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Route 5 West Anglia



Section 1: Today's railway

Route context

The West Anglia route carries main line services to the London terminals of Liverpool Street and Kings Cross, supports a busy suburban network in North London, Essex and Hertfordshire, rural services in Cambridgeshire, Norfolk and Suffolk, and inter-regional services from East Anglia to the Midlands and North of England. The main line south of Cambridge largely parallels the M11 and rail services penetrate right to the heart of London. The route serves one of the fastest growing regions in the country with densely populated areas at its southern end and two significant traffic generators at Cambridge and Stansted Airport. The main markets are commuter travel to London, in particular to the city and the Docklands, and leisure travel,

especially to Stansted Airport. The route provides an important corridor for freight services to and from the East Coast Main Line (ECML) and to North East, especially from the Port of Felixstowe.

The route is included in the Greater Anglia Route Utilisation Strategy (GA RUS), which was published by Network Rail in December 2007 and established by the Office of Rail Regulation on 18 February 2008. The GA RUS covers the period to 2021, but also includes a longer term view of the strategy for meeting continued growth.

The Eastern Regional Planning Assessment (RPA), covering the period from 2011 to 2021, was published by the Department for Transport (DfT) on 16 February 2006. The RPA sets out

Rail Regulation on 18 February 2008. The GA RUS covers the period to 2021, but also includes a longer term view of the strategy for meeting continued growth.

The Eastern Regional Planning Assessment (RPA), covering the period from 2011 to 2021, was published by the Department for Transport (DfT) on 16 February 2006. The RPA sets out scenarios of continuing growth in commuting to the centre of London and Docklands. However parts of the current NLL and Thameside route are already operating at or close to capacity in terms of train paths.

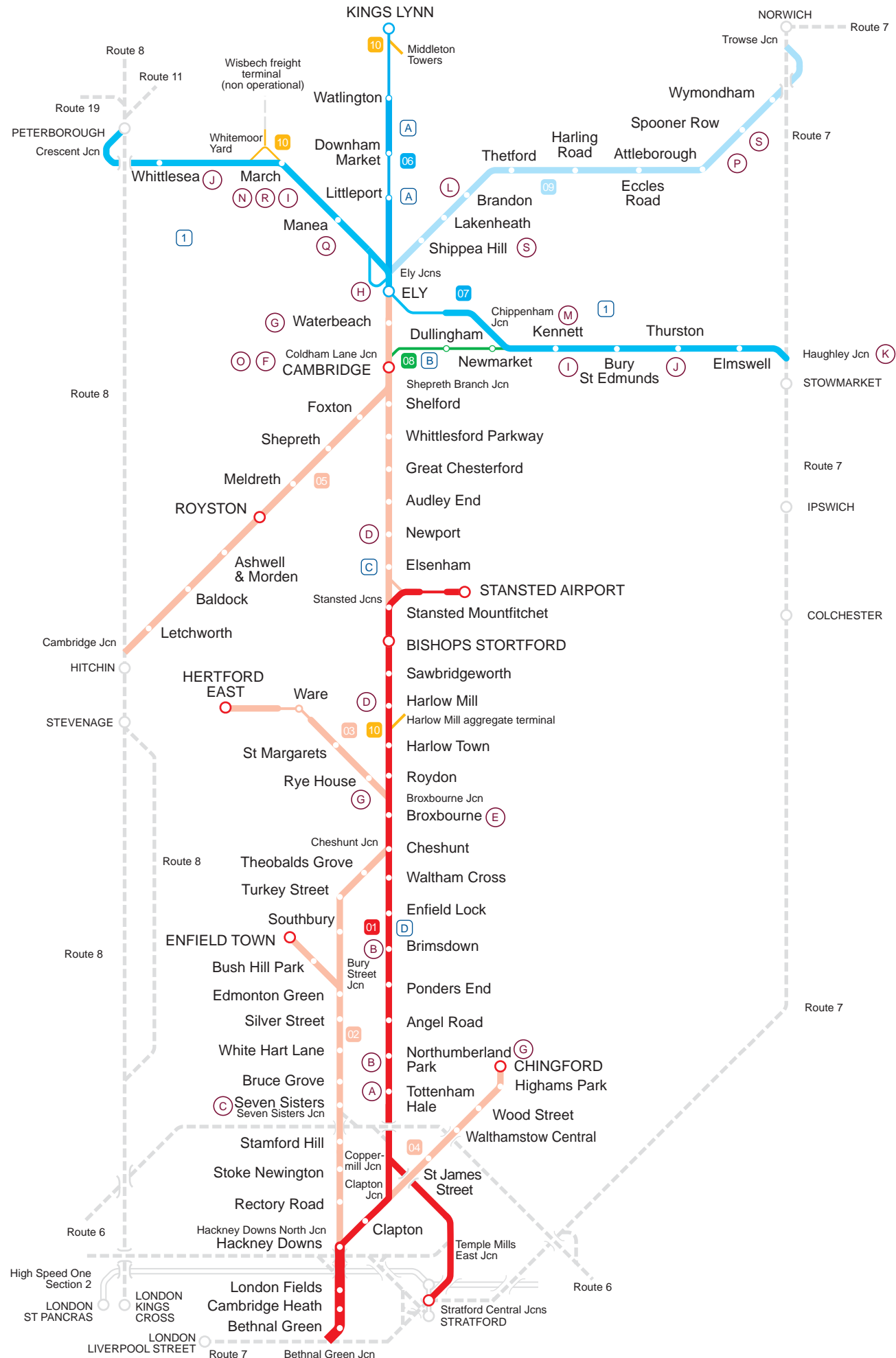
The CL RUS looked at options and recommendations for accommodating future growth, and options proposed by the CL RUS have been further developed for implementation under the North London Route Improvement Project (NLRIP). The GA RUS has looked at options and recommendations for accommodating future growth on the Thameside part of the route and these recommendations are being taken forward in Control Period 4 (CP4) to meet the capacity metrics set by the Department for Transport in their High Level Output Specification (HLOS) published in July 2007.

Today's route

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

- the NLL which comprises the Richmond to Stratford route (06.01, 06.06, 06.07 and 06.09), the Gospel Oak to Barking route (06.03 and 06.05), the Dudding Hill lines (the freight route between Cricklewood, on the Midland Main Line (MML), and Acton Wells Jn – 06.10) and associated connections to all of London's main radial routes
- the Thameside route comprises the main line between Fenchurch Street and Shoeburyness (06.02), and the Tilbury Loop together with a line connecting Chafford Hundred station (adjacent to the Lakeside shopping complex) with Upminster and Grays (06.04). There is also a freight only branch line to Thames Haven (part of 06.08).

Route 5 West Anglia



Key

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

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

Current passenger and freight demand

Passenger demand is increasing on the route (for example the autumn 2007 morning peak passenger count was three percent higher than in 2006) especially into central London. The route also serves Docklands (there are direct services from West Anglia to Stratford), which continues to expand; this nascent market has performed well despite a very limited service frequency during peak hours. Most of the peak demand is commuter flows from the main population centres. There is also a fast growing leisure market driven by low cost flights from Stansted Airport and successful marketing campaigns from the train operators.

Main line services compete with the M11 corridor, which extends down into the eastern approaches to the city. Road traffic from the end of the M11 to the City is very congested at peak times and this means that the railway tends to be the first choice for commuters. In autumn 2007 there were approximately 10,000 passengers per day travelling into London on the main line peak services.

