

Route Plans 2008
Route 2
Brighton Main Line
and Sussex



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Route 2 Brighton Main Line and Sussex



Section 1: Today's railway

Route context

The Brighton Main Line provides a high capacity fast link between London (both the West End and City), Croydon, Gatwick Airport and the south coast, with a network of branches to other destinations in Surrey, West Sussex and East Sussex.

The Sussex route also provides an extensive suburban overground network throughout much of South London, providing frequent metro services to a large part of the capital which is not served by the underground system.

The majority of passenger services on the Sussex route are provided by Southern. The other main operators are First Capital Connect

(who operate cross London services to Brighton and Wimbledon) and Gatwick Express (who operate direct non-stop services between Victoria and Gatwick Airport). Several other operators run on parts of the route.

There are significant overcrowding issues on both main line and suburban services. Resolving overcrowding by adding additional on-train capacity is therefore the main priority for future development of the route.

Implementation of the Brighton Main Line RUS (BML RUS) in December 2008 will involve extending morning and evening peak Gatwick Express services to start back from and extend to Brighton respectively. This will provide a significant number of additional high peak seats for main line commuters and will also free up train

paths which will be used to address crowding problems on the Redhill corridor.

The operation of the East London Line (ELL) services to West Croydon and Crystal Palace will require a major timetable recast, affecting all suburban and main line services. Detailed development work commenced in autumn 2007, building on the "proof of concept" timetable that was developed for the ELL project. The result of the work for the morning peak will be reflected in the final South London RUS and will inform the Department for Transport's timetable specification for the replacement South Central franchise from December 2009 onwards.

The recently published HLOS included Government commitment to funding the implementation of the Thameslink Programme, with work commencing in 2008. This will provide significant additional capacity in the central London area when work is completed by around 2015. Prior to this time major construction works will be required on critical parts of the network, potentially reducing capacity.

The South London Route Utilisation Strategy (SL RUS) identified a strong business case for a programme of train and platform lengthening for stopping services via Norbury, Gipsy Hill and Hackbridge into Victoria from 8-car to 10-car from 2011. Similarly there is a strong case for lengthening of suburban services to 12-car on the slow lines into London Bridge via Sydenham and on the East Grinstead route for services to Victoria and London Bridge.

Distinct from the key radial commuter routes, the West London Line (WLL) is a vital north-south freight route and is becoming an increasingly busy passenger corridor.

Freight operations on the remainder of the Sussex route are much less extensive, consisting predominantly of flows to aggregates terminals situated mostly on the Brighton Main Line.

The Sussex RUS was launched in February 2008 and will be published in the summer/autumn of 2009. The RUS will cover all routes and services in the Route 2 area with the exception of those suburban routes covered in the SL RUS.

Today's route

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

- the main line from London to Brighton via Gatwick Airport. This comprises separate multi-track routes from Victoria (02.01) and London Bridge (02.03), joining together in the Croydon area to Brighton (02.02), reducing to two tracks at Balcombe Tunnel junction;
- branches off the main line forming routes to East Grinstead/Uckfield (02.12, 02.10), Caterham/Tattenham Corner (02.11), Tonbridge (01.11), Reigate (03.08), the Arun Valley (02.04), Eastbourne (02.06), Worthing (02.05) and beyond. Services joining from these routes make the main line increasingly busy closer to London;
- the lines leading west and east from Brighton providing links along the coast (02.05, 02.06);
- a complex network of suburban lines throughout south London (02.07, 02.08, 02.14). This is characterised by multiple connections between the different lines so that most stations have services to both Victoria and London Bridge;
- the Dorking to Horsham line (02.09);
- the WLL, providing an orbital north-south link around London (02.13); and
- the Thameslink route, running in tunnels beneath the City of London, which connects radial routes north and south of the Thames (02.15).

The boundaries of the Sussex route with adjacent routes are particularly complex. There are a number of boundaries with Route 1 and Route 3 in particular, and also north of the Thames on the WLL and Thameslink routes.

Current passenger and freight demand

Passenger demand predominates on the whole of the Brighton Main Line, plus most of the branches off it, leading to widespread peak period overcrowding. Most of the peak demand is commuter flows from the main population centres but it is notable that the most intensive flight arrivals period at Gatwick Airport is also during the morning peak.

Main line services generally compete with the parallel A23/M23 highway. This narrows from a six lane motorway to a single carriageway as soon as the Greater London boundary is reached, making the railway the only viable option for the majority of commuters.

A significant portion of demand is for the sizeable short distance commuting flow on both main line and outer suburban services between East Croydon and London. Developments in Croydon town centre and the Croydon Tramlink system have contributed to this significant feature in recent years.

With regard to the London suburban network, demand is also high, again leading to widespread peak period overcrowding and, in cases, passengers not being able to board trains at certain locations. The SL RUS identified that many routes have demand which is significantly suppressed by current capacity and service patterns, leading to extra pressure on the alternative transport options and reduced economic activity.

Many of the current travel patterns require passengers to interchange onto other rail, underground, tram or bus routes to complete their journey. Many of these also have limited capacity, currently suppressing demand on certain routes. Key interchanges are Victoria (Victoria and District/Circle lines), Clapham Junction (South West Trains and London Overground), London Bridge (Jubilee, Northern lines and Southeastern) and Balham (Northern line).

There is modest freight demand on the core Sussex route (mainly to aggregates terminals) but the WLL has a high number of cross London freight services, primarily aggregates to and from southeast terminals and international trains running between the West Coast/Great Western main lines and the Channel Tunnel. At the southern end of the WLL services to the Channel Tunnel are normally routed via Catford and Maidstone East (on Route 1). The line via Redhill is the only alternative to this for W9 gauge freight traffic, though it requires diesel haulage due to the incompatibility of track circuits on the route with Class 92 traction.

Passenger demand on the WLL is also growing significantly and a strategy for increasing the number of services operating on this route is outlined in the established Cross London RUS. There is growing demand for through services across Clapham Junction.

Demand on the coastal lines is generally focussed on the major urban centres, especially Brighton and Portsmouth. These services compete with the parallel A27 highway.

Current services

The main operators on the route are Southern Railway, Gatwick Express and First Capital Connect. Passenger services are also operated on the route by First Great Western, Southeastern, South West Trains (SWT), London Overground and CrossCountry. Freight services are operated by English Welsh and Scottish Railway (EWS), Freightliner, Fastline, First GBRf and Direct Rail Services.

The main line passenger service structure is complicated by the number of separate branches off the Brighton main line, the different stopping patterns on it and the existence of more than one London terminal.

Main line services to Victoria generally remain at a high level throughout the day, reflective of the spread of demand to leisure and shopping destinations in the West End. Services run to a variety of destinations in Surrey and the south coast at regular frequencies. There are some peak period additional services to certain destinations.

The Gatwick Express service consists of a non-stop train between the airport and London Victoria every 15 minutes.

Main line services to London Bridge have a very intensive peak period with services terminating in the nine low level platforms. The off peak service is significantly lower, much of it being made up of four Bedford to Brighton through trains per hour. These services cannot generally operate via London Bridge during peak hours due to the lack of capacity in the area.

The London area passenger suburban service is governed by the complex nature of the network and by interaction with main line and First Capital Connect services, particularly during the peaks.

The West and East Coastway lines from Brighton are served by a mixture of local stopping services and semi-fast services providing faster links between the main towns.

The WLL is currently served by a combination of through services from Gatwick and Brighton and a local Clapham Junction to Willesden Junction shuttle (with some peak trains extended to Stratford). There is wide variation in intervals between services. In addition there are typically 20-30 freight trains per day in operation each way on this line. Empty Eurostar trains running between Waterloo International and North Pole depot ceased to use the West London Line during 2007. Instead, Eurostar services now operate from St Pancras and associated stock is serviced at Temple Mills.

Figure 1 and Figure 2 show the current level of service to London from principal stations.

