South London

Route Utilisation Strategy

March 2008

Foreword

I am delighted to present Network Rail's Route Utilisation Strategy (RUS) for South London. This presents our detailed plans for a complex suburban railway, giving this crucial and often overlooked part of the network the attention it merits.

The dominant challenge within the South London RUS area is providing sufficient capacity for commuters travelling between the suburbs and central London during the weekday morning and evening peak periods. This has always been a challenge in this densely populated part of the capital, and recent trends have seen substantial passenger growth, which is forecast to continue. Our principal strategy to accommodate this growth is a programme of train and platform lengthening, entirely consistent with our Strategic Business Plan which responded to Government's High Level Output Specification.

This RUS is presented in a slightly different format than others to date. This is primarily because of several developments which have occurred since the publication of the Draft for Consultation, all of which are welcomed. These have included Government's funding commitment to the Thameslink Programme, further timetable development work on the East London Line extension to West Croydon and Crystal Palace and an agreement between DfT and Southeastern to maintain broadly current levels of train services in peak hours to Charing Cross following the introduction of high-speed rail services to St Pancras. As a result of these developments many of the options which were presented in the Draft for Consultation have now become committed schemes.

The RUS starts by describing in detail infrastructure, operational and demand aspects of the current railway network. It moves on to describe the strategy for the December 2009 timetables, making it clear how issues such as the East London Line extension and the commencement of construction works on Thameslink will be accommodated. It goes on to describe the strategy for providing additional capacity by 2012, primarily train lengthening but also including a small number of service changes. The RUS highlights issues associated with the reconstruction of London Bridge before moving on to present detailed analysis regarding the 2015 train service specification for the Thameslink network. Finally, it considers longer term issues and opportunities, responding to the lead given in the Government's Delivering a Sustainable Railway White Paper.

This RUS was initially published as a Draft for Consultation in July 2007. A great many issues were raised during the consultation period and these have now influenced several aspects of the strategy. I would like to thank everyone who responded to the consultation for their contribution.

The production of this strategy has been led by Network Rail, but it has been developed by the whole industry. A large number of organisations, including Transport for London and our customers, the passenger and freight operators, have been fully involved and I would like to thank them all for their efforts.

Iain Coucher
Chief Executive

Executive summary

The South London Route Utilisation Strategy (SL RUS) is part of Network Rail's national RUS programme. It highlights how best to meet the challenges of overcrowding and the continued growth that the railway now faces, nowhere more so than in this part of the capital. The RUS has been developed as a result of considerable analysis and close collaboration between Network Rail, the Department for Transport, Transport for London, passenger and freight train operators.

The RUS process has also involved extensive engagement with a wider group of stakeholders, including a formal consultation on the Draft RUS between July and October 2007. The consultation raised many significant issues and these have influenced several aspects of the strategy.

The detailed recommendations resulting from the RUS process are now contained in this document. The strategy covers in detail the period up to 2019 but also considers issues and opportunities which may be relevant beyond this period.

This RUS, together with all the others that have been published to date, is available electronically at www.networkrail.co.uk.

Context

The SL RUS focuses its attention on the complex suburban railway network south of the river Thames. This area is dominated by morning and evening peak commuting on weekdays from the suburbs into central London, and it is therefore issues associated with peak capacity which the RUS has primarily sought to address. It is, however, recognised that there is significant off-peak passenger demand and that sizeable volumes of freight traffic operate over parts of the network.

Whilst the operation of suburban services cannot be treated independently from the main line services with which they interact, one of the main rationales for the geographic scope of this particular RUS was the view that previous rail industry plans have focused their attention on longer distance services.

This RUS is intended to ensure that the South London suburban network is given the attention it merits.

Since the draft RUS was published, Government has issued its White Paper 'Delivering a Sustainable Railway'. This incorporated the High Level Output Specification (HLOS) and a funding package for the Thameslink Programme, which was given funding approval as a specified scheme. Similarly, in October 2007, a funding package was agreed for the Crossrail scheme. The RUS has since been developed on the expectation that these schemes will go ahead.

Passenger growth

The trend in recent years has been one of continuing growth in peak period passenger numbers. On some routes – for example Southern's busiest Sydenham and Norbury lines – morning peak growth has been in excess of 40% over the last 10 years.

Journey times are generally short (less than 20 minutes) so the capacity of trains assumes that substantial numbers of passengers will stand for peak period journeys rather than have a seat. However, even when standing is allowed for, many trains still operate in excess of their design capacity. Furthermore crowding has now reached the level at which passengers are physically unable to board some peak trains at certain stations.

The RUS has identified that growth is forecast to continue. Combined with the current overcrowding and evidence of a high level of suppressed demand at present this makes a compelling argument for provision of additional capacity.

Short term changes (up to 2010)

There are three significant challenges in the short term and these are interlinked.

The initial challenge is the commencement of construction work on the Thameslink programme at Blackfriars. The infrastructure changes here will result in a rolling stock cascade across the RUS area. This will be caused by the non-availability of platforms 1-3, requiring all services into Blackfriars to continue to operate northwards, resulting in an increase in the use of scarce dual voltage rolling stock. Implementation of this scheme is planned for early 2009. As a result, many stations will benefit from new direct journey opportunities beyond Blackfriars.

The second challenge is the opening of the East London Line extension (ELLX) to West Croydon and Crystal Palace. This scheme will provide significant capacity and new journey opportunities and is expected to be warmly welcomed by those benefiting from it. However it is incompatible with the current timetable structure and a major recast of services across the whole of the suburban area and Brighton Main Line will be necessary before ELL services can run. Much of the timetable development work undertaken for the RUS has sought to maximise the capacity that can be provided, responding to a range of peak crowding issues, rather than just fitting in the new ELL services. This new timetable will be introduced upon opening of the ELLX by mid 2010.

The third challenge is the introduction of a revised timetable structure on Southeastern routes from December 2009, in conjunction with implementation of domestic services to St Pancras on High Speed One. Southeastern's original franchise commitments required them significantly to reduce suburban capacity on routes to Charing Cross at this time. However, the draft RUS highlighted that this would exacerbate already severe overcrowding and recommended that some additional services be run. The Department for Transport has since agreed with Southeastern that they maintain services at broadly current levels into established terminals.

The combined effect of the above is that most passengers will experience significant changes in train timetables between now and 2010, generally maintaining at least current levels of service, with some areas seeing major improvements.

Train and platform lengthening

In the slightly longer term, prior to 2012, the RUS recommends a significant programme of train and platform lengthening to provide additional capacity. This will involve suburban routes from Charing Cross and Cannon Street having trains lengthened from 10-car to 12-car. Suburban routes via Balham are recommended for trains to be lengthened from 8-car to 10-car, with provision for 12-car trains in the longer term. The Sydenham and East Grinstead routes are recommended for lengthening from 8-car to 12-car.

The train lengthening strategy is a major item in Network Rail's Strategic Business Plan and is consistent with the specimen schemes included within the Department for Transport's High Level Output Specification for Control Period 4.

By 2011 major works will have been completed at Blackfriars and Farringdon, enabling 12-car trains to run on a limited number of routes through the Thameslink core. Additional dual voltage rolling stock will have become available. Thameslink route passengers will see many improvements, for example Blackfriars station will have a new entrance on the south bank of the Thames, significantly improving its accessibility. At this time all peak Thameslink route trains will need to operate via Elephant & Castle, since there will not yet be any additional capacity at London Bridge.

Station congestion and facilities

In parallel with the train lengthening strategy, congestion relief works are recommended for some of the busiest stations to ensure satisfactory passenger flows around the station. There are some stations – for example Clapham Junction – where the additional passenger numbers arising from the train lengthening strategy cannot satisfactorily be accommodated in the station itself without major works.

Several stations will benefit from improvements such as better facilities, better access for the mobility-impaired and car park expansions.

The South London Line

Apart from accommodating a variety of regular passenger services, the South London Line (SLL) is recognised as a key artery for freight trains, especially in off-peak hours. Indeed, it is the single most important line in the RUS area for freight. Passenger services on this route operate into several London terminals, specifically Victoria (both Central and Eastern sides), Blackfriars and London Bridge.

The Draft RUS highlighted that the present format of Southern's Victoria – Denmark Hill – London Bridge service is not sustainable. This issue triggered far more debate than any of the other matters raised by the RUS and has been the subject of several hundred consultation responses. However the facts remain unchanged – this service carries far fewer passengers than any of the others which run into these congested London terminals. The capacity is needed by other trains, and a number of suitable alternatives for users of this service either already exist or are recommended by the RUS. Industry stakeholders are in agreement that the RUS analysis is correct.

In order to facilitate the replacement of the existing service, early implementation of a further phase of the East London Line extension – to Clapham Junction – is supported by the RUS. This will provide increased frequency at all stations on the SLL and will provide direct links to Clapham Junction and Docklands. It will create numerous new journey opportunities, with a wide range of destinations becoming available with only a single interchange. The ELL will also help to mitigate the impacts of the construction works at London Bridge, as described below, by providing passengers with an alternative route. Journeys from Denmark Hill to London Bridge will be easy to make, though will require a same-platform change of train at Peckham Rye or Queens Road Peckham.

The RUS also recommends introduction of a new Victoria Eastern to Bellingham service. This will ensure that SLL stations receive at least today's level of service to Victoria and will provide a major benefit to stations such as Catford. It is recommended that this service be operated as soon as possible as an 8-car formation, requiring platforms at Wandsworth Road and Clapham High Street to be lengthened.

Overall the package for the South London Line offers far more trains than exist today. The improvements proposed for passengers outweigh the disbenefits and retaining the status quo is not viable.

Freight

It is possible that the increases in passenger traffic on the Catford Loop and the South London Line discussed above may require some additional infrastructure, to ensure that there is no adverse impact on current

and likely future freight traffic. The precise nature of any requirements will be determined through ongoing timetable development work, and an agreed solution will need to be implemented prior to any major enhancement of the passenger service taking effect.

In the short term the provision of a new loop on the long single track Isle of Grain branch is recommended. This will improve timetable opportunities and the robustness of both passenger and freight services, removing a potential source of delay for services from St Pancras to Medway.

There may be a case for a Class 92 diversionary route to the Channel Tunnel via Redhill at some stage, especially as certain types of renewal become due, which would provide benefits when the Maidstone East route is unavailable.

Thameslink London Bridge reconstruction works

Reconstruction of London Bridge will be a critical issue for the 2012 – 2015 period. In order to maintain sufficient passenger capacity a wide range of interventions will need to be considered.

The RUS emphasises the need for the major part of the train lengthening programme to be complete prior to the commencement of London Bridge construction works, in order to maintain broadly equivalent levels of capacity when compared to today.

The RUS does not present a detailed strategy for the reconstruction of the London Bridge station area but presents a wide range of potential strategic interventions which could assist. The methodology for the London Bridge reconstruction works will be the subject of considerable further analysis over the next year.

Strategy upon completion of the Thameslink Programme

2015 will see completion of the Thameslink Programme and will result in significant improvements in and beyond the RUS area.

The RUS describes the industry's latest working assumptions regarding an indicative train service specification that would operate from this time. This is based on Thameslink route trains operating along key corridors at 4tph frequency, including all-stations suburban services via the Sydenham and Catford lines.

It is emphasised that the completion of Thameslink will provide benefits to both Thameslink and non-Thameslink services. The service specification is driven by the need to maximise capacity overall, rather than by considering Thameslink services in isolation.

In addition, during the second half of Control Period 5, it is recommended that trains into Victoria via Balham are lengthened to 12-cars; and that trains into London Bridge via Tulse Hill are lengthened to 10-cars.

Longer term

Completion of the Crossrail branch to Abbey Wood in 2016 will provide significant benefits, including capacity relief to the North Kent Line. Extension of services beyond Abbey Wood is not committed at present, but there may be a case for this in the future.

Beyond 2020, once both the train lengthening and Thameslink programmes are complete, there will only be very limited opportunities to provide additional capacity on the existing railway network in the RUS area. Schemes involving other transport modes, such as an extension to the LUL Bakerloo Line, are noted as potential opportunities.

With respect to freight, further incremental capacity and capability enhancements will be considered on their individual merits, with gauge clearance to the Channel Tunnel and Grain being the priorities currently identified.

Summary

The strategy outlined above is more fully described in the remainder of this document. It provides a detailed plan for accommodating growth up to 2019, with an outline view of how to meet further increases in demand beyond that point.

Contents

1. Background

1.1 Introduction

1.1.1

Following the Rail Review in 2004 and the Railways Act 2005, the Office of Rail Regulation (ORR) modified Network Rail's network licence in June 2005 to require the establishment of Route Utilisation Strategies (RUSs) across the network. Simultaneously, the ORR published guidelines on RUSs. A RUS is defined in Condition 7 of the network licence as, in respect of the network or a part of the network[1], a strategy which will promote the route utilisation objective. The route utilisation objective is defined as:

> "the effective and efficient use and development of the capacity available, consistent with funding that is, or is reasonably likely to become, available during the period of the route utilisation strategy and with the licence holder's performance of the duty".

Extract from ORR Guidelines on Route Utilisation Strategies, June 2005

1.1.2

The "duty" referred to in the objective is Network Rail's general duty under Licence Condition 7 in relation to the operation, maintenance, renewal and development of the network. The ORR guidelines also identify two purposes of RUSs, and state that Network Rail should balance the need for predictability with the need to enable innovation. Such strategies should:

> a) "enable Network Rail and persons providing services relating to railways better to plan their businesses, and funders better to plan their activities;" and
>
> b) "set out feasible options for network capacity, timetable outputs and network capability, and funding implications of those options for persons providing services to railways and funders."

Extract from ORR Guidelines on Route Utilisation Strategies, June 2005

1.1.3

The guidelines also set out principles for RUS development and explain how Network Rail should consider the position of the railway funding authorities, the likely changes in demand and the potential for changes in supply. Network Rail has developed a RUS Manual which consists of a consultation guide and a technical guide. These explain the processes that will be used to comply with the Licence Condition and the guidelines. These and other documents relating to individual RUSs and the overall RUS programme are available on Network Rail's website at www.networkrail.co.uk.

1.1.4

The process is designed to be inclusive. Joint work is encouraged between industry parties, who share ownership of each RUS through its industry Stakeholder Management Group. There is also extensive informal consultation outside the rail industry by means of a Wider Stakeholder Group.

1 The definition of network in Condition 7 of Network Rail's network licence includes, where the licence holder has any estate or interest in, or right over a station or light maintenance depot, such station or light maintenance depot.

1.1.5
The ORR guidelines require options to be appraised. This is normally undertaken using the DfT's appraisal criteria and, in Scotland, the Scottish Executive's STAG appraisal criteria. To support this appraisal work, RUSs seek to capture implications for all industry parties and wider societal implications in order to understand which options maximise net industry and societal benefit, rather than that of any individual organisation or affected group.

1.1.6
RUSs occupy a particular place in the planning activity for the rail industry. They utilise available input from processes such as the DfT's Regional Planning Assessments and Wales Planning Assessment, and Transport Scotland's Scotland Planning Assessment. The recommendations of a RUS, and the evidence of relationships and dependencies revealed in the work to reach them, in turn form an input to decisions made by industry funders and suppliers on issues such as franchise specifications, investment plans or the High Level Output Specifications.

1.1.7
Network Rail will take account of the recommendations from RUSs when carrying out its activities. In particular they will be used to help inform the allocation of capacity on the network through application of the normal Network Code processes.

1.1.8
The ORR will take account of established RUSs, and those in preparation, when exercising its functions.

1.2 Document structure

1.2.1
This document starts by outlining, in **Chapter 2**, the geographic scope and timescales of the RUS, and the planning context within which it has been developed. It also describes the linkage to associated work streams and studies, together with links to other RUSs.

1.2.2
Chapter 3 describes the railway today, covering passenger and freight demand and the capability and capacity of the infrastructure to meet that demand.

1.2.3
Chapter 4 highlights the gaps and options that were identified and options appraised in the Draft for Consultation (published in July 2007).

1.2.4
Chapter 5 covers the consultation process, including a summary of the responses received to the Draft for Consultation and how these have been taken into account in developing the strategy.

1.2.5
Chapter 6 outlines the strategy in the short term, focusing on the significant timetable changes required within the RUS area in the period up to 2010. The schemes relevant to this are the commencement of construction works on the Thameslink Programme (Key Output 0), extension of services onto the existing National Rail network from the East London Line, South Central refranchising and implementation of a revised timetable structure on the Kent network to accommodate High Speed Line domestic services.

1.2.6

Chapter 7 describes the recommended strategy for providing capacity needed to cope with existing levels of demand and the continuing growth expected prior to 2012. This chapter mainly focuses on the infrastructure and rolling stock requirements to enable longer trains to operate, together with the opportunities upon completion of the first stage of Thameslink Programme works (Key Output 1). Also highlighted is the need for the train lengthening programme to be substantially complete prior to the commencement of Thameslink construction works at London Bridge.

1.2.7

Chapter 8 focuses on the latest plans to ensure that there is sufficient capacity to cater for commuter flows during the implementation of Thameslink construction works at London Bridge. This will be the major challenge impacting on the RUS area within the next 10 years. Some of the issues described in this chapter remain a work in progress at the present time.

1.2.8

Chapter 9 describes the indicative peak train service strategy within the RUS area upon completion of the Thameslink Programme. It identifies the likely peak crowding levels in the RUS area to 2019, based on currently anticipated rates of growth, and opportunites for further train lengthening.

1.2.9

Chapter 10 considers longer term opportunities, focusing on areas where there may be a need to provide additional capacity after 2019.

1.2.10

Finally **Chapter 11** outlines the mechanisms for implementing the recommendations of this RUS.

1.2.11

Supporting data are contained in the appendices to this document, some of which, owing to their size, are only available electronically from Network Rail's website at www.networkrail.co.uk.

2. Dimensions

2.1 Introduction

2.1.1

This chapter describes the geographic scope of the South London RUS, the time horizon towards which it looks, the planning context in which it is set, and the assumptions it has made about funding.

2.2 Geographic scope

2.2.1

The South London RUS concentrates on the suburban network in south and south-east London, as shown in Figure 2.1. Within the London Travelcard area, the scope includes:

- the suburban lines, covering all intermediate stations, on all routes from Victoria (Eastern), Blackfriars, Charing Cross and Cannon Street to:

  Hayes

  Bromley North

  Knockholt

  St Mary Cray

  Crayford

  Barnehurst

  Slade Green

  the freight-only branch from Charlton to Angerstein Wharf

- the suburban lines, covering all intermediate stations, on all routes from Victoria (Central) and London Bridge (Central/Low Level) to:

  Ewell East

  Epsom Downs

  Wimbledon (via both Tooting and West Sutton)

  Purley (including the freight facility)

  Tattenham Corner

  Caterham

  Upper Warlingham

  Stewarts Lane (including the freight facility)

- Loughborough Junction to Herne Hill
- Herne Hill to Tulse Hill.

2.2.2

The RUS also extends beyond the London Travelcard area to include the following lines:

- Crayford/Barnehurst/Slade Green to Dartford
- Dartford to Gravesend and Gillingham
- the freight-only branch from Hoo Junction to the Isle of Grain
- St Mary Cray to Swanley and Sevenoaks
- Knockholt to Sevenoaks
- Upper Warlingham to East Grinstead and Uckfield
- Ewell East to Dorking and Horsham.

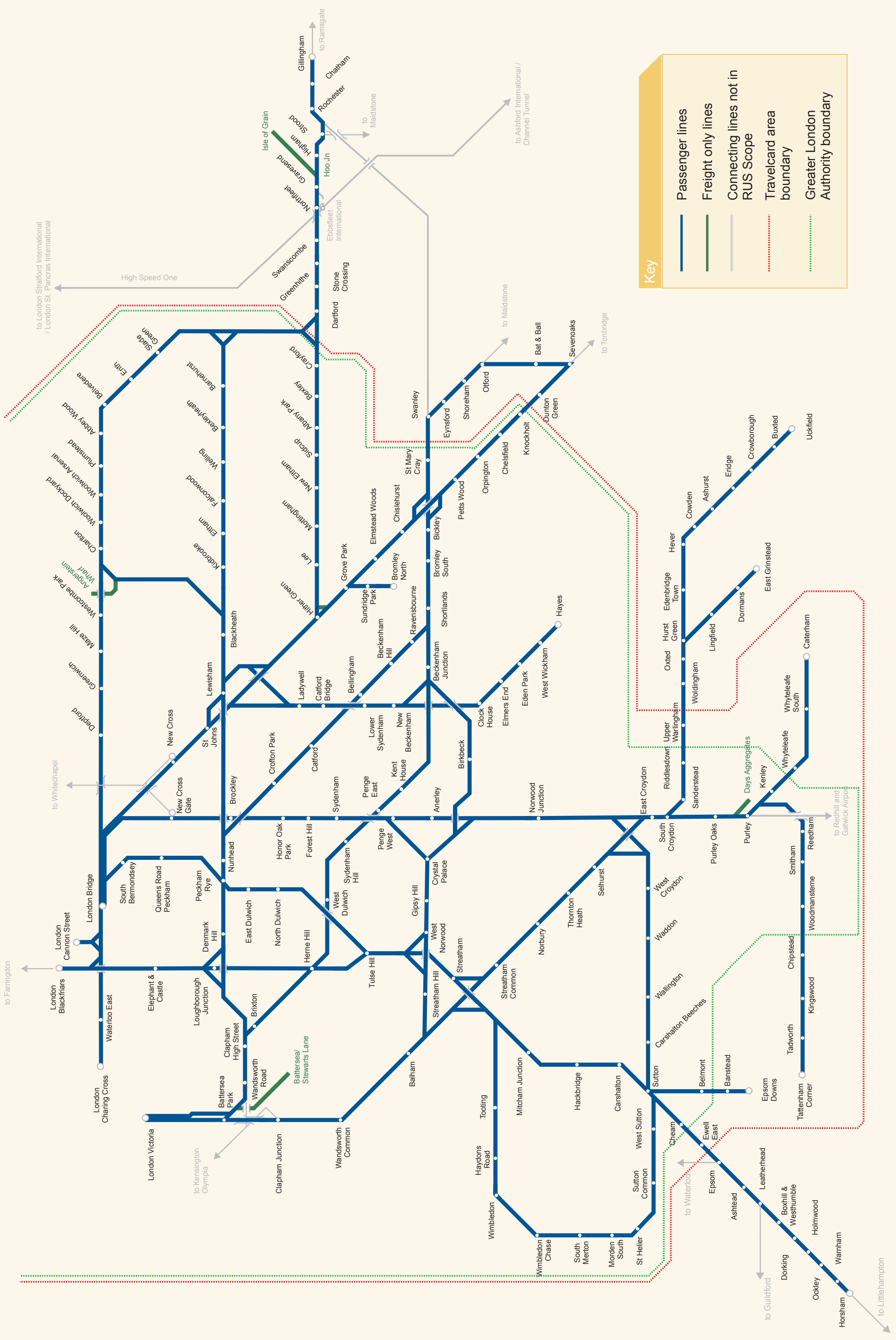
2.2.3

On sections of 4-track railway (or greater), this RUS will typically only consider those lines used by suburban trains – normally, though not exclusively, the slow lines. However account will be taken of services which use the fast lines, particularly where these services have a direct impact on the demand for, and operation of, suburban services using the slow lines.

2.2.4

Similarly, this RUS will include appropriate analysis of traffic generators which lie outside the geographic scope area, particularly where they have a significant effect on the pattern of demand within the scope area.

Figure 2.1 – Geographic scope



2.3 Time horizon

2.3.1

The RUS examines in detail a time period of ten years from the December 2009 timetable change to 2019. However, the RUS also identifies longer term challenges beyond this point, highlighting further options and opportunities that may arise.

2.4 Planning context – Department for Transport (DfT)

2.4.1

The Government's High Level Output Specification (HLOS) identifying requirements for the rail network in Control Period 4 (CP4: 2009-2014) was published in summer 2007. Alongside this, Government also published its Statement of Funds Available (SOFA), identifying the funding which would be made available to the rail industry. This was followed by Network Rail's publication of its Strategic Business Plan (SBP) for CP4, in response to the above.

2.4.2

The development of the South London RUS has been closely coordinated with the HLOS, SOFA and SBP analysis and this final RUS is consistent with these documents.

2.4.3

Alongside the above, the Government published the "Delivering a Sustainable Railway" White Paper in which it highlights its strategic intentions for the railway over the next 30 years. This anticipates the doubling of freight and passenger traffic within that timeframe.

2.4.4

As mentioned in paragraph 1.1.6, RUSs have utilised the DfT's Regional Planning Assessments (RPAs) where available as input to the study. Two RPAs have been issued during the course of production of this RUS: the South Eastern RPA and the Southern RPA. These were discussed in the Draft for Consultation.

2.4.5

The outcome of the RUS will help to inform DfT's future franchise specifications.

2.5 Planning context – Greater London Authority (GLA) and Transport for London (TfL)

2.5.1

In February 2004, the London Mayor published the London Plan which is the key planning document for the capital. It considers forecasts for population and employment growth, and highlights the main locations which could be developed to meet that growth. As part of a review process, proposed alterations to the Plan were published in October 2005 and May 2006. Following consultation, the former were adopted in December 2006, and the latter are expected to be adopted in 2008.

2.5.2

Under the framework provided by the London Plan, TfL produces Rail Corridor Plans (RCPs) which set out proposals and aspirations for the London rail network to meet the Mayor's planning objectives. The RCP for South London was completed in May 2007. The South London RUS Draft for Consultation provided further details.

2.5.3

TfL's London Rail Freight Strategy (LRFS), published in Autumn 2007, set out how TfL aims to meet its obligations in the London Plan, as far as railfreight is concerned, over the next ten years. If implemented in full, the strategy would remove an estimated 176m lorry-miles from UK roads each year, with attendant benefits worth around £126m each year.

2.6 Planning context – South East England Regional Assembly (SEERA) and South East England Development Agency (SEEDA)

2.6.1

The South East Plan was submitted to Government in March 2006, and following an Examination in Public, a final version is expected to be approved during 2008.

The document sets out a vision for the future of the South East Region to 2026, outlining ways to respond to challenges facing the Region such as housing, the economy, transport and protection of the environment. The Draft for Consultation provided further details.

2.7 Planning context – other Local Authorities

2.7.1

Within the context provided by the national and regional planning authorities, other local authorities produce spatial development and implementation plans which also cover transport issues. These authorities include counties, districts and boroughs.

2.8 Links to other RUSs

2.8.1

The South London RUS has a number of interfaces with other RUSs at varying stages of development. These are:

- The Brighton Main Line RUS (SRA/DfT 2006), which concentrated on the use of the fast lines between Victoria/London Bridge, Gatwick Airport, and the Sussex coast. The main service changes recommended by the BML RUS will be implemented in December 2008. A Network Rail Sussex RUS, to be published in 2009, will provide a longer term update to the BML RUS.
- The Kent RUS, to be published in 2009, which will concentrate on the long distance main line services into London via Swanley and Sevenoaks.
- The South West Main Line RUS (Network Rail 2006), which interfaces with this RUS over the Epsom – Leatherhead section of route and at Clapham Junction and Wimbledon stations.
- The Cross London RUS (Network Rail 2006), which similarly has an interface with this RUS at Clapham Junction, and also along the South London Line (SLL).
- The Midland Main Line RUS (SRA 2004), where the Thameslink route creates an interface with this RUS. As with the BML RUS, this will be updated by a Network Rail East Midlands RUS in 2009.
- The East Coast Main Line RUS (Network Rail 2008), which will in future also interface with this RUS over the Thameslink route.
- The Freight RUS (Network Rail 2007), which looks at the key strategic issues for freight across the network as a whole, including that covered by this RUS.

2.9 Assumptions about funding

2.9.1

In preparing the RUS it has been assumed that the only schemes that can reasonably be relied on to go ahead in CP4 are those which either have full funding commitment at present or those that are required to meet the metrics contained within the DfT's High Level Output Statement (HLOS).

2.9.2

Within the RUS geographic area, the main schemes covered by the above are:

- Thameslink Programme, which will provide a major increase in the capacity of the railway across central London. The infrastructure works are being delivered in two discrete stages, with upgrading of the St Pancras Thameslink to Elephant & Castle section between 2008-2011 and the London Bridge station area between 2012-2015.
- East London Line Extension (Phase 1), which will provide a connection to the national rail network at New Cross Gate, enabling trains to run from Dalston to Crystal Palace and West Croydon by 2010.
- Docklands Light Railway enhancements, with an extension currently under construction to Woolwich Arsenal and train lengthening planned on the Lewisham branch.

- Southeastern's franchise commitments to DfT, which were amended in early 2008, maintaining current train service levels into existing London terminals whilst incorporating domestic services on the new High Speed line.
- Southern refranchising in 2009, for which a revised timetable structure is being developed in conjunction with DfT.
- Crossrail, which would impact on this RUS in the Woolwich/Abbey Wood area, subject to the project gaining planning approval.
- Train and platform lengthening schemes. These were appraised in the Draft for Consultation RUS which was used to inform Network Rail's Strategic Business Plan submission in October 2007. Further information is given in Chapter 7.
- Station improvements (station facilities, congestion relief, "Access for All" schemes, interchange, car parking etc), consistent with known funding availability.

2.9.3

A number of other schemes are not yet funded but have potential to become committed at some stage after publication of this strategy. Several of these have been tested within the RUS process, so as to inform the funding decisions. Such schemes, described in more detail later, include:

- Further train and platform lengthening, above that required to meet CP4 HLOS requirements (eg. the Tulse Hill to London Bridge route).
- Further station improvements, beyond those with confirmed funding at present.
- East London Line Extension (Phase 2 – Southern End), which would provide a connection to the national rail network near South Bermondsey, enabling trains to run from the East London Line to Clapham Junction.
- Incremental freight capability improvements, for example provision of a second unrestricted route to the Channel Tunnel with W9 gauge clearance usable by Class 92 locomotives; or the construction of new terminals (e.g. at Howbury Park, which has now received planning consent).
- An extension of the Croydon Tramlink network to Crystal Palace, which would potentially use the heavy rail alignment between Bromley Junction and Beckenham Junction.
- Implementation of the Cross River Tram scheme, which would provide links from Brixton and Peckham Rye feeding into a tramway across Waterloo Bridge.
- Opportunities for further incremental infrastructure enhancement schemes, potentially undertaken in conjunction with forthcoming renewals such as the planned Victoria resignalling scheme.

2.9.4

There are also a number of further potential schemes at earlier stages of development than the above. These schemes are considered unlikely to become funded in the period to 2019, so have not been recommended during that period. However, they might require further analysis for implementation in that timescale if demand grows faster than envisaged or other circumstances change. Such schemes, also described in more detail later, potentially include:

- the extension of Crossrail beyond Abbey Wood
- the potential new station at Brixton High Level
- additional standalone major infrastructure enhancement schemes such as grade separation of the flat junction at Herne Hill or additional tracks through the East Croydon area.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3. Current demand, capability and delivery

3.1 Introduction

3.1.1

In this chapter, the present-day function and capability of the rail network in the RUS area are described. Profiles are provided of both passenger and freight operations, as well as information about the current infrastructure, how it performs, and how it is maintained.

3.2 Passenger train operators

3.2.1

At present, five passenger train operators run scheduled services over the lines covered by this RUS. These are:

- New Southern Railway (trading as Southern), which operates trains from south London, Surrey, Sussex, and parts of both Hampshire and Kent to the London terminals of Victoria, London Bridge and Charing Cross.
- London and South Eastern Railway (trading as Southeastern), which operates trains from south-east London, Kent and parts of Sussex to the London terminals of Victoria, Blackfriars, City Thameslink, London Bridge, Charing Cross and Cannon Street.
- First Capital Connect (FCC), which serves Wimbledon loop line stations with trains via Blackfriars to/from St Albans and Luton. Note that FCC's main line services running between Brighton and Bedford use the lines covered by this RUS during morning and evening peak periods, when they are routed via Elephant & Castle (instead of via London Bridge during the rest of the day).
- Stagecoach South Western Trains (trading as South West Trains), which operates services fringing on the RUS area at Clapham Junction and Wimbledon and services between Epsom and Dorking.
- Gatwick Express, which operates dedicated non-stop services between Victoria and Gatwick Airport, but normally only using the fast lines. As a result of the implementation of the BML RUS, this franchise will be subsumed within the New Southern Railway franchise from June 2008.

3.2.2

Open access/passenger charter operators, such as Venice Simplon Orient Express (VSOE) work occasional services through the RUS area.

3.2.3

Other passenger operators run services which only just penetrate the RUS area, or run close by and feed passengers into it. These include:

- Arriva, operators of CrossCountry, whose limited passenger service between Gatwick Airport/Brighton and Manchester uses the slow lines between at least Clapham Junction and Balham, albeit running non-stop between East Croydon and Kensington Olympia. However, it is not a mandatory requirement of the New Cross Country franchise to continue this service beyond December 2008.
- London Overground Rail Operations Limited (LOROL), operated by MTR Laing, on behalf of Transport for London. These services operate between Clapham Junction and Willesden Junction, with some peak services continuing along the North London Line to Stratford.
- London Underground, which provides interchanges with its services at all the London terminals in the RUS area, as well as at Elephant & Castle, Clapham High

Street (for Clapham North), Wimbledon, Balham and Brixton. There is currently no interchange to the Underground at either New Cross or New Cross Gate due to East London Line extension construction works.

- Docklands Light Railway, whose Canary Wharf branch serves Greenwich and Lewisham.
- Croydon Tramlink, which offers interchange with the national rail network at Wimbledon, Mitcham Junction, West Croydon, East Croydon, Elmers End, Birkbeck and Beckenham Junction.
- London Buses, and other bus operators, which offer interchange with most stations within the RUS area.

3.3 Profile of the passenger market

3.3.1
The lines in the RUS area provide an extensive suburban network throughout much of south and south east London, and offer frequent metro services to a large part of the capital which is not served by London Underground.

3.3.2
A detailed discussion of travel patterns throughout the RUS area, focusing on a localised analysis of origins, destinations and journeys being made was included within the South London RUS Draft for Consultation. This was based on data for the 2005/06 financial year. Selected highlights are reproduced here, with information updated where appropriate.

3.3.3
The Consultation Draft highlighted that the predominant market for train services in the RUS area is for commuting, accounting for about 66% of all trips within the RUS area.

3.3.4
The Draft also highlighted the following typical split between London destinations: West End 44%, City 25%, South Bank 23% and Docklands 8%.

3.3.5
Whilst the RUS focuses primarily on capacity for peak hour commuters it is noted that leisure traffic is also an important market. This is again mainly focused on central London, but with identifiable flows to other attractions such as major shopping centres, airports and leisure facilities.

3.4 Passenger train services – December 2007 timetable

3.4.1
The timetables within the RUS area have not been fundamentally changed for several years. However, some minor changes have been made since publication of the RUS Draft for Consultation. These were in the main targeted at relieving overcrowding and/or improving performance through the London Bridge area.

3.4.2
The current morning peak frequencies (arrivals at a London terminal between 0800-0859) are shown in Figure 3.1.

3.4.3
Figures 3.2 and 3.3 show a diagrammatic representation of the current morning peak train service structure, for both the suburban area of the Southern Railway network and the whole of the Southeastern network respectively.

3.4.4
Figure 3.4 shows the current fastest journey times to London in the morning peak from stations in the RUS area.

Figure 3.1 – Morning peak train service frequencies (2008)

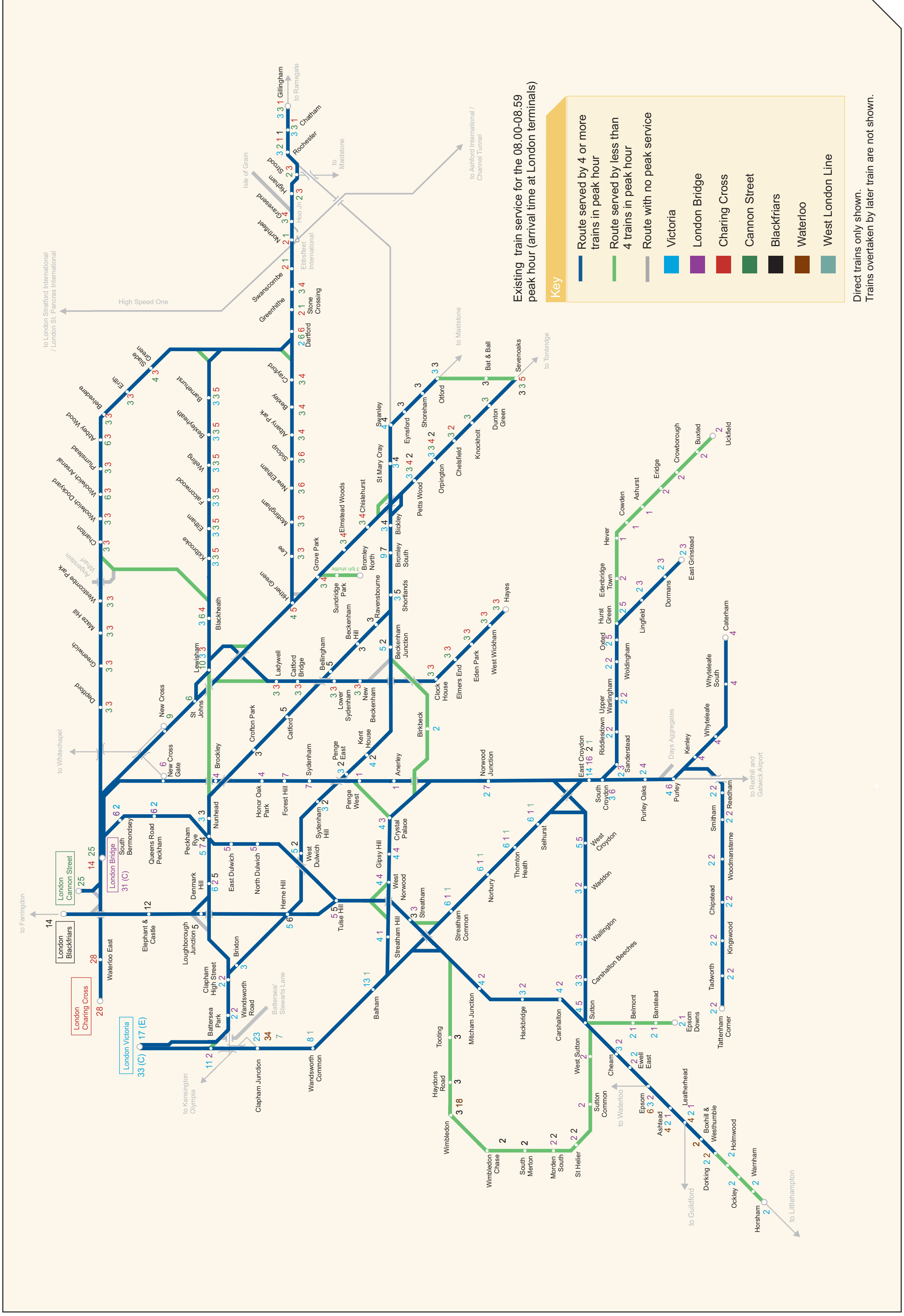


Figure 3.2 – South Central suburban peak train service (2008)

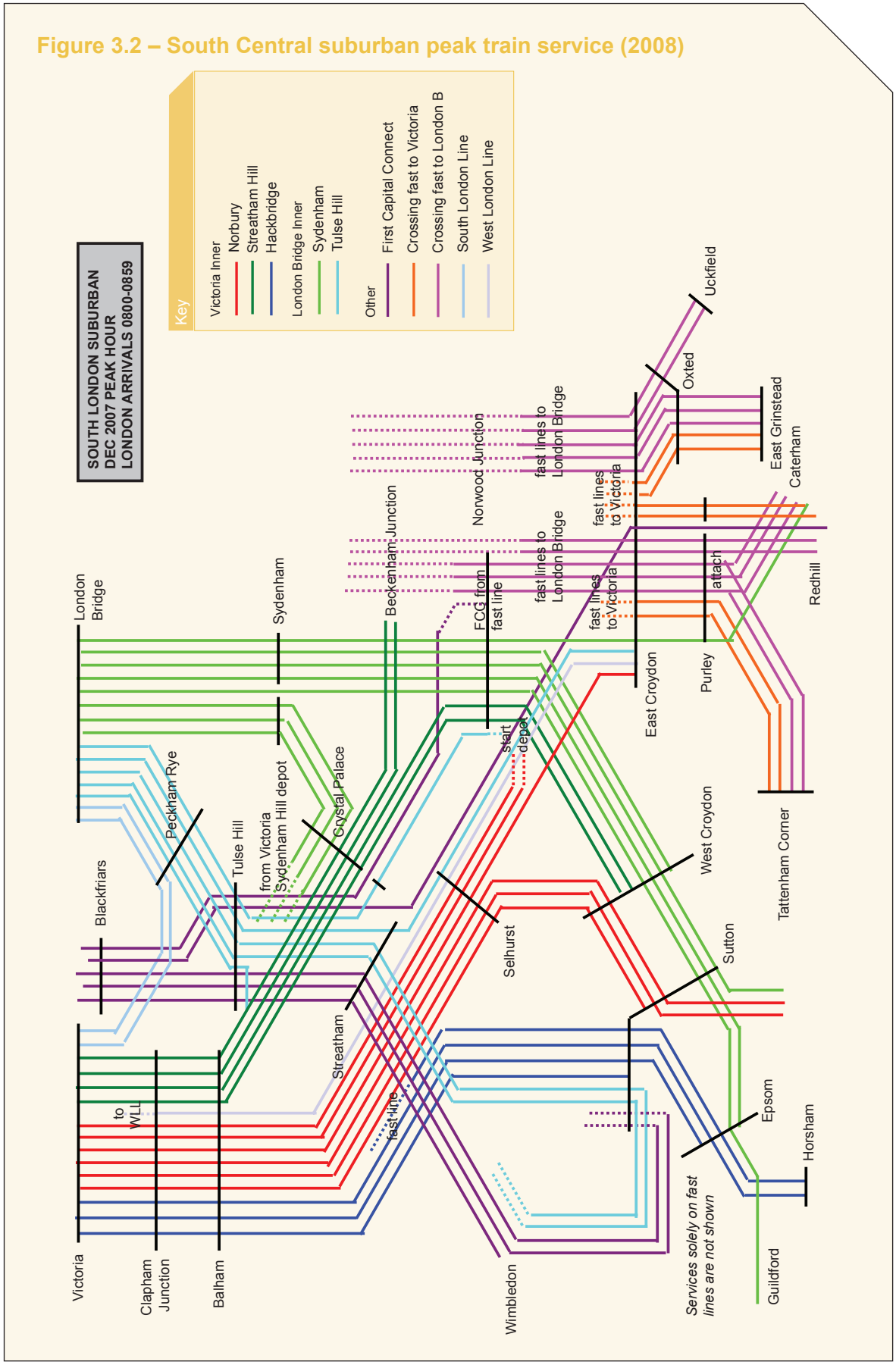


Figure 3.3 – Southeastern peak train service (2008)

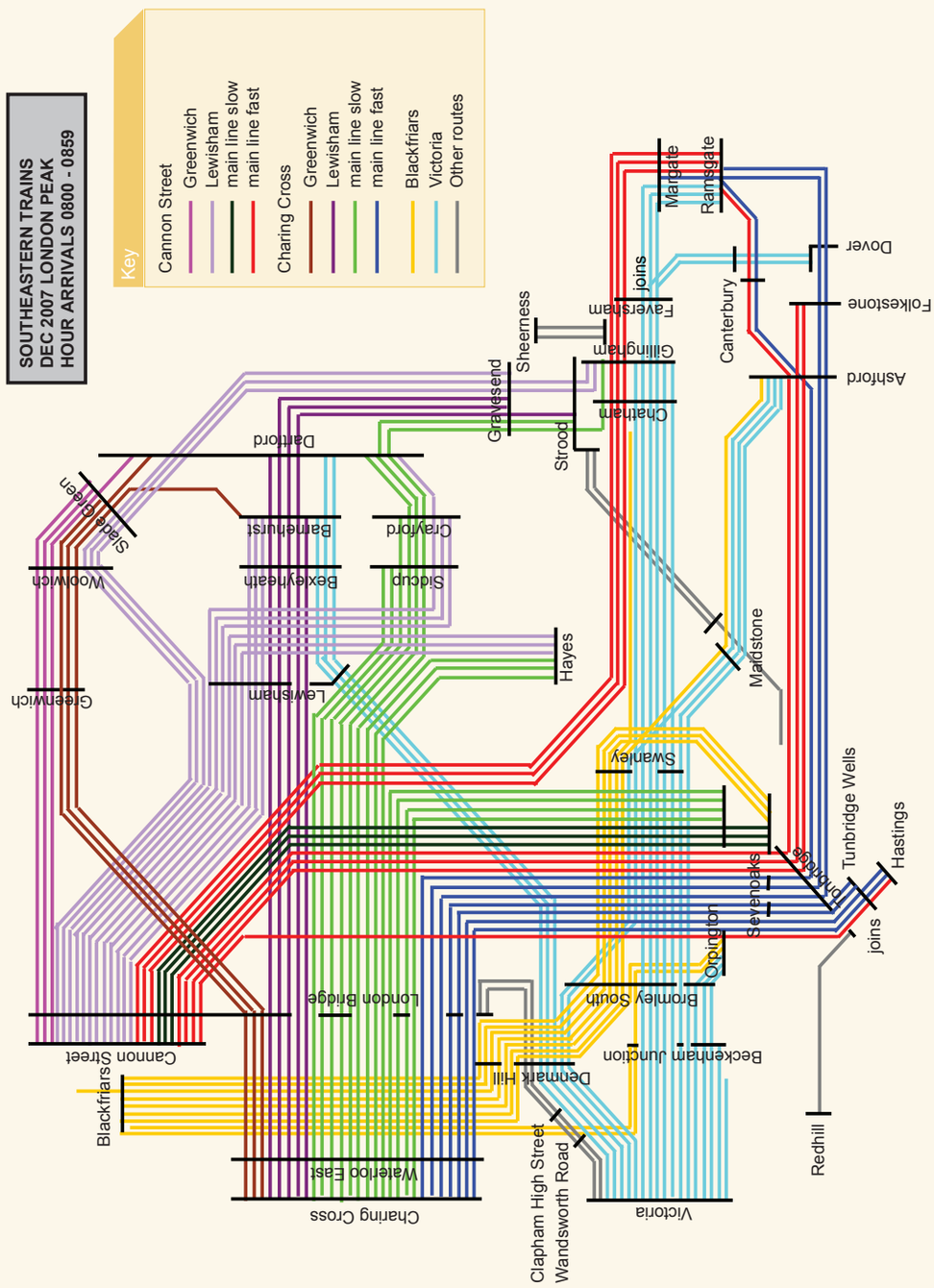
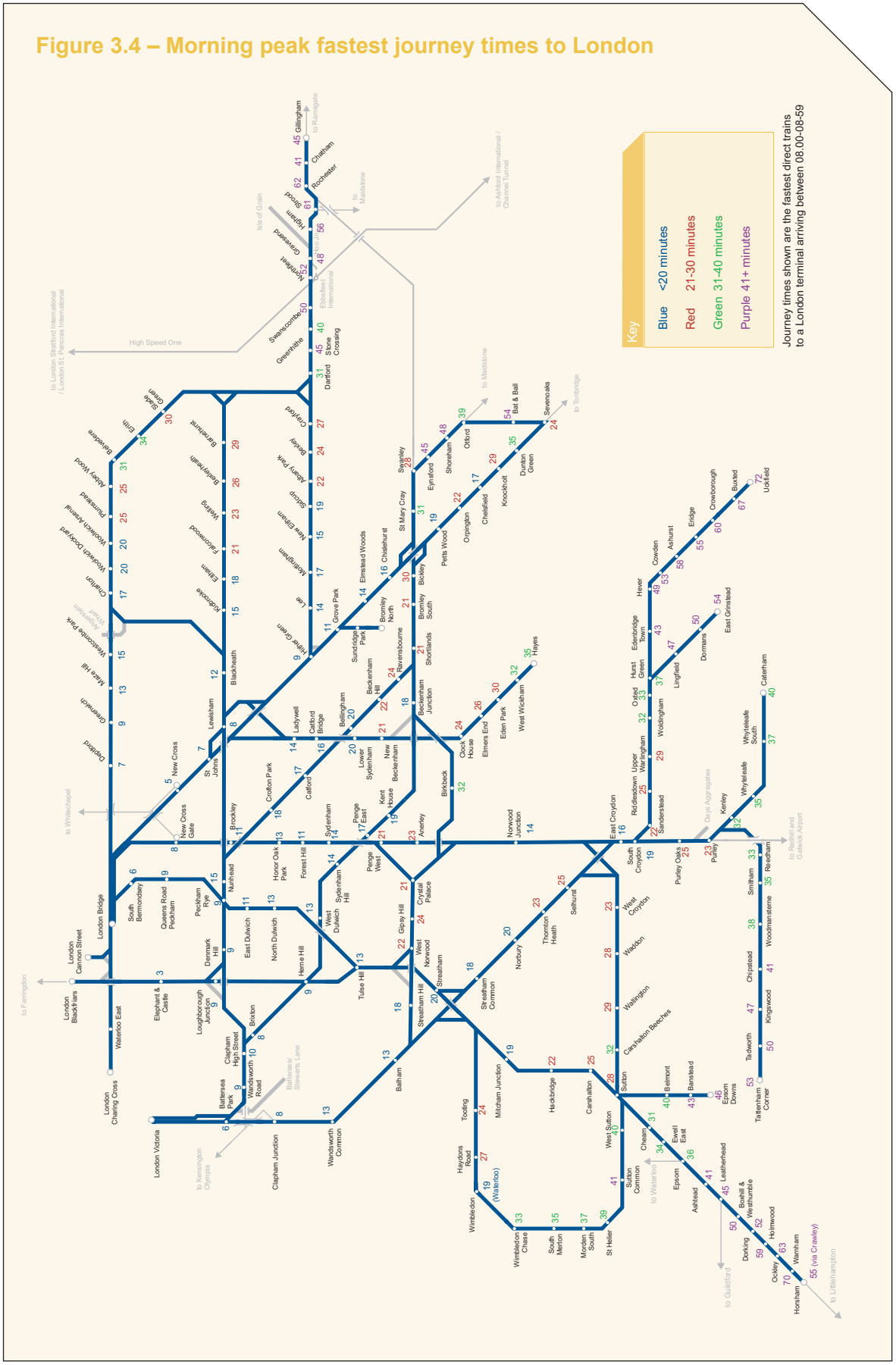


Figure 3.4 – Morning peak fastest journey times to London



3.5 Stations and station usage

3.5.1

Peak station usage statistics are given in Figure 3.5, showing the estimated number of station entries on a typical weekday between 0700 and 1000. This data is based on counts undertaken in 2001, and then uplifted by factors reflecting growth in ticket sales (including an adjustment to reflect the effect of growing sales of Oyster cards) to give an estimate for 2007.

