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## Route 13 Great Western Main Line



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### Section 1: Today's railway

#### Route context

The backbone of the Great Western Main Line (GWML) is the high-speed section from London Paddington through Swindon to Cardiff Central and to Bristol Temple Meads. Designated as Trans European Network (TEN) High Speed status this key element of the route provides fast interurban links between the English and Welsh capital cities and the west of England regional capital. Beyond Cardiff towards Swansea the lower-speed South Wales Main Line section is an integral extension of GWML. The full extent of this core part of the route is replicated by the M4, M32 and M48 motorways.

The route plays a crucial role in the core cross country intercity network, linking the South Coast, Thames Valley, West Country, South Wales and South Midlands with the Midlands, Greater Manchester, Yorkshire, the North East and Scotland.

As well as providing the express rail link to Heathrow Airport, the route also extends from Basingstoke to just north of Oxford via Reading and Didcot, which also forms part of the key freight route from the Southampton ports to the Midlands, North West and Scotland. The route also takes in the Cotswold line towards Worcester and the branch line to Bicester.

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From just south of Birmingham the route runs through Gloucestershire towards Bristol and Taunton where it links with Route 12: Reading to Penzance, forming the main artery from the north and Midlands to the far west of England. The route diverges at Gloucester where it skirts the banks of the River Severn towards South Wales and via the Stroud Valley towards Swindon for links to London and the South East. These elements of the route are replicated by and compete with the M5 motorway and the A48 and A417/419 trunk roads.

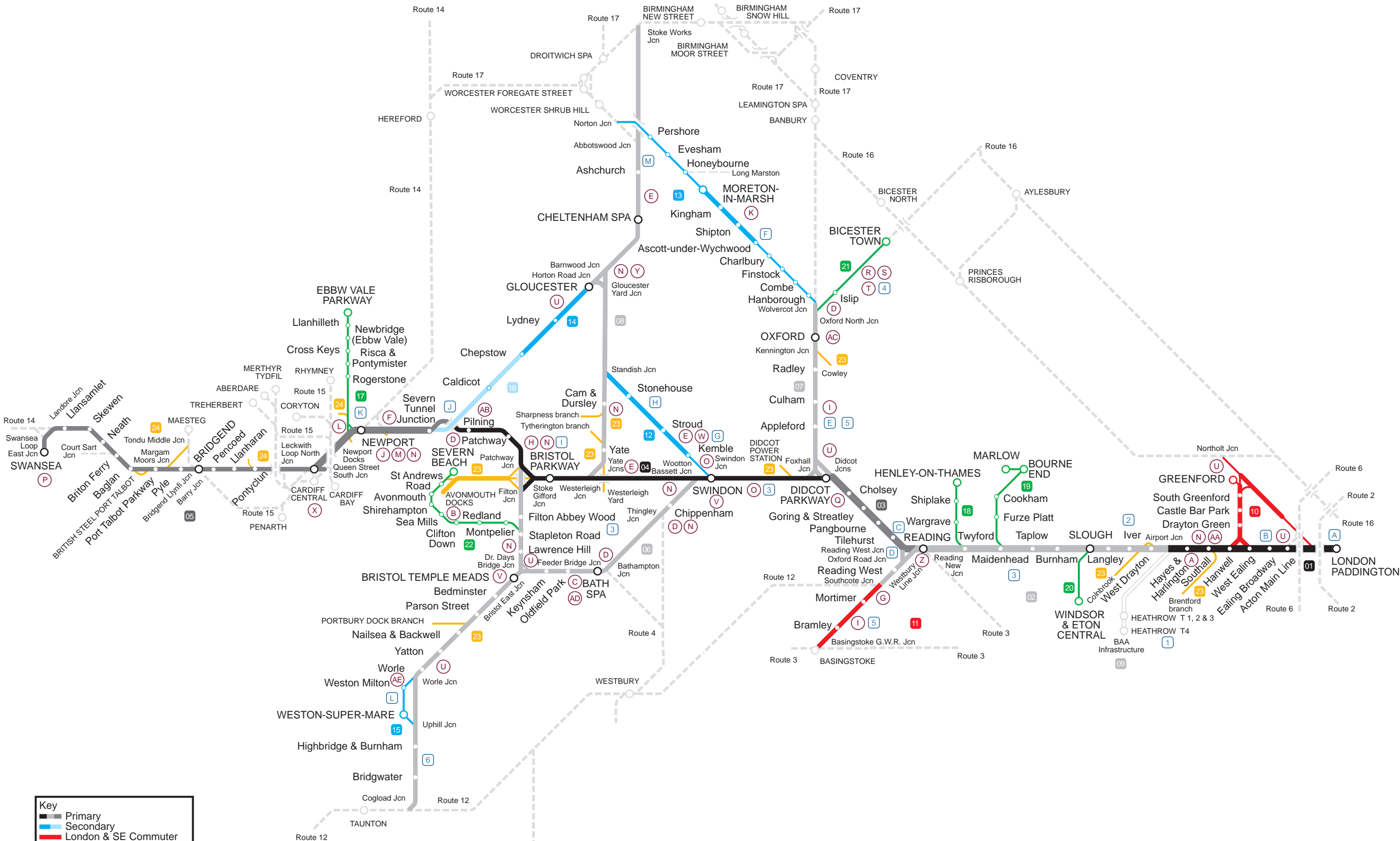
### Today's route

The route comprises five distinct sections, which are described below. The relevant Strategic Route Section is shown in brackets:

- GWML, which includes the route from Paddington to Cardiff via Reading, Swindon, Bristol Parkway and the Severn Tunnel, and on to Swansea, and from Swindon to Bristol Temple Meads via Bath (13.01, 13.02, 13.03, 13.04, 13.05 and part of 13.06)
- cross country routes radiating from Birmingham, which includes Oxford to Basingstoke via Didcot (Parkway station or the avoiding line) and Reading (station or west curve) and from south of Birmingham (Stoke Works Junction) to Taunton (Cogload Junction) via Cheltenham, Gloucester, Bristol Parkway and Bristol Temple Meads. (13.07, 13.08, 13.11 and part of 13.06)
- extensions from Old Oak Common West Junction to Northolt towards the Chiltern line (part of 13.10), from Oxford along the Cotswold line towards Worcester (13.13) and from Swindon to Severn Tunnel Junction via Gloucester (13.12, 13.14 and 13.16)
- branch lines to Greenford (part of 13.10), Heathrow Airport (13.09), Windsor (13.20), Bourne End and Marlow (13.19), Henley-on-Thames (13.18), Bicester (13.21) Severn Beach 13.22) and Ebbw Vale (13.17)
- freight only branches to Brentford, Colnbrook, Cowley, Sharpness Docks, Tytherington, Avonmouth terminals complex, Portbury Docks, and Uskmouth (13.23 and 13.24).

In describing and developing these routes we are aware that none exist in isolation and that constraints and opportunities here have implications for the rest of the national rail network and vice versa.

# Route 13 Great Western Main Line



**Key**

- Primary
- Secondary
- London & SE Commuter
- Rural
- Freight only

The line shading indicates strategic route sections which are numbered on the map

## Current passenger and freight demand

The Department for Transport's (DfT) Thames Valley and South West Regional Planning Assessments (RPA) for the railway identify the role of rail as supporting London's role as a world city and the local economies of other key urban centres by enabling rail commuting linking employers to sources of skilled labour; supporting the growth and integration of the London and South East, and the South West economies through provision of rail services linking London to the key centres, and contributing to the provision of surface access to Heathrow Airport.

The main markets for rail are identified as long and short distance commuting into London and to a lesser extent Reading and Bristol; interurban travel between main centres on the route, such as Bristol towards London and Birmingham, and access to airports. Significant passenger volumes also pass over the route from the South Coast and West Country to Birmingham and beyond

Between 2000 and 2006 rail passenger demand grew by 20 percent between the Bristol urban area and London, by nearly 60 percent between Bristol and Birmingham, and by 40 percent on other cross country interurban flows. Cross-Bristol demand grew by up to 30 percent.

Based on the December 2006 timetable, the RPAs also identify that the demand for seats on main line services to London during the morning peak exceeds provision by as much as 10 percent, from as far west as Swindon and rising to in excess of 45 percent from Reading. However, more than sufficient capacity is available to meet current demand on local services between Reading and Paddington.

Significant volumes of freight are carried over the route. Aggregates traffic dominates the route to the east of Reading with flows from the Mendip Hills and the east Midlands to London area terminals at Paddington, Acton, Brentford, Hayes, West Drayton, Thorney Mill, Colnbrook and others to the south and east of London.

The south coast port of Southampton generates significant volumes of container traffic for the West Midlands, the North and Scotland and to a lesser extent to south Wales. Avonmouth and Wentloog terminals also generate container movements.

The Port of Bristol's Avonmouth and Portbury terminals handle in the region of 6 million tonnes per year of imported coal destined for power stations at Didcot, Aberthaw and the West Midlands. South Wales, however, remains the

focus for metals traffic with steel production facilities at Llanwern and Port Talbot generating up to 15 trains each way per day.

The coal fired Uskmouth power station is mainly supplied locally from Newport docks, with some flows from Bristol.

Automotive manufacturing on the route is centred on Swindon (Honda) and Oxford Cowley (BMW). Train loads of export cars run via the Channel Tunnel and Purfleet Docks respectively. The import market is mainly based on the Port of Bristol's Portbury and Avonmouth terminals. Daily trains between Dagenham in east London and Bridgend cater for Ford traffic. A rail terminal at Swindon Hawksworth handles imported steel for car manufacture.

Up to five trains per week convey petroleum from Milford Haven to either Westerleigh or Theale. There is one oil train per day from Lindsey Oil Refinery (Immingham) to Colnbrook.

Train loads of containerised waste to landfill sites at Appleford and Calvert originate from Brentford, and Bristol and Bath respectively. Nuclear traffic moves between two locations on the GWML and the North West.

