





Prospectus for investment in the East Coast Main Line

Report



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Report

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- 1) The Economies of East Coast Corridor
- 2) Rail Service and Infrastructure Review
- 3) Rail Connectivity Analysis
- Economic valuation of improving rail services 4)
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1 Introduction

- 1.1 The Consortium of East Coast Main Line Authorities represents Local Authorities and Scottish Regional Transport Partnerships throughout the area served by the East Coast Main Line. The many strategic decisions that need to be made about rail connectivity over the next few years mean that the Consortium has a vital role in representing all the communities served by the East Coast Main Line. The Consortium is working in partnership with both Governments, the rail industry and business to deliver the investment that is needed to enable economic growth.
- 1.2 The East Coast Main Line is a key piece of infrastructure connecting local and regional economies with each other, to the national economy and to Europe and consequently is of considerable strategic importance to both the national and regional economies. However, its ability to fully realise this economic value is currently constrained and the Consortium intends to make the economic case for influencing investment to enable the delivery of solutions by the rail industry that release these constraints.
- 1.3 Specifically, ECMA seeks to:
 - set out the economic benefits of investing in the line;
 - raise awareness about the continued need to invest;
 - ensure that decision makers have all the relevant evidence before they make choices;
 - create a strong partnership with the rail industry.
- 1.4 This prospectus for the ECML sets out the economic context of the route, the benefits of continuing to invest in the line, and any constraints that prevent the full realisation of their economic visions. City of York Council, acting on behalf of the East Coast Main Line Authorities Consortium (ECMA) appointed JMP Consultants and Albion Economics to provide external economic advice to support their advocacy for this continued investment in the East Coast Main Line (ECML).
- 1.5 In this report we set out our findings. During the course of this research we have:
 - Compiled evidence on the economic linkages that are key to each area along the route through a series of stakeholder consultation events (a summary of which can be found in Annex 6), a review of documentation provided by ECMA members and an independent desk-based research exercise;
 - Identified the current scale of rail use, the levels of connectivity provided by rail between the regional economies and identified the constraints to this connectivity;
 - Developed an economic model to demonstrate the linkages between improvements in rail accessibility and economic performance and quantify them;
 - Identified where rail can help improve the performance of these economies, and;
 - Identified the *conditional outputs* required to enable the East Coast Main Line to facilitate the achievement of this economic potential.
- 1.6 Six technical Annexes provide the additional detail that underpins the findings in this report.

2 The East Coast corridor

The East Coast corridor is really important to UK plc

- 2.1 The local and regional economies served by the East Coast Main Line corridor rail services are valuable to the UK. The GVA of local economies in the East Coast corridor, including London, represents just short of a half of UK economic output. The strong influence of the London economy in this is plain.
- 2.2 In 2010, the Pan London economy generated GVA of £277bn. The next largest economy in LEP and RTP areas within the ECML corridor is Leeds City Region, with GVA of £45bn in 2010. This is not to say that the economies of the areas within the corridor north of London are insignificant, generating as they do in excess of £300bn of GVA annually.



Figure 2.1 Total GVA (NUTS3¹ 2010 Data) by LEP/RTP Area (£M pa) excluding London

2.3 Many of the local and regional economies in the corridor are highly productive, with GVA per capita at its highest in London where a range of activities contribute, not least the strong finance and business sector. In 2010, the £277bn GVA generated in London represented £35,421 per head. The higher productivity levels in the corridor also include Aberdeen & North East Scotland (£29,506), Edinburgh & South East Scotland (£27,140) and Hertfordshire (£23,432). Aberdeen & North East Scotland's strong productivity is principally related to the valuable oil and gas production sector; and in Edinburgh & South East Scotland, Hertfordshire, the Leeds City Region, and Greater Cambridge and Greater Peterborough finance and business services are strong elements of the economy that drive high productivity levels.

¹ Nomenclature of Units for Territorial Statistics, third level, more detail can be found at http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction

These important and diverse local and regional economies generate demand for a range of connections

- 2.4 There is a diversity of economic geographies within the rail corridor. Many sectors of the economy benefit from strong connectivity to enable, for example, the transport of goods to markets, and for cities to benefit from business connections to synergistic places. This diversity of economic geographies means that the range and variety of connections between the areas is complex.
- 2.5 The importance of London is universally recognised, as the centre of UK government, a true world city, and as a global finance and business centre. Links to Heathrow and other London airports are also important for international connectivity for businesses all along the corridor. Edinburgh as Scotland's capital is also a strong attractor, with connections to all of Scotland as the centre of government, and as an important centre of financial business.
- 2.6 The high value North Sea oil and gas industry drives the demand for connectivity, including to related sectors, and to parts of eastern Scotland and England as far south as the Humber. The growing renewable energy and oil and gas sectors along the east coast are increasing the need for collaboration and connectivity, from the Humber, to the Tees and the Tyne, the Tay and northern Scotland.
- 2.7 Important finance and business service sectors require good business-to-business connections, these including London, Edinburgh, Hertfordshire and the Leeds City Region. Existing and emerging digital and creative sectors in all areas within the East Coast corridor also demand good business-to-business connections, and the biotech and "science city" sector is growing and creating demand for new business-to-business connections, for example to and from Cambridge, Peterborough and Stevenage, and in Scotland to and from Edinburgh, Dundee and Tayside.
- 2.8 Tourism is important to economies along the whole length of the corridor, in its many diverse forms. Tourism is worth over £120 billion each year to the UK economy, and supports over 3 million jobs. The East Coast Main Line links the two major tourist centres in the UK, London and Edinburgh, with the historic cities of York and Durham in between, both with strong visitor economies. Rail services in the East Coast corridor provide a vital link on a tourism trail that encompasses a huge variety of tourism activities from our capital cities to the beautiful landscapes of Northumberland and the Scottish Highlands.
- 2.9 Manufacturing specialisms - both advanced and applied - with for example a strong automotive sector in North East England, petrochemicals and steel on Teesside, and advanced manufacturing in the Sheffield City Region also play an important role in the East Coast corridor economies. World class food and drink production is also an important element of local and regional economies from northern and central Scotland to Lincolnshire. Links to important freight routes are critical for these sectors to ensure goods can get to market, and connections to the east coast ports are therefore important for international trade to support a variety of manufacturing and production sectors.
- 2.10 The East Coast Main Line is not just about supporting region-to-region economic linkages. Supporting local and regional economies through services that provide commuting opportunities is increasingly important and a major contributor to the labour market. This is most obvious in commuting to London, but is increasingly important along the length of the corridor.

1

Rail constraints and pinch points in the corridor

- 2.11 Along the length of the route there are a range of capacity constraints. Some are long standing issues; others are as a result of the growth in services operating on the East Coast Main Line. Individually these issues might be manageable and only have local impacts on the operation of the railway, however in combination they make the planning of timetables for long distance services in particular extremely complex.
- 2.12 There has been a programme of works to increase capacity on the route through Control Period 4 (CP4, 2009-2014). This has delivered a railway that operates six long distance high speed paths per hour between London King's Cross and Doncaster. Entering Control Period 5 (CP5, 2014-2019) there is a desire to deliver seven long distance paths per hour between London King's Cross and Doncaster, providing a further increase in capacity.
- 2.13 The constraints to capacity also have an impact on the operation of the service, with any delays to any services at pinch points having an impact on other services; this is compounded further if there are any major incidents, meaning that service resilience can be a major issue. This in turn is reflected in Public Performance Measure (PPM) results for operators, reflecting reliability on the route.
- 2.14 Ultimately, this constrains the pattern of passenger services. Currently, East Coast operates a weekday trunk service from London King's Cross of five trains per hour in a standard off peak hour plus a number of less frequent additional destinations. A small number of these services are extended beyond the trunk route to Bradford Forster Square, Glasgow Central, Harrogate, Hull, Inverness, Lincoln, Skipton (all 1 train per day) and Aberdeen (4 trains per day). Open access operators provide a small number (16 trains per day) serving three main off-line destinations, namely Bradford, Hull, and Sunderland via Hartlepool.
- 2.15 South of Peterborough up to 6 trains per hour in the off peak and 11 in the peak are commuting and stopping services to London. North of Doncaster there are additional Cross Country, Transpennine, regional and ScotRail services.
- 2.16 The East Coast Main Line is not just a passenger railway. It is used by a diverse range of freight services. The vast majority of such traffic originates from locations away from the East Coast Main Line, with the bulk of services operating in the Yorkshire & Humber and North East areas, as well as container traffic originating from Felixstowe. This is a function both of the origins and destinations of freight flows, but also the available capacity for freight traffic to run. The level of passenger traffic using the route is such that there are relatively few paths available for freight traffic, particularly south of Peterborough.
- 2.17 There are a number of ports and gateways which are in part influenced and affected by the East Coast Main Line. The largest of these include the Port of Immingham, the Port of Hull, Teesport and Felixstowe, all of which are major drivers of economic growth. The whole East Coast Main Line is however gradually being enhanced to W12 gauge and is therefore expected to increasingly carry freight that can no longer be accommodated on the WCML due to capacity constraints.

Service patterns influence existing levels of connectivity

2.18 Inevitably these capacity constraints and pinch points mean that choices have had to be made on the level of service provided, limiting the pattern of passenger services and the available freight paths, and stifles innovation in service provision. It results in journey times that are often slow and unattractive especially in the northern parts of the corridor. Service reliability is compromised

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throughout the corridor. Businesses and customers along the length of the corridor see reliability as a critical issue.

- 2.19 The constraints imposed by the nature of the line also mean that connectivity to London and to other places from many towns and cities in the corridor is poor. For these places not directly served by East Coast Main Line services, improved connectivity is the priority. In central and northern Scotland, this issue of poor connectivity is particularly marked, and indeed leads to problems of peripherality. In England, in terms of access to London the absence of regular, direct services from places such as Lincoln, Grimsby, Hull, Bradford, Middlesbrough and Sunderland place these towns and cities at a distinct disadvantage when compared to places a similar distance from London that receive regular direct trains.
- 2.20 This is illustrated in Figure 2.2, where there is a clear distinction between those places directly served (in yellow) which generally see much faster journey speeds than those places that rely on infrequent or connecting associated services (in black).



Figure 2.2 Generalised Speed (mph) to London

2.21 In terms of journey times, these are often slow and unattractive in the north of the corridor. This is illustrated in Figure 2.3 which represents journey times with respect to services to London, and illustrates the influence of geography clearly. North of York, journey times stretch well beyond the 2-hour threshold (the red line) that for many represents an acceptable journey time. In many cases, these journey times extend beyond three hours (the blue line) and so journey time improvements are a priority.

2.22 Better connectivity is sought not only for journeys to London, but are also important for many journeys to other key nodes and intermediate stations directly served on the East Coast Main Line, including for example, for services to Edinburgh from northern Scotland. This is particularly true for journeys to the north of the corridor from locations such as Stevenage and Peterborough.



Figure 2.3 Generalised Journey Time (minutes) to London (Key nodes and intermediate stations)



Figure 2.4 Generalised Journey Time (minutes) to London (Associated Stations)

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The East Coast Main Line has suffered from under investment

- 2.23 In summary, in spite of the importance of the economies served in the East Coast corridor to the UK economy, there is evidence from often poor levels of rail connectivity that there has been under investment in the East Coast Main Line and its services. This is certainly the case in comparison, for example, to the West Coast Main Line. The investment in West Coast Route Modernisation saw investment of around £9bn over the course of a decade in the form of both renewal work and investment in infrastructure enhancement. In the latest 5 year spending period from 2009 to 2014, (CP4) the West Coast Main Line has seen a further £344m of investment in three large schemes. Looking forward to CP5 and the period to 2019 it will see a further £236m invested. In contrast the East Coast Main Line has seen £820m of investment in CP4, with a further £247m forecast for CP5, totalling just under £1.1bn in the decade to 2019.
- 2.24 This under investment results in significant capacity constraints and pinch points which limit the pattern of passenger services and the available freight paths, and stifles innovation in service provision. In terms of capacity that this investment has delivered the West Coast has 9 paths per hour from London Euston for Long Distance High Speed (LDHS) services, contrasting with the East Coast which has only 6 LDHS paths per hour out of Kings Cross, with a promise of 7 by the end of CP5 in 2019. This in turn results in limited capacity and journey times that are often slow and unattractive especially in the northern parts of the East Coast corridor, and connectivity to London and other places from stations not directly served is poor.
- 2.25 Reliability of services is also an issue. Critically, service reliability is compromised throughout the corridor, illustrated by service level targets in the Public Performance Measure (PPM) for East Coast that are amongst the least onerous anywhere on the rail network. Poor reliability impacts on all Train Operating Companies (TOCs) using the ECML, not just the East Coast franchise, including local services.
- 2.26 The targets for CP5 are for all TOCs to have a minimum of 92.5% punctuality with the exception of both Virgin (West Coast LDHS) and East Coast (LDHS) which have a target of 88% each. The real difference between West Coast and East Coast is in the Cancelled and Seriously Late (CaSL) measure, for which Virgin (West Coast) has a target of 2.9% of service allowed to be in this category while East Coast has a target of 4.2%.
- 2.27 Freight paths continue to be difficult to accommodate despite the expectation of increased demand for freight movements. Added to this, stakeholders have indicated that station and rolling stock quality can be inconsistent, resulting in variability in the customer experience, which can be poor at times.
- 2.28 In order to exemplify the connectivity problems imposed by the constrained infrastructure and services, the remainder of this report focuses on the case for investment in the East Coast Main Line and its services. Specifically, in the next chapter, the report assesses the GDP growth and productivity benefits that investment in improvements to the line and to the services operated could bring.

1

3 Economic valuation of improving services

Preparing the Evidence: How does investment support economic growth?

- 3.1 'Traditional' transport economic benefits that form part of a cost: benefit analysis include time savings, road de-congestion benefits and other specific transport benefits. These benefits are illustrated in the lower half of Figure 3.1 below (transport user cost savings) and are likely to form part of any business case that franchise bidders will make in their proposals to operate services in the corridor. As Figure 3.1 illustrates these are likely to form the largest element of the total benefits from investing in improved services.
- 3.2 ECMA is however committed to illustrating the wider economic benefits (essentially the impact on GDP) of improvements to the line and to the services, in addition to these benefits provided by transport user cost savings and other direct transport benefits. This is shown in the top portion of Figure 3.1, thus demonstrating the added value of investing in the East Coast Main Line and its services.



Figure 3.1 Typical economic Benefits of Transport Schemes

- 3.3 Our approach to identifying these wider economic benefits includes two key measures of the GDP impact:
 - **Agglomeration benefits** (the productivity benefits that arise from businesses being better connected)

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- Labour market benefits (productivity benefits to businesses from having access to a wider pool of employees)
- 3.4 This approach is consistent with recent work in this field to identify the wider economic benefits of investing in rail, undertaken by Network Rail in the development of its *Market Studies*. Additionally, the analysis undertaken, as explained in more detail below, incorporates analysis to reflect Department for Transport advice on the differential impact that rail improvements have on different sectors of the economy.

Influences on the wider economic benefits derived from rail investment

- 3.5 The analysis undertaken to illustrate the GDP growth and productivity benefits that investment in improvements to the East Coast Main Line and to the services operated could bring is influenced by a number of fundamental factors. The size of places and their economies that are connected by the East Coast Main Line is a critical factor. Also, the benefits derived from investment are influenced by the constituent parts of those local and regional economies, including population and labour force, and reflects the propensity of the labour force in specific economic sectors to undertake rail travel. Finally, the quality of existing rail connections is important. Those locations with poorer existing service levels stand to gain more from improved levels of service than those with existing high levels of connectivity.
- 3.6 Consequently, in summary, the results of our economic modelling will explicitly reflect three factors:
 - The **size** of each individual economy;
 - The type of economy and its structural components, and;
 - The relative levels of **accessibility** (or connectedness) by rail between it and the other economies along the route.
- 3.7 In undertaking the economic modelling, the data used with respect to the 'type of economy' was taken from the Department for Transport dataset for use in calculating wider economic benefits (WebTAG Unit A2.1). This data has been used in the analysis as it is from a verifiable and accepted source (the Department for Transport); is expressly provided by the Department for use in identifying wider economic benefits; is consistent across the UK; and can be accessed at the equivalent of a district authority level, allowing the analysis to be at an appropriate spatial scale to identify a suitable proxy equivalent to East Coast Main Line station catchments.
- 3.8 The WebTAG dataset² used identifies four components of the economy:
 - Producer services;
 - Consumer services;
 - Construction;
 - Manufacturing.
- 3.9 Looking at the WebTAG dataset used in the economic modelling, while the construction and manufacturing sectors are relatively self-explanatory, self-contained sectors of the economy, the

² It is worth noting that while this dataset broadly allows the identification of constituent parts of the economy, as does the NUTS data quoted elsewhere in this report and its annexes, the two datasets are independent, and the sectors within the WebTAG dataset are not comparable and do not translate directly to the NUTS data.

consumer services and producer services sectors are more complex, and are worthy of explanation. The table below defines the sub sectors that constitute these broad categorisations:

Consumer Services	Producer Services
Motor Trade	Financial
Wholesale	Insurance
Retail	Auxiliary/Financial
Hotels/Restaurants	Machinery Renting
Land Transport	Computer Services
Water Transport	Research & Development
Travel Support	Other business services
Post Telecom	

Table 3.1 Definition of Consumer and Producer Services Sectors

Calculating the wider economic benefits derived from investment in the corridor

- 3.10 The wider economic benefits (both agglomeration and labour market) of investing in the East Coast Main Line and its services have been derived through an assessment of the benefits of improving the rail service between a series of origin-destination (O-D) pairs. The level of service improvement has been defined by using a series of benchmarks, and the value of the wider economic benefits that will be derived calculated from improving the service from its present level between each O-D pair to a defined benchmark level.
- 3.11 These definitions of service level or benchmark utilise service definitions developed by Network Rail for its Market Studies. The benchmarks help with understanding the relative merits of improving services to these specified levels. Three core assessments have been undertaken, based on Network Rail definitions known as *Best Possible, Best Current* and *Good Current*. For clarity, the terminology has been simplified throughout the narrative that follows to identify the three service level benchmarks as *Gold, Silver* and *Bronze*.
- 3.12 These are directly equivalent to the three definitions used by Network Rail in terms of service standards, though it is important to note that the Network Rail methodology requires judgement to be applied in relation to the service levels applied to trips between 50 and 75 miles. Some judgement on service levels for these distances has therefore been applied in this work.
- 3.13 Table 3.2 overleaf provides details of the service level benchmarks used in the analysis.

Distance	Service threshold	Journey Speed (mph)	Trains per Hour
>100 Miles	Gold	160	3 or 4
	Silver	100	2 or 3
	Bronze	80	1 or 2
<50 Miles	Gold	60	5 or 6
	Silver	60	3 or 4
	Bronze	45	1 or 2

Figure 3.2 Definition of Service levels

Valuing Other Types of Service Enhancement – Reliability and Station Improvements

3.14 While the *Gold*, *Silver* and *Bronze* service levels provide a helpful way of articulating improvements to the service to enable us to undertake a comparative assessment there are other important types of quality enhancement that will generate economic benefits that are not directly encapsulated in these definitions. These include improvements to the reliability of the service and to improvements to the 'gateways' to the route, the stations. Annex 4 includes indicative assessments of the effects of improvements in reliability and to improvements in the quality of stations as well as providing more details on the main results described in summary in the following paragraphs.

Modelled wider economic benefits derived from service improvements

- 3.15 There are over 1000 O-D pairs within the economic modelling undertaken. It is not therefore practical to show all results individually for each O-D pair. The outputs of the tests for each of the three service level benchmarks are therefore presented as the total increase in GDP per annum for the sum of all of the local and regional economies within the study area.
- 3.16 The GDP uplifts that the model predicts (illustrated in Figure 3.3) are:
 - £310 million per year for bringing all services up to a minimum Bronze benchmark standard;
 - £909 million per year for getting to *Silver*, and;
 - £2,091 million per year for achieving Gold.