The suburban network also experiences a large number of passengers in the peak (17,000 in the morning peak in autumn 2007) and this is due to increasing employment in central London.

Although the majority of the current demand is for travel into Liverpool Street, a significant number of passengers interchange with the underground Victoria Line at Seven Sisters, Tottenham Hale and Walthamstow Central. At Seven Sisters especially, there is limited station capacity, which causes overcrowding and suppresses demand. Stansted Airport currently handles around 23 million passengers per annum (mppa) and in October 2008 the Government granted BAA permission for increased passenger numbers on Stansted's existing single runway; this decision will allow Stansted to serve up to 35 mppa.

There are already five off-peak Stansted services per hour into London – four fast to Liverpool Street and one slow to Stratford – plus one northward to Birmingham and demand is set to grow.

The hourly passenger service between Norwich and Cambridge is generating increased demand between these major regional transport hubs. In addition there is healthy growth on the interurban services from the region to the West Midlands and the North West.

The Freight RUS was published by Network Rail in March 2007 and established by the Office of Rail Regulation in May 2007. A key input to the strategy was a set of 10 year demand forecasts that were developed and agreed by the industry through the RUS Stakeholder Management Group. Demand for movement of intermodal deep sea containers from the Port of Felixstowe is growing year on year by 4-5 percent. This demand could be further increased by the impending port developments at Felixstowe South (work commenced in 2008), and Bathside Bay, Harwich (approved March 2006). The forecasts in the Freight RUS show that the developments at Felixstowe and Bathside Bay could generate around 26 additional trains per day (over and above the 2004/05 base year), but that this figure could fall to around 18 additional trains per day when the London Gateway Port (Shell Haven) is developed. Increasing use of 9' 6" containers at the ports is raising capacity issues as until recently the only route cleared for these larger containers on standard wagons (known as W10 gauge) was along the already congested Great Eastern Main Line (GEML) and across North London. There is therefore increasing demand to run more of this traffic over the cross country route via Bury St Edmunds, Ely, March and Peterborough; this is further explored in the capability section.

Figure 1 Current train service level (trains per hour)

Station	tph to Liverpool Street	tph to Kings Cross
Enfield Town	4 peak/2 off-peak	n/a
Chingford	4 peak/4 off-peak	n/a
Cheshunt (includes 2 peak/1 off peak to Stratford)	8 peak/7 off-peak	n/a
Broxbourne (includes 2 peak/1 off peak to Stratford)	9 peak/5 off-peak	n/a
Hertford East (includes 1 peak to Stratford)	3 peak/2 off-peak	n/a
Stansted Airport (includes 1 off peak to Stratford)	4 peak/5 off-peak	n/a
Royston	n/a	6 peak/2 off-peak
Cambridge	4 peak/2 off-peak	4 peak/4 off-peak
Kings Lynn/Ely	1 peak/0 off-peak	2 peak/1 off-peak

Current services

The passenger services are operated by National Express East Anglia (NXEA), First Capital Connect (FCC), East Midlands Trains and CrossCountry TOCs, with the main freight services operated by DB Schenker, Freightliner Limited and GB Railfreight (First GBRf).

Figure 1 contains the morning peak (08:00 to 09:00 arrivals) and off peak passenger trains per hour frequencies into the London terminals.

Figure 2 contains the tph frequencies for the regional/rural passenger services.

The West Anglia network carries a mixture of traffic types with significant variations in speed, acceleration and stopping patterns.

NXEA operates inner suburban and outer main line services into Liverpool Street as well as cross country services between Ipswich and Cambridge, Ipswich and Peterborough and hourly services between Norwich and Cambridge. FCC operates outer suburban services between Kings Lynn, Cambridge and Kings Cross. East Midlands Trains operate hourly cross country services between Liverpool and Norwich. CrossCountry operates hourly services between Birmingham and Stansted Airport.

The passenger services above are operated by a mix of inner and outer suburban electric multiple units, 90mph main line electric multiple units and diesel multiple units.

As well as an intensive passenger network the route provides an important cross country link for several long distance freight flows, including that from the Port of Felixstowe to the north east of England that would otherwise have to be routed along the already congested Great Eastern Main Line (GEML) and across London. The route also sees varying volumes of freight to local terminals and yards, including aggregates (Broxbourne, Bury St Edmunds, Chesterton, Ely, Harlow and Kennett), sand (Middleton Towers) and general merchandise (Ely). There is a major Network Rail national logistics unit depot based at Whitemoor, between Ely and Peterborough, which feeds track components, ballast and other materials around the network.

The freight services on the West Anglia route are primarily diesel hauled with a few electrically hauled services at the southern end of the route.

Figure 2 Current Train Service Level (trains per hour)

Regional/Rural Services	tph
Ipswich (starts from Liverpool Street) to Peterborough	1 every 2 hours
Ipswich to Cambridge	1
Norwich to Cambridge	1
Norwich to Liverpool	1
Stansted Airport to Birmingham New Street	1

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

Figure 4 summarises traffic volumes.

There is no segregation between freight or passenger traffic on the West Anglia Main Line (WAML) or the cross country routes.

