Freight

Route Utilisation Strategy

March 2007

Foreword

I am pleased to introduce the Route Utilisation Strategy which covers rail freight.

This RUS plays a key role in the RUS programme. It brings together in one document the key strategic issues facing the future of rail freight and identifies a strategy for accommodating growth and changes in current demand on the network. The strategy has been developed with the full involvement of the freight operators and other key industry players.

Rail freight is a success story. It has grown rapidly in the last 10 years and this strategy forecasts further growth of up to 30 percent - the equivalent of an extra 240 freight trains per day – over the next ten. For this additional demand to be met by road freight, on the other hand, would lead to around an extra 1.5 million lorry journeys on the roads each year.

This growth in rail freight is good news – it reflects the attractiveness of rail as a way to move freight and the success of the freight operators in marketing the railway to their customers. It also has clear and substantial environmental benefits for the country compared to the alternative of moving this freight by road.

In meeting this rising demand, the strategy considers the ways in which the existing network can facilitate additional freight traffic, as well as recommending network enhancements where these are necessary and have a positive business case.

One of the key demands of the rail freight industry has been for gauge enhancement to allow greater access to the network for the increasingly common ‘high cube’ 9’6” W10 containers. This strategy recommends the enhancement of a number of routes to allow W10, including those from the West Coast Main Line to the ports at Southampton and Felixstowe.

Network Rail is particularly pleased that it is able to announce that the Network Rail Discretionary Fund and the company’s Out Performance Fund will be used to fund a number of the enhancements proposed in this strategy, allowing them to move forward immediately. Amongst those enhancements Network Rail will fund or part-fund directly are works to generate additional train paths and diversionary flexibility between the ports of Immingham, Hull, Tyne and Hunterston and the Aire and Trent Valley power stations.

Overall, this strategy reflects Network Rail’s ambition to grow the rail freight industry in this country. It now feeds into the Government’s High Level Output Specification which it plans to publish in the summer.

Rail freight makes an enormous contribution to Britain’s economy and delivers considerable benefits to the environment and in reducing road congestion. I am proud to present Network Rail’s strategy for rail freight.

John Armitt
Chief Executive

Executive summary

In many parts of Britain, economic growth is leading to increasing demands on the rail network. Development of rail capacity and capability to meet the growing demand is a central element of the Government's transport policy. It aims to provide a well performing network that accommodates the aspirations of both freight and passenger operators to increase their services, in a way that maximises overall value for money and is affordable.

In October 2006 HM Treasury published the Stern Review on the Economics of Climate Change which estimated that the dangers of unabated climate change could be equivalent to 20 percent GDP or more each year. The report was based on an update of the scientific evidence produced for the 2001 Intergovernmental Panel on Climate Change. The evidence of the relationship between transport emissions and climate change has reinforced a Government focus on the causes of greenhouse gases. There has been an increasing focus on the environmental benefits of modes of transport with lower emissions, including benefits of moving freight by rail.

Subsequently, in December 2006 HM Treasury and the Department For Transport published The Eddington Transport Study which highlighted the pivotal role that transport plays in the UK's economic productivity, growth and stability, within the Government's broader commitment to sustainable development. Recent announcements by the Department For Transport support the enhancement of infrastructure to international gateways, which will facilitate greater volumes of freight movements by rail.

The Freight Route Utilisation Strategy (Freight RUS) presents a view of the freight growth and alterations in existing traffic flows that could reasonably be expected to occur on the network by 2015 and presents a strategy to address the key issues that arise in accommodating these changes.

Unlike the individual 'geographical' RUSs which concentrate on resolving the changing demands on fairly self-contained parts of the network, the Freight RUS considers the future of freight across the entire network. This is important because freight movements cross operational and political geographical boundaries. A network wide approach ensures that the freight demand forecasts used within each of the geographical RUSs are consistent and that each RUS adopts a consistent strategy for freight which will only be revisited if capacity requirements are significantly different when taken alongside demands for the passenger railway.

Despite the unique role of the Freight RUS in the RUS programme, the process followed is consistent with that taken throughout the RUS programme. It has involved a detailed understanding of the freight network, forecasting freight on the network up to 2015, assessing and agreeing the key gaps with industry stakeholders and optioneering to understand what action can be taken to bridge the gaps. As with all RUSs a range of solutions are considered in a hierarchical manner starting with non-infrastructure solutions (such as amendments to timetables and operating longer trains where the existing infrastructure permits) and progressing to consideration of infrastructure solutions if required. The Freight RUS has been overseen by a Stakeholder Management Group consisting of Network Rail, English Welsh and Scottish Railway, Freightliner, GB Railfreight, the Association of Train Operating Companies, the Department

for Transport, Transport Scotland, the Welsh Assembly Government, Transport for London, the Rail Freight Group and the Freight Transport Association. Passenger Focus has been consulted at regular intervals during its development. The Office of Rail Regulation (ORR) attended Stakeholder Management meetings as observers.

A growth of just under 30 percent in freight tonnes lifted is forecast over the study period (the 10 years to 2014/15) which equates to up to 240 additional trains per day on week days (including return trips running empty) compared to the base year of 2004/05. Whilst growth is predicted in the volumes of most commodities carried, the greatest overall level of growth is expected in deep sea (intercontinental) intermodal traffic. The greatest levels of change in demand on a route by route basis are driven by alterations in the sourcing of electricity supply industry (ESI) coal. Accordingly, the majority of the key capacity and capability issues identified by the study are driven by these two commodities.

Coal routeings

The RUS assumes that the levels of imported coal will continue to grow throughout the period covered by the RUS, replacing some remaining domestic coal supplies. It examines the costs and benefits of accommodating growth along the two main competing corridors that feed the Aire and Trent Valley power stations: the route from the ports on the east coast of England (the 'Base Case') and the 'Anglo-Scottish' coal route from the Port of Hunterston and the Ayrshire opencast coal fields via the Glasgow and South Western and Settle and Carlisle routes (Sensitivity 1). There is a clear business case for developing the east coast ports coal route. This is reinforced by recent increases in the traffic carried which are in line with forecast.

There is also a business case for enhancements on the Anglo-Scottish coal route which provide benefits to passenger services and enhance the route's capacity as a diversionary route for both freight and Anglo-Scottish passenger services whilst providing an alternative coal route. Although demand on the route is not growing in line with Sensitivity 1 projections at present, it is recognised that the route will continue to see coal traffic demand throughout the RUS period and if the projected growth did develop in line with Sensitivity 1, additional renewals would also be required (costing up to an estimated £60m).

Gauge clearance for the intermodal market

The Freight RUS recommends a proactive strategy for development of priority core and diversionary/capacity generating routes to W10 gauge. This will facilitate the growth of rail's share of the market for haulage of 9ft 6in containers, enabling it to carry a significant volume of traffic that would otherwise be carried by road. Routes from the Ports of Southampton and Felixstowe are demonstrated to have a positive business case.

The FOCs have expressed aspirations to expand the coverage of W12 gauge (including electrification clearance) and European gauge to specific parts of the network. It is recommended that W12 clearance (which in many cases involves only a small amount of incremental work over W10 clearance) is considered as a starting point when a structure is renewed on the routes identified as priorities within the RUS. This may be achieved by either replacement with higher structures or lowering of the track.

Strategy for key freight routes

West Coast Main Line

The key flows driving the RUS strategy for the West Coast Main Line are between Carlisle and Preston (the continued operation of Class 6 diesel hauled services over the steep gradients and some projected intermodal growth) and further south between Winsford and Weaver Junction, at Stafford and between Rugby and Wembley (growth in the deep sea intermodal market).

Short term (CP3: 2007 – 2009)

- The proposed December 2008 timetable is seeking to meet freight operators' existing needs.
- new loop at Hartford with higher entrance and exit speeds to be delivered under the West Coast Route modernisation project.
- diversion of some services via Macclesfield to remove some daytime services from Stafford station and Stafford Trent Valley junction.

Medium term (CP4: 2009 – 2014)

- Electric haulage of some new freight traffic between Crewe/Warrington and Carlisle/ Glasgow (over Shap) to enable a third Up path in most daytime hours.
- diversion of some Up Class 6 services via the Settle and Carlisle and Hellifield – Clitheroe – Farington Junction (away from Shap).[1]
- W10 clearance from Peterborough to Nuneaton and some initial additional capacity from Felixstowe to Nuneaton, allowing 5 additional paths from Felixstowe to be routed cross-country away from the southern section of the WCML.

Long term (beyond CP4)

The following schemes are beyond the timescales of the RUS but will be needed if the projected growth continues:

- lengthening of some intermodal services to/from the Haven ports
- major enhancements in the Stafford area (passenger demand could drive this scheme in the medium term)
- major capacity enhancements on the Felixstowe to Nuneaton route.[2]

Haven ports[3] to the West Coast Main Line

Short term (CP3: 2007 – 2009)

- The Base Case assumes that the capacity upgrades which Hutchison Ports UK are required to deliver as part of the planning permission for Bathside Bay and the expansion of the Port of Felixstowe (capacity upgrade of the Felixstowe branch, alterations to Ipswich yard and W10 clearance of the route between Ipswich, Peterborough and Doncaster) are completed within the RUS period.
- The established Cross London RUS states that 10 additional trains can be accommodated on existing routeings via the Great Eastern (GE) and North London Line. This should be sufficient until at least 2010/11[4]. Three additional trains per day have already started running since the base year 2004/05.

Medium term (CP4: 2009 – 2014)

- There will be a medium-term requirement to route some trains to and from the Midlands and West Coast Main Line via Ely, Peterborough, Leicester and Nuneaton (the 'cross-country' route). The RUS recommends that it is cleared to W10 and that signalling headways are shortened in the Kennett area and a northern facing chord to the Down slow line is added at Nuneaton, subject to further development through the GRIP process.

1 This option is dependent on significant volumes of track and structures renewals work between Hellifield and Blackburn.

2 The optimum time to deliver capacity enhancements at Leicester (the key constraint on the 'F2N' route) may fall inside the medium term (CP4) depending on the timing of resignallling of Leicester control area (currently planned for 2013 – 15).

3 Felixstowe and Harwich/Bathside Bay.

4 The precise point at which remaining capacity on the GE is taken up is dependent on the rate of portside development at Felixstowe South and Bathside Bay and the timing of delivery of HPUK enhancements to the Felixstowe branch and Ipswich yard.

- The above will be sufficient to accommodate growth of five trains per day[5] in each direction on the cross country route and provide a valuable diversionary route. The specification of long-term capacity enhancements[6] will depend on the timing of new portside capacity at Bathside Bay, and any future decision to route some existing services away from the Great Eastern and North London Line to facilitate improvements in the passenger timetable.
- The Cross London and Freight RUS both recommend the implementation of gauge clearance to W10 of the Tottenham and Hampstead Line and associated capacity enhancements which would enable some services from North Thameside (including those from Shell Haven if it is developed) to avoid the North London Line.

Long term (beyond CP4)

- Lengthening of some container trains to 30 wagons (from the present 24) could be facilitated by further alterations to Ipswich Yard, and loop enhancements on the cross country route. Higher powered traction would also probably be required if trains are to maintain Class 4 timings. This option should be considered in conjunction with Ipswich area re-signalling which is due to occur post 2015.

Southampton to the West Coast Main Line
Short term (CP3: 2007 – 2009)

- Signalling enhancements on the Sutton Park Line implemented with Saltley signalling renewals to increase capacity on the alternative route to the WCML from Leamington.

Medium term (CP4: 2009 – 2014)

- W10 gauge clearance of the core route via Eastleigh, Reading West Junction, Leamington and Nuneaton.
- W10 gauge clearance of Landor Street – Sutton Park line – Darlaston Junction to complete a second W10 cleared route between Leamington and the WCML offering access to the WCML at times of blockade on the core route.
- Development of a W10 gauge and capacity capability for diversion via Melksham or Laverstock/Andover is subject to further business case development.

Long term (beyond CP4)

The RUS recommends that if the demand continues to grow as predicted further schemes may be necessary beyond the life of the RUS. If development of an additional one million TEU handling capacity takes place at the Port of Southampton, the following schemes will be required in the medium term.

- Grade separation at Reading West: Construction of a flyover to allow container trains traveling to and from the Basingstoke lines to reach the Up and Down goods and relief lines on the Great Western without crossing the fast lines.

Further capacity enhancements are also likely to be required along the core route and these are detailed further in Chapter 9.

East coast ports to the Aire and Trent Valley power stations
Short term (CP3: 2007 – 2009)

- Brigg Line enhancement to provide a significant number of additional paths per day in each direction between Immingham and the Trent Valley power stations/ Doncaster and a diversionary option to the South Humberside Main Line.
- Wrawby Junction linespeed improvements.
- partial double tracking of the Hull Docks. branch.
- reinstatement of the Boldon East curve to generate additional paths to and from the Port of Tyne and provide an alternative to the East Coast Main Line routeing via Durham.

5 This is in addition to nine growth paths identified via Peterborough to the East Coast Main Line destinations.
6 As footnote 2.

Medium term (CP4: 2009 – 2014)

- Cottam Chord, allowing direct access from Port of Immingham to the Cottam power station, thereby relieving congestion on the Doncaster-Worksop route and the South Humberside Main Line.
- Killingholme Loop to provide improved rail access to the Port of Immingham, particularly HIT2 and the Killingholme branch.
- partial double tracking of the Hull Docks branch.
- Selby station bi-directional signalling and extension of Barlby loops.

Anglo-Scottish coal route

The Scotland RUS (published in March 2007) recommends enhancements on the Glasgow and South Western route. The Freight RUS recommends the following additional enhancements:

Short term (CP3: 2007-2009)

- Enable loaded Up freight services to join and depart WCML at greater speed by relaying part of Mossband up arrival line to 50 mph and providing a starter signal on Gretna station platform.
- provision of six additional signalling sections on the Settle and Carlisle route to generate additional paths and improve passenger and freight performance.

Medium term (CP4: 2009 – 2014)

- If the maximum tonnage (Sensitivity 1) forecast occurs, there would be a requirement for up to approximately £60 million worth of additional track renewals and structures work.

The Freight RUS will give the Office of Rail Regulation the opportunity to consider the key options to meet freight growth when considering expenditure on the network. Similarly it will enable the Department for Transport and Transport Scotland to understand freight's needs whilst developing their High Level Output Specifications for the future railway.

The RUS sets out the recommended short and medium-term schemes which are likely to be funded or part funded by the Network Rail 'Discretionary Fund' (NRDF) or the Out Performance Fund. It also provides the strategic context for Transport Innovation Fund decisions. Funding decisions will be made in the light of any changes which result from the recently consulted review of the structure of charges by ORR.

The Freight RUS will also provide third party investors with an indication of enhancements that would be required to meet their aspirations.


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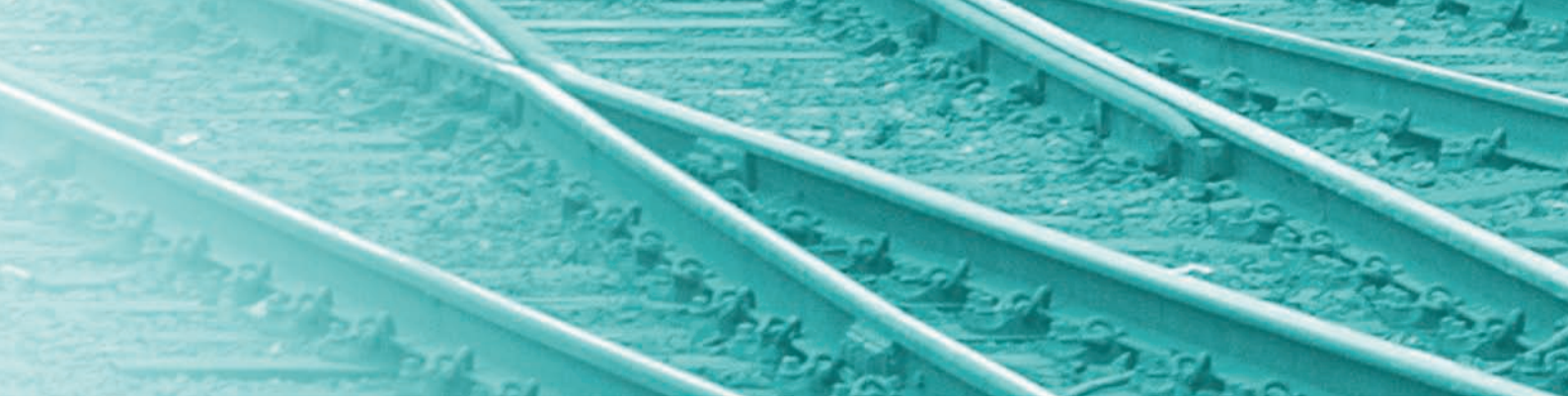


1. Background

1.1 Introduction

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

> "the effective and efficient use and development of the capacity available, consistent with funding that is, or is reasonably likely to become, available during the period of the route utilisation strategy and with the licence holder's performance of the duty".
>
> Extract from ORR Guidelines Strategies, June 2005

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

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

> "enable Network Rail and persons providing services relating to railways better to plan their businesses, and funders better to plan their activities; and set out feasible options for network capacity, timetable outputs and network capability, and funding implications of those options for persons providing services to railways and funders."
>
> Extract from ORR Guidelines on Route Utilisation Strategies, June 2005

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

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

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

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

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

ORR will take account of established RUSs when exercising its functions.

1.2 Document structure

This document starts by describing, in Chapter 2, the role of the Freight RUS within the RUS programme, its geographical scope, the time horizon which it addresses, and the key issues which it will consider. Current freight usage of the network is summarised in Chapter 3. Chapter 4 considers estimates of future demand on the network both in terms of the number of trains expected and the associated tonnage which will be carried.

Consideration of the future demand highlights a number of 'gaps' between the existing network and the network that would be required to meet the future demand. These gaps are presented in Chapter 5 which considers both capacity and capability issues which would arise if the expected growth materialises. Chapter 6 outlines gauge issues which arise from the consideration of the future market and, importantly, the size of the intermodal containers expected to be used.

The options which were proposed and appraised, in conjunction with our Stakeholder Management Group, to bridge the potential gaps in network provision are outlined in Chapter 7.

Chapter 8 covers the consultation process, including a summary of the responses received and how there are taken into account in the final document.

Chapter 9 presents with the strategy itself. It covers the key considerations and our recommendations and proposals for meeting growth. These recommendations are summarised in terms of short, medium and long-term interventions.

Finally, Chapter 10 discusses the mechanisms for implementing the recommendations in the RUS.

The appendices contain supporting data.

2. Scope and planning context

2.1 The role of the Freight RUS within the RUS programme

The Freight RUS is central to the RUS programme and complements the role of the individual 'geographical' RUSs which concentrate on a particular rail corridor or geographical area. It is required for a number of reasons. The primary driver is the need for clarity on the treatment of freight to ensure that it is considered appropriately within each individual geographical RUS and consistently across the RUS programme as a whole.

To ensure consistency of treatment, the RUS has a network wide scope. By its very nature, freight does not observe route or even regional boundaries. Many freight flows are long by passenger service standards and cross a number of geographical RUS route areas.

A key role is to provide consistent freight forecasts for input into the geographical RUSs, based on the routeings (and diversionary routeings) preferred by freight operators. The network wide scope of the Freight RUS ensures that forecasts of flows which cross geographical RUS boundaries are treated similarly in each RUS they cross.

The Freight RUS identifies key network capacity constraints to carrying the expected freight flows over the preferred routeings, when considered alongside existing commitments to passenger operators. As such it brings together, in one document, the key strategic capacity issues of concern to freight. The RUS identifies a strategy to overcome the capacity constraints on this basis.

Unlike the geographical RUSs, the Freight RUS does not consider performance or engineering access issues. Clearly both sets of issues are of prime importance to the freight operators and are central to the RUS programme. In each case, an understanding of the detail of local operations is key to understanding the issues. To reflect this they are considered in the geographical RUSs where passenger and freight movements can be examined together and local circumstances can be taken into account.

Network Rail is carrying out a study to investigate the potential for efficient engineering access, in conjunction with our customers. It will be considered further in the Network RUS.

Given the importance of passenger demand growth and engineering access strategies to the development of an optimum route strategy, the geographical RUSs will take the consideration of capacity one step further when they take the freight growth forecast from the Freight RUS and consider it alongside a detailed agreed passenger forecast and proposals for engineering access. Taken together, the freight and passenger projections can be used to ensure that the appropriate timetable and/or infrastructure solutions are recommended.

Each geographical RUS will use the freight demand and the strategy recommended from the established Freight RUS when developing its route-based strategy. The detailed implementation of the strategy set out in the Freight RUS will be considered further in the geographical RUS in the light of other factors identified by that RUS. It is envisaged that the Freight RUS strategy will usually be adopted by the geographical RUS. It will only be amended if freight growth is proven to be accommodated on the existing network as the consequence of an equivalent downturn in the requirement for passenger paths on the network.

The Freight RUS will play an important role in providing an 'early warning' of where capacity issues are likely to arise on those parts of the network that do not currently have an ongoing geographical RUS. This will aid the development of RUS scope documents.

The provision of the appropriate physical network capability to enable projected traffic to operate is clearly as important as provision of the appropriate level of operational capacity. Consequently the Freight RUS examines the key capability requirements that exist today or would be triggered by the expected changes to traffic. Careful consideration will be given to the gauge requirements of the predicted traffic.

2.2 Time horizon

The Freight RUS primarily considers a time period of 10 years, although a longer time horizon is taken to identify any major factors that would influence strategy.

2.3 Planning context

In October 2006 HM Treasury published the Stern Review on the Economics of Climate Change which estimated that the dangers of unabated climate change could be equivalent to 20 percent GDP or more each year.
The report was based on an update of the scientific evidence produced for the 2001 Intergovernmental Panel on Climate Change. The evidence of the relationship between transport emissions and climate change has reinforced a Government focus on the causes of greenhouse gases. There has been an increasing focus on the environmental benefits of modes of transport with lower emissions, including benefits of moving freight by rail.

Subsequently, in December 2006 HM Treasury and the Department for Transport published The Eddington Transport Study which highlighted the pivotal role that transport plays in the UK's economic productivity, growth and stability, within the Government's broader commitment to sustainable development. Recent announcements by the Department for Transport support the enhancement of infrastructure to international gateways, which will facilitate greater volumes of freight movements by rail.

One of the prime objectives of the RUS is to provide the Office of Rail Regulation with the opportunity to consider the key options recommended for meeting anticipated freight growth when considering future expenditure on the network.

As mentioned in Chapter 1, the RUS outcome will help to inform the Department for Transport (DfT) and Scottish Executive's High Level Output Specifications and will provide an understanding of freight growth to feed into the Train Operating Company (TOC) franchise specification process.

The RUS takes into account the findings of the programme of planning assessments produced for the DfT and the Scottish Executive to develop understanding of the priorities for development of transport over the next 5-20 years in the wider context of planning policy and strategy. It is informed by the North East England and East of England Regional Planning Assessments, Part 1 of the Scottish Planning Assessment and the relevant transport strategies of the Mayor of London, the Welsh Assembly Government and the English regions.

3. Current demand and the baseline network

3.1 Freight operators

The following Freight Operating Companies (FOCs) are currently licensed to run services on the network. All are open access operators which means that each operator can bid to run services on any part of the network.

- English Welsh and Scottish Railway (EWS) which is the largest freight operator in the UK and also has a licence to operate european services. EWS runs services for a wide range of markets. It is organised into four market-based groups, each led by their own Managing Director. These are Energy (which includes coal), Construction (which includes domestic waste), Industrial (which includes metals and petroleum) and Network (which includes international, automotive, intermodal, infrastructure[1] and express parcels services).
- Freightliner which has two divisions. Freightliner Limited is the largest rail haulier of containerised traffic, predominantly in the deep sea market. Freightliner Heavy Haul is a significant conveyor of bulk goods, predominantly coal, construction materials and petroleum and operates infrastructure services.
- GB Railfreight which is a significant operator of deep sea container trains and infrastructure services and also runs a growing number of services for bulk market customers, most notably in the coal and construction sectors.
- Direct Rail Services (DRS) which transports a variety of commodities. In the last few years the company has expanded into running services for the domestic intermodal market.

Other licensed freight operators are; Fastline Freight Limited, Amec Spie, the West Coast Railway Company, Advenza and Victa Westlink Rail.

3.2 Profile of the freight market

The overall size of the surface freight market (rail and HGV) in the UK grew by eight percent over the 10 years to 2004 to 1,933 million tonnes lifted.

Rail freight has a five percent share of the market in terms of tonnes lifted which has been fairly static over the last 10 years. It is, however, a static share of an expanding market. Rail freight has a 12 percent share in terms of tonne kilometres (weight of freight multiplied by the distance carried) which has increased from approximately 10 percent in 1994 reflecting an increase in the average distance of rail freight movements whilst the average distance of road hauls has declined.

Table 3.1 shows the volume of rail freight lifted identified by key commodities. The total grew from 96 million net tonnes lifted in 2000/01 to 105 million net tonnes lifted in 2004/05. The profile of the freight market is assessed in detail up to 2004/05 as this is the base year for the Freight RUS 10 year forecasts discussed in Chapter 4. Since the inception of the RUS, data for 2005/06 and the first eleven periods of 2006/07 has become available. The way in which this relates to the 10 year forecasts is commented on in Chapter 4.

The growth has not been uniform across all commodities. There have been considerable increases in the haulage of coal (20 percent over five years) and construction products (17 percent) while some commodities have declined or shown little change.

1 Services used as part of railway infrastructure renewals and enhancements work.

The trends in tonne kilometres or freight moved (weight of freight lifted multiplied by the distance carried) are shown for the same period in Table 3.2. These trends are similar to those for freight lifted, shown in Table 3.1, but show more pronounced increases in coal movement. This reflects the recent trend of coal for the electricity supply industry (ESI coal) to be carried over greater distances. This is the result of a move away from burning deep mined coal from England towards burning imported coal which arrives in the UK through deep water ports and coal from opencast sites in south west Scotland which

Table 3.1: Rail freight lifted

Millions of net tonnes lifted	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06*
Coal	37.9	40.4	42.9	45.1	45.5	47.6*
Metals[2]	20.2	16.6	16.9	18.0	17.4	n/a
Construction	19.4	20.9	19.3	21.1	22.8	n/a
Petroleum[3]	7.0	7.1	7.0	7.3	7.6	n/a
Channel Tunnel[4]	1.2	1.0	0.8	1.1	1.2	n/a
Intermodal	9.4	8.2	7.9	8.0	8.7	n/a
Other[5]	0.8	0.9	1.2	1.8	1.8	n/a
Total	**95.9**	**95.1**	**96.0**	**102.4**	**105.0**	**107.0***

Source:2000/01 to 2004/05: EWS; Freightliner; Network Rail estimates of DRS and GB Railfreight tonnages from billing data.

*2005/06: Estimate only: Based on net tonnes lifted growth estimate between 2004/05 and 2005/06 in National Rail Trends (NRT) Yearbook 2005/06.(ORR July 2006). Disaggregated data for commodities other than coal is not published in NRT

Table 3.2: Rail freight moved

Billion net tonne km moved	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Coal	4.8	6.2	5.7	5.8	7.0	8.6
Metals	2.1	2.4	2.6	2.4	2.6	2.2
Construction	2.4	2.8	2.5	2.7	2.8	3.0
Petroleum	1.4	1.2	1.2	1.2	1.2	1.3
Channel Tunnel	1.0	0.6	0.5	0.5	0.5	0.5
Intermodal	3.8	3.5	3.4	3.5	4.0	4.4
Other	2.6	2.6	2.7	2.8	2.5	2.3
Total	**18.1**	**19.4**	**18.5**	**18.9**	**20.6**	**22.1**

Source: National Rail Trends, 2006/07 Q2 update. ORR December 2006

2 Includes ore

3 Includes oil

4 Includes all commodities which have originated at or are destined for the Channel Tunnel.

5 Includes automotive and waste services. Excludes railway engineering trains so overall total is lower than freight definitions including these services.

are generally further from the power stations than the former English pits. ESI coal accounts for around 90 percent of the total coal tonnes lifted to rail with industrial coal making up the remainder. Industrial coal is used in the production of steel and construction products and has not experienced the same level of growth over the last five years.

Strong growth in the commodity sectors outlined above has led to the present network being more heavily used by freight services than at any time since the structural changes that took place in the UK's heavy industry in the 1970s and 1980s. That period saw large decreases in the demand for transport of bulk products by rail such as iron ore, industrial and domestic coal, metals and, as the pipeline network developed, petroleum.

Tables 3.1 and 3.2 illustrate that the rail freight business has been based upon the bulk commodity markets. Coal, metals and construction constituted 82 percent of rail freight lifted and 60 percent of rail freight moved in 2004/05. Petroleum constituted seven percent of tonnes lifted and six percent of freight moved in the same year.

Intermodal traffic (predominantly deep sea containers at present) is now established as a major market. In 2004/05 it accounted for eight percent of rail freight lifted and 19 percent of rail freight moved reflecting the significant distances over which it is transported. By 2005/06 this had risen to 20 percent of freight moved.

Given that, the ESI coal and intermodal markets have been subject to fundamental shifts in the last decade. The next part of this section includes more information about recent trends in these key rail freight sectors.

3.2.1 ESI coal

The increase in the price of gas over several years until the autumn of 2006, combined with relatively low prices for coal, has resulted in a shift for electricity generation from gas to coal burn. This trend produced a three percent increase in coal burn for electricity generation over the five years to 2004/05 when demand was 51.1 million tonnes.

Despite this modest increase in market size, the volume of ESI coal lifted to rail increased by more than a quarter over the five years to 2004/05. This growth trend is shown in Table 3.3. It results from a switch towards more electricity being generated at rail served power stations and rail's competitive position improving as the average distance between coal supply points and power stations increases.

Table 3.4 shows how the balance between domestically produced and imported coal has changed over the last six years. The volume of coal mined in the UK has fallen by around one third over the period. The decline of deep mined coal has been particularly pronounced, falling by 40 percent. There has been a shift by electricity generators to burning more low sulphur coal (which is primarily imported) in order to meet emissions targets and so reduce costs. Coal imports have increased by nearly 75 percent since 2000/01.

Table 3.3: GB coal lifted by rail for electricity supply since 2000/01

	2000/01	2001/02	2002/03	2003/04	2004/05
Tonnes (millions)	31.9	34.4	36.9	40.6	41.0
Indexed to FY2001=100	100	108	116	127	129

Source: EWS; Freightliner.

The rail market share of ESI coal haulage in the UK has increased by 18 percent between 2000/01 and 2004/05. Between 85 and 90 percent[6] of all ESI coal is now hauled by rail.

3.2.2 Maritime intermodal container market

The number of maritime containers arriving at UK ports has increased at an average rate of around 5 percent a year since 2001 reaching 7.8 million twenty foot equivalent units (TEU) in 2005. TEU is the standard measurement in the container market for quantum of boxes taking into account variations in length (a 20ft length box is one TEU, a 40ft length box is two TEUs). Table 3.5 shows that around two thirds of the growth occurred between 2003 and 2004.

These volumes can be separated into two categories: short sea (intra European routes only) and deep sea (intercontinental). Rail currently has less than a five percent market

Table 3.4: UK coal supply since 2000

	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Deep Mined	17031	18089	15785	14669	11513	10312
Opencast	13249	14285	13101	11629	11778	10124
Imported	27084	33799	28194	34482	36863	46741

Source: DTI Digest of Energy Statistics and Energy Trends, 2005.

Table 3.5: Container volumes at GB Ports since 2001 (Twenty foot equivalent units), Index 2001=100

	2001	2002	2003	2004	2005*
TEU (thousands)	7000	7,234	7,324	8,023	7,788*
Indexed to FY2001=100	100	103	104	114	111*

Source: Maritime Statistics 2005, Department for Transport.

* Figures for 2005 are not directly comparable with earlier years. In 2005 more accurate recording of container/shipborne port-to-port trailer movements has been applied; Approximately 315,000 container units which in earlier years would have been reported as containers are now reported under 'rail wagons, shipborne port-to-port trailers and barges' and hence do not appear in the above figures.

6 This is a percentage of mainland UK ESI coal burn and does not include coal burnt in Northern Ireland.

share of onward transportation of short sea container movements. This is because there are a large number of ports served by short sea shipping and historically there have been insufficient volumes to make rail competitive against road haulage. In addition some of the key short sea ports are close to the end destinations of containers which in many cases gives road a competitive advantage. The railway is also not gauge cleared to carry some short sea box types. Nonetheless at least one freight operator and a number of key ports have expressed confidence that rail's competitive situation in the short sea market can be improved.

In theory the transportation of deep sea containers is well suited to rail. A large number of containers arrive at a small number of UK ports for long distance onward shipment to inland distribution centres, making rail transport viable. Rail is a competitive mode for the inland journeys to population centres outside the South East (where the major deep sea ports themselves are presently located), enabling a modal share of nearly 25 percent overall in 2005/06. The main inland destinations are located in the West Midlands, Manchester, Merseyside, Leeds and Glasgow. Road haulage is dominant for short-distance movements. The deep sea shipping market growth has been driven by a continuing trend of migration of manufacturing activity from Europe to Asia coupled with strong domestic demand. The volume of deep sea traffic carried on rail has increased greatly since 1995/96, the year of privatisation of rail freight, when market share was only 17 percent.

The container volumes at the largest GB ports are shown in Table 3.6. Volumes fell slightly at Felixstowe before returning in 2004 whilst Southampton has experienced steady increases, totalling 24 percent over the three years to 2004 but levelling off in 2005. The next largest ports (in terms of TEU throughput) have all experienced growth in excess of the national average since 2001.

Table 3.7 shows rail modal share at Britain's two largest deep sea ports Felixstowe and Southampton. About 80 percent of maritime container trains serve these two main ports, which themselves handled 74 percent of the total deep sea throughput in the UK in 2004/05.

A growing proportion of deep sea traffic is transported in High Cube containers which are 9ft 6in high. In 2006 around 40 percent of deep sea TEU was this height.

Table 3.6: Largest GB ports by TEU throughput

TEU (thousands)	2001		2002		2003		2004		2005	
	TEU	Deep sea share at port	TEU	Deep sea share at port	TEU	Deep sea share at port	TEU	Deep sea share at port	TEU	Deep sea share at port
Felixstowe*	2,839	56%	2,683	59%	2,482	63%	2,717	63%	2,760	66%
Southampton	1,170	87%	1,275	87%	1,374	90%	1,446	93%	1,382	93%
London ports	752	32%	873	28%	911	20%	979	35%	735	41%
Seaforth (Liverpool)	512	45%	487	45%	566	47%	603	43%	612	44%
Medway	493	84%	530	84%	518	86%	632	83%	707	87%
ALL GB PORTS	6,770	52%	7,004	52%	7,074	53%	7,744	55%	7,753	56%

Source: Maritime Statistics 2001-05, Department for Transport. Deep sea percentage reflects proportion of total TEU throughput at each port.

*Felixstowe Port estimates that the deep sea share of total TEU throughout is approximately 7 percent higher than statistics indicate due to assignment of empty containers for export.

Table 3.7: Rail modal share at the largest deep sea ports (TEU)

	2004	2005	2006
Felixstowe	21%	22%	23%
Southampton	26%	28%	N/A

Source: Base data Hutchison Ports UK: Felixstowe; ABP Southampton. All data is rail share of total port throughput. As some TEU are for transshipment, rail share of TEU for surface transport will be higher.

This is significant as these containers require W10 gauge clearance to be moved on conventional wagons. Gauge clearance is discussed in Chapter 6.

3.2.3 Other key markets

Construction

The construction market was the other key driver of growth in the five years to 2004/05, having seen approximately 17 percent growth in both tonnes lifted and tonne kilometres. Growth has occurred nationwide, but rail has a particularly strong share of the market for the movement of products to London and the South East with approximately 40 percent market share of aggregates consumed within the M25 ring. Long distance flows include those originating from quarries in the South West, East Midlands and the Peak District to a large number of unloading terminals where onward local transportation is usually by road. Very large construction projects such as Heathrow Terminal 5 and the CTRL have contributed to the overall demand in recent years.

Metals

Volumes of metals traffic have remained broadly static over the last six years. The metals market includes large volumes of steel transported within South Wales and the North East/South Humberside and also between these regions. Transport of scrap metal by rail has increased considerably over the last few years, in particular flows from inland scrapyards to ports.

Petroleum

Petroleum and oil traffic hauled by rail has also remained broadly constant. In addition to road haulage, rail competes with an underground pipeline network. Rail flows are predominately between refineries located at deep sea ports and major inland distribution centres including sites in the Midlands and along the M4 corridor. The most significant of the refineries is Lindsey near the Port of Immingham which accounts for approximately 55 percent of all rail hauled petroleum traffic.

The December 2005 fire at the major petroleum storage and distribution facility at Buncefield (near Hemel Hempstead) has led to a growth in petroleum traffic on rail from other distribution centres. This is partly reflected in the 2005/06 tonne km statistics in Table 3.2.The first two quarters of 2006/07 have seen continued petroleum growth on rail suggesting that some of the post Buncefield growth may well be retained in the longer term.

Infrastructure

Infrastructure services include all trains on the network conveying materials for (or engaged in) the maintenance and renewal of the railway. These services currently account for approximately seven percent of all freight gross tonnes on the network. Services in this category are not confined to specific route corridors and operate across the entire network. There are, however, particularly heavy flows between key infrastructure materials depots. Trends in this traffic sector are intrinsically linked to maintenance and renewal activity on the network.

