



OFFICE *of*  
RAIL REGULATION

## **Periodic Review 2008**

# **Initial assessment of Network Rail's CP4 revenue requirement and consultation on the financial framework**

**December 2005**



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## Chairman's foreword

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The Periodic Review 2008 will establish Network Rail's programme for the operation, maintenance, renewal and enhancement of Britain's rail network for the period to 2014. But the effects of that programme will extend well beyond then. So decisions by the Office of Rail Regulation on the review must be based on a clear and appropriate longer term vision and strategy for the railway which reflects the expectations both of users and of those providing public sector funding.

The Railways Act 2005 set out a new framework for the industry. Ministers, including for Scotland the Scottish Ministers, are now required to give us a clear specification of the high level outputs they expect the railway to deliver and the funding they are prepared to make available. If, after detailed analysis, our view is that the funding is not sufficient to deliver those outputs, and the specification is not revised by Ministers, then we have to decide what outputs the railway should provide from the specified funding.

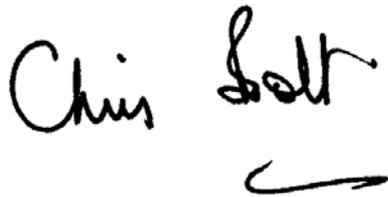
To establish their output specification and determine the funds that should be made available, Ministers must be well informed about the cost and demand pressures on the industry, and the opportunities for improved efficiency. Analysis of these issues will continue through 2006, leading to publication by Ministers of their specification of outputs and funding in mid-2007.

The purpose of this document is an initial assessment of the prospects for Network Rail funding over the next control period, both as an input to this analysis by Ministers, and to seek wider views on the issues which will need to be further developed by Network Rail before it publishes its medium term plan in June 2006. Given the expected growth in demand, it will be particularly challenging for Network Rail and its partners to develop plans which both maintain and improve safety and operational performance and accommodate the increase in the costs of financing Network Rail's balance sheet, without adding to pressures on funding. This will require relentless pursuit of improved efficiency, while not compromising long-term sustainability of the network.

The regulatory framework will need to provide effective incentives for Network Rail to seek innovative ways to improve performance and to reduce costs, in partnership

with train operators. Therefore we are seeking initial views on the financial framework which is most likely to achieve this, and in particular on the balance between risk and reward for Network Rail. While the document suggests the potential for significant further efficiency gains by Network Rail, these may only be achievable if, working with its customers and suppliers, Network Rail is encouraged to take up more demanding challenges and adopt innovative approaches, and is rewarded for doing so. The alternative is likely to be a company which is less able to respond to the pressures identified in this document.

These are important issues which will affect all those involved in Britain's railways – whether passengers, freight users, operators, suppliers or funders. So while the Periodic Review 2008 is still at an early stage, we encourage you to think carefully about the questions raised, and to engage in the debate. Only in that way can we secure an outcome which reflects our objective for the review, which is to secure value for money for users and taxpayers, by determining the level of Network Rail access charges and outputs in a way which balances the interests of all parties.

A handwritten signature in black ink that reads "Chris Bolt". Below the signature is a simple horizontal line with a slight curve at the end, serving as a decorative underline.

**Chris Bolt**  
**Chairman, Office of Rail Regulation**

15 December 2005

## Executive summary

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1. We have started the Periodic Review 2008 (PR2008) of Network Rail’s outputs, revenue requirement and access charges for control period 4 (CP4), from April 2009 to March 2014.
2. This document sets out our independent initial assessment of a possible range for Network Rail’s CP4 revenue requirement. We are also consulting on key issues relating to the financial framework for CP4.
3. Our initial assessment provides a basis for the next stages of PR2008. These include the development of the high-level output statements (HLOSs) and statements of public funds available (SOFAs), led by the Department for Transport (DfT) and Scottish Executive, but involving Network Rail and ourselves. We also set out key challenges that Network Rail will need to overcome to provide robust information during PR2008.

### **Initial assessment of Network Rail’s CP4 net revenue requirement<sup>1</sup>**

4. We have based our initial assessment on the standard ‘building block’ methodology we used in the Access Charges Review 2003 (ACR2003). This has involved assessments of the key individual building blocks of the revenue requirement: activity and expenditure, efficiency, other single till income and financial assumptions (e.g. rate of return, amortisation).
5. There is a great deal of uncertainty around the CP4 revenue requirement at this stage. Much more data needs to be collected, analysis undertaken, discussions held, and many more decisions remain to be made before we determine the final output expectations, revenue requirement and access charges. Therefore, we have identified an illustrative range for the net revenue requirement at this stage rather than a single projection.

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<sup>1</sup> The net revenue requirement is the gross requirement less other single till income (principally station charges, property income and freight charges). The net revenue requirement is funded by franchised passenger train operating company (TOC) track access charges.

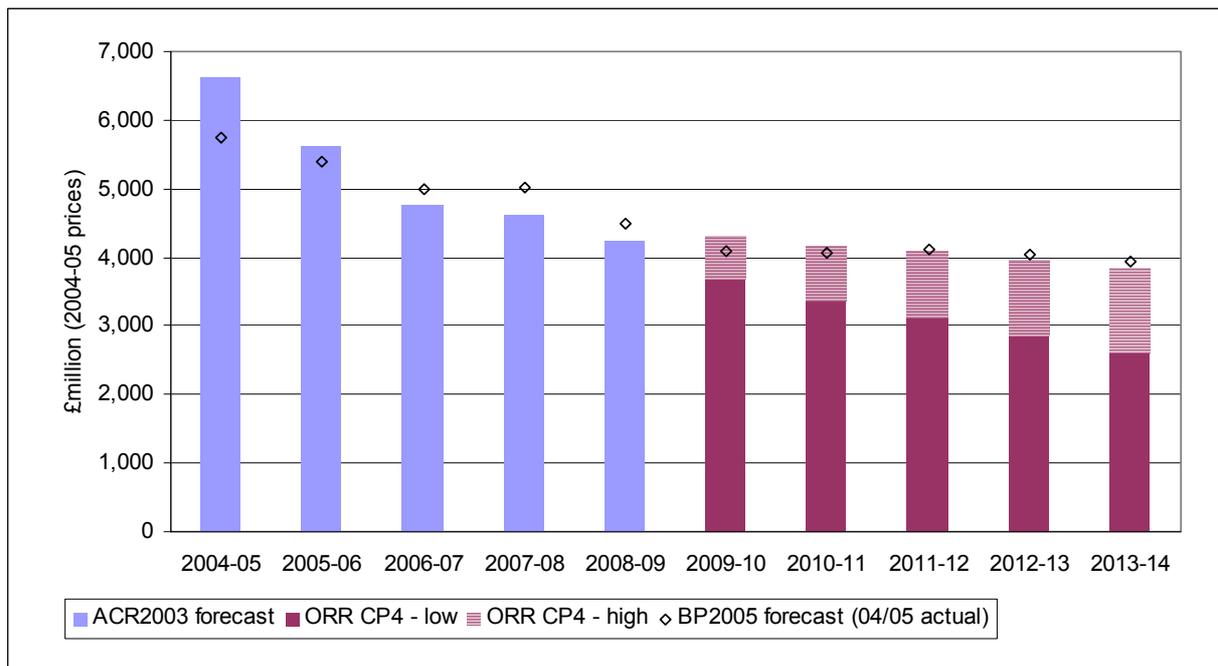
6. Our assessment takes as given the projections set out by Network Rail in its 2005 business plan (BP2005) for its outputs, assumptions of network capability and capacity, forecast demand, and safety and environmental performance. These parameters, which have a material bearing on the revenue requirement, will need to be considered fully during PR2008. The assessment does not attempt to anticipate the outputs that governments will want to be achieved in CP4, which will be set out in the HLOSs and costed accordingly later in PR2008.

### **Activity, expenditure and efficiency**

7. We have assessed the possible range for expenditure, given the assumptions set out by Network Rail in BP2005.
8. We have looked to derive upper and lower estimates that we consider could frame the likely outcome for the given set of outputs. Outcomes outside our range are possible. We will be challenging Network Rail to justify all its forecasts, even where these fall below our lower estimates.
9. For operating expenditure (opex), maintenance and enhancements we have made no changes to the pre-efficiency levels assumed in BP2005; the variation to the CP4 expenditure is derived solely from our initial assessment of the scope for improvements in efficiency. The assessment does not include expenditure for all possible major enhancements in CP4, e.g. Thameslink.
10. For renewals, our upper estimate of pre-efficiency expenditure (equivalent to activity volumes) is more than 6% below BP2005. This is due to a significant reduction in signalling renewal expenditure compared to BP2005, based on Network Rail’s work as part of our recent medium-term signalling review, which more than offsets the upper estimates for all other renewal categories (which individually lie above BP2005 projections). Our pre-efficiency lower estimate is around 24% below BP2005.
11. We have started work to understand the scope for improvements in unit cost efficiency in CP4. Our consultants have advised us that, based on their preliminary study, there is potential for efficiency improvements in unit cost efficiency of between 2% and 8% per annum in CP4, or 10% to 34% over CP4 as a whole, with similar potential for each of the expenditure categories.

This preliminary assessment does not take account of future real increases in input prices, possible technological improvements or the impact of quality.

12. We have applied this range as an overlay to our assessment of pre-efficiency activity and expenditure. The resulting expenditure projections are shown in Figure 1 (all in 2004-05 prices). Our assessed range for the total post-efficiency expenditure in CP4 is £15.6 – 20.3 billion. In control period 3 (CP3) (April 2004 – March 2009) this was £25.9 billion.

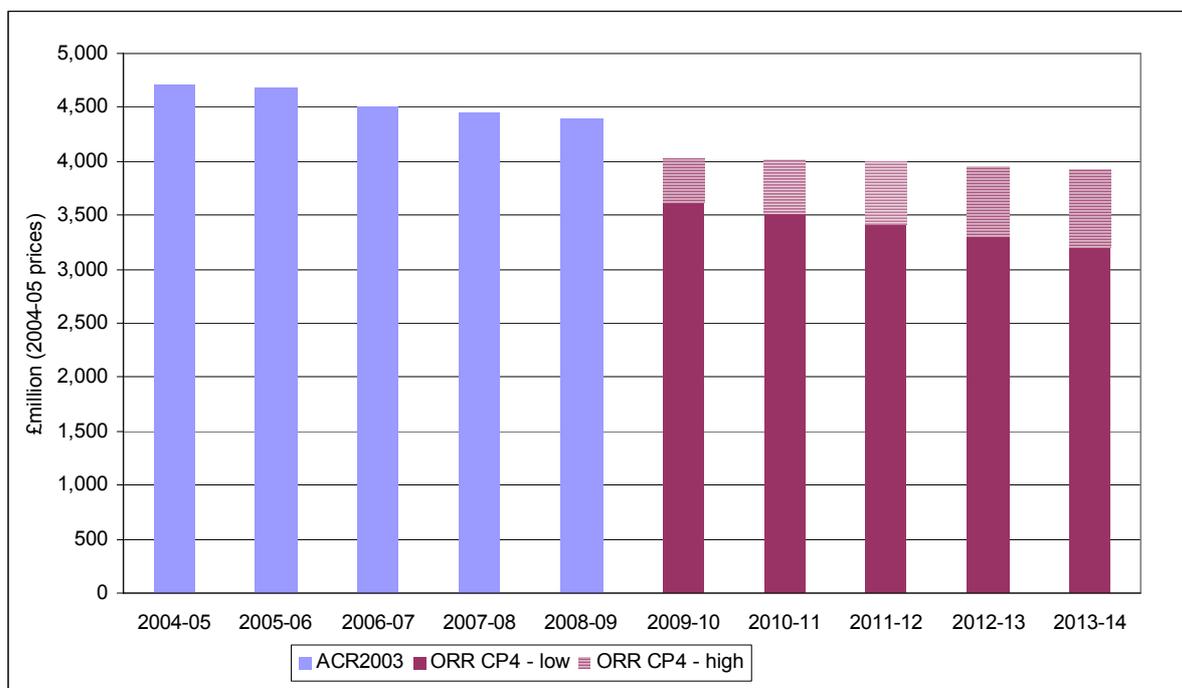


**Figure 1: Illustrative range for the GB-wide expenditure projection**

### Illustrative range for the CP4 net revenue requirement

13. To illustrate possible implications for the CP4 net revenue requirement, we have taken our assessments of the range for expenditure and combined these with calculations of the rate of return, amortisation, and our preliminary estimate of additions to the starting CP4 regulatory asset base (RAB) and other single till income. Figure 2 illustrates the range for Great Britain. Table 1 includes a breakdown for England & Wales and Scotland.
14. Our lower estimate is a combination of our low expenditure (including high efficiency) projection and the higher rate of return (with a higher surplus),

which illustrates a situation where, in order to manage the increased risk associated with achieving greater efficiencies, a higher surplus is allowed. The upper estimate is a combination of our high expenditure projection (including low efficiency) and lower rate of return (with a lower surplus), which reflects reduced risk associated with needing to achieve lower efficiency.



**Figure 2: Illustrative range for the GB-wide CP4 net revenue requirement**

**Table 1: Illustrative range of the possible CP4 net revenue requirement**

£million (2004-05 prices)	CP3	Illustrative CP4 range
<b>GB-wide</b>		
Total	22,730	17,050 – 19,900
Annual average	4,550	3,410 – 3,980
<b>England &amp; Wales</b>		
Total	20,320	15,180 – 17,720
Annual average	4,060	3,040 – 3,540
<b>Scotland</b>		
Total	2,410	1,870 – 2,180
Annual average	480	370 - 440

15. Our initial assessment shows that the range for the GB-wide net revenue requirement in CP4 could be between 12 – 25% less than the net revenue requirement determined for CP3.
16. At this early stage in PR2008, it is quite possible that the final revenue requirements are outside the ranges we have established, for example due to new information that comes to light during PR2008 or material changes to assumptions or output requirements, e.g. in the HLOSs.

### **Key challenges for Network Rail**

17. Our initial assessment and, in particular, the work on activity, expenditure and efficiency, has highlighted a range of challenges that Network Rail needs to overcome, to provide robust information for PR2008.
18. The challenges include the need for the company to improve its understanding of asset knowledge and cost causation; to consider explicitly passenger and freight demand growth on activity and expenditure requirements; to provide further disaggregated information on activity and expenditure; and to develop its view of possible future efficiency improvements.

### **Financial framework**

19. The document consults on key strategic issues for the CP4 financial framework. As part of PR2008 we intend to consider the wider role of incentives, including in relation to the financial framework, so that Network Rail is properly incentivised to achieve and outperform the regulatory expectations and meet the demands of its customers and funders. In addition, we need to consider the flexibility of the financial framework to accommodate the potential for Network Rail to introduce alternative forms of capital in the future (not supported by the financial indemnity), if this were shown to represent value for money.



# 1. Introduction

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## Context

- 1.1 In August 2005, we published our first consultation document for the Periodic Review 2008 (PR2008)<sup>2</sup>. PR2008 will determine Network Rail’s outputs, revenue requirement and access charges for control period 4 (CP4), from April 2009 to March 2014<sup>3</sup>.
- 1.2 Our overarching objective for the review is to ensure an outcome which secures value for money for users and taxpayers, by determining the level of Network Rail access charges and outputs in a way which balances the interests of all parties. Annex A contains our specific objectives for the review, which we consulted on
- 1.3 PR2008 will be the first review to take place after the procedure for conducting an access charges review, set out in Schedule 4A of the Railways Act 2003, was amended following the Railways Act 2005. The central element of the new process is that the Secretary of State for Transport and Scottish Ministers will prepare high-level output specifications (HLOSs) and statements of the public funds available (SOFAs). These contain, respectively, information about what the Secretary of State and Scottish Ministers want to be achieved by railway activities during the control period and the public financial resources that are, or are likely to be, available for the achievement of those activities. We use the HLOSs and SOFAs provided to us as the basis for determining Network Rail’s outputs, revenue requirement and access charges.
- 1.4 We have divided the review into a preparation phase and a formal review phase. The preparation phase runs until early in 2007-08 and covers the preparatory work necessary for the access charges review, which includes

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<sup>2</sup> *Periodic Review 2008: First Consultation Document*, Office of Rail Regulation, August 2005. <http://www.rail-reg.gov.uk/upload/pdf/245.pdf>.

