP5	CP6	CP7
Operating expenditure														
Controllable opex	81	74	72	70	69	68	67	67	342	76	68	66	65	65
Non controllable opex	26	26	27	27	31	31	32	32	152	26	30	33	34	35
Total opex	**107**	**100**	**99**	**97**	**100**	**99**	**99**	**99**	**494**	**102**	**99**	**99**	**99**	**99**
Maintenance	**108**	**98**	**95**	**100**	**96**	**92**	**88**	**87**	**463**	**100**	**93**	**82**	**77**	**76**
Renewals (non-WCRM)														
Track	84	74	60	70	72	73	71	74	359	72	72	67	65	71
Signalling	32	69	62	25	36	35	35	33	164	54	33	63	62	73
Civils	65	67	66	89	88	80	67	65	390	66	78	66	63	63
Operational property	14	28	18	48	61	54	53	33	249	20	50	34	27	27
Telecoms	46	35	34	40	29	23	15	4	111	38	22	12	7	14
Electrification	10	4	8	11	8	10	7	6	43	7	9	4	5	5
Plant and machinery	4	8	8	12	8	5	4	5	35	7	7	8	8	8
Other renewals	0	38	30	16	14	10	10	7	57	23	11	9	8	7
Discretionary investment	0	0	0	28	21	13	10	5	78	0	16	4	3	5
Total	**255**	**324**	**285**	**340**	**339**	**303**	**272**	**232**	**1,485**	**288**	**297**	**266**	**248**	**273**
Renewals (WCRM)														
Total	**28**	**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**13**	**0**	**0**	**0**	**0**
Total renewals	**283**	**334**	**285**	**340**	**339**	**303**	**272**	**232**	**1,485**	**301**	**297**	**266**	**248**	**273**
Total O, M and R	**498**	**532**	**479**	**537**	**534**	**494**	**460**	**417**	**2,441**	**503**	**488**	**447**	**423**	**448**

Appendix 4 Network total income projections

£m (2006/07 prices)	Control period 3			Control period 4					Total		Control period averages			
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	CP4		CP4	CP5	CP6	CP7
Income														
Schedule 8	80	81	59	0	0	0	0	0	0		0	0	0	0
Schedule 8 access charge supplement	7	7	6	0	0	0	0	0	0		0	0	0	0
Schedule 4	(101)	(115)	(115)	(100)	(100)	(100)	(100)	(100)	(500)		(100)	(100)	(100)	(100)
Schedule 4 access charge supplement	87	89	90	100	100	100	100	100	500		100	100	100	100
Variable track access	228	233	235	194	195	200	201	202	993		199	204	206	206
Electric asset usage	0	0	0	9	9	9	9	9	45		9	9	9	9
EC4T income	163	190	208	165	169	175	182	187	878		176	190	192	192
Capacity charge	7	8	8	127	128	129	130	131	645		129	133	135	135
Station income (incl. QX)	306	303	304	78	78	78	78	78	391		78	78	78	78
Depots income	47	46	46	46	46	46	46	46	231		46	46	46	46
Freight income	96	96	99	99	103	107	111	115	534		107	126	132	132
Property income	253	255	271	190	188	187	190	187	943		189	187	187	187
Property sales	0	0	0	26	25	34	18	24	128		26	24	24	24
Open access income	61	54	48	19	19	19	19	19	94		19	19	19	19
Other income	2	2	2	2	2	2	2	2	12		2	2	2	2
Total income	**1,236**	**1,249**	**1,261**	**956**	**964**	**987**	**988**	**1,000**	**4,894**		**979**	**1,019**	**1,031**	**1,031**

