

**Network Rail**

**Strategic Business Plan update  
Supporting document**

**Strategic Freight Network**

**April 2008**

# Strategic Freight Network

## 1. Background

The DfT's July 2007 White Paper 'Delivering a sustainable railway' proposed the development of a Strategic Freight Network (SFN) in England and Wales as part of its high level strategy to address the growing demands on the network for moving passengers and freight. The Statement of Funds Available (SOFA) to the rail industry for CP4 allocated a maximum of £200m towards the development of the SFN to be spent in the last four years of the control period. Network Rail will be funded for the work which will be added to the RAB.

This paper outlines the objectives of the SFN. It discusses how these objectives can be translated into the identification of a network of core and diversionary routes. The necessary enhancement and enabling schemes which Network Rail and its customers view as key to development of the network are identified. The paper recommends schemes to be taken forward for implementation in CP4 and describes their outputs, costs and deliverability.

## 2. The process adopted

Network Rail has coordinated the development of the SFN on behalf of the industry and the DfT. It has taken the concept proposed by the DfT and translated it into a vision for a future SFN and proposed the first steps to be implemented in CP4. The development has been overseen by a Strategic Freight Network Group based on the Freight RUS Stakeholder Management Group consisting of DfT, The Welsh Assembly Government, EWS, Freightliner, GB Railfreight, DRS, The Rail Freight Group, The Freight Transport Association and ATOC. The ORR has attended as observers. Transport Scotland also opted to attend the meetings.

The approach taken, and described below, involved a discussion of the nature and pattern of flows, bilateral discussions with all parties to understand their aspirations and discussions about proposed core and diversionary routes.

The recent detailed work during the development of the Freight RUS which outlined the expected development of rail freight markets and the need for enhancements to meet the growth has put the group in a good position to take the work a step further to create a vision for a Strategic Freight Network.

## 3. The Strategic Freight Network concept envisaged in the White Paper

The DfT proposed the SFN in its 2007 White Paper. The intention was to provide a framework for investment and network management to better meet freight requirements. Measures within this framework would help facilitate growth and contribute to the resolution of conflicts between freight and passenger services where such conflicts erode network capacity and / or network reliability. The intention is to improve the logistical efficiency of the railway and secure network capacity and reliability gains to benefit all users.

The White Paper envisaged that the SFN would:

“Complement, and be integrated with, the existing rail network. It would provide an enhanced core trunk network capable of accommodating more and longer freight trains, with a selective ability to handle wagons with higher axle loads and greater loading gauge”

Whilst this paper concentrates on the investment measures required to meet this objective, it is important to note that the White Paper emphasises that the investment should be complemented by improved network management. The Government wishes to see more rigorous application of the ‘use it or lose it’ principle to space held in the timetable by freight operators. This would help minimise the number of unused train paths which take up network capacity that other operators could use for freight or passenger services.

The DfT paper of 23<sup>rd</sup> November 2007 to the Strategic Freight Network group suggested that it may be possible to sufficiently differentiate traffic to achieve maintenance and renewals savings from running lighter passenger trains. If this were to be the case, it argued, network savings could be used to justify additional investment in freight enhancements.

The White Paper also emphasised the benefits of linking the development of the SFN to the development of a ‘seven day railway’ with an optimised and co-ordinated pattern of possessions / blockades with “definitive” diversionary routes. The intention is that this would maximise the network availability for freight and minimise the costs of reactive routes.

DfT has proposed that an ideal freight network would accommodate: optimum size freight train running at appropriate line speed, without checks, over optimum routeing to preferred timings. It accepted that the SFN will need to evolve over time to reflect emerging issues in the freight market. Consequently it emphasised the importance of safeguarding for future requirements wherever there is a business case.

The 23<sup>rd</sup> November paper confirmed that 'within the wider strategic requirement to optimise overall railway capacity, reliability and availability for all users, the way in which the SFN is developed and implemented is very much for the industry to define'.

This paper takes this approach and develops the ideas within it to propose a vision for the SFN.

#### **4. Defining characteristics of the SFN**

The Strategic Freight Network can be viewed as a network of core trunk routes with sufficient capacity and appropriate gauge to carry the expected major flows of freight. An optimised pattern of freight trunk routeing would minimise conflicts between freight and passenger traffic benefiting both forms of traffic.

Subject to acceptable business cases, the core trunk route network would ultimately be expected to:

- have sufficient capacity for growth ; possibly fewer high capacity lines

- have limited conflicts between passenger and freight traffic (e.g. by utilising avoiding lines, grade separation)
- minimise freight movements via London where an alternative route is available (unless the ultimate origin or destination of the freight is in London)
- provide for longer trains
- provide for appropriate axle loads
- have appropriate gauge for the traffic that needs to use it
- include defined diversionary routes for each core route with the objective of ensuring availability whenever operators wish to use the network.

In planning a 'future proof' network, it will be important that the network is reviewed periodically to establish what will be 'appropriate' and 'sufficient' in the long term. All investment decisions (including those for CP4 discussed below) should be made against a common understanding of the long term vision.

## **5. Identification of core and diversionary routes**

### **5.1 Process**

The Freight RUS, and the subsequent White Paper, published forecasts of 30% growth in tonnage carried between 2005 and 2014/5. The forecasts were developed using two separate methodologies. One was largely model based and was carried out in conjunction with some of the freight industry's customers. The second was based on Freight Operating Companies' detailed understanding of their markets. It is reasonable to expect growth to continue beyond this date as the economy continues to expand.

The changing nature of the freight market in Britain – which inevitably reflects structural changes in the import / export market, the growth in the economy and the differential growth of urban areas – means that it is difficult to be absolutely certain about the nature and size of freight markets in twenty to thirty years time. Uncertainty about the future extent of road pricing, permissible lorry weight and fuel prices also make it difficult to predict rail's mode share. Nonetheless, it is reasonable to assume that there will be a need to carry the increasing level of imported goods by rail between expanded ports and conurbations. It is also reasonable to assume that rail will continue to play a role in the carriage of other goods notably construction materials, metals and petrochemicals. The future of coal carriage is clearly related to Government energy policy.

Maps 1 to 3 show the major flows that are most likely to occur if you link the largest points of imported goods / extraction and the largest markets (which are assumed to coincide with the largest distribution centres). Whilst the twenty to thirty year time horizon does not allow accurate forecasting, the maps nonetheless can help form a vision of the patterns of movement which we can expect and can form a reasonable starting point for the designation of core trunk and diversionary routes.

### **5.2 The intermodal network**

Map 1 shows the main flows of intermodal traffic which are anticipated in 2030. Major flows are expected between the ports of Felixstowe, Southampton and the Thames Ports to the major conurbations outside London. This reflects a growth in the current pattern of movements and assumes that ports in the south and east will maintain their

dominance<sup>1</sup>. Whilst these are currently expected to be the dominant flows, it is very important that growth at other ports should be monitored and potentially included in updates of the SFN if and when their facilities are developed to a comparable size.

An examination of existing flows and alternatives for diversionary routes suggests the following core trunk routes and diversionary routes for intermodal traffic. The core routes chosen reflect existing routeings as endorsed by the operators during the Freight RUS process. Wherever possible routes have been chosen that avoid the lines which are most heavily used by mixed use traffic as shown in Map 4). Diversionary routes are chosen wherever routes can be identified. They are as direct as possible.

**Core trunk route**

**Diversionary route**

**Haven Ports – Midlands / NW / Scotland (Map 5)**

Peterborough – Leicester – Nuneaton  
Peterborough – Syston – Stoke

Great Eastern ML / West Coast ML  
Great Eastern ML / West Coast ML

**London – West Yorkshire / North East (Map 6)**

Midland Main Line  
East Coast Main Line

East Coast Main Line  
Midland Main Line – Water Orton

**Haven Ports – West Yorkshire / North East (Map 7)**

Peterborough – Midland Main Line  
Peterborough – 'Joint Line'

East Coast Main Line  
East Coast Main Line

**Southampton – Yorkshire / North East (Map 8)**

West Midlands via Water Orton  
via new east - west route (via Bletchley) /  
MML

Laverstock / SWML / ECML  
Laverstock / SWML / ECML

**Southampton – Midlands / North West / Scotland (Map 9)**

West Midlands via Nuneaton  
West Midlands via Bescot  
Bletchley / WCML

Laverstock / SWML / ECML  
Laverstock / SWML / ECML  
Laverstock / SWML / WCML

Nb: Two diversionary routes have been identified for flows to and from Southampton. The first would be via Laverstock and Andover as discussed in the Freight RUS. The second would be via Laverstock and Melksham. The latter route has the disadvantage of additional length and operating costs but, if the programme allows, may be able to act as a diversionary route during the forthcoming Reading works.

The routes have been discussed with the SFN Group and were well received.

*Footnote 1: The Appendix includes maps of recent movements of commodities for reference*

### **5.3 The ESI coal network**

Map 2 showed the anticipated pattern of electricity supply industry (ESI) coal movements. It is assumed that whilst coal remains the predominant fuel for power stations, the pattern of movement will reflect existing flows i.e. with the largest flows between the north east ports and the Aire and Trent Valleys but with important additional flows from Hunterston and, to a lesser degree from Avonmouth.

An examination of existing flows as identified in the Freight RUS and the alternatives for diversionary routes suggests that the following core trunk routes and diversionary for coal traffic:

#### **Core trunk route**

Humber ports to Aire & Trent Valleys

Hunterston/Ayrshire to Aire & Trent Valley

Port Talbot / Avonmouth to Didcot

#### **Diversions route**

Alternative routes are available  
Via Brigg, Scunthorpe and Market  
Rasen

Glasgow and South Western;  
East Coast Main Line / Newcastle  
to Carlisle

Berks and Hants / Great Western

The above are shown on Map 10.