Figure 3.3 Total GDP Increase and Size of GDP Uplift (£m pa)

- 3.17 In calculating these overall assessments of the wider economic benefits to be derived from service improvements to the defined benchmark levels, where a service between O-D pairs already exceeds the benchmark being modelled (*Gold, Silver* or *Bronze*, but in practice mainly relevant to the *Bronze* benchmark modelling) then a 'negative' benefit was identified. These O-D pairs were set to zero in establishing overall results, as the calculation assumes that there will be no reduction in service level.
- 3.18 These are the summation of the economic uplifts between many individual origin-destination (O-D) pairs. It is perhaps unsurprising that a large proportion of the benefits of improving services are derived from a relatively small number of O-D pairs. This holds true for the modelling tests undertaken for each of the three benchmark service levels.
- 3.19 The proportion of benefits derived from O-D pairs where benefits are large (where the uplift between any pair of places is worth over £5m per year, shown in black in Figure 3.3), medium (worth £1m to £5m per year, shown in yellow), or small (worth less than £1m per year, shown in grey) is also illustrated. By way of example, when looking at the modelling for the *Gold* service level benchmark, around 6% of the O-D pairs generate almost £1.2m (or 60%) of the benefits, illustrating that improving service levels on a few key linkages provide most of the benefits.

Spatial impacts on modelled wider economic benefits of service level improvements

3.20 This analysis illustrates that there are significant wider economic benefits as a whole within the East Coast Main Line corridor that will be derived from investment in improved rail services. Everywhere stands to benefit to some degree, with identifiable benefits of improving services for over 1000 potential O-D links. The analysis also shows that for some O-D pairs, the benefits are substantial.

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- 3.21 There are a number of O-D pairs where the benefits of service improvements were found to be exceptionally large, in the range of £20m per annum or above. These valuations would suggest that where it is possible there is a strong case for investing to bring about the service levels that would deliver these economic benefits. Inevitably the majority of these connections include London.
- 3.22 Table 3.2 identifies the *Top 10* two-way flows based on absolute benefits, for business to business connections, that could be derived from improving services to the *Silver* benchmark level. Given the dominance of London within the *Top 10* (every *Top 10* flow includes London) also shown is the *Top 10* non-London increases in GDP.
- 3.23 There is a high representation of towns and cities in the Yorkshire & Humber and North East areas within these lists. In terms of non-London flows there is a dominance of flows both within and between these two areas. Much of this relates to the relatively poor existing service standards in these areas and therefore the large gains that can also be made with improved direct links between these important economies, in combination with what are, in some instances, relatively large local economies.

To/From London	Non-London Flows		
Bradford	Leeds – Doncaster		
Leeds	Middlesbrough-Leeds		
Scunthorpe	Sunderland – Leeds		
Hull	Glasgow – Sunderland		
Lincoln	Leeds – Retford		
Grimsby	Glasgow – Newcastle		
Harrogate	Bradford – Doncaster		
Middlesbrough	Newcastle – Leeds		
Retford	York – Bradford		
Doncaster	Leeds – Scunthorpe		

Table 3.2 Top 10 largest Absolute Increases in GDP (Silver Level)

- 3.24 Table 3.3 identifies the *Top 10* two-way flows based on absolute benefits, for business to business connections, that could be derived from improving services to the *Bronze* benchmark level. Again there is a dominance of London within the *Top 10* (every *Top 10* flow includes London), so again also shown is the *Top 10* non-London increases in GDP.
- 3.25 For the links to London, shown in the left hand column, Sunderland and Aberdeen enter the *Top 10* when compared for the data for the *Silver* benchmark (while Inverness, not shown here, moves up to number 11). This is a reflection of both the economic potential from enhancing the linkages but also the relatively poor level of service that is currently provided.
- 3.26 For non-London links a couple of sub-regional linkages between Leeds and North and North East Lincolnshire move into the *Top 10* of largest GDP uplifts.
- 3.27 More details of the spatial distribution of the modelled GDP growth and wider economic benefits that could be derived from investment in the East Coast Main Line and its services can be found in Annex 4 to this report.

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To/From London	Non-London		
Bradford	Sunderland - Leeds		
Scunthorpe	Middlesbrough – Leeds		
Lincoln	Glasgow – Sunderland		
Hull	Scunthorpe - Leeds		
Grimsby	Leeds – Retford		
Harrogate	Middlesbrough – Bradford		
Middlesbrough	Bradford – Doncaster		
Retford	Leeds – Grimsby		
Sunderland	Newcastle – Glasgow		
Aberdeen	York - Bradford		

Table 3.3 Top 10 largest Absolute Increases in GDP (Bronze Level)

Economic benefits from investment by route section within the corridor

- 3.28 Identifying the GDP growth that could be achieved by better linking O-D pairs allows an assessment to be undertaken of the wider economic benefits that might be realised from improvements to specific route sections within the corridor.
- 3.29 This has been done by allocating the benefits from each O-D pair to route sections over which the O-D trip passes. The core section of the route from London to Edinburgh was divided into sections of line based around the locations of key junctions, and the sum of the GDP benefits from all O-D pairs that would use those sections was derived. Table 3.4 shows them ranked according to GDP uplift for each service level scenario.
- 3.30 The section from Peterborough to Newark performs well, reflecting the large number of O-D pairs that operate over this section. It is worth noting that the rankings for the *Bronze* benchmark level present some distinct results, with London to Hitchin ranking bottom. This is because this would represent a significant decline in service for many of the O-D pairs on the route, and therefore the 'benefits' are negative.

	Gold	Silver	Bronze
Kings Cross – Hitchin	3	8	10
Hitchin – Peterborough	2	3	9
Peterborough – Newark	1	1	3
Newark – Doncaster	4	2	1
Doncaster – Leeds	5	5	7
Doncaster – York	7	4	5
York – Leeds	10	10	8
York – Northallerton	6	6	2
Northallerton – Newcastle	8	7	4
Newcastle - Edinburgh	9	9	6

Table 3.4 Route Section Ranked by Potential GDP Uplift

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Using the evidence to identify the *conditional outputs* from future investment

- 3.31 This evidence of the potential GDP growth that will accrue from investing in improved service levels is valuable in illustrating what can be achieved from better connecting O-D pairs within the East Coast Main Line corridor. The evidence also informs the identification of sections of route where interventions might deliver significant benefits.
- 3.32 From this evidence we can start to identify the outputs that will deliver higher levels of GDP growth from the improvement of rail services in the corridor. These are the *conditional outputs* that are described in the section that follows. *Conditional outputs* are essentially broad outcomes that will identify what difference an intervention will actually make.
- 3.33 There will be a range of ambitions some to one benchmark, others to a higher benchmark that reflect the realism of the level of improvement (and consequently GDP growth) that can be achieved between O-D pairs or on lengths of the route, and the costs of doing so. The results of the GDP uplift likely to each benchmark (*Gold, Silver* and *Bronze*) informs the *conditional outputs* necessary to maximise the GDP growth within realistic bounds.
- 3.34 The *conditional outputs* provide a vision for the longer term, from which a strategy can be developed in partnership with the rail industry. From this, the rail industry can develop appropriate interventions that will enable the achievement of the defined *conditional outputs*. Potential interventions could be improvements to services, infrastructure or rolling stock or a combination of all of these.

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4 Conditional Outputs

Derivation of conditional outputs

- 4.1 The research informing this case for investment is focused on identifying the service outcomes required to unlock the economic potential of the East Coast Main Line corridor, expressed in terms of *conditional outputs*. Together, the *conditional outputs* form a package of outcomes that will benefit a number of cities and towns in the corridor. The *conditional outputs* have been produced with reference to the evidence collected and derived from modelling described in this report.
- 4.2 The *conditional outputs* are presented by grouping stations within the East Coast corridor on a geographical basis, with each section of the route including a *key node*, *intermediate stations*, and *associated stations*. *Key node stations* are the major junction stations served by the East Coast Main Line; *intermediate stations* are also significant stations served directly by services on the East Coast Main Line itself; *associated stations* are those that lie within the corridor, but that currently are not directly served, or served only with infrequent service by East Coast or open access providers. London itself is not treated specifically as a grouping but services to London are dealt with through each spatial group.

Service-based conditional outputs

- 4.3 For the *key node* group of stations, namely Peterborough, Doncaster, Leeds, York, Darlington, Newcastle and Edinburgh, *conditional outputs* are focused broadly on the achievement of a *Silver* benchmark level of service from the key node stations to London, other nodes and some intermediate stops. The conditional outputs for these key stations can be summarised as:
 - At least 2-3 per hour, to London and other key stations, offering an average speed of circa 100mph
- 4.4 For Leeds, and for other stations influenced by HS2 Phase 2 proposals, a *Gold* benchmark level of service (which broadly accords with a high speed rail type service in terms of journey speed and frequency) should be the long term focus of *conditional outputs* related to journeys to and from London.
- 4.5 For the *intermediate stations*, namely Stevenage, Huntingdon, Grantham, Newark, Retford, Wakefield, Northallerton, Durham, Morpeth, Alnmouth, Berwick-upon-Tweed, and Dunbar *conditional outputs* are focused on the achievement of a *Silver* benchmark level of service from the intermediate stations to London, key nodes and to some (but not all) intermediate stops. The conditional outputs for these intermediate stations can be summarised as:
 - Increased frequency and speed to London and direct services to a wider range of key and intermediate stations.
- 4.6 For the *associated stations*, including Lincoln, Scunthorpe, Grimsby, Hull, Bradford, Harrogate, Scarborough, Middlesbrough and Sunderland, one series of *conditional outputs* is focused on the introduction of regular direct services to London. Other *conditional outputs* focus on the achievement of the *Bronze* benchmark level of service to a number of key nodes and intermediate stations from the associated stations, including improvement of journey times and service frequencies. The conditional outputs for these associated stations can be summarised as:

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- Regular direct services to London;
- Improved service levels to some key and intermediate stations.
- 4.7 In Scotland *conditional outputs* focus on maintaining and the potential for developing long distance Anglo-Scottish services, where journey time improvements and targeted service extensions north of Edinburgh through Stirling or Falkirk and Perth to Inverness and through Dundee and Montrose to Aberdeen would bring internal and external connectivity benefits to Scotland's seven cities and provide improved cross-border options and connectivity.
- 4.8 A full list of *conditional outputs* is contained in Annex 5. Table 4.1 on the following pages shows the *conditional outputs* derived for key node stations. Detailed *conditional outputs* have also been derived for *intermediate stations* and *associated stations*.

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Station	Destination	Conditional Output
Peterborough	West Yorkshire	Improved services up to <i>Silver</i> level to West Yorkshire including Leeds, Wakefield and Bradford. Direct services to Bradford and journey time to Leeds ultimately to be reduced to 65 minutes, with two trains per hour
	Grantham, Newark, Retford, Doncaster	Aim to improve journey times to <i>Silver</i> level with two trains per hour (1TPH to Retford) to these stations and journey times reduced to the following times: Grantham 17, Newark, 26, Retford, 37. Retain existing minimum journey times between Peterborough and Doncaster.
	London	Retain journey times and frequencies at present levels, aim to increase speeds of FCC services to reduce journey times and increase line capacity by operating at a speed closer to East Coast services
	York, North East and Scotland	Reduced journey times to move average journey time closer to minimum journey, at least hourly service to Edinburgh aiming at journey times below 3h 30 minutes. Improvements in connectivity to Aberdeen and Inverness and intermediate destinations should also be considered.
Doncaster	London	Retain existing frequency but work towards incremental journey time reductions to a maximum journey time of 1h33min. This JT should apply to 2TPH
	West Yorkshire	Work towards a <i>Bronze</i> level of service between Doncaster and Leeds (Journey Time 25 minutes) and introduce direct service to Bradford. Retain existing Wakefield service, but additional service to Leeds may be routed via Hambleton junction, avoiding Wakefield.
	York, North East & Scotland	Reduced journey times to move average journey time closer to minimum journey, at least hourly service to Edinburgh aiming at journey times around 2h30 minutes. Improvements in connectivity to Aberdeen and Inverness and intermediate destinations should also be considered.
	Retford, Newark, Grantham, Peterborough	Provide an hourly direct link to these stations, utilising the proposed Cambridge service, and provide 2TPH to Newark, Grantham and Peterborough through stops in other LDHS services. Work towards journey times of: Peterborough as now, Grantham, 30 minutes, Newark 22 min, Retford 10min.
	Cambridge	Introduction of hourly direct service to Cambridge originating at Leeds. Journey time to Cambridge of 1h35min.
Leeds	London	In the long term deliver <i>Gold</i> output of 3TPH and journey time of 1h18 through completion of HS2. Prior to this work towards <i>Silver</i> journey time of 1h51min and 3TPH
	Doncaster	Work towards reduced journey times between Doncaster and Leeds including a journey time to Doncaster of 20 minutes. LDHS frequency to Doncaster should be increased to 3TPH while
	Retford, Newark, Grantham	Introduce hourly direct service to these locations as part of the Cambridge service described below.
	Tees Valley	Retain existing direct links to Middlesbrough, and work towards reducing journey times through

Table 4.1 Conditional outputs for key node stations

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		improvements in maximum permissible speeds.
	Tyne & Wear &	Retain existing connectivity to Darlington and the North East. Extend 1TPH forward to Edinburgh in
	Scotland	addition to existing Cross Country service. In the long term work towards a Leeds Newcastle journey
		time of 65 minutes - this would only be achievable with significant investment in line speeds and
		alignment. In the short term aim for a journey time of 1h20minutes. Improvements in connectivity to
		Aberdeen and Inverness and intermediate destinations should also be considered.
	Cambridge	Introduce hourly direct service from Leeds to Cambridge calling at Wakefield, Doncaster, Retford,
		Newark, Grantham, Peterborough and Cambridge. Journey time should be targeted at 1h55min.
York	London	In the long term deliver Gold output of 3TPH and journey time of 1h19 through completion of HS2. In
		the meantime existing service levels and frequencies should be maintained, and line speed
		enhancements investigated to further lower journey times.
	West Yorkshire	Existing connectivity to Leeds should be maintained while services to Bradford should be increased to
	—)/ // 0	21PH both of which would operate fast between York and Leeds
	Tees Valley &	Existing service frequencies should be maintained from York to Darlington, Middlesbrough and
	North East	Newcastle. However journey times should be reduced with a target journey time of 48 minutes from
	Ocational	Y OFK TO INEWCASTIE.
	Scotland	I he service frequency from York to Edinburgh should be increased to 31 PH by extending the existing
		London – Newcastie services to Edinburgh. In addition journey times should be reduced with a long
		term aim of reducing journey times to around 2n5min. Improvements in connectivity to Aberdeen and
Darlington	London	In the long term deliver <i>Cold</i> output of 3TPH and journey time of 1h50 through completion of HS2. In
Newcastle	LUNUUN	the meantime existing service frequencies should be increased to 3TPH to further maximise the
Newcastie		benefits of HS2 and also to bring a range of journey time improvements to a variety of locations journey
		time reduction between Darlington and York should also be investigated
	York & North	Maintain existing levels of service frequency and journey time between Darlington and York
	Yorkshire	Maintain existing levels of service nequency and journey time between banington and ronk
	West Yorkshire	The post May 2014 service frequency to Leeds should be maintained of at least 3TPH, however
		journey times should be reduced with a target journey time of around 45 minutes.
	Tyne & Wear	Existing service levels to Newcastle should be maintained, however improvements should be made to
		journey times. A long term target journey time of 25 minutes should be set; this however would only be
		achievable with substantial investment in infrastructure.
	Scotland	The service frequency from Darlington to Edinburgh should be increased to 3TPH by extending the
		existing London – Newcastle services to Edinburgh. In addition journey times should be reduced with a
		long term aim of reducing journey times to around 1h40min; this however would only be achievable
		with substantial investment in infrastructure. Improvements in connectivity to Aberdeen and Inverness
		and intermediate destinations should also be considered.

	London	In the long term deliver <i>Gold</i> output of 3TPH and journey time of 2h10 through completion of HS2. In the meantime existing service frequencies should be increased to 3TPH. To further maximise the benefits of HS2 and also to bring a range of journey time improvements to a variety of locations journey time reductions between Newcastle and York.
	Darlington & Tees Valley	Existing service levels to Darlington should be maintained, however improvements should be made to journey times. A long term target journey time of 25 minutes should be set, this however would require a significant investment in infrastructure to achieve this. Improved journey times to Middlesbrough, including improved connection to local services at Darlington.
	York & West Yorkshire	The post May 2014 service frequency to Leeds should be maintained of at least 3TPH, however journey times should be reduced with a target journey time of around 65 minutes.
	Scotland	Service frequency to Edinburgh should be increased to 3TPH by extending the existing London – Newcastle service to Edinburgh. Journey times should also be improved by minimising intermediate stops and also by investment in higher line speeds where possible. At least 1TPH should be extended to serve Glasgow. Improvements in connectivity to Aberdeen and Inverness and intermediate destinations should also be considered.
	Morpeth, Alnmouth, Berwick-Upon- Tweed, Dunbar	As part of a mechanism to improve journey times from Newcastle to Edinburgh for LDHS services it is suggested that 1TPH should operate from Newcastle to Edinburgh calling at intermediate stations this would help to deliver improved connectivity between these locations.
Edinburgh	London	In the long term deliver <i>Gold</i> output of 2TPH and journey time of 3h38 through completion of HS2. In the meantime existing service frequencies should be increased to 2TPH. To further maximise the benefits of HS2 and also to bring a range of journey time improvements to a variety of locations journey time reductions between Edinburgh and York should also be investigated. The present proposals for HS2 show services as being routed via the WCML, however if sufficient journey time reductions could be delivered on the ECML routing via the ECML may be justified, helping bring broader benefits.
	North East & York & West Yorkshire York & West Yorkshire	Improved LDHS service frequency to 4TPH, formed of 2TPH to London and potentially 1TPH Cross Country Service to Birmingham via Leeds and 1TPH TPE to Manchester via Leeds. A target journey time of 2h5min to Leeds should be worked towards.
	Morpeth, Alnmouth, Berwick-Upon- Tweed, Dunbar	As part of a mechanism to improve journey times from Newcastle to Edinburgh for LDHS services it is suggested that 1TPH service should operate from Newcastle to Edinburgh calling at intermediate stations this would help to deliver improved connectivity between these locations. To further increase connectivity it is suggested that such a service should be an extension of TPE services from Manchester to Newcastle giving greater connectivity from Northumberland to the south.
	North and North East Scotland	Improvements in connectivity to Aberdeen and Inverness and intermediate destinations should be considered.

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Customer services and other enhancements

- 4.9 In addition to identifying *conditional outputs* related to improved connectivity and service levels, a series of outputs for customer service has also been developed. On train, in the stations, and on the journey to the station, seamless, high quality journeys are important, especially to business.
- 4.10 The reputational impact of service quality, including to potential investors, is significant, even on relatively short journeys. The current offer is often poor in terms of customer service and comfort, including aspects such as catering, facilities for luggage, the comfort of seating, and sufficient leg room. *Conditional outputs* focus on:
 - Free wifi that works consistently, is high quality and continuous;
 - Phone reception that works consistently, is high quality and continuous;
 - An "office like" environment for work during a journey;
 - Stations and terminals that provide a consistently high quality waiting environment with good means of access, connections within the station, and high quality spaces for people to work, wait, meet and spend time;
 - Station and gateway access should be quick and easy by a variety of modes, including sufficient parking, and seamless interchange with other trains and public transport;
 - Sufficient seat capacity should be provided at peak times;
- 4.11 Fares should be both affordable and offer value for money, and should be clear and understandable for customers.