Appendix 5 England and Wales income projections

£m (2006/07 prices)	Control period 3			Control period 4					Total	Control period averages			
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	CP4	CP4	CP5	CP6	CP7
Income													
Schedule 8	78	79	58	0	0	0	0	0	0	0	0	0	0
Schedule 8 access charge supplement	7	7	6	0	0	0	0	0	0	0	0	0	0
Schedule 4	(98)	(104)	(104)	(90)	(90)	(90)	(90)	(90)	(452)	(90)	(90)	(90)	(90)
Schedule 4 access charge supplement	80	82	83	90	90	90	90	90	452	90	90	90	90
Variable track access	217	222	224	179	180	185	186	186	917	183	189	190	190
Electric asset usage	0	0	0	8	8	8	8	8	42	8	8	8	8
EC4T income	156	180	197	156	158	164	171	175	824	165	179	181	181
Capacity charge	7	8	8	118	119	120	121	122	601	120	124	125	125
Station income (incl. QX)	280	278	278	73	73	73	73	73	364	73	73	73	73
Depots income	42	41	41	41	41	41	41	41	205	41	41	41	41
Freight income	86	86	89	88	92	95	98	102	476	95	113	118	118
Property income	234	240	259	179	177	175	179	175	884	177	175	175	175
Property sales	0	0	0	25	23	33	17	24	122	24	24	24	24
Open access income	61	54	48	19	19	19	19	19	94	19	19	19	19
Other income	2	2	2	2	2	2	2	2	11	2	2	2	2
Total income	**1,152**	**1,175**	**1,189**	**888**	**893**	**917**	**915**	**927**	**4,540**	**908**	**946**	**957**	**957**

Appendix 6 Scotland income projections

£m (2006/07 prices)	Control period 3			Control period 4					Total	Control period averages			
	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	CP4	CP4	CP5	CP6	CP7
Income													
Schedule 8	2	2	1	0	0	0	0	0	0	0	0	0	0
Schedule 8 access charge supplement	0	0	0	0	0	0	0	0	0	0	0	0	0
Schedule 4	(3)	(11)	(11)	(10)	(10)	(10)	(10)	(10)	(48)	(10)	(10)	(10)	(10)
Schedule 4 access charge supplement	7	7	7	10	10	10	10	10	48	10	10	10	10
Variable track access	11	11	11	15	15	15	15	16	76	15	16	16	16
Electric asset usage	0	0	0	1	1	1	1	1	3	1	1	1	1
EC4T income	7	10	11	10	10	11	11	12	54	11	11	11	11
Capacity charge	0	0	0	8	9	9	9	9	44	9	9	9	9
Station income (incl. QX)	26	25	26	5	5	5	5	5	27	5	5	5	5
Depots income	5	5	5	5	5	5	5	5	26	5	5	5	5
Freight income	10	10	10	10	11	12	12	13	59	12	14	14	14
Property income	19	15	12	12	12	12	12	12	59	12	12	12	12
Property sales	0	0	0	2	2	1	1	0	6	1	0	0	0
Open access income	0	0	0	0	0	0	0	0	0	0	0	0	0
Other income	0	0	0	0	0	0	0	0	1	0	0	0	0
Total income	**84**	**74**	**72**	**68**	**71**	**71**	**72**	**72**	**354**	**71**	**73**	**74**	**74**