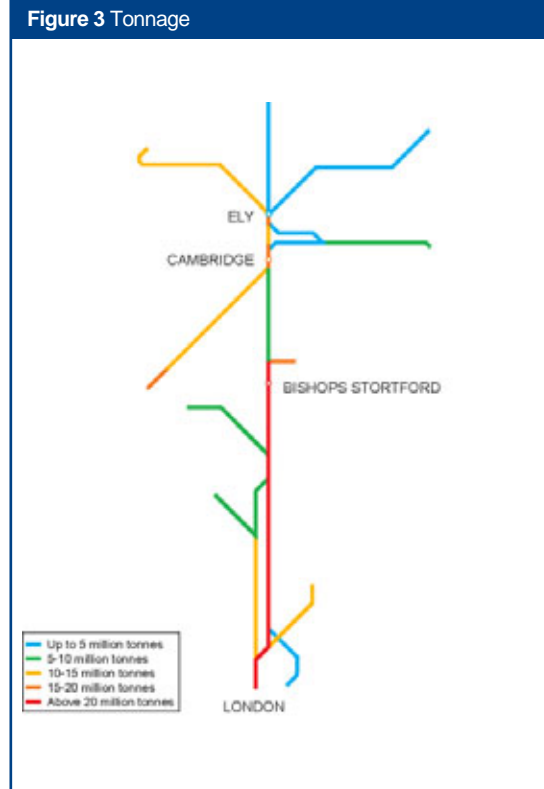
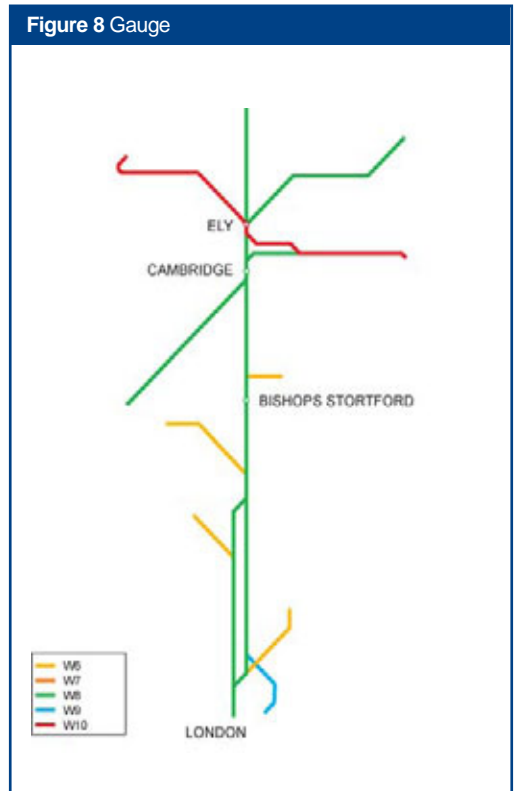
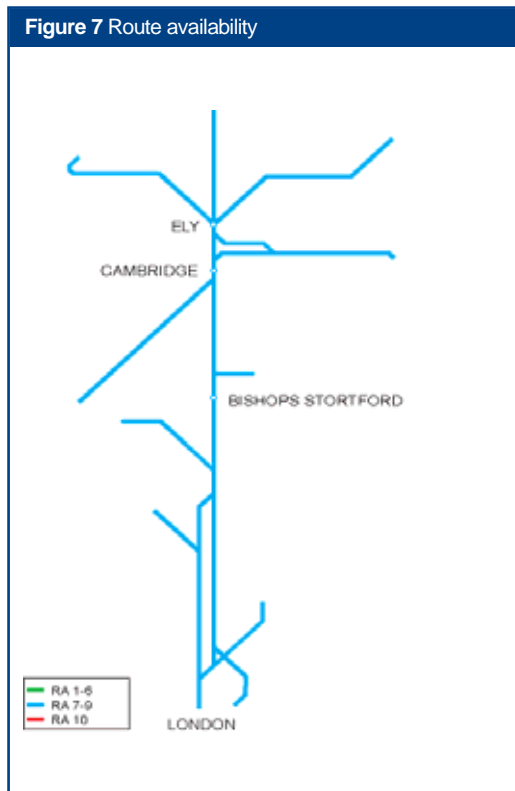
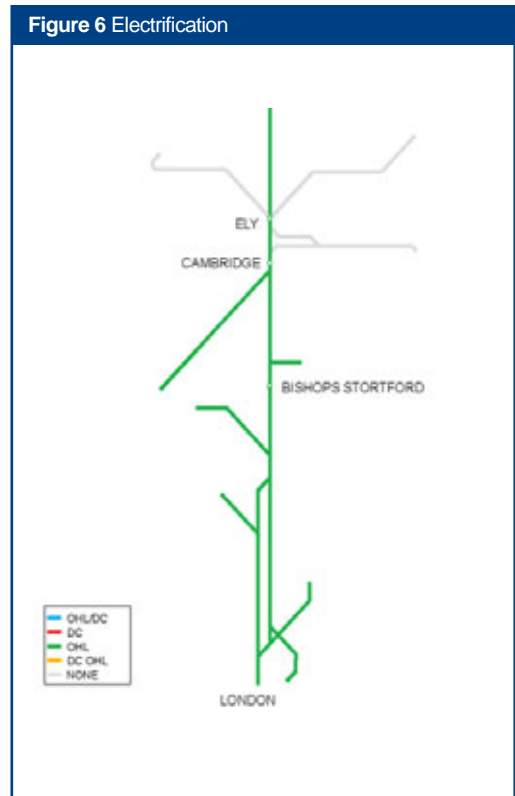
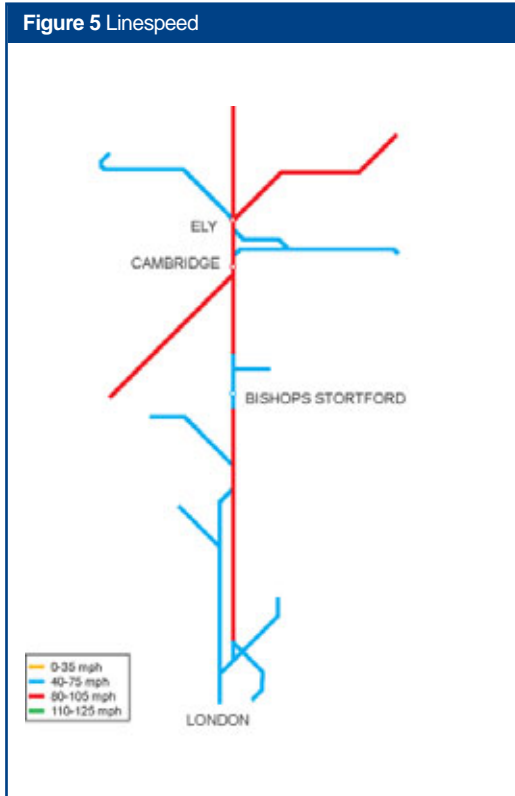


Figure 4 Current use

	Passenger	Freight	Total
Train km per year (millions)	17	1	18
Train tonne km per year (millions)	3,365	938	4,303

Current infrastructure capability

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



Current capacity

There are serious issues of capacity on the West Anglia route. This is due to the mixture of services and stopping patterns, many flat junctions and single line sections. Overall route capacity is constrained by a combination of these factors. Additionally the suburban lines into Liverpool Street are heavily used in the peak and there is little capacity to run additional trains.

Key issues on the West Anglia route are:

- the mixture of fast and stopping services on the two track Lea Valley line giving rise to congestion and performance risk through much of the day
- lack of a W9 & W10 gauge cleared cross country route to West Coast Main Line (WCML)
- speed restrictions on heavy axle weight freight wagons on the cross country route
- any additional services on the congested Lea Valley line will impact on the length of time the level crossings are closed to road traffic
- the layout and operation of Cambridge station including one long single platform with a scissors crossover in the middle that has to accommodate through services in both directions and which causes problems with access to and egress from the north facing bay platforms
- intensive platform utilisation and congestion on the throat at Liverpool Street
- the single track Stansted Airport Tunnel currently being used at capacity and single track sections north of Ely, between Ely and Soham and between Chippenham and Cambridge
- absolute block signalling on the cross country lines coupled with long signal sections between Bury St Edmunds and Kennett
- convergence of three lines at Ely North Jn including single lead junctions and reduced functionality
- high congestion on the two track section between Cheshunt and Broxbourne junctions
- passenger overcrowding on the platforms at Cambridge, Seven Sisters and Tottenham Hale stations at peak times, constrictive passageways and large numbers of passengers transferring with LUL services at the latter stations.

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

Figure 9 Current Train Service Level (peak trains per hour)

Route Section	
Letchworth to Hitchin	7
Royston to Letchworth	6
Cambridge to Royston	4
Seven Sisters to Hackney Downs	6
Clapton to Hackney Downs	14
Enfield Town branch	4
Chingford branch	4
Cheshunt to Tottenham Hale	12
Hertford East branch	3
Harlow Town to Broxbourne	8
Stansted Airport branch (includes 1 to Birmingham)	5
Audley End to Newport (includes 1 to Stansted Airport)	5

Current performance

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

The passenger train services on the route are mainly operated by NXEA, FCC, CrossCountry (running services from Stansted Airport to Birmingham) and East Midlands Trains (running services from Norwich to Liverpool).

