



National Audit Office

# The Modernisation of the West Coast Main Line

LONDON: The Stationery Office  
£13.50

Ordered by the  
House of Commons  
to be printed on 20 November 2006



# SUMMARY

**1** In January 2002, the Secretary of State instructed the Strategic Rail Authority to intervene and find a way forward for the programme to renew and upgrade the West Coast Main Line (**Figure 1**). The upgrade was being undertaken under a 1998 agreement between Railtrack, the private sector owner and operator of rail infrastructure, and Virgin Rail Group, which operates the West Coast passenger rail franchise, and involved the introduction of new signalling technology to allow improved services delivered by new trains running at 140 miles per hour. By 2001, neither the rail infrastructure upgrade nor the new trains were on course for delivery as set out in the 1998 agreement. In October 2001, Railtrack went into Railway Administration and by May 2002 its projection of

the programme's final cost had risen from £2.5 billion<sup>1</sup> (in 1998) to £14.5 billion, with the first stage of implementation in May 2006. Railtrack had spent £2.5 billion on the programme by March 2002, and had committed some £500 million of further works, but had delivered only a sixth of its scope. There had been substantial abortive costs to the programme, including £350 million of work developing new signalling and train control systems and the building of, and technology development for, a Network Management Centre that were de-scoped from the programme in 2002-03. Appendix 1 provides further background to the programme.

<sup>1</sup> Unless otherwise indicated, this and other costs in the report are in 2005-06 prices to facilitate comparisons.

## 1 The West Coast Main Line is the busiest mixed-use railway in the UK



Source: National Audit Office analysis of Network Rail information

### Physical features

- 640 route miles and 1,660 miles of track
- London to Crewe mainly four track (two fast and two slow lines)
- North of Crewe mainly two track
- 114 stations
- 13 major junctions
- 60 tunnels
- 2,800 signals
- 10,000 bridge spans

### The route is used by

#### Train operators

Arriva Trains Wales  
Central Trains  
First Scot Rail  
Northern Rail  
Silverlink  
TransPennine Express  
Virgin Cross Country  
Virgin West Coast

#### Freight operators

Direct Rail Services  
English, Welsh & Scottish  
Railway (EWS)  
Freightliner  
Freightliner Heavy Haul  
GB Railfreight

### Use of line

Passenger train miles per year: 22 million  
Freight train miles per year: six million

2 The Strategic Rail Authority clarified the direction, scope and expected outputs of the programme in the June 2003 *West Coast Main Line Strategy*<sup>2</sup> and engaged stakeholders in support of the programme. The Strategy brought forward the delivery of train speed and frequency enhancements, to September 2004 and December 2005, to match with Virgin's revised programme for the introduction of its new tilting trains. Delivery to a tight timetable put pressures on costs and the Rail Regulator took this into account, when determining, in December 2003, the efficient cost of delivery of the remaining outputs

and setting Network Rail's overall funding for the period between 2004-05 and 2008-09, including funding for the programme.<sup>3</sup> The Regulator's funding determination implied an overall programme budget of £8.3 billion. This assumed Network Rail could achieve efficiencies totalling £940 million<sup>4</sup> and was £2.5 billion below the £10.8 billion<sup>5</sup> upper limit approved by government when it accepted the 2003 Strategy. Both Network Rail and the Strategic Rail Authority considered this efficiency assumption was very challenging.

2 West Coast Main Line Strategy, June 2003: [http://www.sra.gov.uk/pubs2/strategy\\_policy\\_planning](http://www.sra.gov.uk/pubs2/strategy_policy_planning).

3 Network Rail replaced Railtrack-in-Administration in October 2002. The Regulator, who was succeeded by the Office of Rail Regulation in July 2004, determined the efficient price for Network Rail's work and the level of access charges and network grant funding that train operators and the Strategic Rail Authority/DfT needed to pay to meet Network Rail's costs from 2004-05.

4 Equivalent to £863 million in 2002-03 prices, as set out in the Rail Regulator's Final Conclusions to the Access Charges Review 2003.

5 Equivalent to the £9.9 billion, in 2002-03 prices, set out in the SRA's April 2004 Progress Report on the programme.

3 The Authority's June 2003 *West Coast Main Line Strategy* set out three delivery phases and five key objectives (Figure 2).

4 So far, Network Rail has met the key infrastructure delivery and performance milestones and Virgin West Coast has introduced into service its new fleet of Pendolino tilting trains. By April 2006, 77 per cent of the physical work in the programme was complete, with the key remaining projects being the enlargement of Milton Keynes and Rugby stations and the widening of the Trent Valley route. From April 2009, following completion of the modernisation programme, ongoing work to renew and develop the route will be undertaken as part of Network Rail's normal business.

