Route Plans 2009
Route 7
Great Eastern

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Route 7 Great Eastern

Section 1: Today's railway

Route context

The Great Eastern main line (GEML) runs from London to Norwich and has a number of branches that serve the coastal resorts of Southend-on-Sea, Clacton-on-Sea, Walton-on-the-Naze, Felixstowe, Lowestoft, Great Yarmouth, Cromer and Sheringham, as well as the Norfolk Broads, the east coast ports (including Harwich and Felixstowe) and the branch lines to Braintree, Southminster, Sudbury and Upminster. The main line competes with the primary road network, and rail services penetrate into the City of London.

The route serves one of the fastest growing regions in the country with densely populated areas at its southern end and some key locations along its length, including the Essex county town of Chelmsford and the regional centres of Colchester, Ipswich and Norwich. The main markets are commuter travel to London, in particular to the City and Docklands, and business and leisure travellers. The route also provides the main artery for substantial freight traffic between the east coast ports of Felixstowe and Harwich and the rest of the country via London.

Along with the West Anglia and Thameside routes, the Great Eastern 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 scenarios of continuing growth in commuting to the centre of London and Docklands. However, the current network is already operating at or close to capacity in terms of train paths.

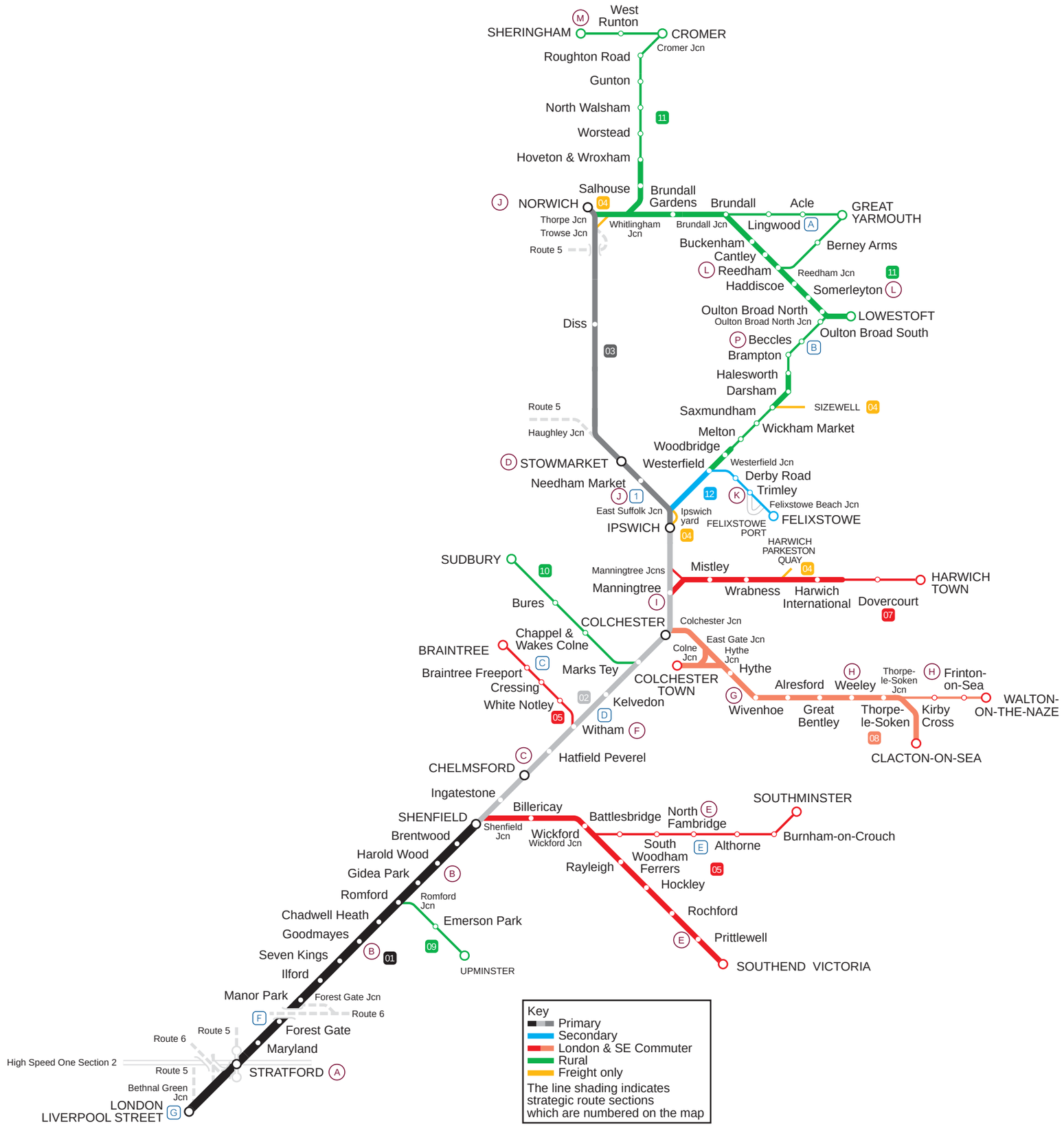
The GA RUS has looked at options and recommendations for accommodating future growth and whilst some of these recommendations are being taken forward in Control Period 4 (CP4), either wholly or partially, to meet the capacity metrics set by the DfT in their High Level Output Specification (HLOS) published in July 2007, the remainder will be taken into further consideration for future options of meeting additional growth through Control Period 5 (CP5).