As a result of the route operating at close to track capacity for most of the day, there are difficult performance issues. The current mix of fast and stopping services and the intensity of the peak service mean that an incident can cause a knock on effect on following services that can quickly result in large amounts of reactionary delays for what might be initially a small specific delay.

Analysis of recent performance shows the main problems on the route to be level crossings reliability and misuse, and trespass and vandalism incidents, which particularly affect the inner suburban services.

Figure 10 2008/09 PPM

TOC	Forecast MAA	As at period
National Express East Anglia	90.7%	10
First Capital Connect	92.1%	10
CrossCountry	89.8%	10
East Midlands	88.6%	10

Section 2: Tomorrow's railway: requirements

HLOS output requirements

Figure 11 Total demand to be accommodated by Strategic Route

Routes	Annual passenger km forecast in 2008/09	Additional passenger km to be accommodated by 2013/14
West Anglia	1,561	482

Figure 12 Peak hour arrivals to be accommodated by Strategic Route

London Terminals	Peak three hours			High- peak hours		
	Forecast demand in 2008/09	Extra demand to be met by 2013/14	Maximum average load factor at end CP4 (%)	Forecast demand in 2008/09	Extra demand to be met by 2013/14	Maximum average load factor at end CP4 (%)
Liverpool Street	74,300	10,600	67	36,700	4,900	76

Future demand in CP4

The M11 corridor has been targeted by the Government as an area key to the accommodation of future housing growth in the South East. Cambridge is a location of national importance in knowledge-based industries and a key tourist destination. This makes it an attractor of a considerable volume of rail trips as well as having high numbers of resident London commuters. Capacity constraints are primarily driven by peak commuter demand for travel to London. Due to the anticipated housing growth, the West Anglia route has the highest rate of background demand growth predicted for all routes serving London. The number of trips in the morning peak is predicted to rise by around 3-3.5 percent a year on average over CP4. This could be considerably exceeded when trains on the WAML are lengthened to 12-cars to relieve on-train crowding.

Air passenger numbers at Stansted Airport are anticipated to rise rapidly in line with proposed improvements. Throughput of passengers has nearly tripled over the last five years, which has been driven by the rapid expansion of low-cost airlines. The Government has recently granted permission for passenger numbers to rise to 35 mppa on Stansted Airport's existing single runway and the proposed strategy for meeting growth up to 35 mppa involves the operation of 12-car trains to London and 4-car trains to Birmingham New Street in conjunction with platform extensions on the WAML and an additional platform and/or platform extensions to be built at Stansted Airport.

The Freight RUS set the demand for freight services in CP4, which was reinforced in the Greater Anglia RUS.

London is the host city for the 2012 Olympic Games and Paralympic Games (the Games) and Network Rail is now working with the Olympic Delivery Authority on the development and ongoing construction of facilities to meet the needs of the Games taking account of the requirement for such schemes to have a legacy value by supporting the long term development of Stratford City and improved access to Docklands. During this time there will be an additional demand for freight services to support construction of the Olympic venues. A direct train service operates between Stansted Airport and Stratford to cater for the growing passenger demand.

Port developments at Felixstowe and Bathside Bay and the increased use of 9' 6" containers (on standard wagons) on expanding intermodal freight services will bring additional trains on the now cleared W10 cross country route from Ipswich to the East Coast Main Line (ECML) via Peterborough.

Future demand beyond CP4

The Government white paper into the future of air travel proposed the construction of a second runway at Stansted Airport, which would increase capacity at the airport to 70-80 mppa and so accommodate future predictions of growth there. However, to cater for the demand created by a second runway, changes to the infrastructure will be necessary and the Secretary for State has announced that Network Rail should develop proposals for enhancing the WAML incorporating consideration of line improvements and potential four-tracking options; this will be developed in CP4. CrossCountry will be focussing on the need to accommodate demand generated by the expansion of Stansted Airport. It is anticipated that a second tunnel will be needed at Stansted Airport to cope with future demand.

It is also anticipated that morning peak trips into London will continue to rise at the current rate over CP5 due to sustained housing growth but this too could be considerably exceeded if the WAML is remodelled bringing with it the potential to improve performance and reduce journey times.

Meanwhile proposed developments in the Lea Valley and at Chesterton and Cambridge will bring increased demand for rail travel not only to London, but also between the regional centres of Cambridge, Norwich and Ipswich.

The Government white paper into delivering a sustainable railway predicts that rail borne freight demand will grow by 30 percent over the next 10 years.

The proposed port development at Bathside Bay, extended W9 & W10 clearance from Peterborough to the WCML via Nuneaton and capacity improvements across the whole route from Felixstowe to Nuneaton will contribute to further increases in freight services across the region.

Section 3: Tomorrow's railway: strategy

Figure 13 summarises the key milestones during CP4 in delivering the proposed strategy for the route.

Further explanation of the key service changes and infrastructure enhancements are set out in the following sections.

Figure 13 Summary of proposed strategy milestones

Implementation date	Service enhancement	Infrastructure enhancement	Expected output change
2009	Strengthen Stansted – Birmingham services	Lengthen Stansted – Birmingham services to 4-car and lengthen bay platform at Stansted Airport (potentially funded by BAA)	Increase capacity
2011	12-car operation on the Liverpool St – Stansted Airport services	Platform extensions on WAML plus platform extensions and/or 4th platform at Stansted Airport (funded by BAA)	Increased peak capacity
2011	12-car operation on the Liverpool St – Cambridge services	Platform extensions plus island platform at Cambridge	Increased peak capacity
2011	WA peak strengthening 4-car to 8-car	None	Increased peak capacity
2012	Facilitate the operation of high cube container traffic on the cross country route.	Work to increase gauge to W9 and W10 between Peterborough and Nuneaton incorporating signalling work between Kennett and Bury St Edmunds	Cross country freight growth

Figure 14 Capacity enhancements to meet HLOS peak capacity in CP4				
Description	Additional vehicles involved	Station served	0700 – 0959 Capacity Impact	0800 – 0859 Capacity Impact
WA 12-car operation on Liverpool St-Cambridge services	20	Liverpool Street	2,100	800
WA 12-car operation on Liverpool St-Stansted Airport services	36	Liverpool Street	4,900	1,600
WA Inner Peak strengtning	24	Liverpool Street	3,700	800

Figure 15 shows how the HLOS load factor targets for locations on the route are met by the proposed strategy. The measures will also allow the total additional passenger KM to be accommodated.

* the load factor requirement in the HLOS applies as an average across 12 London stations.

London Terminals and regional Hubs	Peak three hours				Load factor end CP4	High peak hours			
	Demand end CP4	Capacity start CP4	Capacity end CP4	Capacity end CP4		Demand end CP4	Capacity start CP4	Capacity end CP4	Load factor end CP4
Liverpool Street	84,900	115,400	134,900			41,600	50,400	56,000	
Other London Termini*	477,000	628,600	747,000	64%		240,700	273,600	325,600	74%

Strategic direction

Network Rail expects that the route will continue to see high levels of passenger and freight growth. The main drivers of passenger growth will continue to be employment in central London, Docklands and regional centres, together with the increased leisure travel due to growing expansion at Stansted Airport. Port developments at Felixstowe and Bathside Bay on the Great Eastern route will bring significant demand for increased freight services, which will make providing additional capacity on the cross country route to the ECML and WCML via Peterborough and Nuneaton, and further clearance for W9 & W10 gauge freight traffic beyond Peterborough to the WCML at Nuneaton, a high priority if capacity is not to be compromised on the congested Great Eastern route via London. The cross country route becomes a core freight route under the auspices of the Strategic Freight Network.

