Route 12 Reading to Penzance

Route context

The route links the south-western peninsula counties of Cornwall, Devon and Somerset with both the Midlands and the North and with London by feeding on to the core Great Western Main Line at Taunton and at Reading. In addition to the long spine of the main route from Reading through Westbury to Penzance, a number of branches enable many of the larger west of England coastal resorts to be rail-served, and holiday traffic is a significant element of the overall passenger market.

In June 2005 the Strategic Rail Authority published the Great Western Main Line Route Utilisation Strategy for the period 2006-2012. The RUS identified continued growth at well above the national average at the eastern end of the route serving commuter towns in west Berkshire, and to a lesser extent in Wiltshire. The Regional Planning Assessment for the South West is due to be published during 2006.

In Cornwall, the branches from St. Erth to St. Ives, from Liskeard to Looe and from Plymouth to Gunnislake were designated in 2005 by the Strategic Rail Authority as Community Railways.

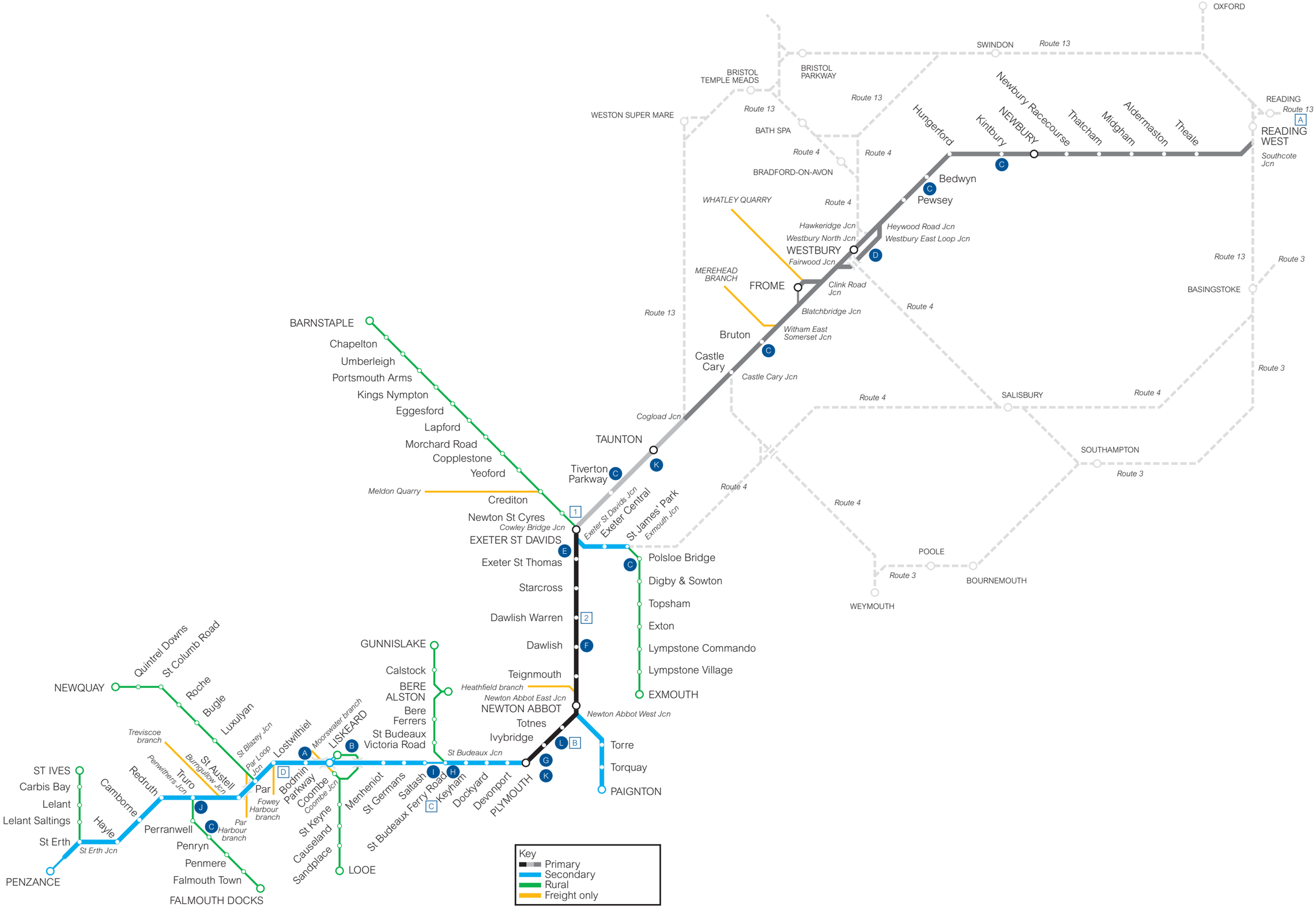
Today's route

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

- the 270-mile long main line section from Reading to Penzance (12.01,12,02,12.03 and 12.04). Feeding this 'spine' are eight shorter branch lines in Devon and Cornwall:
- Exeter to Exmouth (12.05 and 12.10);
- Exeter (Cowley Bridge Junction) to Barnstaple (12.07);
- Newton Abbot (Aller Junction) to Paignton (12.06);
- Plymouth (St. Budeaux) to Gunnislake (12.13);
- Liskeard to Looe (12.09);
- Par to Newquay (12.12);
- Truro (Penwithers Junction) to Falmouth (12.11); and
- St. Erth to St. Ives (12.08).