Channel Tunnel

Freight volumes through the Channel Tunnel declined sharply in 2001/02 when there were security problems which disrupted traffic. Volumes have struggled to recover and are yet to attain the pre-security crisis levels. Intra european road haulage for unitised traffic

has remained extremely competitive over the last few years, with drivers and hauliers from Eastern Europe helping to keep the price of road transport down in this highly competitive market.

Domestic intermodal

Domestic intermodal and general distribution traffic has shown some growth in recent years. In particular domestic intermodal services between the West Midlands and Scotland have grown significantly with a number of major supermarket chains now making regular use of rail services.

3.3 Summary of base year freight demand: actual trains

Figure 3.1 displays average actual weekday usage of the network by freight trains in financial year 2004/05. 2004/05 is selected as it is the base year for the 10 year forecasts detailed later in this document.

The busiest sections of the network for freight are set out in red. These sections see in excess of 50 trains per day in each direction. Table 3.8 summarises usage data for some of the busiest freight route sections on the network. The South Humberside Main Line at Barnetby is the busiest in the country, providing a vital artery for coal, iron ore, petroleum and steel movements between the Port of Immingham and Scunthorpe steelworks. The route also plays an increasing role in the supply of imported coal to the Aire and Trent Valley power stations[7].

The West Coast Main Line experiences heavy freight usage throughout its length with the section between Warrington and Nuneaton via the Trent Valley the most heavily used. This route is a key corridor for intercontinental and domestic intermodal traffic, much of it to/from the major deep sea ports in the South East, in particular Felixstowe.

Table 3.8: Freight hotspots

		2004/05		2006/07 December /Jan only*		
Location	**Area**	**Av**	**Max**	**Av***	**Max***	**Main commodities**
Barnetby	South Humberside	54	70	61*	N/A	Metals, petroleum, coal
Norton Bridge	West Coast	52	67	45*	N/A	Intermodal
Water Orton	West Midlands	51	65	48*	N/A	Intermodal, metals, coal
Doncaster	East Coast	50	86	45*	N/A	Coal, metals
Colton Junction	East Coast	44	55	39*	N/A	Coal, metals
Rugby	West Coast	42	52	52*	N/A	Intermodal
Crowle	Trans-Pennine	40	57	37*	N/A	Metals
Camden Road	North London	38	52	33*	N/A	Intermodal
Carlisle	West Coast	36	46	38*	N/A	Coal, intermodal
Burton-on-Trent	Midland Main Line	36	51	29*	N/A	Construction, metals, petroleum
Ealing	Great Western	36	52	N/A	N/A	Construction

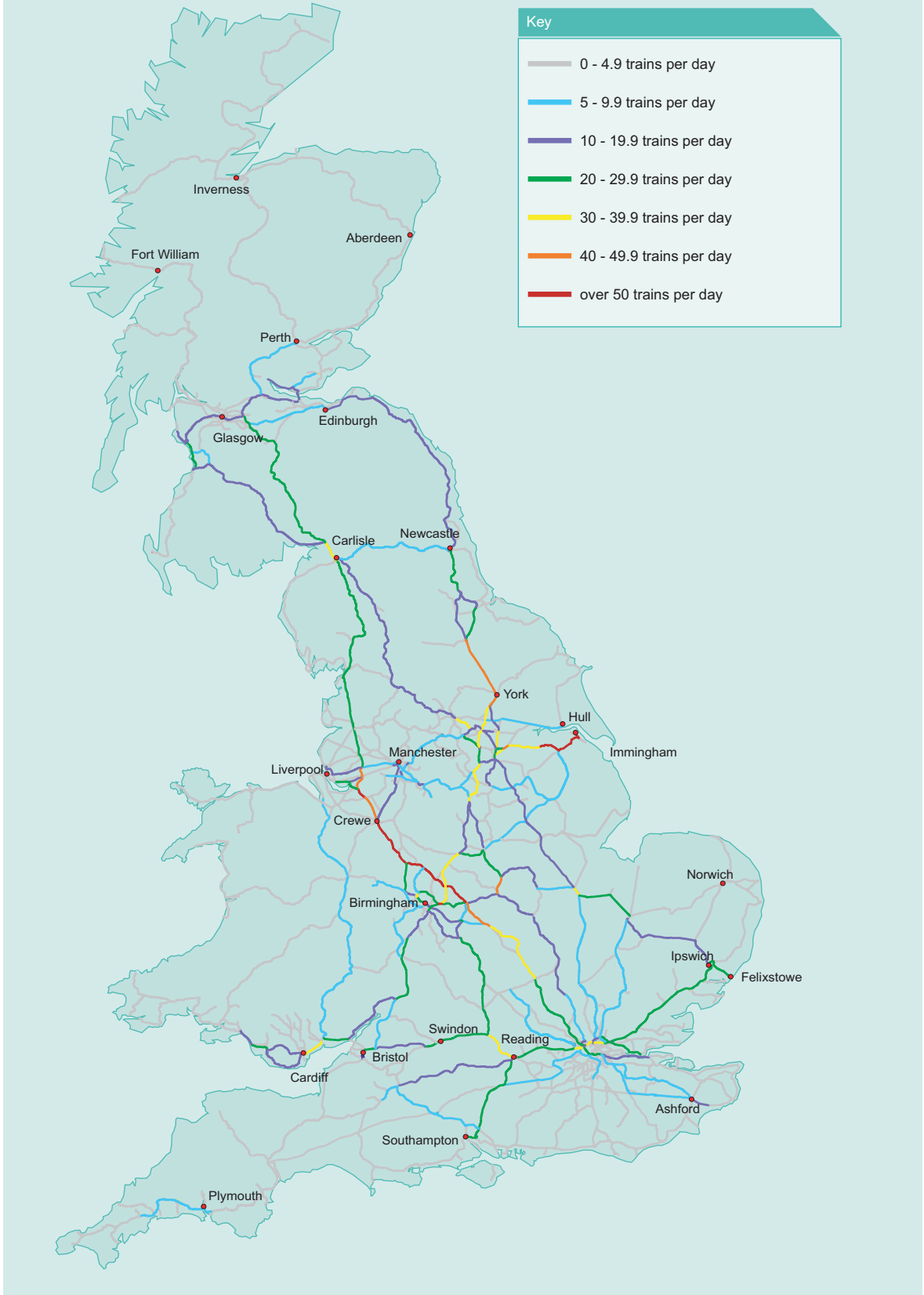
Key Av = average, Max = maximum. Source: TOPS.

2004/05: Average and maximum are daily freight trains in busier direction on Thursdays in the base year. Maximum is often much higher than the average due partly to additional traffic related to diversions. Source: ACTRAFF

* 2006/07 Average and maximum are daily freight trains in busier direction on Thursdays in December 2006 and January 2007 only, holiday periods excluded. Traditional seasonal downturn in January means 2006/07 sample would be expected to be slightly lower than 2004/05 full year average.

7 These are: Aire Valley: Eggborough, Ferrybridge, Drax. Trent Valley: Cottam, West Burton, Ratcliffe.

Figure 3.1: Average daily freight trains in single direction 2004/05



Busiest weekday average used (Thursday), highest direction shown. Source: ACTRAFF

Other key routes for freight include the North East – South West axis linking the heavy industry of Teesside and the north east ports with the Midlands and South West/South Wales via York, Moorthorpe, Chesterfield, Burton, Water Orton, Barnt Green and Gloucester.

The South Wales Main Line, particularly between Margam and Newport remains a vital freight route, with metals and coal traffic predominating. The route between Southampton Port and the WCML via Reading and Oxford is the key route for deep sea container services from Southampton and has seen growing use in recent years.

Aggregates for the construction industry originating in the Mendips account for much of the freight traffic between the West Country and London on the Great Western Main Line.

The orbital routes around London are all heavily used with the North London Line (NLL) between Stratford and Camden Road having particularly significant volumes of freight traffic. These routes currently accommodate traffic from all of the south east ports and the Channel Tunnel destined nationwide in addition to traffic destined for London freight terminals.

Much of the freight traffic shares routes with fast and/or high frequency passenger services including the main lines radiating out of London and many of the suburban networks around the major cities, including London and Birmingham.

Figures A1 to A4 in Appendix A set out in more detail the current most heavily used routes by key commodities across the network.

3.4 Freight usage of network paths

To provide operational flexibility and customer service, freight trains require more booked paths in the Working Timetable (WTT) than are actually used.

Table 3.9 summarises, by commodity, the proportion of booked WTT paths that were actually utilised in the base year 2004/05.

Figure 3.2 reflects freight train utilisation of key network sections across all commodities. Again the base year of 2004/05 is selected, as it is this year from which the industry forecasts have been built. Since 2004/05 a number of operators have actively sought to reduce the number of unused paths they have in the timetable.

For example, EWS have calculated that they have removed approximately 1,000[8] paths from the Working Timetable since the 2004/05 base year.

Some freight operators have expressed a desire to explore how released paths could be reserved for freight growth in future timetables.

Despite ongoing efforts to improve utilisation, take up of booked freight paths will always

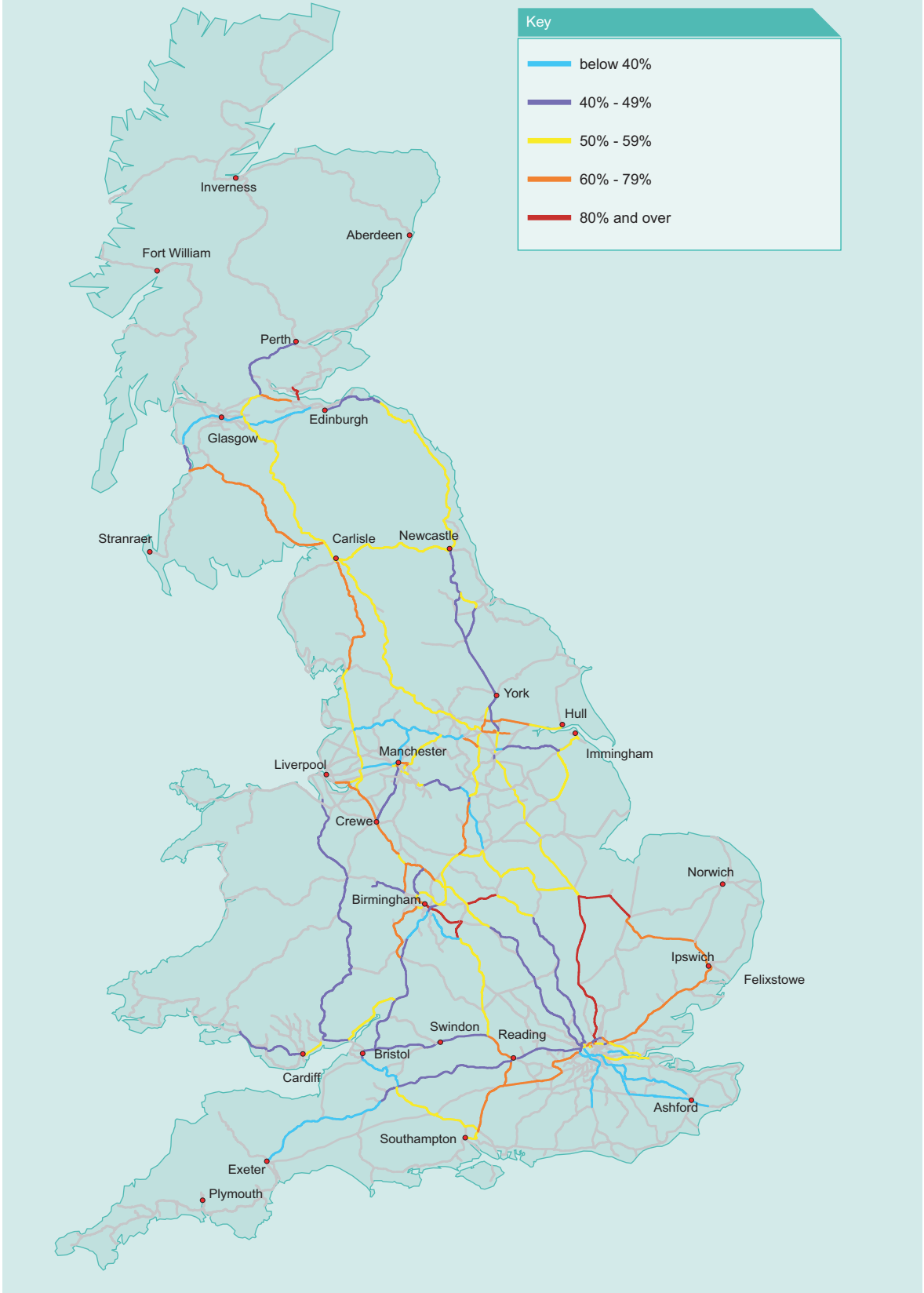
Table 3.9: Path take-up by key commodities 2004/05

Commodity	Take-up
Intermodal	95%
Petroleum	56%
Metals	51%
Coal	45%
Construction	37%
Channel Tunnel	21%

Source: ACTRAFF for base year 2004/05

8 This is not a net figure, new paths will of course have been added for new flows, some removed paths may have been for traffic now moved by other operators.

Figure 3.2: Actual freight train utilisation of WTT paths on key freight sections



Ratio of average actual trains run on Thursdays throughout the 2004/05 against WTT booked paths (winter 2004/05 timetable) Duplicate paths have been excluded.

be less than 100 percent for a wide range of reasons. WTT paths need to be booked months in advance and for some commodities a range of supply scenarios have to be covered. For example paths for ESI coal will often be booked to a power station from a range of mines and ports to cover for fluctuations in the choice of coal supplier. Additional paths may also be booked to cover seasonal variations in demand for electricity, although operators are presently working with the power stations to reduce these seasonal fluctuations.

Paths for a construction customer may be booked in the timetable for five days per week, but the customer may in reality require fluctuating volumes, with a five days per week service on occasions and a two or three days a week service at other times of the year.

In addition to the market driven fluctuations discussed above, paths are also required for diversionary purposes allowing operational flexibility for the railway. Again this reduces the reported WTT path utilisation.

Unlike passenger trains, for most commodities if there is little or no demand for a particular booked service on a particular day, the service is cancelled and does not run. To run an empty service would be illogical for economic and environmental reasons. As most bulk services run loaded in a single direction, cancellations will lead to removal of two services as the empty wagons returning will also not run.

By contrast, intermodal trains have a higher utilisation of paths. They operate like passenger trains (ie. to a fixed timetable) with services rarely cancelled due to demand fluctuations. Consequently, when there is less demand, the train usually still operates but with lower utilisation of wagon space.

The quantum of Channel Tunnel WTT paths was set before the decline in intra european traffic of recent years. Consequently, there is currently a low utilisation of paths.

Generally routes with the highest take-up of paths have high levels of intermodal traffic with other freight routes with lower take-up having more bulk product traffic. On mixed use routes with competing demands for limited spare capacity (eg. the Great Eastern Main Line, parts of the East Coast Main Line and the Manchester Piccadilly – Deansgate corridor) utilisation of freight paths tends to be higher than average, with limited ability to book a range of slots for an individual service.

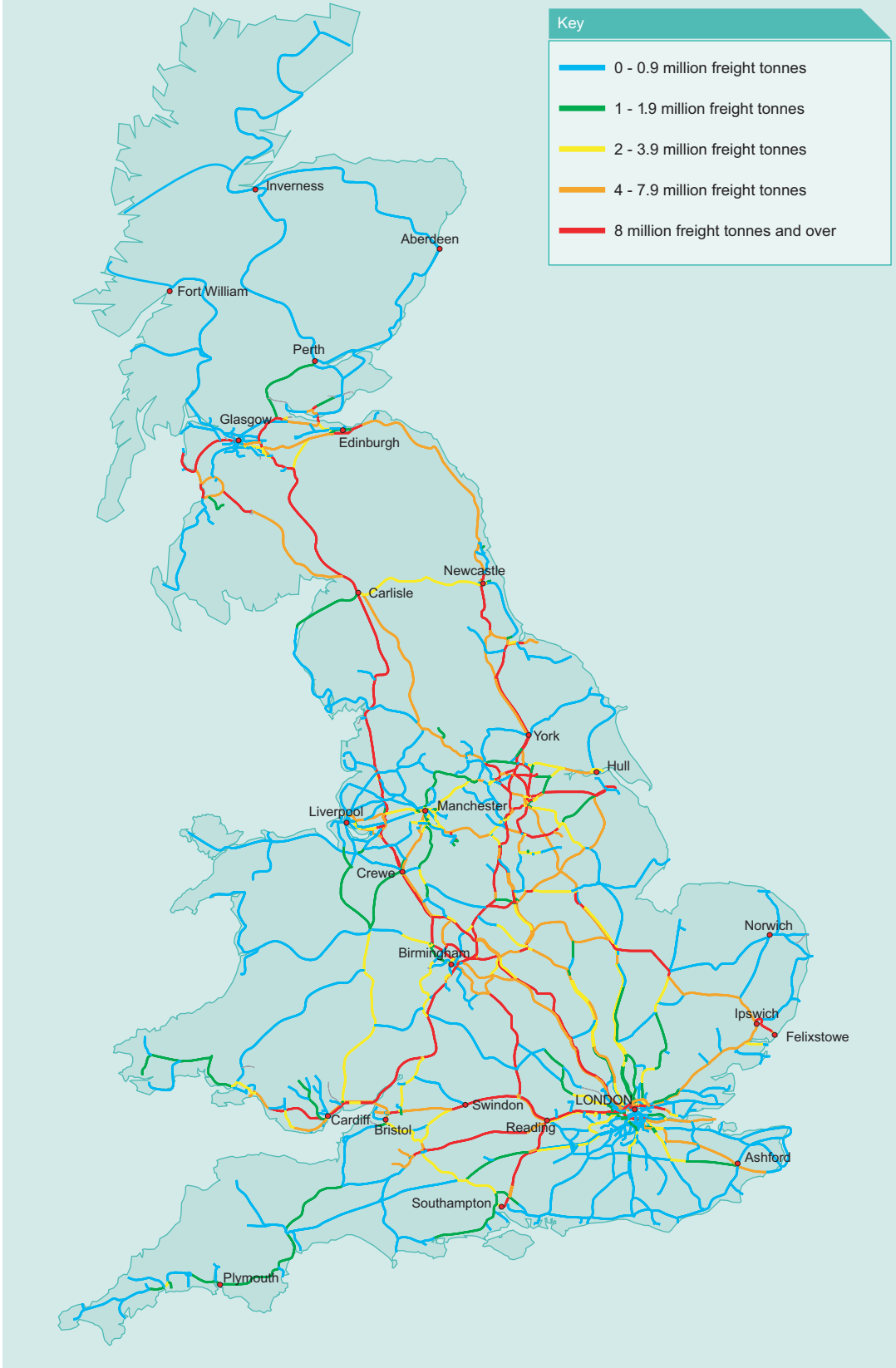
3.5 Summary of base year freight demand: gross tonnage

Figure 3.3 highlights many of the same sections of network as the actual usage map displaying train numbers. The heaviest trains operated on the network are aggregate trains from the Mendips to London via the Great Western Main Line which can reach 5,000 gross tonnes each. Most bulk traffic is conveyed in heavier trains than other commodities with many coal trains hauling around 20 wagons weighing over 2000 tonnes in total when laden.

For information Figure A5 in Appendix A displays how tonnage levels have evolved in the last financial year (2005/06).

Net tonnage (the weight of the freight excluding locomotive and wagons) is normally in the range of 65 to 75 percent of the gross tonnage in the loaded direction.

Figure 3.3: Gross freight tonnage on the network in the base year (2004/05)



Annual tonnage shown in both directions. Routes with two different colour codes reflect differing tonnage on fast and slow lines.

3.6 Summary of base year gauge and Route Availability (RA)

The UK network has a more restrictive gauge than most european countries.

This is partly due to the earlier development of railways in the UK with relatively few new lines built since the 19th Century.

Figure A6 in Appendix A displays the kinetic envelope for the various freight gauges currently used on the network.

The main drivers of schemes to increase gauge clearance in recent years have been the evolution of larger deep sea containers and to a lesser extent the opening of the Channel Tunnel in the early 1990s. These developments are discussed further in Chapter 6. Figure A7 in Appendix A displays base year 2004/05 gauge clearance across the network.

The Route Availability (RA) measure used by Network Rail sets out the maximum axle weight permitted on a route. Dispensations to run heavier than published axle weights can be granted by Network Rail given specific asset and business conditions. Lower RA values are generally driven by characteristics of assets such as bridges where structural damage could be caused by a heavy freight train.

RA values for routes are primarily of concern to operators of bulk traffic which tend to be heavier per axle. For example, a typical loaded coal train requires routes of RA10[9] for the entire length of its journey. If the shortest route between supply point and end customer has insufficient RA rating then the train would need to be routed over a longer distance which could reduce productivity for the operator. In this example, it may be possible for the same train to make its return journey empty over the shortest route as its weight per axle would be significantly reduced when unloaded.

RA8 is generally required for non-bulk trains such as intermodal services.

9 Track and structures which permit up to 25.5 tonnes per axle.


EWS

4. Forecast of change – Industry demand forecasts trains and tonnage

4.1 Approach to forecasting

4.1.1 Introduction

This chapter provides a summary of the external drivers of change and the way in which they are expected to influence the demand for rail freight over a 10 year period. As explained in Chapter 2, the forecasts are used to inform the Freight RUS and will be used throughout the RUS programme in each individual geographical RUS.

The forecasts have been developed in conjunction with the freight operators and other stakeholders. Both the Rail Freight Operators' Association (RFOA) who represent the FOCs and the Rail Freight Group and the Freight Transport Association (RFG/FTA) who represent the freight industry contributed forecasts to the process. The results have been peer reviewed by other stakeholders through the processes of the Stakeholder Management Group and its sub-groups.

Forecasting of future freight demand is a particularly complex process. Future traffic patterns are difficult to link to high level economic indicators. Demand is highly dependent on the decisions of a small number of decision makers who determine the mode used on the basis of a wide range of market specific information and commercial deals which do not lend themselves easily to econometric modelling.

Whilst rail passenger forecasting exercises benefit from the accumulation of years of shared experience of practitioners reported in the widely accepted Passenger Demand Forecasting Handbook, equivalent guidance is not available for the development of freight demand.

Two alternative approaches to forecasting were adopted – each with its own merits. Interestingly, these two separate methods produced closely aligned projections.

The consistency between the forecasts exists both at a high level and, in most cases, when disaggregated down to route level. In addition they are broadly consistent with freight demand as described in the Scottish Planning Assessment and the Regional Planning Assessments covering England and Wales that have been published to date.

The methodology of each forecast is described in this chapter (in both cases the base year was 2004/05). An integrated set of growth scenarios on the network is subsequently produced to identify capacity gaps.

As with all forecasts in the RUS programme, the Base Case forecasts assume only committed developments and policies.

4.1.2 Methodology one: "Bottom Up"

The Rail Freight Operators' Association (RFOA) developed freight forecasts building on each operator's experience of its markets. The process tapped into a vast amount of industry experience and was carefully coordinated to ensure there was no double counting if two competing operators both identified the same market.

The approach followed was a two stage bottom up process.

Stage 1 involved developing a matrix of all current rail freight services between each origin and destination in the 2004/05 base year. The resulting matrix was subsequently validated against Network Rail's data.

In Stage 2 the forecasting process was then carried out separately for those flows with specific current market intelligence and those without.

2A: Where specific market intelligence existed

This process employed specific existing market intelligence from within the business units of the FOCs to predict the changes to the base year flows. For example, flows with known expiry dates, such as the movement of construction materials for Heathrow Terminal 5, were removed from the forecasts at specified future dates when the flows were expected to terminate. Flows with known changes in volume as a result of the winding down or expansion of a particular plant were amended from the expected date of change.

2B: Where no specific market intelligence existed.

For each market sector there is usually a range of sub markets each with their own particular driver. Each current flow was therefore assigned to the correct sub market with growth factors applied accordingly.

For each sub market an appropriate driver or combination of drivers was then selected from the following options:

- analysis of past trends
- company specific factors. Some markets are dominated by large customers, eg. for metals; Corus[1]. In these cases the internal policies of that company are crucial
- regional factors. Markets such as construction are driven primarily by regional factors, in particular the local rate of new housebuilding and general infrastructure development
- general factors. GDP, RPI, balance of trade, industry output forecasts. Use of these general factors has been limited to only a few sub markets
- specific forecasts. Publicly available market forecasts, from government, SRA, academic research, etc.

The growth factors applied are outlined in Appendix B. Table B1 sets out the growth factors resulting from this process for each of the key sub markets.

Table B2 sets out the high level background assumptions behind the bottom up forecasts in relation to GDP, HGV weights, lorry road user charging, rail productivity, rail network enhancements and Channel Tunnel access charges.

Finally Tables B3 and B4 cover further specific assumptions made in the key markets of coal and deep sea intermodal including overall market growth rates and assumptions on Company Neutral Revenue Support (CNRS) and Rail Environmental Benefit Procurement Schemes (REPS) grant rates.

1 Corus was taken over by Tata Steel in January 2007. It is not possible at this stage to predict whether this will have any impact on individual facilities within the UK over and above that already envisaged in the industry forecast.

4.1.3 Methodology two: "Top Down"

The RFG/FTA adopted a top down approach. They based their analysis on outputs from the GB Freight Model, an established modelling tool employed by the Department for Transport (and formerly the SRA) to forecast freight growth.

The GB Freight Model is designed to forecast freight moved within and in and out of Great Britain by mode, route and, where applicable, port. The model itself forecasts on the basis of relative transport costs (which are similar to those used for rail grant purposes), trends and econometric analysis of the drivers behind freight market growth.

The base year matrices of freight traffic by commodity, origin and destination, port and current mode are derived from a wide range of data sources including the Continuing Survey of Road Goods Transport, UK Maritime Statistics, Network Rail and HM Customs & Revenue.

This established model was updated to provide RFG and the FTA's input into the RUS. A revised base consisting of all freight train movements over a time period in 2004/05 was developed. Data was classified by origin and destination, route, commodity and net tonnes carried.

This process resulted in a 'base year' matrix and an assignment of traffic to routes which corresponded well with Network Rail data of what actually ran on the network. The model was then employed to forecast changes in the share of the future market for each commodity that rail would be expected to win by origin and destination county.

A growth rate for each origin/destination/commodity combination was then applied by year to each corresponding train movement.

The resulting forecasts of number of trains on each section of the route therefore reflect realistic base year routeings and tonnes per train, increased by assumptions on the level of underlying growth.

The underlying market growth rates used in the model are based on econometric exercises using factors derived from market trends. The international cargo growth assumptions correspond with the UK port forecasts published by the DfT in their May 2006 Ports Policy consultation document.

RFG/FTA's consultants discussed the results of their models in a number of industry consultation groups, consisting of a range of companies and representatives of each sector of rail freight industry. Feedback from these groups was used to sense-check the assumptions and the resulting forecasts.

Table B2 in Appendix B sets out the high level assumptions behind the forecasts on GDP, HGV weights, lorry road user charging, rail productivity, rail network enhancements and Channel Tunnel access charges.

Table B3 in Appendix B covers further specific assumptions made in the deep sea intermodal market, including overall market growth rates and assumptions on CNRS/REPs.

4.2 Demand results: Rail freight growth to 2014/15

4.2.1 Overview

The two methodologies described led to broadly similar 10 year forecasts. The high level figures are shown in Table 4.1. The bottom up approach gives a net tonnage growth of 26 percent whilst the top down approach gives 28 percent. There is also a clear consensus on which commodities will be the key drivers of change.

Table 4.1 displays the 10 year projections for tonnes lifted in each commodity category.

The trends outlined are explored in detail in section 4.2.4.

The RFG/FTA top down forecast has a corresponding disaggregated net tonne km projection to 2014. Table B11 in Appendix B contains further details.

In addition to the high level tonnes lifted data, the bottom up forecasts contained the ultimate

origins and destinations based breakdown of how demand is envisaged to translate onto the network in both tonnage and train numbers.

The RFOA has also provided a routeings preference statement, by exception, highlighting where they have aspirations to alter their existing traffic routeings. This statement was used to help map future flows to the network.

Forecast results were close for both methodologies even when mapped at a route by route level. Detailed route and origin to destination mapping from the bottom up approach has been used for further analysis. However, where significant differences do arise between the two methodologies at a route level, sensitivity tests have been presented to ensure the impact of both scenarios is fully considered.

In the case of ESI coal, the RFOA offered two separate scenarios and these also have been presented as a base and sensitivity test as outlined below.

Table 4.1: Industry 10 year forecast to 2014/15: Tonnes lifted

Commodity	Bottom up Forecast 2014/15 mt	Top down forecast 2014/15 mt[2]	Approximate growth over industry 2004/05 base
Coal	50.5	43.1	-8% to +9%
Metals	14.6	11.8	+12% to +39%
Ore	5.9	6.0	-3% to -5%
Construction	23.6	31.5	+20% to +45%
Waste	1.8	2.3	-9% to +14%
Petroleum and Chemicals	7.1	7.0	+4% to +5%
Channel Tunnel	6.0	6.5	[3]+200% to +266%
Domestic Intermodal	2.5	6.5	+177% to +838% (from low present base)
Maritime Containers	20.3	18.8	+42% to +83%
Auto	0.5	0.6	25% to +76%
Total	**132.8**	**134.1**	**+26% to +28%**

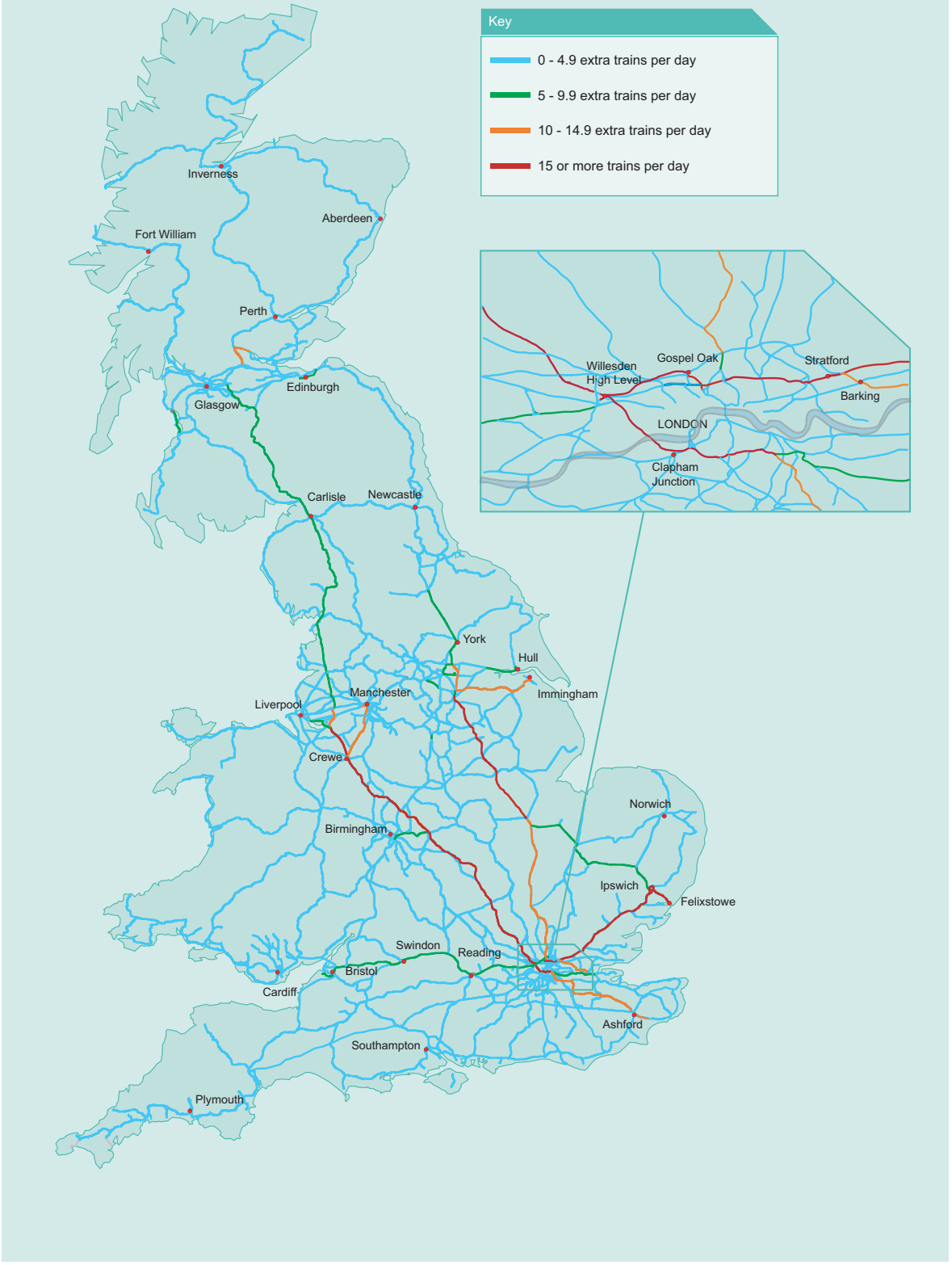
The commodity categorisation used by the industry to produce the tonnes lifted 10 year forecasts was slightly more disaggregated than that set out for the historical tonnes lifted data in Table 3.1. The methodology used by the industry for calculating tonnes lifted for the base year was also slightly different. For example, tonnes lifted for intermodal traffic includes container as well as cargo weights. This leads to a discrepancy in the overall base year tonnes lifted estimate of approximately 5 million tonnes.

Bottom up growth rates to 2014/15 are calculated from the original base year tonnes lifted data provided by the industry which, with the exception of the treatment of box weights, matches closely with the data set out in Table 3.1. for 2004/05. The top down forecast growth rate is calculated from the RFG's revised 2005 base year tonnes lifted estimate.

2 The RFG/ FTA have made some relatively minor alterations to their high level top down tonnes lifted forecast since publication of the Draft RUS for Consultation.

3 Forecast does not take into account recent changes to Channel Tunnel usage charges, and assumes considerably lower future costs (see Appendix B).

Figure 4.1: Additional trains by 2014/15 compared to base year for Base Case



Additional trains are for a single direction.

4.2.2 Demand forecasts: Additional trains mapped to the network: Base Case

Figure 4.1 sets out where the additional trains are projected to fall on the network in 2014/15 in the Base Case. All commodities are included. In all cases the preferred routeings of the FOCs have been applied unconstrained by capacity at this stage. Base Case assumptions on which routes are available for W10 traffic are applied.

Tables B3 and B4 in Appendix B display key assumptions for deep sea intermodal and ESI coal underpinning the Base Case.

The 'Other commodities' section within this chapter considers the geographical distribution of growth in more detail by commodity.

4.2.3 Sensitivity tests: ESI coal and deep sea intermodal markets

It became clear during the forecasting process, and in subsequent discussions of the forecasts with the Stakeholder Management Group, that there was scope to test three sensitivities specific to the markets of ESI coal and deep sea intermodal. The sensitivities are set out in Table 4.2 below.

Sensitivity 1 has been developed to explore the impact of further growth in Anglo-Scottish coal (imported and opencast) to the Aire and Trent Valley power stations. The Base Case scenario assumes the east coast ports of Immingham, Hull, Redcar, Tyne and Blyth pick up future shortfall in domestic English ESI coal production for the Aire and Trent Valley power stations. Section 4.2.4 details how additional trains are distributed on the network in the Base Case and Sensitivity 1.

Sensitivity 2 has been developed to display the impact of Shell Haven port opening and the abstraction from Haven Ports (Felixstowe and Bathside Bay) growth that would result.

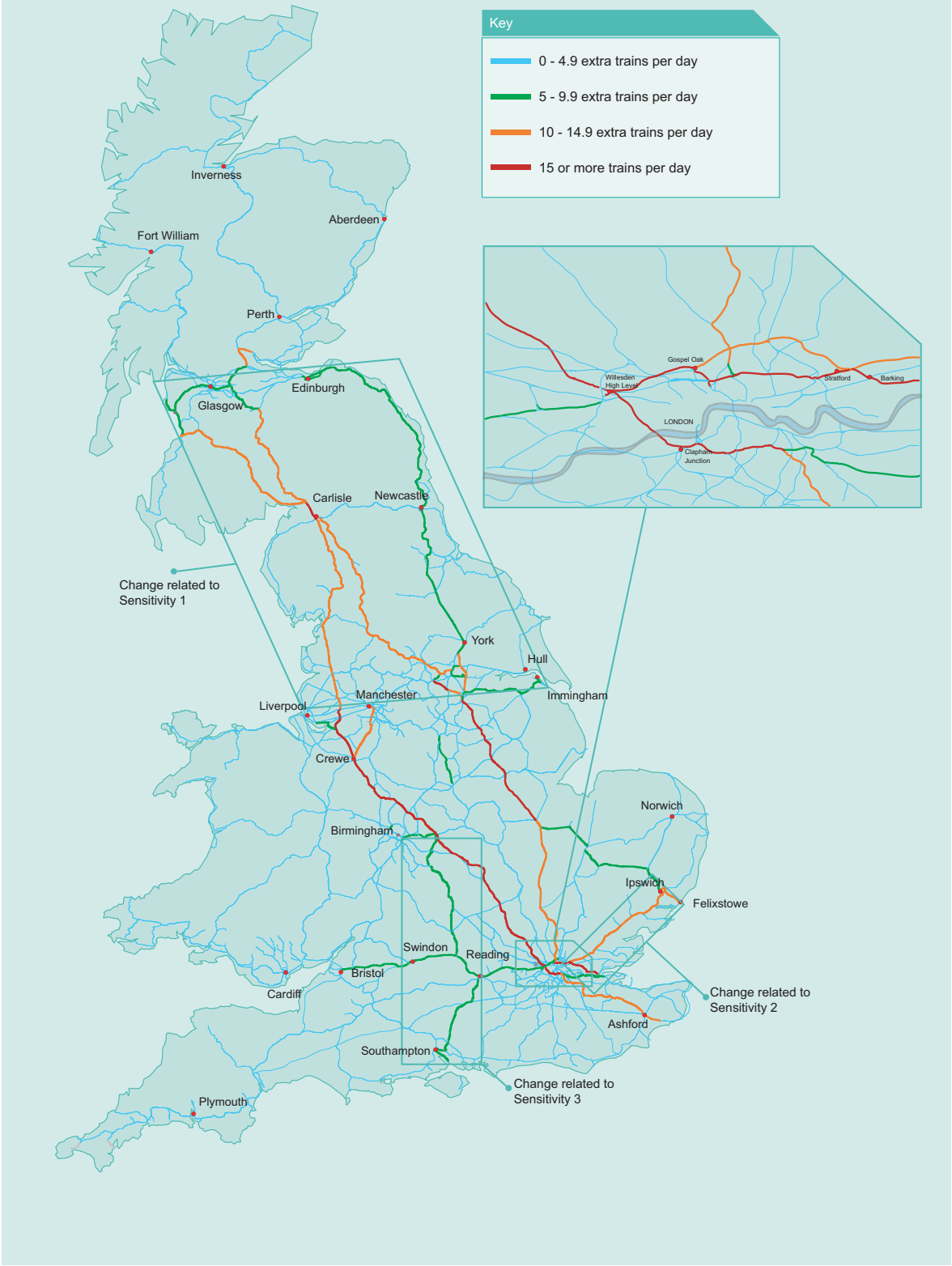
Sensitivity 3 has been developed to display the impact of W10 enhancement between Southampton and the WCML.