<sup>3</sup> For the purposes of this document we are assuming that CP4 will be five years, the length for a control period we have adopted previously, and which is the standard length employed by other regulators. We will consult on, and confirm, the specific length of CP4 during 2006.

development of the HLOSs and SOFAs, led by the Department for Transport (DfT) and the Scottish Executive, but involving Network Rail and ourselves. The formal review phase will start when we issue the formal notice to conduct an access charges review, giving the Secretary and State and Scottish Ministers notice to provide us with their HLOSs and SOFAs. We expect to issue the notice early in 2007-08 and receive the HLOSs and SOFAs in the summer of 2007. We plan to complete the formal review in October 2008 when we publish our final conclusions of PR2008.

- 1.5 We are publishing our response to our August consultation document at the same time as this document<sup>4</sup>. The current PR2008 timetable is contained in Annex B of this document.

### **Purpose of this document**

- 1.6 PR2008 will take three years to complete. It will involve a significant amount of detailed analysis and debate. We are committed to conducting the review transparently, exposing the issues and consulting on all our key decisions.
- 1.7 This document marks the start of the preparation phase. We said in our August consultation document that we would publish at the end of 2005 an initial analysis of Network Rail outputs, efficiency and expenditure for CP4 and a consultation document on the company’s financial framework for CP4. This document meets these requirements and its purpose is to:
- set out our independent initial assessment of the possible range for Network Rail’s CP4 net revenue requirement, taking as a basis the company’s own projections for its outputs in its 2005 business plan (BP2005)<sup>5</sup>; and
  - consult on key issues relating to the financial framework in which Network Rail will operate in CP4.
- 1.8 The assessment will underpin the next stages of PR2008. It will:

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<sup>4</sup> *Responses to the Periodic Review 2008 First Consultation Document*, Office of Rail Regulation, 15 December 2005.

<sup>5</sup> Network Rail’s 2005 Business Plan can be accessed on its website at: <http://www.networkrail.co.uk/companyinformation/BusinessPlans/BusinessPlan2005.htm>.

- provide an early estimate of the possible range for the CP4 expenditure levels and revenue requirement, to inform work on the development of the HLOSs and SOFAs that has recently started, being led by the DfT and Scottish Executive, but involving Network Rail and ourselves, which will become more intensive during 2006<sup>6</sup>;
- inform the debate on the future financial framework for Network Rail, which has a major bearing on its revenue requirement; and
- set out key challenges that Network Rail needs to address in order to provide robust information for PR2008.

1.9 Network Rail’s initial CP4 submission to us will be in June 2006 and we will publish our guidance on the required form and content of the submission in January 2006. This guidance will draw on our initial assessment.

### **Scope and limitations of the initial assessment**

1.10 At this early stage in PR2008, there is a great deal of uncertainty around Network Rail’s future revenue requirement and it is not possible to make a firm projection for CP4.

1.11 The current emphasis is therefore to outline a range for the CP4 revenue requirement and for the purposes of this assessment we do not provide a ‘central forecast’. We have taken as given Network Rail’s assumptions in BP2005 regarding outputs, network capability and capacity, safety and environmental performance, and the company’s current assumptions of forecast demand. For key outputs relating to asset condition and train performance, the company currently predicts stability or continued improvement in CP4. The Secretary of State’s and Scottish Ministers’ HLOSs will state the specific projection for the high-level railway outputs they wish to fund, which will have a major bearing on Network Rail’s outputs. At this stage we have not challenged any of Network Rail’s assumptions. However, all these parameters, which have a material bearing on the revenue requirement, will need to be examined by Network Rail in developing its June 2006

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<sup>6</sup> We also expect the work on the HLOSs and SOFAs to inform DfT’s preparatory work for the Government’s 2007 spending review, which require departmental submissions in autumn 2006.

submission, to ensure that the best available evidence about costs and demands, and the implications for performance, is taken into account.

- 1.12 In our assessment we assume that Network Rail achieves the expenditure levels and outputs assumed for control period 3 (CP3), which runs from April 2004 to March 2009<sup>7</sup>. During the first year of CP3, Network Rail has performed well in terms of achieving the outputs we established in the Access Charges Review 2003 (ACR2003). The company has underspent compared to our CP3 determination, through a combination of deferral to later years in CP3 as well as outperformance of the efficiency assumptions<sup>8</sup>.
- 1.13 The initial assessment is focused on Network Rail’s net revenue requirement (NRR). The NRR is the gross requirement less other single till income (principally station charges, property income and freight charges).
- 1.14 The company currently receives the NRR through a combination of track access charges paid by franchised passenger train operating companies (TOCs) and grants paid directly by the DfT (and also from April 2006 by the Scottish Executive). We do not discuss the implications of different NRRs for the balance of track access charges and grants. In addition, we do not consider here the implications for the track access charges for individual passenger and freight train operators. Similarly, we do not address the question of rail industry funding, including the balance between fares and public support.
- 1.15 We have not had extensive involvement from Network Rail, the DfT, the Scottish Executive or other stakeholders in the preparation of this initial assessment; although we have had a number of very useful discussions with Network Rail to enable us to deepen our understanding of the assumptions it used in preparing BP2005. We have also had valuable initial discussions with the DfT, HM Treasury, the Scottish Executive and Network Rail in relation to

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<sup>7</sup> We will take into account in our determination of the CP4 revenue requirement any outperformance over the efficiency assumptions assumed for CP3, or underspend by Network Rail associated with failure to deliver its required outputs.

<sup>8</sup> Our assessment of the company’s performance in 2004-05 is in the *Annual Assessment of Network Rail 2004-05*, Office of Rail Regulation, September 2005, available at: <http://www.rail-reg.gov.uk/upload/pdf/252.pdf>.

options and issues for the CP4 financial framework, which have informed this document.

- 1.16 It is important to note that, at this stage in PR2008, we do not rule out the possibility that the final revenue requirement could be outside the range we have established. This could be due to, for example, new information that comes to light during PR2008 or material changes to assumptions or output requirements. We will be challenging Network Rail to justify all its forecasts even where these fall below these lower estimates.

### **Control period 3**

- 1.17 ACR2003 established Network Rail’s network outputs and associated revenue requirement and access charges for CP3, from April 2004 until March 2009.
- 1.18 Our final conclusions to ACR2003 established a gross revenue requirement of £26.4 billion and a net requirement for CP3 of £22.7 billion<sup>9</sup>. Of this net requirement, £9.5 billion is funded by track access charges payable by franchised passenger train operating companies (TOCs), £9.9 billion is funded by Government grant (averaging £1.9 billion per annum during CP3) and the remaining £3.3 billion is made up by additional borrowing by Network Rail (which will be added to the RAB at the start of CP4).

### **Wider rail industry finances**

- 1.19 It is useful to put Network Rail’s revenue requirement in the context of wider rail industry finances and Government support for rail. For the most recent year available (2003-04) total Government support for rail was approximately £3.6 billion. Over CP3 it is expected to average around £4 billion per annum, of which nearly half is accounted for by the grants to Network Rail, and around £1.5 billion per annum goes in direct support for TOCs. The remainder, of around £500 million per annum, covers grants to TOCs via the regional Passenger Transport Executives (PTEs), the Channel Tunnel Rail Link (CTRL), enhancements and freight grants.

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<sup>9</sup> The £3.7 billion difference between the gross and net revenue requirements is due to other single till income.

## **England & Wales and Scotland**

1.20 We have assessed the NRR at the GB-wide level and separately for England & Wales and Scotland, however at this stage in PR2008, we have not focused in any detail on the two countries

## **Incentives**

1.21 Our initial assessment has been undertaken without detailed consideration of the incentive framework. We will be publishing a comprehensive consultation document on the incentive framework in spring 2006. This will include consideration of the appropriate balance between corporate and management incentives on Network Rail; the implications of the financial framework for incentives; and the potential for greater industry alignment of incentives.

## **Price base and precision**

1.22 All values in this document are in 2004-05 prices unless otherwise stated. All historic data used is rebased to November 2004-05 prices using the all items retail prices index (RPI). Financial values are rounded to the nearest £10 million unless otherwise stated. Therefore not all totals will sum exactly.

## **Structure of the document**

1.23 The document is structured as follows.

- Chapter 2 contains the results of the assessment of the range for CP4 activity, expenditure, efficiency and other single till income.
- Chapter 3 discusses the CP4 financial framework.
- Chapter 4 brings together our expenditure assessment and the financial framework to illustrate a range for the CP4 revenue requirement.
- Chapter 5 sets out the key challenges for Network Rail.
- Annex A contains our specific objectives for PR2008.
- Annex B contains the current timetable for PR2008.

- Annex C contains further detail on the activity and expenditure assessment.
- Annex D contains further detail on the post-efficiency CP4 expenditure projections for England & Wales and Scotland.
- Annex E contains further detail on the financial framework.
- Annex F contains detailed information on the revenue requirement for our illustrative upper and lower estimates.

## Responses to this document

1.24 We welcome views on any issue raised in this document. In particular, responses are sought in relation to the financial issues discussed in Chapter 3 and Annex E.

1.25 Responses to this document should be sent in both electronic and hard-copy format by 31 March 2006 to:

Paul McMahon  
Deputy Director - Regulatory Economics  
Office of Rail Regulation  
1 Waterhouse Square  
138-142 Holborn  
London EC1N 2TQ

Tel: 020 7282 2095

E-mail: [paul.mcmahon@orr.gsi.gov.uk](mailto:paul.mcmahon@orr.gsi.gov.uk)

1.26 Responses will be made available in our library, published on our website and may be quoted from. Respondents should indicate clearly if they wish all or part of their responses to remain confidential to ORR. Where a response is made in confidence, a statement summarising the submission should accompany it, excluding the confidential information, which can be treated as above. We may also publish the names of respondents in future documents or on our website unless a respondent indicates that they wish their name to be withheld.

1.27 Copies of this document can be seen in the ORR library and on the ORR website ([www.rail-reg.gov.uk](http://www.rail-reg.gov.uk)).



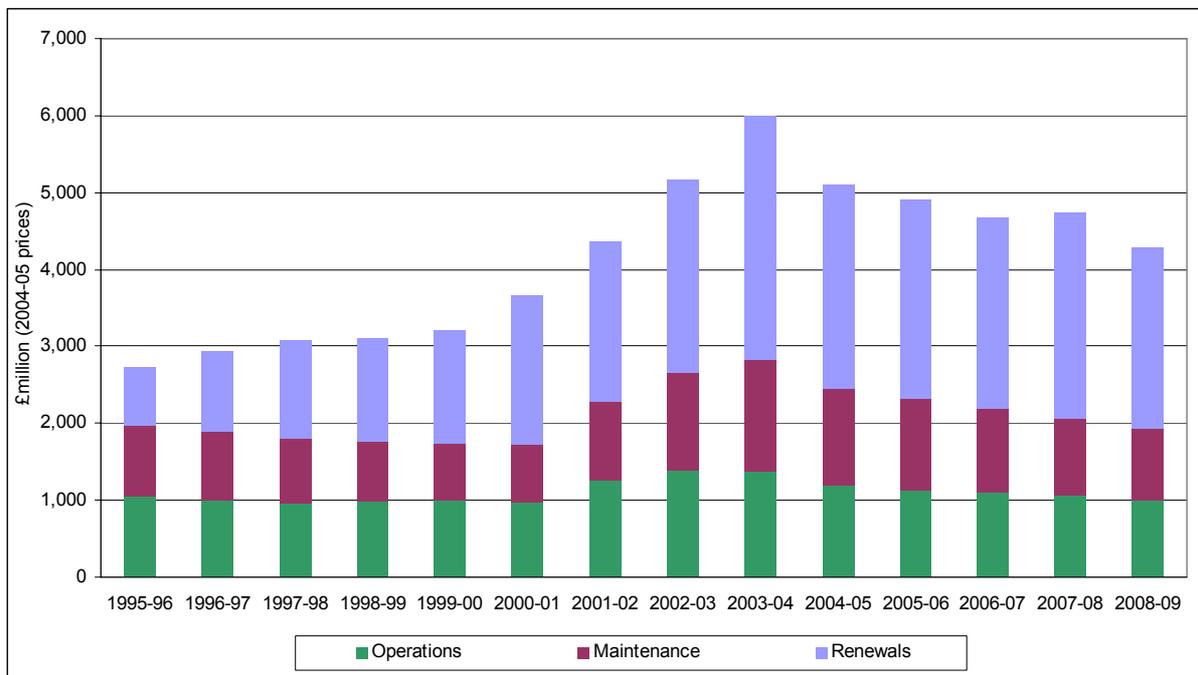
## 2. Activity, expenditure, efficiency and other single till income

### Introduction

2.1 This chapter summarises the assessments of activity, expenditure, efficiency and other single till income that we have undertaken.

### Background - expenditure since privatisation

2.2 Figure 3 shows Network Rail and Railtrack’s actual (to 2004-05) and forecast (from 2005-06) operating, maintenance and renewals (OMR) expenditure between 1995-96 and 2008-09, all expressed in 2004-05 prices. Total OMR, including West Coast Route Modernisation renewals expenditure, increased from under £3 billion in 1995-96 to a peak, in the wake of the Hatfield derailment in October 2000, of £6 billion in 2003-04. It is currently projected to fall to around £4.2 billion per annum by the end of CP3.



**Figure 3: Operating, maintenance and renewals expenditure since privatisation (forecast from 2005-06)**

- 2.3 Following Hatfield, there was significant increase in activity levels and upsurge in unit costs. For instance, under Railtrack renewal rates for each of rail, sleeper and ballast were around 400km per annum between 1996-97 and 1999-00. Since Network Rail took over responsibility for the network, renewal rates have increased significantly. Rail renewal, for example, increased to a peak of 1125km in 2003-04, and is currently forecast by the company to reduce to 920km per annum by the end of CP3, and then remain stable over BP2005 timescale (to 2014-15).

## **Activity and expenditure**

- 2.4 Our assessment of the range of activity and expenditure has covered operating expenditure (opex), maintenance, renewals and enhancements. We have focused principally on renewals activity and expenditure, which forms the greatest share of total expenditure (projected to be around 50% during CP4) and which saw the greatest increase following the Hatfield derailment. For all elements of expenditure we have taken the pre-efficiency projections in Network Rail's BP2005 as our starting point.
- 2.5 For maintenance and renewals expenditure, these forecasts and the activity volumes underpinning them formed the basis for a series of technical meetings with Network Rail in each of the main asset areas. Through these meetings we have sought to deepen our understanding of the company's approaches to forecasting activity volumes and expenditure. Following this we have used the pre-efficiency activity and expenditure projections as the basis for identifying initial upper and lower level estimates of the activity and expenditure necessary to deliver the BP2005 outputs.
- 2.6 It is important to note that this assessment of activity and expenditure assumes that growth in passenger and freight train-kilometres, and improvements in performance, are at the levels set out in BP2005 and that network capability and capacity is maintained at current levels. We also take as given the BP2005 assumptions for safety and environmental performance.

## **Operating activity and expenditure**

- 2.7 We have not undertaken a detailed assessment of Network Rail's CP4 opex requirement at this stage. After removing the effect of Network Rail's 2% per annum efficiency assumptions in BP2005, there is a small increase in

controllable opex during CP4, which rises to 4% above the 2008-09 level by 2013-14, due to an assumption used by Network Rail that staff costs will increase in real terms. The main variation in opex for the purposes of modelling the range of the possible CP4 revenue requirement will be driven by the assessment of future efficiency improvements discussed further in paragraphs 2.24 – 2.31. The pre-efficiency forecast for CP4 operating expenditure derived from BP2005 is shown in Table 2. We will give further detailed consideration to opex during PR2008.