Freight

- 4.12 In addition to identifying *conditional outputs* for passenger traffic a series of outputs for freight traffic has also been developed:
 - Completion of gauge enhancement to all port locations to ensure rail can contribute to the rapidly growing inter modal freight sector;
 - Ensure capacity is available to facilitate the expected growth in Biomass fuel sector and the required linkages between East Coast ports and power stations;
 - Additional electrification to allow operation of through electric freight services from the electric spine to the ECML;
 - Ensure additional capacity for freight in parallel with passenger investment north of Newcastle;
 - Ensure adequate capacity and access to Rossington Inland Port is provided;
 - Ensure adequate capacity for freight traffic giving consideration to potential logistics parks at Retford;
 - Ensure appropriate infrastructure is provided at Peterborough to allow freight to pass from the west to east side to allow access to the Joint Line at Werrington Junction;
 - Gauge enhancement and infill electrification for freight in the Edinburgh area, and development of rail freight north of Newcastle.

5 **Delivering the benefits**

GDP benefits from delivering the conditional outputs

- 5.1 The research and analysis presented in this report demonstrates that investment in the line would yield significant GDP benefits to the UK as a whole and bring specific benefits to all of the local and regional economies along the length of the line. We have already presented some estimates of the scale of GDP uplifts that might be achievable. Much of this is related to identifying the largest benefits from the range of O-D pairs that were modelled. This formed a useful basis for identifying the theoretical benefits of improving linkages. It is clearly not feasible to provide the highest level of service for all O-D pairs, partly due to conflicts arising between them but also due to the practical constraints on investing in the network to deliver on these benefits. However, the conditional outputs defined in the preceding pages have attempted to maximise the level of benefits achievable. With the delivery of HS2 Phase 2 it would be possible to provide Gold levels of service to a number of locations, while also allowing a range of other O-D pairs to receive a Silver level of service.
- 5.2 The conditional outputs identified in chapter 4 have therefore been derived in broad terms around a more realistic long term aspiration of where the benchmark levels of service (Gold, Silver, Bronze) could be delivered. Through mapping these conditional outputs that could be achieved in the longer term for each location to the GDP benefits that modelling identifies would accrue from such a level of service change, it has been possible to estimate the GDP benefits of delivering the conditional outputs, simply by summing the appropriate benefits across locations.
- 5.3 Table 5.1 identifies the GDP uplifts per annum arising from these conditional outputs. They are estimated to range from over £300m per year without HS2 Phase 2 to over £500m per year with both phases of HS2.

Service Level	Wit	thout HS2	With HS2	
	No of city-city pairs upgraded to	GDP increase (£m pa)	No of city-city pairs upgraded to	GDP increase (£m pa)
Gold	0	n/a	5	264
Silver	41	152	36	96
Bronze	34	155	34	155
Total GDP pa £m	307			515

Table 5.1 Summary of GDP Uplifts based on Conditional Outputs

In Net Present Value terms over 60 years, GDP benefits could be worth between £5bn without HS2 5.4 rising to £9bn with HS2.

Realising the benefits

5.5 An initial assessment of the conditional outputs described above suggests that 8 Long Distance High Speed (LDHS) train paths per hour would be required between London and Peterborough,

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rising to a peak of 9 between Peterborough and Newark, in order to realise these benefits. By the end of Control Period 5 existing committed schemes will have delivered a capacity of 7 LDHS paths per hour from London to Doncaster. Therefore, as a minimum, one additional path would be required from London in each hour above those delivered in CP5.

5.6 For the purposes of the analysis we have assumed that HS2 Phase 2 will be constructed and that investment prior to HS2 will bring benefits to Leeds and Newcastle services, but that not all additional London services from associated routes will be able to operate prior to HS2. After HS2 Phase 2 is completed some existing services will be diverted and further services from associated routes could be introduced. More fundamentally this implies that investment in the ECML, both in advance of HS2 Phase 2 and then subsequently to enable the benefits of HS2 network to be realised north of Leeds, is essential. This is not a choice between investing in ECML or in HS2. They are complementary.

Delivering the investment – the next steps

- 5.7 Having established that there are substantial benefits from investing in the East Coast Main Line corridor and its services, ECMA will work with the rail industry to develop the best solutions and investments to make the economic growth potential in the corridor a reality.
- 5.8 The next step is for Network Rail to identify the interventions required, including infrastructure, rolling stock, station and service improvements. These will each be costed and assessed in terms of value for money and deliverability, and a programme of short, medium and long-term interventions produced
- 5.9 This investment will be supported in the meantime by jointly funded enhancement projects such as station upgrades and access improvements, which will be complementary to the delivery of the full range of *conditional outputs* described here.

6 Summary and conclusions

The East Coast corridor is an important driver of the UK economy

6.1 The local and regional economies served by the East Coast Main Line corridor rail services are of great value to the UK. Including London they represent just short of a half of UK economic output. Even when London's large economy is excluded from this calculation the other local and regional economies along the route contribute over £300 billion p.a. GVA.

There is tremendous potential for economic growth along the length of the East Coast corridor

6.2 The diversity of economic geographies means that the range and variety of connections between the areas within the East Coast corridor is complex. However, this work has shown that investment in the East Coast Main Line corridor and its rail services stands to bring benefits to *all* of the local and regional economies along the length of the corridor.

The GDP benefits to be gained from investment in the East Coast Main Line corridor could be in excess of £5 billion

6.3 The research and analysis presented in this report demonstrates that investment in the line would yield significant GDP benefits to the UK as a whole and bring specific benefits to all of the local and regional economies along the length of the line.

Unlocking this economic potential needs investment in the ECML

6.4 Investment in the East Coast Main Line is vital to help unlock this economic potential and growth. There has been under investment in spite of the demonstrable importance of the economies served in the East Coast corridor to the UK economy.

Identifying what is required to realise the economic potential

6.5 The research informing this case for investment is focused on identifying the service outcomes required to unlock the economic potential of the East Coast Main Line corridor, expressed in terms of *conditional outputs*. These include improvements to journey time and frequency, improved connectivity to London and to other key destinations, and improved trains and station facilities.

How rail investment can help deliver the growth potential in the East Coast Corridor

- 6.6 Investment to realise up to eight long distance high speed (LDHS) train paths out of London, and nine north of Peterborough, would generate over £0.3bn of additional GDP per year. If developed in combination with the High Speed 2 (HS2) Phase 2 proposals this could rise to over £0.5bn per year. This would be worth in the range £5bn-£9bn to the UK economy in present value terms over 60 years.
- 6.7 This GDP benefit to the UK is *in addition* to significant direct transport benefits to the economy that would arise from journey time savings and improved reliability. These GDP benefits will support increased productivity in our local and regional economies and new job creation.

Investment in the East Coast Main Line Corridor is complementary to HS2

6.8 This is not a choice between investing in the East Coast Main Line or in HS2. They are complementary investments and indeed these ECML investments are essential if HS2 is to deliver to its full potential.

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Annex 1

The Economies of East Coast Corridor

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Prospectus for investment in the East Coast Main Line

Annex 1 The Economies of the East Coast Corridor





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1 Introduction

1.1 The East Coast Main Line (ECML) is one of the most important transport corridors in the UK. It directly connects the UK capital and world city, London, with Scotland and with local and regional economies across the country. It's role in providing vital connectivity for these economies is therefore not only of local and national, but of international significance, providing economic linkages to government and the globally important financial and business centres in the UK capital, and to onward connections to London's international airports, as well as providing a huge variety of links between local economies in the UK itself. The economies in the corridor, taken together, are responsible for nearly half of UK economic output, as measured by GVA.

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2 Why investment in longer distance rail is important to the economy

Long Distance High Speed Services

- 2.1 Transport investments can, and generally do, affect the economy. They can in particular affect the location and pattern of economic activity (DfT Discussion Paper *Transport, Wider Economic Benefits, and Impacts on GDP*, 2005). In very simplistic terms if a transport improvement reduces the time needed to make a particular journey, it is likely to facilitate economic development at either end of the journey.
- 2.2 A 2013 paper for HS2 Ltd on the economic impacts of HS2, *High Speed Rail, Transport Investment and Economic Impact* by Bridget Rosewell (Volterra Partners) and Tony Venables (University of Oxford) is a most helpful, recent, summary of the economic impact of new rail investment in the UK. While the paper is, naturally, focused on HS2 and the benefits that investment in a totally new piece of infrastructure might bring, the paper provides a useful, and readable, insight into how investment in rail can provide economic benefits.
- 2.3 Rosewell & Venables cite a useful distinction, identified by historian Tim Leunig, writing in 2011, who noted that "what history teaches us is that transport matters when it connects up two places that are synergistic, or when it allows a confined place to grow." Leunig went on to contend that "expanding the City of London falls into the second, which is generally a rarer category".
- 2.4 This economic benefit from transport facilitating the expansion of places, which Rosewell & Venables note can be facilitated through "more commuting capacity (which) enables more economic activity to take place at a high level of productivity in city centres" can be captured through an assessment of the agglomeration externalities derived from such investments. It is these arguments that have been applied to CrossRail, and to the calculation of the wider economic benefits that will accrue from this investment in London. These agglomeration benefits and the economic advantages of expanded labour catchment areas that can result from transport investment were referenced by Rod Eddington in his 2006 report on transport and the economy, where he noted that "transport networks support the productivity and success of urban areas and their catchments, by getting people to work, supporting deep and productive labour markets and allowing businesses within the area to reap the benefits of agglomeration."
- 2.5 There has been much research undertaken on transport investment and agglomeration benefits over the last decade, including significant work in the UK by Daniel Graham. Writing in March 2010, in Advice on the Assessment of Wider Economic Impacts: a report for HS2, Graham and Patricia Melo provide an overview of how these agglomeration economies provide benefits from appropriate transport investment. Graham & Melo note that, at their broadest level, agglomeration economies occur when individuals benefit from being "near" to other individuals, and exist when the spatial concentration of economic activity gives rise to increasing returns in production. Transport and communications play a crucial role because, in most contexts, speed and low costs in transportation and communication provide a direct substitute for physical proximity. In simple terms, these benefits arise from linkages between intermediate and final goods suppliers, labour market interactions, and knowledge spillovers. Savings on transport costs mean that firms benefit from locating close to their suppliers and customers. Larger, denser labour markets may, for example, allow for a finer division of labour or provide greater incentives for workers to invest in skills. Finally, knowledge or human capital spillovers arise when spatially concentrated firms or workers are more easily able to learn from one another than if they were spread out over space.

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- 2.6 Graham & Melo assert that in looking at agglomeration economies, "the connectedness of locations can be thought of in terms of generalised transport costs, and there is some evidence that suggests that the strength of these relationships changes by economic sector, with some sectors likely to benefit more from concentration of activity than others. The key point is that agglomeration is essentially about the scale that can be achieved though proximity. In this sense it is clear that the ease of movement within cities, which is crucial to proximity, clearly counts."
- 2.7 Graham & Melo note that most of the arguments linking transport to agglomeration could hold in the sense that if spatial interactions between economic agents are made more efficient we may expect increasing returns, and that there are no obvious characteristics that would limit their generation over longer distances. This is helpful to this work when thinking of the context of inter-city interactions, comparable to those on the East Coast Main Line, as the benefits of agglomeration may be gained from investment in improved longer distance services. Indeed, Graham & Melo quote that evidence "on the spatial distribution of commuting and business flows shows that there is a considerable amount of long-distance interactions in the UK, which suggests investment in long-distance services could have an important effect on the level of connectivity between firms and workers", though they do place a caveat on this that empirical evidence to date is limited.
- 2.8 Wider economic benefits from transport investment, such as those from agglomeration externalities, are now generally accounted for when appraising transport investment in the UK. This is in addition to a number of ways of looking at how transport investment can bring economic benefits. These include direct transport supply benefits including income from transport operations, such as fares and wages, and from access to wider distribution markets. There are direct demand benefits including improved accessibility, and time and cost savings. There are also a number of indirect impacts at the microeconomic (sector) and macroeconomic (whole economy) levels. These include rent income, price of commodities, the attraction and accumulation of economic activities, increased competitiveness, and the growth of consumption.
- 2.9 In the UK, appraisal of these economic benefits falls broadly into two categories, welfare and GDP. Welfare or "social welfare" is the total well-being of society. It reflects the "utility" of people within society. Although the level of welfare is impossible to measure, it is possible to assess changes resulting of a project or policy, and it is this that forms the basis (of the benefit side of the equation) of the cost-benefit analysis traditionally undertaken to appraise transport investments. These welfare effects include journey time savings and reliability, and environmental and other factors (DfT Discussion Paper *Transport, Wider Economic Benefits, and Impacts on GDP*, 2005). Environmental effects such as noise, local air quality, greenhouse gas emissions, and physical impacts on the environment are clearly welfare only impacts, as are social impacts such as road safety, while wages or profits is a manifestation of the time saving to a traveller, and therefore is both a welfare and GDP gain.
- 2.10 While this evidence around arguments on the benefits that might be accrued from agglomeration externalities may be helpful, and there is a clear stream of welfare and GDP benefits that accrue from transport investment, in terms of longer distance rail investment, it is the connection of places that are synergistic that is the most interesting. Fundamentally, investment in longer distance rail is about connecting different centres. However, as noted by Rosewell & Venables, "the full impacts of 'connecting places that are synergistic' have received less attention" in the current debate around HS2, though they intimate that "wider benefits may be at least as important for a 'connecting places' project as they are for an 'expanding places' project."

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- 2.11 The primary purpose for ECML is to connect cities, as it is for HS2. When examining the latter, Rosewell & Venables present a number of arguments that hold for ECML. Increased connectivity increases the potential for trade, whether by improving freight connections or by improving the ease with which meetings can take place. This allows a reorganisation of economic activity between places, with firms, plants and offices moving to new - and now more efficient - locations.
- 2.12 Rosewell & Venables note that "the changes arise because better connectivity improves both 'market access' and 'supplier access', but "the consequences of better market and supplier access depend on the characteristics of the places connected." Rosewell & Venables however caution that "connectivity is necessary, but not sufficient, for such changes to occur. Whether (the changes) take place will be contingent on the ability of market participants to take up the opportunities or the extent to which poor connectivity has constrained them."
- 2.13 Rosewell & Venables explore two scenarios where improved connectivity may provide economic benefits. Firstly, when looking at transporting goods or service to market, for places that are quite similar, they assert that there will still be trade and economic benefits, as "better connectivity will tend to increase trade volumes, bringing benefits of more choice for consumers and more intense competition between firms." If the connected places differ - in size or initial income levels - the larger centre will have higher wages and land prices. The obvious example in UK terms is the difference between London and provincial cities such as Birmingham, Edinburgh, Manchester, or Leeds. In assessing "whether better connectivity will amplify or mitigate such differences", Rosewell & Venables stress that "there are opposing forces at work". Essentially, better connectivity will enable a concentration of activity in the larger centre, such as might be made possible by closing satellite offices and moving activity to a head office in the larger centre; but better connectivity will also enable the smaller centre to become "a more attractive location for headquarters; it starts off with lower wages and rents, and improved connectivity means that it will get better access to London's large market and large base of suppliers".
- 2.14 The second scenario examines specialisation and productivity, building on the basic economic principal that trade between areas with different economic characteristics is in general mutually beneficial. This is essentially based on the idea of 19th Century economist David Ricardo that a place should concentrate solely on those industries in which it is most competitive, and should trade to acquire products it doesn't produce. This is known as 'comparative advantage'. Rosewell & Venables note two modern dimensions to this. One is task specialisation, rather than application of this idea across broad economic sectors, illustrated by "on the service side, the provision of advertising or legal services", and "on the goods side, it may be about specialisation in particular parts and components which are then traded and put together in final assembly". The second innovation identified by the authors "is the recognition that while comparative advantage in these tasks may be partly to do with inherent characteristics of the location (e.g. abundant cheap labour or land), it is also acquired by a process of learning and by building economies of scale."
- 2.15 Rosewell & Venables identify the importance of connectivity. They refer to "a final good the production of which involves two tasks. Two unconnected cities will each perform both tasks at small scale. Two connected cities will each specialise in one task at double scale, and consequently higher efficiency levels. Connectivity allows each location to gain scale in a particular range of activities, thereby gaining a comparative (and absolute) advantage in what it does, while buying in the other task from a similarly specialised and efficient source."

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2.16 These economic gains are not accounted for in traditional cost-benefit analysis, but we can therefore identify that economic benefits will be gained through investment in rail, whether through the saving of business time, which represents a productivity gain, whether it leads to extra productivity for an existing activity (reducing prices or improving the product), or to increased business in a new location. In this way rail investment can improve business to business connectivity; provides benefit by improving connectivity for retail, leisure and tourism; and reduces travel time and cost, thereby increasing economic benefit.

3 The economies along the East Coast Corridor

- 3.1 The economic connections that the ECML provides stretch the length of the country, from London and South East England to the Highlands and Islands of Scotland, encompassing along its route many varied economies. This variety of economic geographies, and consequently the characteristics of the goods and services provided by them, creates a huge diversity of transport connections and travel needs. This is influenced by geography and by sector.
- 3.2 The economies within the corridor served by the ECML, as noted earlier, are responsible for nearly half of UK GVA. The strong influence of the London economy in this is plain. The Pan London economy is an order of magnitude larger in terms of GVA (measured in £bn, 2010, using NUTS3 data) than any of the other individual economies of Local Enterprise Partnership (LEP) areas, in England; or Regional Transport Partnership (RTP) areas, in Scotland.
- 3.3 In 2010, the Pan London economy generated GVA of £277bn. The next largest economy in LEP and RTP areas within the ECML corridor is Leeds City Region, with GVA of £45bn in 2010. This is not to say that the economies of the areas within the corridor north of London are insignificant, generating as they do in excess of £300bn of GVA annually.



Figure 3.1 Total GVA (NUTS3¹ 2010 Data) by LEP/RTP Area (£M pa) excluding London

3.4 London also has the most productive economy per capita. In 2010, the £277bn GVA generated in London represented £35,421 per head. The Aberdeen & North East Scotland (£29,506), Edinburgh & South East Scotland (£27,140) and Hertfordshire (£23,432) areas are the only other three LEP or RTP areas that achieved a GVA per capita of over £20,000 in 2010. GVA per capita for each of the LEP and RTP areas is illustrated in the figure below.

¹ Nomenclature of Units for Territorial Statistics, third level, more detail can be found at http://epp.eurostat.ec.europa.eu/portal/page/portal/nuts_nomenclature/introduction

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Figure 3.2 GVA per person (NUTS3 2010) by LEP/RTP Area

3.5 Expressing this in terms of the percentage contribution or size of the sector, within each local and regional economy, the figure below is helpful in understanding the importance of each sector within the specific geographies served by the ECML.



Figure 3.3 GVA by Sector Percentage (NUTS3 2010)

3.6 Public administration, education & health represents between 15% and 28% of the economy in every LEP and RTP area. There are distinctions within this range. In seven of the fifteen local and regional economies this sector represents 21% to 23% of the economy. In a further five (Highlands & Islands, Tayside & Central Scotland, North East England, the Tees Valley, and the Sheffield City Region)

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there is a greater reliance on public administration, education & health with this sector representing in excess of 25% of GVA per capita. The three areas where this sector represents a smaller part of the economy are Pan London, Hertfordshire and Aberdeen & North East Scotland, with between 14% and 16% of the economy in each of the three areas. These are three of four most productive areas when examining the productivity data.