Section 4.2.4 details how additional trains fall on network in the Base Case and Sensitivity 2 and 3.

Table 4.2: Sensitivity tests

Sensitivity 1	ESI coal: The predicted further decline in domestic ESI coal production serving Aire and Trent Valley power stations is met by further Anglo-Scottish growth from Hunterston and Ayrshire opencast sites at the expense of Base Case east coast ports import growth
Sensitivity 2	Deep sea intermodal: Shell Haven opens in 2011. Eight trains per day (tpd) run in each direction by 2014/15. Growth replaces eight tpd of growth from Felixstowe and Bathside Bay in Base Case
Sensitivity 3	W10 gauge clearance is delivered by 2011 between Southampton and the WCML. Clearance generates an extra six intermodal trains per day by 2014/15 over the Base Case

Figure 4.2: Additional trains by 2014/15 compared to base year for Sensitivites 1, 2 and 3



Additional trains are for single direction.

Figure 4.2 sets out where the additional trains are forecast on the network in 2014/15 with Sensitivities 1, 2 and 3 displayed. Each Sensitivity is independent, and has impacts independent of the other two. All commodities are displayed. Again in all cases the preferred routeings of the FOCs have been applied unconstrained by capacity at this stage.

In both Figure 4.1 and Figure 4.2, the orange and red lines indicating growth of more than ten and more than 15 trains per day respectively are primarily driven by deep sea intermodal growth and changes in the supply sources of ESI coal. These factors are considered in more detail by market sector below.

The unconstrained forecasts are based on the current track access charging regime. If these charges change, for example using greater differential pricing based on commodity type, then a different demand profile could result.

4.2.4 Commodity summary:
ESI Coal

Figure B1 in Appendix B sets out all current ESI coal import facilities, domestic pits and power stations in the UK along with the key routes used for coal transport by rail. The main routes where additional trains are projected on the network in both the Base Case and Sensitivity 1 are marked.

Tables B1 and B4 in Appendix B set out the Base Case assumptions for ESI coal within the forecasts.

Both the Base Case and Sensitivity 1 assume that ESI coal broadly maintains its existing share of the electricity market. They also assume that there will be further minor increases in rail market share of ESI coal business, driven primarily by the closure of the two water only served power stations and the trend toward longer distance hauls from coal source to power station. The trend of ESI coal supply away from domestic production toward imports is also assumed to continue over the 10 year study period.

Table B5 in Appendix B sets out the RFOA ESI coal lifted by rail forecast in 2014/15 alongside the most recent projections from the DTI for total ESI coal burn.

The industry is taking a slightly more optimistic view of ESI coal demand than the DTI studies at present. Demand for ESI coal in 2014/15 will be heavily influenced by the carbon trading arrangements in place and the market price of carbon credits at the time. The Government's recent Energy Review[4] confirms that reduction of CO2 emissions in the energy sector remains a key target and cites the emissions trading regime as the means of achieving this. The Review may lead to new predictions for coal traffic that will need to be taken into account in the future.

Wholesale gas prices will also be key. After several years of rising gas prices, autumn 2006 saw a significant fall following the opening of a new pipeline from Norway, and this has had an immediate knock on effect on coal demand (see section 4.4 below).

Network Rail has carried out a further review of likely rail based coal demand scenarios to 2020. The results of this work, which are also included in Table B5 in Appendix B, are broadly consistent with the industry view up to 2012/13. The Network Rail scenario ranges beyond this date recognise the uncertainty on policy triggered by the third phase of carbon emissions trading and the end of dispensations to burn coal for power stations not fitted with equipment to reduce sulphur emissions.

In addition to the emissions trading regime for carbon, EC sulphur emissions regulations from 2008[5] are also key to the future demand picture. These regulations will effectively limit the volume of coal burned in power stations not fitted with Flue Gas Desulphurisation (FGD) equipment[6]. Table B6 in Appendix B sets out the current and expected position with regard to FGD fitment at UK power stations. Without such equipment stations operating at

4 Energy Review. DTI, July 2006.

5 These are part of the Large Combustion Plant Directive (LCPD), which takes effect in 2008.

6 Flue gas desulphurisation equipment. Equipment designed to reduce emissions of noxious gases including nitrogen oxide and sulphur dioxide.

full capacity will over time be in breach of EC sulphur emissions regulations and hence will be granted only a limited volume of coal burn post 2008.

FGD equipment is therefore one of a number of key indicators in understanding which power stations are likely to be in operation up to and beyond the 10 year horizon of the RUS and both the industry forecasts and the DTI and NR assessments take this emerging picture into account.

Table B6 in Appendix B shows that all six major Aire and Trent Valley stations[7] are planning to have FGD fitment by 2010. This suggests that regardless of projections for overall ESI coal burn, the key drivers of the Base Case and Sensitivity 1 routeing changes (ie. the continued operation of these six stations) are likely to remain in the medium-term future.

The Base Case envisages that a post 2004/05 shortfall in domestic production and some increase in rail market share is met by growth from a combination of import facilities on the east coast, namely Immingham, Hull, Redcar, Tyne Dock and Blyth, with Anglo-Scottish volumes at 2004/05 levels. This effectively results in a net gain of 18 trains per day from the east coast ports to the Aire and Trent Valley power stations over 2004/05 volumes. Table B7 in Appendix B sets out current capacity and proposed increases in handling capability at the key east coast ports for imported coal.

The Base Case also drives additional trains on the South Humberside mainline, the ECML between Joan Croft Junction and Hambleton Junction and the route from Hull docks to the Aire Valley via Selby and Milford. The route between Stainforth and Brancliffe East Junction (the South Yorkshire Joint line) is also projected to see further growth[8] as a key route to the Trent Valley power stations from the Humber ports.

Sensitivity 1 envisages that the majority of the post 2004/05 shortfall in domestic production and some increase in rail market share will be made up by increased imports through the port of Hunterston allied with continued growth in Scottish opencast forwardings and some limited growth through the east coast ports. The principal destination of this traffic is the Aire and Trent Valley power stations.

This scenario consequentially drives a continued increase in coal demand on the Glasgow and South Western and Settle & Carlisle routes (serving both the Aire and Trent Valley). This amounts to an additional 13 trunk services per day over the 2004/05 base, on the core Glasgow and South Western / Settle & Carlisle axis, around seven destined for the Aire Valley power stations with six continuing on routes from Yorkshire to the Trent Valley as imported coal continues to supplant locally mined sources close to the Trent.

Table B8 in Appendix B shows observed data that has become available since the production of the forecasts. It shows how flows of imported coal to the Aire and Trent valley from Immingham and the main route from Scotland have developed in late 2006. Actual operations are presently following the Freight RUS Base Case scenario rather than Sensitivity 1.

The Base Case predicted that much of the growth from Immingham in particular would take place in the first two years of the forecast period (2005/06 and 2006/07). Table B8 shows that this is indeed occurring, with Anglo-Scottish volumes dropping back as predicted to 2004/05 levels.

The Freight RUS capacity gaps and optioneering exercise outlined in Chapters 5 and 7 clearly sets out the impact of both the Base Case and Sensitivity 1.

Deep sea intermodal

The industry predicts a 64 percent growth in the number of intermodal trains on the network over the 10 years in the Base

7 Of these six stations, Eggborough and Ferrybridge could have a number of individual units not fitted with FGD equipment

8 All these route sections are projected to see growth without intervention in terms of upgrade of an alternative route. Chapter 9 considers interventions that would relieve these routes.

Case. In Sensitivity 3 with W10 gauge from Southampton this climbs to a 74 percent growth overall.

The level and distribution of this growth will be dependent on a number of factors including the timing and location of new port capacity, the level of REPS grant available and the annual growth rate of the deep sea business.

In the Base Case the highest levels of growth are projected to be to/from the proposed new deep sea developments at the Haven Ports of Felixstowe and Bathside Bay. This growth is the prime driver of the high levels of additional trains (shown by orange and red lines) on Figure 4.1 on the Great Eastern, WCML and ECML (between Peterborough – Doncaster).

The same network sections are affected in Sensitivity 2 displayed in Figure 4.2, although this sensitivity involves a proportion of growth coming through Shell Haven on North Thameside rather than the Haven Ports. The principal change the sensitivity drives is slightly fewer additional trains on the Great Eastern and cross country route between the Haven Ports and Peterborough.

One additional impact not displayed on the map is that the additional services from Shell Haven would be forced to make flat junction crossing movements at Forest Gate to access the W10 cleared North London Line, unless W10 clearance and routeing via the Tottenham and Hampstead line can be achieved (see Chapters 6 and 9).

In Sensitivity 3 an additional six trains per day from Southampton to the West Coast Main Line are predicted contingent on W10 clearance taking place.

It is assumed that the preferred routeing of these trains is via Reading West, Leamington and Nuneaton (see Figure 4.2).

The Freight RUS gaps and optioneering exercise outlined in Chapters 5 and 7 takes account of the impacts of the Base Case and Sensitivities 1-3.

Other commodities

Figures 4.1 and 4.2 incorporate growth projected in all other commodities. Figures B2 – B4 in Appendix B show the additional trains projected on the network in 2014/15 by commodity for other key markets of construction, metals and petroleum traffic.

Construction traffic is expected to grow by 20 percent in tonnes lifted over the period, and approximately 25 percent in train numbers. The train numbers growth tends to be incremental rather than delivering a step change in demand levels on any given route. Figure B2 in Appendix B displays this position.

The highest level of growth for construction services is projected to be on the heavily used routes from the west of England to Acton via the GWML. Three or four additional trunk services per day from South Wales and the Mendips are projected and consequentially additional trip workings from Acton to the receiving terminals in the London area are also expected.

The other key area of growth for construction traffic is projected to be the Hope Valley south trans Pennine route, with approximately three to four additional trains daily. Limestone from the Buxton area to de-sulphurisation plants at power stations, cement from Hope and further general aggregates traffic from the Buxton/ Peak Forest area to various destinations are the components of the forecast.

Most metals traffic is generated by a small number of very large customers so a few key decisions drive most changes of significance in this sector. The industry projects up to 19 percent growth in train numbers over the 10 years. As with construction, the traffic does not represent step changes in demand on any given route section.

Figure B3 in Appendix B details this pattern nationwide. The biggest single change on any given route section for metals is actually a decrease of approximately six trains per day on the north east – south west axis between Teesside and South Wales. This traffic

decrease is a result of changes to interworks movements for Corus resulting from a production upgrade at Port Talbot.

The largest increase on a single route section for metals is approximately two additional trains per day additional on the South Humberside Main Line serving Scunthorpe steelworks. The Sutton Park line in Birmingham is also predicted to see an increase of around two trains per day. It is not possible to judge at this stage whether Tata Steel's recent takeover of Corus will have an impact on volumes.

Figure B4 in Appendix B details the limited changes projected in the petroleum market. The market is regarded to be largely stable and static with no routes in the country showing an increase of more than two trains per day over the 10 years. The long-term impact of the Buncefield fire on rail demand is yet to be clear, but as Chapter 3 and section 4.4 highlights, currently rail is continuing to move increased volumes as a result of the incident.

Domestic intermodal traffic is forecast to see continued growth in line with the last few years, with supermarkets and other retail distributors increasingly making regular use of rail. The WCML London – Midlands – Scotland corridor is highlighted as the key route for this traffic, with traffic between Scottish terminals at Mossend, Coatbridge and Grangemouth and intermodal terminals in the Midlands projected to show further growth.

At least one operator has reported that it expects Channel Tunnel traffic to increase subject to resolution of access and pricing discussions.

4.2.5 Stakeholder projections outside the Industry forecast

As part of the consultation process detailed further in Chapter 8, a number of ports have raised potential further growth scenarios outside those detailed in the Industry forecast. Table B9 in Appendix B summarises those scenarios (where quantified) and their potential net impact on the industry forecast for the RUS should the developments reach full capacity.

The majority of Ports which reponded have not challenged the Industry forecast view of the overall size of the key markets in future or the forecast growth in rail market share in key markets.

In addition to a broad set of responses from ports, a number of potential new terminal developers, companies acting for developers or other interested parties have highlighted plans for new inland terminals as part of the consultation.

Table B10 in Appendix B lists those developments highlighted. In most cases the terminals are under development and are either going through or have recently completed the formal planning process.

The majority of the new developments listed are for new rail connected warehousing and/or intermodal facilities. The list is not intended to represent an exhaustive record of all aspirations for new terminal developments over the RUS period. New schemes are constantly under development and the impact of each will need to be considered on its merits as and when detailed traffic forecasts are available.

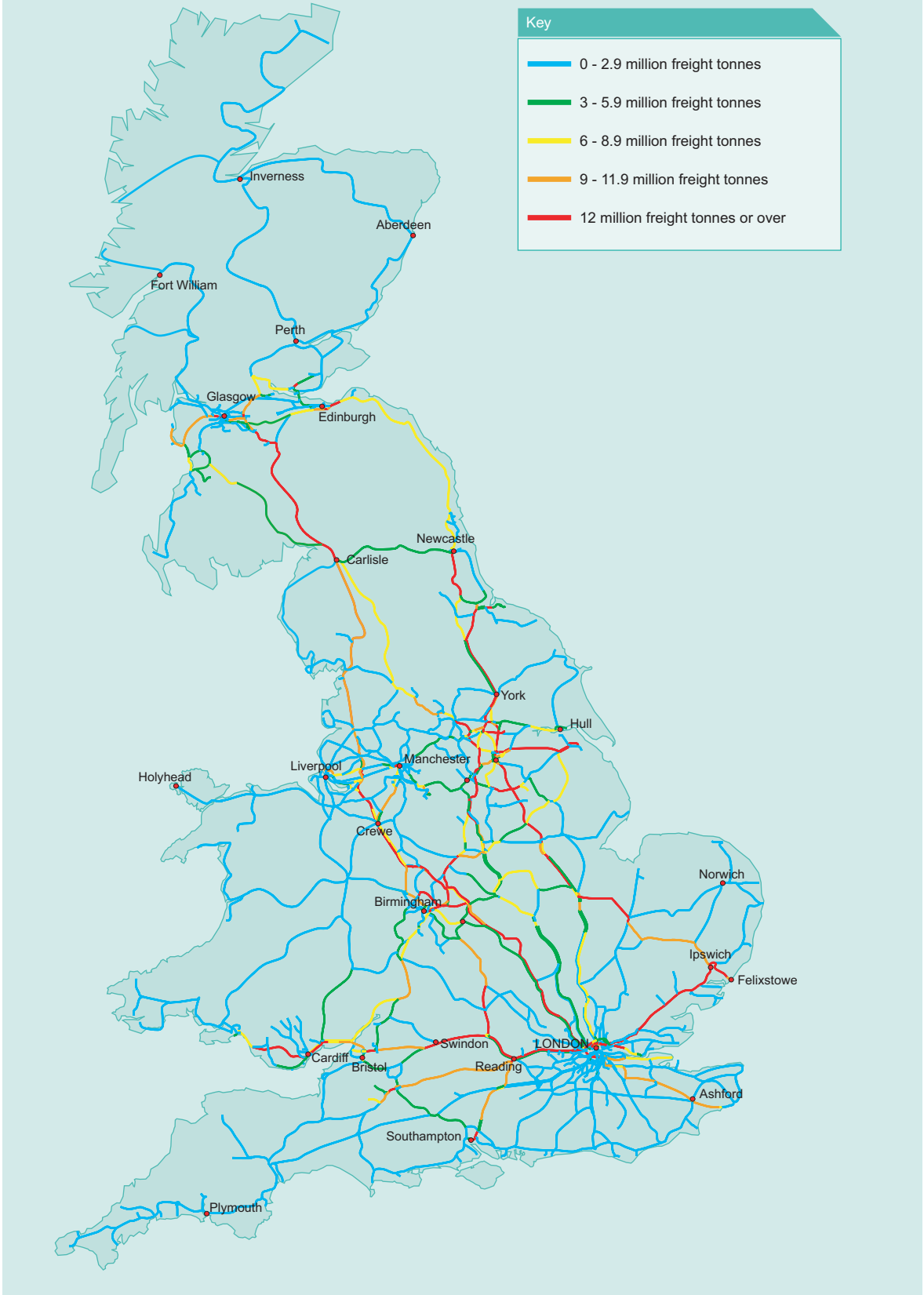
Chapter 8 explains further how consultation responses from terminal developers have been considered.

4.3 Industry 2014/15 demand results: gross tonnage

Gross tonnage forecasts are displayed in Figure 4.3 for the Base Case and Figure 4.4 overleaf for Sensitivity 1, 2 and 3. Sensitivities 2 and 3 do not drive any significant changes in gross tonnage on the network.

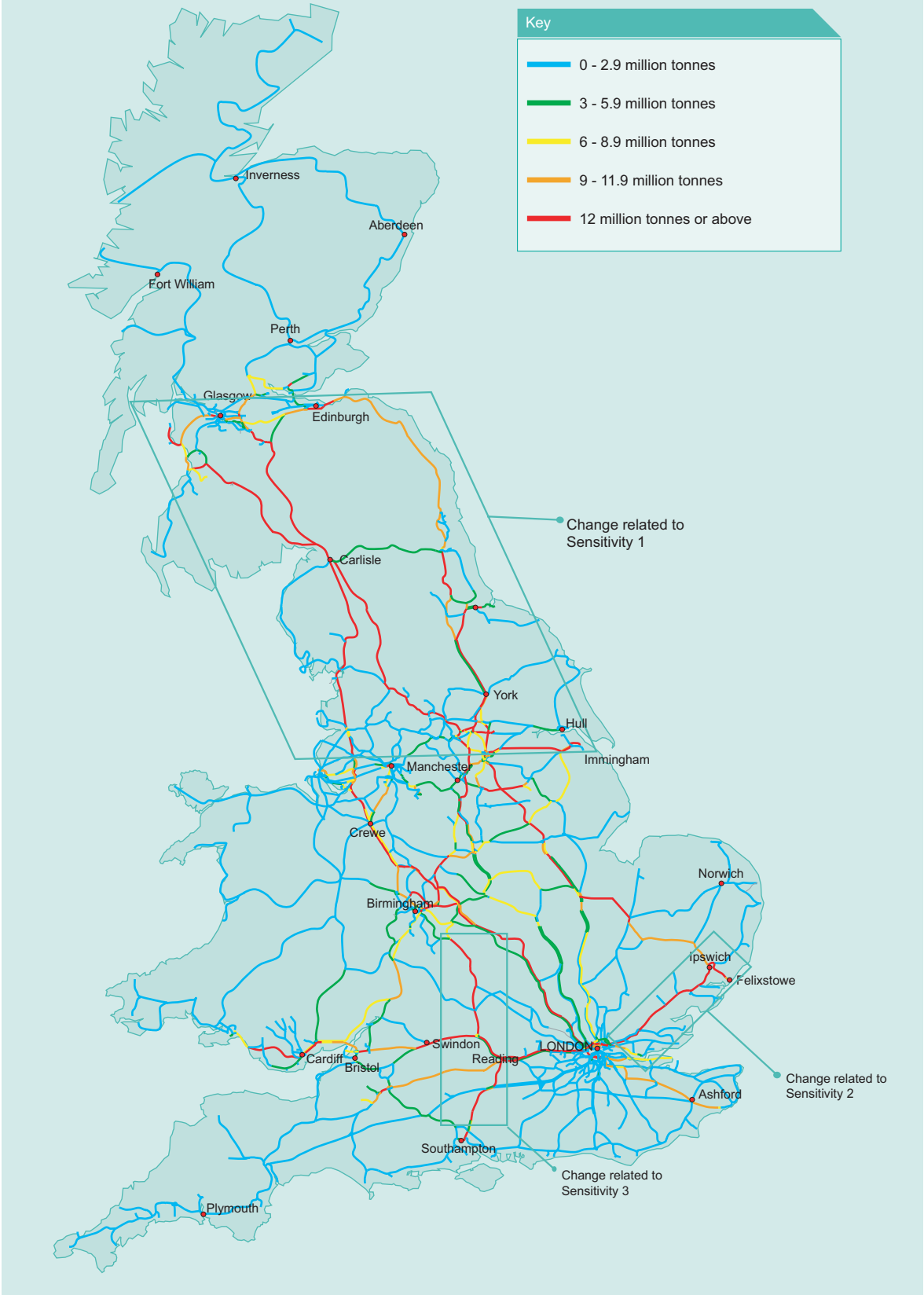
The tonnage maps illustrate a similar pattern to that displayed by Figures 4.1 and 4.2 showing additional trains in 2014/15 compared to the base year. The routes with a higher number of bulk services eg. coal, aggregates and petroleum, will show a higher ratio of gross tonnage to additional trains projected.

Figure 4.3: Gross tonnage on the network in 2014/15 for Base Case



Annual tonnage shown in both directions. Routes with two different colour codes reflect differing tonnage on fast and slow lines.

Figure 4.4: Gross tonnage on the network in 2014/15 for Sensitivites 1, 2 and 3



Annual tonnage shown in both directions. Routes with two different colour codes reflect differing tonnage on fast and slow lines.

For example in Sensitivity 1, the Glasgow and South Western and Settle & Carlisle axis has considerably fewer additional services projected to run than most sections of the WCML, however the tonnage increase on these lines is projected to be as high as that on many sections of the WCML where the growth is predominantly in lighter intermodal traffic.

4.4 Predicted growth compared to actual 2005/06 figures and emerging 2006/07 figures

Since the Freight RUS forecasts were produced based on 2004/05 data, information on freight traffic for the most recent financial year 2005/06 is now available and is detailed in Chapter 3, Tables 3.1 and 3.2. This has allowed a high level comparison between the 10 year forecasts outlined in this chapter and freight volumes which occurred in 2005/06, effectively the first year of the forecast.

National Rail Trends[9] for 2005/06 reports a two percent growth in freight tonnes lifted and a seven percent growth in net tonne kilometres over 2004/05.

In the coal sector, both tonnes lifted and net tonne km statistics showed continued growth in 2005/06. Total coal lifted was estimated at 47.6 million tonnes in 2005/06, roughly half way between the bottom up and top down projected tonnes lifted by the industry 2014/15 projections in Table 4.1[10].

Growth in coal tonnes lifted has continued further in the first two quarters of 2006/07 but is expected to fall back in quarters three and four as a result of lower gas prices and the mild winter. This recent development coupled with the predicted switch of some coal traffic from the Anglo-Scottish route to shorter routes from the Aire and Trent valley means that overall net freight tonne km and tonnes lifted statistics could well be flat or even show a slight fall once the full 2006/07 statistics are available.

For commodities other than coal, bespoke tonnes lifted data for comparison with Table 4.1 is not available, despite this some informative consideration of net tonne km statistics can be made.

Both deep sea and domestic intermodal traffic continue to show considerable growth with published net tonne km growth statistics in 2005/06 supporting thus far the industry's 2014/15 projection. Net tonne kms grew 9 percent in 2005/06 with further growth recorded in the first two quarters of 2006/07. Growth in train numbers from the key ports is in line with the detailed bottom up origin destination projections in the RUS forecasts, with Felixstowe already generating an additional three trains per day growth over the 2004/05 base year as projected in the industry forecast.

Construction traffic showed further consistent net tonne km growth in 2005/06 of 4.3 percent, although this is expected to fall back in the 2006/07 results as several major construction projects in the south east are completed. Oil and petroleum traffic showed a 5.9 percent increase by the same measure in 2005/06 and 2006/07 is expected to display similar progress. Only metals and channel tunnel traffic of the major sectors have shown a decline in 2005/06 in net tonne km.

Metals traffic showed a decline in 2005/06 as a result of a large reduction in long distance north east to south west interworks flows. This is factored into the Freight RUS forecast as outlined in section 4.2.4.

Channel tunnel traffic is currently not showing growth. Long-term resolution of tunnel charging issues has been highlighted by the industry as a key condition of the growth outlined in the RUS forecast.

9 National Rail Trends, 2005/06, ORR.

10 The National Rail Trends tonnes lifted statistics are not precisely comparable with the tonnes lifted statistics in table 3.1 or those used as the base for the industry forecasts. This is due to slightly different allocation of some non ESI coal flows to other commodity sectors.

5. Summary of gaps identified

5.1 Capacity gaps

5.1.1 Approach

One of the main objectives of the Freight RUS is to highlight the key capacity issues which would need to be addressed in order to accommodate the forecast growth in the rail freight market. By taking a network wide view it identifies constraints that would not be identified if a more narrow route-based view of freight were to be adopted. As discussed in Chapter 2, capacity issues are best considered in geographical RUSs which benefit from detailed passenger growth estimates alongside the established freight forecasts from the Freight RUS. These RUSs will ensure that both freight and passenger traffic are considered when developing timetable and/or infrastructure solutions.

Whilst it does not benefit from viewing freight growth alongside the detailed passenger growth forecasts which will be developed in each of the geographical RUSs, the Freight RUS can identify key constraints against a background of known passenger TOC commitments. Whilst the geographical RUSs will revisit the findings in the light of passenger forecasts, in an era of considerable growth in passenger numbers, it is not likely that many (if any) of the capacity constraints identified would be alleviated by equivalent declines in the passenger market.

This RUS therefore highlights the key strategic capacity constraints of concern to freight users in one document. By doing this, it enables operators and funders to understand the network wide implications of constraints and identifies solutions.

5.1.2 Methodology

The analysis in the Freight RUS uses forecasts of trains/tonnage classified by origin to destination pairs (as detailed in Chapter 4) on a trains per day basis. A range of key indicators has then been assessed to determine the critical pinch points on the network against these projections. The results of this assessment have been consulted widely both internally at Network Rail and with the Stakeholder Management Group.

To do this, it has clearly been necessary to make some assumptions about passenger demand growth. The Government's Regional Planning Assessments and the RUS programme forecast widespread growth in passenger demand. However, for much of the network there are not yet firm commitments to translate this growth into amended timetables. In the absence of this, the Freight RUS has assumed that the passenger growth will be accommodated without reducing the working timetable (WTT) paths that are currently available to freight. On the WCML where the emerging picture on 2008 standard hour freight paths is available against the revised passenger specification, this picture has been adopted.

The capacity gaps which fall on a route section where major change in the passenger timetable is also likely are highlighted as eligible for further study within the designated geographical RUS which will also consider the passenger timetable implications. Table C1 in Appendix C shows which gaps are considered in the Freight RUS, and which gaps are considered in the geographical RUSs.

The methodology for identifying key freight capacity constraints follows a four stage process as described below.

A: Focus on high growth corridors
An initial 'sift A' identified corridors with high forecast growth. For this exercise, 'high growth' was defined as occurring on route sections where eight or more additional trains per day were projected (in the busier direction). A variety of levels of demand were considered as hurdles for this test and it was concluded that eight trains per day growth picked up most of the strategic changes including those on key routes to and from major sea ports and coal import terminals.

This process was followed up by a review with stakeholders of further sections where there was difficulty in securing paths on today's railway where these had not been captured in the first sift. The further sections identified were: the Hope Valley line, the Sutton Park line, crossing moves at Coventry station and a number of route sections linking the north east ports with the Aire/Trent Valley power stations.

Routes in South Wales (such as Cwmbargoed to Aberthaw) were also highlighted as potential gaps not picked up by sift A. On consultation it was agreed that these were best examined further in the Wales RUS due to close linkages with changes in passenger service frequencies.

B: Analysis of current path take-up on high growth corridors
This stage involved detailed analysis of the utilisation of freight paths on the route sections selected following sift A to establish whether there were some sections of the network where high growth levels could be comfortably accommodated within the existing WTT path provision.

Care was taken to avoid a blanket assumption that a low path take-up means that spare capacity exists for growth within the current quantum of booked paths. This was because the existing quantum on any given section may contain spare paths for a particular operational reason. For example, spare paths may be included to cover for the particular supply arrangements of a power station, paths booked to cover operations of services with a less than daily pattern or paths booked for diversionary purposes. In all these cases assumptions that these slots could be used for new flows of traffic would be spurious.

Nonetheless, it has been possible to eliminate some route sections from the study at this stage. For example, the primary route for Channel Tunnel traffic between Dollands Moor and Wembley via Maidstone East is forecast to have some growth. However, the utilisation of booked WTT freight paths on the route over the last two years has never been higher than 40 percent per day on any section, and the regularly unused paths available are suitable for the predicted future growth in terms of sectional running times and the times of day they are available. In this, and similar cases, it was concluded that it was not necessary to identify the route as a potential capacity constraint to the forecasts.

C: Analysis of remaining available capacity over and above WTT provision

For the route sections sifted through processes A and B a further analysis was undertaken to assess likely available capacity for freight over and above that reserved in the current WTT. The peak and off peak Capacity Utilisation Index (CUI) measure for each section was reviewed.

The CUI is a measure of the usage of a route section against its capacity and consequently gives a broad indication of where additional capacity may be available, over and above that traffic which currently runs.

The CUI is not, however, always appropriate for indicating spare capacity likely to be available for freight. This is partly due to the complex nature of freight movements at many of the key points of constraint, particularly crossing moves at junctions.

Consequently, its use as an indicator of potentially available capacity was supplemented by a review of each individual route section and the service mix and routeing. CUI data was only used as a basis for removing route sections from the study if the nature of movements on the section in question did not involve conflicting movements at junctions or other known operational issues.

D: Full peer group review

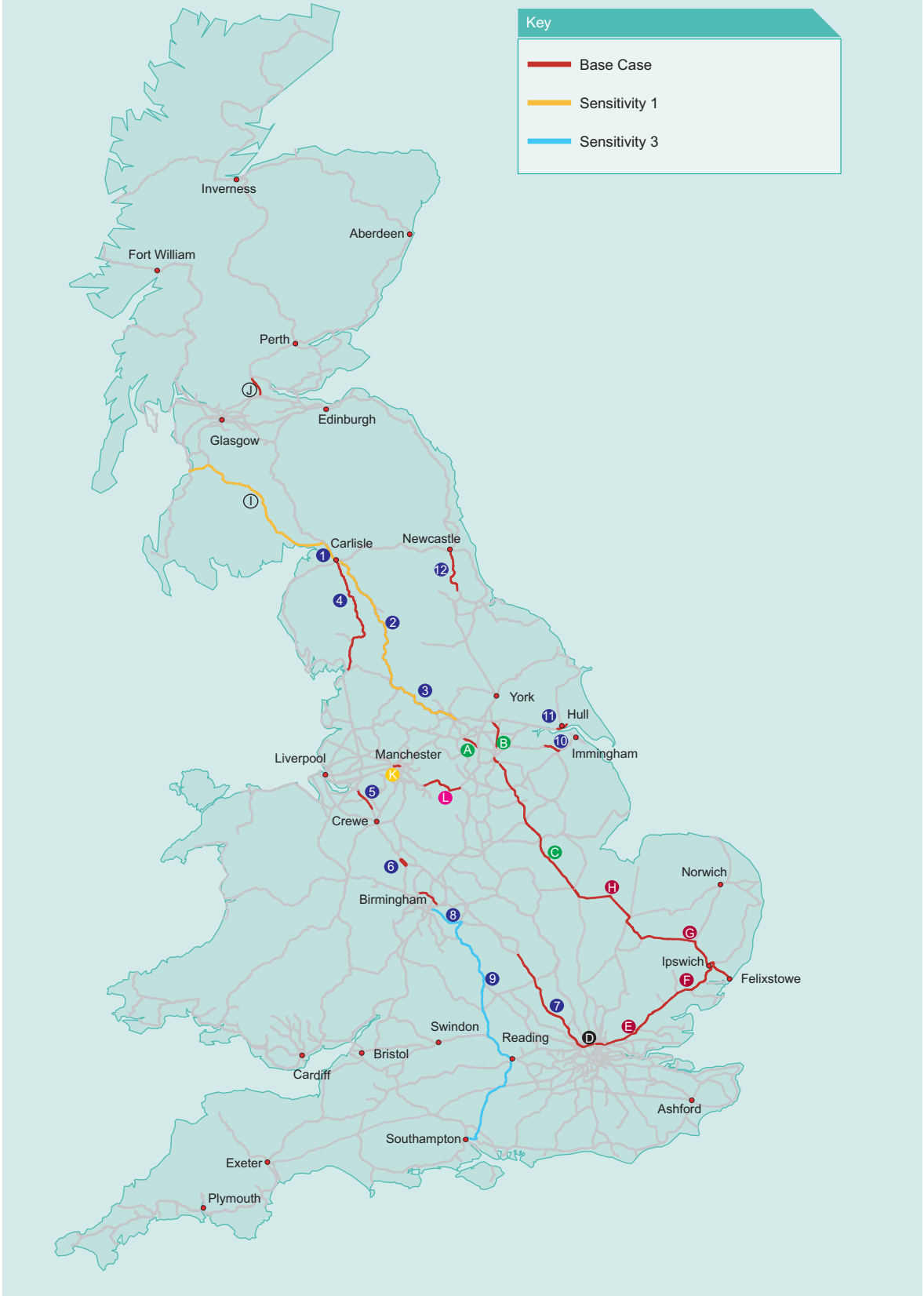
The process and results of sifts A to C were shared at the Freight RUS Stakeholder Management Group (SMG) and subsequently reviewed in two separate working groups made up of attendees determined at the SMG.

5.1.3 Key gaps defined

Figure 5.1 illustrates the key capacity gaps against the 2014/15 forecasts as defined by the methodology and peer group review outlined above. The figure highlights those gaps driven by the sensitivities as well as the Base Case demand forecast.

Table C1 in Appendix C sets out further WTT, ACTRAFF and CUI data for each of the route sections highlighted. For the cases where the Freight RUS will not be taking analysis of the gap further, the relevant geographical RUS is also shown.

Figure 5.1: Key capacity gaps



Numbers 1 to 12 are capacity gaps considered within the Freight RUS.
Letters A to L are capacity gaps considered within the appropriate geographical RUS.
Sensitivity 2 does not drive any additional capacity gap route sections, excluding those identified in Table 5.6.

5.1.4 Drivers of capacity gaps

The key capacity gaps can be divided into two distinct groups.

Firstly there is a set of gaps arising from the forecast growth in imported coal and coal from opencast sites. The gaps include route sections between the east coast ports and the Aire and Trent Valley power stations in the Base Case, and between the Scottish port of Hunterston and Ayrshire opencast sites and the Aire and Trent Valley power stations in Sensitivity 1.

The key coal growth flows in Sensitivity 1 and the Base Case and the key capacity gaps they drive are shown in Tables 5.1 and 5.4 covering the Anglo-Scottish route and the lines from the east coast ports respectively.

The group of gaps driven by deep sea intermodal growth in the Base Case and Sensitivities 2 and 3 are shown in Tables 5.2, 5.3, 5.5 and 5.6. In the Base Case these gaps include sections on the Great Eastern Main Line, the West Coast Main Line, the southern part of the East Coast Main Line and the cross country route between Ipswich and Peterborough.

Sensitivity 2 introduces an additional gap between Forest Gate and Stratford on the GEML, and in Sensitivity 3 there is a group of capacity gaps between Southampton and the West Coast Main Line.

Each gap has been given a unique identifier. Gaps which are identified for further examination in the optioneering phase of a geographical RUS are highlighted with letters. Gaps for consideration in the Freight RUS in advance of future RUSs are highlighted with numbers.