### **5.4 Freight using conventional gauge**

Map 3 showed the more complex pattern of movements of other commodities. This includes the important flows for the construction industry, metals, petrochemicals, Channel Tunnel traffic and the expanding distribution of food and consumer goods within the UK.

The current patterns of flows of these commodities were published in the Freight RUS. Maps 11, 12, 13 and 14 propose networks of core trunk and diversionary routes to carry petroleum, metal, construction materials and other commodities.

### **5.5 European gauge**

Freight does not currently run on European gauge on the UK network; primarily because the infrastructure and terminal facilities are not sufficient to enable it do so. High Speed 1 (CTRL) is the only section of the UK rail network which currently has European gauge. In theory European gauge freight traffic could operate on the line. To do so, there would need to be either a freight terminal at the London end (e.g. Barking). However, longer term freight optimisation would require through running onto a more extensive European gauge network to enable the trains to run beyond London.

Clearance to European gauge would involve a considerable amount of work, particularly to structures on existing routes. The business case, however, is improved if the clearance work were to be combined with other planned clearance work, such as preparation for line electrification. The development of electrification strategy within the Network RUS may give opportunities to develop this further with relation to any potential electrification of, for example, the Midland Main Line.

Gauge could also be a consideration in the construction of new alignments. It is unlikely that a major new north south alignment could be justified on freight alone. Consideration of new alignments for passenger services, however, may give the opportunity for additional freight capacity at night.

## **5.6 The geographical extent of SFN**

Map 15 shows the core and diversionary routes above on one map. Those lines that would potentially be subject to gauge enhancement and those that would require re-opening are marked separately. To reiterate the discussion above, the network should be viewed as a future objective which would need considerably more investment than will be made available in CP4 to be realised. It can, however, act as an objective against which future investment decisions could be tested as markets develop.

The resulting network is consistent with the recommended long term investment options, aspirational W12 network and the diversionary routes discussed in the Freight RUS with four notable exceptions i.e. the addition of:

- Gauge clearance of the 'Great Northern & Great Eastern Joint Line' (Peterborough to Doncaster via Lincoln);
- The gauge clearance of the Midland Main Line;
- The re-opening of the Oxford-Bletchley line ; and
- Investment in 'Channel Tunnel 3' Line i.e. via Redhill to Reading and beyond

The specific SFN goals of greater network availability and reduction of conflicts on the network have led to a greater emphasis on the use of the Joint Line, an acceleration of consideration of providing additional capacity on the routes from Felixstowe, acceleration of provision of diversionary routes for higher gauge traffic from Southampton than had previously been proposed by the Freight RUS.

It has also led to a greater emphasis on exploring the potential of utilising the Midland Main Line for freight. It is clear, however, that there would need to be considerable investment for it to be made fit for purpose for the SFN.

A new north - south route between Southampton and the north could be provided if there were to be gauge clearance of the Midland Main Line to at least W12 north of Bedford and re-opening of the former freight line from Oxford to Bletchley (again to W12 gauge). This could provide an alternative route to by-pass Birmingham. Oxford-Bletchley would also provide an alternative route around London to the West Coast Main Line. The business case for the re-opening would need to be considered in a broader planning context as it would be unlikely to have a positive

business case unless considered simultaneously with an east-west passenger scheme. The business case for gauge clearance on the MML would most sensibly be prepared in conjunction with any emerging proposals for electrification.

There is little capacity for freight on the MML south of Bedford at present. It is therefore difficult at present to see how freight flows from London or the Channel Tunnel could be routed this way without intervention. Capacity and gauge issues would need to be examined. The East Midlands RUS provides an opportunity to take this further.

Investment in the freight route for Channel Tunnel traffic to operate via Redhill and Reading would provide a London bi-pass for freight traffic from the Channel Tunnel to the Midlands and the North West.

The SFN network is extensive. The intention is that it will provide sufficient flexibility to enable increased availability of the network for freight against the background of growth in both the passenger and freight markets. With appropriate investment to increase capacity and gauge, it should be able to accommodate growth from the main ports and enable routing of more of the freight traffic away from London and reduce passenger conflicts of the ECML, WCML (particularly around Birmingham) and SWML.

## **6. The first steps : identification of schemes for delivery in CP4**

### **6.1 The long list**

Following a discussion of the future nature of freight flows and an initial proposal for core trunk and diversionary routes, Network Rail held bi-lateral meetings with each of the organisations in the SFN Steering Group to discuss their specific aspirations. The resulting list is shown in Appendix A.

All schemes on the list are consistent with the Strategic Freight Network as defined in Section 5 above (and shown in Map 15). It became apparent at an early stage that meeting the aspirations would cost considerably more than the £200 million which has been allocated to the SFN for CP4. It was therefore necessary to develop criteria to reflect the costs and benefits and the contribution of each scheme to the SFN objectives, consider any synergies of delivering the schemes in CP4, their deliverability within CP4 and whether any other funding streams may be available to facilitate their delivery.

The costs of the schemes reflect the schemes' current levels of development. None of the schemes are developed beyond GRIP levels 3. Network Rail has taken a view on deliverability of each of the schemes within CP4.

Appendix B describes a scoring system which has been developed to provide a high level comparison between the schemes. Where the route is to be used as a diversionary route, the analysis reflects Network Rail's 7 Day Railway team initiative. Schemes are also scored on their ability to reduce conflicts between different traffic types.

Appendix C takes the long list and shows dependencies between projects which have a bearing on the optimum time for their implementation. Examination of the list in this way throws up some major opportunities. For example, the Felixstowe – Nuneaton capacity works would fit well with Leicester re-signalling in 2014; a Southampton to West Midlands diversionary route would be useful in advance of the Reading works scheduled for CP4. Other schemes may fit more comfortably with schemes after CP4 (e.g. gauge clearance Reading Willesden in conjunction with Crossrail).

## **6.2 Development of the SFN in CP4**

The choice of proposed schemes to be taken forward using the £200m allocated for CP4 has been made in the light of the analysis of the costs, benefits, contribution to a more available railway, reduction in network conflicts, deliverability and fit with other strategic schemes. The schemes provide a balance of investment between the various freight commodities carried. Map 16 shows the schemes recommended. Approximately half of the fund is allocated to the principal intermodal flows from Felixstowe and Southampton. Continuing growth for these flows is forecast in the Freight RUS, and these schemes, which build upon the already committed gauge clearance schemes, will facilitate the retention and growth of rail's share of the market for haulage of 9' 6" containers. A provision is also made for in-fill gauge schemes. It is proposed that a fund is provided for the development of schemes to enable longer trains on key SFN routes and that provision is made to further develop a south of London route for Channel Tunnel traffic to destinations north and west of London.

In the latter three cases, which include a provision for schemes to be developed, a governance procedure will be put into place to ensure efficient and timely expenditure of the fund. Each proposal will be supported by a paper outlining how the scheme contributes to the objectives of the SFN and its geographical coverage as defined in Section 5.6 and Map 15. Recommendations will be reported to an industry stakeholder group. The selection of schemes should be completed before the end of Year 1 of CP4. It is envisaged that funds will be transferable within the SFN if insufficient schemes within a subfund fulfil SFN objectives.

### **Ipswich to Nuneaton capacity enhancement.**

This scheme increases the capacity of the cross country route between Ipswich and Nuneaton, with enhancements at a number of locations between Ipswich and Nuneaton, notably Ipswich (East Suffolk Junction), Ely, Peterborough, Leicester and Nuneaton.

It addresses the growth in intermodal trains from Felixstowe forecast in the Freight RUS. It builds on the TIF and third party funded schemes for gauge clearance and incremental capacity enhancements between Ipswich and Nuneaton, and provides an estimated additional 16 daily paths for intermodal trains on the cross country route. This allows for traffic growth (which could not be fully accommodated on the current route via the GEML, NLL and WCML) and also allows some trains to be diverted away from their current route via the GEML, NLL and WCML, providing a shorter and less congested route for these trains. Phase 1 of the project will be delivered in CP4, providing additional paths between Ipswich and Leicester.

### **Diversions route from Southampton via Laverstock / Andover.**

This scheme provides W12 gauge clearance between Southampton and Worting Junction via Laverstock and Andover<sup>2</sup>.

*Footnote 2: In accordance with Freight RUS policy, clearance to W12 should be the starting point for business cases whenever a structure is being rebuilt. W12 clearance would accommodate both w10 and w12 traffic*

It follows on from the TIF funded scheme to gauge clear the route from Southampton to the West Midlands and the WCML. It is the first step in a strategy to provide both additional capacity and diversionary capability for W10 traffic on the route from Southampton to the West Midlands and the WCML. It provides a gauge cleared diversionary route between Southampton and Worting Junction, and also allows a practical alternative route between those points for some trains, catering for future forecast growth.

### **Channel Tunnel route to the south of London**

It is proposed that this scheme is progressed as the first step towards the development of the 'CT3' route enabling Channel Tunnel traffic to go via Redhill and Reading and beyond. The scheme will offer an alternative route from the Channel Tunnel to the Midlands and the North West.

### **Train lengthening**

Train lengthening potentially enables haulage of more freight per train without changing the weight per axle. Thus it can permit some growth without increasing capacity utilisation. Nonetheless, in some cases it can only be facilitated by infrastructure spend on sidings and / or loops. Other than the Basingstoke loop (which is discussed in the NRDF section below), no specific schemes train lengthening schemes have been identified at present. Nonetheless, the DfT and operators have suggested that the capacity utilisation benefits of lengthening are potentially sufficiently significant to justify the allocation of a specific ring-fenced fund which could be called upon to facilitate train lengthening in CP4.