Today's route

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

- the main line from London to Norwich (07.01, 07.02 and 07.03)
- branches to Upminster (07.09), Southend Victoria and Southminster (07.05), Braintree (07.06), Colchester Town, Clacton-on-Sea and Walton-on-the-Naze (07.08) and Harwich Town (07.07)
- the Sudbury branch (07.10) and the remaining branch lines in Norfolk and Suffolk (07.11) including the important freight route between Ipswich and the Port of Felixstowe (07.12), which is the country's largest container port. There is also a short freight only branch to Sizewell Power Station (07.04).

Route 7 Great Eastern



Current passenger and freight demand

Passenger demand has grown steadily and strongly for years on this route, particularly into central London and Docklands. The number of people travelling into London in the morning peak increased by 4 percent between autumn 2006 and 2007. Peak demand has increased particularly sharply on inner suburban services, which saw an increase of around 6 percent over the last year. Off peak leisure travel – driven by successful marketing campaigns from the train operators and rail partnerships – has also experienced strong growth in demand.

Main line services parallel the A12 corridor southwards from Ipswich, which feeds the M25 around London and extends all the way down into the Docklands. 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 (60,000 passengers a day were recorded in the autumn 2007 peak passenger counts).

Although the majority of the current demand is into Liverpool Street, a significant number of passengers interchange at Stratford with onward journeys via the underground Central and Jubilee Lines, Docklands Light Railway and the North London Line (NLL). Stratford is the gateway to the Docklands from the Great Eastern Main Line (GEML), and employment in Docklands is expanding. Stratford itself is set to benefit from the new Stratford City development (currently under construction), and demand is set to grow.

The Freight Route Utilisation Strategy (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 ten year demand forecasts that were developed and agreed by the industry through the RUS Stakeholder Management Group. Freight demand, especially 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 deep sea London Gateway Port (Shell Haven) on the Thameside route (Route 6). This is further explored in the capability and capacity sections below. The Freight RUS predicted 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. The London Gateway Port itself is forecast to generate around eight trains per day.

Current services

Passenger services on the route are operated by National Express East Anglia (NXEA), with a small number of services into Liverpool Street operated by c2c. DB Schenker, Freightliner Limited, Direct Rail Services (DRS) and First GBRf operate the main freight services on the route.
The Great Eastern network carries a mixture of traffic types with significant variations in speed, acceleration and stopping patterns.

