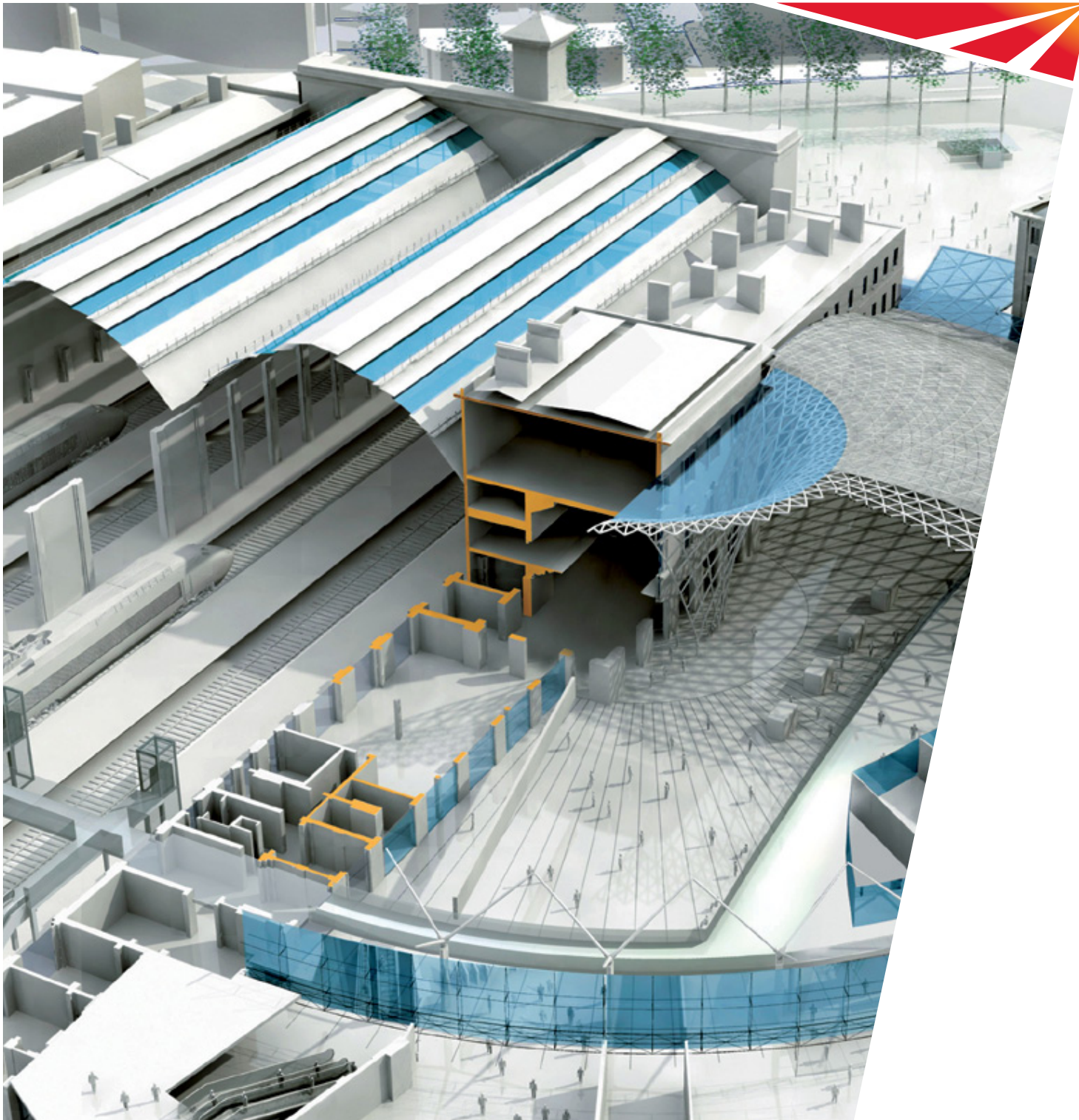


*Moving ahead
Planning tomorrow's railways*

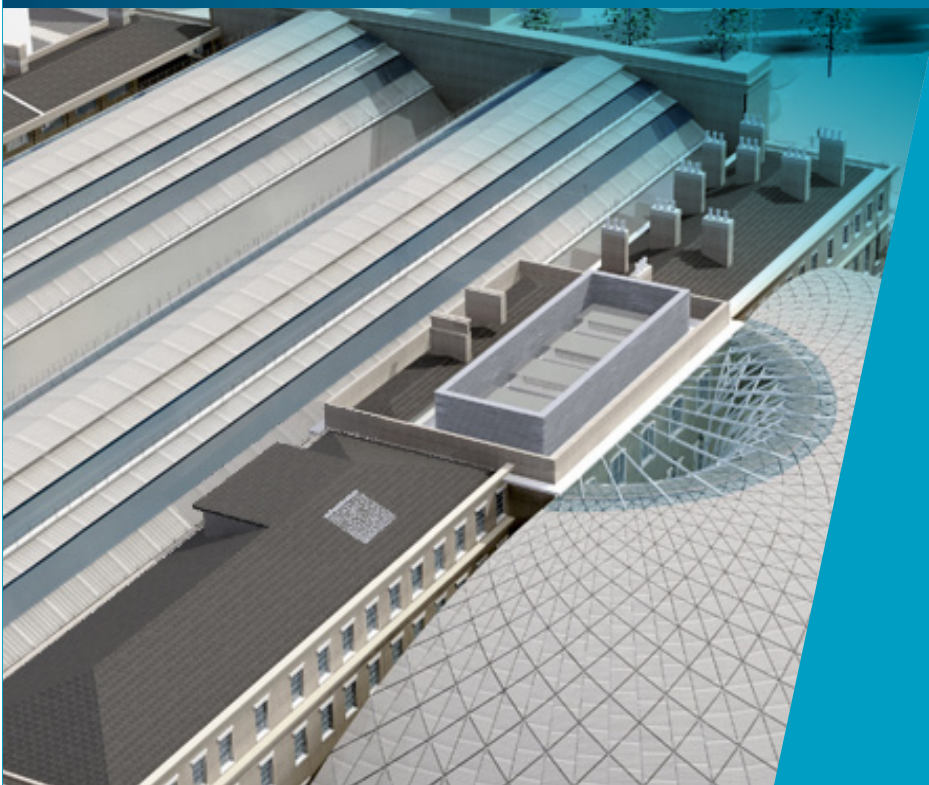
NetworkRail



*Our railways play a vital role
in building Britain's future*

Planning tomorrow's railways

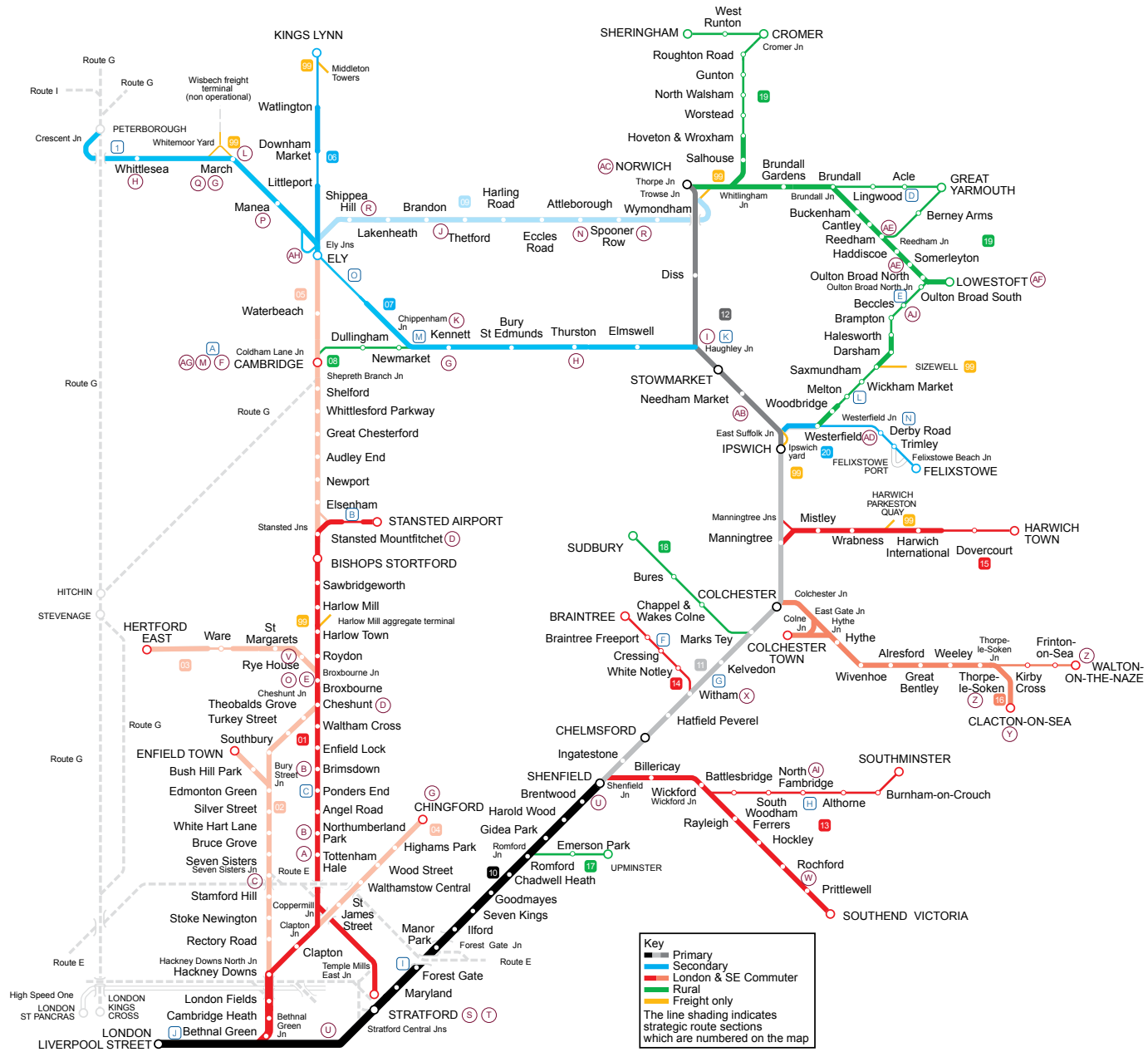
Our £500 million investment in King's Cross station will transform the experience of passengers using the station. We are delivering hundreds of projects across the network to build a bigger, better railway for passengers, freight and the whole of Britain.



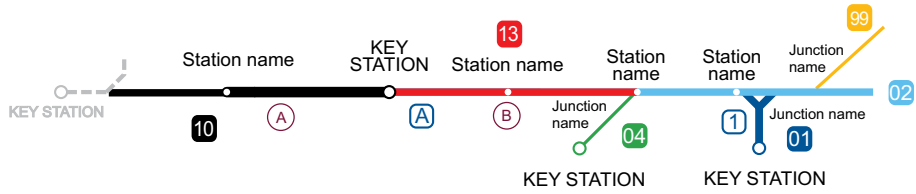
Route Plan D
East Anglia



Route Plan D East Anglia



Key to route diagrams



A Capacity and operational constraints
Location: capacity or operational constraint

1 Issues on the route
Location: issue on the route

A Key planned projects
Location: planned project on the route

01 Strategic route sections
Listed in the appendix of the route plan

Other symbols

	Key station location
KEY STATION	Key station on this route
	Key station on another route
KEY STATION	Key station on another route
	Other station location
Station name	Other station on this route
	Junction / other landmark
Junction name	Junction / other landmark

Track descriptions

The colour of the line denotes the route classification	
	Primary
	London and South East commuter
	Secondary
	Rural
	Freight only

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

The width of the line denotes the number of tracks	
	Multiple track
	Double track
	Single track

Other lines are shown as follows:	
	Line on other route
	Non Network Rail infrastructure
	Non operational line

Section 1: Today's railway

Route context

The East Anglia route carries: Main line services to Liverpool Street; 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.

South of Cambridge the West Anglia Main Line (WAML) largely parallels the M11, whilst south of Ipswich the Great Eastern Main Line (GEML) parallels the A12 and rail services on both arteries penetrate right to the heart of London.

The East Anglia route serves one of the fastest growing regions in the country with densely populated areas at its southern end and significant traffic generators at Cambridge, Chelmsford, Colchester, Ipswich, Norwich 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 important corridors for substantial freight traffic to and from the East and West Coast Main Lines (ECML and WCML) and onwards to the rest of the country, especially from the Port of Felixstowe, which is the largest container port in the country.

The East Anglia route is covered 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 in 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) in February 2006. The RPA sets out scenarios of continuing growth in commuting to the centre of London and Docklands and continued growth to Stansted Airport. However, the current network is already operating at or close to capacity in terms of train paths.

The GA RUS has looked at options and recommendations for accommodating future growth on the route and whilst some of these recommendations are being taken forward in Control Period 4 (CP4) to meet the capacity metrics set by the DfT in their High Level Output Specification (HLOS) published in July 2007, others will be taken into further consideration for future

options of meeting additional growth through Control Period 5 (CP5).

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.

The current National Express East Anglia franchise is due to expire on 31 March 2011. DfT issued a consultation document for the replacement Greater Anglia franchise on 21 January 2010. The closing date for consultation responses is 19 April 2010.