**Table 2: Pre-efficiency projections of CP4 operating expenditure**

£million (2004-05 prices)	2009-10	2010-11	2011-12	2012-13	2013-14	Total	Annual average
Controllable opex	770	780	790	790	790	3,920	780
Non-controllable opex	250	250	250	250	250	1,250	250
Total opex	1,020	1,030	1,040	1,040	1,040	5,170	1,030

## Maintenance

- 2.8 Network Rail is achieving significant reductions in maintenance expenditure during CP3, since it has brought maintenance in-house from the Infrastructure Maintenance Contractors (IMCs). However at present there is a lack of quantitative information on maintenance activities, and of information about the relationship between levels of activity and levels of outputs. We recognise that Network Rail is now improving this.
- 2.9 We have therefore taken overall expenditure levels as the indicator of activity levels in our assessment. We have removed the 2% per annum efficiency assumption included in the BP2005 projection. This reveals that BP2005 implies a small reduction in maintenance activity during CP4, falling to 2% below Network Rail’s projected 2008-09 level by 2013-14. Network Rail has explained to us that this is due to a small reduction in activity reflecting the level of track renewals delivered.
- 2.10 Given the absence of relevant metrics and data on activity levels we have assumed at this stage that, given a fixed network size with broadly constant outputs, the potential for reductions in maintenance expenditure can be captured within the unit cost efficiency assessment (discussed in paragraphs

2.24 – 2.31). The pre-efficiency forecast for CP4 maintenance expenditure derived from BP2005 is shown in Table 3.

2.11 There is a relationship between the level of renewal activity and the efficient level of maintenance. This trade-off is not explored in this assessment, and is one area where we expect Network Rail to provide greater clarity in its PR2008 submissions than has been possible in the past.

**Table 3: Pre-efficiency projections of CP4 maintenance expenditure**

£million (2004-05 prices)	2009-10	2010-11	2011-12	2012-13	2013-14	Total	Annual average
Maintenance	930	920	920	910	910	4,590	920

## Renewals

2.12 We have considered the planned scale of renewals explicitly for each major asset type, using BP2005 as the starting point and basis for discussions with Network Rail’s engineering and business planning teams.

2.13 Our meetings with Network Rail have sought to improve our understanding of the company’s engineering policies, forecasting methodologies, key issues behind renewal plans for CP4 and the principal assumptions that underpin the business planning process. We have then applied our own analysis of risks and opportunities around Network Rail’s projections in order to identify plausible upper and lower estimates for the levels of activity in CP4 that we consider are required to deliver the BP2005 outputs and sustain the network. We have focused our work on the categories of highest spend (track renewals, signalling renewals and civil engineering structures), with less input on the areas of relatively low spend. Moreover, the robustness of the basis for BP2005 numbers varies from asset to asset, and we have taken this into account in arriving at a range for possible activity levels.

2.14 There are variations in the robustness of the underlying analysis and the quality of definition of work volumes for different asset categories. In a number of areas of renewals expenditure, as with maintenance, Network Rail is making progress, improving its understanding of cost causation and the level

of activity necessary to sustain a given level of outputs, but it still has much to do.

2.15 In broad terms, Network Rail’s activity plans do not appear to be unreasonable projections at this time. For the major asset types of track, structures and operational property, the BP2005 projections of CP4 renewals activity are at a level broadly equivalent to planned delivery in the final year of CP3. In respect of defining plausible activity ranges, however, we note that Network Rail’s plans imply that most activity volumes increase from current levels during the remaining years of CP3. Signalling renewals are projected to rise very significantly above CP3 levels as the bow-wave of life expired and obsolescent signalling systems builds up in CP4. Table 4 shows the BP2005 forecast activity levels for track and signalling, which together form about 60% of Network Rail’s current planned renewals expenditure in BP2005.

**Table 4: Network Rail’s BP2005 projections of CP4 renewals activity**

Renewals category	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Rail renewal (km)	930	930	950	920	920	920	920	920	920	920
Sleepers renewal (km)	665	745	785	740	740	740	740	740	740	740
Ballast renewal (km)	685	896	930	940	940	940	940	940	940	940
S&C renewal (#)	393	529	545	508	520	520	520	520	520	520
Signalling (signalling equivalent units)	254	732	1,094	1,425	1,675	1,900	1,900	1,900	1,900	1,900

2.16 Having netted off the company’s 2% per annum efficiency assumption, the total (pre-efficiency) BP2005 figure for renewals during CP4 is some £11.6 billion. The range we are proposing is between £8.9 billion and £10.9 billion. Whilst this range lies below the BP2005 projection, the upper end of our range is at, or above, Network Rail’s BP2005 figures for every area except signalling. Work during our medium-term signalling review has indicated to Network Rail and ourselves that the BP2005 figures are substantially overstated. The significant reduction in our upper estimate for CP4 signalling expenditure (more than £1.1 billion below BP2005 figures) offsets the additional headroom assessed for the other categories. Table 5 summarises

our assessment of the pre-efficiency range of renewals expenditure in CP4. Detail for the individual asset categories is provided in Annex C.

**Table 5: Pre-efficiency projections of CP4 renewals expenditure**

£million (2004-05 prices)	2009-10	2010-11	2011-12	2012-13	2013-14	Total	Annual average
BP2005	2,210	2,270	2,390	2,400	2,380	11,650	2,330
ORR high	2,250	2,200	2,180	2,130	2,130	10,890	2,180
ORR low	1,840	1,800	1,780	1,760	1,740	8,920	1,780

## Enhancement expenditure

- 2.17 Just under £2.3 billion of expenditure for enhancements was funded through ACR2003, with £660 million of this for enhancements associated with the West Coast Route Modernisation project. BP2005 identifies £617 million of committed enhancements in CP4 that are RAB funded, and a further £200 million of planned RAB funded enhancements. These include expenditure for the works required at stations under the Disability Discrimination Act (DDA), European Rail Traffic Management System (ERTMS) preparatory schemes and Kings Cross schemes. We have not taken account of additional major enhancements, such as Thameslink, that could be a possibility during CP4, where these do not have a firm start date and cost estimate. However, we expect that as PR2008 and the development of the HLOSs progress, further enhancements are likely to emerge to be funded through the RAB and, as a result, expenditure is likely to be higher than identified here.
- 2.18 For the purposes of modelling the initial assessment at this stage we assumed that the £817 million includes Network Rail’s 2% per annum efficiency assumption and we have removed this and profiled the resulting £866 million as per Network Rail’s BP2005 over CP4 and not assumed any variation around this. We have assumed that the efficiency assumptions derived for CP4, discussed in paragraphs 2.24 – 2.31, also apply to enhancement expenditure.

## The impact of demand on expenditure

- 2.19 Table 6 shows Network Rail’s current forecast of growth used in BP2005. The company assumes that passenger train-kms, which along with passenger growth have been increasing by 3% per annum on average over the last decade, remain constant from 2007-08 onwards. It assumes a continuing further 7% growth in freight tonne miles during CP4.
- 2.20 We consider that Network Rail’s current projections of passenger and passenger train-km growth probably understate the actual levels. Moreover, from our discussions with Network Rail it appears that the BP2005 traffic growth figures have not been consistently used in development of the BP2005 expenditure projections. The expenditure forecasts are in many cases predicated on either zero or minimal traffic growth or based on a continuation of historic levels of renewals or maintenance. Our current estimate is that an increase in total traffic of 1% could broadly lead to an additional maintenance and renewals expenditure requirement of around £5 – 10 million per annum (pre-efficiency).

**Table 6: Demand growth assumptions in Network Rail’s BP2005**

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Cumulative passenger train-km growth from 2004-05	1.6%	1.9%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Cumulative freight train tonne km growth from 2004-05	8.8%	10.8%	12.4%	14.0%	15.6%	17.3%	18.9%	20.5%	22.1%

- 2.21 Given the uncertainty around variable cost causation generally (which we will be addressing through further work on the structure of costs and charges during PR2008<sup>10</sup>) and the actual use of the demand forecasts in BP2005, we are not making any adjustments in this assessment to our projections.
- 2.22 We recognise that understanding the link between passenger demand forecasts and projections of activity and expenditure is complex, especially

<sup>10</sup> See *Structure of Costs and Charges Review: Conclusions*, Office of Rail Regulation, October 2005 (<http://www.rail-reg.gov.uk/upload/pdf/256.pdf>).

where increases in train-km necessitate enhancement expenditure. However, developing a better understanding of passenger demand forecasts and how they translate to projections for train-km growth, and for activity and expenditure requirements represents a key challenge for Network Rail to address in PR2008.

## Summary of expenditure assessment

2.23 Table 7 summarises the possible range of CP4 pre-efficiency operating, maintenance, renewals and enhancement (OMR&E) expenditure for the purposes of our initial assessment.

**Table 7: OMR&E expenditure (pre-efficiency)**

£million (2004-05 prices)	2009-10	2010-11	2011-12	2012-13	2013-14	Total	Annual average
BP2005	4,350	4,400	4,530	4,540	4,460	22,280	4,460
ORR high	4,390	4,330	4,320	4,270	4,210	21,520	4,300
ORR low	3,980	3,930	3,920	3,900	3,820	19,550	3,910

## Efficiency

2.24 ACR2003 built challenging assumptions for unit cost efficiency into Network Rail’s CP3 revenue requirement. In aggregate, it is assumed that the company could achieve 31% unit cost efficiency in OMR expenditure over CP3 (comprising 35% improvement in maintenance and 30% for both renewals expenditure and controllable opex).

2.25 BP2005 incorporates an illustrative efficiency assumption of 2% per annum from 2009-10 onwards. Network Rail has not yet undertaken any specific assessment of the efficiency that might be achievable.

2.26 In order to obtain an initial understanding of the potential for further unit cost efficiency improvements in CP4, we commissioned consultants LEK/Oxera to undertake a preliminary assessment of the overall scope for efficiency improvements in CP4<sup>11</sup>. The study starts from the premise that Network Rail exactly achieves its CP3 efficiency target of a 31% reduction in unit costs.

<sup>11</sup> *Assessing Network Rail’s scope for efficiency gains over CP4 and beyond: a preliminary study*, LEK Consulting (International) Ltd and Oxera Consulting Ltd, December 2005. This report is available at: <http://www.rail-reg.gov.uk/upload/pdf/lek-oxera-cp4efficiencygains.pdf>.

- 2.27 The study draws on a variety of publicly available information and did not involve any collaboration with Network Rail. In particular, it examined:
- the total scope for efficiency improvements implied by the studies undertaken by ORR to inform the CP3 determinations;
  - Network Rail's progress to date in implementing efficiency initiatives identified for CP3;
  - the long-term trend in GB rail industry costs;
  - the experience in other UK regulated network industries of improving efficiency; and
  - evidence on efficiency trends provided by the experience of other liberalised or privatised railways.
- 2.28 The study concludes that there is scope for further improvements in OMR unit cost efficiency of between 2% and 8% per annum in CP4, or 10-34% over the control period as a whole, with similar potential within each of the three expenditure categories. Separate forecasts for England & Wales and Scotland have not been produced at this stage.
- 2.29 The top of the range is informed by the upper end of the range of efficiency improvements achieved in other regulated industries over the long run. The bottom of the range is based on an assumption that the majority of the unit cost inefficiencies were identified as part of the CP3 review and will be driven out of the company by the end of CP3, with the ongoing 2% therefore representing improvements in the efficiency frontier.
- 2.30 Importantly, LEK/Oxera's estimates explicitly exclude the potential for scope efficiencies, technological improvements and the impact of quality. They also do not consider the effects of input prices. While the estimates for renewals efficiency derived from experience in other regulated industries, could conceivably capture some element of scope as well as unit cost efficiency (due to the use of output based units in other industries but activity based units by us at present). The consultants concluded however that there was no evidence to suggest that this is the case.

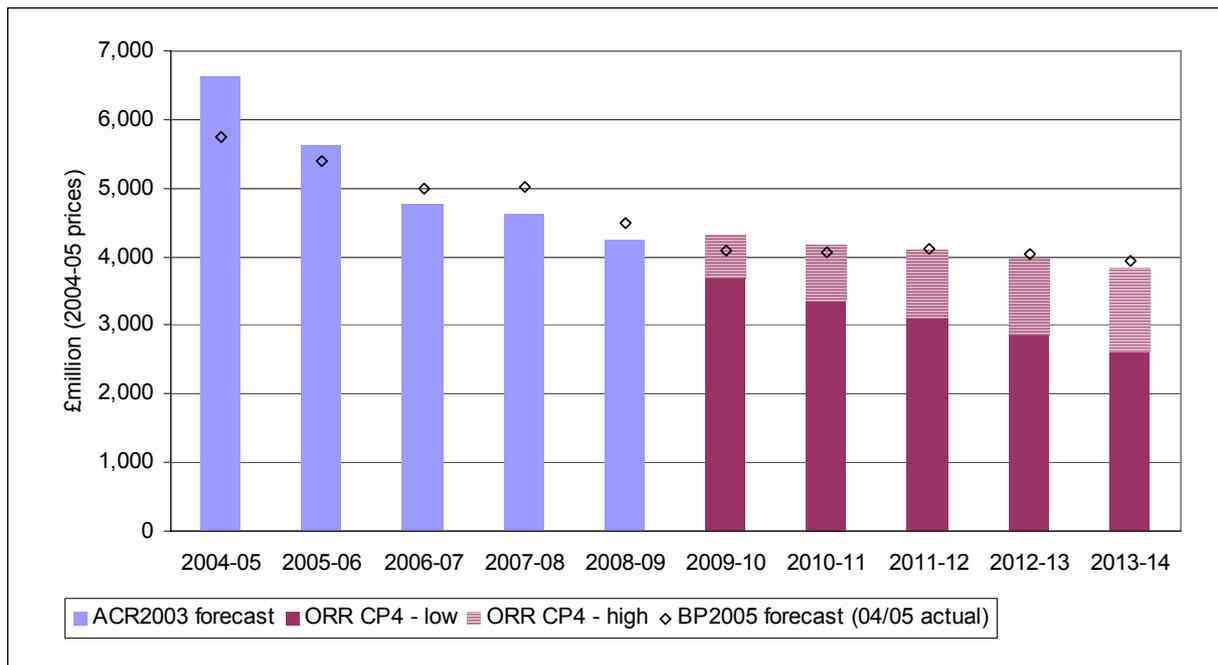
- 2.31 The LEK/Oxera study provides a preliminary assessment of Network Rail’s scope for further unit cost efficiency gains. However in order to arrive at appropriate CP4 efficiency targets considerable, more detailed analysis will need to be conducted. We expect this to include: regional benchmarking to identify Network Rail’s internal best practice; international benchmarking; benchmarking of Network Rail’s business processes (e.g. finance and HR) and supply chain against UK comparators; the findings of the current review of possessions efficiency; a review of emerging technologies and their potential to deliver efficiency improvements; and a bottom-up assessment of the efficient level of activity volumes. In undertaking this work it will be important to take into consideration likely input price pressures and the impact of changes in the quality of outputs, both of which could have a material impact on the overall scope for improvements in cost efficiency.

### **Post-efficiency expenditure assessment**

- 2.32 In order to produce a range for CP4 expenditure, we have applied LEK/Oxera’s assumptions as ‘overlays’ to the pre-efficiency expenditure projections.
- 2.33 The upper end of the range for the post-efficiency expenditure in CP4 is our high projection of activity combined with the low end of the range for efficiency improvement (2%). The lower end of the range is our low projection of activity combined with the high end of the range for efficiency improvement (8%). These combinations are used purely to illustrate a possible range. The range is summarised in Table 8.
- 2.34 Figure 4 shows our range for the GB-wide CP4 expenditure lies between £15.6 – 20.3 billion in total over the control period, or between £3.1 – 4 billion on average for each year of CP4. This range is between 20 – 40% less than the equivalent expenditure assumed for CP3 (£25.9 billion in total and an annual average of £5.2 billion).