## What we examined

5 This report examines how effectively the Strategic Rail Authority/Department for Transport<sup>6</sup> and Network Rail turned around the West Coast programme between 2002 and 2006 in terms of delivering outputs and expected outcomes in line with the schedule and targets set by the government in the *West Coast Main Line Strategy* in June 2003 and the expenditure assumed by the Rail Regulator in December 2003. We examined:

- how the Strategic Rail Authority/Department and Network Rail addressed the weaknesses in programme management before 2002 to achieve delivery to schedule (Part 1);
- whether costs have been brought under control (Part 2); and
- whether the programme is delivering its anticipated benefits (Part 3).

## 2 The 2003 Strategy set out three delivery phases and had five key objectives

<p><b>Phase 1</b></p> <p>27 September 2004</p> <p>Track upgraded to enable introduction of a new, and more frequent, timetable incorporating 125 mph tilting trains operating between London and Manchester, Birmingham and Crewe (Stage 1A).</p>	<p><b>Phase 2</b></p> <p>10 December 2005</p> <p>Track upgraded to enable journey time improvement from 110 mph to 125 mph from Preston to Glasgow under tilting train operation working to a new timetable, after the start of 125 mph operations between Crewe and Preston from 12 June 2005 (Stage 1B).</p>	<p><b>Phase 3</b></p> <p>31 December 2008</p> <p>Major renewals and enhancements to complete the upgrade and the increase in capacity to achieve overall 80 per cent more long distance passenger trains and 60-70 per cent more freight paths than before September 2004.</p>
---	--	--

### The Programme's five key objectives

- 1 Address the major backlog of maintenance and renewals on the route, ensuring value for money.
- 2 Provide an improved level of performance, safety and reliability, which will in turn help the railway regain lost market share and increase the role it can play in the national and regional economies.
- 3 Provide capacity for anticipated growth in passenger and freight business over the next 20-30 years, with substantially faster and more competitive journey times.
- 4 Establish sustainable and cost effective maintenance regimes.
- 5 Achieve these objectives on a 'working railway' while allowing for the continuation of key freight and passenger traffics during the rebuilding and enhancement work.

Source: National Audit Office review of the Strategic Rail Authority's June 2003 *West Coast Main Line Strategy*

6 The Department for Transport took over the Strategic Rail Authority's responsibilities for sponsoring major rail investment projects and letting and monitoring operator franchises from July 2005, following the abolition of the Strategic Rail Authority under the Railways Act 2005. In this report, we use the phrase Strategic Rail Authority/Department to signify sponsorship of the programme by the Authority to July 2005 and by the Department thereafter.

**6** We interviewed key personnel in the West Coast teams of the Strategic Rail Authority, Network Rail, the Department and the Office of Rail Regulation, and reviewed and analysed supporting documents and data. As case studies, we examined three completed and three current key projects within the programme (Appendix 3). We also interviewed train and freight operators affected by the programme and, jointly with Network Rail, commissioned QinetiQ to review the risk of obsolescence for the West Coast Main Line's signalling systems. A detailed explanation of our methods is at Appendix 2.

## Key findings and conclusions

**7** The Strategic Rail Authority and Network Rail, which replaced Railtrack in October 2002, turned around the programme by providing clear direction through an industry-supported Strategy, reducing technology risk through reliance on conventional signalling for most of the upgrade, and by tightening controls over changes to scope and over the management of the programme and contractors.

**8** The 2003 Strategy appropriately removed from the programme the European Rail Traffic Management System (ERTMS), new signalling technology, and the Network Management Centre, on which Railtrack had spent £350 million, to reduce these major risks to programme delivery. Continued ERTMS development, to address European Union requirements, became a separate national programme. But some new technologies were not removed from the programme and there have been implementation problems with two of these since 2002: axle counters and computer-based interlocking signalling. These have increased costs to Network Rail by over £35 million.