Today's route

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

- the WAML (D.01, D.02, part of D.05 and D.06), which runs from Kings Lynn to London and includes the two routes between Liverpool Street and Cheshunt, one via Tottenham Hale (the Lea Valley) and one via Seven Sisters (the Southbury Loop). It also includes the branch to Stansted Airport
- the GEML from Norwich to London (D.10, D.11 and D.12)
- WA inner and outer suburban branches, to Chingford (D.04), Enfield Town (part of D.02), and Hertford East (D.03)
- GE inner and outer suburban branches to Upminster (D.17), Southend Victoria and Southminster (D.13), Braintree (D.14), Colchester Town, Clacton-on-Sea and Walton-on-the-Naze (D.16) and Harwich Town (D.15)
- the cross country lines from Norwich to Peterborough via Ely, and Haughley Jn to Cambridge and Ely (D.15, D.16 and D.17)
- the Sudbury branch (D.18) and the remaining branch lines in Norfolk and Suffolk (D.17)
- the important freight route between Ipswich and the Port of Felixstowe (D.20).
- the short freight only branches to Sizewell Power Station (D.99), Middleton Towers (D.99) and Griffin Wharf (D.99).

Current passenger and freight demand

Passenger demand on the two core commuter routes into London and the Docklands is increasing.

On the West Anglia route the autumn 2008 morning peak passenger count was one percent higher than in 2007 especially into central London. On the Great Eastern route the number of people travelling into London in the morning peak increased by three percent between autumn 2007 and 2008.

Most of the peak demand is commuter flows from the main population centres, but there is also a fast growing leisure market driven by low cost flights from Stansted Airport and successful marketing campaigns from the train operators and rail partnerships.

The main lines compete with the M11 and A12 corridors, which feed the M25 around London and extend all the way down into the Docklands and the eastern approaches to the city. However, road traffic in and around London is very congested at peak times and this means that the railway tends to be the first choice for commuters especially on the suburban network, which experiences strong patronage in the peak. On the West Anglia route in autumn 2008 there were approximately 10,000 passengers per day travelling into London on the main line peak services and 17,000 in the morning peak on the WA suburban network, whilst on the Great Eastern route 60,000 passengers a day were recorded in the autumn 2008 peak passenger counts travelling into London: This is due to increasing employment in central London and Docklands.

Although the majority of the current demand is for travel into Liverpool Street, on the West Anglia route a significant number of passengers interchange with the London Underground (LUL) 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. On the Great Eastern route passengers interchange at Stratford with onward journeys via the LUL Central and Jubilee Lines, Docklands Light Railway and the London Overground.

Stratford is the gateway to the Docklands and employment in Docklands is expanding. Stratford itself is set to benefit from the new Stratford City development (currently under construction), and interchange with the High Speed 1 line to the Channel Tunnel and Kent domestic high speed services.

Stansted Airport currently handles around 20 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.