**Table 8: Possible range for the CP4 post-efficiency expenditure**

£million (2004-05 prices)	2009-10	2010-11	2011-12	2012-13	2013-14	Total	Annual average
<b>Low activity and high efficiency</b>							
Renewals	1,690	1,520	1,390	1,260	1,150	7,010	1,400
Enhancements	180	150	140	140	90	690	140
Maintenance	860	780	720	650	600	3,600	720
Opex	960	910	870	820	770	4,320	860
<b>Total</b>	<b>3,680</b>	<b>3,370</b>	<b>3,110</b>	<b>2,870</b>	<b>2,600</b>	<b>15,620</b>	<b>3,120</b>
<b>High activity and low efficiency</b>							
Renewals	2,210	2,110	2,050	1,970	1,930	10,260	2,050
Enhancements	190	170	170	180	120	820	160
Maintenance	910	880	870	840	820	4,320	870
Opex	1,010	1,000	990	980	960	4,940	990
<b>Total</b>	<b>4,310</b>	<b>4,170</b>	<b>4,080</b>	<b>3,960</b>	<b>3,830</b>	<b>20,340</b>	<b>4,070</b>



**Figure 4: Possible range for the CP4 post-efficiency expenditure**

## England & Wales and Scotland

2.35 Figures 5 and 6 show our range for the post-efficiency CP4 expenditure for, respectively, England & Wales and Scotland. Annex D contains further detail for these projections. We have based the split of the expenditure and revenues (including Schedule 4 and 8 costs and other single till income,

discussed in paragraphs 2.36 – 2.39) on the work we undertook earlier in the year to separate Network Rail’s RAB and determine separate revenue allowances to support the devolution of responsibility for rail strategy and funding from the Secretary of State to Scottish Ministers<sup>12</sup>.

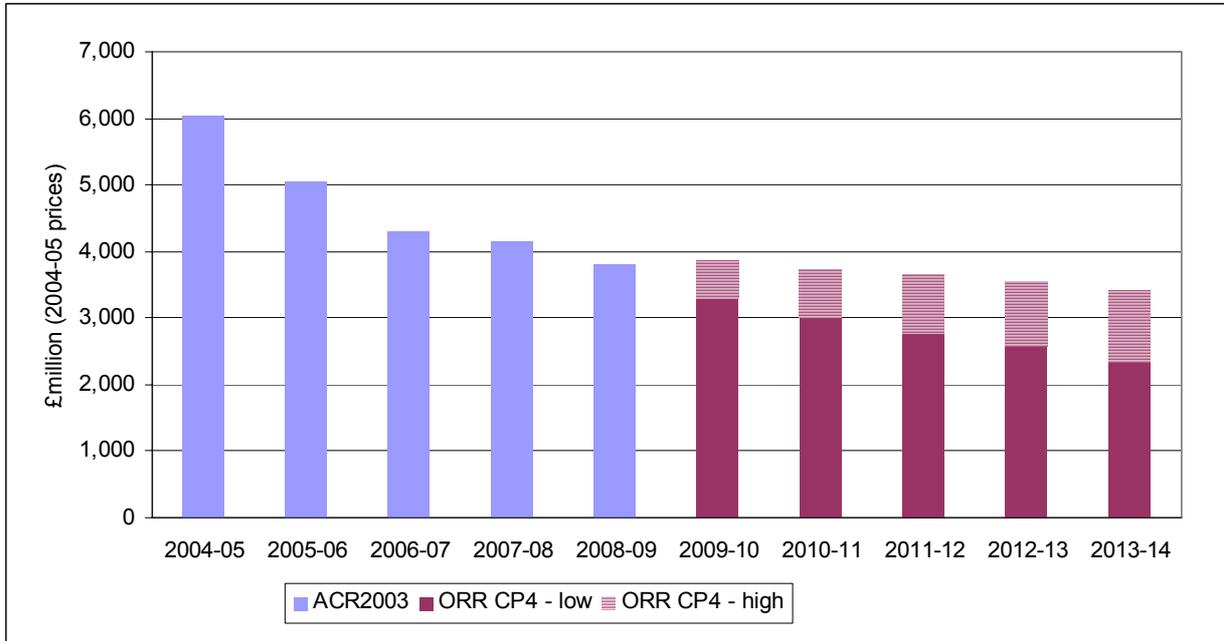


Figure 5: OMR&E expenditure projections for England & Wales

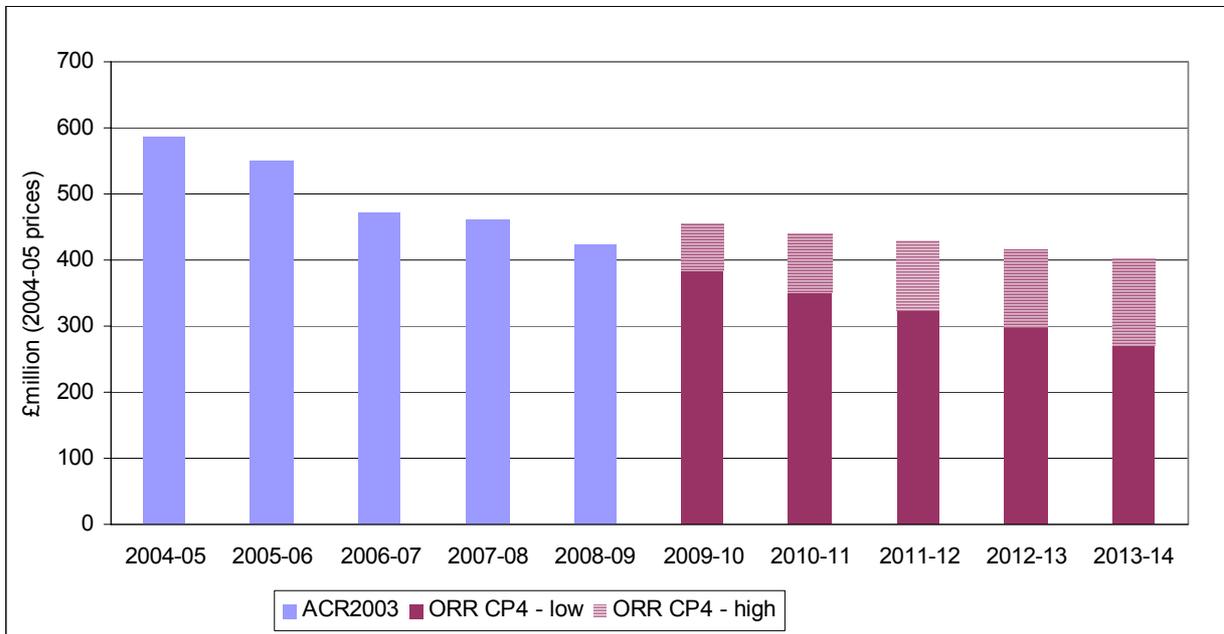


Figure 6: OMR&E expenditure projections for Scotland

<sup>12</sup> This work is outlined in *Disaggregating Network Rail’s Expenditure and Revenue Allowance and the Future Price Control Framework: a Consultation*, Office of Rail Regulation, June 2005 (<http://www.rail-reg.gov.uk/upload/pdf/238.pdf>) and our letter to the Scottish Executive ([http://www.rail-reg.gov.uk/upload/pdf/lett\\_rag\\_scot\\_ew.pdf](http://www.rail-reg.gov.uk/upload/pdf/lett_rag_scot_ew.pdf)).

## **Schedule 4 and 8 costs and other single till income**

2.36 In addition to OMR&E expenditure Network Rail also incurs Schedule 4 and 8 costs, which form part of its revenue requirement. Furthermore, in order to calculate the NRR to be funded from track access charges and grants, it is necessary to estimate the other single till income that Network Rail will receive in CP4. Single till income is then netted off the gross revenue requirement.

### *Schedule 4 and 8 costs*

2.37 Network Rail incurs costs through the expected payments to TOCs under the Schedule 4 and 8 incentive regimes for, respectively, possessions and performance. These are projected to be on average some £90 million per annum during CP3. Network Rail uses a forecast of £95 million per annum in BP2005. For the purposes of the initial assessment we assume in CP4 that this is £100 million per annum, a total of £500 million over the whole control period. This has not been subject to any detailed analysis at this stage. As part of PR2008 this will be examined further, in particular in relation to demand growth and the performance targets we will establish as part of PR2008.

### *Other single till income*

2.38 Other single till income comprises all of Network Rail’s income with the exception of franchised passenger track access charges and grants. It comprises income from property, freight operators, open access operators, stations charges, depots (and other facilities) and certain ring-fenced revenues (such as third party contributions for enhancements). Other single till income is broadly stable across time at around £700 million per annum and therefore we have not undertaken any new analysis of single till income at this stage.

2.39 We will undertake more detailed work on single till income during PR2008, for both England & Wales and Scotland. There might be some changes to the overall level due to variations in freight and open access charges, following changes to the structure of track access charges. There is also a potential small cross-subsidy between franchised passenger track access and stations charges, which could mean that total franchised passenger track access

charges, and hence the NRR, would reduce by a small amount (our current estimate is that this could be in the region of £15 – 20 million per annum). Stations charges would increase correspondingly.

## 3. Financial framework

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### Introduction

- 3.1 This chapter sets out some of the strategic issues we need to consider fully in developing an appropriate financial framework for Network Rail. Annex E provides more details on the individual components of the financial framework and ways in which these might be addressed. We would welcome feedback from you on any of the issues set out here or in Annex E.
- 3.2 Network Rail requires effective incentives to deliver the maximum level of efficiency improvements, so the risk / reward balance will need to be considered in some detail as part of our development of the CP4 incentive and financial framework during PR2008.

### Context

- 3.3 The parameters of Network Rail’s financial framework that we need to establish as part of PR2008 will not only impact on its allowed revenues in CP4. More fundamentally it could affect:
- how strong the incentives will be on Network Rail and its partners to first deliver and then exceed our output and efficiency expectations as well as meeting passenger and freight customer needs;
  - how viable would be the options for Network Rail to migrate to alternative financial structures either during CP4 or in the future, if this could be shown to represent better value for money; and
  - whether Network Rail would be able to continue to recruit and retain top-class management needed to direct and manage the company to meet the challenges ahead.
- 3.4 We believe that it is important to establish a financial framework which, as part of the overall incentive framework, enables and encourages Network Rail to take appropriate risks in seeking and delivering material and sustained year-on-year improvements in performance, safety, and efficiency. This includes giving Network Rail strong incentives to take informed and

appropriate risk-based decisions, whilst exploring and implementing cost effective solutions to accommodate expected growth in passenger and freight demand. This must include Network Rail proactively facilitating and delivering third party enhancement schemes in an efficient and timely manner.

- 3.5 During 2006, we propose to examine in detail whether the overall incentive framework is fit-for-purpose to achieve these objectives and consider what, if any, modifications need to be made. We believe that it would be more difficult to achieve these objectives if we do not ensure that the financial framework reflects the private sector, commercial (‘for profit’) status of Network Rail. We would not want to make it impossible for the company to introduce different forms of capital during CP4 or beyond. This needs to be set in the context of affordability of the outputs that the Secretary of State and Scottish Ministers wish to specify, given the funds available in CP4.

### **Setting the rate of return and incentive mechanisms**

- 3.6 The Government has provided Network Rail with a financial indemnity mechanism (FIM), which means that investors (bondholders) are largely insulated from Network Rail’s business risk. In almost all circumstances, if Network Rail were to default on its interest payments, the Government would meet its liabilities. This is significant because it means that Network Rail has continuous access to cheap debt, almost irrespective of the financial framework that the ORR establishes. Our initial work here has assumed that Network Rail will continue to benefit from the FIM in CP4, and therefore that financeability considerations may not be relevant (i.e. Network Rail would not require a surplus over and above its expected cost of debt (an implied return on its ‘equity’) to finance its business). This assumption would change if Network Rail proposed to raise capital in CP4 not protected by the FIM (see paragraphs 3.13 – 3.15).
- 3.7 Nevertheless, the discussion above indicates that there are reasons other than financeability which we believe need to be considered in setting the appropriate allowed rate of return for Network Rail. In particular, the rate of return should incentivise Network Rail to take appropriate risks and to manage them effectively in developing its business to meet customer and funder aspirations. This probably implies an allowed rate of return which exceeds the expected cost of debt in CP4.

- 3.8 There is also a potential relationship between a rate of efficiency improvement we could assume and the rate of return. High efficiency challenges could imply greater risk and hence the possible need for higher allowed rates of return, to provide an incentive to management and to reflect the risk that the higher targets may not be fully achieved.
- 3.9 We see a strong interaction between the appropriate incentive and financial frameworks. Much more work needs to be done both to understand the effectiveness of the current frameworks and assess future options before decisions on the right package can be made for CP4 and beyond. We will be starting a debate on these issues early in 2006.
- 3.10 The debate will also need to consider how surpluses could be used in CP4 given that there are no shareholders to whom dividends would otherwise be distributed. Apart from rewarding employees for exceeding the regulatory expectations (in performance, safety and cost), we see there are other possible uses of surpluses, such as:
- increasing the ‘implied equity’ (i.e. the difference between debt and RAB – see next section) in the business by reducing levels of debt;
  - reinvesting in the network at Network Rail’s discretion;
  - establishing as part of the review a list of discretionary enhancements to be carried out as surpluses arose;
  - adopting a benefit-sharing arrangement between Network Rail and the relevant operating companies that have worked with Network Rail to achieve the surpluses; or
  - providing rebates to customers and funders.
- 3.11 Annex D provides more detail on some of the different options for calculating an appropriate rate of return. We have not conducted any detailed analysis at this stage. An illustrative range of the allowed surplus over and above the cost of debt has been used in this initial assessment (between £200 million and £500 million per annum). This illustrative range translates into an average real pre-tax return on the RAB of between 3.6% and 4.5% per annum.

## CP3 RAB and debt

3.12 Table 9 shows the value of Network Rail’s RAB and debt, in nominal prices. By the end of the control period the debt to RAB ratio decreases to 60% from the current value of 77%, based on Network Rail’s current projections of its net debt.

**Table 9: CP3 RAB and debt**

£billion, nominal prices	April 2005	April 2009
Net debt	15.6	20.4
RAB	20.5	34.0
Debt to RAB	77%	60%

Source: Network Rail’s 2005 regulatory accounts, 2005 business plan and ORR calculations. Note: The April 2009 RAB expressed in 2004-05 prices is £29.8 billion. This includes our current estimate of an upward adjustment of £3.6 billion to reflect the deferral of revenues and other expected adjustments including additions for improvements in the asset stewardship index and the volume incentive.

## Who bears risks?

- 3.13 Network Rail has no shareholders; the members of the company have no financial interests in it and lenders are protected by the FIM. Thus it is currently passengers, freight users and taxpayers who are exposed to the business risks carried by Network Rail. The company’s structure means that the normal pressures from the capital markets for the company to meet and exceed investor expectations are absent. There are substitute regulatory measures in place (such as the Network Licence requirement for a management incentive plan) in order to compensate in part for this systemic weakness.
- 3.14 Allowing Network Rail an expected surplus could enable the company to raise capital not protected by the FIM and hence strengthen its financial accountability and sharpen incentives on management. Furthermore, it could enable the Government to begin to limit the future coverage of the FIM, if it felt that it was appropriate to re-distribute risks from itself, and other funders and customers, to investors.
- 3.15 Network Rail is currently examining the costs and benefits of raising a tranche of capital not supported by the FIM, possibly with a coupon linked to the

company’s financial performance. As well as strengthening financial accountability, Network Rail believes that it could also enable greater flexibility in relation to longer-term financing options. Network Rail would need to show that this would represent value for money, given that the cost of such debt would exceed that under the FIM.