### **In-fill gauge schemes**

Progression towards the SFN vision of extensive W12 gauge clearance as described in Section 5.6 will require progressive extension of gauge schemes over the next two control periods. To this end the DfT and industry suggest that a specific ring-fenced fund is allocated for those schemes which further this objective and have favourable business cases. Early examples may include, for example Water Orton to Doncaster.

### **Studies**

The DfT have proposed that a small proportion of the SFN is reserved for studies to further develop the Strategic Freight Network vision.

### **6.3 Costs of CP4 schemes**

The costs outlined in this section are generally estimated at GRIP stage 1 or 2 and include an element for contingency in accordance with their GRIP stage.

### **Ipswich to Nuneaton capacity enhancement.**

The principal outputs of the scheme are 16 additional paths, greater network availability, improvement in passenger/freight interactions (particularly where re-routing away from London) and shorter routing for freight trains. The estimated cost in CP4 is £50m. The bulk of the spend on this scheme would take place in CP5, in order to exploit synergies with the Leicester resignalling scheme. The following sub-projects will be delivered in CP4 : Doubling of East Suffolk Junction, an enhanced run-around at Barham, extension of loops at Ely and provision of loops for recessing at Peterborough. This is anticipated to deliver an additional 16 paths in each direction between Ipswich and both the East Coast Main Line and Midland Main Line. The majority of the benefits of the scheme would not be delivered until completion of both Phase 1 and Phase 2 in CP5 when enhancements are completed along the whole route. Upon completion of the Joint Line project in CP4, Phase 1 of the scheme would accommodate growth in intermodal traffic from the Haven ports to the north east. In addition the works at Hinkley will give performance benefits to the additional traffic generated by the TIF funded gauge enhancement and capacity scheme on the route.

### **Southampton diversionary route**

The Laverstock / Andover diversionary gauge scheme will improve network availability when there is disruption to the SWML south of Basingstoke and will provide additional capacity in the future should the SWML reach capacity. The estimated cost in CP4 is £55m.

### **Channel Tunnel route to the south of London**

It is proposed that a study is carried out to establish the scope of works needed to provide a round London route from the Channel Tunnel through Tonbridge and Redhill to Reading. A provision of £10m is proposed for the implementation of associated signalling works in CP4.

### **Train lengthening**

It is proposed that a provision of £40m is allocated to a ring-fenced train lengthening fund as described in 6.2 above. Studies will be commissioned to establish the work that would be required to run longer trains on key routes. The routes will be selected early in the process. Candidate routes could include for example specified coal routes, the Hope Valley to the Midland Main Line and / or South Wales / Avonmouth to the West Midlands and the north.

### **In-fill gauge schemes**

It is proposed that a provision of further £40m is allocated to a ring-fenced gauge enhancement schemes as described above. The fund would be only be authorised where it is proven to be consistent with the development of the Strategic Freight Network as defined in Section 5.6 and Map 15. There are a number of candidate schemes included in the long list in Appendix A including Gauge clearance from Syston to Crewe and a diversionary from Southampton to the West Midlands via Melksham.

### **Studies**

The DfT have proposed that a provision of £5m of the SFN fund is ring-fenced for studies to further develop the Strategic Freight Network vision. This would include studies to develop train lengthening and in-fill gauge proposals to enable allocation of the ring-fenced funds. It may also include studies of the extension of European gauge, routes from Thamesport and /or further London by-pass schemes such as the use of the Dudding Hill Line.

## **7. Safeguarding**

It is recommended that the currently unused alignment from Oxford to Bletchley be safeguarded from non-railway use development given its potential as a useful diversionary route for container traffic from Southampton to the Midlands and the north. It has only recently become disused and is still in Network Rail's ownership.

Similarly, it would be prudent to safeguard Lichfield to Ryecroft Junction. It has been disused for longer but the trackbed remains and is owned by Network Rail.

## **8. Passive provision for gauge**

In accordance with the recommendations of the Freight RUS, 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 whenever a structure is renewed on the routes prioritised. This may be achieved by either replacement with higher structures or lowering of the track. It is proposed that the Midland Main Line north of Bedford is added to the list of routes prioritised by the Freight RUS.

## **9. Additional contributions to the provision of SFN capacity**

### **9.1 Use of paths**

As discussed in Section 3, the White Paper emphasises that the SFN investment in capacity where it is most needed should be complimented by improved network management. A more rigorous application of the 'use it or loose it' principle to space held in the timetable will help minimise the number of unused train paths which take up network capacity.

### **9.2 Contributions from third parties**

The industry encourages third party contributions towards the costs of enhancing the railway. It is freight industry's intention that the £200m allocated for the development of the SFN in CP4 will be supplemented by contributions from scheme promoters and beneficiaries.

Whilst the industry is currently in discussion with a number of agencies, any contributions will be subject to negotiation and therefore the exact level of additional funds is uncertain at this point. If the industry is successful in obtaining contributions for the four schemes outlined in Section 6.2, it would wish to revisit the long list of schemes outlined in Section 6.1 and consider whether additional schemes could be taken forward within CP4. On this basis early consideration may be given to W12 gauge clearance on the northern part of the ECML from Doncaster to Edinburgh and Mossend and W12 gauge clearance on the southern part of the ECML between London and Peterborough via the Hertford Loop.

### **9.3 NRDF in CP4**

The CP4 NRDF Fund may be a further source of funding for schemes where they fulfil the criteria of the fund. Possible candidate schemes may include The Hope Valley scheme, Midland Main Line slow schemes and Basingstoke loop.

### **9.4 Other enhancement schemes in the SBP**

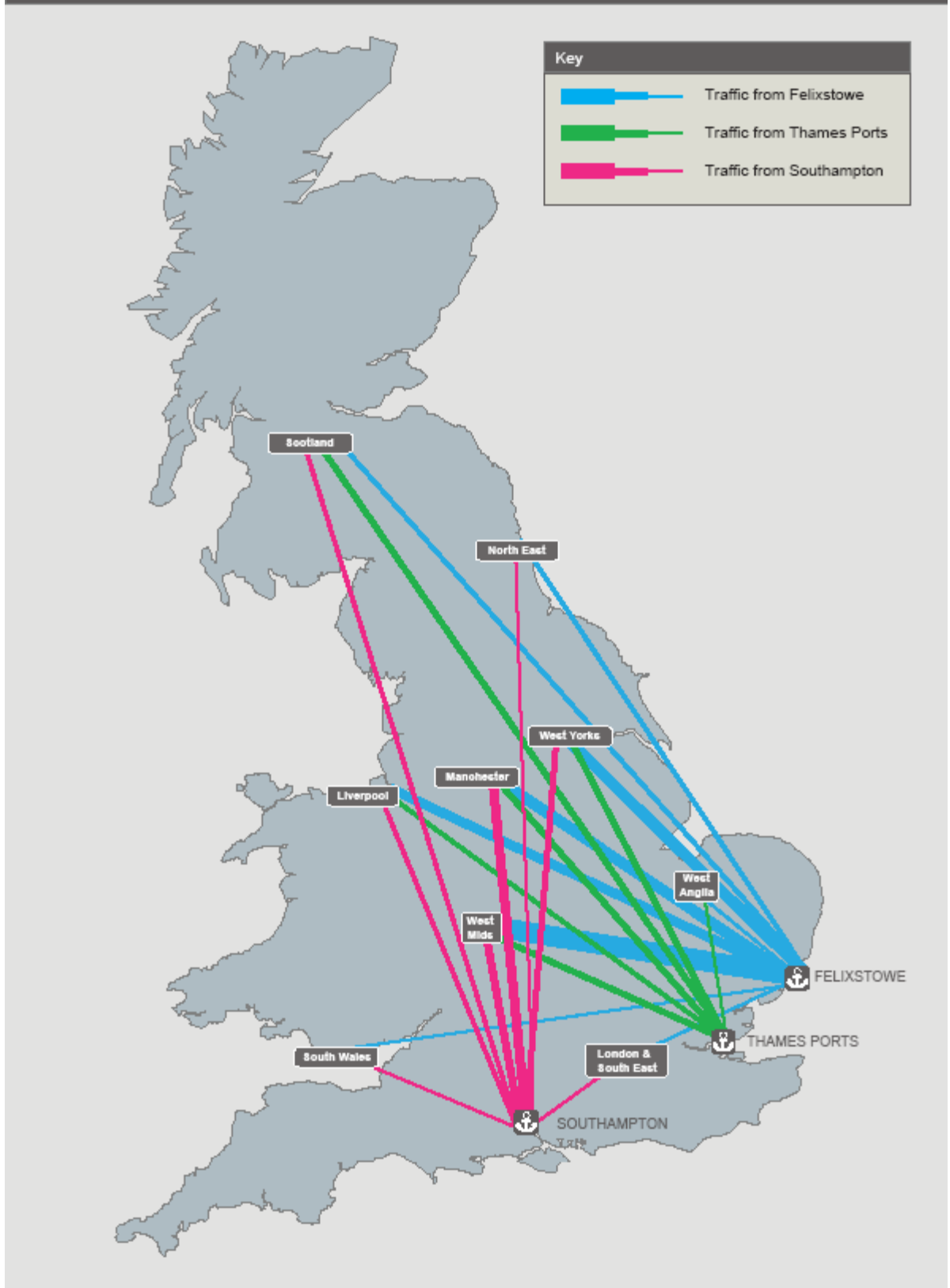
The October Strategic Business Plan contains two schemes which will make a significant contribution to the development of the SFN as defined in this paper: the Joint Line and Stourbridge – Walsall.