Appendix 7 Network total asset stewardship performance indicators

	Control period 3					Control period 4				
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
KPIs										
Good track geometry	128.6%	131.4%	132.9%	135.2%	135.2%	135.2%	135.3%	135.4%	135.5%	135.6%
Poor track geometry	3.10%	2.80%	2.60%	2.40%	2.30%	2.30%	2.27%	2.25%	2.22%	2.20%
Geometry faults per 100 track km (primary and secondary)	57.4	51.5	45.3	43.2	41.2	4.4% reduction per annum				
Immediate action geometry faults per 100km (network)	-	-	-	-	-	4.4% reduction per annum				
Immediate action rail defects per 100km (primary and secondary)	-	-	-	-	-	0.9% reduction per annum				
Rail breaks per 100km (network)	1.09	1.07	0.65	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Civils assets subject to inspection (number)	-	-	-	1,300	1,190	1,131	1,085	1,053	1,032	1,011
TSRs imposed(severity index)	-	134	114	111	108	106	104	101	99	97
Station stewardship measure - category A stations	-	-	-	-	-	0.0%	0.4%	0.8%	1.0%	1.1%
Station stewardship measure - category B stations	-	-	-	-	-	0.0%	0.4%	0.8%	1.0%	1.1%
Station stewardship measure - category C stations	-	-	-	-	-	(1.3%)	(1.3%)	(1.2%)	(0.9%)	(0.9%)
Station stewardship measure - category D stations	-	-	-	-	-	(1.3%)	(1.3%)	(1.3%)	(0.9%)	(0.9%)
Station stewardship measure - category E stations	-	-	-	-	-	(1.5%)	(1.5%)	(1.5%)	(1.1%)	(1.2%)
Station stewardship measure - category F stations	-	-	-	-	-	(1.6%)	(1.6%)	(1.5%)	(1.2%)	(1.2%)
Light maintenance depot stewardship measure	-	-	-	-	-	(0.7%)	(0.7%)	(1.1%)	(1.1%)	(1.3%)
Sub station and contact systems condition	-	-	-	-	-	1% per annum improvement in condition measure				
Traction power incidents causing train delays	84	55	80	77	74	71	67	64	61	58
Signalling failures	24,641	23,378	22,765	20,696	18,721	18,126	17,587	17,035	16,500	16,205
Points and track circuit failures	18,003	17,288	17,039	14,769	13,003	12,471	12,008	11,382	10,764	10,496

Appendix 8 England and Wales asset stewardship performance indicators

	Control period 3					Control period 4				
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
KPIs										
Good track geometry	128.1%	131.0%	132.4%	134.9%	134.9%	134.9%	135.0%	135.1%	135.2%	135.3%
Poor track geometry	3.17%	2.87%	2.73%	2.50%	2.40%	2.38%	2.35%	2.33%	2.30%	2.28%
Geometry faults per 100 track km (primary and secondary)	59.9	53.3	46.8	44.5	42.2	5% reduction per annum				
Immediate action geometry faults per 100km (network)	-	-	-	-	-	5% reduction per annum				
Immediate action rail defects per 100km (primary and secondary)	-	-	-	-	-	1% reduction per annum				
Rail breaks per 100km (network)	1.13	1.06	0.67	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Civils assets subject to inspection (number)	-	-	-	1,200	1,100	1,045	1,003	973	954	935
TSRs imposed(severity index)	-	133	113	110	107	105	103	100	98	96
Station stewardship measure - category A stations	-	-	-	-	-	0.0%	0.4%	0.8%	1.0%	1.1%
Station stewardship measure - category B stations	-	-	-	-	-	0.0%	0.4%	0.8%	1.0%	1.1%
Station stewardship measure - category C stations	-	-	-	-	-	(1.3%)	(1.3%)	(1.2%)	(0.9%)	(0.9%)
Station stewardship measure - category D stations	-	-	-	-	-	(1.3%)	(1.3%)	(1.3%)	(0.9%)	(0.9%)
Station stewardship measure - category E stations	-	-	-	-	-	(1.5%)	(1.5%)	(1.5%)	(1.1%)	(1.2%)
Station stewardship measure - category F stations	-	-	-	-	-	(1.6%)	(1.6%)	(1.5%)	(1.2%)	(1.2%)
Light maintenance depot stewardship measure	-	-	-	-	-	(0.7%)	(0.7%)	(1.1%)	(1.1%)	(1.3%)
Sub station and contact systems condition	-	-	-	-	-	1% per annum improvement in condition measure				
Traction power incidents causing train delays	78	49	75	72	69	66	63	60	57	54
Signalling failures	21,667	20,531	20,062	18,269	16,850	16,314	15,828	15,331	14,850	14,585
Points and track circuit failures	15,886	15,228	14,833	12,927	11,538	11,224	10,807	10,244	9,687	9,446

