Route 18 West Coast Main Line

Route context

The West Coast Main Line (WCML) is the busiest mixed traffic route in the UK and is one of the busiest in Europe. It is central to the business of Virgin West Coast in providing recently enhanced fast long distance passenger services between London, the West Midlands, the North West, North Wales, Glasgow and Edinburgh. Beyond this, it plays a crucial role in commuter rail services in North West London and beyond, as well as linking with numerous other urban, interurban and rural rail routes. Forty per cent of all UK rail freight uses the WCML at some stage in its journey and key freight depots along the route are forecast to generate increasing traffic for at least the next 10 years. All the main UK freight operators run trains over the route.

The West Coast corridor is of strategic importance in both a European and a national context and has been designated as a priority Trans-European Network (TENS) project. It is the principal rail freight corridor linking the European mainland (via the Channel Tunnel) via London and South East England to the West Midlands, North West England and Scotland.

From September 2004 the route has seen a near-doubling of the frequency of fast passenger trains between London Euston, Stoke-on-Trent, Stockport and Manchester and an improvement in the fastest journey time Manchester to London from 2 hours 41 minutes to 2 hours 6 minutes, improved again in December 2005 to 2 hours 5 minutes. In the same month the journey time between Euston and Glasgow also improved to 4 hours 25 minutes as compared with 5 hours 6 minutes in the original timetable.

Following Railtrack's entry into Railway Administration in October 2001, the SRA led a joint working group to agree revised output objectives for the route. This led in turn to the publication of the SRA strategy for the WCML in June 2003, reflecting the consensus of a period of 18 months industry consultation on the mix of outputs required until 2020. Further consultation by the (then) Regulator as part of his track access charges review established the SRA strategy as constituting broadly the reasonable requirements of customers on the route.

High levels of renewals will be completed during 2006, with the focus then transferring to a number of site-specific improvements for completion during the remainder of the control period, enabling achievement of the planned capacity, performance and service improvements in Control Period 4. December 2005 saw the completion of the first phase of long distance speed and journey time improvements, with linespeed improvements between Rugby and Birmingham and acceleration to Glasgow.

Much of the planning and implementation for the major capacity schemes at Rugby and along the Trent Valley are now well under way for completion in December 2008. At this point, we will have achieved the near-total physical separation of express passenger from other flows south of Colwich Junction, with a near-continuous 4-track section of 200 kilometres between London and Crewe. We will also have provided competent electrified diversionary routes for the WCML south of Crewe, which by allowing Class 390s to run under their own power at weekends with only a small journey time penalty will assist both cost-effective engineering access and growth of the weekend leisure travel market.

Up to 7 January 2006 we have spent £6.6 billion on the West Coast modernisation programme, the first major work to the route for over 35 years; approximately 20 per cent of the works are enhancements/upgrades and 80 per cent renewals. An overall view of the scale of the work can be gained from the following:

- 2,293 kilometres of rails, sleepers and ballast renewed;
- 1,108 kilometres of tamping to provide for 125 mph running;
- 1,399 OHL wire runs installed;
- 9,643 OHL structures renewed/installed;
- 1,576 signalling locations (LOCs), relocatable equipment buildings (REBs) etc installed;
- 3,799 signalling units installed;
- 686 TASS balises installed;
- 2,704 warning devices installed (TOWS, TPWS, AWS)
- 1,481 kilometres of fibre optic cabling laid;
- 4,501 kilometres of signalling cable laid;
- 472 kilometres of cable routeing and troughing laid:
- 129 bridges renewed/installed (including resonance mitigation major repairs);
- 652 kilometres of fencing renewed/installed; and
- 176 GSM-R base transceiver stations installed.

The Regulator provided a fixed sum for the WCRM programme over Control Period 3, in addition to some renewals delivered outside the project. He accepted that requiring Network Rail to deliver to the precise schemes and timescales implied in the SRA's June 2003 document would not be consistent with acceptable levels of efficiency and economy. Thus we are maximising synergy between enhancements and renewals, exploiting renewals opportunities to deliver low risk enhancements to network functionality. Therefore, whilst for example the journey time improvements to Glasgow were clearly needed by December 2005 and the work therefore driven by this deadline, in the case of schemes required to cater for predicted long-term growth to 2020 we are as far as possible aligning the scheme dates with renewals opportunity and traffic need.

In summer 2005, the SRA issued a Route Utilisation Strategy for the West Midlands, which embraces Route 18 in the Trent Valley and, to a small extent, Stoke-on-Trent corridors. One aspect of the conclusions is that some recasting of local train services would bring benefits in terms of efficiency and capacity; the first stage of this has been taken forward in the December 2005 timetable.

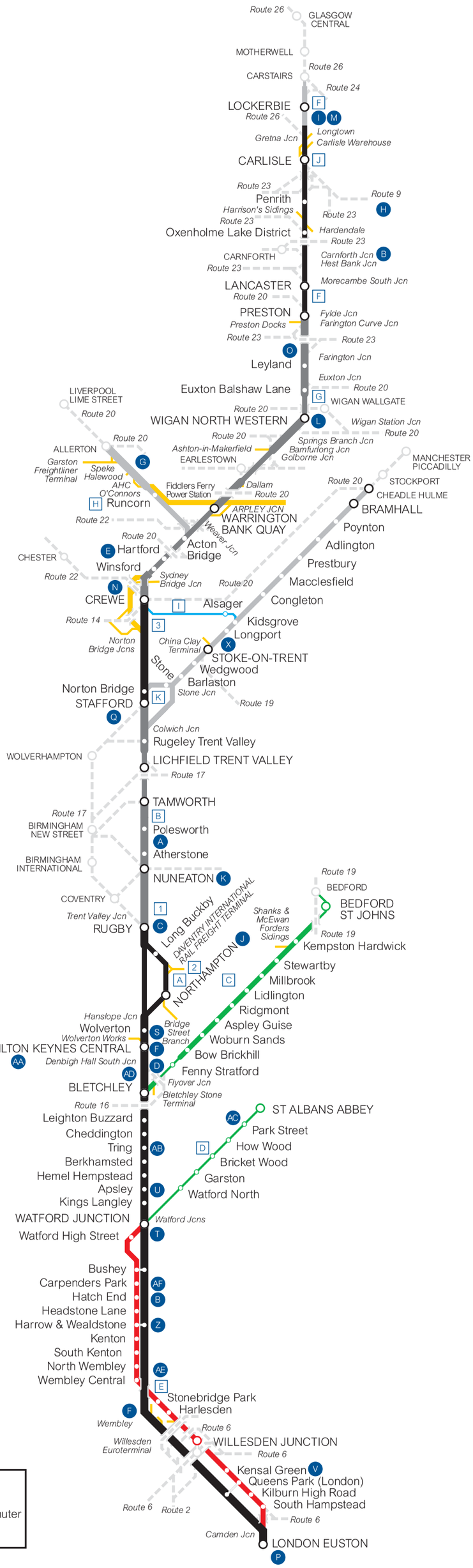
The Watford to St Albans Abbey line is a Community Rail pilot.

Today's route

The principal elements of the route are described below. The relevant Strategic Route Section is shown in brackets:

- the WCML from London Euston to Carstairs via Trent Valley and Crewe for approximately 600km (18.01 – 18.06) with diverging routes at Rugby for Birmingham, Colwich Junction/Norton Bridge to Cheadle Hulme (Manchester) (18.08) and at Weaver Junction to Allerton (Liverpool) (18.07);
- the Camden Junction to Watford Junction DC electric lines (18.11);
- the branch from Watford Junction to St Albans Abbey (18.10);
- the branch from Bletchley to Bedford excl. (18.12);
- the Kidsgrove to Crewe line (18.09); and
- various freight-only lines (18.13).