As well as these passenger branches there are freight branches (12.14) to Whatley, Merehead, Heathfield, Plymouth Cattewater, Fowey, and Drinnick Mill; and a connection from Crediton to Coleford Junction (alongside the Exeter to Barnstaple branch) which leads on to the privately-owned Meldon Quarry freight line through Okehampton.

Route 12 Reading to Penzance



Passenger and freight demand

In addition to the main cities and towns served directly by the Reading to Penzance route and its branch feeders, there are large areas of the South-west which are remote from a station, and long-distance trains call at smaller stations such as Castle Cary to address demand for railheading in South Somerset. Similarly the stations at Tiverton Parkway, Totnes and Bodmin Parkway cater for large swathes of North Devon, South Devon and North Cornwall respectively.

There is very little through freight movement between the home counties and the far west of England although the Reading to Westbury section of the route is heavily utilised by long and heavy freight trains conveying aggregates eastwards from the Mendips. Freight traffic generated in Cornwall is predominantly china clay, mostly exported locally through the port of Fowey, but with some longer-distance traffic also.

Current services

The broadly hourly London Paddington to Plymouth services (operated by First Great Western) come together with the hourly Midlands and north to Plymouth services (operated by Virgin Cross Country) at Cogload Junction (east of Taunton), to make traffic volumes greatest between there and Plymouth. Between Plymouth and Penzance passenger train services are mostly operated by First Great Western and Wessex Trains, with a limited Virgin Cross Country presence. A number of London Waterloo to Exeter St. Davids (via Salisbury) services operated by South West Trains run westwards beyond Exeter, to Paignton and Plymouth.

At the eastern end of the route the broadly hourly commuter services provided by First Great Western Link are operated with 2 car or 3 car formations and a more intensive service is operated during morning and evening commuter peaks. The most intensively used Devon branch, to Exmouth, enjoys half-hourly frequencies whilst the other west of England branches have hourly or less frequent interval services.

Figure 1 shows the current level of service to London from principal stations.

Current traffic

Passenger traffic predominates on most of the route, much of it long-distance in character from London Paddington and Reading, between which two stations West of England through services to Exeter, Plymouth and Penzance are integrated with core GWML operations. London commuter services are provided from Bedwyn and the local stations east thereof, but the character of the route between Newbury and Exeter is largely rural with Taunton as the only significant centre of population. Cross-country services from the North and Midlands generally run as far west as Plymouth, with a limited number of journeys extended through to Penzance.

Local services around Exeter, to Exmouth, Paignton and Barnstaple carry some commuter traffic, and also link Exeter Central station with Exeter St. Davids main-line station. In addition to serving all of the Devon and Cornwall branch lines, the local operator Wessex Trains provides stopping main line services between Bristol, Exeter, Plymouth and Penzance. Stopping services between Bristol and Weymouth use the Reading-Penzance main line between Westbury and Castle Cary. Most of the West of England branch lines have self-contained services which connect at the main-line junction with long distance services. The Newquay branch (from Par) still sees through long distance services (of both FGW and VxC) in the summer season

Figure 1 Current train service level (trains per hour)

Main line services	Trains per hour
Plymouth – Paddington	1 peak/1 off peak (7 trains per day from Penzance)
Exeter St Davids – Paddington	1 peak/0 off peak
Bedwyn – Paddington	2 peak/1 off peak
Newbury – Paddington	1 peak/1 off peak
Plymouth – Birmingham New St	1 peak/1 off peak (3 trains per day from Penzance)

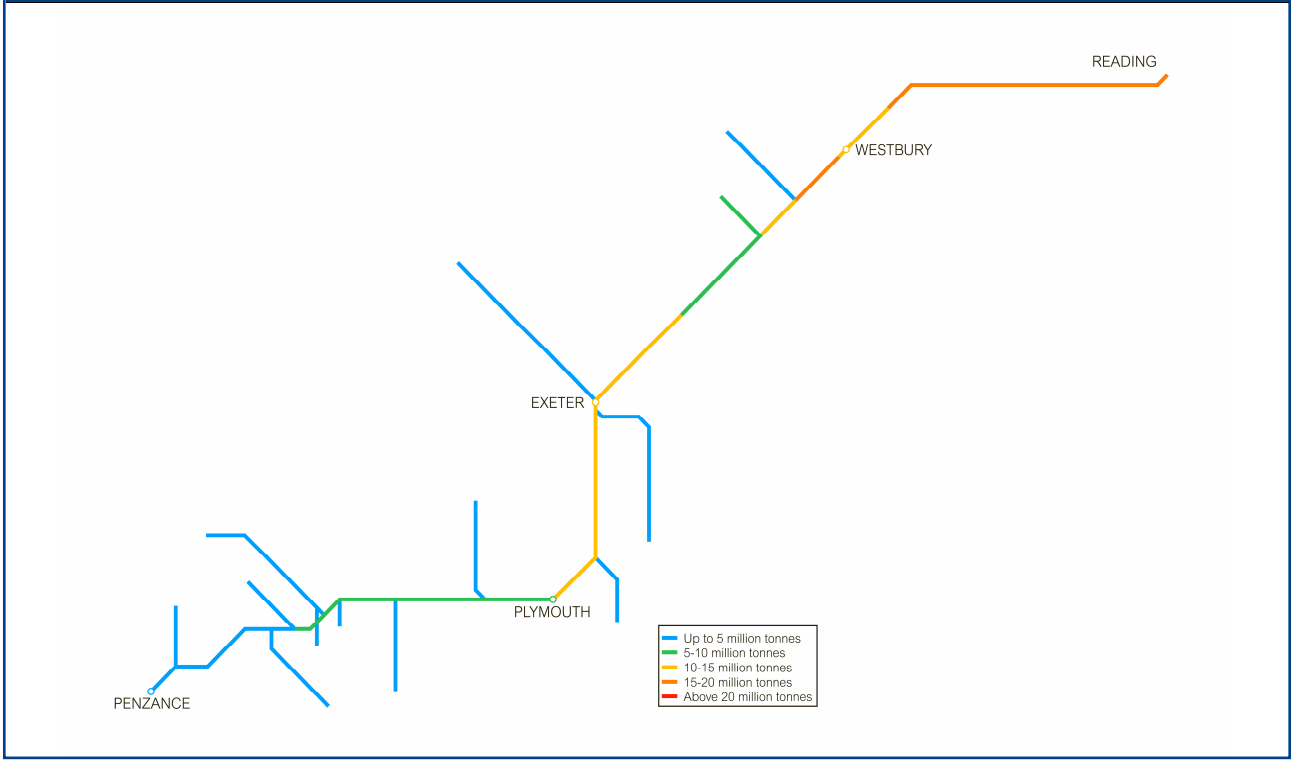
Figure 2 Current train service level (trains per hour)