Since the introduction of an hourly passenger service between Norwich and Cambridge, demand between these major regional transport hubs has increased. In addition there is healthy growth on the interurban services from the region to the West Midlands and the North West.

Since the Freight Route Utilisation Strategy was published by Network Rail in March 2007 and established by the Office of Rail Regulation in May 2007, the demand forecasts have been revisited and further refined and agreed by the industry. Freight demand, especially in intermodal deep sea containers from the Port of Felixstowe is growing year on year by 4-5 percent. This demand will be further increased by the impending port developments at Felixstowe South (work commenced in 2008), and Bathside Bay, Harwich (approved March 2006), as well as the development of the proposed deep sea London Gateway Port at Shell Haven on the Thames Haven branch (Thameside Route – Route F), which received approval in May 2007. These revised forecasts show that Felixstowe 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 is developed. London Gateway Port itself could generate up to as many as 30 trains a day by 2030.

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 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.

Current services

The passenger services are operated by National Express East Anglia (NXEA), First Capital Connect (FCC), East Midlands Trains and CrossCountry, with a small number of services into Liverpool Street

operated by c2c, DB Schenker, Freightliner Ltd, Freightliner Heavy Haul Ltd, Direct Rail Services (DRS) and GB Railfreight (First GBRf) operate the main freight services on the route.

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 East 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 rural services in Norfolk, Suffolk, Essex, cross country services between Ipswich and Cambridge, Ipswich and Peterborough and services between Norwich and Cambridge. FCC operates outer suburban services between Kings Lynn, Cambridge and Kings Cross. East Midlands Trains operate 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, main line electric multiple units, main line electric loco hauled services as well as diesel multiple units.

As well as an intensive passenger network the East Anglia route provides two important arteries for long distance freight flows from the east coast ports of Felixstowe and Harwich: The congested GEML and across London; and the cross country route to Peterborough via Bury St Edmunds, Ely and March.

The route also sees varying volumes of freight to local terminals and yards, including: Aggregates & cement (Bow, Broxbourne, Lea Interchange, Kennett, Marks Tey, Harlow Mill, Chesterton Jn, Chelmsford, Purfleet, West Thurrock, Brandon, Barnham, Eccles Road, Ely, Ipswich Griffin Wharf); sand (Middleton Towers); general merchandise (Ely, Ripple Lane); gas distillate (North Walsham); deep sea container traffic (Felixstowe, Ipswich Griffin Wharf); domestic, short sea and deep sea intermodal traffic (Tilbury, Barking, Purfleet); Olympics supplies (Bow East, Lea Interchange); scrap metal (Snailwell); and seed potato traffic (Eccles Road). 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 East Anglia route are primarily diesel hauled with some electrically hauled services on the southern end of the GEML.

Figure 1 Current train service level (trains per hour)

Station	tph to Stratford	tph to Liverpool Street	tph to Kings Cross
Enfield Town		4 peak/2 off-peak	n/a
Chingford		5 peak/4 off-peak	n/a
Cheshunt	2 peak/1 off-peak	8 peak/7 off-peak	n/a
Broxbourne	2 peak/1 off-peak	9 peak/5 off-peak	n/a
Hertford East	1 peak/0 off-peak	3 peak/2 off-peak	n/a
Stansted Airport		4 peak/4 off-peak	n/a
Cambridge		4 peak/2 off-peak	3 peak/3 off-peak
Kings Lynn/Ely		1 peak/0 off-peak	2 peak/1 off-peak
Ilford		16 peak/6 off-peak	n/a
Gidea Park		12 peak/6 off-peak	n/a
Shenfield (includes Main Line and Metro services)		13 peak/6 off-peak	n/a
Southend		6 peak/3 off-peak	n/a
Southminster	2 peak/0 off-peak (see figure 2)		n/a
Chelmsford		7 peak/5 off-peak	n/a
Braintree		1 peak/1 off-peak	n/a
Colchester		8 peak/5 off-peak	n/a
Clacton		4 peak/1 off-peak	n/a
Harwich Town/International		1 peak*/1 off-peak	n/a
Norwich		4 peak/2 off-peak	n/a

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
Romford to Upminster	2
Southminster to Shenfield	1
Walton-on-the-Naze to Colchester via Colchester Town	1
Sudbury to Marks Tey	1
Harwich Town to Manningtree (terminates at Liverpool Street)	1
Ipswich (starts at Liverpool Street) to Lowestoft	1 every 2 hours
Ipswich to Felixstowe	1
Norwich to Lowestoft/Great Yarmouth/Sheringham	1 to each destination

There is no segregation between freight or passenger traffic on the East Anglia route.

Figure 3 shows the total annual tonnage levels on the West Anglia and Great Eastern Route.

Figure 4 summarises traffic volumes.

Figure 3 Tonnage

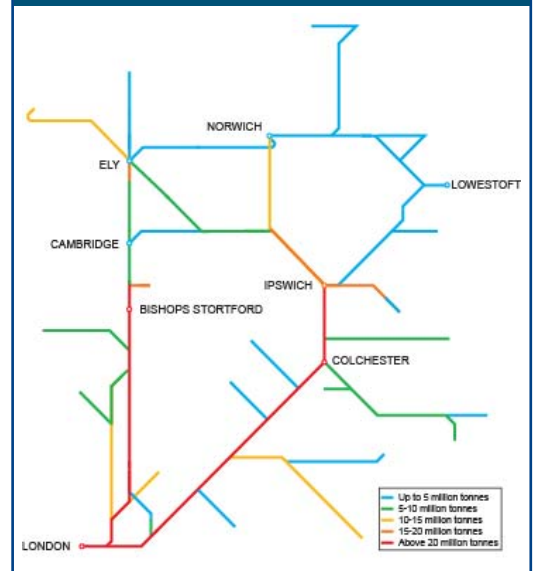


Figure 4 Current use

	Passenger	Freight	Total
Train km per year (millions)	36	3	39
Train tonne km per year (millions)	8,756	2,761	11,517