3.5.2

Station facilities are shown in Figure 3.6. It can be seen, for example, that only a relatively small proportion of the network is currently accessible by a step-free route between street level and the platforms. Interchanges with underground, DLR and Tramlink are also shown.

3.5.3

Figure 3.6 also highlights car parking at stations. Car parking at the majority of stations is at or near capacity, particularly at the major nodes. This may currently cause passengers to amend their travel plans and use other modes of transport.

Figure 3.5 – Existing station usage

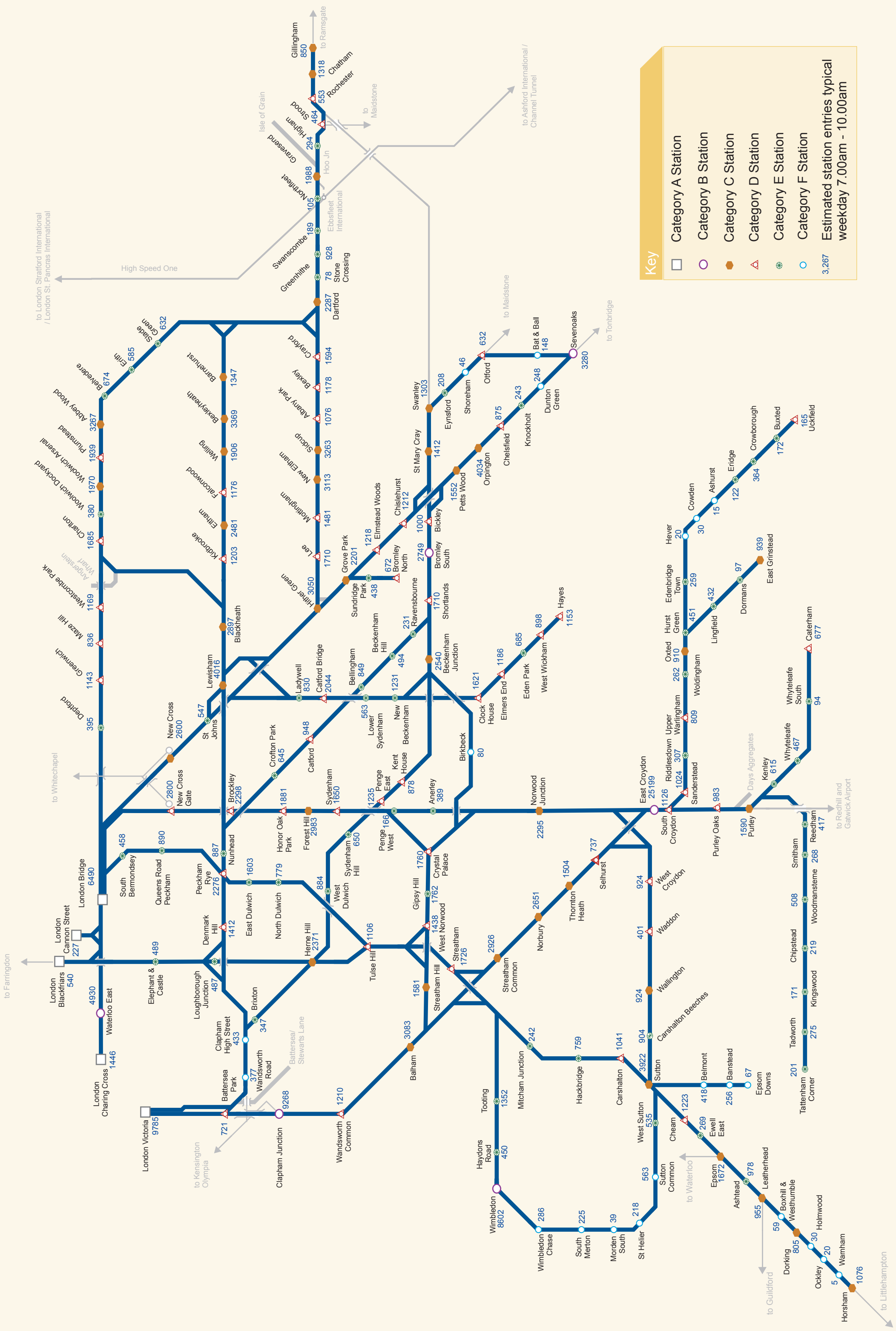
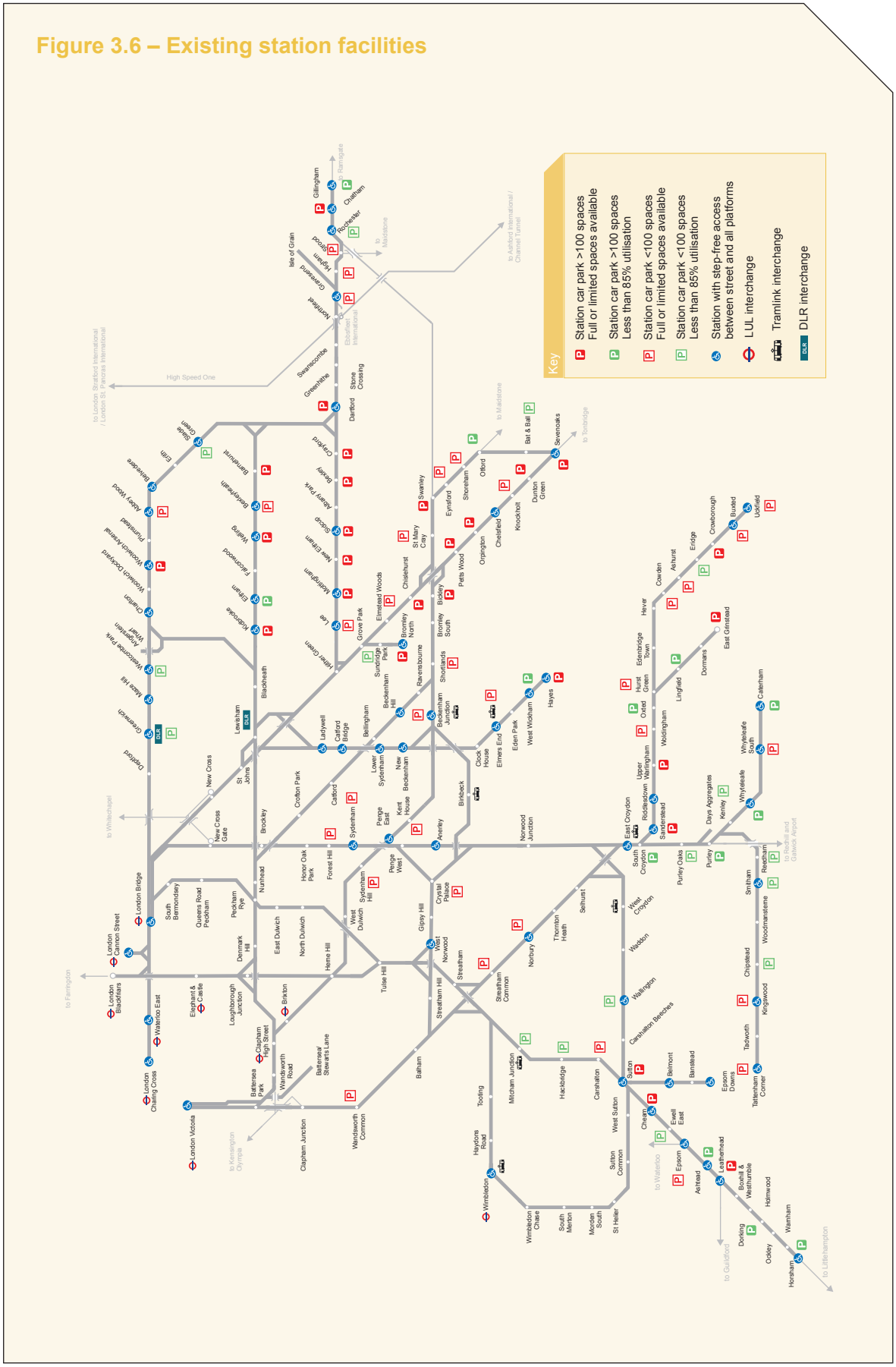


Figure 3.6 – Existing station facilities



3.6 Passenger demand trends

3.6.1

The trend in recent years has been one of ongoing peak growth, distributed across the entire RUS area but with several notable localised hot spots.

3.6.2

On some lines the operators have been able to provide extra capacity to keep pace with this growth in demand. This has been done by adding extra carriages to short formation trains, introducing higher capacity rolling stock and, in certain rare cases, running some additional peak trains.

3.6.3

To a limited extent some recent trends in passenger demand have helped operators to accommodate a limited number of additional passengers. The two main examples are the growth in commuting to Docklands via the DLR (two passengers can effectively re-use the capacity on the same train – one into Greenwich/Lewisham and a different passenger into London) and the continuing development of Croydon town centre (again passengers travelling to work in Croydon are replaced by passengers travelling from East Croydon to London).

3.6.4

At some locations it has not been possible to provide sufficient additional capacity to keep pace with demand. This had led to PIXC (Passengers In Excess of Capacity) and in some cases, passengers not being able to board some trains at all.

3.6.5

The available evidence points to a high level of suppressed demand, with additional capacity being filled up as soon as it can be provided. In effect, peak passengers are currently put off travelling by the current high levels of overcrowding. As a result, modelling suggests that some potential passengers do not travel at all, some travel at times they would not otherwise choose to, and some travel by alternative routes or alternative modes.

3.7 Southern demand trends

3.7.1

Figures 3.7 and 3.8 highlight the trends in Southern Metro passenger loadings for each of the key lines, in the morning and evening peaks. It can be seen that some of the highest levels of growth have been seen on the busiest Sydenham and Norbury lines, where morning peak passenger numbers have grown by over 40% over the last 10 years. The lowest levels of growth have been on the South London Line, where factors such as improvements to bus services have affected travel patterns.

Figure 3.7 – Southern metro morning peak trends

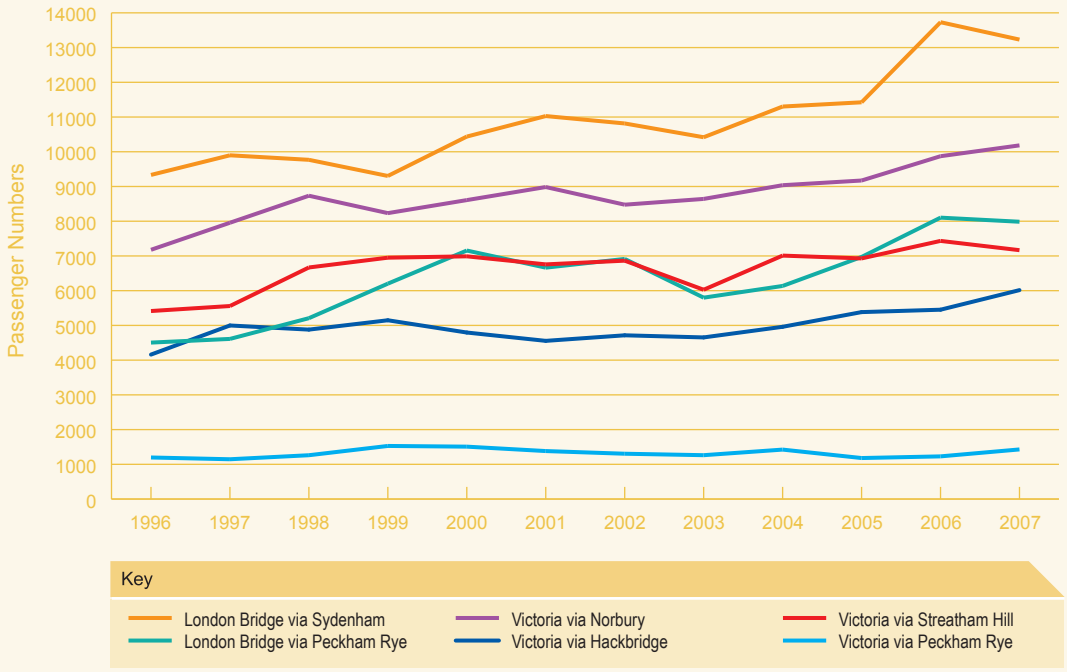
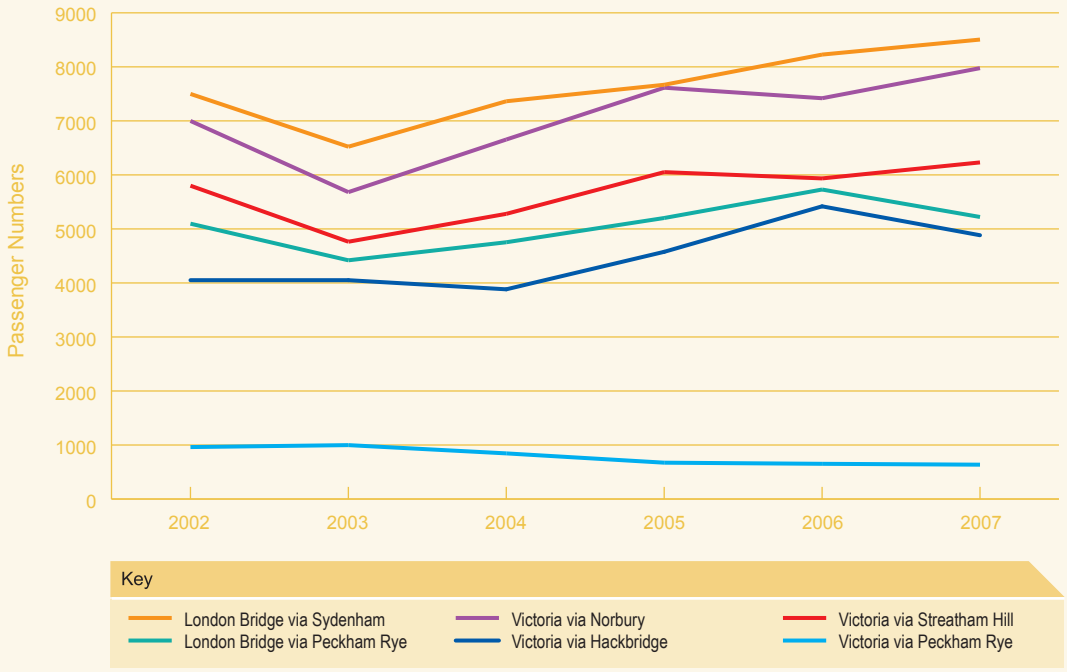


Figure 3.8 – Southern metro evening peak trends



3.8 Charing Cross/Cannon Street demand trends

3.8.1

Figures 3.9 and 3.10 highlights the trends in Southeastern Metro passenger loadings for services operating via London Bridge. As with Southern services, it can be seen that there has been significant morning peak growth on most of these service groups since the data provided in the Draft for Consultation, which only covered the period up to 2005.

3.8.2

A factor which is not apparent from the above is that there has also been a continued trend in increasing numbers of passengers changing on to the Docklands Light Railway (DLR) at either Greenwich or Lewisham (between 2006 and 2007, DLR trips at Lewisham grew by 19%), helping to ease pressure on critical loads nearer to London.

Figure 3.9 – Charing Cross/Cannon Street morning peak trends

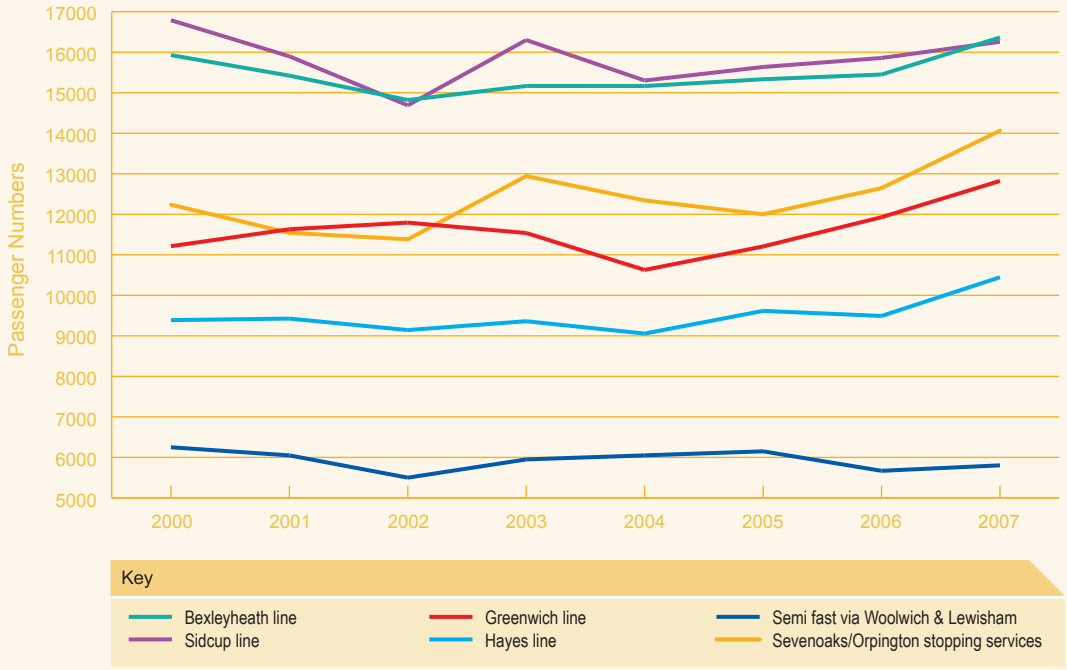
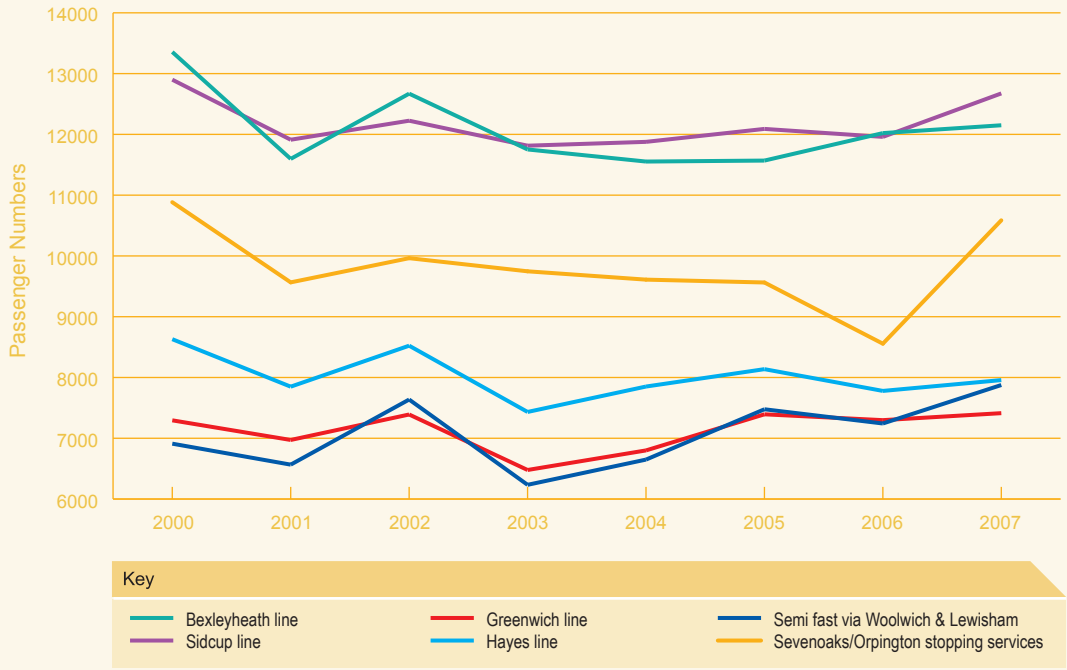


Figure 3.10 – Charing Cross/Cannon Street evening peak trends



3.9 Victoria Eastern/Blackfriars demand trends

3.9.1

Figures 3.11 and 3.12 highlight the demand trends in services from the RUS area to Victoria (Southeastern) and Blackfriars (Southeastern and FCC). It can be seen that total passenger numbers on these routes are lower than those described in 3.7 and 3.8, and that recent trends are mixed.

Figure 3.11 – Victoria Eastern/Blackfriars morning peak trends

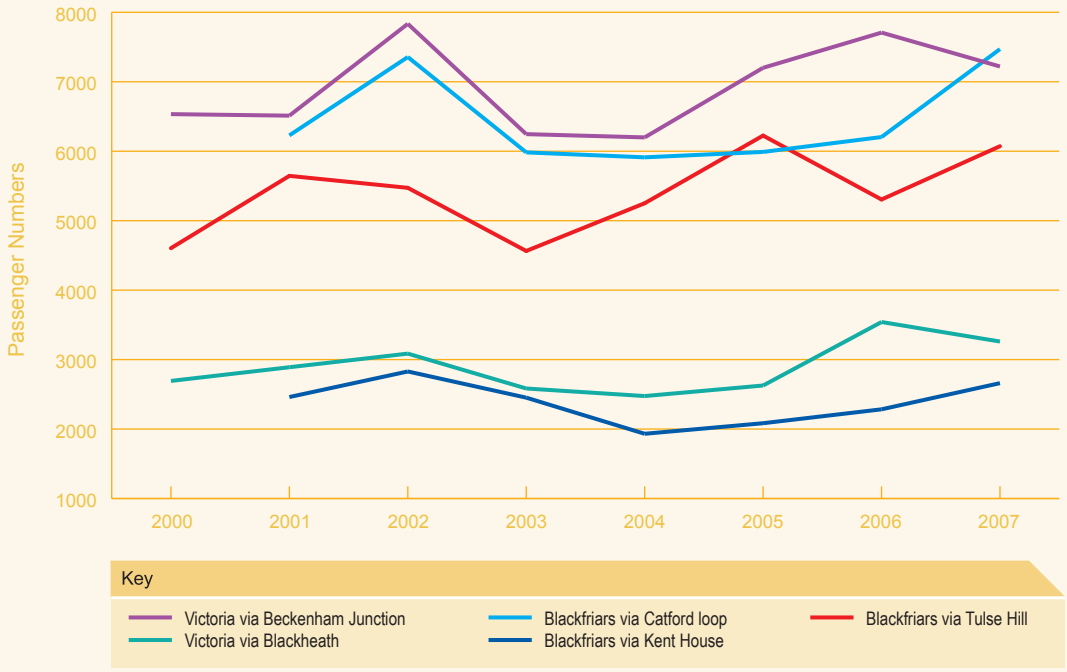


Figure 3.12 – Victoria Eastern/Blackfriars evening peak trends

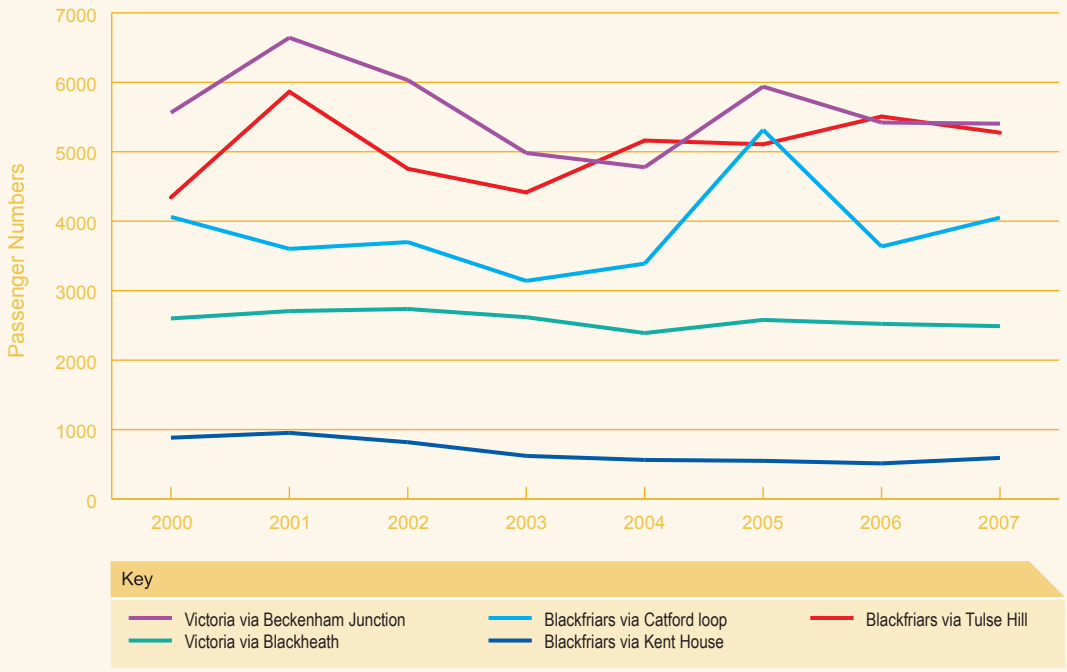
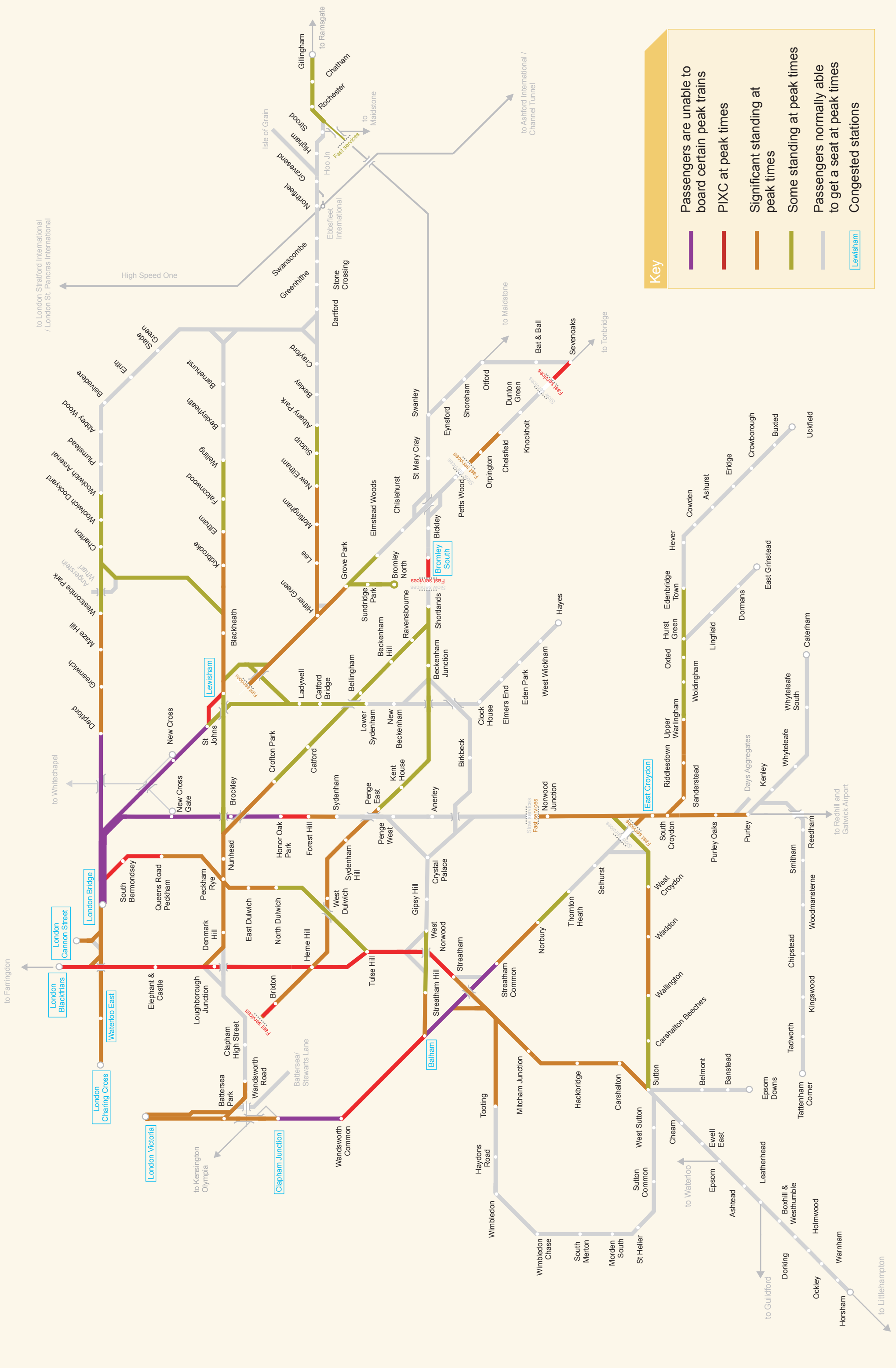


Figure 3.13 – Current morning peak overcrowding



3.10 Crowding

3.10.1

Figure 3.13 shows how the crowding builds up on each line during the am peak, based on data provided by train operators. Three points in particular stand out:

- At some stations near to Central London, in the height of the peak, some passengers simply cannot board trains because they are so crowded. This is further evidence of suppressed demand across the RUS area.
- Current DfT standards specify that passengers should not expect to stand for more than 20 minutes. It is clear that substantial numbers of passengers are already standing for close to 20 minutes (and, because Figure 3.13 shows the average situation, it is likely that on some trains standing is already starting more than 20 minutes from London). Any significant growth in future is therefore likely to result in larger numbers of people standing for more than 20 minutes, together with a greater number of trains conveying more people than their nominal capacity.
- There exist several stations where passenger congestion is already an issue at certain peak times.

3.10.2

The key conclusions from sections 3.6 to 3.10 are that:

- passenger numbers are growing strongly on most routes into London
- severe crowding is occurring during the peak periods, especially during the am peak
- a significant number of trains are carrying loads which exceed their nominal capacity;
- on many routes, passengers are standing for close to the 20-minute limit specified by current DfT standards.

3.11 Freight train operators

3.11.1

Most of the currently licensed freight operators run services through the South London RUS area. They are:

- English Welsh and Scottish Railway (EWS), which is the largest freight operator in Great Britain, and has a licence to operate European services. EWS runs trains for a wide range of markets, and is organised into four market-based groups each led by their own managing director. These are Energy (which includes coal), Construction (which includes domestic waste), Industrial (which includes metals and petroleum), and Network (which includes international, automotive and express parcels services).
- Freightliner, which has two divisions: Freightliner Limited is the largest haulier of containerised traffic, predominantly in the deep sea market; and Freightliner Heavy Haul is a significant conveyor of bulk goods, especially coal, construction materials and petroleum. It also operates rail infrastructure services.
- First GBRF, formerly GB Railfreight, is also a significant operator of deep sea container trains and rail infrastructure services. It also runs a number of services for bulk market customers, as well as for Royal Mail.
- Direct Rail Services (DRS) operates traffic for the nuclear industry in Great Britain. In the last few years the company has expanded into running services for the domestic intermodal and short sea intermodal markets.
- Fastline Freight, which is an established provider of rail infrastructure services, and has recently expanded into the intermodal market.

3.12 Profile of the freight market

3.12.1

There are a number of influences governing the profile of the rail freight market within the RUS area:

- the powerful economy of London and the South East draws freight into the region. In particular, aggregates for the construction sector constitute a large proportion of the rail freight market. For aggregates delivered within the M25 ring, rail's share of the market is 40%
- all international freight trains which come through the Channel Tunnel, and which are bound for destinations in London and beyond, pass across the RUS area
- ports on the Thames and Medway rivers generate a range of rail-borne traffic, including aggregates, steel and intermodal trains.

3.12.2

In the **aggregates** market, the RUS area contains five major terminals. These are:

- **Angerstein Wharf**
  This facility handles both dredged and quarried material, mainly for onward distribution to other rail terminals within London. About 750,000 tonnes are transported by rail annually.
- **Cliffe**
  Around 300,000 tonnes of dredged material are conveyed each year to rail terminals in London, Sussex and Surrey.
- **Grain**
  Approximately 560,000 tonnes per annum of quarried material are carried by rail. As with Cliffe, trains are destined for terminals in London and the South East. In addition, rail ballast is conveyed to the major rail infrastructure logistics centre at Hoo Junction, and also to several London Underground locations on behalf of the PPP consortium.
- **Purley**
  The terminal at Purley receives 480,000 tonnes of material each year. Dredged material typically comes from Cliffe, and quarried material from the Mendip Hills in Somerset.
- **Battersea**
  Dredged material typically comes from Cliffe and Angerstein, and quarried material from the Mendip Hills in Somerset.

3.12.3

In addition to these flows, which have origins or destinations within the RUS area, other aggregates flows traverse the area to destinations in, or near to, Crawley, Maidstone and Ashford.

3.12.4

Rail is particularly suited to the transport of aggregates for both economic and environmental reasons:

- aggregates products tend to have a relatively low unit value, as a result of which transport costs comprise a large proportion of the end price. With a typical payload of at least 1,000 tonnes per train, rail can carry large volumes reliably and economically.
- terminal operators mainly provide products which are perishable (such as concrete or tarmac), and which therefore need to be manufactured close to end use. As a result, these terminals are normally found in, or near to, urban areas. Rail haulage of the raw material thereby removes many thousands of lorry movements each year from urban roads and streets within the RUS area.

Figure 3.14 – Other Freight Traffic in RUS Area

Location	Commodities	Origin/destination
Chatham Docks	Imported steel	London area
Dungeness	Spent fuel	North West England
Hoo Junction	Imported steel coil	West Midlands
Hoo Junction	Rail industry construction materials	Various
Hoo Junction	General merchandise	Various
Sheerness	Furnace feed for steel production and finished products.	Various
Sheerness	Automotive imports	Corby
Mountfield	Rock gypsum	Southampton Western Docks

3.12.5
In the **international** market, the Channel Tunnel generates a variety of traffic in the form of containers, swap bodies, conventional general goods wagons, finished cars, and specialist items such as imported passenger train units. The traffic operates 7 days per week.

3.12.6
International trains are normally routed to London via Ashford, Maidstone, Swanley, Bromley South, Nunhead and thence on to Wembley via the West London Line. A diversionary route exists via Ashford, Tonbridge, Redhill, East Croydon and Clapham Junction; however, this route (although electrified) requires the use of diesel haulage until such time as immunisation issues in respect of Class 92 electric locomotives are addressed. The route via Sevenoaks is at present of too small a loading gauge to accommodate most international freight trains (see paragraph 3.13.1). These constraints also have an impact on the planning of track maintenance possessions.

3.12.7
Since Channel Tunnel traffic commenced in the mid-1990s, volumes have fluctuated. From a peak of 3.2 million tonnes per annum (mtpa), tonnages dropped to around 0.8 mtpa in 2003 owing in large part to the refugee crisis in Calais during 2001/2 which caused long periods of service disruption. Traffic has subsequently recovered to around 1.5 mtpa and is now starting to grow following the recent introduction of new services. Overall, the cross-Channel freight market, by all modes, is assessed to amount to some 80 mtpa (source: Intermodality report for EWS).

3.12.8
A series of usage agreements between the various parties have guaranteed the provision of 35 paths per day, in each direction, between the Channel Tunnel and Wembley. These paths are safeguarded until 2052, and would be sufficient to handle at least 8.1 mtpa.

3.12.9
For the **intermodal** market, Thamesport on the Isle of Grain generates over 120,000 TEUs (Twenty-foot Equivalent Units) of rail-borne container traffic each year, representing 18.5 percent of the port's total throughput, and requiring at least four trains per day.

3.12.10
The economic benefits of running container trains tend to favour longer-distance hauls. Consequently, the destinations of trains from Thamesport are in the West Midlands and the North of England, rather than, for example, shorter-haul locations such as London.

3.12.11
The flows of other freight traffic running through the RUS area are shown in Figure 3.14.

3.12.12

In addition, there are a number of other freight-related services which use the network. These include:

- infrastructure maintenance and renewal trains operated for or by Network Rail
- light locomotives moving to maintenance depots or fuelling points such as at Hither Green
- ad hoc or one-off services, such as the haulage of passenger rolling-stock between depots.

3.12.13

The current take-up of timetabled paths by freight trains is shown in Figure 3.15. It should be specially noted that the number of 'Paths Planned' normally exceeds the number of 'Paths Used' for several reasons:

- to provide alternative routes during line closures (eg. for engineering works)
- to give customers flexibility over when deliveries can be accepted (eg. on different days of the week)
- since customer requirements can change more quickly than the normal timetable production process can respond; additional paths are built in to cater for this.

3.12.14

There are very limited locations where it is possible to hold freight services without delaying passenger traffic behind. This issue is potentially a significant constraint for freight operators, since paths on one part of the network can need to match up with those a significant distance away. One such suitable regulating location at present is the section of freight-only route between the West London Line (Latchmere Junction) and the South London Line (Factory Junction).

3.12.15

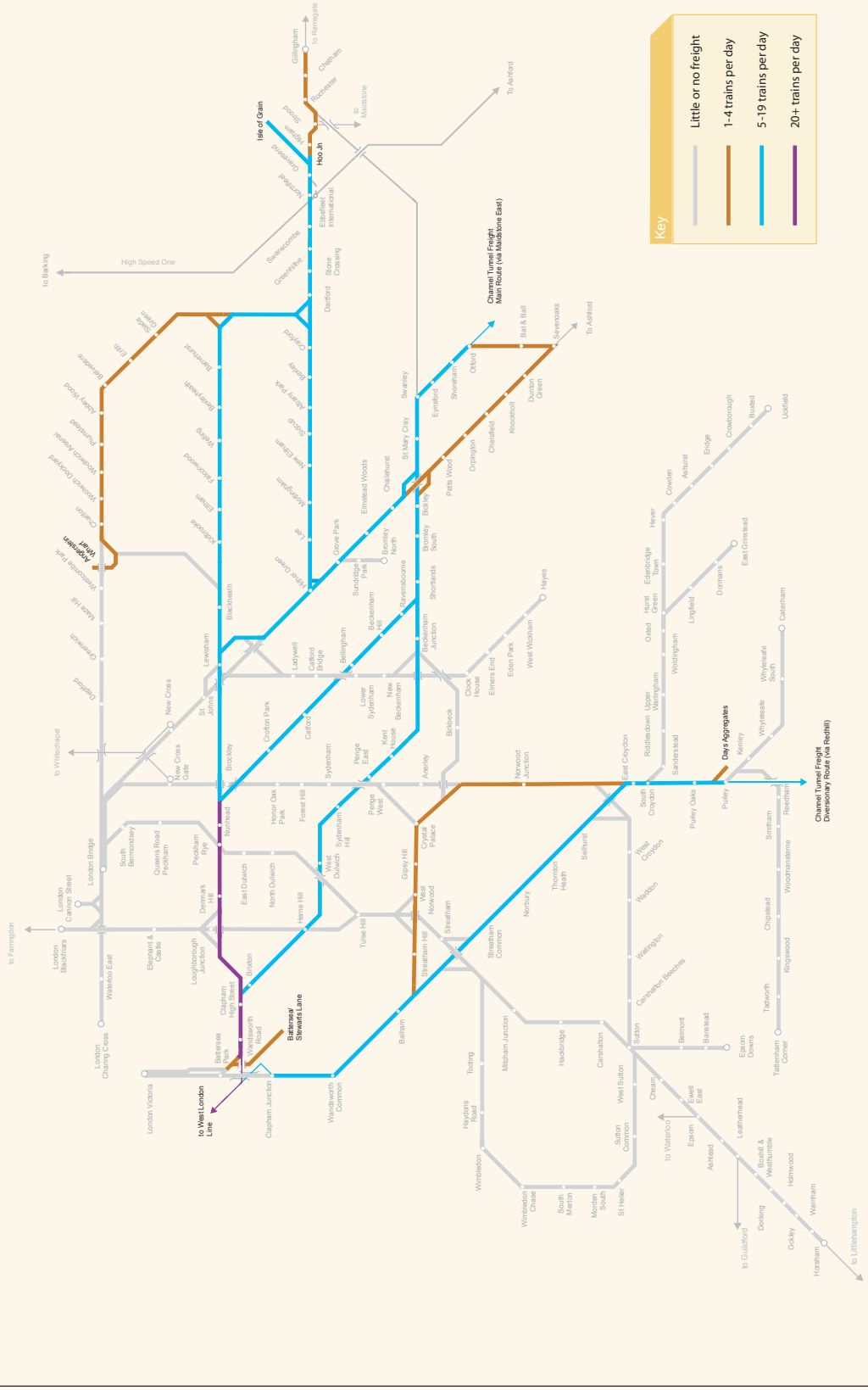
A map showing the number of freight trains using the RUS area daily is given in Figure 3.16. Further information about freight utilisation can be found in Network Rail's Freight Utilisation Strategy, published in March 2007 and available on the Network Rail website (www.networkrail.co.uk).

Figure 3.15 – Freight path usage in RUS area (busiest direction August 2006)

Location	Number of Paths Planned Each Day	Average Number of Paths Used Each Day	Maximum Number of Paths Used Each Day
East Croydon	21	7	16
Nunhead	91	28	36
Woolwich Arsenal	10	3	7
Dartford	31	17	23

Note: The planned paths at Nunhead include the 35 protected Channel Tunnel paths

Figure 3.16 – Freight trains in the RUS area (typical)



3.13 Freight specific infrastructure

3.13.1

The loading gauges within the RUS area are shown in Figure 3.17, and a chart illustrating the various gauges is given in Figure 3.18. Loading gauge defines the maximum height and width of vehicles that can be safely accommodated without fouling structures such as bridges and platforms. Most of the area can only allow the passage of vehicles built to the historic W6 gauge. However, two routes to the Isle of Grain (via Bexleyheath and via Sidcup) are cleared for W8 gauge vehicles; and two routes to the Channel Tunnel (the main route via Swanley, and the diversionary route via East Croydon) are capable of accepting W9 gauge vehicles. The Freight RUS has referenced an aspiration to upgrade the Grain route to W10 gauge, and the Channel Tunnel route via Maidstone to W12 gauge, but no economic or financial case has yet been developed for doing so. However, when structures are renewed they would be rebuilt to the appropriate higher gauge where practicable.