Table 5.1: Growth driver 1: Coal: Sensitivity 1: Hunterston/ Ayrshire – Aire Valley/Trent Valley

13 additional trains per day in busier direction by 2014/15

Identifier	Resulting key gaps:	Driver of gap
Ⓘ Scotland RUS	Glasgow South Western: (Mauchline Junction – Gretna Junction)	■ Single line section Gretna – Annan ■ Signalling headways in particular at Ardoch (between Thornhill and Kirkconnel) and Auchinleck (between New Cumnock and Mauchline)
1	WCML: (Gretna Junction – Petteril Bridge Junction)	■ Conflicting movements at Gretna Junction ■ Speed differentials freight – passenger, including entering/leaving loops ■ Conflicting movements south of Carlisle station
2	Settle & Carlisle: (Petteril Bridge Junction – Settle Junction)	■ Long signalling headways, in particular at Horton in Ribblesdale, Long Meg and Mallerstang.
3	Settle Junction – Milford	■ Insufficient paths across Whitehall Junction ■ Lack of regulating points in Whitehall Junction area

Table 5.2: Growth driver 2: Intermodal Base Case: Haven Ports – Midlands, the North West, Scotland

Up to 19 additional trains per day in busier direction by 2014/15

Identifier	Resulting key capacity gaps: (geographical)	Driver of gap
4	WCML: Lancaster – Carlisle	■ Speed differential between passenger services and diesel hauled freight services over Shap summit ■ Sub optimal positioning and length of some loops
5	WCML: Winsford – Weaver Junction	■ Speed differential between passenger services and freight services on two track section between Winsford South and Weaver ■ Slow entry/exit speeds to existing loops
6	WCML: Stafford	■ Conflicting movements at southern end of Stafford station between Down/Up slow and Down/Up Birmingham lines.
7	WCML: Daventry – Wembley	■ Available Class 4 & 6 slots between off peak passenger service
D Cross London RUS	Stratford – Channelsea North Junction – Camden Road	■ Interface with access to / from the GEML at Stratford
E F Anglia RUS	GE Main Line	■ Available Class 4 & 6 slots between off peak passenger service ■ Interface with access to/from the NLL at Stratford
K North West RUS	Manchester Piccadilly – Deansgate	■ Available freight paths across Ardwick Junction, through Platforms 13 & 14 at Manchester Piccadilly and along the Deansgate corridor

Table 5.3: Growth driver 3: Intermodal Sensitivity 3: Southampton –WCML W10 cleared

Six additional trains per day in busier direction by 2014/15 over base scenario

Identifier	Resulting key capacity gaps:	Driver of gap
8 9	Southampton – WCML: Basingstoke/Reading West Junction/Cherwell Valley, Leamington – Nuneaton	■ Southampton – Basingstoke: Only two freight paths per hour available between off-peak passenger service ■ Conflicting freight and passenger movements at Reading West Junction ■ Up movements to Coventry at Nuneaton ■ Crossing movements at Coventry ■ Conflicting movements between freight and empty stock passenger paths in the Oxford Station area

Table 5.4: Growth driver 4: Coal: Base Case: East coast ports[1] – Aire/Trent Valley

18 additional trains per day[2] in busier direction by 2014/15

Identifier	Resulting key gaps:	Driver of gap
10	Wrawby – Scunthorpe	■ Signalling headways Wrawby – Scunthorpe ■ Available time for maintenance access ■ Junction speeds at Wrawby
11	Hull docks branch	■ Single line and signalling system on the Docks branch
12	Tyne Yard – Tursdale Junction[3]	■ 2 track section of ECML: speed differential between freight and high speed passenger services

Table 5.5: Growth driver 5: Intermodal Base Case: Haven Ports – Yorkshire/the North East

Eight additional trains per day in busier direction by 2014/15

Identifier	Resulting key gaps:	Driver of gap
A	ECML: Hare Park Junction - South Kirby Junction	■ Conflicting freight crossing movements between Moorthorpe and Hare Park Junction
B	ECML: Joan Croft Junction - Hambleton Junction	■ Freight crossing movements to the Down line at Joan Croft Junction ■ Freight crossing movements to the Up line at Hambleton Junction.
C	ECML: Peterborough – Doncaster	■ Access from Up Slow and Peterborough Yard to Up March line ■ Speed differential freight to passenger on two track section Stoke Junction – Doncaster
G H	Haughley Junction – Peterborough	■ Single lead junction at Haughley ■ Signalling headways at Kennett ■ Conflicting movements through Ely station

[1] Immingham, Hull, Redcar, Tyne, Blyth.

[2] This number reflects the total additional trains per day from all the east coast ports.

[3] Likely to be a constraint primarily at times when coal diversions are also on this section away from the Settle & Carlisle.

Table 5.6 shows the additional gap introduced by Sensitivity 2. The gaps shown in Table 5.2 would also apply.

Table 5.6: Growth driver 6: Intermodal Sensitivity 2: Shell Haven – Midlands/ the North West/Scotland & Haven Ports – Midlands/the North West/Scotland

11 additional trains per day from Haven Ports and eight additional trains per day from Shell Haven, in busier direction by 2014/15.

Identifier	Resulting additional key gaps:	Driver of gap
E	Forest Gate – Channelsea	■ Conflicting movements at Forest Gate with GE service on both Main and Electric lines ('E' lines)

Under Sensitivity 2 there are five additional trains per day from Haven Ports, and two additional trains per day from Shell Haven to Yorkshire/the North East in busiest direction by 2014/15. The gaps on the route to Yorkshire/ the North East are the same as those in Table 5.5.

There are a small number of key constraints that are not driven by coal traffic pattern alterations or deep sea intermodal growth. The South Trans Pennine route (marked L on Figure 5.1) is included as further growth is projected in aggregates and construction materials from terminals on the route. There are already difficulties in pathing slow moving freight services in-between passenger services on the route. The optimal solution for this gap is heavily dependent on the future strategy for fast and stopping passenger services on the route, and for this reason the identified gap will be optioneered further in the Yorkshire and Humber RUS.

In addition to the deep sea growth highlighted above, the inclusion of the section of the WCML between Carlisle and Lancaster is partly driven by projected growth in domestic intermodal traffic between England and Scotland, as well as the predicted continuation of demand for diesel hauled freight on the route, which can cause conflicts with passenger services on the steep gradients.

Capacity Gap Ⓙ : Larbert – Stirling is driven by the change to existing routeing of coal traffic from Hunterston/Ayrshire opencast sites to Longannet. This change is as a result of the reopening of the Stirling – Alloa line and will be considered as part of the Scotland RUS.

Table C1 in Appendix C sets out each of the route sections identified as representing a capacity gap above, alongside the geographical RUS that will take forward optioneering.

5.1.5 Potential constraints arising from developments outside the Freight RUS forecasts

As noted in Chapter 4, the industry forecasts do not include all possible future container or coal handling port developments. A number of further port expansion schemes are currently going through the planning process or have recently received necessary permissions. The potential demand implications highlighted in the consultation process from these additional developments are summarised in Table B9 in Appendix B. A high level assessment of the gaps each of these further developments could drive is made below.

Port of Southampton

The Port of Southampton has highlighted a potential further expansion in handling capacity set out in Table B9. 40 percent growth in train numbers from the port is factored into Sensitivity test 3 of the industry forecast.

Gaps 8 and 9 set out above are identified as a result. Further growth would drive a different set of solutions to Gaps 8 and 9. The implications are summarised in Chapter 9.

Teesport
The port is currently progressing plans for a deep sea berth as set out in Table B9 in Appendix B. There are no obvious capacity constraints to some additional rail traffic from the port.

It is possible that a large share of projected rail traffic would be to/from the North West. In connection with these trans Pennine flows, there could be localised capacity implications between Ardwick Junction and Deansgate if there is a particular requirement to have multiple daytime services to/from the Trafford Park terminal in Manchester. There are no obvious other constraints but further work would be helpful to understand the availability of daytime paths on the trans Pennine 'Diggle' route.

Port Talbot
Expansion of coal handling facilities at Port Talbot for ESI coal imports to South Wales and Midlands power stations is unlikely to drive any major new capacity gaps on the network, though the potential routeing into the West Midlands has yet to be determined. The Wales RUS will consider further if there are likely to be any conflicts with passenger growth aspirations in South Wales.

Hull
The impact of further expansion of ESI coal handing and container facilities at Hull is largely already included in the industry forecast, and capacity Gap 11 is identified as a result. Further growth as identified in Table B9 could drive the need for signalling headway improvements between Hessle Road Junction and Selby.

Port of Bristol
The increase in coal handling capacity at the Port of Bristol is largely already covered in the industry forecast as detailed in Table B9. Further growth driven by development of a major new deep sea container terminal could drive some significant new capacity gaps outside those identified by the RUS. Network Rail is undertaking a bespoke timetable study for the port in order to identify these issues.

Port of Liverpool
The Port of Liverpool is developing further container handling capacity as detailed in Table B9. The solution to handling further rail growth from the port involves building the Olive Mount Chord and providing W10 access via Earlestown and Runcorn. Chapter 9 considers this option further.

Hunterston
Clydeport have expressed an aspiration to develop their port at Hunterston as a deep sea container port. Table B9 sets out possible volumes. For gauging reasons (see Chapter 6), initial routeing of container traffic between Hunterston and the WCML would probably be via Paisley and Rutherglen (in the Glasgow suburbs).

Should this development go ahead, an assessment of the likely number of container services generated will need to be made and considered alongside the forecast for coal services from Hunterston/Ayrshire – Longannet/Cockenzie and the plans of Transport Scotland for suburban services on the Ayr route.

An alternative routeing via the Glasgow and South Western line to the WCML at Gretna could be used, though this route would require substantial gauge clearance work, and also the signalling schemes and partial re-doubling of Gretna – Annan (as outlined in the Scotland RUS).

It is noteworthy that there are no significant capacity gaps identified in Wales and comparatively few in Scotland. No significant strategic issues were identified that might impede the growth currently expected by the industry in either country.

The Scotland RUS contains an analysis of those sections of route where freight and passenger growth necessitates capacity enhancement. Table 5.7 shows the issues which will be examined by the Wales RUS.

Table 5.7: Freight issues to be dealt with in the Wales RUS

Route	Commodity	Issue
Cwmbargoed – Aberthaw	Coal	Capacity constraints between Cardiff Junction and Cogan Junction
Blaenau Ffestiniog – Llandudno Junction (Conwy Valley)	Slate waste	Upgrading of branch line
Machynlleth – Chirk	Timber	Effect of more frequent passenger services on paths on Cambrian line

5.2 Capability gaps

5.2.1 Gross tonnage

Figures 4.3 and 4.4 in Chapter 4 set out the expected demand profile in additional gross tonnes on the network in 2014/15. The maps highlight significant additional tonnage across a wide range of routes. Predominantly the growth falls on main lines such as the East and West Coast. However, under Sensitivity 1, significant uplift is also forecast on less heavily used routes including the Settle & Carlisle and the Glasgow and South Western.

Using a base year of 2004/05, Network Rail has reviewed the network to identify those sections of route which are most likely to have a near term requirement for significant volumes of track or structure renewals in the event of further additional tonnage.

Table 5.8 sets out the projected additional gross tonnage on each of the route sections which falls into the category set out above where growth projected exceeds one million gross tonnes per annum. These are all regarded as key strategic route sections.

Table 5.8: Route sections with changes in tonnage over 1 million and likely to require accelerated renewals

Route section	Gross freight tonnes (m)		Growth tonnes (m)
	2004/05	2014/15	
Eastriggs – Bank Junction	2.0	5.1	3.1
Bank Junction – Mauchline	3.2	5.2	2.0
Mauchline – Bank Junction – Eastriggs	4.8	9.2	4.4
Gretna Junction – Carlisle	10.8	19.0	8.2
Carlisle – Gretna Junction	6.2	10.2	4.0
Carlisle – Kirkby Thore	3.5	9.2	5.7
Kirkby Thore – Carlisle	1.2	3.4	2.2
Kirkby Thore – Settle Junction	4.0	9.7	5.7
Settle Junction – Kirkby Thore	2.2	3.4	1.2
Larbert Junction – Stirling	0.8	2.2	1.4
Stirling – Larbert Junction	0.5	2.0	1.5
Crewe Independent Up	0.6	6.2	5.6
Crewe Independent Down	8.9	15.6	6.7
Woodgrange Park to Barking	5.3	6.6	1.3
Barking to Woodgrange Park	5.1	6.4	1.3

All sections in bold type only see tonnage increase in Sensitivity 1

The route sections shown in bold are all on the Settle & Carlisle or Glasgow and South Western Lines, all see significant tonnage growth only in Sensitivity 1.

Both lines have already seen substantial tonnage growth in this flow up to, and indeed since the base year 2004/05. In 2005/06 around two million gross tonnes of the 2014/15 per annum projected growth (of 5.7 million tonnes) had already occurred. Despite this peak in the winter of 2005/06 volumes are now back down to around 2004/05 levels as predicted in the RUS Base Case forecast.

All other route sections in the table are projected to see growth in the Base Case and Sensitivities 1 – 3. Growth projected on the Crewe Independent lines represents a whole range of traffic traversing the WCML but avoiding Crewe station. Growth projected through Woodgrange Park (on the Tottenham & Hampstead Line) is mostly intermodal and aggregates traffic to/from North Thameside. The additional tonnage projected on Larbert – Stirling is a result of the proposed re-routeing of Longannet coal traffic via the Stirling – Alloa line.

Appendix C Table C2 sets out indicative cost estimates for accommodating the tonnage projections set out in Table 5.8.

5.2.2 Route Availability (RA) and train length

Stakeholders have raised aspirations for specific increases in axle weight limits (improved RA). Where a capacity gap has been identified in this chapter, Chapter 7 considers options for relieving those gaps, including improvements to axle weight limits, where these improvements would be likely to reduce demand for train paths.

By the same criteria, improvements in train length are also considered in Chapter 7 as options against a number of capacity gaps.

6. Gauge aspirations

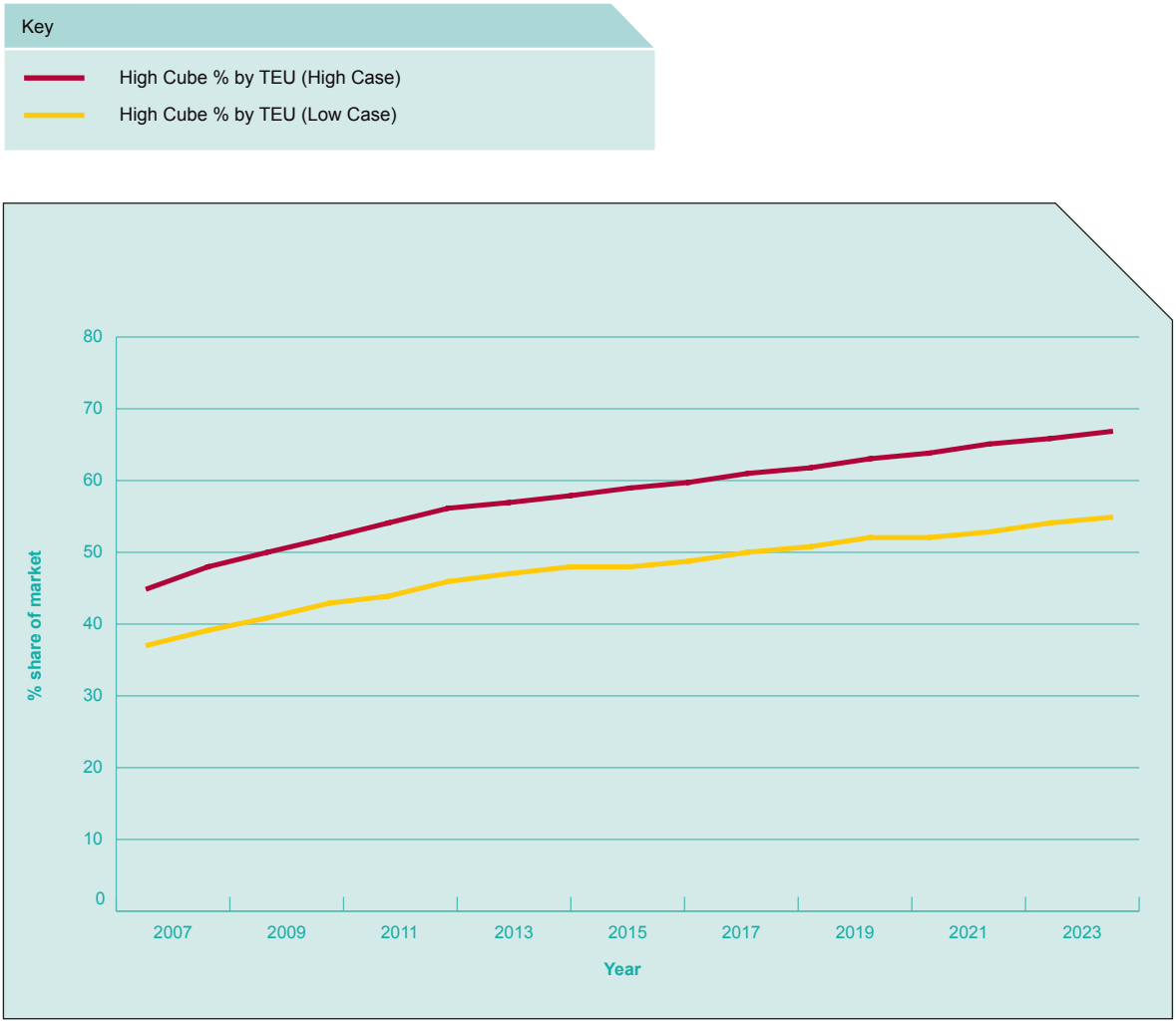
6.1 Background

This chapter considers the gauge aspirations of the rail freight operators. It examines the aspirations which arise from the intermodal market (both deep sea and short sea) and Channel Tunnel traffic.

The recent trend towards larger containers in both the deep sea and short sea markets is forecast to continue over the next 10 years.

The standard container sizes for deep sea and short sea differ and are considered separately below. Table A1 in Appendix A sets out the most common box dimensions in operation in both these markets. Rail freight operators have aspirations to increase their modal share of these markets.

Figure 6.1: Projected High Cube percentage of deep sea market by twenty foot equivalent unit (TEU)



Data source: Bathside Bay and Felixstowe South planning enquiries 2004.

The market for the movement of continental gauge conventional wagons through the Channel Tunnel is currently constrained by UK gauges. This is explored in the European gauge section in this chapter.

Deep sea intermodal

Productivity gains for intercontinental shipping lines of using taller boxes are driving a continuing rise in market share of High Cube containers (9ft 6in tall).

The future growth in 9ft 6in units was discussed at the planning inquiries for Bathside Bay and Felixstowe South in 2004. Figure 6.1 charts the anticipated growth as a proportion of the deep sea box fleet projected between 2007 and 2023.

Since these projections were published, the share of 9ft 6in high boxes within the deep sea container fleet by TEU has grown to 40 percent in 2006, up from 34 percent in 2004 and 28 percent in 2002, suggesting that the 'high scenario' is likely to be closer to what would be forecast today.

Whilst 8ft 6in containers can be accommodated on standard wagons (deck height 1000mm) within W8 gauge (see Appendix A for description of these standard gauge profiles), High Cube containers on standard wagons require W10 gauge.

Short sea (including maritime and Channel Tunnel intermodal)

There is greater diversity in the range of box dimensions for intra european containers. This is partly due to the wider range of methods of container transportation used for the shorter intra european hauls. Both container width and container height are constraints for handling some box types within the UK gauges. Unlike deep sea boxes, which (with the exception of refrigerated 'reefers') are restricted to 2.5m in width, an increasing number of short sea units are of 2.55m and 2.6m width. These units if 9ft 6in high are not compatible with W10 on a standard wagon (1000mm platform) and can only be conveyed within W12 gauge (see Appendix A Figure A6 for gauge comparison).

6.2 Industry priority gauge aspirations 2014/15

In the light of the trend towards larger container sizes in the intermodal market, the FOCs have proposed amendments to the SRA's Gauging Policy[1] highest priority routes for future gauge enhancement schemes. The Base Case forecasts detailed in Chapter 4 assumed no further gauge enhancements (except those already committed as part of port developments) with Sensitivity 3 being W10 clearance from Southampton to the West Coast via Winchester.

Deep sea intermodal priority routes

The Stakeholder Management Group discussed and proposed a priority network for W10. The priority routes for further W10 clearance are overlaid on the existing W10 network.

1 SRA Gauging Policy: June 2005.

Figure 6.2: W10 gauge priorities

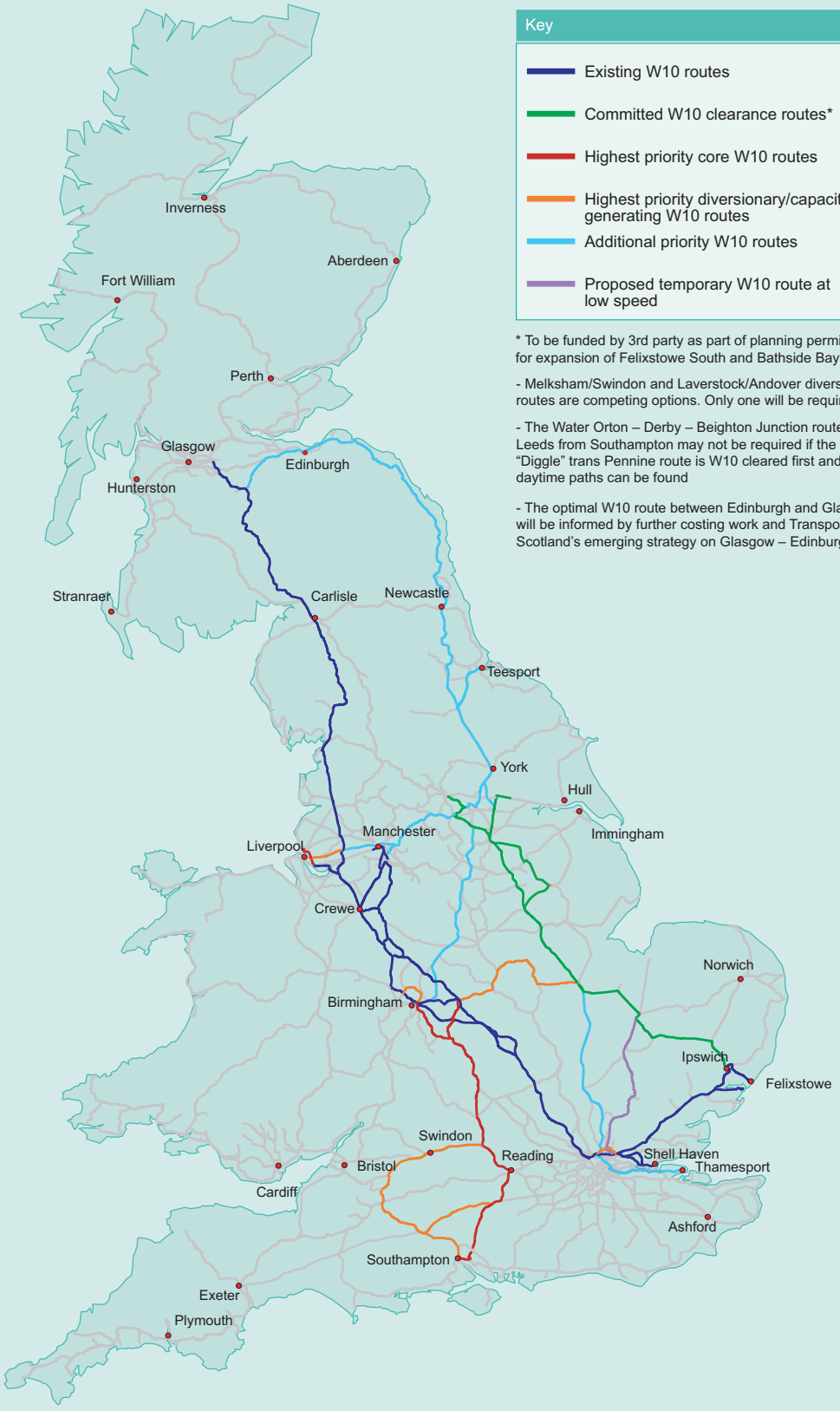


Figure 6.2 shows current W10 cleared routes consisting mainly of the Haven ports to London via the Great Eastern Main Line, North London Line and the entire West Coast Main Line including branches to freight terminals around Birmingham, Liverpool, Manchester and Glasgow. There are already some limited W10 diversionary routes around Birmingham and between the Midlands and Manchester.

The routes designated as the highest priority core routes represent the industry's preferred routeing from the largest deep sea container ports (by TEU throughput, see Table 3.2, Chapter 3) to depots in the West Midlands, the North West and the North East. These routes are supplemented with further highest priority diversionary and capacity generating routes for the same flows.

The highest priority diversionary/capacity generating routes were viewed as important because a high proportion of intermodal traffic runs overnight when engineering possessions are normally taken. Also in some cases the diversionary routes can act as generators of additional regular capacity. For example the route between Peterborough and Nuneaton, although a duplication of the current core route from the Haven Ports to the WCML via the Great Eastern, would be a significant capacity generator as well as a diversionary route, if gauge works are combined with capacity schemes. Chapter 9 deals with this particular project in more detail. Whilst the existing W10 network is electrified, some of the diversionary routes would require operators to use diesel traction. Further analysis of the options in Chapter 9 takes this into account.

The additional priority routes represent connections to smaller existing deep sea ports and terminals and alternative diversionary routeings. These routes are to be considered as an increment on the highest priority routes.

As highlighted in section 4.2.5, stakeholders have provided information on potential further deep sea port developments over and above the committed developments assumed in the industry Base Case forecasts.

On port size criteria it is not expected that these developments would supplant the routes to Southampton and the Haven Ports outlined in Figure 6.2 as the highest priorities for W10 clearance. Nonetheless, Network Rail is working with a number of ports and Regional Development Agencies to assess the costs of both W10 and W12 gauge access to build a case for further additions to the network outlined in Figure 6.2. Chapter 7 displays those routes which currently have a business case to justify gauge clearance.

In addition to these developments, the Welsh Assembly Government is currently producing a Wales Transport Strategy and the Scottish Executive intends to produce its own Ports Strategy. These strategies could drive the need for further revision of priorities in the future.

Low platform wagon options

High Cube containers can be accommodated within a smaller gauge such as W8 if transported on a well wagon where the container is loaded into a 'well' located between the bogies, at a lower height than on a standard flat bed wagon. Although the wagons are approximately the same length, they can only carry two TEUs instead of the three TEUs which can be accommodated on standard 60ft wagons. This is because the loading area is limited to the space between the bogies as opposed to the full length of the wagon. Therefore fewer containers can be transported per train given the same train length.

The wagons are also considerably heavier than a standard 60ft 1000mm platform height wagon.

Given a typical maximum train length of 24 wagons (governed by terminal and ports siding lengths and maximum length that can be hauled by a single locomotive), using well wagons would reduce maximum load factors from 72 TEUs to 48 TEUs per train. This reduction in productivity efficiency explains why freight train operators have not invested in significant numbers of well wagons and favour gauge clearance on the busiest core and diversionary routes to and from the biggest ports.

A fleet of small wheeled 'lowliner' wagons exists that can convey 9ft 6in tall by 2.5m containers within the W8 gauge profile without the length penalties associated with well wagons. These wagons however are presently more expensive to purchase and maintain.

Finally an intermediate platform height wagon design called a Megafret exists that allows 9ft 6in high units to be conveyed at a lower height but not in a 'well' although this solution requires W9 clearance (few existing routes are cleared to this gauge). These wagons consist of two 50ft long platforms so do not match the space efficiency of standard 60ft wagons when accommodating 20ft and 40ft containers.

Wagons have a lifespan of around 20 years so any option which requires a change of FOCs' wagon use can most effectively be achieved over the medium to long term as replacement decisions are made. Despite this, if W10 gauge clearance is achieved on the highest priority routes marked in green, red and orange in Figure 6.2 in the next few years, a considerable fleet of well wagons, lowliners and Megafrets will be available to operators to service other core routes where gauge clearance may not yet have proved value for money.

It is worth noting that the current proportion of 20ft units with the deep sea box fleet is in decline, meaning that in future, new build deep sea wagon designs may start to focus on 40ft twin sets, to achieve optimal loading patterns.

Short sea maritime and Channel Tunnel intermodal

The freight industry has expressed an aspiration for W12 gauge clearance for sections of the network which could be used to transport short sea traffic. This gauge maintains the height of W10 (9ft 6in on a standard platform) but an increased width of 2.6m which would accommodate additional container sizes (eg. refrigerated units).

Figure 6.3 shows the freight industry's W12 gauge clearance aspiration.

The industry's W12 aspiration is focused on the links from the main short sea ports and the Channel Tunnel to a range of freight terminals in the North East, West Midlands and the North West and includes diversionary routes. The main short sea ports are defined as those with the largest TEU throughput of domestic and intra-european traffic. The largest are shown in Table 6.1 which shows the volume of containerised traffic.

The Wales Transport Strategy assesses possible future container traffic through Holyhead, Milford Haven, Swansea and Port Talbot.

If these ports are developed then potentially routes to these ports would be added to the industry gauge clearance aspirations.

European gauge

Whilst W12 is sufficient to accommodate all short sea containers that operate currently in the european container fleet[2], there is an

Table 6.1: Largest short sea container ports in GB (thousand TEUs) in 2005

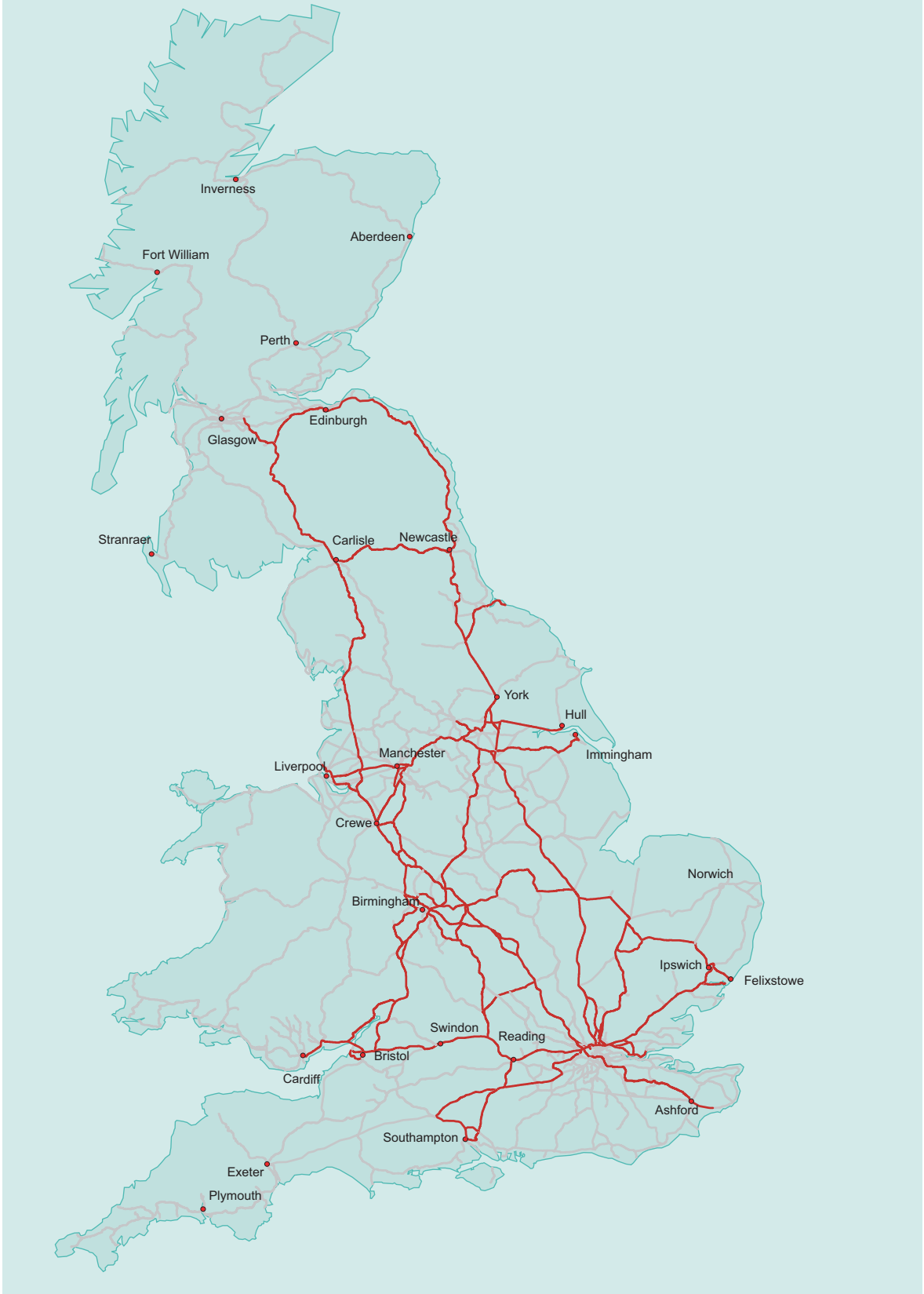
	Domestic	Intra-european	Total
Felixstowe	78	664	742
London (Purfleet/Tilbury)	2	432	434
Hull	1	250	251
Teesport	9	126	135
Southampton	14	65	79

Source: Maritime Statistics 2005.

It should also be noted that the Dover Straits ports have significant volumes of unitised Roll-on /Roll-off traffic.

2 With the exception of a very small fleet of specialist 10ft 6in high equipment.

Figure 6.3: W12 gauge clearance aspiration



aspiration for the even larger european gauge profiles, specifically UIC GB+ (see Figure A6, Appendix A). This clearance would allow transit of all variations of box sizes currently hauled by rail within Europe as well as accommodating the larger European conventional wagon designs, thereby enabling through connections without gauge change to mainland Europe. As this is much larger than existing UK gauges, routes could only be enhanced during major upgrade and the corresponding incremental costs of clearance compared to clearing to W12 could be high. As Figure A6 displays the gauge requires significant additional height and width and in the latter case would be incompatible with many UK platforms. Currently only the CTRL is cleared to GB+ and its further application may remain restricted to new lines.

The industry's aspiration for UIC GB+ is indicated in Figure 6.4 It is focused on primary routes between the CTRL and the main freight depot locations near Birmingham, Manchester and Leeds.

6.3 Summary of gauge gaps

Demand likely to be generated by W10 clearance is closely linked to the increasing use of High Cube containers in the enlarging deep sea container market.

As Table 3.6 in Chapter 3 displays, it is at the largest deep sea ports where the critical mass of containers for inland transport is concentrated. These ports also have the highest rail market shares. For this reason the routes to and from the major deep sea ports represent the highest priority 'gaps' in gauge provision terms. Table 6.2 below summarises the key gaps for further consideration.

In addition to these key gaps, Figure 6.2 also highlights some important 'addional priority' routes for W10 clearance. Sufficient information on costs and benefits is not yet available to appraise these routes in the RUS but as highlighted in Section 6.2, work is underway with stakeholders to quantify benefits and costs in several cases.

W12 accommodates all short sea boxes[3] in addition to deep sea boxes although costs are likely to be higher as additional work is usually required. The work usually relates to lineside equipment and arched structures (where the top corner restricts W12 but not W10) and also an even greater number of structure rebuilds instead of track slewing solutions.

Sufficient rail demand information for short sea traffic is not available at this stage to build business cases for bespoke W12 schemes. Although the RUS does not take forward any W12 projects for appraisal, Chapter 9 proposes a strategy for ensuring W12 clearance is considered whenever structure renewals are taking place.

Meanwhile Network Rail is working with a wide range of stakeholders to find solutions to specific gauge constraints on the network. In addition to the studies underway on W10 and W12 clearance with regional stakeholders described above, bespoke gauge improvements are being implemented in Scotland, on the route to Aberdeen via Dundee. In this case relatively minor alterations are being made to allow specific types of domestic/european and deep sea box designs to move on a range of low platform wagon designs[4].

Table 6.2: Key gauge gaps

Reference	Gap
1	Port of Southampton – WCML W10 core and diversionary/capacity generating route
2	Haven Ports – WCML: W10 diversionary/capacity generating route
3	Port of Liverpool – WCML: W10 core and diversionary/capacity generating route
4	Gap 4: Tilbury (and potentially Shell Haven): W10 diversionary/capacity generating route

3 With the exception of a very small fleet of specialist 10ft 6in high equipment.

4 In addition to allowing a standard 8ft 6in high x 8ft 2.5in wide unit to be moved on a standard height (1000mm) platform.

Figure 6.4: European gauge aspirations

7. Optioneering

7.1 Principles of optioneering

Identifying options against gaps

This section identifies options to meet the gaps outlined in Chapters 5 (capacity) and 6 (gauge). The options were developed in working groups involving Network Rail and members of the Stakeholder Management Group prior to the publication of the Freight RUS Draft for Consultation.

The selection and development of options was undertaken with the following aims:

- to present potential solutions to resolving the capacity and gauge gaps identified from the 2014/15 forecasts of rail freight under the different demand sensitivities
- to deliver a strategy which provides optimum value for money and falls within the affordability criteria.
- In doing so, to ensure that:
  - the performance impact on all users is considered
  - the impact on engineering access is considered
  - the best use of existing capacity is considered before preferred options involving investment are proposed
  - opportunities for enhancements in conjunction with renewals are highlighted, where appropriate
  - the financial impact on operators is considered where quantifiable.

7.2 Capacity Options

The principal gaps between the network's existing capacity and a) existing and projected demand and b) other stakeholder aspirations were identified and discussed in previous chapters.

The options identified to address these gaps fall into nine broad categories. These options are not mutually exclusive, and might therefore be considered in combination.

Option 1 – Optimising timetables

Alterations to existing timetables for freight and passenger services can often yield additional capacity without infrastructure enhancement. This may involve retiming of existing paths, changes to routeings (see Option 3), changes to stopping patterns and flighting of services. Optimising timetables is managed through standard industry processes and may be initiated by geographical RUSs.