## **Amortisation**

- 3.16 Another key component of the financial framework, which will have a significant impact on Network Rail’s revenue requirement in CP4, is the allowance for amortisation. The allowance for amortisation determines how much of Network Rail’s investment in the network is funded through access charges and, in consequence, how much must be funded through borrowing. Other things being equal, the higher the allowance for amortisation, the less Network Rail will be required to borrow (and vice versa).
- 3.17 In setting the amortisation allowance, we have adopted an assumption in this document that it should be equal to the level of expenditure required to maintain the network in steady state over time. Chapter 2 highlighted the uncertainty in the level of renewals expenditure required to deliver baseline outputs in CP4 and this uncertainty extends over the longer-term. At this stage, based on a range of longer-term average annual expenditure possibilities, the amortisation allowance in CP4 could be between £1 billion and £1.6 billion per annum. This would mean that Network Rail would be required to continue to borrow in order to sustain the baseline outputs in CP4 and we would therefore need to be satisfied that this would not lead to the railways being financially unsustainable over the longer term. We could increase the amortisation allowance if it was felt that the level of debt needed to be reduced to what might be considered more sustainable levels.

## **Next steps in development of the financial framework**

- 3.18 We will consult on the wider incentive framework in May/June 2006 and will publish our emerging thinking on the financial framework in July/August 2006.



## 4. Illustrative revenue requirement

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### Introduction

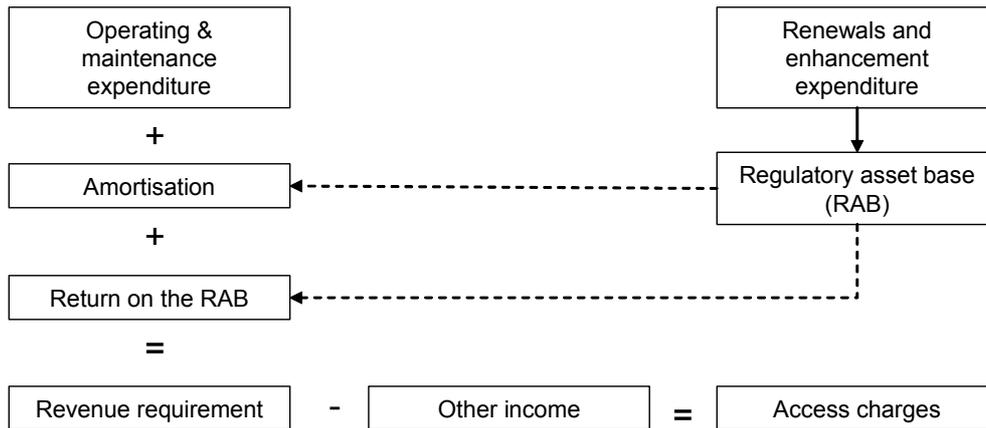
4.1 This chapter contains our calculations of an illustrative range for the CP4 revenue requirement. It draws together our assessment of the possible range for expenditure from Chapter 2 and our assessment of the key financial assumptions from Chapter 3.

### Building block methodology

4.2 We have based our assessment of the revenue requirement on the standard building block methodology, which we used at ACR2003 for calculating the revenue requirement and access charges. It is also used by other economic regulators. The methodology is illustrated in Figure 7.

4.3 The key features of the building block methodology are that:

- projected operating and maintenance expenditure is determined for each year of the control period and recovered on a ‘pay-as-you-go’ basis (i.e. the revenue requirement with respect to O&M equals projected expenditure);
- projected renewals and enhancement expenditure is added to the RAB. The actual expenditure in the control period on renewals and enhancements is financed through the amortisation allowance or, where renewals and enhancements exceed the amortisation allowance, through borrowing. The company receives the revenue to repay its debt principal and interest charges through, respectively, the amortisation allowance and return on the RAB; and
- the return on the RAB covers the interest payments that the company needs to make to its creditors. In the case of ACR2003 determination for Network Rail, the return also includes a margin to build up a surplus to deal with unanticipated cost or revenue shocks during the control period.



**Figure 7: Building blocks of the revenue requirement**

### Combining the financial assumptions with the expenditure assessment

- 4.4 We have combined the upper and lower estimates of post-efficiency expenditure with financial assumptions to illustrate upper and lower estimates of the net revenue requirement (NRR).
- 4.5 While we have selected combinations of parameters from the elements of the building block methodology that allow us to illustrate a plausible range for the NRR, it is important to note that these combinations are purely illustrative at this stage in PR2008. There are no pre-determined relationships between any given level of expenditure and the financial assumptions. The specific levels for all the building blocks of the revenue requirement, their interactions and the effect on incentives, will be determined in detail during PR2008.

#### *Rate of return assumptions*

- 4.6 We have selected two assumptions for the (pre-tax, real) allowed rate of return on the RAB of, respectively, 3.6% and 4.5% on average over CP4, which cover the cost of debt plus a surplus. These represent high and low estimates of the possible range of the return in CP4, although as the discussion in Chapter 3 highlights, there are a large number of options for the CP4 financial framework which we will consider in more detail during the course of PR2008.
- 4.7 In our modelling of the NRR we have assumed that the surplus we assume in the return is not used to reduce debt. As we discuss in Chapter 3 decisions need to be made on how any surplus will be used in CP4.

- 4.8 An alternative approach to remunerating the surplus through the allowed rate of return would be to set a low rate of return without any inbuilt surplus (i.e. pure cost of debt) but incentivise the company to achieve a surplus. This could be through building into the revenue requirement an assumption of a lower level of efficiency improvement, on the understanding that higher efficiencies are achievable. For the purposes of this assessment we are modelling surpluses through the return. As we take forward the development of the financial and incentive frameworks in 2006 we will examine the relative merits of these two approaches further and consult on our final proposals for PR2008.

#### *Amortisation assumptions*

- 4.9 Following the discussion in Chapter 3, our assumption for this assessment is that amortisation should be equivalent to the long-run steady state level, which we have set for the purposes of our initial assessment as £1 billion per annum for our low expenditure profile and £1.6 billion per annum for our high expenditure profile.

#### *Additions to the starting CP4 RAB*

- 4.10 Our ACR2003 determination projects the RAB to increase from £18.8 billion to £26.2 billion over the course of CP3. In addition to this, we are currently committed to further additions to the RAB at 1 April 2009. Current expected adjustments to the RAB comprise additions for deferral of CP3 revenue (of around £3.3 billion) less reductions logged up in the 2004-05 regulatory accounts, giving a net increase in April 2009 of some £2.5 billion. There is also a possible further net addition of some £1 billion (including possible adjustments for additional renewals expenditure resulting from our interim review of signalling, for asset stewardship/volume incentives; and also an adjustment downwards for possible lower cost of delivery of the enhancement schemes funded on an emerging cost basis).
- 4.11 Our current working assumption is that the total RAB addition could be as much as £3.6 billion in April 2009 and we have used this value as the input to modelling the range of the CP4 revenue requirement for this paper. We have not varied this value in this assessment. A lower addition to the RAB of, say, £2.5 billion would have the effect of reducing the NRR by upto £100 million

per annum, depending on the assumptions for the rate of return and amortisation.

*Schedule 4 and 8 costs and other single till income*

4.12 For both of our illustrative calculations we are assuming that Schedule 4 and 8 costs are £100 million per annum and that other single till income is £700 million per annum, as discussed in Chapter 2.

*Lower estimate*

4.13 Our lower estimate is a combination of our low expenditure (including high efficiency) projection and a higher allowed rate of return of 4.5% on average over CP4. This illustrates a situation where, in order to manage the increased risk associated with achieving greater efficiencies, a higher surplus is allowed.

4.14 While this approach does not assume that the equity (RAB minus debt) needs to be remunerated with a conventional equity return it ensures that the company would be able to finance its debt and generate a surplus of around £500 million per annum. This set of assumptions gives adjusted interest cover ratios of around 1.65x.

4.15 Amortisation is set at £1 billion per annum, to reflect the expected long-run expenditure levels associated with this (lower) level of expenditure.

*Upper estimate*

4.16 Our upper estimate is a combination of our high expenditure projection and lower allowed rate of return of 3.6% on average over CP4. This illustrates a situation with reduced risk associated with achieving lower efficiencies and hence a lower surplus is allowed.

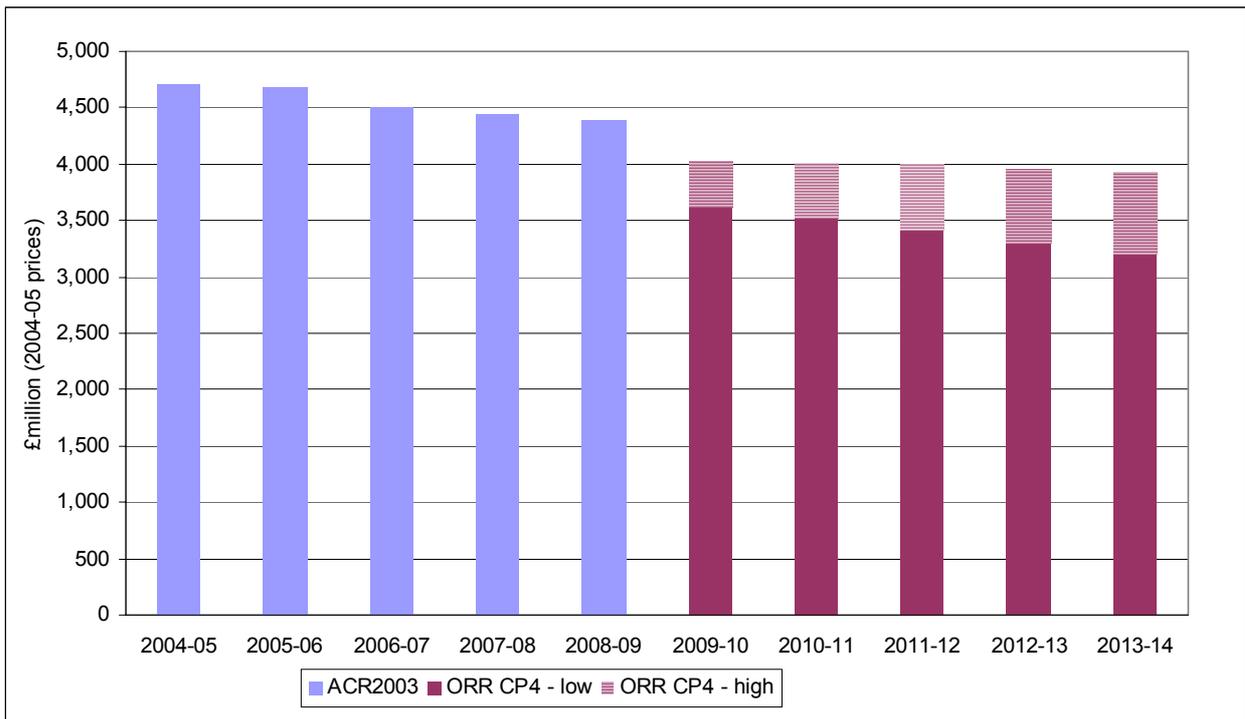
4.17 Again, this approach does not assume that the equity needs to be remunerated with a conventional equity return, but it ensures that the company would be able to finance its expected debt and generate a surplus, in this case of around £200 million per annum. This generates adjusted interest cover ratios above 1.3x. This assumes continuation of the financial indemnity, since it assumes no need to ensure an investment grade credit rating (of say at least 1.5x). In practice, the need to achieve any rating would

be determined by the views of investors and be affected by the cost and level of debt.

4.18 In this illustration, amortisation is higher, at £1.6 billion per annum, to reflect higher expenditure levels.

### Illustrative range for the CP4 net revenue requirement

4.19 Figure 8 illustrates the range for the CP4 NRR based on our assessment.



**Figure 8: Range for the CP4 net revenue requirement**

4.20 On the basis of our assessment and the assumptions we have used, the range for the total NRR in CP4 is £17.1 – 19.9 billion, an average of between £3.4 – 4 billion per annum. The upper end of our range is in total 12% lower than the total NRR established for CP3 (of £22.7 billion). The lower end of our range is 25% less than the CP3 total. Table 10 provides a breakdown of the components of NRR for our range. Annex F contains further detail for our calculations of the ranges of NRR.

**Table 10: Illustrative range of the CP4 net revenue requirement**

£million (2004-05 prices)	CP3	CP4 – lower estimate	CP4 – upper estimate
Maintenance	5,520	3,600	4,320
Opex	5,570	4,320	4,940
Schedule 4 and 8 costs	470	500	500
Return	7,550	7,130	5,640
Amortisation	7,330	5,000	8,000
<b>Gross revenue requirement</b>	<b>26,440</b>	<b>20,550</b>	<b>23,410</b>
Other income	3,710	3,510	3,510
<b>Net revenue requirement</b>	<b>22,730</b>	<b>17,050</b>	<b>19,900</b>

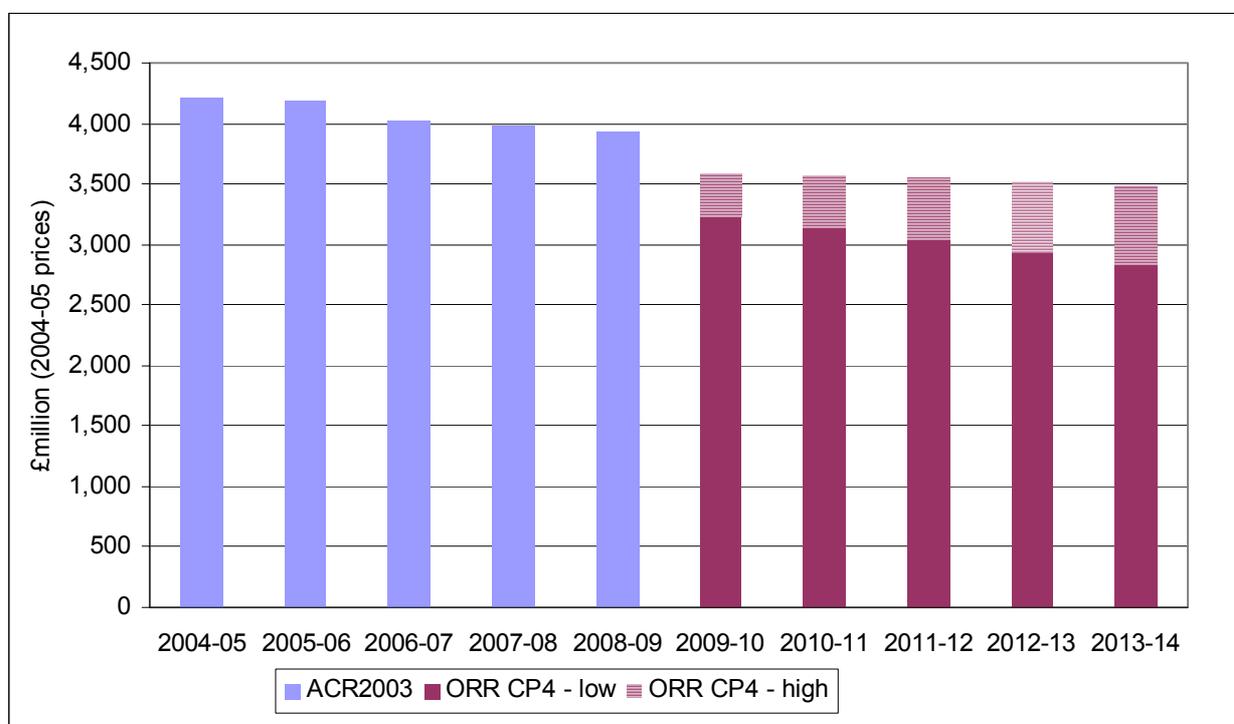
4.21 A significant share of the uncertainty in the range of the NRR is due to different assumptions for the financial assumptions (the difference in the total CP4 return and amortisation between our upper and lower estimates is around £1.5 billion). However, our initial assessment has revealed that, based on the assumptions used, there is greater uncertainty (in terms of the effect on the NRR) about the underlying levels of activity and expenditure necessary to sustain and, as necessary, enhance the network. The difference between our upper and lower estimates for the total CP4 (post-efficiency) OMR&E is some £4.5 billion. The overall difference in our upper and lower estimates for the NRR, of around £3 billion, is due to the way that our illustrative high/low combinations of expenditure and financial assumptions offset each other in the calculations.