## Current services

The passenger service structure can be broken down into distinct groups, which integrate at varying locations throughout the route and reflect the different markets served.

First Great Western (FGW) operates interurban services which are evenly divided between Paddington and south Wales and Paddington and the greater Bristol area and to Oxford and the Cotswold line, Cheltenham and the far west of England.

Heathrow Express operates non-stop express services, and the jointly operated Heathrow Connect stopping services, between Paddington and Heathrow Airport.

FGW also operates inner suburban services to the east of Slough, outer suburban services to Oxford and the Cotswold line, Bedwyn and between Reading and Basingstoke, branch line services throughout the Thames Valley and joint operation with Heathrow Express of Heathrow Connect services to Heathrow Airport.

FGW operates a structured cross-Bristol local network incorporating services between Worcester/Cheltenham and Westbury/ Southampton/

**Figure 1** Current train service level (trains per hour)

Regional/Rural Services	Trains per hour each way
Slough – Windsor	3
Marlow – Bourne End – Maidenhead	2 peak / 1 off peak
Henley-on-Thames	2 peak / 1 off peak
Basingstoke – Reading	3 (includes CrossCountry services)
Bicester – Oxford	8 trains per day
Cheltenham Spa – Swindon	1
Cardiff – Taunton	1
Bristol – Weston-super-Mare	2 (includes some through Paddington services)
Bristol – Avonmouth	2
Cardiff – Swansea	3
Cardiff – Birmingham	1
Cardiff – Portsmouth	1
Bristol – Weymouth	7 trains per day

Weymouth, and between Cardiff and Taunton and between Bristol Parkway and Weston-super-Mare.

FGW's hourly semi-fast service between Cardiff and Portsmouth via Bristol and Bath, and the Severn Beach branch line service add to the cross-Bristol network. FGW also operates services between Swindon and Cheltenham and between Swindon and Westbury.

CrossCountry services from the north and Midlands provide direct links to the south coast via Oxford and Reading, and to the south west and south Wales via Cheltenham. The December 2008 timetable introduced a standard pattern in which the same origins and destinations are linked to each other each hour. This has many advantages but in the process some through journey opportunities have been lost, including regular direct trains between the Thames Valley and West Yorkshire and between the south coast and Yorkshire, the North and Scotland.

Arriva Trains Wales operates services over the route between Swansea, Cardiff and Cheltenham. London Midland operates services from the West Midlands to Gloucester via Worcester.

Chiltern Railways operate one service each day to and from Paddington via Park Royal.

DB Schenker, Direct Rail Services, Freightliner Heavy Haul Limited and Freightliner Limited operate freight services throughout the route.

Figure 1 shows the service frequencies between principal stations.

Figure 2 shows the current level of service to London from principal stations.

**Figure 2** Current train service level (trains per hour)

Originating traffic	Trains per hour to Paddington
Greenford	2 peak/2 off peak
Heathrow Airport	6 peak/6 off peak
Bourne End	1 peak/0 off peak
Henley-on-Thames	2 peak/0 off peak
Reading (local stoppers)	2 peak/2 off peak
Bedwyn	1 peak/1 off peak
Exeter St Davids	1 peak/0 off peak
Plymouth	1 peak/1 off peak (9 trains per day from Penzance)
Oxford	5 peak (2 Banbury)/4 off peak
Cotswold line	1 peak/1 off peak
Cheltenham Spa	1 peak/1 every 2 hours off peak
Bristol Temple Meads	2 peak/2 off peak
Cardiff Central (Including departures from Swansea)	2 peak/2 off peak
Swansea	2 peak/1 off peak

Figure 3 Tonnage



Figure 3 shows the total annual tonnage levels on the route.

Figure 4 summarises traffic volumes on the route.

Figure 4 Current use			
	Passenger	Freight	Total
Train km per year (millions)	36	5	42
Train tonne km per year (millions)	9,522	5,416	14,938

### Current infrastructure capability

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

Figure 5 Linespeed



Figure 6 Electrification

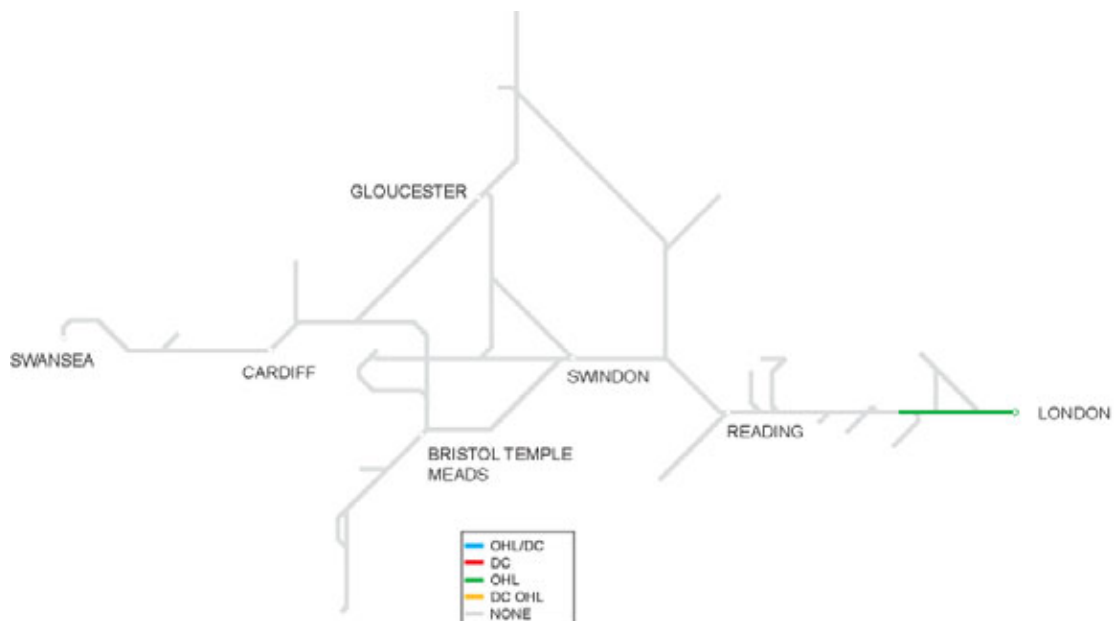


Figure 7 Route availability

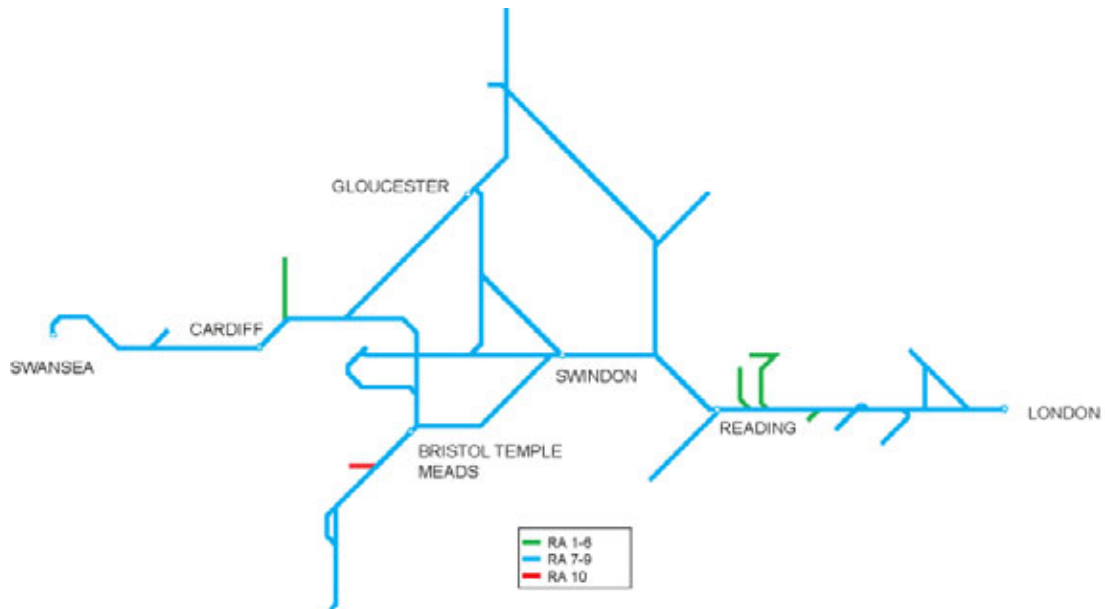
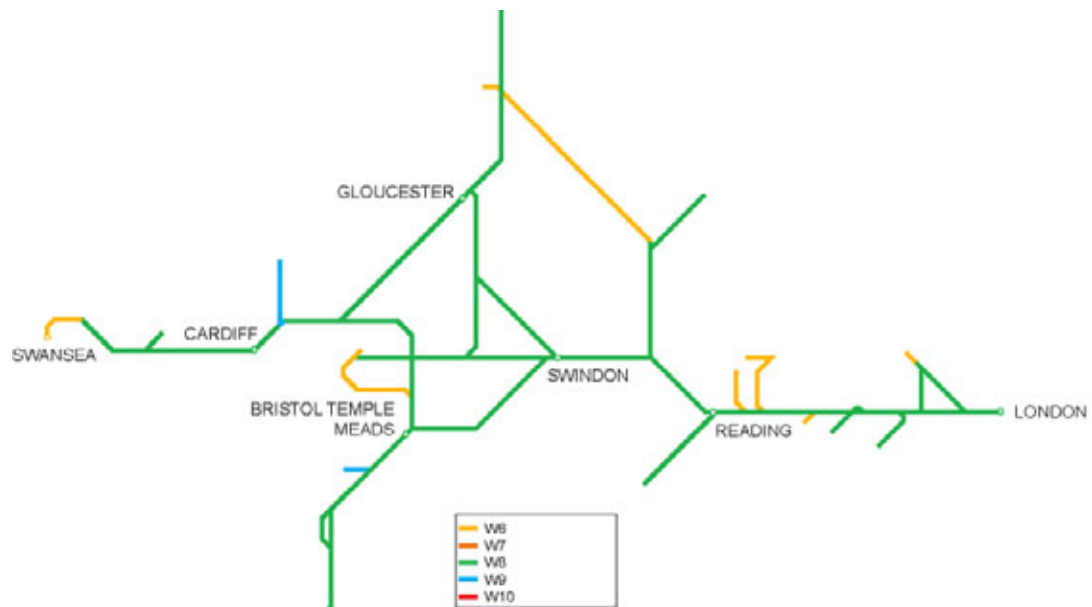


Figure 8 Gauge



**Figure 9** Current train service level (peak trains per hour)

Route Section	Main Lines	Relief Lines
Paddington – Heathrow Airport Junction	18	11
Heathrow Airport Junction – Reading	12	9
Reading – Didcot	10	4
Didcot – Oxford	9	–
Didcot – Swindon	8	–
Swindon – Gloucester	3	–
Gloucester – Severn Tunnel Junction	3	–
Swindon – Bristol Parkway	4	–
Bristol Parkway – Cardiff	8	5
Cardiff – Swansea	5	–
Swindon – Bristol Temple Meads	4	–
Stoke Works Junction – Bristol Temple Meads	10	–
Bristol Temple Meads – Taunton	6	–

### Current capacity

Figure 9 shows the current peak hour train service levels on the route.