Option 2 – Haulage alternatives

Shorter journey times provide opportunities to increase the quantum of paths, and can be achieved by more powerful locomotives or double heading. Where routes are electrified, operators have the option of using diesel or electric powered locomotives, though present electric traction charges (EC4T) mean electric traction is often more expensive. Electric haulage provides shorter journey times, largely as a result of quicker acceleration and better performance, particularly on routes with significant gradients. There may be journey time and cost penalties if a change to diesel power is required for part of the journey (ie. a flow over both electrified and non electrified sections). Option 9 below covers new electrification.

Option 3 - Routeing alternatives

Changing the routeing of a train can free up capacity on the original route. Often this will increase the journey time with associated resource cost impact on the FOC.

Option 4 – Train lengthening
Train lengthening potentially enables haulage of more freight per train without changing the weight per axle (see Option 7). This permits some growth in demand to be met without increasing capacity utilisation although infrastructure spend may be required on terminals, reception sidings and loops (see option 5). Significant train lengthening may require an increase in motive power which will have an operational cost impact on the FOC.

Option 5 – Provision of additional and/or longer loops
Loops provide additional capacity for traffic of varying speeds operating on a given route. If train lengthening is introduced, loops may need to be extended and alterations made at junctions, terminals and reception yards.

Option 6 – Signalling headways
More signals or modernising existing equipment (eg. increasing the signal aspect) would allow trains to operate closer together and therefore increase the capacity of the route. The cost of enhancing signalling can be reduced if combined with renewals.

Option 7 – Axle weight increases
Hauling more tonnage per wagon would permit some growth in demand for bulk products to be met without increasing capacity utilisation. Infrastructure enhancement may be required if the increase in weight increased the RA requirement of the route, and in some cases the wagons required will need gauge clearance. For some flows, increasing the axle weight without reducing the length of the train will lead to a need for double headed or more powerful traction.

Option 8 – Capacity generating gauge schemes
Increasing the loading gauge through tunnels, bridges, stations and other structures would allow larger wagons and/or containers (especially for the intermodal market) to operate on the route, thereby facilitating routeing alternatives and hence potentially providing additional capacity.

Option 9 – Bespoke infrastructure
If options 1 to 8 do not produce sufficient capacity, it may be appropriate to consider larger infrastructure options such as new lines, doubling track and new electrification.

Table 7.1 summarises the gaps and the option categories selected to address each one. It should be noted that some gaps may only be partially addressed by individual options, and conversely that some options may address more than one gap.

Table 7.1 Capacity gap/option summary matrix

Gap No.	Route/ route section	Option by which gap addressed
1	Gretna Junction – Carlisle station – Petteril Bridge Junction	Optimising timetables Train lengthening Loop enhancements Bespoke infrastructure
2	Petteril Bridge Junction – Settle Junction	Optimising timetables Train lengthening Signalling headways
3	Settle Junction – Skipton – Whitehall Junction	Optimising timetables Train lengthening
4	Carlisle – Lancaster	Optimising timetables Haulage alternatives Train lengthening Routeing alternatives Loop enhancements
5	Winsford South Junction – Weaver Junction	Train lengthening Loop enhancements
6	Stafford station	Train lengthening Routeing alternatives Bespoke infrastructure
7	Rugby – Wembley Central	Optimising timetables Train lengthening Capacity generating gauge schemes Bespoke infrastructure
8	Nuneaton – Coventry –Leamington	Routeing alternatives Loop enhancements Capacity generating gauge schemes Signalling headways
9	Leamington – Didcot East – Reading West – Basingstoke – Southampton	Routeing alternatives Signalling headways
10	Wrawby – Scunthorpe	Optimising timetables Train lengthening Provision of additional and/or longer loops Routeing alternatives Signalling headways Axle weight improvements Bespoke infrastructure
11	Hull Hedon Road – Hessle Road Junction	Train lengthening Signalling headways Bespoke infrastructure
12	Tyne Yard – Tursdale Junction	Routeing alternatives

For each capacity gap, a more detailed description of the capacity options considered is set out below in Tables 7.2 to 7.5. The outputs of each of the options are summarised along with a reminder from Chapter 5 of the traffic flows driving the gaps.

Table 7.2: Anglo-Scottish coal route (Hunterston/Ayrshire – Aire/Trent Valley)

Option description/output	Key flows driving gap (See Appendix C for ref.)	Key dependant/ linked gaps (inc) in RUSs
Gap 1: WCML: Gretna Junction – Carlisle station – Petteril Brige Junction		
Short/Medium-term options:		
1.1 Optimise existing timetable to maximise through Anglo-Scottish paths from the Glasgow and South Western (GSW) (completed by NR December 2005) Output: 22 through paths per day now available on the GSW – Settle and Carlisle axis	1	2,3 (I)
1.2 Higher entry speeds and running speeds on northern section of Up arrival line from Mossband (50mph) combined with starter signal on Up platform at Gretna Output: Aids freight pathing and passenger performance in the up direction at Gretna Junction by improving clearance time off the WCML onto the Up arrival line		
1.3 Higher exit speed on Down Goods at Kingmoor & Floriston Output: Aids freight pathing in the down direction		
1.4 Creation of route on Carlisle panel for track section from the Kingmoor Up flyover into Up reception sidings Output: Improved management of freight services in the Kingmoor Yard area		
1.5 Relocation of Caldew Jn to north end of Caldew viaduct Output: Consequential improvement in linespeed		
1.6 Improvements to signal acceptances in Gretna Junction area Output: Improved performance		
1.7 Doubling of single lead junction at London Road Output: Increased capacity for freight movements through the station area		
1.8 Extension of some Anglo-Scottish coal train lengths, incremental via S&C and to 900m operation via Tyne Valley to York Output: Reduction in requirement for coal train paths		
2014/15 and beyond:		
1.9 Re-instatement of Carlisle avoiding lines Output: Removal of some freight trains from the WCML between Upperby and Kingmoor avoiding Carlisle station area and all associated constraints		

(Table continues overleaf)

(Table 7.2 cont...)

Gap 2: S&C: Petteril Bridge Junc – Settle Junction		
Short/Medium-term options:		
2.1 Optimise existing TT to maximise through Anglo-Scottish Paths from GSW (completed by NR December 2005)	1	1,3 (I)
Output: 22 through paths per day now available on the GSW – S&C axis		
2.2 Additional signalling sections on the Settle and Carlisle route, to reduce the longest headways: Requires additional signals at: Up direction: Long Meg, Griseburn, Mallerstang, Horton in Ribblesdale. Down direction: Long Meg, Horton in Ribblesdale Output: Improved passenger and freight performance, additional through paths		
2.3 Extension of some Anglo-Scottish coal train lengths, incremental via S&C and to 900m operation via Tyne Valley to York. Output: Potential reduction in demand for Anglo-Scottish coal paths.		
2014/15 and beyond:		
Above options sufficient to meet projected industry growth		
Gap 3: S&C: Settle Junction – Skipton – Whitehall Junction		
Short/Medium-term options:		
3.1 Optimise existing timetable to maximise through Anglo-Scottish Paths from GSW (completed by NR Dec 2005) Output: 22 through paths per day now available on the GSW – S&C axis	1	1,2 (I)
3.2 Extension of some Anglo-Scottish coal train lengths incremental via S&C and to 900m via Tyne Valley to York. Output: Potential reduction in demand for Anglo-Scottish coal paths.		
2014/15 and beyond:		
Above options sufficient to meet projected industry growth.		

Table 7.3: West Coast Main Line

Option description/output	Key flows driving growth -See Appendix C	Key
Gap 4: WCML: Lancaster – Carlisle		
Short/Medium-term options:		
4.1 Development of WCML 2008 timetable to allow 2 -3 freight paths per hour (mix of Class 4 and 6 diesel & electric traction). Output: as above	2,6 + General	1,5,6
4.2 Loop extension/ new loop: Low Gill (new 775m loop, extensive earthworks required), Grayrigg extension of existing loops to 650 or 775m. Output: A new or lengthened loop between Carnforth and Tebay will allow longer services and so potentially reduced path demand for some specific services. It will also improve the ability to regulate existing services in some cases. Improvements to entry/exit speeds to/from loops aids pathing of new and existing freight services.		
4.3 Lengthening of some intermodal services Output: reduced path demand in combination with 4.1		
4.4 Electric haulage of projected growth services Output: Partial removal of speed differential over Shap summit between freight and passenger services, leading to an additional path being available every other hour Class 4 or 6 in the Up direction.		
4.5 Route remaining Up daytime Class 6 non container services via the Settle & Carlisle and Hellifield to Clitheroe instead of West Coast. Undertake substantial renewals of track and structures on the Hellifield – Clitheroe route, and alter signalling for the Up direction at Horrocksford Junction. Output: Removal of 3 or 4 daytime Class 6 trains from the Up direction over Shap releasing capacity and potentially improving passenger performance. May add some journey time for diverted trains depending on current path via Shap. Additional route mileage is 19.		
2014/15 and beyond:		
4.6 Further new/ extended loops as and when area signalling north of Preston takes place.		
Gap 5: WCML: Winsford South Junction – Weaver Junction		
Short/Medium-term options:		
5.1 New loop at Hartford (>1000m) with high entrance and exit speeds (effectively replaces Winsford Down loop); Being taken forward under the WCRM programme Output: Improved pathing for freight services accessing and leaving loops	2,3,6	6,E,F
5.2 Lengthening of some deep sea intermodal services Output: Productivity of up to 1 path saved for every 4-12 trains run to a given destination depending on increment of additional wagons added per train (+2 to +6)		
2014/15 and beyond:		
No options considered at this stage		
Gap 6: WCML: Stafford station		

(Table continues overleaf)

(Table 7.3 cont...)

Short/Medium-term options:		
6.1 Routeing of some Manchester traffic (Trafford Park and Euroterminal) via Stoke. Diversion of some through WCML services via Kidsgrove and Stoke. Outputs: Could remove up to an hourly freight in each direction from Stafford station area	2,3,6	6, E,F, 8,7
6.2 Lengthening of some deep sea intermodal services Output: Productivity of up to 1 path saved for every 4-12 trains run to a given destination depending on increment of additional wagons added per train (+2 to +6)		
2014/15 and beyond:		
6.3 Major infrastructure alterations in the Stafford area as outlined in the DFT WCML Progress Report May 2006		
Gap 7: WCML: Rugby – Wembley Central		
Short/Medium-term options:		
7.1 Balance freight demand with Passenger timetable to deliver 3 paths per hour off-peak south of Daventry, 4 paths north, (ongoing as part of the 2008 timetable work). Output: 2 Class 4 paths (1 electric, 1 diesel) and 1 Class 6 path (diesel or electric) in every off peak hour south of Daventry	2,6	5, E,F, 6
7.2 Lengthening of some deep sea intermodal services Output: Productivity of up to 1 path saved for every 4-12 trains run to a given destination depending on increment of additional wagons added per train (+2 to +6)		
7.3 Peterborough - Nuneaton W10 Gauge clearance: Output: A W10 cleared route between Felixstowe and Nuneaton offering diversionary access to the GE and NLL.		
7.4 Felixtowe to Nuneaton Gauge and first stage capacity: (includes Nuneaton northern chord, Kennett signalling headway improvements, gauge Peterborough to Nuneaton only). Output: Provides 5 additional through cross country paths per day. Potential for further paths (up to 10) if other freight class 6 services on route could be organised into a more standard hour pattern with FOC agreement. Comment: The northern chord at Nuneaton may need TWA and requires further development through the GRIP process		
2014/15 and beyond:		
7.5 Felixstowe to Nuneaton Gauge and full capacity: Capacity enhancements across the route including at Haughley Jn, Ely, March, Peterborough and Leicester, detailed further in Table E1 Appendix E. Output: Minimum 14 through paths per day in each direction		

Table 7.4: Southampton to West Midlands

Option description/output	Key flows driving growth -See Appendix C	Key
Gap 8: Leamington – Coventry – Nuneaton		
Short/Medium-term options:		
8.1 Reduction in signalling headways on the southern end of the Sutton Park line. Remodelling of Park Lane Junction. All implemented with Saltley signalling renewals. Output: Reduction in crossing moves at Coventry and conflicting 'Up' movements at Nuneaton for Southampton trains. Increases capacity on the alternative route to the WCML via Water Orton, Sutton Park and Bushbury. Comment: Combines with gauge option G1.3.	3	6,9
8.2 Extension of loop South of Coventry on Kenilworth line. Output: Will aid ability to regulate freights making crossing moves at Coventry.		
2014/15 and beyond:		
8.3 Re-routeing of Up North West/Scotland to Southampton container services via Bletchley flyover – Claydon – Oxford. Outputs: Avoids present conflicting movements in the Up direction at Nuneaton, provides 2nd route north of Oxford improving maintenance access and pathing opportunities. Also potential routeing for Down traffic.		
Gap 9: Leamington – Didcot East- Reading West – Basingstoke - Southampton		
Short/Medium-term options:		
9.1 Further improvements to longest signalling headways between Didcot East and Leamington. Enhancements during Banbury re-signalling Output: Generates additional paths Oxford – Cherwell Valley – Leamington	3	6,8
9.2 Diversion of projected growth via Salisbury/Melksham, Didcot West. Output: Generates a small number of additional paths Southampton – WCML, with substantially extended journey times (up to an additional 1 hour 30 minutes) Comment: Requires G1.2 to be delivered (see Table 7.8)		
9.3 Movement of signal on Reading West curve. Output: Ensures a regulating point for any potential combination of 24 '60 ft platform' container flats and a Class 66 loco at Reading West Junction, improving performance and increasing freight pathing opportunities. Also depending on repositioning may allow 26 container wagons and a Class 66 to be held on the curve.		
2014/15 and beyond (or point from which W10 clearance completed):		
9.4 Grade separation at Reading West Junction. Output: Removes main pathing constraint on route between Southampton and West Coast Main line. Improves passenger service performance.		

Table 7.5: East Coast Ports – Aire/Trent Valley

Option description/output	Key flows driving growth -See Appendix C	Key
Gap 10 : Wrawby – Scunthorpe		
Short/Medium-term options:		
10.1 Timetable recast: Port of Immingham – Wrawby – Scunthorpe Outputs: Maximises standard hour paths available on section for through freight services.	4	B
10.2 Brigg Line upgrade: Outputs: Creates a significant number of additional paths per day between Immingham and the Trent/ Aire power stations and/or Immingham and Doncaster away from the South Humberside Main Line (SHML) and the Doncaster – Worksop route. Also allows for improved maintenance access to the SHML.		
10.3 Wrawby Junction. improvements: improvements to permitted speeds over the junction. Outputs: Provides an improvement of between 1 and 1.5 minutes in junction clearance times. Performance and timetabling benefits.		
10.4 Further coal train lengthening 21 to 23 HTAs Immingham – Aire Valley Outputs: Reduces total path demand on the South Humberside Main Line.		
10.5 Axle weight increases to 36t Immingham – Aire Valley Outputs: Potential operating cost savings, reduced path demand Comments: May require gauge clearance also for large bulk wagons, as well as considerable investment in track and structures.		
10.6 Additional freight loops: Wrawby to Brocklesby Outputs: Aids regulation of trains in and out of the Port of Immingham.		
10.7 Lindsay Oil refinery- Killingholme Branch loop Outputs: Aids regulation of coal trains into the HIT 2 terminal at Immingham.		
10.8 Cottam Chord Outputs: Relieves congestion on the Doncaster – Worksop freight route by allowing direct access from the port of Immingham to Cottam power station via the Brigg line avoiding routeing via Scunthorpe and the SHML. May improve locomotive and wagon utilisation for the FOCs.		
Gap 11: Hull Hedon Road – Hessle Road Junction		
Short/Medium-term options:		
11.1 Hull docks branch upgrade. Partial track doubling and signalling alterations. Outputs: Ability to run 14 additional trains per day in each direction on the Hull Docks branch.	4	-
11.2 Incremental Train length improvements. 21 to 23 HTAs with Barlby loops extension. Outputs: Reduced demand for train paths between Hull Docks and the Aire Valley.		
2014/15 and beyond:		
N/A		

Table 7.5: East Coast Ports – Aire/Trent Valley (continued)

Gap 12: Tyne Yard – Tursdale Jn		
Short/Medium-term options:		
12.1 Re-activation of Boldon East Curve Outputs: Allows routeing of some import coal services via the Durham coast line avoiding the constrained King Edward Bridge Junction to Tursdale section of the ECML	4	-
2014/15 and beyond:		
Short/Medium-term options sufficient		

7.3 Capacity options appraised

The Draft RUS for Consultation proposed a specific subset of the capacity options outlined above for further development and appraisal. A summary of the results for all of these appraisals is set out in Table 7.6 below.

Some options have not been formally appraised by the RUS as they are already being taken forward (for example, under the West Coast Route Modernisation programme or under other committed enhancement or renewal projects). Some options were agreed to be long term, and outside the timescales of the RUS whilst other options were discarded after consultation with stakeholders. A small number of options have no specific costs, and have been recommended in Chapter 9 without appraisal.

Chapter 9 sets out full recommendations for each of the gaps identified in Chapter 5, bringing the options outlined in this chapter together into a strategy for each route taking into account the appraisal results in Table 7.6 and Table 7.8 covering gauge (see section 7.1.3).

The results in these tables have been estimated following published DfT appraisal guidance. The NPV column shows the present value of the benefits less the present value of the estimated investment cost and identified continuing costs (increased maintenance costs, for example). The BCR column reports the ratio of the present values of benefits to costs. This indicates the rate of return on the investment, so allowing comparison between alternative interventions.

Our estimates of benefits from the options exclude any benefits that may accrue to operators or their customers from the intervention. They also exclude any wider impacts on businesses, such as increasing GDP.[1] Rather, the benefits are an estimate of the value of transporting freight by rail instead of by road. These are measured as Sensitive Lorry Miles – a value that varies according to the levels of congestion along the alternative road route for the traffic flow.[2] Allowances for risk, uncertainty and optimism bias have been added to the cost estimates according to the stage of development of the scheme.

1 Appraisals conducted for schemes that may be funded by the TIF Productivity Fund include benefits of increased GDP that are estimated to result from implementing those schemes. The estimates of GDP impacts were calculated by Network Rail under the instruction of the Department for Transport.

2 Sensitive Lorry Miles value reduced: road congestion; accidents; noise; pollution; road wear and tear; and taxation. The value also includes an estimate of the marginal value of the impacts on long term climate change.

Table 7.6: Capacity options appraised

Capacity options				
Scheme	**NPV (£m)**	**BCR**	**Indicative cost[3] (PV £m) CAPEX only**	**Indicative cost[4] (PV £m) CAPEX + OPEX[5]**
Option 1.2: Starter signal on Up platform at Gretna.[6]	21.4	1.50	46.1 (Options 1.2 & 2.2 £5-6m element of total scheme)	43.8 (Options 1.2 & 2.2 £5-6m element of total scheme)
Option 2.2: Additional signalling sections on the Settle and Carlisle line.[7]				
Option 4.2: WCML Carlisle – Preston growth capacity (Loop option)	-17.1	N/A	17.1	17.1
Option 4.4: WCML Carlisle – Preston growth capacity (Electric traction)	941.3	3.94	-	13.7[8]
Option 4.5: WCML Carlisle – Preston growth capacity (diversion)	749.3	3.59	29.2	60.9
Option 5.2/6.2/7.2: Haven Ports – WCML: Intermodal train lengthening				
Scen 1a: 26 wagons via GE	24.7-92.7	1.62-2.75[9]	29.2	29.2
Scen 1 b: 30 wagons via GE (with specific electric traction only)	152.1	3.35	29.2	29.2
Scen 2: 26 wagons cross country route	-25.4	0.55	51.1	51.1
Scen 3: 30 wagons cross country (requires higher powered locomotive than single class 66. Costs not included in appraisal. See Chapter 9)	318.7	3.58	51.1	51.1
Option 7.4: Nuneaton to Peterborough W10 gauge enhancements & incremental capacity[10]	1182	5.25	132.8	124.8
Option 8.1: Reduction in signalling headways on the southern end of the Sutton Park line. Remodelling of Park Lane Junction. All implemented with Saltley signalling renewals	23.7	1.93	5.7	5.7
Options 10.2, 10.3, 10.7, 10.8, 11.1 & 11.2: Humber Ports / Immingham to Aire/ Trent Valley[11]	474.1	4.6	91.6	91.6
Option 12.1: Re-activation of Boldon East curve	62.9	3.19	12.4	14.7

3 Costs displayed are gross costs. In some cases BCR's reflect investment net of private sector contribution.

4 Costs displayed are gross costs. In some cases BCR's reflect investment net of private sector contribution.

5 OPEX includes in, certain cases, maintenance and operational savings or costs to Network Rail and additional operating costs for operators.

6 This option has been appraised as an integrated package with the part doubling and signalling improvements on the Glasgow and South Western Main Line and the Settle and Carlisle option 2.2. The GSW elements are covered in the Scotland RUS. The BCR reported in this RUS is for the full package of works, not just option 1.2. Option 1.2 also includes relaying part of the Mossband Up arrival line but this has not been appraised as an enhancement as it will take place as a renewal within CP3. Costs for this element are therefore not included.

7 The additional signals on the Settle and Carlisle line have been appraised as an integrated package with the part doubling and signalling improvements on the Glasgow and South Western mainline. This latter project is covered in the Scotland RUS. The BCR reported in this RUS is for the full package of works, not just the Settle and Carlisle element.

8 Includes estimate of increased operating costs for electric current (EC4T) versus use of diesel. Does not include potential costs to FOCs of locomotive changes in yards for some services and in the case of some FOCs loco procurement.

9 Range reflects uncertainty over the ability of several inland terminals to regularly receive 26 wagon trains.

10 Option 7.4 results assume Shell Haven is not developed (Base Case).

11 Option 10.2 to 10.8, 11.1 and 11.2 results assume growth as Base Case for ESI coal.

7.4 Gauge options and appraisals

Chapter 6 sets out the key gaps in terms of gauge provision on the network. To address these, stakeholders have produced a set of options for testing against each gap, these are summarised in Table 7.7 below.

Table 7.7: Gauge options

Options	
Gap 1: Southampton – WCML W10	
Core route	
G1	Southampton to WCML via Winchester, Reading West, Coventry and Nuneaton W10
Diversionary routes	
G1.1	Route via Laverstock and Andover only W10
G1.2	Southampton to WCML via Melksham W10
G1.3	Route via Leamington – Dorridge – Sutton Park Line – Bushbury – Stafford only W10
Gap 2: Haven Ports – WCML: W10 diversionary and capacity generating route	
G2.2	Peterborough to Nuneaton W10 (included in capacity option 7.4)
Gap 3: Port of Liverpool – WCML W10	
G4	Port of Liverpool – Winwick Junction/ Edge Hill/ Garston W10
Gap 4: Tilbury/ Shell Haven: W10 diversionary and capacity generating route	
G2.1	Tottenham and Hampstead W10 gauge clearance

The Draft RUS for Consultation proposed the above gauge options for further development and appraisal. A summary of the results for all of these appraisals is set out in Table 7.8.

Chapter 9 sets out full recommendations for each of the gaps, bringing the options together into a strategy for each route taking into account the results in Table 7.8. and Table 7.6 covering capacity.

Table 7.8: Gauge options appraised

Gauge Options				
Scheme	**NPV (£m)**	**BCR**	**Indicative cost[12] (PV £m) CAPEX only**	**Indicative cost[13] (PV £m) CAPEX + OPEX[14]**
Option G1: Southampton to WCML W10 gauge enhancements	383	4.56	61	61
Option G1.1: Southampton – WCML Andover W10 diversion	-5.7	0.94	55.5	75.8
Option G1.2: Southampton – WCML Melksham W10 diversion	-9.8	0.91	47.9	83.3
Option G1.3: Sutton Park Line W10 gauge clearance	69.9	4.18	1.8	1.8
Option G2.1a: Gospel Oak to Barking rail gauge and capacity enhancement[15] (including passenger enhancements)	3698	8.17	46.7	63
Option G2.1b: Gospel Oak to Barking Rail gauge enhancement[16]	16.4	1.88	9.7	14.8
Option G4: Reinstatement of Olive Mount Chord & W10 Port of Liverpool to WCML via Earlestown and Runcorn	135	3.54	12.5	12.5

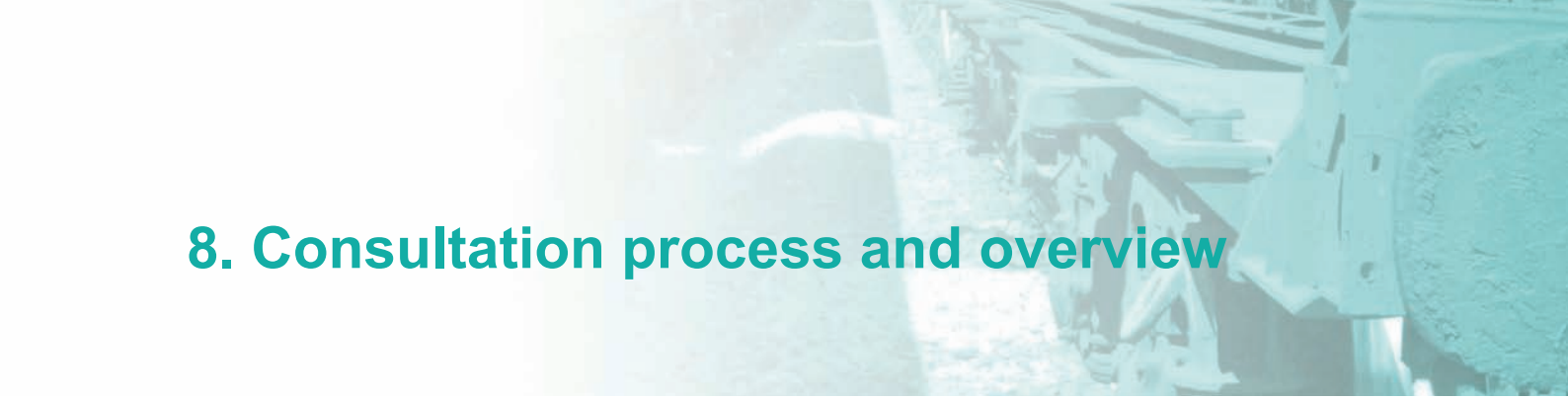
12 Costs displayed are gross costs. In some cases BCR's reflect investment net of private sector contribution.

13 Costs displayed are gross costs. In some cases BCR's reflect investment net of private sector contribution.

14 OPEX includes, in certain cases, maintenance and operational savings or costs to Network Rail, additional operating costs for operators and in the case of option G2.1a, subsidy required for operation of additional passenger services.

15 Option G2.1a and Option G2.1b results assume Shellhaven is not developed (Base Case).

16 Option G2.1a and Option G2.1b results assume Shell Haven is not developed (Base Case).



8. Consultation process and overview

8.1 The draft for consultation

The Freight RUS Draft for Consultation was published in September 2006. The document set out forecast demand for rail freight nationally to 2014/15 and identified a number of resulting key capacity and gauge gaps on the network. A set of options were proposed for bridging those gaps on routes where a 'geographical RUS' was not currently underway.

The Draft for Consultation was distributed to a wide range of stakeholders and also made available on the Network Rail website. A period of twelve weeks was provided to allow stakeholders to respond; and this ended on 24 November 2006.

During the consultation period stakeholders were invited, either collectively or individually, to briefing sessions at which specific issues were discussed.

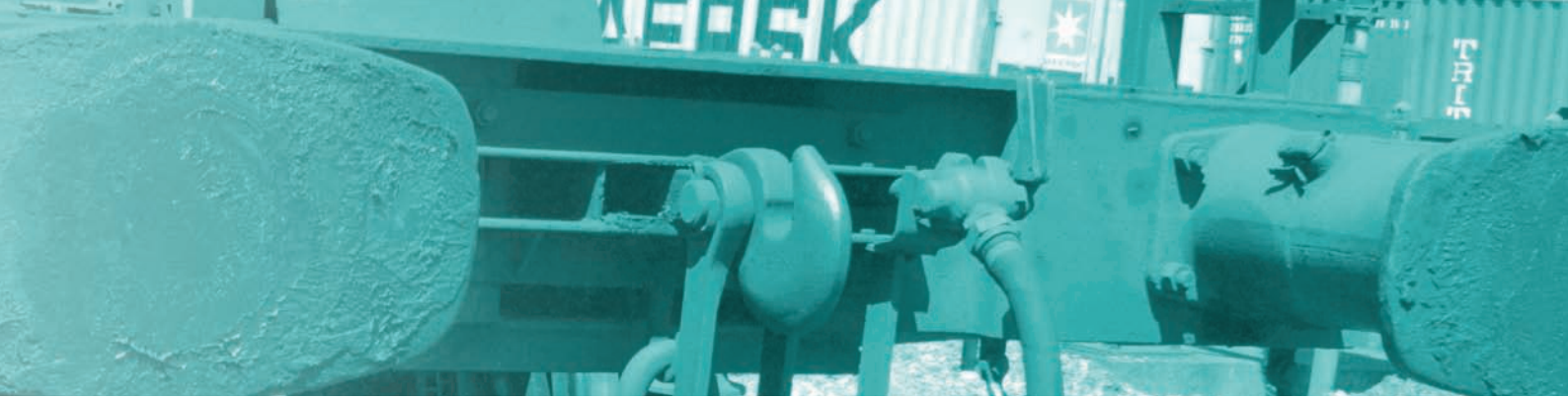
8.2 Consultation responses

Ninety eight responses to the consultation document were received. Those who responded to the consultation fell into six broad categories. Formal responses were received from:

- The RUS Stakeholder Management Group
  - Department for Transport
  - Transport Scotland
  - Welsh Assembly Government
  - Transport for London
  - English Welsh and Scottish Railway
  - Freightliner Group
  - GB Railfreight
  - Association of Train Operating Companies
  - Rail Freight Group
  - Freight Transport Association
  - Office of Rail Regulation

- Ports and other end customers
  - Bristol Port Company
  - Peel Ports
  - Mersey Maritime Limited
  - Hutchison Ports (UK) Limited
  - Associated British Ports
  - PD Ports
  - Dover Harbour Board
  - Portsmouth Commercial Port
  - International Power
  - Scottish and Southern Energy
  - Russell Transport

- Terminal developers
  - Helioslough
  - Railfreight Interchange Investment Group: On behalf of:
    - ProLogis
    - Astral
    - Burford
    - Shell Real Estate
    - Helioslough
  - Tweedale
  - Kilbride Properties Limited
  - MDS Transmodal on behalf of Alconbury Developments Ltd
  - Jacobs on behalf of Thames Water
  - Chapel Railhead



- Local, regional and national authorities/ government agencies
  - Regional Development Agencies (joint response)
  - Sefton Council
  - Essex County Council
  - Yorkshire and Humber Assembly
  - SPITS (South Pennines Integrated Transport Strategy)
  - Peak District National Park Authority
  - Nestrans
  - South East England Regional Transport Board
  - City of Stoke on Trent
  - North London Strategic Alliance
  - Corporation of London
  - Aberdeen City Council
  - West Midlands Regional Assembly
  - Cambridgeshire County Council
  - Hertfordshire County Council
  - Chelmsford Borough Council
  - Northwest Regional Development Agency
  - Oxfordshire County Council
  - Tees Valley Joint Strategy Unit
  - SEEDA (South East England Regional Agency)
  - North East Assembly
  - London Borough of Hackney
  - Hampshire County Council
  - South West of England Regional Development Agency
  - Yorkshire Forward
  - Devon County Council
  - EEDA (East of England Development Agency)
  - EERA (East of England Regional Assembly)
  - Greater Manchester Joint Transport Team
  - Merseytravel
  - SESTRAN (South East of Scotland Transport Partnership)
  - Kingston Upon Hull City Council
  - East Midlands Regional Assembly
  - Advantage West Midlands
  - East Midlands Development Agency
  - Cornwall Council
  - South West Regional Assembly
  - Derbyshire County Council
  - Wiltshire County Council
  - Southwark Council
  - Nexus
  - Brent Council
  - Highways Agency
- Rail User/interest groups
  - Railfuture Scotland
  - Railfuture Northeast
  - Railfuture West Midlands
  - Railfuture (Freight Committee)
  - NatCRAG
  - Stratford Upon Avon Rail Transport Group

- Transpennine Rail Group
- Freight on Rail
- Transport 2000: West Midlands
- TravelWatch Northwest
- FoFNL (Friends of the Far North Line)
- Alton Line Users' Association
- Clydesdale Rail Action Group
- National Union of Rail Maritime and Transport workers

- Privately promoted projects, consultancies and private individuals
  - Central Railway
  - Direct Link North
  - Eurorail Freight Route
  - Truck Train Developments
  - Capita Symonds
  - 5 private individuals

One response was received from an individual TOC (First Great Western) in addition to the response received from the Association of Train Operating Companies. One response was also received from a professional body, the Scottish region policy group of the Chartered Institute of Logistics and Transport (UK).

8.3 Key themes and issues in the consultation responses

8.3.1 Scope of response

The responses received were all well considered. Many gave full consideration to a wide range of issues raised in the consultation document.

Given the large number of comprehensive responses, it is impractical to provide an individual précis of each submission. However, copies of the each organisation's full response can be found at www.networkrail.co.uk

The key themes and reoccurring issues are summarised below.

8.3.2 Key themes

- Support for the collaborative approach adopted throughout the development of the RUS
- Broad support for the combination of a top down and bottom up forecasting process and the results produced
- Broad support for the sensitivity tests employed
- Broad support for the gap analysis process and how this was applied to identify options for evaluation
- Support for the clear statement of the investment required to enable freight growth

8.3.3. Specific issues

The demand forecasts

- A number of stakeholders, in particular certain ports and regional bodies, suggested that the maritime container forecasts were an underestimate of the potential market for rail in their region, although noone objected to the view of total market growth in this sector. In the deep sea market a number of ports suggested that developments they are currently planning could lead to greater demand for haulage of deep sea containers on a variety of routes from north eastern, north western and south western ports.

- In the short sea market, several ports in the north east highlighted the potential for greater rail market share in this currently road dominated sector and highlighted the trans Pennine route in particular as potentially seeing higher demand than reflected in the RUS forecasts.
- For both the deep and short sea markets, Network Rail is progressing further work with a number of third parties assessing both demand for, and the cost of, gauge clearance on a number of routes in the north including the trans Pennine route.
- Notwithstanding these further workstreams, after careful consideration in conjunction with the Stakeholder Management Group, it was decided that the Base Case and sensitivity test forecasts produced by the industry for the RUS should not be amended. The DfT Ports Review has highlighted the competition between ports for future markets and, in the case of deep sea traffic, it appeared prudent to avoid double counting of traffic which will be the subject of competition.
- Nonetheless, it is clearly important that the growth aspirations of ports are reflected in the RUS. Accordingly sections 4.2.5 and 5.1.5 of the final RUS have been considerably expanded to reflect the expectations of all the ports who responded to the consultation document and indicate at a high level any additional gaps that would result from their potential demand scenarios.
- The Highways Agency pointed out thatthere was a need to consider road-based initiatives which influence the choice of mode. They also observed that there is uncertainty about the competitive position of road freight in the medium term. For example, there may be more restrictive factors such as road user charging and changes in road transport legislation which could lead to further restrictions in drivers' hours. Conversely, there may be a move towards larger lorries such as the 60 tonne vehicles which operate in Sweden. Given the uncertainty, our own forecasts have not been amended at this stage.
- A number of respondents highlighted that the 10 year planning horizon of the forecasts to 2014/15 would only represent an eight year view at RUS establishment. It was suggested that a 10, 15 or even 20 year horizon would be more appropriate. In accordance with the agreed scope when the RUS commenced 2014/15 represented a 10 year horizon. To ensure consistency with the RUS programme, the original scope has been maintained. Nonetheless, the importance of longer term issues is acknowledged and Chapter 9 of this document includes a high level consideration of potential key demand issues beyond this date and their implications for the network.
- A number of the SMG members suggested the RUS should give greater prominence to the freight growth figures for 2005/06 presented in the draft. These show significant progress in a number of the key commodity groups as projected in the industry 10 year forecast. Chapter 4 of the RUS highlights this progress in further detail, but also provides some initial analysis of emerging results for 2006/07 where growth is expected to be flat overall or slightly negative.

New terminal developments

- Several companies planning new non-bulk inland terminal developments highlighted the additional growth these terminals could generate and the importance the RUS should attach to ensuring capacity is available to/from these sites. All potential terminal developments that were highlighted as part of the consultation process are listed in Appendix B, Table B10.

- The RUS has been careful not to make specific references to available capacity to/from individual potential inland terminal developments that could prejudice the outcome of planning inquiries. New terminal developments require bespoke timetabling work to assess suitable paths as and when clear proposals for rail traffic are established including an understanding of the time of day customers require slots in and out of facilities, other traffic on the route and the local operating plan that will be adopted. Such assessments are inappropriate in a 10 year national freight strategy document. Nonetheless it is intended that this RUS plus the geographical RUSs will help existing and potential developers understand where key capacity gaps exist on the wider network and the schemes the industry is progressing to address these.

Protection of disused alignments

- A number of operators, local authorities and rail interest groups suggested the RUS should set out which disused freight alignments should be protected from development. In particular the Leamside line in the north east, Bletchley to Claydon, the Carlisle avoiding lines and the Walsall – Stourbridge route featured prominently in responses.
- Network Rail would seek to work closely with those local authorities who would wish to protect freight alignments which are consistent with the strategy outlined in Chapter 9.