It is believed that the solution to passenger growth and future capacity requirements can be met by a combination of several generic initiatives:

- changes to the timetable structure to reduce the mix of different train types and the number of conflicting moves
- train lengthening, often supported by platform lengthening and other rolling stock changes that would require a complete review of the available traction power supply
- incremental introduction of additional services
- incremental enhancements (which can be delivered as improvements to planned track and signalling renewals in many cases) and certain limited stand alone enhancements. These have the potential to improve performance, enable specific increases in train paths and facilitate timetable restructuring
- provision of additional passenger capacity at key stations
- a review of car parking and other modes of transport at stations to look at ways of improving access to the network.

To accommodate the high levels of growth on the West Anglia route additional peak services and train lengthening is being planned to meet passenger growth. This will require infrastructure works including longer platforms and additional tracks. More details can be found in the capacity section.

Future train service proposals

Network Rail has been working with NXEA, FCC, CrossCountry, East Midlands and the DfT on developing plans for meeting growth through additional and lengthened train services in CP4.

West Anglia inner services

On the Enfield Town/Cheshunt and Cambridge semi fast services, trains will be lengthened to eight cars in the peaks. It is not anticipated that this will require any additional infrastructure work. The trains will be formed from the cascade of existing rolling stock from the introduction of new EMUs onto the Stansted Airport services.

West Anglia outer services

New rolling stock will be introduced onto the Stansted Airport services, which will be lengthened to 12-cars. This will allow a cascade of the current rolling stock to lengthen peak Cambridge services to 12-cars. The introduction of 12-car services will require new and lengthened platforms as well as the use of selected door operation (SDO) subject to safety approvals.

Most trains will be berthed in Ilford and Orient Way (near Stratford) but additional berthing will be required in the Cambridge area.

Interurban Services

On the Birmingham–Stansted service, CrossCountry proposes to strengthen the service by introducing 4-car trains on this route. CrossCountry also plans to extend the Birmingham to Leicester service to Cambridge in the short term and Stansted in the medium to longer term. There is also a desire to introduce earlier services into and later services out of Stansted Airport to meet demand from airline customers and airport staff.

The freight operators have emphasised the need for freight paths to depots on the WAML to be protected and also support development of the cross country freight route to meet future growth. The FOCs provided input to the industry wide freight forecasts, which have formed the input to the RUSs.

More detail on future services including those proposed beyond CP4 has been incorporated into the capacity section.

Future capability

Gauge

Until 2008 the primary route for W10 gauge freight traffic in the region was along the Great Eastern route from the east coast ports of Felixstowe and Harwich to the WCML via Ipswich tunnel, Stratford and the North London Line (NLL) (via Primrose Hill).

The use of 9' 6" high containers continues to increase; from 28 percent of all deep sea containers in 2002 to 40 percent in 2006. Expansion of the port at Felixstowe has already commenced and with development of a new port proposed at Bathside Bay (near Harwich), it is of the utmost importance that alternative W9 and W10 routes are developed.

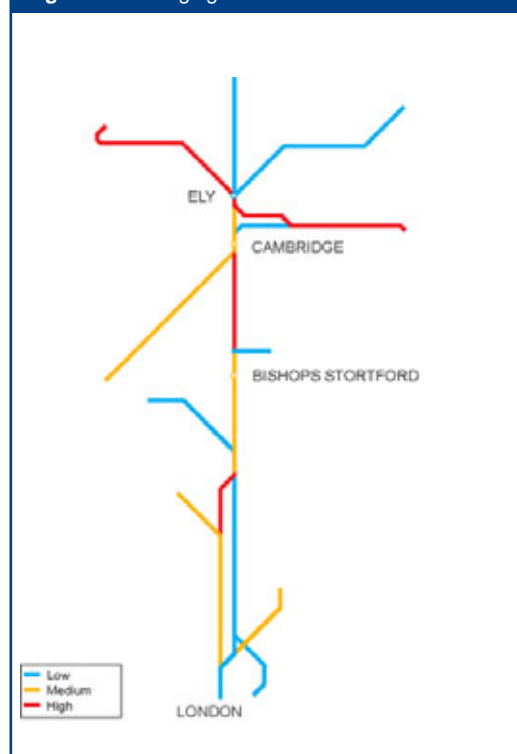
The cross country route from Ipswich to the ECML via Bury St Edmunds, Ely, March and Peterborough has therefore been cleared for W10 gauge freight services during 2008 and further clearance works between Peterborough and Nuneaton will be undertaken during CP4 to give a cleared route from the haven ports through to the WCML. In conjunction with these, capacity works will be developed through the Strategic Freight Network that will allow additional freight services to operate. In advance of this, capacity improvements are planned on the Felixstowe branch and to Ipswich Yard as well as improving signalling between Kennett and Bury St Edmunds. In addition improvements, including doubling Haughley Jn and commissioning bi-directional signalling on Ely West Curve, are to be taken forward for development using NRDF funding.

Linespeed

Modest improvements to linespeeds on the cross country route between Newmarket and Cambridge could give longer turn round margins at Cambridge station, which would improve operation and performance as well as increasing demand, however this may only be possible in conjunction with increased infrastructure and could be jointly funded by NXEA and Network Rail (from NRDF) provided that a successful business case can be made. Other routes being considered for local speed improvements in conjunction with the track renewals are Ely – Norwich, together with the East Suffolk Line and the Sudbury branch (both on Route 7). CrossCountry has aspirations to improve journey time between Stansted Airport and Peterborough.

The causes of speed restrictions on heavier freight vehicles across the cross country route between Ipswich and Peterborough are being examined to determine the works required to raise speeds.

Figure 16 Tonnage growth



Target linespeeds will be set for each main route section, so that when assets are renewed any historic restrictions can be removed where practical.

Tonnage

Figure 16 indicates the forecast percentage change in tonnage to 2017.

Increased demand for freight traffic to and from the east coast Port of Felixstowe and the proposed port at Bathside Bay will cause much higher tonnages to be carried across the West Anglia strategic route section, Peterborough–Ely–Haughley Jn, due to the need to provide an alternative route for W9 and W10 gauge freight to the WCML away from the congested Great Eastern route between Ipswich and Stratford (Route 7). The additional traffic will bring capacity issues on this strategic route section, which will need to be upgraded to remove the restrictions on heavy trains. The following parts of the route are predicted to see the highest increases of freight tonnage carried:

- Haughley Jn to Ely Dock Jn
- Ely North Jn to Crescent Jn (Peterborough).

Platform lengths

It is generally accepted that the practical approach to continued growth is the incremental lengthening of trains, especially as this solution is flexible, caters for the wide range of different growth scenarios and makes better use of scarce and high value paths.

As part of its franchise commitment FCC will commence running 12-car trains from Kings Cross to Cambridge on their fast services, which will entail platform extensions on the GN route.

Network Rail is working with NXEA to allow 12-car trains to run on the Stansted Airport and Cambridge peak services to London. This will require a mixture of platform extensions and SDO (subject to safety approvals) at stations served by the outer services, so that growth can be met on the Stansted and Cambridge corridors. Additional rolling stock, berthing and power will also be required, as well as a new 12-car island platform at Cambridge and platform extensions or a 4th platform at Stansted Airport (funded by BAA).