NXEA operate inner suburban and outer main line services into Liverpool Street as well as rural services in Norfolk, Suffolk and Essex.

The passenger services above are operated by a mix of inner and outer suburban electric multiple units, 100mph main line electric loco hauled services and diesel multiple units on the rural sections of the route.

Figure 1 Current train service level (trains per hour)

Station	tph to Liverpool Street
Ilford	14 peak/6 off-peak
Gidea Park	13 peak/6 off-peak
Shenfield (includes Main Line and Metro services)	16 peak/12 off-peak
Southend	7 peak/3 off-peak
Southminster	2 peak/0 off-peak (see figure 2)
Chelmsford	7 peak/5 off-peak
Braintree	1 peak/1 off-peak
Colchester	10 peak/5 off-peak
Clacton	4 peak/1 off-peak
Harwich Town/International	1 peak*/1 off-peak
Norwich	4 peak/2 off-peak

Figure 1 contains the morning peak (08:00 to 09:00 arrivals) and off peak trains per hour (tph) frequencies into Liverpool Street.

*Harwich Town has 1tph peak connecting service to Liverpool Street and Manningtree.

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

Figure 2 Current train service level (trains per hour)

Regional/Rural Services	tph
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 Peterborough	1 every 2 hours
Ipswich (starts at Liverpool Street) to Lowestoft	1 every 2 hours
Ipswich to Felixstowe	1
Ipswich to Cambridge	1
Norwich to Cambridge	1
Norwich to Chesterfield	1
Norwich to Lowestoft/Great Yarmouth/Sheringham	1 to each destination

The route provides the main artery for long distance freight flows from the east coast ports of Felixstowe and Harwich to the rest of England via North London as well as varying volumes of freight to local terminals and yards, including aggregates (Bow, Chelmsford, Parkeston and Trowse), sand (Marks Tey), gas distillate (North Walsham), and mud oil (Lowestoft).

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

Traffic volumes are summarised in Figure 4.

Figure 3 Tonnage

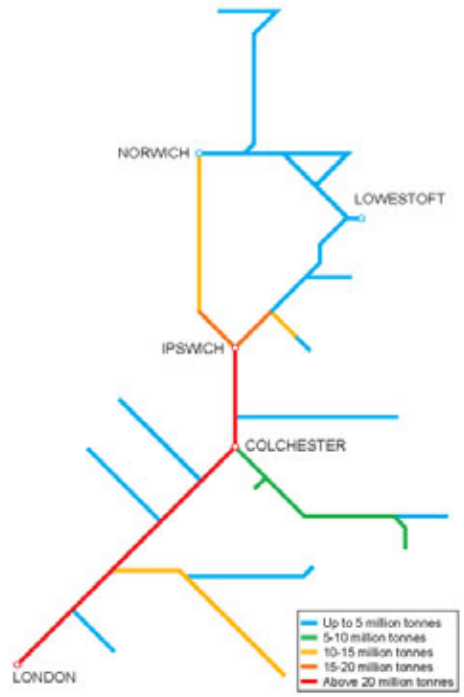


Figure 4 Current use

	Passenger	Freight	Total
Train km per year (millions)	20	2	22
Train tonne km per year (millions)	5,760	1,646	7,406