Figure 1 Current main line train service level (trains per hour)

Station	London Bridge or Blackfriars	Victoria
Brighton	3 peak/4 off peak	2 peak/2 off peak
Haywards Heath	6 peak/4 off peak	5 peak/2 off peak
Gatwick Airport	5 peak/4 off peak	4 peak/8 off peak
Redhill	4 peak/2 off peak	3 peak/2 off peak
Oxted	5 peak/1 off peak	2 peak/2 off peak
East Croydon	18 peak/7 off peak	14 peak/8 off peak

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

Station	London Bridge or Blackfriars	Victoria
Sydenham	8 peak/6 off peak	0 peak/2 off peak
Norbury	1 peak/2 off peak	6 peak/6 off peak
Crystal Palace (via Gipsy Hill)	1 peak/4 off peak	4 peak/4 off peak
Sutton (via Hackbridge)	2 peak/2 off peak	4 peak/4 off peak
Wimbledon (via Tooting)	3 peak/2 off peak	None
West Croydon	5 peak/4 off peak	5 peak/6 off peak

Figure 3 Tonnage

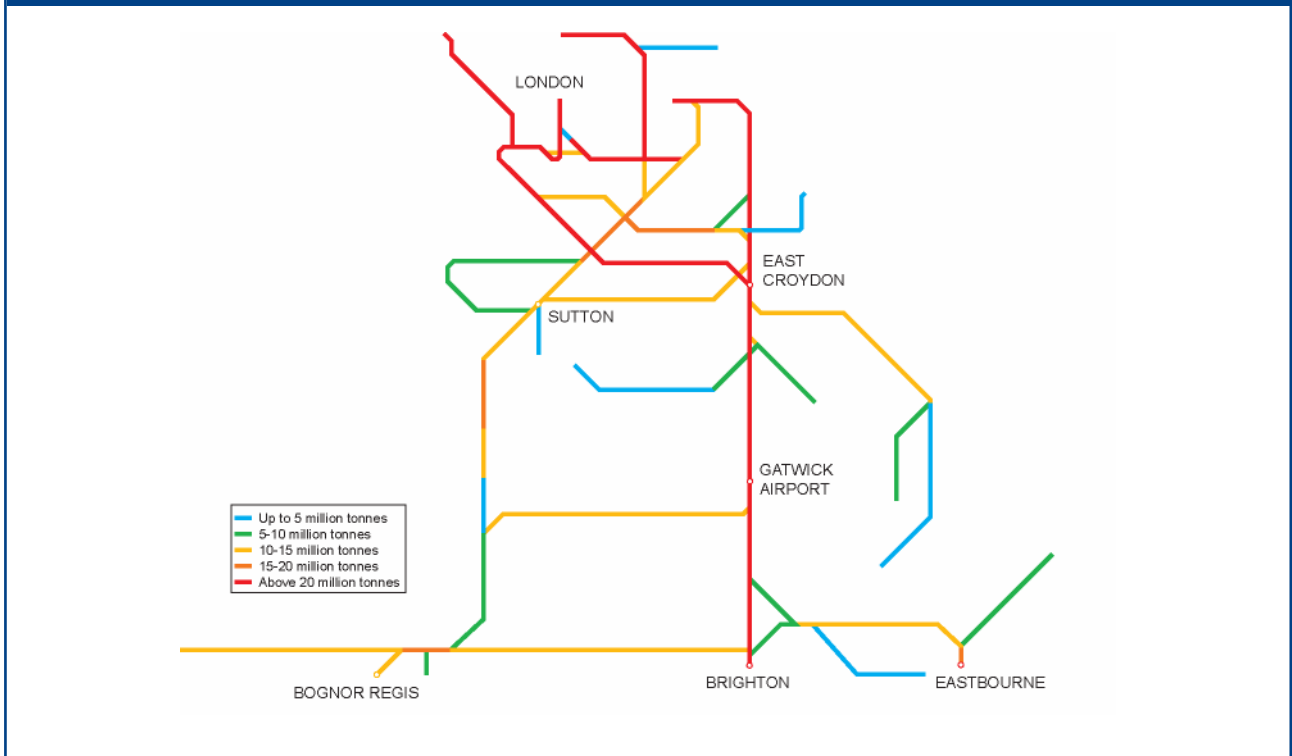


Figure 3 shows the total annual tonnage levels on the route.

Traffic volumes are summarised in Figure 4.

Figure 4 Current use

	Passenger	Freight	Total
Train km per year (millions)	37	1	38
Train tonne km per year (millions)	9,365	335	9,700

Current infrastructure capability

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

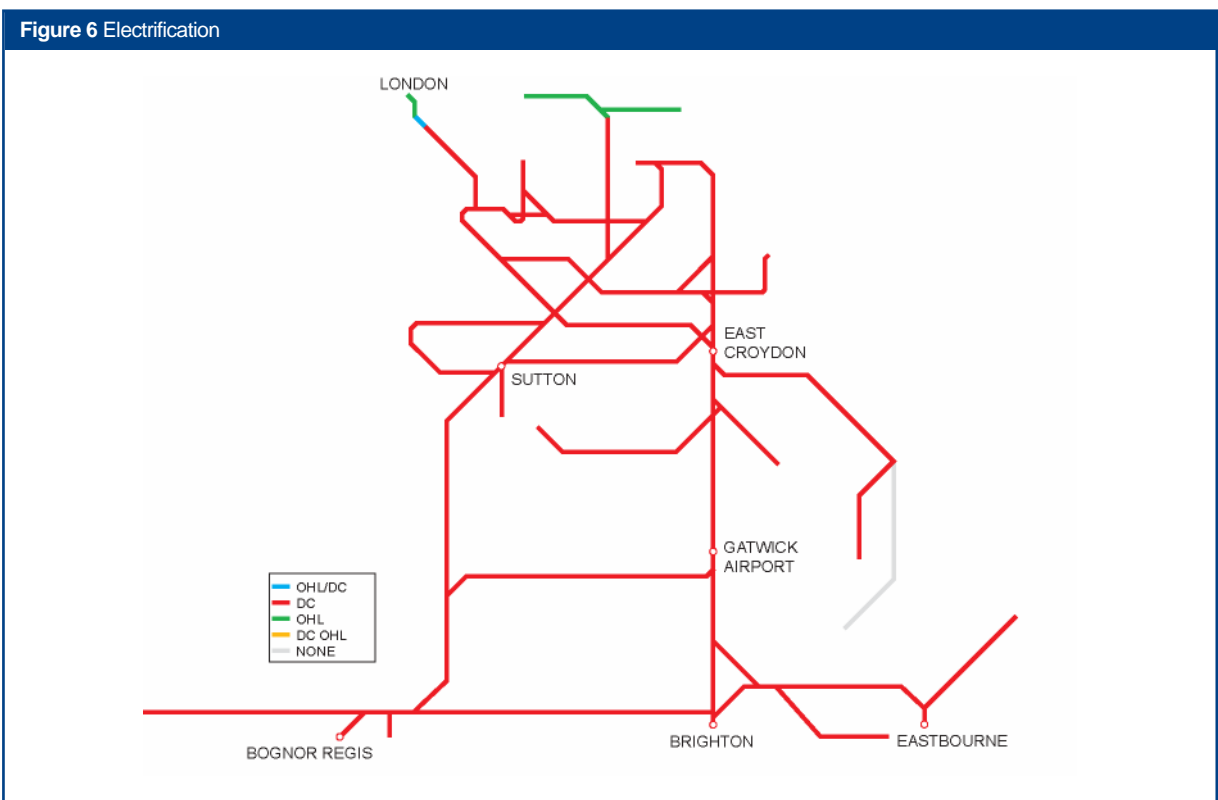
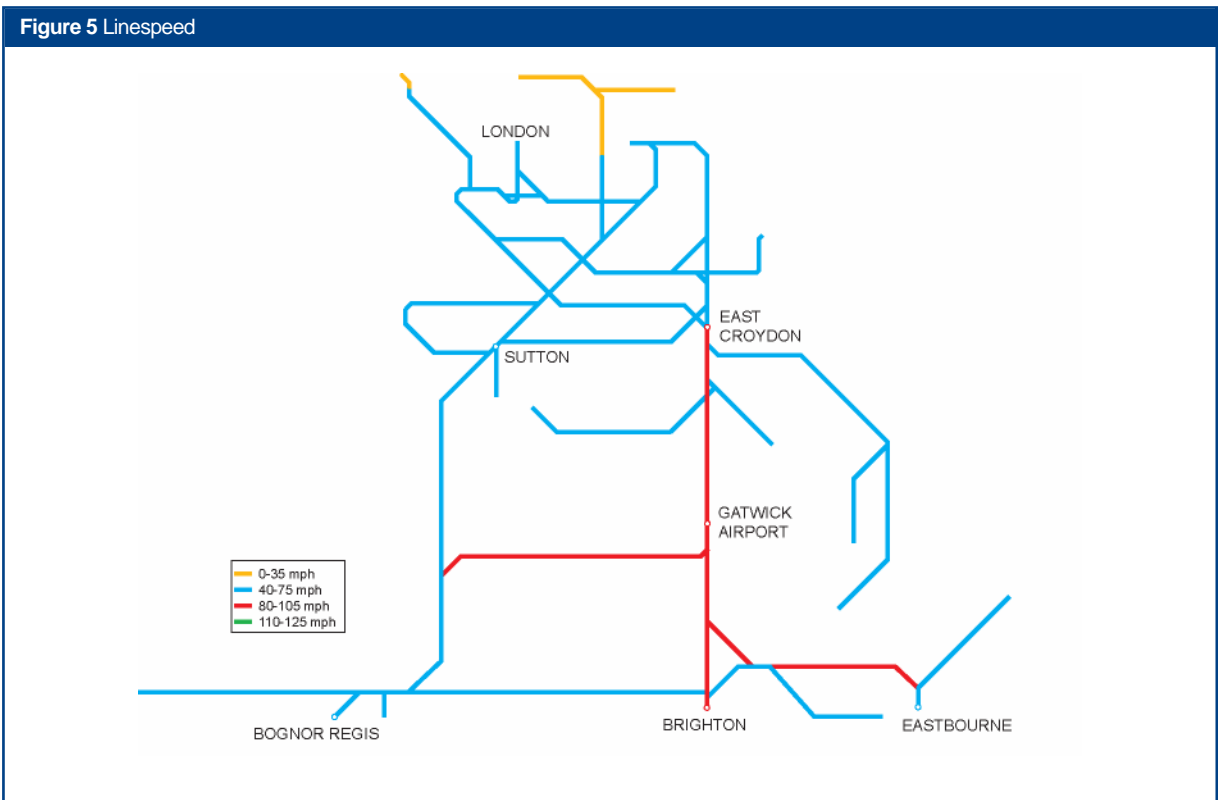