CrossCountry intend to run 4-car trains from Birmingham to Stansted Airport, which will require the extension of the bay platform at Stansted Airport.

Future capacity

The forecasts of significant further growth in CP4 (as detailed in the future demand section above) and beyond, pose significant problems and are driving a requirement for additional capacity.

Currently most of the WAML is already operating at, or very close to, capacity and there are few options for increasing the number of train paths available at peak times (or, on some corridors, for changing the stopping patterns) without providing additional infrastructure.

Network Rail has been working with NXEA and the DfT on delivering passenger capacity improvements in CP4 and is continuing to develop proposals for CP5 and beyond. The Greater Anglia RUS explored a number of options for improving future capacity and these will continue to be developed along with train operators and our stakeholders. On each main service the proposed strategy for increasing capacity includes the following:

- platform extensions on the Cambridge/Stansted Airport corridor being taken forward under CP4
- a new island platform at Cambridge (under CP4) and platform extensions or a fourth platform at Stansted Airport (funded by BAA)
- In CP5 additional services will require additional infrastructure, including remodelling of the WAML (including the closure and replacement of at grade level crossings with off-grade crossings, in the Lea Valley)
- replacement of the existing units on the Chingford and Hertford East branches with high density rolling stock in CP5

- the potential introduction of a shuttle service from Cheshunt to Seven Sisters at peak times in CP5
- replacement of the existing units on the Cheshunt/Enfield services with high density rolling stock in CP5
- the doubling of Stansted Airport tunnel should the second runway be developed in CP5
- additional berthing in the Cambridge area
- the introduction of new fixed formation rolling stock on the Thameslink service from 2015 on the Shepreth branch to Cambridge.

To facilitate increased services to regional locations upgrading the cross country route would be required in conjunction with the Felixstowe – Nuneaton freight scheme.

The cross country freight proposals put forward to meet the growth contain the following:

- with the existing infrastructure together with the first phase of enhancements (i.e. those contained in the Hutchinson Ports UK (HPUK) section 106 and the TIF bid works) around five additional paths can be found on the cross country route to Nuneaton in addition to the nine paths to/from South Yorkshire
- with additional infrastructure proposed in a second phase of enhancement works funded through the Strategic Freight Network, it is possible to path the additional Yorkshire trains as well as 14 additional services to/from Nuneaton
- reviewing the existing cross country freight and passenger services to see if additional freight services could be pathed
- potential for running longer trains
- increased capacity at Ipswich Yard
- a potential north connection from the Felixstowe branch at Bacon Factory Curve, Ipswich.

The development of this strategy is to continue with refinement of the timetable and infrastructure works. Further funding may then be sought.

Further path capacity may also be generated by changes to the train timetable and service mix. This also has a role in improving performance by improving service interaction.

The implementation of Integrated Train Planning System (ITPS) will be phased over the next two years and will help to unlock capacity on the network that may be constrained by current planning environment. The system involves planning at a lower level of granularity, increasing the processing amount in areas such as journey time calculations and conflict detection. It is anticipated that during the development of

Figure 17 Forecast PPM MAA – CP4 plan

	2009/10	2010/11	2011/12	2012/13	2013/14
National Express East Anglia	90.8%	91.8%	92.1%	92.3%	92.8%
First Capital Connect	91.7%	92.1%	92.4%	92.7%	92.9%
CrossCountry	90.0%	90.2%	90.6%	90.9%	91.3%
East Midlands	88.1%	88.7%	89.4%	89.9%	90.2%

timetables it will improve the efficiency of processes and timetable accuracy to provide industry wide benefits, particularly for long distance operators.

Discussion with the relevant train operator and the DfT around the detailed implementation plan, timing (linked with the release of rolling stock in particular) and specific timetable solutions related to the above passenger capacity proposals are now underway. It is therefore likely that variations to these proposals, including alternative timetabling solutions, may be developed as these discussions progress.

Future performance

Figure 17 sets out the planned PPM for each train operator. These are lower than planned given the need for flexibility in achieving the HLOS targets and to reflect the greater uncertainty and risk associated with projecting performance at a disaggregated level. In some cases the services covered by the franchises will change; this means that the forecast PPM figures are not directly comparable with the current PPM figures.

The delivery of improvements in train performance is one of Network Rail's key priorities. This is being progressed by ensuring that infrastructure and network management caused delays are systematically reduced. This is being addressed by the introduction of a fully integrated control centre for East Anglia, which is bringing benefits by improving communications, streamlining the decision making process and delivering an improved service to customers.

Network Rail is working with NXEA to minimise the effects of trespass and vandalism incidents as well as level crossing misuse. These are being addressed along with other initiatives as part of the Joint Performance Improvement Plans (JPIP).

The JPIP includes action plans, which have introduced regular infrastructure monitoring and improved reliability of the rolling stock, as well as monitoring/improving the level of right time departures.

Work also continues on the annual programmes of targeted performance improvement schemes across the route. A major success has been dealing

with vertical and longitudinal splitting track faults on the Ely to Norwich line.

National Express East Anglia

The performance of NXEA is 90.7 percent and joint plans exist to improve performance to 91.2 percent by the end of March 2009. The JPIP is supported by initiatives that have been implemented by the TOC and Network Rail's Anglia route team, this continues to focus on the elimination of small consistent problems which tend to drive down performance even on the good days.

The key performance issues and opportunities for the west Anglia route have been identified to include:

- the need to accommodate more and longer freight trains associated with traffic growth from the Port of Felixstowe
- the impact of the rolling stock cascade promoted by the HLOS capacity requirements
- working with the TOC to minimise the impact on performance of overcrowding
- autumn management
- remote condition monitoring both on the infrastructure and on the fleet
- upgrade of signalling modules and work to isolate power problems to a single running line.

Network Rail and the TOC have drafted a Long Term Performance Plan and propose to continue to work on this during the summer. Performance is forecast to reach 92.8 percent PPM by the end of 2013/14 however at present this is not fully backed up by funded plans and the TOC therefore remains concerned by its deliverability although the figure is in line with its aspirations.

First Capital Connect

FCC operates the suburban train routes into London Kings Cross and the cross London Thameslink route. The performance of the TOC is currently 92.1 percent and this is planned to rise to 90.7 percent by the end of March 2009 due as a result of the action included within the Joint Performance Plan. There is a significant level of change in service patterns driven by the Thameslink works throughout CP4 and the likelihood that some services will be jointly operated with Southeastern. This together with relatively

major changes to fleet resources will result in some challenges to maintain performance.

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

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

The TOC is currently concerned by the lack of a detailed plan to deliver performance improvements on this route especially due to the large amount of uncertainty. We will work with the TOC to produce a long term performance plan during the Summer and the expectation is that this will result in a forecast level of performance of 92.9 percent by the end of 2013/14 (including the impact of the Thameslink works).

CrossCountry

CrossCountry has introduced a tighter timetable across its routes in December 2008 and there may be congestion issues at junctions and key corridors across the network. Right time arrival at junctions will therefore be critical to meeting timescales for PPM and significant lateness targets set in the HLOS.

Further performance issues for CrossCountry can be found in the plans for Routes 8, 12, 13, 17, 18, 19 and 20.