**9** Network Rail's control over costs has improved, particularly from 2004-05, but our analysis of its reported and forecast expenditure shows that final programme spend is likely to be £8.6 billion<sup>7</sup>, bringing overspending to around £300 million,<sup>8</sup> or 10 per cent, on the Regulator's £3 billion<sup>9</sup> allowance for the control period 2004-05 to 2008-09. As Network Rail's forecast expenditure on renewal work on the route carried out outside the programme (regional renewals) is £390 million under its funding allowance of £1,025 million, Network Rail is within its overall funding allowance for expenditure on the route. For the programme, it is on course to achieve

around 70 per cent of the £940 million cost efficiencies assumed by the Rail Regulator. achieve around 70 per cent of the £940 million cost efficiencies assumed by the Rail Regulator. Inefficiencies existed in the contracting arrangements to 2005 (inherited from Railtrack). High demand pushed up rates for signalling work. Booked possessions of the track for renewal work were not fully used. Eight per cent of programme expenditure by Railtrack/Network Rail has been on programme and project management, including annual payments to Bechtel Ltd, programme managers appointed by Railtrack, in return for which it has supplied its expertise, with around 140 staff in mid-2004. Between January 2002 and April 2006, Bechtel was paid £165 million (in 2005-06 prices).

**10** West Coast track renewal unit costs were 60 per cent above the network average in 2003 but fell from 2004. They remain 14 per cent higher than the network average, mainly because of the line's particular features such as the high intensity of traffic, the narrow spacing of the original track, and the high specification for the renewals work. Network Rail has measured unit costs within the programme for two activities, track renewals and switches and crossings, which comprise 25 per cent of annual expenditure. Its data are difficult to compare across projects and regions. Network Rail is working to increase the coverage of its unit costs and develop methods to normalise rates for distorting factors, such as the mix and difficulty of work.

**11** In 2002, the Strategic Rail Authority suspended the original terms of the franchise agreements with Virgin Rail Group to operate the West Coast and Cross Country routes – because of the Group's high costs (including the lease costs of the new Pendolino trains) and lower than anticipated revenues (resulting from the lasting effects of the disruption following the Hatfield derailment and from the failure to deliver the service improvements set out in the 1998 Passenger Upgrade Agreement, PUG 2). Thereafter, the Strategic Rail Authority has set subsidies on an annual basis, following detailed review of the operators' costs and revenues. As a result, between 2002-03 and 2005-06 the government paid Virgin West Coast £590 million more subsidy than planned under its original franchise agreement. This amount represents a payment needed to maintain train services and lies outside the £8.6 billion expected final cost of the programme.

<sup>7</sup> This £8.6 billion in 2005-06 prices is equivalent to the £8.1 billion expected final programme cost reported on page 19 of Network Rail's Business Plan 2006. The difference arises because Network Rail's total involves a mixture of current prices, for spend before 2005-06, and 2005-06 prices for spend from 2005-06.

<sup>8</sup> We calculated the 2004-05 to 2008-09 projected programme overspend after first deducting expenditure for work on the West Coast route, outside the programme, which was funded by third parties and the EU. In its Business Plan 2006, Network Rail projected it had a funding shortfall on the programme of £246 million, with some of the overspend already funded from Network Rail's other budgets.

<sup>9</sup> £2.8 billion in 2002-03 prices.



**12** Although approximately 80 per cent of the work in the programme has been renewals, under the terms of the Network Code, Network Rail has paid 95 per cent of financial compensation to train operators for track access lost to engineering work as compensation for enhancements work. This has been because in part the renewals have contributed to enhancements of the network. Compensation paid to train operators under the Network Code can be twice as much as the amounts paid for similar access for standard renewals. Two-thirds of access compensation has been paid to Virgin West Coast, under provisions in its track access contract and special arrangements agreed in its 1998 upgrade agreement with Railtrack. The Department has protected taxpayers' interests by taking these amounts into account when determining its annual subsidy payments, since 2002.

**13** The business case and appraisals of the West Coast Programme, carried out in 2003-04, were not conventional, as the programme was already underway, with substantial sunk and committed costs, which were excluded from the appraisals. The 2004 business case showed a positive benefit:cost ratio of 2.5:1, which hinged on delivery of non-financial benefits, chiefly passenger journey time savings and road decongestion. The project has delivered journey time improvements and other passenger benefits in line with, and in some cases beyond, its business case. The programme has reduced journey times in line with the 2003 Strategy, with train timetables since September 2004 providing for a 22 per cent reduction in the fastest journey time between Manchester and London, to 125 minutes. Punctuality and train reliability on the West Coast route have improved from 2005 and are close to the interim targets set in the 2003 Strategy. Passenger satisfaction with train services on the route has improved. The Department has not monitored whether the increase in passenger journeys has resulted in road decongestion benefits.