- 3.7 This reliance on the public sector, where there has been strong growth over the last decade and a half growth which is unlikely to be repeated represents a weakness in a number of local and regional economies. A number of areas have economies with too few private sector jobs and enterprises, and too few jobs in key parts of the service sector economy, notably business and financial services; and lower levels of productivity, impacting on earning levels for a number of groups in the labour force.
- 3.8 A number of these areas are seeking to develop more higher skilled and higher paid jobs, such as through an increase in the number of higher value service sector jobs linked to business services and the new economy, as well as retaining the high value manufacturing jobs that presently exist in some of the economies. This is especially true of economies in the northern parts of the corridor, in northern England and parts of Scotland. This includes financial and business services, the key driver of employment growth nationally, and emerging sectors and niches around creative industries, digital, media, telecommunications and software. This contrasts with other local economies, especially those in the south of the corridor, where the overall skills and qualifications attainment of residents is a strength, although there certain local areas where skills are a challenge. These areas such as Greater Cambridge & Greater Peterborough, and Hertfordshire, rank highly amongst LEP areas by the share of Degree-level (or equivalent) qualified residents, and the share of residents in high level occupations, especially professionals.
- 3.9 This independence from the public sector in London, Hertfordshire and Aberdeen & North East Scotland coincides in geography to those areas that have distinct strengths in other parts of the economy. In the instance of Aberdeen & North East Scotland, the data show a dominant production sector representing 35% of the economy, illustrating the strong role that the private sector exhibits in the oil and gas industry in the North Sea based in and around Aberdeen.
- 3.10 When looking at Hertfordshire and Pan London in contrast, neither has a large element of production. Rather, the data reflect the strong role that the financial and business services sectors, again within the private sector, play in these areas. In the Pan London area these two sectors represent over 38% of the economy; in Hertfordshire, over 22%. Other areas where there is strong representation of financial and business service sectors include Edinburgh & South East Scotland (22%), Greater Cambridge and Greater Peterborough (21%) and Leeds City Region (19%).
- 3.11 Smaller sectors include information & communications; and agriculture. Information and communications generally represent less than 5% of each economy, with the exceptions of Pan London (9%), Hertfordshire (7%) and Greater Cambridge and Greater Peterborough (6%). Agriculture generally represents less than 2% of each economy, with the exceptions of the Highlands & Islands (5%), Lincolnshire (3.5%) and York, North Yorkshire and East Riding (3%).
- 3.12 This overview of the size and constitution of the local and regional economies served by the ECML illustrates the diversity of economic geographies within the rail corridor. Each is distinctive. The range and variety of connections between the areas is complex, though the common theme of the importance of access to London runs through the connectivity priorities of all areas. Each area also has its own priorities for growth and its own ambitions for future improvements to services and connectivity on the ECML. Some economies centred on knowledge and hi-tech industries, and the finance and business services sector, require direct business to business connections, facilitated by

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effective and fast passenger transport networks bringing people and businesses closer together. Elsewhere, tourism and the visitor economy is an important aspect of other local and regional economies served by ECML; yet others are based around manufacturing, requiring timely and cost effective freight services to move goods to market whether in the UK or overseas; and finally there are assorted primary sectors that form important elements of local and regional economies across the length of the country, necessitating the movement of bulk goods and agricultural produce, which in themselves produce a range of demands for transport. Emerging sectors, such as those associated with renewable energy, digital and creative industries, add to the complexity of demands, and ensure that business has ever changing requirements from the ECML. The ECML corridor and its connections have to cater for all of these diverse needs.

The importance of London is universally recognised

- 3.13 London is a genuine world city and one which is growing very quickly. It is a dominant economic force in a number of sectors and vital to the UK globally. A report by GLA (Greater London Authority) Economics suggests that between 1997 and 2010, London's share of headline GVA in "financial and insurance" activities rose from 41% to 47% of the UK total, while that in "professional, scientific and technical" activities increased from 32% to 36%.
- 3.14 The importance of London's economy, the reasons for its global and national importance, and the reasons it acts as a focus of travel for other economies in the East Coast corridor, start with its sheer size. London's economy is bigger than that of Sweden or Austria. It is larger than Denmark's and Portugal's combined. The city is home to 7.6 million people and acts as the heart of a wider South East region of around 21 million. Around three-quarters of a million people commute into the city every day.
- 3.15 Amongst its significant economic assets are:
 - The London stock exchange is the 4th largest with a market capitalisation topping £2.377tr as of 2011;
 - The Bank for International Settlements says that London's daily turnover of foreign exchange is \$1.9tr;
 - In 2011 London based companies raised a total of about £450m in venture capital investment;
 - London employs 45% of solicitors in private practice and is home to 25% of all private practice firms in the UK;
 - In 2010 the UK film industry spent £1.1bn, while international investment rose to a record breaking £928.9m with approximately three quarters being concentrated in and around the city of London;
 - In 2010 London's office space market was valued at £98.6bn and the City's contribution to the entire UK commercial property market was £488bn;
 - London is the world's number one tourist destination attracting around 30 million visitors annually with the revenues generated comprising approximately 10% of the city's gross value added income and employing 13% of London's workforce;
 - Retail accounts for about 40 percent of all money spent in London and provides roughly 400,000 jobs.

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- 3.16 London is also home to the UK government, yet another reason why connectivity is important for the rest of the UK.
- 3.17 In the case of those local economies geographically close to London, the relationship with the UK capital's economy is even more marked. One of Hertfordshire's priorities is to harness its relationships with London, recognising the benefits of its location so close to a world city. This enables Hertfordshire to pay particular attention to the growth of four sectors: film and media; sport, leisure and cultural activities; financial and business services; and high-end logistics.

Important finance and business service sectors require good business-to-business connections

- 3.18 Local and regional economies along the length of the East Coast corridor recognise the importance of finance and business services to the UK economy, and have ambitions to develop more higher skilled and higher paid jobs, such as through an increase in the number of higher value service sector jobs linked to finance and business services. The importance of good connections to other centres of activity within the sector make rail the natural choice for business travel, not just for business trips to London but also to other key centres such as Edinburgh and Leeds.
- 3.19 Rail offers an effective solution for maximising the amount of face to face time on a typical business day trip between economic areas in this and other sectors, whilst allowing productive work to be done during travel time. Comfortable trains of adequate seating capacity are important, providing reliable wifi access and a good working environment.
- 3.20 Both indigenous and international financial services businesses represent an important sector in Scotland, and potential for growth remains, particularly in asset management, asset servicing and the insurance sector. In particular in Edinburgh and its surrounding region, there is a relatively high concentration of employment in high value added sectors. Financial and insurance activities are responsible for over 10% of employment in the City of Edinburgh, and nearly 9% across the Edinburgh City Region as a whole. There is a low reliance in the Edinburgh region economy for employment on sectors which are expected to experience a decline in coming years, such as manufacturing. There is also a relatively low proportion of total employment in the public sector in the region - meaning that it is better placed than others in the UK to absorb the impact of cuts to public expenditure. Indeed, since 2011, whilst public sector employment (public admin, education and health) has fallen by just 1% in Edinburgh and the surrounding region, private sector employment has grown by 5% in Edinburgh, and 4% in the region overall. This reflects that overall, a third of employment in Edinburgh is in private professional services including information and communications, financial services, real estate services, professional services, administration and support services. This drops to just under a quarter in the wider city region, but represents over 180,000 jobs in total.
- 3.21 Leeds City Region is home to a nationally and regionally significant hub of activity in financial and businesses services that complements the global financial services hub of London. With a population of over 3 million, the Leeds City Region is the largest city region in the country outside London, producing approximately 5% of total national GVA annually, and contributing over half Yorkshire and Humber's GVA and employment. The city region is also home to one of the most diverse employment, business and knowledge bases in the North of England. It is the largest business base of any city region outside London with over 100,000 businesses and social enterprises, based around its prominence as the largest employment centre both for financial and business services outside the UK capital.

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3.22 As an illustration of how important the financial and business services sector can also be in smaller centres of activity seeking to take advantage of the sector's position as a leading growth area in the national economy, in Doncaster the sector employs over 9,000 people, which is more than 8% of the workforce. Doncaster, and other smaller centres, need to capture a share of the employment growth associated with finance and business services, particularly the higher skilled employment, given its importance for building a more resilient and productive local economy. Economies geographically close to London, such as those in Hertfordshire and Greater Cambridge and Greater Peterborough also benefit from strong finance and business services elements.

The high value North Sea oil and gas industry drives the demand for connectivity, including to related sectors in other local and regional economies

- 3.23 Aberdeen & North East Scotland benefits from high productivity levels, second only to London within the East Coast corridor, driven by the success of the oil and gas industry. Over the past 40 years, Aberdeen City and Shire has built a global reputation for excellence in oil and gas. The expertise of the oil and gas supply chain is enabling the continued investment currently being seen in the North Sea, and is also in demand all over the world, with many global projects being serviced from the region.
- 3.24 Good connections are important to related sectors and other local and regional economies in the East Coast corridor with activity in the oil and gas industry. For example, the Tees Valley is home to the largest integrated heavy industrial area in the United Kingdom, including a strong emphasis on petrochemicals. The Humber chemicals sector is of European scale and the second largest in the UK.

The growing renewable energy sector along the east coast is increasing the need for collaboration

- 3.25 This strong legacy in the oil and gas industry for local and regional economies in the East Coast corridor, and abundance of renewable energy resources stretching from Northern Scotland and along the length of the North Sea coast, mean its local economies are ideally placed to be at the forefront of the energy industry. Good connectivity within the East Coast corridor will benefit collaboration in the emerging energy sector.
- 3.26 In the Highlands & Islands, with superb natural resources, modern fabrication and port facilities, and transferable skills from the oil and gas industry, the area is bidding to be a world capital for renewable energy. Investment is being pursued in key ports and harbours to support offshore renewables development across Scotland, including important ports on the east coast such as Dundee and Montrose. Further south, the Tees Valley has a long history in energy production, including Teesside Power Station, one of the world's largest Combined Cycle Gas Turbine combined heat and power plants, producing 1,875 megawatts of electricity. This is now supported by Europe's largest bioethanol plant, which has opened at Wilton using locally grown wheat, and there is a further £4 billion of private sector investment programmed in the next five years in energy, biofuels and petrochemicals.
- 3.27 Located in the York, North Yorkshire and East Riding LEP area are Drax, the largest coal-fired power station in the UK, and Eggborough power stations. Again building on a legacy of power generation Drax has made a £700 million pound investment to transform itself into a largely biomass fuelled

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facility. Alongside its investment in converting to biomass, it is shortlisted for a £1bn carbon capture and storage investment. More widely there is great potential for sustainable energy and resource efficiency in farms and food businesses. That includes producing energy from waste.

- 3.28 The Humber's location and land resources on both banks offer unrivalled competitive assets for renewable and sustainable energy, especially offshore wind. The creation of a 'super cluster' through the formation of a new industry sector is planned. Biomass power generation is also an immediate opportunity. In the medium term, Carbon Capture and Storage offers an economic advantage for the Humber. The Humber also has significant potential for tidal and wave power generation, further illustrating the estuary's potential as a national asset with unparalleled economic opportunity. With 484 hectares of Enterprise Zone (EZ) sites fronting or close to the estuary, the Humber has sufficient portside land in the right location to create a UK manufacturing cluster connected to the renewable energy industry in the Humber and Greater Lincolnshire LEP areas. In Doncaster, low carbon industries are a fast growing and dynamic sector the planned investments in carbon capture, waste and renewable energy will make Doncaster one of the UK's biggest energy hubs, creating an estimated 4,500 - 5,000 new jobs (including around 3,600 construction jobs) over the next 10 years. The presence of major energy companies and the availability of natural resources, such as groundwater supplies and minerals, are among the key drivers of the emerging low carbon economy within the Sheffield City Region.
- 3.29 In the Greater Cambridge and Greater Peterborough LEP area low carbon environmental goods and services are increasingly important too. Peterborough is home to 335 companies and organisations with 6,000 jobs and a £600m turnover that anchors a much broader sector of firms and capabilities across the area. There is both a strong research and development and commercial presence in the Cambridge and Peterborough, and significant bio-renewable production companies across the rural economy. The strong presence of emerging energy sectors along the length of East Coast corridor can therefore benefit from, and support, the strong high-tech and bioscience industries that are forming an increasingly important, and valuable, part of local economies.

Biotech and "science city" sector is growing and creating demand for new business-to-business connections

- 3.30 By way of illustration, the Greater Cambridge area has the largest UK cluster of scientific research and development industry employment outside London. Biotech and life sciences are responsible for a cluster of nearly 600 companies, and makes the desire for strong connectivity with Cambridge an emerging feature of economies along the length of the East Coast corridor (see stakeholder views summarised in Annex 6).
- 3.31 In neighbouring Hertfordshire, there is a very high proportion of employment in pharmaceuticals manufacture, scientific research and development. Looking forward, Hertfordshire's vision includes to nurture the county's strength in science based enterprise and innovation. Hertfordshire LEP wants the county to be a catalyst across the "great technologies" that are likely to shape the UK's economic future. Among these, this could mean a particular role in relation to satellites and commercial applications of space; life sciences, genomics and synthetic biology; regenerative medicine; and agriscience.
- 3.32 Looking northwards, Derby Derbyshire Nottingham & Nottinghamshire LEP has determined that medical and bioscience is one of its priority growth areas. The Leeds City Region has potential for internationally competitive advantage in life sciences and related industries, particularly biosciences and healthcare & medical technologies; low carbon industries, particularly environmental technologies and biorenewables; and digital technologies, particularly in tele-health and IT. Life sciences and

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related industries have significant clusters of activity in the medical tech industries across the north and west of the city region, including a centre of excellence in regenerative medicine centred in Leeds and significant biosciences expertise centred in York.

- 3.33 The research and development base in York competes on the international stage in agri-tech and biorenewables. It is home to the Biorenewables Development Centre and two internationally recognised research groupings at the University of York, the Centre for Novel Agricultural Products and the Green Chemistry Centre of Excellence. The Food and Environment Research Agency (Fera) located at Sand Hutton outside York complements these resources. Fera employs some 550 scientists to support and develop a sustainable food chain and a healthy natural environment. In the Tees Valley, construction has commenced on the National Biologics Manufacturing Centre in Darlington, a £38m initiative that will research and develop potentially life-saving cures and vaccines. In the North East, Newcastle is a Science City, providing access to business support and community programmes, and supporting the attraction of investment onto the city's key science sites.
- 3.34 These links between emerging research and development based industries and excellent universities are illustrative of the importance of world class higher education institutions along the length of the East Coast corridor. Collaboration in biosciences and other high value sectors drives the desire for improved connections with internationally recognised institutions such as Cambridge University, and improved rail connectivity is an important aspect of this. For example, the Leeds City Region has one of the largest concentrations of higher education institutions in Europe (8 in total), producing high-quality research, of which 36% is world class, and 10% is world-leading. Improved connectivity to Cambridge is a strong ambition (see stakeholder views summarised in Annex 6).
- 3.35 Links north are also important. Scotland hosts the UK's second largest Life Sciences cluster and one of the most sizeable in Europe, contributing some £1.5bn of GVA a year and turnover worth £3.1bn to the economy. It also represents a growing sector of Scotland's economy. There are over 630 organisations in Scotland employing over 32,000 people. Scotland's main focus is on human healthcare with over 70% of the core life science organisations involved in this area. Aberdeen City & Shire, Tayside and Central Scotland are home to significant and growing biomedical and life sciences communities within Scotland, with numerous companies and research institutions employing nearly 6,000 specialists in fields including human health and nutrition, bone health, MRSA and fungal infections. Ninewells Hospital in Dundee is one of the largest teaching hospitals in Europe and has a business partnership with Dundee University covering a range of medical research activities and specialisms. In Edinburgh there is extensive activity in this sector, especially around the BioQuarter, and Midlothian for animal health. The industry in Scotland is recognised by both UK and Scottish Governments as one with high growth potential and the capacity to contribute significantly to the nation's productivity.
- 3.36 The East Coast Main Line will also link these important emerging local economies to a major new biomedical research centre currently under construction in King's Cross, London. Due to open in 2015, the Francis Crick Institute is a consortium of six of the UK's most successful scientific and academic organisations the Medical Research Council, Cancer Research UK, the Wellcome Trust, UCL (University College London), Imperial College London and King's College London. When it is fully operational, the Francis Crick Institute will employ 1500 staff, including 1250 scientists, and have an operating budget of over £100 million a year.

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Emerging digital and creative sectors also demand good businessto-business connections

- 3.37 Existing and emerging growth sectors across the local and regional economies within the East Coast corridor are digital and creative sectors. Creative industries are those based on individual creativity, skill and talent, plus those that have the potential to create wealth and jobs through developing intellectual property. The sector is dominated by small and micro units, and includes a high proportion of semi-professionals, self-employed and voluntary or unpaid workers. This is the standard model worldwide, as business units will work with a much wider chain on individual projects. Support for indigenous business growth will be important, for example by maintaining strong links to local Universities to harness research expertise and the pool of graduate talent available, whilst also attracting inward investment from national and international companies. This emphasises the need for excellent connectivity for businesses within these emerging sectors.
- 3.38 Creative industries are important in the more rural areas within the corridor. In the Highlands & Islands creative industries are diverse and fast-growing, and make an important contribution to the economy and cultural life of the Highlands & Islands. The dominance of small and micro businesses in the sector is strong. In the York, North Yorkshire and East Riding LEP area the economy is also based upon micro and small businesses, and future growth is dependent upon these small enterprises. There are 20% fewer medium and 50% fewer large companies than the UK average. A similar pattern can be seen in Greater Lincolnshire where over 96% of businesses employ less than 50 staff and a significant majority employ less than five.
- 3.39 In the urban economies, creative and digital industries are also important growth sectors. The digital sector is an important driver of growth nationally, especially with regards to cloud computing, data centres, software and IT services. Digital media and creative industries have a strong heritage in Dundee and Tayside, with 350 companies employing over 3000 people and a number of world leading computer games software houses located there supported by University and research capability. In Edinburgh there are also a number of success stories in this sector, including Rockstar North and the Leith Agency. In the Leeds City Region there is a network of strong local clusters of activity in the creative and cultural industries, which provide an important source of employment and add inimitable character to the city region's many distinctive places. Digital technologies (particularly in telehealth and IT) extend from the cluster of strengths in the Airedale Corridor and wider industrial base in digital and media technologies in the west of the city region, through to the hubs of digital expertise and enterprise in Leeds, Huddersfield and York. In the Humber digital and creative sectors are important growth sectors, and, with one of the fastest growing digital sectors outside London, the Humber can further develop its strengths in digital gaming, content creation and the creative sectors. The creative and digital sector in Doncaster currently employs over 2,000 people and will have an increasingly important role to play in supporting the success of other sectors where digital capabilities are required, for example advanced manufacturing and healthcare technologies.
- 3.40 In Greater Cambridge and Greater Peterborough knowledge and innovation are key strengths and future drivers of the area's economy, ranking highly in both the share of patent applications per 10,000 residents, and the share of total employment in the knowledge economy and high and medium technology manufacturing. The ICT and telecommunications sector, rooted in the Greater Cambridge and Greater Peterborough area's internationally significant ICT, software and telecoms cluster employs nearly 50,000 individuals. Creative industries are also strong across the Greater Cambridge and Greater Peterborough area, with technology-based creative companies turning over more than

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£1billion per annum in the area. The key sub-sectors demonstrating significant national growth are publishing, software and computer gaming, representing the area's most established creative industry clusters. Ten per cent of the UK's computer games developers are within five miles of Cambridge city centre.

3.41 Hertfordshire also has a very high proportion of employment in telecommunications, which the area is seeking to translate into a leading role in the big data revolution and the development of energy-efficient computing.