East Midlands Trains

The future performance for East Midlands Trains can be found in the plan for Route 19.

Network availability

The high level of capacity utilisation on the route has meant that there has been difficulty in gaining access for maintenance and renewals work.

Network Rail working together with the train operators has introduced a revised set of cyclic possessions, which allow a better balance between

the train operators' requirements and Network Rail's requirements for maintaining the track. This has enabled better access to Stansted during weeknights although this will be further reviewed for the 2010 timetable with a view to reducing the frequency of cyclic possessions on the line between Stansted Airport and Cheshunt on Sundays and between Clapton Jn and Chingford on weeknights.

The 'Seven Day Railway' concept is being delivered by giving NXEA consistent services to Stansted Airport standardised for six nights a week with an eight hour no-trains period every Saturday between Cheshunt and Stansted Airport. Further work is needed on delivering the concept for services north of Stansted.

Network Rail is also looking to replace signals with LEDs, have electronic treadles at level crossings and introducing new equipment to reduce the time taken to weld sections of track. There is a set strategy where freight services are timed around the sections of line that are being worked upon on the cross country route. Possessions will also allow at least one route to be open between London and Cheshunt either by Hackney Downs or Stratford and Tottenham Hale or Seven Sisters.

The GA RUS has explored how possession regimes can be improved and continuing workstreams include investigating the practicalities of:

- increased use of single line working (where practical and safe) to reduce the disruption to operators
- separate OLE feeds to depots, so that the depot can still operate when it is adjacent to a possession of the running line
- using the upgraded cross country route as a diversionary route during works on the GEML and vice versa are being explored
- undertaking more work for other disciplines in existing possessions planned for track renewals
- taking longer blockades rather than frequent smaller possessions
- looking at better use of high output equipment so that once major renewals have been undertaken the system can move towards becoming a 'Seven Day Railway'.

Long term opportunities and challenges

The work undertaken in the RUSs identifies key challenges that the rail industry will face in the long term, and through analysis and optioneering the most appropriate methods to resolve these issues will be determined. A key element of this work is to understand the issues that cross the RUS boundaries, and this work will then inform planning in CP5 and beyond.

Network Rail anticipate that accommodating growth in commuting to central London and the Docklands and continued growth in Stansted Airport demand will be a significant challenge on parts of the WAML and other sections of the route, which are already operating at, or very close to, capacity.

The Thameslink programme, which will replace London bound Cambridge and Kings Lynn services to Kings Cross with through services to places south of the Thames, will generate additional demand through improved connectivity giving new interchange opportunities such as Crossrail at Farringdon.

Many scenarios were evaluated in the GA RUS in conjunction with stakeholders. Strategies for provision of the capacity and performance improvements needed are largely centred on gaining the benefits from remodelling the Lea Valley and the potential to close and replace the at grade Level Crossings in the Lea Valley with off grade bridges or subways. In addition when Crossrail is built it is assumed that the additional services using the remodelled tracks will be able to run on from Stratford into Liverpool Street.

The GA RUS proposed running 9-car trains on the West Anglia Inner services as historically this length of train was operated over the Inner routes although works would be needed to accommodate modern safety standards. If this were to be a longer term consideration then this would be subject to a future DfT Rolling Stock Plan in CP5 or beyond.

CrossCountry have highlighted the need to achieve journey time reductions as a key future objective across all their primary routes.

The development of Crossrail on the Great Eastern route and the service increases on the NLL mean that the Ipswich–Ely–Peterborough route must be upgraded to absorb freight growth; especially the growth in maritime container traffic.

The GA RUS proposed a half hourly peak service between Norwich and Cambridge to improve the links between the two cities, as well as provide an additional commuter service into the cities from their surrounds, however timetable work has shown that additional infrastructure will be required to operate such a service making it a longer term opportunity.

A further important area, which was covered in the GA RUS, is public access to the network. The following four areas were considered:

- station capacity
- station facilities
- car parking
- new stations to serve developments.

Network Rail is working with the train operators in developing schemes to address station capacity issues and improve station facilities using a number of funding mechanisms including the National Station Improvement Programme. There are also development opportunities at stations with a scheme being developed at Cambridge and Joint Venture initiatives proposed for Enfield Town and Walthamstow Central.

Car park extensions are proposed at a number of stations including Audley End, Broxbourne, Harlow Town and as part of the proposed development at Cambridge. A study by Passenger Focus showed that if parking is deterred due to lack of capacity, rail patronage will be reduced as customers either drive further to alternative stations or drive all they way to their final destination.

The growth identified in the Regional Spatial Strategy included developments on the edge of existing settlements and thus new stations are being considered at locations such as Chesterton (near Cambridge).

Chesterton also has the potential to provide additional berthing facilities that could release land at Cambridge for redevelopment. Discussions are underway between the TOCs, FOCs and other stakeholders on how this could be taken forward.

Links to RUS documents can be found on Network Rail's website www.networkrail.co.uk

Infrastructure investment in CP4

Figure 18 Proposed enhancements in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2010	Ⓐ Tottenham Hale station improvements	Improvement to the station circulation as part of the Tottenham Hale development programme	Capacity Enhancement	TfL/ Developer	2
2014	Ⓑ Lea Valley Level Crossings	Replacement of level crossings with off grade bridges or subways	Capacity Enhancement & Performance Improvement	Network Rail	–
2012	Ⓒ Seven Sisters Improved access	Improve access to Seven Sisters on the upside	Capacity Enhancement	Periodic Review 2008	–
2011	Ⓓ 12-car trains to Cambridge and Stansted	12-car platform extensions (excluding Cambridge island platform and Broxbourne)	Capacity Enhancement	Periodic Review 2008	3
2010	Ⓔ Broxbourne station 12-car platform	12-car platform extension and associated works	Capacity Enhancement	Periodic Review 2008	3
2011	Ⓕ Cambridge new island platform	New 12-car island platform and associated works	Capacity Enhancement	Periodic Review 2008	3
2011	Ⓖ Traction Power Supply Enhancement	Improve power supply for additional/lengthened trains	Capacity Enhancement	Periodic Review 2008	1
2012	Ⓘ Gauge clearance to W10 and initial capacity works	Gauge clearance and capacity improvements between Peterborough and Nuneaton/South Yorkshire and Kennett signalling	Capacity Enhancement	Transport Innovation Fund/Third Party/ Network Rail Discretionary Fund	4
2009 - 2016	Ⓛ Ipswich to Nuneaton capacity increase	Capacity enhancements at various locations between Ipswich and Nuneaton (development only during CP4 through Strategic Freight Network)	Capacity Enhancement & Performance Improvement	Periodic Review 2008/Third Party	2

Figure 18 Proposed enhancements in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2010/11	Ⓚ Haughley Jn S&C	Double the single lead at Haughley Junction in association with S&C renewal	Capacity Enhancement & Performance Improvement	Network Rail Discretionary Fund/Network Rail	3
2009/10	Ⓛ Ely/Thetford track renewal	Plain Line Track Renewal	Renewal	Network Rail	5
2010/11	Ⓜ Kennett track renewal	Plain Line Track Renewal	Renewal	Network Rail	3
2010	Ⓝ March signalling renewal	Interlocking renewal	Renewal	Network Rail	3
2010	Ⓞ Cambridge TDM renewal	TDM renewal	Renewal	Network Rail	3
2010/11	Ⓟ Thetford/Trowse track renewal	Plain Line Track Renewal	Renewal	Network Rail	3
2010	Ⓠ Broxbourne S&C renewal	S&C renewal	Renewal	Network Rail	3
2011	Ⓡ Manea bridge renewals	Bridge reconstruction/strengthening	Renewal	Network Rail	2
2009	Ⓢ March East S&C	S&C renewal	Renewal	Network Rail	5
2010	Ⓣ Ely to Norwich Resignalling	Modular resignalling	Renewal	Network Rail	1

NRDF candidate schemes in CP4

Figure 19 Candidate NRDF schemes in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2011	Ⓢ Cambridge Interim Stabling	Electrify additional sidings for EMU stabling	Capacity Enhancement	Network Rail Discretionary Fund	1
2010	Ⓢ Ely West Curve	Commission bi-directional signalling operation over the West Curve and remove double blocking/make the Down Peterborough line reversible	Performance Improvement	Network Rail Discretionary Fund	3

Renewals activity

Figure 20 shows the estimated renewals costs and activity volumes.