Appendix 9 Scotland asset stewardship performance indicators

	Control period 3					Control period 4				
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
KPIs										
Good track geometry	131.8%	133.8%	136.2%	137.4%	137.4%	137.5%	137.6%	137.6%	137.7%	137.8%
Poor track geometry	2.56%	2.07%	1.77%	1.78%	1.80%	1.78%	1.75%	1.73%	1.70%	1.68%
Geometry faults per 100 track km (primary and secondary)	41.6	39.6	35.5	35.1	34.8	1% reduction per annum				
Immediate action geometry faults per 100km (network)	-	-	-	-	-	1% reduction per annum				
Immediate action rail defects per 100km (primary and secondary)	-	-	-	-	-	Nil reduction				
Rail breaks per 100km (network)	0.80	1.16	0.53	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Civils assets subject to inspection (number)	-	-	-	100	90	86	82	80	78	76
TSRs imposed(severity index)	-	1	1	1	1	1	1	1	1	1
Station stewardship measure - category A stations	-	-	-	-	-	0.0%	0.4%	0.8%	1.0%	1.1%
Station stewardship measure - category B stations	-	-	-	-	-	0.0%	0.4%	0.8%	1.0%	1.1%
Station stewardship measure - category C stations	-	-	-	-	-	(1.3%)	(1.3%)	(1.2%)	(0.9%)	(0.9%)
Station stewardship measure - category D stations	-	-	-	-	-	(1.3%)	(1.3%)	(1.3%)	(0.9%)	(0.9%)
Station stewardship measure - category E stations	-	-	-	-	-	(1.5%)	(1.5%)	(1.5%)	(1.1%)	(1.2%)
Station stewardship measure - category F stations	-	-	-	-	-	(1.6%)	(1.6%)	(1.5%)	(1.2%)	(1.2%)
Light maintenance depot stewardship measure	-	-	-	-	-	(0.7%)	(0.7%)	(1.1%)	(1.1%)	(1.3%)
Sub station and contact systems condition	-	-	-	-	-	1% per annum improvement in condition measure				
Traction power incidents causing train delays	6	6	5	5	5	5	4	4	4	4
Signalling failures	2,974	2,847	2,703	2,427	1,871	1,813	1,759	1,703	1,650	1,621
Points and track circuit failures	2,117	2,060	2,206	1,842	1,465	1,247	1,201	1,138	1,076	1,050

Appendix 10 Enhancement projections

£m (2006/07 prices)	Control Period 4					
	2009/10	2010/11	2011/12	2012/13	2013/14	Total
DfT projects						
Baseline projects	182	199	248	319	274	**1,221**
Specified projects	857	1,035	663	720	761	**4,036**
HLOS projects	489	549	503	332	107	**1,978**
Other	41	101	108	81	116	**447**
Performance funds	80	80	80	80	80	**400**
Seven day railway (DfT)	54	54	54	54	54	**270**
TS projects						
Borders rail	1	1	2	0	0	**3**
Airdrie - Bathgate	122	22	1	0	0	**145**
Glasgow Airport rail link	21	60	90	0	0	**170**
Tier 3 development	3	3	3	3	3	**13**
Small projects funds	4	4	4	4	4	**20**
Seven day railway (TS)	6	6	6	6	6	**30**
TIF projects						
Round 1 TIF	79	39	0	0	0	**117**
Third party funded						
Third party	305	302	97	35	40	**779**
Total enhancements	**2,242**	**2,454**	**1,858**	**1,633**	**1,443**	**9,630**

England & Wales						
Baseline Projects	182	199	248	319	274	**1,221**
Specified Projects	857	1,035	663	720	761	**4,036**
HLOS projects	489	549	503	332	107	**1,978**
Other	41	101	108	81	116	**447**
Performance funds	80	80	80	80	80	**400**
Seven day railway (DfT)	54	54	54	54	54	**270**
Round 1 TIF	79	39	0	0	0	**117**
Total England & Wales	**1,782**	**2,056**	**1,656**	**1,586**	**1,390**	**8,470**

Scotland						
Borders Rail	1	1	2	0	0	**3**
Airdrie - Bathgate	122	22	1	0	0	**145**
Glasgow Airport Rail Link	21	60	90	0	0	**170**
Tier 3 development	3	3	3	3	3	**13**
Small projects funds	4	4	4	4	4	**20**
Seven day railway (TS)	6	6	6	6	6	**30**
Total Scotland	**155**	**96**	**105**	**13**	**13**	**380**