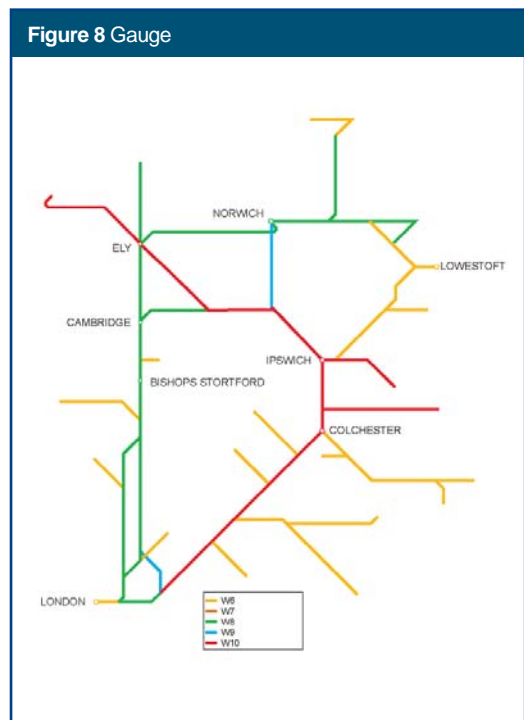
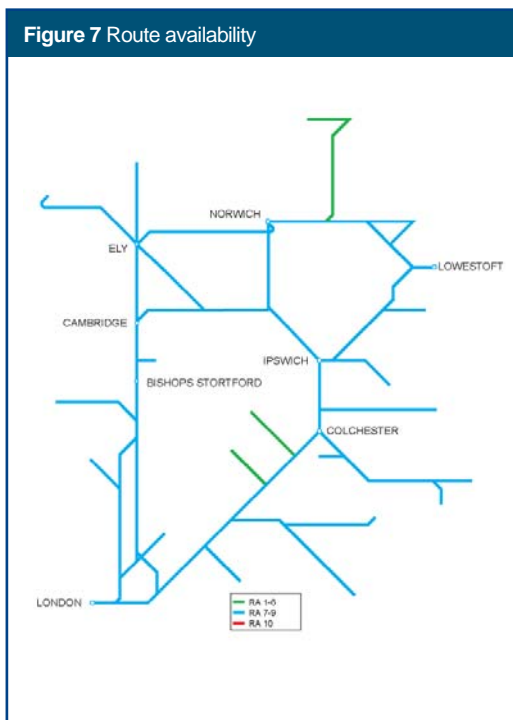
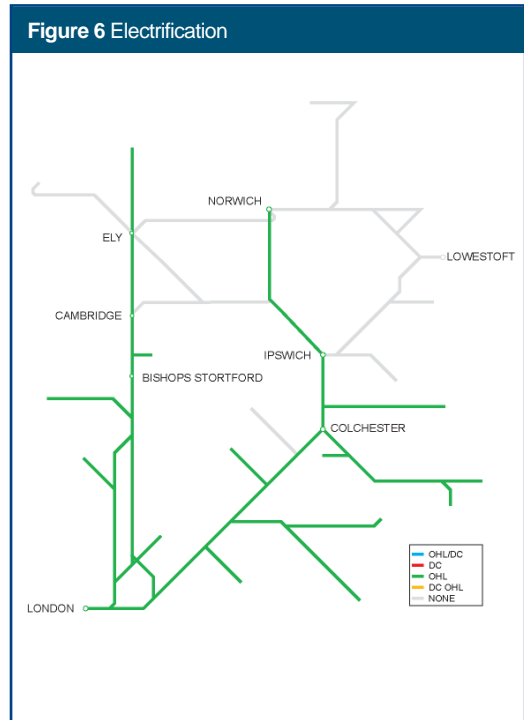
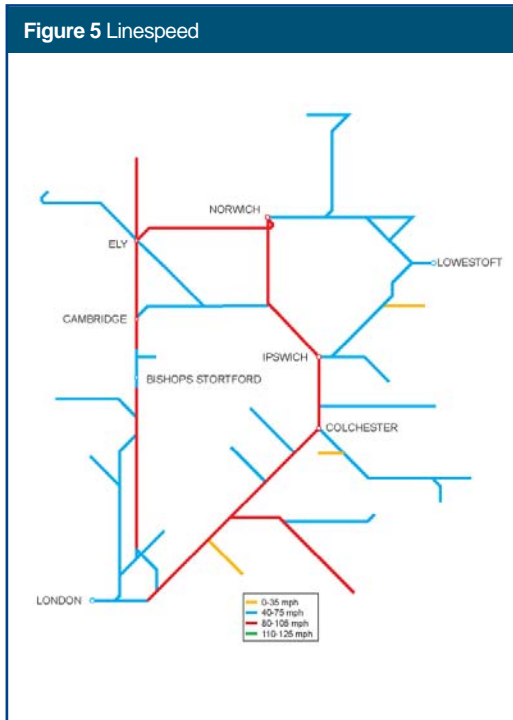
Current infrastructure capability

The following maps provide an indication of the predominant capability on each section of the route.

As part of the Infrastructure Capability Programme a number of Network Changes to Route Availability and Gauge, which may affect some of the detail of these maps, have been issued for consultation. Details of the Network Changes being consulted can be found on the [Network Rail](#) website and

details of Network Changes established can be found on the [Network Rail](#) website.

Current capability is shown in the Network Rail Sectional Appendix.



Current capacity

The East Anglia route is mainly two track and capacity is limited by a mix of fast and stopping services especially between Broxbourne and Tottenham Hale and between Colchester and Shenfield, which is further constrained in the off peak by freight services. A combination of complex junctions, station occupancy and single line sections exacerbate these issues.

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. There is a four track section inwards to London from Shenfield, which does allow some segregation between fast and stopping passenger services but even here the route is close to its capacity at peak times. Outside the peak the mix of current stopping patterns north of Shenfield and the growing number of freight trains from the Thameside route, which cross the Great Eastern on the flat between Forest Gate Jn and Stratford, use almost all of the available track capacity.

Key issues on the East Anglia route are:

- a lack of an alternative route to WCML beyond Peterborough with W9 and W10 loading gauge capability to relieve capacity on the GEML for the predominantly intermodal freight traffic
- the high volumes of freight traffic from Thameside, which has to weave across the Great Eastern route from the electric lines to the main lines on the flat between Forest Gate Jn and Stratford to access the North London Line (NLL)
- a lack of long freight loops between Haughley Jn and Stratford
- the long single line Felixstowe Branch, which is a constraint to increasing traffic at the Port of Felixstowe
- the mixture of fast and stopping services on the two track WAML between Broxbourne and Tottenham Hale along the Lea Valley line and on the two track GEML between Colchester and Shenfield giving rise to congestion and performance risk through much of the day
- 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 in 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 Junction and Cambridge
- absolute block signalling on the cross country lines coupled with long signal sections between Bury St Edmunds and Kennett and speed restrictions on heavy axle weight freight wagons
- the long single line track sections on the East Suffolk Line
- the three track throat to Norwich station
- convergence of three lines at Ely North Jn including single lead junctions and reduced functionality
- 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
- passenger capacity is an issue at Stratford station due to increasing passenger numbers at peak times and high levels of transfers to the LUL, London Overground and Docklands Light Railway
- Ipswich Yard capacity.

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	
Seven Sisters to Hackney Downs	6
Clapton to Hackney Downs	14
Enfield Town branch	4
Chingford branch	4
Cheshunt to Tottenham Hale	10
Hertford East branch	3
Harlow Town to Broxbourne	8
Stansted Airport branch (includes 1 to Birmingham)	5
Cambridge to Audley End (includes 1 to Stansted Airport)	5
Norwich to Diss	4
Ipswich to Manningtree	5
Thorpe le Soken to Hythe	5
Colchester to Marks Tey	10
Braintree branch	1
Witham to Hatfield Peverel	11
Chelmsford to Ingatestone	12
Southend Victoria to Wickford	7
Wickford to Shenfield	9
Shenfield to Gidea Park (electric line)	7
Gidea Park to Romford (electric line)	13
Ilford to Stratford (electric line)	14
Shenfield to Stratford (main line)	21

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 most of the route operating at close to track capacity for most of the day, there are some difficult performance issues. The current mix of fast and stopping services and the intensity of the peak service along with increasing freight services mean that any 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 track faults and associated speed restrictions, OLE problems, seasonal weather related problems, possession overruns, level crossings reliability and misuse, and trespass and vandalism incidents, which particularly affect the inner suburban services.

Figure 10 2009/10 PPM

TOC	Forecast MAA	As at period
National Express East Anglia	90.0%	11
First Capital Connect	89.4%	11
CrossCountry	90.4%	11
East Midlands Trains	92.5%	11

Section 2: Tomorrow's railway: requirements

HLOS output requirements

Figure 11 below shows the HLOS output requirement for the total demand to be accommodated on the former strategic routes which make up Route D: East Anglia.

Figure 11: Total demand to be accommodated by Strategic Route

Routes	Annual passenger km in 2008/09	Additional passenger km to be accommodated by 2013/14
West Anglia	1,561	482
Great Eastern	2,775	319

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

London Terminals	Peak three hours			High peak hours		
	Assessed demand in 2008/09	Extra demand to be met by 2013/14	Maximum average load factor at end CP4 (%)	Assessed 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. Elsewhere growth at the regional centres of Chelmsford, Colchester, Ipswich and Norwich are fuelling peak commuter demand for travel to London.

Due to the anticipated housing growth, the WA route in particular has the highest rate of background demand growth predicted for all routes serving London. The number of trips here in the morning peak is predicted to rise by around 3-3.5 percent a year on average over CP4 (compared to an average of around 2 percent a year elsewhere on the route). 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 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 at Stansted Airport itself.

It is envisaged that increases in demand beyond those predicted will be generated by the Stratford City development and employment growth in Docklands and the City of London. There is also the need to handle a significant temporary increase in passenger flows associated with The London Olympic Games and Paralympic Games (the Games) in 2012.

The Freight RUS set the demand for freight services in CP4, which was reinforced in the Greater Anglia RUS and has been expanded with revised long term forecasts agreed by the industry.

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. This is fuelling additional demand for freight services to support construction of the Olympic venues.