Tourism is important along the whole length of the corridor – and improved connectivity could extend the international 'circuit'

- 3.42 Tourism represents an important element of each and every local and regional economy within the East Coast corridor. The diversity and variety of tourism in the corridor is vast. The sector includes a wide range of accommodation establishments; visitor attractions; restaurants, bars and shops; travel agencies and tour operators; and sporting and other recreational activities. A number of areas rely on their distinctive and special natural and cultural heritage, and attract visitors who participate in outdoor activities such as walking and cycling, or even something more adventurous. Culture and history are the principal attractors in a number of towns, cities and rural areas alike.
- 3.43 A 2013 report by Deloitte for Visit Britain indicated that the tourism economy was expected to be worth around £127 billion in 2013, equivalent to 9% of the UK's GDP. Tourism supports over 3.1 million jobs, representing 9.6% of all jobs and 173,000 more than in 2010. The sector is predicted to grow at an annual rate of 3.8% through to 2025; significantly faster than the overall UK economy. Since 2010 tourism has been the fastest growing sector in the UK in employment terms, responsible for one-third of the net increase in UK jobs between 2010 and 2012. Britain will have a tourism industry worth over £257 billion by 2025 constituting just less than 10% of UK GDP and supporting almost 3.8 million jobs, which is around 11% of the total UK number. Tourism spending in 2013 was expected to be £113bn; £24bn by international visitors on visits to the UK and fares paid to UK carriers and £89bn by domestic residents. Inbound tourism will continue to be the fastest growing tourism sector with spend by international visitors forecast to grow by over 6% a year. The value of inbound tourism is forecast to grow from over £21bn in 2013 to £57bn by 2025.
- 3.44 Overseas tourists that landed at Heathrow are estimated to have spent £5.6 billion in the UK. This is estimated to create £3.7 billion in GDP in the tourist industry, £1.1 billion in its supply chain and £0.8 billion due to wages financed by consumer spending. Due to current visitor patterns, 68% of the economic activity generated occurred in London, which remains a focus, particularly for international tourists.
- 3.45 Improved connectivity in the East Coast Main Line corridor is therefore a vital element in spreading the benefits of both international and domestic tourists, ensuring that visitors can easily reach a range of potential tourism destinations within the corridor. This will enhance the already important tourism sectors in each of the local and regional economies along the route, and help to ensure that the local economies each have an opportunity to benefit from the overall growth in tourism over the next decade.
- 3.46 As an illustration of the value and importance of tourism for local economies within the East Coast corridor, in 2012 the City of York alone saw £606 million spend by visitors. The tourism industry in York supports over 20,000 jobs, which accounts for 20%, or 1 in 5 jobs in the city. Figures from York also illustrate the growth of tourism in local economies. These 2012 figures show that around 7 million people visit the city each year, compared to just over 2 million in 1987, and that visitors are

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spending increasing amounts. Expenditure by visitors to York is highest on food and drink, followed closely by shopping. Rising numbers of visitors are staying overnight, with expenditure by day visitors accounting for only a third of spending.

- 3.47 Scotland's tourism industry is made up of around 20,000 businesses, and supports over 200,000 jobs directly and indirectly. Tourism in Scotland generates over £4 billion each year, accounting for approximately 4% of Scotland's GDP. Tourism expenditure is forecast to grow at 3% per annum to 2020 with spending by inbound visitors forecast to grow at a faster rate than spending by residents. Business tourism accounts for 20% of total tourism spend, worth over £800 million to Scotland's economy. Furthermore, both Glasgow and Edinburgh are ranked among the top 30 cities in the world for conferences.
- 3.48 Tourism is crucial to the economy of the Highlands and Islands, and proportionally more so than in the rest of Scotland. Famous destinations such as the Isle of Skye and Loch Ness attract large numbers of visitors each year. Global whisky companies showcase their individual brands and there are distinctive cultural and sporting events and a range of food and drink festivals. Similarly, tourism is important in Aberdeen & North East Scotland. It is a growing sector, currently generating £340 million worth of spend in Aberdeen City and Shire every year. In addition to this, the day trip market is estimated at over £300 million annually. 18,400 people currently rely on the tourism industry for employment, totalling 8% of the region's total jobs. Tourism is also a key part of the economy of Tayside and Central Scotland, worth nearly £800 million annually, with heritage and history, golf, and outdoor activities tourism all being important. The ongoing £1.1 billion regeneration of the Dundee Waterfront, which includes the new V&A museum of art and design and a transformed Dundee Station at its heart, will further enhance the tourism and wider economic potential of the region, with direct connectivity to the East Coast and wider rail network.
- 3.49 Edinburgh's tourist attractions are visited by over 7 million people a year. In 2011, visitor spending was £1.16 billion, compared to only about £250 million in 1990 and employment in tourism is 32,000, accounting for about 12% of the city's workforce. Around 29% of visitors currently arrive by train, less than the 41% arriving by air. 57% of visitors to the city were from overseas. Attractions include Edinburgh's Festivals which account for some 4.2 million attendances, generating £261 million of national economic impact, of which £41 million is spent on accommodation and £37 million in the city's cafes and bars.
- 3.50 In North East England many of the area's attractions are easily accessible from the East Coast Main Line, including Durham Cathedral, Hadrian's Wall, Lindisfarne and the Northumberland coast and its castles, as well as cities such as Newcastle with its array of attractions.
- 3.51 In 2010 there were 10 million domestic overnight trips in Yorkshire and the Humber (10% of all the trips in England) generating nearly £1.5 billion in spend. There were also 1 million inbound trips in Yorkshire and the Humber which generated over £400 million. In Yorkshire and the Humber the visitor economy builds on its existing strengths in this sector through the distinct Yorkshire and Lincolnshire identities, including its traditional coastal resorts, heritage assets such as York Minster and Fountains Abbey, museums and galleries including the National Railway Museum and the Millennium Galleries in Sheffield, and world class sport such as at York and Doncaster Racecourses. In Nottinghamshire the visitor economy is also important, with the influence of Robin Hood and Sherwood Forest being a strong attractor. In Newark the English Civil War is important, and the town will shortly see the opening of the £5.4 million National Civil War Centre.
- 3.52 Lincolnshire has outstanding heritage assets in Lincoln City including the Cathedral and Lincoln Castle. Other visitor assets include the east coast resorts, Boston with its historic links to the Pilgrim Fathers, RAF heritage (exemplified by the RAF Waddington International Air Show) and the natural

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beauty of the Wolds. More than 20 million visitors come each year to the Greater Cambridge and Greater Peterborough area's distinctive heritage attractions such as Cambridge, Ely, Bury St Edmunds and Peterborough, horse racing at Newmarket and Huntingdon, the Imperial War Museum at Duxford, and rural habitats such as Wicken Fen, Great Fen and Rutland Water, the Fenland waterways and the North Norfolk Coast.

Manufacturing specialisms – both advanced and applied: links to important freight routes

- 3.53 There are a wide range of manufacturing activities and specialisms within the East Coast corridor. In the North East of England, manufacturing jobs remain important, accounting for a large proportion of better paid, private sector jobs. Employment levels in manufacturing continue to be above the national average and this is particularly true in the case of the automotive sector. The automotive sector is dominated by the Nissan manufacturing plant in Sunderland, which has produced over 7.5 million cars since it opened three decades ago. The Sunderland plant produced more than 500,000 vehicles in both 2012 and 2013 and more than 7,000 staff now work at the site, plus more than 29,000 employed by suppliers and there is ambition for an international advanced manufacturing park built around the Nissan campus and serving the country's export and manufacturing ambitions. This model is expected to be replicated by the new Hitachi train manufacturing plant at Newton Aycliffe, where the next generation of IEP trains will be produced. This extends the tradition of the rail industry in the East Coast corridor, which still retains strong links through Wabtec in Doncaster, and Network Rail and others in York.
- 3.54 The Tees Valley also retains a strong manufacturing sector. Petrochemicals, industrial biotechnology plants of a world scale, a steel industry specialising in construction steels and a world-class advanced engineering industry are all present in the Tees Valley. The petrochemical cluster, at Wilton, Billingham and Seal Sands, is the largest integrated chemical complex in the UK in terms of manufacturing capacity, and the second largest in Europe it contributes £3.5 billion to the UK economy and 70,000 jobs in the UK depend on it. The world class engineering design and plant maintenance industry employs over 5,000 people, and strong potential for maritime engineering remains, particularly in Hartlepool. Steel manufacturing, in spite of some job losses, still employs 2,500 in steel making in the area, focused around the Redcar Steel complex. The needs of the manufacturing and other industrial sectors in the North East and Tees Valley are served by Teesport, the fourth largest port in the United Kingdom, as well as the Port of Tyne and other smaller ports.
- 3.55 In the Leeds City Region, manufacturing remains important across a diverse range of sub-sectors, particularly centred in Bradford, Kirklees, Leeds and Wakefield, but extending across the west and south of the city region. The Sheffield City Region has a high value manufacturing base together key assets such as the world renowned Advanced Manufacturing Park and Research Centre, which is a centre of collaboration between business and Universities, and will be home to the most advanced manufacturing factory in the world. This success in advanced manufacturing builds on the historical legacy of manufacturing across the city region, and can be seen to continue to impact upon the area. Doncaster retains a competitive manufacturing sector which employs over 10,000 people and advanced engineering represents an excellent opportunity for Doncaster to support more highly skilled jobs. The range of manufacturing and engineering is extensive from skilled tool-making through to rail and aviation engineering employers. The rail engineering sector is also projected to grow through electrification and modernisation investment in the national rail network, bringing further high-value jobs and output for the Sheffield City Region.

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- 3.56 In the Humber and Greater Lincolnshire, Scunthorpe is home to one of Europe's most competitive integrated steel plants. The Humber's plans to grow the offshore wind sector have major potential in terms of steel demand from the supply chain and the development of complementary areas of expertise. Elsewhere in the Humber the marine engineering sector is essential to support the trading estuary and the rapidly emerging offshore renewable energy sector, as well as providing worldwide marine services. Aerospace has a long term future around the Humber and caravan manufacturing remains an important part of the local economy, as do modular buildings and modular building erection.
- 3.57 In Derby Derbyshire Nottingham Nottinghamshire (D2N2), the LEP has identified advanced manufacturing and transport engineering as a sector of focus. The area has strengths in manufacturing, with the percentage of jobs and economic output from manufacturing being higher in D2N2 than for the East Midlands as a whole or for the UK. The productivity of the transport equipment manufacturing sector in and around Derby, where a number of globally important firms in this sector are located, considerably exceeds the national average. A relatively high skill and high pay employment profile exists in Derby City, South Derbyshire and along the M1 corridor, related to the presence of highly competitive advanced manufacturing firms. In Newark engineering is important, with local strengths in the manufacture of fabricated metal products and industrial machinery, closely linked to distribution, logistics, and the wholesale and retail sectors.
- 3.58 In the rural parts of the corridor, food processing and manufacturing remain important to many of the local and regional economies. The industry relies on good freight and logistics for product supply across the length of the East Coast corridor.
- 3.59 Food and drink was Scotland's top exporting industry in 2009. In the Highlands & Islands not only is the food and drink industry a significant economic driver with great potential for further development, but quality products such as world-class beef and lamb, fresh fish and shellfish, traditional shortbread, Scottish oatcakes and malt whisky, help in defining the Highlands and Islands of Scotland to the rest of the world. The food and drink industry in the Highlands and Islands generates turnover in excess of £1 billion per annum and supports around 25,900 full time jobs across the region. Some 1,900 businesses operate in the food and drink supply chain, ranging from the world brands to the many small, innovative producers successfully supplying domestic and international niche markets. In Aberdeen & North East Scotland food and drink are similarly important, building on the region's history and strengths across agriculture and fishing - contributing 14% to Scotland's total agricultural output, and over a quarter of Scotland's total food and drink exports. The region is also home to the UK's largest white fish landing port in Peterhead, and Europe's largest shellfish port in Fraserburgh together accounting for over 40% of all Scottish fish landings (2011). Tayside and Central Scotland is the major producer of soft fruits in Scotland and is also a significant producer of quality beef, potatoes, grain and whisky.
- 3.60 In York, North Yorkshire and East Riding there is a diverse agricultural base. Businesses in the agricultural sector are around 3.5 times more concentrated in the LEP area than national average, and more concentrated than any other sector locally, whilst food manufacturing accounts for around 35% of all manufacturing jobs. Focus on food manufacturing, agri-tech and biorenewables is in keeping with a 'smart specialisation' approach given the strength of the sectors here and the pronounced research and development activity and expertise in them. In the Humber and Greater Lincolnshire food processing and manufacture is important, and the Humber's relationship with the sea and its agricultural hinterland is as relevant now as ever in terms of jobs. There is particular expertise in all forms of frozen and chilled foods in Grimsby, supporting over 5,000 jobs. Although agriculture itself makes up only a small share of jobs in Lincolnshire, there are a substantial number of jobs in the food sector within manufacturing and service industries. 15.5 % of employees work in

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manufacturing, much connected with agri-business. Greater Lincolnshire has a nationally strong agrifood sector with many established and nationally important food-based businesses, both on the South Humber bank and in south Lincolnshire.

3.61 Food and drink manufacturing is important in Derbyshire and Nottinghamshire. The manufacturing of food and drink products is important across the D2N2 area accounting for 3.8% of GVA – particularly so in Newark & Sherwood where food manufacturing is by far the largest manufacturing sub-sector accounting for 39% of manufacturing jobs in the district; and in Bassetlaw. The sector is important locally because of its close connection to agriculture and also because of the D2N2 area's excellent connectivity, enabling the rapid distribution of food and drink products nationally and internationally. Greater Cambridge and Greater Peterborough is home to a strong and fast-evolving food processing and agribusiness sector.

International links – connectivity to Heathrow and other London airports is important

- 3.62 Aviation plays an important role in the UK economy. It supports tourism, enabling international visitors to travel easily to and from the UK. It facilitates inward investment, making it easier for international companies to establish bases in the UK with easy access to both their home markets and other markets in Europe. And it supports exports by transporting British-made goods in international markets, and by enabling British businesses to develop relationships with potential customers in overseas locations. Britain's international connectivity is boosted by the presence in the UK of a major international hub airport at Heathrow, and the East Coast Main Line corridor and its services represent an important connection for areas along the corridor to Heathrow and other London airports, namely Gatwick, Stansted, Luton, London City and Southend. The East Coast Main Line provides good access to a number of these airports from connections at Stevenage and Peterborough, as well as through London King's Cross. The East Coast Main Line corridor and its services also provides connectivity to a range of regional airports, including (in order of passenger volume) Edinburgh, Glasgow, Newcastle, East Midlands, Aberdeen, Leeds-Bradford, Robin Hood Doncaster Sheffield, Inverness, Humberside, Durham Tees Valley and Dundee.
- 3.63 It is estimated that 80% of all long haul passengers visiting Britain arrive at Heathrow. Foreign tourists that land at Heathrow are estimated to spend over £5.5 billion in the UK each year. In the UK, 3.7 million people are estimated to work for foreign-owned firms, many of whom, estimated to be in the order of 1.3 million, have to use a hub airport to travel to visit the parent company. It is estimated that the manufacture of goods for export by air contributed £28 billion to UK GDP.

International links – and connections to the east coast ports are important for international trade

- 3.64 To support the development of trade and exporting, economies within the East Coast corridor need fast, reliable and resilient connectivity to external markets by road, rail, air and sea. This is equally true about facilitating visitors to come to the area. Developing the full potential of rail freight, including for traffic to and from the area's ports, without constraining the requirement for improved inter-city and regional rail passenger services is therefore paramount.
- 3.65 There is a significant export economy focused around Teesport. Some 60% (approximately £15 billion) of the UK's chemical exports are from the Tees Valley. Teesport is the fourth largest port in the UK and the fastest growing, and handles between 7 and 8% of all UK container traffic in addition

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to oil and gas based chemicals, iron ore import, coal imports and steel exports, which account for 75% of its trade. Teesport handles over 5,000 vessels each year and around 34 million tonnes of cargo. The Teesport estate covers some 779 acres and is an integral element of the wider industrial area. Steel, petrochemical, agribulks, manufacturing, engineering and high street commerce operations are all supported through Teesport, in addition to a burgeoning renewable energy sector. Two major retail import centres opened in 2009, employing around 800 people, and planning permission has been granted for a major deep sea container terminal of national importance at Teesport. Good road and rail connections to the port, including on wider national and regional networks, as well as good direct local access, are critical.

- 3.66 The Humber is the largest trading estuary in the UK (by tonnage) and the fourth largest in Europe, handling 79.8m tonnes of cargo in 2011 and experiencing strong year-on-year growth. The estuary supports the petrochemicals and chemicals sector worth £6bn per year; provides raw materials for much of the UK's energy sector; and offers international expertise in logistics in key sectors including automotives, handling over 500,000 vehicles per year. The logistics element of the port offer is emerging, especially in support of port-centric logistics. The Humber ports are important elements of the economy both in support of manufacturing locally and as a vital gateway for the UK economy. Grimsby and Immingham form the fourth largest port in Northern Europe, serving the varied needs of the manufacturing and other trading sectors. The Port of Immingham is the UK's largest port by tonnage, handling up to 55 million tonnes, including nearly 20 million tonnes of oil and 10 million tonnes of coal. The Port of Hull handles around 10 million tonnes each year.
- 3.67 The Sheffield City Region logistics sector already has an economic output of £930m and employs 31,000 people; its expected growth means that this sector has huge potential to provide a significant contribution to the growth of the local economy. The development of the Airport Growth Corridor and major sites alongside the M18 also gives Sheffield City Region the opportunity to become the centre of excellence for the sector in the UK. The logistics sector employs 6,500 people in Doncaster alone.
- 3.68 Further south, building on Peterborough's strengths as a value added logistics hub, the Greater Cambridge and Greater Peterborough area is home to a range of nationally important logistics operators. The Port of Felixstowe, Britain's biggest and busiest container port, and one of the largest in Europe, serves the East Coast corridor and its businesses. The port handles more than 3.4million TEUs (Twenty-foot Equivalent Units) and welcomes over 4,000 ships each year, including the largest container vessels afloat today.

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Appendix A

Bibliography of economic plans and other documents used to collate this review

Issue no

1

North East Independent Economic Review Report, chaired by Lord Adonis, North East Local Enterprise Partnership, April 2013

Economic and Regeneration Statement of Ambition, Tees Valley Unlimited, 2012

Connecting the Tees Valley: Statement of Transport Ambition, 2011

Strategic Economic Plan, draft version, Business Inspired Growth, the York, North Yorkshire & East Riding Enterprise Partnership, December 2013

Realising the potential, the Leeds City Region Local Enterprise Partnership Plan

European Structural and Investment Fund Strategy for the Humber 2014-2020

A Plan for the Humber 2012-17, October 2012

Humber LEP Rail Strategy, January 2013.

Sheffield City Region Local Enterprise Partnership Draft Strategic Economic Plan, December 2013

Doncaster Council, draft Economic Growth Plan 2013-18, 2013

D2N2 Growth Plan consultation draft, 2013

A Profile of the Economy, Labour Market and Business Structure of Newark and Sherwood - A report produced on behalf of the Newark and Sherwood District Council, October 2013, Nottingham Business School at NTU

Growth Ambitions for the Greater Lincolnshire LEP, 2013

The wider economic benefits of rail interventions in Lincolnshire, CEBR, 2008

Improving Rail Services between Lincoln and London, Lincolnshire County Council, 2012

Supporting Lincolnshire Railways, 2010

Greater Cambridge Greater Peterborough Growth Prospectus Economic Position Statement August 2012

Perfectly placed for business: A Strategy for Smart Economic Growth in Hertfordshire 2013-2030: Consultation Draft, June 2013

Hertfordshire's Economic Outlook 2011, Hertfordshire County Council, October 2011

The Mayor's Economic Development Strategy for London, Greater London Authority, 2010

The London Economic Plan and Major Industries website, focused on providing information pertaining to the Lord Mayor's London Plan, which is based on the Greater London Authority Act 1999

City of Edinburgh Council 2013 outlook, Oxford Economics, 2013



Fast Track Scotland - Making the Case for High Speed Rail Connections with Scotland, Transport Scotland, 2013

The value of aviation connectivity to the UK – a report for BAA, Oxford Economics, March 2012

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Annex 2

Rail Service and Infrastructure Review

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> Annex 2 Rail Services and Infrastructure Review





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1 Introduction

- 1.1 The East Coast Main Line is one of Britain's key rail arteries linking London, the East Midlands, Yorkshire & Humber, the North East and Scotland. While it may be characterised as being a long distance main line dominated by express passenger services it is truly a mixed traffic, mixed purpose, railway serving a diverse range of journey purposes and with a range of long distance passenger, London and South East commuter services, regional passenger services and freight operations.
- 1.2 Over the coming years there will be a number of changes to the patterns of working, contributing to meeting rising demand for rail services and also contributing to the economic objectives of the areas served.
- 1.3 The following sections describe the existing pattern of operation, divided by sector, constraints to capacity and proposed planned interventions to mitigate the issues, and future services and aspirations.