Current infrastructure capability

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

Figure 5 Linespeed

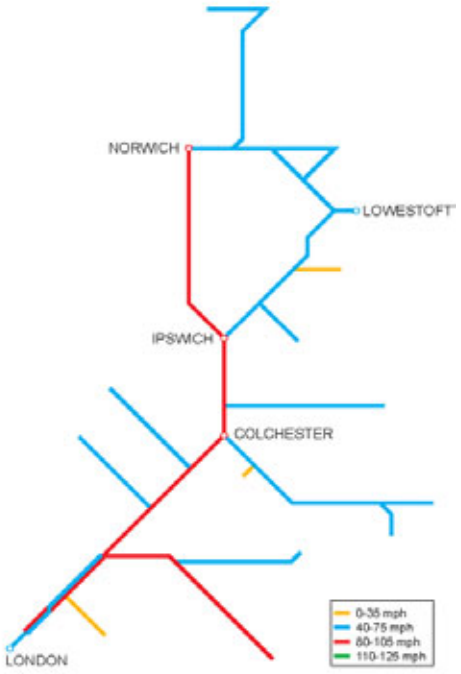


Figure 6 Electrification

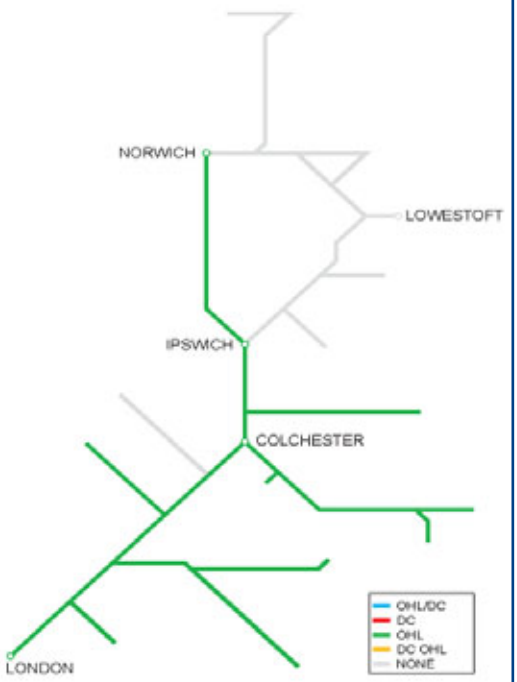


Figure 7 Route availability

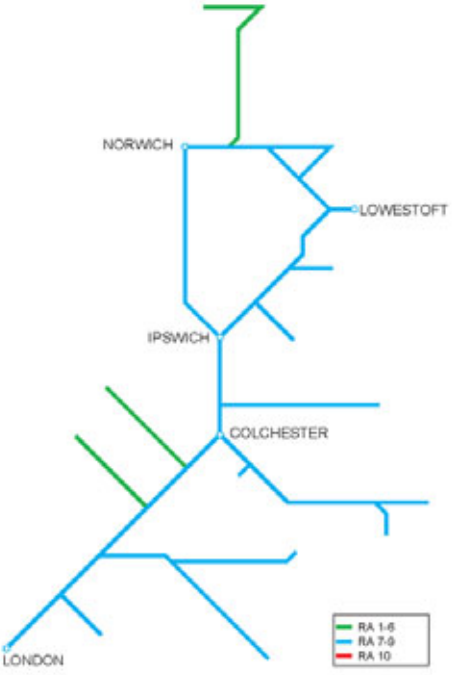
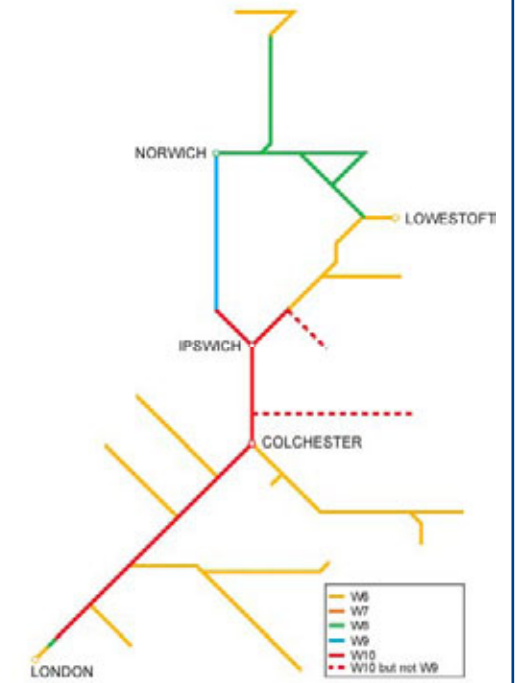