Overall the demand for freight paths is forecast to increase on the Great Eastern route by 10-15 paths a day by 2014/15. This increase is predicted primarily due to the port developments at Felixstowe, Bathside Bay and London Gateway Port. The level of construction work scheduled over the next five years (including house building and the Games) will require an increase in the volume of aggregates hauled on the route and this has been taken into account in the revised industry forecasts.

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 soon to be cleared W10 cross country route from Ipswich to the East Coast Main Line (ECML) via Bury St Edmunds, Ely, March and Peterborough.

The London and South East RUS is currently being developed and will highlight new gaps and recommendations for meeting growth on the network.

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 track remodelling 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 if a second runway was to be built then a second rail tunnel will be needed at Stansted Airport to cope with future demand.

It is also anticipated that employment in the City of London will continue to drive the current rate of demand over CP5, linked 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.

Increases in passenger demand are expected to be generated by the Stratford City development and employment in Docklands and it is anticipated that there will also be a permanent increase following the redevelopment of the Olympic site after the Games. There is also the potential for new development around Southend airport including a new station.

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.

It is also anticipated when Crossrail is completed in 2017 that as well as providing additional capacity on the GE route it will also be an attractor of increased demand to London.

Longer term forecasts to 2030 of freight demand have been agreed with the industry; these show continued growth in freight beyond CP4. The demand for freight paths is forecast to increase on the route as the extended W9 & W10 gauge 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, along with the continued growth of the ports of Felixstowe, Bathside Bay, and London Gateway. It is expected that aggregates volumes will continue to rise as the level of construction work for house building increases and this too has been taken into account in the revised industry forecasts.

Section 3: Tomorrow's railway: strategy

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

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

Figure 13 Summary of proposed strategy milestones			
Implementation date	Service enhancement	Infrastructure enhancement	Expected output change
2010	Run additional high peak trains on the GEML outer services, plus additional shoulder peak services	Lengthen Platform 10A (and provide freight loop) at Stratford and lengthen North Farnbridge loop so that two 12-car trains can pass	Increased peak capacity and improve freight regulation
2010	Allow additional GE outer peak services to call at Stratford	Lengthen Platform 10A at Stratford	Increase peak capacity and improve access to Docklands
2011	Strengthen Stansted – Birmingham services	Lengthen Stansted – Birmingham services to 4-car and lengthen bay platform at Stansted Airport	Increase capacity
2011	12-car operation on the Liverpool St – Stansted Airport services	Platform extensions on WAML and at Stansted Airport	Increased peak capacity
2011	12-car operation on the Liverpool St – Cambridge services	Platform extensions plus new island platform at Cambridge	Increased peak capacity
2011	WA peak strengthening 4-car to 8-car	None	Increased peak capacity
2011	Run two additional peak services on the GE inner services	None	Increased peak capacity
2012	Hourly service on Ipswich – Lowestoft	Passing loop at Beccles, plus potential linespeed improvements associated with resignalling	Double service frequency
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 strengthening	24	Liverpool Street	3,700	800
GE two additional main line services	24	Liverpool Street	2,500	0
GE eight extended main line services to 12-car	32	Liverpool Street	3,000	0
GE one extended Southminster service to 12-car	4	Liverpool Street	400	400
GE alterations to rolling stock allocations on main line services	0	Liverpool Street	1,200	1,100
GE two additional peak electric line services	8	Liverpool Street	1,700	900

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

Figure 15 Impact on HLOS peak capacity metric

London Terminals and regional Hubs	Peak three hours				High peak hours			
	Demand end CP4	Capacity start CP4	Capacity end CP4	Load factor end CP4	Demand end CP4	Capacity start CP4	Capacity end CP4	Load factor end CP4
Liverpool Street	84,900	115,400	134,900		41,600	50,400	56,000	
Other London Termini*	477,000	621,400	710,900	66%	240,700	270,900	318,600	75%

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

Strategic direction

Network Rail expects that the East Anglia 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. This 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, 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 East Anglia route, additional peak services and train lengthening is being planned to meet passenger growth. This will require some infrastructure works including longer platforms, lengthened loops, additional tracks and some traction power reinforcement. More details can be found in the capacity section and this document also contains a look forward to some of the longer term plans for the route.

In terms of dealing with freight growth the strategy has been set out in the CL RUS, Freight RUS and also in the GA RUS. These strategies describe the industry growth forecast and the strategy for dealing with the growth in traffic. On the GEML this strategy requires the two off-peak freight paths per hour to be protected in future timetables. It also assumes that the growth in East Coast Ports traffic will be accommodated by modest increases in traffic on the GEML with the majority of the growth being routed cross country via an upgraded Ipswich – Bury St Edmunds – Ely – March – Peterborough – Nuneaton route. An additional assumption is that Thameside (Route F) freight services including growth from the London Gateway Port will be routed across North London (Route E) via an upgraded Gospel Oak – Barking route away from the congested Great Eastern route between Forest Gate Jn and Stratford.

Future train service proposals

Network Rail has been working with NXEA, FCC, CrossCountry, East Midlands Trains 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 Hertford East 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 WA Outer services. (See below)

West Anglia outer services

New rolling stock is planned to be introduced onto the Stansted Airport and a number of Cambridge services to Liverpool Street, some of which will be lengthened to 12-cars in the peak. This will allow a cascade of the current rolling stock to lengthen other peak Cambridge services to 12-cars, and some WA inner services to 8-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 some additional berthing will be required in the Cambridge area.

Norwich services

To meet peak demand on these services lengthening trains will be introduced by the train operator.

Additional overnight/inter-peak berthing will be provided at Orient Way and Norwich Crown Point.

Great Eastern outers

To meet forecast growth, extra services will be required and additional 12-car high peak services will be introduced on the GEML. On the Southminster line North Farnbridge loop will be extended so that more 12-car trains can operate in the peak. In addition, calling more services at Stratford will enable the additional services to operate and this will also enable loads between services to be evened up.

The additional 4-car EMUs required for these services will be met from the cascade of existing rolling stock from the introduction of new rolling stock on Stansted Airport and London Midland services, as envisaged in the DfT Rolling Stock Plan. It is proposed to re-open the berthing sidings at Harwich (Parkeston Quay) to accommodate the additional rolling stock.

Great Eastern inners

Two additional peak trains will be required to meet medium term growth.

The additional 4-car EMUs required will be cascaded from the West Anglia route.

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 longer term in accordance with the East Midlands RUS recommendations. 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. Additional units will be available for a Liverpool to Nottingham afternoon service to be extended through to Norwich

Cross country routes

On the cross country services some peak trains will be strengthened radiating from the regional centres. In addition, an hourly Ipswich – Saxmundham service is planned to be introduced which will be extended to Lowestoft every other hour. Subject to the provision of a loop at Beccles, the Ipswich to Lowestoft service will become hourly.

Freight services

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 revised industry wide freight forecasts.

The following parts of the East Anglia route are predicted to see the higher freight flows due to expansion at the east coast ports:

- Port of Felixstowe to Ipswich Yard (includes the whole of the Felixstowe branch and part of the East Suffolk Line between Westerfield and East Suffolk Jn)
- Bathside Bay to Manningtree Junctions (Harwich branch)
- Ipswich Yard to Stratford along the GEML
- Ipswich Yard to Peterborough (to access the ECML and eventually the WCML) via Haughley Jn, Bury St Edmunds, Ely and March.

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 GEML from the east coast ports of Felixstowe and Harwich to the ECML and WCML via Ipswich tunnel, Stratford and the North London Line (NLL) (via Cannonbury and Primrose Hill).

The use of 9' 6" high containers continues to increase. 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 West Anglia cross country route from Ipswich to the ECML via Bury St Edmunds, Ely, March and Peterborough is in the process of being cleared for W9 and W10 gauge freight services and further clearance works between Peterborough and Nuneaton will be undertaken during CP4 to give a cleared route from the haven ports (Felixstowe and Harwich – Route D) through to the WCML at Nuneaton. In conjunction with this, capacity works, such as improving signalling between Kennett and Bury St Edmunds, are being developed through the Strategic Freight Network that will allow additional freight services to operate. These works will absorb most of the freight growth from the proposed east coast port developments at Felixstowe and Bathside Bay and relieve the congested GEML and NLL routes. Freight management between Anglia and both ECML and WCML is critical if freight is to flow smoothly across the NLL.