3.13.2

Route availability (RA) is primarily of interest with respect to freight operations. RA is a system for determining which types of locomotive and rolling stock can travel over any given section of route, and is normally a function of the strength of underline bridges in relation to axle load and speed. A locomotive rated as RA8, for example, would not normally be permitted on a route rated as RA6. As shown in Figure 3.19, most of the RUS area is classified as RA8, which permits axle loads of up to 24.1 tonnes per axle. Only in certain specially controlled circumstances may trains with heavier axle loads be allowed to operate.

Figure 3.17 – Existing loading gauge

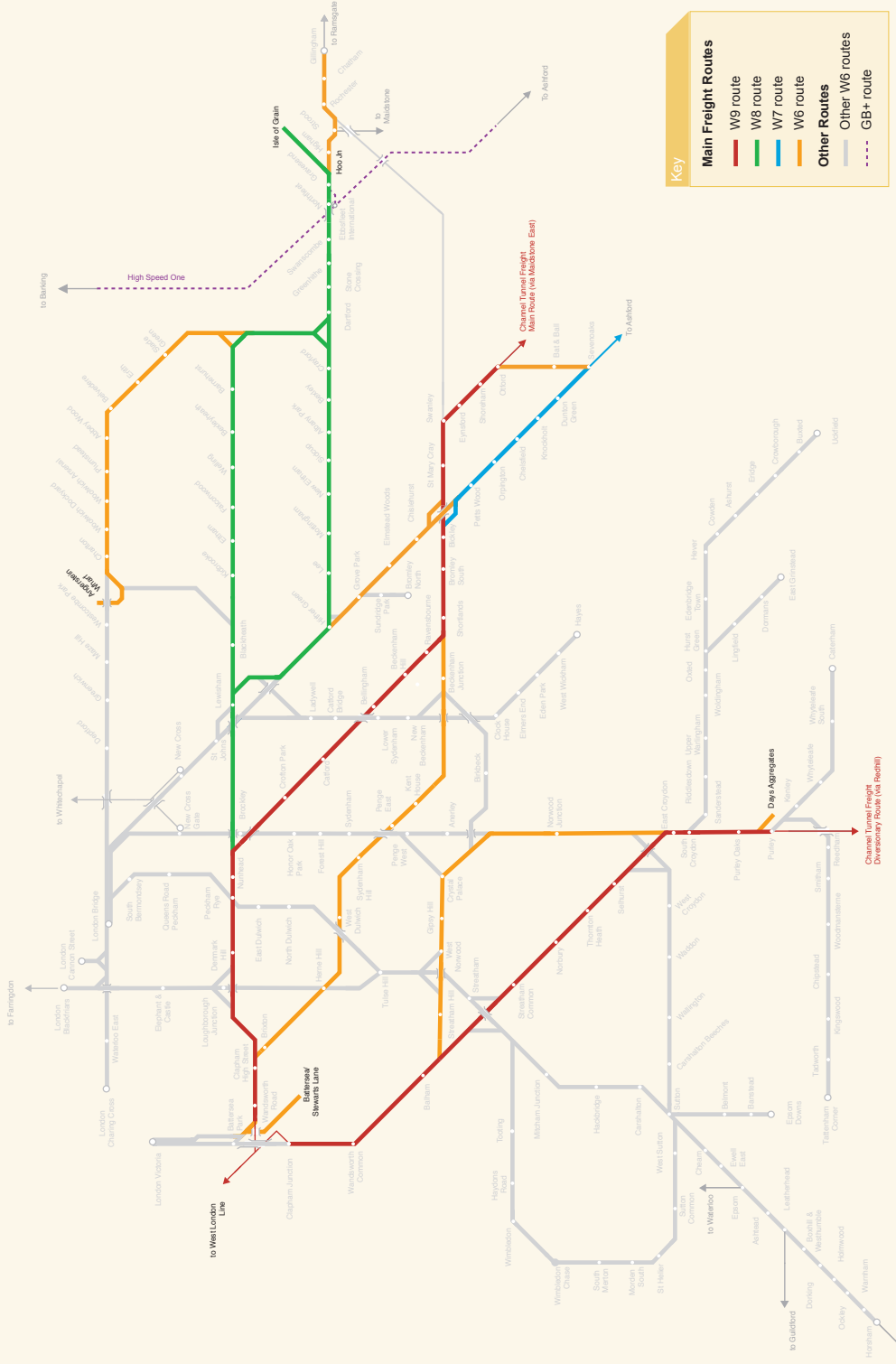
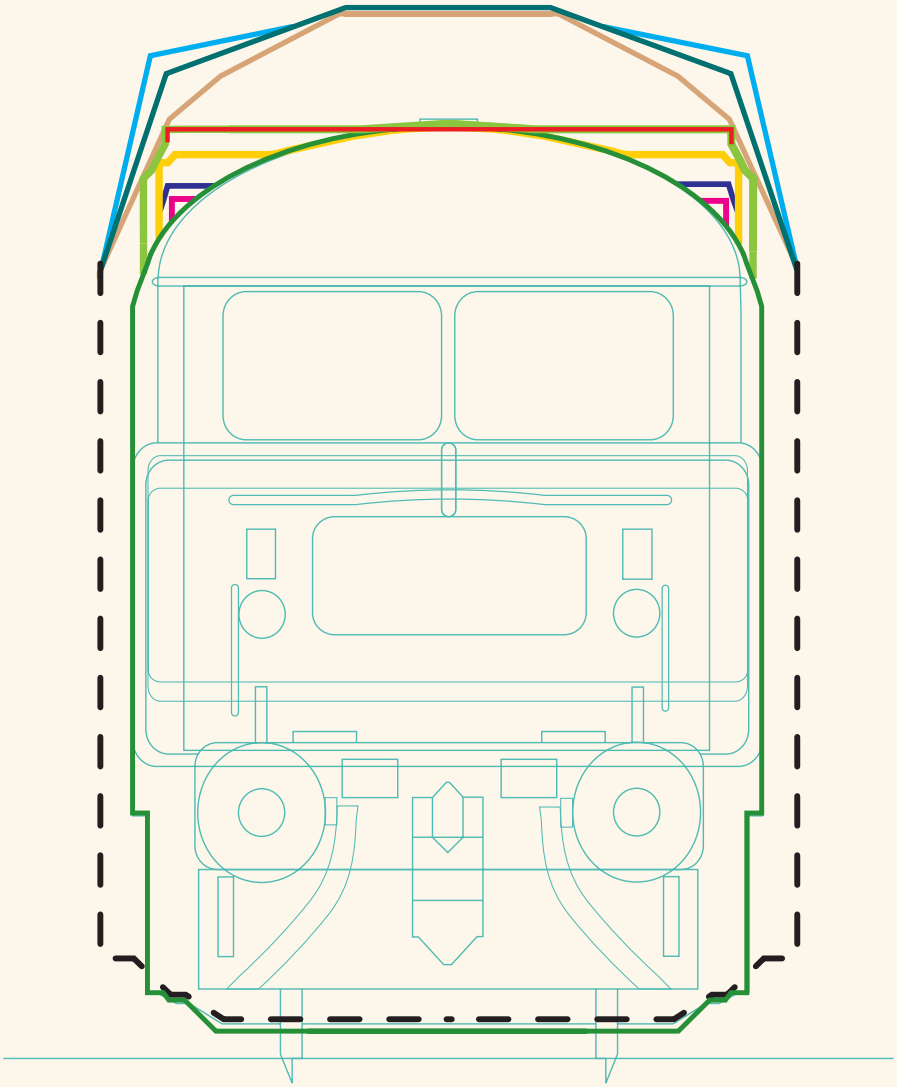


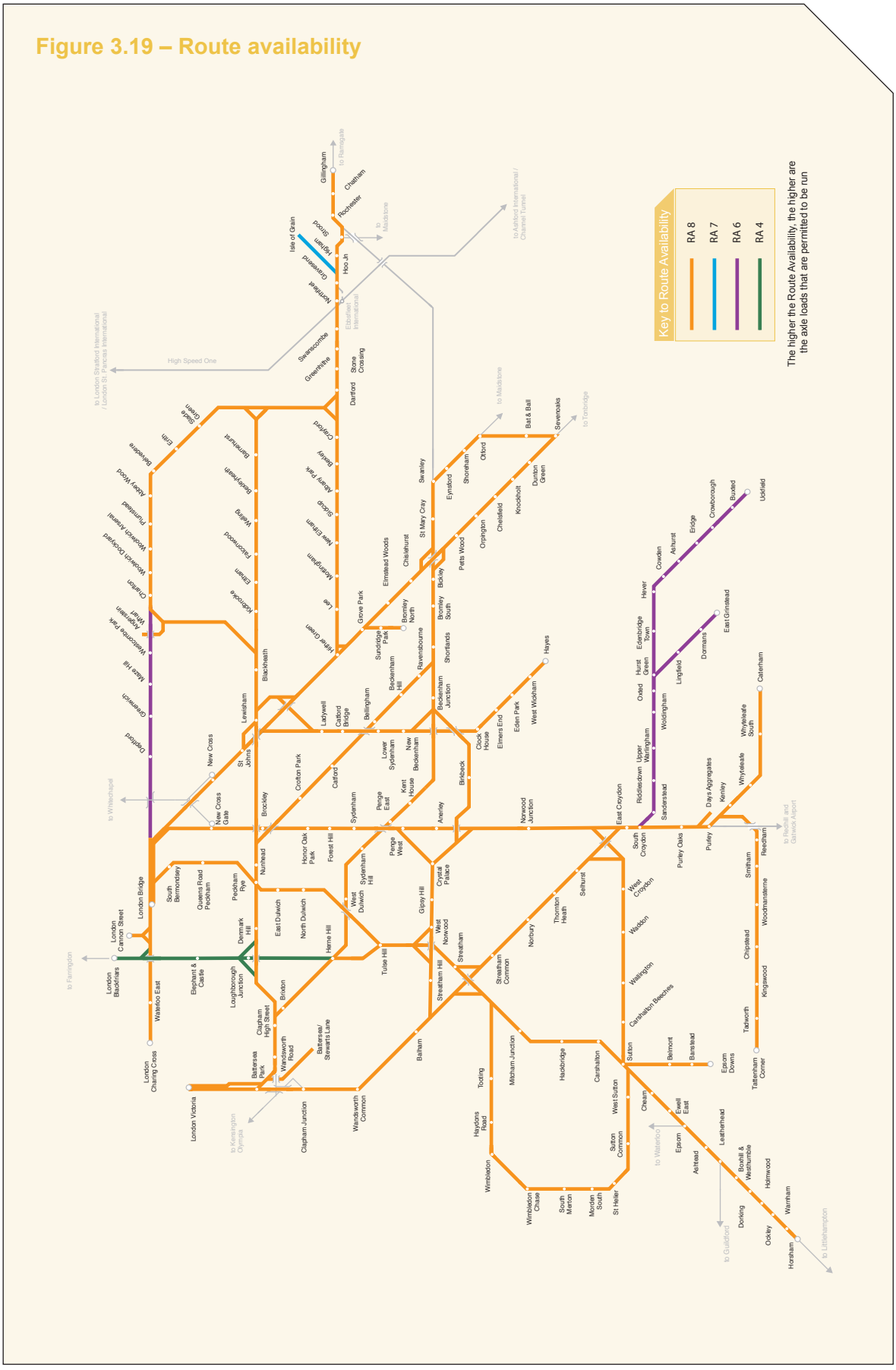
Figure 3.18 – Gauge envelopes



Key

GB+
GB
GA
W12
W10
W9
W8
W7
W6

Figure 3.19 – Route availability



3.14 Infrastructure

3.14.1

This section describes more general aspects of the infrastructure in the RUS area, including:

- linespeeds
- headways
- electrification
- platform lengths
- driver-only operation (DOO)
- signalling
- stabling.

3.14.2

Figure 3.20 shows the existing **linespeeds** within the RUS area. Most of the network has maximum plain-line speeds of between 45mph and 60mph. This is appropriate for a suburban network where most trains are stopping frequently at stations and would therefore seldom attain speeds of over 60mph[1]. The area is also characterised by numerous flat junctions with tightly curved turnouts where speeds are in the range of 15mph to 20mph. In many cases these junctions are in the vicinity of stations where trains would already be travelling at low speed.

3.14.3

Planning headways are shown in Figure 3.21. As one would expect, the nearer to London the shorter the headways become, with most of the suburban network being able to run trains as little as 3½ minutes apart. In some places, such as on the Dartford lines, the planning headway is even shorter at 2½ minutes. It should however be noted that this does not mean that trains can be consistently or regularly timetabled at these frequencies. This is because of:

- conflicting movements at flat junctions
- more restrictive headways at other points along the route
- the need to provide a performance buffer to enable train services to recover from perturbation
- platform capacity at terminal stations
- dwell times at busy stations.

3.14.4

Most of the area has 3rd rail 750V DC **electrification**, with the exception of the unelectrified line from Hurst Green to Uckfield, and the freight branches to Grain and Angerstein Wharf. Despite some recent improvements to the power supply system (to allow the introduction of new rolling stock) there is presently very limited scope for running additional or longer train services without further upgrades to the power supply. This is explored further in Chapter 7.

1 Whilst non-stopping freight trains could in theory achieve speeds of up to 75mph, in practice this is constrained by signalling and braking considerations, and by sharing the track for most of the day with the stopping passenger service.

Figure 3.20 – Current linespeeds

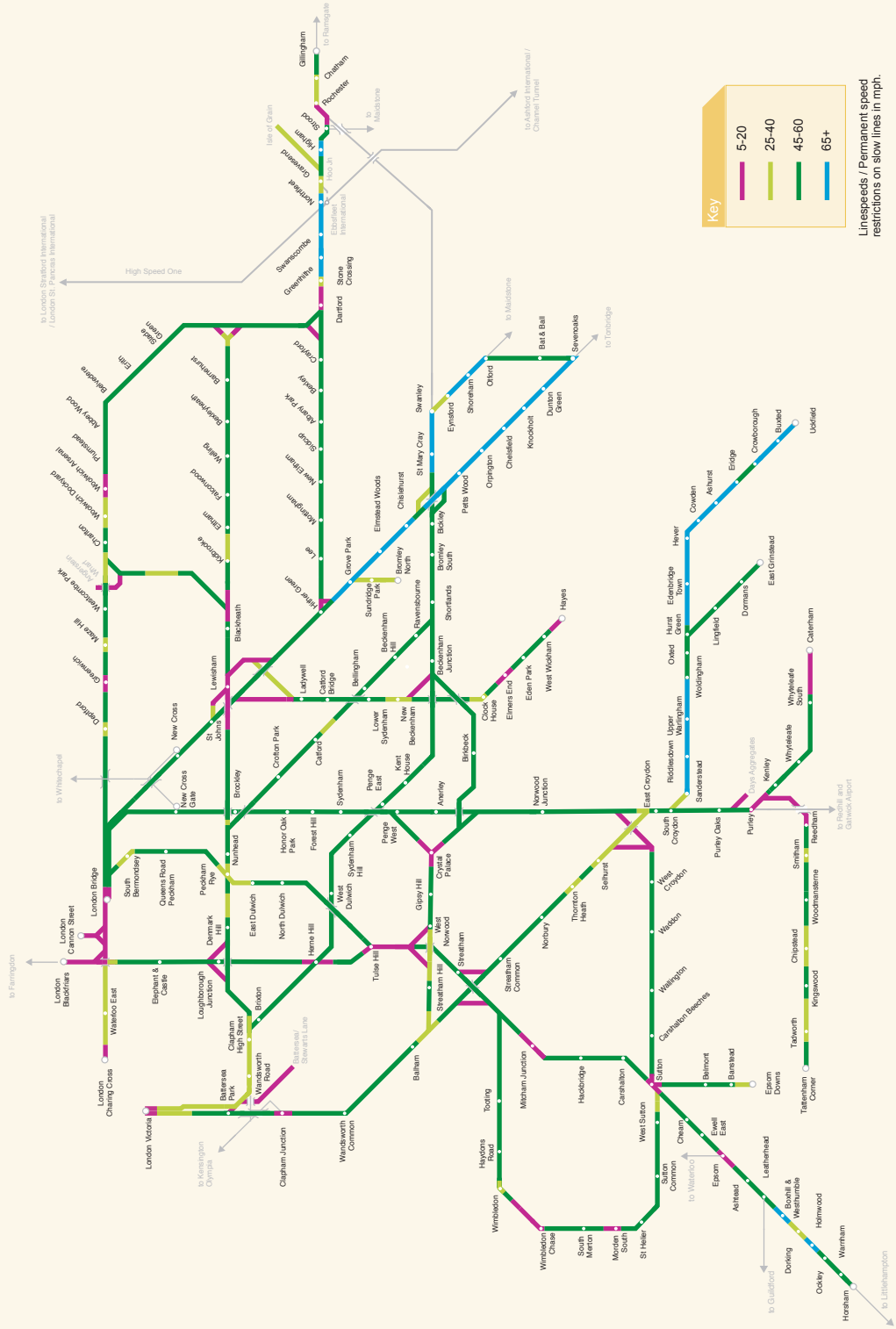
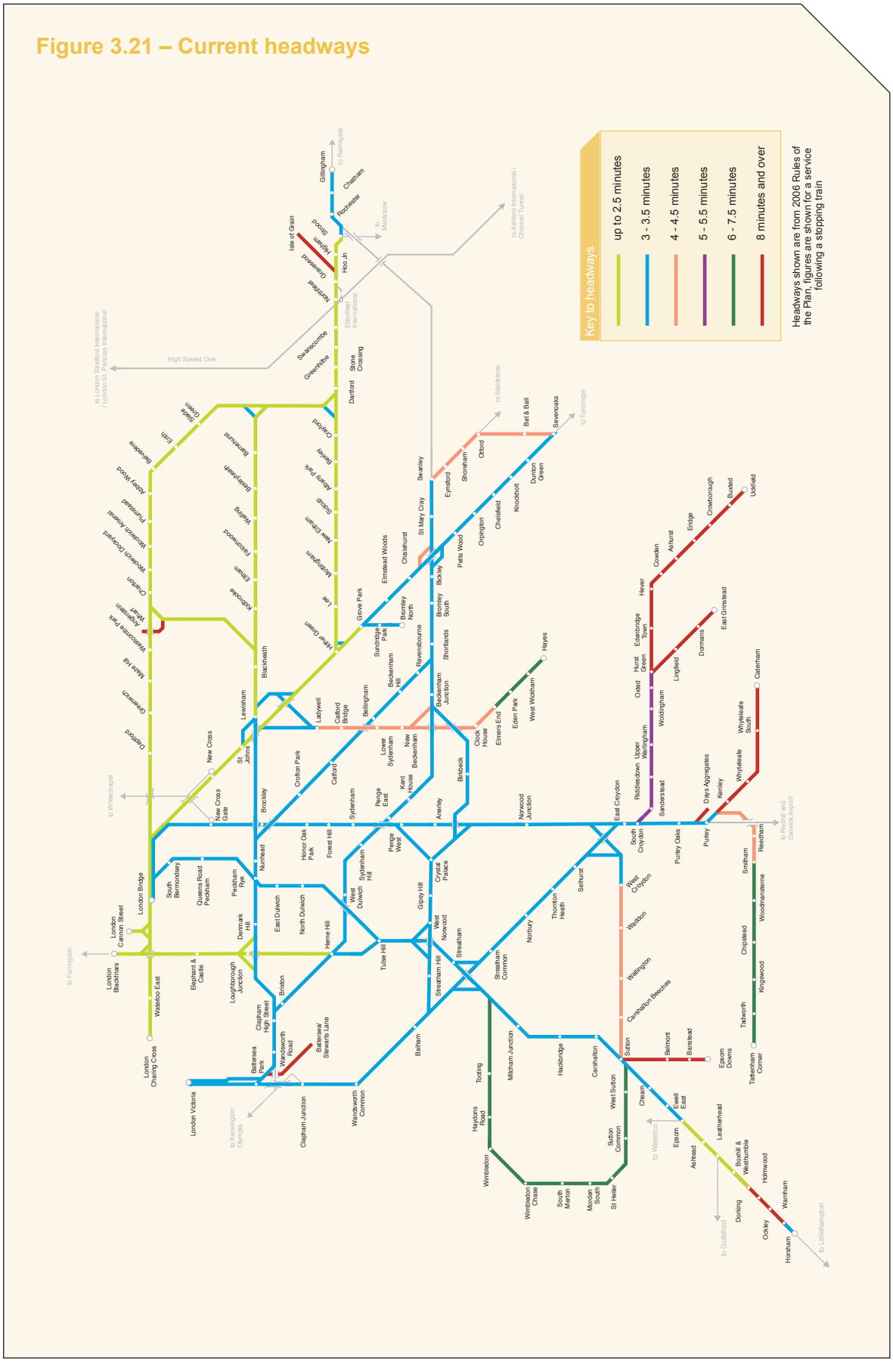


Figure 3.21 – Current headways



3.14.5

Existing **platform lengths** are shown in Figure 3.22 together with typical peak train lengths. Where trains are longer than platforms, doors which overhang the platform must for safety reasons be locked either manually, or electronically by a process known as selective door opening (SDO – see glossary for further details).

3.14.6

Most of the lines within the area are capable of **driver-only operation**, with the exception of:

- the line from South Croydon to East Grinstead and Uckfield
- the line from Dorking to Horsham
- the line from Strood to Gillingham
- the line from Grove Park to Bromley North.

However, not all services are necessarily operated in driver-only mode, even where the necessary platform equipment is available. This would be the case, for example, where a service requires selective door opening to be activated by on-board staff other than the driver; or in certain instances where the service runs to or from a non-DOO line and it would be impracticable to switch between modes.

3.14.7

The **signalling** system throughout the area uses standard track-circuit block principles with colour-light signals (except on the freight-only branches). The signalling control centres and their geographic boundaries are shown in Figure 3.23. Also shown on this map are the small number of level crossings within the area.

3.14.8

A further important consideration is the stabling capacity for passenger rolling stock. This is an important factor and is considered in more detail in Chapter 7.

Figure 3.22 – Train and platform lengths

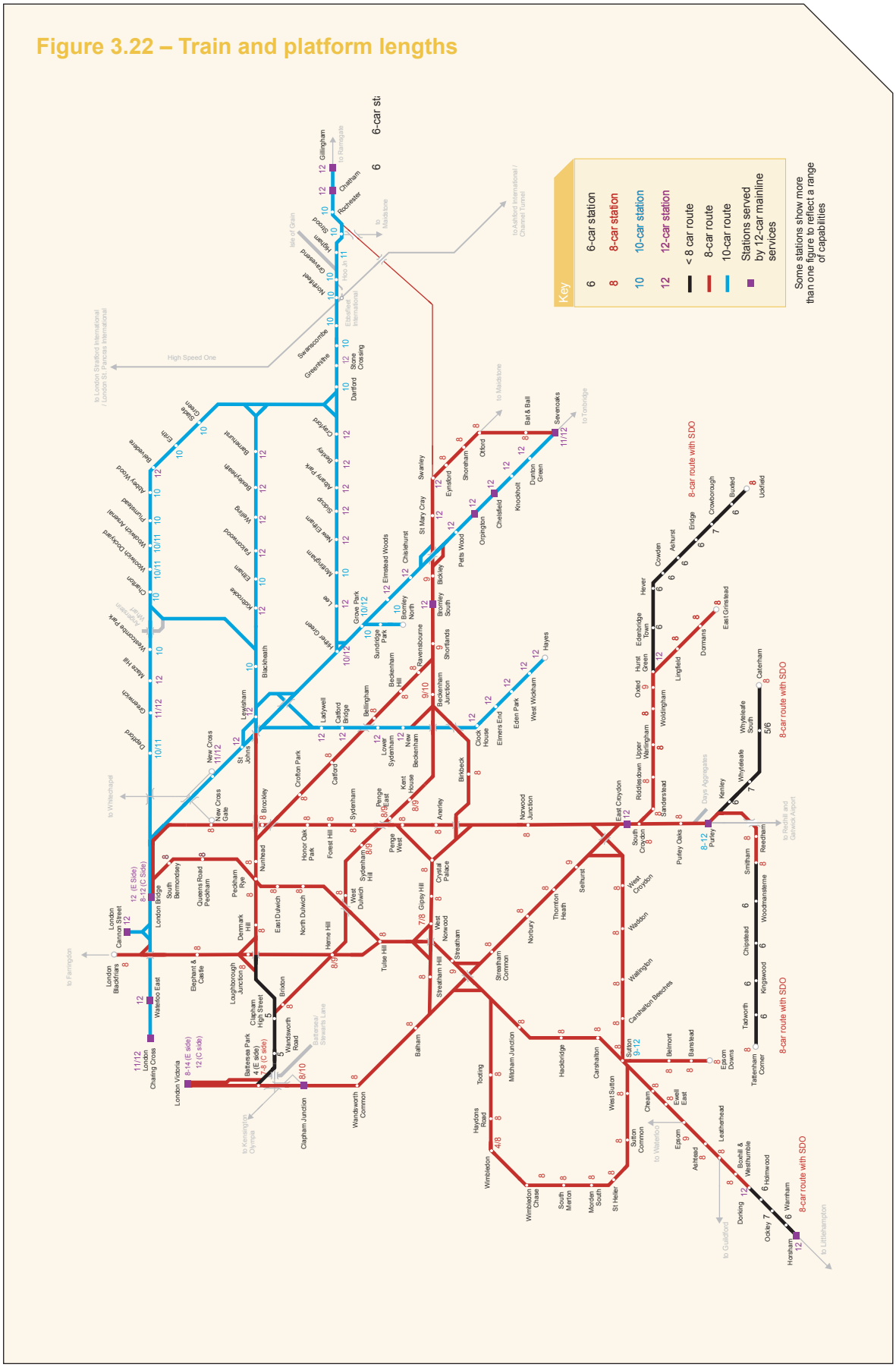
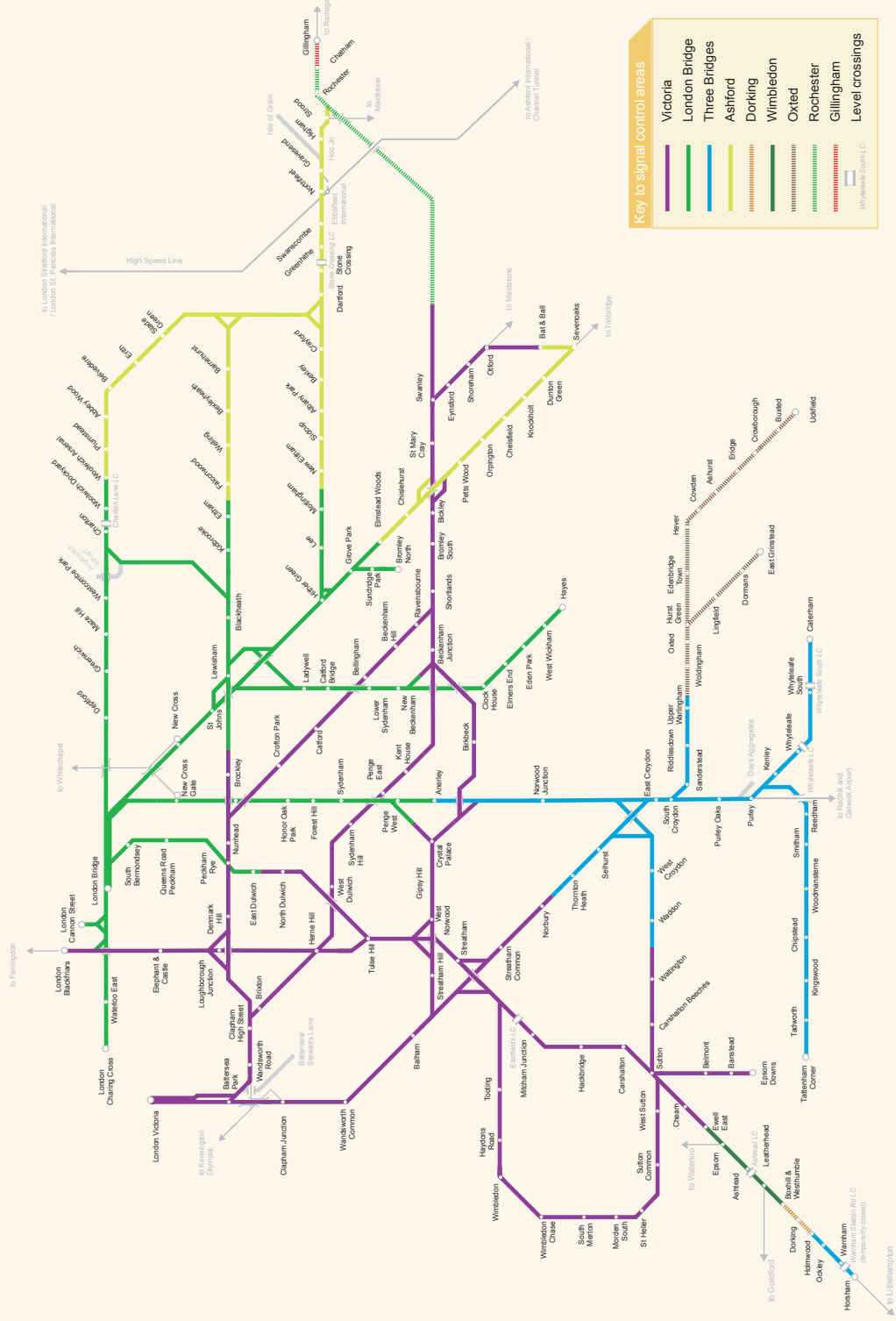


Figure 3.23 – Signalling control areas



3.15 Capacity

3.15.1
The industry has for a while been using the Capacity Utilisation Index (CUI) as an indicative, and somewhat limited, measure of how much of the planning capacity of a section of railway is being utilised by the current timetable. One of the shortcomings of the index is that it does not adequately reflect how junctions affect capacity utilisation.

3.15.2
Because the RUS area is characterised by a large number of flat junctions, it was decided to supplement the raw CUI data with stakeholders' professional judgment in an effort to provide a realistic assessment of capacity utilisation during the morning peak. The results of this exercise are given in Figure 3.24.

3.15.3
The locations where the network is most highly utilised during the morning peak are:

- between Balham and Victoria
- in the East Croydon area
- at Herne Hill
- at Dartford
- between Sevenoaks and Orpington
- at Lewisham
- between Hither Green/Lewisham and Charing Cross/Cannon Street, and all routes approaching London Bridge.

3.15.4
It is noteworthy that five of these seven locations, with the exception of Herne Hill and Sevenoaks/Orpington, also feature in the list of places at which most reactionary delay to passenger trains was originated in 2005/2006 (see Appendix D in Draft for Consultation).

3.15.5
Unsurprisingly, the least densely used parts of the network tend to be further away from London. This does not, however, necessarily imply that they could sustain a more frequent service, even if it were confined to that particular stretch of line. On the generally lightly-used Uckfield branch, for example, capacity is constrained by three sections of single line, which are highly utilised in the morning peak.

3.15.6
It is important to recognise that maximising the use of available track capacity also depends on the ability of terminal stations to handle the level of traffic. This is a function of:

a) the number and length of platforms available at the terminal

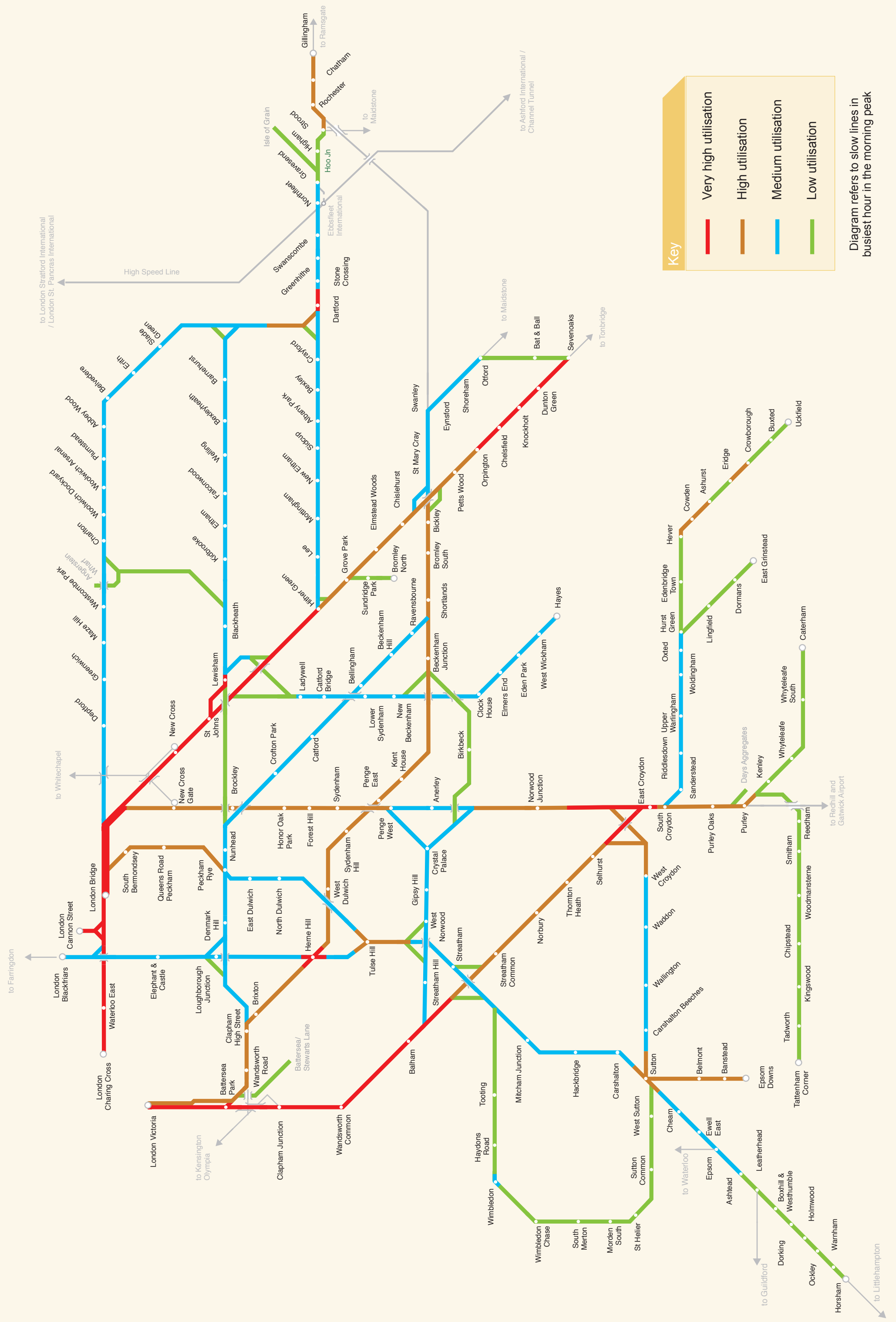
b) how quickly trains can be turned round in order to free up a platform for a following train.

For example, even though the track capacity on the slow lines through Sydenham would permit an increase in frequency of around 6 trains per hour above current morning peak levels, London Bridge Low Level station would not at present be able to accommodate them. The East London Line extension, however, provides additional terminal capacity at Dalston Junction, and thus enables the spare track capacity through Sydenham to be exploited.

3.15.7
A further complication, perhaps somewhat paradoxically, concerns the effects on terminal working of train lengthening. Whilst it is generally accepted that track capacity can often be maximised by running longer trains, the benefits can also be offset by the additional time it takes to turn a longer train round at a terminal, thereby potentially reducing the number of trains the terminal can handle.

3.15.8
Longer trains can also potentially have an adverse impact on planning headways (and hence capacity), by increasing junction margins and platform re-occupation times, and by fouling signal overlaps or junctions when stopped within short signal sections.

Figure 3.24 – Capacity utilisation (2008)



3.15.9

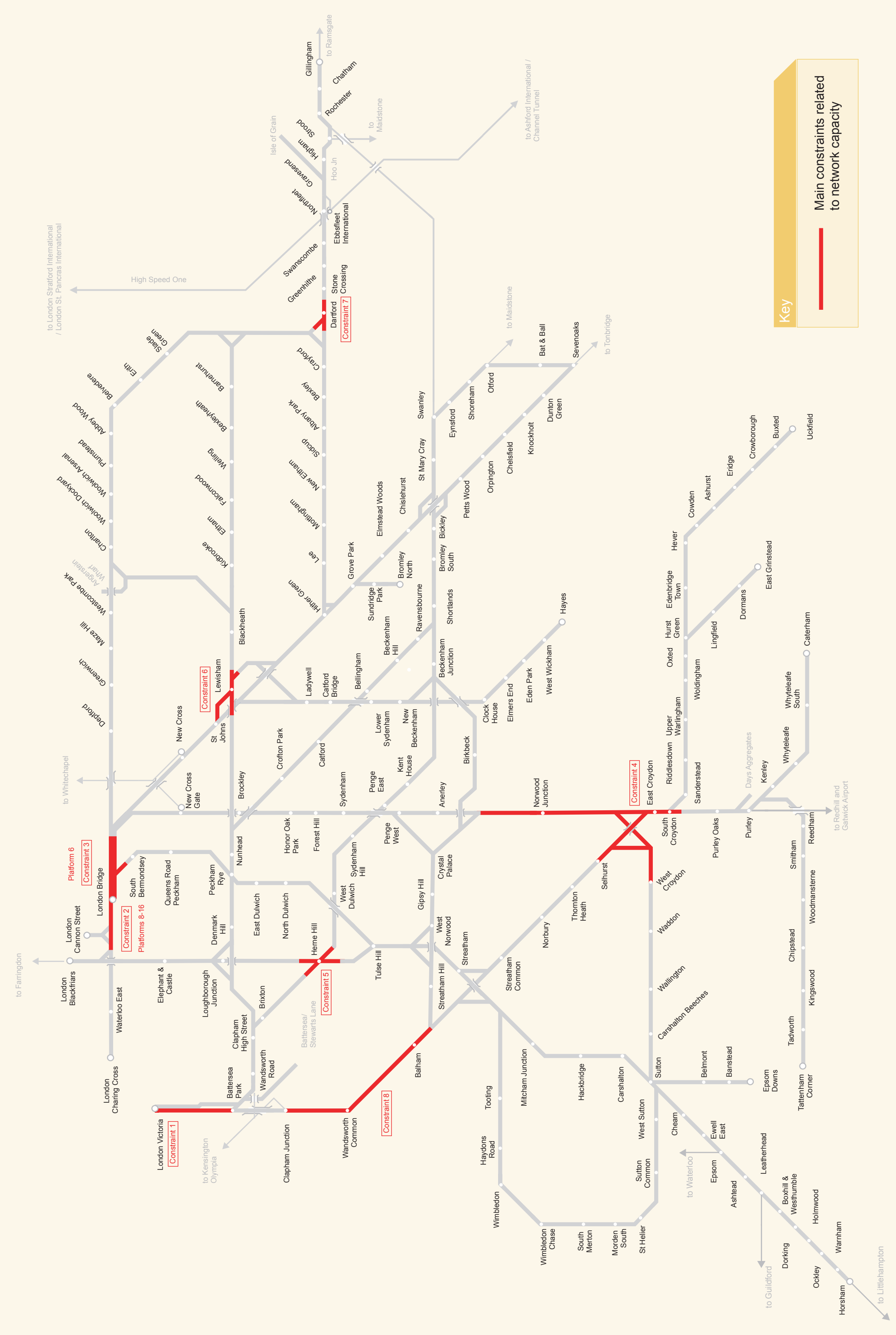
For these reasons it will be important for any proposed intervention which involves longer or more frequent trains to be modelled so that the effects on both capacity and performance are captured and understood.

3.15.10

The RUS has identified that there are several key localised capacity constraints which restrict the overall capacity of the whole wider network. These, also shown in Figure 3.25, are:

- the capacity of Victoria station (Central suburban side), with only platforms 9-12 normally available to services
- the capacity of both London Bridge low level and the approach tracks leading up to it
- only platform 6 at London Bridge normally (ie. planned to be) available for services to Charing Cross to call
- the low speed two-track section over Borough Market and the flat crossing moves needed at Metropolitan Junction
- the flat junctions and limited capacity for terminating services in the Croydon area
- the flat junction at Herne Hill
- the flat junctions at and around Lewisham
- limited capacity in the Dartford area, primarily due to the need to terminate services from three separate routes
- the slow lines between Clapham Junction and Balham
- capacity for freight traversing the SL RUS area, in particular the lack of any facility to recess freight trains between Factory Junction (near Wandsworth Road station) and either (1) the Isle of Grain or (2) the Channel Tunnel freight route.

Figure 3.25 – Network capacity constraints (passenger)



3.16 Performance

3.16.1

The area covered by the South London RUS is one of the most congested parts of the UK network. As such, even relatively minor disruption can quickly escalate due to the density of traffic arriving at, or leaving London termini. The Suburban (Inner) service groups for Southern and Southeastern are largely aligned to the geographic scope of the South London RUS, providing an accurate picture of performance through the relevant metrics.

3.16.2

There are two principal measures used to monitor performance: Public Performance Measure (PPM) and delay minutes. PPM provides a national metric for overall passenger train punctuality and reliability and is expressed as a percentage of all trains arriving on time (defined as being within 5 minutes of scheduled time for London and SE TOCs) at destination compared to the total number of trains planned. Delays accrued during a train journey are expressed in delay minutes, which are broken down by responsibility and cause. Delay minutes attributed to Network Rail typically relate to infrastructure failure, operation of the network, timetabling or external events. Delays attributed to Train Operators or Freight Operators relate to fleet reliability, station delays and operational incidents.

3.16.3

Figures 3.26 and 3.27 give the PPM moving annual average for Southern and Southeastern Suburban service groups for both peak and all day punctuality. Both operators have experienced a slower trajectory since autumn 2006, much of which has been due to several very disruptive events over the past year, notably major fires in the London Bridge area and weather related incidents including flooding, high winds and ice/snow.

3.16.4

At period 11 2007/08, the PPM moving annual average for Southern Suburban Peak services stands at 87.5%, which is 0.2% lower than the equivalent period in 2006/07 but 4.5% better than two years before. Punctuality for peak services is slightly worse than off peak, but the trajectory between peak and off-peak services is very closely aligned. PPM for Southeastern Suburban peak services currently stands at 85.3%, which is 2.0% better than the previous year and 5.1% better than period 11 2005/06. There is a wider variance between peak and off-peak services when compared to Southern, with the peak currently 4.9% worse than off-peak.

Figure 3.26 – Southern PPM (suburban peak & off-peak)

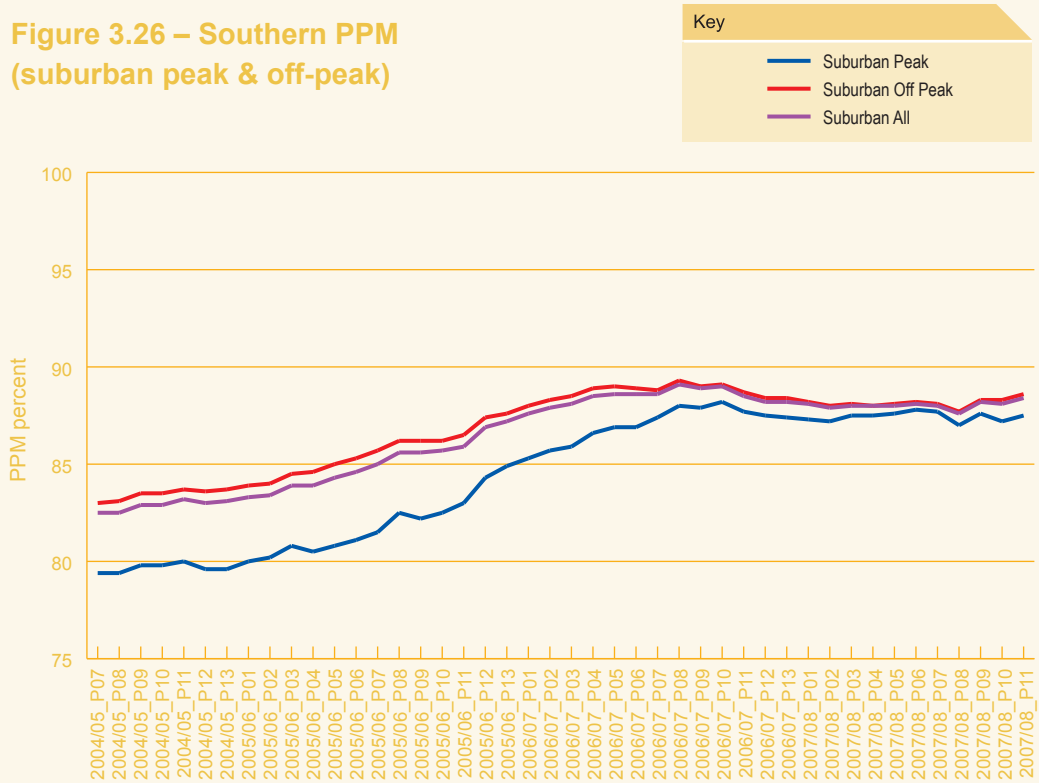
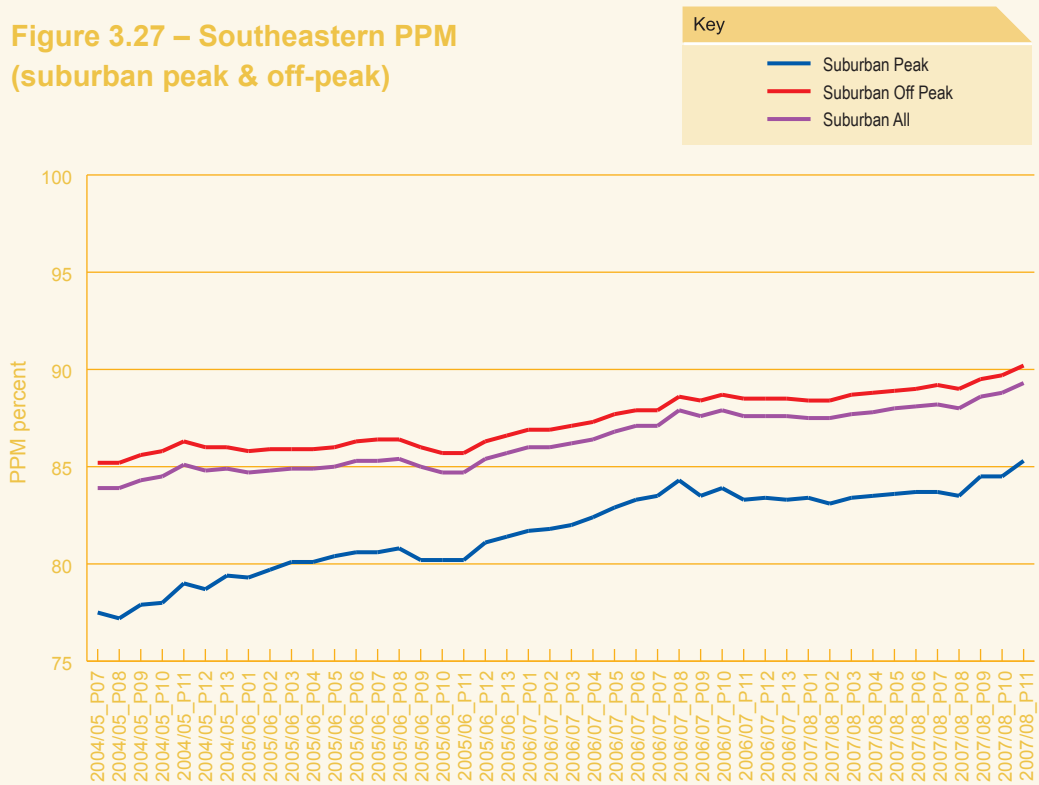


Figure 3.27 – Southeastern PPM (suburban peak & off-peak)



3.16.5
PPM for Suburban services at each London terminus is provided in Figure 3.28. As may be expected, greater frequency of arrivals has an adverse affect on PPM. This effect will be exacerbated during future London Bridge construction works, during which time the use of alternative termini is likely to increase congestion and reduce flexibility of the network (see Chapter 8).