Figure 8 Gauge



Current capacity

The Great Eastern route is mainly two track and capacity is limited by the mixture of fast and stopping passenger and freight services, complex junctions, and station occupancy. Long single line sections on a number of the rural lines exacerbate these issues. 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 Great Eastern route are:

- a lack of an alternative route to WCML with W9 and W10 loading gauge capability to relieve capacity on the Great Eastern Main Line (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
- a mixture of fast and stopping services on the two track GEML between Colchester and Shenfield
- intensive platform utilisation and congestion on the throat at Liverpool Street station
- the long single line track sections on the East Suffolk Line
- the three track throat to Norwich station
- passenger capacity is an issue at Stratford station due to increasing passenger numbers at peak times and high levels of transfers to the underground and Docklands Light Railway.

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	tph
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)	20

Current performance

The Public Performance Measure (PPM) for NXEA shown in figure 10 also includes the services that are operated on the West Anglia route.

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 intensity of the peak service means that when a problem occurs there is a knock on effect on following services that can quickly cause large amounts of reactionary delay for what might be initially a small specific incident.

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 and possession overruns.

Figure 10 2008/09 PPM

TOC	Forecast MAA	As at period
National Express East Anglia	90.7%	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
Great Eastern	2,775	319

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

Passenger demand forecasts for the route predict underlying passenger growth at around the average rate for peak trips into London, around 2 percent a year during CP4. This is significantly lower than the rates of increase in passenger numbers that have been experienced on the route in the last couple of years, but similar to the average over the last 10 years.

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 GA RUS.

London is the host city for the Games and Network Rail is now working with the Olympic Delivery Authority (ODA) 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.

The demand for freight paths is forecast to increase by 10-15 paths a day on the route 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 industry forecasts contained in the GA RUS.

Future demand beyond CP4

Passenger demand will continue to grow for peak trips into London. It is predicted that crowding will become so severe on the route that capacity and associated infrastructure increases will be required or up to half of the background growth could be crowded off rail.

Increases in demand will continue to be generated by the Stratford City development and employment in Docklands, the City of London and, potentially, development around Southend Airport. There will also be a permanent increase following the redevelopment of the Olympic site after the Games.

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 demand for freight paths is forecast to increase on the route as the ports of Felixstowe, Bathside Bay and London Gateway Port continue to grow. 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 industry forecasts contained in the GA RUS.

Section 3: Tomorrow's railway: strategy

Figure 13 summaries 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
2011	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 Fambridge loop so that two 12-car trains can pass	Increased peak capacity and improve freight regulation
2011	Allow all GE outer peak services to call at Stratford	Lengthen Platform 10A at Stratford	Increase peak capacity and improve access to Docklands
2011	Run two additional peak services on the GE inner services	Review timetable	Increased peak capacity
2011	Hourly service on East Suffolk Line	Passing loop at Beccles, plus potential linespeed improvements associated with resignalling	Double service frequency

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 14 Capacity enhancements to meet HLOS peak capacity in CP4

Description	Additional vehicles involved	Station served	0700 – 0959 Capacity Impact	0800 – 0859 Capacity Impact
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 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	628,600	747,000	64%	240,700	273,600	325,600	74%

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

Strategic direction

Network Rail expects that the route will continue to see high levels of passenger and freight growth. In common with other London commuter routes, particularly the West Anglia Main Line (WAML), one of the routes' key functions is feeding workers into London to support the city's economy. London is a world-leading financial centre which makes a net contribution to the national economy and it is thus essential that the transport links are provided to facilitate this growth. To this end the strategy for the route over the next 10 years and beyond has been set through the GA RUS and further developed through the HLOS process for CP4.