Regional/Rural Services	Trains per hour each
Newbury – Reading	1
Exmouth – Barnstaple	1
Exmouth – Paignton	1
Plymouth – Gunnislake	8 trains per day
Liskeard – Looe	1
Par – Newquay	4 trains per day
Truro – Falmouth	1
St Erth – St Ives	2

Figure 2 shows the current service for regional and rural services

Figure 3 shows the tonnage levels on the route.

Figure 3 Tonnage



Traffic volumes are summarised in Figure 4.

Figure 4 Current use

	Passenger	Freight	Total
Train km per year (millions)	12	1	13
Train tonne km per year (millions)	3,005	1,372	4,377

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

Figure 5 Linespeed

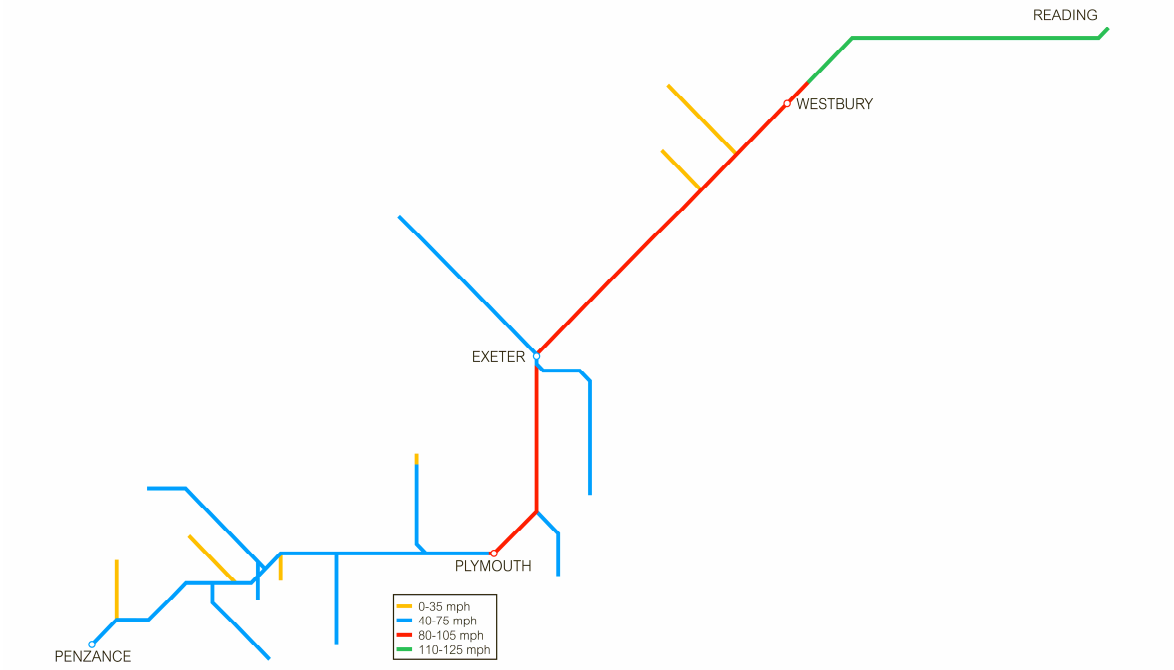


Figure 6 Electrification

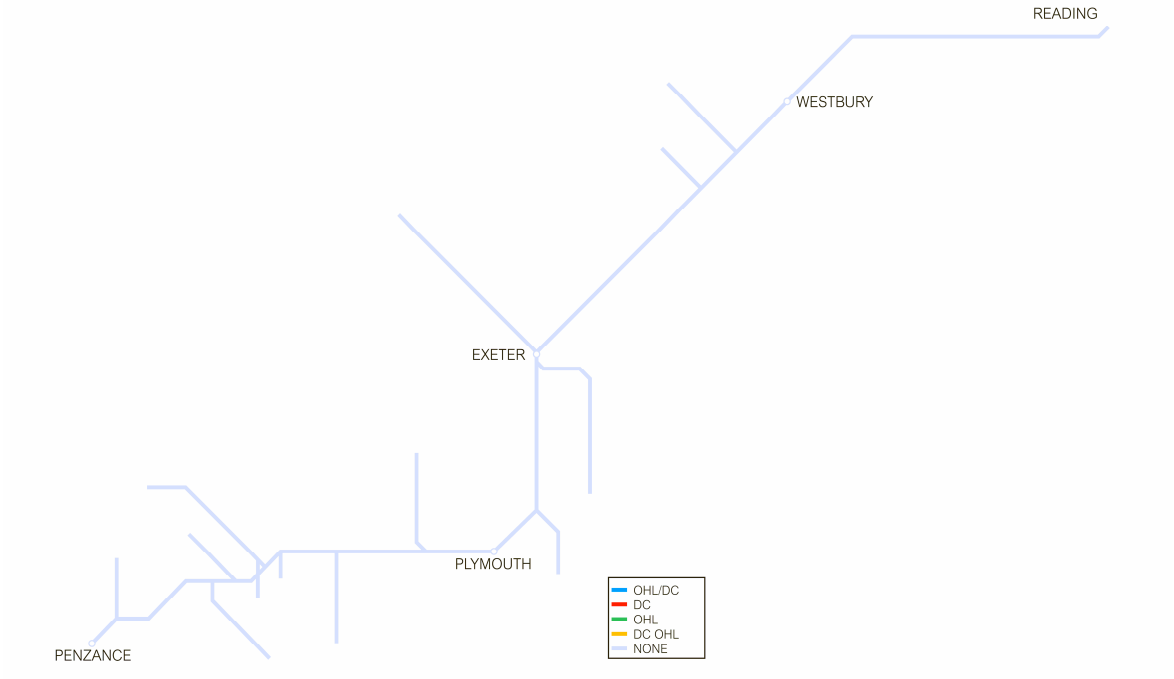


Figure 7 Route availability

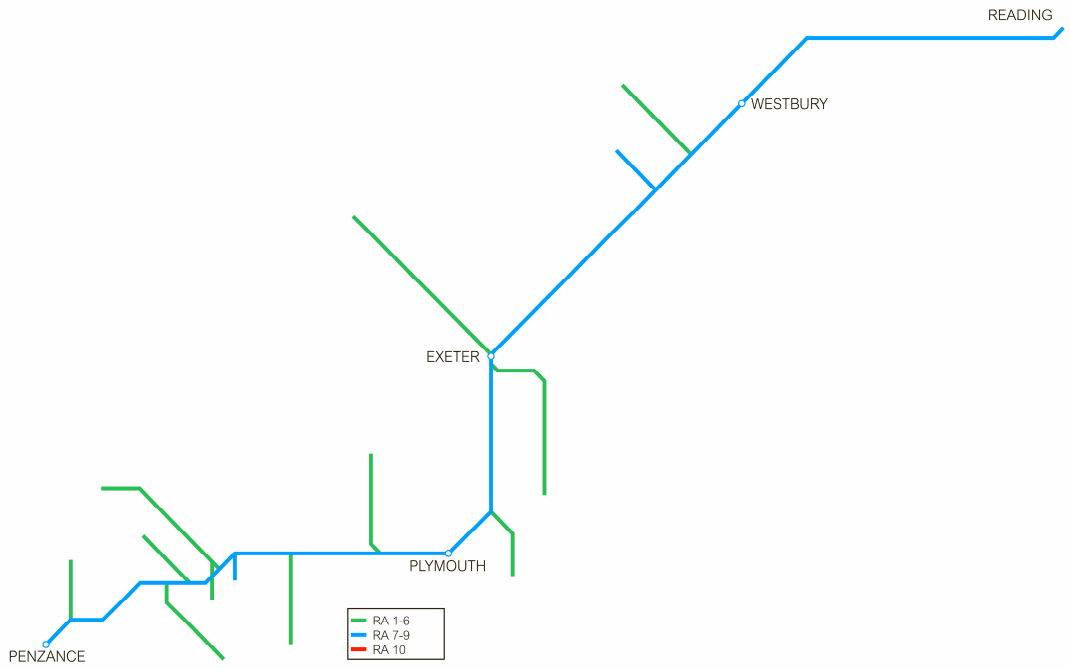
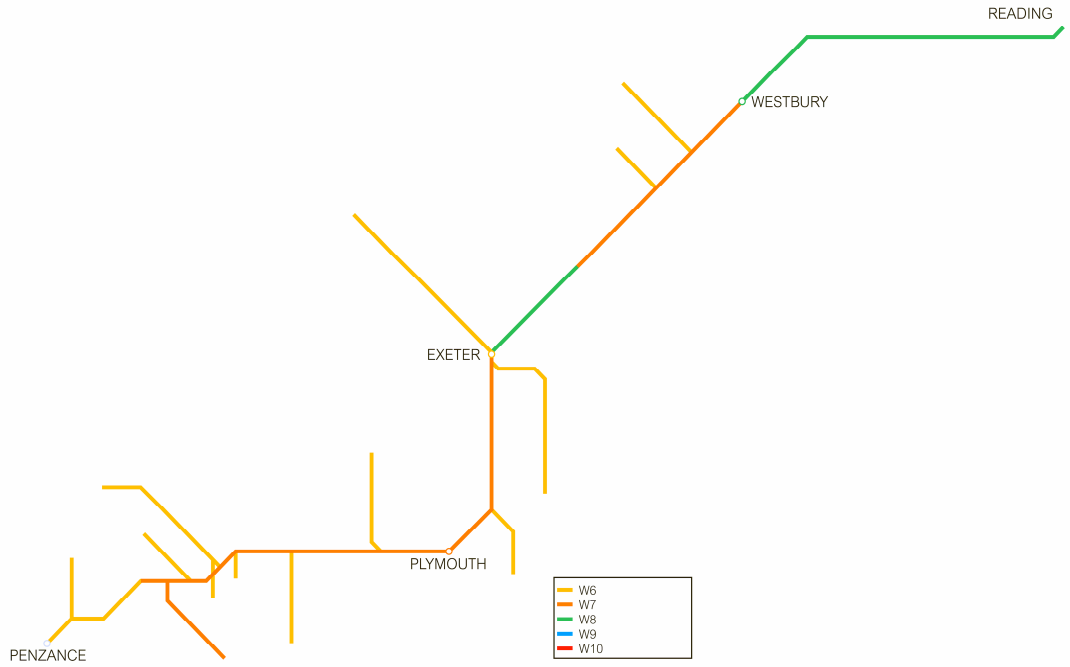