Route 18 West Coast Main Line



Passenger and freight demand

The West Midlands RUS indicated that passenger rail use had grown substantially in the study area over the period 1995-2004, with journeys up by 44 per cent compared with an average of 34 per cent nationally. Reasons for this are varied, but one aspect is clearly the various service improvements made during that time. So far as the WCML is concerned, long-term trends are less readily identified, due to the effects of some years of service disruption due to the implementation of WCRM and, prior to that, relatively uncompetitive long-distance journey times. However, Virgin West Coast have been reporting overall growth in the region of 25 per cent compared with the previous year as the benefits of improved speed and service quality become increasingly recognised, such that some peak-period journeys are close to capacity although considerable opportunities still exist off-peak.

London to Manchester growth has been particularly strong following the introduction of two trains per hour throughout the day. The rail proportion of the air/rail market on this flow has jumped from 40 to 58 per cent. Given the finite resource of train paths and rolling stock, it is expected that demand will be managed by increasingly sophisticated, demand led advance ticketing systems to help spread the load to times when seats are available, although by around 2010 it is likely the effective ceiling will have been reached.

The West Midlands RUS identified Stafford and Tamworth as stations in the 'top 20' in the study area, whilst at the other end of the scale six of the 20 least used stations in the West Midlands were identified on Route 18. These are Atherstone, Polesworth, Rugeley Trent Valley, Norton Bridge, Barlaston and Wedgwood – with Polesworth noted as averaging less than one passenger per train.

Demand for peak commuter services into London and general travel at the southern end of the line is expected to grow as employment in central London increases, coupled with the impact of the proposals announced in 2003 by the Office of the Deputy Prime Minister to increase substantially the number of homes in the Milton Keynes/Northampton area. Even taking into account the improvements made as part of WCRM, it is foreseeable that at some stage the capacity of the Network may limit the extent to which expanding demand can be accommodated. Continued economic growth can be expected to generate an increasing market for off-peak travel, especially to central London where rail competes strongly with other modes.

There is a growing demand for freight traffic throughout the route including potential high speed parcels and logistics services, and present predictions are that an upward trend can be expected to continue for the foreseeable future.

The timetable introduced in September 2004 (with service accelerations in June and December 2005) consumes all available capacity on the route until December 2008 when the major capacity enhancement schemes at Rugby and through the Trent Valley are completed. Meanwhile, growth will need to be accommodated very largely by maximising the effective use of existing train paths.

A fleet of new Class 350 trains has recently entered service jointly with Silverlink and Central Trains predominantly on semi-fast services. This has allowed an increase in the number of 8 car and 12 car formations in the Euston to Northampton corridor and an acceleration of services particularly in the West Midlands to Liverpool/Preston corridor. A limited regional service linking London and the intermediate stations in the Trent Valley as proposed in the SRA Strategy has been introduced and this is expected to increase in frequency in December 2008 when the capacity work is complete.

Current services

Virgin West Coast operates high speed long distance passenger services over the route from London Euston serving the West Midlands, Manchester, Liverpool, Holyhead, Preston, Glasgow and Edinburgh. Most services are operated by Class 390 electric tilting trains, with some diesel services to Holyhead provided by tilting Class 221s. Typical weekday frequency is two trains per hour between London and Birmingham and London and Manchester, with generally one per hour each to Liverpool and to Preston and a somewhat lower frequency further north.

Silverlink operates over the route between London, Milton Keynes and Northampton, including the branches to St Albans Abbey and Bedford, with Central Trains providing local/regional services on many other parts of the route between Northampton and Preston. Silverlink Metro operates on the DC lines to provide an 'all stations' service and LUL Bakerloo line services also utilise them between Queens Park and Harrow & Wealdstone. Southern provides a service linking Brighton and Gatwick Airport with a WCML interchange at Watford Junction.

Arriva Trains Wales, Central Trains, First ScotRail, Northern Rail and TransPennine Express operate an extensive range of services that call at various stations on the route. In many cases these provide vital connecting links between the long distance main line trains and numerous communities in the Midlands, North West England, Wales and Scotland. Virgin Cross Country long distance services radiate around the Network from Birmingham with a clock face timetable to the

major destinations, and using the WCML as a key component in their network to reach cities such as Manchester, Glasgow and Edinburgh. First ScotRail operates overnight sleeping car services between London and many places in Scotland.

EWS, Freightliner, Freightliner Heavy Haul, GB Railfreight and Direct Rail Services provide many freight services over the route – some over almost its entire length. Traffic carried is a mix of wagonload, bulk cargoes and intermodal, with both diesel and electric traction being used. A modest amount of Royal Mail traffic is moved by GB Railfreight using two trains each way between Willesden PRDC and Shieldmuir.

Current traffic

A particular characteristic of Route 18 is the complete cross-section of passenger and freight traffics using it, with the unique feature for the UK that the great majority of long distance passenger business is now conveyed by 125 mph tilting trains. As well as forming the major part of, or sometimes the entire, journey for many Virgin West Coast and Silverlink trains, it also forms a shorter element for a great diversity of other movements, such that in the region of 50 per cent of the entire UK rolling stock fleet passes over it at some time, or nearer 90 per cent in the case of the freight locomotive fleet.

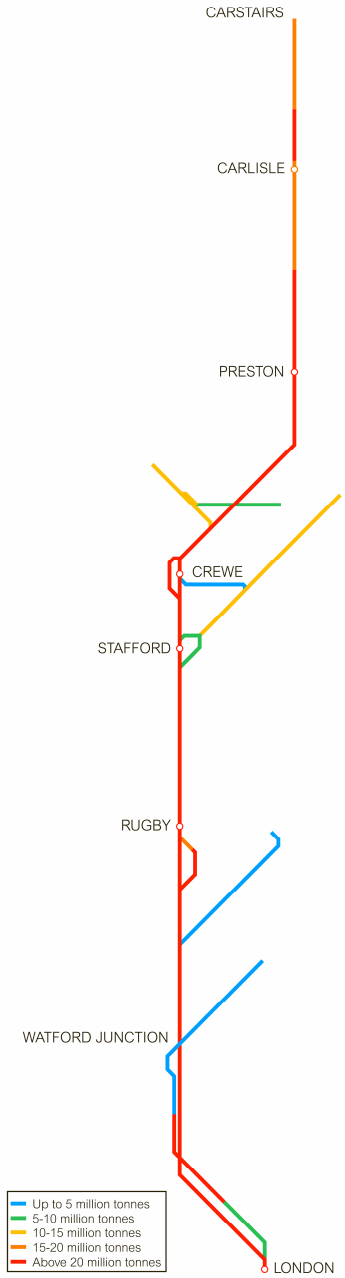
Current traffic volumes are summarised in Figure 1.

Figure 1 Current use

	Passenger	Freight	Total
Train km per year (millions)	35	10	45
Train tonne km per year (millions)	11,831	8,087	19,918

Figure 2 shows tonnage levels on the route.

Figure 2 Tonnage



Current infrastructure capability
The following maps set out the capability of the current network.