It is noted that some of the alignments referred to in the consultation responses are not consistent with the demand currently forecast but may prove to be helpful if unexpected flows occur. Accordingly, Chapter 9 now clearly recognises the potential future role of a number of the alignments highlighted by stakeholders for longer term growth.

The Felixstowe – Nuneaton freight route

- A very wide range of respondents including regional development agencies, local authorities and the FOCs supported the proposed development of the Felixstowe – Nuneaton route for through container traffic.
- A number of respondents highlighted the need for further development of option 7.5 to deliver significant additional freight capacity on the route. Chapter 9 summarises the results of timetabling work undertaken thus far and the infrastructure work identified as necessary to deliver an initial limited set of paths as set out in option 7.4. The RUS also highlights the locations where further development of infrastructure schemes to deliver additional capacity will need to take place as part of the Anglia and East Midlands RUSs. In particular the importance of resignalling of Leicester control area in 2012 to 2015 is highlighted.

Train lengthening

- Train lengthening featured as an issue in several responses from the SMG members. Several stakeholders highlighted the role of train lengthening in improving the economics and environmental performance of rail freight and helping to solve identified capacity gaps. Other stakeholders questioned the practicality and costs of significant train lengthening schemes and warned against the approach being seen as a panacea.
- Network Rail is working with the FOCs across the network on individual initiatives to improve train lengths. This practical approach to meeting customer requirements, where possible, is ongoing and it is not possible to report all of these potential schemes in the RUS. The RUS highlights such initiatives where a capacity gap has been identified as part of the process. The RUS has examined longer term train lengthening options on a number of strategic routes in particular those from the Haven Ports to terminals in the Midlands and North West. The result of this analysis is reported in Chapter 9.

9. Strategy

9.1 Introduction

The Freight RUS has considered the current freight market and has assessed the predicted growth and key changes to existing flows. It has identified options for the effective and efficient accommodation of the growth in accordance with Condition 7 of Network Rail's licence. It has also looked at stakeholder aspirations, particularly aspirations of FOCs for the development of gauge capability to enable them to expand their markets. In the course of the investigation, options were developed, tested, sifted, modified and appraised until feasible solutions were identified with acceptable value for money, which were also consistent with anticipated funding and acceptable to stakeholders.

This chapter outlines the resulting strategy. It brings together, in one document, the key strategic capacity and gauge issues of concern to freight operators and identifies a strategy to overcome the constraints.

Given its national coverage, the Freight RUS plays a unique role in the RUS programme. It identifies a strategy for accommodating freight growth effectively and efficiently given existing commitments to passenger operators. The geographical RUSs will take the consideration of capacity one step further when they examine the Freight RUS strategy in conjunction with detailed agreed passenger forecasts and proposals for engineering access.

Each geographical RUS will use the freight demand and the strategy recommended in the established Freight RUS when developing its route-based strategy. It is envisaged that the Freight RUS strategy will usually be adopted by a geographical RUS. It will only be modified if freight growth can be proven to be accommodated on the existing network as a consequence of an equivalent downturn in the requirement for passenger paths on the route. An increase in the requirement for passenger paths would generally be expected to reinforce the requirement for the Freight RUS strategy.

Section 2 of this chapter outlines the principles adopted in developing the strategy. This is followed in section 3 by the recommended strategy for each of the key freight routes where gaps were identified.

9.2 Developing the Strategy

9.2.1 Approach

The Freight RUS aims to ensure that sufficient capacity is available to meet expected growth in freight traffic up to 2014/5. In considering the strategy a range of solutions is presented including options for re-timetabling, train lengthening, small enhancements which provide operational improvements, haulage options to speed up freight movements to improve capacity utilisation and finally major infrastructure improvements (including gauge enhancements). Diversionary routes are proposed where they meet an identified RUS gap.

The strategy has been developed in a hierarchical manner. Operational changes, train lengthening and any minor infrastructure enhancements necessary to facilitate them, were considered first and only where they were viewed as insufficient to meet demand, were more major investments considered. Options are recommended for inclusion in the strategy only if they have a positive business case and wherever possible enhancements should take place in conjunction with planned renewals.

9.2.2 Operational planning based solutions

The Freight RUS recommends that before an enhancement is considered, timetabling

solutions to capacity constraints should be examined. Wherever possible, sectional running times for passenger and freight trains should be similar. For example, on the inter-urban network, timetables should aim to facilitate non-stop 75 mph running of intermodal traffic which equates well to the speed of some inter urban passenger services including stops.

As a general principle, the operational planning solutions should generate a limited requirement for loops. However, in some cases, and subject to a positive business case, minor infrastructure enhancement work may be required to facilitate additional capacity in the timetable. Such solutions are relatively low cost and can generally be implemented in a short time frame. This may include the extension of loops to improve regulation of services (such as the loop extension currently underway on the Coventry to Kenilworth line), improvement of junction/loop access speeds (such as those at Mossband on the West Coast Main Line) or the installation of intermediate block signalling (such as those on the Settle to Carlisle section of the Anglo-Scottish coal route).

9.2.3 Train lengthening based solutions

In common with each of the geographical RUSs and consistent with EWS's Big Freight Railway[1] principles, the Freight RUS recommends consideration of extending the length of trains on sections of route which are currently capacity constrained. Train lengthening can sometimes be achieved without infrastructure enhancement but, in common with strategies to lengthen passenger trains, there are a number of sections of the network where infrastructure capability will need to be improved. Whereas lengthening passenger trains often leads to a requirement for longer platforms, lengthening freight trains may require alterations to be made to loops, terminals and/or reception sidings to handle longer trains for example on the routes from the Port of Felixstowe. Where infrastructure enhancements are needed to facilitate lengthening and they have a positive business case, they are included in the strategy.

For certain commodity flows and/or on sections of the network with challenging gradients even minor train lengthening may be constrained by haulage capability, for example on the West Coast Main Line over Shap. In these cases, traction options have been considered.

On sections of the network which are less constrained by these factors, the strategy recommends that Network Rail continues to work with its customers to enable longer trains to operate, for example moving to 1357ft trailing length (eg. 21 to 23 HTA wagons) between Immingham and the Aire Valley power stations.

9.2.4 Traction

The potential level of utilisation of capacity of a section of track is greatest where trains run at equal speeds. Precise equalisation of speeds between passenger and freight trains is rare given differing power to weight ratios and stopping patterns of passenger trains. Nonetheless, improved capacity utilisation can be achieved if the differences in speed are reduced.

Freight train speeds are affected by the weight of the loaded train and the power of the locomotive, particularly where this effects acceleration over gradients. The Freight RUS recommends consideration of electric traction where this is expected to significantly improve path availability

1 EWS launched the 'Big Freight Railway' concept in 2006, seeking to encourage a move to longer, heavier and bigger freight services on the network, where practical, in order to improve efficiency of operations.

and where a capacity gap has been identified, for example between Carlisle and Preston. The increased use of electric traction will be attractive on environmental grounds if the electricity generating industry is able to reduce it's carbon footprint as envisaged by the government's recent Energy Review[2]. There are however cost implications in terms of both operating costs and in some circumstances locomotive provision.

9.2.5 Routeing

At the outset of the RUS, the participating FOCs were asked to identify their preferred routeings where they differ from those operated today. With a few specific local exceptions, the FOCs opted for status quo. This was not altogether surprising as there are few practical routeing alternatives for many services. Existing routeings have generally been chosen because they are seen by operators to minimise operating costs and optimise productivity within existing staff rotas.

Given this, the strategy only proposes alternative routeings if

- current capacity utilisation is sufficiently high on a given preferred route that accommodation of freight growth is not possible or
- expected growth in passenger services alongside freight growth would make it difficult to accommodate growth.

This is most likely to occur where freight is currently running on the same tracks as high speed passenger services or where there is a frequent urban passenger service. A key example of this is North London Line where Transport for London have an aspiration to increase the frequency of passenger services on a corridor which is also expecting significant freight growth.

The appropriate place for resolution of these issues is in geographical RUSs which will have detailed passenger demand growth estimates and can give due consideration of timetabling issues and engineering access (maintenance and renewal).

9.2.6 Gauge

The Freight RUS recommends a proactive strategy for development of priority core and diversionary/capacity generating routes to W10 gauge where they have a positive business case (eg. routes from the ports of Southampton and Felixstowe).

The strategy has a number of advantages. It should enable rail to increase its share of the growing intermodal market, enabling it to carry a significant volume of traffic which would otherwise be taken by road. It also makes more efficient use of railway resources by reducing the need to use heavier well wagons which carry fewer units per train and have a greater effect on the wear and tear of the infrastructure.

The W10 routes identified are shown in Figure 6.2 in Chapter 6 and the appraisal results for each detailed in Chapter 7. It is recommended that those W10 schemes with a positive business case are implemented. Well wagon, Lowliner or Megafret based wagon solutions are not ruled out for other routes at this stage.

Chapter 6 sets out the FOCs' long-term aspiration to achieve W12 gauge across much of the network. Network Rail is working with stakeholders to understand more about the potential demand for W12. Third party studies are underway assessing demand for several routes in the north east and Network Rail is costing clearance on these routes for both W10 and W12. The FOCs are also undertaking further work on W12 demand which will be considered in these and other future gauge intervention projects.

Whilst a business case does not exist at this stage for specific enhancement projects to deliver W12 on the routes highlighted in Chapter 6 it is recommended that W12 gauge is considered as a starting point whenever structures are renewed across the network, or new structures built on the routes highlighted as W12 aspirations in Figure 6.3 in Chaper 6.

In some cases it may not be practical to renew a structure to W12, but for all those routes outlined in Figure 6.2 as W10 'highest' or

2 Energy Review: DTI. July 2006.

'additional' priority routes, structure rebuilds/ new builds should not deliver less than W10 clearance.

This latter recommendation should also apply to track renewals under structures on those routes outlined in Figure 6.2, unless a specific appraisal can justify a more limited clearance.

9.2.7 Diversionary routes

Diversionary routes are required on those occasions where engineering possessions for necessary maintenance or renewal of the track, or performance perturbations, prevent freight trains from running in their usual booked paths. To be of use, the diversionary route needs to have sufficient unused capacity to carry the diverted trains and needs to be an appropriate gauge. This is particularly important for 9ft 6in container traffic which is restricted to the comparatively limited W10 route network.

The Freight RUS has not included a systematic network wide study of the requirements for diversionary routes for all existing freight flows. This would require a systematic route by route timetabling study and input from the on going national efficient engineering access strategy. However, the Freight RUS recommends provision of additional diversionary routes on the network wherever a gap in the provision has been identified through the RUS process of examining growth and identifying gaps in the existing provision to meet the growth.

In particular where a new W10 route has been recommended, we have recommended an appropriate diversionary route wherever there is a positive business case to do so.

9.2.8 Coal routes

The industry forecast sets out a view of overall demand for ESI coal by 2014/15. Network Rail has tested this view by considering a range of possible future total burn and individual supply route scenarios.

Chapter 4 outlines two potential future scenarios for coal flows by rail, the Base Case forecasting further growth in imported coal supply to the Aire and Trent Valley stations through the east coast ports and Sensitivity 1 further growth in Anglo-Scottish supply to these key stations.

There is a clear business case for developing the east coast ports coal route. This is reinforced by recent increases in the traffic carried which are in line with the forecast. The Freight RUS recommends a series of schemes to support these flows. It also recognises the value of incremental enhancements to the key Anglo-Scottish route that would benefit passenger services and improve the route's value as a diversionary route to both freight and Anglo-Scottish passenger services.

The industry forecasts fully recognise the importance of other import facilities around the country and the ongoing role of power stations outside the Aire and Trent Valley. These locations are all set out in Figure B1 in Appendix B.

9.3 Freight RUS strategy recommendations for gaps on key freight routes

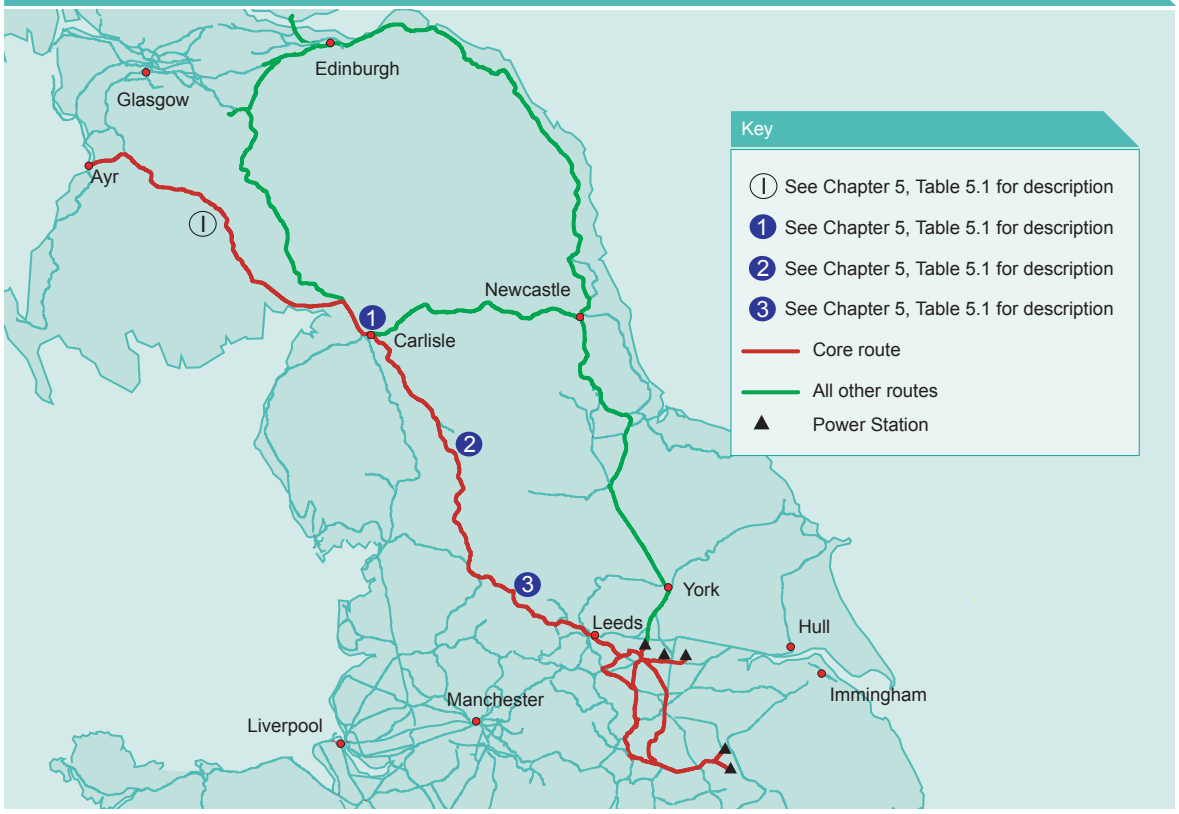
9.3.1 Approach

The Freight RUS strategy has been derived from the identification of gaps in capacity and the gauge capability of the network to meet the 10 year rail freight growth forecast (as shown in Chapters 5 and 6). Chapter 7 sets out the process adopted for optioneering against the gaps identified and reports the results of those options appraised.

Each of the appraised options has been carefully considered in developing the strategy. This section sets out the strategy for key freight routes. It takes the gaps identified on each of the key routes and sets out a short, medium and long-term strategy for each route.

In each case, short-term recommendations refer to the period up to the end of Network Rail's Control Period Three (March 2009), medium-term recommendations relate to Control Period Four (April 2009 to March 2014) and long-term recommendations relate to Control Period Five and beyond (April 2014 onwards).

Figure 9.1: Anglo-Scottish coal route: key gaps



9.3.2 Anglo-Scottish coal route: Ayrshire to the Aire and Trent Valley

The Base Case forecast predicts that Anglo-Scottish coal traffic will drop back to 2004/05 levels[3] once additional import capacity is available at the east coast ports (from 2006 onwards). The gaps on the core Anglo-Scottish route[4] are driven by the growth forecast in Sensitivity 1. The test predicts an additional 12 – 13 coal trains per day over the 2004/05 volumes from Hunterston port/Ayrshire opencast facilities to the Aire Valley/Trent Valley via the Glasgow and South Western (GSW), Gretna Junction, Carlisle, the Settle and Carlisle and Whitehall Junction. If this forecast is achieved, it would drive capacity gaps as identified above in Figure 9.1.

The last two years have seen fluctuations in demand. Table B8 in Appendix B indicates that at present, it is the RUS Base Case rather than Sensitivity 1 forecast which is proving most accurate.

Short term

The strategy for this route is to ensure capacity exists for the fluctuations in coal traffic that have been seen over the last two years whilst ensuring that performance for passenger and freight services is improved on the axis, including at the point where the West Coast Main Line is crossed in the Carlisle area.

The importance of both the GSW and Settle and Carlisle routes as diversionary options for both passenger and freight traffic is recognised, in particular the ability to maintain good performance and sufficient capacity on the routes at times when scheduled and unscheduled diversions are taking place.

To this end a set of minor enhancements are set out as recommendations in Table 9.1. It should be noted that improvements to the GSW route are not listed below as these are covered in the Scotland RUS.

3 5 to 10 through ESI coal trains per day using the GSW and Settle & Carlisle as a trunk route.

4 The route between Hunterston port and Ayrshire opencast sites in south-west Scotland and the power stations in the Aire Valley and Trent Valley via the Glasgow and South Western (GSW) and Settle and Carlisle lines.

Table 9.1: Anglo-Scottish coal route: Ayrshire to the Aire and Trent Valley. Option recommendations: Short term

Recommended option	Output summary	Gap addressed/ part addressed
1.1: Optimise existing timetable to maximise through Anglo-Scottish paths	22 through paths per day for coal	Gap 1, Gap 2, Gap 3 Completed Winter 2005/06
1.2: Relay Northern end of Mossband Up arrival line to provide 50 mph capability, and provide Up starter signal on Gretna platform	Allows loaded Up freight services to join the West Coast Main Line at greater speed and depart the Up mainline quicker onto the Mossband loop. Potentially improves performance on the West Coast Main Line	Gap 1
2.2: Additional signalling sections on the Settle and Carlisle route, to reduce the longest headways. Requires additional signals at: Up direction: Long Meg, Griseburn, Mallerstang, Horton in Ribblesdale. Down direction: Lond Meg, Horton in Ribblesdale	Generates additional paths through longest block sections on the Settle and Carlisle line, and improves passenger and freight performance	Gap 2

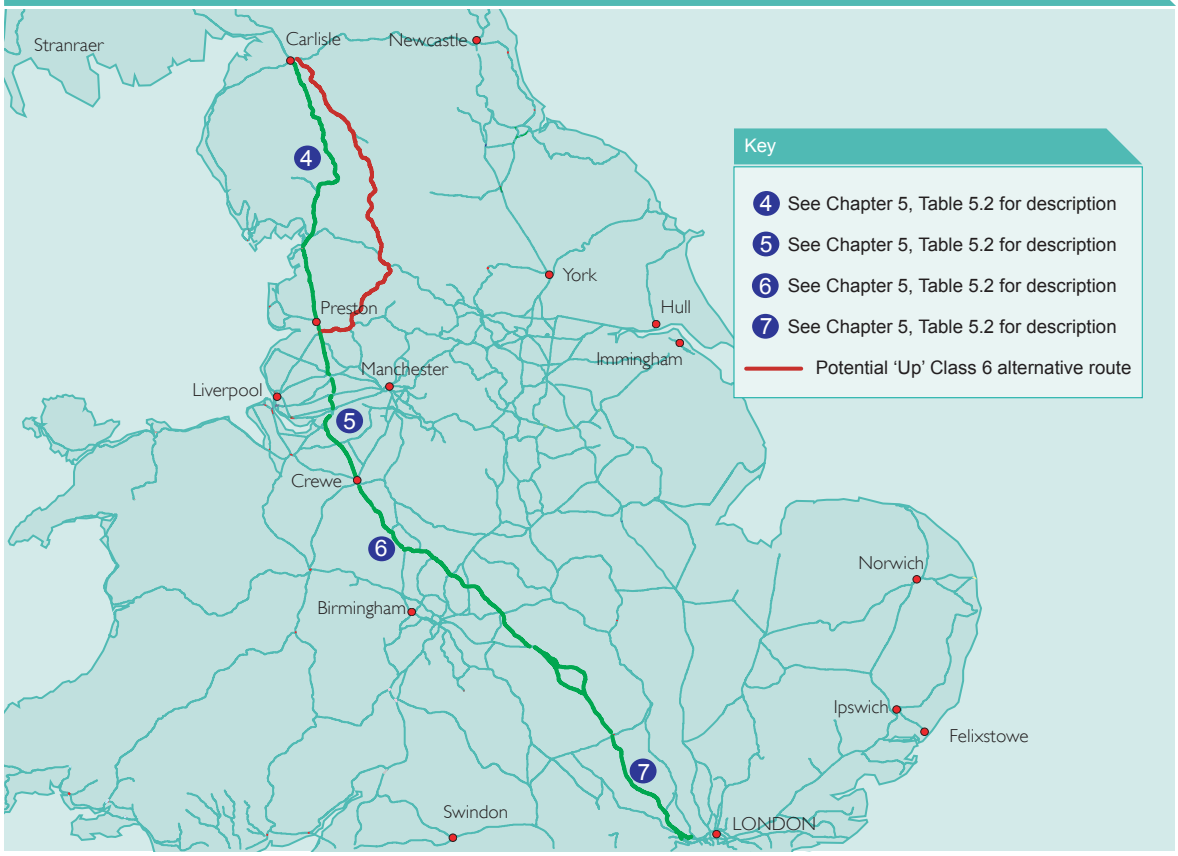
Medium term

It is recommended that two further options should be assessed as possible enhancements in conjunction with renewals projects as and when renewals are due. These include higher exit speeds on the Down goods loops at Kingmoor and Floriston (option 1.3) and doubling of the single lead junction at Carlisle London Road (option 1.7).

It is estimated that the growth in tonnage forecast in Sensitivity 1 would drive £46 million to £61 million[5] worth of additional track and structures renewals in the medium term.

5 These are high level cost estimates. If the full upturn in Anglo-Scottish volumes highlighted in Sensitivity 1 occurs these renewals plans will need to be developed further.

Figure 9.2: West Coast Main Line: key gaps



9.3.3 The West Coast Main Line

The key capacity gaps and the flows driving them on the West Coast Main Line are:

- Northern end of the route: Carlisle – Preston driven by continued operation of Class 6 services over the gradients in the Up direction plus some projected Class 4 intermodal growth (deep sea and domestic).
- Further south: Winsford – Weaver Junction, Stafford station, Brinklow – Attleborough and Rugby – Wembley Central driven by the volume of additional Class 4 deep sea intermodal services projected (up to 18 extra trains per day in each direction on some sections).

Short term:

Network Rail is developing a new West Coast Main Line timetable with FOCs and passenger operators for implementation in December 2008. The timetable will seek to meet the freight operators existing needs and on some route sections provide some additional headroom for growth.

Table 9.2 right outlines the likely outcome of the work on the key constrained sections outlined in the Freight RUS as well as recommending several other short-term routeing and looping options that would be required to meet the RUS growth forecast.

Medium term

In the medium term two recommendations are made covering the northern and southern end of the route.

At the northern end of the route three options were assessed to accommodate the industry's projected growth in Class 4 intermodal and Class 6 bulk traffic over the gradients between Preston and Carlisle. A looping strategy was considered with an extended/new loop between Tebay and Carnforth to increase the opportunities for regulating existing and longer trains.

Table 9.2 The West Coast Main Line. Option recommendations: Short term

Recommended option	Output summary	Gap addressed/ part addressed
4.1: Balancing the needs of passenger and freight in West Coast Main Line 2008 timetable to allow daytime freight paths between Carlisle and Preston	3 paths per hour in the Down direction (diesel/electric); 2 electric paths every hour and a minimum of one diesel path every other hour in the Up direction	Gap 4
5.1: New loop at Hartford (1000m+) with higher entrance and exit speeds (60mph)	Improves performance and aids pathing of freight between Winsford and Weaver Junction	Gap 5 (Committed 2007/08)
6.1: Diversion of some Trafford Park and other services via Macclesfield and Stoke or Crewe, Kidsgrove, Stoke	Removes some daytime freight services from Stafford station and Stafford Trent Valley Junction	Gap 6
7.1: Deliver minimum three off peak standard paths per hour south of Daventry and four Daventry - Rugby in West Coast Main Line 2008 timetable	As described	Gap 7

A routeing option was also considered. It routed existing daytime Up Class 6 coal trains away from Shap via the Settle and Carlisle and Hellifield to Clitheroe lines. This would allow additional Up daytime paths over Shap for projected Class 4 intermodal growth and other diesel hauled traffic. Finally an electric traction strategy between Preston and Carlisle[6] was considered, assessing the additional paths that could be generated if electric traction was used for future growth traffic.

This latter option, greater use of electric traction for growth services over Shap (both Class 4 and Class 6) is recommended as the best option for meeting the industry growth forecast. The differential between the sectional running times of diesel and electric locomotives means that diesel hauled paths for growth in between the passenger service in the Up direction over Shap will be difficult to find even with a new/extended loop in the fells. Subsequent changes to passenger timetables could also change the optimum location for a new looping facility.

In addition, haulage by a Class 92 electric or similarly powerful design will allow longer trains over the section as well as more paths. For example, 1357ft trailing length coal trains (eg. 23 HTA wagons) could be accommodated as could some longer intermodal services.

The routeing option via the Settle and Carlisle and Hellifield – Clitheroe also shows a positive business case and could represent a sensible medium to long-term strategy for slower moving Class 6 freight in the Up direction[7]. This option could be a cheaper solution for the FOCs than electric traction. The option could not be implemented regularly until the Medium term due to the extent of work required on structures and track south of Hellifield.

At the southern end of the route, timetabling work has shown that by the end of the 10 year forecast period there could be difficulty in pathing some of the intermodal growth projected by the industry. The RUS therefore recommends medium-term implementation of gauge clearance and an initial capacity scheme on the Felixstowe – Nuneaton route to remove some growth originating at Felixstowe/ Bathside Bay from the West Coast Main Line south of Nuneaton. This recommendation and its additional relevance to cross London constraints is explored further in section 9.3.4.

6 These are not the end to end locations where loco changes are proposed, but the route sections over which electric traction for growth traffic was assessed.

7 Subject to the substantial structure and track renewals costs included in the business case, the route would be suitable for most of the Up Class 6 services traversing the West Coast Main Line over Shap but not those conveying container traffic.

Table 9.3 The West Coast Main Line. Option recommendations: Medium-term

Recommended option	Output summary	Gap addressed/ part addressed
4.4: Electric haulage of some future growth traffic between Crewe/ Warrington and Carlisle/Glasgow. Both Class 4 intermodals and Class 6 bulk services	Allows a third Up path in most daytime hours	Gap 4
7.4: Peterborough – Nuneaton W10 gauge and Felixstowe – Nuneaton first stage capacity	Allows five growth paths per day in each direction from Felixstowe to be routed cross country away from the Great Eastern and North London lines	Gap 7

Long term

Consideration of the long term requires a detailed understanding of forecast passenger demand beyond the introduction of the 2008 timetable. The West Coast Main Line RUS will consider these issues. In the meantime a number of options are clearly worthy of further analysis with a view to possible longer term implementation.

Lengthening of some intermodal services to and from the Haven Ports has some relatively limited productivity benefits in terms of train paths saved on the West Coast Main Line but does show a positive business case. Lengthening of a significant number of services would require some infrastructure works which are detailed further in section 9.3.4 below covering the Felixstowe – Nuneaton route.

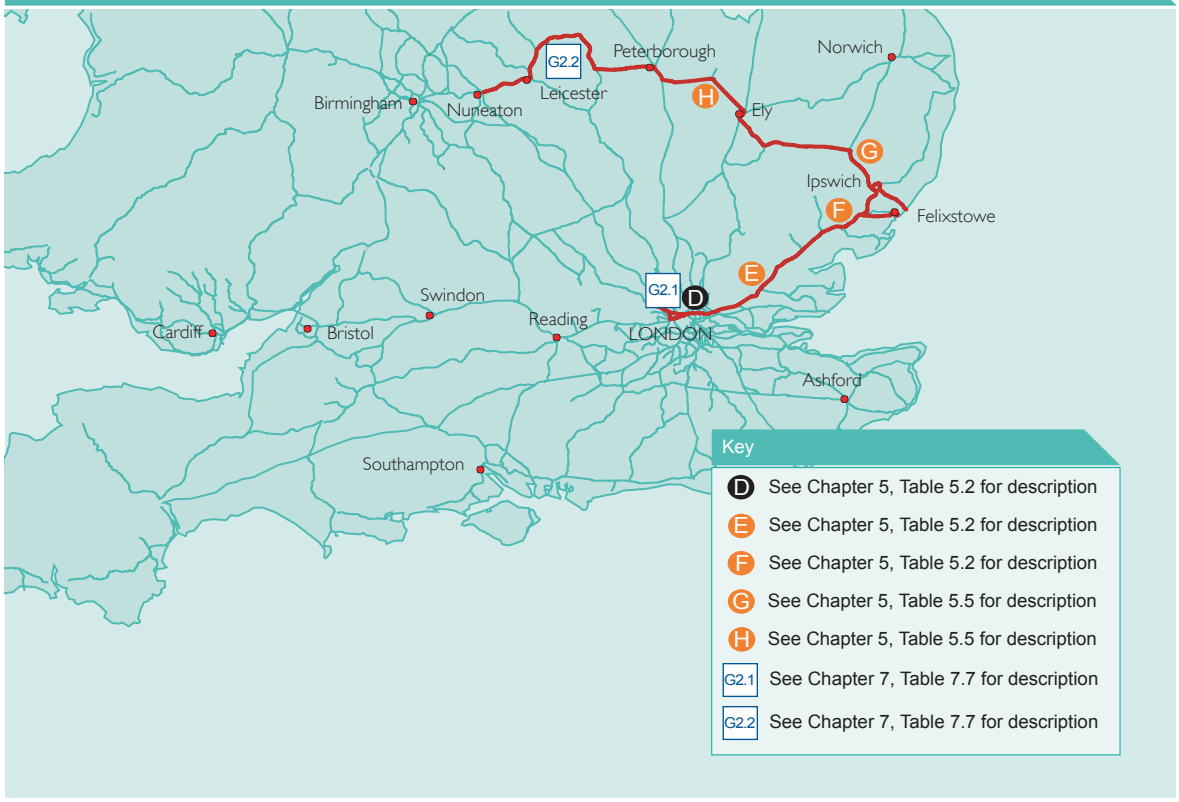
Table 9.4 lists longer term solutions for further consideration.

Table 9.4 The West Coast Main Line. Option recommendations: Long term

Recommended options for further development	Output summary	Gap addressed/ part addressed
5.2/6.2/7.2: Lengthening of some intermodal services to/from the Haven Ports	Productivity of up to one path saved for every 4-12 trains run to a given destination depending on increment of additional wagons added per train (+2 to +6)	Gap 5, Gap 6, Gap 7
6.3: Major enhancements to route capacity in the Stafford area as described in the Department for Transport West Coast Progress Report document[8]	As described in the Department for Transport West Coast progress report document	Gap 6
7.5: Major capacity enhancements on Felixstowe – Nuneaton route	Details outlined in section 9.3.4 and table D1 in Appendix D	Gap 7

8 Department for Transport: West Coast Main Line: Progress Report. May 2006.

Figure 9.3: Haven Ports to the West Coast Main Line: key gaps



9.3.4 The Haven Ports to the West Coast Main Line

Using 2004/05 as the base year, the Base Case of the RUS forecasts an additional 26 container trains per day from the Haven Ports of Felixstowe and Bathside Bay over 10 years. Nineteen of these are projected to be to/from destinations on or near the West Coast Main Line and 7 for destinations on or near the East Coast Main Line. These estimates drop to 13 and 5 respectively in Sensitivity 2 should the Shell Haven development go ahead. In addition to the Shell Haven test, should further development take place at Southampton as outlined in 9.3.5, this could impact on the growth forecast. Already, since the base year forecast of 2004/05, three additional trains per day have started running from Felixstowe.

Figure 9.3 displays the key gaps driven by the projected growth. The Freight RUS has highlighted and proposed solutions to those gaps identified on the West Coast Main Line (see section 9.3.3 above). The solutions proposed are consistent with those proposed in the Cross London RUS for relieving congestion points on the North London Line (NLL).

The recommendations of the Cross London and Freight RUS in relation to Haven ports traffic are outlined below. It should be noted that as part of the planning permission for expansion of the Port of Felixstowe and the new facility at Bathside Bay, Hutchison Ports UK are required to invest in a capacity upgrade of the Felixstowe branch, alterations to Ipswich Yard and W10 gauge clearance of the route between Ipswich, Peterborough and Doncaster. These enhancements have been assumed in the Base Case within the Cross London and Freight RUS.

Short term

The Cross London RUS states that up to the first 10 additional services for West Coast Main Line destinations from the base year onwards (of which three per day have already

now started) may be accommodated on existing routeings via the Great Eastern and North London Line. This strategy is likely to be sufficient to accommodate the forecast growth until at least 2010/11[9] and should be adopted.

Medium term

Once the route via the Great Eastern reaches capacity, there will be a medium-term requirement to begin routeing trains for the Midlands and West Coast Main Line destinations via Ely, Peterborough, Leicester and Nuneaton (the 'cross country route').

The Freight RUS recommends gauge clearance to W10 of this route (option 7.4) and some initial capacity works; shortening of signalling headways in the Kennett area and provision of a Northern Chord at Nuneaton[10].

Recently completed timetabling work suggests that this option will provide around five[11] through paths per day in each direction for freight. This number could be increased possibly to around 10 through paths per day by a recast to a standard hour pattern of some of the other class 6 freight paths on the route, though this will only be possible with the agreement of the freight operators concerned. Option 7.4 will therefore offer a valuable diversionary route to the Great Eastern / North London Line route, and will have some limited scope for handling of growth. It will not be sufficient to handle long-term growth or facilitate any diversion of existing GE/NLL routed services to the cross country route.

The Anglia RUS and shortly the East Midlands RUS will be further assessing capacity enhancements that could be added to Option 7.4 to provide additional increments to cross country paths. Table D1 in Appendix D highlights the likely additional work required to deliver a significant increment of further through paths and shortened journey times. The key constraint on the route is crossing the Midland Main Line at Leicester. If further improvements as outlined in Table D1 are to take place, it will be critical to co-ordinate these with the resignalling of Leicester control area between 2012 and 2015. Timetabling work to date indicates these further enhancements, alongside the existing option 7.4, could yield at least 14 through paths in each direction between Felixstowe and the West Coast Main Line.

The precise combination of the capacity enhancements that will be required within the Medium and Long term will depend on the timing of new portside capacity coming on line at Bathside Bay, and any future decision to route existing services away from the Great Eastern and North London Line to facilitate improvements to the passenger timetable.

The Cross London RUS and the Freight RUS both recommend implementation of W10 gauge clearance of the Tottenham and Hampstead line in north London with some associated capacity enhancements (option G2.1). This will allow some services from North Thameside, including Shell Haven traffic under Sensitivity 2, to avoid the sections of the North London Line used by Haven Ports traffic.

Long term

The RUS has examined the possibility of lengthening container trains from the Haven Ports via both the Great Eastern and cross country routes (options 5.2, 6.2 & 7.2). The new Felixstowe North rail terminal[12] will be capable of handling regular 650m (30 wagon) container trains. Despite this, a number of obstacles exist en route which mean that lengthening of a significant number of container trains is likely to be only a long-term option. Amongst the key constraints are length limits at Ipswich yard and potential haulage constraints which currently limit trains to 24 wagons.

Any further alterations to Ipswich Yard beyond the essential HPUK works would not take place within the RUS timescales to 2014/15. The appraisals conducted show that it would be advisable to review options for handling longer trains on both the Great Eastern and cross

9 The key factor here is the timing of the new portside capacity at Felixstowe South and Bathside Bay and the delivery of Base Case HPUK works to improve capacity on the Felixstowe branch and at Ipswich Yard. If this moves back, so too will the date when extra rail capacity on the cross country route is required.

10 This infrastructure scheme may require TWA, and is under further development.

11 This is in addition to nine growth paths identified via Peterborough to East Coast Main Line destinations.

12 This may be in operation from 2010/11 but depends on the timing of port expansion.

country routes at the time of the Ipswich area resignalling (which is due to occur around 2015). In the meantime it is recommended that further development of the cross country route, in the form of any new loops or recessing facilities, should allow for the possibility of 650m (30 wagons) trains at some stage in the future.

Further south on the route from the Haven ports to the West Coast Main Line via the Great Eastern and North London Line, some existing services to/from North Thameside which are electrically hauled are likely to have to continue utilising paths on the North London Line along with Haven Ports traffic (even after delivery of the medium-term W10 clearance of the Tottenham and Hampstead line proposed above). There may be a case, to be further explored alongside passenger benefits, for electrifying the Tottenham and Hampstead route in the long term.

9.3.5 Southampton to the West Coast Main Line

This route is not a capacity constraint under the Base Case but the demand for an additional six trains per day generated by gauge clearance (Sensitivity 3) leads to capacity gaps which need to be addressed to enable the FOCs to take full advantage of the gauge clearance.

Chapter 7 sets out the positive business case for W10 gauge clearance on the core route via Eastleigh, Reading West, Leamington and Nuneaton. It is recommended that this scheme proceeds and the strategy outlined below therefore takes account of the additional six trains per day growth that this scheme enables.