Paddington station operates to near capacity throughout the day and to full capacity at peak times with accessibility for long interurban style trains restricted by a number of shorter platforms on the north side of the station and the dedication of two platforms for the electric Heathrow Express service. Platforms 3 to 12 are electrified.

Between Paddington and Reading the route is operating at near capacity for large parts of the day with a Capacity Utilisation Index (CUI) of about 80 percent. Whilst the Strategic Rail Authority's GWML RUS published in 2005 confirms that the number of train services that weave between the main and relief lines has significantly reduced in recent years, further segregation of the main and relief lines will be needed to deliver main line capacity improvements. The GWML RUS also reaffirms that operation of rolling stock of varying speed capabilities, and station calls on the main lines inhibit the provision of additional train paths to meet current and future demand. Relief line capacity is constrained by a number of factors including the close proximity of some stations, the variable stopping patterns of local passenger trains and the mix with freight trains. Nearly all freight through the inner London area of the route requires access to and from the Acton Yard complex via a single lead connection crossing the relief lines. This severely restricts the ability to provide additional paths to meet forecast growth.

The Reading station area is a critical 'crossroads' on the east – west and north – south axes for both passenger and freight flows and the lack of available platforms and through-capacity, allied with the aforementioned Paddington constraints,

prevent train service growth to meet current and future passenger demand. The area is further restricted at Reading West Junction where long north – south axis freight services have to cross the GWML at grade.

Between Didcot and Oxford the mix of non-stop passenger and freight services with local services calling at lightly used stations reduces the ability to maximise capacity (CUI is about 87 percent). The current layout at Oxford station necessitates empty stock movements to cross at the north end of the station between arrival and departure, which restricts flexibility of operation.

The intermittent four-tracking between Didcot and Swindon is insufficient to meet the forecast mix and volume of passenger and freight traffic over the route.

Inadequate signal spacing in the Bath to Bristol corridor impacts on the ability to improve the operation of the approaches to both Bristol Temple Meads and Bath Spa stations. Capacity in the cross-Bristol area can not be maximised due to the mix of non-stop passenger and freight services with local services that call at lightly used stations.

Capacity is constrained by a number of lengthy single line sections, notably on the Cotswold line and between Swindon and Kemble and the Weston-super-Mare loop. The Swindon to Gloucester line is also the main diversionary route to and from south Wales if the normal route via the Severn Tunnel is closed.

The variance in linespeeds on the route between Bant Green and Westerleigh Junction is due to age related condition of the permanent way and track curvature, which restricts the ability to improve

service provision on this key passenger and freight corridor.

With the increasing number of freight services emanating from the Avonmouth terminal complex the GWML's other 'crossroads', Bristol Parkway station to Westerleigh Junction, can become severely congested due to the limited number of platforms and track sharing with two distinct main line passenger flows. This also impacts on the route further east towards Didcot.

The seven minute headway through the 4 miles 628 yards long Severn Tunnel reduces the ability to enhance services to and from south Wales.

The lower speed of the relief line between the Severn Tunnel and Cardiff restricts capacity and the ability to reduce journey times

### Current performance

The GWML suffers from a number of performance issues. A prime cause of delay was the increasing number of temporary speed restrictions imposed throughout the route due to the poor condition of track, which is age related.

Due to the route's high capacity utilisation, reactionary delay on the route is endemic. The lack of spare capacity on the route, particularly in the Severn Tunnel/Bristol Parkway and Thames Valley areas, is also evident at times of perturbation making service recovery difficult and resulting in greatly extended journey times over restrictive diversionary routes.

Figure 10 shows the forecast 2008/09 PPM for the main TOCs running along the route.

Network Rail has developed a major three-phase investment programme to improve performance on the Western route.

Phase One includes the continuation of the Performance Improvement Programme, set up in 2005 to target poor-performing assets and implement 'quick win' remedial action, with over £29 million being spent on 135 selected schemes,

of which 127 have been delivered to date.

Phase Two includes the Temporary Speed Restriction (TSR) reduction strategy, which reduced the number of TSRs on the route to 19 as at 31 March 2009. We continue to increase handback speeds post engineering possessions at locations where there is a performance gain, for example, handback at 80mph delivers 65 percent reduction in delays compared to a 50mph TSR. We are continuing with a sustained High Output Track Renewal programme throughout the route. For 2009/10 it is proposed to report speed restrictions in two methods: planned speeds (those that are applied during the time we are enhancing and renewing the network) and unplanned speeds (condition-driven speeds). We will then be measured on the number of unplanned speeds, and for this the Western route will have a target of ten unplanned speeds by 31 March 2010.

Phase Three includes the now delivered Port Talbot (East) Area Signalling Renewal, additional platforms at Bristol Parkway and Newport and relief line speed increase between Reading and Paddington. Further enhancements throughout the Thames Valley, Worle Junction and between Severn Tunnel Junction and Newport are proposed, subject to a positive business case.

Following on from the significant performance gains made by Arriva Trains Wales in 2007/08 to surpass their PPM target of 90.1 percent, a higher PPM target of 92.5 percent for April 2009 is being surpassed, with a current forecast PPM MAA of 92.7 percent.

2008/09 has seen a significant improvement in the performance of First Great Western services, with the PPM MAA target of 86 percent consistently bettered and a daily PPM often in the 90 – 97 percent range.

CrossCountry's forecast PPM MAA is 89.8 percent, which is ahead of its target of 89.3 percent set for the end of 2008/09. This is in spite of the challenges posed by the capacity constraints and pinch-points encountered across the national rail network.

Figure 10 2008/09 PPM

TOC	Forecast MAA	As at period
First Great Western	90.2%	10
CrossCountry	89.8%	10
South West Trains	93.5%	10
Arriva Trains Wales	92.7%	10
London Midland	86.5%	10

## Section 2: Tomorrow's railway: requirements

### HLOS output requirements

**Figure 11** Total demand to be accommodated by Strategic Route

Routes	Annual passenger km (millions) forecast in 2008/09	Additional passenger km (millions) to be accommodated by 2013/14
GWML	4,327	637

**Figure 12** Peak hour arrivals to be accommodated by Strategic Route

Cities	Peak three hours			High- peak hours		
	Forecast demand in 2008/09	Extra demand to be met by 2013/14	Maximum average load factor at end CP4 (%)	Forecast demand in 2008/09	Extra demand to be met by 2013/14	Maximum average load factor at end CP4 (%)
Paddington	24,100	2,900	67	11,500	1,400	76
Cardiff	8,500	900	39	4,000	600	43
Bristol	4,600	600	49	2,000	300	46

Note: the load factor requirement in the HLOS applies as an average across 12 London stations

### Future demand in CP4

The Government's White Paper 'Delivering a Sustainable Railway' published in July 2007 forecasts significant growth on the route. Forecast demand for peak hour arrivals at Paddington (0800 – 0859) rising to 12,900 by the end of 2013/14 from 11,500 in 2008/09.

Access to London, including Heathrow Airport, within a two hour journey time is seen as extremely important within the business community and is achievable from most stations on the route.

The Government's White Paper 'The Future of Air Transport' published in 2003 set out a strategic framework for the development of airport capacity in the UK until 2033. Developments at Heathrow, such as the new Terminal 5, which opened in March 2008 and the modernising of other terminals has and will continue to have a major impact on the route. Airline passenger numbers at Heathrow are forecast to grow from 67 million per annum to 87 million by 2016. Currently 72,000 people are employed by 315 different organisations at the airport and an additional 11,000 new jobs are likely to be created. BAA has developed a number of initiatives to increase the use of public transport for commuting to the airport and reduce the high level of car use. This will impact on train service provision by Heathrow Express, Crossrail and the proposed Airtrack project.

There is strong demand from the business community for improved western rail access to the airport to reduce their substantial road transport costs.

Planned regeneration of commercial and residential property around the Paddington, Reading, Didcot, Oxford, Bicester, Bristol and Cardiff station areas is forecast to increase demand for commuting into these centres.

Road congestion in the major towns and cities on the route is forcing local authorities to seek alternative modes of transport to provide a solution, of which rail service enhancement is considered a key option.

With the Olympic Games being held in London in 2012 demand will manifest itself on two fronts. Firstly the demand for construction materials from the Mendips will see an increase in freight tonnage during the construction phase and secondly, passenger demand is likely to increase during and after the events. Whilst the main athletics events will take place in the London area and sailing events at Weymouth, rowing events will be centred at Dorney Lake, between Slough and Windsor.