Figure 7 Route availability

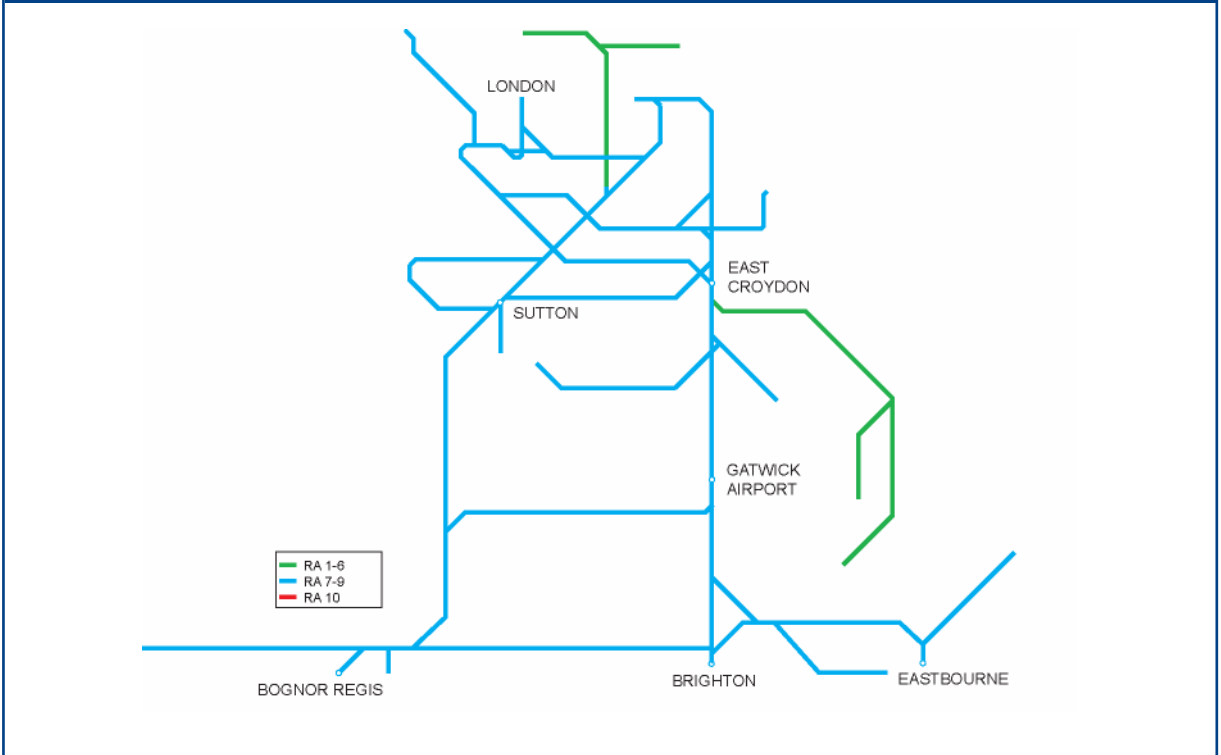
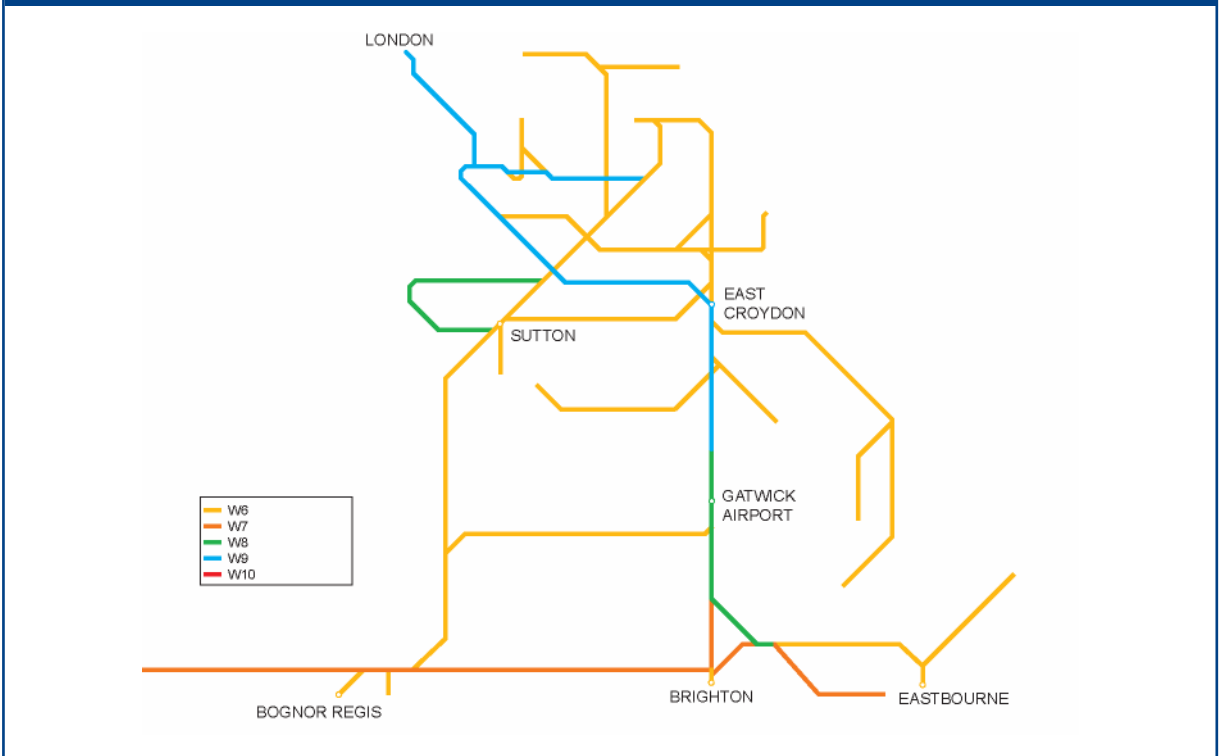


Figure 8 Gauge



Current capacity

The route is operating near capacity for several hours each day. This is governed by a mixture of constraints, in particular the layout of certain junctions, dwell times at stations, limited reversing facilities and some features of the existing timetable. The issues are interlinked and overall route capacity is affected by a combination of these factors.

Key constraints to main line services are highlighted below:

- the dedicated Gatwick Express platforms 13/14 at Victoria limit other main line services to using platforms 15-19;
- the restrictive layout of the approaches to London Bridge and the limited number of platforms;
- the current method of operation at Gatwick Airport, due to numerous crossing moves between the fast and slow lines and a train always occupying one of the through platforms;
- the two track railway between Balcombe Tunnel Junction and Brighton constrains capacity due to station dwell times on the stopping services;
- eight-car platform lengths and limited through capability of the core Thameslink route;
- eight-car platform lengths on the East Grinstead line;
- conflicting moves between Down Victoria & Up London Bridge services at Windmill Bridge Junction and fast to slow line crossing moves at Selhurst; and
- the restrictive track layout and number of trains needing to reverse direction or split and join at Redhill.