## **10. Development of the SFN beyond CP4**

It is clear from the discussion above that the development of the SFN would need to be a long term project. The funds available in CP4 enable the next steps in its development but there will still be considerable work needed to the network beyond CP4 to meet its objectives.

The obvious first candidate for CP5 will be the second phase of the Peterborough to Nuneaton capacity works. There is every reason to believe that rail freight will continue to grow in CP5 at least as quickly as is anticipated for CP4. It is proposed that the schemes on the long list described in Section 6.1 of this paper are reviewed periodically during CP4 to ensure that they still have a strategic fit with the emerging patterns of demand and that development works starts on the strongest candidates in anticipation of CP5.

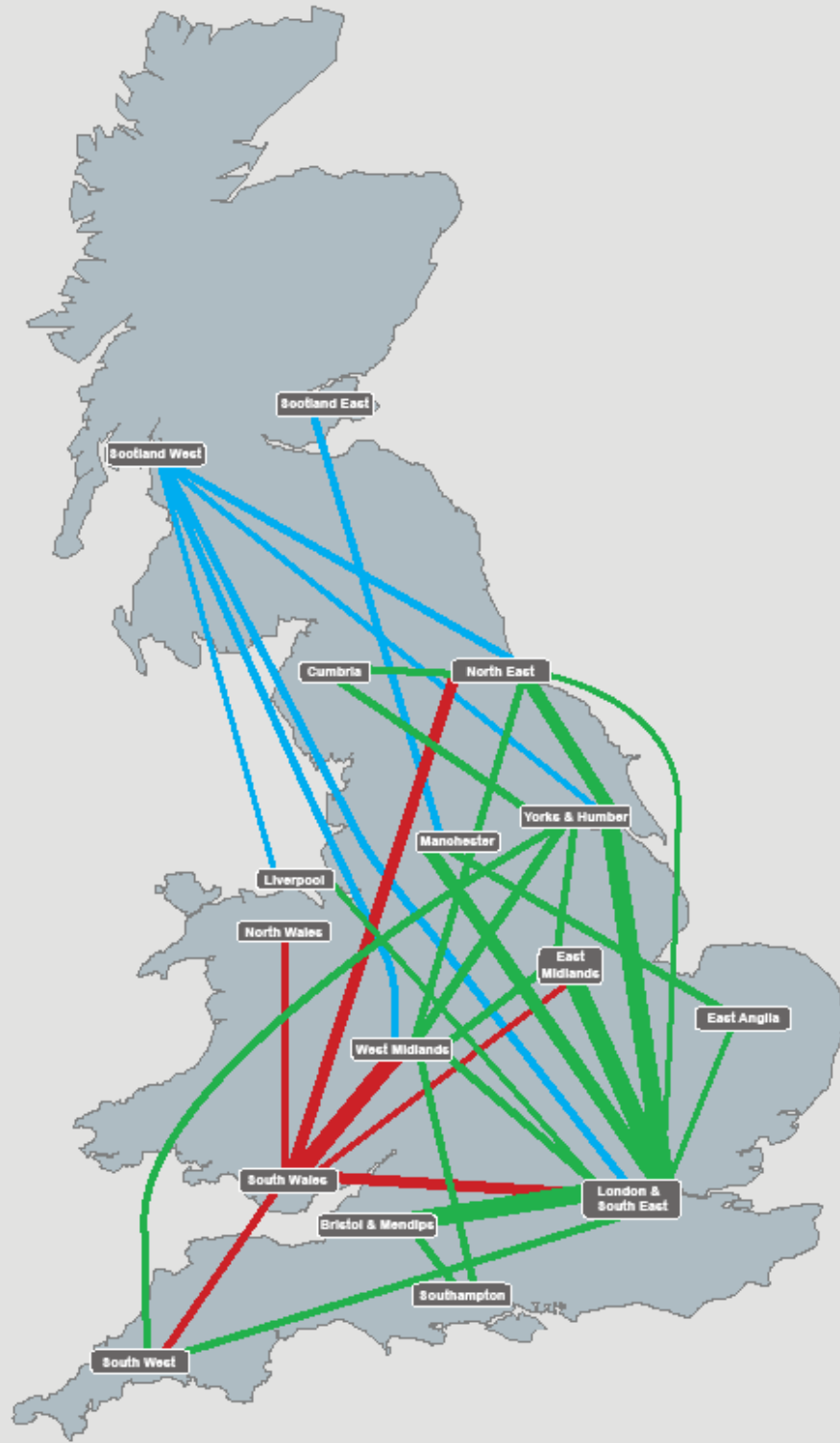
Map 1: Intermodal Traffic from Felixstowe, Thames Ports and Southampton. Main flows anticipated in 2030



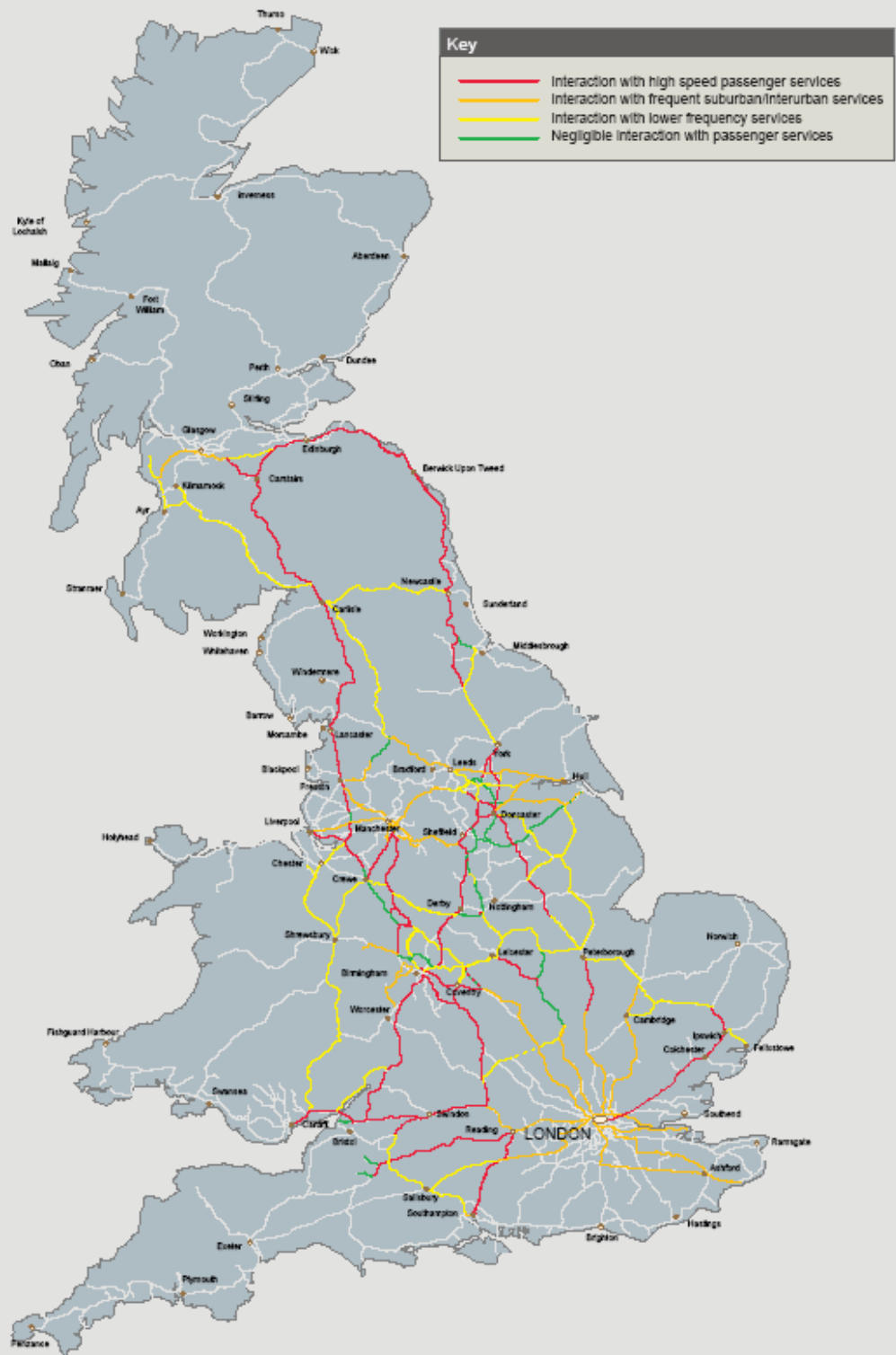
Map 2: Long distance ESI coal - main flows anticipated in 2030



Map 3: Long distance freight (other than container and ESI Coal). Main flows anticipated in 2030