Strong deep sea container growth is forecast to continue now that W10 gauge clearance between the Port of Southampton and the WCML (passing between Reading and Oxford) has been funded through the Transport Innovation Fund (TIF). Once delivered in 2011, the forecasts identify growth of six to eight trains per day in each direction to and from the Port by 2014/15.

Proposals for two new freight terminals on the Colnbrook branch are undergoing evaluation.

The construction of Crossrail will generate significant volumes of freight movements both for aggregate and cement traffic to site, and extracted materials from tunnelling from site.

### Future demand beyond CP4

Demand growth is expected to continue well into CP5, for both freight and passenger businesses. Beyond that, the Government's July 2007 White Paper challenged the industry to plan for a doubling of demand in the subsequent 30 years.

The implementation of Crossrail by 2017, to Maidenhead and Heathrow Airport, will provide through services to and from the City of London and will impact on travelling patterns along the route particularly at the Ealing Broadway and Paddington interchanges. The Thames Valley RPA concludes that with the additional seating capacity provided by Crossrail there would not be significant crowding on inner suburban services before 2026.

Forecast growth in passengers using Heathrow Airport has identified the need for further airport expansion leading to the proposal for a third runway. The challenge for rail will be how it can contribute to providing national links to key centres.

The DfT's Thames Valley RPA forecasts demand growth for morning peak arrivals into Reading is predicted to rise from 2006 levels by 15 percent by 2016, and 31 percent by 2026.

The Thames Valley and South West RPAs also indicate that inter urban growth on the Bristol to Paddington route is forecast to be in excess of seating capacity by as much as 18 percent, from as far west as Chippenham by 2026.

Major residential and commercial developments to the north and south of Bristol, at Yate/Stoke Gifford and Weston-super-Mare/Worle, along with substantial city centre development within walking distance of Bristol Temple Meads station have increased commuting by rail across the city.

The South West RPA forecasts that by 2016 demand will be in excess of existing seating capacity by 21 percent and 45 percent by 2026.

Demand for cross country travel is also on the increase. Between Bristol and Birmingham 36 percent growth in unconstrained demand is forecast by 2016 and 63 percent by 2026.

We are currently analysing forecast demand for the route in the Great Western Route Utilisation Strategy (RUS). Recommendations for interventions to address that demand will be published in The Draft for Consultation document in Spring 2009. This will be followed by a three month consultation period with the final document published in Autumn 2009.

### Section 3: Tomorrow's railway: strategy

Figure 13 summarises the key milestones during CP4 in delivering the proposed strategy for the route. Further explanation of the key service changes and infrastructure enhancements are set out in the following sections.

Figure 13 Summary of proposed strategy milestones			
Implementation date	Service enhancement	Infrastructure enhancement	Expected output change
2010/11	Introduction of additional vehicles for cross-Bristol peak services.		Additional seats for cross-Bristol services in three hour peak to meet forecast demand, with the load factor reduced to 49 percent
2010/11	Introduction of additional vehicles for Thames Valley peak services		Additional seats into Paddington in three hour peak period to meet forecast demand, with the load factor reduced to 67 percent
2010/11		Newport Area Signalling Renewal (NASR) Phase 1	Improved reliability – facilitates additional capacity and improved track layout throughout the Newport area with a new platform at Severn Tunnel Junction – signal box closures
2010/11		Cotswold line part redoubling	Improved reliability and additional capacity – enhanced train service
2012/13		Cardiff Area Signalling Renewal (CASR)	Improved reliability – facilitates additional capacity and improved capability throughout the area with additional platforms at Cardiff Central – signalling controls migrate to new South Wales Signalling Centre – signal box closures
2013/14		Barnt Green – Westerleigh Junction linespeed increase	Improved reliability and additional capacity and journey time savings between the South West and the Midlands
2013/14		Newport Area Signalling Renewal (NASR) Phase 2	Improved reliability – facilitates additional capacity and improved capability throughout the area – signalling controls migrate to new south Wales Signalling Centre – signal box closures
(Ongoing until March 2016)		Reading station area redevelopment with four additional platforms for GWML services, one new platform and platform extensions for 'Waterloo' line services and grade separation with major track reconfiguration to the east and west of the station. A new train maintenance depot will be constructed to the west of the station replacing the existing depot, which will be demolished to accommodate the new track layout.	Additional capacity, improved train service to meet forecast demand and improved reliability for both east –west and north – south passenger and freight services. Passive provision for both Crossrail and Airtrack is built into the project.
(Ongoing until March 2017)	Crossrail services replace suburban services between Maidenhead/ Heathrow and central London by 2017	Crossrail construction and implementation including platform extensions to cater for 200m electric trains at Acton Main Line, Ealing Broadway, West Ealing (including a new bay platform for Greenford services), Hanwell, Southall, Hayes & Harlington, West Drayton, Iver, Langley, Slough, Burnham, Taplow and Maidenhead.	Improved connectivity to central London. Station upgrades with platform extensions. Early delivery of the platform extensions would contribute to the HLOS capacity metric requirement for Paddington – possible cascade of displaced Turbo fleet to cross-Bristol service

**Figure 14** Capacity enhancements to meet HLOS peak capacity in CP4

Description	Additional vehicles involved	Station served	0700 – 0959 Capacity Impact	0800 – 0859 Capacity Impact
Strengthening of Thames Valley services	53	Paddington	4,100	1,600
Strengthening of cross-Bristol services	12	Bristol Temple Meads	100	100

Figure 15 shows how the HLOS load factor targets for locations on the route are met by the proposed strategy.

The measures will also allow the total additional passenger KM to be accommodated.

**Figure 15** Impact on HLOS peak capacity metric

London Terminals and regional Hubs	Peak three hours				High peak hours			
	Demand end CP4	Capacity start CP4	Capacity end CP4	Load factor end CP4	Demand end CP4	Capacity start CP4	Capacity end CP4	Load factor end CP4
Paddington	27,000	28,100	32,200	64%	12,900	11,100	12,700	74%
Other London termini*	534,900	716,000	849,700		269,400	312,900	368,900	
Cardiff	9,400	28,400	29,000	32%	4,600	11,500	11,700	39%
Bristol	31,000	14,600	14,700	40%	14,300	5,800	5,900	46%
Other urban areas		56700	63000			20,000	25,500	

## Strategic direction

The first GWML RUS, published by the Strategic Rail Authority in 2005, demonstrated that the Thames Valley and the greater Bristol areas are the key growth areas on the route. Although that RUS was developed without any infrastructure enhancement proposals, it is our judgement that infrastructure capacity enhancement will be required to meet the DfT's more recent general forecast of 103 percent unconstrained growth over the next 20 years. This includes the enhancement of Paddington station, additional track capacity between Paddington and Reading, the development of the Reading and Oxford station areas, additional track capacity between Didcot and Swindon and Didcot and Oxford, and some additional capacity at critical parts of the wider Bristol area.

The DfT's Thames Valley and South West RPAs, published in early 2007, assess rail traffic and infrastructure needs for the next twenty years. They identify that there will be significant crowding problems on interurban services between both Bristol and Cardiff and London; Crossrail will alleviate but not eliminate crowding on suburban services; demand will increase significantly into Reading by 2026 with load factors well above 100 percent on interurban and Oxford services; and that car parks throughout the route will be unable to accommodate growth.

The DfT and Welsh Assembly Government's (WAG) jointly commissioned Wales Rail Planning Assessment (WRPA) recognised growth in traffic levels in South Wales and endorsed the need for development of schemes to enhance capacity at Cardiff Central station to cater for longer term projected growth. The WRPA informed the Wales Route Utilisation Strategy (RUS) published in November 2008.

The South West Regional Assembly's draft revised Regional Spatial Strategy (RSS) covers the period up to 2026. This focuses on the development of a corridor management approach for corridors of both national and regional importance. Along these corridors, measures will be taken to improve the reliability and resilience of journey times, develop opportunities to facilitate modal shift, and support the growth of key cities and towns.

The Government's White Paper 'Delivering a Sustainable Railway' published in July 2007 proposes a hierarchy of solutions for each route to seek ways of increasing capacity:

- maximise the efficient use of existing rail assets by increasing service frequency
- lengthening existing train services
- enhance infrastructure to improve both frequency and capacity

- simplify service patterns
- make step-changes in infrastructure.

The Network Rail led Great Western Route Utilisation Strategy, for which baseline work commenced in spring 2008 with publication of the Draft for Consultation in spring 2009. The Great Western RUS will consider a period up to thirty years.

Further interventions on the GWML, such as IEP, Electrification, Crossrail and ERTMS, towards the end of the next regulatory control period CP4 (2009 – 2014) and in CP5 (2014 – 19) will have a major impact on the development of the route either by their construction or implementation.