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 – Ely – Peterborough – Nuneaton route. An additional assumption is that Thameside freight services including growth from the London Gateway Port will be routed across North London via an upgraded Gospel Oak – Barking route away from the congested Great Eastern route between Forest Gate Jn and Stratford.

To accommodate the high levels of growth in passenger demand on the Great Eastern route, additional peak services on both the inners and outers and train lengthening on the branches is planned. This will require some infrastructure works including lengthened loops. Later sections in this document also contain a look forward to some of the longer term plans for the route.

Future train service proposals

Network Rail has been working with NXEA and the DfT on developing plans for meeting growth in CP4.

Norwich services

To meet peak demand on these services higher capacity stock will be introduced by NXEA.

Additional overnight/inter-peak berthing will be provided at Orient Way.

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 Fambridge 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 intended 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.

Cross country routes

On the cross country services some peak trains will be strengthened radiating from the regional centres. In addition, an hourly Ipswich – Lowestoft service is planned to be introduced, subject to funding, and the results of a detailed assessment of level crossings along the route.

Freight services

The following parts of the 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 Haughley Jn (to access the ECML via the West Anglia cross country route – Route 5).

More detail on future services has been incorporated into the capacity section.

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

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 West Coast Main Line (WCML) via Ipswich tunnel, Stratford and the 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 of Felixstowe has already commenced and with the development of a new port at Bathside Bay (near Harwich) and the proposed London Gateway Port on the Thameside route (Route 6) it is of 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 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 this, 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 will be taken forward for development using NRDF funding. The TIF programme is also funding the upgrading of the Barking to Willesden (via Gospel Oak) line (part of Route 6) for Thameside freight traffic.

Linespeed

Modest improvements to linespeeds 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. Improvements are currently being examined (in conjunction with the track renewals programme) on the East Suffolk Line and the Sudbury branch.

Tonnage

Increased demand for freight traffic to and from the east coast ports will cause much higher tonnages to be sustained across the Great Eastern route.

Figure 16 Tonnage growth

Train 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.

Most of the outer suburban and main line Great Eastern stations can already accommodate 12-car EMUs and loco hauled rolling stock of up to 9-car plus a DVT. The inner suburban line stations with the exception of Shenfield and Stratford can only accommodate 8-car services. Platform 10A at Stratford will be extended as part of the works associated with the Games, which will also provide an extended freight loop.

Future capacity

Network Rail has been working with NXEA and the DfT on delivering capacity improvements in CP4 and is continuing to develop proposals for CP5 and beyond. The GA RUS explored a number of options for improving future capacity and these will continue to be developed along with train operators and our stakeholders.

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). A new turnback siding could be constructed at Chadwell Heath which could allow additional trains to run following a retimetabling exercise (CP5). However, the turnback is also being considered as a potential CP4 performance scheme in line with LTPP requirements. In the longer term 10-car operation is required and this forms part of the Crossrail project (CP5), which is currently proposed for 2017.

Southend/Southminster services

In order to allow all trains to run at full length it is necessary to lengthen the loop at North Fambridge (on the Southminster branch) so that 12-car trains can pass (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 potentially 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 opportunity for enhancements, particularly driven by the business needs of the operators (generally to be funded thorough 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.

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.

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%

Future performance

Figure 17 sets out the planned PPM for the 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.

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.

Track faults are being addressed by the renewal programmes and other improvements in performance are being achieved through Joint Performance Improvement Plans (JPIP).

Initiatives include 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. Other 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 design and implementation of the renewal of the OLE between Liverpool Street and Chelmsford is being developed with a view to completing the work before the Games in 2012. 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 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 this route have been identified to include:

- the need to accommodate more and longer freight trains associated with traffic growth from the ports of Felixstowe and Tilbury
- the impact of the rolling stock cascade promoted by the HLOS capacity requirements
- the need to improve the condition of the overhead line to reduce the need to impose heat related speed restrictions
- focus on performance delivery for the Games
- timetable review for the Great Eastern services
- 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.