Since the publication of the Draft Freight RUS for Consultation, the Port of Southampton has announced plans for a potential capacity expansion of a further 1 million TEU in 2010. The impact of this expansion on train numbers from the port, should it take place, is not yet

Figure 9.4: Southampton to the West Coast Main Line: key gaps

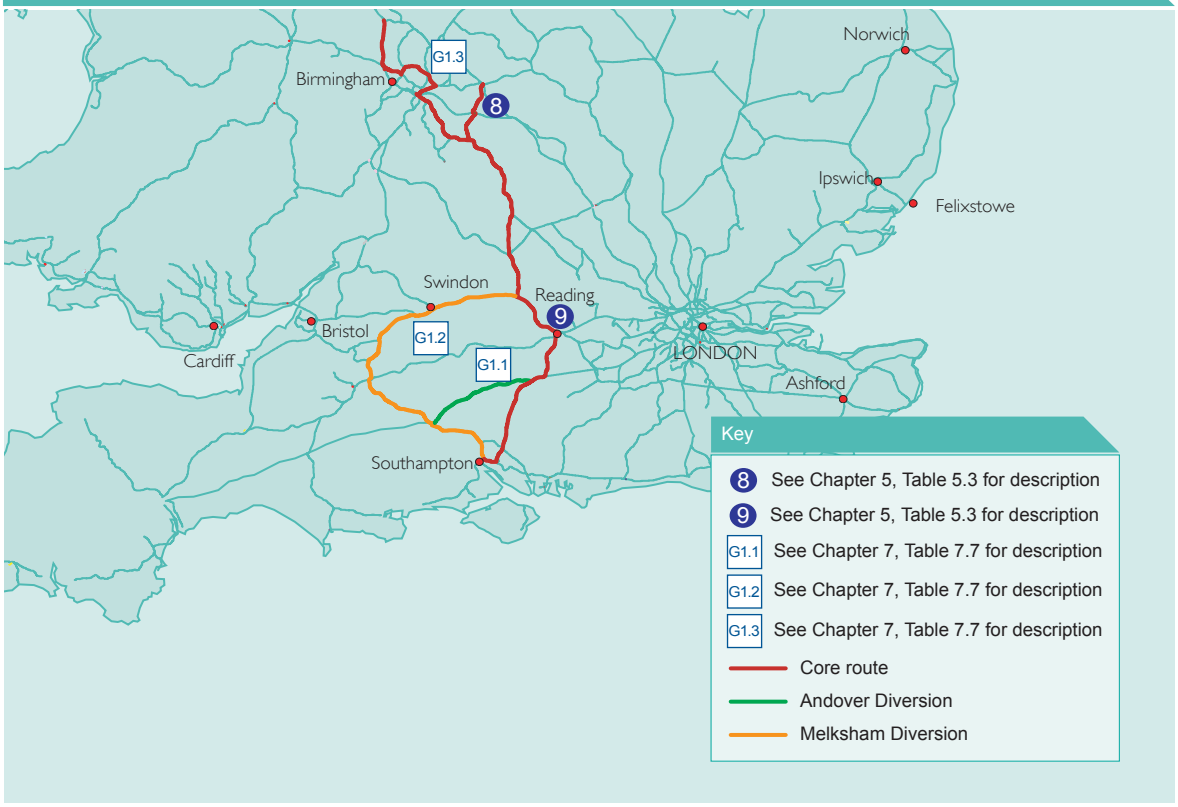


Table 9.5 Southampton – West Coast Main Line. Option recommendations: Short term

Recommended option	Output summary	Gap addressed/ part addressed
8.1: Reduction in signalling headways on the southern end of the Sutton Park line. Remodelling of Park Lane junction. All implemented with Saltley signalling renewals[13]	Increases capacity on the alternative route to the West Coast Main Line via Water Orton, Sutton Park and Bushbury	Gap 8
8.2: Extension of loop south of Coventry on Kenilworth line	Improves regulation of freight services making crossing moves at Coventry	Gap 8 Committed for implementation 2006/2007

clear, but it is likely to mean the Sensitivity 3 forecasts would be exceeded by 2014/15.

Where the strategy conclusions would be likely to differ from those arising from the RUS growth forecasts, as a result of this possible further growth, this is highlighted below.

Short term

A timetabling assessment completed for the RUS has indicated that approximately four further paths per day, in each direction, are available without capacity enhancement between the port and the West Coast Main Line. In addition to these, Table 9.5 above sets out some minor schemes that are recommended to improve regulation of existing services and enable further routeing of some services via the Sutton Park line, particularly at times of planned blockade of the route via Coventry and Nuneaton.

A further scheme (option 9.3) is presently under development to move signal R377 on Reading West curve and create a regulating point for a 24 x 60ft wagon container train plus loco (and possibly a 26 x 60ft wagon train plus loco) at Reading West junction.

Regulation of freight trains across the busy Great Western Mainline is presently complicated by the fact that some container services from Southampton are too long to be held on Reading West curve. This option could also be deliverable within the short term.

Medium term

Gauge clearance to W10 of the core route is recommended. The RUS also recommends that at the same time the Landor Street – Sutton Park – Darlaston Junction route is also cleared to W10. This will allow W10 traffic to operate to/from Southampton during planned blockades on sections of the core route via Coventry, Nuneaton, and Colwich. Gauge clearance of this route also allows Felixstowe container trains to run at W10 to/from Lawley Street when the Nuneaton – Hams Hall – Water Orton route is under possession.

Further south a diversionary route is required to allow trains to run at W10 during blockades of the Southampton to Basingstoke section of the South West Main Line. This section presently has regular rules of the route blockades on weekday nights and and this requirement is expected to continue. The business case for gauge clearance of the Laverstock and Andover diversionary route presently used (Option G1.1 in Chapter 7) is not sufficiently positive to allow the RUS to recommend this scheme at present. However it is recommended that the scheme is further developed to GRIP 4 as soon as possible and that the business case is reassessed at that point.

In addition to the gauge schemes a medium-term opportunity exists during Banbury signalling renewals[14] (currently programmed for Control Period 4) to improve signalling

13 The renewal project is likely to begin right at the end of Control Period 3, with enhancement outputs not delivered until Control Period 4.

14 The Banbury schemes are not yet recommended in the medium term options because designs for the renewals and potential bolt on enhancements are still being costed, and have hence not yet been appraised.

Table 9.6 Southampton – West Coast Main Line. Option recommendations: Medium term

Recommended option	Output summary	Gap addressed/ part addressed
G1: W10 gauge clearance of Core route Southampton – Eastleigh – Reading West – Leamington – Coventry – Nuneaton	Delivers W10 gauge allowing conveyance of 9ft 6in containers on standard height wagons	G1
G1.3: W10 gauge clearance of Landor Street – Sutton Park line – Darlaston Junction.	Completes second route between Leamington and the West Coast Main Line at W10. Provides key diversionary alternative during planned blockades	G1.3

headways and possibly provide improved looping facilities for Southampton container trains in the Banbury area. These, along with the short-term schemes highlighted above, would be sensible enhancements to help facilitate the Sensitivity 3 growth forecast.

Long term

In the longer term (or in the medium term if the additional one million TEU development at Port of Southampton takes place within Control Periods 3 or 4), further capacity enhancements will be required if growth is to be accommodated from the port.

The primary constraint to freight pathing is the capacity of Reading West junction. A scheme is under development to overcome this by providing grade separation. Timetable analysis completed for the RUS indicates that the next most significant constraint is likely to be the Basingstoke to Southampton (via Winchester) section of the route.

An alternative routeing option to this section (via Melksham) could deliver a small number of additional paths per day to the West Coast Main Line. W10 gauge clearance would allow the route to act as a diversionary route to the core route south of Didcot, however the routeing adds up to an hour and a half to the journey between Southampton and Didcot and is not favoured by operators as a daytime core route. It is recommended that the Melksham scheme be developed further as a combined diversionary route and capacity generating alternative alongside the Laverstock and Andover diversionary option. The shorter Andover diversion when combined with grade separation of Reading West could act as a capacity generating route (avoiding Basingstoke – Southampton via Winchester) during the daytime, the Melksham option though longer would provide an additional diversionary option to Basingstoke – Reading – Didcot.

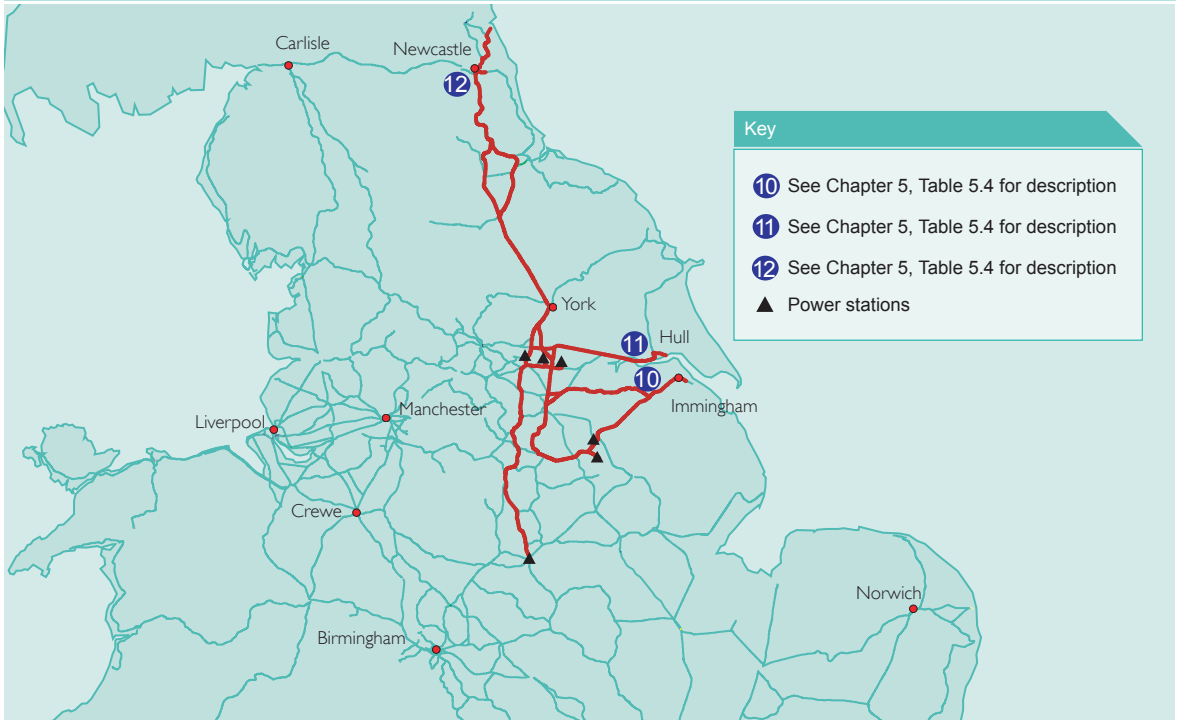
Grade separation at Reading West, an alternative to the Basingstoke – Winchester – Southampton section and some more minor enhancements between Basingstoke and Reading and in the Oxford area could yield a step change in through capacity from the port. The strategy for the long term is therefore to develop these schemes into an integrated package that can deliver a significant increment of through paths to and from the West Coast Main Line should the port expand.

Although likely to be outside the timescales of the Freight RUS, re-opening of the Bletchley – Claydon – Oxford line could offer a preferable Up routeing option for Southampton container services presently making conflicting movements at Nuneaton. It is recommended that this is examined further in the West Coast Main Line RUS.

Table 9.7 Southampton – West Coast Main Line. Option recommendations: Long term/Medium term requiring further development

Recommended options for further development	Output summary	Gap addressed/ part addressed
9.4: Grade separation at Reading West Junction	Removes main pathing constraint on route between Southampton and West Coast Main Line. Improves passenger service performance.	Gap 9
G1.1: W10 gauge clearance Laverstock and Andover diversion	Provides diversion to Southampton – Basingstoke (via Winchester) section of the South West Mainline. May also offer some additional daytime paths if Reading West is grade separated.	Gap 9
G1.2: W10 gauge clearance Laverstock and Melksham diversion	Provides diversion to Southampton – Didcot section of the Core route. May also offer some additional daytime paths. Alternative to option G1.1	Gap 8, Gap 9
8.3: Re-routeing of Up and possibly Down NW/Scotland to Southampton container services via Bletchley Flyover – Claydon – Oxford	Avoids present conflicting movements in the Up direction at Nuneaton, provides 2nd route north of Oxford improving maintenance access and pathing opportunities	Gap 8, Gap 9

Figure 9.5: East coast ports – Aire and Trent Valleys: key gaps



9.3.6: East coast ports – Aire Valley/Trent Valley

The capacity gaps identified between the east coast ports and the Aire Valley and Trent Valley are driven by the Base Case coal scenario. This predicts an additional 18 coal trains per day (over 2004/05 volumes) from the east coast ports (Immingham, Hull, Redcar, Tyne and Blyth) to the Aire Valley and Trent Valley power stations. The growth is generated by closure of domestic supply sources combined with some limited growth in demand and rail market share.

As discussed in Chapter 4, there are well advanced plans for increased capacity at a number of the east coast ports, and Table B8 in Appendix B sets out the rapid progress Immingham is making towards meeting the 10 year Base Case forecast. Hull, Tyne, Redcar and Blyth have also shown growth over the 2004/05 base in line with Base Case predictions.

Short term

As a result of the immediate need to accommodate the rapid growth from these ports, the RUS recommends a set of short-term options to meet demand as set out below.

Since publication of the draft RUS, a timetable recast has been completed providing a standard hour path to/from the HIT terminals at the Port of Immingham to allow the initial growth from the port to be handled. In addition to this Network Rail has been working with operators to lengthen coal trains between Immingham and the Aire Valley. As a result EWS are now regularly operating 23 rather than 21 HTA coal trains on this axis, and the opportunity for other operators to run longer

Table 9.8: East Coast Ports – Aire/Trent Valley. Option recommendations: Short term

Recommended option	Output summary	Gap addressed/ part addressed
10.1: Timetable recast: Immingham Port – Wrawby – Scunthorpe	Delivers a standard weekday hourly path between the HIT 1 and 2 terminals at Immingham and Milford/Gascoigne Wood	Gap 10 Implemented August 2006
10.2: Brigg line enhancement	Delivers a significant number of additional paths per day in each direction between Immingham and the Trent Valley power stations/Doncaster. Also offers a diversionary/alternative routeing option to the South Humberside Main Line and the Doncaster – Worksop route	Gap 10
10.3: Wrawby Junction linespeed improvements	Gives 1 to 2 minute improvement to junction clearance times. Performance and timetabling benefits for services to/from Immingham	Gap 10
10.4: Further coal train lengthening Immingham – Aire valley	Extension to 1357ft trailing length (eg. 21 to 23 HTA) wagons, effectively saving one path for every ten trains run	Gap 10 Implemented 2006
11.1: Hull docks branch: Partial double tracking	Delivers additional paths to/from the Port of Hull, sufficient to meet Base Case RUS forecast	Gap 11
12.1: Reactivation of Boldon East curve	Will generate a small number of additional paths to and from the Port of Tyne, by providing an alternative route to/from the Aire and Trent valley stations via the Durham coast	Gap 12

Table 9.9: East Coast Ports – Aire/Trent valley. Option recommendations: Medium term

Recommended option	Output summary	Gap addressed/ part addressed
10.7 Lindsay Oil refinery – Killingholme Branch loop	Aids regulation of coal trains into the HIT 2 terminal at Immingham	Gap 10
10.8 Cottam Chord	Relieves congestion on the Doncaster – Worksop freight route. Allows direct access from the Port of Immingham to Cottam power station via the Brigg line avoiding routeing via Scunthorpe and the South Humberside Main Line	Gap 10
11.2 Selby station bi-directional signalling and extension of Barlby loops	Improves flexibility of operation through station area. Allows move to 1357ft trailing length (21 to 23 HTA wagons) coal trains from port of Hull	Gap 11

services exists. Beyond these initial measures the RUS recommends some infrastructure enhancements, specifically the upgrade of the Brigg line, providing a direct route to the Trent Valley power stations from Immingham.

The need to increase capacity from the Port of Hull is also recognised and partial doubling of the docks branch is recommended.

Further north, reactivation of Boldon East curve is proposed to offer an alternative route from the Port of Tyne to the constrained part of the East Coast Main Line between King Edward bridge junction and Ferryhill.

Medium term

Further enhancements are recommended in the medium term to improve management of services in and out of the Port of Immingham and on routes to the Trent Valley power stations. They are outlined in Table 9.9 above. In the case of the Killingholme branch loop and the Cottam Chord, options have been developed since the Freight RUS consultation document.

Long term

The short and medium-term measures highlighted above will be sufficient to handle the industry's 2014/15 Base Case demand projections from the east coast ports. In the long term if further growth takes place beyond the industry forecast from the Port of Tyne, and/or more generally on the East Coast Main Line between Ferryhill and Newcastle, it may be sensible to look again at the re-opening of the Leamside line for freight traffic. There is not a sufficient case for such a project to be proposed in this RUS but it is recommended that the alignment of the route be protected.

9.3.7: Other routes to/from Ports

As Chapter 5 section 5.1.5 highlights there are a number of other ports in the UK projecting further expansion of rail demand in some cases beyond that of the industry forecast for the RUS.

Chapter 7 sets out appraisal results for the building of Olive Mount Chord and W10 gauge clearance to the Port of Liverpool. The scheme has a positive business case and it is recommended that it should proceed.

Network Rail is actively working with a number of other ports to identify the need for and cost of possible further enhancements to gauge and capacity. It is recommended that the work proceeds and that schemes are developed in line with committed approved increases in port capacity.

9.3.8: Gaps on key freight routes: Conclusions

The RUS has focused on the key changes in demand and identified where they drive substantial gaps in the network's ability to accommodate it. The short and medium-term recommendations outlined above should prove sufficient to meet the projected demand to 2014/15.

Further work would be necessary to integrate the capacity for freight outlined in this strategy into future timetables.

As highlighted in Chapter 5 section 5.1.5., there is always the possibility that within the RUS timescale demand will differ from the industry forecast and different gaps will emerge. Network Rail is actively engaged with the operators and end customers to understand changes to demand patterns as and when they occur. Chapter 10 sets out the process that will be put in place to ensure the demand inputs to the RUS are reviewed regularly.

10. Next Steps

10.1 Introduction

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

The recommendations of a RUS – and the evidence of relationships and dependencies revealed in the work to meet them – form an input to strategic investment decisions made by the industry's funders.

The Freight RUS also provides agreed freight demand – and considered options to meet that demand - to the individual geographical RUSs, thereby enabling consistent treatment of freight throughout the RUS programme.

10.2 Network Rail's Route Plans and Strategic Business Plan

All of Network Rail's 26 Strategic Routes carry freight traffic. The Freight RUS will be reflected in each Route Plan where it has an impact and will be published alongside the Network Rail Business Plans in March 2007. Each Route Plan reflects significant planned investment on that route, including scheduled renewals as well as committed and aspirational enhancements.

The Freight RUS also provides the freight demand and strategy which will be included in Network Rail's Strategic Business Plan, which is in the course of development to support the ORR's Periodic Review of Network Rail's access charges.

10.3 Network Rail Discretionary Fund (NRDF) and Out Performance Fund (OPF)

In August 2005 the DfT approved the Network Rail Discretionary Fund (NRDF) for enhancements to the network. The governance of its use was set out in ORR's publication "Policy Framework for investments: Guidelines on implementation arrangements and processes" in March 2006. The fund provides £200m in Control Period 3, to be used on small enhancements (generally less than £5m – although there are exceptions by specific agreement). Around £20m is to be spent in Scotland. Network Rail is seeking an extension of the fund into Control Period 4.

In addition, Network Rail announced an Out Performance Fund with the publication of its 2006/7 Business Plan. This represents a further £200m (in addition to NRDF), to be spent on enhancements focused on capacity improvements that are needed to meet projected growth in demand.

Table 10.1 summarises those schemes recommended by the RUS, which have infrastructure costs and may be eligible for full or partial NRDF or Out Performance funding.

Table 10.1: Potential NRDF or Out Performance funded/part funded schemes

Options	Scheme	Indicative cost[1] (PV) CAPEX	Control period
Capacity Options			
Option 1.2	Starter signal on Up platform at Gretna (combined with Mossband Up arrival line renewals)	£5-6m components of a £46.1m integrated scheme with GSW re-doubling	CP3 & CP4
Option 2.2	Intermediate block signals on the Settle and Carlisle line[2]		
Option 8.1	Signalling headway improvements on Sutton park line. Remodelling Park Lane Junction. Implementation with Saltley signalling renewals	£5.7m	CP3 & CP4
Option 10.2	Brigg Line upgrade	£9.1m	CP3 & CP4
Option 10.3	Wrawby Junction line speed enhancements	£2m	CP3 & CP4
Option 11.1	Hull Docks branch upgrade	£14.7m	CP3 & CP4
Option 12.1	Re-activation of Boldon East Curve	£12.4m[3]	CP3 & CP4
Capacity Options			
Option G1.3	Sutton Park Line W10 gauge clearance	£1.8m	CP4

10.4 Transport Innovation Fund (TIF)

The DfT published guidance in January 2006 on the operation of the Transport Innovation Fund (TIF). The guidance explained that TIF would enable the DfT to direct resources towards two key objectives – tackling road congestion (Congestion TIF) and improving national productivity (Productivity TIF). The Secretary of State for Transport announced during 2006 that two priority themes might offer a strong strategic fit with the objectives of the first round of Productivity TIF.

The themes were:

- measures to improve capacity and resilience of the strategic national freight distribution networks, hence supporting international trade and competitiveness
- measures to make the most of capacity at key pressure points on the strategic networks, thus improving mobility for business and freight users.

1 Indicative capital cost (PV). Does not necessarily represent NRDF/Out Performance Fund contribution.

2 The additional signals on the Settle and Carlisle line and the starter signal at Gretna have been appraised as an integrated package with the part doubling and signalling improvements on the Glasgow and South Western mainline. This latter project is covered in the Scotland RUS. The BCR reported in this RUS is for the full package of works, not just the Settle and Carlisle element.

3 All projects include allowances for risk, uncertainty and optimism bias according to the stage of development of the scheme. Option 12.1 is at a particularly early stage of development and consequentially has considerable additional provision within the estimate.

Table 10.2: Potential TIF funded/part funded schemes

Options	Scheme	Indictive cost (PV)[4] CAPEX	Control period
Capacity Options			
Option 7.4	Nuneaton to Peterborough W10 gauge enhancements & incremental capacity	£132.8m[5]	CP4
Options 10.2, 10.6, 10.7, 10.8, 11.1 & 11.2:	Humber Ports / Immingham to Aire/ Trent Valley	£91.6m[6]	CP3 & 4
Gauge Options			
Option G1:	Southampton to WCML W10 gauge enhancements	£61m	CP4
Option G2.1a:	Gospel Oak to Barking Rail gauge and capacity enhancement	£46.7m full integrated scheme costs including passenger enhancements)	
Option G4:	Reinstatement of Olive Mount Chord & W10 Port of Liverpool to WCML via Earlestown and Runcorn	£12.5m	CP4

Accordingly, the strategic freight schemes outlined in Table 10.2 above have been taken forward for business case development and appraisal. All scheme costs are indicative at this stage and the DfT is not committed to providing funding.

The Secretary of State announced that TIF funding will be limited in the opening years of the scheme and that it will only be possible to fund a limited number of schemes in the initial allocation round. The DfT is considering providing a contribution through Productivity TIF, not the full scheme costs.

10.5 High Level Output Specifications (HLOSs)

The DfT and Transport Scotland are currently preparing High Level Output Specifications (HLOSs) to define the outputs that they wish to buy from the rail network over the next control period ie. 2009-2014. These statements alongside the accompanying Statements of Funds Available (SoFA) will be used by ORR to set the funding requirements of Network Rail over that period, taking into account other obligations and funders' reasonable requirements.

The HLOSs are not required to include output measures specifically related to freight. Nonetheless, both DfT and Transport Scotland have been careful to ensure that growth forecasts developed from the Freight RUS have been taken into account when developing passenger-related metrics.

10.6 Treatment of freight in the programme of geographical RUSs

The Freight RUS will provide a set of consulted rail freight forecasts for use in the RUS programme. This will ensure consistency of forecasts, and by implication, the assumptions underlying the forecasts.

Each geographical RUS will take the freight demand growth from the Freight RUS and consider it alongside passenger demand growth when determining the capacity requirements of users of a route.

4 Indicative CAPEX cost. Includes costs likely to be met by private sector contribution. Does not represent TIF contribution.

5 Potential NRDF funding contribution also.

6 Also potential NRDF/Out Performance Fund contribution.

Those geographical RUSs which commenced during the development of the Freight RUS have been provided with freight demand and the identified capacity gaps and gauge aspirations outlined in this document.

The Freight RUS will continue to supply each new geographical RUS with identified gaps and recommendations for schemes to meet the capacity requirements of freight traffic on the basis of an existing committed level of passenger traffic. The individual geographical RUS may need to re-examine these schemes in the light of bespoke passenger demand analysis. There may be instances where the business case for a freight scheme becomes even stronger if there is an expectation of higher freight growth than could be currently accommodated by committed passenger paths. It is also possible that an expectation of a decline in passenger usage may mean that freight traffic could be more easily accommodated than anticipated by the Freight RUS.

10.7 Reviewing the Strategy

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

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

The Stakeholder Management Group has agreed to continue to meet on a twice-yearly basis. This will allow issues raised in the RUS to be monitored as the geographical RUS and TIF programmes progress and facilitate discussions of the impact of any significant changes in the key demand drivers.

Appendix A: Demand in base year and existing network

Figure A1: Coal trains per day in 2004/05

Trains in one direction. Average of Thursdays sample throughout the year.

Figure A2: Metal trains per day in 2004/05

Trains in one direction. Average of Thursdays sample throughout the year.

Figure A3: Intermodal trains per day in 2004/05

Trains in one direction. Average of Thursdays sample throughout the year.

Figure A4: Construction trains per day in 2004/05

Trains in one direction. Average of Thursdays sample throughout the year.

Figure A5: Gross tonnage levels in 2005/06 (freight only)

Annual tonnage shown in both directions.

Figure A6: Gauge envelopes and container sizes

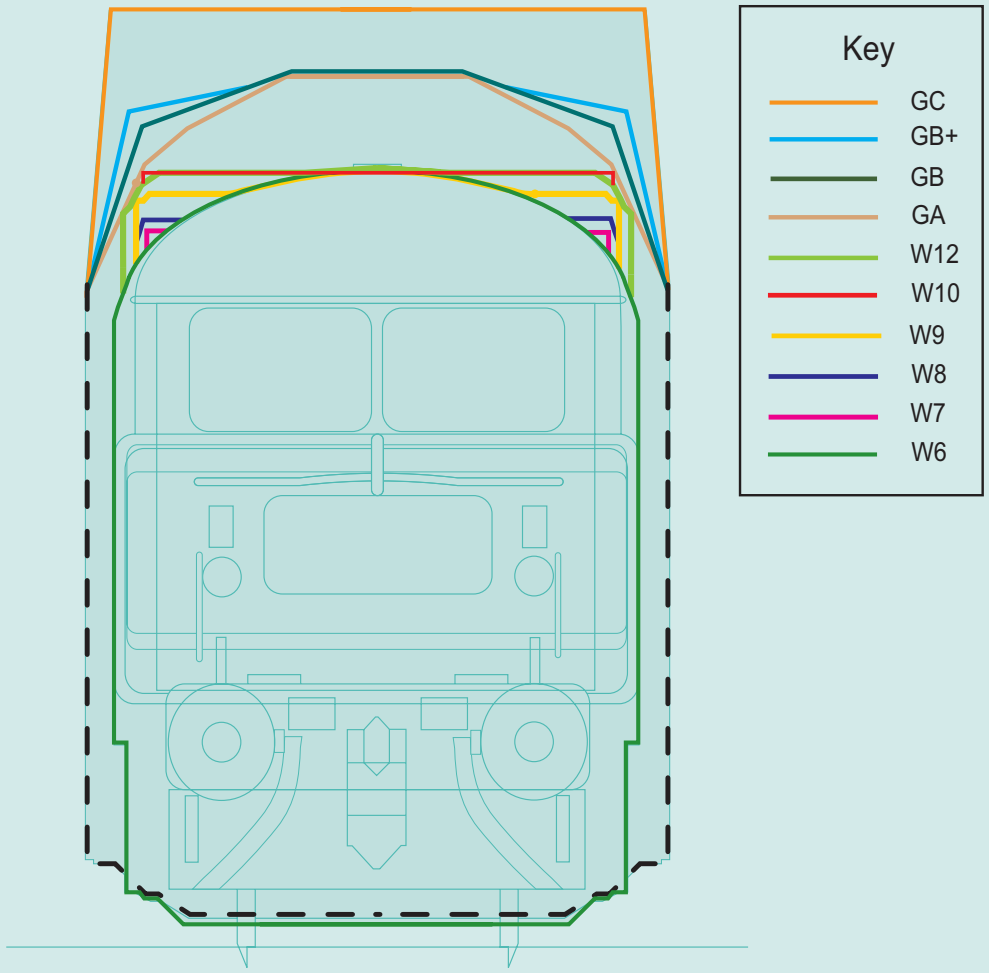
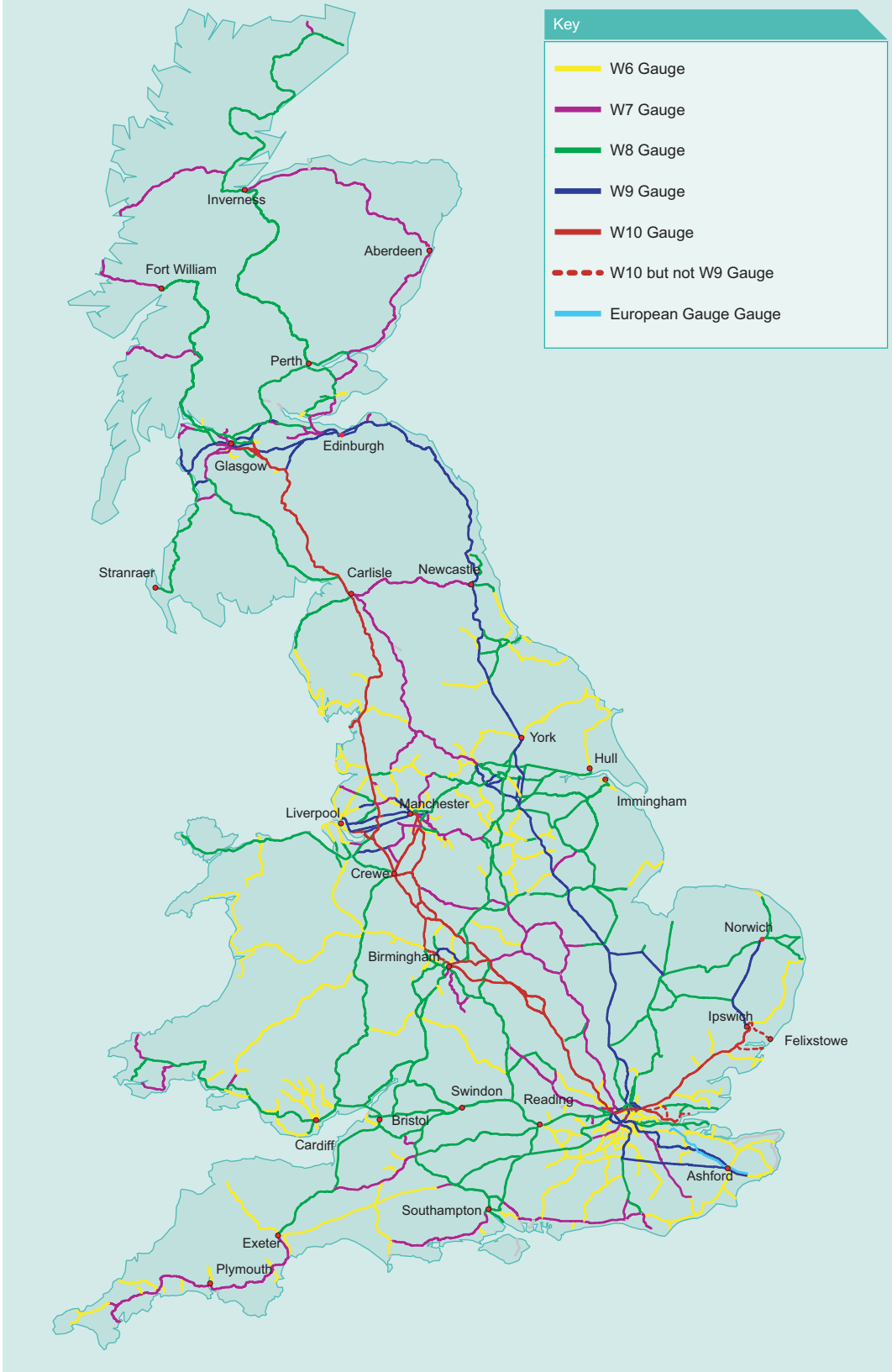


Table A1: Indicative gauge requirements for container sizes

Length	Height	Width	Minimum gauge required on standard height wagon
Deep sea boxes			
20ft	8ft 6in (a handful of 8ft units exist)	2.44m	W8
40ft	8ft 6in	2.44m - 2.5m	W8
40ft	9ft 6in	2.44m - 2.5m	W10
Most common short sea boxes			
40ft or 45ft	9ft or 9ft 2in	2.5 - 2.55m	W10 - W12
40ft or 45ft	9ft 6in	2.5 - 2.55m	W10 - W12
40ft or 45ft	8ft 6in or 8ft 9in	2.5 - 2.55m	W8 - W9

Figure A7: 2004/05 gauge clearance map (indicative)



A review of gauge capability is being undertaken during this year. The programme which is agreed with ORR, will verify the accuracy of published data for this measure.

Appendix B: Assumptions underlying forecast growth

Table B1: Bottom Up: 10 year demand forecasts to 2014/15: Sub market driver summary

Business	Driver	Assumption	Factor	Comments
ESI Coal	Electricity demand			
ESI Coal	Change in electricity supply			
ESI Coal	Carbon targets			
Domestic deep mined	Progressive closure years 1-5. Daw Mill, Harworth, Thoresby and Kellingley remain and pick up some of the volume shortfall			
Assumptions:	Power station closures by 2014/15: Tilbury, Kingsnorth, Ironbridge			
Industrial Coal	Construction general			Used for manufacture of cement outside London
Industrial Coal	Chemicals			Coal for ICI chemical plants
Industrial Coal	General Industrial Coal			
Metals: interworks feedstock	Company factor			
Metals: UK home market	Domestic consumption			Cambridge Econometrics forecast 2002-2021 average used in SRA market study
Metals: rail	Special market			Network Rail Business Plan renewal rates
Metals: UK export	Trade trend			Consistent with export trend 1995 - 2004
Metals: UK import	Domestic consumption			
Metals: Scrap	Economic trend			Economic trend, reduced scrap metals due to generally lower manufacturing level
Primary Aluminium industry	Market judgement			Consistent with OEF forecast for DTI
Metals: raw materials Ore	Production			
Metals: raw materials limestone	Production			
Metals: raw materials coal	Production			

Aggregates				Office of the Deputy Prime Minister's national average production of aggregates forecast 2001-2015
Aggregates	W. Mids			Exhaustion of locally produced stone leading to longer "railable journey". Strong regional economic activity
Aggregates	Northern			Very strong regional growth and construction activity in Manchester and Leeds continuing
Aggregates	London			Accounts for 30% national activity, out-grows the rest of the country too
Aggregates	Special Market			New EU road noise reduction leading to increasing demand for S. Wales gritstone for surfacing
Aggregates	Special Market			Demand for ballast from LUL
Aggregates	Housing			Various materials such as stone, blocks, sand and cement
Building Materials				Customer intelligence
Special/ Exceptional				
Building Materials	Housing			Various materials such as stone, blocks, sand and cement
Building Materials	Construction general			Mainly commodities used for cement, or finished product
Industrial Minerals	Construction General			Mainly commodities used for cement, or finished product; sand, lime, etc.
Industrial Minerals	Glass			Sand or glass
Industrial Minerals	Chemical market			Limestone used in Cheshire chemicals industry
Industrial Minerals	Lime			
Industrial Minerals	Special market			Clay used for pottery
Industrial Minerals	Special market			Clay used for paper
Waste	Domestic waste			Domestic waste reducing constantly as a result of land use planning and taxation
Waste	Spoil			Following general activity; project based jobs
Petroleum	Aggregates National			Bitumen for road surfacing
Petroleum	Railway Industry			Fuel for trains, including EWS
Petroleum	Aviation			Fuels for planes. White paper passenger numbers 2005-2015 mid scenario
Petroleum	Primary Products			
Petroleum	Crude Oil			Refinery capacity high none will close

To protect the commercial confidentiality of the FOCs, the 'Assumption' and 'Factor' columns are not shown.