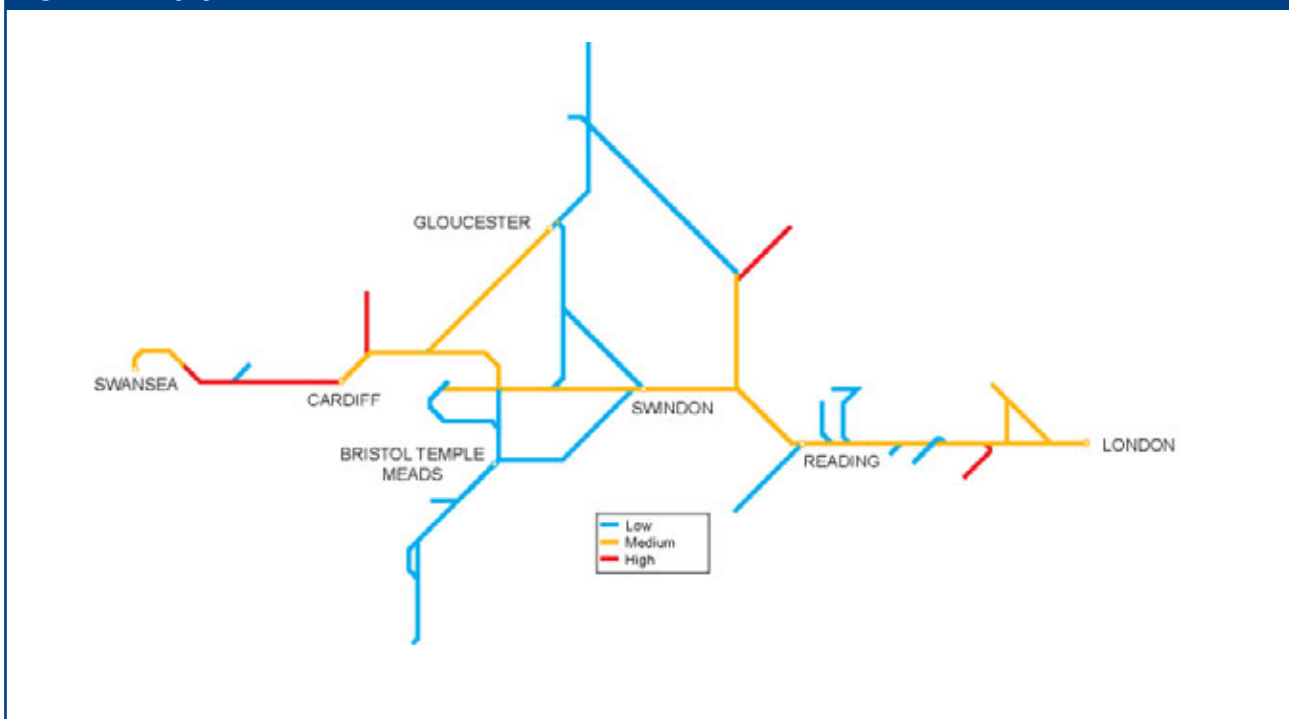
Introduction of the Intercity Express Programme (IEP), replacing the current fleet of High Speed Trains, from 2016 will bring a substantial increase in passenger carrying capacity with longer train formations. Infrastructure enhancement, such as platform extensions and realignment, will be required at certain locations to accommodate these much longer wheel-base vehicles. However, selective door operation is an option for certain key locations where platform extensions may not be viable, such as Bath Spa.

The construction and implementation of Crossrail by 2017 would provide a number of capacity benefits in its own right and synergies with our proposals for additional capacity in the Thames Valley are being explored. Early delivery of the platform extensions would contribute to the HLOS capacity metric requirement for Paddington.

The phased implementation of European Rail Traffic Management System (ERTMS) an in-cab system supported by the GSM-R radio network replaces the need for fixed lineside equipment. ERTMS will be a key enabler for the future railway by supporting capacity enhancement schemes, providing greater operational and maintenance flexibility, less-invasive renewals and enhancements, and cross-industry cost savings.

A number of options are being reviewed for Airtrack, the proposed southern rail link from Heathrow Airport, which may impact on the GWML at Reading.

Figure 16 Tonnage growth



We are also developing a detailed level crossings strategy for the route; changes currently programmed are as follows:

- closure of Bullo Pill near Grange Court (SWM2) and Charfield Hall Farm near Charfield (BGL2)
- upgrade of Marina and Brooksby near Marlow (MWB) from AOCL to ABCL in 2009.

### Future train service proposals

Figure 16 indicates the forecast percentage change in tonnage to 2018.

Heathrow Express aspires to operate additional services between Heathrow Airport (Terminal 4) and Paddington to meet the forecast demand resulting from the increased airport capacity following the opening of Terminal 5 at Heathrow, as well as the upgrading of other terminals at the airport.

The Greater Western franchise runs until 2016 and during its lifetime additional services will be required to meet forecast growth. First Great Western (FGW) is evaluating options for different HST formations to provide additional capacity and for longer train formations on key Thames Valley and Kennet Valley services to provide additional capacity. Additional vehicles will be required by FGW in order to operate these services.

Additional vehicles would also be required to support cross-Bristol services to meet forecast demand. This could include strengthening of Cardiff – Portsmouth

services to provide additional seating capacity into and out of Cardiff and across the Bristol – Bath corridor.

The Welsh Assembly Government (WAG) aspires to substantially reduce journey times between London and Swansea by reducing the station calling patterns on key business services. WAG is evaluating a proposal to operate train services between Ebbw Vale and Newport, and between Cardiff, Bridgend and Maesteg.

Network Rail's Freight RUS, published in March 2007, indicates that by 2014/15 there will be up to three additional aggregate trains per day on the route. It also estimates two additional metals trains per day and one additional petroleum train per day will be needed.

The Freight RUS also highlights the potential development at the Port of Bristol allied to a predicted 60 percent increase in import coal trains from the port for the electricity supply industry. Other potential freight developments include Bristol Cabot Park and Steventon.

### Future capability

We propose to improve the capability and performance of the core routes between London and Cardiff and Bristol, to facilitate the introduction of the High Speed Train replacement (IEP) around 2016. This will be achieved by implementing a number of smaller enhancements to complement the major enhancement of the Reading and Paddington station areas. We are exploring synergies with Crossrail

capacity enhancement proposals, including platform extensions, which would contribute to the delivery of the capacity metric at Paddington.

We are developing options to reduce journey times and improve performance between the key business centres of Bristol and Birmingham. This will be achieved by increasing the linespeed to a more uniform 100mph, where feasible, between Westerleigh Junction and Barnt Green. This would also reduce acceleration and braking requirements. We shall be exploiting the benefits from High Output equipment to deliver elements of the track improvements, which are planned between 2010 and 2012.

Network Rail is developing a national programme for station improvements and car park expansion, which includes a number of stations on the route. Working in conjunction with our customers we have short listed a number of stations on the route for modernisation as part of the Government's £150m funding initiative. These are Slough, Didcot Parkway, Swindon, Gloucester, Cheltenham Spa, Chippenham, Severn Tunnel Junction, Cardiff Central, Pontyclun, Swansea and Port Talbot Parkway.

The Department for Transport Access for All Programme also targets improvements to station access at a number of locations. The current programme includes Twyford, Chippenham and Gloucester.

Network Rail's Freight RUS sets out a proposed intermodal freight network cleared for the transportation of 9' 6" high ISO containers. The route between Basingstoke and Oxford and beyond is identified as the highest priority core W10 route and major infrastructure investment will be necessary to accommodate both the increased gauge and longer trains. This project is subject to a major Transport Innovation Funding (TIF) bid.

### Future capacity

We propose to increase the capacity of the GWML by linking existing goods and relief lines and upgrading them to passenger status, freeing up the main lines for uninterrupted high speed service provision.

At Paddington station the upgrade of Span 4 by 2010, will be followed by platform extensions and realignment to accommodate the introduction of a significantly increased level of service operated with longer Intercity Express Programme (IEP) trains from 2016. This and the introduction of Crossrail services from 2017 will have a major impact on the capacity and capability of the existing Paddington station layout and its approaches.

Crossrail will introduce an electrified high density suburban train service between Maidenhead and Heathrow in the west and Abbey Wood (South East London) and Shenfield (Essex) via a new central London tunnel between a new Paddington Low Level station and Liverpool Street station.

Crossrail will replace the majority of existing Thames Valley suburban diesel services and Paddington main line station will only be served by IEP long distance and outer suburban services, Heathrow Express and a small number of residual Reading – Paddington diesel services. Should Crossrail services be extended to Reading in the future, Paddington station would then only be used by IEP long distance and outer suburban services and Heathrow Express services.

We are evaluating options to create up to fourteen long platforms at Paddington and reconfigure the approaches to the station, which are necessary to accommodate the proposed service level increase for peak period main line services.

Heathrow Express is agreeable in principle to a transfer to alternative platforms to free up the central core of the station for long distance high speed service operation, provided accessibility and ticketing facilities are adequately provided.

It is proposed to bring forward work at West Ealing to create a dedicated bay platform for Greenford services. This will enable the Heathrow Connect to double their service frequency to four trains per hour.

At Reading we are redeveloping the whole of the station area in order to provide additional capacity and improve reliability. Phase 1 implementation, which mainly focuses on developing the station structures and remodelling the track layout starts in March 2009 and runs to March 2012. Phase 2 commences in April 2011 and continues to March 2016 and focuses mainly on the west end grade separation element as well as the Waterloo lines platform alterations. This project is government and third party funded. A new maintenance depot is being provided at Reading West, replacing the existing depots which are to be demolished to facilitate the revised layout.

At Oxford, upgrade of freight loops to passenger status, provision of an additional south facing bay platform, an enhanced Wolvercot Junction and the realignment of the Bicester line connection would provide additional capacity and performance benefits.

There are a number of proposals to enhance the route between Oxford and Bletchley (on Strategic Route 18 – West Coast Main Line). These include the East West Rail consortium proposal to enhance the route

for the introduction of Oxford – Milton Keynes services and Chiltern Railways' proposal to link the Chilterns route (Strategic Route 16) with the Oxford – Bicester branch, via a new chord line, for the introduction of Oxford – London Marylebone services via High Wycombe. A new station, Water Eaton Parkway, to the north of Oxford would also be provided. There is also a proposal for an eco-town at Weston Otmoor, to the north of Oxford, which includes the provision of a new station and enhanced transport links to Oxford and towards Bedford and London. We will ensure these schemes complement the future development of the route as a trunk route linking the South Coast and Thames Valley with the WCML for both long distance passenger and freight services.

We will redouble the single line sections between Evesham and Charlbury on the Cotswold line, which runs from Oxford to Worcester, to improve reliability and increase capacity. The scheme will also greatly reduce the importation and exportation of delays from and to the Thames Valley.

In order to improve reliability and capacity between Swindon and Bristol Temple Meads we plan to shorten the signal spacing through the Bath Spa station area.

Redoubling of the single line between Swindon and Kemble, which is also a key diversionary route for South Wales when the Severn Tunnel is closed, would provide additional capacity and performance improvement for south Cotswolds services and also passive provision for Swindon Borough Council's aspiration for a new station to the north of Swindon.