2 Existing Services

Long Distance High Speed Services

- 2.1 Long Distance High Speed (LDHS) services on the East Coast Main Line are provided by four main operators, as follows:
 - East Coast: Dominant operator of LDHS services, operating the trunk route from London to Leeds, Newcastle and Edinburgh.
 - Cross Country: Operator of services from the South West and South East to Newcastle and Edinburgh, joining the ECML at Doncaster and Wakefield
 - Trans Pennine Express: Operator of services from Liverpool and Manchester to Hull, Scarborough, Middlesbrough, and Newcastle.
 - Hull Trains: Open access operator providing services between London and Hull
 - Grand Central: Open access operator providing services between London and Bradford via Brighouse and Sunderland via the Durham Coast.

East Coast:

- 2.2 East Coast operates the majority of Long Distance Services on the route. On a weekday East Coast operates a trunk service from London King's Cross of five trains per hour in a standard off peak hour. The number of trains that run allow a lot of services to operate with very few stops, helping to minimise journey times, but creating some connectivity issues for intermediate stations. The five trains per hour from London King's Cross operates as follows:
 - Xx:00 London Edinburgh calling at York, Darlington, Newcastle, Berwick-upon-Tweed, Edinburgh
 - Xx:03 London Leeds calling at Peterborough, Doncaster, Wakefield Westgate and Leeds
 - Xx:08 London Newark/York calling at Stevenage, Peterborough, Grantham, Newark Northgate, Retford, Doncaster and York. Alternate services terminate at York.
 - Xx:30 London Newcastle/Edinbugh calling at Peterborough, Newark Northgate, Doncaster, York, Northallerton (alternate hours), Darlington, Durham, Newcastle, Alnmouth, and Edinburgh. Alternate services terminate at Newcastle.
 - Xx:35 London Leeds calling at Stevenage, Grantham, Doncaster, Wakefield Westgate and Leeds.
- 2.3 The standard weekday pattern provides a compromise between high speed operation, with a number of point to point average speeds being over 100mph and connectivity, with key hub stations such as Peterborough, Doncaster and York being served well, but other smaller stations such as Stevenage, Grantham, Newark Northgate and Retford being served less well. Some other stations notably Morpeth and Dunbar are served at peak times and in the evening only.
- 2.4 In addition to this core service East Coast operate services to a number of other destinations beyond the main trunk routes. A number of these services operate only once per day, providing a morning peak business train to London with a return service in the evening. A number of these services operate within "marginal time" which is to say the trains used would not be utilised on

alternative services at these times and therefore there is no opportunity cost of providing the service. Additionally they often serve locations relatively close to a depot allowing services to start in the early morning and return at night at relatively limited cost. This is particularly the case for three West Yorkshire destinations served by East Coast. The additional destinations served are as follows:

- 1 Train per day in each direction Bradford Forster Square, Glasgow Central, Harrogate, Hull, Inverness, Lincoln, Perth, Skipton, Stirling
- 4 Trains per day in each direction: Aberdeen, Dundee
- 2.5 Scotland's east coast authorities regard the existing East Coast network and service extensions north of Edinburgh to Inverness and Aberdeen as critically important strategic cross-border links which should be preserved and developed. In 2011 the London King's Cross to Glasgow service was reduced from a two hourly frequency to one service per day partly in response to an improved service on the West Coast Main Line but also to improve rolling stock utilisation allowing an improvement in service frequency on the trunk route.
- 2.6 The level of service at weekends is reduced relative to weekdays with only 3 trains per hour departing from London. Services provided are 2 TPH to Edinburgh and 1 TPH to Leeds. Due to the lower number of services journey times are extended at weekends to enable the services to accommodate more stops, although it should be noted that Edinburgh generally receives an improved service at weekends.
- 2.7 Services also provide good connectivity with access to Europe via High Speed1 and Eurostar, and interchange at London St Pancras. For access to Paris and Brussels travelling via the ECML and HS1 is competitive with the door to door journey time by air for trips from the Yorkshire and Humber and southwards, and the number of opportunities to travel tend to be greater than from regional airports.
- 2.8 East Coast currently operates a mixed fleet of diesel and electric trains all capable of operating at 125mph. These trains offer a generally high level of passenger accommodation. Looking to the future these trains are to be replaced from 2017 by new IEP trains which will be delivered in, electric and bi mode forms. These trains will have a higher capacity than the existing trains but will still only be capable of operating at 125mph, limiting the scope for incremental increases in line speeds.
- 2.9 The East Coast franchise is presently operated by Directly Operated Railways on behalf of the Department for Transport, however a refranchising process is in place with the aim of returning the franchise to the private sector by Mid 2015.

Cross Country:

- 2.10 North of Doncaster, Cross Country Trains is an important operator, providing two trains per hour over the section of line from York to Newcastle. Cross Country services originate away from the ECML with services starting either in the South West at Plymouth or in the south east at Reading. The typical pattern of services is as follows:
 - 1 TPH Reading Newcastle via Doncaster and York
 - 1 TPH Plymouth Edinburgh via Leeds and York

- 2.11 North of York all services call at Darlington, Durham and Newcastle, with less frequent calls at Morpeth, Alnmouth and Berwick-Upon-Tweed. North of Edinburgh, four trains per day operate to Dundee and Aberdeen, serving intermediate stations, while a broadly two hourly service operates to Glasgow Central.
- 2.12 While there are 2 TPH north of York provided by Cross Country the services are in fact flighted, operating within a few minutes of each other and hence reducing the potential benefits of two trains per hour from stations between Newcastle and York to Sheffield, Derby and Birmingham. The reason for this is the difference in journey time between York and Sheffield for services routed via Doncaster and via Leeds, and is complicated further by capacity issues between Northallerton and Newcastle that limit the ability to spread out LDHS departures over each hour.
- 2.13 The Cross Country franchise is presently set to run until 2019 at which point there may be significant changes to services as a result of the development of the electric spine route from Southampton to Sheffield. This may also involve the replacement of the existing diesel powered Voyager rolling stock with alternative electric rolling stock.

Trans Pennine Express:

2.14 Trans Pennine Express operate two main services along the ECML. The first is an hourly service from Manchester Airport to Middlesbrough, which joins the ECML at York and leaves at Northallerton, but provides the main service at Thirsk station. The second service is an hourly service from Manchester Airport to Newcastle. These two services form the main service to Northallerton, while the Newcastle service provides the main service to Chester-le-Street station, north of Durham.

Open Access Operators

2.15 The ECML is unique in Britain in that some services are provided by open access operators, providing competition with franchised operators at some stations. These operators provide services between locations which historically have either been not served directly or alternatively have only had a very infrequent direct service. However these operators also compete with the principal incumbent operator (East Coast) at a number of locations including Doncaster and York.

Hull Trains

- 2.16 Of the two open access operators Hull Trains has been established longest. Seven trains per day are provided each way between Hull and London King's Cross. This provides a broadly two hourly service throughout the day. The services call at Brough, Howden, Selby, Doncaster, Retford and Grantham. The stops at Retford in particular help to supplement the comparatively low frequency services provided at these locations by East Coast.
- 2.17 Hull Trains provides an important link from Hull to London, providing the vast majority of services, although constraints on their track access agreement limits the level of connectivity that can be provided by the service. The track access agreement for the operator presently expires in 2016, with the operator aiming for renewal at that point. Both Hull Trains and its parent group First Group are expressing signs of a long term commitment to the service through proposals to electrify the route from Selby to Hull, allowing the use of electric trains.

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Grand Central

- 2.18 The second open access operator on the ECML is Grand Central who operate services between London and Sunderland via Eaglescliffe and Hartlepool, and London and Bradford Interchange via Wakefield Kirkgate Brighouse and Halifax. In the case of the service from Sunderland this is an entirely new route with no other direct services to London being operated, while the service from Bradford supplements East Coast's one daily service. Service frequencies are relatively low with five trains per day from Sunderland to London and four trains from Bradford. However the level of connectivity provided by these services is high, with many smaller stations served by direct trains to London for the first time in decades, which is likely to be having a positive impact on local economies.
- 2.19 Grand Central also serves a number of stations on the trunk East Coast route, including Northallerton, Thirsk, York and Doncaster, providing further additional connectivity and again providing new direct links from secondary destinations.

Alliance Rail

2.20 Alliance Rail is a potential new open access operator that is aiming to develop a number of new services on the East Coast Main Line. Their proposed services at the present time involve a service from London to Edinburgh with a journey time of 3h43, a time not currently achieved on the ECML, a second service group involving services from London to Ilkley and Bradford and a final group involving direct services from London to Cleethorpes via Scunthorpe.

London & South East

- 2.21 There are a number of services on the ECML that form part of the London and South East group of services, linking central London with the outer suburbs and other locations within the commuting catchment of London.
- 2.22 These services are operated by First Capital Connect and fall into two main groups, inner suburban services, which mainly operate from Moorgate station in the City of London and outer suburban/long distance services that operate from King's Cross. The two groups are described in more detail below.

Inner Suburban Services

- 2.23 Inner Suburban services operate from Moorgate (weekdays) and King's Cross (weekends) providing stopping services to a number of destinations on the East Coast Main Line. While these services are not directly of relevance to this study they are important to the operation of the south end of the East Coast Main Line as they occupy capacity on the key approaches to London King's Cross, in particular they form the bulk of services on the slow lines between London and Welwyn Garden City. The standard off peak service level is as follows:
 - 3 TPH Moorgate Welwyn Garden City
 - 1 TPH Moorgate Letchworth via the Hertford Loop
 - 2 TPH Moorgate Hertford North via the Hertford Loop
- 2.24 It can be seen that in the weekday off peak most services operate from Moorgate rather than King's Cross, however at weekends all services operate from King's Cross as demand for services

Job No NEA7026 into the City of London is lower at the weekend. A number of services operate via the Hertford loop, and thus leave the ECML relatively early in their journey. One issue with the present service is that there is only one service per hour between Hertford and Stevenage thus making connections at Stevenage into and out of long distance services difficult.

Long Distance Commuter Services

- 2.25 Up to six trains per hour operate from King's Cross to two key destinations. These services vary from calling at only a very limited number of stations, to calling at the majority of stations north of Potters Bar. The service pattern is as follows:
 - 1TPH London King's Cross Kings Lynn via Cambridge (Fast)
 - 2 TPH London King's Cross Cambridge (Fast)
 - 1TPH London King's Cross Cambridge (Slow)
 - 1TPH London King's Cross Peterborough (Fast)
 - 1 TPH London King's Cross Peterborough (Slow)
- 2.26 At peak times an amended service pattern is operated with up to 11 departures per hour from London King's Cross. It will be seen that the majority of services operate to Cambridge. This has in the past created operational problems at Hitchin where the junction for Cambridge is located. Any unreliability at this location created delays due to the conflicting movements. This has been mitigated through the opening in December 2013 of the Hitchin flyover which provides a grade separated junction for northbound Cambridge services.

Regional

- 2.27 The ECML is crisscrossed by a large number of regional services, with ECML services connecting with east west services at a number of locations. There are also some services that operate along the route providing local services. Arguably many of the long distance services provide a regional function either in parallel with specific local services or in isolation without the support of other services. For example East Coast and Cross Country provide the bulk of services between Durham and Newcastle.
- 2.28 The list below sets out the key stations where connections are made between the ECML and East West Regional Services.
 - Stevenage: Cambridge, Kings Lynn
 - Peterborough: Ely, Cambridge, Norwich, Spalding Stamford and Leicester
 - Grantham: Skegness, Sleaford, Nottingham
 - Newark Northgate: Nottingham (via interchange to Newark Castle), Lincoln
 - Retford: Lincoln, Worksop, Sheffield
 - Doncaster: Lincoln, Sheffield, Scunthorpe, Hull, Grimsby, Cleethorpes
 - Wakefield: Pontefract, Huddersfield



- Leeds: Skipton, Harrogate, Ilkley, Castleford, Pontefract, Huddersfield, Halifax, Bradford, Manchester
- York: Scarborough, Harrogate, Hull, Middlesbrough
- Darlington: Bishop Auckland, Middlesbrough, Saltburn
- Newcastle: Hexham, Carlisle, Sunderland
- Edinburgh : Fife Circle, Dundee, Aberdeen, Glasgow, Falkirk, Stirling, Perth
- Aberdeen: Stations to Inverness via Elgin
- 2.29 It can be seen from the list above that through a combination of long distance and regional services a relatively high level of connectivity can be achieved to destinations off the main ECML route.
- 2.30 The main regional services that operate along the ECML are operated by Northern Rail and ScotRail. The main services operated are as follows:

Northern Rail:

- 2.31 Northern Rail operate the majority of services in the north of England although only two of these services run directly along the ECML. The first of these are a pair of morning peak services from Middlesbrough to Newcastle via Darlington and Durham. These provide direct services from Middlesbrough to Durham and Newcastle. Historically these services operated on a frequent basis throughout the day, however they were withdrawn in favour of more LDHS services some years ago.
- 2.32 Northern also operate an hourly service from Newcastle to Morpeth with many services starting or terminating at Metrocentre. At peak times one service in each direction is extended to Chathill serving a number of minor stations in Northumberland, and the larger station at Alnmouth which is otherwise served by LDHS services. It is proposed to reopen a station at Belford to the north of Chathill and if this occurs services that presently serve Chathill will be extended to Belford.
- 2.33 In the medium to long term Northumberland County Council hold an aspiration to reopen to the Ashington Blyth and Tyne freight network to passenger services, providing services from Newcastle to Ashington, such a service would be operated by the Northern franchise.

Scotrail:

- 2.34 Scotrail operates five trains per day from Edinburgh to Dunbar, and an hourly service from Edinburgh to North Berwick. The services serve a number of smaller station on the ECML between Edinburgh and Drem and form part of the Edinburgh suburban service.
- 2.35 There are aspirations for the introduction of a semi fast service from Edinburgh to Newcastle, providing an improved level of connectivity between intermediate stations.
- 2.36 Additionally Scotrail provides all connecting services from East Coast trains at Edinburgh to other locations within Scotland, including the majority of services to Aberdeen and Inverness.

Freight

2.37 The ECML is used by a diverse range of freight services. The vast majority of such traffic originates from locations away from the ECML, with the bulk of services operating in the Yorkshire & Humber

Job No NEA7026 and North East areas, as well as container traffic originating from Felixstowe. This is a function both of the origins and destinations of freight flows, but also the available capacity for freight traffic to run.

- 2.38 Freight traffic on the ECML is operated by a broad range of operators; however the three main operators are DB Schenker, Freightliner and GB Railfreight.
- 2.39 The level of passenger traffic using the route is such that there are relatively few paths available for freight traffic particularly south of Doncaster. The following sections describe some of the principal freight flows on the route.

London – Doncaster

- 2.40 At the south end of the ECML there is relatively little freight traffic, reflecting the intense passenger service that operates over the line. An additional complicating factor is the limited gauge clearance of the route from London to Hitchin which is only cleared to W8 gauge and therefore cannot accommodate shipping containers larger than 8'6". Between London and Peterborough there are only around 4 freight trains in each direction per day. These include a regular steel flow between Scunthorpe and Belgium via the Channel Tunnel, a Tilbury Leeds container train, gypsum trains and brick trains, the latter originating at Biggleswade.
- 2.41 At Peterborough the ECML is crossed by the route from East Anglia to the West Midlands. This route is used by the significant number of container services that operate from the Port of Felixstowe. Many of these container trains continue towards the West Midlands via the route to Leicester, however a number head north along the ECML. At the present time around 20 trains operate in each direction, largely intermodal trains serving destinations in the Yorkshire & Humber area. The potential to expand the number of services further is limited by the availability of paths, due to the intense passenger operation. Network Rail is addressing this issue with the upgrading of the GN/GE Joint Line from Doncaster to Peterborough which will allow the diversion of freight services from the ECML. While this route is longer, the additional time penalty is not great as freight services will not be subject to regulation in loop lines while passenger services overtake.
- 2.42 While not using the ECML directly a further flow that interacts with it are oil trains from Immingham to locations in the Midlands and Wales which cross the ECML on the level at Newark Flat Crossing. This acts as a constraint to developing services on both the ECML and the Lincoln Nottingham line.

Doncaster – Newcastle

- 2.43 The section of line from Doncaster to Newcastle is the section most intensively used by freight traffic. Much of the traffic is bulk flows particularly coal and biomass travelling from the ports in the area to power stations. Particularly strong flows are from the Port of Immingham to the Aire Valley Power Stations at Drax and Ferrybridge.
- 2.44 There are a number of flows from the Teesside area including steel and coal traffic, however intermodal flows from Teesport have stopped. This situation may however change once gauge enhancements have been implemented to allow 9'6" containers to reach the area.
- 2.45 There are also a number of bulk flows originating in the Tyne & Wear area with significant coal flows originating on the Port of Tyne. These flows are somewhat constrained by the need to use



the ECML between Newcastle and Northallerton, which as described elsewhere, has a limited capacity.

Newcastle - Edinburgh

- 2.46 North of Newcastle a number of flows originate from the Ashington, Blyth and Tyne network of lines in Northumberland. There are a number of opencast coal mines in the area with flows heading south, while coal flows also work into to serve Lynemouth Power Station.
- 2.47 Between Newcastle and Edinburgh there are very few freight flows with no Intermodal traffic, the handful of flows that do operate are mostly steel traffic, alumina and cement flows.

Access to Ports and Gateways

- 2.48 There are a number of ports and gateways which while not located on the ECML are in part influenced and affected by the ECML. The largest of these is the Port of Immingham which is the largest port in Britain by tonnage. This port deals with large volumes of imported bulk products in particular oil and coal. Much of is freight is then transferred inland by rail, with coal flows supplying a large number of power stations. This traffic uses parts of the ECML in the Doncaster area. Looking to the future Immingham has aspirations to increase its share of intermodal traffic and a programme of gauge enhancement to accommodate freight traffic is planned between Doncaster and Immingham.
- 2.49 The Port of Hull and Teesport also generates imported bulk flows, particularly coal which utilise the ECML for parts of their journey.
- 2.50 There are a number of freight terminals along the route which utilise freight capacity on the ECML. These often only handle a small number of trains per day but collectively are quite important, these can be found at:
 - Leeds Freightliner Terminal
 - Doncaster Europort
 - Doncaster Railport
 - Wakefield Europort
 - Wilton Freightliner Terminal
 - Selby (Potter Group)
- 2.51 In addition there are aspirations for the development of a number of rail freight and logistics terminals, these include the Rossington inland port, proposals for rail connected logistics terminals at Retford and safeguarded land at Tursdale, County Durham for a freight distribution centre.


3 Constraints to Capacity and Planned Interventions:

- 3.1 Along the length of the route there are a range of capacity constraints. Some of these are long standing issues, while others are as a result of the growth in services operating along the ECML. Individually these issues might be manageable and only have local impacts on the operation of the railway. However in combination they make the planning of timetables, for long distance services in particular, extremely complex.
- 3.2 There has in recent years been a programme of works to increase capacity on the route, with a significant programme taking place through Control Period 4 (2009-2014) which is presently drawing to a close. This has delivered a railway that operates six long distance high speed paths per hour between King's Cross and Doncaster. Entering Control Period 5 (2014-2019) there is a desire to deliver seven long distance paths per hour between King's Cross and Doncaster, providing a further increase in capacity.
- 3.3 The constraints to capacity also have an impact on the operation of the service, with any delays to services at pinch points having an impact on other services; this is compounded further if there are any major incidents, meaning that service resilience can be a major issue. This is reflected in Public Performance Measure (PPM) results for operators on the route.
- 3.4 The following text divides the route into four sections and describes the principal constraints on that section and any interventions that are likely to take place to mitigate the issues.

London – Peterborough

3.5 The section of line from London to Peterborough is the busiest section of the ECML, however the majority of the line is quadrupled as far as Huntingdon. There are four main capacity constraints on this section excluding Peterborough Station. These are as follows.

London King's Cross

- 3.6 King's Cross station presents some capacity constraints. The station presently has 12 platforms, but there is no further scope for increasing this due to the physical limits of the stations footprint. The nature of the operation of long distance passenger services is such that platform occupancy per train is higher than for a station dominated by shorter distance journeys. This means that the number of trains that can operate are lower than at a 12 platform commuter station.
- 3.7 Looking to the future the issue will be mitigated by the completion of the Thameslink works. These works will divert the majority of First Capital Connect services that arrive in King's Cross from Cambridge and Peterborough into the Thameslink network via the Canal Tunnels in the Holloway area. This may create further timetabling constraints as it will be necessary for the ECML timetable to be planned with reference to the Thameslink timetable. However the diversion of these trains will create additional platform capacity at King's Cross making the planning of services easier.