Map 4: Key Strategic Freight Routes - interaction with passenger traffic



Map 5: Haven Ports - Midlands/NW/Scotland: proposed routes



Map 6: London - Yorkshire/NE: proposed routes



Map 7: Haven Ports - Yorkshire/NE: proposed routes



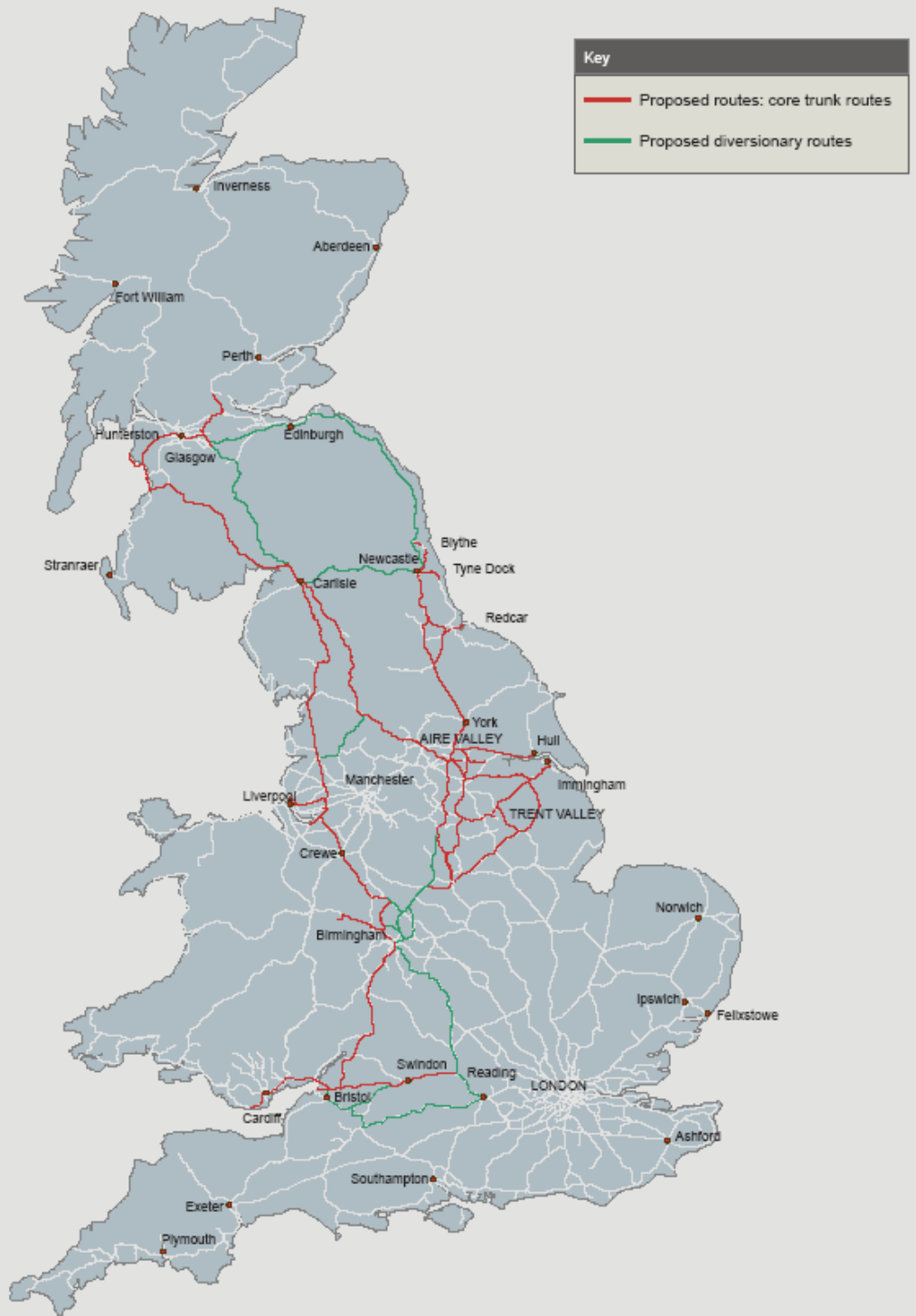
Map 8: Southampton - Yorkshire/NE: proposed routes