East Midlands Trains only impact on the Great Eastern route between Trowse Jn and Norwich. The future performance section for East Midlands Trains can be found in the plan for Route 19.

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 6.

Network availability

The high level of capacity utilisation on the route has meant that in the past there has been difficulty in gaining access for maintenance and renewals work. As a result a cyclic maintenance regime was introduced that allows weekend maintenance possessions on a twelve week cycle at key junctions north of Shenfield. There are four different Sunday cyclics designed to target Witham, Colchester, Manningtree, Ipswich and Haughley Jn. Additionally there is a weekly cyclical programme that maintains services into Liverpool Street station.

In conjunction with the operator, 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 following completion of this work there will no longer be 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 is to be 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
- 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 anticipates that accommodating growth in commuting to central London and the Docklands will be a significant challenge on the route, especially when considering the continued developments around Stratford, which will include the interchange with the High Speed 1 line to the Channel Tunnel, the expanding DLR network and the Games in 2012; this combines with the east coast ports expansion and freight from London Gateway Port.

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 construction of a turnback siding at Chadwell Heath could allow additional services to operate in CP5. However, the turnback is also being considered as a potential CP4 performance scheme in line with LTPP requirements. It is assumed that 10-car operation will be required to meet long term demand in CP5. The Crossrail project enables 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. Additional and upgraded berthing will also be required.

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 resignalling work is carried out.

A further important area, which was covered in the GA RUS, is public access to the network. The following 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 (NSIP).

Car park extensions are proposed at a number of stations including Diss and Stowmarket. 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 Regional Spatial Strategy identified a number of developments on the edge of existing settlements and new stations are being considered to serve them, including those at 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.

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	Ⓐ 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	–
2010	Ⓑ OLE improvements Liverpool Street-Shenfield	Conversion from fixed to auto tensioned equipment	Performance Improvement	Network Rail	6
2011	ⓒTraction Power supply upgrade	To provide power supply to support longer trains and additional services	Capacity Enhancement	Periodic Review 2008	1
2010	Ⓔ Southend Airport New Station	New station to serve Airport development	New Station	Third Party	4
2010	Ⓕ Witham Second Entrance	Additional entrance to Witham station	Capacity Enhancement	Network Rail Discretionery Fund/Third Party	5
2012	Ⓖ Colchester-Clacton Resignalling	Resignalling between Colchester and Clacton including bi-directional signalling between Marks Tey and Colchester	Performance Improvement	Network Rail	6
2010	Ⓗ Thorpe-le-Soken to Walton-on-the-Naze track renewal	Plain line track renewal	Renewal	Network Rail	4
2009	Ⓘ Manningtree station car park	Provision of a car park deck	Capacity Enhancement	Network Rail	5
2010	Ⓙ Claydon S&C	S&C renewal	Renewal	Network Rail	3
2009	Ⓙ Barham S&C	S&C renewal	Renewal	Network Rail	3
2013	Ⓚ 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	Ⓛ Somerleyton and Reedham swing bridges	Swing bridge refurbishments	Renewal	Network Rail	3
2009	Ⓜ Sheringham Rail Link	Link to North Norfolk Railway	New Link	Third Party	3

NRDF candidate schemes in CP4

Figure 19 Candidate NRDF schemes in CP4

Implementation date	Project	Project description	Output change	Funding	GRIP stage
2010	Ⓓ North Fambridge Loop	Lengthen the loop at North Fambridge to allow 12-car trains to pass	Capacity Enhancement	Network Rail Discretionary Fund	3
2010	Ⓟ Beccles Loop	Provision of loop for hourly service. Work in conjunction with (but separate to) resignalling.	Capacity Enhancement	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 our overall obligations as efficiently as possible consistent with the reasonable requirements of operators and other stakeholders.