The Welwyn Gap

3.8 One of the longest standing constraints to operation of the south end of the ECML is the Welwyn Gap. This is the section of line that runs from Digswell Junction north of Welwyn Garden City to Woolmer Green Junction between Welwyn North and Knebworth. This three mile section has only two tracks on an otherwise four track railway. This creates a severe constraint as all slow and fast

line traffic has to be merged onto one line. In addition services that call at Welwyn North create further constraints as they take a longer time to pass through the section than other trains.

3.9 The cause of this issue is Digswell Viaduct and tunnels to the north, which unlike the rest of the route has never been widened to accommodate four tracks. While there have been schemes in the past to resolve the issues they have been abandoned largely due to cost issues. At the present time there are no schemes proposed to resolve this issue.

Hitchin: Cambridge Junction

- 3.10 A long standing capacity issue that has been resolved recently is that of Cambridge Junction at Hitchin. This location has historically been a constraint due to the large number of conflicting movements over the flat junction. In particular any train passing from the northbound platform at Hitchin to the Cambridge route conflicted with the northbound fast line and the southbound fast and slow lines. As well as constraining the planning of services it was also a source of delay to services.
- 3.11 This issue has however been mitigated by the recent completion of the Hitchin Flyover which provides grade separation between the northbound slow line and the northbound Cambridge line. This has now resolved the vast majority of issues at this location.

Huntingdon – Fletton Junction: Twin Track Section

3.12 Between London and Huntingdon the ECML is a four track railway with fast and slow lines (apart from the section at Welwyn mentioned above). However north of this point the line is reduced, firstly to three tracks and then to two tracks. While the number of services passing through this section is lower than further south, the section does represent a constraint to planning services, in particular due to the difference in speed between LDHS services operating at 125mph and slower First Capital Connect services operating at 100mph. The section also acts as a constraint to developing freight services as it is difficult to accommodate a slow moving freight train within the infrastructure. More generally the section represents a broader planning constraint as services have to planned around this capacity issue limiting the scope for making use of capacity elsewhere. Network Rail is developing plans to resolve this issue during CP5 as part of the East Coast Connectivity Programme, with proposals to extend the three and four track sections without creating a full four track railway.

Peterborough – York

3.13 The section of line from Peterborough to York is principally a two track Main Line dominated by LDHS services. There are however a number of capacity constraints at junction locations. The removal of these capacity constraints would greatly simplify the planning of long distance services and also contribute to improvements in the day to day operation of the route by reducing delay at these locations.

Peterborough Station Area

3.14 Peterborough station acts as a constraint to capacity on the ECML with a number of conflicting movements taking place. The station is presently being remodelled as part of the CP4 enhancements, including the construction of new platforms for East Anglia – East Midlands services. However going forward there is a need to enhance capacity further. The remaining constraints that hinder future timetable recasts include:



- Low line speed on the Down Slow approaches, causing most passenger trains to use the Down Fast
- Terminating FCC services cross the Up Fast line to access their platforms
- Freight trains to/from East Anglia and the southern ECML have to cross the fast lines at low speed to access Eastfield Yard to the north of the station and also to access Werrington Junction for access to Spalding and GN/GE Joint Line.
- 3.15 Mitigating these issues would improve operational performance and also further reduce the number of planning constraints helping to facilitate future timetable recasts. As part of work on the East Coast Connectivity Programme mitigation of these issues has been proposed, largely through a programme of increased line speeds on the affected areas.

Great Northern/Great Eastern Joint Line

- 3.16 Due to the number of LDHS services that operate on the ECML providing capacity for freight traffic has become difficult in recent years. To improve this situation, and also facilitate further increases in passenger services, upgrades have taken place to the Great Northern/Great Eastern (GN/GE) Joint Line. This route runs from Peterborough to Doncaster via Spalding, Sleaford and Lincoln, and is in the process of being upgraded to allow increased line speeds and longer hours of operation.
- 3.17 The diversion of freight via this route does however create some issues at Peterborough particularly for traffic attempting to access the line from either East Anglia or the south end of the ECML due to the need to cross the ECML fast lines north of Peterborough station to access Werrington junction where the GN/GE joint line diverges from the ECML. However this issue may be mitigated as part of the East Coast Connectivity Programme through the improvements to Peterborough Station Area outlined above.

Newark Flat Crossing

- 3.18 A further long standing issue relates to the flat crossing to the north of Newark Northgate station where the ECML has an at grade crossing of the Lincoln Nottingham line. Service frequencies on the Lincoln Nottingham line are not high, however they do not operate at a regular pattern, and in combination with freight flows that use the route, act as a constraint to planning services on the ECML.
- 3.19 The flat crossing is therefore a constraint to both planning ECML services and also to developing Nottingham Lincoln services. However mitigating the issue is a non trivial task. In the past there have been plans for the construction of a flyover, this is however complicated by the geography of the area with the River Trent and A46 Road in close proximity and the need to maintain access to Newark Castle stations and maintain a chord between the ECML and the Lincoln line.
- 3.20 At the present time there are no schemes proposed by the rail industry to mitigate this issue, however Newark & Sherwood District Council have safeguarded an area of land for a possible flyover to replace the flat crossing.

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Doncaster Station Area

- 3.21 Doncaster station is an operationally complex area with the convergence of 6 lines which carry a large volume of both passenger and freight traffic. The area is also a hub for freight traffic with a number of large yards to the south of the station at Belmont and Decoy.
- 3.22 The station itself also has capacity issues with high demand for the four through platforms. In particular demand for platform 3 is high, being the only platform that allows movements from the Hull and Grimsby lines towards Sheffield. Network Rail have proposed a number of alterations to the layout at Doncaster to mitigate some of the existing issues. These improvements include the upgrading of certain goods lines to passenger standards, the installation of bi directional signalling, and the construction of a new platform to the north of the existing station to accommodate terminating services from the Thorne lines and thus relieve pressure on platform 1 of the main station.
- 3.23 Network Rail aims to progress these measures as part of the CP5 enhancements over the period 2014-19.

Doncaster North Chord

- 3.24 The section of route between Doncaster station and Hambleton junction (near Selby) is used by both LDHS services and significant numbers of freight trains, principally coal traffic moving from Immingham to the Aire Valley Power Stations notably Drax. This creates a timetabling conflict due to the contrast in speed profiles between the passenger and freight flows. This issue is currently being mitigated through the construction of the Doncaster North Chord. This scheme will provide a grade separated link from the Stainforth Adwick freight line to the Shaftholme junction Knottingley line, removing the need for freight traffic to travel up the ECML from Joan Croft junction to Hambleton junction, thus bringing an increase in capacity and flexibility to both passenger and freight services.
- 3.25 This £44M scheme is currently under construction and will be completed in 2014.

Doncaster – Leeds

3.26 This line is a busy section of railway complicated by the operation of a mixture of LDHS, stopping passenger and freight services. The route has a number of capacity constraints that limit capacity on the route, described below:

Mix of Services

- 3.27 The core passenger service on the route is formed of five trains per hour as follows:
 - 2 TPH London Leeds
 - 1 TPH Doncaster Leeds Stopping service
 - 1 TPH Plymouth Edinburgh (joining at South Kirkby junction)
 - 1 TPH Sheffield Leeds (joining at South Kirkby junction) stopping service
 - 1 TPH Sheffield Adwick via Doncaster

- 3.28 In addition there are a significant number of freight trains make use of the section from Doncaster to Hare Park Junction (south of Wakefield). This mixture of services and speed profiles constrains the ability to improve both long distance services and local services. The mixture of services and diversity of origins and destinations also impacts on reliability and punctuality with far reaching repercussions across the network.
- 3.29 In recent years there have been a number of proposals to increase frequency between Leeds and London and these have assumed that any additional services would be diverted via an alternative route via Hambleton Junction and Micklefield to arrive in Leeds from the east.

South Kirkby Junction

3.30 South Kirkby Junction marks the point where Cross Country and Northern services to Sheffield diverge from the Leeds – Doncaster line. While the number of services (2 TPH in each direction) using the junction is not significant it does represent a constraint to planning services, particularly when placed in the context of the mixture of services using the route. At the present time there are no plans to alter the present layout.

Leeds Station

- 3.31 Leeds station represents a capacity constraint due to the number of services converging on the station and the limited number of platforms available. This is a particular problem for services to and from London which in the weekday timetable requires two platforms to be occupied simultaneously at certain periods, including one of the through platforms.
- 3.32 Looking to the future there are plans to increase the number of platforms at Leeds and provide an additional through platform through the combination of a pair of existing bay platforms.

York – Newcastle

3.33 The section of route from York to Newcastle is shared by a mixture of long distance, regional and freight services. The route has both fast and slow lines between York and Northallerton, however beyond Northallerton the line is reduced to two tracks. This creates a number of timetabling constraints resulting in a sub optimal passenger timetable from a commercial perspective.

Northallerton – Newcastle Twin Track

- 3.34 While the section of line from York to Northallerton has four tracks, providing ample capacity for the service requirements, the section beyond Northallerton is constrained by being formed of only two tracks. The impact of this is that to accommodate both passenger and freight trains the passenger service has to be "flighted", the implications of this being that rather than services operating at an even interval, providing the most optimum frequency for users, services are compressed into a limited period of time. In the case of the Northallerton Newcastle section this means that the five services in each hour that operate between York and Newcastle are grouped into a 42 minute period.
- 3.35 This situation further limits the potential for the expansion of services, both passenger and freight, without further flighting being imposed. There are a number of potential solution to this issue. One of the most frequently proposed has been the reinstatement of the Leamside Line linking Tursdale Junction and Pelaw Junction and providing a route avoiding Durham. In combination with the diversion of freight traffic via Yarm, Eaglescliffe and the Stillington line to Ferryhill Junction on the



ECML it would be possible to provide a separate route for freight in much the same way that the GN/GE joint line will between Doncaster and Peterborough.

3.36 While there is broad support for this scheme in principle the cost of implementing it would be significant. Instead Network Rail are examining the possibility for an increased number of freight loops between York and Newcastle to allow for the expansion of freight and passenger traffic. The North East LEP is however undertaking work to develop a business case for the reinstatement of the Leamside Line.

Darlington Station Remodelling

- 3.37 Located on the twin track section of line between Northallerton and Newcastle, Darlington station, which acts as a gateway to the Tees Valley, has a number of capacity issues that constrain the ability to improve both long distance and regional passenger services. The current layout of Darlington station is a large island platform, providing two through platforms, although access to these requires a significant deviation from the Main Line itself meaning that trains must slow down on approach much earlier than they otherwise might need to. Cut into the south end of the island are two bay platforms. These latter platforms are used by the Darlington Saltburn service. The through platforms are used by all long distance services and the Saltburn Bishop Auckland service. To access Darlington station trains from Saltburn and Middlesbrough have, in both directions, to cross the southbound Main Line at Darlington South Junction. In addition all movements to and from the Bishop Auckland branch at Darlington North Junction block the northbound through platform.
- 3.38 This situation presently results in a sub optimal timetable for trains towards Saltburn with the two trains per hour operating at an uneven headway of 20 and 40 minutes, rather than the more optimal 30 minute headway. Furthermore the Bishop Auckland service is constrained to a 90 minute headway service, in part due to pathing problems around Darlington station, which are also partially linked to the more general capacity problem between Northallerton and Newcastle mentioned above.
- 3.39 The solution to these problems lies in the proposed Darlington Remodelling scheme. This scheme would provide new platforms for Saltburn trains on land to the east of the existing station removing conflicting movements. In addition it is proposed to locate new platforms on the fast lines which avoid the station to improve the capacity of the station for long distance services. Many of the benefits of this scheme lie with the provision of local services between Darlington and Saltburn, particularly as stakeholders have aspirations for improved services on this route; however long distance services would also benefit from the additional capacity and reduced journey times.

Newcastle – Edinburgh

3.40 The section of line from Newcastle to Edinburgh is a two track railway throughout its length. The section is also the most lightly used on the route from London to Edinburgh, with only two to three trains per hour in each direction. The line does however have a few limits to further development.

Line Speed Restrictions

3.41 The route from Newcastle to Edinburgh has a generally lower average speed than the rest of the ECML. Unlike the rest of the route which is comparatively straight the section north of Newcastle is constrained by a formation dominated by curves. This limits the maximum speed for much of the

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length, with only limited periods of 125mph running being possible. At a number of locations, most notably Morpeth there are severe speed restrictions for specific curves, further impacting on journey times.

3.42 There are no immediate solutions to these issues as they relate to the physical formation of the line. It has in the past been suggested that tilting trains would provide solutions to these issues, however the ordering of non tilt IEP trains to replace the existing rolling stock for East Coast has precluded this option, although Alliance Rail who propose operating an open access service from London to Edinburgh are planning to use tilting Pendolino trains.

Passing Loops

3.43 Stakeholders have identified a lack of passing loops on the sections from Edinburgh to Newcastle as a constraint to developing freight services. Over the 123 mile section there are only 7 passing loops, which are not evenly spread. If both passenger and freight services were to develop further it may be necessary to address this issue further if potential capacity is to be optimised.



4 Future Services and Aspirations

4.1 Over the coming years there are likely to be a number of changes to the pattern of services operating on the ECML. Some of these changes are a result of investment in other areas of the network that will bring changes to services that link into the ECML. Other changes are more closely associated with changes on the ECML. In addition, stakeholders along the line hold a variety of aspirations for the improvement of services.

Long Distance

- 4.2 A number of stakeholders along the route hold aspirations for improved long distance services along the route. The majority of these relate to the development of more direct services to and from London. Within the constraints of the route discussed above it is likely that not all aspirations could be delivered, irrespective of financial viability, however in the long term the delivery of HS2 would bring more capacity for expanding services. The main service aspirations are presented below:
 - Frequent direct Lincoln London service
 - More direct Bradford/Halifax London services
 - Cleethorpes London services
 - Hourly Hull London services
 - More direct services from Stevenage to the north particularly York, Newcastle and Edinburgh.
 - Improved linkages between the northern half of Scotland to/from Edinburgh and the south
 - Reduced journey time from Edinburgh to the North East, Yorkshire and London
- 4.3 In addition to these aspirations for service improvements there also aspirations for improvements to other aspects of service such as rolling stock quality, and stations.

Electrification

- 4.4 The present programme of electrification of routes will have some impacts on ECML services. Currently the majority of East Coast services are electrically operated, but a number of services are operated by HST Diesel trains, while all Cross Country services that use the route are diesel powered.
- 4.5 Looking to the future the Trans Pennine electrification will include the routes from Leeds to York and Selby. In the case of the former this will provide an electrified diversionary route between Doncaster and York improving service resilience. The Leeds Selby electrification will also act as a diversionary route but will also realise the long standing aspiration to route additional Leeds London services via Hambleton junction, assuming that there is sufficient capacity between Micklefield and Leeds.
- 4.6 Proposals exist for electrification from Selby to Hull, although funding for this has not yet been secured. Were this to be delivered it would allow the conversion of London Hull services to electric traction, improving flexibility and lowering operating costs. This might also allow an increase in service levels, as appropriate rolling stock might be easier to source.

- 4.7 In Scotland the Scottish Government has a stated commitment to a programmed extension of electrification of the Scottish rail network northwards from Glasgow and Edinburgh to Aberdeen and Inverness. This presents a development opportunity for additional East Coast services being extended north of Edinburgh to both Aberdeen and Inverness.
- 4.8 Away from the ECML the Electric Spine proposals to electrify the route from Southampton to Sheffield might have an impact on ECML Cross Country services. New routes via the Midland Main Line and Milton Keynes to Oxford will be developed while electric rolling stock will be introduced to replace the Voyager rolling stock which offers a relatively low level of passenger amenity.
- 4.9 A number of schemes including Middlesbrough - Northallerton and Hull - Selby are now being examined by the electrification task force with a view to further of extension of the electrified network which would bring further connectivity benefits to East Coast services.

London & South East

Thameslink

- 4.10 The completion of the Thameslink programme in 2018 will change the pattern of outer suburban services on the south end of the ECML. The diversion of eight trains per hour onto Thameslink will create a range of new journey opportunities in the area. Although still at this stage indicative and subject to change, the proposed service pattern is as follows¹:
 - 2TPH Peterborough Horsham .
 - 2TPH Cambridge Brighton .
 - 2TPH Cambridge Tattenham Corner •
 - 2TPH Welwyn Garden City Caterham (peak only)
- 4.11 It can be seen that new services will provide connectivity to a range of destinations south of the Thames which as well as improving travel opportunities may contribute to the development of new economic linkages.

Regional

Electrification service changes

- 4.12 The present programme of electrification in Control Period 5 (2014-19) will have an impact on services using the ECML. In particular Trans Pennine electrification from Manchester to York will bring increased frequencies on the section between Leeds and York and will also convert diesel services north of York to electric traction.
- 4.13 Other electrification schemes proposed include the Leeds – Harrogate – York route, this combined with planned capacity enhancements between Knaresborough and York will bring improved connectivity with the ECML. In addition there will be greater flexibility to deliver more direct services from Harrogate to London if electric services could be operated.

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¹ According to DfT website, accessed August 2014



Freight

Gauge Enhancement

4.14 In recent years a number of gauge enhancement schemes have been developed to facilitate the operation of full sized shipping containers on conventional wagons allowing a reduction in the cost of intermodal rail freight operation and an improvement in competitiveness. In addition to completed schemes including Felixstowe – Nuneaton which crosses the ECML at Peterborough and access to Teesport completed in 2014, a number of other schemes are progressing Doncaster – Immingham, scheduled for completion in 2017. There also a number of other locations with aspirations for improvements including Selby – Hull Docks as well as access to inland locations.

The Impact of High Speed 2

- 4.15 In addition to future aspirations for the existing rail network the proposals for the High Speed 2 (HS2) line are becoming more developed.
- 4.16 Assuming that the line is developed there will be a major impact on the services on the ECML, particularly south of York, with significant capacity released as Leeds London and Edinburgh/Newcastle London services will be diverted onto HS2. This does not mean that investment in the classic network at the present time will go to waste as the released capacity could be used for alternative services. The alternative services would have the potential to meet multiple stakeholder aspirations for the route, as the need to balance the service provided between being a long distance high speed strategic service and a service providing strong connectivity and economic benefits to the settlements along the route would change.
- 4.17 Network Rail examines² potential post HS2 service options for the ECML. This is clearly a starting point and there would be scope for variations to the service levels presented. The following summarises Network Rail's proposed post-HS2 service levels on the ECML:
 - 1 TPH Cambridge Leeds via Peterborough and Doncaster, potentially starting at either Stansted Airport or London Liverpool Street
 - 1 TPH London King's Cross Lincoln via Spalding
 - 1 TPH London King's Cross Hull
 - 1 TPH London King's Cross Middlesbrough/Saltburn or Sunderland
 - 1TPH London Kings Cross to one of: Cleethorpes /Scarborough /Skegness /Nottingham /Harrogate /Bradford
- 4.18 It can be seen from the above ideas postulated by Network Rail that there are a broad range of potential service options for the ECML, and there is the potential to increase connectivity to many areas not currently well served by the existing ECML service. A service from Cambridge and Stansted Airport to West Yorkshire for example would provide many new travel opportunities and reduced journey times.