Map 9: Southampton - Midlands/NW/Scotland: proposed routes



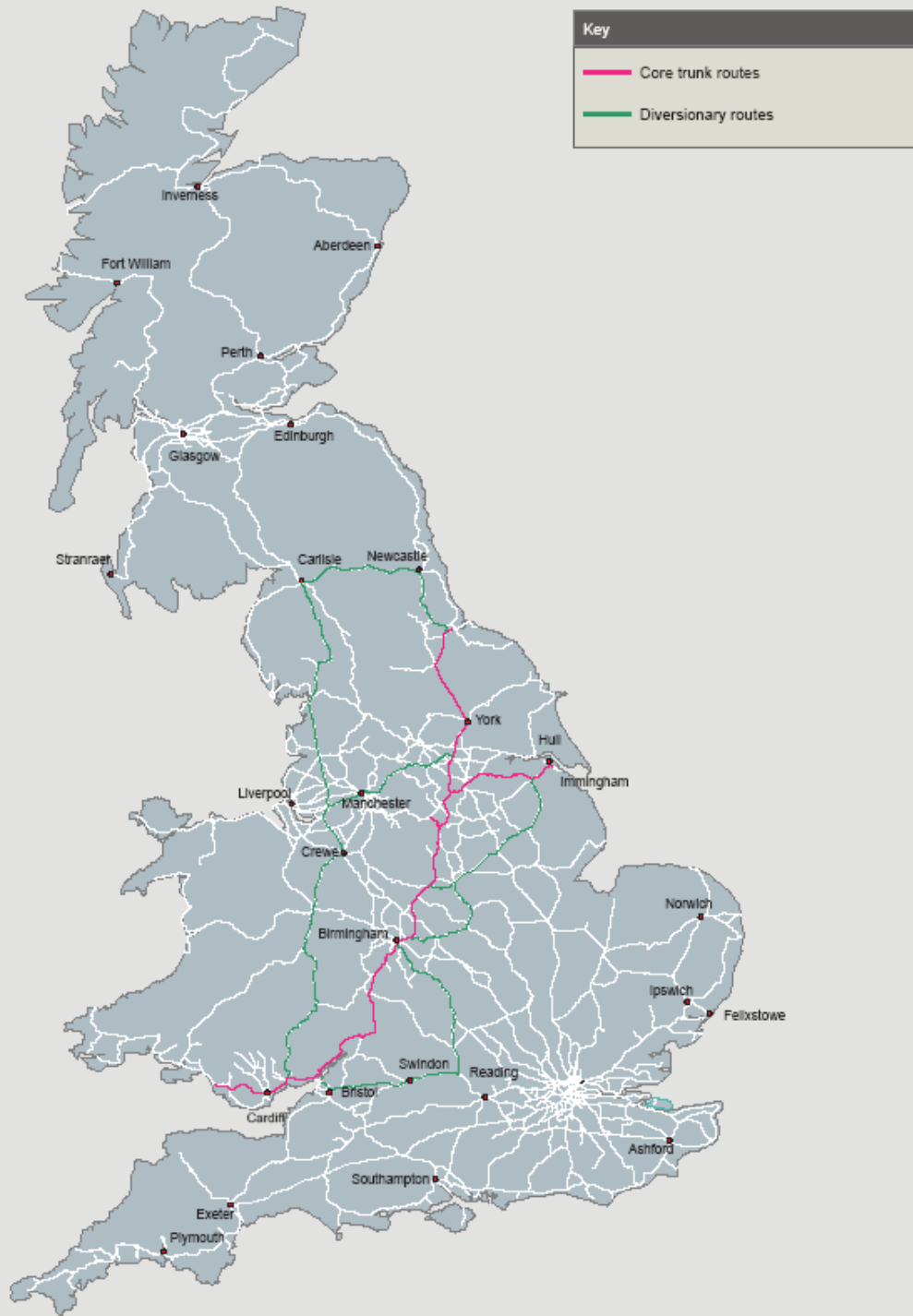
Map 10: Coal: proposed routes



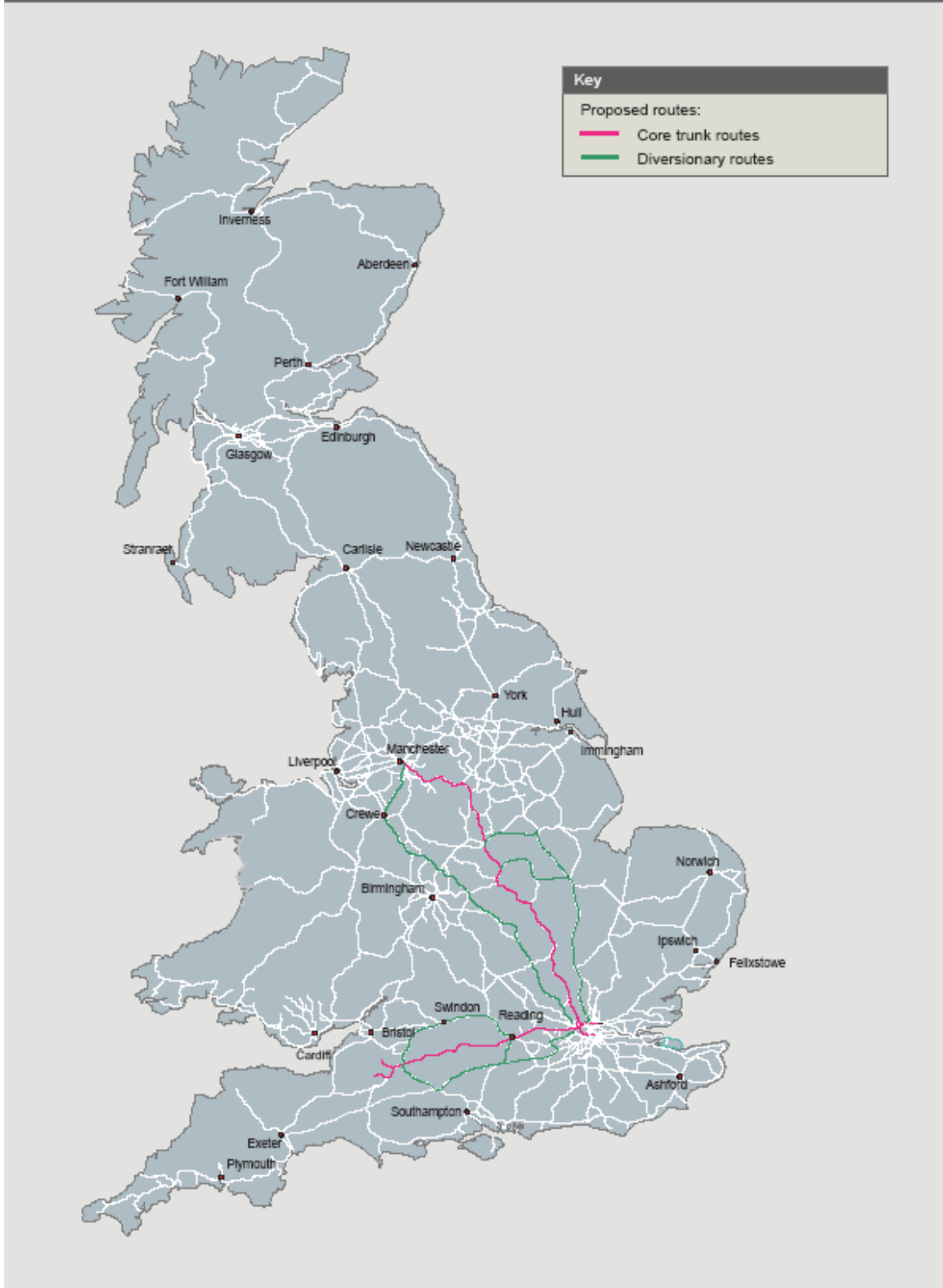
Map 11: Petroleum: proposed routes



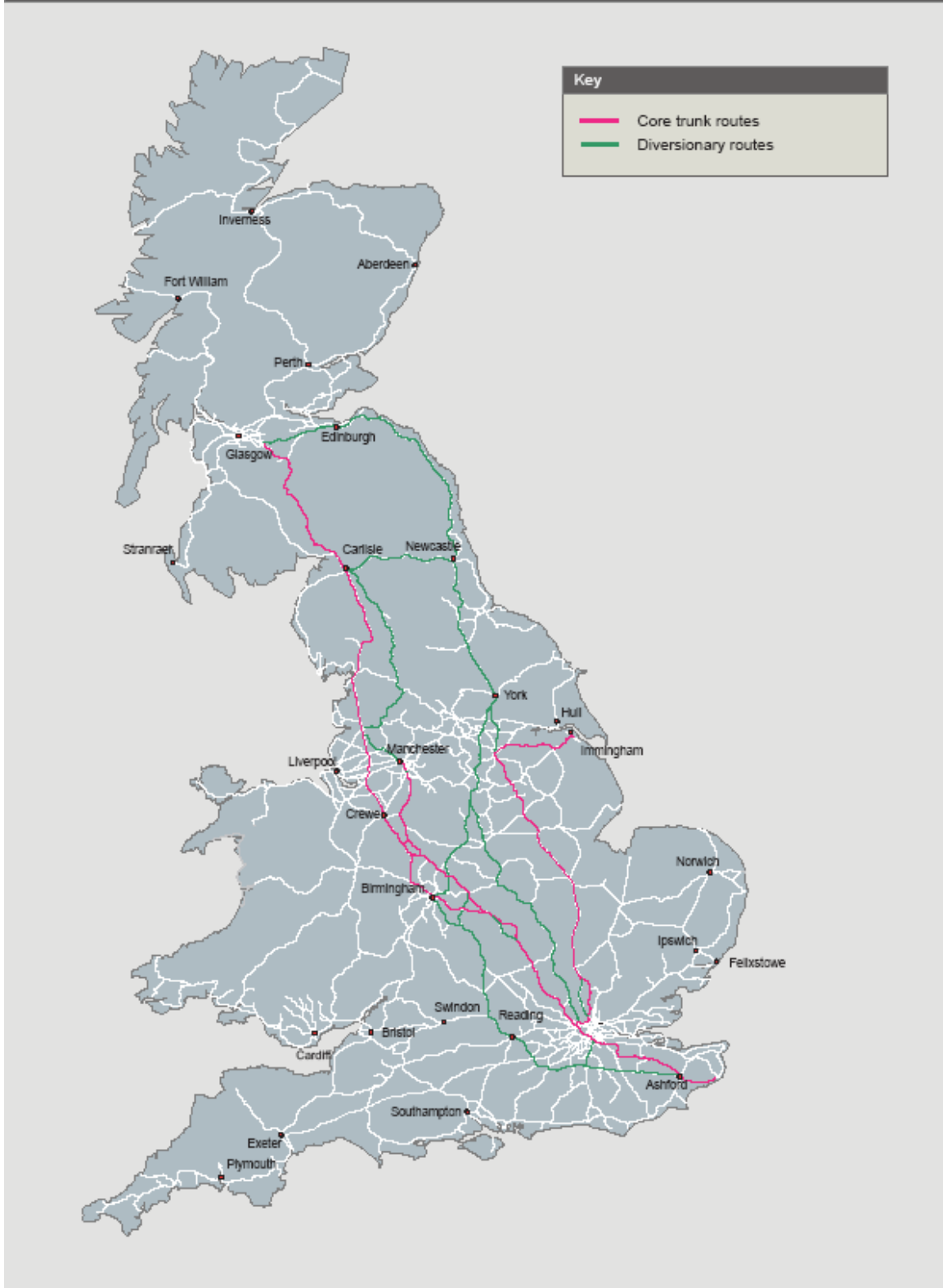
Map 12: Metals: proposed routes



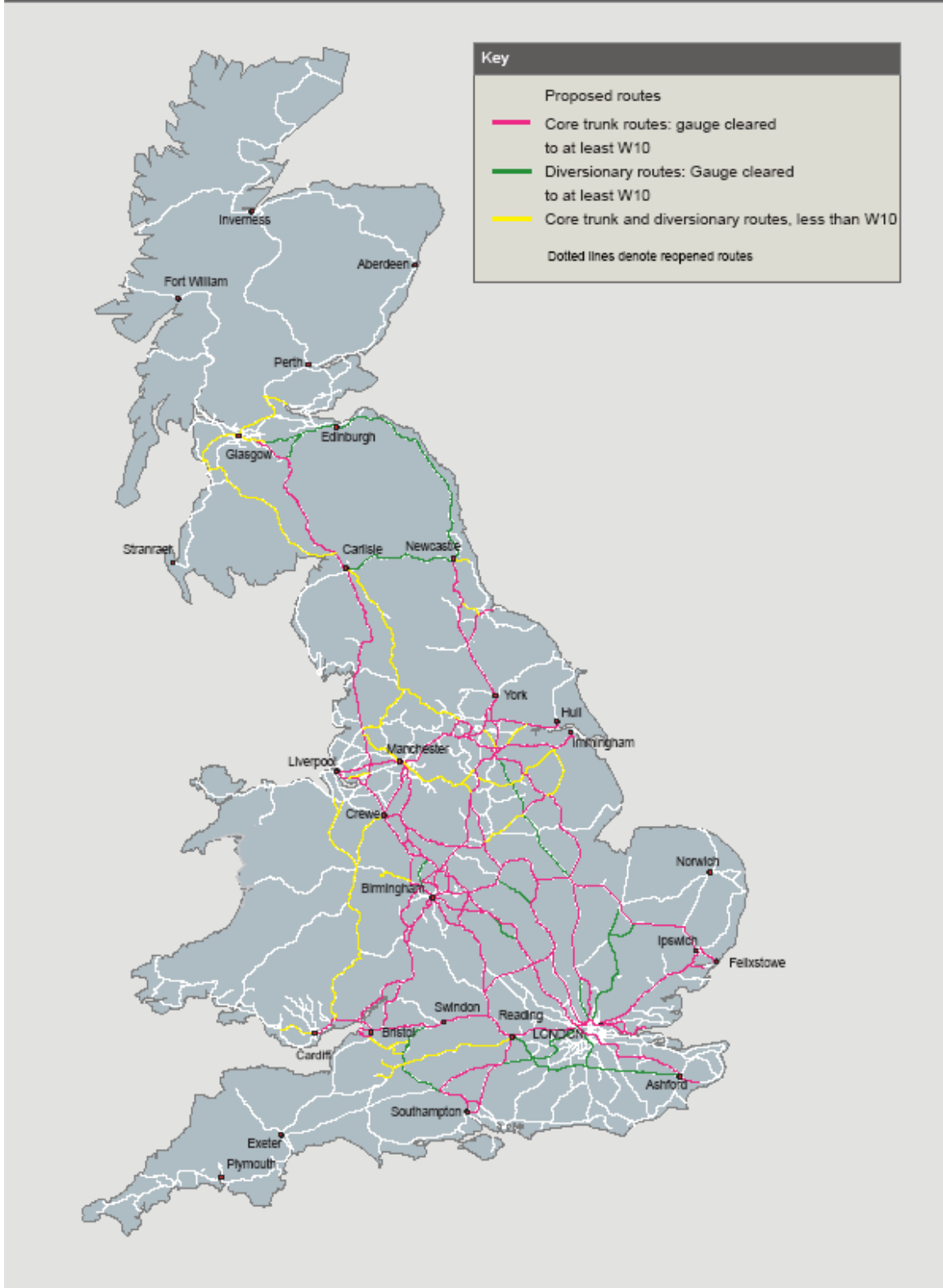
Map 13: Construction: proposed routes



Map 14: Other commodities: proposed routes



Map 15: The proposed Strategic Freight Network



# Map 16 : Schemes recommended for CP4



Appendix A

	Scheme description		Criteria							
	Scheme	Outputs	Optimising routing to achieve greater separation of passenger and freight flows	Improves network availability	Facilitates retention/growth in freight traffic					Additional passenger benefits (in addition to increasing freight / passenger separation)
					Capacity	Gauge	Train length	Axle Weight	Improved asset utilisation	
East coast and Thames Ports	Felixstowe – Nuneaton Capacity	Enables growth and diversion of Felixstowe to West Midlands, North West and Scotland traffic away from GE/NL/WCML south plus creates capacity for London Gateway traffic	GEML, NLL and south end of WCML	Y	Y				?	Y
	Gauge clearance Syston -Crewe via Stenson including Crewe diverender	Provides additional route from East Coast to WCML. Would enable diversion of Gauge clearance freight traffic away from WCML between Nuneaton and Crewe	Leicester-Nuneaton-Stoke on Trent	Y	?	Y				
	Barking -Willesden electrification	Electric traction for trains routed via GOB	Stratford - Maryland; NLL	Y					Y	Electric passenger service
Southampton	Southampton - Worting Junction via Laverstock Gauge clearance gauge, and capacity increase Laverstock - Worting	Provides diversionary route between Southampton and Worting Junction, and additional capacity for future growth	Southampton - Worting, if some trains permanently diverted	Y	Y	Y				Y
	Southampton - Didcot via Melksham Gauge clearance gauge	Provides diversionary route between Southampton and Didcot		Y		Y				
	Southampton - West Midlands capacity: Provision of loop at Basingstoke	Additional regulating opportunity	Basingstoke		Y					
	Southampton - West Midlands capacity: Leamington - Coventry capacity upgrade	Improves access to WCML			Y					Y
	Gauge clearance SWML Basingstoke to Acton Wells Jct via Kew	Provides diversionary route Southampton to WCML		Y	Y		Y			
	Gauge clearance GWML Reading to Willesden	Provides diversionary route Southampton to WCML		Y	Y		Y			
	Oxford to Bletchley gauge clearance	If route re-opened route; provides alternative gauge cleared route and easier access to WCML	Oxford – Leamington – Coventry and Birmingham	Y	Y					New service opportunities
ECML and S Humber	Gauge clearance Doncaster - Mossend	Allow 9'6" containers on ECML. Provides alternative Gauge clearance route to Scotland to WCML		Y	?	Y				
	Gauge clearance ECML south of Peterborough, via Hertford loop	Allow 9'6" containers on ECML. Diversionary route Felixstowe to Yorkshire. Creates Gauge clearance route London Gateway to ECML terminals		Y		Y			Y	
	Joint Line (Peterborough – Doncaster) upgrade - capacity and gauge	Ability to path freight trains away from ECML between Peterborough and Doncaster	ECML between Peterborough and Doncaster	Y	Y	Y				Y
	March – Spalding reopening (in conjunction with Joint line upgrade)	Allows freight trains from East Anglia to access Joint Line without passing through Peterborough	Werrington Junction	Y	Y					Possibly if new service options developed
	South Humber side SIMBIDS	Enhanced flexibility		Y					Y	
MML	Gauge clearance on Bletchley-Bedford and MML and capacity upgrade on slow lines north of Sharnbrook	Additional paths, and higher gauge capability on MML	Potentially ECML south of Doncaster	Y	Y	Y				
	Initial investigation of enhanced gauge	Full scheme will provide enhanced gauge to Midlands and possibly beyond				Y			Y	
WCML	Access to Widnes	Access to facility at Widnes from North and South with minimum of runround required		Y					Y	
Cross Country	Gauge clearance Water Orton - Doncaster	Provides route from Southampton to ECML for 9'6" containers. Provides 9'6" WCML-ECML link		Y		Y			Y	
	Gauge clearance for Ryecroft Jct to Rugeley Jct	Gauge cleared diversionary route		Y						
	Stourbridge-Walsall reopening	Reopen route allowing Lickey Incline / Birmingham to be bypassed	Cross Birmingham flows	Y	Y		Y (higher trailing loads?)		Y	
Trans Pennine	Hope valley capacity and train length improvements	Additional paths for freight trains on Hope Valley, improved opportunities to regulate trains, longer trains	Dore station Junction to Sheffield station approaches		Y		Y		Y	Y
	Gauge clearance on a transPennine route	Provides east-west higher gauge capability				Y				
Newcastle Carlisle	Gauge clearance Newcastle-Carlisle	Provides east-west higher gauge capability			Y					
Generic capability	"Big freight railway" provision for longer /heavier trains	Ability to run higher axle weight trains on key routes				Y		Y		
North and West	IBSs between Abergavenny and Hereford and at Church Stretton	Additional capacity on North and West route.	Bristol-Birmingham		Y					Y