Figure 3 Linespeed

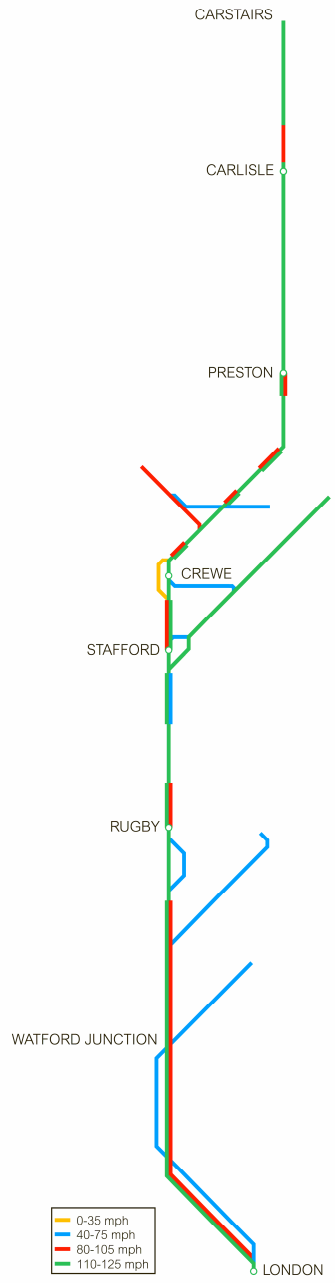


Figure 4 Electrification

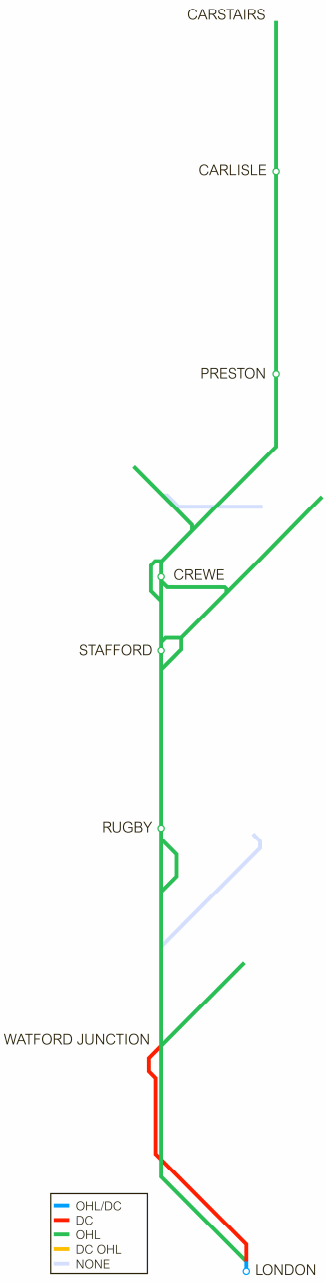


Figure 5 Route availability

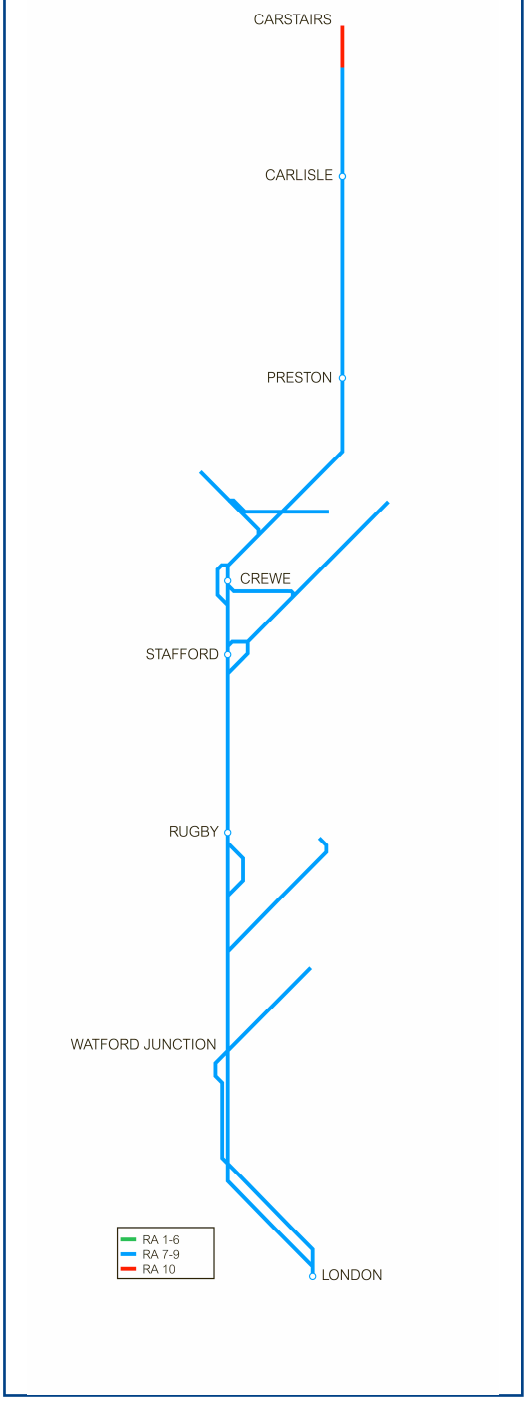
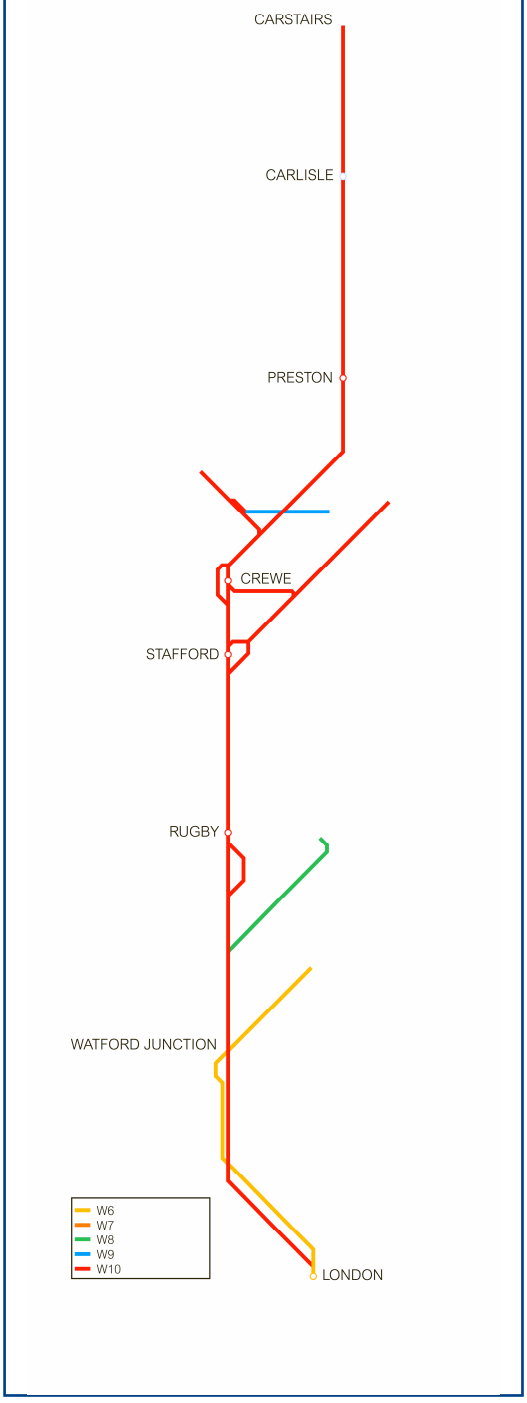


Figure 6 Gauge



Current capacity

The Functional Specification for WCRM is based around the assumption of an increase in long-distance passenger paths as the result of growth generated by new trains, increased frequency and improved journey times. Network Rail has agreed a trend growth line for freight to be assumed for December 2008 to 2016 as part of the Freight RUS.

There will be a need to balance carefully the demand for paths against the ongoing need for maintenance and renewals access driven by the increasingly heavy traffic on the route. Additionally, the four-tracking project means that the Trent Valley route will be closed almost every weekend until mid/late 2008, which limits the scope for additional paths at these times.