Key constraints to suburban services are highlighted below:

- the restrictive layout of the approaches to London Bridge, the limited number of platforms and the intensive use of the available peak capacity by main line services;
- the current practice of running many peak period outer suburban services fast from East Croydon removes the calls that these services would otherwise make closer to London;

- platform lengths generally limit trains to eight-car;
- platform lengths on the Caterham and Tattenham Corner lines limit the many trains originating from these lines to six-car length for their whole journey, unless carriages are locked out of use or they attach/detach at Purley;
- suburban services are generally restricted to using only platforms 9 to 12 at Victoria;
- conflicting moves at the numerous flat junctions, particularly Battersea Park, Balham, Streatham North, Streatham Common, Selhurst and Gloucester Road;
- the convergence of multiple suburban routes in the Croydon area, with very limited capacity for turning trains round at both East and West Croydon. These challenges will increase when ELL services commence in June 2010;
- only a single platform available for turning trains in the Sutton area;
- the requirement to run most peak period Brighton – Bedford services via Herne Hill utilises capacity that would otherwise be available for suburban services; and
- the short formation Victoria – Peckham Rye – London Bridge service utilises the same platform capacity at each end of its route as longer trains from further out.

Other notable constraints are:

- the power supply capacity, particularly south of Gatwick;
- the flat junctions at either end of the West London Line with very limited locations suitable for holding freight trains;
- the inability to operate Class 92 hauled freight services via Redhill, resulting in the lack of availability of a second unrestricted Channel Tunnel route;
- the single line sections of the Uckfield Line; and
- passenger congestion at key stations such as Clapham Junction, Gatwick Airport, Balham, Victoria, London Bridge, Blackfriars, Farringdon, Kings Cross Thameslink and East Croydon.

Figure 9 represents the number of trains in the morning peak hour.

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

Route Section	Fast lines	Slow lines
Battersea Park – Victoria	16	15
Sydenham – London Bridge	15	8
East Croydon – Windmill Bridge Junction	20	20
Keymer Jn – Balcombe Tunnel Junction	12	N/A

Current performance

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

Performance on Sussex Route has been challenging over the past year. The Route is particularly sensitive to external events over which the rail industry has no direct control. Specific examples include:

- weather, particularly extremes of heat or cold, flooding, heavy rain and strong winds;
- landslips, whose risk is exacerbated by increasing extremes of wet and dry weather conditions;
- suicides;
- security alerts; and
- trespass and vandalism, mainly by youths on the outer area, remains a problem.

Management attention has been focussed on identifying and improving the worse performing Key Performance Indicators (KPI's) by analysing the root cause of train delay and taking appropriate improvement action. Some examples of actions taken include process improvements; leadership intervention & team changes; service recovery management and investment initiatives.

The complex layout and density of traffic on the Sussex Route means that performance can be severely affected by incidents, partly due to the complexities of train crew and rolling stock diagrams and the number of operators involved. Joint contingency plans for the Route, drawing on experience gained in previous incidents, have been developed to assist in service recovery; these plans are subject to continual review by the Integrated Control Centre team.

Figure 10 Current PPM MAA (2007/08)

TOC	MAA	As at period
Southern	89.4%	12
Gatwick Express	91.9%	12
First Capital Connect	90.4%	12

Section 2: Tomorrow's railway

HLOS output requirements

Figure 11 Total demand to be accommodated by Strategic Route

Routes	Annual passenger km forecast in 2008/09 (millions)	Additional passenger km to be accommodated by 2013/14 (millions)
Sussex	4,681	536

Figure 12 Peak hour arrivals to be accommodated by Strategic Route

London Terminals	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 (%)
Blackfriars (via Elephant & Castle only)	21,900	3,500	67	11,200	1,200	76
London Bridge (includes Charing Cross/Cannon Street /Blackfriars and terminating services)	127,600	12,600		65,200	7,800	
Victoria (includes Kent services)	58,700	5,300		29,300	2,800	

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

Future demand

Passenger numbers are anticipated to continue to grow strongly throughout the route, with peak commuter travel into London expected to grow to quickly fill up any additional capacity that can be provided in the short term.

A detailed assessment of future demand patterns for the London suburban area was carried out as part of the SL RUS. This work highlighted that passenger numbers on these services will grow at around 15 percent within the RUS period (to 2019). However existing demand is suppressed by typically 10 percent due to current overcrowding levels, leading to a potential overall growth rate of 25 percent.

The SL RUS acknowledges that annual growth rates higher than those projected over the 10 year period have been experienced in recent years. AM peak demand growth on Southern Metro services has been around 15 percent over the three years to the end of 2007, however the rate of growth has tailed off considerably during 2007 as trains become increasingly congested.

For main line services our understanding of demand is based on assessments that were undertaken by the SRA, and subsequently DfT, in developing the BML RUS. This predicted a background growth rate (due to new employment and housing etc) of between 1 percent and 3 percent per year on main line services up to 2012.

These figures may well need refinement as we develop the Sussex RUS, which commenced in February 2008 and will be published in the summer/autumn of 2009. The RUS will cover all routes and services in the Route 2 area with the exception of those suburban routes covered in the SL RUS.

The planned operation of ELL services from stations on the Sydenham line will open up new journey opportunities and demand from this line to northern parts of the City, plus interchanges to the Jubilee, District, Hammersmith & City and DLR.

Charing Cross, located in the heart of the West End, is likely to remain the preferred final destination for a significant proportion of the suburban flows into London Bridge.

There is significant peak period interchange from suburban services onto the Northern Line at Balham, contributing to congestion both at the station and on the Northern Line itself. Many of those interchanging are believed to work in the City of London so it may be possible to reduce this

feature by providing an increased level of peak services from the Norbury and Gipsy Hill routes direct to London Bridge.

It is likely that the development of improved through services from the West London Line to local stations south of Clapham Junction would lead to significant patronage. The large shopping centre under construction at Shepherds Bush is expected to be a significant off peak destination. The new station planned to open at this site will also provide an interchange with the Central Line leading to significant new journey opportunities.

The planned redevelopment of Battersea Power station is likely to generate significant off-peak demand.

Demand on the Uckfield Line is expected to continue to grow. This is likely to become constrained by on-train capacity due to the lack of availability of suitable diesel rolling stock.

Demand on the Coastway routes is likely to continue to grow in line with employment and leisure growth at Brighton, Portsmouth and elsewhere. A further factor is the increasing traffic congestion on the A27 highway corridor and in town centres.

Freight demand on the WLL is likely to grow modestly as aggregates, Channel Tunnel and other traffic develops.

The planned major increases in capacity at Victoria underground station and on the Victoria Line are likely to encourage additional peak period demand on services into the main line station. At present, some journeys are made via alternative routes to avoid the underground.

The planned construction of several new high rise developments in the City of London, with the tallest at London Bridge station itself, is likely to lead to a significant increase in demand for services to London Bridge and the Thameslink core stations.

The continued development of the Docklands area and London Olympics site is likely to lead to an increase in passengers interchanging to the Jubilee Line at London Bridge, especially from stations that will not be served by the extended ELL.

Section 3: Proposed strategy

Figure 13 summarises the key milestones 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
December 2008 > March 2009	Implementation of Brighton Main Line RUS	Minor works at Gatwick Airport station Minor power supply works south of Gatwick	Additional commuter capacity to Brighton line Additional commuter capacity to Redhill corridor
December 2008 > March 2009	Thameslink Programme Key Output 0	Closure of Blackfriars bay platforms to permit Thameslink construction works to proceed	Kent route services terminating Blackfriars to be extended up the Thameslink core, taking over the paths of services terminating at Moorgate. This has a significant indirect affect on the Sussex route as a result of the rolling stock cascade required.
September 2009	New South Central franchise. Main line and suburban timetable rewrite (including West London Line route)	None	New timetable to allow ELL services to operate It is intended that this will also implement SL RUS options and be compatible with Thameslink Programme Key Output 1
December 2009	East London Line extension Phase 1	New Cross Gate flyover Turnback siding at West Croydon Additional platforms and track layout changes at Crystal Palace Additional crossover at South Croydon	ELL services to West Croydon and Crystal Palace
December 2011	12-car operations on East Grinstead Line	Several platform extensions and associated works	12-car East Grinstead to Victoria/ London Bridge services
December 2011	10-car suburban operations into Victoria/ London Bridge	Battersea Park station redevelopment with platform extensions potentially closing Atlantic line junction Clapham Junction redevelopment with platform 14 and 15 straightening and lengthening Balham track and station layout modifications Streatham Common new bridge Platform extensions and associated S&C and signalling works at a wide range of further locations Depot modifications	10-car services on suburban routes via Norbury, Gipsy Hill and Hackbridge into Victoria. 10 car suburban services on the Sydenham lines into London Bridge, with possible 12 car capability on some services.