Figure 8 Gauge



Current capacity

The highest take-up of paths is at the eastern end of the route, between Reading and Newbury, where west of England services have to fit between intensive passenger and freight movements (between Reading and Southcote Junction) on the immediately adjacent Basingstoke section of the GWML, which influence how capacity is then shared westwards along the whole route towards Taunton. The capacity constrained Reading station restricts the ability to deliver additional paths on the route to meet future demand, particularly freight traffic for the construction of the Olympics' sites and Crossrail.

The single-track Devon branches run at or close to capacity, as dictated by passing-loop provision, whilst the Cornish branches, except that to St. Ives, operate somewhat less intensely. In the case of the St. Ives branch, utilisation has been increased to the maximum possible level as a result of the Community Railway initiative, the results of which are being monitored.

Figure 9 shows the current train service level in key sections of the route.

Current performance

Figure 10 shows the current PPM for the main TOCs running along the route.

Route performance, particularly west of Taunton, is strongly influenced by late running long distance services from off the route. This, with the inability to recover lost time, generates further reactionary delay both on and off the route.

However, performance has benefited from two distinct infrastructure upgrade schemes in recent years, the first of which was at Taunton station, by means of the provision of additional platforms, which have improved train service timetabling and operation. Secondly, in Cornwall, re-doubling of the long, former single-track section between Burngullow (near St. Austell) and Probus (near Truro) has significantly improved performance and eased pathing constraints. Two shorter sections of single track remain in Cornwall where otherwise the main line is double track throughout.

The closure of Silk Mill level crossing, to the west of Taunton, enabled by the construction of a new road bridge, will also contribute to performance improvement.

Future requirements

Strategic direction

The GWML RUS broadly dealt with the route by considering its eastern and western sections either side of Taunton. Between Reading and Taunton, the strategic vision set out within the RUS involves simplification of the service pattern so as to make better use of paths by means of deploying higher-capacity rolling stock. No case was foreseen for investment in any upgrading to give higher speeds. West of Taunton, further simplification of the service pattern was identified, linked in to the re-franchising where the operations of two different TOCs will be fully amalgamated.

The South West Regional Assembly's (SWRA) emerging Regional Spatial Strategy (RSS) covering the period until 2026, will focus on the implementation of an integrated Transport Corridor approach where local authorities will work with the rail industry to develop opportunities to facilitate modal shift, address overcrowding, improve strategic interchanges and improve use of the network to deliver spatial growth and congestion targets. The RSS also recommends that commercial developments which generate high volumes of freight movements should be located close to appropriate rail freight facilities to support more sustainable distribution in the South West.

In Cornwall, the branches from St. Erth to St. Ives, from Liskeard to Looe and from Plymouth to Gunnislake are designated as Community Railways.

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

Route Section	Number of trains
Newbury to Reading	4
Exmouth branch (Devon)	3
Totnes to Plymouth	5
Falmouth branch (Cornwall)	1

Figure 10 Current PPM MMA (2005/06)

TOC	MAA	As at period
First Great Western	74.8%	10
First Great Western Link	83.0%	10
South West Trains	89.1%	10
Virgin Cross Country	80.2%	10
Wessex Trains	84.6%	10

Future demand
The GWML RUS forecast year on year growth for journeys from the South West to Central London to increase by 3.4% until 2012. This is in line with the Regional Spatial Strategy, which recognises the importance of maintaining reliable links with the capital for business purposes.

Growth in holiday traffic to Devon and Cornwall is expected to continue with the Eden project near St Austell a year-round main attraction. However, major trunk road improvements and the continued use of short formation long distance cross country trains may impact on some rail markets in the area.

The merging of First Great Western, First Great Western Link and Wessex trains to create the Greater Western franchise in April 2006 will see no immediate significant changes to rolling stock types on the route used by those TOCs. However, train service variations are proposed which will simplify the route service structure including additional through London services for the Newquay branch.

Figure 11 indicates the forecast percentage change in tonnage to 2015.