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

It should be noted that in order to manage the deliverability of Network Rail's Civils, Signalling & Electrification plans an element of over planning in the work banks has been included. As a consequence the sum of the route plans exceeds the plan for the network as a whole. It is likely that a small proportion of the activities in these areas will slip to subsequent years.

Figure 20 Summary of estimated renewals costs and activity volumes

£m (2009/10 prices)	2009/10	2010/11	2011/12	2012/13	2013/14	CP4 total
Renewals						
Track	25	31	17	27	22	121
Signalling	14	14	6	6	8	47
Civils	5	3	5	5	5	23
Operational property	6	7	5	9	8	35
Electrification	2	2	2	2	2	10
Telecoms	1	0	1	1	1	5
Plant and machinery	1	1	0	1	1	4
Total	53	59	36	51	46	244
Renewals volumes						
Track						
Rail (km)	9					
Sleeper (km)	11					
Ballast (km)	14					
S&C (equivalent units)	11					
Signalling						
SEUs (conventional)	0	0	154	0	1	155
SEUs (ERTMS)	0	0	0	0	0	0
Level crossings (no.)	0	0	10	0	1	11

Appendix

Figure 21 Strategic route sections

Predominant aspect recorded (secondary aspects recorded in brackets). ELR is Engineers Line Reference, RA is Route Availability. OTIS: One Train In Section

SRS	SRS Name	ELR	Classification	Funding	Community Rail	Freight Gauge	RA	Speed	Electrification	Signalling Type	Signalling Headway (mins)	No of Tracks
05.01	Bethnal Green – Stansted Airport	BGK (TLA)	London & SE	DfT	No	W8 (W6)	8	various	25kv AC	TCB	3	2 (4)
05.02	Hackney Downs – Cheshunt	HDT (ENT)	London & SE	DfT	No	W8 (W6)	8	50 (60)	25kv AC	TCB	3	2
05.03	Hertford East Branch	HEB	London & SE	DfT	No	W6	9	60 (various)	25kv AC	TCB	4	2
05.04	Chingford Branch	CJC	London & SE	DfT	No	W6	7	50	25kv AC	TCB	3	2
05.05	Cambridge Lines	BGK (SBR)	London & SE	DfT	No	W8 (W9)	8	various	25kv AC	TCB	3 (4/5)	2
05.06	Ely – Kings Lynn	BGK	Secondary	DfT	No	W8 (W9)	8	90 (various)	25kv AC	TCB	various	1 (2)
05.07	Peterborough–Ely–Haughley Jn	EMP (CCH)	Secondary	DfT	No	W10 (W9)	8	75 (various)	None	TCB (AB)	various	2 (1)
05.08	Coldham Lane Jn – Chippenham Jn	CCH	Rural	DfT	No	W8	8	60	None	TCB (TB)	OTIS	1
05.09	Ely – Norwich	ETN	Secondary	DfT	No	W8	8	75 (90)	None	AB (TCB)	AB	2
05.10	Freight Lines	various	Freight	DfT	No	various	8 (6)	various	various	OTW (TCB)	4 (OTIS)	various

Capacity and operational constraints

- A** Littleport – Downham Market & Watlington – Kings Lynn: Single track sections limit capacity
- B** Cambridge station: Single through platform
- C** Stansted Airport Tunnel: Single track
- D** Tottenham Hale – Broxbourne: Mixed use of fast and slow services constrains capacity and potential journey time reductions

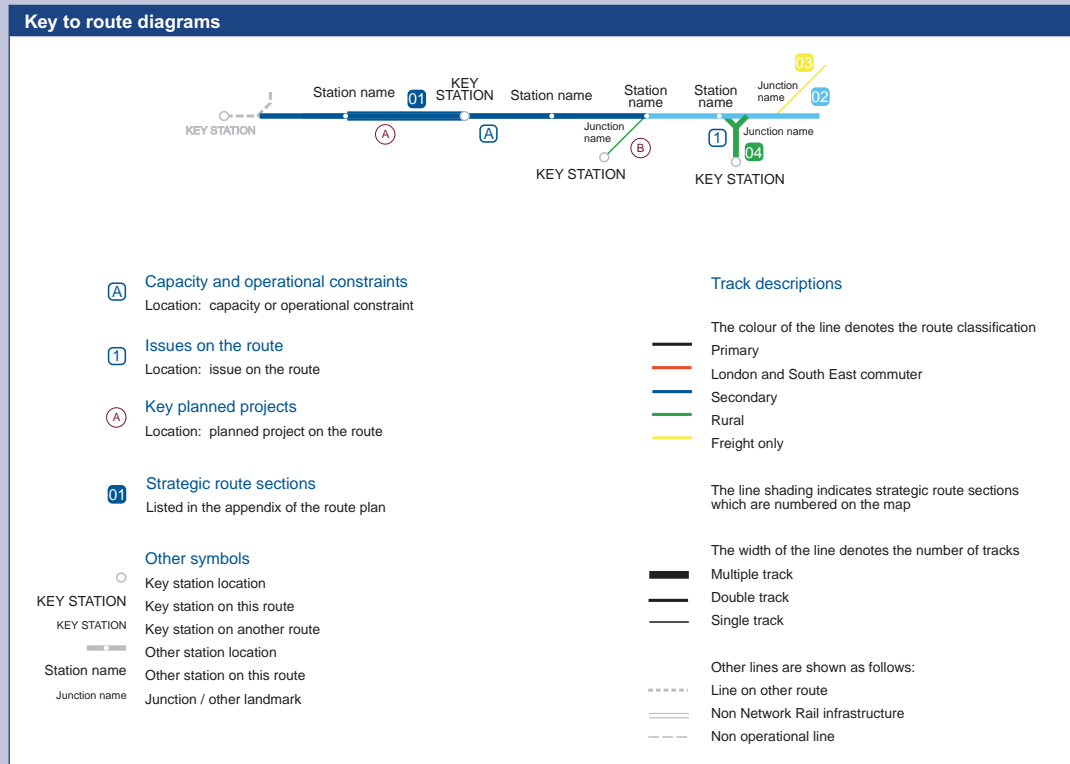
Other issues on the route

Potential strategic freight route would require an upgrade to this section

Note

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

Other documents in the Delivery Plan can be found on the Network Rail website www.networkrail.co.uk



GRIP stages

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

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