Figure 13 Summary of proposed strategy milestones

Implementation date	Service enhancement	Infrastructure enhancement	Expected output change
		Enhancements to stabling facilities Potential further power supply enhancement works	
December 2011	Thameslink Programme Key Output 1	Blackfriars remodelling Farringdon remodelling	12-car services through the Thameslink core
January 2012	Start of London Bridge remodelling	Reduction in terminating capacity at London Bridge to allow construction works to proceed	Potential temporary service reductions to facilitate long term works to re-configure the station
December 2012	Gatwick track layout and station remodelling	New station concourse, additional platform and track layout modifications	Improved station facilities and congestion relief Improved track capacity and performance Facilitates 2tph Reading to Gatwick service
March 2014	West Croydon track layout and station remodelling	Creation of a through Up platform 1 and improvements to station concourse and platform access	Improved terminating capacity at West Croydon, with capability to turn back 12 car services conflict free of Up services.
March 2014	Redhill remodelling	Additional platform and track layout modifications	Improved track capacity, maintainability and performance.
December 2015	Thameslink Programme Key Output 2	Completion of the Thameslink Programme	Increase in through capacity via London Bridge

Strategic direction

The Sussex route will undergo a significant period of change over the next ten years. The most visible of these will be the completion of the extended East London Line and the commencement and completion of construction works for the Thameslink Programme.

In parallel with these major projects, significant timetable changes will be required to implement the Brighton Main Line RUS, to facilitate ELL services, Thameslink Programme construction works and to implement RUS options.

The SL RUS identified that train and platform lengthening will be the major means of delivering growth in the London suburban area.

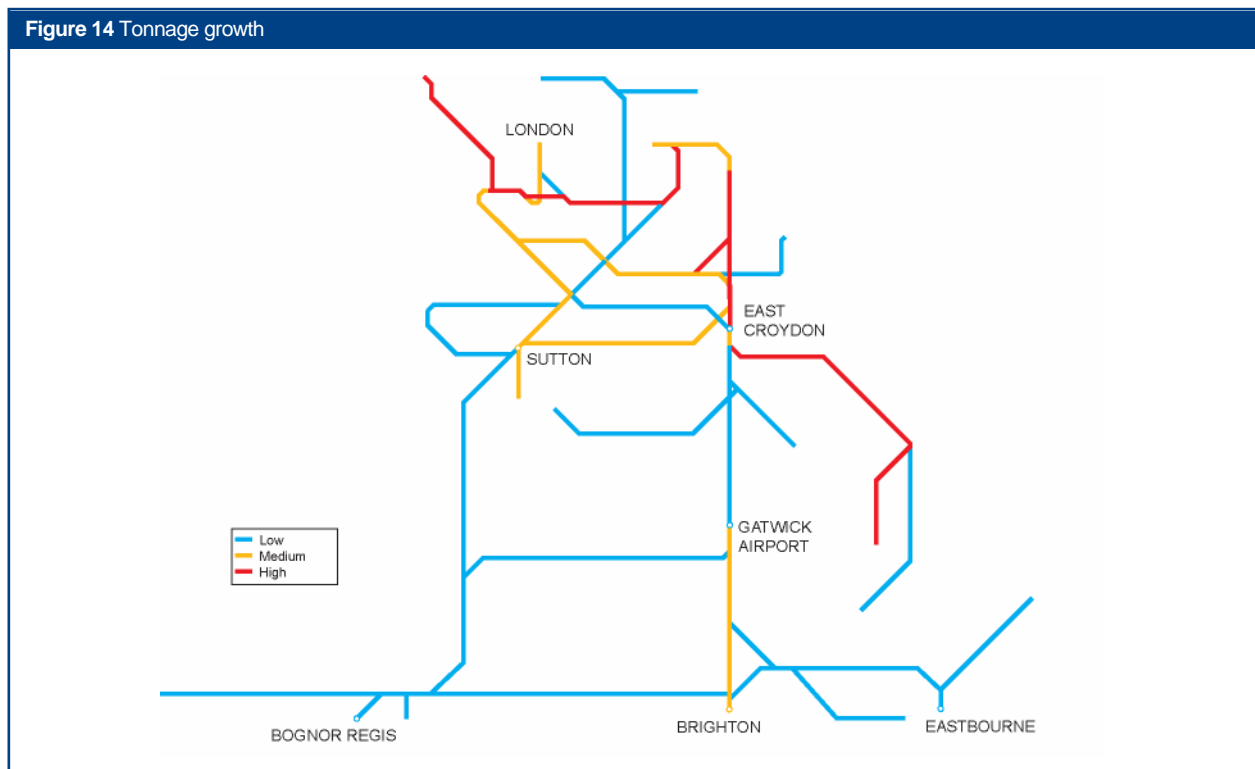
Whilst work on the Sussex RUS has only just commenced it is likely to have fewer such options available, since many main line services are 12-car already. The Sussex RUS is therefore likely to need to consider whether further train lengthening is appropriate or if additional train paths could be facilitated by infrastructure works at key constraints such as Gatwick Airport and East Croydon. Detailing the limitations imposed on capacity by the key London termini will also be key to understanding the value of any further major infrastructure investment on the route.

The key infrastructure enhancement requirements for CP4 are therefore:

- implementation of the Thameslink Programme;
- 10/12-car operation in the suburban area, as identified by the SL RUS;
- track layout, signalling and platform work at various sites to facilitate 10/12-car operations; and
- modifications to depot and stabling facilities to support a 10/12-car peak railway.

The lengthening of suburban services to Victoria and London Bridge needs to be complete prior to the Thameslink construction works at London Bridge affecting the terminating platforms. This will help mitigate against some of the loss in train paths during the works.

All development work on 10-car operations will consider, location by location, the feasibility of going straight to 12-car platform lengths.



The key timetable changes required on the route will be driven by the following:

- modifications in December 2008 to implement the Brighton Main Line RUS, together with changes resulting from Class 442 introduction and a rolling stock cascade required to implement Thameslink Programme Key Output 0;
- a new timetable from December 2009 to allow ELL services to operate and to implement SL RUS options. It is intended that this will also make provision for the lengthening of Bedford – Brighton services to 12-car in 2011;
- changes and possible reductions in service levels will be necessary post-2012 to facilitate remodelling works at London Bridge; and
- a new timetable will be required in 2015 to allow the final 24tph Thameslink service to operate.

As part of the Strategic Freight Network, there is provision in CP4 for the development of an alternative route enabling Channel Tunnel freight traffic to run via Redhill and Reading and beyond, taking account of other traffic on the route. The scheme would offer a route from the Channel Tunnel to the Midlands and the North West which would avoid congested routes in the London area.

Future train service proposals

Figure 14 indicates the forecast percentage change in tonnage on the route to 2017.

The completion of the ELL extension and the construction works and subsequent completion of the Thameslink Programme will lead to opportunities for new train routeings.

ELL services will operate onto the Network Rail network south of New Cross Gate. These will offer new journey opportunities but services will be restricted to four car so will be operated by high density rolling stock designed for large numbers of standing passengers.

TfL is presently developing plans for ELL Phase 2 that would see four tph operating from Clapham Junction (a new Platform 1) via the Ludgate Lines to the South London Line and a new connection with the ELL north of Queens Road Peckham.

WLL services will operate across Clapham Junction onto the slow lines to the Croydon area. Services will initially be restricted to four car though they could be extended to eight car at a future date as demand grows. Some northbound services could potentially be terminated at Shepherds Bush to minimise the need for dual voltage rolling stock and platform lengthening north thereof.

Services from the Thameslink core will operate to various suburban and longer distance destinations on the Sussex route. The precise destinations are likely to be driven by operational practicability as much as passenger demand, especially until the final works are complete. The need to minimise station dwell times in the Thameslink core will be a critical factor. These trains will operate both south and north of the Thames and will therefore be both AC and DC equipped.

Future capability

The key infrastructure capability issues are related to train lengthening requirements. Some of the platform lengthening works will require only minor associated works such as relocation of Driver Only Operation equipment and extension of existing platforms. Certain sites will require more significant work such as track layout changes, bridge reconstruction and considerable alterations to the positioning of signals.

The most significant implications of the suburban 10/12-car strategy for berthing are likely to be at Selhurst depot, where many roads are not suitable for 10- or 12-car formations.

A number of other significant depots and berthing facilities such as Streatham Hill and Horsham may not have adequate capacity for 10- or 12-car formations at present though options could exist for further capacity. A number of regularly used stabling points such as Pugs Hole and Battersea Pier are unable to take 10-car formations and clearly could not be extended. In the medium term additional capacity at Stewarts Lane or possibly Three Bridges for Sussex suburban stock may be required, though it is noted that in the former case at least, the depot location is sub optimal for sourcing stock for the morning peak.