4.22 As set out in Chapter 3, we will consult on our emerging thinking for the financial framework in July/August 2006. Chapter 5 discusses key challenges that Network Rail needs to overcome to provide robust information for PR2008, in order to reduce the uncertainties.

## England & Wales and Scotland

4.23 Figures 9 and 10 show the illustrative ranges for the NRRs for England & Wales and Scotland. The range of reductions compared to the (implied) CP3 levels are of a similar magnitude for both countries compared to the GB level illustration. Our initial assessment has not involved examining the revenue

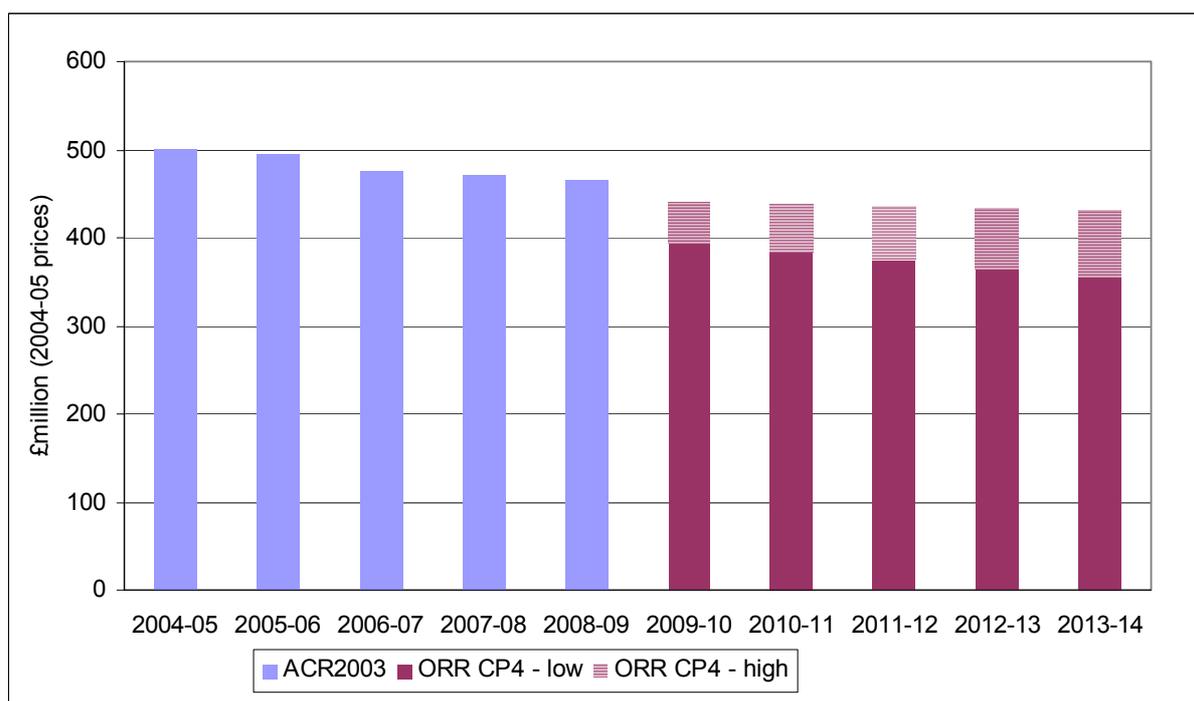
requirements in detail for the two countries, our further work on PR2008 will focus on each country separately, as necessary. Tables 11 and 12 show the detail for the two ranges of NRRs.



**Figure 9: Illustrative range of the England & Wales net revenue requirement**

**Table 11: Illustrative range of the England & Wales net revenue requirement**

£million (2004-05 prices)	CP3	CP4 – lower estimate	CP4 – upper estimate
Maintenance	5,020	3,280	3,930
Opex	5,030	3,900	4,460
Schedule 4 and 8 costs	420	450	450
Return	6,750	6,330	5,010
Amortisation	6,540	4,470	7,120
<b>Gross revenue requirement</b>	<b>23,760</b>	<b>18,420</b>	<b>20,970</b>
Other income	3,440	3,250	3,250
<b>Net revenue requirement</b>	<b>20,320</b>	<b>15,180</b>	<b>17,720</b>



**Figure 10: Illustrative range of the Scotland net revenue requirement**

**Table 12: Illustrative range of the Scotland CP4 net revenue requirement**

£million (2004-05 prices)	CP3	CP4 – lower estimate	CP4 – upper estimate
Maintenance	500	330	390
Opex	540	420	480
Schedule 4 and 8 costs	50	50	50
Return	800	800	630
Amortisation	790	530	880
<b>Gross revenue requirement</b>	<b>2,680</b>	<b>2,130</b>	<b>2,440</b>
Other income	270	260	260
<b>Net revenue requirement</b>	<b>2,410</b>	<b>1,870</b>	<b>2,180</b>

## 5. Key challenges for Network Rail

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### Introduction

5.1 Network Rail has made significant progress since 2002 in putting its business planning onto a sounder footing. This chapter identifies key challenges that Network Rail still needs to overcome in order to provide robust data for PR2008.

### Key challenges

5.2 While a significant proportion of the uncertainty in the range of the net revenue requirement is due to different assumptions for the financial framework, there remains considerable uncertainty about the underlying levels of activity and expenditure necessary to sustain and, where appropriate, enhance the network. There is also uncertainty about the levels of efficiency gain which Network Rail should set itself to achieve beyond those required during CP3. Our assessment presents a significant challenge to Network Rail to develop a better understanding of these issues for its PR2008 submissions.

5.3 Network Rail inherited a poor base in terms of asset knowledge and understanding of cost causation, and there remains a considerable amount for the company to do in order to produce robust business plans and optimise performance, asset management and cost control.

5.4 To realise efficiencies at the higher end of the range set out in our initial assessment we expect the company to look for innovative options which might include changes to its standards, technologies and processes.

5.5 Key tasks that Network Rail needs to tackle are:

- to complete and implement its asset management planning and business planning criteria;
- to improve its understanding of cost causation, e.g. linking changes in forecast demand to asset degradation and activity levels for all relevant asset types;

- to improve the transparency and robustness of operations and maintenance expenditure forecasts, relating them to relevant measures of activity and output;
- to develop a robust measure of network availability and possessions requirements;
- to consider explicitly passenger demand forecasts, their relationship to projected changes in train-kilometres, and the implications of both for network operational performance;
- to develop its own view of its efficiency and the scope for further improvements, including benchmarking and continued work on development of maintenance and renewals unit cost measures and the emerging conclusions of the industry possessions review; and
- to provide more geographically disaggregated activity, output and expenditure forecasts.

5.6 In respect of renewal activity levels in particular, there are further issues to be addressed:

- the development of a more objective quantified basis for the production of figures in some areas (such as operational property);
- further exploration of the implications of alternative activity profiles in others (e.g. track);
- explicit consideration of the trade-offs between levels of maintenance and renewal activity;
- what current levels of activity may indicate about the industry's ability to deliver future volumes of work (in order to assess where resource constraints may limit future activities);
- whether activities that have already been at high levels for a number of years (eg. rail renewal since the Hatfield derailment) can be considered to have tackled a backlog of work and should therefore be expected to reduce in future;

- (a) the possibility that Network Rail’s current under-spending against the CP3 provision may suggest that higher levels of activity are not as necessary as the company believed at the time of that review. It is appropriate to question whether these lower levels of activity would continue to be sufficient in CP4;
  - the effect of the in-house transfer of maintenance activities. There is emerging evidence of improved quality and effectiveness of interventions, and therefore a reasonable expectation that the amount of renewal work should reduce, or at least be capable of longer-term spread through a degree of deferment; and
  - similar effects that arise from the use of improved materials, maintenance and inspection technologies.
- 5.7 Most of the issues listed in the previous sections are recognised by Network Rail and are either being discussed with ORR or are already being progressed through defined processes. The work on the activity and expenditure has, however, allowed us to improve our understanding of the remaining shortcomings in Network Rail’s business planning processes.
- 5.8 Some of this work is being developed through the asset information workstream, the ongoing development of the decision support tools and the associated development of the infrastructure cost model. Network Rail needs to ensure that these initiatives are aligned wherever possible, and are being progressed taking account of the PR2008 process and milestones.



## **Annex A: Specific review objectives**

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1. Our specific objectives for the Periodic Review 2008 are:
  - to set Network Rail’s access charges which are:
    - o so far as practicable, cost reflective so as to give good signals to users and funders;
    - o no higher nor lower than they need to be to meet the HLOS specifications and to provide passengers/freight customers with what they want at a value for money price;
  - to set Network Rail’s outputs:
    - o with improved definition (e.g. capability, availability, reliability), to focus Network Rail planning/management and to facilitate measurement of outcomes;
    - o targeted to what users and funders want from the railway;
    - o forward looking, with a trajectory set in the short, medium and long term, to an appropriate level of disaggregation which challenge Network Rail to better understand the drivers of good performance in all time frames;
    - o wherever practicable, moving away from specifying inputs (e.g. activity levels);
  - to improve incentives:
    - o to deliver continuous improvement in operations and maintenance and renewal/enhancement procurement efficiency;
    - o optimise cost/quality trade-offs based on evidence of what railway users value;
    - o balance outputs in different time frames (e.g. performance in the short and longer term);

- to challenge Network Rail to improve its knowledge/understanding of assets, especially its ability to predict impacts of changing patterns of usage and ways of working to optimise extent/cost of accommodating forecast/emerging demand;
- to develop Network Rail’s planning framework and asset knowledge;  
and
- to promote continuous improvement in health and safety.

## Annex B: PR2008 timetable

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### Preparation phase

December 2005	ORR publishes an initial analysis of possible Network Rail outputs, efficiency and OMR expenditure for CP4.
	ORR publishes a consultation document on Network Rail’s financial framework for CP4.
January 2006	ORR issues guidance to Network Rail on content of its CP4 initial submission.
March 2006	Consultation closes on ORR material published at end 2005.
March 2006	Network Rail’s Business Plan is published, focused on CP3 but reflecting improvements to planning capability e.g. route plans.
May/June 2006	ORR publishes a consultation document on Network Rail’s incentive framework for CP4.
June 2006	Network Rail makes its initial CP4 submission.
July/August 2006	ORR publishes emerging views on Network Rail’s financial framework (following the December 2005 consultation)
July/August 2006	Provisional conclusions from industry group on possessions policy.
November 2006	ORR consults on its assessment of Network Rail initial submission and developments in possessions/ signalling reviews.
Feb 2007	Consultation closes on ORR’s assessment of Network Rail initial submission.
March 2007	Network Rail Business Plan published.

## Formal review phase

Quarter 1 2007-08	ORR issues notice of Access Charges Review <sup>13</sup> .  ORR issues an initial ‘information requirement’ to Network Rail, for compiling submission on outputs, cost and financing plans.
June/July 2007	Secretary of State and Scottish Ministers issue HLOSs and statements of funds available.  ORR publishes its statement of implications of HLOSs and funds available for Network Rail, for consultation, and to give Network Rail initial assumptions for its cost submission.  ORR revises, as necessary, Network Rail information requirements following consultation.
October 2007	Network Rail detailed submission to ORR for CP4 in the form required by ORR in its ‘information requirement’.  ORR commences review of submission, and consults on the submission.
February 2008	ORR produces initial assessment of Network Rail’s submission and implications for access charges and industry outputs.  ORR consults on its assessment.
April 2008	Revisions to Network Rail submission are made as necessary in response to initial assessment.  ORR makes statement about early start funding for 2009-10.
June/July 2008	Draft conclusions on review.
October 2008	Final conclusions on review.

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<sup>13</sup> Schedule 4A is expected to be commenced by the DfT during 2006. Under these provisions the HLOS must be provided to ORR at a date specified by ORR in the Access Charges Review Notice, with this date being not less than three months after publication of the Notice.

# Annex C: Detail on renewals activity and expenditure assessment

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## Introduction

1. This annex provides further detail to the assessment of renewals activity and expenditure provided in Chapter 2. The annex covers:
  - track;
  - signalling;
  - civil engineering structures;
  - operational property; and
  - electrification, plant, telecoms, IT and other expenditure.

## Track renewals

2. Significant work has been done by Network Rail to establish required future activity volumes. Its 2005 business plan (BP2005) assumes 920km of plain line track renewal, 740km of sleeper renewal, 940km of ballast renewal and renewal of 520 switches & crossings (S&C) units each year of control period 4 (CP4).
3. We consider that the appropriate rate of rail renewal could, on average, lie in the range of 650 to 970km per annum (2% to 3% of the network total). For sleeper renewal it could lie in the range of 620 to 740km per annum and for ballast renewal in the range of 750 to 1000km per annum. For S&C, we further consider that the range could be 415 to 545 units per annum.
4. Track renewals form a significant proportion of total renewal expenditure (projected to be 27% during CP3 and 29% in CP4, according to BP2005). Network Rail has developed decision support tools but at this stage more work is needed to fully substantiate the expenditure profile in the business plan for CP4. We have therefore taken a higher level view of the main long-run drivers of renewals, to estimate a range of activity levels all of which

could, on the basis of current knowledge, be appropriate for delivery of the assumed outputs and long-term network sustainability. The BP2005 total for track renewals during CP4 is £3.4 billion (excluding efficiency). Our assessed range based on the activity levels shown in Table B1, pre-efficiency, is between £2.8 billion and £3.7 billion.

**Table B1: CP4 track renewal activity projections**

	<b>Network Rail 2005 business forecast</b>	<b>ORR lower estimate</b>	<b>ORR upper estimate</b>	<b>Difference lower estimate to BP2005</b>	<b>Difference upper estimate to BP2005</b>
Plain line rail (km)	920	650	970	-29%	5%
Sleepers (km)	740	620	740	-16%	0%
Ballast (km)	940	750	1000	-20%	6%
S&C units	520	415	545	-20%	5%

## Signalling

5. Signalling renewals also represent a significant proportion of renewals expenditure (13% during CP3 but this is projected to rise sharply in CP4 to more than 30%). Work over recent months on the medium-term signalling review has provided Network Rail and ORR with a clearer insight into requirements for CP4, and in particular has indicated that the original BP2005 figures were substantially overstated. BP2005 proposed total expenditure of £3.9 billion on renewals during CP4 (pre-efficiency). Our proposed pre-efficiency range is between £2.5 billion and £2.7 billion, significantly below the BP2005 projection.
6. Significant work has been done to understand the oncoming bow-wave of signalling renewals, expressed in terms of signalling equivalent units (SEUs) as an activity unit. Network Rail’s BP2005 proposed an annual renewal rate of 1900 SEUs, but following the work through the medium-term signalling review, we have adopted 1700 SEUs as a lower estimate.

## **Civil engineering structures**

7. Expenditure on civil engineering structures is the third largest area of renewals expenditure (after track and signalling). During CP4 it is projected by Network Rail to be 15% of total renewals expenditure.
8. As yet there is little real activity volume information, although Network Rail is making good progress on an asset management process that will inform business planning with robust scopes of work. At this stage of the Periodic Review 2008 (PR2008), our view is that there is little potential for reducing levels of expenditure without returning to a network-wide policy of short-term minimisation of structures expenditure. This approach would be inconsistent with the conclusions of the Access Charges Review 2003 (ACR2003). Network Rail is currently underspending against the ACR2003 determination, and we are taking the level of expenditure as the lower end of our range. For the upper end of our range we have taken Network Rail's BP2005 forecast.