Table B2: Freight forecast assumptions: Bottom up and top down assumptions

General Factors:		
Assumption	**Bottom Up**	**Top Down**
GDP forecast	Treasury GDP five year deflator projected forward	GB FM standard assumptions.
Changes in HGV maximum weight	Not Included	Not included
Lorry road user charging	Not Included	Not included
Significant reduction in Channel Tunnel access Charges	Included	Included
No increase in mean train lengths/ other productivity gains	Included	Included
Additional rail-connected warehousing	Excluded	Additional 2.2 million m^2
Railway infrastructure enhancements	2009: W10 Gauge clearance from Haven Ports to ECML/Yorkshire Terminals + W10 Southampton – WCML (Worked as Sensitivity 3)	2009: W10 Gauge clearance from Haven Ports to ECML/ Yorkshire terminals + W10 Southampton – WCML (Worked as Sensitivity 3)

Table B3: Deep sea intermodal: Base Case assumptions

Assumption	**Bottom up**	**Top down**
Overall market growth	5% per annum	3.75% per annum
Rail market share	10 year growth rate to match growth of 'last' 10 years 1996 to 2005. (17% in 1996 to 25% in 2005).	Output of model
Company Neutral Revenue Support (CNRS)/Rail Environmental benefit Procurement Schemes (REPS)	Confidential	Total available budget reduced to £11 million per annum.
Committed enhancement schemes	2009: W10 gauge clearance from Haven Ports to ECML/Yorkshire terminals + W10 Southampton – WCML (worked as Sensitivity 3)	2009: W10 gauge clearance from Haven Ports to ECML/Yorkshire terminals + W10 Southampton – WCML (worked as Sensitivity 3)
Start date of step changes in port capacity:		
Felixstowe South	2009	Before 2014
Bathside Bay	2010	Before 2014
Shell Haven	Not in base	Before 2014 (worked as Sensitivity 2)

Table B4: ESI coal key Base Case assumptions

	Bottom up only
Domestic deep mined	Progressive closure years 1-5. Daw Mill, Thoresby and Kellingley remain and pick up some of volume shortfall
Aire & Trent Valley power station import sourcing.	Remaining shortfall in domestic ESI coal production picked up by east coast ports: Immingham/ Hull/ Redcar/ Tyne/ Blyth. Anglo –Scottish volumes from Ayrshire and Hunterston drop back to broadly 2004/05 levels, east coast ports pick up shortfall
Power station closures by 2014/15	Tilbury, Kingsnorth Ironbridge

Table B5: ESI coal burn estimates

Study/ Scenario	ESI Coal Burn (estimate date)(mt)
DTI: UK energy and CO2 emissions projections: February 2006: Favourable to coal scenario. Total ESI market	42.9 (2015)
DTI: UK energy and CO2 emissions projections: February 2006: Favourable to gas scenario. Total ESI market	37.9 (2015)
DTI: Coal production outlook March 2004: High coal burn scenario. Total ESI market	56 (2012)
DTI: Coal production outlook March 2004: Low coal burn scenario. Total ESI market	30 (2012)
Freight RUS: Bottom up base case: **ESI coal tonnes lifted to rail only**	46 (2014/15)
Freight RUS: Bottom up Sensitivity 1**: ESI coal tonnes lifted to rail only**	48 (2014/15)
Freight RUS: Top Down**: ESI coal tonnes lifted to rail only**	43.1 (2014/15)
Mc Closkeys/ Mott Mac Donald for NR: Total ESI market: High scenario	58 (2012) 50 (2015)
Mc Closkeys/ Mott Mac Donald for NR: Total ESI market: Base case	56 (2012) 38 (2015)
Mc Closkeys/ Mott Mac Donald for NR: Total ESI market: Low scenario	45 (2012) 26 (2015)

Context Note: Rail currently has a market share of the mainland UK ESI coal market of 85-90%.

Table B6: Flue gas desulphurisation equipment at UK power stations

Station	Owner	Capacity: GW	No. of units	Committed FGD: GW	FGD Status	Opt-in	Opt-out
Aberthaw	RWE	1.5	3	1.5	Committed	1.5	
Cockenzie	Scottish Power	1.2	2		No		1.2
Cottam	EDF	**2**	**2**	**2**	Under Construction	**2**	
Didcot A	RWE	**2**	**4**		No		**2**
Drax	Drax	**4**	**6**	**4**	Operating	**4**	
Eggborough	British Energy	**2**	**4**	**1**	Under Construction	**2**	
Ferrybridge	SSE	**1**	**2**	**1**	Committed	**1**	
Ferrybridge	SSE	**1**	**2**		No		**1**
Fiddler's Ferry	SSE	**2**	**4**	**1.5**	Committed	**2**	
Fifoot Point	MBO	**0.4**	**3**	**0.4**	Operating	**0.4**	
Ironbridge	EON	**1**	**2**		No		**1**
Kingsnorth	EON	**2**	**4**		No		**2**
Longannet	Scottish Power	**2.3**	**4**	**2.3**	Committed	**2.3**	
Ratcliffe	EON	**2**	**4**	**2**	Operating	**2**	
Rugeley	International Power	**1**	**2**	**1**	Committed	**1**	
Tilbury	RWE	**0.9**	**3**		No		**0.9**
West Burton	EDF	**2**	**4**	**2**	Operating	**2**	
Total		**28.3**	**55**	**18.7**		**20.2**	**8.1**

Source: Mott MacDonald/McCloskey's for Network Rail.

Table B7: UK coal import facilities

Port	Max Vessel dead weight tonnes (DWT)	Capacity million tonnes 2005/06	Capacity increases underway/ delivered in 2006/07 + possible further developments (million tonnes)
Redcar	165,000	3	+ 2
Immingham HIT	120,000	6	+ 8
Immingham IBT	120,000	1	+ 2
Immingham Dock	30,000	2	
Blyth	25,000	0	+ 1 > 2
Tyne Dock	30,000	0.65	+ 3 DWT to 50,000
Hunterston	200,000	7	
Port Talbot	170,000	2	+6
Leith	100,000	2	
Bristol Portbury	120,000	8	+4
Bristol Avonmouth	38,000	1.2	+0.3
Liverpool	60,000	5	
Hull	30,000	3	+5.5 DWT to 50,000
Newport	30,000	2	
Kingsnorth	25,000	5	
Tilbury	25,000	3.5	

Source: DTI Coal Production Outlook: 2004 – 16. Updated by Network Rail.

Table B8: Winter 2006 ESI coal train demand ex Immingham and ex Ayrshire via Glasgow & South Western (GSW) and Settle & Carlisle (S&C).

Scenario		2004/05 base year ESI coal trains*	2014/15 forecast ESI coal trains	October/ November 2006 av. Actuals*
FRUS base case	Ex: Immingham	16.5	30	24
	Ex Hunterston/ Ayrshire	8 on S&C 12 on GSW	10 on S&C 14 on GSW	7 on S&C 10 on GSW
FRUS sensitivity test 1	Ex: Immingham	16	19.5	24
	Ex Hunterston/ Ayrshire	8 on S&C 12 on GSW	20.5 on S&C 24.5 on GSW	7 on S&C 10 on GSW

* All trains 1 direction, weekday Thursday average throughout time period stated.

Table B9: Further port developments and their demand implications

Port	Key expansion plans/ aspirations	Potential impact on RUS forecast at specific port*
Hull	ESI coal: Up to an additional 5.5 million tonnes of imported coal capacity	100 percent rail growth from coal handling facilities on the dock is already factored into RUS forecasts giving 10 trains per day coal imports. Full take up of further capacity outlined by the port would mean the RUS forecasts would be exceeded
	Deep sea/ short sea intermodal: Container terminal expansion to 500,000 TEU. Has planning approval	RUS forecasts do not include significant intermodal growth from Hull. Full take up of capacity outlined would mean RUS forecast could be exceeded, if rail can prove competitive over the relatively short distances from the port to key markets.
Southampton	Deep Sea intermodal: A potential additional 1 million TEU expansion of capacity	RUS forecasts allow for up to 40 percent growth in train numbers out of the port by 2014/15. If this further capacity is fully taken up by the market then RUS forecasts would be exceeded.
Port Talbot	ESI coal: A possible additional 6 million tonnes capacity for imported coal by 2008	RUS forecasts do not predict coal growth out of Port Talbot. If this new capacity is fully taken up then RUS forecasts will be exceeded.
Teesport	Deep sea/short sea intermodal: HRO application submitted for a new deep sea terminal. Potential future throughput 1.5 million TEU	RUS forecasts do not project major intermodal growth from Teesport. Full take up of capacity outlined would mean RUS forecast would be exceeded.
Port of Liverpool	Deep sea: Additional 600,000 TEU capacity under development	RUS forecasts already project a 25 > 30 percent growth in train numbers on the port branch. This development could drive some further growth.
Port of Bristol	ESI coal: Increase in coal handling capacity at Portbury from 8 to 12 million tonnes in 2007. 0.8 million tonnes further capacity increase at Avonmouth planned.	RUS forecasts already predict a 62 percent growth in import coal trains per day from the port of Bristol over base 2004/05 volumes. Full take up of new capacity could drive further growth

Port of Bristol (continued)	Deep sea/ short sea intermodal: Plans for 1.5 million TEU container facility expansion	The RUS forecasts do not predict intermodal growth from the Port of Bristol. If the market takes up the projected capacity, RUS forecasts will be exceeded.
Hunterston	Deep sea intermodal: Possible development of a 1 million TEU container port by 2015 rising to 2 million TEU by 2020	The RUS forecasts do not predict intermodal growth from Hunterston. If the capacity is developed and the market takes it up the RUS forecasts would be exceeded.

* This column assesses impact on the RUS forecast at the specific port referenced. In most cases for the deep sea intermodal and ESI coal markets, exceeding the RUS forecast at that location would lead to a corresponding decrease in rail traffic from a competing port.

In addition to individual representations from ports, at least one rail freight operator has highlighted that growth in short sea and domestic intermodal traffic could exceed RUS forecasts

Table B10: Terminal developments highlighted during Freight RUS consultation.

Terminal location/ name	Promoter/ Owner
Shipton- upon - Cherwell	Kilbride Properties Ltd
East Midlands Distribution Centre: Castle Donington	Wilson Bowden
Markham Vale	Henry Boot
Stanion Lane Eurohub: Corby	Astral & Bee Bee/ Pro Logis
Mersey Multimodal Gateway: Ditton*	Innovis
Cabot Park: Bristol	Burford
Keypoint: Swindon	Legal & General
ModalSwitch/ CIRFT: Wentloog*	Helioslough
Birch Coppice*	IM Properties
Hortonwood: Telford	Telford & Wrekin BC
Nimbus Park: Thorne	Helioslough
SIRFT: Sheffield	Helioslough
Alconbury	ADL (Prologis/BAA)
Radlett	Helioslough
Barking	TfL
Cricklewood	Hammerson
Howbury Park	ProLogis
Parkside	Astral
Port Salford	Peel Holdings
Trafford interchange	Burford
Hollingbourne	DMI/Axa
Kemsley Fields	Gazeley
Steventon	Thames Water
Skypark: Exeter	The Church Commissioners
Chapel Railhead	Chapel Railhead

* Already active terminal site.

Table B11: RFG/FTA top down forecast tonne kms by commodity

Commodity	2005	2014	2030
Maritime containers	4,782,417,157	6,797,380,616	11,342,296,377
Coal	7,752,763,501	5,603,326,589	4,114,529,023
Metals	2,036,776,728	2,067,583,105	1,895,782,183
Ore	256,472,866	242,029,267	212,596,119
Other Minerals	3,477,647,746	4,465,603,881	4,260,492,779
Auto	109,359,241	174,674,394	186,015,979
Petroleum & Chemicals	1,387,592,013	1,456,128,005	1,456,297,007
Waste	225,298,610	229,407,641	203,311,673
Domestic Intermodal/wagonload	250,951,132	2,124,460,647	2,347,431,850
Own Haul (Network Rail)	1,482,258,257	1,462,587,159	1,422,344,708
Channel Tunnel	542,859,541	2,095,039,729	3,090,966,261
Grand Total:	**22,304,396,792**	**26,718,221,034**	**30,532,063,959**

Source: MDS Transmodal

Figure B1: Key import coal routes and coal loading points

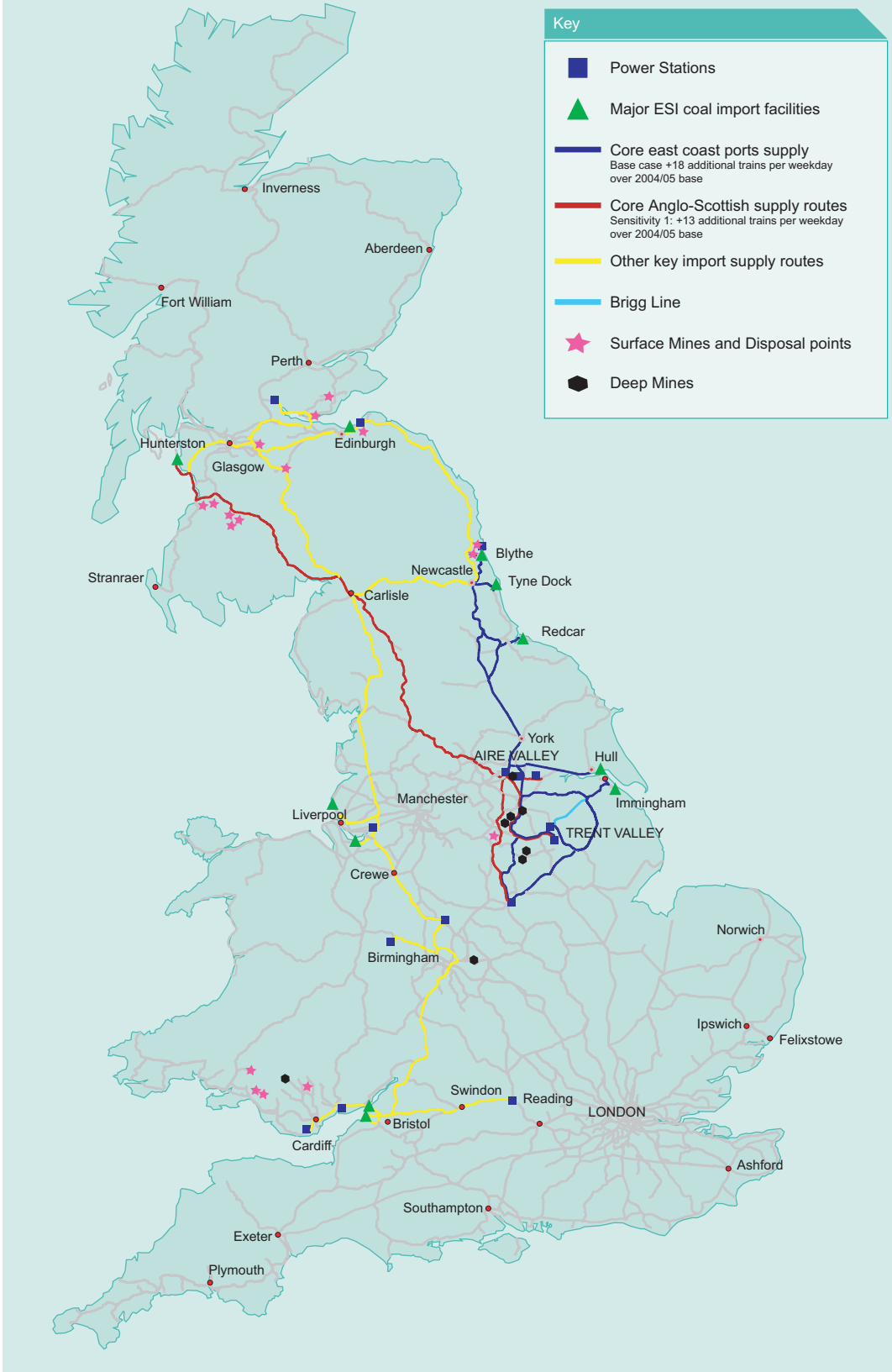
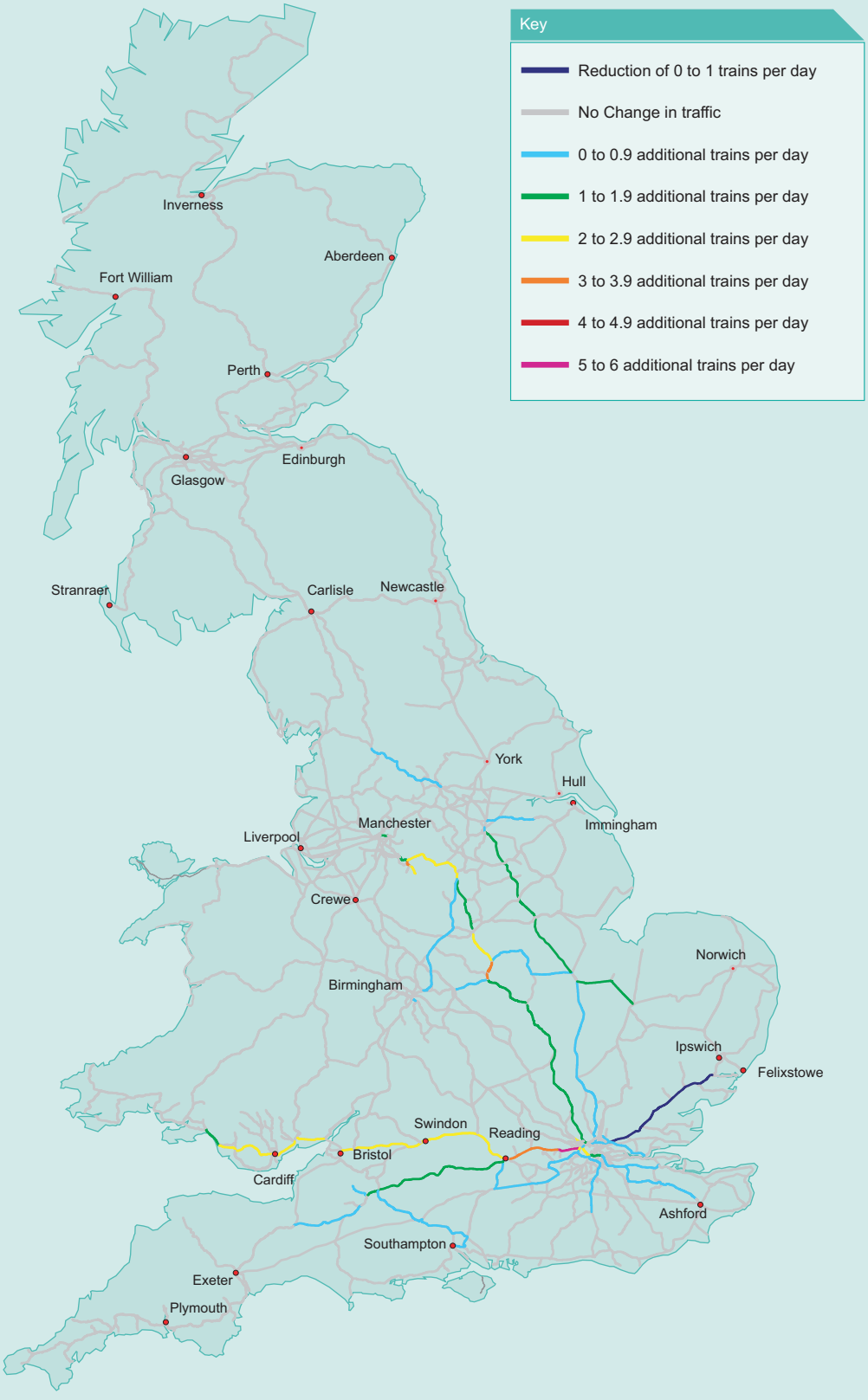


Figure B2: Additional trains by 2014/15: Construction



Hope Valley growth occured in first year of forecast 2005/06. Operators now believe 10 year forecasts will be exceeded.

Figure B3: Addional trains by 2014/15: Metals

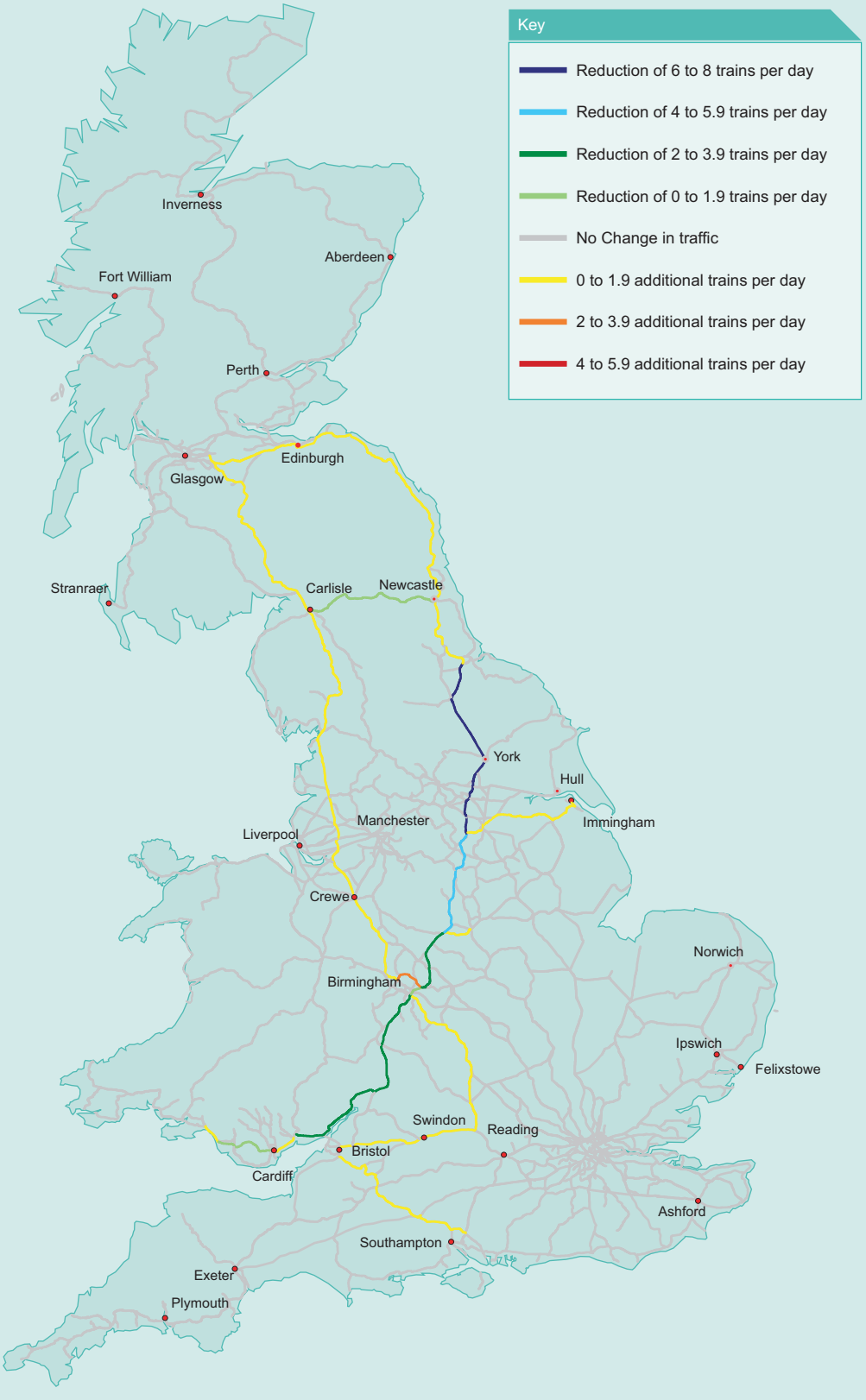
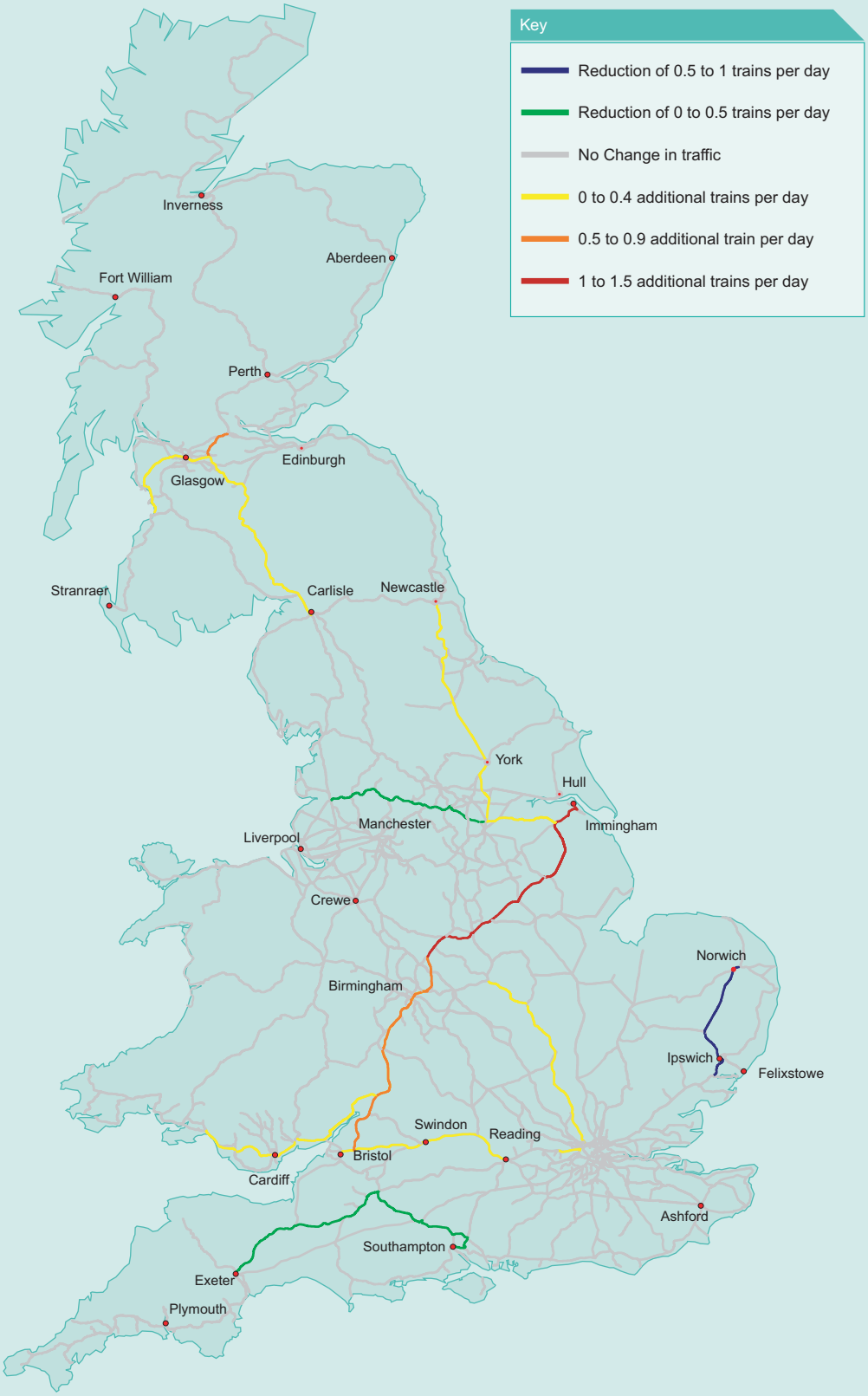


Figure B4: Additional trains by 2014/15: Petroleum



Appendix C: Key capacity and capability gaps

Table C1: Key capacity gaps against 2014/15 base forecasts

Freight RUS Capacity gap No.	Route / Route Section	Key growth driver	Forecast wkday av. actual un-constrained 2014/15	Av. Actual 2004/05 daily average Thurs (max actual)	Planned WTT paths 2004/05	CUI index (highest direction & highest point on section)			Applicable study
						Morn	Off	Even.	
Anglo-Scottish route (Sensitivity 1)									
I	GSW: Falkland yard – Annbank Junction Mauchline Junction – Gretna Junction	1	28	14	(19) Recorded Dumfries	75	61	59	Scotland RUS
1	Gretna Junction – Carlisle station – Petteril Bridge Junction	1	57	37(46)	60	31	41	36	Freight RUS
2	Settle and Carlisle: Petteril Bridge Junction – Settle Junction	1	24	11(17)	14	26	62	40	Freight RUS
3	Settle Junction – Skipton – Whitehall Junction	1	28	15(23)	19	60	76	60	Freight RUS
West Coast Main Line (Base Case)									
4	Carlisle –Lancaster (data sample Carnforth – Upperby Bridge Junction)	2,6 + General	41	27(32)	44	48	52	59	Freight RUS
5	Weaver Junction – Winsford South Junction	2,3,6	69-74	52(67)	73	61	60	66	Freight RUS
K	Manchester Piccadilly - Deansgate	2,3,6	29	17(22)	33	41	48	45	North West RUS
6	Stafford Station	2,3,6	83	52(67)	89	35	34	40	Freight RUS
7	Rugby – Wembley Central	2,6	65	32(40)	74	79	63	84	Freight RUS
Southampton to West Midlands (Sensitivity 3)									
8	Sutton Park Line	3	N/A	N/A	N/A	N/A	N/A	N/A	Freight RUS
8	Leamington-Coventry-Nuneaton (recording point-Coventry Station)	3	17	15(30)	18	76	84	85	Freight RUS
9	Millbrook – Southampton Central – Eastleigh	3	30-32	22(30)	39	61	69	73	Freight RUS
	Eastleigh – Winchester – Worting Junction	3	33-35	27(34)	35	48	56	54	Freight RUS
	Worting Junction – Basingstoke – Bas. G.W.R. Junction	3	29-32	23(26)	30	28	30	28	Freight RUS
	Reading West Junction	3	46-48	36(46)	58	42	44	42	Freight RUS/ Reading area renewals scheme
	Didcot East Junction Leamington	3	30-32	22(30)	39	61	69	73	Freight RUS

North East Ports – Aire/Trent Valley (Base Case)									
B	Joan Croft Junction – Hambleton Junction	4	43	31(44)	65	34	30	42	ECML RUS
10	Wrawby Junction – Scunthorpe	4	59	46(62)	64	34	30	34	Freight RUS & Yorks & Humber RUS
11	Hull Hedon Road – Hessle Road Junction	4	17	15 (30)	18	76	84	85	Freight RUS & Yorks & Humber RUS
12	Tyne Yd – Tursdale Junction	4	N/A	N/A	N/A	N/A	N/A	N/A	Freight RUS & ECML RUS
Haven Ports to London (Base Case)									
E F	GE: Ipswich yard – Halifax Junction	2,6	40-37	20(31)	27	25	30	39	Anglia RUS
	GE: Halifax Junction – Shenfield	2,6	37-31	17(25)	24	73	53	77	Anglia RUS
	GE: Shenfield - Forest Gate	2,6	37-31	17(25)	24	47	32	46	Anglia RUS
	GE: Forest Gate – Stratford	2,6	55-51	28(37)	48	65	38	60	Anglia RUS
D	Stratford – Channelsea Nth Junction	2,6	55-50	27(36)	48	66	53	62	Cross London RUS
D	Channelsea North – Camden Road Junction	2,6	62-50	38(52)	61	66	53	62	Cross London RUS
Haven Ports to the North East (Base Case)									
G H	Haughley– Kennett – Ely West Junction	5	21	31(25)	14	50	43	45	Anglia RUS
	Ely West Junction – Peterborough	5	31	23(41)	28	32	34	34	Anglia RUS
C	ECML: Peterborough Crescent Junction – Doncaster Loversall Carr Junction	5	34	14(18)	27 Nb 16 Sb	53	46	51	ECML RUS
A	ECML: Hare Park Junction – South Kirkby Junction	1,5	36	23(28)	32	61	49	49	ECML RUS
Hope Valley (Base Case)									
L	Chinley East Junction – Dore West Junction	General Construction traffic	N/A	N/A	N/A	N/A	N/A	N/A	Yorkshire and Humber RUS
Scottish Coal (Base Case)									
J	Larbert -Stirling	Re-routeing of existing Longannet flows	18	6(10)	14	47	49	54	Scotland RUS

(All numbers trains in busiest direction)

Assumptions:

- Key constraints identified against present passenger service base. Where information is available eg. emerging 2008 WCML specification, this has been considered.

Notes:

- Forecasts consist of bottom up forecast for 2014-15 overlay. Where top down figures differ significantly a range is presented.
- The bottom up forecasts do not at present include any additional light engine movements
- "Planned" represents a sample of Thursday booked WTT paths (highest direction is quoted). Winter 2004/05 timetable base.
- CUI data: As at winter 2004/05. morn. peak: 06:30 – 09:30, off peak: 09:30 – 16:30, evening peak: 16:30 – 19:30.

Key growth drivers: Reference numbers.

1: Coal: Sensitivity 1 : Hunterston/Ayrshire – Aire/Trent Valley

2: Deep sea intermodal: Base Case: Haven Ports – the Midlands/the North West/ Scotland

3: Deep sea intermodal: Sensitivity 3: Southampton – WCML (W10 cleared)

4: Coal: Base Case: east coast ports (Immingham/Hull/Redcar/Tyne/Blyth) – Aire/Trent Valley

5: Deep sea intermodal: Base Case: Haven Ports – Yorkshire/the North East

6: Deep sea intermodal: Sensitivity 2: Shell Haven – the Midlands/the North West/ Scotland & Haven Ports – the Midlands/ theNorth West/ Scotland

Table C2: Indicative costs: Structures and Track

Chapter 5, section 5.2.1 highlights the key route sections where, after initial assessment, Network Rail believes there is most likely to be a near term requirement for significant volumes of track or structure renewals in the event of further additional tonnage. An assessment has not been made of the longer term impact on renewals requirements of the forecasts across the network.

Table C2 below sets out the routes most likely to be significantly effected under the Base Case and sensitivity test scenarios and is limited to route sections where more than an additional one million gross tonnes per annum are expected to operate. The table highlights indicative costs that may be driven by the projected additional tonnage and also provides a brief summary of the nature of work required. Estimates refer to additional renewals that would be expected to be required during the period of the RUS and do not include those already underway or committed to meet present tonnages.

Table C2:

Route section	Indicative costs of upgrading route section to meet 2014/15 forecast tonnage		
	Structures	**Track**	**Further comments**
Glasgow & South Western (GSW) Mauchline jn – Gretna Junc: Up and Down direction	£9.6m Arch bridge reconstructions and strengthening	£7 – 10m Re-ballasting sites with accelerated ballast degradation	Further work is being progressed to quantify costs.
Settle and Carlisle: Petteril Bridge jn – Settle jn – Whitehall Jn: Up and Down direction	£20.6m Arch bridge reconstructions and strengthening	£25 - £40m Renewal of remaining jointed track, renewal of scarified steel sleeper CWR, re-ballasting sites with accelerated ballast degradation. Renewal of 20 units of switches and crossings.	Further work is being progressed to quantify costs.
Crewe avoiding lines: Up and Down direction	-	Track and sleeper renewals handled by speed restrictions at present – renewal estimate pending. £5 – 8m Renewal of all jointed plain line and switches and crossings	Further work is required to quantify cost. Track renewals would be co-ordinated with re-signalling proposals for economic delivery
Tottenham and Hampstead (Barking – Gospel Oak via Tottenham South): Up and Down direction	£12m Strengthening or reconstruction of a large number of bridges. Earthwork strengthening at Harringay Green Lanes	£2 –3m Renewal of jointed track and upgrade at longitudinal timber bridges.	Further work is being progressed to quantify costs. Longitudinal timber bridge work would be co-ordinated with structure renewals plans.
Larbert – Stirling Up and Down direction	-	No expenditure addition to existing plans.	

The main costs highlighted are on the Glasgow and South Western (GSW) and Settle & Carlisle (S&C) lines. These come about as a result of Sensitivity 1 where significant further additional tonnage is projected between Hunterston/ Ayrshire Opencast and the Aire and Trent valley power stations over and above the 2004/05 base year.

In the Base Case where further growth in import coal volumes is focused through the east coast ports the additional costs may well not apply on the GSW and S&C. As discussed in Chapter 4, at present the Base Case demand profile is occurring.

Appendix D

Table D1: Potential further capacity increments on Felixstowe to Nuneaton cross country route

Location	Scope of work
East Suffolk Junction	Doubling of single lead junction
Haughley junction	Doubling of single lead junction
Ely	Two loops in sequence 650 or 775m capability
Ely West curve	Commission signalling to allow bi-directional working
March	Bi-directional loop 650 or 775m capability
Peterborough	New down loop north of station 650 or 775m long, possible additional crossover and bi-directional capability
Syston Junction – Wigston Junction	Doubling of single lead junction at Syston
	Four tracks Syston to Wigston (including additional line through Leicester station)
	New Up slow line Wigston North Junction – Kilby Bridge
	All above combined with re-signalling of Leicester control area circa 2012 - 2015

Glossary

CNRS	Company Neutral Revenue Support
CTRL	Channel Tunnel Rail Link
DfT	Department for Transport
Down	Generally direction away from London
ECML	East Coast Main Line
ESI	Coal Electricity Supply Industry Coal
F2N	Felixstowe to Nuneaton
FGD	Flue gas desulphurisation
FOC	Freight Operating Company
GEML	Great Eastern Main Line
GBFM	Great Britain Freight Model
HIT	Humber International Terminal
HLOS	High Level Output Statement
HTA	High capacity coal wagons
IBS	Intermediate Block Signal
NLL	North London Line
NRDF	Network Rail Discretionary Fund
Up	Generally direction towards London
RA	Route Availability – a system to determine which types of locomotive and rolling stock may travel over a route, normally governed by the strength of underline bridges in relation to axle-loads and speed
REPS	Rail Environmental Benefit Procurement Schemes
RUS	Route Utilisation Strategy
SHML	South Humberside Main Line
SOFA	Statement of Funds Available
SRA	Strategic Rail Authority
T & H	Tottenham & Hampstead Line
TEU	Twenty foot Equivalent Unit – standard measure of intermodal containers
TfL	Transport for London
TPD	Trains per day
WCML	West Coast Main Line
WTT	Working Timetable