Continued expansion in London area commuting suggests the present 3 car operation of Euston to Watford Junction DC lines services may become insufficient, necessitating longer formations and infrastructure to support these. For the present, however, a scheme is in the early stages of development whereby the existing three Silverlink trains per hour between Harrow & Wealdstone and Watford Junction could be replaced by six LUL Bakerloo trains per hour. The feasibility study will consider also the possible synergy with other schemes such as Watford Interchange and Network Rail transformer renewals. We note that Transport for London will be letting the new train operating franchise for North London local services, including the DC lines, with the new operator taking over in November 2007. We look forward to working with TfL and the new franchisee to enhance the overall travel product on the DC lines in the years ahead.

As a Community Rail pilot route, consideration is being given to a passing loop on the Watford to St Albans line to allow improved service frequency.

Unlike some other routes, with the completion of many platform extensions to 12 car length between Euston and Bletchley, platform lengths on the WCML are not generally a major capacity issue. However, the up slow line platform at Bletchley will not be lengthened until completion of remodelling/resignalling targeted for 2008.

Further increases in capacity for inter city services may require longer trains and platform extensions, and an option could be to extend the Class 390 Pendolino sets in length, possibly up to 10 car or even up to 12 car with substantial infrastructure works. With the planned population growth in the area, the capacity at Milton Keynes Central is likely to become insufficient. This will be addressed by the proposed track remodelling targeted for completion December 2008, which is planned to provide an additional platform face and turnback facilities on the down fast line, convert the up slow bay platform into a loop and make provision for later construction of a short bay platform on the up slow, (the latter for implementation in the event of extension of the Bedford to Bletchley service to Milton Keynes). Growth in demand in the London – Birmingham and London – Manchester corridors is expected to be addressed in the December 2008 timetable by provision of paths for typically three trains per hour compared with two per hour at present.

The layout at Crewe is known to place limitations in respect of movements in a north east – south west direction such as the Manchester to Crewe and Cardiff services. Consideration is now being given to how this can be addressed as part of the resignalling under consideration for implementation from 2010 onwards.

More generally, it is becoming recognised that a very real limitation to growth in passenger travel on the WCML is likely to be the availability of car parking at all but the smallest stations. There are ongoing discussions between Network Rail, the train operators and local authorities to consider how improved facilities can be accommodated and funded. In a few cases, improvements to local bus/light rail may also offer opportunities.

Figure 7 Current train service level (peak trains per hour)

Route Section	Fast Lines	Slow Lines	DC Lines
Euston – Watford Junction	11	9	13
Milton Keynes – Rugby (south of Hanslope Junction)	11	6	n/a
Rugby – Stafford (south of Colwich Junction)	9	n/a	n/a
Stafford – Crewe (south of Norton Bridge)	7	3	n/a

Note: The DC lines figure covers the section Queens Park to Harrow & Wealdstone and includes both LUL and Silverlink services.

As to freight traffic, there is an identifiable sub-optimal use of capacity on the double track sections north of Preston due to the presence of slow moving diesel hauled coal trains amongst long-distance passenger trains formed of Class 221 and 390 rolling stock. There is a need for a strategic appraisal of traction policy and traffic mix, together with the routeing of freight trains. Indeed, there could be a wider question of economic policy whereby at present it is found most cost effective to supply imported coal to power stations in the Midlands/Yorkshire area via Scottish ports and a lengthy rail haul.

At the southern end of the WCML, where four or more tracks are available the question of fast and slow traffic mix is less acute, and there is some scope for increased freight capacity by using allocated paths that are not taken up on a daily basis.

Current performance

With many of the renewal and enhancement works now complete and the entire fleet of Virgin's new trains now in service, a robust base for long-term, sustained high standards of service reliability has been established and a generally encouraging trend is now starting to show through, with a forecast annual minutes' delay of 550,000 for 2005/06 – a 25 per cent betterment compared with the previous year. This is expected to improve further with delivery of many of the remaining works, especially at the northern end of the route, coupled with the benefits of introducing new trains of Classes 185 and 350 on regional services. Additionally, there is an action plan in hand to improve reliability of axle counters and trial initiatives are in place to reduce the impact of routine track patrolling under 'T2' rules, involving the use of Lookout Operated Warning System (LOWS) and physical TSRs. In the longer term, it is expected the day-to-day monitoring of track assets will increasingly be provided by remote measurement technology such as the New Measurement Train, reducing the need for maintainer access to the track during the day.

As well as continued improvement in asset reliability, a major focus for the future is the work necessary to devise more robust train timetables. Network Rail is working closely with all train operators to encourage the development of timetables and resource plans that are more robust in terms of recovery from incidents. The migration of the timetable in 2004 into one based on repeated pattern standard paths was an important milestone, but until completion of the capacity schemes in 2008/09 it consumes all available capability on the route, and even in 2008 with enhanced passenger and freight services there will be very limited spare capacity. In the meantime, there is an unavoidable ongoing short-term performance risk whilst fast and slow traffic must continue to sharing tracks and potentially causing congestion at junctions. As part of the 2008 timetable development, a review of the allowances (engineering and performance) and overall route management is being undertaken to optimise the delivery of sustainable journey time savings, whilst ensuring ongoing sustainable route maintenance.

One particular future challenge as overall asset performance and incident recovery continue to improve is that external events are assuming a higher proportion of delays. Recent events have included a series of related vandalism incidents around the West Midlands affecting signalling equipment accounting for a substantial proportion of the total delays for the year, although we are hopeful such impacts can be minimised by the 652 kilometres of new fencing installed under WCRM. It would also be unrealistic not to recognise the potential performance impact during 2006/07 of the WCRM projects at Rugby, Nuneaton and in the Trent Valley, for which we are predicting an impact of 28,000 minutes for the year, albeit offset by improvements elsewhere.

An integrated control centre (ICC) opened in Birmingham in Spring 2005. In addition to bringing operational and infrastructure controls together, two TOCs have moved their control to the same centre, providing opportunities for closer working and improved incident response. However, there are a number of TOCs and FOCs not represented at present in the ICC and it is hoped that as refranchising proceeds opportunity can be taken further to extend the scope of integrated control. Progressive centralisation of signal operations into Rugby SCC similarly is expected to yield benefits. With the many routes interfacing with the WCML and the possibility as a result of any disruption having a wide impact, it is clearly important to develop the widest practical control overview.

Figure 8 Current PPM MAA

TOC	MMA	As at period
Arriva Trains Wales	80.4%	10
Central Trains	76.8%	10
Northern Rail	86.1%	10
Silverlink	89.3%	10
Transpennine	77.4%	10
Virgin Cross Country	80.2%	10
Virgin West Coast	80.3%	10

Future requirements

Strategic direction

The overall strategy for the route is as defined in the former SRA's West Coast Main Line Strategy dated June 2003. This envisages that by completion of the WCRM programme in December 2008 an expansion of 80 per cent in long distance passenger paths would be achieved compared to the pre-WCRM situation, and capacity for 60-70 per cent more freight paths and 775 metre trains. These outputs are embodied in the WCRM Functional Specification.

Part of the additional capacity has already been taken up, predominantly on Mondays to Fridays when the impact of continuing WCRM works is least.

Looking to the future, it would be unrealistic not to recognise that growth in passenger usage may be considerably more than the 15-25 per cent on the major long-distance flows envisaged in the SRA document as a result of the WCRM improvements. With Virgin West Coast already reporting an overall figure in the region of 25 per cent, with more in the London – Manchester corridor, there is early evidence to suggest that the combination of new trains and faster journey times is already proving a more powerful stimulant to travel than might have been anticipated. Moreover, with the further journey time improvements made in December 2005 and anticipated for 2008 the trend may accelerate further.

Based on present assumptions, it is probable that passenger growth can be handled for the next few years by means of increased train lengths and increasingly advanced methods of yield/demand management. However, there must be a serious possibility that in 10-20 years' time even with these measures parts of the WCML will reach a point where saturation is reached at peak periods once all practical options on longer trains have been taken up.