Increased Selective Door Opening capability is likely to be required if, as expected, it proves impractical to extend all platforms on the routes proposed for train lengthening. However some of the sites which are the hardest to extend are the busiest stations where SDO would not be workable.

Despite the recent completion of significant power supply upgrade work, further work will be required at a number of locations across the route to facilitate delivery of the proposed timetable changes and train lengthening set out in Figure 13.

Future capacity

The SL RUS and BML RUS highlight that the route is operating close to the maximum number of trains that can be run in peak periods at present.

By the end of 2011 the SL RUS recommends 10-car operation on the Norbury, Gypsy Hill, Hackbridge routes and 12-car capability on Sydenham and East Grinstead lines into Victoria and London Bridge.

Approximately 100 additional vehicles will be required to implement this suburban train lengthening strategy for the high peak (08:00 – 08:59 arrivals into London termini) and on some shoulder peak services.

In addition to those vehicles required to lengthen current eight car services, a small number of vehicles is required to strengthen existing peak services that are not presently operating at their potential maximum length. These are primarily on the Uckfield route where approximately eight additional DMU vehicles would be required to strengthen peak and some shoulder peak services. A small number of high peak services on the Caterham/Tattenham branches and to/from the Wimbledon loop are also currently not operating at their maximum potential length. Approximately four additional vehicles would be required to cover these services.

Train lengthening for the Thameslink programme will allow 12-car services to operate between the BML and Thameslink destinations north of London by December 2011.

This move from eight to 12 car would require up to 48 additional vehicles to cover the peak hours on the Sussex route and would be in addition to up to 48 additional vehicles likely to be required initially to cover timetable changes in December 2008 and December 2009.

The Sussex RUS will consider further the case for train lengthening and/or capacity enhancements on the east and west coastway services and on other remaining 'outer' peak commuter services that are not already 10/12-car. It is reasonable to expect that a further eight to 16 vehicles could be required to support these services by the end of CP4.

In addition to train lengthening initiatives, a number of major infrastructure enhancements at key capacity bottlenecks are planned within CP4.

The planned remodelling of the Gatwick Airport track and station layout would provide some additional capacity in this area and ease one of the

major constraints on the route. However additional trains to London would be dependent on additional capacity being available elsewhere on the route, particularly through the East Croydon corridor. The Sussex RUS will consider this latter constraint further, in the meantime land adjacent to the station is being safeguarded in order to allow for the future development of additional platform capacity.

The planned remodelling of Redhill will improve the operability of this area and reduce maintenance difficulties.

The post ELL works remodelling of West Croydon, best undertaken as part of the 10/12-car scheme in 2011, could facilitate improved terminating capacity for suburban services. This is significant, since it potentially offers a simpler way forward in the short to medium term than providing further terminating capacity in the East Croydon area. In particular, if completed by the time of the London Bridge blockade, 12-car Sydenham Line services could be turned round at West Croydon. Longer term the scheme could provide a terminating point for 12-car Sydenham Line Thameslink services, should this route prove to be a favoured Key Output 2 option.

The SL RUS and other workstreams have identified that certain stations will require works to enable them to cope with the predicted growth in passenger numbers:

- London Bridge station is very congested. This is to be addressed by the London Bridge Masterplan which forms part of the Thameslink Programme;
- parts of Victoria station, notably the interface between main line and underground stations, are very congested. Options for increasing passenger capacity are under development by our Victoria Masterplan project and are being closely coordinated with London Underground's plans;
- King's Cross Thameslink station suffered from serious congestion but was replaced by a new station at St Pancras Midland Road in late 2007;
- Blackfriars and Farringdon are also congested stations and capacity would be increased significantly by the Thameslink project;
- Clapham Junction is severely congested in places. Options for a short term improvement by providing a new station entrance to the footbridge are under development. We are also working with adjoining landowners to ensure that provision is made for the straightening of platforms 14-17 to improve stepping distances and facilitate lengthening;
- Balham station is currently congested with significant interchange movements to the

Figure 15 Forecast PPM MAA- CP4 plan

	2009/10	2010/11	2011/12	2012/13	2013/14
First Capital Connect	89.9%	90.4%	90.7%	91.1%	91.4%
Southern	90.7%	91.0%	91.2%	91.7%	92.0%

Figure 16 Forecast PPM MAA - proposed local commitments

	2009/10	2010/11	2011/12	2012/13	2013/14
First Capital Connect	88.9%	89.4%	89.6%	90.0%	90.4%
Southern	89.0%	89.3%	89.6%	90.0%	90.4%

- Northern Line. A combined scheme is being considered to respond to both station congestion and platform lengthening issues; and
- East Croydon will require works in the short term to relieve congestion. This would work best if it could be integrated with adjacent developments on either side of the railway corridor. A project is presently under development.

Future performance

Figure 15 sets out the planned PPM for each train operator. Figure 16 sets out the trajectory we propose as local commitments with each operator. These are lower than planned given the need for flexibility in achieving the HLOS targets and to reflect the greater uncertainty and risk associated with projecting performance at a disaggregated level. Reasonable requirements will finally be established for CP4 in our 2009 Business Plan. In some cases the services covered by the franchises will change; this means that the forecast PPM figures are not directly comparable with the current PPM figures.

Southern

The performance of the Southern franchise is currently 89.8 percent PPM and this is forecast to rise to 90.7 percent by April 2009 as an outcome of the 2008/09 Joint Performance Improvement Plan (JPIP).

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

- uncertainty around the impact of the East London Extension, Thameslink programme work and the Brighton Main Line RUS;
- integration of Southern and Gatwick Express services and re-franchising of the operator;
- full remote condition monitoring for all assets;
- removal of permanent speed restrictions across the route (one of these will be as a result of the closure of a level crossing);
- reduce the impact of trespass, vandalism and fatalities;
- junction remodelling at Gatwick Airport;
- autumn management;
- level crossing renewal;

- timetable recast to ensure full compliance with an updated Rules of the Plan; and
- examination of further infrastructure enhancements including increased turnround speeds, closed-up signalling and increased line speeds.

The Route Plan is being developed around these key points and currently suggests that performance on Southern by April 2014 will be around 92.0%. This includes an allowance for passenger/traffic growth and for the effects of Thameslink Key Output 0.

First Capital Connect

First Capital Connect operates the suburban train routes into London King's Cross and the cross London Thameslink route. The performance of the TOC is currently 90.4 percent and this is planned to rise to 90.7 percent by the end of March 2009 due as a result of the action included within the Joint Performance Plan. There is a significant level of change in service patterns driven by the Thameslink works throughout CP4 and the likelihood that some services will be jointly operated with Southeastern. This together with relatively major changes to fleet resources will result in some challenges to maintain performance.

The key performance issues and opportunities identified for this TOC include:

- minimising the operational impact of the Thameslink programme; to date modelling work has only been focussed on Key Output 0 and there is a degree of uncertainty around the full impact of the work programme;
- uncertainty over the impact of the ELL extension and planned rewrite of the South London and Brighton Mainline timetables;
- the impact of passenger growth;
- the impact of enhancements on the East Coast – especially around King's Cross, Finsbury Park and Hitchin;
- specific concerns over seasonal variation and the likely benefits of Remote Condition Monitoring;
- maintenance of journey times; and

- the impact of fleet changes – and stabling arrangements.

The TOC is currently concerned by the lack of a detailed plan to deliver performance improvements on this route especially due to the large amount of uncertainty. We will work with the TOC to produce a long term performance plan during the summer and the expectation is that this will result in a forecast level of performance of 91.4% by the end of 2013/14 (including the impact of the Thameslink works).

The other operators on this route are FGW, Southeastern, SWT, Arriva CrossCountry and London Overground. The future performance section for FGW can be found in the plans for Routes 12 & 13, Southeastern in the plan for Route 1, SWT in the plans for Routes 3 and 4, CrossCountry in the plans for Routes 8, 12, 13, 17, 18, 19 and 20 and London Overground in the plan for Route 6.

Engineering access

Engineering access on the route is largely managed by a cyclical possessions regime, generally providing our engineers with access to every location on the route at least every 13 weeks.

Overnight maintenance opportunities are particularly short, primarily due the very high passenger demand for trains leaving London late in the evening, rendering the unpopular option of bus substitution impractical in most cases. This results in midweek possessions generally lasting no more than four hours, severely limiting the types of activity that can be carried out on weekdays and significantly increasing overall maintenance costs.