The TIF programme is also funding the upgrading of the Barking to Willesden (via Gospel Oak) line (Route E) for Thameside freight traffic in order that it

can be rerouted away from the congested GE between Forest Gate Jn and Stratford.

Linespeed

Modest improvements to linespeeds on the cross country route between Newmarket and Cambridge could give longer turn round margins at Cambridge station and on some rural routes could give longer turn round margins at origin and destination stations, which would improve operation and performance as well as increasing demand, however this may only be possible in conjunction with increased infrastructure provided that a successful business case can be made. Other routes being considered for local speed improvements in conjunction with track renewals are GEML, Ely – Norwich, together with the East Suffolk Line and the Sudbury branch; again these are subject to a successful business case being made for them. CrossCountry has aspirations to improve journey time across the whole of the Birmingham to Stansted Airport route.

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.

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

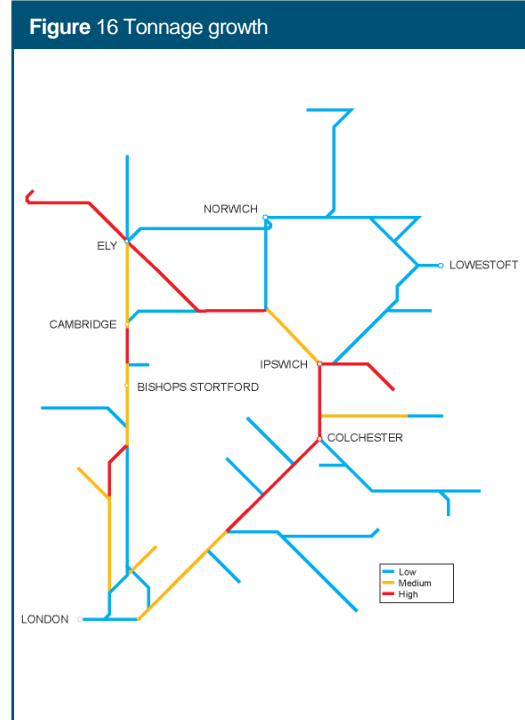
Figure 16 indicates the forecast percentage change in tonnage to 2019.

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 East 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 GEML between Ipswich and Stratford. 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 to Crescent Jn (Peterborough).

Train lengths

It is generally accepted that the practical approach to continued passenger and freight 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 traction power will also be required, as well as a new double faced 12-car island platform at Cambridge and a platform extension at Stansted Airport.

NXEA also intend to lengthen trains on their Cambridge to Norwich and Cambridge to Ipswich services.

CrossCountry intend to run 4-car trains from Birmingham to Stansted Airport, which also requires 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 WA and GEML 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:

West Anglia outer services

The strategy for the WA outers recommends the introduction of new rolling stock onto the Stansted Airport and some Cambridge services, which will allow services to be lengthened and require some platform extensions on the Cambridge/Stansted Airport corridor being taken forward (CP4); a new island platform at Cambridge (CP4) and a platform extension at Stansted Airport (CP4). 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). The Stansted Airport tunnel should be doubled if a second runway is developed (CP5). Provision of additional berthing in the Cambridge area and the introduction of new fixed formation rolling stock on the Thameslink/IEP service from 2015 on the Shepreth branch to Cambridge and Kings Lynn.

West Anglia inner services

The strategy for the WA inners recommends replacement of the existing units on the Chingford, Cheshunt/Enfield Town and Hertford East branches with high density rolling stock (CP5) and to potentially introduce a shuttle service from Cheshunt to Seven Sisters at peak times (CP5).

Great Eastern Outers

The strategy for the GE Outers recommends the operation of additional peak services (CP4) and replacement of the inter-city loco hauled sets with long distance EMUs or IEP (CP5). To enable the additional peak services to operate and more trains to call at Stratford, it will require the extension of Platform 10A so that it can take 12-car trains (CP4).

Great Eastern Inners

Two additional peak hour trains will be required to meet medium term growth (CP4). In the longer term

10-car operation and a new turnback siding at Chadwell Heath is required and this forms part of the Crossrail project (CP5), which is currently proposed for completion in 2017.

Southend/Southminster services

In order to allow two 12-car trains to pass each other on the predominately single line Southminster Branch it is necessary to lengthen the loop at North Farnbridge (CP4). Further interventions include calling more trains at Stratford to even up loadings and spreading the peak load into the shoulder peak in conjunction with the extension of Platform 10A (CP4), which will allow the flighting of main line peak services over two tracks in the peak direction.

Cross country routes

A loop is to be constructed at Beccles, subject to funding, to allow the introduction of an hourly service on the Ipswich – Lowestoft service (CP4). Level Crossings are also being reviewed along the route to assess if modest speed increases may be possible in conjunction with resignalling (CP4). The doubling of East Suffolk Jn is currently being investigated, so that freight growth is not affected by these proposals.

With the expansion of the Port of Felixstowe and the development of Bathside Bay, the growth in deep sea maritime container traffic is key to the route. Gauge and capacity works between Felixstowe and South Yorkshire are being developed in conjunction with Hutchinson Ports UK (HPUK), and a TIF bid has been successfully submitted for W10 gauge clearance on the Peterborough – Nuneaton route that will allow traffic an alternative route to the WCML. Capacity enhancements on the Ipswich – Nuneaton route will be developed from the Strategic Freight Network allocation allowed in the ORR Final Determination of Network Rail's funding for CP4. Implementation of the resulting developed infrastructure enhancements will be the subject of a variety of funding mechanisms including Trans European Network and a subsequent TIF bid.

The HPUK funded works include partial doubling of the Felixstowe branch and remodelling of Ipswich Yard.

In conjunction with proposed capacity improvements on the cross country route, development of the timetable could potentially allow increasing the frequency of the Ipswich – Peterborough passenger service to hourly.

Other investment issues

We will continue to carry out regular reviews of the renewal workbanks with a view to identifying the

Figure 17 Forecast PPM MAA – CP4 plan

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

opportunity for enhancements, particularly driven by the business needs of the operators (generally to be funded through NRDF and other means). In addition, these reviews consider the longer term needs of the route when specifying renewals, whether for power supply, capacity or linespeed.

Growth associated with works for the Games is, in part, being addressed by a range of third party schemes.

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

Future performance

Figure 17 sets out the planned PPM for each train operator. The PPM figure quoted represents the expected contribution of the TOC to the sector-level regulatory outputs in the CP4 delivery plan. 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. A fully integrated control centre for East Anglia is 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. Our improvement measures and initiatives include an improved possession strategy to maintain track circuits at key locations, fencing renewals to prevent trespass and vandalism and a rolling programme of tamping to improve track faults.

The programme of component replacement on the Overhead Line Equipment (OLE) continues, however most of the OLE problems are caused by fixed termination equipment, much of which is of a very old design, and needs to be seasonally re-tensioned according to the weather. The programme for the implementation of the renewal of the OLE between Liverpool Street and Chelmsford/Southend Victoria is being developed with a view to completing the work by the end of CP4. Work in the Liverpool Street area was completed in December 2007.

As part of the GA RUS work, junction margins and allowances are being examined, and the potential for timetable improvements explored.

National Express East Anglia

The performance of NXEA is currently 91.0 percent and joint plans exist to improve performance to 91.2 percent by the end of March 2010. The JPIP is supported by initiatives that have been implemented by the NXEA 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 East 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 NXEA 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
- Crossrail performance improvement schemes to help with meeting their planned performance of 95 percent PPM
- Rule of the Plan changes to December 2010 timetable for the Great Eastern line to improve reliability of service.

Network Rail and NXEA have drafted a Long Term Performance Plan. 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 FCC is currently 89.4 percent and this is planned to rise to 90.7 percent by the end of March 2010 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 services being 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 FCC 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.

We are working with FCC to produce a long term performance plan 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 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 G, H, I, J, K, L, M and N.

c2c

Another operator on this route is c2c, which operates some late night trains out of Liverpool Street. The future performance section for c2c can be found in the plan for Route F.