The reinstatement of the four track railway between Bristol Dr Days' Junction and Filton Abbey Wood would increase capacity by better separation of traffic flows between Bristol and South Wales and Bristol and the north/London via Bristol Parkway. This would also further enhance cross-Bristol capacity.

In addition to the north side third platform at Bristol Parkway which opened in May 2007, we propose a fourth platform on the south side. This, with the doubling of Worle Junction and the single line towards Weston Milton in 2011 (funded by NRDF) facilitates an enhanced standard pattern cross-Bristol service to encourage modal shift and alleviate chronic road

congestion across the city. CrossCountry services between the West Midlands and the West of England/South Wales will also benefit from this enhancement.

The area signalling renewal programme in South Wales provides opportunities for track layout improvements and strategic enhancements for the route with capacity and reliability benefits.

Facilitated by the Newport Area Signalling Renewal (NASR) we propose to upgrade Piling goods loops to passenger status with increased linespeeds and greater operational flexibility for routes through the Severn Tunnel. Relief line speed increases between the Severn Tunnel and Cardiff would improve reliability by creating additional capacity for both freight and local passenger services, freeing up the main lines for higher speed services. This also facilitates the development of a new station on the relief lines between Severn Tunnel Junction and Newport, as proposed in the Sewta rail strategy. We also propose to upgrade Severn Tunnel Junction station by reinstating the fourth platform and improving passenger facilities and car parking.

Facilitated by the Cardiff Area Signalling Renewal (CASR), the Cardiff Central station area will be enhanced with additional platform capacity and operational capability improvements to benefit both South Wales Main Line and South Wales Valleys traffic. This is also linked to the DfT funded Cardiff Queen Street – Barry corridor upgrade (Route 15).

Jointly funded by Network Rail and WAG Newport station is to be further developed to a high modern standard as part of Newport's regeneration programme.

Immediately north of the route, but significantly influencing capacity and performance, enhancement of the Down goods loop and relocation on the station at Bromsgrove will provide additional capacity and service reliability on the key Birmingham – Bristol/South Wales corridors.

### Future performance

Figure 17 sets out the planned PPM for each train operator.

**Figure 17** Forecast PPM MAA – CP4 plan

	2009/10	2010/11	2011/12	2012/13	2013/14
First Great Western	90.7%	91.3%	92.2%	92.7%	93.0%
Cross Country	90.0%	90.2%	90.6%	90.9%	91.3%
South West Trains	92.3%	92.5%	92.8%	93.1%	93.3%
Arriva Trains Wales	92.7%	92.9%	93.2%	93.4%	93.5%
London Midland	87.8%	89.1%	89.9%	90.5%	90.6%

Our strategy of developing core high speed routes will deliver improved performance for both passenger and freight customers.

In addition to continued improvement in asset reliability, a major focus of attention going forward is the work necessary to develop more robust train timetables and resource plans in terms of recovery from incidents.

Extreme weather is no longer confined to particular periods of the year. Flooding and high winds can strike at any time with an adverse effect on long distance services. A regional weather event can have a national impact. Vulnerable pieces of infrastructure and land such as Dawlish Sea Wall and the Teignmouth cliffs will continue to pose a performance risk although specific Network Rail operational plans minimise the impact of such incidents. Of particular concern are blanket emergency speed restrictions which can severely impact services which operate the length and breadth of the country as well as across Network Rail organisational boundaries.

The introduction of two new signalling control centres for South Wales (mid-2009) and the Thames Valley (late 2010) will deliver greater operational and performance management benefits for all our customers.

The steps we are taking to achieve these performance improvements are described in the Performance section of the Strategic Business Plan.

### **First Great Western (FGW)**

The performance of the FGW franchise is currently 90.2 percent PPM MAA. Both Network Rail and First Great Western are working together to continue the recent improvements made to the PPM performance across the whole franchise. The 2009/10 Joint Performance Plan targets a PPM of 90.7 percent by April 2010.

The key performance issues and opportunities for this route have been identified as:

- local initiatives for real time operations
- strategic works to improve the reliability of train detection
- further improvements through train planning through the introduction of the Integrated Train Planning System, and targeted improvements on key lines of route
- installing remote condition monitoring for points and track circuits at major locations on the route
- insulation of the power supply at Didcot
- strategic flood mitigation works
- enhanced fencing and vegetation works at locations on the route

- upgraded signalling at between Slough and Maidenhead to provide greater operational flexibility during times of disruption
- Oxford station area enhancements
- Bristol Parkway fourth platform
- Renewals work for 650v power supply in Bristol area
- improvements in fleet availability and reliability.

The route plan is being developed around these key points and currently suggests that performance on FGW by April 2014 will be around 93 percent. This includes an allowance for passenger/traffic growth and an increase in engineering work. This figure has been discussed with FGW and although FGW has no franchise commitment on PPM this figure is in line with stakeholder aspirations.

### **CrossCountry**

As a long distance operator CrossCountry faces significant performance challenges. Additional capacity in the form of HSTs as well as additional seating on Class 220/221 and Class 170s is being introduced in the period between May 2008 and summer 2009.

### **Performance Levels**

PPM MAA for the franchise at the end of period 10 2008/09 is 89.8 percent. Franchise plans developed during bidding based on TOC on Self improvements have a PPM figure of 91.3 percent at the end of the franchise. This was based on a given bid assumption of no improvement from Network Rail in CP4. It is therefore expected by CrossCountry that the further improvement sought in franchise and national PPM will come from Network Rail initiatives.

### **Significant lateness**

Network Rail nationally is developing plans for a 25 percent reduction in trains over 30 minutes late over CP4. These plans include continued work on flooding prevention and joint initiatives being developed between Network Rail and BTP to prevent theft and vandalism. These commitments are consistent with CrossCountry's desire to minimise the number of significantly late trains, a source of customer complaint, loss of business to rail and payments under the delay repayment regime. Although plans are currently in their early stages, any actions under this heading are likely to benefit the performance of the CrossCountry services given the geographic extent and long distance nature of the business.

The key performance issues and opportunities for CrossCountry on this route have been identified as:

- improved asset reliability through the use of maintenance benchmarking and the full installation and deployment of remote condition monitoring
- Efficient Engineering Access and possession planning Improvements
- full implementation of GSM-R
- enhanced management of the network
- eradication of intrusive T2 track patrols
- weather proofing the network through enhanced drainage and upgrade of climate control systems for signalling equipment
- enhanced usage of on train monitoring recording equipment
- reduction in the impact of trespass, vandalism and fatalities
- quicker incident response.

The route plan is being developed around these key points and currently suggests that performance for CrossCountry services by April 2014 will be around 91.3 percent, this includes an allowance for passenger/traffic growth and an increase in engineering work.

#### **Arriva Trains Wales (ATW)**

PPM MAA for the franchise at the end of period 10 2008/09 is 92.7 percent. The improved PPM is an outcome of Network Rail and Arriva Trains Wales working together to improve the PPM performance across the whole franchise, and with the Standard Pattern Timetable benefiting performance. Route Improvement Groups are focused on individual service groups to sustain PPM improvements.

The key performance issues and opportunities for this route have been identified as:

- construction works risk due to the resignalling works in South Wales
- reduction in the impact of trespass, vandalism and fatalities
- Autumn management.

The Network Rail route plan is being developed around these key points and currently suggests that performance on ATW by April 2014 will be around 93.5 percent. This includes an allowance for passenger/traffic growth and an increase in engineering work. ATW is willing to work closely with Network Rail to develop detailed year-by-year plans for delivery of a higher level of sustained performance.

#### **Network availability**

Engineering access on this route varies from heavily restricted by franchise commitments and Heathrow Express contract requirements on the mainline, to a reasonable match to requirements on the branches.

In the four track section between Didcot and London a permanent timetable solution has been agreed whereby access to two track sections is provided overnight for up to eight hours with standardised weave patterns between main and relief lines. Access at Airport Junction is reduced to five hours only and weekend access is essential for the maintenance of this heavily used junction. The remainder of the route relies upon a cyclical maintenance strategy, which involves weeknight diversions on some of the key sections.

The vast majority of renewals and enhancement work is undertaken at weekends and the track possession plan is constructed on a territory wide basis to ensure that on most weekends at least one route is available from London to Bristol and South Wales, and north – south coast cross country and freight services can continue to operate. This possession strategy also needs to intertwine with other key routes throughout the rest of the country, particularly Didcot North and Reading to Basingstoke.

The section from Didcot to Swindon requires extended journey times (predominantly through rail replacement bus services). For this reason, work is concentrated into non-summer periods when critical maintenance and renewals work takes place.

A key asset on the route is the Severn Tunnel in which the extreme and aggressive environment necessitates a specific cyclical renewal programme to maintain performance and safety. A six year cycle requires that a full renewal of the track and a detailed civil engineering inspection takes place.

This puts additional strain on the diversionary routes via Gloucester – these add at least one hour to the journey time. The Severn Tunnel is maintained on a cyclical midweek night frequency.

In 2009/10 there will be additional and continuous engineering work taking place in the Severn Tunnel area as part of the Newport Area Signalling Renewal (NASR). This will require diversions of freight and passenger services on either side of the tunnel as a feature of the timetable.

Works will commence in 2009 for the remodelling and rebuilding of Reading station area. This is likely to involve some weekend journey disruption and diversions during the construction period.

CrossCountry, like other operators has aspirations for greater access to the rail network. The nature of CrossCountry, Sunday carries the second highest volume of passengers (with Friday peak having the greatest volume). Therefore, some weekend line closures, extended journey times and bus

replacement services can impact on the revenue of the business. Possession overruns resulting in unplanned service changes are particularly damaging.

In conjunction with our customers, the Freight (FOC) and Train Operating Companies (TOC), we are developing the Seven Day Railway concept. This will enable both TOCs and FOCs to operate a more comprehensive timetable seven days a week. At weekends TOCs require to operate the full timetable on Saturdays with improved availability and journey times on Sundays and remove the need to substitute rail services with alternative means. The freight operators wish to maintain their existing level of operation on weekdays and improve the scope to operate services on Saturdays and Sundays. This route has been identified as a priority route for enhancing network availability.