Future capability
Due to the gradients and curvature of the route west of Exeter, no major capability changes are planned. However, Virgin Cross Country has expressed an interest in maximising the tilt capability of their Class 221 trains between Taunton and Plymouth to reduce journey times.

The SRA Gauging Policy set out a proposed intermodal freight network cleared for the transportation of 9' 6" high ISO containers including the route between Southcote Junction and Reading. However, demand for this type of traffic to the west of England is not deemed sufficiently high enough to warrant any infrastructure investment and the relatively small volumes of this type of traffic would be best catered for by utilising low platform wagons.

Figure 11 Tonnage growth

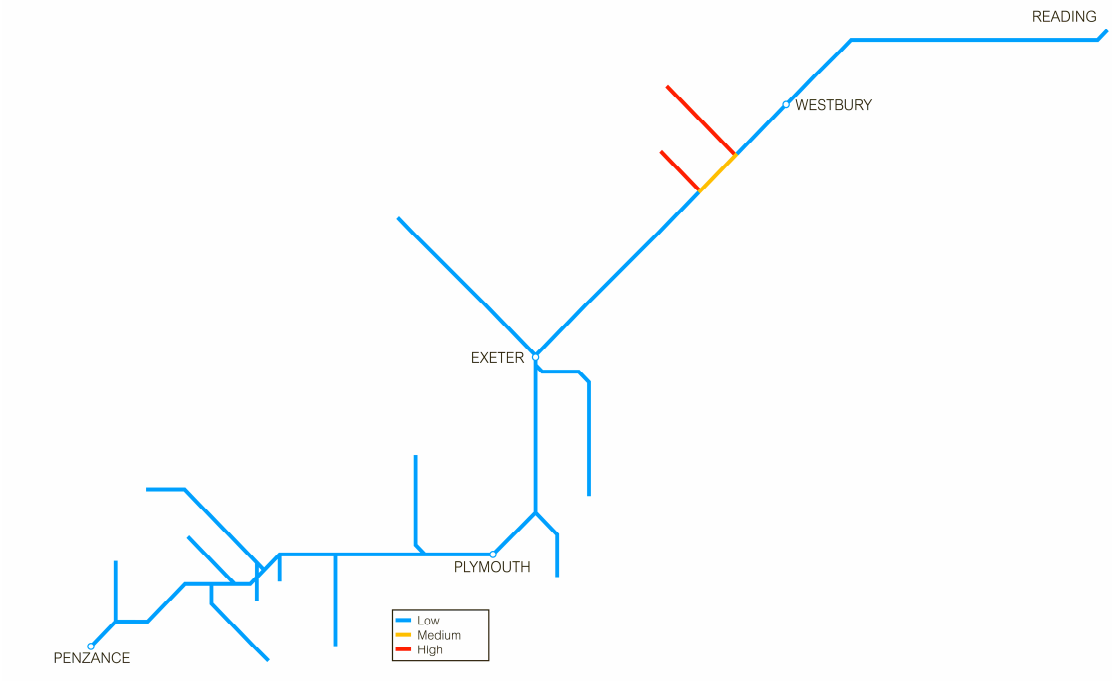


Figure 12 Forecast reduction in delay minutes

	2006/07	2007/08	2008/09
% reduction in delay minutes	13%	22%	28%

Future capacity

The creation of the Greater Western franchise in April 2006 will see the introduction of a simplified train service structure for the route, particularly west of Taunton, from December 2006. This will eradicate some of the current service duplication and better meet existing demand.

We plan to increase capacity between Truro and Falmouth by introducing a train passing facility and extended platform at Penryn station. This will permit two trains to operate on the branch at one time instead of the one train operation that currently exists.

In the longer term we will be examining the potential to reduce long headways that exist between Newton Abbot and Plymouth to reduce journey times, particularly for long distance services to and from London and other key regional centres.

Future performance

In addition to continued improvement in asset reliability, a major focus of attention going forward is the work necessary to devise more robust train timetables. The opportunity arises with the creation of the new Greater Western franchise for Network Rail to work more closely with the train operator to encourage the development of timetables and resource plans that are more robust in terms of recovery from incidents.

First Great Western has started a programme of overhauling its High Speed Train power car fleet with new quieter and more environmentally friendly engines which will provide greater efficiency and reliability. The vast majority of the fleet will be overhauled within two years of the start of the new Greater Western franchise in April 2006.

The introduction of the new Integrated Control Centre in Swindon will deliver greater operational and performance management benefits for our customers.

We are embarking on a programme to remove Temporary Speed Restrictions, imposed due to the poor condition of track, by the end of March 2009.

Figure 12 shows the forecast reduction in Network Rail delay minutes compared with 2005/06.

Figure 13 (below) shows the forecast PPM for the main TOCs running along the route.

Engineering access

Engineering access on this route varies from being fairly restrictive on the main line to reasonably available on the branches. In many areas access is available on overnight possessions with consent from affected operators. Wherever possible, possessions are managed to ensure that a route is available to the West. The main considerations include no concurrent possessions from Southcote Junction to Exeter, or Bristol to Cogload Junction and Bathampton Junction to Bristol, or Bathampton Junction to Westbury. In addition there are restrictions on Friday night possessions throughout the summer to cater for the holiday market.

A different approach to heavy maintenance of the numerous West of England branches has been developed where workload requirements are such as to warrant extended midweek possessions and bus substitution by agreement with the operator Wessex Trains.