East Midlands Trains

East Midlands Trains only impact on the East Anglia route between Peterborough, Ely and Norwich. The future performance section for East Midlands Trains can be found in the Plan for Route I.

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 including:

- weekend maintenance possessions on a twelve week cycle at key junctions north of Shenfield giving a better balance between NXEA's requirements and Network Rail's requirements for maintaining the track.
- 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.

- weekly cyclical programme that maintains services into Liverpool Street station.

In conjunction with NXEA a Sunday service has been introduced using only a two track railway between Bethnal Green and Shenfield, which allows full possessions on sections of any two adjacent tracks of the four track section, providing access to key depots are maintained. During recent works to upgrade the OLE to auto tensioned equipment some multi track possessions have been required however completion of this work will remove one of the reasons for the need for three or four track possessions between Bethnal Green and Shenfield.

Although the introduction of cyclical access onto the Great Eastern route is delivering improved maintenance and performance in most places, the need to run increasing services to cater for rising demand in both passenger and freight and a corresponding desire for greater access for regular maintenance to address the resulting wear and tear on the assets may require a revision of the current regimes. Also Network Rail is continuing to work with operators on improving weeknight maintenance on the two-track Shenfield to Colchester section of the GEML, which will now benefit from bi-directional signalling throughout as this equipment has now been installed on the last remaining section between Marks Tey and Colchester. In the longer term it is an aspiration to extend bi-directional signalling from Colchester to Haughley Jn in conjunction with resignalling on this section of the route.

In addition Network Rail is investigating the practicalities of:

- using the cross country route to enable the GEML/NLL route and the cross country routes to be used as alternative routes for each other, so that one or the other could be blocked at nights/weekends to enable enhanced engineering access
- undertaking more work for other disciplines in existing possessions planned for track renewals
- taking long blockades rather than frequent smaller possessions
- 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
- 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'.

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 replacing signals with LEDs 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.

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.

Accommodating growth in commuting to central London and the Docklands continues to be a significant challenge on the route, especially when considering the continued developments around Stratford, which includes the interchange with the High Speed 1 line to the Channel Tunnel, the expanding DLR network and the Games in 2012. It is also anticipated that the 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. 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 with off grade bridges or subways. In addition when Crossrail is built it is assumed that the additional services using the remodelled tracks on the Lea Valley will be able to run onwards from Stratford into Liverpool Street.

The Thameslink/IEP 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.

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.

In the longer term it is not feasible to operate additional outer and long distance services over the GEML without a prohibitively expensive capacity upgrade between Shenfield and Liverpool Street. It is therefore proposed to consider the scheme put forward in the London to Ipswich Multi-Modal (LOIS) Study. This scheme involved four-tracking between Colchester and Chelmsford and then building a new line across to the LUL Central Line and then running into the proposed Crossrail 2 alignment, thereby enabling additional outer services to operate.

On the GE inner services it is assumed that 10-car operation will be required to meet long term demand in CP5. This will be provided by the Crossrail project, which will also enable the current Class 315 EMUs to be replaced by new 10-car Crossrail units. Platform extensions will be required and/or selective door opening introduced where the cost of platform works would be prohibitive. A turnback siding will be constructed at Chadwell Heath and additional and upgraded berthing will also be required, along with enhanced traction power supply.

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 at Ely North Junction to address the single leads will be required to operate such a service making it a longer term opportunity.

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

The Freight RUS examined the long term prospects for longer and heavier trains in order to increase capacity without using additional paths. This work concluded the future plans for route upgrade need to allow for lengthening loops and sidings when signalling work is carried out.

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 Strategic Freight Network vision includes making the Ipswich to Peterborough route a core trunk route for Intermodal trains to the North East, West Midlands, North West and Scotland. The growth in the Ports of Felixstowe and the new Port at Bathside Bay in Harwich will double the volume of rail freight, hence the need for a new route. The West Anglia Main Line is also included in the vision to provide another gauge cleared route towards London and act as a diversionary route.

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 Broxbourne, Harlow Town and Diss. 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 the 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), Great Blakenham (to serve the Snoasis development north of Ipswich), Southend Airport and a station to serve a development to the north-east of Chelmsford.

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, DfT and other stakeholders on how this could be taken forward.

The Department for Transport published its formal consultation document Delivering a Sustainable Transport System (DaSTS) in November 2008. It sets out long term transport priorities for the period to 2019 and beyond and reflects conclusions from the Eddington Study and the Stern review.

The document sets out five clear transport goals for the network these are:

- To support national economic competitiveness and growth by delivering reliable and efficient transport networks
- To reduce transports emissions of carbon dioxide (CO2) and other greenhouse gasses, with the desired outcome of tackling climate change
- To contribute to better safety and health and longer life expectancy by reducing the risk of death, injury or illness arising from transport, and by promoting travel modes that are beneficial to health
- To promote greater equality of opportunity for all citizens, with the desired outcome of achieving a fairer society, and
- To improve quality of life for transport users and non transport users, and to promote a healthy natural environment.

Rail has potential to help meet these objectives and Network Rail will continue to engage with the Regions and Local Authorities at all levels of the process. There are four stages in the process. In stage one each Region was invited to propose a number of strategically relevant studies to take forward which they believe will meet the DaSTS objectives. The DfT then selected the studies that would progress into stage two to generate options for appropriate interventions. All studies are currently in stage two and need to produce a long list of options by the end of March 2010 for further review. Stage three will involve the sifting and packaging of options, while stage four will see the completion of an overall programme, with all studies complete by 2012.

As part of the DaSTS programme there are both National and Regional studies, the national studies are led by the DfT and the local studies are led by the Regions. There are a number of joint studies with the involvement of both the DfT and the Regions.

There is a national Freight Modal Choice study looking to confirm the economic, social and environmental benefits of current freight movements by non-road modes on national network corridors and to identify where changes in future modal choice, from road to rail or water, could address issues on the network and deliver against the five

DaSTS goals. This includes consideration of the capacity and capability of the national infrastructure to accommodate these changes in modal choice.

On this route the studies that may affect long term opportunities and challenges are:

- Access to Greater Cambridge
- Sustainable transport options to support housing and economic growth
- Role of transport options to support housing and economic growth
- Role of transport in addressing peripherality
- Sustainable transport options for the A12
- Transport options for London Arc and Thames Gateway
- Carbon plus study
- Enhancement of regional transport model
- Option generation, co-ordination and prioritisation
- London to Haven ports corridor study
- Freight from road to rail.

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
2012	(A) Tottenham Hale station improvements	Improvement to the station circulation as part of the Tottenham Hale development programme	Capacity Enhancement	TfL/ Developer	2
2014	(B) Lea Valley Level Crossings	Replacement of level crossings with off grade bridges or subways	Capacity Enhancement & Performance Improvement	Network Rail	–
2012	(C) Seven Sisters Improved access	Improve access to Seven Sisters	Capacity Enhancement	Periodic Review 2008	–
2011	(D) 12-car trains to Cambridge and Stansted Airport	12-car platform extensions (excluding Cambridge island platform and Broxbourne)	Capacity Enhancement	Periodic Review 2008	4
2011	(E) Broxbourne station 12-car platform	12-car platform extension and associated works	Capacity Enhancement	Periodic Review 2008	4
2011	(F) Cambridge new island platform	New 12-car island platform and associated works	Capacity Enhancement	Periodic Review 2008	4
2012	(G) 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	6
2009 - 2014	(H) Ipswich to Nuneaton capacity increase	Capacity enhancements at various locations between Ipswich and Nuneaton (development only during CP4 through Strategic Freight Network) via London	Capacity Enhancement & Performance Improvement	Periodic Review 2008/Third Party	6

Figure 18 Proposed enhancements in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2010/11	Ⓛ Haughley Jn S&C renewal	S&C renewal	Renewal	Network Rail	4
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	4
2011	Ⓢ Manea bridge renewals	Bridge reconstruction/strengthening	Renewal	Network Rail	2
2010	Ⓣ March East S&C	S&C renewal	Renewal	Network Rail	5
2010	Ⓤ Ely to Norwich Resignalling	Modular resignalling	Renewal	Network Rail	4
2010	Ⓡ Stratford Platform 10A	Extend Platform 10A to 12-car operation (plus incorporate a freight loop)	Capacity Enhancement	Third Party	4
2011	Ⓣ Stratford capacity works	Additional signals	Capacity Enhancement	Third Party	–