### Long term opportunities and challenges

The Network Rail led cross-industry Great Western Route Utilisation Strategy (RUS) will consider a timeframe of up to thirty years mainly concentrating on CP5 and beyond. The baseline date for the RUS has been set at March 2014 (the end of CP4) and the baseline infrastructure consists of today's railway plus the committed projects programmed to be delivered in CP4 and CP5 (2014 – 2019), such as:

- Crossrail to Heathrow Airport and Maidenhead
- Intercity Express Programme
- Electrification
- Paddington station redevelopment
- Heathrow Airport expansion
- Reading station area redevelopment
- Cotswold Line redoubling
- Swindon – Kemble redoubling
- Bristol Parkway 4<sup>th</sup> platform
- Worle Junction redoubling
- Barnt Green – Westerleigh Junction linespeed increase.

The RUS has identified a number of 'gaps' for detailed analysis. Examples of which include the provision of additional capacity between Paddington and Slough, the extension of Crossrail beyond Maidenhead, western access and improved rail service provision for Heathrow Airport, expansion of the electrification programme, additional capacity for the Oxford area and the cross-Bristol rail network and a number of other capacity and performance proposals to meet forecast demand and growth.

We are also evaluating options for the development of the high speed line network.

Further W10 gauge provision from the Southampton ports to south Wales and Bristol and the potential for

an alternative route via Salisbury and Melksham to accommodate forecast growth in container traffic will be assessed.

Consolidation of the various schemes to enhance the route between Oxford and Bletchley would facilitate a major freight and passenger trunk route from the South Coast and Thames Valley to the West Coast Main Line. The DfT's Thames Valley Regional Planning Assessment states that forty minutes passenger journey time could be saved between Reading and Manchester via this route.

## Infrastructure investment in CP4

Figure 18 Infrastructure investment in CP4 (formerly Proposed enhancements in CP4)

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2009/10	Ⓐ Hayes & Harlington Phase II	Station enhancements	Improved station facilities	Multi-Funded (Part NRDF)	7
2009/10	Ⓑ Clifton Down turnback	Turnback signal	Capacity and performance improvement	Third Party	6
2009/10	Ⓒ Bath Spa	Buildings renewals at Bath Spa station	Renewal	Network Rail	6
2009/10	Ⓓ Track renewals	S&C renewals at Ableton Lane, Bathampton Junction, Oxford North Junction and Thingley Junction	Renewal	Network Rail	
2009/10	Ⓔ Earthworks renewals	Earthworks renewals at Chipping Sodbury, Cleeve, Kemble and Tredington	Renewal	Network Rail	
2009/10	Ⓕ Severn Tunnel Junction – Newport linespeeds	Relief line speed increases	Improved reliability and capacity and reduced journey times	Periodic Review 2008	3
2010/11	Ⓖ Reading Green Park station	New station	New station adjacent to the M4 motorway Junction 11 commercial area	Third Party	4
2010/11	Ⓗ Bristol Parkway 4 <sup>th</sup> platform	Additional platform face abutting existing down goods line, which will be converted to passenger status	Improved reliability and additional capacity – improved train service. Facilitates enhanced cross-Bristol service	Network Rail Discretionary Fund	4
2010/11	Ⓙ Southampton to West Coast freight upgrade	Works to allow W10 gauge trains to run from Southampton to the WCML	The line will be cleared to enable 9' 6" high containers to be conveyed on conventional wagons	Transport Innovation Fund	4
2010/11	Ⓚ Newport Area Signalling Renewal Phase 1 enhancement element	Signalling renewal of Severn Tunnel Junction – Newport – boundary of Cardiff PSB	Improved reliability, additional capacity and improved track layout throughout the Newport area with a new platform at Severn Tunnel Junction	Network Rail Renewals	6

**Figure 18** Infrastructure investment in CP4 (formerly Proposed enhancements in CP4)

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2010/11	Ⓚ Cotswold line redoubling	Redoubling of single line sections between Evesham and Moreton-in-Marsh and Ascott-under-Wychwood and Charlbury	Improved reliability and additional capacity – journey time improvements	Periodic Review 2008	4
2010/11	Ⓛ Gaer Junction	Remodelled junction	Improved reliability and additional capacity	Welsh Assembly Government and Network Rail	3
2010/11	Ⓜ Newport station	Station regeneration	Major station upgrade in time for the 2010 Ryder Cup Contribution to Newport regeneration	Welsh Assembly Government	6
2010/11	Ⓝ Track renewals	S&C renewals at Barnwood Junction, Berkley Road Junction, Lawrence Hill, Newport Usk Viaduct, Southall West Junction, Stoke Gifford Junction, Thingley Junction and Whitehill	Renewal	Network Rail	
2010/11	Ⓞ Earthworks renewals	Earthworks renewals at Bourton, Rodbourne and Uffington	Renewal	Network Rail	
2010/11	Ⓟ Swansea	Buildings renewals at Swansea station	Renewal	Network Rail	3
2010/11	Ⓠ Didcot Parkway	CCTV, CIS and PA renewals	Renewal	Network Rail	2
2011/12	Ⓡ East West Rail	Route upgrade	Additional capacity – facilitates train service between Oxford and Aylesbury and Milton Keynes	Third Party	2
2011/12	Ⓢ Oxford – Bicester line	Route upgrade including new Bicester chord line	Additional capacity – facilitates Oxford – Marylebone service via High Wycombe and new parkway station at Water Eaton north of Oxford	Third Party	1

**Figure 18** Infrastructure investment in CP4 (formerly Proposed enhancements in CP4)

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2011/12	Ⓣ Weston Otmoor eco-town	Environmentally sustainable new town facilitating Oxford – Bicester line upgrade	Additional capacity – facilitates local and Oxford – Marylebone service via High Wycombe and new parkway station at Weston Otmoor north of Oxford. Introduces tramtrain technology	Third Party	1
2011/12	Ⓤ Track renewals	S&C renewals at Acton East Junction, Didcot North Junction, Dr Days Junction, Grange Court, Greenford, Worle Junction and Yatton	Renewal	Network Rail	
2011/12	Ⓥ Telecoms renewal	CCTV, CIS and PA renewals at Bristol Temple Meads and Swindon	Renewal	Network Rail	
2012/13	Ⓦ Swindon – Kemble redoubling	Redoubling of the 12 miles long single line between Swindon and Kemble	Improved reliability and additional capacity – main South Wales diversionary route – facilitates new station north of Swindon	Third Party	3
2012/13	Ⓧ Cardiff Area Signalling Renewal enhancement element	Signalling renewal of Cardiff PSB area	Additional capacity and improved capability throughout the Cardiff area – facilitates additional platforms at Cardiff Central – signalling controls migrate to new South Wales Signalling Centre – signal box closures	Network Rail Renewals	3
2013/14	Ⓨ Westerleigh Junction – Barnt Green line upgrade	Options for linespeed increases up to 100mph	Improved reliability and additional capacity and journey time savings between Bristol and Birmingham	Periodic Review 2008	2
2013/14	Ⓩ Newport Area Signalling Renewal Phase 2 Enhancement element	Signalling renewal of Severn Tunnel Junction – Gloucester and Newport – Abergavenny	Additional capacity and improved track layout throughout the area – signalling controls migrate to new South Wales Signalling Centre – signal box closures	Network Rail Renewals	4

**Figure 18** Infrastructure investment in CP4 (formerly Proposed enhancements in CP4)

Implementation date	Project	Project description	Output change	Funding	GRIP stage
(Construction ongoing until March 2016)	Ⓩ Reading station area redevelopment	Reading station area redevelopment with four additional platforms for GWML services, one new platform and platform extensions for 'Waterloo' line services and grade separation with major track reconfiguration to the east and west of the station. A new train maintenance depot will be constructed to the west of the station replacing the existing depot, which will be demolished to accommodate new track layout.	Improved reliability – additional capacity for both east – west and north – south flows. Complements Southampton – West Coast freight upgrade	Periodic Review 2008 and Reading Borough Council	3
(Construction ongoing until March 2017)	Ⓜ Crossrail - A cross-London train service between Maidenhead and Heathrow in the west and Abbey Wood and Shenfield in the east via central London by 2017	GWML Relief Lines reconfiguration with platform extensions to cater for 200m electric trains at Acton Main Line, Ealing Broadway, West Ealing (including a new bay platform for Greenford services), Hanwell, Southall, Hayes & Harlington, West Drayton, Iver, Langley, Slough, Burnham, Taplow and Maidenhead.	Fast and frequent cross-London rail service with additional seating capacity. Crossrail services replace inner suburban services by 2017. Early delivery of the platform extensions would contribute to the HLOS capacity metric requirement for Paddington	Third Party	3

## NRDF candidate schemes in CP4

**Figure 19** Candidate NRDF schemes in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2009/10	(AB) Pilning Up & Down goods loops	Linespeed upgrade and conversion to passenger status	Improved reliability, additional capacity and improved operational capability for the Severn Tunnel	Network Rail Discretionary Fund	5
2009/10	(AC) Oxford Up & Down goods loops	Goods loops converted to passenger status	Additional capacity through the Oxford station area. Complements part redoubling of the Cotswold line and Southampton – West Coast freight upgrade – improved reliability	Network Rail Discretionary Fund	6
2010/11	(AD) Bath Spa capacity enhancement	Repositioning of signals	Improved reliability, additional capacity and reduced platform reoccupation times. Facilitates enhanced cross-Bristol service	Network Rail Discretionary Fund	4
2011/12	(AE) Worle Junction and single line to Weston Milton redoubling	Doubling of the single lead Worle Junction and single line towards Weston Milton	Improved reliability and additional capacity – improved train service. Facilitates improved cross-Bristol service	Network Rail Discretionary Fund	2

## Renewals activity

Figure 20 shows the estimated renewals costs and activity volumes.