As part of the community rail development strategy pilot work, Network Rail are working with partners to review the costs and feasibility of the installation of a passing loop at Bricket Wood on the Watford Junction to St Albans Abbey line. This would permit a 30 minute frequency on the line. The project is at a very early stage with no certainty that it will proceed, but it is being used to examine methods for cost effective delivery and to challenge standards where these are believed to be adding cost.

There is currently only one freight train per day each way over the Bicester Town to Claydon section, but the line is of importance in the light of the long-term aspiration by Local Authorities and other bodies for reopening of an East-West route linking Oxford, Bletchley, Bedford and Cambridge. Significant upgrading would be necessary, but the line of route is intact between Bicester and Bletchley and it would be physically possible to reopen the railway, obviously subject to a robust business case and funding. Against this background, the introduction of an Oxford – Bletchley – Milton Keynes service appears a reasonable possibility, but operation eastwards from Bedford to Cambridge looks far more challenging with effectively the need to construct new sections of railway and to cross the intensively utilised ECML. It is expected that any reinstated route could also offer useful opportunities for freight.

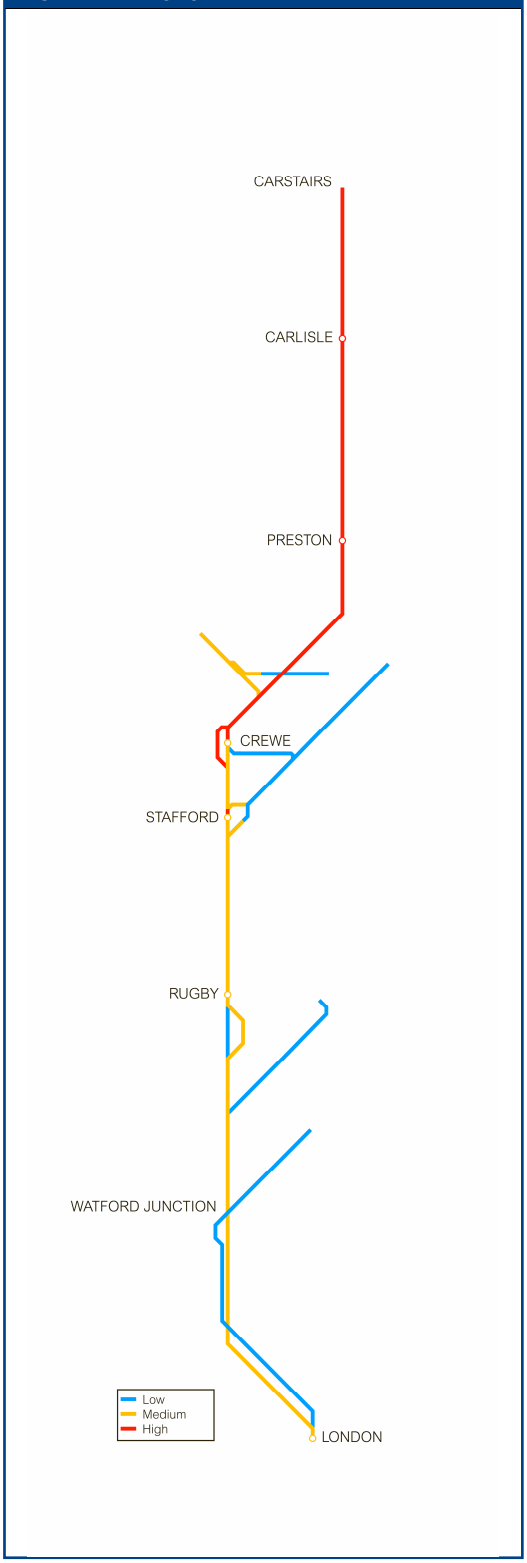
Future demand

Based around the situation described above, it is reasonable to assume that the level of demand, whilst challenging, can be handled on most of the route for the next 5-10 years, but beyond that a real question does arise as the long term strategy to be adopted. Clearly, one option will always be to constrain demand by pricing action, but it would be unrealistic not to recognise the wider societal costs in terms of road usage and congestion. The question then becomes one of the extent to which the existing route can be used still more productively, perhaps by use of ERTMS and additional infrastructure at emerging pinch-points, or whether within the next 10 years it would be better to start planning sections of completely new railway, which would be unconstrained by historic limitations in terms of maximum speed and other output characteristics.

We predict that in the years ahead the present layout at Stafford will increasingly represent a capacity limitation and a performance liability and discussions are at present ongoing with the DfT concerning a range of options for improvement early in the next Control Period.

Figure 9 indicates the forecast percentage changes in tonnage to 2015.

Figure 9 Tonnage growth



Future capability

Figure 10 Planned capability changes

Route section or location	Capability measure	Current value	Future value	Year
Bletchley (Bedford – Bletchley branch)	Run-round facility on flyover at Bletchley	Not available	Provided	2006
Bletchley	Up Slow platform length	8 car	12 car	2009/10
Rugby	Additional platforms	2 through 3 bays	5 through, 2 bays	2008
Milton Keynes Central	Additional platforms	4 through 1 bay	6 through	Target 2008
Euston – Northampton	Linespeed	90mph or below	100mph or below	2006
Trent Valley	Capacity	2 tracks Tamworth – Armitage	4 tracks	2008

Figure 11 Potential capability changes

Route section or location	Capability measure	Current value	Future value	Date
Alsager – Crewe	Number of tracks	Single Track	Double	2012

The possible reinstatement of double track between Alsager and Crewe has been identified as an aspiration and may be of particular value when Stafford and/or Crewe resignalling and remodelling take place. To date no development of such a scheme has been undertaken.

Fragile routes

Network Rail engineers have identified a set of 'Fragile routes' across the country where the addition of any further loco hauled traffic would have a significant impact on the residual life of track and/or structures.

The rail freight industry has recently provided to Network Rail a set of 10 year traffic forecasts as part of the Freight RUS, and we are presently assessing their implications. The key route sections within this route that has been identified as a fragile route and has clearly defined additional tonnage/ train numbers projected by the industry are: Crewe Independent lines and Ditton – Garston slow lines.

Published capability

As part of the ongoing work that Network Rail is committed to in relation to Infrastructure Capability, we have included "category 1" capability routes in our investment processes in order to resolve discrepancies between actual capability and published capability, i.e. for the following lines within this route:

- Garston Junction – Allerton East Junction;
- Rugby New Bilton Branch.

Future capacity

Figure 12 shows a planned headway change.

Figure 12 Planned headway changes

Route section	ROTP planning headway	Future headway
Colwich Junction to Stone	3 minutes	5 minutes (former headway not attainable)

Figure 13 Forecast reduction in delay minutes

Year	2006/07	2007/08	2008/09
% reduction in daily minutes	6%	11%	18%

Future performance

From late 2007 the Central Trains, Silverlink and Virgin Cross Country services are subject to refranchising and this will affect the PPM figures.

Figure 13 shows the forecast reduction in Network Rail-delay minutes compared with 2005/06.

Figure 14 shows the forecast PPM for the main TOCs running along the route.

Engineering access

Even after completion of the West Coast Route Modernisation programme, significant engineering access will be required to maintain and renew the network. In particular, parts of the route will not have been renewed and this will be done as part of our normal business. We will, however, seek to do this in a way which balances the need to improve efficiency with the need to avoid unnecessary disruption.

Our general policy is to maintain two-track access between Camden and Hanslope to allow work to be carried out on the other two tracks at times of least traffic, and between Hanslope and Rugby to utilise the alternative routes as between the main line and the Northampton loop.