Appendix 11 Maintenance and renewal expenditure at franchised stations

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Maintenance	70	84	102	114	122	**492**
Renewals	45	53	65	73	78	**314**
Total	**115**	**137**	**166**	**187**	**201**	**806**

Appendix 12 Expenditure projections for franchised stations by Station Facility Owner

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Total
Arriva Trains Wales	8	9	11	13	14	**54**
c2c Rail	2	2	3	3	3	**12**
Chiltern Railways	2	2	2	3	3	**11**
East Midlands Trains	4	5	6	6	7	**28**
First Capital Connect	5	6	7	8	8	**33**
First Greater Western	9	11	13	15	16	**63**
First ScotRail	13	15	19	21	22	**90**
one	9	10	12	14	15	**60**
South Eastern	10	11	14	16	17	**67**
London Midland Trains	7	9	10	12	13	**51**
London Overground	1	2	2	2	3	**10**
London Underground	2	2	2	3	3	**11**
Merseyrail	3	4	5	5	6	**22**
Southern	9	10	13	14	15	**61**
Northern Rail	16	19	23	26	28	**114**
National Express East Coast	2	2	2	2	3	**11**
South West Trains	10	12	15	17	18	**72**
First/Keolis TransPennine Express	2	3	3	4	4	**15**
West Coast Trains	3	3	4	4	5	**18**
Other	0	0	0	0	0	**1**
Total	**115**	**137**	**166**	**187**	**201**	**806**

Appendix 13 Candidate stations for the National Stations Improvement Programme *

Candidate stations for the National Stations Improvement Programme

Aberystwyth	Brentwood	Darlington	Grantham	Huyton	Moorfields	Royston	Telford	Wokingham
Accrington	Brixton	Dartford	Gravesend	Ilford	Moreton	Rugeley Town	Thorpe Bay	Wolverhampton
Aldershot	Bromley South	Denmark Hill	Grimsby	James Street	New Brighton	Salisbury	Tonbridge	Wood Street
Alfreton	Burnley Central	Derby	Halifax	Keighley	New Malden	Scarborough	Tunbridge Wells	Woolwich Arsenal
Altrincham	Burnley Manchester Road	Dewsbury	Hall Road	Kentish Town	Newark	Seaforth & Litherland	Twickenham	
Andover	Burton on Trent	Didcot Parkway	Hamilton Square	Kettering	Newbury	Selhurst	Uckfield	
Ashford International	Bush Hill Park	Dover Priory	Harold Wood	Kirkby	Norbury	Seven Sisters	Upminster	
Ashtead	Cambridge	Ealing Broadway	Harpenden	Lancaster	Norwood Junction	Sevenoaks	Vauxhall	
Balham	Cannock	Earlsfield	Harringay	Landywood	Ockendon	Shenfield	Virginia Water	
Banbury	Canterbury West	East Grinstead	Harrogate	Leagrave	Ormskirk	Shoeburyness	Waltham Cross	
Barking	Cardiff Central	East Tilbury	Hartlepool	Leicester	Peckham Rye	Shrewsbury	Walton	
Barrow in Furness	Carlisle	Eastleigh	Hassocks	Lewisham	Peterborough	Skegness	Wandsworth Town	
Basingstoke	Carmarthen	Exeter St Davids	Hatfield	Lichfield TV	Port Talbot Parkway	Skipton	Warwick	
Bedford	Castle Carey	Farnham	Havant	Limehouse	Potters Bar	Slough	Waterloo (Merseyrail)	
Billericay	Chalkwell	Finsbury Park	Hednesford	Llandudno Town	Preston	Smitham	Wellington	
Birkenhead Central	Chatham	Fleet	Hereford	Long Eaton	Putney	Southampton Central	Wellwyn Garden City	
Birkenhead North	Chelternham Spa	Flitwick	Hersham	Longbridge	Queens Rd Peckham	Southend Victoria	West Croydon	
Birmingham Snow Hill	Chester	Forest Gate	Hillside	Loughborough	Rayleigh	Staines	West Hampstead	
Bishops Stortford	Chippenham	Formby	Hitchin	Maidenhead	Retford	Stalybridge	West Kirkby	
Bloxwich	Clapham Junction	Fratton	Honiton	Manchester Oxford Rd	Rhyl	Stevenage	West Norwood	
Bloxwich North	Cleethorpes	Gidea Park	Hooton	Manchester Victoria	Rice Lane	Stratford - Upon - Avon	Weymouth	
Blundellsands & Crosby	Colchester	Gillingham (Kent)	Horsham	Mexborough	Rochdale	Streatham Hill	Wickford	
Bolton	Cosford	Gipsy Hill	Hounslow	Middlesborough	Rock Ferry	Surbiton	Wigan	
Bradford Interchange	Crystal Palace	Gloucester	Huddesfield	Mill Hill Broadway	Romford	Swansea High Street	Winchester	