3.16.6
A summary of delay minutes trends for suburban peak service groups is provided in Figures 3.29 and 3.30. As reflected in PPM, the delay minutes affecting Southern services have deteriorated over the past year. Both Network Rail-responsible and Southern-responsible delays have risen in this period. Delays caused by Southeastern to their own trains have reduced steadily. Network Rail delays on Southeastern have not reduced at the same rate. There have unfortunately been a significant number of high impact incidents in the RUS area recently which have contributed to the short term deterioration in Network Rail attributed delay.

3.16.7
It is not currently possible to provide disaggregated performance metrics for First Capital Connect services on the South London RUS area as high level performance reporting processes do not differentiate between north and south of Blackfriars. However, taking FCC as a whole, performance largely mirrors that of Southern and Southeastern. FCC PPM is improving, which is supported by a reduction in delays attributed to FCC and other train operators. However, Network Rail delays have worsened over the past year.

3.16.8
Current performance is supported by Joint Performance Improvement Plans developed between each TOC and Network Rail, through which performance improvement initiatives are identified and implemented. Notably, both Kent and Sussex routes have developed and agreed with Southern, Southeastern and FCC service recovery and contingency plans to mitigate the effect of disruption when incidents occur. Additionally, the Thameslink Project is facilitating a programme of performance protection initiatives, whereby effects of the Thameslink construction programme are mitigated through reliability enhancements within the Thameslink route.

Figure 3.28 – Public Performance Measure (PPM)

Southern Railway	**Peak**	**Off Peak**	**All Suburban**
Victoria (56)	86.1%	86.7%	86.6%
London Bridge (61)	88.8%	90.5%	90.2%
Charing Cross (0)	-	84.0%	84.0%
All London termini	87.5%	88.1%	88.0%
Southeastern Railway	**Peak**	**Off Peak**	**All Suburban**
Charing Cross (50)	78.7%	87.5%	86.0%
Cannon Street (38)	82.6%	92.7%	90.4%
Victoria (15)	90.2%	92.4%	92.1%
Blackfriars (13)	92.9%	93.4%	93.3%
All London termini	83.1%	90.4%	89.0%

Figures in brackets give the number of peak (07:00 – 10:00) weekday arrivals

Figure 3.29 – Southern delay minutes (suburban peak & off-peak)

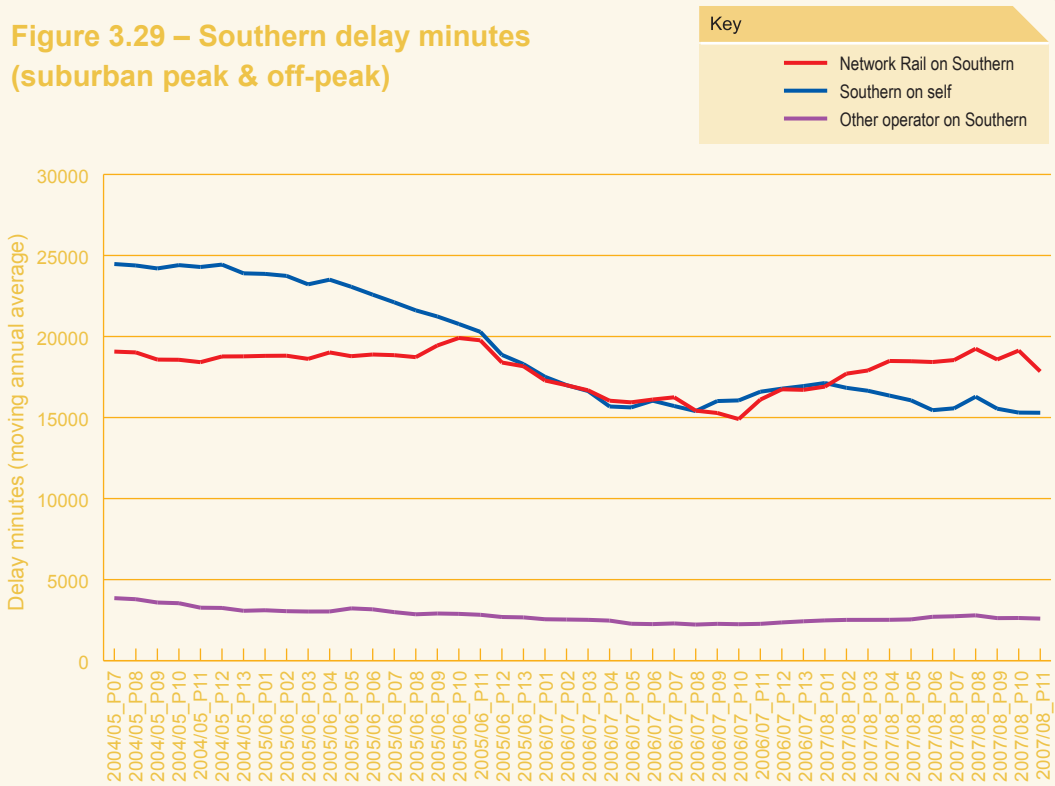
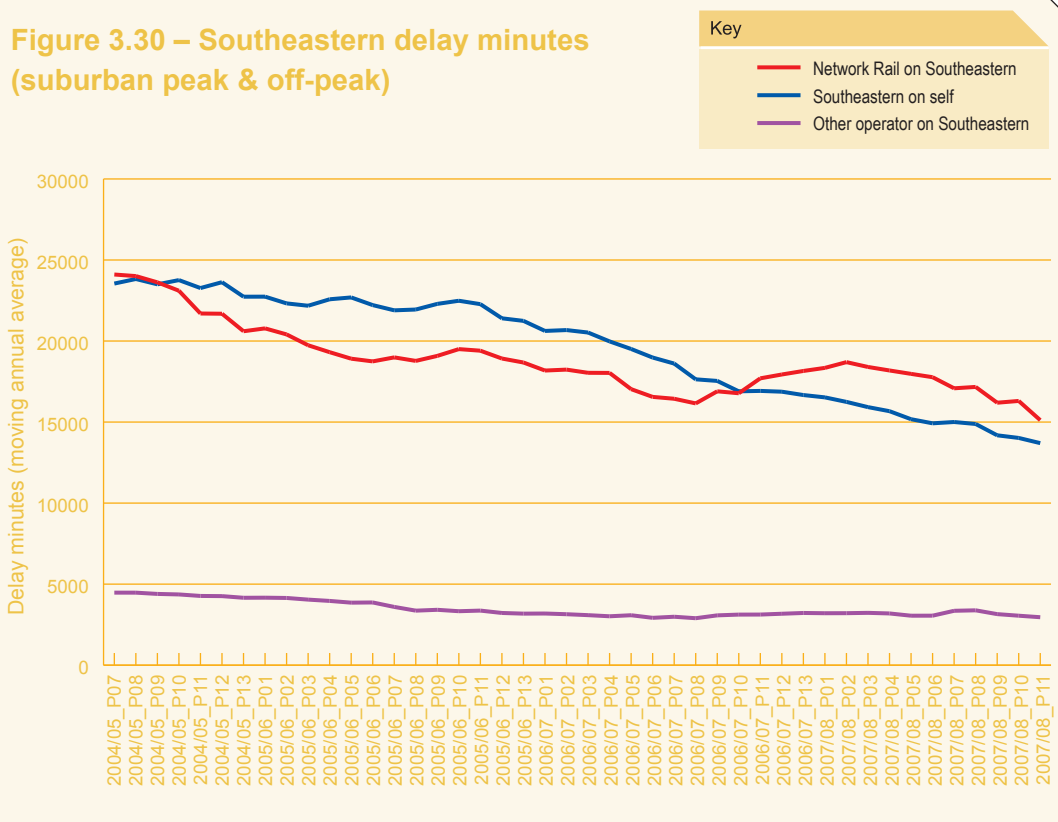


Figure 3.30 – Southeastern delay minutes (suburban peak & off-peak)



3.17 Engineering access

3.17.1

Network Rail needs to gain access to sections of route in order to meet its obligations safely to maintain, renew and enhance the infrastructure. Broadly, there are three main types of engineering access:

- non-disruptive work carried out between trains, which on most non-freight routes means overnight (other than routine patrolling and inspections). Typically this would be used for work arranged at short notice, such as that in response to faults which have arisen
- cyclical possessions, where different sections of route are closed to traffic on a pre-planned basis once every 12-13 weeks (thereby giving access to all locations at least 4 times each year). Such possessions normally take place overnight or at weekends; train services are then diverted, replaced by road transport, or in some cases delayed until the line re-opens
- one-off possessions, used for specific projects such as renewal or enhancement schemes, or for significant emergency repairs.

3.17.2

Both Government and the ORR have challenged Network Rail to achieve considerable efficiencies in the cost of maintenance and renewal activities, but without reducing the extent of their outputs. Possessions impose a range of additional direct and indirect costs on train operators, and it is therefore important that optimum value is obtained from the work undertaken during each possession. In an ideal world, maintenance and renewal activity would be safely performed with little or no disruption to customers' train services. Network Rail is therefore progressing a number of national initiatives aimed at identifying how maintenance activity can be made more efficient for the industry as a whole.

3.17.3

Across the South London RUS area, a number of generic issues affecting engineering access at present have been identified:

- the London economy exhibits a growing demand for later evening services on all routes, thereby reducing the time available for maintenance work; the conventional solution of using replacement bus services has become problematic because of the greater number of passengers involved
- the London economy exhibits a growing demand for more services at weekends, and on Sundays in particular when maintenance possessions are customarily taken. Again, the resultant number of passengers (and their belongings) makes bus substitution increasingly difficult
- with rising traffic congestion in the Greater London area, bus substitution leads to significantly increased journey times; this risks constraining demand that might otherwise have been attracted to rail
- whilst the intricacy of the RUS network means that there are often diversionary route options available when lines are closed for maintenance, this is not necessarily of benefit to freight operators for whom considerations of gauge, route availability and electrification need also to be taken into account when alternative routes are planned
- not all train drivers have knowledge of all appropriate diversionary routes
- the potential for growth of freight traffic, in both existing and new flows, could put pressure on maintenance regimes as presently conducted
- the diversion of services to an alternative route has a knock-on impact on services normally using that route

- there is a large amount of unproductive time incurred in both taking and giving up possessions because of a) the prevalence of junctions requiring several routes to be blocked; and b) the need for electrical isolations of the third rail for many maintenance tasks
- in the London area in particular, there are few locations where it is possible for road-borne maintenance equipment to gain access to the railway
- night-time maintenance of the railway in densely built-up areas gives rise to complaints about noise and artificial lighting
- on four-track railways where lines are paired by function (i.e. fast and slow), it is often possible to take possession of the fast lines while keeping the slow lines open to traffic, or vice versa. However this is often not the case when lines are paired by direction (ie. up and down – but see also next paragraph)
- the continued tightening of safety requirements for maintenance staff may lead to more restrictions on whether work can be done at night, or without electrical isolations, or without the closure of adjacent lines – thereby challenging long-established work processes.

3.17.4

In addition to these generic topics, a number of location-specific issues have also been identified. Whilst most of these are not of a strategic nature and will therefore be addressed outside the RUS process, there are a few whose implications are more significant. They include:

- engineering possessions on the lines through Sydenham are taken in just one direction, with trains running in the other direction only. For passengers, this means taking an alternative route and then doubling back on themselves via London or Croydon.
- there are important depots for infrastructure trains at Hither Green and Hoo Junction. Possessions and consequential train alterations need to be planned in such a way that these depots can still be accessed. Whilst this does not normally pose problems at present, the situation will need to be kept under review if growth in other train services leads to a significant reduction in paths available to and from these locations
- the siting of major rolling stock depots, and of Selhurst and Slade Green in particular, where train movements may be required 24 hours a day, is a constraint on maintenance access in the immediate vicinity.
- maintaining the two-track section in the Metropolitan Junction area is particularly challenging owing to the physical access constraints, the complexity of the infrastructure, and the volume of traffic. This is primarily managed at present by diverting Charing Cross services into Cannon Street and FCC services via Elephant and Castle on a number of weekends each year.

4. Gaps and options

4.1 Introduction

4.1.1

This chapter lists the gaps which were identified in the Draft for Consultation, and reminds the reader of the various options which were proposed in the Draft to bridge those gaps.

Figure 4.1 Gaps identified in Draft for Consultation

Generic gap	Issue highlighted	Specific routes affected
a	Existing and predicted overcrowding, and inability to meet demand on peak services	Southeastern services to Charing Cross/ Cannon Street
b		Southeastern services to Victoria/ Blackfriars
c		Southern services to Victoria
d		Southern services to London Bridge East London Line services
e		FCC services via Blackfriars
f	Existing and predicted overcrowding at certain stations, potentially leading to closures at peak times.	N/A
g	Shortcomings in the timetable specifications previously agreed for December 2009	Southern Metro and East London Line services
h		Southeastern SLC2 services
i	Sub-optimal capability and limited capacity in respect of some routes used by freight trains	Various

4.2 Gaps

4.2.1

A total of nine generic gaps were identified, as highlighted in Figure 4.1. Further details and rationale behind the identification of these gaps were provided in the Draft for Consultation.

4.2.2

The strategy outlined in the remainder of this document has been designed to facilitate addressing the issues arising from the gaps highlighted above.

4.3 Options

4.3.1

In the Draft for Consultation each gap was investigated using a standard 'toolkit' of types of solution, and this approach produced a set of options for detailed analysis.

4.3.2

The options which were identified are listed in Figure 4.2. Detailed descriptions and analysis of each of these were included in the Draft for Consultation.

Figure 4.2 Options identified in Draft for Consultation

Option number	Name
Peak train frequency options – these options would increase peak service levels above the previously envisaged December 2009 timetable, generally maintaining current levels of service	
1.1	Hayes Line
1.2	Sidcup Line
1.3	Bexleyheath Line
1.4	Greenwich Line
1.5	Chislehurst Line (stopping services)
1.6	Penge East Line (stopping services)
1.7	Catford Loop Line
1.8	Bromley South (level of fast services)
2.1	Norbury Line to London
2.2	Gipsy Hill Line to London
2.3	Sydenham Line
2.4	Tulse Hill Line
2.5	Caterham and Tattenham Corner Lines
2.6	Hackbridge Line
2.7	Balham (and south thereof) to the West London Line
2.8	Purley to London (calls at Purley in fast services)
Peak train lengthening options – these options would increase capacity by running longer trains than operate today	
3.1a	Sidcup Line 12-car operation
3.1b	Bexleyheath Line 12-car operation
3.2	Hayes Line 12-car operation
3.3	Chislehurst Line (stopping services) 12-car operation
3.4	12-car capability at Gravesend
3.5	12-car capability at Rochester

Option number	Name
3.6	Greenwich & Woolwich Line 12-car operation
4.1	Norbury Line 10/12-car operation
4.2	Gipsy Hill Line 10/12-car operation
4.3	Sydenham Line 10/12-car operation
4.4	Tulse Hill Line 10/12-car operation
4.5	Hackbridge Line 10/12-car operation
4.6	East Grinstead Line 12-car operation
4.7	East London Line 5-car, 6-car or 8-car operation
Generic capacity options	
5	Reconfigure rolling stock interior layouts to provide more capacity
6	Use of fares policy to spread demand
7	Short-term acquisition of additional rolling stock
Enabling options – optimising use of capacity at London terminals	
8.1	Diversion of London Bridge-Victoria (via SLL) service to Victoria Eastern
8.2	Diversion of London Bridge-Victoria (via SLL) service to Clapham Junction
8.3	Termination of London Bridge-Victoria (via SLL) service at Battersea Park
9	Utilise Platform 8 or 13 at Victoria for Southern suburban services
10.1	Diversion of Victoria-London Bridge (via SLL) away from London Bridge to Catford Loop
10.2	Diversion of Victoria-London Bridge (via SLL) service away from London Bridge to Lewisham and beyond
10.3	Diversion of Victoria-London Bridge (via SLL) service away from London Bridge to ELL (phase 2 extension)
11.1	Platform lengthening at Wandsworth Road and Clapham High Street
11.2	New 8-car platform face at Wandsworth Road on Chatham Reversible
Enabling options – optimising use of capacity in the Croydon area	
12.1	Operate East London Line services to Crystal Palace only
12.2	Operate East London Line services to a destination beyond Croydon
12.3	Calls in fast line services at New Cross Gate
13.1	West London Line services to terminate at Clapham Junction
13.2	West London Line services to terminate between Clapham Junction and Croydon
13.3	West London Line services to terminate at East Croydon or South Croydon
13.4	West London Line services to terminate at Sanderstead, Purley or Smitham
13.5	West London Line services to terminate at West Croydon or Sutton

Option number	Name
13.6	West London Line services to terminate at Redhill or Reigate
13.7	West London Line services to terminate at Gatwick Airport
14.1	Revise Oxted line services to a standard pattern through East Croydon
14.2	Revise FCC services to a standard pattern through East Croydon
14.3	Revise Gatwick and Sussex Coast services to a standard pattern through East Croydon
15.1	Provide a new turnback facility at Norwood Junction (for Victoria services)
15.2	Provide an improved turnback facility at Selhurst
15.3	Provide a new turnback facility at Crystal Palace
15.4	Upgrade running line from Selhurst to Norwood Junction via Selhurst Depot
15.5	Provide grade separated running line from Norwood Junction to Selhurst station and/or Selhurst depot
16.1	Provide additional tracks between Windmill Bridge Junction and East Croydon and/or additional platforms at East Croydon
16.2	Provide additional infrastructure at West Croydon
16.3	Changes to signalling in the East Croydon area
Enabling options – optimising use of capacity in the Herne Hill area	
17.1	Prioritise spare capacity at Herne Hill for use by FCC services
17.2	Prioritise spare capacity at Herne Hill for use by Southeastern services
17.3	Increase capacity at Herne Hill by grade separation
18	Alternative Thameslink & Wimbledon Loop service pattern
Enabling options – optimising use of capacity in the Lewisham area	
19.1	Divert proposed Charing Cross-Plumstead services to run via Greenwich
19.2	Divert proposed Victoria-Dartford services to run to/via Sidcup
Thameslink Programme sensitivity tests – It is noted that these options were included in the Draft for Consultation, prior to the project becoming committed in July 2007	
20.1	Implementation of full Thameslink Programme (Key Output 2)
20.2	Implementation of Thameslink Programme stages (Key Outputs 0 and 1)
20.3	Provision of new platform face on Up Passenger Loop at London Bridge
20.4	Operation of trains from Sydenham line through to Charing Cross
20.5	Refinements to final Thameslink train service specification (at Key Output 2)

Option number	Name
Freight specific options	
21.1	Provide freight loops on the Grain branch
21.2	Provide freight loops on the West London Line
21.3	Remove approach control at Crofton Road Junction
21.4	Provide a west-to-north connection onto the Angerstein Wharf branch
21.5	Construct a new freight terminal at Howbury Park (near Slade Green)
21.6	Provide W10 gauge to Grain
21.7	Provide W12 gauge to the Channel Tunnel
21.8	Enable electric freight locomotives to use the Channel Tunnel diversionary route via Redhill
Congestion relief at stations	
22.1	Congestion relief at London Bridge
22.2	Congestion relief at Victoria
22.3	Congestion relief at Clapham Junction
22.4	Congestion relief at East Croydon
22.5	Congestion relief at Bromley South
22.6	Congestion relief at Lewisham
22.7	Congestion relief at Blackfriars
22.8	Congestion relief at Waterloo East
22.9	Congestion relief at Charing Cross
22.10	Congestion relief at Balham
New stations	
23.1	New station at Eastfields
23.2	New station at Camberwell Green
23.3	New station at Brixton High Level
23.4	New station at Brockley High Level

4.3.3
The options being recommended are now incorporated into the appropriate part of this RUS strategy and are therefore described in subsequent chapters, together with the appropriate rationale behind the conclusions.

4.3.4
A list summarising the final status of recommendations for each of the above options is included as Appendix A.

5. Consultation process and overview

5.1 The Draft for Consultation

5.1.1

The South London RUS Draft for Consultation was published in July 2007, along with a press release announcing its publication. As described in the previous chapter the document outlined a number of gaps between the present capability of the network and the predicted demand up to 2019. It then proposed a wide range of options for bridging the gaps.

5.1.2

The Draft for Consultation was distributed to a wide range of stakeholders and also made available on the Network Rail website. A period of 12 weeks was given to allow stakeholders to respond, and this ended on 26 October 2007.

5.1.3

During the consultation period Network Rail held meetings with a number of stakeholders, either collectively or individually, at which specific issues were discussed.

5.1.4

In addition, as responses were received and common themes emerged, Network Rail introduced onto its South London RUS web page a 'Frequently Asked Questions' section. This enabled a range of topics to be explained, or in some cases clarified - particularly where potentially misleading interpretations of the RUS had been circulated.

5.2 Consultation responses

5.2.1

Stakeholders who responded to this consultation fell into six broad categories. Formal responses were received from:

- The RUS Stakeholder Management Group
  - Department for Transport
  - English Welsh and Scottish Railway
  - First Capital Connect
  - London and Southeastern Railway
  - New Southern Railway
  - Office of Rail Regulation
  - Transport for London
- Other rail industry organisations
  - Rail Freight Group
- Statutory and voluntary rail user groups
  - London TravelWatch
  - Passenger Focus
  - Clapham Transport Users Group
  - East Surrey Transport Committee
  - Fen Line Users Association
  - Norwood Rail Users Group
  - Sevenoaks Rail Travellers Association
  - Southwark Rail Users Group
  - Sutton Rail Users Forum
  - West London Line Group
- Regional/local authorities and umbrella groups
  - South East England Regional Assembly
  - East Sussex County Council
  - Gravesham Borough Council
  - Tandridge District Council
  - City of London
  - London Borough of Bexley
  - London Borough of Croydon
  - London Borough of Greenwich
  - London Borough of Hammersmith and Fulham
  - Royal Borough of Kensington and Chelsea
  - London Borough of Lambeth
  - London Borough of Lewisham
  - London Borough of Merton

  - London Borough of Southwark
  - London Borough of Sutton
  - London Borough of Wandsworth
  - East London Line Group
  - London Councils
  - South East London Transport Strategy (SELTRANS)
  - South London Partnership
  - South and West London Transport Conference (SWELTRAC)

- Political, campaigning and charitable organisations
  - Bellingham Councillors, London Borough of Lewisham
  - Brockley Rise Residents Association
  - Camberwell Society
  - Forest Hill Society
  - Green Party
  - Labour Group, London Borough of Southwark
  - Liberal Democrat Group, London Borough of Lambeth
  - Peckham Society
  - Railfuture
  - Streatham Liberal Democrats
  - Sydenham Society

- Companies, other public or private organisations, elected representatives and private individuals
  - Some 627 formal written responses were received during the consultation period. Of these, however, fewer than 10% were in direct response to the consultation document itself, with the rest apparently being in response to selective interpretations of the document prepared by third parties
  - In addition, two of these responses enclosed petitions opposing specific sub-options, some of whose signatories had also responded directly and are included in the total of 627 above.

5.2.2
Copies of the various organisations' responses can be found in the South London RUS section at www.networkrail.co.uk. Because most of the private individuals who responded were unlikely to have been aware that their submissions would be published, we have not placed any of these on the website.

5.3 Key themes in the consultation responses

5.3.1
This RUS is a particularly complex one. The responses which Network Rail received were well-considered and in many cases comprehensive. As a result, it is difficult to provide an individual précis of each one. Instead some of the key and recurring themes are summarised below.

5.3.2
In the time since the consultation document was drafted and published, some significant developments have taken place. In July 2007, the Government published its White Paper 'Delivering a Sustainable Railway' together with its High Level Output Specification for the period up to 2014. These were accompanied by an announcement confirming funding for the Thameslink Programme, which can now be treated by the RUS as a committed scheme (**see Option Group 20**). Similarly, in October 2007, the Government announced that funding had been agreed for the Crossrail project and, subject to it completing its passage through the parliamentary process, the scheme is expected

to be completed in 2017. Many consultees remarked on these developments; their implications on the RUS are fully discussed throughout the rest of this document.

5.3.3
Although the draft document made it clear that it was concentrating almost exclusively on the morning peak (and mutatis mutandis on the evening peak) - because it is at peak times that the system as a whole faces its biggest challenges - a number of people wanted the RUS to specify levels of off-peak, evening and weekend services. However, we believe that these should be considered by the appropriate franchising authority or the Train Operating Company concerned, and not by the RUS, since (with a few exceptions, discussed elsewhere in this document) sufficient track capacity exists at these times.

5.3.4
A few respondents questioned whether, in the light of growth in passenger numbers whilst the consultation document was in preparation, the forecasts contained in it may be understated. We have therefore updated the current demand figures to reflect the position in Autumn 2007, and these results are assessed further in Chapter 3. There were, however, no dissenters from the conclusion that significant growth could be expected up to 2019.

5.3.5
Overall there was widespread support for the RUS recommendation that longer trains should form the cornerstone of initiatives to deal with crowding and growth up to 2019 (**Option Groups 3 and 4**). Only a very small number felt that running more trains was a better solution in principle, despite the significant sums that would be incurred in infrastructure costs to provide the necessary capacity. Among those supportive of a lengthening strategy, a few issues were highlighted:

- the need to consider whether the savings achieved by not lengthening certain routes would be outweighed by the costs incurred through the loss of operational flexibility
- the additional time needed to turn round longer trains at terminals, and the cost of mitigating this with 'turn-round' drivers
- whether the use of selective door opening (SDO) was sensible at certain locations where platform lengthening was likely to be very expensive (such as Woolwich Dockyard)
- the need to ensure that stabling and maintenance facilities would be able to handle a) the quantum increase in the number of vehicles, and b) the longer rakes of vehicles.

5.3.6
Where the draft RUS did recommend the running of more trains than previously planned (**Option Groups 1 and 2**), principally in response to perceived shortcomings in the morning peak timetables specified to operate from December 2009, there was general support. A few correspondents remained concerned that some routes, such as the Bexleyheath and Sidcup lines, were still insufficiently catered for (**Options 1.2 and 1.3**). In these cases, we have looked again (in conjunction with Southeastern and DfT) at the original specification to see if further enhancements can sensibly be made on these lines without seriously compromising performance or purloining capacity unhelpfully from other lines.

5.3.7
With regard to **Option 2.3**, which supported running two additional trains from Crystal Palace to the East London Line in 2010, there was some local concern that this would leave insufficient capacity, and fewer trains, on the route to London Bridge from the Sydenham/ Forest Hill corridor during the morning peak. However, if the RUS proposals (as originally conceived in the consultation document) are implemented in full:

- from Brockley and Honor Oak Park, the number of trains arriving at London Bridge between 0700 and 0959 will increase from 15 to 18; and in the high peak hour (0800

to 0859) from 4 to 6. In addition there will be up to 10 new trains each hour running to the East London Line

- from Forest Hill and Sydenham, the number of trains arriving at London Bridge between 0700 and 0959 will remain the same as today at 18; in the high peak hour (0800 to 0859) there will be a small reduction from 7 to 6. Again, there will be up to 10 additional ELL trains each hour
- a growing proportion of current users will switch to ELL trains, freeing up capacity on the London Bridge trains. For journeys to Docklands, the ELL will provide a quicker (and cheaper) option; and for most trips to central London, the ELL route will offer journey times identical to - or quicker than - those on the route via London Bridge (source: TfL Journey Planner, based on journeys commencing at New Cross Gate in December 2007). This is before factoring in the higher frequency of the new ELL service
- the trains running on the Sydenham line to London Bridge from December 2009 are specified to commence their journeys much nearer to London than the present-day services, meaning that there will be more space available on them. We would also recommend that they operate at their maximum 8-car length

Whilst, therefore, we have not sought to amend the December 2009 specification from that originally proposed, we did retain a few concerns about catering for growth in the longer term. These are addressed in Chapters 7 and 9.

5.3.8
There was lukewarm support for the re-configuration of rolling stock interiors as a means of accommodating demand (**Option 5**), with several making the point that it ran the risk of making more passengers stand for much longer and of thereby breaching the 20-minute threshold for time spent standing. A small number felt that the removal of first-class accommodation from suburban trains would also be worthwhile, albeit that very few trains running wholly in the suburban area offer such facilities. Some also felt that toilet facilities could be removed and replaced by seating space.

5.3.9
Opinions were more polarised about the potential benefits of smart electronic ticketing technology (**Option 6**). Whereas some saw this as a powerful tool to manage peak demand, others were concerned that it would lead to a significant and unwelcome increase in high-peak fares. A few commented that the roll-out of Oyster Pay-as-you-Go across the RUS area would in itself stimulate substantial demand.

5.3.10
Option Groups 8 and 10 considered the future of the South London Line service from Victoria to London Bridge via Denmark Hill. This subject generated 597 of the total of 627 written responses to the draft RUS from members of the public, their elected representatives, and local companies/ organisations. Over half of the submissions (308) came from members of staff at either Kings College or Maudsley hospitals. As happened with the draft Cross London RUS, many of these were evidently responding to one of several interesting but inaccurate interpretations of the RUS document, rather than to the document itself. The draft RUS did not, for example, as some people supposed, recommend any reduction in the number of trains running through Denmark Hill, still less the closure of the station itself. Full details of what the RUS now recommends are included in Chapter 7.

5.3.11
Concern was expressed about the loss of direct services from Denmark Hill to London Bridge if the SLL service were to be diverted away from London Bridge towards Nunhead and the Catford Loop. Seemingly overlooked by many local people, however, was the strong support given by the draft RUS (support which was welcomed almost unanimously by other stakeholders) to early implementation of the East London Line Phase 2 extension to Clapham Junction as a means of mitigating that diversion. This would effectively double the frequency of journey opportunities from Denmark Hill to London Bridge, at the expense of one same-platform interchange.[1] In addition, the suggestions in the draft RUS would make access to the hospital sites quicker and easier (and potentially cheaper if avoiding Zone 1), particularly from west and east London; this would benefit staff, patients and visitors alike, which was a repeatedly stated aspiration of the hospital staff.

5.3.12
Among the industry stakeholders, there was widespread recognition that the SLL service cannot continue in its present form. Even without the threats posed by the likely severing of Battersea Park Junction and the loss of terminating platforms at London Bridge, the service represents a poor use of network capacity which satisfies only a comparatively low level of demand – for which alternatives are either already available or proposed.

5.3.13
On balance, consultees were not in favour of changes to the destination points of ELL (Phase 1) trains (**Option Group 12**), although a number did agree that they should be reviewed in the light of experience.

5.3.14
On the subject of where West London Line services should terminate (**Option Group 13**), there was considerable opposition to the suggestion that they should terminate at Clapham Junction in the southbound direction. All respondents believed they should go at least as far as Croydon, with some still pressing the case (rejected by the Brighton Main Line RUS) for continuation of these services to Gatwick Airport and Brighton. The choice of South Croydon as the terminating point gave rise to one particular concern about performance; although not ideal, South Croydon remains the only practicable contender for a 2009 implementation date and the required track and signalling enhancements do provide additional operational flexibility in the Croydon area.

5.3.15
The desire to achieve a standard pattern of service through Croydon met with general approval (**Option Group 14**). Of the few comments about **Option Group 15** (additional turnback capability in the Croydon area) there was very strong support for **Option 15.1** (Norwood Junction Platform 7). As far as **Option Group 16** was concerned (measures to increase capacity in the Croydon area), most considered the RUS had not gone far enough – especially with regard to East Croydon, where some felt we should also have considered in greater depth its importance as an inbound commuting destination. Similarly a number of respondees felt that a grade-separated junction at Herne Hill should be given a higher priority (**Option 17.3**).

1 It was frequently remarked that south London is not served by London Underground. One of the features of LU services, of course, is that the higher frequency made possible by self-contained lines is nonetheless offset by the need to change lines/trains on many journeys.

5.3.16
The constraints at Lewisham, for which there are no easy solutions, are the subject of ongoing work (**Option Group 19**). Rationalisation of train service patterns, in order to minimise conflicting movements, will still need to be considered. Nevertheless, there were a few concerns expressed about **Option 19.2** which mooted running the Victoria to Dartford services to/via Sidcup rather than Bexleyheath.

5.3.17
The freight-related options (**Option Group 21**) were largely supported. A few reservations were expressed about how much capacity would be available to/from Howbury Park, and some stakeholders wanted more detail about how and when structure renewals would facilitate incremental progression to W10/W12 gauge. Comments were also made about the impact of new and/or increased passenger services on freight operations, and these will need to be addressed.

5.3.18
The draft RUS's decision not to recommend new stations at Brockley High Level, Brixton High Level, and Camberwell Green attracted a number of representations (**Option Group 23**), although no new evidence was adduced to permit a different conclusion to be reached.

5.3.19
Several consultees highlighted subjects which they felt the RUS had either not addressed or not dealt with adequately. These included:

- car parking capacity
- engineering access in the context of the 7-Day Railway initiative
- future performance following recommended RUS interventions
- setting a strategic vision over a 30-year period, in line with the July White Paper.

5.3.20
Finally, a few correspondents took the trouble to propose a range of innovative ideas for future consideration. For example, one person suggested that at least two platforms at Charing Cross could be made into through platforms by tunnelling northwards towards Euston. A second felt that Waterloo International could be exploited by the East London Line. And another wanted to see a Heathrow to Ebbsfleet service routed via the West London Line.

5.3.21
We are grateful to all those who responded to the draft RUS, and we hope that where possible, within our terms of reference, we have been able to take account of genuine concerns.

6. Planned short term schemes – 2010 timetable

6.1 Introduction

6.1.1

In the Draft for Consultation we outlined several options related to train service frequencies relevant to the December 2009 timetable change onwards.

6.1.2

The presentation of these options in the draft was significantly complicated by the 2010 "base position" having become committed (ie. funded) before work on the RUS commenced. This led to the RUS base position (against which all options must be assessed) having fewer train services than operate today on several routes.

6.2 Drivers of change

6.2.1

In general a RUS is undertaken, amongst other reasons, to inform the future train service specification for the area involved (for example during a refranchising process). However in the case of the South London RUS the following schemes, and their significant impacts, became committed prior to the RUS analysis commencing:

- Extension of the East London Line to West Croydon and Crystal Palace. For this it was noted at the time that the ORR was "minded to approve" TfL's request for a Track Access Option[1]. As a result TfL's "Proof of Concept" timetable was used for the Southern suburban area as a base. This meant, however, that certain peak frequencies were considered as reduced relative to today (e.g. Sydenham to London Bridge, Streatham Common to Victoria).
- Southeastern's franchise commitments with DfT for their December 2009 timetable change. For this we used the SLC2 service specification, resulting from the Strategic Rail Authority's 2005 consultation process, as a base. Again it was noted that this timetable would reduce certain peak frequencies relative to today (notably on the Hayes, Bexleyheath and Bromley South routes).

1 The Track Access Option for ELLX has now been agreed by ORR.

6.2.2
Following on from the above, at the time of the original RUS analysis it was not possible to use today's level of train service as a base position, since the then committed schemes actually planned to reduce certain service levels. Hence the RUS had to consider options for retaining today's level of train service as interventions.

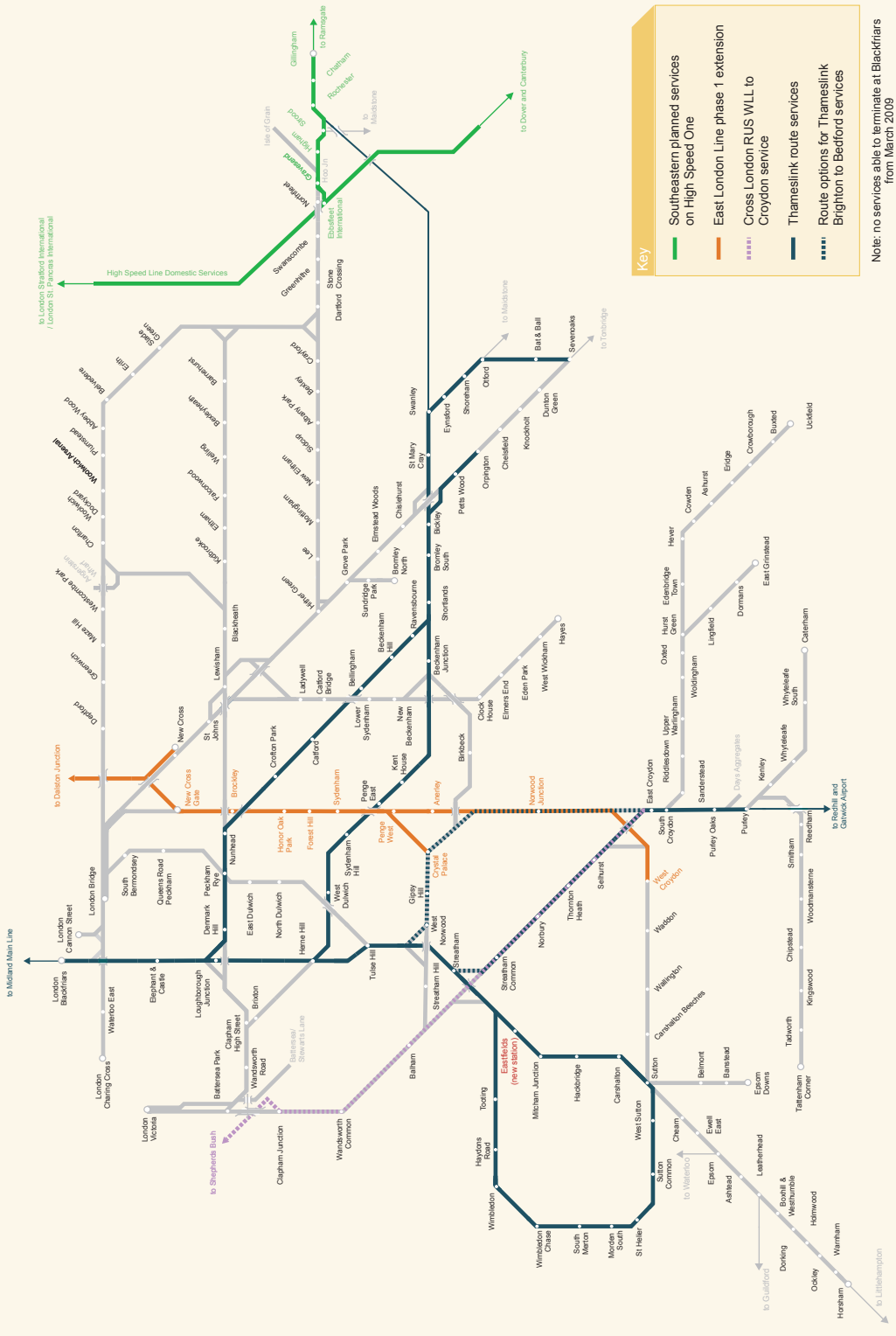
6.2.3
However, following publication of the Draft for Consultation there have now been several further developments related to the level of train service to be operated in 2010. The most relevant of these are outlined below.

- Further development work on the timetable for the East London Line extension (Phase 1) has identified the need for a complete rewrite of the entire Southern suburban area and Brighton main line to make this project workable. This further timetable development work is now seeking to provide additional capacity beyond that envisaged in TfL's "Proof of Concept" timetable.
- The DfT have now reached an agreement with Southeastern to retain broadly the current level of peak capacity to terminals such as Charing Cross from December 2009 onwards.
- As a consequence of the Thameslink Programme becoming a committed scheme, closure of Platforms 1-3 at Blackfriars is planned from Spring 2009 to enable infrastructure enhancements at this location to commence. This will result in all Blackfriars trains needing to operate further north via City Thameslink. In addition other timetable changes are now being developed with the Thameslink Programme in mind.

6.2.4
As a result of the above it is not considered meaningful for this Final RUS to describe the train service strategy in terms of a committed base and assessment of a number of options. This chapter presents the recommended strategy for the timetables required to operate in 2010. It can therefore be read as a standalone document.

6.2.5
Figure 6.1 highlights diagrammatically the key drivers of change for the 2010 timetable.

Figure 6.1 – Drivers of timetable change to 2010



6.3 South Central refranchising

6.3.1

A major timetable change will need to take place at some stage between December 2009 and Summer 2010, which will affect the whole of the Brighton Main Line and the current Southern Railway suburban area. It has now been robustly demonstrated that it will not be possible to open Phase 1 of the East London Line extension (to Crystal Palace and West Croydon) without this.

6.3.2

The development work for this timetable change now incorporates the following principal features with respect to morning and evening peak services. Where these were described as options in the Consultation Draft this is indicated.

- On the Sydenham line, Brockley, Honor Oak Park, Penge West and Anerley all see an increase in the number of morning peak trains to London Bridge. Sydenham and Forest Hill will see a marginal reduction from 7tph at present to 6tph in the high peak hour, but no change from the existing 18tph trains across the entire three-hour peak. However, the RUS considers that, even if this change were to be carried out in isolation (as opposed to at the time of ELL opening), the service pattern will provide sufficient capacity, since no trains serving this route will originate from further away than the Croydon area (as opposed to locations such as Epsom or Caterham today).
- A 2tph service will operate from the Sydenham line to Victoria via Crystal Palace. This is a significant improvement in the morning peak, developed in response to stakeholder feedback, since this service currently only commences after the morning peak has finished.
- A 4tph peak fast service is provided from Norwood Junction to London Bridge, at improved intervals. This will provide capacity for some of the passengers who would otherwise use the all-stations trains.
- Paths have been found for 2tph services to London Bridge from both the Streatham Common and West Norwood routes (via Tulse Hill), again a significant improvement compared with today's morning peak.
- Due to the capacity taken up by ELL on the slow lines, Wallington line services will need to operate via the fast lines to and from London Bridge all day. Whilst this means that such services will not be able to call at stations such as Sydenham and Forest Hill this has the advantage of providing journey time improvements for many passengers relative to today.
- Paths have been identified for 10tph from the Sydenham route in the peaks to the East London Line (Option 2.3b in the Draft RUS) to alleviate crowding.
- A repeating peak hour standard timetable has been developed for the critical East Croydon area to maximise capacity. (Options 14.1-14.3 in the Draft RUS).
- It has been found necessary for all peak Caterham and Tattenham Corner trains to split/join at Purley, since this reduces the number of train paths required overall and removes short formation trains from operating into London terminals. However, it is recognised that this will slightly extend some journey times and reduce frequencies at Purley Oaks and South Croydon (see Figure 6.2).
- Additional capacity will be provided on the Redhill corridor by building on features of the BML RUS (to be implemented in December 2008).
- A timetable solution has been identified which enables retention of the Denmark Hill to London Bridge service at this stage, though not in the longer term (this is discussed further in Chapter 7).
- Paths have been identified for a 2tph all stations service from South Croydon to Shepherd's Bush service at peak times (Option 13.3 in the Draft).

- The timetable has been constructed on the basis of the current service level of 6tph in the peaks from the Streatham Common route to Victoria.

6.3.3
No specific decisions have been taken regarding the level of off-peak services. This is because the RUS is primarily concerned with responding to peak overcrowding, with the level of off-peak services to be considered by the DfT in the forthcoming South Central refranchising process.

6.3.4
In connection with the above the RUS emphasises that freight capacity at certain locations – notably between Clapham Junction and Croydon – is an important aspect of the off-peak timetable, and that passenger train services will need to be planned accordingly.

6.3.5
The RUS notes that the high level of all day service on the Sydenham corridor is likely significantly to increase maintenence requirements on this route.

6.4 Updates to Southeastern's SLC2 timetable commitments

6.4.1
A major timetable change will need to take place in December 2009. This will affect the whole of the Kent route, including the Metro area. Due to the interaction between the high speed and "classic" services it would not be possible to commence domestic services over the High Speed Line without this.

6.4.2
Further development work by Southeastern has confirmed the analysis in the Draft RUS which highlighted that the SRA's original SLC2 timetable specification would not provide sufficient capacity into existing London terminals. It has also been highlighted that the implementation of SLC2 as originally specified would not enable the industry to meet DfT's HLOS requirements to accommodate passenger growth via London Bridge.

6.4.3
A plan for further development regarding the December 2009 timetable change is now in place. This incorporates the following principal features with respect to morning and evening peak services. Where these were described as options in the Consultation Draft this is indicated.

- The number of trains currently operating into Victoria, Charing Cross and Cannon Street will be retained at broadly current levels.
- Service frequencies in the Metro area will generally be retained at today's levels, for example with 6tph on the Hayes line (Option 1.1 in the Draft RUS) and 11tph on the Bexleyheath line (Option 1.3)

6.4.4
Southeastern are also considering some improvements to off-peak services, which would be designed to provide passenger benefits.