Beyond Rugby, access can be maintained as far as possible using competent diversionary routes via Trent Valley or via Birmingham and via main line or via Stoke-on-Trent. However, the Nuneaton phase 2 remodelling simultaneously with the Trent Valley four-tracking and resignalling of the Coventry corridor will entail critical capacity constraints through the Midlands in 2005/06 and 2006/07. The provision of bi-directional signalling on the Trent Valley should reduce the need for diversions via Birmingham after 2008.

Further north – particularly north of Preston – the problem of engineering access is acute because there is no diversionary route that does not import heavy time penalties. First ScotRail sleeping car services and one time-critical freight service are effectively the only traffic operating on the West Coast route on a Saturday night/Sunday morning and as such this does offer some potential opportunities for maintenance and renewals to be carried out. In general maintenance access in this area will be limited to Sunday night and an extended block on Saturday nights.

We aim to coordinate work on the WCML with that on the ECML, so that as far as possible one through route is always available between England and Scotland.

Where new and additional tracks are being installed, the opportunity is taken wherever possible to provide improved spacing between tracks to allow typically two tracks to be taken out of use for maintenance whilst operations continue unimpeded on the other two. This had not been traditionally the case on multi-track sections, resulting in work on one track causing those on each side to be put out of use whilst it was carried out. Similarly, increased use of bi-directional signalling improves the ability to take individual tracks out of use whilst normal operations continue on adjacent lines. In designing renewed assets, we have aimed to include features which will reduce the need for service disruption by maintenance activities. For example, the use of heavier section UIC60 rail will provide a track section more resilient to increased loading thus increasing the periodicity of the maintenance and renewal cycles.

Reviews continue via the Sustainability Strategy Steering Group with all stakeholders to look again in an innovative way at the balance between weekday night and weekend maintenance/renewal activities, and the scope for imaginative use of new technology. The overall aim is to achieve the optimal balance between passenger and freight train operator needs and value and engineering costs.

A characteristic of the operation of 125 mph tilting trains is the need to maintain a more precisely fixed track alignment for ride quality and track life

Figure 14 Forecast PPM MAA

TOC	2006/07	2007/08	2008/09
Arriva Trains Wales	83.6%	84.5%	85.2%
Central Trains	83.8%	84.5%	84.5%
Northern Rail	86.7%	87.5%	88.3%
Silverlink	90.0%	90.5%	91.0%
Transpennine	88.7%	90.5%	91.4%
Virgin Cross Country	81.6%	83.5%	84.3%
Virgin West Coast	85.5%	87.8%	88.6%

reasons as well as for maintaining clearances. We are developing new maintenance techniques associated with this, including the use of the highly accurate EMSAT track monitoring equipment. A benefit of the new approach of maintaining an absolute track geometry is that it reduces the level of intrusion by day-to-day maintenance activity.

The completion in 2008 of the capacity schemes will mean that freight traffic can be largely segregated from the high speed passenger tracks, thus reducing the maintenance burden on the fast lines which have traditionally been required to accommodate a mixture of both heavy tonnages and high speeds.

We have carried out route clearance of the G&SW route (Gretna – Dumfries – Kilmarnock – Glasgow) for Class 390 trains to be diesel hauled in non-tilting mode. This is to allow diversion of Virgin West Coast services to minimise disruption when the WCML north of Gretna is blocked by engineering work. We have also carried out electrification of the Kidsgrove to Crewe route to improve its usefulness for engineering diversions, but a bottleneck remains the approx. 5km section of single track towards the Crewe end. With the prospect of resignalling/remodelling work at both Stafford and Crewe early in the next Control Period and the diversions this work will entail, consideration may need to be given to reinstatement of double track throughout.

Land

The WCRM programme has required extensive land acquisition across the whole route, to accommodate equipment such as telecommunications and power supply, and to provide new lineside access points and temporary work sites. In most cases for single small projects the land has been acquired by agreement with the landowner.

For the larger and more complex projects – notably the Trent Valley 4-tracking and closure of road crossings – where significant land acquisition was required, two orders were made under the Transport & Works Act. Since the making of the orders in 2003 and 2004 all of the compulsory purchase orders have been served. In all some 360 separate parcels of land have been required, totalling some 140 hectares.

The purchase of land continues to support the WCRM programme, notably continuing requirements for the power supply upgrade project and for temporary worksites.

Opportunities and challenges

We anticipate that if trends emerging post-September 2004 timetable change are sustained, accommodating growth in peak period long distance passenger demand will become increasingly challenging. Given also the substantial population growth expected in the Milton Keynes/Northamptonshire area (15,000 more homes in Milton Keynes alone by 2016) considerable expansion in London area commuting, as well as increasing aspirations for intermediate stops in inter city services, will almost certainly need to be addressed.

The solution to passenger growth and future capacity requirements in our view lie in a number of areas:

- measures to spread the peak and smooth the high peak, described elsewhere in this route plan. However, we cannot be confident these alone will be enough to handle all forecast growth if the likely higher growth scenarios do prove to be the outcome;
- maximise train lengths to optimise use of the platform lengths already provided at almost all stations on the route with significant levels of demand;
- a continuing policy of incremental enhancements when opportunities become available to supplement the capacity benefits already achieved as part of WCRM. Examples would be when Crewe resignalling takes place, and again when other signalling in the northern part of the route becomes due for renewal; and
- in the longer term, analysis of enhancement options to ascertain whether construction of sections of new railway may be a more effective solution than attempts to gain further performance/capacity on a route originating well over a century ago.

Delivering future requirements

Summary

Following the general WCML route upgrade works carried out under the WCRM programme, the work shown below will shortly be delivered:

- Euston to Northampton Slow Lines Upgrades – June/December 2006
- Additional Linespeed Enhancement Works – December 2006

The thrust under the WCRM programme then changes to a series of major capacity-related schemes due to deliver at or around the time of the December 2008 timetable change:

- Nuneaton Phase 2 Remodelling
- Northampton Phase 2
- Crewe to Weaver Junction Remodelling
- Rugby station Remodelling
- Trent Valley 4-Tracking
- Auto Transformer and Power Supply Upgrade
- Bletchley and Milton Keynes Remodelling

The end result is the creation of 80 per cent more long distance passenger paths and 60-70 per cent trunk freight paths as compared with the pre-WCRM position, as specified in the former SRA's WCML Strategy of June 2003. For the December 2008 timetable the fastest journey time London to Glasgow is planned to be 4hr 15 min as compared with 4hr 25 min today (or 5hr 6min before September 2004).

Expenditure

Figure 15 shows the planned level of expenditure on renewals on this route over the next three years. The most significant individual renewal items are outlined in the individual asset sections, which follow. However, the precise timing and scope of renewals remains subject to review to enable us to meet our overall obligations as efficiently as possible in accordance consistent with the reasonable requirements of operators and the plans of other stakeholders. As noted in our Business Plan, we intend to conduct a review of the expected outturn cost of the West Coast Route Modernisation Programme to assess whether it would be prudent to provide an element of contingency.