*This list is subject to modification in the light further development and the availability of local funding.

Appendix 14 Projected Public Performance Measure over CP4

	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
England & Wales						
Franchised TOC						
Transpennine Express	91.5%	91.9%	92.5%	93.1%	93.7%	94.2%
One	90.5%	90.9%	91.5%	92.0%	92.5%	93.0%
Northern Rail	90.0%	90.3%	90.8%	91.3%	91.7%	92.2%
First Great Western	86.7%	86.8%	87.6%	88.6%	89.9%	91.1%
First Capital Connect	89.9%	89.1%	89.8%	90.3%	90.9%	91.4%
Cross Country	86.5%	87.1%	88.2%	89.2%	90.2%	91.0%
West Midlands	88.9%	89.6%	90.4%	91.0%	91.6%	92.1%
London Overground	91.5%	92.7%	93.7%	94.2%	94.7%	94.9%
East Midlands	87.1%	87.7%	88.5%	89.3%	90.1%	90.8%
Great North Eastern Railway Ltd	87.2%	88.2%	89.5%	90.6%	91.7%	92.7%
Merseyrail Electrics 2002 Ltd	94.4%	94.4%	94.7%	94.9%	95.1%	95.3%
Virgin West Coast	87.9%	88.7%	89.6%	90.3%	91.0%	91.5%
Arriva Trains Wales	90.8%	90.6%	90.8%	91.0%	91.3%	91.4%
The Chiltern Railway Co.Ltd	94.4%	94.6%	94.9%	95.3%	95.5%	95.8%
c2c	95.4%	95.3%	95.3%	95.4%	95.5%	95.5%
South Eastern Trains Ltd	91.6%	91.2%	91.9%	92.4%	92.8%	93.2%
Gatwick Express Ltd	92.0%	92.4%	92.9%	93.4%	93.9%	94.4%
Southern	90.8%	90.5%	91.1%	91.7%	92.2%	92.6%
South West Trains Ltd	91.8%	92.4%	92.7%	93.0%	93.1%	93.3%
Sector						
London & south east	91.1%	91.1%	91.7%	92.2%	92.6%	93.1%
Long distance	87.3%	87.9%	89.0%	90.0%	91.0%	92.0%
Regional	89.9%	90.2%	90.7%	91.1%	91.5%	92.0%
Total	90.4%	90.5%	91.1%	91.7%	92.2%	92.6%
Scotland						
First ScotRail	90.3%	90.8%	91.1%	91.4%	91.7%	92.0%