## **Operational property**

9. Network Rail currently projects expenditure on operational property (stations, depots and lineside buildings) of about £880 million in CP4. There is at present a real absence of worthwhile information about actual activity levels or any means of linking activity and spend with outputs. Network Rail considers that current levels of spend are only sufficient to maintain health and safety, to meet other statutory requirements and some contractual obligations. We have taken 5% above the BP2005 figures as the upper end of our range, and have defined a lower estimate by removing the early CP4 peak contained in Network Rail's plan.

## **Electrification, plant, telecoms, IT and other expenditure**

10. Each of these asset categories represents a comparatively small area of expenditure. Network Rail currently projects CP4 expenditure of around £1.6 billion in total on these asset renewals categories, less than 15% of its total projected expenditure. We have not examined these categories in detail at this stage and for the purposes of the initial assessment we are using nominal +/-5% ranges around Network Rail's BP2005 figures.



## Annex D: England & Wales and Scotland expenditure

**Table D.1: Post-efficiency expenditure projections for England & Wales**

£million (2004-05 prices)	2009-10	2010-11	2011-12	2012-13	2013-14	Total	Annual average
<b>Low activity and high efficiency</b>							
Renewals	1,500	1,350	1,230	1,120	1,010	6,210	1,240
Enhancements	160	140	130	120	80	630	130
Maintenance	780	710	650	590	560	3,290	660
Opex	870	820	780	740	690	3,900	780
<b>Total</b>	<b>3,310</b>	<b>3,020</b>	<b>2,790</b>	<b>2,570</b>	<b>2,340</b>	<b>14,030</b>	<b>2,810</b>
<b>High activity and low efficiency</b>							
Renewals	1,950	1,870	1,810	1,740	1,700	9,070	1,810
Enhancements	170	170	150	160	110	760	150
Maintenance	830	800	790	760	750	3,930	790
Opex	910	900	900	880	870	4,460	890
<b>Total</b>	<b>3,860</b>	<b>3,740</b>	<b>3,650</b>	<b>3,540</b>	<b>3,430</b>	<b>18,220</b>	<b>3,640</b>

**Table D.2: Post-efficiency expenditure projections for Scotland**

£million (2004-05 prices)	2009-10	2010-11	2011-12	2012-13	2013-14	Total	Annual average
<b>Low activity and high efficiency</b>							
Renewals	200	180	160	150	130	820	160
Enhancements	20	20	20	10	10	80	20
Maintenance	80	70	70	60	50	330	70
Opex	90	90	80	80	80	420	80
<b>Total</b>	<b>390</b>	<b>360</b>	<b>330</b>	<b>300</b>	<b>270</b>	<b>1,650</b>	<b>330</b>
<i>High activity and low efficiency</i>							
Renewals	260	250	240	230	220	1,200	240
Enhancements	20	20	20	20	10	90	20
Maintenance	80	80	80	80	70	390	80
Opex	100	100	100	100	90	490	100
<b>Total</b>	<b>460</b>	<b>450</b>	<b>440</b>	<b>430</b>	<b>390</b>	<b>2,170</b>	<b>430</b>



## Annex E: Further detail on the financial framework

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### Context

1. Our August 2005 consultation document<sup>14</sup> set out some of the issues that need to be considered when putting in place an appropriate financial framework for Network Rail in the next control period. This annex considers these issues in more detail, setting out our current thinking and options for the key financial building blocks.
2. The financial framework that we determine for Network Rail as part of the Periodic Review 2008 (PR2008) will form a key input in determining exactly how much money the company will receive over the control period in return for the outputs that it will be expected to deliver. In particular, the financial framework will determine:
  - the extent to which Network Rail will be expected to borrow money from lenders to cover the costs of improving the network;
  - the return that it can expect to make if it delivers required outputs in an efficient manner; and
  - the risk profile that the company will be expected to bear (which will impact on incentives) in terms of:
    - the level of surpluses / buffers that it will receive to manage risks; and
    - the protections in the regulatory framework, such as the level of price control re-openers.

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<sup>14</sup> *Periodic Review 2008: First Consultation Document*, Office of Rail Regulation, August 2005. <http://www.rail-reg.gov.uk/upload/pdf/245.pdf>.

3. Relatively small variations in these variables can have a very material impact on the amount of revenue that Network Rail is allowed. This chapter highlights these variations and discusses the issues which we will need to consider in finalising the methodology for determining each of the building blocks of the financial framework.
4. As part of the wider incentive framework (which we intend to start a debate on shortly), the financial framework could also impact on the incentives for the company to take appropriate risks in delivering a better railway to meet passenger and freight customer needs over both the short- and longer-term, as well as potentially having a key bearing on the possible future directions the company could take in terms of its corporate and capital structure. Some options would either close off or make it very difficult, for instance, to introduce some capital into the business which is not supported by the financial indemnity or to move back to a more conventional financial structure.

### **Network Rail’s financial structure**

5. Network Rail is a company limited by guarantee. This means that, whilst it is a private sector organisation and operates as a commercial business, it has no shareholders. Instead, the company is accountable to its Members, who are appointed to represent the interests of particular user groups. They have similar powers to those of shareholders in a public company, but they have no financial or economic interest in Network Rail and hence bear no risk.
6. Network Rail’s financial structure is, therefore, quite different from its predecessor (Railtrack) and from other regulated businesses in the UK. Because of these differences, we introduced a number of changes to the financial framework at the Access Charges Review 2003 (ACR2003), including:
  - changing the way that renewals are funded by adding this expenditure to the regulatory asset base (RAB) and amortising it over time rather than funding Network Rail for the expenditure in the year that it is incurred;
  - changing the methodology for calculating the allowed return; and

- introducing a new provision to undertake an interim review should Network Rail’s cumulative expenditure depart by 15% from the assumptions made by us in ACR2003.
7. Since the final conclusions of ACR2003, Network Rail launched its Debt Issuance Programme (DIP) in November 2004. The DIP is a long-term funding platform that enables Network Rail to raise a wide range of debt finance. The DIP is supported by the Government through a financial indemnity, which allows Network Rail to borrow at a relatively low cost of capital. The existence of the financial indemnity means that the circumstances at the start of the PR2008 will differ again from those that we considered during ACR2003.

## Financial framework building blocks

8. In the past, the most relevant building blocks in the financial framework have been the value of the RAB, the level of return, the allowance for amortisation and our assessment of the business’s financeability. The discussion below will highlight that under Network Rail’s current structure as a company limited by guarantee (CLG) and with the existence of the financial indemnity, it would be possible to de-link the RAB from Network Rail’s revenue requirement. In addition, under current arrangements, where all of Network Rail’s debt is supported by the financial indemnity, there are no financeability constraints.
9. **RAB.** To date, the RAB has been used as a proxy for our estimate of the value of Network Rail’s (and Railtrack’s) assets and it has been a key driver in determining the revenue requirement (the allowed rate of return is expressed as a percentage of the RAB). This value will change over time to reflect the depreciation of assets and investment in new assets, which improve the capability and performance of the network. The value of the RAB will also change to reflect Network Rail’s performance against regulatory incentives such as the Asset Stewardship Index and the Volume Incentive.
10. **Amortisation.** The effectiveness and value of assets depreciates naturally over time and customers and funders should bear these costs in return for the benefit they receive from these assets. We, therefore, allow for an appropriate amortisation (or depreciation) allowance to be recovered through access charges. The allowance for amortisation determines how much of Network

Rail’s investment in the network is funded through access charges and, in consequence, how much must be funded through borrowing. Other things being equal, the higher the allowance for amortisation, the less Network Rail will be required to borrow (and vice versa).

11. **Returns.** There are two broad options for establishing the rate of return for a debt-financed company limited by guarantee. We could adopt a standard weighted average cost of capital (WACC) approach, whereby we remunerate both the efficient level of debt and equity (defined as the difference between debt and RAB) in the business. Alternatively we could adopt a cash-flow based approach whereby the allowed return is the rate of return that we believe Network Rail requires to pay the interest it owes to lenders and then to earn an appropriate surplus commensurate with the level of risks within the business.
12. **Financeability.** As a final check in our analysis of Network Rail’s revenue requirement, we must be satisfied that the proposed level of access charges does not make it unduly difficult for the company to finance its relevant activities. Under current arrangements however, where all of Network Rail’s debt is supported by Government through the financial indemnity mechanism (FIM), issues of financeability are of less relevance. This is because investors are largely protected against business risk and Network Rail therefore effectively has unlimited access to the debt markets. Financeability considerations would be relevant if Network Rail proposed to reintroduce some ‘at risk capital’ into the business in the future.
13. Each of these building blocks are examined further in the sections below.

## **The RAB**

14. In the past, a key element of the financial framework for Network Rail (and Railtrack before it) has been the RAB. This has had a significant impact on the overall level of Network Rail’s revenue requirement since it formed the basis for calculating two of the components of allowed revenue: the level of return and the allowance for amortisation.

15. The value of the RAB is based upon principles and policies that we have set out in the past, most recently in the ACR2003 final conclusions<sup>15</sup>. The value of the RAB changes over time to reflect these policies. Efficient expenditure on renewing and enhancing the network is added to the RAB while an offsetting reduction is made through the allowance for amortisation, to reflect wear and tear on the assets over time. The value of the RAB is set out each year in the company’s regulatory accounts. At 31 March 2005, the RAB was valued at £20.5 billion, and it is expected to reach around £30 billion (in 2004/05 prices) by the beginning of control period 4 (CP4).
16. At ACR2003 we based the rules for valuing the RAB during the current control period on three main principles:
  - transparency – publishing assumptions and calculations in full;
  - consistency – the methodology must be consistent with the policy statements made previously; and
  - simplicity – by including in the RAB past expenditure which would have otherwise generated a stream of unregulated income (through separate agreements with customers and funders), ORR sought to simplify the process of regulation.

## Amortisation

### ACR2003

17. Under the methodology for calculating Network Rail’s revenue requirement at ACR2003, we introduced a change to the way in which renewals expenditure was remunerated. Rather than fund renewals on a pay-as-you-go basis, as was the case at the Periodic Review 2000, we considered that a proportion of such expenditure should be financed by borrowing and paid for by future generations of customers and funders. Therefore, instead of Network Rail receiving one pound in income for every pound to be spent on renewals, this expenditure was to be added to the RAB and an allowance for amortisation

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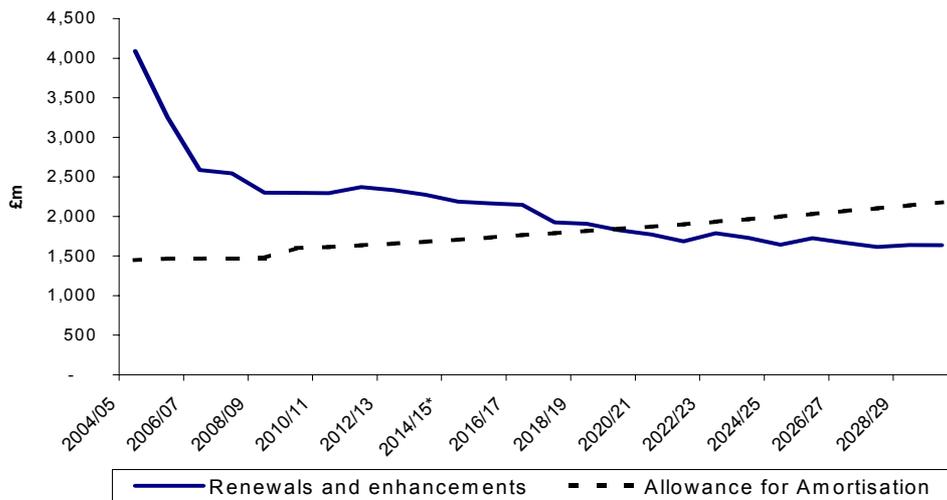
<sup>15</sup> *Access Charges Review 2003: Final Conclusions*, Office of the Rail Regulator, December 2003 (<http://ornet/upload/pdf/184.pdf>).

and a return on the unamortised balance included in our calculation of Network Rail’s revenue requirement.

18. The principal reason for this change in approach was Network Rail’s new financial structure, which enabled the company to finance a proportion of its renewals through borrowing. At ACR2003, we considered a number of different approaches to defining the rules, which determine the allowance for amortisation.
19. A key principle that influenced the final decision was that, in general, the allowance for amortisation in a given year should be broadly equivalent to the level of capital expenditure that is required to maintain the network in steady state over time.
20. We concluded that approximately half of Network Rail’s renewals and enhancements programme should be financed through borrowing during the five years of the control period. The remaining expenditure, which is implicitly required to maintain the network in steady state over time, would then be funded through the allowance for amortisation.

#### *Amortisation in CP4*

21. The principles adopted at ACR2003 for determining the amortisation allowance are sound economic and accounting principles and we intend to continue to adopt them for the PR2008.
22. Figure E1 shows Network Rail’s Business Plan 2005 (BP2005) forecasts of renewals expenditure alongside the amortisation allowance that Network Rail would receive in the future, assuming we rolled forward the current rules for amortising the RAB.
23. The key feature of the chart is the extent to which the allowance for amortisation, based on existing rules, remains below Network Rail’s expected annual capital expenditure. Under this scenario, some of the benefits to current railway users and funders would be paid for by future users and funders.



**Figure E1: Long-run expenditure and amortisation (source: Network Rail’s Business Plan 2005 and ORR calculations)**

24. However, to the extent that the capital expenditure in CP4 may be seen as partially to deal with a backlog or peak of renewals and that there are further efficiencies to be generated over time (which the graph clearly shows), there is a credible argument for current and future railway users and funders to share the costs of this backlog/peak and current inefficiency. This would imply that we should base the amortisation allowance on the long-run annual average expenditure required to maintain the network in steady state over time. This is our starting assumption.
25. Setting the amortisation allowance on the basis of a longer-term annual average expenditure would leave Network Rail in a position where it must continue to borrow in order to maintain the network in a steady state, in CP4 and beyond, and thereby potentially jeopardise the long-term financial sustainability of the industry. We would need to consider carefully whether financial sustainability issues should lead us to conclude that the amortisation allowance should be set more in line with the expenditure required in CP4 to maintain the network in steady state.
26. Table E1 shows the implications for the annual level of amortisation of different levels of capital expenditure required to maintain the network in steady state in CP4 and over the longer term.

**Table E1: Possible levels of amortisation in CP4 (annual average)**

£million (2004-05 prices)	BP2005	CP4 High	CP4 Low	Longer-term average
Current rules	1640	1630	1570	
Steady-state	2160	2030	1390	1000 - 1600

*Summary*

27. Our starting point in determining the amortisation rules in CP4 will be that the levels should be set equal to the capital expenditure required to maintain the network in steady state (based on a longer-term average subject to financial sustainability considerations). The current degree of uncertainty around the level of renewals and enhancement expenditure requirements for CP4, set out in Chapter 3, means that the level of amortisation based on this principle is also necessarily uncertain at this stage.

**Rate of return**

28. In considering our approach to determining the rate of return at the next review it is important to have a clear view of the financial character of Network Rail and the manner in which it will finance itself in the next five-year period. The financial indemnity is particularly relevant in this context. Our starting assumption is that all of Network Rail’s debts, including any additional debt raised in CP4, continues to be supported by the financial indemnity. However, raising debt in CP4 or beyond which is not supported by the financial indemnity may be desirable on grounds of introducing stronger investor-led financial disciplines and incentives for efficiency. Any financial framework should therefore be able, in principle, to accommodate such a proposal if it represented value for money. We would not want to establish a framework in the short term that made it difficult to migrate to different value for money structures in the longer term.

29. It would seem to us that there are two broad options for determining the rate of return in the PR2008:

- a conventional weighted average cost of capital (WACC) approach; or
- a cash flow-based approach.