6.4.5
As in 6.3.4 above freight capacity at certain locations – notably the South London Line route between Factory Junction and Lewisham – is an important aspect of the off-peak timetable, and passenger train services will need to be planned accordingly.

6.5 First Capital Connect / Thameslink route services

6.5.1
As noted in 6.2.3 above there will be no terminating platforms available at Blackfriars from Spring 2009 onwards and all morning peak services from the SL RUS area to Blackfriars will therefore need to continue northwards. The replacement terminating platforms are not scheduled to become available until December 2011.

6.5.2
Also as highlighted previously, the wider timetable changes in December 2009 will require significant changes to all services, including the Thameslink route timetable. It is recommended that such changes are designed as an intermediate step towards the

Thameslink Key Output 1 service as described in the next chapter.

6.5.3
The present capacity of the Thameslink core route is 15tph, owing to signalling restrictions. This therefore forms a theoretical upper limit to the services which can run through the route until around December 2011.

6.5.4
All services running north of Farringdon must be formed of dual voltage rolling stock, which is in very short supply. Analysis of existing rolling stock quantities has indicated that, prior to 2011, there is only likely to be sufficient rolling stock to operate 14tph from Thameslink South in the high peak.

6.5.5
The key recommendations for the December 2009 timetable change for services into London from Thameslink south are as follows:

- 2 clockwise and 2 anti-clockwise FCC trains per peak hour are recommended from the Wimbledon Loop. This is an increase on today's service, since the morning peak anticlockwise service currently only runs to London Bridge. This feature enables a sufficient level of service to operate between Streatham/Tulse Hill/ Herne Hill and Blackfriars.
- 4 FCC trains per peak hour would ideally be recommended at this time from East Croydon to Blackfriars (all routed non-stop via Herne Hill). This would be an increase on today's infrequent peak service and has been shown to be achievable by timetable development work. However, analysis of currently available rolling stock suggests that insufficient dual voltage stock exists for this service to be resourced. For this reason only 2tph is likely to be achievable at this time, with the other 2tph running to London Bridge instead.
- 4 high peak stopping trains per hour are recommended to the Thameslink route from the Catford Loop.
- 2 high peak trains per hour are recommended as fast services from Bromley South to Thameslink (routed via, but not calling at, Catford). One of these services would originate from the Medway area, the other from Maidstone.
- 2 high peak stopping trains per hour are recommended from the Kent House route to Thameslink.

6.5.6
A further option considered (in response to the shortage of dual voltage rolling stock) was to terminate certain peak services at City Thameslink. This would have the advantage of being achievable with DC rolling stock. However, capacity overall in the high peak would be restricted, due to the conflicting move needed for trains to exit Smithfield sidings (given the significant increase in trains relative to today in operation through City Thameslink). Furthermore these sidings are not long enough to accommodate 8-car Class 465/466 units. This option has therefore not been progressed.

6.5.7
Finally, also in response to the same issue, there may be an argument for running some trains with short formations in the shoulder peak hours, for a temporary period until the necessary rolling-stock can be acquired. This would enable the full specification to operate, potentially avoiding the need for subsequent changes, but at the expense of increased crowding. This option is not recommended for the high peak hour.

6.6 Summary of 2010 peak frequencies to London

6.6.1
Based on the proposed 2010 timetable structures, the planned level of train service into London (from stations in the SL RUS area) in the morning peak in 2010 is shown in Figure 6.2.

6.6.2
The envisaged routeings of 2010 morning peak train services are shown diagrammatically in Figures 6.3 to 6.5.

Figure 6.2 – 2010 Timetable planned morning peak frequencies

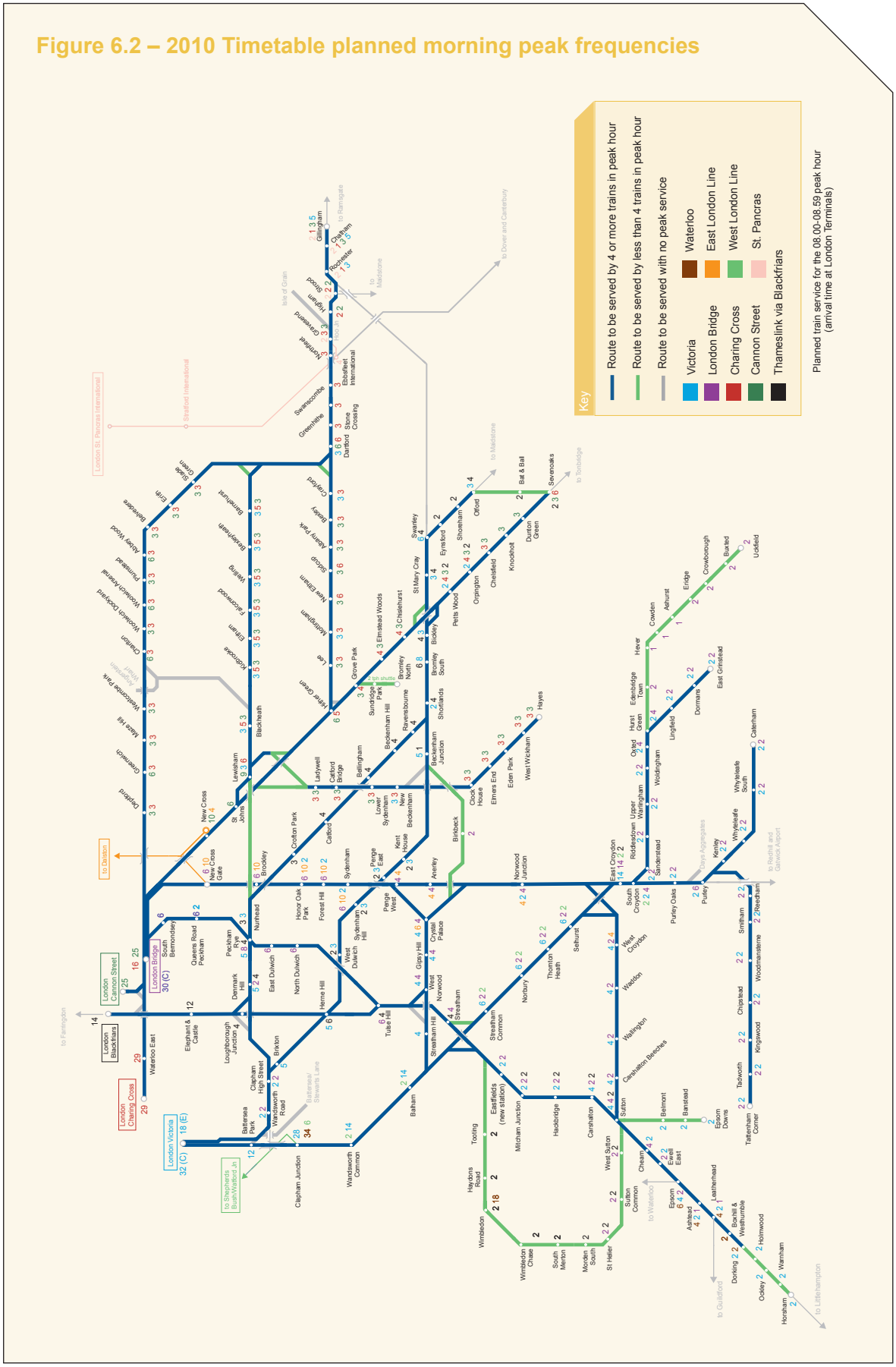


Figure 6.3 – South Central suburban peak train service (2010)

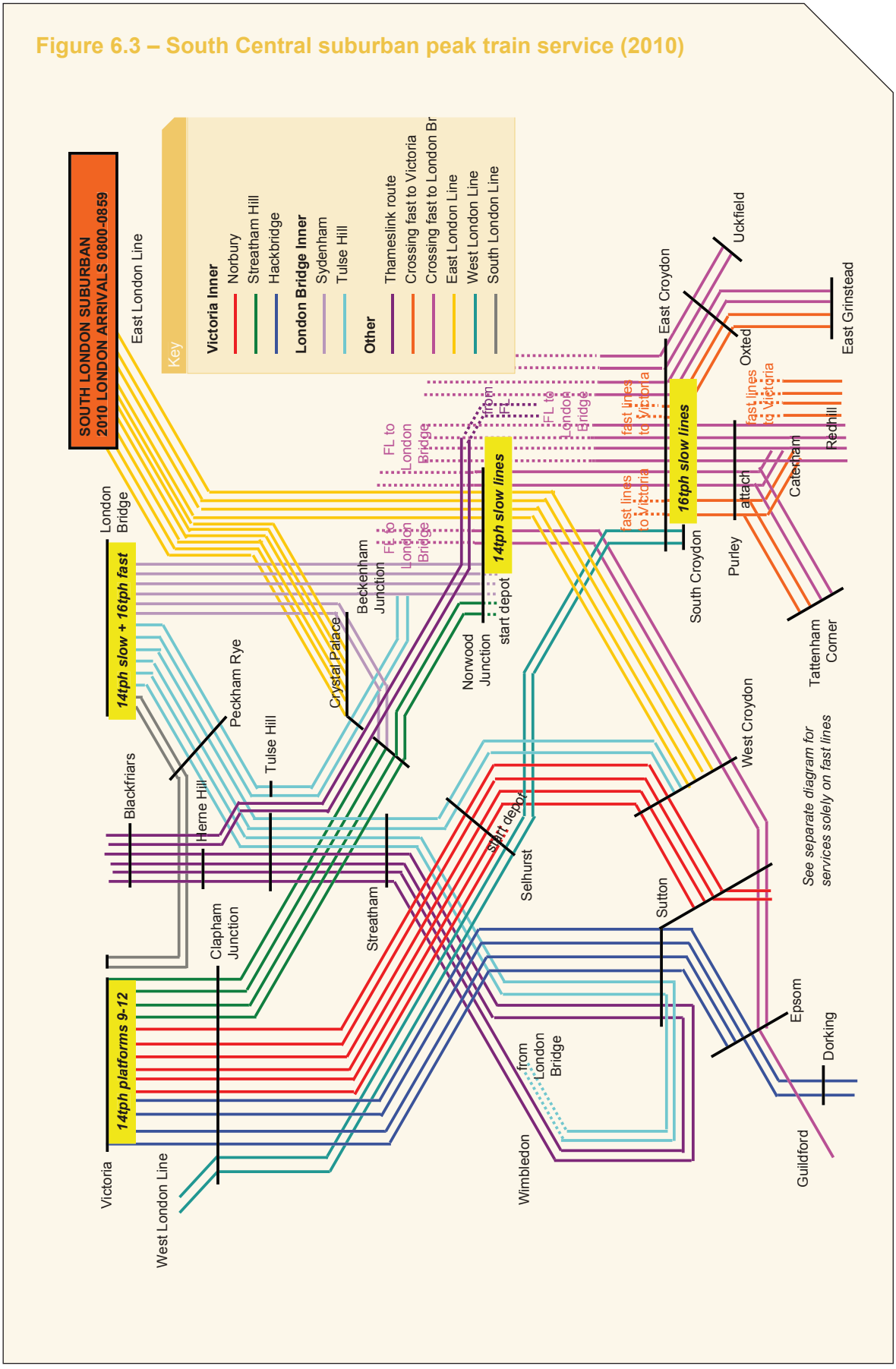


Figure 6.4 – Brighton Main Line peak train service (2010)

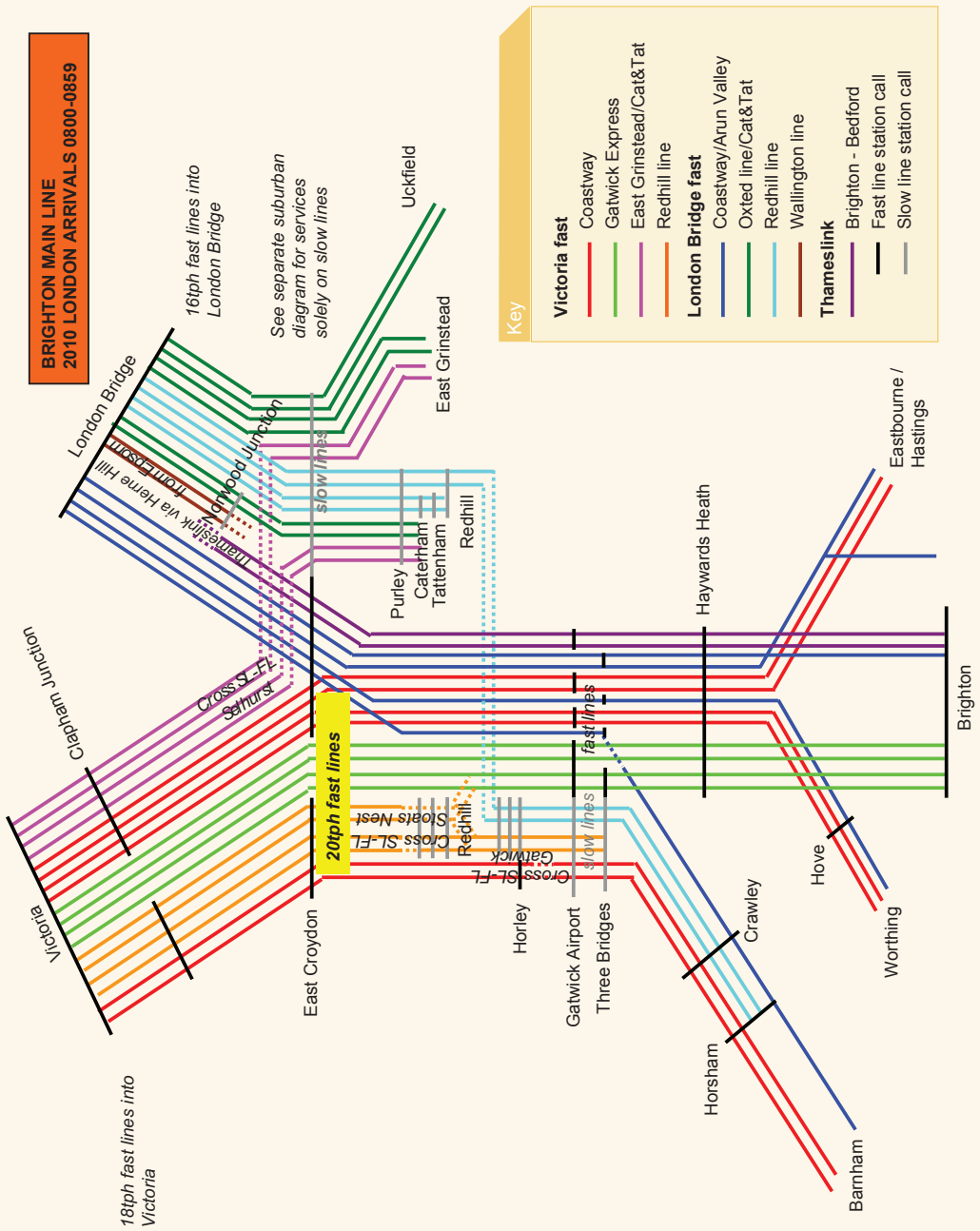


Figure 6.5 – Southeastern peak train service (2010)

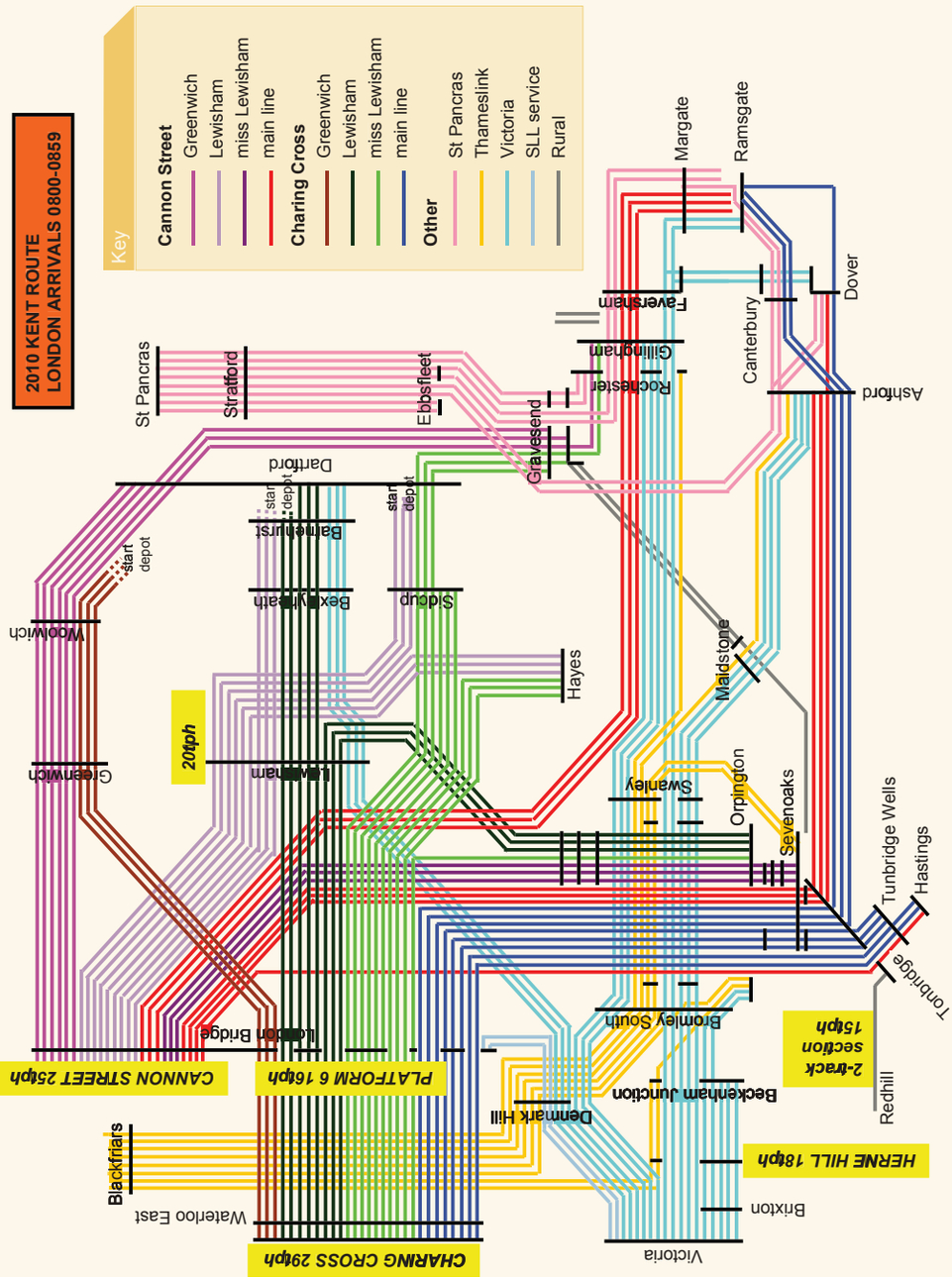
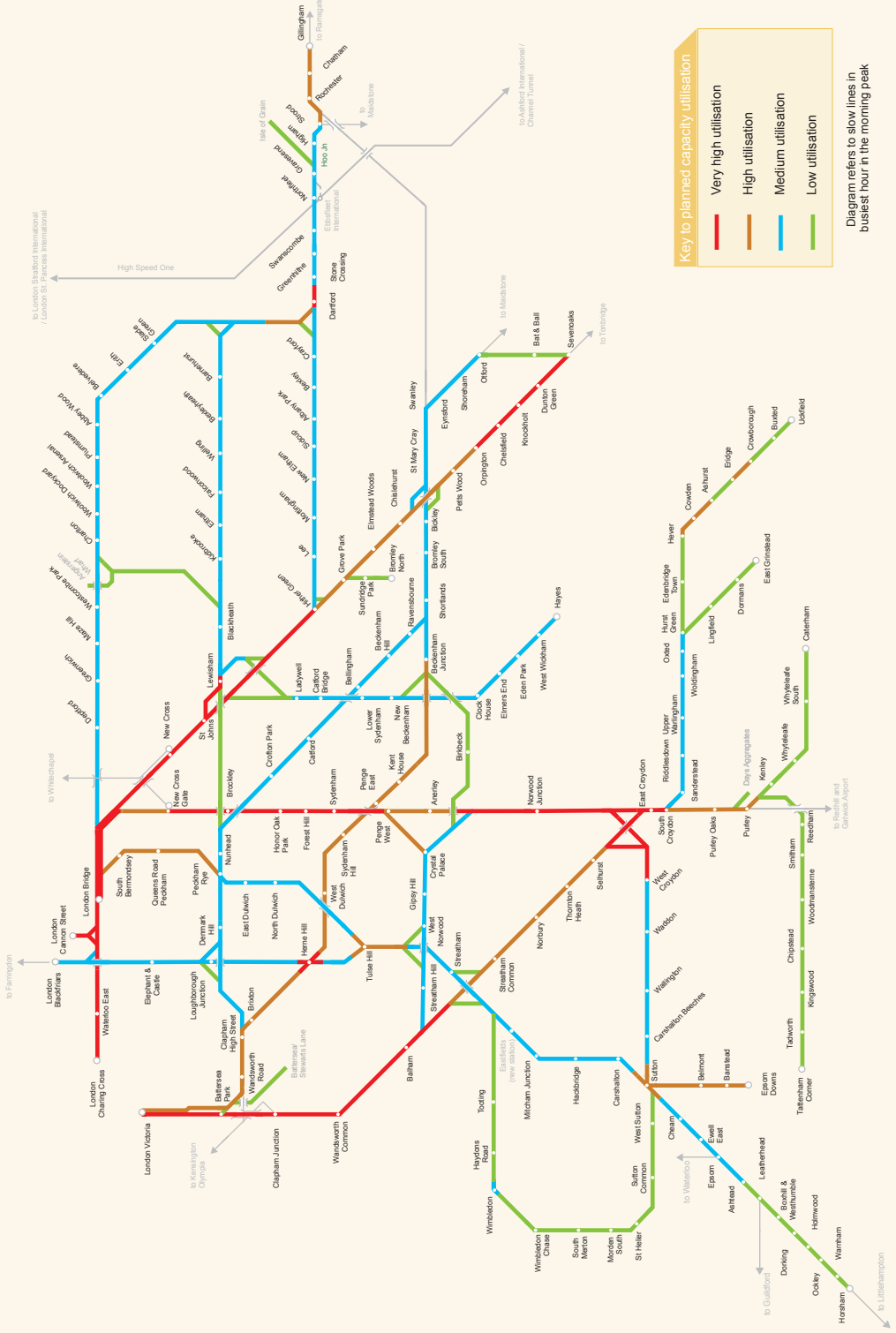


Figure 6.6 – 2010 Timetable capacity utilisation



6.7 Operability of the 2010 timetables

6.7.1

The 2010 level of train service increases the utilisation of the network significantly at a number of locations. An assessment of the level of utilisation of capacity is given in Figure 6.6.

6.7.2

The timetable provides an opportunity to optimise performance on the SL RUS area ahead of the major interventions planned post-2010. Achieving an improved performance level in this period will go some way to mitigate the effects of disruption during subsequent interventions.

6.7.3

Within this period there is a variety of projects and schemes that improve the robustness and operability of the network and therefore accelerate performance improvement trajectories:

- Network Rail is planning for the 2010 timetables for all operators to be compliant with Rules of the Plan and robust in performance terms.
- An early element of Thameslink Programme works is aimed at performance protection, incorporating plans to improve the reliability of key assets on the core route – in advance of the main construction works – through accelerated renewal or additional maintenance.
- Improved asset and fleet reliability, notably through increasing use of condition monitoring to enable proactive maintenance.
- It is anticipated that the industry's recent development of Joint Performance Improvement Plans (JPIPs), which are based on close working between the infrastructure controller and the train operators, will start to pay off as these plans reach maturity.

7. Recommended medium term schemes – increasing capacity up to 2012

7.1 Introduction

7.1.1
In the Draft for Consultation we outlined several options for increasing capacity within the next few years. The schemes recommended concentrated on the following main issues:

- platform lengthening to accommodate longer peak trains
- a limited number of other small scale infrastructure enhancements, targeted at specific bottlenecks
- improving station capacity and capability
- improving freight capacity and capability, in line with the recommendations of the Freight RUS and emerging work on the Strategic Freight Network
- optimising certain inefficient train routeings, in cases where necessary to maximise network capacity overall.

7.1.2
Since the draft was published certain developments, such as the revised timetable structure described in Chapter 6 and the funding commitment to the Thameslink Programme, have further influenced the strategy for responding to existing crowding problems and the further growth envisaged.

7.1.3
In this chapter we summarise the RUS recommendations for increasing passenger and freight capacity over the next few years, with schemes to be completed in general prior to 2012.

7.1.4
Following the introduction of the 2010 timetables (expected to take effect from December 2009) described in the previous chapter, further timetable changes may become necessary to implement certain aspects of this strategy. However the RUS would prefer that these should be minimised, for the benefit of all stakeholders.

7.2 Train lengthening

7.2.1
In the Draft for Consultation we assessed in detail several sub-options based on the principal theme of running longer trains throughout much of the RUS area. This was in response to the ongoing and predicted growth in peak demand, and evidence that passenger numbers are already suppressed by the capacity that is available.

7.2.2
The draft RUS did consider potential alternatives to this general strategy, but reached the following conclusions:

- Extra peak trains – this was not considered viable since no more trains than today can be run through the existing key network operational constraints (as highlighted in figure 3.25). Furthermore the constraints shown are not in the main considered resolvable by any infrastructure scheme that has a realistic chance of being funded within the RUS period.

- Double deck trains – this was not considered viable or beneficial owing to the magnitude of changes which would be required to the infrastructure, the extended dwell times at stations which would result and the limited additional capacity which would be provided.
- Reconfigured trains – removal of seats to increase standing capacity was considered worth exploring further, albeit only to a limited degree for some types of rolling stock. However, the draft RUS outlined that in general this would not provide sufficient additional capacity to cope with expected growth and would lead to passengers standing for unacceptable periods of time.
- Peak spreading/peak fares policy – the draft RUS advised that further development of electronic ticketing technologies would be necessary before any significant effect could be achieved from incentives aimed at spreading or smoothing the peak.

7.2.3
As a result the principal recommendation in the draft RUS was for a programme of train and platform lengthening by 2011/12, principally 10-car on most Southern suburban routes and 12-car on Southeastern suburban routes via London Bridge. The draft highlighted that further assessment was required in certain cases, for example services routed via Tulse Hill where infrastructure costs would be very high and the benefits lower than elsewhere.

7.2.4
Following the RUS Draft for Consultation the DfT published its High Level Output Specification (HLOS) and Network Rail produced its Strategic Business Plan in response. The final recommendations in this RUS are consistent with the HLOS requirements and the SBP. They are also considered to be consistent with the DfT's Statement of Funds Available (SOFA).

7.2.5
The scope of the relevant train lengthening recommended for implementation in CP4 is described below:

- 10-car operation on all suburban routes to Victoria via Balham
- 12-car operation on the suburban route via Sydenham to London Bridge[1]
- 12-car operation on the East Grinstead line
- 12-car operation on all Southeastern suburban routes via London Bridge
- 8-car capability at Clapham High Street and Wandsworth Road.

7.2.6
The above scope is indicated diagrammatically in Figure 7.1. A quantified economic appraisal of the train lengthening strategy is provided in Appendix B.

7.2.7
For routes via Balham where 10-car capability is recommended, provision will be made wherever realistically practical (or financially efficient) for further extension to 12-car at some stage in the future – see Chaper 9.

1 The Strategic Business Plan incorporated costs for 10-car operation on the Sydenham route. However, the need to mitigate adverse impacts of construction works at London Bridge (as described in Chapter 8), together with the current working assumption regarding the 2015 Thameslink train service (as described in Chapter 9), indicates that there is a need for 12-car operation on this route.

7.2.8

Existing stabling locations are shown in Figure 7.2, some of which will require enhancement. The scope for these enhancements is being developed in response to the DfT's Rolling Stock Plan (published in january 2008) and the requirements of the Thameslink Programme. It is anticipated that an outline scope and cost will be included in the revised Strategic Business Plan in April 2008, and detailed design will take place alongside development of the train lengthening programme. Appendix B identifies the headroom available within the train lengthening appraisal for expenditure on depot/stabling works whilst maintaining good value for money.

7.2.9

Longer trains will require additional power supply capability throughout the system. An assessment of areas where work will need to be carried out is shown diagrammatically in Figure 7.3, and costs have been included in the appraisal in Appendix B.

7.2.10

Owing to physical constraints, a very small number of stations are not capable – except at disproportionate cost – of accommodating platform extensions. Notable examples are Charing Cross platforms 3-6 and Woolwich Dockyard. The use of Selective Door Opening (SDO) at such sites will therefore be required. This has important implications for the rolling stock strategy since only trains fitted with SDO will be suitable for such routes.

7.2.11

In developing the train lengthening strategy it is noted the Thameslink construction works at London Bridge (as described in the next Chapter) will reduce existing capacity on several routes for an extended period. In order to provide mitigation against this factor, the RUS strongly recommends that the train lengthening programme is completed before the major works at London Bridge commence.

7.2.12

The above point creates a significant linkage between the train lengthening programme and the Thameslink London Bridge construction works.

Figure 7.1 – Platform lengthening recommended by 2012

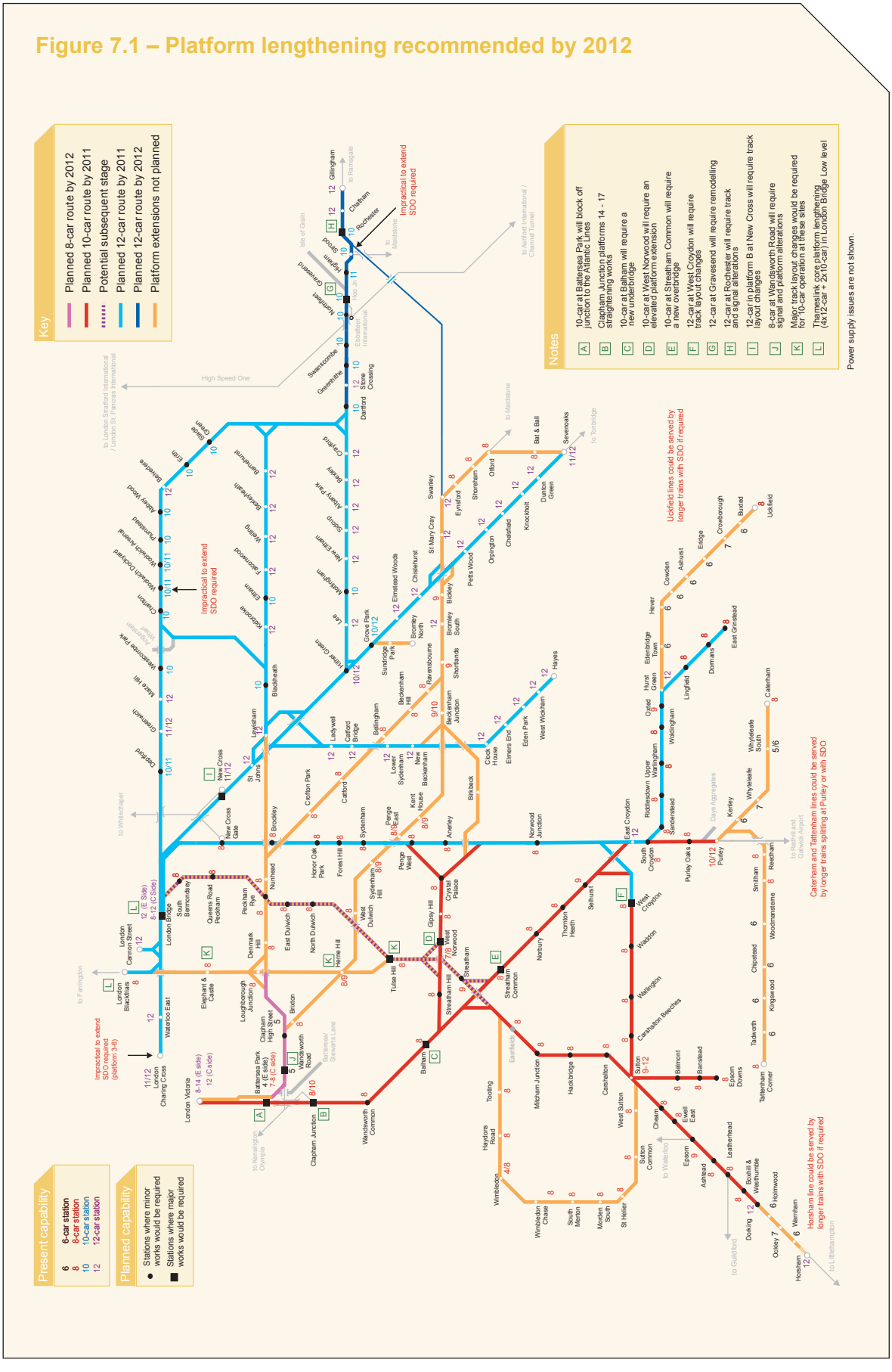


Figure 7.2 – Stabling and maintenance requirements

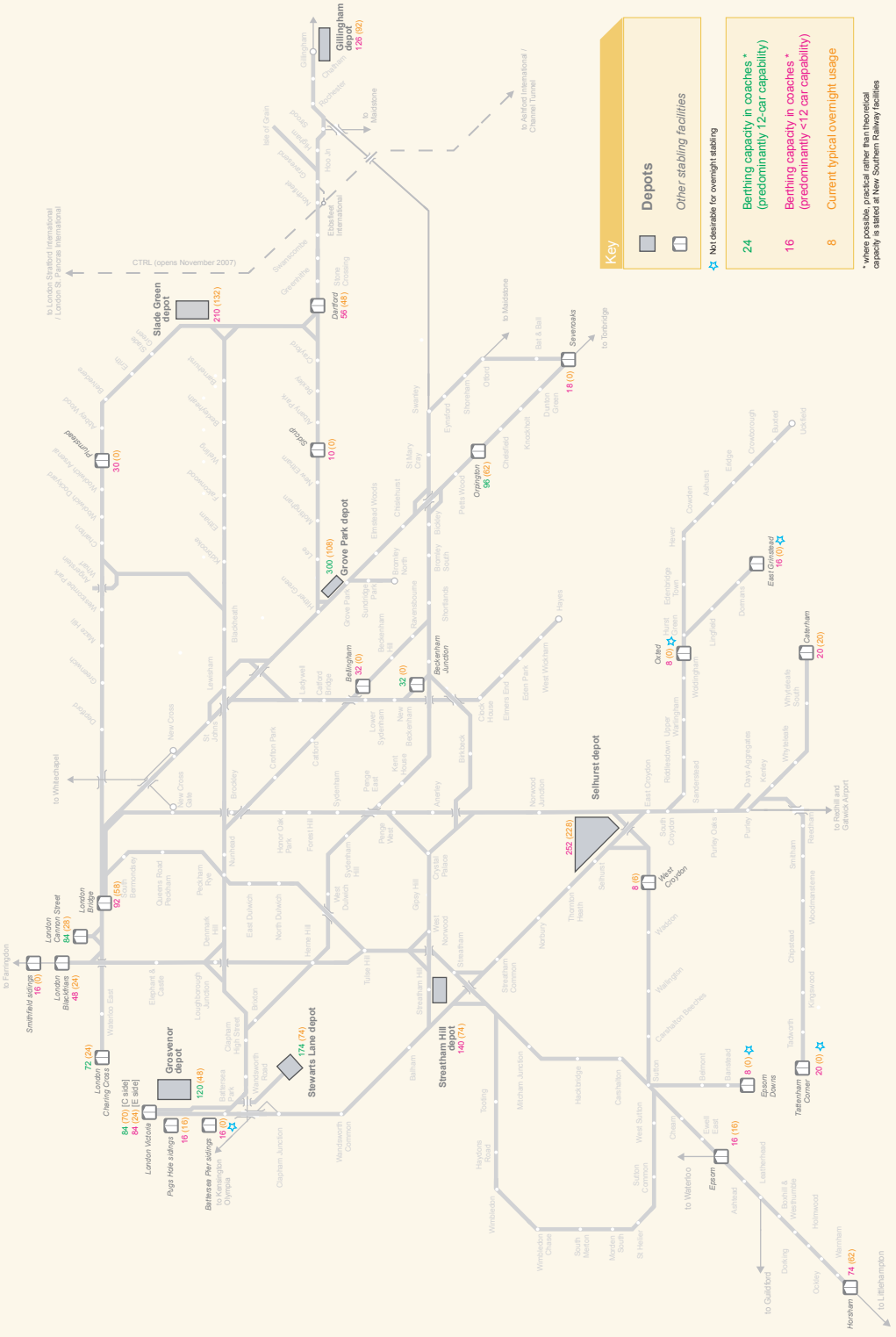
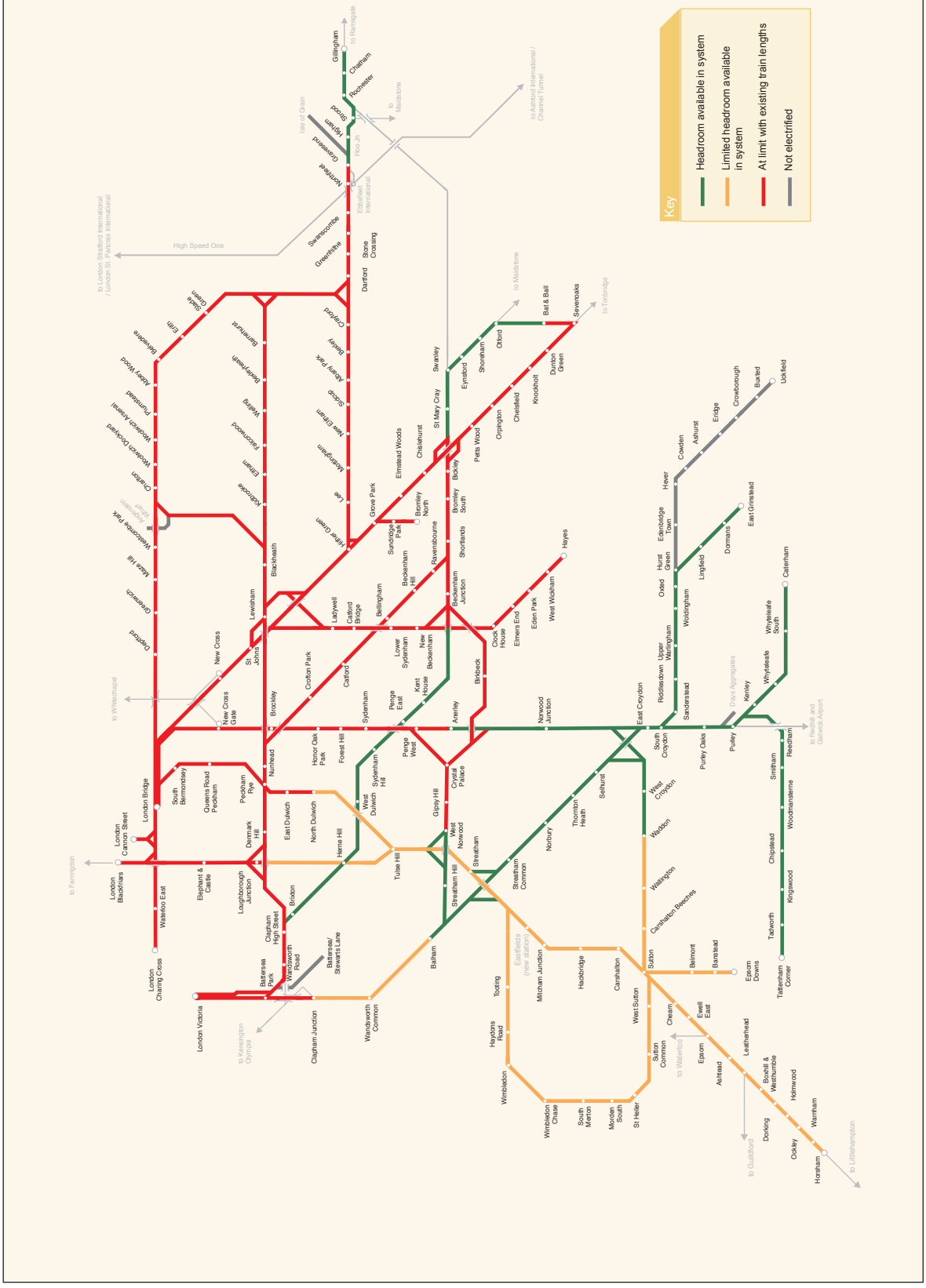


Figure 7.3 – Train lengthening: power supply capability (indicative)



7.3 Thameslink Key Output 1

7.3.1

Trains through the Thameslink core route are currently limited to 8-car maximum length. The key constraints on the route are the platform lengths at Blackfriars and Farringdon. Additionally, as described in Chapter 6, the current signalling systems can only support a maximum of 15tph operation. Furthermore passenger congestion at Farringdon in particular is currently a significant issue during the morning peak.

7.3.2

From 2011 the major remodelling works at the above sites will be complete and all stations on the Thameslink core route across London will be capable of handling 12-car trains. The signalling system and station capacity will have been upgraded to enable additional trains to operate, and it is envisaged that additional dual voltage rolling stock will have been procured. This will enable implementation of the following service enhancements:

- 16tph operation through the Thameslink core area
- 12-car operation of most peak period peak direction FCC services on the Midland Main Line
- 12-car operation of all peak period peak direction services from the Brighton Main Line to Thameslink. However since London Bridge will not have been rebuilt at that stage these will all need to be routed via Herne Hill in the peaks, as is mostly the case at present.

7.3.3

Consideration has also been given to running peak Thameslink trains from the Kent Metro area via London Bridge from 2011 onwards. However the RUS strongly recommends against this because of the following:

- Prior to the completion of works at London Bridge this could only be done by means of a significant reduction in Waterloo East and Charing Cross services, which would not be beneficial to passengers.
- Prior to the provision of an additional track in the Metropolitan Junction area, running peak services between London Bridge and Blackfriars would not be robust operationally and is likely to reduce capacity overall.
- The train lengthening strategy presented in 7.2 above already incorporates provision of 12-car services into Charing Cross, so diversion of such trains to serve the Thameslink route would provide no additional capacity into central London overall.

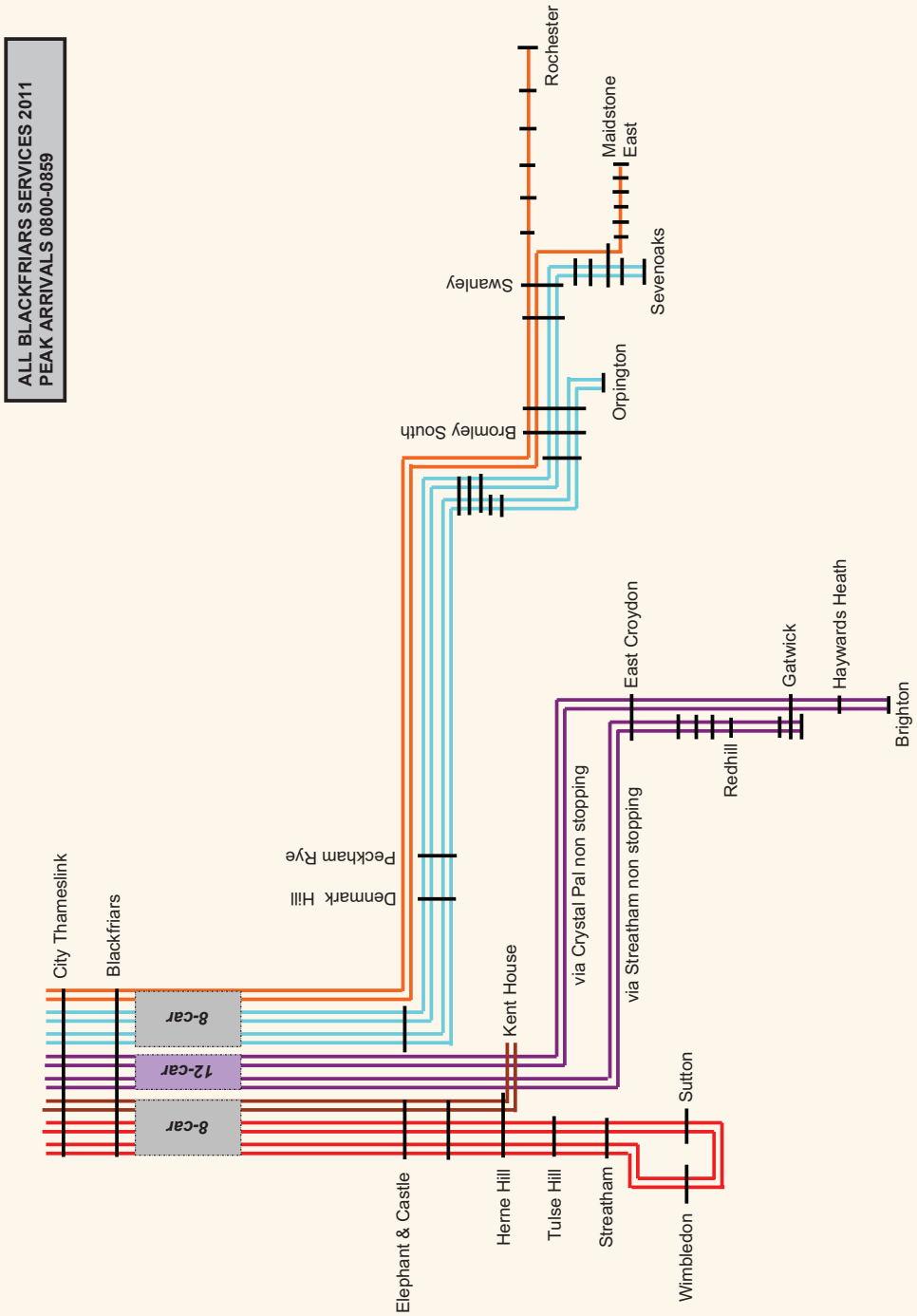
7.3.4

The implication of the above is that the RUS recommends that Thameslink Key Output 1 should focus entirely on peak services running via Elephant & Castle. Specifically it is recommended that peak direction services from Thameslink South should comprise:

- 4tph Brighton Main Line, all running non-stop from East Croydon to Blackfriars (2tph Brighton, 2tph Three Bridges via Redhill)
- 4tph Wimbledon Loop via Herne Hill (2tph clockwise, 2tph anticlockwise)
- 2tph Kent House via Herne Hill
- 4tph Catford Loop stopping (2tph Orpington, 2tph Sevenoaks)
- 2tph Bromley South fast, with 1tph from the Medway area and 1tph from the Maidstone East line.