Demand for weekend services is presently significantly lower than that on weekdays for most of the year, though weekend passenger demand is rising consistently across the Sussex route at present. Major items of engineering work are presently scheduled to be carried out on Sundays, or in some cases on Saturdays, affecting fewer passengers than weekday possessions but still in some cases creating disruption for the growing weekend market. Weekend passenger demand is particularly high for coastal services (especially to Brighton) between mid May and mid September, during which time we seek to avoid disruptive engineering work. There is also high weekend demand into principal towns in the month prior to Christmas and at times of other key events.

There are diversionary routing opportunities that enable passengers to reach many of the main towns even if the main route is closed with, for

example, multiple routes to London from Croydon, Sutton, Epsom and Horsham. There are also diversionary routes available to Brighton via either Horsham or Lewes, though both routes have significantly longer journey times than the main line and have limited capacity.

It is normally possible for two tracks to be kept open to traffic during most types of maintenance work on the four track sections of the Brighton Main Line. This enables an hourly overnight service to run between London Victoria and Three Bridges every night of the week. If adjacent lines are required these can be taken on a Saturday night for four hours whilst trains are single line worked over the remaining open line. If any longer periods are required this is generally planned around Christmas Day and Boxing Day when a limited service would normally operate.

The route will be affected by some significant and challenging engineering projects over the next few years. Careful planning is underway for these schemes to minimise any adverse impact. Potential examples include implementation of the ELL project, the Thameslink Programme (especially works around London Bridge), together with the potential enhancement schemes at Gatwick Airport, Redhill, East Croydon and Clapham Junction.

There are also potentially a number of further S&C renewal schemes on the route. These are currently under investigation, though by their nature some of these will be extremely disruptive and will therefore be planned at times when there are fewer passengers travelling.

Long term opportunities and challenges

We anticipate that accommodating growth in commuting and other travel to central London will be a significant challenge on the route, with continued growth in central London employment expected. The context is that much of the route is already operating at, or very close to, capacity.

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

- implementation of the BML RUS;
- implementation of an improved main line and suburban timetable to facilitate the opening of the East London Line Extension;
- an ongoing programme of train lengthening, commencing with suburban services into Victoria;
- construction of the Thameslink programme;
- ticket pricing initiatives to spread the peak and smooth the high peak requirements;
- remodelling of key infrastructure constraints such as Gatwick Airport, Redhill and West Croydon;
- maximising the throughput of the critical East Croydon corridor. In the longer term this may require additional tracks and platforms and potentially further grade separation of junctions; and
- incremental capacity enhancements elsewhere.

It is notable that certain infrastructure constraints on this route do not lend themselves to a solution in the foreseeable future. These factors limit the route's ability to cope with future growth:

- there are several lines where expansion from two to four tracks would be desirable, but there is insufficient land available at critical locations;
- there are several flat junctions on the route, but there is insufficient space available for grade separation at many of the locations that would benefit from it;
- the key terminus stations at London Bridge and Victoria are close to capacity in the peak and few options are available to provide additional terminating platform capacity;
- extending suburban services operating via Tulse Hill and Herne Hill to beyond eight car would be very expensive; and
- extending other suburban services to lengths beyond 10-car length would then become increasingly expensive.

Enhancements to be completed by end of CP3

Figure 17 CP3 enhancements					
Implementation date	Project	Project description	Output change	Funding	GRIP stage
2008	ⓑ Shepherds Bush new station	New station	New journey opportunities. Interchange to LUL Central Line	Developer	6
2008	ⓒ Eastfields, Mitcham new station	New station	New journey opportunities	Network Rail Discretionary Fund	6
2008 - 2009	ⓓ BML RUS implementation works	Minor station works at Gatwick Airport Class 442 route clearance	Facilitates implementation of BML RUS	Network Rail Discretionary Fund	2
2008	ⓔ Thameslink Programme Key Output 0	Closure of Blackfriars bay platforms	Permits work to commence on the Thameslink Programme	Periodic Review 2008	3
2008	ⓕ Enhanced selective door opening	Track-based equipment to optimise SDO operation where platform lengths at a station differ	Removes unnecessarily restrictive SDO door opening arrangements	TOC	6

Proposed enhancements in CP4

Figure 18 Proposed enhancements in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2008-2012	Ⓜ Strategic Route 2: Power Supply enhancements	Upgrade to four substations of four track paralleling huts at Redbridge, Copyhold Jn, Burgess Hill and Folly Hill and construction of a new substation at Maidenbower. Further substantial works to be determined from power supply modelling work presently under way	Facilitates BML 2008 timetable changes and SL RUS strategy of suburban 10-car network and 12-car to East Grinstead	Periodic Review 2008	1
2008-2011	Regenerative braking	To facilitate the return of braking energy into power supply system	Reduction in operational costs	Periodic Review 2008	–
2009	Ⓚ Imperial Wharf new station	New station	New journey opportunities	Developer	5
2010	Ⓛ ELL Phase 1 extension	Extension of ELL services to West Croydon and Crystal Palace	New journey opportunities Provides additional capacity without requiring extra services into London Bridge	TfL	3-6
2010	Ⓛ Newhaven rationalisation	Close Harbour station and rationalise Marine branch	Reduction in operating costs	RAB	1
2011	Ⓜ 10-car suburban operation into Victoria and London Bridge	Platform extensions to facilitate train lengthening from 8-car to 10-car on Norbury, Hackbridge and Gypsy Hill routes. 12-car capability on some Sydenham line services into London Bridge	25% increase in capacity on selected suburban routes into Victoria and London Bridge	Periodic Review 2008	up to 2
2011	Ⓝ Battersea Park redevelopment	Platform extensions and track layout changes Station improvements	Facilitates 10-car operation on Sussex Suburban routes Provides access to Battersea Power station development	Periodic Review 2008/ Developer	2

Figure 18 Proposed enhancements in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2011	Ⓞ Clapham Junction redevelopment	Straighten and extend platforms 14 & 15 Station improvements	Facilitates 10/12-car operation on Sussex suburban routes Provides additional passenger capacity at a congested station	Periodic Review 2008 Developer	2
2011	Ⓟ 12-car operation East Grinstead line	Works to facilitate train lengthening from 8-car to 12-car	50% increase in capacity on extended services	Periodic Review 2008	up to 2
2011	Ⓞ Thameslink Programme Key Output 1	Reconstruction of Blackfriars and Farringdon stations	Allows 12-car services to operate across central London, with timetable enhancements Station congestion relief and improved facilities	Periodic Review 2008	
2012	Ⓡ Gatwick Airport remodelling	Expanded station concourse, integration with airport terminal and improved track layout with additional platform face	Improved station capacity and additional track layout flexibility	Periodic Review 2008/Developer	3
2011-2014	Ⓢ West Croydon remodelling	Track layout changes and platform extensions Station improvements	Facilitates 10/12-car operation, potentially with additional turnback capacity if track remodelling is delivered in parallel Improves station facilities	Periodic Review 2008	1
2011-2014	Ⓣ East Croydon redevelopment	Station concourse and access improvements	Increased passenger capacity and improved station facilities	Periodic Review 2008/Developer	2
2012	ⓐ ELL Phase 2 extension	Extension of 4tph ELL services to Clapham Junction. Requires Clapham Junction Platform 1, possibly signalling and trackwork on the Ludgate lines, new junction north of Queens Road Peckham	New journey opportunities Provides additional capacity without requiring extra services into London Bridge or Victoria	TfL	-
2012-2015	Ⓞ Thameslink Programme Key Output 2	Reconstruction of London Bridge station and eastern approaches	Allows 24tph to operate across central London Station congestion relief and improved facilities	Periodic Review 2008	

Figure 18 Proposed enhancements in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2013-2018	Ⓟ Victoria station redevelopment	Station redevelopment scheme	Improved station facilities	Network Rail	–
2014	ⓧ Redhill remodelling	Additional platforms and track layout changes	Provides additional capacity and improves maintainability, journey times and performance	Periodic Review 2008	1

NRDF candidate schemes in CP4

Figure 19 Candidate NRDF schemes in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2009	Ⓨ Billingshurst Up platform extension	Platform extension to allow 8 or possibly 12-car services to call without SDO	Removes trains fouling the level crossing whilst calling at the station	Network Rail Discretionary Fund	1
2010	Ⓜ East Grinstead signalling improvements	Installation of additional signal on Up and Down lines to reduce headways	Improved performance	Network Rail Discretionary Fund	1
2010/11	Ⓜ Sutton platform 3, Wallington Line tumbback	S&C and signalling alterations at time of S&C renewal to deliver an additional terminating platform for Wallington line services	Provides additional turnback capacity for Wallington line services, improves performance	Network Rail Discretionary Fund	–
2009-2011	Ⓜ Falcon Junction & Bromley Junction	Removal of approach control	Reduction in time taken for the conflicting move	Network Rail Discretionary Fund	3
2011	Ⓜ Balham station	Creation of second station entrance	Increased station capacity	Network Rail Discretionary Fund	–
2009-2014	Ⓜ General linespeed improvements	Increases in linespeeds at a number of locations e.g. between Balcombe and Earlswood, on the Arun valley line and between Lewes and Eastbourne	Potential reduction in journey times/ improvement in performance	Network Rail Discretionary Fund	–

Maintenance and renewals activity

Figure 20 shows the estimated maintenance and renewal 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 & 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 small proportion of the activities in these areas will slip to subsequent years.