The precise timing and scope of renewals will remain subject to review to enable us to meet our overall obligations as efficiently as possible consistent with the reasonable requirements of operators and other stakeholders.

It should be noted that in order to manage the deliverability of our Civils, Signalling and Electrification plans we have included an element of over planning 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 proportion of the activities in these areas will slip to subsequent years.

**Figure 20** Summary of estimated renewals costs and activity volumes

£m (2009/10 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	CP4 total
<b>Renewals</b>						
Track	111	47	74	84	66	382
Signalling	68	89	51	74	93	375
Civils	22	23	21	21	20	107
Operational property	44	25	13	11	6	99
Electrification	0	0	0	0	0	1
Telecoms	6	11	8	1	1	28
Plant and machinery	2	1	1	2	2	8
<b>Total</b>	<b>252</b>	<b>195</b>	<b>169</b>	<b>193</b>	<b>189</b>	<b>998</b>
<b>Renewals volumes</b>						
Track						
Rail (km)	63					
Sleeper (km)	40					
Ballast (km)	56					
S&C (equivalent units)	49					
Signalling						
SEUs (conventional)	182	403	4	212	162	963
SEUs (ERTMS)	0	0	0	0	478	478
Level crossings (no.)	0	0	4	4	7	15

## Appendix

Figure 21 Strategic route sections

Predominant aspect recorded (secondary aspects recorded in brackets). ELR is Engineers Line Reference and RA is Route Availability.												
SRS	SRS Name	ELR	Classification	Funding	Community Rail	Freight Gauge	RA	Speed	Electrification	Signalling Type	Signalling Headway (mins)	No of Tracks
13.01	Paddington – Airport Junction	MLN1	Primary	DfT	No	W8	8	125(90)	25kV	TCB	2.5	4
13.02	Airport Junction – Southcote Junction	MLN1, BKE	Primary	DfT	No	W8	8	125(75)	none	TCB	3	4
13.03	Reading – Didcot	MLN1	Primary	DfT	No	W8	8	125(100)	none	TCB	4	4
13.04	Didcot – Border (nr Pilning)	MLN1, SWB	Primary	DfT	No	W8	8	125	none	TCB	4	2
13.05	Border (nr Pilning) – Swansea	SWB, BSW, SWM2, SWA	Primary	DfT	No	W8, W6A	8	90(60)	none	TCB	7, 4	2
13.06	Wotton Bassett Junction – Cogload Junction (via Bristol Temple Meads) – Filton Junction	MLN1, BSW	Primary	DfT	No	W8	8	100	none	TCB	4	2
13.07	Didcot Junction – Wolvercot Junction	DEC, DCL	Primary	DfT	No	W8	8	90	none	TCB	4	2
13.08	Bristol – Birmingham Line	YAT, BGL2, CHL, BAG2	Primary	DfT	No	W8	8	100	none	TCB	4	2
13.09	Heathrow Airport	HAL	(owned by BAA)	BAA	No	W6A	8	80	25kV	TCB	2.5	2
13.10	Greenford Lines	WEL1, GEC, HAN	LSE	DfT	No	W8	8	40	none	TCB	6	2

**Figure 21 Strategic route sections**

Predominant aspect recorded (secondary aspects recorded in brackets). ELR is Engineers Line Reference and RA is Route Availability.

SRS	SRS Name	ELR	Classification	Funding	Community Rail	Freight Gauge	RA	Speed	Electrification	Signalling Type	Signalling Headway (mins)	No of Tracks
13.11	Southcote Junction – Basingstoke Junction	BKE	LSE	DfT	No	W8	8	90	none	TCB	4 – 4.5	2
13.12	Swindon Junction – Standish Junction	SWM1	Secondary	DfT	No	W8	8	90	none	TCB	(AB)	1 / 2
13.13	Cotswolds Line	OWW	Secondary	DfT	No	W6A	7	90	none	Mech.	(AB)	1 / 2
13.14	Border (Chepstow) – Gloucester	SWM2	Secondary	DfT	No	W8	8	90	none	TCB	4	2
13.15	Weston-super-Mare Loop	WSM	Secondary	DfT	No	W8	8	90	none	TCB	4	1
13.16	Severn Tunnel Junction – Border (Chepstow)	SWM2	Secondary	DfT	No	W8	8	90	none	TCB	4	2
13.17	Ebbw Vale Line	GAE, WVW	FOL	DfT	No	W8	8	50	none	OTW	(AB)	1
13.18	Henley-on-Thames Branch	HEN	Rural	DfT	No	W6A	6	50	none	OTW	(AB)	1
13.19	Marlow Branch	WBB, MWB	Rural	DfT	No	W6A	6	50	none	OTW	(AB)	1
13.20	Windsor and Eton Branch	WIN	Rural	DfT	No	W6A	6	50	none	OTW	(AB)	1
13.21	Bicester Town Branch	OXD	Rural	DfT	No	W8	7	40	none	OTW	(TB)	1
13.22	Avonmouth Branch	CNX, AMB	Rural	DfT	Yes	W6A	7	60	none	OTW	(AB)	1
13.23	Freight Lines (England)			DfT	No				none			

**Figure 21** Strategic route sections

Predominant aspect recorded (secondary aspects recorded in brackets). ELR is Engineers Line Reference and RA is Route Availability.

SRS	SRS Name	ELR	Classification	Funding	Community Rail	Freight Gauge	RA	Speed	Electrification	Signalling Type	Signalling Headway (mins)	No of Tracks
13.24	Freight Lines (Wales)			DfT	No				none			

#### Capacity and operational constraints

A	Paddington station: platform configuration and OHL
B	Acton West Junction: single lead junction
C	Reading station: flat junctions and restricted platform capacity
D	Reading West Curve and Junction: Short length curve and junction crossing main and relief lines at grade
E	Didcot – Oxford: two track section capacity limitations with lightly used stations
F	Oxford – Worcester: single track sections limit capacity and flexibility
G	Swindon – Kemble: 12 miles of single line limit capacity and flexibility
H	Kemble – Standish Junction: 14 minute headways limit capacity
I	Westerleigh Junction – Bristol Parkway: two track section on highly utilised converging route
J	Severn Tunnel: 7 minute headways limit capacity
K	Severn Tunnel Junction – Cardiff: variable relief line speeds restrict capacity
L	Weston-super-Mare loop: single line restricts capacity and flexibility
M	5 AHB level crossings north of Cheltenham restrict linespeed to 100 mph

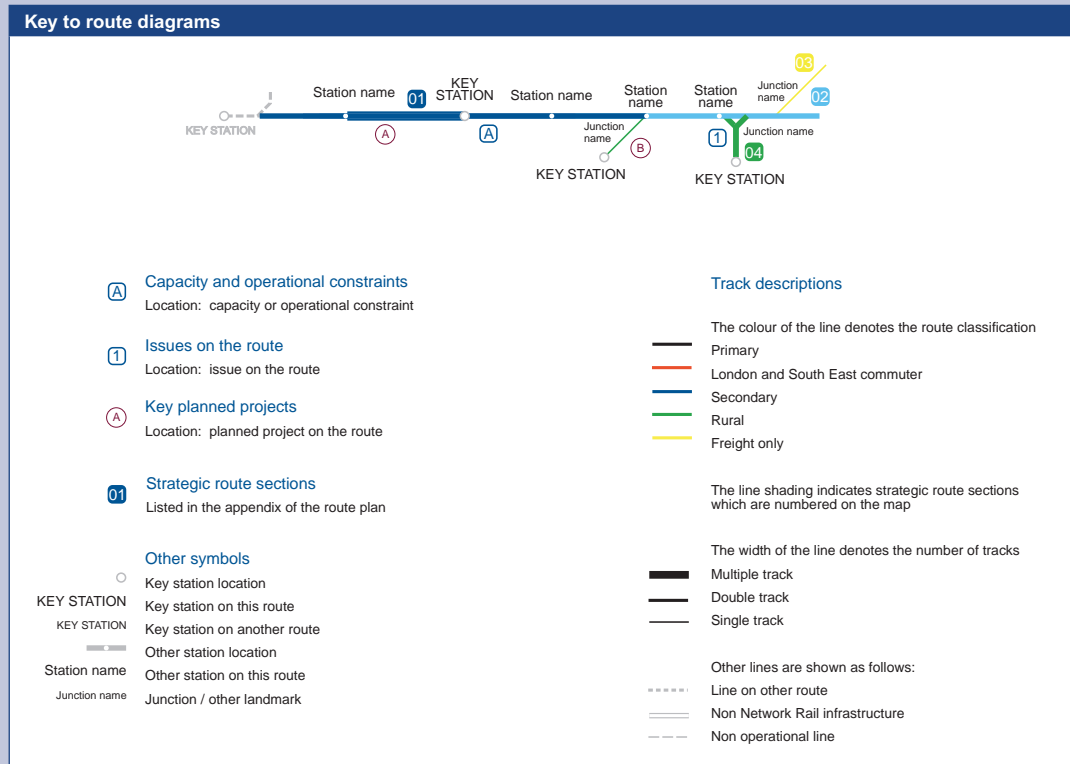
#### Other issues on the route

1	Heathrow terminal 6 and 3rd runway
2	Crossrail construction
3	Introduction of in-cab signalling on the GWML
4	East – West Railway
5	Southampton – West Coast freight upgrade to W10 gauge
6	Somerset Levels – flooding

## Note

This Route Plan forms part of the Control Period 4 (CP4) Delivery Plan and supersedes the version published in April 2008.

Other documents in the Delivery Plan can be found on the Network Rail website [www.networkrail.co.uk](http://www.networkrail.co.uk)



## GRIP stages

- 1 Output definition
- 2 Pre-feasibility
- 3 Option selection
- 4 Single option selection
- 5 Detailed design
- 6 Construction, test and commission
- 7 Scheme hand back
- 8 Project close out

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