Figure 15 Forecast expenditure

£m (05/06 prices)	2006/07	2007/08	2008/09
Renewals			
Track			
Plain line	82	53	48
S&C	78	104	59
Drainage	1	1	1
Track Total	161	157	108
Civils			
Underbridges	5	4	3
Overbridges	0	1	1
Bridgeguard 3	2	4	1
Footbridges	0	1	1
Earthworks	3	3	3
Tunnels	–	0	0
Culverts	–	0	–
Retaining walls	0	0	0
Major structures	1	–	–
Other	11	5	1
Civils Total	22	19	11
Signalling			
Resignalling	142	65	21
Minor works/other	5	9	11
Signalling Total	147	74	32

Electrification			
AC Systems			
HV switchgear	0	0	0
HV cables	–	0	0
Grid supply points	0	1	1
OHL re–wiring	0	–	–
OHL campaign changes/refurbishment	4	4	3
OHL structures	0	0	0
Other	83	108	8
DC Systems			
HV switchgear	0	2	0
HV cables	0	0	0
Transformers/rectifiers	1	1	0
Conductor rail	0	0	0
Other	0	0	0
Electrification Total	88	117	14
Telecoms			
Concentrators: large	–	0	1
DOO CCTV	0	–	–
CIS systems	1	1	1
Telecoms cables	6	3	0
Other	0	1	2
Telecoms Total	7	4	3
Plant and machinery			
Fixed plant	1	2	1
Signal supply point	0	0	0
Mobile plant/vehicles	5	4	1
Point heating	1	1	1
Plant Total	7	7	2
Operational property			
stations	10	15	17
Light maintenance depots	–	–	0
Lineside buildings	0	1	0
Operational property Total	10	15	17
Other Renewals			
Maintenance delivery unit depots	1	0	–
Other Renewals Total	1	0	–
Total Renewals	442	394	187

Enhancements (funded by)			
Network Rail			
West Coast Route Modernisation	89	70	13
Network Rail Total	89	70	13
Other Third Party			
Crewe Gateway	0	1	2
West Coast Route Modernisation – TENS Funding Enhancements	7	7	7
Other	1	1	0
Other Third Party Total	8	8	9
Total Enhancements	98	78	22

The planned volume of renewals is detailed in Figure 16

Figure 16 Forecast volumes

	2006/07	2007/08	2008/09
Track			
Rail (km)	108	158	69
Sleepers (km)	95	124	80
Ballast (km)	122	158	71
Switches & crossings (no)			
Complete renewal	58	80	98
Partial renewal/reballasting	23	5	5
Fencing (km)	0	2	0
Drainage (km)	2	2	2
Civils			
Underbridges (square metres)	2,304	4,131	100
Overbridges (square metres)	854	1,689	99
Footbridge (square metres)	112	350	0
Embankments (square metres)	2,120	6,130	950
Tunnels (square metres)	0	10	0
Culverts (square metres)	0	10	0
Retaining walls (square metres)	0	144	0
Major structures (square metres)	449	0	0
Signalling			
Resignalling (SEUs)	0	285	927
Electrification			
AC Systems			
HV switchgear (CBs)	0	0	2
HV cables (km)	718	234	3
Booster transformers (no)	23	218	10
Grid supply points (CBs)	27	23	3
OHL rewiring (tension length)	308	282	500
OHL spanwires (no)	15	14	4
OHL structures (no)	0	5	8
DC Systems			
HV switchgear (CBs)	0	20	0
HV cables (km)	0	0	5
Transformers/rectifiers (no)	3	4	0
Conductor rail (km)	1	3	3
Telecoms			
Concentrators: large (no)	0	0	2
CIS systems (stations)	2	1	1
Plant			
Signal supply point (no)	0	0	0
Point heating (point end)	88	57	47

It should be noted that in order to manage the deliverability of our Civils, Signalling & Electrification plans we have included an element of overplanning in our work banks. As a consequence the sum of our route plans exceeds our plan for the network as a whole. It is likely that a small proportion of the activities in these areas will slip to subsequent years.

Maintenance

Figure 17 shows the planned level of expenditure on maintenance on this route over the next three years.

Figure 17 Forecast expenditure

£m (05/06 prices)	2006/07	2007/08	2008/09
Maintenance	92	84	77

Infrastructure investment

Figure 18 Planned infrastructure investment

Project	Scope	Enhancement or output change	Main asset Type (s)	Third Party funding	GRIP Stage	Completion Year
Ⓐ Trent Valley Four Tracking (18.02)	Tamworth to Armitage	Widening to 4-tracks to improve capacity	Track	none	6	2008
Ⓑ AutoTransformer Power Supply Upgrade (18.01 – 18.09)	Line of route power supply upgrade	Improved line capacity and asset reliability	Electrification	none	6	2008
Ⓒ Rugby station Remodelling (18.01)	Complete renewal of station area, including additional platforms.	Creates greater capacity and improves line speeds in station area	Track/signalling	none	4	2008
Ⓓ Bletchley – Milton Keynes Remodelling (18.01)	Resignalling/ remodelling.	Provides additional capacity, including 6 reversible tracks through Milton Keynes Central.	Signalling	ODPM (part)	3	Target 2008
Ⓔ Crewe – Weaver Junction Remodelling (18.04)	Remodelling for improved flexibility	Improved operability and replacement of life expired assets	Track	none	3	2008
Ⓕ Euston – Northampton Linespeed Enhancements (18.01)	Slow Lines speed improvement	Provides 100 mph maximum speed	Track	none	6	2006
Ⓖ Weaver Junction – Liverpool Linespeed Enhancements (18.07)	Speed improvement	Higher speed for trains designated HST	Track	none	6	2006

Figure 18 Planned infrastructure investment

Project	Scope	Enhancement or output change	Main asset Type (s)	Third Party funding	GRIP Stage	Completion Year
H North of Preston Linespeed Enhancements (18.05)	Speed improvement	Increased 125 mph running	Track	none	6	2006
I Scotland Linespeed Enhancements (18.06)	Speed improvement	Increased 125 mph running	Track	none	6	2006
J Northampton Phase 1 (18.01)	Capacity/Performance	Improves operability of station layout, and provides 775 metre freight loop	Track	none	4	2006
J Northampton Phase 2 (18.01)	Transfers signalling control to new Rugby signalling centre	Improves co-ordination, performance, productivity	Signalling	none	3	2008
J Northampton Depot (18.01)	Connection to new EMU depot	Allows opening of new Siemens EMU depot for Silverlink fleet	Track	Siemens	6	2006
K Nuneaton Phase 2 (18.02)	Track/signalling remodelling	Improved functionality	Signalling	none	5	2008
L Wigan Remodelling (18.04)	Layout improvement	Improved flexibility/performance by separating Liverpool line from main line	Track/signalling	none	6	2006
M Mossband Junction (18.05)	S&C renewal	S&C renewals giving improved asset reliability	Track	none	3	2007
N Crewe station Roofs (18.04)	Renewal of life expired station canopies	Improved passenger environment and better maintainability	Structures	none	2	2009

Figure 18 Planned infrastructure investment

Project	Scope	Enhancement or output change	Main asset Type (s)	Third Party funding	GRIP Stage	Completion Year
O Signalling Renewals – NW (18.04, 18.05)	Signalling renewal	Improved asset reliability	Signalling	none	4	2006
P Euston (18.01)	Renew life-expired station electrical services	Maintains reliability and safety.	Electrical	none	1	2007
Q Stafford South (18.03)	S&C renewals	Improved asset reliability	Track	none	3	2007
Q Stafford Trent Valley (18.02)	S&C renewals	Improved asset reliability	Track	none	3	2007
R Various	Bridge reconstructions	Deliver Bridgeguard 3 or to maintain safety/performance	Structures	Highway Authority (if BG3)	2	2008
S Wolverton station (18.01)	New station building	Provides new ticket office and waiting area	Station	ODPM grant	1	2009
T Watford Interchange (18.01)	New access road and car parking, improved passenger facilities	Increased car parking to cater for growth	Station	Potential LTP grant	1	2010
U Apsley (18.01)	Reconstruct station platforms	Maintains safety and availability	Station	none	2	2009
Q Stafford (18.03)	Platform resurfacing	Maintains safety and availability	Station	none	2	
V Kensal Green (18.11)	Renew footbridge stairways	Maintains safety and availability	Station	none	3	