Figure 20 Summary of estimated maintenance & renewals costs and activity volumes

£m (2006/07 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	Control Period Totals			
						CP4	CP5	CP6	CP7
Maintenance expenditure									
Track	19	19	18	17	18	90	78	74	74
Signalling	8	8	8	8	7	39	35	34	34
Electrification	3	3	3	2	2	13	11	11	11
Telecoms	4	3	3	3	3	16	13	12	12
Plant and Machinery	1	1	1	1	1	5	5	5	5
Other (overheads / indirect)	16	15	15	14	14	74	67	64	64
Total	51	49	47	45	46	238	209	200	200
Renewals									
Track	37	35	37	36	36	181	187	108	79
Signalling	9	9	20	35	33	106	156	258	53
Civils	23	31	23	20	19	116	104	100	99
Operational Property	25	20	18	17	17	98	75	75	75
Electrification	9	13	15	15	14	66	33	21	43
Telecoms	16	10	6	6	3	41	27	20	27
Plant and Machinery	8	6	3	3	3	22	24	23	26
Total	128	124	121	131	126	630	606	604	403
Renewals Volumes									
Rail (KM)	29	29	29	28	30	146	206	116	142
Sleepers (KM)	39	39	39	39	39	197	234	146	53
Ballast (KM)	45	45	45	45	45	227	295	237	144
S&C Units	28	28	38	43	42	179	161	116	103
SEUs commissioned	0	0	7	0	190	197	854	1423	180

Appendix

Figure 21 Strategic route section

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
02.01	Victoria – Windmill Bridge Jn	VTB1	Primary	DfT	No	W6/W9	RA8	45-60	Third rail	TCB	2 – 3	4
02.02	Windmill Bridge Jn – Brighton	VTB2,3	Primary	DfT	No	W7/8/9	RA8	70-90	Third rail	TCB	2 – 4	2 and 4
02.03	London Bridge – Windmill Bridge Jn	LBW	London & SE	DfT	No	W6	RA8	60-70	Third rail	TCB	2 – 3	4
02.04	Three Bridges – Littlehampton Jn (Arun Valley Line)	TBH1	London & SE	DfT	No	W6	RA8	65-85	Third rail	Various	3 – 12	2
02.05	South Coastal Line (West Coastway)	BLI, PPH, BBR, TBH2	London & SE	DfT	No	W7	RA8	60-80	Third rail	TCB	3 – 4	2
02.06	Eastbourne Line (East Coastway)	KJE,BTL, STS, WJB	London & SE	DfT	No	W6	RA8	55-90	Third rail	Various	3 – 7.5	Mostly 2
02.07	Southern Inner Suburban	BTH1,HHT, LTH,BBJ, WTH,SCP, SSC,WCS, NFE,BJN, SNS	London & SE	DfT	No	W6	RA8	30-50	Third rail	TCB	2 – 3.5	Mostly 2
02.08	Southern Suburban Sutton Lines	SMS,NFE, BTH2,3	London & SE	DfT	No	W6	RA8	40-60	Third rail	TCB	3 – 7.5	Mostly 2
02.09	Dorking – Horsham	BTH3	Rural	DfT	No	W6	RA8	75	Third rail	mixed	3 – 9	2

Figure 21 Strategic route section

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
02.10	Hurst Green Junction – Uckfield	SCU	London & SE	DfT	No	W6	RA6	70	None	TCB	12	1 and 2
02.11	Tattenham Corner and Caterham Lines	PAT,TAT	London & SE	DfT	No	W6	RA8	20-60	Third rail	TCB	4 – 8	2
02.12	East Grinstead Line	SCU,HGG	London & SE	DfT	No	W6	RA6	60-70	Third rail	TCB	3.5 – 8	2
02.13	West London Line	WLL,CJL, SCC,FLL, CKL,BSF	London & SE	DfT	No	W9	RA8	40-60	Third rail/overhead line	TCB	3 – 4	2
02.14	South London Line	ATL	London & SE	DfT	No	W9	RA8	45	Third rail	TCB	2.5 – 3	2
02.15	Thameslink Routes	HHH,FTL, MCL	London & SE	DfT	No	<W6	RA4	25-60	Third rail/overhead line	TCB	2 – 3	Mostly 2

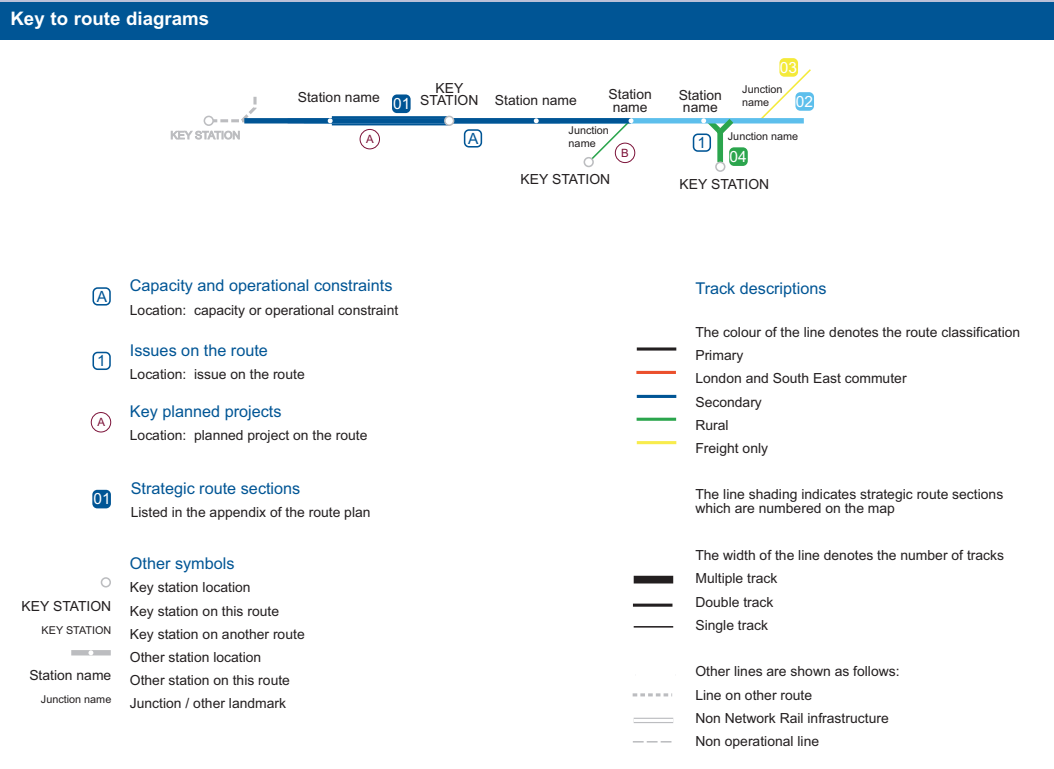
Capacity and operational constraints

- A Gatwick Airport: track layout is not optimised for terminating services, pedestrian capacity issues in station.
- B East Croydon area: track and platform capacity at limit, pedestrian capacity issues in station.
- C Clapham Junction: pedestrian capacity issues in station.
- D Suburban area: 8-car platforms.
- E Spa Road/Blue Anchor: flat crossing for FCC services between Sussex and Kent routes restricts capacity
- F Redhill: limited number of platforms and the need for services to reverse restricts capacity
- G Heme Hill: flat crossing between Sussex and Kent routes restricts capacity
- H Balcombe Tunnel Junction to Brighton: mainly two track railway with differing stopping patterns restricts capacity

Note

This Route Plan forms part of the April 2008 update of Network Rail's Strategic Business Plan. The Route Plan supersedes the version published on 1 November 2007.

Other documents in the Strategic Business Plan can be found on the Network Rail website 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

**This Route Plan is part of a set.
To view or download the others
visit www.networkrail.co.uk**

Network Rail
40 Melton Street
London NW1 2EE
Tel: 020 7557 8000
www.networkrail.co.uk

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