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

Figure 21 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	42	12	23	16	21	113
Signalling	17	14	20	7	35	91
Civils	15	3	8	8	8	42
Operational property	8	10	7	7	8	40
Electrification	41	49	34	7	5	136
Telecoms	2	0	1	2	1	6
Plant and machinery	2	2	1	2	3	9
Total	**127**	**89**	**93**	**48**	**80**	**438**
Renewals volumes						
Track						
Rail (km)	34					
Sleeper (km)	27					
Ballast (km)	24					
S&C (equivalent units)	19					
Signalling						
SEUs (conventional)	214	0	0	0	0	214
SEUs (ERTMS)	0	0	0	0	175	175
Level crossings (no.)	0	0	0	0	0	0

Appendix

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
07.01	Liverpool Street – Shenfield	LTN1	Primary	DfT	No	W10 (W9)	8	90 (70)	25kv AC	TCB	2	4 (6)
07.02	Shenfield – Ipswich	LTN1	Primary	DfT	No	W10 (W9)	8	100 (90)	25kv AC	TCB	3	2
07.03	Ipswich – Norwich	LTN1 (LTN2)	Primary	DfT	No	W10 (W9) Ipswich-Haughley Jn. W9 (W8) Haughley Jn-Norwich	8	100	25kv AC	TCB	3	2
07.04	Freight Lines	various	Freight	DfT	No	W6 (W8)	various	various	various	various	OTIS	1
07.05	Shenfield – Southend Victoria/ Southminster	SSV (WIS)	London & SE	DfT	Yes	W6	7	80 (60)	25kv AC	TCB	3 (OTIS)	2 (1)
07.06	Braintree Branch	BRA	London & SE	DfT	No	W6	6	50	25kv AC	TCB	OTIS	1
07.07	Harwich Branch	MAH (NTE)	London & SE	DfT	No	W10	8	60 (45)	25kv AC	TCB	4 (OTIS)	2 (1)
07.08	Walton and Clacton Branches	COC (various)	London & SE	DfT	No	W6	7	75 (50)	25kv AC	TCB	4 (OTIS)	2 (1)
07.09	Romford – Upminster	ROU	Rural	DfT	No	W6	8	30	25kv AC	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
07.10	Sudbury to Marks Tey	SUD	Rural	DfT	Yes	W6	6	50	None	OTW	OTIS	1
07.11	East Suffolk line and Norfolk Branches	various	Rural	DfT	Yes	W6 (W8)	7 (6)	various	None	RETB (various)	various	various
07.12	Felixstowe – Ipswich Yard	FEL (various)	Secondary	DfT	No	W10	7	50	None	TCB	OTIS (4)	1 (2)

Capacity and operational constraints
A Acle: Passing loop length restricts capacity
B Halesworth – Oulton Broad: Single track section with no passing loops
C Braintree Branch: Single track section with no passing loops
D Shenfield – Colchester: Intensively used track section almost at capacity
E Southminster Branch: Single line with only one passing loop
F Forest Gate – Stratford: Capacity constrained by a mix of passenger and freight trains
G Liverpool Street – Bethnal Green: Lines almost at capacity

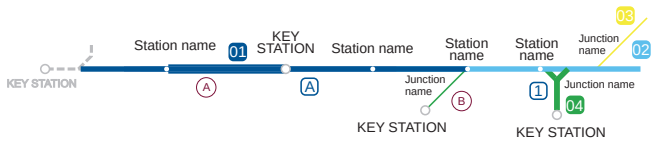
Other issues on the route
1 Potential strategic freight route would require an upgrade to this section

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

Key to route diagrams



Capacity and operational constraints
Location: capacity or operational constraint

Issues on the route
Location: issue on the route

Key planned projects
Location: planned project on the route

Strategic route sections
Listed in the appendix of the route plan

Other symbols

KEY STATION — Key station location
KEY STATION — Key station on this route
KEY STATION — Key station on another route
Station name — Other station location
Station name — Other station on this route
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

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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