30. The implications of each are described below.

*WACC approach*

31. The WACC approach (adopted by ORR at the Periodic Review 2000) uses estimates of the cost of debt finance, the cost of equity finance and an assumed level of gearing (the proportion of debt and equity) to build up an overall level of return. Most of the other economic regulators in the UK have used some form of WACC approach to calculate the allowed return in the price controls that they have carried out in recent years.

32. The benefits of adopting this type of approach for the PR2008 would be:

- consistency of approach with other UK regulators (although more recently some regulators have adjusted the returns derived from a pure WACC approach in order to ensure that future investment can be financed by entities that do not benefit from external support such as Network Rail's financial indemnity);
- the credibility of the RAB is retained, which can be important to maintain RAB-based incentives (e.g. the volume incentive and asset stewardship incentive that are already in place) and to facilitate access to capital markets, especially outside the scope of the financial indemnity;
- it is a well-established approach which is well-understood by the financial markets, thereby enabling an easier transition to different financial structures; and
- it enables Network Rail to absorb risks of the kind faced by other private sector businesses, strengthening incentives for efficiency both in operations and in investment planning.

33. If we were to conclude that the benefits of this approach merited further consideration, we would need to explore the appropriate value of equity to remunerate. In doing this, we would need to consider the existing level of the RAB (which has been built up from past expenditure in a variety of categories), and the extent to which this continues appropriately to reflect the value of Network Rail's assets. We would also need to consider the regulatory implications of any change to this level.

34. We would also need to consider carefully the appropriate method for determining the allowed return on equity. The current structure of Network Rail means that effectively its Members (as substitutes for shareholders) hold the equity. However, unlike in a conventional equity-based business, the Members have no financial interest in the company and bear no risk. Remunerating the equity in Network rail is therefore not associated with rewarding providers of capital for the risk that they bear. The return on equity would therefore be whatever surplus was provided over and above the cost of debt, which, in turn, is based on the considerations listed below with the cashflow-based approach.

*Cash flow-based approach*

35. Given the existence of the FIM, Network Rail will have virtually continuous access to the debt markets. This protection afforded by the FIM means that lenders to Network Rail will not be concerned with the underlying financial strength of the business, only the credit quality of the Government indemnity.
36. Therefore, given that Network Rail will be able to borrow to fund shocks to its costs and revenues, and that it will have a considerable margin between its opening debt at the beginning of CP4 and the regulatory limit on borrowing<sup>16</sup>, our starting point in establishing the rate of return could simply be the interest costs that the company will incur in CP4 (plus an allowance for tax).
37. For reasons of transparency, in principle we believe that the interest costs should be calculated without the FIM. This will make explicit the payment that Network Rail makes to Government for provision of the FIM.
38. Once we have calculated Network Rail’s interest costs, the key question is then whether there are reasons why the company should be allowed a surplus above the cost of debt. In theory, it could use a combination of the strength of its balance sheet and the FIM to borrow to fund any cost and revenue shocks. However, we believe that there may be good reasons for allowing a surplus over and above the cost of debt. These are:

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<sup>16</sup> Condition 29 of the company’s Network Licence establishes a limit of the ratio of debt to the value of the RAB of 85%.

- to incentivise (as part of the wider incentive framework) appropriate risk-based decision making within Network Rail. As with the WACC approach, it would need to enable Network Rail to absorb risks of the kind faced by other private sector businesses, strengthening incentives for efficiency both in operations and in investment planning;
  - to enable Network Rail to introduce alternative forms of capital not protected by the FIM, in order to increase financial accountability and sharpen incentives on management (although this would need to represent value for money since, clearly, such capital would be more expensive than if supported by the FIM);
  - to enable an easier transition to radically different financial structures, if this is a longer-term possibility;
  - to be consistent with the company’s private sector, ‘for profit’ commercial status; and
  - to ensure consistency of approach. Although the allowed return at ACR2003 was expressed as a return on the RAB, it was essentially built up from an assessment of the surplus Network Rail would require over and above the cost of debt in order to raise enough finance to fund its investment programme.
39. For both the cash-flow based approach and the WACC approach, it will also be important to have regard to:
- the appropriate use of surpluses. There are no shareholders entitled to receive dividends and customers/funders are not currently entitled to receive surpluses through a rebate (this is entirely at Network Rail’s discretion). We believe that there might need to be an automatic mechanism for Network Rail to rebate or reinvest a percentage of or all surpluses; and
  - affordability/budgeting issues. The Governments will need to support whatever rate of return is established for Network Rail but will not be able to allow for expected rebates in its available funds for the railway or expected reinvestment in its high level output specifications (although it may wish to include a list of discretionary investments to be implemented if

surpluses materialise). Therefore, we will need balance some of the considerations outlined above with possible short-term affordability constraints.

40. Although any surplus could be considered to be the implied return on equity, and the total return expressed as a percentage of the RAB, the way that it would be built up has implications, in particular, for the relevance of RAB-based incentives. Nevertheless, we do not believe that such an approach generally undermines the credibility of the RAB, for example as a measurement of performance (such as through the debt to RAB ratio).
41. We believe that there are three key considerations in sizing any surplus:
  - the underlying business risk, as the surplus would need to incentivise Network Rail to take efficient risk-based decisions in running the business. The surplus could be viewed as a contingency to manage risk effectively;
  - any proposals Network Rail has to raise different forms of capital, either in CP4 or beyond; and
  - affordability.
42. We have not yet conducted any detailed analysis of what Network Rail’s underlying business risk in CP4 is likely to look like. Nor do we yet know how Network Rail proposes to finance itself in CP4 or whether there are any longer-term plans to adopt different financing arrangements. Therefore, at this stage, the possible range we present for the allowed return should be treated as very indicative.
43. Based on some simplistic assumptions, we believe that the allowed return (excluding any allowance which may be required to fund expected taxation) could be in the range of £1.1 billion to £1.4 billion per annum (in 2004/05 prices). The lower end of the range is based on an assumed approximate £0.9 billion per annum interest payments<sup>17</sup> plus around a 5% contingency allowance on projected OMR&E expenditure (£200 million). The upper estimate is assumed to provide Network Rail with an investment grade credit

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<sup>17</sup> This will depend on the amortisation allowance relative to the required capital expenditure.

rating (again assuming £0.9 billion per annum interest costs) which might be required if the company proposes different financing arrangements to those currently in place<sup>18</sup>. However, we recognise that the financial cover ratios required and the credit rating will depend on the financing options proposed and the market's view of Network Rail's business. The range that we have set out here is therefore very indicative at this stage.

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<sup>18</sup> These numbers may change to reflect the latest available information about expected future interest costs when we come to finalise the CP4 revenue requirement.



# Annex F: Detail of the net revenue requirement calculations

Low activity levels & high efficiency; high rate of return		Control period 3 (CP3)		Control period 4					Total for control period 4	Average for CP4
		2004-05	Likely position in 2008-09	Year 1 2009-10	Year 2 2010-11	Year 3 2011-12	Year 4 2012-13	Year 5 2013-14		
<b>A - Output/outcome and other key assumptions</b>										
A1	Passenger growth - annual cumulative change passenger train km	base	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%		
A2	Freight growth - annual cumulative change in freight train tonne km	base	14.0%	15.6%	17.3%	18.9%	20.5%	22.1%		
A3	PPM	83.6%	90.0%	90.8%	91.2%	91.4%	91.6%	91.8%		
A4	Train delay minutes	11,400	8,500	8,114	7,908	7,826	7,745	7,668		
A5	Delay minutes per 100 train kms	2.19	1.6	1.52	1.48	1.46	1.44	1.43		
<b>B - Potential expenditure and investment implications (£m 04-05 prices)</b>										
B1	Operating expenditure - likely needs at current levels of efficiency/effectiveness			1,020	1,030	1,040	1,040	1,040	5,170	1,034
	Assumed scope for improvement in efficiency and effectiveness (%)			8.00%	8.00%	8.00%	8.00%	8.00%		
	Potential <b>operating expenditure</b> needs	1,248	1,011	958	910	865	816	771	4,320	864
B2	Potential <b>schedule 4 and 8 payments</b> to TOCs	83	99	100	100	100	100	100	500	100
B3	Maintenance expenditure - likely needs at current levels of efficiency/effectiveness			930	920	920	910	910	4,590	918
	Assumed scope for improvement in efficiency and effectiveness			8.00%	8.00%	8.00%	8.00%	8.00%		
	Potential <b>maintenance expenditure</b> needs	1,296	928	856	779	716	652	600	3,602	720
B4	Capital investment - renewals and enhancements - likely needs at current levels etc..			2,030	1,980	1,960	1,950	1,870	9,790	1,958
	Assumed scope for improvement in efficiency and effectiveness			8.00%	8.00%	8.00%	8.00%	8.00%		
	Potential <b>capital investment - renewals and enhancements</b> needs	4,087	2,299	1,868	1,676	1,526	1,397	1,232	7,699	1,540
B5	Total <b>expenditure and capital investment</b> needs	6,714	4,337	3,782	3,465	3,208	2,965	2,703	16,122	3,224
<b>C - Potential revenue implications (£m 04-05 prices)</b>										
C1	Potential <b>operating &amp; maintenance expenditure + S4/8 payments</b>	2,627	2,037	1,914	1,789	1,682	1,568	1,470	8,423	1,685
C2.1	Assumed amortisation (CCD) on pre-April 2004 regulatory asset base (RAB)	1,314	983	325	270	219	172	131	1,117	223
C2.2	Assumed amortisation on post-April 2004 investment (renewals and enhancements)	136	492	675	730	781	828	869	3,883	777
C2.3	Total assumed <b>amortisation</b>	1,450	1,475	1,000	1,000	1,000	1,000	1,000	5,000	1,000
C3.1	Regulatory asset base (RAB) as at 1 April	18,768	25,384	29,808	30,676	31,352	31,878	32,275	155,988	31,198
C3.2	Net annual increase in the RAB	2,636	824	868	676	526	397	232	2,699	540
C3.3	Regulatory asset base (RAB) as at 31 March	21,405	26,208	30,676	31,352	31,878	32,275	32,507	158,688	31,738
C3.4	Average RAB for the year	20,087	25,796	30,242	31,014	31,615	32,076	32,391	157,338	31,468
C3.5	Rate of Return (%)	6.76%	6.30%	4.68%	4.60%	4.53%	4.46%	4.39%		
C3.6	<b>Return on the average RAB</b>	1,358	1,624	1,415	1,428	1,433	1,431	1,422	7,130	1,426
C4	<b>Other income</b>	(723)	(749)	(703)	(702)	(701)	(700)	(699)	(3505)	(701)
C5	<b>Net revenue requirement</b>	4,712	4,388	3,626	3,515	3,414	3,299	3,194	17,048	3,410
<b>D - Financial indicators and ratios (nominal prices)</b>										
D1	Memo item - <b>Net Debt (£m)</b>	15,646	20,372	21,362	22,155	22,788	23,279	23,574		
D2	Debt to RAB (%)	77%	69.92%	61.01%	60.29%	59.38%	58.32%	57.11%		
D3	Adjusted interest cover	(0.18)	2.03	1.66	1.65	1.64	1.64	1.65		
D4	85% of RAB less debt / forecast expenditure	36%	91.11%	156.75%	176.38%	197.23%	221.00%	250.05%		

<b>High activity levels &amp; low efficiency; low rate of return</b>	Control period 3 (CP3)		Control period 4					Total for control period 4	Average for CP4
	2004-05	Likely position in 2008-09	Year 1 2009-10	Year 2 2010-11	Year 3 2011-12	Year 4 2012-13	Year 5 2013-14		

**A - Output/outcome and other key assumptions**

A1	Passenger growth - annual cumulative change passenger train km	base	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%		
A2	Freight growth - annual cumulative change in freight train tonne km	base	14.0%	15.6%	17.3%	18.9%	20.5%	22.1%		
A3	PPM	83.6%	90.0%	90.8%	91.2%	91.4%	91.6%	91.8%		
A4	Train delay minutes	11,400	8,500	8,114	7,908	7,826	7,745	7,668		
A5	Delay minutes per 100 train kms	2.19	1.6	1.52	1.48	1.46	1.44	1.43		

**B - Potential expenditure and investment implications (£m 04-05 prices)**

B1	Operating expenditure - likely needs at current levels of efficiency/effectiveness			1,020	1,030	1,040	1,040	1,040	5,170	1,034
	Assumed scope for improvement in efficiency and effectiveness (%)			2.00%	2.00%	2.00%	2.00%	2.00%		
	Potential <b>operating expenditure</b> needs	1,248	1,011	1,005	999	994	979	964	4,940	988
B2	Potential <b>schedule 4 and 8 payments</b> to TOCs	83	99	100	100	100	100	100	500	100
B3	Maintenance expenditure - likely needs at current levels of efficiency/effectiveness			930	920	920	910	910	4,590	918
	Assumed scope for improvement in efficiency and effectiveness			2.00%	2.00%	2.00%	2.00%	2.00%		
	Potential <b>maintenance expenditure</b> needs	1,296	928	911	884	866	839	823	4,323	865
B4	Capital investment - renewals and enhancements - likely needs at current levels etc..			2,440	2,380	2,360	2,320	2,260	11,760	2,352
	Assumed scope for improvement in efficiency and effectiveness			2.00%	2.00%	2.00%	2.00%	2.00%		
	Potential <b>capital investment - renewals and enhancements</b> needs	4,087	2,299	2,391	2,286	2,221	2,140	2,043	11,081	2,216
B5	<b>Total expenditure and capital investment needs</b>	6,714	4,337	4,407	4,268	4,181	4,058	3,930	20,844	4,169

**C - Potential revenue implications (£m 04-05 prices)**

C1	Potential <b>operating &amp; maintenance expenditure + S4/8 payments</b>	2,627	2,037	2,016	1,983	1,959	1,918	1,887	9,763	1,953
C2.1	Assumed amortisation (CCD) on pre-April 2004 regulatory asset base (RAB)	1,314	983	908	832	758	686	618	3,802	760
C2.2	Assumed amortisation on post-April 2004 investment (renewals and enhancements)	136	492	692	768	842	914	962	4,198	840
C2.3	Total assumed <b>amortisation</b>	1,450	1,475	1,600	1,600	1,600	1,600	1,600	8,000	1,600
C3.1	Regulatory asset base (RAB) as at 1 April	18,768	25,384	29,808	30,599	31,285	31,906	32,446	156,045	31,209
C3.2	Net annual increase in the RAB	2,636	824	791	686	621	540	443	3,081	616
C3.3	Regulatory asset base (RAB) as at 31 March	21,405	26,208	30,599	31,285	31,906	32,446	32,889	159,126	31,825
C3.4	Average RAB for the year	20,087	25,796	30,204	30,942	31,596	32,176	32,668	157,586	31,517
C3.5	Rate of Return (%)	6.76%	6.30%	3.68%	3.63%	3.58%	3.53%	3.48%		
C3.6	<b>Return on the average RAB</b>	1,358	1,624	1,112	1,125	1,133	1,136	1,136	5,642	1,128
C4	<b>Other income</b>	(723)	(749)	(703)	(702)	(701)	(700)	(699)	(3505)	(701)
C5	<b>Net revenue requirement</b>	4,712	4,388	4,025	4,005	3,991	3,954	3,924	19,900	3,980

**D - Financial indicators and ratios (nominal prices)**

D1	Memo item - <b>Net Debt (£m)</b>	15,646	20,372	21,275	22,079	22,827	23,495	24,057		
D2	Debt to RAB (%)	77%	69.92%	60.91%	60.21%	59.43%	58.55%	57.61%		
D3	Adjusted interest cover	(0.18)	2.03	1.33	1.32	1.32	1.32	1.32		
D4	85% of RAB less debt / forecast expenditure	36%	91.11%	138.58%	149.35%	159.58%	171.83%	185.16%		