## Appendix B

### The scoring system for costs and benefits of potential SFN schemes

This appendix summarises the scoring system used to compare potential SFN schemes. The scoring system is designed to provide a high-level analysis of each scheme. It is based on benefits quantified at an 'order of magnitude' level, to indicate the scale of benefits involved. It is not intended to provide a detailed analysis of each scheme and does not reflect all the potential benefits of each scheme.

Table B1 summarises the results of the scoring system. The overall scores and the scores per £m of expenditure are highlighted.

The scoring system consists of scores for the following aspects of each scheme, which are addressed in turn:

- Capacity/sensitive lorry mile (SLM) benefits;
- Improvement in traffic mix;
- Improvement in route mileage.

#### **1. Score for capacity/sensitive lorry mile (SLM) benefits** (see column 7).

This shows the extent to which the scheme is expected to reduce lorries on the roads by enabling the network to meet projected demands for extra rail freight. Extra freight movements result from either capacity or gauge clearance schemes. The score is also shown in column 6. It reflects:

- the extra trains per day (tpd) using core routes resulting from capacity schemes (column 1);
- the number of tpd on core routes benefiting from gauge clearance schemes (column 2);
- the extra tpd using diversionary routes resulting from capacity schemes (column 3); and
- the number of tpd on diversionary routes benefiting from gauge clearance schemes (column 4).

Column 5 expresses these benefits in core capacity tpd equivalent. One tpd benefiting from gauge clearance is assumed to be equivalent to 0.5 extra tpd resulting from a capacity scheme. This is due to the assumption that only about half the containers on trains benefiting from gauge clearance require the gauge clearance, and would be carried by road in the absence of the scheme.

The figures in column 5 also convert diversionary route benefits (whether due to capacity or gauge schemes) into core route equivalents by multiplying the tpd by the proportion of the year each diversionary route is expected to be used. This varies from about 7% to 17%, with the proportion increasing as the length of the core route from which the traffic is diverted increases. Higher proportions were also assumed for diversionary routes serving the Southampton to Basingstoke core route. Diversionary route benefits were also given an extra weighting, of 2 relative to core route benefits, to reflect the higher value placed on the availability of diversionary routes under a 7-day railway.

Finally the scores in column 6 and 7 are based on those in column 5, but each benefit is presented in 100 mile route units. This is to ensure that flows benefiting over longer routes are given a higher value.

As an example, the Ipswich to Nuneaton scheme provides extra capacity on the core route of 10 tpd (column 1). It also provides a gauge cleared diversionary route for 6 tpd (column 4). This latter figure is converted into core tpd equivalent by multiplying by 0.5, to reflect that only about half the containers on these trains directly benefit, by multiplying by 10% to reflect the proportion of the year during the diversionary route is expected to be used, and by multiplying by 2 to reflect the extra weight given to diversionary benefits. This provides a figure 0.6. This is added to the capacity benefit to provide the core tpd equivalent figure of 10.6 in column 5. This is converted into 100 mile units in column 6; the average route length is about 220 miles so the figure shown is about 2.2 times the 10.6 figure, or 23.7.

## **2. Score for improvement in traffic mix (column 8).**

The derivation of this is shown in Table B2. The score is shown in column 10 of this table. Column 3 shows the current route for the flows affected (column 1); column 4 shows the new routing resulting from the scheme. This re-routing results in changes in interactions with high speed passenger (column 5), frequent interurban or suburban services (column 6) and lower frequency services (column 7). These are weighted by the values shown in columns 5 to 7 – see column 8. A higher weighting of 2 is given to reduced interaction with high speed passenger services relative to reduced interactions with other services. The weighted numbers are then multiplied by the number of trains per day and divided by 100 so that they are expressed in 100 mile units – this is shown in column 9. Column 10 is the opposite sign of column 9.

## **3. Score for improvement in route mileage (column 9).**

The derivation of this is also shown in Table B2. The score is shown in column 13. This is calculated from the change in mileage per train due to the re-routing; (column 11). This figure is multiplied by the number of trains per day and divided by 100 so that it is expressed in 100 mile units; see column 12. Column 13 is the opposite sign of column 12.

These three scores are weighted equally in Table B1 to provide an overall score, see column 12. Equal weighting can be justified on the basis that common units – a train per day over 100 miles – are used for each score.

The overall score divided by the scheme cost in £m is shown in column 13. This gives an indication of value for money.