This is shown diagrammatically in Figure 7.4.

Figure 7.4 – Key Output 1 peak direction services from Thameslink South



7.3.5
The 2012 Thameslink service described in 7.3.4 above is the same as that described for 2010 in the previous chapter (see paragraph 6.5.5), with the addition of the Three Bridges via Redhill service. Importantly, this particular service would be formed by diversion of trains which would run to London Bridge in the 2010 timetable, as a first step towards facilitating the London Bridge construction works.

7.3.6
In order to deliver the Midland Main Line peak train lengthening to 12-car, the majority of southbound morning peak services would need to run empty from Blackfriars, stabling at a location south of the river between the morning and evening peak periods.

7.3.7
At off-peak times it is envisaged that, as at present, Thameslink services to/from the Brighton Main Line would operate via London Bridge.

7.3.8
The RUS emphasises that any changes to off-peak services would need to take full account of freight requirements, together with envisaged growth.

7.4 Station capacity and capability

7.4.1
In order for the network to accommodate the increased number of passengers resulting from longer trains the Draft RUS highlighted that congestion relief measures were required at a number of stations. Figure 7.5 below provides an update to the recommendations highlighted in the consultation.

Figure 7.5 – Congestion relief measures at stations

Significantly congested stations	Current status and recommendation
London Victoria	A redevelopment scheme for Victoria station is currently being considered by Network Rail. The aims of this scheme are to reduce passenger congestion and improve the station facilities. Major improvements to the underground station are planned by Transport for London.
Clapham Junction	Network Rail's Strategic Business Plan identified a specific funding requirement for passenger congestion relief works at Clapham Junction. The railway industry is also working closely with an adjacent landowner to produce a viable redevelopment scheme for the station and surrounding buildings. The combination of these schemes would result in station improvements, lifts to all platforms, improved station facilities and straightening and lengthening of platforms 14-17. With the exception of the "Access for All" scheme, these issues are currently awaiting funding and planning approval. See section 10.6 for longer term issues that may need consideration for this station.
Balham	The need for congestion relief at Balham is linked to the need for platform lengthening and potentially additional entrances. Possible designs are currently being developed.
London Bridge	The committed London Bridge Masterplan will address congestion issues.
East Croydon	Network Rail's Strategic Business Plan identified a specific funding requirement for passenger congestion relief works at East Croydon. The railway industry is working closely with Croydon Council and two potential developers of the adjacent site to produce a viable redevelopment scheme for the station, together with ensuring the protection of land which would be needed for any future additional tracks and platforms in this area (Option 16.1).

Blackfriars	The committed Thameslink Programme will address congestion issues and provide a new South Bank station entrance.
Lewisham	Potential designs are currently being developed.
Bromley South	Potential designs are currently being developed.
Charing Cross	Some limited short term options for improving passenger circulation space are potential available by removing retail units from the station. Beyond this we do not expect satisfactorily to resolve passenger congestion issues at this very difficult site within CP4. See section 10.6 for longer term options that may need consideration for this station.
Waterloo East	Planning continues for an additional station entrance at the Southwark end which will provide a partial solution to passenger congestion. See section 10.6 for longer term requirements, connected to the development of the Waterloo main station.

7.4.2

A number of other station improvements, such as Access for All schemes, better station facilities, environmental/security improvements and a variety of commercial developments are also planned. These schemes are not generally required to meet a specific RUS capacity gap but are planned as part of ongoing improvements to the passenger journey experience.

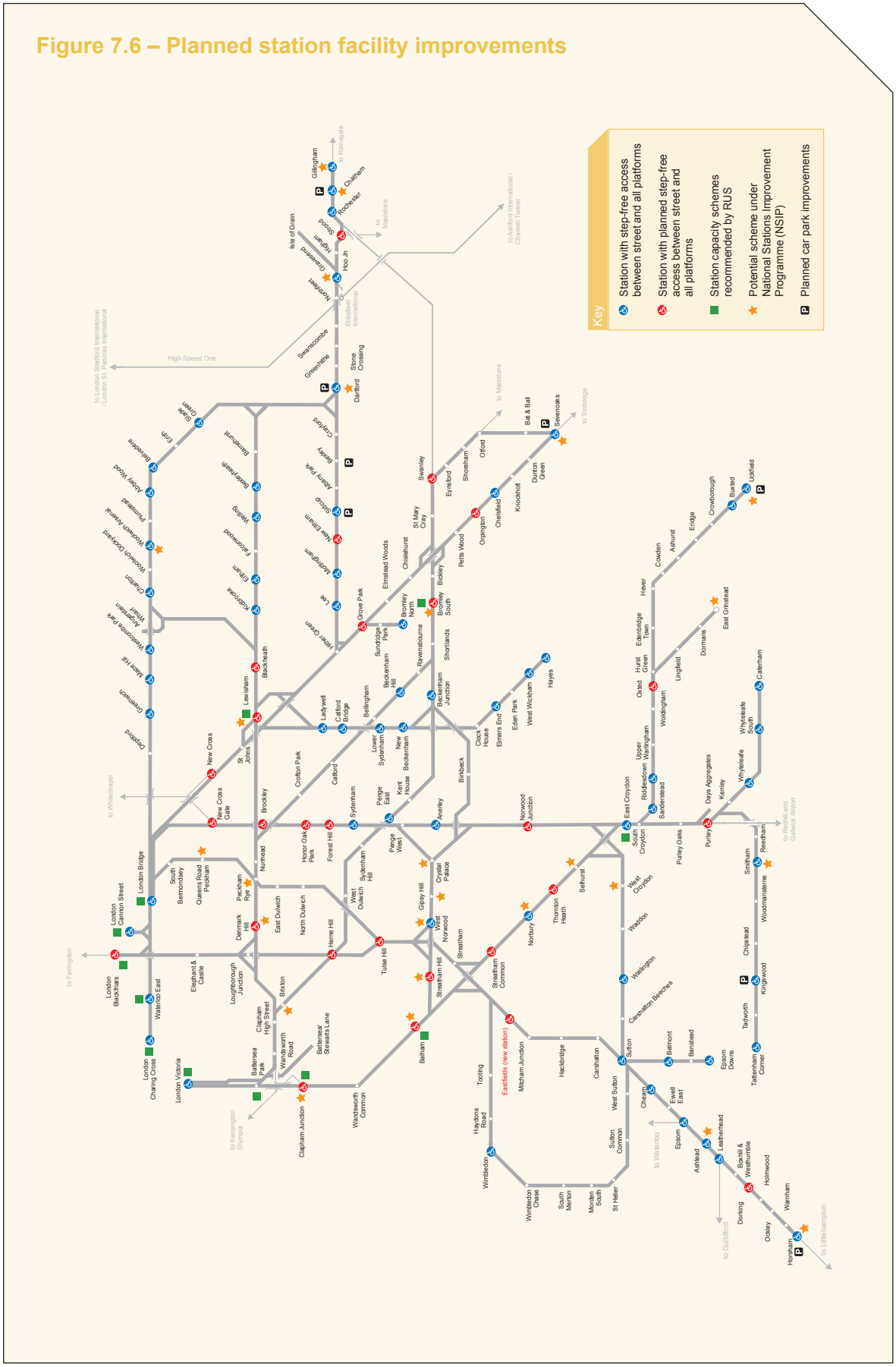
7.4.3

Whilst car parking at stations is not particularly relevant for much of the SL RUS area there are some areas, generally further out from London, where it is an important consideration. Commuter parking at many of these stations is constrained by the capacity available, which will be exacerbated in the future as passenger volumes increase. Provision of additional car parking will therefore need to be considered at several sites. However, it is recognised that in some cases benefits could be limited by increased road congestion (especially during peak times) and that improvements in the local bus network, cycle parking or taxi provision may be equally relevant. TfL's policy is that new or additional car parking should only be provided if this will result in an overall reduction in the number of car journeys and distance travelled by road.

7.4.4

The station improvements highlighted by the RUS are shown in Figure 7.6.

Figure 7.6 – Planned station facility improvements



7.5 Changes to South London Line services

7.5.1

The Consultation Draft outlined a number of options for both the Victoria and the London Bridge ends of the South London Line. The section below describes the strategy now recommended by this RUS for services on this line of route.

7.5.2

The RUS recommends that the existing Victoria – Battersea Park – Denmark Hill – London Bridge service should be maintained in its present format as long as it is practical to do so. As highlighted in section 6.3.2 timetable development work suggests that a Victoria – Denmark Hill – London Bridge service will be able to continue in the 2010 timetable.

7.5.3

In the slightly longer term the RUS advises that retaining the SLL service in its current format will not be viable. The key drivers for changes being needed were identified in the draft RUS and are described below:

- There is significant capacity pressure on platforms 9-12 at Victoria, with nearly all of the passenger demand here being for services via Clapham Junction.
- Lengthening of Platforms 3 and 4 at Battersea Park (to enable 10-car suburban services to operate via Clapham Junction) will block the route from the SLL into Victoria Central, meaning that the SLL services will need to be re-routed into Victoria Eastern. SDO for services via Clapham Junction has been considered but the RUS view is that, at a busy station so close to London, best practice would be to extend platforms to match the length of trains which operate.
- Construction works for Thameslink at London Bridge (as described in Chapter 8) will require overall service levels to be reduced. The SLL service is by far the least heavily loaded service into London Bridge and is therefore the first which will be considered for removal. The scale of the challenge of the London Bridge construction works is such that removal of this service is unavoidable.

7.5.4

The above drivers of change are not necessarily coincident in the date at which they will be triggered. However the RUS would prefer to see these changes made (as described below) by December 2011. This would minimise the inconvenience that would otherwise be caused to passengers by repeatedly changing train service routeings.

7.5.5

As a means of providing an alternative route for passengers during the Thameslink construction works at London Bridge, the draft RUS noted that accelerated implementation of TfL's proposed Phase 2 extension of the East London Line to Clapham Junction could provide mitigation for any curtailment of the present-day SLL service. TfL are currently reviewing the business case for the project, but among its benefits are:

- It would assist in maintaining and enhancing the ease of access to important and developing communities along the line.
- The extension would contribute to a reduction in passenger congestion at London Bridge station, where passenger capacity will be severely constrained by the Thameslink Programme reconstruction works. Passengers from the Denmark Hill and Tulse Hill corridors will be able to use the new service to reach Canada Water (for Docklands) or Shoreditch High Street (for the eastern part of the City), thereby not needing to pass through London Bridge.

- It would create new orbital journey opportunities, including at Clapham Junction where the enhanced interchange opportunities could help to reduce the pressure on the central London termini and the Underground.
- It would provide a new 4tph frequency service at Wandsworth Road and Clapham High Street, providing better journey opportunities for passengers living or working close to these stations.

7.5.6
However, replacement of the current SLL service with the East London Line extension to Clapham Junction would remove all direct services to Victoria from Clapham High Street and Wandsworth Road, as well as reducing them from Peckham Rye and Denmark Hill. The RUS notes that this would result in significant passenger disbenefits which must be addressed. The recommended remedy is to provide a new Victoria to Bellingham stopping service via the SLL.

7.5.7
By December 2011, and subject to the development of a satisfactory business case, the RUS therefore suggests the following peak service to serve South London Line stations:

- 2tph Victoria Eastern to Bellingham, fast to Wandsworth Road then calling at all stations via Denmark Hill.
- 3tph Victoria Eastern to Dartford via Bexleyheath, calling at both Denmark Hill and Peckham Rye.
- 4tph East London Line to Clapham Junction, though this is subject to funding for this scheme being approved.
- 4tph Thameslink via Blackfriars to the Catford Loop, calling at both Denmark Hill and Peckham Rye.
- 6tph London Bridge to Tulse Hill and beyond, with all services calling at East Dulwich, North Dulwich, Peckham Rye, Queens Road Peckham and South Bermondsey

This is shown in graphical format in Figure 7.7.

7.5.8
The service pattern described would provide the following passenger benefits relative to today:

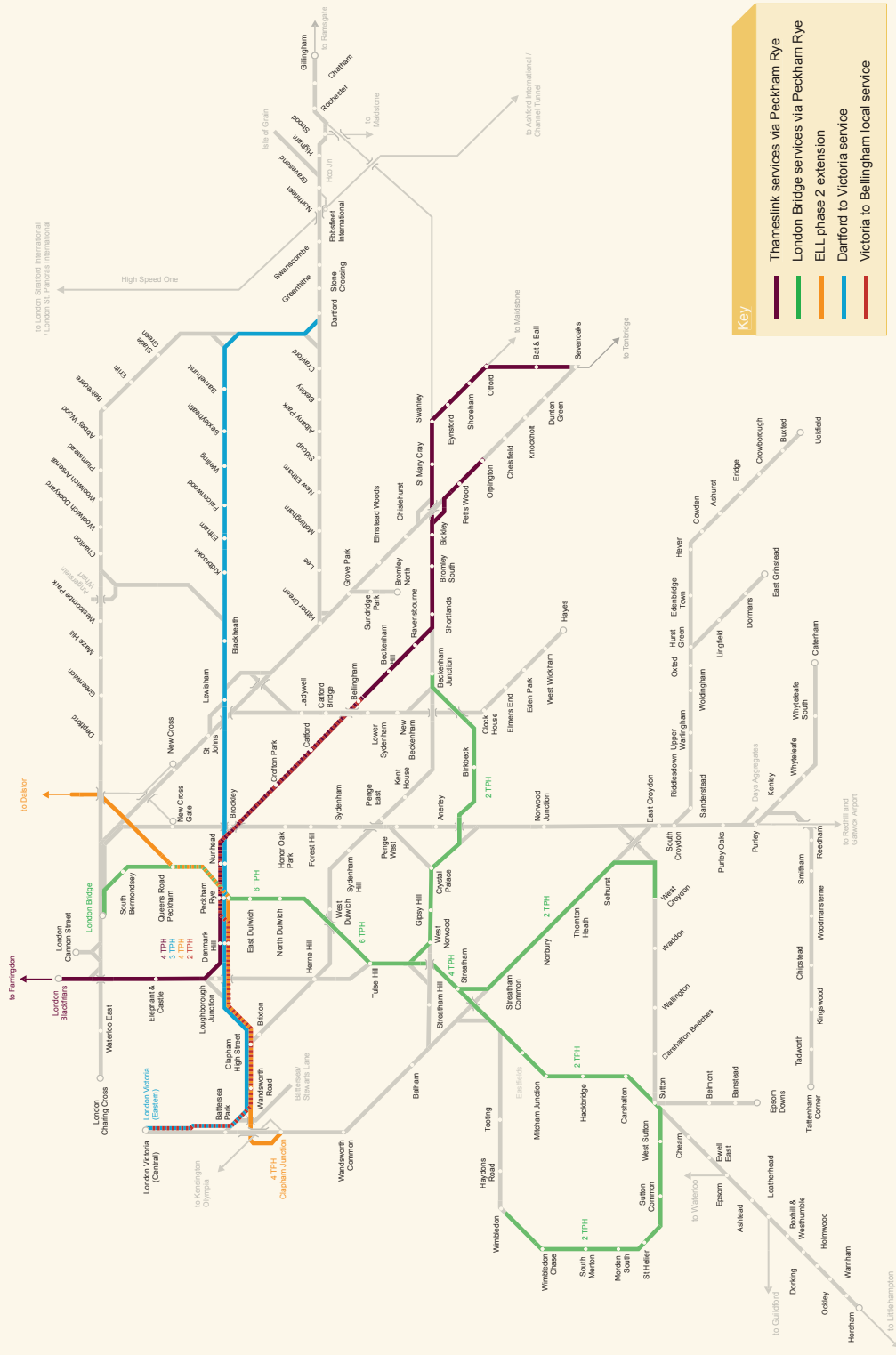
- Allowing 10-car trains on suburban services into Victoria via Clapham Junction, to provide a 25% increase in capacity where it is needed most.
- Elimination of 4-car (and in some cases 2-car) trains on peak services that operate through Peckham Rye towards London Bridge.
- Provision of direct services to Victoria from the Catford route.
- Provision of through journey opportunities from Denmark Hill, Peckham Rye and the Catford route to stations beyond Blackfriars and to the new Blackfriars station entrance on the South Bank.
- Provision of new journey opportunities from the SLL to Clapham Junction and the East London Line.

7.5.9
It is recognised that the above service pattern would also result in some features which are considered by some to be disbenefits. In particular it will result in:

- The loss of all direct trains (2tph) from South Bermondsey and Queens Road Peckham to Victoria (though a 5tph peak service would be available with a change of train at Denmark Hill or Peckham Rye).
- The loss of all direct trains (2tph) from Clapham High Street, Wandsworth Road and Denmark Hill to London Bridge (though approximately a 6tph peak service would be available by changing at Peckham Rye – 4tph without the need to change platform).

Overall, however, the RUS considers that the loss of direct train services for these passengers is compensated by the benefit of increased frequencies.

Figure 7.7– South London Line peak train services by December 2011



7.5.10
It is also important to note that the service pattern described represents an increase of four passenger trains per hour in the usage of the Catford Loop and South London Line infrastructure; together these lines represent the major freight artery in the RUS area. As explained in Chapter 3, it is important that freight trains are able to take up their paths reliably on these sections of route if performance is not to be adversely affected. This is currently achieved by using recess points in which freight trains can await their onward paths without obstructing other trains.

7.5.11
In the same way that the draft RUS identified the possible need for a loop on the Grain branch (partly in response to an increase in passenger traffic through Gravesend) it will be important during the further development of this service specification that the existing capability of the recess points in the Battersea area are either maintained or replicated where necessary, prior to any major enhancement of the passenger service taking place. TfL has recently commissioned a study into the ELL extension to Clapham Junction. This will include an investigation into the issue of linking freight paths together reliably in the Battersea area. The results of this study will need to be agreed by Network Rail and other industry stakeholders to ensure that the issue is adequately resolved before the service changes are implemented.

7.5.12
The proposed higher quantum of services may also trigger a review of track maintenance policies and practices in the area.

7.5.13
The Victoria Eastern to Bellingham service will initially be restricted to 4-car operation by the current platform lengths at Clapham High Street and Wandsworth Road. It is therefore recommended that these platforms are extended to 8-car by 2012 to enable an 8-car service to operate. Subject to detailed design work it may also be appropriate to provide a new platform face on the Chatham Reversible Line at Wandsworth Road at this time to allow Bellingham services to avoid the Stewarts Lane route out of Victoria.

7.5.14
The RUS recommends that the route between Factory Junction and Battersea Park be retained for emergency use, special occasions and assisting with engineering access, although this may need to be subject to further analysis.

7.6 Other capacity schemes

7.6.1
A number of smaller capacity enhancement schemes is considered appropriate for implementation over the next few years. These will generally be driven by when either renewals become due or resources (including funding) become available. The major examples include:

- Enhancements to the track layout at West Croydon, in connection with the train lengthening strategy, station improvement and development opportunities.
- Provision of turnback capability from a reopened platform 7 at Norwood Junction to the Crystal Palace route.
- Enhancements in the Victoria signalling area, to tie into resignalling requirements.
- Enhancements in the Medway towns area, to tie into resignalling requirements.

7.6.2

Each of the above is noted by the RUS as highly desirable, though work is ongoing in order to identify whether there are sufficiently robust business cases for these projects to proceed.

7.7 Freight capacity and capability

7.7.1

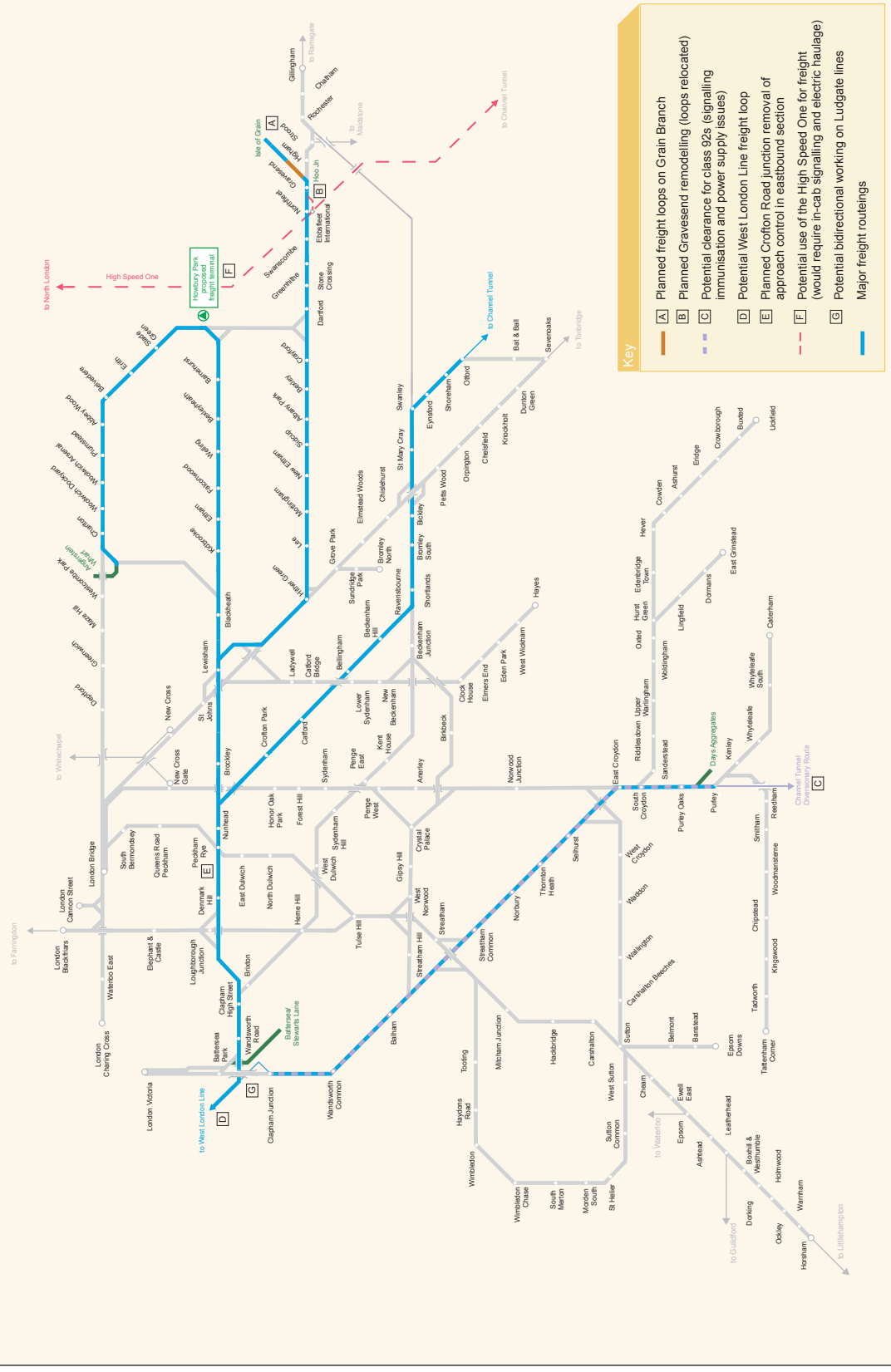
The following items form the recommended strategy for improving freight capability and capacity to 2012.

- Removal of the approach control in the eastbound direction at Crofton Road junction (planned during 2008).
- Provision of a passing loop on the Isle of Grain branch.
- Investigating the use of High Speed One for certain freight services that would otherwise need to operate through the SL RUS area.
- Any structures renewals during this period to make provision for at least W12 gauge, to assist development of the freight network.
- Potentially implementing signalling changes and power supply enhancements on the Clapham Junction – Redhill – Tonbridge route to make provision for Class 92 operations, though a robust case for this scheme has not yet been made.
- The possible need for enhanced recessing facilities in the Battersea area in order to preserve current capability in the light of potential increases in passenger traffic on the Catford Loop and SLL. The precise nature of any such enhancements will be the subject of a separate study, but might, for example, include another loop on the WLL (Option 21.2) or bi-directional signalling on the Ludgate Lines.

7.7.2

These are shown in graphical format in Figure 7.8.

Figure 7.8 – Plans and opportunities for freight capacity and capability



7.8 Performance impact of longer trains

7.8.1

The introduction of longer trains onto the network as recommended in sections 7.2 and 7.3 will potentially result in an impact on train performance, even without any timetable changes. The key issues are:

- Increased turn-around time at terminal stations, owing to the need for the driver to walk further to change ends, additional train cleaning etc.
- Increased station dwell times at any stations where SDO is found to be necessary.
- Trains will take longer to clear signal sections.
- There may be some locations where the rear of trains stopped at red signals could lead to junctions being fouled.
- There is some potential for poorer acceleration associated with power supply limitations.

7.8.2

Analysis of the above issues has suggested that there would be a slight adverse performance impact due to the introduction of longer trains. However this is considered manageable within the overall context of an ongoing trend of performance improvement.

7.8.3

Furthermore there is a significant counterbalancing factor with respect to any impact on train performance, which is that overcrowded trains at present are often delayed by longer station dwell times. Providing additional capacity in the form of longer trains should help to tackle this issue, which would otherwise become worse as crowding increases.

8. Planned medium term schemes – Thameslink construction works at London Bridge

8.1 Introduction

8.1.1
Since the Draft for Consultation was published the Thameslink Programme has become a committed scheme. This development is welcomed by the RUS.

8.1.2
The most significant issue during the Thameslink construction period will be the remodelling of the railway in the London Bridge area, including reconstruction of the station. This work, whilst not yet planned in detail, will have a major impact on capacity in the RUS area for several years prior to completion in 2015. Owing to the extended duration of the works it is just as important for the planning process (RUS or otherwise) to ensure that sufficient capacity is provided during this interim period as it is in the longer term.

8.1.3
The main London Bridge construction works comprise remodelling the station to incorporate nine through and six terminating platforms and upgraded customer facilities. Additionally, the grade separation of tracks in the Bermondsey area, provision of additional capacity in the Lewisham area (such as doubling of Tanners Hill flydown) and the construction of a 4-track section between London Bridge and Metropolitan Junction, incorporating an enhanced connection to the Thameslink route, are features of this major scheme.

8.1.4
The construction phasing will be designed to ensure that during the period of the London Olympics in 2012 the amount of station and operational capacity made available is sufficient to cope with anticipated additional demand.

8.2 Construction methodology – early phases

8.2.1
The strategy being developed recognises the importance of maintaining maximum achievable capacity through the London Bridge corridor whilst providing sufficient working space for efficient delivery of reconstruction and remodelling works.

8.2.2
Current planning, albeit not yet validated, suggests that delivery of the early phases of the construction works should start with the Low Level (terminating) platforms and move progressively onto the High Level platforms.

8.2.3
As a result the impact is likely to be primarily on South Central franchised services during the early stages of the work, with a more limited impact on Southeastern services until later in the construction sequence.

8.3 Maintaining capacity into London – early phases

8.3.1
Given the current crowding on peak services into London Bridge, together with the expected growth in demand prior to 2012, it is obvious that any reduction in capacity in this area will be a critical issue.

8.3.2
The 2010 timetable described in Chapter 6 would feature 30tph operation into the terminating platforms at London Bridge at peak times. It is likely that the construction works will require this to be bought down to around 20tph for an extended period. This would be prior to the stage at which any of the displaced services could be extended through London

Bridge to become Thameslink services, currently expected from late 2015.

8.3.3

The following options have been identified as requiring fuller evaluation. These are aimed at ensuring sufficient capacity is provided for South Central franchise passengers during the London Bridge construction works:

- Completion of the train lengthening strategy for suburban services to Victoria in advance of commencement of works at London Bridge. This is seen as essential and should enable capacity into London overall to be retained. Additionally, TfL's planned upgrades to the Victoria Line and to the LUL station at Victoria will help avoid the extreme overcrowding and regular station closures which may currently discourage travel via this route.
- For main line services there is also a need to encourage main line passengers to use services to Victoria rather than London Bridge. This could include further train lengthening or possibly calls at East Croydon in express services from Gatwick Airport.
- Encouraging passengers to use services to Thameslink route destinations via Blackfriars also has the potential to alleviate congestion at London Bridge. Implementation of Thameslink Key Output 1 as described in Chapter 7 should assist with this, as should the new station entrance planned at Blackfriars South Bank, which will significantly improve the accessibility of this station.
- Using the East London Line phase 1 to full potential as an alternative route between the Sydenham Line and central London. The line interchanges with other sections of the TfL network at Canada Water (Jubilee Line), Whitechapel (District/Hammersmith & City Lines) and Shadwell (DLR).
- Removal of all short formation services into London Bridge is seen as essential, to ensure that the capacity that remains is put to best use. This will principally require alterations to the South London Line service via Denmark Hill as outlined in Chapter 7.
- There may also be a need to avoid the relatively low-capacity Uckfield line service using capacity at London Bridge. Given the strong growth on this route the most realistic way of achieving this is considered to be having East Grinstead and Uckfield trains splitting and joining at Oxted. This would entail some East Grinstead to London Bridge services being temporarily provided by diesel trains, for which some additional rolling stock would need to be sourced.
- Implementation of the East London Line extension to Clapham Junction (as described in Chapter 7) would provide an alternative route between parts of south London and central London.
- Operation of 12-car services into London Bridge via Sydenham, but at a reduced frequency compared to 2010. It is recognised that this option is likely to prove unpopular but that it may be necessary to enable the construction programme to be delivered in a timely manner.

- Similarly it may be necessary to operate 10 or 12-car services into London Bridge via Tulse Hill, but at a reduced frequency compared to 2010. Given the difficulty of providing longer platforms at Tulse Hill station itself within the necessary time horizon SDO would almost certainly be required, which is considered likely to impose a significant performance risk.
- Diversion of additional South Central franchise London Bridge services (ie. above the Key Output 1 service described in Chapter 7) to run to Blackfriars instead, terminating in the new bay platforms which will become available from 2011. However it is noted that such services would need to operate across the flat junction at Herne Hill, where capacity is very limited.
- Use of capacity into the vacant platforms at Waterloo International will be considered. However this is likely to be of very limited benefit for South Central services, since the only route into Waterloo International from the South Central network is also via Herne Hill.
- Reconfiguring the internal layout of rolling stock to increase capacity for standing passengers may become necessary.
- Removing First Class from all services into London Bridge may be required.
- Provision of extra drivers may be beneficial, to minimise train turn-round times and thereby maximise the capacity of the reduced number of platforms at London Bridge.
- Continuing the improvement programme to the bus network may provide alternative routes for a small number of customers in South London.

8.3.4
The final construction strategy is still under development. However it is likely that a combination of most of the above options will be required.

8.4 Construction methodology – later phases

8.4.1
During the later stages of construction it will be necessary to remodel the through platforms at London Bridge and to tie into the remodelled track alignments eastwards and westwards. Despite some additional through capacity having already been made available following completion of the earlier phases of work it will still be necessary to maintain a reduced level of service until construction and re-modelling has been completed.

8.5 Maintaining capacity into London – later phases

8.5.1
Given the current crowding levels on peak services operated by Southeastern running to, and through London Bridge, together with the expected growth in demand prior to 2012, it is obvious that any reduction in capacity in this area is a critical issue.

8.5.2
The following options have been identified as requiring fuller evaluation. These are aimed at ensuring sufficient capacity is provided for Southeastern passengers during the London Bridge construction works.

- Implementing the train lengthening strategy described in Chapter 7 in advance of commencement of works affecting the through platforms.
- Using High Speed One to full potential as the major route between the Medway and East Kent areas into London, hence avoiding London Bridge.
- Re-routeing of some Southeastern services away from Charing Cross to the vacant platforms at Waterloo International. However it is noted that this would require additional trains to be accommodated on the busy Herne Hill and/or Denmark Hill approach routes.

- Encouraging passengers to use services to Thameslink via Blackfriars where possible rather than via London Bridge. Implementation of Thameslink Key Output 1 as described in Chapter 7 will assist with this, as will the new station entrance at Blackfriars South Bank.
- Similarly passengers could be encouraged to use services to Victoria rather than London Bridge. There may be some opportunities for some additional train lengthening to facilitate this, for example through platform lengthening at Nunhead, Denmark Hill and Peckham Rye (which would enable Bexleyheath line to Victoria services to be lengthened to 12-car, subject to there being an available 12-car platform at Victoria).
- Using the ELL, DLR and Jubilee line to move passengers from the New Cross, Greenwich, Lewisham and Woolwich areas into central London, together with encouraging passengers from further out to interchange onto these routes.
- Reconfiguring rolling stock to increase capacity for standing passengers.
- Removing First Class from all services running via London Bridge.
- Continuing the improvement programme to the bus network.
- Encouraging commuter growth on river services to central London from areas such as Greenwich and Woolwich.

8.5.3
Similar to the issues described in 8.3, the final construction strategy is still under development. However it is likely that a combination of most of the above options will be required.

8.6 Performance

8.6.1
It will be extremely challenging to maintain pre-works levels of performance during the London Bridge construction works. Detailed planning will be needed to ensure that train operations remain robust and that any adverse performance effect is minimised.

8.6.2
The performance protection plans will include detailed systems modelling, to simulate the operation of train services under a range of scenarios. These techniques can indicate where additional measures may be required in order to support a robust level of service performance.

8.6.3
A key feature is an enhanced maintenance regime for a number of the key infrastructure assets in the London Bridge area, as well as the core Thameslink route. The effect of these works will be to reduce infrastructure failures at key locations where they would have the highest impact.

8.7 Wider effect on engineering access

8.7.1
The London Bridge construction works are likely to be only one of a range of significant investment items occurring on the network at this time. It is highlighted that Network Rail's engineering access plans will still need to provide maintenance, renewal and enhancement opportunities to the remainder of the network. Careful planning will be needed to coordinate these works, for example to ensure that any works at Victoria do not clash with those at London Bridge.

9. Strategy upon completion of the Thameslink Programme

9.1 Introduction

9.1.1
Following the construction works period, the completion of the Thameslink Programme will create numerous opportunities for the RUS area and beyond.

9.1.2
During the development of this RUS it became apparent that previous assumptions regarding the Thameslink train service, to operate after implementation of Key Output 2 in 2015, were inconsistent with projects already implemented, committed schemes or other RUS recommendations. As a result the conclusion was reached that these assumptions required updating. This analysis has now produced some initial recommendations which, whilst not finalised, are incorporated into this RUS.

9.1.3
The intention of this work has been to use the opportunity provided by the Thameslink Programme to respond to the capacity challenges which have been identified through the RUS process. It seeks to maximise the overall level of benefits that will be delivered by this major investment in the railway – both to Thameslink and to non-Thameslink services.

9.2 Review of Thameslink TWA train service specification

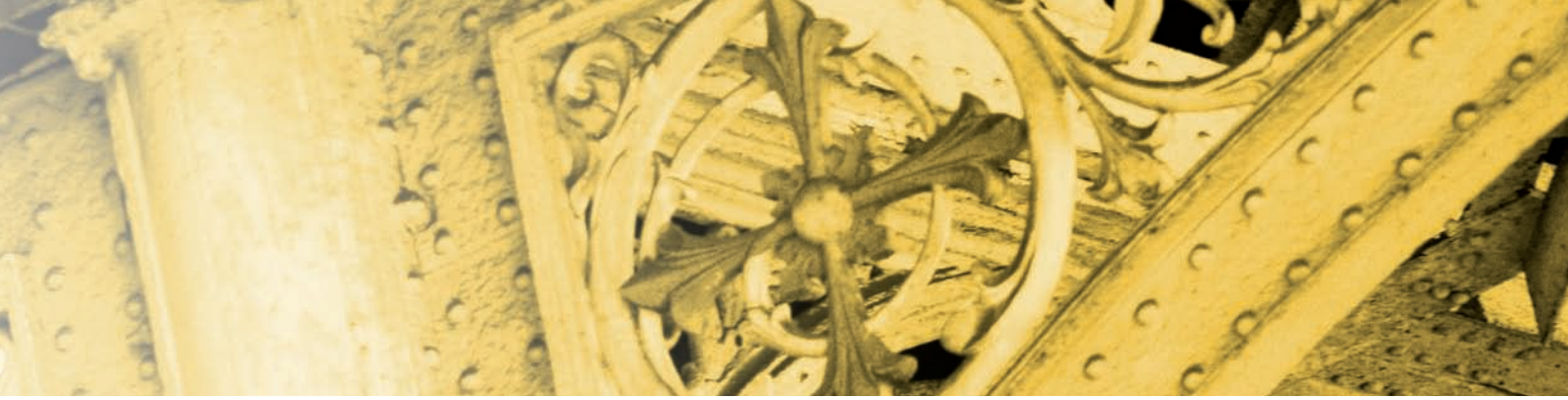
9.2.1
It is important to note that the future Thameslink route services cannot be considered in isolation. They will be subject to many of the same infrastructure constraints, highlighted earlier, that affect all other service groups operating the mixed traffic railway that characterises the railway network south of the River Thames. The Thameslink TWA service specification was focused on only a small proportion of the total train service, whilst the RUS now takes a broader view.

9.2.2
In addition, in the intervening years since the TWA specification was prepared, there has been significant growth in both passenger and freight volumes. The latter in particular is of note with respect to the specification for off-peak services.

9.2.3
In considering the future Thameslink route destinations it is critical to understand that, in the main, the Thameslink trains will be diversions of services which currently run to London Bridge, Cannon Street or potentially Charing Cross, with very few additional train paths into London possible overall.

9.2.4
The potential train service specification now described has sought to maximise the opportunities to provide additional capacity into London on the busiest routes. In some cases this would be on Thameslink services, in other cases the capacity is provided on non-Thameslink services.

9.2.5
The RUS process seeks to match capacity to demand efficiently and effectively. On this basis the priority for Thameslink during peak hours must be to provide peak direction capacity into central London. The peak train service specification has therefore been considered on this basis. Work is ongoing to develop the full Thameslink route service proposal, including the fit between Thameslink North and Thameslink South services.



9.3 London Bridge approaches – overall capacity

9.3.1
The most important factor for the 2015 train service specification is the need to maximise overall peak direction capacity into and through London Bridge station. The RUS considers the capacity limit to be 86tph, distributed across each of the station approaches as follows:

- 20tph into the terminating platforms
- 18tph via the through platforms to Thameslink
- 28tph via the through platforms to Charing Cross
- 20tph via the through platforms to Cannon Street.

9.3.2
Any alternative to the proposed train service specification would also need to provide a capacity of 86tph or more into/via London Bridge, to maintain an equivalent level of overall capacity.

9.3.3
It is noted that the capacity constraints in the Croydon area, at Lewisham and over the Orpington – Tonbridge section are also particularly relevant. Any amendments to the recommendations below would need to recognise that no additional services can operate through these areas without major infrastructure enhancement.

9.4 Analysis of potential Thameslink services

9.4.1
The Thameslink core route (between Blackfriars and St Pancras) is being designed to accommodate a peak flow of 24tph in each direction. From the south, this 24tph will comprise 18 trains that have approached Blackfriars via London Bridge, and 6 trains via the Elephant & Castle route.

9.4.2
A key principle in considering how best to optimise the train service pattern was that a 4tph peak Thameslink train service should operate at the majority of principal stations served. This is consistent with providing a "turn up and go" peak service and leads to a reduction (when compared with previous assumptions) in the overall number of routes where Thameslink services are now proposed.

9.4.3
The RUS analysis regarding the ideal composition of these 24tph for peak services are shown below. This is based on maximising the overall level of capacity that can be provided and targeting improvements at the most crowded routes. However, it must be recognised that no detailed timetable development work has yet taken place and that this process may require further refinements to be made.

via London Bridge

- 4tph Brighton main line
- 4tph Redhill corridor
- 4tph Kent main line
- 2tph East Grinstead
- 4tph Sydenham route stopping.

via Elephant & Castle

- 4tph Catford loop stopping
- 2tph Medway and/or Maidstone line semi-fast.

9.4.4
The Thameslink stopping service via Sydenham (which is included in 9.4.3 above) appears to be highly desirable from a passenger demand perspective. Although the new infrastructure in the New Cross Gate area has not been specified with this service in mind, the track layout would still permit it to operate – albeit at the expense of an increased number of conflicting crossing moves between fast and slow lines. Although this is not believed to be a significant hurdle at the time of writing, further timetabling work will need to be undertaken to ensure the operational robustness of this proposal. In addition, there is potentially a requirement for further enhanced turnback facilities in the Croydon area.

9.4.5
The RUS deliberations do not include Thameslink services operating via Lewisham or to Dartford. This is for the following reasons:

- This could only be done by diversion of some Cannon Street services, leading to a multiplicity of London terminals for both the Sidcup and Bexleyheath routes. Furthermore Cannon Street station would not then be used to its full potential.
- Such an option appears likely to result in a total of fewer than 86tph operating into/via London Bridge. The total train service quantum would be limited by capacity in the Lewisham area and the Orpington – Tonbridge section, rather than at London Bridge.
- Timetable development work has identified that a 20 minute repeating pattern works better operationally on the Kent Metro area than a 15 or 30 minute frequency. This makes Thameslink services (which need to be 2tph or 4tph to tie into frequencies from the Brighton main line) difficult to integrate into this pattern.
- The track layout in the North Kent East junction area would require a very high level of conflicting moves to allow 8tph to operate to and from the Kent route to Thameslink. This is not considered operationally robust.
- Running Thameslink services via Lewisham would effectively require other services (which could otherwise run through the Thameslink core) to be terminated at London Bridge low level. This would exacerbate the constraint caused by the six terminating platforms at London Bridge low level, further restricting overall capacity on the Sussex route.

9.4.6
It has not been possible within the geographic scope of the SL RUS to identify the precise destination points, on Thameslink North, of the 24tph in the morning peak from South London. However, a variety of suitable destinations on the ECML and MML exists, so it is not envisaged that this would present an insurmountable issue when further analysis takes place.

9.4.7
It is noted that 24tph from Thameslink North will need to operate contra-peak (ie. southbound from Blackfriars during the morning peak). Many of these vehicles are likely to require berthing between the morning and evening peaks within this RUS area, whilst others would provide return services to London or Thameslink North in the later part of the peak.

9.4.8
It is recognised that the indicative Thameslink service in 9.4.3 may change in the future. For this reason it is recommended that the infrastructure be designed with sufficient flexibility to cope with a variety of alternative train service structures.

9.4.9
The Thameslink service described above would eventually allow up to 20tph of the 24tph peak services from south of the Thames to be formed of 12-cars. However, it is not necessarily a requirement for all of these to have 12-car operations from 2015.

9.5 London Bridge low level

9.5.1

The number of terminating platforms at London Bridge will be permanently reduced to six upon completion of the Thameslink construction works, giving a reduced total capacity at the low level station of 20tph.

9.5.2

There is sufficient flexibility in the infrastructure that will be available at London Bridge that it is not yet necessary to specify exactly which services will operate into the terminal platforms. However, based on the Thameslink train service specification described in 9.4.3 above the following services will almost certainly need to be included:

- at least 2tph Sydenham line all stations (in addition to the 4tph to Thameslink)
- at least 6tph Tulse Hill line all stations (2 Hackbridge/2 Norbury/2 Gipsy Hill routes)
- 2tph Caterham/Tattenham Corner (fast from Norwood Jn)
- 2tph Wallington line (fast from Norwood Jn)
- 2tph Uckfield (fast from East Croydon)
- 2tph Sussex Coast (fast from East Croydon)

9.5.3

Once the services above have been provided, the remaining capacity available for any other services is 4tph. Assuming that the timetable in operation repeats on a half-hourly basis this would allow 2 of the following 4 options to be implemented:

- Increasing services up to a total of 8tph to London Bridge on the stopping route via Sydenham (including the 4tph to Thameslink)
- Increasing services up to a total of 8tph on the Tulse Hill to London Bridge route
- Increasing services from origins south of East Croydon
- Reinstating the South London Line service from Denmark Hill.

If more than two options were implemented this would then exceed the 20tph available capacity in the terminating platforms.

9.5.4

Initial demand forecasts have indicated that crowding on the Sydenham line will be broadly addressed by running longer trains, including those running to the Thameslink network, and the introduction of East London Line services. For this reason, the best available information at the present time suggests that the remaining capacity should be targeted at other routes, notably the Tulse Hill line and routes running through the Purley area.

9.5.5

Demand modelling for the purposes of developing a business case for the train lengthening has been based on the allocation of capacity described in 9.5.3 and 9.5.4 above. However, it is emphasised that demand developments over the next few years will potentially alter this suggested balance of services at London Bridge and there is no pressing reason to make a decision until nearer the time.

9.6 Blackfriars services

9.6.1

Owing to the transposed layout of the lines serving the Catford loop and the Herne Hill route south of Blackfriars, the RUS recommends that all services via Herne Hill will need to terminate at Blackfriars. The RUS does not consider it operationally robust to run trains from the Catford route to the new Blackfriars terminating platforms.

9.6.2

Based on the above, the services at present envisaged to terminate at Blackfriars from 2015 are:

- 4tph Wimbledon Loop
- 2tph from Kent House
- 2tph semi-fast service from the Medway area and/or Maidstone line.

9.6.3
The indicative service mapped in Figure 9.2 shows an increase in today's frequency of service to provide 4tph in the peaks each way on the Wimbledon loop. This is a potential benefit of the operation of 8tph into London Bridge via Tulse Hill (as described in 9.5.3), so should be considered as indicative only.

9.7 Charing Cross and Cannon Street services

9.7.1
Peak service frequencies into Charing Cross will be maintained at today's levels, in line with TWA commitments. However, all services will be able to call at London Bridge station, offering improved journey opportunities. Most peak services will be extended to 12-car, as described in Chapter 7.

9.7.2
Peak service frequencies into Cannon Street will need to be reduced since the amendments to the track layout between London Bridge and Blackfriars will reduce the ability of trains to clear the platforms for the next arrival. However those Kent main line trains affected will be diverted to the Thameslink network, so this will also result in improvements. Most peak Cannon Street services will also be extended to 12-car.

9.7.3
The completion of work on the Thameslink network will mean that through services between the Greenwich line and Charing Cross will not be viable, since the Thameslink tracks will be located between these routes. However, the Greenwich line would see a corresponding increase in services to Cannon Street.