Figure 18 Proposed enhancements in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2010	(U) OLE improvements Liverpool Street-Shenfield	Conversion from fixed to auto tensioned equipment	Performance Improvement	Network Rail	6
2011	(V) Traction Power supply upgrade	To provide power supply to support longer trains and additional services	Capacity Enhancement	Periodic Review 2008	3
2010	(W) Southend Airport New Station	New station to serve Airport development	New Station	Third Party	6
2010	(X) Witham Second Entrance	Additional entrance to Witham station	Capacity Enhancement	Network Rail Discretionary Fund/Third Party	5
2012	(Y) Clacton Resignalling	Resignalling at Clacton Station	Performance Improvement	Network Rail	6
2010	(Z) Thorpe-le-Soken to Walton-on-the-Naze track renewal	Plain line track renewal	Renewal	Network Rail	4
2010/11	(AB) Claydon S&C	S&C renewal	Renewal	Network Rail	3
2012/13	(AC) Barham S&C	S&C renewal	Renewal	Network Rail	3
2013/14	(AD) Felixstowe to Ipswich Freight Upgrade	Doubling 4½ mile section of single-track line between Trimley and Derby Road on the Felixstowe branch line plus provision of three additional full length sidings at Ipswich Yard	Capacity Enhancement	Third party	4
2010	(AE) Somerleyton and Reedham swing bridges	Swing bridge refurbishments	Renewal	Network Rail	3
2010	(AF) Sheringham Rail Link	Link to North Norfolk Railway	New Link	Third Party	6

NRDF candidate schemes in CP4

Figure 19 Candidate NRDF schemes in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2011	(F) Cambridge Interim Stabling	Electrify additional sidings for EMU stabling	Capacity Enhancement	Network Rail Discretionary Fund	3
2011	(H) 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
2011	(D) North Farnbridge Loop	Lengthen the loop at North Farnbridge to allow 12-car trains to pass	Capacity Enhancement	Network Rail Discretionary Fund	4
2012	(P) Beccles Loop	Provision of loop for hourly service. Work in conjunction with (but separate to) resignalling.	Capacity Enhancement	Network Rail Discretionary Fund	4

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

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 (2010/11 prices)	2010/11	2011/12	2012/13	2013/14
Renewals				
Track	52	39	43	40
Signalling	33	26	11	16
Civils	17	7	5	27
Operational property	17	11	15	16
Electrification	35	41	48	50
Telecoms	3	2	-	-
Total renewals	158	127	122	149
Renewals volumes				
Track				
Rail (km)	77	58	68	69
Sleepers (km)	36	32	37	37
Ballast (km)	35	32	36	37
S&C (equivalent units)	12	13	14	15
Signalling				
Conventional (SEU)	0	152	0	36
ERTMS (SEU)	0	0	0	0
Level crossings (no)	2	10	0	1

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
D.01	Bethnal Green – Stansted Airport	BGK (TLA)	London & SE	DfT	No	W8 (W6)	8	various	25kv AC	TCB	3	2 (4)
D.02	Hackney Downs – Cheshunt	HDT (ENT)	London & SE	DfT	No	W8 (W6)	8	50 (60)	25kv AC	TCB	3	2
D.03	Hertford East Branch	HEB	London & SE	DfT	No	W6	9	60 (various)	25kv AC	TCB	4	2
D.04	Chingford Branch	CJC	London & SE	DfT	No	W6	7	50	25kv AC	TCB	3	2
D.05	Cambridge Lines	BGK	London & SE	DfT	No	W8 (W9)	8	various	25kv AC	TCB	3 (4/5)	2
D.06	Ely – Kings Lynn	BGK	Secondary	DfT	No	W8 (W9)	8	90 (various)	25kv AC	TCB	various	1 (2)
D.07	Peterborough– Ely–Haughley Jn	EMP (CCH)	Secondary	DfT	No	W10 (W9)	8	75 (various)	None	TCB (AB)	various	2 (1)
D.08	Coldham Lane Jn – Chippenham Jn	CCH	Rural	DfT	No	W8	8	60	None	TCB (TB)	OTIS	1
D.09	Ely – Norwich	ETN	Secondary	DfT	No	W8	8	75 (90)	None	AB (TCB)	AB	2
D.10	Liverpool Street – Shenfield	LTN1	Primary	DfT	No	W10 (W9)	8	90 (70)	25kv AC	TCB	2	4 (6)

Figure 21 Strategic route sections

Predominant aspect recorded (secondary aspects recorded in brackets). ELR is Engineers Line Reference, RA is Route Availability												
SRS	SRS Name	ELR	Classification	Funding	Community Rail	Freight Gauge	RA	Speed	Electrification	Signalling Type	Signalling Headway (mins)	No of Tracks
D.11	Shenfield – Ipswich	LTN1	Primary	DfT	No	W10 (W9)	8	100 (90)	25kv AC	TCB	3	2
D.12	Ipswich – Norwich	LTN1 (LTN2)	Primary	DfT	No	W10 (W9) Ipswich-Haughley Jn. W9 (W8) Haughley Jn-Norwich	8	100	25kv AC	TCB	3	2
D.13	Shenfield – Southend Victoria/ Southminster	SSV (WIS)	London & SE	DfT	Yes	W6	7	80 (60)	25kv AC	TCB	3 (OTIS)	2 (1)
D.14	Braintree Branch	BRA	London & SE	DfT	No	W6	6	50	25kv AC	TCB	OTIS	1
D.15	Harwich Branch	MAH (NTE)	London & SE	DfT	No	W10	8	60 (45)	25kv AC	TCB	4 (OTIS)	2 (1)
D.16	Walton and Clacton Branches	COC (various)	London & SE	DfT	No	W6	7	75 (50)	25kv AC	TCB	4 (OTIS)	2 (1)
D.17	Romford – Upminster	ROU	Rural	DfT	No	W6	8	30	25kv AC	OTW	OTIS	1
D.18	Sudbury to Marks Tey	SUD	Rural	DfT	Yes	W6	6	50	None	OTW	OTIS	1

Figure 21 Strategic route sections

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

SRS	SRS Name	ELR	Classification	Funding	Community Rail	Freight Gauge	RA	Speed	Electrification	Signalling Type	Signalling Headway (mins)	No of Tracks
D.19	East Suffolk line and Norfolk Branches	various	Rural	DfT	Yes	W6 (W8)	7 (6)	various	None	RETB (various)	various	various
D.20	Felixstowe – Ipswich Yard	FEL (various)	Secondary	DfT	No	W10	7	50	None	TCB	OTIS (4)	1 (2)
D.99	Freight Lines	various	Freight	DfT	No	various	8 (6)	various	various	OTW (TCB)	4 (OTIS)	various

Capacity and operational constraints

- A Cambridge station: Single through platform
- B Stansted Airport Tunnel: Single track
- C Tottenham Hale – Broxbourne: Mixed use of fast and slow services constrains capacity and potential journey time reductions
- D Acle: Passing loop length restricts capacity
- E Halesworth – Oulton Broad: Single track section with no passing loops
- F Braintree Branch: Single track section with no passing loops
- G Shenfield – Colchester: Intensively used track section almost at capacity
- H Southminster Branch: Single line with only one passing loop
- I Forest Gate – Stratford: Capacity constrained by a mix of passenger and freight trains
- J Liverpool Street – Bethnal Green: Lines almost at capacity
- K Haughley Jn – Single lead junction
- L Woodbridge – Saxmundham: Single track section with no passing loops
- M Bury – Chippenham Jn: Long signal section restricts capacity
- N Felixstowe Branch: Single track section with only one passing loop
- O Soham – Ely: Single track section with no passing loops

Other issues on the route

- 1 Potential strategic freight route would require an upgrade to this section

Network Rail

Kings Place
90 York Way
London N1 9AG

Tel: 020 7557 8000
www.networkrail.co.uk

March 2010