Figure 18 Planned infrastructure investment

Project	Scope	Enhancement or output change	Main asset Type (s)	Third Party funding	GRIP Stage	Completion Year
W Virgin Trains locations	National project to renew Virgin retail facilities to provide additional CIS	Improved communication and station environment	Telecoms	none	4	2007
I Lockerbie station	New DDA footbridge	Improved station accessibility	Civils	Dumfries and Galloway	2	2006/07

Figure 19 Infrastructure investment under consideration

Project	Scope	Enhancement or output change	Main asset Type (s)	Status
X Linespeed enhancement (18.08)	Stoke-on-Trent to Longport	Reduce journey time London – Manchester	Track	
Q Remodelling (18.03)	Stafford	Improve capacity/performance	Track/Signalling	Part of overall review with DfT etc.
N Remodelling/ Resignalling (18.03)	Crewe station and yards area	Improve capacity/performance and centralise control	Track/Signalling	Initial scoping discussions
Z Signalling Renewals (18.01)	Wembley – Watford	Improve asset reliability and centralise control	Signalling	
AA Platform copes renewals (18.01)	Milton Keynes Central	Maintain safety	station	
AB New ticket office etc (18.01)	Tring station	Improve passenger environment	Station	Possible LTP grant
AC New passing loop (18.10)	St Albans Abbey branch	Provide for improved service frequency	Track/Signalling	Possible LTP grant
N Station Gateway (18.03)	Crewe – new ticket office, entrance, car parking	Improve passenger environment and car parking	Station	Possible LTP grant
AD Station Improvements (18.01)	Bletchley station enhancements	Improve passenger environment and access	Station	LTP/ODPM/English Partnerships?

Figure 19 Infrastructure investment under consideration

Project	Scope	Enhancement or output change	Main asset Type (s)	Status
P Station redevelopment(18.01)	Combined commercial development and station improvements at London Euston	Improve passenger capacity, environment and access	Station	Property Development
AE Station and stadium access (18.01)	Wembley Central	Improved access	Station	
AF Extension of LUL Bakerloo Line service (18.11)	Harrow & Wealdstone	Increased frequency	Electrification/Signalling	TfL
C Provision of new freight loop (18.01)	Provision of Hillmorton loop, Rugby	Freight capacity	Track/Signalling	Possible NR Discretionary and/or freight contribution.

Non infrastructure developments

Figure 20 shows potential developments which do not involve changes to the infrastructure

Figure 20 Timetable development

Description	Key issues	Actions or options being developed	Benefits	Start date
Franchise re-mapping and re-specification	Re-mapping of Central, Silverlink and Cross Country franchises.	We await further details of the new franchises.		December 2007 & December 2008
Euston – Rugby	West Coast Strategy incorporates increase in Euston – West Midlands and Manchester services on route with an already very high capacity utilization	20 minute all day frequency Birmingham and Manchester – Euston	Increased inter-city service Euston – West Midlands and North West;	December 2008

Figure 20 Timetable development

Description	Key issues	Actions or options being developed	Benefits	Start date
Euston – Chester/North Wales	Expansion of frequency of through services	Potential being evaluated	Improved inter city service for Chester and North Wales coast	December 2008

Figure 21 Other projects

Description	Key issues	Actions or options being developed	Benefits	Start date	Description
Smartcard introduction	Revenue protection and flexible ticketing	TfL/ATOC to take forward	Revenue increase and potentially demand management improvements.		

Appendix

Figure 22 Strategic route section

SRS	SRS Name	ELR	Classification	Funding	Community Rail	Freight Gauge	RA	Speed	Electrification	Signalling Type	Signalling Headway	No of Tracks
18.01	Euston – Rugby	LEC1,	Primary	DfT	No	W9 & W10	8	125 EPS (75 to 120)	25 kv (both)	TCB	3 (4)	4
18.02	Trent Vallley	LEC2	Primary	DfT	No	W9 & W10	8	125 EPS (75 to 120)	25 kv	TCB	3 (5)	2 (4)
18.03	Stafford – Crewe	LEC3, LEC4, LEC5	Primary	DfT	No	W9 & W10	8	125 EPS (75 to 110)	25 kv	TCB	3 (5)	4
18.04	Crewe – Preston	CGJ1, CGJ2, CGJ3, CGJ4, CGJ5, CHW1, CHW2, WOA	Primary	DfT	No	W9 & W10	8	125 EPS (75 to 110)	25 kv	TCB	4	2 (4)
18.05	Preston – Border (nr Gretna Junction)	CGJ6, CGJ7, WCM1	Primary	DfT	No	W9 & W10 (W9)	8	125 EPS (75 to 120)	25 kv	TCB	4	2
18.06	Border (nr Gretna Junction) – Carstairs	WCM1	Primary	Transport Scotland	No	W9 & W10	10	125 EPS (100 to 120)	25 kv	TCB	4	2
18.07	Weaver Junction – Allerton	WJL1, WJL2, WJL3	Primary	DfT	No	W9 & W10	8	90 (75 to 80)	25 kv	TCB	3	2 (4)

Figure 22 Strategic route section

SRS	SRS Name	ELR	Classification	Funding	Community Rail	Freight Gauge	RA	Speed	Electrification	Signalling Type	Signalling Headway	No of Tracks
18.08	Norton Bridge and Colwich Junction – Cheadle Hume	1, CMD2, MCH, NBS	Primary	DfT	No	W12	8	125 EPS (75 to 110)	25 kv	TCB	3 (5)	2
18.09	Crewe – Kidsgrove	KCS1	Secondary	DfT	No	W9 & W10	8	70 (60)	25 kv	TCB OTW	6	1 (2)
18.10	Watford Junction – St Albans Abbey	WSA	Rural	DfT	Yes	W6	7	50 (20)	25 kv	OTW	37	1
18.11	Euston – Watford Junction (DC Lines)	LEC1, CWJ, HNR	London & SE	DfT	No	W6	8	45 (15 to 40)	750 dc (both)	TCB	4 (6) (3)	2
18.12	Bletchley – Bedford	BBM	Rural	DfT	Yes	W8	8	60	none	AB	4 to 13	2
18.13	Freight Lines	SDJ2, CGJ1,	Freight	DfT	No	various	8	various	25 kv (none)	TCB AB	various	2 (1)

Capacity and operational constraints

A	Northampton – Rugby section: retention of three aspect signalling limits diversionary route capacity resulting in high performance risk when service has to be diverted via Northampton loop
B	Trent Valley line: restrictions due to two-track section Tamworth – Rugby (addressed in 2008 although Brinklow to Attleborough will remain a constraint)
C	Bletchley – Bedford: short single line sections at each end of the route
D	St Albans Abbey branch: single line with no signalling only allows one train at a time on the section, limiting service frequency to 45 minutes
E	Harrow & Wealdstone – Queens Park: volume of traffic limits capacity on DC lines due to LUL and Silverlink shared working
F	Preston – Carstairs: mixed traffic on two-track lines and low performance trains over steep gradients such as Shap and Beattock summits severely limits capacity
G	Wigan – Euxton: a mix of speed and crossing movements in this section severely limits capacity through Wigan and Euxton Junction
H	Winsford – Weaver Junction: high usage of available capacity between Winsford and Weaver Junction where trains diverge to Liverpool
I	Crewe station: large number of crossing moves north and south of Crewe station and existing signalling infrastructure limits capacity
J	Carlisle: blanket 20 mph speed restriction and two-track section north of Carlisle station and existing signalling limit capacity
K	Stafford – Norton Bridge: flat crossings limit capacity and performance

Other issues on the route

1	Rugby: low speeds and capacity bottleneck between south and north (addressed in 2008)
2	Northampton: 20 mph speed restrictions. Route used by Virgin West Coast Trains during diversions. Operationally a two x two track railway (maximum 75 mph via Northampton)
3	Crewe – Basford West: Regional investment site