9.8 Diagrammatic representation of potential 2015 train service

9.8.1
A diagrammatic representation of the indicative train service from December 2015 onwards, based on the sections above, is shown in Figures 9.1 to 9.5.

Figure 9.1 – 2015 Timetable indicative morning peak frequencies

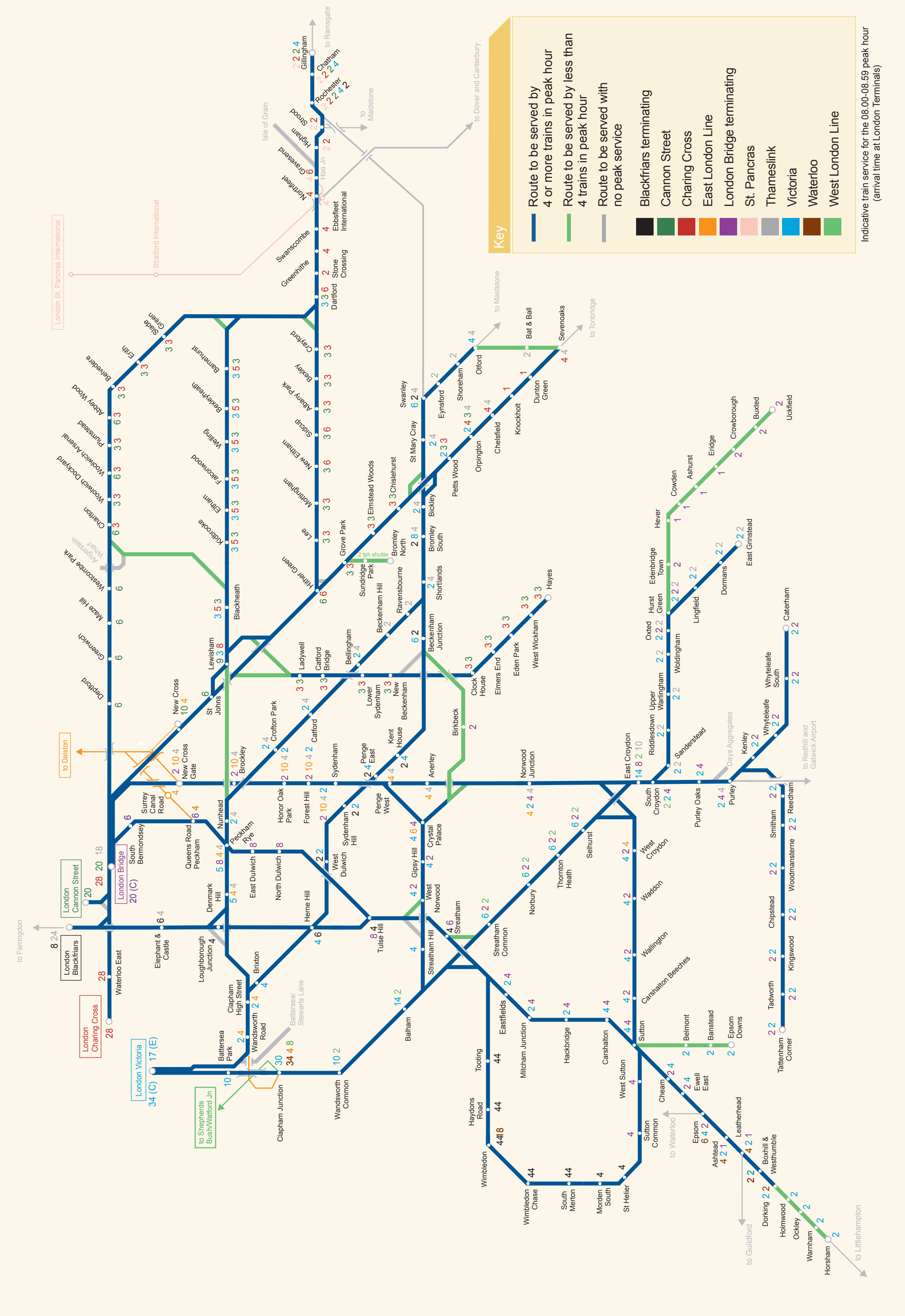


Figure 9.2 – South Central suburban indicative peak train service (2015)

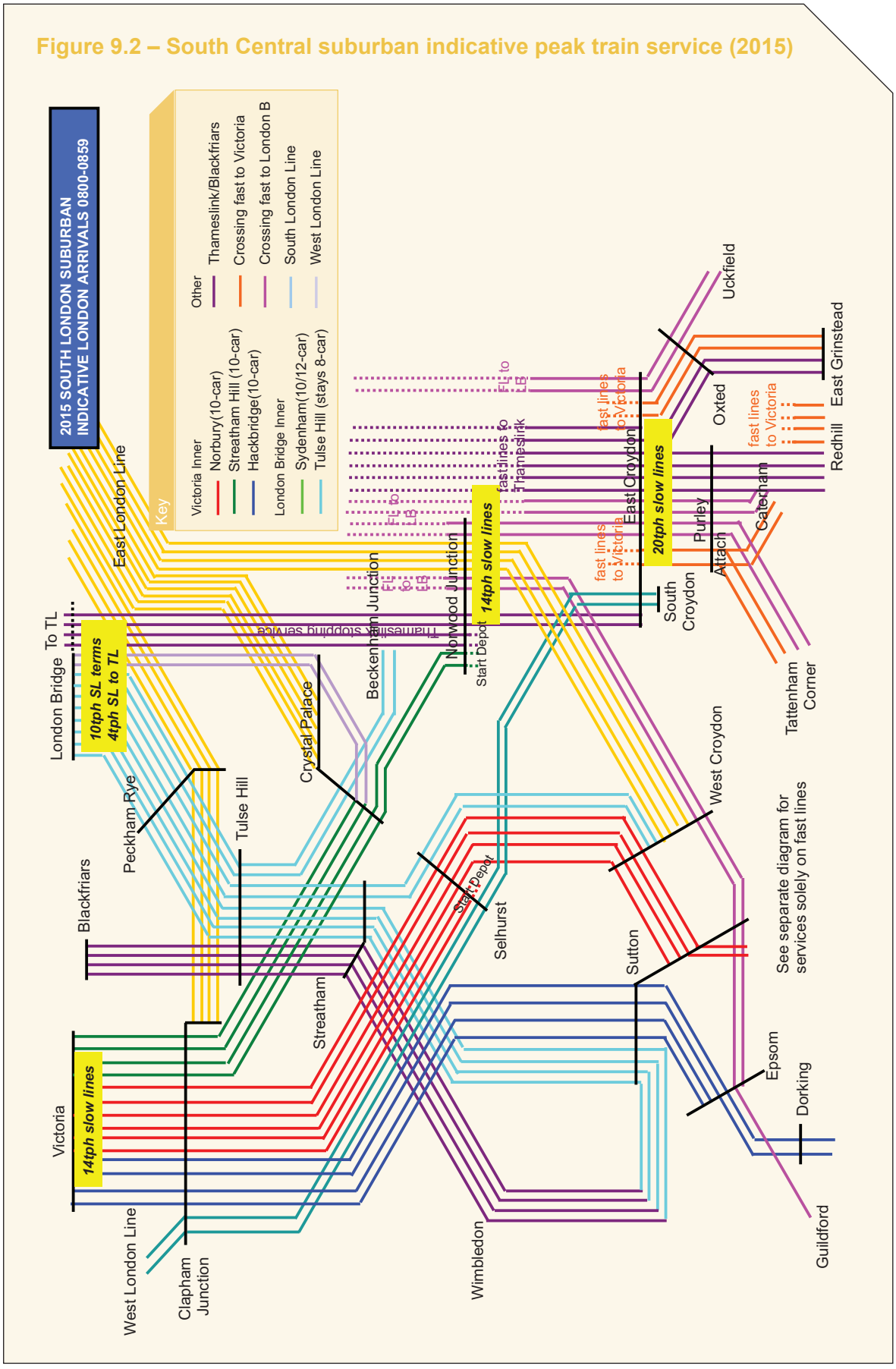


Figure 9.3 – Brighton Main Line indicative peak train service (2015)

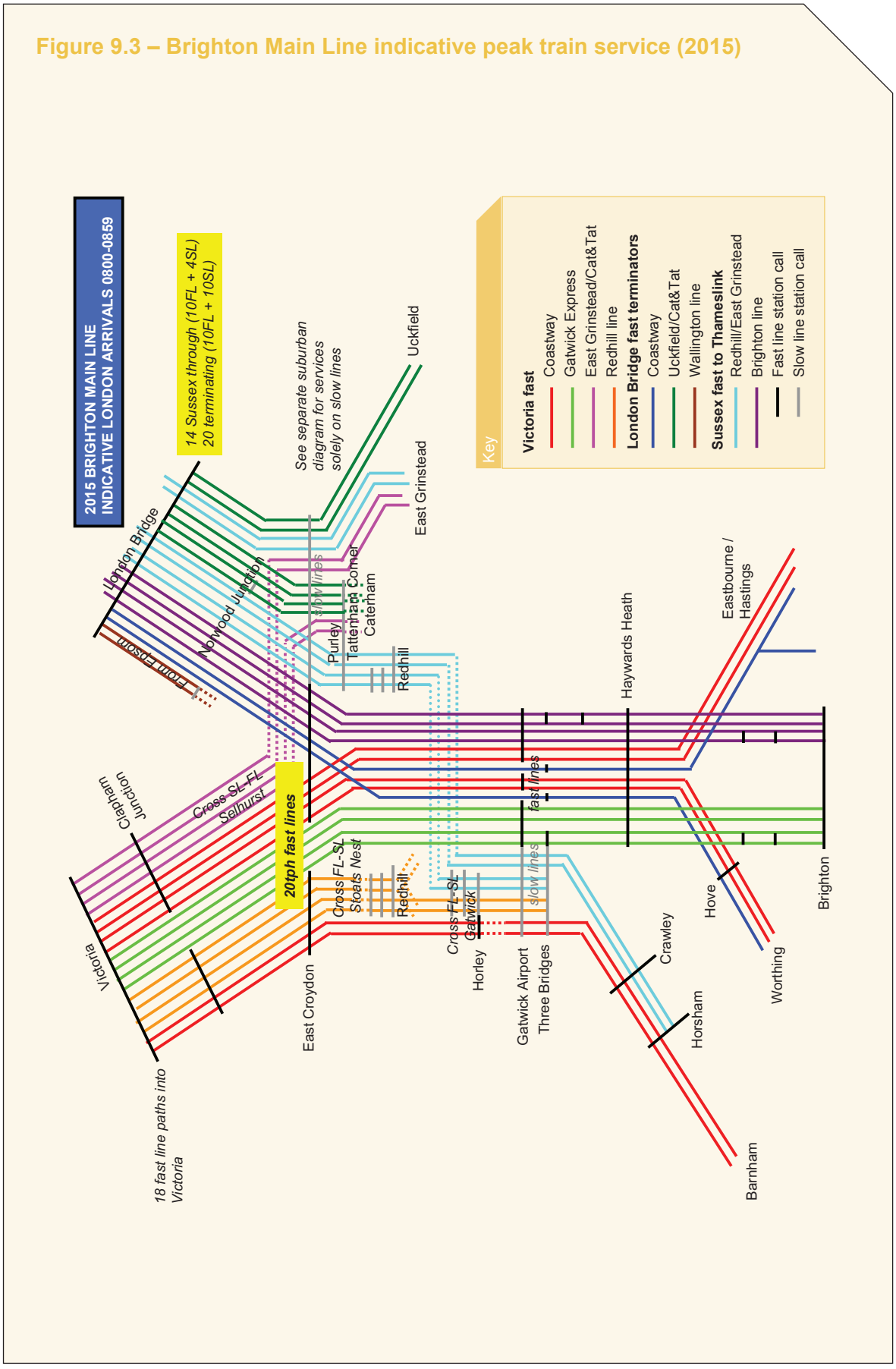


Figure 9.4 – Southeastern indicative peak train service (2015)

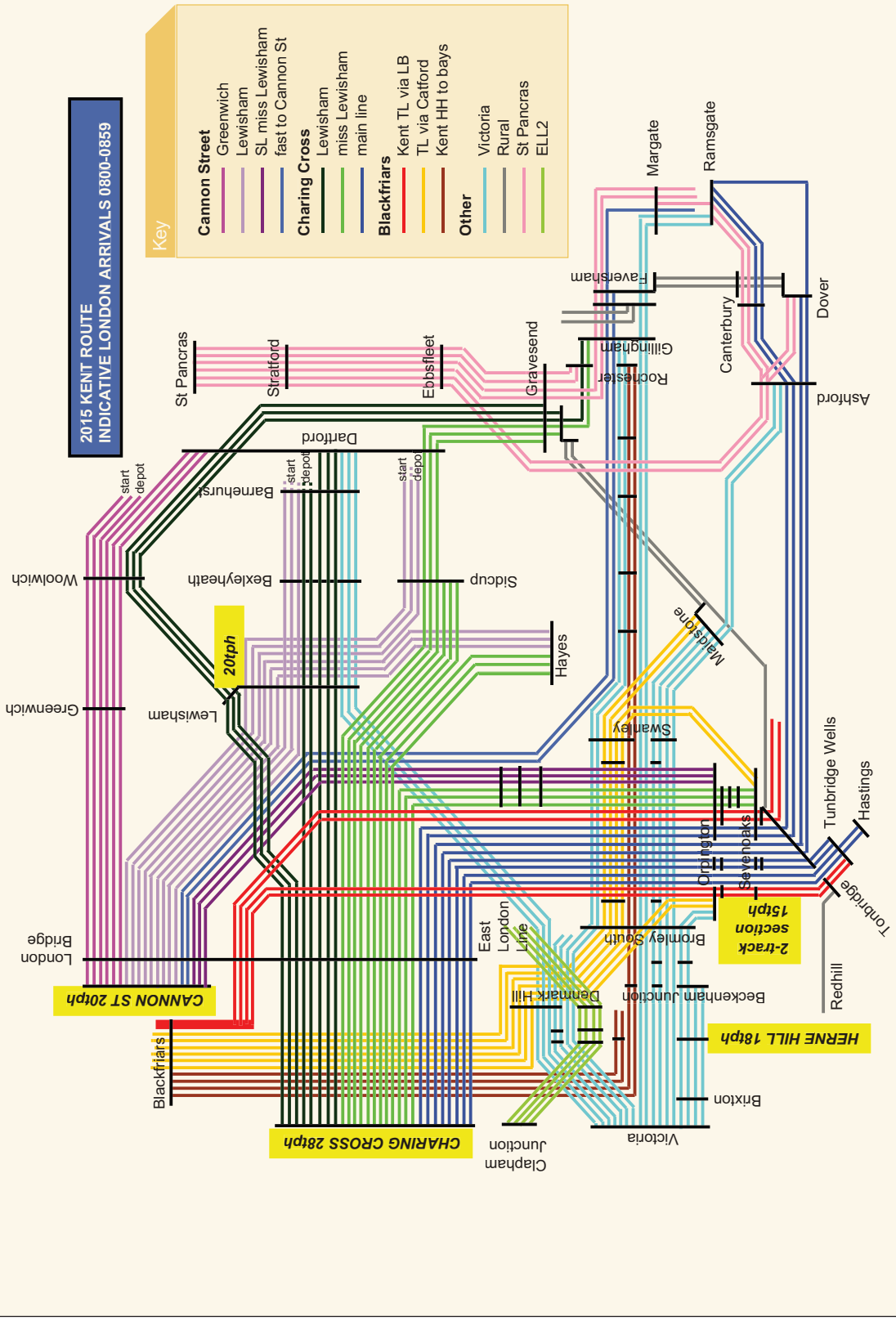
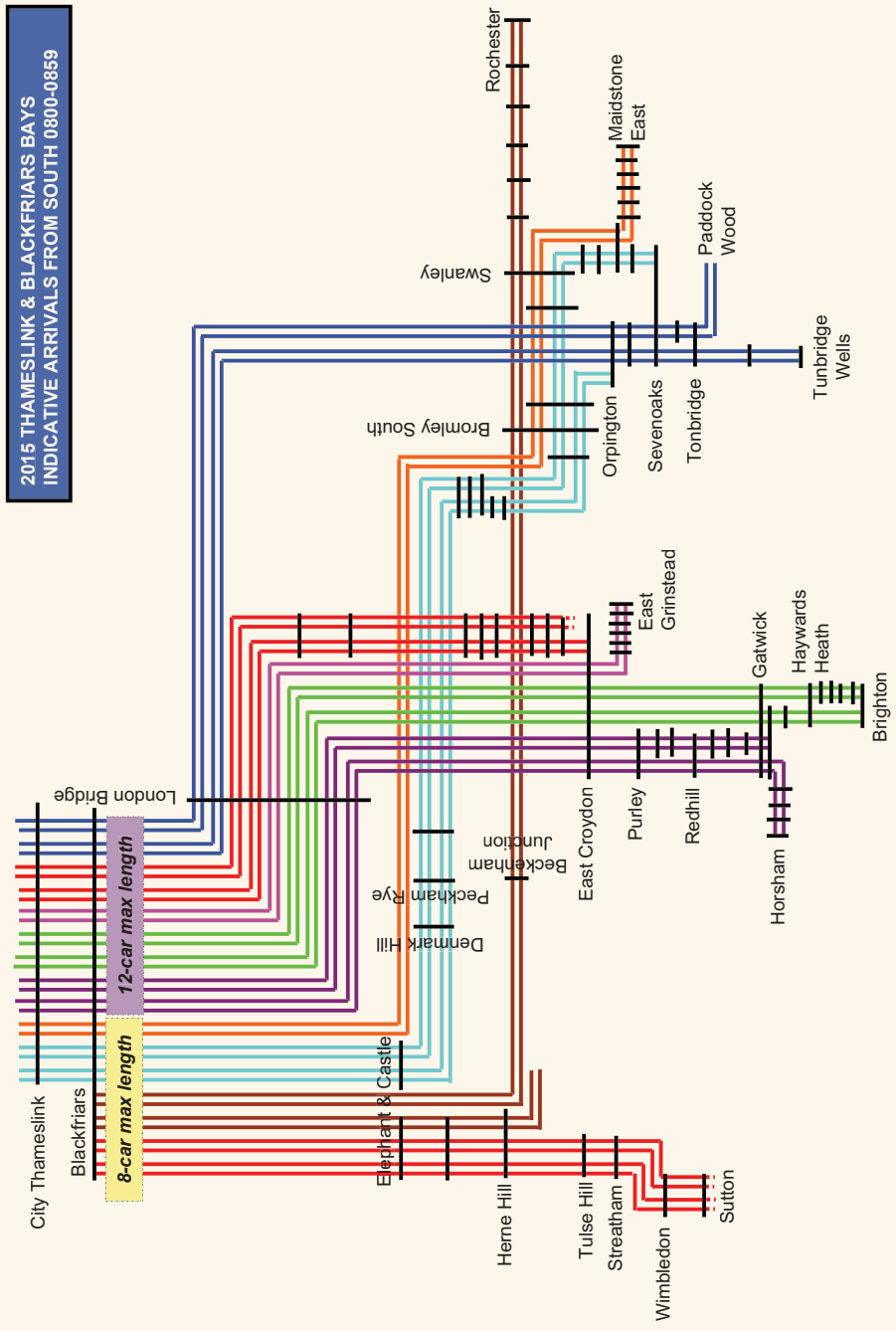


Figure 9.5 – Key Output 2 peak direction services from Thameslink South



9.9 Other benefits

9.9.1

An important feature is that the benefits achievable upon the completion of the Thameslink Programme will not be restricted to those services operating through the Thameslink core route. Other services may benefit from the following:

- Freeing south-north capacity across Herne Hill junction (presently used by peak Brighton Line services) for use by additional east-west services into Victoria or south-north services into Blackfriars via Tulse Hill.
- Enabling all Kent route services to/from Charing Cross to call at London Bridge (at present many peak services are not able to call).
- Improved train performance, with increased capacity in the London Bridge area and fewer conflicting moves at key constraints like East Croydon and Herne Hill.
- Improved engineering access options, for example with 4 tracks becoming available over Borough Market. This could potentially allow services to run from Charing Cross later into the night.
- Journey time improvements, in connection with a limited number of linespeed enhancements and the removal of pathing time from timetables.

9.10 Impact on train lengthening strategy

9.10.1

Network Rail's Strategic Business Plan (as published in October 2007) envisaged 10-car operation on the Sydenham route, but based on 9.4.3 above, this RUS is now working on the assumption that this route would be served by Thameslink services. Having a sub-set of 10-car trains in the Thameslink fleet would be very inflexible and create maintenance difficulties. This effectively leads to a revised infrastructure strategy for 12-car operation on the Sydenham line, from both East and West Croydon.

9.10.2

There is a number of other routes where platform extensions were originally envisaged to accommodate Thameslink trains, but these are not now proposed for Thameslink operation. However in each of these cases it is still proposed to run longer trains into other London terminals, so the platform extension works are still required.

9.11 Impact of Crossrail

9.11.1

The construction of the Crossrail branch to Abbey Wood, together with a new station at Woolwich, will provide new journey opportunities and have some potential to alleviate congestion on the North Kent Line. The RUS therefore welcomes the recent funding commitment to the Crossrail scheme, with completion planned shortly after Thameslink.

9.11.2

The limited penetration of the Crossrail route into the South London RUS area means that it is only of limited relevance with respect to providing additional overall capacity into London as far as this particular RUS is concerned. However it is noted that the planned interchanges at both Farringdon and Whitechapel have the potential to influence travel patterns across much of the RUS area. These interchanges are likely to encourage some demand to shift to the Thameslink and ELL routes respectively. This is consistent with the remainder of this strategy.

9.12 Performance

9.12.1

A key determinant of post-2015 peak train performance will be the ability of the Thameslink core infrastructure to accommodate an intensive 24tph operation. Reliable infrastructure, high performing rolling stock and prompt train despatch arrangements in the central core will be essential to facilitate such a high frequency of train service.

9.12.2

With such a very high density of traffic, there will be considerable pressure on signalling and platform staff to achieve optimum efficiency at peak times. Cross-industry plans to deliver the 24tph operation will need to be further refined, including enhanced maintenance regimes and the development of new train regulation statements to assist signallers in the making of robust decisions.

9.12.3

The removal of historic constraints at London Bridge will provide greater operational flexibility and opportunities for less disruptive engineering access. It is therefore essential that the potential of the revised network is exploited through developing robust operational and maintenance practices.

9.12.4

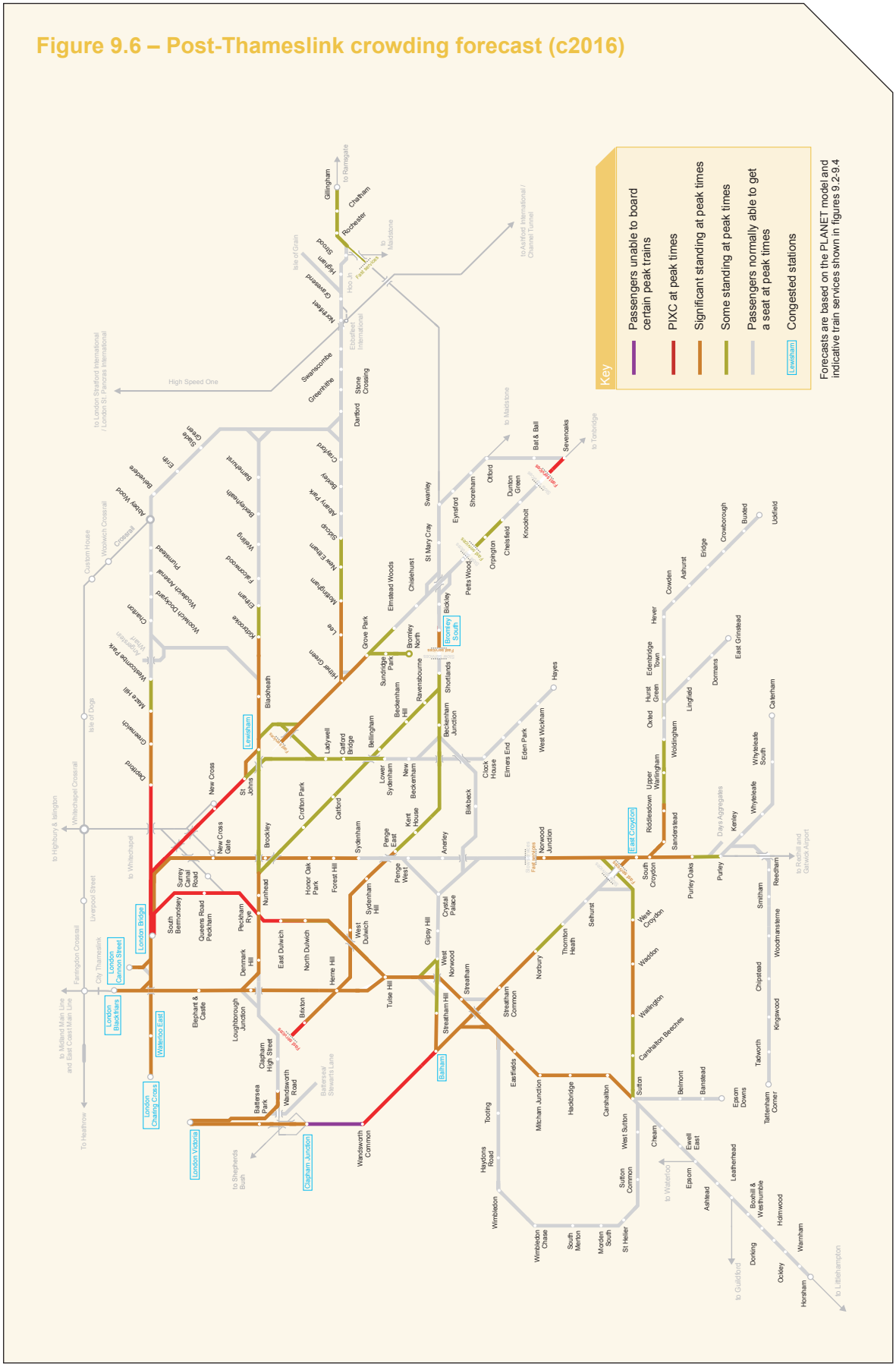
The core section is likely to be one of the most intensively used in the entire UK rail network. Good practice from other rail networks such as London Underground or from abroad may inform maintenance and operational planning. Technology may also improve in the intervening years allowing greater traffic density with increased safety, although it is unlikely that systems such as ERTMS will be installed in the RUS area within this timescale.

9.13 Further train lengthening by 2019

9.13.1

Figure 9.6 demonstrates an indicative level of peak period crowding within the RUS area in 2016, based on forecast changes in passenger demand and implementation of the strategy described in this RUS.

Figure 9.6 – Post-Thameslink crowding forecast (c2016)



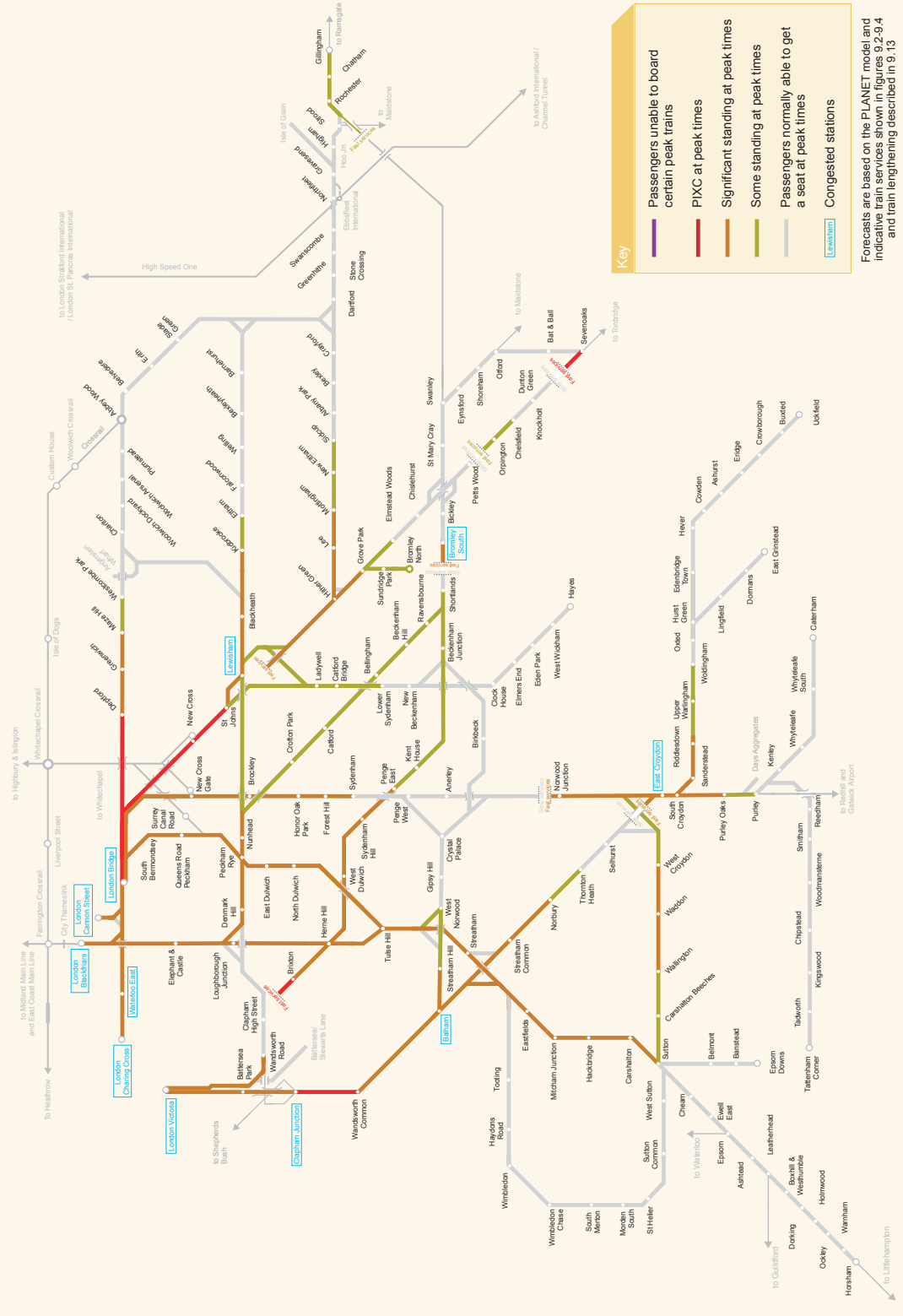
9.13.2
Figure 9.6 is provided in the same format as Figure 3.13 earlier, so that changes can be seen. From comparison of the two it can be seen that much of the crowding in excess of capacity has been relieved. However, the modelling predicts that there may still remain some pressure on the Southern routes into Victoria, and that increased demand on the routes via Tulse Hill into London Bridge may also result in crowding.

9.13.3
To overcome these, the RUS has therefore tested two further interventions: lengthening trains into Victoria (via Balham) to 12 cars, and lengthening Tulse Hill line trains to 10 cars. Initial appraisal of both these options suggests that each has a high value-for-money business case (see Appendix B). The predicted effect on crowding is shown indicatively in Figure 9.7.

9.13.4
The RUS consequently recommends that these schemes should be progressed in the second half of Control Period 5. In addition, it recommends that where platforms on the Victoria routes can be efficiently extended to 12-car length at the same time as they are being extended to 10-car length during Control Period 4, these works should be undertaken in such a way as to avoid a second major intervention. At some locations, however, the costs of further lengthening beyond 10-car may dictate a requirement for using SDO.

9.13.5
The operation of 12-car services on the Tulse Hill route is presently considered impracticable, not least because it would probably require additional platform lengthening works to take place at London Bridge, beyond those planned for the Thameslink Programme.

Figure 9.7– Crowding forecast following further train lengthening (c2019)



9.14 Off-peak services

9.14.1

Whilst this RUS has focused primarily on morning peak services on normal weekdays, it is recognised that passenger demand is also growing strongly at other times of the day, week and year. In addition, freight services operate almost entirely at off-peak times, since this is when they can be accommodated on the network.

9.14.2

With respect to passenger demand in the weekday daytime period between the morning and evening peaks, the RUS has identified no specific issues preventing the anticipated levels of future demand from being accommodated. In general the service frequency at such times will be sufficient to accommodate forecast demand without crowding becoming a problem.

9.14.3

With respect to the period between the evening peak and the closedown of services, it is likely that the crowding already seen on some trains will have to be addressed.

9.14.4

Normal processes for changes to franchise specifications and access rights could be used if a case can be made to funders to change service frequency at off-peak times, taking into account other users of the route and maintenance requirements.

9.15 Engineering Access post-2015: Moving to a "Seven Day Railway"

9.15.1

A strategic issue for the RUS arises in connection with passenger services operating late at night and at weekends, especially on Sundays. Demand for travel is growing strongly at these times, reflecting London's status as a "24-hour city" and the changing nature of society. Sundays and Bank Holidays are now firmly established as a busy day for shopping and leisure travel, and numerous major events – the London Marathon, Lord Mayor's Parade etc. – take place in central London and elsewhere, attracting large numbers of people.

9.15.2

A further strategic issue concerns the operation of freight services, with many of these also already operating overnight or at weekends. As freight demand increases, or rail freight grows its modal share in comparison to road, freight services at such times can be expected to increase. Many freight services have no option but to run over specific sections of railway, for example traffic to the Grain branch must clearly operate over the Dartford – Hoo section of route. In other cases there are potential diversionary routes available (for example the Sevenoaks route to the Channel Tunnel, rather than the normal Maidstone East route), but the diversionary route does not have equivalent capability – gauge in this case – to the normal route.

9.15.3

As a result of 9.15.1 and 9.15.2 above, conflicts will increase between responding to growing demand for travel at such times and the need to maintain, renew and enhance the railway. Such activities have traditionally been planned overnight and during the weekend, as this is when passenger demand is lower. It is therefore essential that a long term maintenance strategy is developed, focusing on developing smarter engineering access methods which achieve more productivity but can be delivered in shorter access times or require the closure of fewer tracks.

9.15.4

Network Rail has established a “Seven Day Railway” initiative, which seeks to respond to these issues. Some of the major items which are being planned of relevance in the SL RUS area include the following:

- The additional Thameslink tracks over the Borough Market area will improve maintenance opportunities on the Charing Cross approaches, providing the flexibility to continue operating some train services whilst engineering work takes place.
- As the condition of infrastructure assets continues to improve, fewer interventions for major maintenance should be expected. Also, remote monitoring of equipment may permit a less intrusive and more proactive maintenance regime.
- The development of modular components, such as switches and crossings, is being progressed with the aim of undertaking work in possessions lasting no more than 8 hours.
- Improved processes for implementation of single line working are being developed. Engineering processes and equipment are being reviewed to identify ways in which work can be undertaken on one track without the need to close the adjacent track. This would enable some trains to continue to run.
- The time taken to isolate the power supply to the third rail system – in a manner that allows engineering work to commence – is a significant maintenance constraint throughout the third rail electrified area at present. Improved processes to reduce this time from up to an hour at present to around five minutes are being considered. It is envisaged that technological improvements will reduce the need for staff on the ground to operate manual switches controlling the power supply.
- Similarly, amended working practices are likely to allow further efficiencies in the time needed to grant and give up engineering possessions.
- The time taken for plant and equipment to reach the site of work from the point at which they access the railway can be a constraint. Improvements to existing access points and new access points are therefore being considered where necessary.

9.15.5

It is recommended that these issues are taken forward through the Seven Day Railway initiative.


Pay & Go

10. Longer term opportunities

10.1 Introduction

10.1.1
Government's 'Delivering a Sustainable Railway' White Paper (2007) anticipated continuing long term growth in the use of the railway. Specifically, it suggests that, nationwide, there could be an overall doubling of passenger and freight traffic over the next 30 years.

10.1.2
It is not practical to predict with any accuracy the effect on individual lines of route the changes in demand which will materialise over such a long time period. However, current thinking suggests that commuting flows into central London have a lower potential for growth than many other flows in the UK, given factors such as rail already having a high modal share in this market and the limited availability of land to accommodate significant new housing growth in what is already a densely populated area. Moreover there will be a practicable limit on the number of new jobs that can be accommodated in central London.

10.1.3
The following sections describe several options that do not form part of the recommended 10-year strategy for the RUS area to 2019 but are potential further development opportunities in the longer term. The implementation of such schemes will be primarily dependent on the levels of funding available at the time, together with the actual levels of passenger and freight growth that materialise over the RUS period.

10.2 Potential schemes for consideration

10.2.1
The schemes described in the rest of this chapter do not constitute an exhaustive list and at present none of them has a demonstrably robust economic case for progression, nor has the technical viability of any of them been proven at this stage. However, they are indicative of the scale of works that might be necessary to accommodate future growth.

10.2.2
There is no pressing reason to make decisions at this time regarding the exact choice and definition of the schemes that might need to be implemented beyond 2019, though future demand growth will be monitored and future schemes developed as they become necessary.

10.2.3
However in each case it is recommended that the railway and non-railway land required to enable these schemes to be implemented in the future is protected from any development which would render the scheme impractical.

10.3 Further train lengthening

10.3.1
The strategy outlined in Chapter 7 was primarily built around a programme of train lengthening to accommodate additional passengers. It is considered realistic to assume that this programme could potentially be continued beyond the schemes recommended in this RUS.

10.3.2
The train lengthening described in Chapters 7 and 9 focused on those routes with relatively high levels of benefits and relatively low levels of infrastructure costs, when compared to the routes not proposed for lengthening. The schemes recommended therefore comprise "quick wins". Extending the train lengthening programme to other areas is potentially achievable but this would then involve routes with relatively lower benefits and much higher costs than the CP4 and CP5 schemes.

10.3.3
In looking beyond 2019, it has been assumed that (on the suburban routes at least) lengthening beyond 12 cars is unlikely to be a feasible solution, owing to the likely high costs and the overall impact of extended junction clearance times on track capacity, given previous train lengthening.

10.3.4
Figure 10.1 lists the sections of route which will be operating shorter trains than 12-car after implementation of the strategy outlined in Chapters 6-9. Conceptual details associated with each of these potential further train lengthening schemes are then provided below.

Figure 10.1 Potential further train lengthening (in addition to those schemes which are recommended in Chapters 7 and 9 of this RUS)

Route	RUS recommendation	Further option
Suburban routes via Herne Hill to Victoria	stays 8-car	10-car or 12-car
Dartford to Victoria	stays 8-car	10-car or 12-car
Routes via Tulse Hill to London Bridge	10-car by 2019	12-car
Routes via Tulse Hill to Blackfriars	stays 8-car	10-car or 12-car
Suburban routes via Catford to Thameslink	stays 8-car	10-car or 12-car
Bellingham to Victoria	8-car by 2012	10-car or 12-car
East London Line	4-car	5-car or more
West London Line	4-car	8-car or more

10.3.5
A train lengthening programme on stopping services into Victoria via Herne Hill would provide an increase in capacity but platform extensions would require major remodelling at several sites. At Herne Hill station itself platform extensions are only considered to be achievable by implementation of the grade separation scheme described in Option 17.3. SDO is unlikely to be a viable option here as the section of the train not in the platform would foul the junction on the Tulse Hill – Blackfriars route. Longer trains on these routes are also likely to require a major reconfiguration of Victoria station, since several of the platforms on the Eastern side cannot accommodate 12-car trains at present and cannot readily be extended.

10.3.6
A train lengthening programme on stopping services into Victoria via Denmark Hill. This would remove short formation trains from the Bexleyheath line but would also increase the utilisation of the restricted number of 12-car platforms at Victoria Eastern.

10.3.7
Assuming that the remodelling of both Tulse Hill and Herne Hill are required to deliver the lengthening described in section 9.13 and 10.3.5 respectively, there would then potentially be an opportunity to lengthen trains operating on this route to Blackfriars. However this is then likely to require major works to allow longer trains to call at Elephant & Castle.

10.3.8
Lengthening of suburban services via Catford to Thameslink is potentially a future option. However, as above, this would require major works to enable services to call at Elephant & Castle and would probably also require infrastructure works on Thameslink North.

10.3.9
Lengthening of the Bellingham to Victoria service beyond 8-car would trigger the same issue regarding platform lengths at Victoria as described in 10.3.5 and 10.3.6 above.

10.3.10
The East London Line services are particularly difficult to extend, given that the central core area is underground. However it is conceivable that works could be identified at some stage in the future which would enable operation of 5-car services.

10.3.11
By contrast, the West London Line South Croydon to Shepherds Bush service could be extended to 8-car at much lower cost. This is dependent on the realignment works for platforms 14-17 at Clapham Junction (see section 7.4.1) and would also require some minor works at other stations.

10.3.12
Further train lengthening beyond that recommended in Chapters 7 and 9 is likely to create a further need for additional power supply enhancements, depot and stabling capacity.

10.3.13
It can be seen from the above that several expensive and complex schemes would need to be implemented before the entire South London RUS network could accommodate 12-car operations. High levels of expenditure to support an additional train lengthening strategy may need to be compared to how much capacity could be provided on other public transport modes at equivalent cost.

10.4 Additional peak trains

10.4.1
The ability of the network to accommodate additional high peak passenger services is to a large extent dependent on the ability to path trains through the key “constraints” shown previously in Figure 3.25.

10.4.2
Figures 10.2 and 10.3 list the major constraints (after the completion of Thameslink), the driver of the constraint and any options which could potentially allow additional trains to operate in future in these areas.

Figure 10.2 Potential alleviation of constraints (post 2015) – London terminals

Constraint	Issue	Options identified
Charing Cross	Six platforms available. All services must operate over a two track section in the Borough Market area	None identified. 28tph is therefore considered to be the maximum capacity into Charing Cross as described in Chapter 9.
Cannon Street	Restricted track capacity on station approach	None identified. 20tph is therefore considered to be the maximum capacity into Cannon Street as described in Chapter 9.
London Bridge low level	Six platforms available plus limited approach tracks	None identified. 20tph is therefore considered to be the maximum capacity into London Bridge as described in Chapter 9.
New Blackfriars bays	Two platforms available	None identified. 8tph is therefore considered to be the maximum capacity into these platforms as described in Chapter 9.
Victoria Central suburban	Four platforms available	Use of platform 8 for South Central suburban services (Option 9a) could potentially allow a small number of additional trains to operate, subject to the alleviation of the Clapham Junction to Balham constraint

Figure 10.3 Potential alleviation of constraints (post 2015) – away from London terminals

Constraint	Issue	Options identified
Croydon area	Limited track, platform and terminating capacity	West Croydon remodelling (Option 16.2) and/or additional platforms and tracks in the East Croydon area (Option 16.1) have the potential to alleviate this constraint
Herne Hill junction area	Flat crossing between Kent and Sussex routes. On the Kent route there is a mixture of fast services and those needing to serve the local stations.	The grade separation scheme (Option 17.3) has potential to alleviate this constraint. Minimising station dwell times for stopping services would be an essential factor over the Kent House route. Implementation of an ERTMS signalling system could potentially enable a small increment in capacity in this area, though this has yet to be demonstrated.
London Bridge to Hither Green section, including Lewisham	The need for a large number of crossing moves between the fast and slow lines	Implementation of an ERTMS signalling system could potentially enable a small increment in capacity in this area, though this has yet to be demonstrated.
Dartford area	The need to accommodate services from all of the Woolwich, Bexleyheath and Sidcup routes, with limited track and stabling capacity.	The safeguarded track alignment to extend Crossrail beyond Abbey Wood would potentially alleviate this constraint by providing additional capacity in the Dartford area.

Constraint	Issue	Options identified
Clapham Junction to Balham slow lines	All slow line services into Victoria Central, together with any bound for the West London Line, must operate over this two track section of route.	Minimising station dwell times through station and rolling stock design will be an essential. Implementation of an ERTMS signalling system could potentially enable a small increment in capacity in this area, though this has yet to be demonstrated. Alternatively cross-Clapham Junction services (for the WLL) could be diverted to Victoria, but this would conflict with the recommendation for Option 2.7 and increase interchange at Clapham Junction station.
Orpington to Tonbridge two track section	All services from south of Orpington must operate over this two track section of route. Mixture of fast services and those needing to serve the local stations.	Minimising station dwell times for stopping services would be an essential factor. Implementation of an ERTMS signalling system could potentially enable a small increment in capacity in this area, though this has yet to be demonstrated.

10.4.3
Figures 10.2 and 10.3 demonstrate that, whilst options for alleviating some of the constraints in the RUS area do exist, other constraints have no known realistic solution or have options which would only achieve a small improvement. Furthermore, many of those schemes shown are unproven or would be very expensive.

10.4.4
Furthermore even if existing services could operate, this could result in other sections of the network becoming “constraints”. For example stopping patterns would be a particular issue on any two-track routes with both fast and slow services, and particular pressure would be put upon depot and stabling facilities. Further infrastructure enhancement work may therefore be necessary beyond that identified. Other issues such as power supply capability would also need consideration.

10.4.5
The implication of the above analysis is that peak hour timetables in 30 years time will only have a small number of additional services when compared to the 2015 timetables, as outlined in Chapter 9, even if further constraints could be alleviated.

10.4.6
An alternative opportunity to achieve an increase in train service frequencies could potentially be through simplification of the operation of the network. This would involve amending train routeings to remove the current multiplicity of flat crossing moves at junctions. Particular examples could include reducing the number of crossing moves between the fast and slow lines in the Hither Green to London Bridge area (including those at Lewisham) and reducing the crossing moves in the network of flat junctions in the Croydon area. Such an approach would, however, be likely to result in the removal of some direct journey opportunities.

10.5 Other alternative solutions

10.5.1

Beyond the strategy interventions set out in previous chapters, it is clear from sections 10.3 and 10.4 that further expansion of heavy rail capacity on the existing radial routes will require very large investment. It is therefore essential to consider the potential to develop solutions using other transport modes alongside or instead of expanding the heavy rail network.

10.5.2

The following are provided as indicative examples of schemes that may be worthy of consideration:

- Extension of Crossrail beyond Abbey Wood. This scheme would divert demand from much of the North Kent Line away from the London Bridge route. If the extension was routed via the Dartford area it is likely that additional tracks and platforms in the station area would be required. However these additional tracks would also provide other benefits.
- Expansion of the London Underground system into South London. The main opportunity to facilitate this appears to be by construction of a southern extension to the LUL Bakerloo line, given that this line does have a limited amount of spare capacity available into central London.
- Construction of the Cross River Tram system, linking Peckham Rye and Brixton towards Euston across Waterloo Bridge.
- Extensions to the Croydon Tramlink system, for example to take over the lightly used Beckenham Junction and Bromley North branches. This could potentially encourage radial journeys, removing the need to travel into central London.
- Further extension to the DLR system, eg. south of Lewisham. This could potentially respond to demand growth on parallel heavy rail routes.