**TABLE B1: Summary of scheme scores**

Scheme	Freight capacity / SLM benefits						Scores			Total estimated scheme cost (£m)	Estimated scheme cost in CP4 (£m)	Overall score	Overall score / total estimated scheme cost in £m	
	Extra tpd using core route due to capacity increase	Tpd using core route benefitting from gauge clearance	Extra diversionary route tpd due to capacity increase	Diversionary route tpd benefitting from gauge clearance	Extra core & diversionary route in core capacity tpd equiv.	Extra core & diversionary route in core capacity tpd equiv. * length of SLM route / 100	Score for capacity increase / SLM benefits (as column 6)	Score for improvement in traffic mix (see Table B2)	Score for improvement in freight mileage (see Table B2)					
Column	1	2	3	4	5	6	7	8	9	10	11	12	13	
Inputs/weights:						100	1.0	1.0	1.0					
East Coast & Thames Ports	Ipswich to Nuneaton capacity (in addition to committed scheme which provides gauge clearance & limited additional capacity) (16 trains per day)	10.0			6.0	10.6	0.0	0	12	1	291	50	14	0.05
	Syston to Crewe via Castle Donington gauge clearance				21.0	1.6	0.0	0	4	2	50	50	6	0.11
Southampton	Southampton to Worthing Junction via Laverstock & Andover gauge clearance				23.0	3.6	0.0	0	0	0	55	55	0	0.00
	Laverstock to Didcot via Melksham gauge clearance				22.0	3.7	0.0	0	0	0	30	30	0	0.00
	SWML Basingstoke to Acton Wells Jct via Kew gauge clearance		1.0		22.0	2.4	0.0	0	0	0	30	30	0	0.00
	GWML Reading to WCML South		1.0		22.0	2.4	0.0	0	0	0	11	11	0	0.00
	Oxford to Bletchley gauge clearance							0	11	-4	25	15	7	0.28
ECML and S Humber	Doncaster to Mossend gauge clearance		3.0		7.0	2.3	0.0	0	0	0	31	31	0	0.00
	ECML South of Peterborough via Hertford Loop gauge clearance		4.0		24.0	4.1	0.0	0	0	0	26	26	0	0.00
	Joint Line (Peterborough to Doncaster) upgrade: capacity & gauge				16.0	1.4	0.0	0	32	-4	225	225	28	0.13
MML	Bletchley to Manton via Bedford gauge clearance (in conjunction with Oxford to Bletchley)							0	12	-1	40	25	11	0.28
Cross Country	Water Orton to Doncaster gauge clearance (in conjunction with gauge clearance via Hertford Loop)		0.0		0.0	0.0	0.0	0	0	0	94	60	0	0.00
Channel Tunnel	Tonbridge to Clapham via Redhill, signal immunisation										10	10		

This shows interaction with passenger services, and other points where freight trains would cross passenger flows

**TABLE B2: Details of re-routing scores**

Scheme	Flows affected	Trains per day re-routed due to scheme	Current routing	New routing	Change in interaction with high speed passenger services (miles per train)	Change in frequent interurban or suburban passenger services (miles per train)	Change in interaction with lower frequency passenger services (miles per train)	Change in interaction with passenger services (change in weighted miles per train with weightings as shown)	Change in interaction with passenger services (change in weighted miles per train / 100 * number of tpd re-routed	Score for improvement in traffic mix	Change in miles per freight train due to re-routing	Change in miles per freight train due to re-routing / 100 * number of tpd re-routed	Score for improvement in route mileage	
Column:	1	2	3	4	5	6	7	8	9	10	11	12	13	
Inputs/weightings:					2	1	0		100			100		
<b>Felixstowe to Nuneaton capacity</b>	Felixstowe to W Mids, Liverpool, Manchester or Scotland	6	Ipswich to Nuneaton via Stratford & Rugby	Ipswich to Nuneaton via Haughley	-59	-90	137	-207	-12	12	-19	-1	1	
<b>Syston to Crewe gauge clearance (assuming F2N capacity)</b>	Total of flows below								-4	4		-2	2	
	Felixstowe to Liverpool or Scotland	11	Syston to Crewe via Colwich & Stafford	Syston to Crewe via Sheet Stores, Stenson, Stoke on Trent & Kidsgrove	1	0	4	2	0			-6		-1
	Felixstowe to Manchester	10	Syston to Crewe via Colwich & Stoke on Trent	Syston to Crewe via Sheet Stores, Stenson & Stoke on Trent	-19	0	-8	-38	-4			-14		-1
<b>Oxford to Bletchley gauge clearance</b>	Southampton to Midlands or Liverpool or Manchester or Scotland or W Yorks or Cleveland	22	Oxford to Nuneaton via Coventry	Oxford to Nuneaton via Bletchley & Rugby	-45	37	20	-52	-11	11	20	4	-4	
<b>Joint Line upgrade</b>	Total of flows below								-32	32		4	-4	
	Felixstowe to Yorks or North East	12	Peterborough to Doncaster via Stoke	Peterborough to Doncaster via Lincoln	-54	0	68	-108	-13			14		2
	Thames Ports to W Yorks	4	Peterborough to Doncaster via Stoke	Peterborough to Doncaster via Lincoln	-54	0	68	-108	-4			14		1
	London or East Anglia to Yorks & Humber or NE (non intermodal)	14	Peterborough to Doncaster via Stoke	Peterborough to Doncaster via Lincoln	-54	0	68	-108	-15			14		2
<b>Bletchley to Manton gauge clearance</b>	Southampton to W Yorks or Cleveland	5	Oxford to Clay Cross	Oxford to Clay Cross via Bedford, Harrowden, Kettering, Trent v Manton, Pye Bridge & Coney Green	-122	0	114	-244	-12	12	24	1	-1	

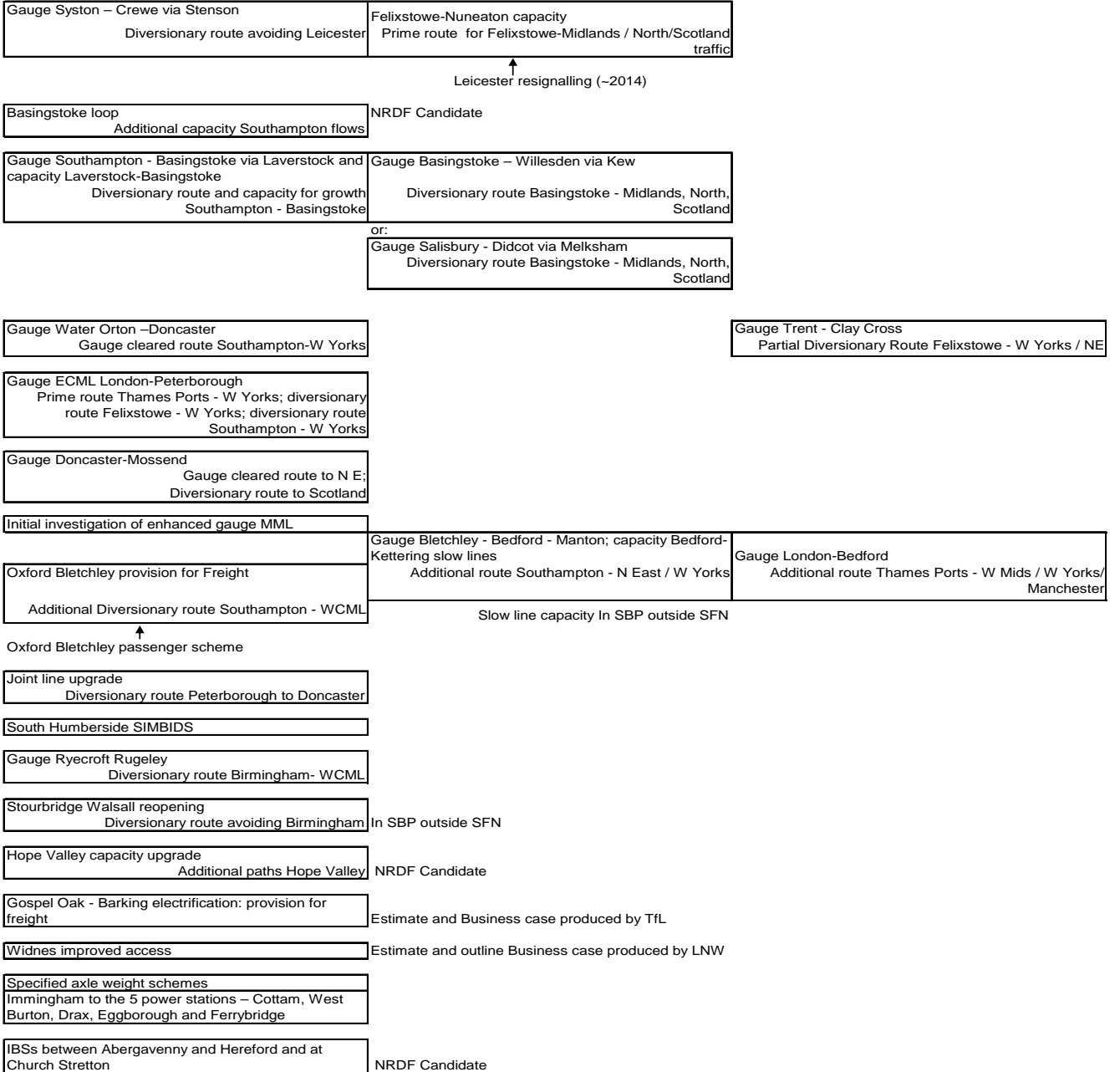
## Appendix C

### Strategic Freight Network - candidate scheme dependencies

#### Strategic schemes with funding (TIF / NRDF / Third Party / Out performance)

Felixstowe to Nuneaton W10 gauge and incremental capacity  
 Peterborough to Yorkshire W10 gauge  
 Southampton to W Midlands W10 gauge  
 Liverpool Docks W10 gauge and improved access  
 Anglo Scottish coal capacity upgrade (G and SW and S and C)  
 Humber Ports / Immingham to Aire / Trent Valley upgrades  
 Sutton Park W10 gauge and headway improvements  
 Gospel Oak to Barking W10 gauge and capacity  
 Ipswich Yard - ability to run longer trains

#### Candidate SFN groups of schemes initially considered for potential start in CP4



#### Candidate SFN schemes with potential start in CP5