**14** In 2005-06, passenger journeys on Virgin West Coast grew by over 20 per cent, which was ahead of forecast, and in 2006 some parts of the route were operating at or near capacity. The remaining work on the programme, to 2009, will increase passenger train and freight capacity, but the consensus in the rail industry is that by around 2015 to 2020 the line will have insufficient capacity to sustain current levels of growth in passenger and freight traffic, should these growth levels continue.

**15** Network Rail expects the investment in the West Coast will reduce the additional maintenance costs which would normally result from increased use and higher train speeds on the line. There is a risk that some of the signalling equipment on the upgraded route could become obsolete before its planned renewal date of 2026. Given the level of investment in signalling, a one year shortfall in the average expected life of equipment would cost Network Rail some £12 million. Network Rail recognised the risk from early obsolescence of its signalling equipment and we jointly commissioned the consultants QinetiQ to review Network Rail's processes for managing obsolescence. QinetiQ confirmed that Network Rail's lack of formal management of the risk of obsolescence left it at risk and found obsolescence issues needing to be addressed in relation to four of the seven systems it reviewed. Network Rail does not have the cost information required to estimate its overall exposure from this risk. It will need to meet the costs of obsolescence from its future maintenance and renewals budgets.

## Overall conclusion

**16** The Strategic Rail Authority's intervention from 2002 turned around the West Coast Programme. It worked with Network Rail and the industry to develop a deliverable Strategy and establish appropriate programme management. Network Rail improved the management of the projects and, so far, has delivered the Strategy outputs to schedule. The Strategy has delivered passenger benefits from a modernised track. But value for money for the programme in its entirety has not been maximised: there were substantial early abortive costs to Railtrack in the programme to 2002 and the need for additional franchise support for Virgin Rail Group from 2002, to keep train services running; Network Rail is likely to overspend its programme budget for 2004-05 to 2008-09 by around 10 per cent, although together with West Coast regional renewals it is within its funding allowance; and there remains uncertainty about the expected lifespan of some of the equipment on the upgraded line.

## Recommendations

- 17** For future major infrastructure projects it sponsors, the Department's business cases should model and appraise the costs and benefits for different options for the timing of delivery and fully consider the impact on franchises of delays in delivery of the project. The project and risk management plans should include a franchise management strategy and should address the pre-2002 key weaknesses in West Coast programme management we have identified in Part 1 (paragraphs 1.1–1.12, 2.4, and 3.2–3.4).
- 18** The Department and the Office of Rail Regulation should further develop standard definitions for costs for different stages and elements of transport projects, such as scoping/design, construction/delivery and programme/project management, so that cost information (for example on project management) can be collected and compared across transport projects (paragraphs 2.6–2.7 and 2.13).
- 19** The Office of Rail Regulation should ensure that Network Rail draws on the experience of contracting on this programme and wider lessons, for example from BAA Terminal 5<sup>10</sup> or the Highways Agency, in its contracting strategies for major projects, and that Network Rail publishes its general approach to contracting and, for major projects, the key elements of its contracting strategy (paragraphs 1.8, 2.8–2.10, Appendix 3 and Appendix 4).
- 20** New technology can bring significant benefits, but its development involves significant costs and risks. Where projects propose new technology or technology new to the UK at significant cost, the Department or Office of Rail Regulation should ensure that Network Rail draws up a supporting business case drawing on previous development and testing of the technology, and addressing costs, benefits, the challenges of technology transfer and risks, along with a supporting implementation and maintenance strategy (for example, covering training requirements for engineers) and submits these to all-industry challenge (paragraphs 1.10 and Appendix 5).
- 21** The Office of Rail Regulation should ensure that Network Rail develops the targets it sets, monitors and reports for its efficient use of possessions of the track for engineering work and that these include a target for the proportion of booked time effectively used (paragraph 2.11).
- 22** The Office of Rail Regulation should review the case for continuing with two separate possessions compensation regimes and how to make rates paid more predictable, transparent and more closely aligned to costs and losses borne by train operators, and to generate appropriate incentives (paragraphs 2.18–2.21) .
- 23** The Office of Rail Regulation should ensure that Network Rail progresses its plans and adopts best practice in obsolescence management. The approach should include establishing a company-wide strategy, addressing whole life costs in its investment appraisal/project business cases, improved recording of maintenance and renewals costs for its equipment and clarifying the responsibilities of its suppliers in its procurement and support contracts (paragraphs 2.26–2.31 and Appendix 6).

<sup>10</sup> *Ministry of Defence: Using the contract to maximise the likelihood of successful project outcomes* (National Audit Office, HC 1047, Session 2005-06, Figure 9, page 9).