Appendix 15 Delay minutes per 100 train km

	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
England & Wales						
Franchised TOC						
Transpennine Express	1.76	1.66	1.50	1.36	1.22	1.10
One	1.74	1.67	1.54	1.44	1.33	1.23
Northern Rail	2.12	2.05	1.92	1.79	1.67	1.56
First Great Western	1.59	1.58	1.46	1.33	1.15	0.99
First Capital Connect	1.21	1.31	1.23	1.13	1.02	0.91
Cross Country	1.72	1.63	1.49	1.34	1.21	1.09
West Midlands	2.24	2.13	2.01	1.91	1.82	1.74
London Overground	2.13	1.91	1.73	1.64	1.55	1.51
East Midlands	1.46	1.37	1.26	1.16	1.05	0.95
Great North Eastern Railway Ltd	0.99	0.92	0.83	0.76	0.68	0.61
Merseyrail Electrics 2002 Ltd	1.00	1.00	0.94	0.89	0.84	0.80
Virgin West Coast	1.77	1.64	1.49	1.36	1.26	1.17
Arriva Trains Wales	1.59	1.63	1.58	1.46	1.35	1.26
The Chiltern Railway Co.Ltd	0.96	0.91	0.82	0.73	0.66	0.60
c2c	0.64	0.66	0.65	0.63	0.61	0.58
South Eastern Trains Ltd	1.54	1.62	1.48	1.36	1.25	1.15
Gatwick Express Ltd	1.10	1.04	0.95	0.88	0.80	0.72
Southern	1.62	1.67	1.54	1.40	1.29	1.18
South West Trains Ltd	1.21	1.08	1.01	0.95	0.91	0.88
Sector						
London & south east	1.43	1.43	1.31	1.21	1.12	1.03
Long distance	1.54	1.46	1.33	1.20	1.07	0.95
Regional	1.91	1.85	1.74	1.63	1.53	1.44
Total	1.58	1.54	1.42	1.31	1.20	1.11
Open access TOCs						
Hull Trains	1.27	1.23	1.15	1.06	0.98	0.91
Heathrow Express	2.10	2.06	1.94	1.83	1.72	1.62
West Coast Railway	2.42	2.37	2.24	2.13	2.01	1.91
Scotland						
First ScotRail	1.21	1.16	1.12	1.09	1.06	1.02
Freight						
Freightliner	3.66	3.57	3.33	3.11	2.90	2.70
GB Rail	3.11	3.04	2.81	2.61	2.41	2.23
EWS	3.63	3.55	3.33	3.13	2.93	2.75
Other Freight	3.00	2.94	2.74	2.57	2.40	2.24
Freight	3.59	3.51	3.28	3.08	2.88	2.69
Total	1.75	1.71	1.58	1.47	1.36	1.26

Appendix 16 Projected Network Rail delay minutes over CP4

	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
England & Wales						
Franchised TOC						
Transpennine Express	268	258	237	219	201	184
One	530	513	478	451	423	395
Northern Rail	855	832	787	742	699	657
First Great Western	628	624	577	524	455	391
First Capital Connect	270	294	279	258	234	211
Cross Country	442	488	446	402	364	329
West Midlands	385	369	351	337	323	312
London Overground	65	64	58	76	73	72
East Midlands	276	261	242	223	203	185
Great North Eastern Railway Ltd	187	177	163	151	138	127
Merseyrail Electrics 2002 Ltd	56	56	54	51	49	47
Virgin West Coast	486	515	468	430	396	367
Arriva Trains Wales	344	355	349	325	305	286
The Chiltern Railway Co.Ltd	85	81	73	66	60	55
c2c	37	38	38	37	35	34
South Eastern Trains Ltd	432	456	420	386	358	333
Gatwick Express Ltd	27	25	23	21	19	17
Southern	437	453	421	388	358	331
South West Trains Ltd	444	397	375	355	343	334
Sector						
London & south east	2,502	2,519	2,332	2,189	2,034	1,893
Long distance	1,934	1,964	1,797	1,636	1,465	1,313
Regional	1,811	1,767	1,673	1,586	1,501	1,421
Total	6,246	6,249	5,802	5,410	5,000	4,627
Open access TOCs						
Hull Trains	20	20	18	17	16	15
Heathrow Express	18	18	17	15	14	13
West Coast Railway	4	4	4	3	3	3
Scotland						
First ScotRail	455	435	421	409	397	385
Passenger total	6,743	6,725	6,262	5,856	5,430	5,043
Freight	1,738	1,703	1,624	1,565	1,513	1,477
Total	8,482	8,428	7,886	7,420	6,943	6,520