The Fairwater Yard site at Taunton (to the west of Taunton) is being developed as a site at which High Output equipment will be based in future.

Figure 13 Forecast PPM MAA

TOC	2006/07	2007/08	2008/09
First Great Western	77.2%	78.9%	80.3%
First Great Western Link	84.4%	85.5%	86.4%
South West Trains	90.3%	90.5%	90.6%
Virgin Cross Country	81.6%	83.5%	84.3%
Wessex Trains	86.0%	86.7%	87.4%

Opportunities and challenges

We anticipate that accommodating the steady growth forecast for travel to and from the capital and other regional centres can be achieved within the service structure proposed by the new Greater Western franchise. However, while this growth may be catered for locally it will have a major impact on known capacity constraints off the route such as the greater Bristol area, Reading and the Thames Valley where even higher growth is forecast.

Whilst it is clearly understood that the business community regard reliable journeys and connectivity with the London and south east business centres in under two hours as extremely important, it can only be achieved from within the eastern end of the route. Three hour journeys are achievable from the Plymouth area on some business trains.

We believe that the solution to passenger growth and future capacity requirements on the route can be met by a combination of several initiatives:

- train lengthening on cross country services, where necessary supported by platform lengthening;
- maximising the benefits of operating Virgin Cross Country Class 221 units in tilt mode to reduce journey times;
- changes to the timetable structure to reduce the mix of different train types and the number of conflicting moves;
- provision of additional capacity off the route across the greater Bristol area and through Reading and the Thames Valley to London; and
- reducing the signalling headways between Plymouth and Newton Abbot.

Delivering future requirements

Expenditure

The age of rail and sleepers on the route is amongst the highest on the national network and varies between 30 and 40 years old and to address this we are implementing a track renewals strategy which matches the traffic usage of the route. This will include the deployment of Network Rail's new High Output equipment on the most intensely used part of the route, between Reading and Exeter, to deliver a higher track quality with absolute minimum rail failures; more conventional targeted renewals will be carried out on the less intensely used sections beyond Exeter, with patch repairs and renewals to maintain stable infrastructure on the more rural branch lines.

Figure 14 shows the planned level of expenditure on renewals on this route over the next three years. However, the precise timing and scope of renewals remains 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.

Figure 14 Forecast expenditure

£m (05/06 prices)	2006/07	2007/08	2008/09
Renewals			
Track			
Plain Line	29	25	24
S&C	2	2	2
Track Total	31	27	26
Civils			
Underbridges	3	6	3
Overbridges	1	1	1
Bridgeguard 3	0	0	–
Footbridges	–	1	–
Earthworks	2	5	4
Culverts	–	0	–
Coastal & estuary defence	0	–	–
Retaining walls	0	1	0
Major structures	–	1	6
Other	1	–	0
Civils Total	8	16	15
Signalling			
Minor works/other	2	3	1
Signalling Total	2	3	1
Telecoms			
Concentrators: large	0	1	–
Telecoms cables	0	–	–
Telecoms Total	1	1	–
Plant and machinery			
Fixed plant	0	4	1
Point heating	1	1	1
Plant Total	1	4	1
Operational property			
Stations	2	1	–
Light maintenance depots	0	–	–
Lineside buildings	1	0	–
Operational property Total	3	1	–
Total Renewals	46	53	43

Enhancements (funded by)			
Other Third Party			
Truro – Falmouth capacity enhancement	0	4	–
Other	0	–	–
Other Third Party Total	1	4	–
Total Enhancements	1	4	–

The planned volume of renewals is detailed in Figure 15.

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

Figure 15 Forecast volumes

	2006/07	2007/08	2008/09
Track			
Rail (km)	36	34	34
Sleepers (km)	33	32	32
Ballast (km)	37	35	35
Switches & crossings (no)			
Complete renewal	7	8	8
Abandonment	6	7	7
Civils			
Underbridges (square metres)	2,843	5,881	3,291
Overbridges (square metres)	191	222	384
Footbridge (square metres)	–	121	–
Embankments (square metres)	36,101	77,208	40,250
Culverts (square metres)	–	55	–
Coastal & estuary defence (linear metres)	220	–	–
Retaining walls (square metres)	12	98	135
Major structures (square metres)	–	2,685	15,315
Telecoms			
Concentrators: large (no)	1	2	–
Plant and machinery			
Point heating (point end)	12	57	51

Figure 16 Forecast expenditure

£m (05/06 prices)	2006/07	2007/08	2008/09
Maintenance	33	31	28

Infrastructure investment

The following table highlights committed schemes that are planned for completion in the financial year shown:

Figure 17 Planned infrastructure investment

Project	Scope	Enhancement or output change	Main asset type(s)	Third Party funding	GRIP Stage	Completion Year
Ⓐ East Largin viaduct	Strengthening works	Improved asset reliability	Civils	None	1	2006/07
Ⓑ Liskeard viaduct	Preventative maintenance	Improved asset reliability	Civils	None	1	2006/07
Ⓒ Track Renewals	Plain line renewals at Kintbury, Bedwyn, Witham (east Somerset), Edithmead, Tiverton Parkway, Polsloe Bridge and Penryn.	Improved asset reliability	Track	None		2006/07
Ⓓ Westbury PSB	SPT concentrator renewal	Improved asset reliability	Telecoms	None	1	2007/08
Ⓔ Exeter PSB	SPT concentrator renewal	Improved asset reliability	Telecoms	None	1	2007/08
Ⓕ Dawlish sea wall	Sea defences preventative maintenance	Improved asset reliability	Civils	None	1	2007/08
Ⓖ Laira LMD	Wheel lathe renewal	Improved asset reliability	Property	First Great Western	2	2007/08
Ⓗ Weston Mill viaduct	Strengthening works	Improved asset reliability	Civils	None	1	2007/08
Ⓘ Royal Albert bridge	Preventative maintenance	Improved asset reliability	Civils	None	1	2007/08
Ⓐ St Pinnock viaduct	Strengthening works	Improved asset reliability	Civils	None	1	2007/08
Ⓙ Truro – Falmouth	Extended platform and passing	Increase capacity from one train to two trains on the branch at one	Track, signalling,	Cornwall County	4	2008

Figure 17 Planned infrastructure investment

Project	Scope	Enhancement or output change	Main asset type(s)	Third Party funding	GRIP Stage	Completion Year
	facility at Penryn	time	civils	Council and EU		
J Truro	S&C renewal	Improved asset reliability and linespeed increase onto the Falmouth branch	Track	None		2007/08

Figure 18 highlights uncommitted schemes under development

Figure 18 Infrastructure investment under consideration

Project	Scope	Enhancement or output change	Main asset type(s)	Status
K Taunton – Plymouth	Maximise Class 221 train tilt capability	Improved journey times	Track	Under consideration
L Newton Abbot – Plymouth	Reduction in headways	Improved capacity and performance	Signalling	Under consideration for inclusion in scope of the area signalling renewal
A St Pinnock viaduct	Reinstate double track	Improved capacity and performance	Civils	Under consideration subject to capability of the viaduct to sustain two track operation. Would be carried out at the same time as the planned St Pinnock Viaduct strengthening works

Figure 18 Infrastructure investment under consideration

Project	Scope	Enhancement or output change	Main asset type(s)	Status
Ⓐ East Largin viaduct	Reinstate double track	Improved capacity and performance	Civils	Under consideration subject to capability of the viaduct to sustain two track operation. Would be carried out at the same time as the planned St Pinnock Viaduct strengthening works

Non-infrastructure developments

The table below shows potential developments which do not involve changes to the infrastructure.

Figure 19 Timetable development

Description	Key issues	Actions or options being developed	Benefits	Target timetable implementation
Greater Western franchise	Timetable restructuring	Cornish and north Somerset train service revisions Simplified train service structure to eradicate duplication	New London services for Newquay and Frome Improved service reliability	December 2006

Appendix

Figure 20 Strategic route sections

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

SRS	SRS Name	ELR	Classification	Funding	Community Rail	Freight Gauge	RA	Speed	Electrification	Signalling Type	Signalling Headway	No of Tracks
12.01	Reading – Cogload Jn	BHL,WES WEY,CCL	Primary	DfT	No	W8,W7	8	100	none	TCB	5,8	2
12.02	Cogload Jn – Exeter St Davids	MLN1	Primary	DfT	No	W8	8	100	none	TCB	4	2
12.03	Exeter St Davids – Plymouth	MLN1	Primary	DfT	No	W7	8	60	none	TCB	4,6	2
12.04	Plymouth – Penzance	MLN2,MLN3, MLN4	Secondary	DfT	No	W7, W6A	8,7	65	none	Mech.	(AB)	2
12.05	Exeter – Exmouth Jn	BAE	Secondary	DfT	No	W6A	6	70	none	TCB	3	2
12.06	Paignton Branch	TOR	Secondary	DfT	No	W6A	6	40	none	TCB	7	2
12.07	Barnstaple Branch	DAC, NDN	Rural	DfT	Yes	W6A		55	none	OTW	(AB)	1
12.08	St Ives Branch	SIV	Rural	DfT	Yes	W6A	5	30	none	OTW	(AB)	1

Figure 20 Strategic route sections

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

SRS	SRS Name	ELR	Classification	Funding	Community Rail	Freight Gauge	RA	Speed	Electrification	Signalling Type	Signalling Headway	No of Tracks
12.09	Looe Branch	LIL, LOO	Rural	DfT	Yes	W6A	4	25	none	OTW	(AB)	1
12.10	Exmouth Branch	EMT	Rural	DfT	No	W6A	6	50	none	OTW	(AB)	1
12.11	Falmouth Docks Branch	FAL	Rural	DfT	Yes	W7	6	50	none	OTW	(AB)	1
12.12	Newquay Branch	NEW	Rural	DfT	Yes	W6A	6	50	none	OTW	(AB)	1
12.13	Gunnislake Branch	DAC, CAL	Rural	DfT	Yes	W6A	4	55	none	OTW	(AB)	1
12.14	Freight Lines			DfT	No				none			

Capacity and operational constraints	
A	Southcote Junction: convergence of two key routes with a mix of heavy aggregates and long intermodal freight traffic, inter city and local passenger services
B	Signalling headways between Newton Abbot and Plymouth
C	Royal Albert bridge: single line section linking Devon and Cornwall
D	St Pinnock and East Largin viaducts: single line sections

Other Issues on Route	
1	Flood plain to the north of Exeter requires constant monitoring
2	Dawlish Sea Wall defences require constant monitoring and enhanced maintenance