10.6 Congestion relief at stations

10.6.1

Figure 7.5 highlighted the congestion relief works at stations currently envisaged. Whilst the RUS notes that plans are developing to respond to most of the station congestion issues within the early years of the RUS period, further acceleration of passenger demand will place additional pressure at these locations. Additional demand will also impact on other stations not currently regarded as having a congestion problem.

10.6.2

Additionally, it is noted that the following congested stations are highly problematic and are likely to need addressing over the longer term:

- Charing Cross – the constrained nature of the existing site will require wider land use issues to be considered for a solution to the congestion problems. A possible conceptual solution here would be to provide a new street level concourse at the Embankment end, linked to the LUL station. It is recommended that the land required for such a scheme be protected.
- Waterloo East – the longer term solution for this site will require addressing through the Waterloo Masterplan project, in connection with redevelopment of the main Waterloo station.
- Clapham Junction – further stages of congestion relief work may become necessary at this station, following the redevelopment scheme recommended for the early years of the RUS period.

10.7 Potential new stations

10.7.1
The RUS notes widespread support for a new station at Brixton High Level to improve access to this area and to provide an interchange between the proposed ELL extension and the LUL Victoria Line. This station scheme is not currently committed and has not been recommended by the RUS for early progression due to the likely high level of construction costs. It is, however, recommended that this conclusion be kept under review and that the land needed for this scheme be protected.

10.7.2
Beyond the above there are likely to be very limited opportunities for additional stations within the RUS area.

10.8 Freight

10.8.1
The long term planning of freight traffic requires assumptions to be made regarding the types of goods that will need to be imported, exported or moved around the UK. This feature is dependent on the performance of the UK economy and how it interacts with those of other countries. The modal share of rail is sensitive to policies such as fuel costs, congestion on the highway network and potentially road pricing. The issues described here assume growth beyond that planned for by the Freight RUS.

10.8.2
Any significant growth of freight traffic in the SL RUS area would probably include a large element of traffic running between north of the river Thames and the Channel Tunnel. As indicated in Chapter 3, the Channel Tunnel Act included protection of 35 freight paths per day for this purpose. These are incorporated into the existing timetable structure, so the RUS does not see any specific reason why this growth could not be handled. This traffic is particularly sensitive to the charging regime for use of the Channel Tunnel.

10.8.3
Section 3.12 included a description of the limited number of terminals in the RUS area capable of loading and unloading freight trains. High levels of increase in freight traffic would potentially require additional terminal sites to be developed.

10.8.4
Section 3.13 included a map of the existing loading gauge of the SL RUS network. It is likely that further gauge increments would be needed to enable certain types of goods to be carried by rail.

10.8.5
The maximum length of freight trains is a significant factor limiting growth. It is probable that longer freight trains will need to be accommodated in the future to enable rail to be competitive with road.

10.8.6
Closure of the railway network for engineering work is a particular concern for freight operators, since this can prevent freight trains from running at all. It is likely that improvements to network availability will be needed to enable more trains to be operated.

10.8.7
The following specific schemes have been identified which potentially provide additional longer term capacity and capability to that outlined earlier. As with passenger interventions these could also be implemented once anticipated demand growth materialises.

- Construction of new terminals, or upgrading of existing terminals, to serve demand in the SL RUS area.
- Gauge improvements, for example complete provision of W10 gauge via the “classic network” to the Isle of Grain branch. There are up to thirty bridges and several tunnels on this route, that may require reconstruction to enable gauge clearance. It is recommended that gauge constraints should be progressively eliminated when these structures are

renewed, which is consistent with the strategy for this area outlined in the Freight RUS.

- Upgrading the network to accommodate longer freight trains, to maximise the tonnage which can be accommodated on each path available.
- Additional passing loops to improve timetabling opportunities for the mixture of passenger and increasing freight traffic.
- Continuing the implementation of the "Seven Day Railway" initiative, as described in Section 9.15.

10.8.8

A more substantial freight improvement would be achievable via extensive utilisation of High Speed One for freight services. Whilst technically out of the geographic scope of this RUS it is noted that this route has the potential to enable higher and wider loads to be carried. It could also drastically improve freight journey times and alleviate congestion on other routes, including those which are covered by this RUS. There may be particular opportunities for freight services to/from the Grain branch, since gauge clearance on the existing network would only be required over 5 miles of railway (approximately 12 bridges may need to be reconstructed).

10.9 Summary

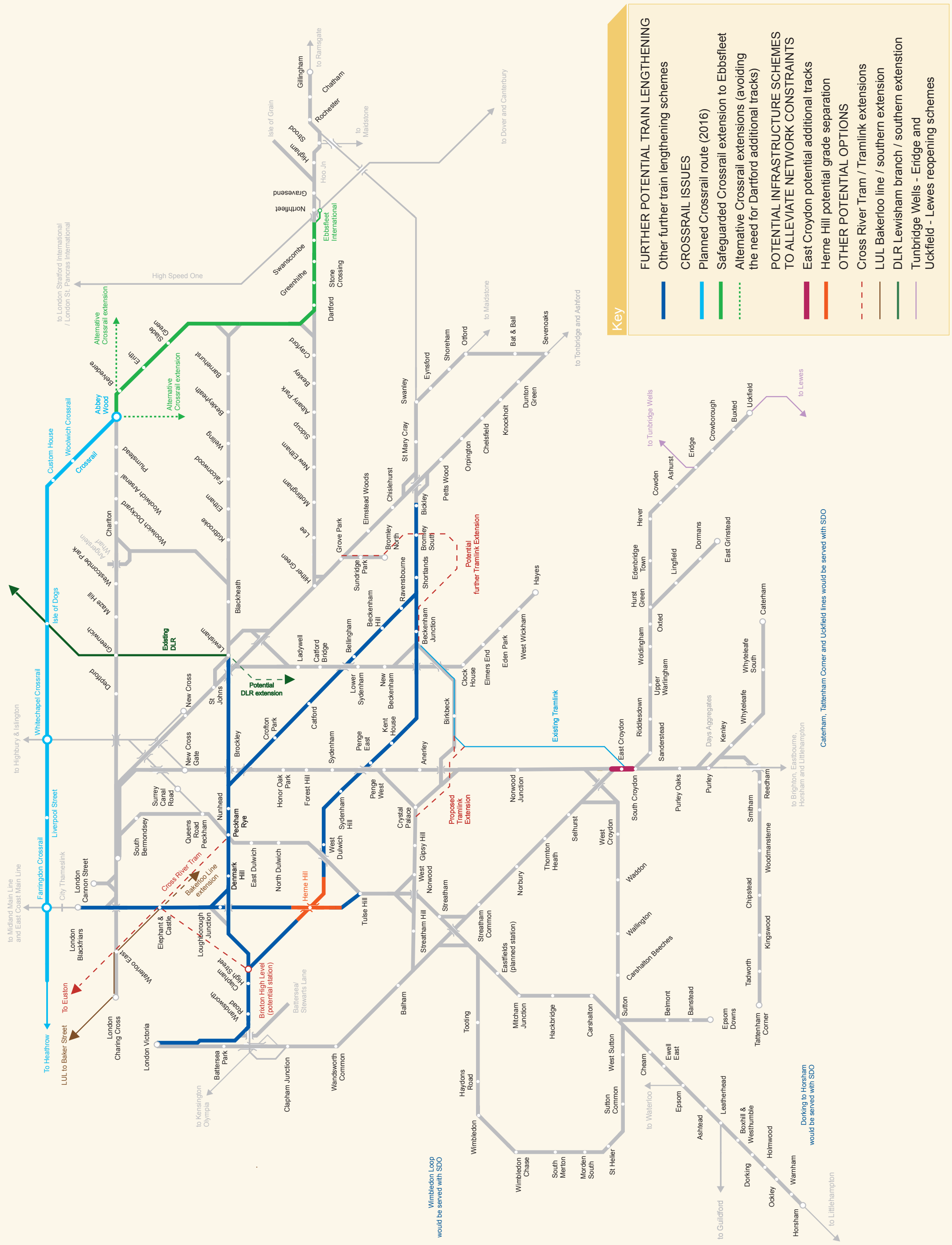
10.9.1

The strategy outlined in previous chapters provides sufficient capacity to cope with the growth that is envisaged to occur up to 2020. A limited amount of further growth might be accommodated beyond that point by further train lengthening, use of high capacity rolling stock, provision of a small number of additional services and freight capability improvements. However, the practical implications of such a strategy would require detailed investigation before the RUS could confirm how much additional capacity it is feasible to provide that would be consistent with the funding thought reasonably likely to be available.

10.9.2

Figure 10.4 highlights diagrammatically some of the main potential longer term opportunities described in 10.2 to 10.8 above.

Figure 10.4 – Longer term opportunities



11. Next steps

11.1 Introduction

11.1.1
This RUS will become established 60 days after publication unless the Office of Rail Regulation (ORR) issues a notice of objection within this period.

11.1.2
The recommendations of a RUS – and the evidence of relationships and dependencies revealed in the work to meet them – form an input to decisions made by industry funders and suppliers on, for example, franchise specifications or investment plans.

11.2 Network Rail Strategic Business Plan

11.2.1
Network Rail published its Strategic Business Plan (SBP) for Control Period 4 in October 2007 and, following ORR's review, will publish an update in April 2008. The schemes contained in the Strategic Business Plan are consistent with the recommendations of this RUS.

11.2.2
Within the geographic scope of this RUS, the SBP contains schemes to implement the recommendations for increasing capacity (primarily train lengthening) as presented in Chapter 7 of this RUS. Network Rail is currently working up detailed designs for these schemes – including plans for the platform lengthening and associated remodelling works, a power supply upgrade, station congestion relief works and depot modifications – based on the assumption that they will become funded following ORR's review of the SBP.

11.3 South Central refranchising

11.3.1
DfT will shortly be commencing the process for replacing the South Central franchise in 2009. DfT has been closely involved in the development of this RUS and will take the RUS recommendations into account when specifying the replacement franchise.

11.3.2
Many of the stakeholder comments received on the Draft RUS were related to off-peak services. These have not in general been addressed through this RUS and will, in the main, be dealt with through the franchise replacement process.

11.4 Southeastern's SLC2 amendments

11.4.1
The recommendations of this RUS involve running significantly more train services than was envisaged by the SRA during its 2005 Integrated Kent Franchise consultation process. This is now being taken forward by DfT and Southeastern.

11.5 Procurement of additional rolling stock

11.5.1
The recommendations of this RUS will require additional rolling stock. This is in the main consistent with the DfT's rolling stock plan, published in January 2008. Key priorities are:

- New rolling stock (currently under construction) for the extended East London Line services and domestic services on the High Speed Line.

- Additional dual voltage rolling stock to enable additional and longer trains to operate on the cross-London Thameslink route.
- Additional trains or vehicles to enable the train lengthening strategy outlined in this RUS (and other RUSs) to be implemented.
- Additional diesel rolling stock for the Uckfield line. As highlighted in Chapter 8 Uckfield trains may need to convey portions for East Grinstead during London Bridge reconstruction works.

11.5.2
A key recommendation of this RUS is that all new rolling stock will require Selective Door Opening (SDO) functionality, since as discussed in Chapter 7, a few platforms are not physically capable of being extended.

11.6 East London Line extension to Clapham Junction

11.6.1
As noted elsewhere the RUS supports the concept of extending ELL services to Clapham Junction, with completion desirable by 2012 at the latest to precede construction works at London Bridge, combined with the recommended local service between Victoria and Bellingham. Funding options for the ELL scheme are currently being considered by Transport for London.

11.6.2
The precise infrastructure requirements for ELL, including mitigation of any impact on freight services in the Battersea area as described in section 7.5.11, will be dependent on the results of ongoing timetable development work.

11.7 London Bridge construction works

11.7.1
The significant challenge of the London Bridge construction works cannot be overstated. This will be a key issue, affecting train services over a wide area for several years.

11.7.2
The analysis contained in Chapter 8 is at outline stage only. Detailed work is currently ongoing to identify the most appropriate methodology for the reconstruction of London Bridge station, minimising the inconvenience for passengers.

11.8 Thameslink Key Output 2 train services

11.8.1
The RUS assumptions regarding the 2015 train service pattern are highlighted in Chapter 9. Plans for the detailed infrastructure design, together with rolling stock procurement workstreams now commencing, will be consistent with this indicative train service structure.

11.8.2
Notwithstanding 11.8.1 it is recommended that the infrastructure design in the London Bridge area should provide sufficient flexibility that it could accommodate alternative train service scenarios to that presented here.

11.8.3
Further consultation regarding the 2015 train service for Thameslink and non-Thameslink routes will be led by the Department for Transport. The process for awarding a new Thameslink route franchise will commence in around 2013.

11.9 Safeguarding of land for longer term opportunities

11.9.1

This RUS has recommended that land is protected for the following longer term heavy rail schemes, even though at this stage they have not been recommended for implementation. This list is not exhaustive, since there will be many other schemes of a more tactical nature which could also have land requirements.

- East Croydon area additional tracks
- Dartford additional tracks (to allow extension of Crossrail services)
- Herne Hill flyover
- Charing Cross passenger congestion relief (potentially to involve a street level concourse at the Embankment end of the station)
- new passing loops on the West London Line, to allow full length freight trains to be held whilst awaiting onward paths, as referenced in the Cross London RUS.

11.9.2

Network Rail will discuss the implications of protecting this land with the relevant planning authorities for each site.

11.10 Ongoing access to the network

11.10.1

Delivery of the restructured timetable in 2009/10 will depend upon renegotiation of some existing track access contracts.

11.10.2

This RUS will also help to inform the allocation of capacity on the network through application of the normal network code processes.

11.11 Review

11.11.1

Network Rail is obliged to maintain a RUS once it is established. This requires a review using the same principles and methods used to develop the RUS:

- when circumstances have changed
- when so directed by ORR
- when (for whatever reason) the conclusions may no longer be valid.

Appendices

Appendix A – Summary status of options presented in SL RUS Draft for Consultation

Draft RUS Option	Details	Final status
Peak train frequency options		
1.1	Hayes Line	DfT and Southeastern have reached agreement regarding revisions to the SLC2 timetable specification. This broadly maintains the existing frequency of peak train service on these routes. Detailed analysis has shown that increases above today's level would not be operationally practical.
1.2	Sidcup Line	
1.3	Bexleyheath Line	
1.4	Greenwich Line	
1.5	Chislehurst Line (stopping services)	
1.6	Penge East Line (stopping services)	Detailed analysis has shown that increases above today's level would not be operationally practical in the short term. See option 17.2 regarding capacity at Herne Hill junction from 2015 onwards.
1.7	Catford Loop Line	From March 2009 services on this route will be extended to run north of Blackfriars, providing new journey opportunities. The Victoria Eastern to Bellingham service, which is recommended for introduction by December 2011, would then provide further new journey opportunities and an increase in peak service frequency on this route.
1.8	Bromley South (level of fast services)	DfT and Southeastern have reached agreement regarding revisions to the SLC2 timetable specification. This broadly maintains the existing frequency of peak train service on this route. Detailed analysis has shown that increases above today's level would not be operationally practical in the short term. See option 17.2 regarding capacity at Herne Hill junction from 2015 onwards.
2.1	Norbury Line to London	Further timetable development work has identified a way of maintaining the existing frequencies of peak train service on these routes to Victoria, together with increasing the peak service to London Bridge (via Tulse Hill) from each route to 2tph from 2010
2.2	Gipsy Hill Line to London	
2.3	Sydenham Line	Further timetable development work has confirmed the 2010 peak service as 6tph to London Bridge and 10tph to the ELL. From 2015 it is envisaged that 4tph on this route would become Thameslink services.

Draft RUS Option	Details	Final status
2.4	Tulse Hill Line	Further timetable development work has confirmed the 2010 peak service as 6tph to London Bridge and 4tph (all commencing from the Wimbledon Loop) to Thameslink. From 2015 the Thameslink services are recommended to terminate at Blackfriars. This is because introducing new crossing moves outside Blackfriars would not be consistent with robust operation of a 24tph core service. Our modelling has assumed an 8tph to London Bridge service would be introduced at this time.
2.5	Caterham and Tattenham Corner Lines	Further timetable development work has confirmed the 2010 peak service as 2tph fast to each of London Bridge and Victoria, with services joining at Purley.
2.6	Hackbridge Line	Further timetable development work has confirmed the 2010 peak service as 4tph to Victoria, 2tph to London Bridge and 2tph to Thameslink. Some trains would not call at all stations. By 2015 the Thameslink services are recommended to terminate at Blackfriars. This is because introducing new crossing moves outside Blackfriars would not be consistent with robust operation of a 24tph core service.
2.7	Balham (and south thereof) to the West London Line	Further timetable development work has confirmed the 2010 peak service as 2tph all stations South Croydon to Shepherds Bush via Norbury. These services will need to reverse in the mothballed North Pole depot access roads, requiring the existing connections to the WLL to be retained. This service option provides capacity where most needed on the WLL, together with avoiding the need for dual voltage rolling stock.
2.8	Purley to London (calls at Purley in fast services)	Further timetable development work has confirmed the 2010 peak service as 2tph fast to Victoria and 6tph fast to London Bridge. From 2011 services would also run to Thameslink. Upon completion of the Thameslink Programme it is envisaged that there would be 4tph to London Bridge, 4tph to Thameslink and 2tph to Victoria.

Draft RUS Option	Details	Final status
Peak train lengthening options		
3.1a	Sidcup Line 12-car operation	Recommended for introduction in 2011.
3.1b	Bexleyheath Line 12-car operation	
3.2	Hayes Line 12-car operation	
3.3	Chislehurst Line (stopping services) 12-car operation	
3.4	12-car capability at Gravesend	Not deliverable as part of main train lengthening scheme but recommended for introduction as a second stage in 2012
3.5	12-car capability at Rochester	
3.6	Greenwich & Woolwich Line 12-car operation	Recommended for introduction in 2011
4.1	Norbury Line 10/12-car operation	10-car recommended for Victoria services for introduction in 2011. Passive provision recommended for 12-car wherever possible, as 12-car recommended after 2015.
4.2	Gipsy Hill Line 10/12-car operation	
4.3	Sydenham Line 10/12-car operation	From 2015 onwards the indicative Thameslink train service described in Chapter 9 requires 12-car capability on this route. However 12-car capability is recommended in advance of this, to maintain capacity at time of a potentially reduced train service during London Bridge construction works.
4.4	Tulse Hill Line 10/12-car operation	10-car recommended after 2015.
4.5	Hackbridge Line 10/12-car operation	10-car recommended for Victoria services for introduction in 2011. Passive provision recommended for 12-car wherever possible, as 12-car recommended after 2015.
4.6	East Grinstead Line 12-car operation	12-car recommended for East Grinstead to Victoria services for introduction in 2011. It is highlighted that East Grinstead/Uckfield to London Bridge services may need to split/join at Oxted during Thameslink construction works.
4.7	East London Line 5-car, 6-car or 8-car operation	Not recommended prior to 2020.
Generic capacity options		
5	Reconfigure rolling stock interior layouts to provide more capacity	Recommended for consideration when rolling stock is procured or refurbished
6	Use of fares policy to spread demand	TfL's Oyster pre-pay system is expected to be progressively expanded to cover services covered by this RUS. It is recommended that continued development of appropriate smart technologies should be undertaken.

Draft RUS Option	Details	Final status
7	Short-term acquisition of additional rolling stock	Procurement of dual voltage stock for Thameslink routes, additional Class 171 stock to strengthen some peak and shoulder peak services on the Uckfield line and additional rolling stock to facilitate train lengthening is recommended at the earliest opportunity. It is pointed out that all trains for use in the RUS area are likely to require SDO functionality, since a small number of station platforms are not physically capable of being lengthened, even at high cost.
Enabling options – optimising use of capacity at London terminals		
8.1	Diversion of London Bridge – Victoria (via SLL) service to Victoria Eastern	Introduction of a 2tph Victoria Eastern to Bellingham all stations service is recommended by the December 2011 timetable at latest
10.1	Diversion of Victoria – London Bridge (via SLL) away from London Bridge to Catford Loop	
8.2	Diversion of London Bridge – Victoria (via SLL) service to Clapham Junction	Introduction of a 4tph Clapham Junction to ELL service is envisaged from the December 2011 timetable
10.3	Diversion of Victoria – London Bridge (via SLL) service away from London Bridge to ELL (phase 2 extension)	
8.3	Termination of London Bridge – Victoria (via SLL) service at Battersea Park	Not recommended
9a	Utilise Platform 8 at Victoria for Southern suburban services	Being considered as part of Victoria area resignalling scheme
9b	Utilise Platform 13 at Victoria for Southern suburban services	Not recommended
10.2	Diversion of Victoria – London Bridge (via SLL) service away from London Bridge to Lewisham and beyond	Not recommended
11.1	Platform lengthening at Wandsworth Road and Clapham High Street	Recommended for completion by December 2012.
11.2	New 8-car platform face at Wandsworth Road on Chatham Reversible	Being considered as part of Victoria area resignalling scheme
Enabling options – optimising use of capacity in the Croydon area		
12.1	Operate East London Line services to Crystal Palace only	Not recommended
12.2	Operate East London Line services to a destination beyond Croydon	Not recommended
12.3	Calls in fast line services at New Cross Gate	Not recommended
13.1	West London Line services to terminate at Clapham Junction	Not recommended
13.2	West London Line services to terminate between Clapham Junction and Croydon	Not recommended
13.3	West London Line services to terminate at East Croydon or South Croydon	See 2.7
13.4	West London Line services to terminate at Sanderstead, Purley or Smitham	Not recommended

Draft RUS Option	Details	Final status
13.5	West London Line services to terminate at West Croydon or Sutton	Not recommended
13.6	West London Line services to terminate at Redhill or Reigate	Not recommended
13.7	West London Line services to terminate at Gatwick Airport	Not recommended
14.1	Revise Oxted line services to a standard pattern through East Croydon	Recommended from December 2009
14.2	Revise FCC services to a standard pattern through East Croydon	Recommended from December 2009. Provision recommended for 4tph in peak periods from 2011 when additional dual voltage rolling stock is due to become available.
14.3	Revise Gatwick and Sussex Coast services to a standard pattern through East Croydon	Recommended from December 2009
15.1	Provide a new turnback facility at Norwood Junction (for services from the Crystal Palace route)	Scheme would be required in the event of Croydon Tramlink extensions taking over the Beckenham Junction branch, to provide an alternative destination for the displaced services. Scheme would also provide wider benefits, potentially reducing the number of trains needing to terminate in the Croydon area.
15.2	Provide an improved turnback facility at Selhurst	Not recommended
15.3	Provide a new turnback facility at Crystal Palace	Not recommended
15.4	Upgrade running line from Selhurst to Norwood Junction via Selhurst Depot	Being considered as part of 2010 timetable development
15.5	Provide grade separated running line from Norwood Junction to Selhurst station and/or Selhurst depot	Not recommended
16.1	Provide additional tracks between Windmill Bridge Junction and East Croydon and/or additional platforms at East Croydon	Not recommended prior to 2020. Protection recommended regarding the land needed for this scheme.
16.2	Provide additional infrastructure at West Croydon	Infrastructure options (post ELL works) remain under development, focussing on providing 12-car capability and additional terminating capacity. Renewal of S&C at the London end of the station is needed within a similar timescale to the platform lengthening works, creating an opportunity for a wider remodelling scheme. It is highlighted that the Sydenham line Thameslink stopping service from 2015 onwards (as described in Chapter 9) would appear to be a strong driver for additional capacity at West Croydon (assuming that this has not been found to be necessary beforehand), given the limited turnback capacity in the Croydon area.
16.3	Changes to signalling in the East Croydon area	To be considered as part of 2015 timetable development

Draft RUS Option	Details	Final status
Enabling options – optimising use of capacity in the Herne Hill area		
17.1	Prioritise spare capacity at Herne Hill for use by Thameslink route services	From December 2011 a 10tph peak Thameslink service is recommended (4 via East Croydon, 4 from the Wimbledon Loop, 2 Kent House). This is to maximise use of the Thameslink Elephant & Castle route during the reconstruction of London Bridge
17.2	Prioritise spare capacity at Herne Hill for use by services to Victoria	For December 2015 further analysis is required regarding the most appropriate use of capacity which will become released at Herne Hill junction. The options available will be to increase the frequency of one of the following: (1) the Tulse Hill to Blackfriars service (2) fast services to Victoria/Blackfriars via Bromley South (3) stopping services to Victoria/Blackfriars via Bromley South
17.3	Increase capacity at Herne Hill by grade separation	Not recommended prior to 2020. Protection recommended regarding the land requirements for this scheme.
18	Alternative Thameslink & Wimbledon Loop service pattern	The option described in the Draft for Consultation is not recommended
Enabling options – optimising use of capacity in the Lewisham area		
19.1	Divert proposed Charing Cross-Plumstead services to run via Greenwich	A Greenwich line to Charing Cross service will be retained in the December 2009 timetable. However in the longer term all services from the Greenwich line will need to operate into Cannon Street, since the location of the Thameslink tracks between the Charing Cross and Cannon Street routes would make operation from the Greenwich line into Charing Cross impractical.
19.2	Divert proposed Victoria-Dartford services to run to/via Sidcup	This option has not been proven to be necessary in the short term, but may be required later.
Thameslink Programme sensitivity tests		
20.1	Implementation of full Thameslink Programme (Key Output 2)	Planned from 2015
20.2	Implementation of Thameslink Programme stages (Key Outputs 0 and 1)	Planned from 2008 and 2011 respectively
20.3	Provision of new platform face on Up Passenger Loop at London Bridge	No longer relevant given that the Thameslink Programme is now committed
20.4	Operation of trains from Sydenham line through to Charing Cross	Not recommended for peak services. Further investigation recommended regarding off peak services.
20.5	Refinements to final Thameslink train service specification (at Key Output 2)	Refer to Chapter 9 for details of the current working assumptions.

Draft RUS Option	Details	Final status
Freight specific options		
21.1	Provide freight loops on the Grain branch	Recommended by 2011
21.2	Provide freight loops on the West London Line	Potentially required to allow increase of services on Catford Loop and SLL. This will be determined through timetable development work. In the event that this scheme does not proceed in the short term, protection is recommended regarding the land requirements for the longer term.
21.3	Remove approach control at Crofton Road Junction	Planned by December 2008
21.4	Provide a west-to-north connection onto the Angerstein Wharf branch	Not recommended prior to 2020 unless there is very high freight growth in this area
21.5	Construct a new freight terminal at Howbury Park (near Slade Green)	Scheme now has planning approval and is expected to be implemented.
21.6	Provide W10 gauge to Grain	Not recommended as a stand alone scheme. Recommended incrementally as structure renewals become due.
21.7	Provide W12 gauge to the Channel Tunnel	Not recommended as a stand alone scheme. Recommended incrementally as structure renewals become due.
21.8	Enable electric freight locomotives to use the Channel Tunnel diversionary route via Redhill	Recommended incrementally as locomotive, power supply and signalling renewals become due.
Congestion relief at stations		
22.1	Congestion relief at London Bridge	Planned by 2015
22.2	Congestion relief at Victoria	Recommended, but with the requirement that disruptive work must not occur at the same time as construction works at London Bridge
22.3	Congestion relief at Clapham Junction	Recommended as part of the platform lengthening strategy and in connection with development of the adjacent land. Platforms 14-17 are also recommended to be straightened at this time.
22.4	Congestion relief at East Croydon	Recommended in connection with development of the adjacent land
22.5	Congestion relief at Bromley South	Recommended
22.6	Congestion relief at Lewisham	Recommended
22.7	Congestion relief measures at Blackfriars	Planned by 2011
22.8	Congestion relief at Waterloo East	Recommended in the short term, by means of an entrance to Waterloo East station at the Southwark LUL end. In the longer term it is recommended that Waterloo East is considered as part of the Waterloo Masterplan.

Draft RUS Option	Details	Final status
22.9	Congestion relief at Charing Cross	Likely to be required after 2014. Protection recommended regarding the land requirements for this scheme.
22.10	Congestion relief at Balham	Recommended as part of the platform lengthening strategy by 2011.
New stations		
23.1	New station at Eastfields	Under construction, will open during 2008.
23.2	New station at Camberwell Green	Not recommended prior to 2015
23.3	New station at Brixton High Level	Not recommended prior to 2015
23.4	New station at Brockley High Level	Not recommended

Appendix B: Business case for peak train lengthening

This appendix summarises the business case for the train lengthening strategy recommended by the RUS. There are separate business cases for the CP4 train lengthening strategy, as recommended in Chapter 7; and for train lengthening in CP5, as recommended in Chapter 9.

B1. CP4 train lengthening strategy

B1.1 Introduction

The Draft for Consultation contained separate business cases for train lengthening on each of a number of key corridors into London – broadly speaking, 10-car operation on Sussex routes into Victoria and on the Sydenham corridor into London Bridge, and 12-car operation on all Kent routes into London Bridge. These interventions form the core of the CP4 train lengthening strategy recommended in Chapter 7.

Since these business cases were produced, Thameslink and Crossrail (the latter subject to planning approval) have become committed schemes. This has several effects on the business case for the train lengthening strategy.

First, the base case, against which the train lengthening strategy is assessed, now includes Thameslink and Crossrail. In other words, the business case assesses the incremental benefits and costs of train lengthening, over and above the extra capacity provided by Thameslink and Crossrail.

Second, as noted in Chapter 8, capacity at London Bridge will be reduced (in terms of trains per hour) during the Thameslink construction period. Implementing train lengthening before 2012 will therefore deliver benefits by providing additional peak capacity during the construction period. The RUS has not sought to quantify these benefits although they will clearly be substantial – indeed, it is unlikely that sufficient peak capacity can be provided during the construction period without the train lengthening being in place.

Third, for purposes of the business case, the incremental costs of the train lengthening strategy need to be identified separately from the costs of Thameslink (and indeed of any other changes). In the case of platform lengthening, this is relatively straightforward. However, it is less straightforward to identify the incremental costs of the power supply and depot/stabling requirements:

- Future power supply requirements are being developed as a single integrated project, taking into account not only the requirements of train lengthening (both in the RUS area and elsewhere) but also requirements such as those of Thameslink and of planned changes in types of rolling stock.
- Depot and stabling requirements for the RUS area are also a function not only of the train lengthening strategy, but also of Thameslink and of other planned changes, and are at an early stage of development.

The quantified business cases for the RUS train lengthening strategy, summarised below, include the costs of platform lengthening and of power supply requirements. They do not include depot or stabling costs. However, the business cases are sufficiently strong that they are expected to be positive even when depot and stabling costs are taken into account.

A further change since the Draft for Consultation is that two business cases have been developed for the train lengthening strategy, one for Sussex routes and one for Kent routes. This gives a more realistic evaluation of the strategy, in that train lengthening is not in practice an independent intervention on each corridor; it is a single, integrated intervention, with significant shared costs and operational inter-working between corridors.

B1.2 Key appraisal assumptions

Appraisal of the train lengthening strategy has been carried out based on DfT appraisal guidance (WebTAG). The key assumptions used in the appraisal are as follows:

- An appraisal period of 60 years.
- Passenger benefits (including reduction in crowding) and incremental industry revenue estimated using the PLANET model.
- Benefits have been modelled as though the schemes were to be implemented in 2019, after completion of Thameslink.
- Demand at 2019 levels based on forecasts set out in the RUS consultation document.
- Non-user benefits (principally reductions in road congestion) estimated using the methodology set out in WebTAG unit 3.13.2.
- Rolling stock leasing and operating cost assumptions agreed with DfT.
- Capital costs of platform lengthening and power supply requirements based on latest available estimates from the project development process. Optimism Bias has been applied at the level appropriate to the GRIP stage concerned (66% for GRIP 1 estimates, 50% for GRIP 2).

B1.3 Appraisal results - Sussex routes

The appraisal results for CP4 train lengthening on Sussex routes, as set out in Chapter 7, are as follows:

CP4 train lengthening - Sussex routes	
Costs (Present Value)	
Investment Cost	97
Operating Cost	159
Revenue	- 56
Other Government Impacts	4
Total costs	**204**
Benefits (Present Value)	
Rail users benefits	425
Non users benefits	114
Total Quantified Benefits	**539**
NPV	**335**
Quantified BCR	**2.64**
Note: All figures are presented in £m, 2002 market prices Totals may not match due to rounding	

Even if the incremental depot and stabling costs of the train lengthening strategy amounted to £71m (in current prices and before addition of Optimism Bias at 66 percent), the strategy would still have a Benefit/Cost Ratio (BCR) of 2.0.

The results are also conservative in that:

- No growth in demand has been assumed after 2019, although the RUS demand forecasts anticipate modest growth between 2019 and 2026.
- They do not include the additional benefits that the train lengthening would deliver during the Thameslink construction period, when capacity at London Bridge is reduced.
- Although there is likely to be some adverse effect on performance of running longer trains, it is expected that this would be no worse than, and probably better than, the effect of running trains at higher and higher levels of crowding (which is what would happen in the base case). This has not been taken into account.
- The appraisal has included the total estimated power supply costs for the Sussex route. In practice a substantial proportion – possibly more than half – of this cost relates to requirements other than train lengthening in the RUS area.

Even allowing for potential depot and stabling costs, it therefore appears that the strategy has a robust business case.

B1.4 Appraisal results - Kent routes

The appraisal results for CP4 train lengthening on Kent routes, as set out in Chapter 7, are as follows:

CP4 train lengthening - Kent routes	
Costs (Present Value)	
Investment Cost	53
Operating Cost	277
Revenue	- 65
Other Government Impacts	6
Total costs	**271**
Benefits (Present Value)	
Rail users benefits	665
Non users benefits	133
Total Quantified Benefits	**799**
NPV	**527**
Quantified BCR	**2.94**
Note: All figures are presented in £m, 2002 market prices Totals may not match due to rounding	

Even if the incremental depot and stabling costs of the train lengthening strategy amounted to £140m (in current prices and before addition of Optimism Bias at 66 percent), the strategy would still have a Benefit/Cost Ratio (BCR) of 2.0.

The results are also conservative, partly for the same reasons as stated above for the Sussex results, and partly because the costs assumed for platform extensions between Dartford and Rochester are based on the costs of stand-alone schemes, whereas in practice there are potential synergies with other schemes such as East Kent re-signalling.

Even allowing for potential depot and stabling costs, it therefore appears that the strategy has a robust business case.

B2. Train lengthening in CP5

B2.1 Introduction

The CP4 train lengthening strategy set out in Chapter 7, together with Thameslink and Crossrail, provides a significant increase in peak capacity in the RUS area. Nevertheless, if growth in demand continues, there will still be significant levels of standing during the peak even after all these schemes are in place. The RUS has therefore considered the extent to which further train lengthening might be practicable and/or justified within the timescales of the RUS. In practice the main options for further train lengthening are likely to be:

- lengthening of services via Tulse Hill into London Bridge from 8-car operation (as now) to 10-car operation
- lengthening of Sussex services into Victoria from 10-car operation (as per the CP4 strategy) to 12-car operation.

The RUS has developed outline business cases for these two options, taking as a base case the network following implementation of CP4 train lengthening, Thameslink and Crossrail. However, it should be emphasised that:

- The costs of these options are more uncertain than the costs of the CP4 strategy. The costs of platform lengthening have been estimated alongside the costs of platform lengthening for the CP4 strategy. However, power supply and depot/stabling costs have yet to be developed. For purposes of these outline business cases only, power supply costs have therefore been estimated based on the power supply costs per additional vehicle from the CP4 strategy.
- The earliest practical opportunity to begin implementation of these options is likely to be once Thameslink construction is complete in 2015. It is therefore unlikely that decisions whether to proceed with these options need to be taken for several years, by which time it will have been possible to develop more detailed costs (and by which time it may be clearer whether current levels of growth are set to continue, which may also affect the business case significantly).

Key appraisal assumptions for these outline business cases are otherwise as described in section B1.2, above.

B2.2 Appraisal results: 10-car operation via Tulse Hill into London Bridge

The appraisal results for 10-car operation via Tulse Hill into London Bridge, over and above the CP4 train lengthening strategy, are as follows:

CP5 train lengthening - via Tulse Hill

Costs (Present Value)	
Investment Cost	30
Operating Cost	51
Revenue	- 35
Other Government Impacts	4
Total costs	**51**
Benefits (Present Value)	
Rail users benefits	99
Non users benefits	72
Total Quantified Benefits	**171**
NPV	**120**
Quantified BCR	**3.36**

Note: All figures are presented in £m, 2002 market prices
Totals may not match due to rounding

This appraisal does not include the incremental depot and stabling costs of 10-car operation on the Tulse Hill route. Neither does it include any incremental cost to the Thameslink programme of providing sufficient 10-car capacity at London Bridge. However, if these costs amounted to £37m (in current prices and before addition of Optimism Bias at 66 percent), the option would still have a Benefit/Cost Ratio (BCR) of 2.0.

The results are also conservative for many of the same reasons as described above for the CP4 strategy: for example, they ignore growth beyond 2019 and they ignore performance benefits.

On the basis of this analysis, there appears to be a case for implementing this option towards the end of the RUS period. The RUS recommends that the option should continue to be developed in the meantime.

B2.3 Appraisal results: 12-car operation from Sussex routes into Victoria

The appraisal results for 12-car operation from Sussex routes into Victoria, over and above the CP4 train lengthening strategy, are as follows:

Even if the incremental depot and stabling costs of the train lengthening strategy amounted to £60m (in current prices, and before addition of Optimism Bias at 66 percent), the strategy would still have a Benefit/Cost Ratio (BCR) of 2.0.

The results are also conservative for many of the same reasons as described above for the CP4 strategy: for example, they ignore growth beyond 2019 and they ignore performance benefits.

On the basis of this analysis, there appears to be a case for implementing this option towards the end of the RUS period. The RUS recommends that the option should continue to be developed in the meantime.

CP5 train lengthening - 12 car into Victoria	
Costs (Present Value)	
Investment Cost	48
Operating Cost	125
Revenue	- 50
Other Government Impacts	4
Total costs	**127**
Benefits (Present Value)	
Rail users benefits	261
Non users benefits	103
Total Quantified Benefits	**364**
NPV	**237**
Quantified BCR	**2.86**
Note: All figures are presented in £m, 2002 market prices Totals may not match due to rounding	

Glossary

TERM	MEANING
AC	Alternating Current, as used in the overhead electrification system predominantly north of the river Thames.
ATOC	Association of Train Operating Companies
BCR	Benefit-Cost Ratio
Capacity (of rolling stock)	Capacity is deemed to be the number of standard class seats on the train for journeys of more than 20 minutes; for journeys of 20 minutes or less, an allowance for standing room is also made. The allowance for standing varies with the type of rolling stock but, for modern sliding door stock, is typically approximately 35 per cent of the number of seats. However, this percentage can be higher for trains with fewer seats and therefore with more standing room.
Capacity (of infrastructure)	The capacity of a given piece of railway infrastructure is an assessment of the maximum number or mix of trains which could operate over it. This is quantified more formally through a Capacity Utilisation Index (CUI).
Capacity (of stations)	The pedestrian capacity of a station is an assessment of the maximum number of passengers it can safely handle, given the station layout at the site concerned.
Constraint	A term used in this document to describe the specific geographic locations where services operate at or close to the maximum practical level
Control Period 4	The 2009 – 2014 period
Control Period 5	The 2014 – 2019 period
DC	Direct Current, as used in the third rail electrification system, being the predominant form of traction power in the South London RUS network.
DfT	Department for Transport
DLR	Docklands Light Railway
DOO	Driver-Only Operation, ie. trains which operate without the need for a guard.
Down line	The line normally used by trains travelling away from London
Dual voltage rolling stock	Rolling stock which is able to operate over both the DC and AC electrified networks. Such rolling stock, which currently only exists in limited quantities, is required for routes such as Thameslink and the West London Line.
Dwell time	The time a train is stationary at a station
Efficient Engineering Access	A generic term for an initiative aimed at establishing a more efficient access regime for the delivery of the required maintenance and renewal of the railway infrastructure, balancing engineering requirements with passenger and freight demand
ELL	East London Line
ELL extension phase 1	The extension of East London Line services onto the existing national rail network to West Croydon and Crystal Palace (via Sydenham), as currently under construction
ELL extension phase 2	The potential extension of East London Line services onto the existing national rail network to Clapham Junction (via Denmark Hill), a scheme not funded at time of publication.
ELL feasibility timetable	A timetable developed in 2005 to support TfL's decision to commit funding to the ELL phase 1 extension. Prior to this point it had not been demonstrated that ELL services to Crystal Palace and West Croydon were viable.
ERTMS	A conceptual future railway signalling system, with equipment located in the driver's cab, rather than at the lineside.
EWS	English Welsh and Scottish Railway
FCC	First Capital Connect, the current operator of the Thameslink route

FL	Fast line
FOC	Freight Operating Company
Gap	Gaps were identified in the Draft for Consultation RUS. These focused on areas where the current or future railway does not or would not meet requirements expected by stakeholders, unless action was taken.
GBRf	GB Railfreight
Headway	The minimum interval possible between trains on a particular section of track
High Speed One	The recently constructed line from St Pancras International to the Channel Tunnel (formerly known as the Channel Tunnel Rail Link)
HLOS	The DfT's High Level Output Specification, which has specified to Network Rail the growth that needs to be accommodated in Control Period 4.
IKF	Integrated Kent Franchise, as currently operated by Southeastern
JPIP	Joint Performance Improvement Plan
Junction margin	The minimum interval possible between trains operating over the same junction in conflicting directions
Key Output 0	An intermediate stage in the Thameslink Programme, this term describes the planned changes in December 2008 where more through services will use the Thameslink route. Termination of services at Blackfriars and Moorgate (via Farringdon) will be discontinued.
Key Output 1	An intermediate stage in the Thameslink Programme, this term describes the planned changes in December 2011 where 16tph capability will be provided over the Thameslink route, included a significant numbers of 12-car services.
Key Output 2	The final stage in the Thameslink Programme, this term describes the completion of the remodelling works at London Bridge, providing 24tph capability over the Thameslink route.
LATS	London Area Travel Survey
Loading gauge	Maximum dimensions to which a vehicle can be built or loaded without being at risk of striking a lineside structure
London Bridge (High Level)	The existing High Level station at London Bridge refers to the through platforms 1-6
London Bridge (Low Level)	The existing Low Level station at London Bridge refers to the terminal platforms 8-16
London Bridge remodelling	The extensive construction works required to allow implementation of Thameslink Key Output 2.
London Overground	The branding being used by Transport for London to describe their train operations over certain routes, including the planned ELL services.
LUL	London Underground Limited
Morning high peak hour	This RUS has taken the morning high peak to comprise all services which arrive at a London terminal within the 08:00 to 08:59 period.
NPV	Net Present Value
ORR	Office of Rail Regulation
Option	The options considered were identified in the Draft for Consultation RUS. These were uncommitted interventions aimed at addressing the highlighted gaps.
Pathing time	Time added into the timetable, in addition to the normal running time between two points, to take account of the interaction with other trains. A particular example would be to allow for occasions when the train needs to be held at a red signal, whilst awaiting other traffic to clear.

PIXC	Passengers In Excess of Capacity only applies to weekday commuter trains arriving in London between 07:00 and 09:59 and those departing between 16:00 and 18:59. The PIXC measure for a Train Operating Company (TOC) as a whole is derived from the number of passengers travelling in excess of capacity on all services divided by the total number of people travelling, expressed as a percentage. PIXC counts are carried out in Autumn each year, either by means of a manual count on a typical weekday, or (increasingly commonly) by the calculation of average loads derived from automatic passenger counting equipment fitted on trains. The DfT has set limits on the level of acceptable PIXC at 4.5 per cent on one peak (morning or afternoon) and three per cent across both peaks. The DfT monitors the level of PIXC across peaks (both individually and combined)
PLANET	A demand forecasting model developed by the former SRA, and now managed by DfT
Possession	Where part of the infrastructure is closed to trains services in order to carry out maintenance, renewal or enhancement works
PPP	Public Private Partnership
PPM	Public Performance Measure, expressed as a percentage of trains running on time compared to those scheduled to run
RA	Route Availability – a system to determine which types of locomotive and rolling-stock may travel over a route, normally governed by the strength of underline bridges in relation to axle-loads and speed
RCP	Rail Corridor Plan, as carried out by Transport for London to input into this RUS.
ROTP	Rules of the Plan. These are detailed timetable planning rules, covering such issues as dwell-times, planning headways, junction margins, running times between key nodes for different types of rolling stock, etc
RPA	Regional Planning Assessment
Rules of the Plan	Set of parameters and assumptions used when constructing timetables. They include running times between stations, platform re-occupation times, times taken to clear junctions, signalling headways etc
RUS	Route Utilisation Strategy
SL	Slow line
South Central franchise	The franchise currently operated by Southern Railway, planned for replacement during 2009
SOFA	The Statement of Funds Available, as determined by Government in connection with the HLOS
SBP	Network Rail's Strategic Business Plan, produced in response to the HLOS.
SDO	Selective Door Opening – a means of ensuring that only selected doors open when a train is stopped at a station, leaving closed any doors which overhang short platforms. Not all rolling stock is fitted with this facility; those types of rolling stock which are so fitted vary in the permutations of doors which can be kept closed in this way
Seated load factor	The number of passengers on a train service expressed as a percentage of total seats available
SEERA	South East England Regional Assembly
SLL service	The current South London Line service, serving all stations over the Victoria – Battersea Park – Peckham Rye – London Bridge route
Southeastern SLC2	The original plans for the December 2009 timetable change on the IKF franchise, based on the SRA's 2005 consultation.
SL RUS	South London Route Utilisation Strategy
SMG	The RUS Stakeholder Management Group
SRA	(The former) Strategic Rail Authority

TfL	Transport for London
TOC	Train Operating Company
tpa	tonnes per annum
tph	trains per hour
Train path	A slot in a timetable for running an individual train
TRUST	A computer system which records actual train running times at strategic locations
TWA	Transport and Works Act
Up line	The line normally used by trains travelling towards London
WLL	West London Line

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