Appendix 17 Reduction in significant lateness and cancellations

England & Wales	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Long distance	5.5%	5.4%	4.9%	4.6%	4.2%	3.8%
Regional	2.9%	2.9%	2.8%	2.6%	2.5%	2.4%
London & south east	2.4%	2.4%	2.3%	2.2%	2.2%	2.1%
National	2.8%	2.8%	2.7%	2.5%	2.4%	2.4%

Appendix 18 Balance sheet

£m (nominal prices)	2009/10	2010/11	2011/12	2012/13	2013/14
Net fixed assets	41,603	45,859	49,097	51,965	54,504
Net current and long term assets/liabilities	(2,890)	(2,840)	(2,811)	(2,751)	(2,687)
Net debt	(24,477)	(27,673)	(30,151)	(32,289)	(34,034)
Provisions	(4,956)	(5,434)	(5,702)	(5,943)	(6,204)
Net Assets	9,281	9,912	10,434	10,982	11,579
Share capital and other reserves	1,639	1,639	1,639	1,639	1,639
Revaluation reserve	5,157	5,090	5,009	4,975	4,972
Retained earnings	2,485	3,184	3,786	4,367	4,967
Capital and reserves	9,281	9,912	10,434	10,982	11,579

Appendix 19 Profit and loss

£m (nominal prices)	2009/10	2010/11	2011/12	2012/13	2013/14
Income					
Fixed track access income	5,053	5,502	5,764	6,040	6,294
Other track access income	541	563	593	620	644
Schedule 4	(109)	(112)	(115)	(119)	(122)
Other income (inc property sales)	503	515	540	544	566
Total income	5,987	6,467	6,780	7,085	7,383
Expenditure					
Controllable operating expenses	(847)	(858)	(865)	(882)	(899)
Non-controllable operating expenses	(374)	(407)	(430)	(451)	(469)
Maintenance (includes reclass.)	(1,312)	(1,290)	(1,282)	(1,288)	(1,308)
Depreciation and amortisation	(1,511)	(1,678)	(1,824)	(1,947)	(2,057)
Total expenses	(4,044)	(4,234)	(4,401)	(4,568)	(4,733)
Operating profit	1,943	2,233	2,379	2,518	2,649
Net Interest (including FIM fee)	(1,163)	(1,337)	(1,504)	(1,638)	(1,754)
PBT	779	896	875	879	896
Tax	(140)	(197)	(273)	(298)	(296)
Retained profit	640	699	602	581	600

Appendix 20 Comparison of SBP with ISBP projections

£m (2006/07 prices)	CP4 (Network total)			CP4 (England & Wales)			CP4 (Scotland)		
	ISBP	SBP	%-change	ISBP	SBP	%-change	ISBP	SBP	%-change
Operating costs	**5,969**	**5,613**	**-6%**	**5,447**	**5,119**	**-6%**	**522**	**494**	**-6%**
Controllable	3,854	3,770	-2%	3,492	3,429	-2%	362	342	-6%
Non-controllable	2,115	1,842	-13%	1,955	1,690	-14%	160	152	-5%
Maintenance	**4,765**	**4,819**	**1%**	**4,261**	**4,356**	**2%**	**503**	**463**	**-8%**
Renewals	**10,944**	**12,487**	**14%**	**9,512**	**11,002**	**16%**	**1,432**	**1,485**	**4%**
Track	3,459	3,468	0%	3,008	3,108	3%	451	359	-20%
Signalling	2,474	2,415	-2%	2,255	2,251	0%	219	164	-25%
Civils	2,067	1,979	-4%	1,689	1,589	-6%	378	390	3%
Operational property	1,277	1,465	15%	1,080	1,216	13%	197	249	27%
Telecoms	509	856	68%	414	745	80%	95	111	16%
Electrification	573	467	-19%	548	425	-22%	25	43	68%
Plant and machinery	261	356	36%	226	321	42%	35	35	0%
Discretionary investment	0	885	-	-	807	-	-	78	-
Other renewals	325	596	83%	292	539	85%	33	57	73%
TOTAL OM&R	**21,678**	**22,919**	**6%**	**19,221**	**20,477**	**7%**	**2,457**	**2,441**	**-1%**