² Network Rail, Better Connections: Options for the Integration of High Speed 2, July 2013



- 1 TPH Stansted Airport Newcastle/Leeds (portion working service splits/couples at Doncaster
- 1 TPH London King's Cross Hull via Selby
- 1TPH London King's Cross Lincoln via Newark
- 1TPH London King's Cross Middlesbrough/Sunderland (potential for portion working from Eaglescliffe)
- 2TPH London King's Cross Leeds (calling at all principal stations)
- 1TPH London King's Cross Edinburgh
- 4.20 In addition to the services presented above it would also be possible to increase the number of services operating from Peterborough to London King's Cross, as two paths would be released by the diversion of long distance services to Stansted Airport.
- 4.21 While the above scenarios are at this stage purely illustrative examples, it can be seen that the introduction of High Speed 2 would not necessarily reduce the number of services operating on the ECML, particularly on the section south of York that would be relieved. Instead the characteristics of the route will be changed with differing origins and destinations of services.
- 4.22 Annex 5 discusses these options in the context of the proposed draft conditional outputs.

Annex 3

Rail Connectivity Analysis

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Issue no

3

Report Name ECMA: Final Report





Prospectus for investment in the East Coast Main Line

Annex 3 Connectivity Assessment



Report Name Prospectus for investment in the East Coast Main Line

Report No

A3

Issue no

3



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Date 29 August 2014

Prospectus for investment in the East Coast Main Line



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1 Introduction

- 1.1 In an attempt to understand the strengths and weaknesses of the existing service that the ECML provides a connectivity assessment has been completed which seeks to examine the levels of connectivity between locations both on the ECML itself and within its catchment area.
- 1.2 The results of this exercise are a standardised assessment of the quality of existing linkages which forms an input into the assessment of potential economic growth from service enhancements (Annex 4) and the draft conditional outputs (Annex 5) and which can be compared with the aspirations of stakeholders to identify where services are either adequate or are identified for improvement.

2 Connectivity Assessment

Methodology

- 2.1 The approach taken to producing the connectivity assessment was based around the approach taken to demand forecasting by the rail industry and relies on the Association of Train Operating Companies (ATOC) Passenger Demand Forecasting Handbook (PDFH). This relies on the concept of Generalised Journey Time (GJT) which converts aspects of a journey such as interchange, frequency and waiting time into an equivalent number of journey time minutes. For the purposes of this assessment the three components of journey time that have been assessed are:
 - Journey time (minutes)
 - Service frequency (modelled using a 'multiplier' of the on-train journey time)
 - Interchange (modelled in the form of a 'penalty' excess for the on-train journey time)
- 2.2 These three components represent the main components of journey time required for comparative purposes. Other aspects such as reliability of rolling stock quality could also be modelled but this would not assist with producing a comparative assessment.
- 2.3 As the timetable and the levels of connectivity vary across both the day and the week, especially at peak time, we have modelled the weekday off peak timetable for the assessment. The rationale for this was that it represents typical journey opportunities for the majority of the week and the timetable is relatively standard throughout the day.
- 2.4 In addition to results presented in terms of GJT, results were also obtained in terms of Generalised Speed (GS), which is simply distance divided by GJT. The calculation of GS allows comparative assessments to be made. It also facilitates, when compared with average speed (journey time only), an understanding of the impact that frequency levels and interchange penalties have on the attractiveness of journeys.

Locations Assessed

- 2.5 Two groups of stations were included as part of the connectivity assessment. The first group of stations are those that are regularly served by direct long distance services as part of the standard off peak timetable. For these stations connectivity was calculated to all other stations in the group. The stations within the group were:
 - London Kings Cross
 - Stevenage
 - Peterborough
 - Grantham
 - Newark Northgate
 - Retford
 - Doncaster

- Wakefield Westgate
- Leeds
- York
- Northallerton
- Darlington
- Durham
- Newcastle
- Alnmouth
- Berwick-Upon-Tweed
- Edinburgh Waverley
- 2.6 The second groups of stations were those that are not served within the standard off peak timetable or are only served infrequently. The majority of these stations are not located on the core East Coast route from London to Leeds and Edinburgh, although some may be served by direct services to London at peak times. A number of locations in Scotland are served by a small number of direct services throughout the day.
- 2.7 In addition a number of stations are located on the main ECML route but are not served by long distance services at regular intervals. Connectivity was assessed this second group of stations to certain key destinations, for brevity not all intermediate stations were assessed. The full list of stations in this second category are:
 - Cambridge
 - Lincoln
 - Grimsby
 - Hull
 - Scarborough
 - Middlesbrough
 - Sunderland
 - Chester-le-Street
 - Dunbar
 - Glasgow Central
 - Perth
 - Inverness
 - Dundee
 - Aberdeen
 - Huntingdon
 - Bradford

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- Harrogate
- Morpeth
- Falkirk
- Stirling
- Montrose

Connectivity Results

2.8 The results of the connectivity assessment are presented in the following tables. A key defining the colours is presented below each table.

Origin/Destination	London King's	Stovopago	Potorborough	Grantham	Nowork	Potford	Doncostor	Wakefield	Loods	Vork	Northallorton	Darlington	Durbom	Nowcastla	Alpmouth	Berwick upon	Edinburgh
London King's Cross	N/A	69	88	92	89	82	83	90	84	97	91	94	88	98	79	101	90
Stevenage	69	N/A	94	104	89	86	87	92	84	79	79	78	78	76	67	81	81
Peterborough	93	94	N/A	83	82	78	92	86	76	84	87	82	95	80	74	78	83
Grantham	92	104	83	N/A	68	74	89	103	71	71	74	72	73	70	59	71	75
Newark Northgate	89	89	82	68	N/A	74	83	71	62	87	78	80	81	75	76	75	77
Retford	82	86	78	74	74	N/A	55	49	46	69	52	70	72	68	70	68	73
Doncaster	83	87	92	89	83	55	N/A	66	51	93	83	78	79	73	74	72	75
Wakefield Westgate	90	92	86	103	71	49	66	N/A	51	47	49	60	66	65	67	71	67
Leeds	84	84	76	71	62	46	51	51	N/A	61	58	73	71	67	73	73	71
York	98	79	84	71	87	69	93	47	61	N/A	78	98	79	84	77	80	82
Northallerton	91	79	87	74	78	52	83	49	58	78	N/A	77	72	71	46	64	67
Darlington	94	78	82	72	80	70	78	60	73	102	77	N/A	82	67	50	77	79
Durham	88	78	95	73	81	72	79	66	71	81	72	88	N/A	52	66	75	75
Newcastle	98	76	80	70	75	68	73	65	67	86	71	74	64	N/A	84	89	83
Alnmouth	79	67	74	59	76	70	74	67	73	77	46	50	66	84	N/A	101	91
Berwick upon Tweed	101	81	78	71	75	68	72	71	73	80	64	75	75	87	101	N/A	84
Edinburgh Waverley	90	81	83	75	77	73	75	67	71	78	67	81	77	86	91	84	N/A

Table 2.1 Average Speed for stations served directly by ECML LDHS Services (mph)

70mph+
60-70mph
50-60 mph
0-50 mph

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Origin/Destination	London King's Cross	Stevenage	Peterborough	Doncaster	Leeds	York	Newcastle	Edinburgh Waverley
Cambridge	64	45	54	62	52	63	65	68
Lincoln	51	45	38	18	33	38	54	63
Grimsby	65	58	45	46	35	41	52	66
Hull	66	56	55	41	56	42	51	63
Scarborough	77	63	51	37	52	50	61	69
Middlesbrough	80	63	44	48	46	51	35	57
Sunderland	80	59	63	88	51	51	24	63
Perth	74	66	69	60	65	74	41	60
Chester-le-Street	75	75	72	71	75	79	80	67
Dunbar	82	80	71	68	60	69	68	59
Glasgow Central	75	69	72	66	65	67	44	46
Inverness	67	63	66	64	60	60	58	51
Dundee	78	65	64	65	61	66	61	39
Aberdeen	72	67	72	67	60	63	59	52
Huntingdon	54	53	58	73	59	74	72	74
Bradford	65	59	59	34	26	34	53	66
Harrogate	68	59	51	32	28	31	48	58
Morpeth	74	72	70	65	50	58	40	54
Falkirk	84	77	73	74	68	74	71	41
Stirling	75	62	66	61	59	69	57	37
Montrose	68	62	67	62	59	62	57	47

Table 2.2 Average Speeds for Stations not directly served by ECML LDHS Services (mph)

70+mph
60-70mph
50-60 mph
0-50 mph

- 2.9 The tables presenting average speed show a distinct contrast between the two groups of stations. The vast majority of locations served by the main LDHS service have very high point-to-point average speeds, with five origin-destination (O-D) pairs having point-to-point average speeds in excess of 100mph. The five O-D pairs in this category are:
 - London King's Cross Berwick-Upon Tweed
 - Stevenage Grantham
 - Wakefield Westgate Grantham
 - Darlington York
 - Alnmouth Berwick-upon-Tweed
- 2.10 The majority of key O-D pairs on the route have high average speeds for example London Edinburgh at 95mph and London York at 98mph. It is however notable that average speeds to and from Leeds tends to be lower than for other locations. This reflects the comparatively low speeds achievable between Leeds and Doncaster for stations to the south, and the lower speeds and need to change at York for some locations to the north. There are very few O-D pairs with average speeds lower than 50mph, these being limited to five O-D pairs as follows:
 - Wakefield Westgate Retford
 - Wakefield Westgate Leeds
 - York Wakefield Westgate
 - Northallerton Wakefield Westgate
 - Alnmouth Northallerton
- 2.11 In contrast to the locations served directly, (Table 2.1), the locations that are not served directly, (Table 2.2), have a very different profile of average speeds, with significantly fewer having average speeds in excess of 70mph. Part of the reason for this is that a number of these locations are principally served by relatively slow stopping trains that are used to access LDHS services at junctions stations. These, in addition to the connections times associated with them lower the point to point speeds. It can be again seen that trips to and from Leeds tend to have lower average speeds than other locations perhaps reflecting the speed of approaches to the city, and the need for interchange form a number of these locations.
- 2.12 Perhaps unsurprisingly average speeds to London are relatively high reflecting the need for no more than one interchange to reach London, coupled to the high average speeds to London on LDHS services which balance the lower average speeds of connecting services.
- 2.13 The following tables present the Generalised Speed results for the scenarios. Like Generalised Time, Generalised Speed includes the impact of passengers perceptions of frequency and interchange on journey times and hence speeds.

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	London King's							Wakefield								Berwick upon	Edinburgh
Origin/Destination	Cross	Stevenage	Peterborough	Grantham	Newark	Retford	Doncaster	Westgate	Leeds	York	Northallerton	Darlington	Durham	Newcastle	Alnmouth	Tweed	Waverley
London King's Cross	N/A	44	65	69	69	56	72	75	71	81	75	81	74	87	67	87	82
Stevenage	44	N/A	60	69	60	54	69	70	66	47	49	48	50	50	44	53	57
Peterborough	68	60	N/A	37	33	56	57	60	56	53	66	65	75	66	59	47	71
Grantham	68	69	40	N/A	20	27	50	59	49	32	38	41	43	45	38	48	50
Newark Northgate	69	60	45	20	N/A	18	41	32	33	56	55	59	61	60	57	48	50
Retford	54	54	39	27	18	N/A	16	19	21	40	29	37	41	39	41	41	47
Doncaster	72	69	68	50	41	16	N/A	29	31	50	49	51	56	54	53	44	50
Wakefield Westgate	75	70	60	59	32	19	29	N/A	23	31	29	43	50	50	38	59	58
Leeds	71	66	56	49	33	21	31	23	N/A	39	42	52	55	54	39	46	61
York	81	47	60	49	56	40	50	23	39	N/A	39	65	58	68	53	66	73
Northallerton	54	49	59	38	40	29	49	29	42	39	N/A	20	35	41	27	39	43
Darlington	81	48	45	41	59	37	51	43	52	66	20	N/A	39	47	34	60	69
Durham	74	50	51	43	61	41	56	50	55	59	35	40	N/A	28	35	38	59
Newcastle	86	50	48	45	59	39	54	50	53	69	40	50	31	N/A	36	58	65
Alnmouth	67	43	58	37	56	40	51	37	38	52	26	33	34	36	N/A	22	53
Berwick upon Tweed	87	53	49	47	48	41	43	43	59	66	38	58	49	57	22	N/A	53
Edinburgh Waverley	82	56	67	50	49	47	50	58	46	70	43	70	59	67	53	53	N/A

Table 2.3 Generalised Speed for stations served directly byECML LDHS Services (mph)

70+mph
60-70mph
50-60 mph
0-50 mph



Origin/Destination	London King's Cross	Stevenage	Peterborough	Doncaster	Leeds	York	Newcastle	Edinburgh Waverley
Cambridge	45	29	29	38	35	40	45	49
Lincoln	33	30	22	13	22	24	36	45
Grimsby	43	38	31	31	24	27	35	47
Hull	44	39	37	23	37	29	33	43
Scarborough	46	42	35	25	37	31	38	47
Middlesbrough	48	43	32	30	35	33	26	37
Sunderland	52	43	42	58	34	32	18	38
Perth	45	41	41	33	43	41	8	33
Chester-le-Street	51	50	49	45	46	58	48	31
Dunbar	61	58	52	49	44	49	45	46
Glasgow Central	57	53	53	48	47	47	33	34
Inverness	55	52	53	50	47	46	43	45
Dundee	58	50	48	46	43	44	40	31
Aberdeen	57	53	56	50	45	45	41	43
Huntingdon	43	32	26	41	37	42	46	51
Bradford	44	41	39	20	16	20	36	46
Harrogate	45	39	36	21	18	17	32	41
Morpeth	50	46	45	37	34	33	17	33
Falkirk	59	55	51	51	49	50	44	32
Stirling	55	47	48	46	44	48	39	26
Montrose	53	49	50	45	43	46	40	37

Table 2.4 Generalised Speeds for Stations not directly served by ECML LDHS Services (mph)

		70+mph	
		60-70mph	
		50-60 mph	
		0-50 mph	
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- It can be seen from the above that using the measure of Generalised Speed (GS) has a significant 2.14 impact on the connectivity assessment. When the impact of interchange and frequency are included in the assessment the average speed drops significantly relative to the average speed based purely on journey time. The only locations where average speeds remain in excess of 70mph are certain flows from London and a very small number of other flows between locations served directly by the main LDHS service. The two fastest flows are London - Edinburgh and London - Berwick-upon-Tweed. This is partly due to the very fast direct service that these two locations receive, but also reflects the fact that journey time forms a very high proportion of GS and therefore origin-destination (O-D) pairs that are along way apart are more greatly influenced by journey time rather than interchange and frequency, whereas shorter distance flows are more strongly influenced by whether the service is direct or requires an interchange, and whether the service frequency is high or not.
- Within the direct group of stations the top and bottom 20 flows (by speed) are as follows: 2.15

20 Fastest Flows20 Slowest FlowsLondon - PeterboroughNewark - GranthamLondon - GranthamRetford - GranthamLondon - NewarkNewark - RetfordLondon - DoncasterNewark - WakefieldLondon - WakefieldNewark - LeedsLondon - LeedsDoncaster - RetfordLondon - YorkWakefield - RetfordLondon - DarlingtonLeeds - RetfordLondon - DurhamNorthallerton - RetfordLondon - NewcastleWakefield - DoncasterLondon - Berwick-upon-TweedLeeds - DoncasterLondon - Edinburgh WaverleyLeeds - WakefieldGrantham - StevenageLeeds - NorthallertonWakefield - StevenageDarlington - NorthallertonWakefield - StevenageDarlington - NorthallertonPeterborough - EdinburghAlnmouth - NorthallertonYork - NewcastleNewcastle - DurhamYork - KewcastleNewcastle - DurhamYork - EdinburghAlnmouth - DarlingtonYork - EdinburghAlnmouth - DurhamYork - EdinburghAlnmouth - Durham	i adie 2.5 Fastest and Slowest Flows between directly served stations						
London – PeterboroughNewark – GranthamLondon – GranthamRetford – GranthamLondon – NewarkNewark – RetfordLondon – DoncasterNewark – WakefieldLondon – WakefieldNewark – LeedsLondon – LeedsDoncaster – RetfordLondon – YorkWakefield – RetfordLondon – DarlingtonLeeds – RetfordLondon - DurhamNorthallerton – RetfordLondon – NewcastleWakefield – DoncasterLondon – Berwick-upon-TweedLeeds – DoncasterLondon – Edinburgh WaverleyLeeds – VorkDoncaster – StevenageLeeds – NorthallertonWakefield – StevenageDarlington – NorthallertonPeterborough – EdinburghAlnmouth – NorthallertonYork - NewcastleNewcastle – DurhamYork - KewcastleNewcastle – DurhamAlnmouth – DarlingtonAlnmouth – DarlingtonYork - EdinburghAlnmouth - DarlingtonYork - EdinburghAlnmouth - DarlingtonYork - EdinburghAlnmouth - DarlingtonYork - EdinburghAlnmouth - DurhamYork - EdinburghAlnmouth - Durham </th <th>20 Fastest Flows</th> <th>20 Slowest Flows</th>	20 Fastest Flows	20 Slowest Flows					
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Wakefield – StevenageDarlington – NorthallertonDoncaster – PeterboroughAlnmouth – NorthallertonPeterborough – EdinburghAlnmouth – DarlingtonYork - NewcastleNewcastle – DurhamYork – EdinburghAlnmouth - DurhamDarlington - EdinburghAlnmouth - Berwick	Doncaster – Stevenage	Leeds – Northallerton					
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York - NewcastleNewcastle - DurhamYork - EdinburghAlnmouth - DurhamDarlington - EdinburghAlnmouth - Berwick	Peterborough – Edinburgh	Alnmouth – Darlington					
York – EdinburghAlnmouth - DurhamDarlington - EdinburghAlnmouth - Berwick	York - Newcastle	Newcastle – Durham					
Darlington - Edinburgh Alnmouth - Berwick	York – Edinburgh	Alnmouth - Durham					
	Darlington - Edinburgh	Alnmouth - Berwick					

at and Clawsot Flows botwaan directly convad stations

- 2.16 Some of the slowest flows above are very short distance, for example those between Leeds, Wakefield and Doncaster, and have interurban rather than intercity characteristics. The fastest flows are characterised by flows to and from London. Other flows are between other principal stations such as York - Edinburgh, while a small group are between smaller stations and likely to be linked to the structure of the timetable rather than having a specific commercial rationale, an example of this might be Grantham - Stevenage.
- 2.17 In contrast to the locations served directly by the ECML, those locations which are not part of the direct East Coast network have markedly lower generalised speeds. Much of this is related to the need to interchange to access key destinations. Only one location has a GS in excess of 60 mph, this being Dunbar to London where interchange at Newcastle or Berwick into the hourly Edinburgh -London service which has already been identified as providing high speed links for those stations that it serves directly.

2.18 There is a second group of O-D pairs where average speeds are relatively high, between 50 and 60mph. The majority of these flows are to and from London, again reflecting the fact that the fast link to London offsets the low speed beginning to many journeys and also the need to interchange. This tends not to be the case for non-London flows. The table below lists the top and bottom 20 flows.

Tuble 2.0 Tublest and blowest Tions between						
20 Fastest Flows	20 Slowest Flows					
London – Sunderland	Peterborough – Lincoln					
London – Glasgow Central	Peterborough – Huntingdon					
London – Perth	Doncaster – Lincoln					
London – Inverness	Doncaster – Hull					
London – Dundee	Doncaster – Scarborough					
London – Aberdeen	Doncaster – Bradford					
London – Falkirk	Doncaster – Harrogate					
London – Stirling	Leeds – Lincoln					
London – Montrose	Leeds – Grimsby					
Stevenage – Glasgow Central	Leeds – Bradford					
Stevenage – Perth	Leeds – Harrogate					
Stevenage – Inverness	York – Lincoln					
Stevenage – Aberdeen	York – Grimsby					
Stevenage – Falkirk	York – Bradford					
Peterborough – Glasgow Central	York – Harrogate					
Peterborough – Perth	Newcastle – Middlesbrough					
Peterborough – Inverness	Newcastle – Sunderland					
Peterborough – Aberdeen	Newcastle – Chester-le-Street					
Doncaster – Sunderland	Newcastle – Morpeth					
York – Dunbar	Edinburgh – Stirling					

Table 2.6 Fastest and Slowest Flows between indi	rectly served stations
--	------------------------

2.19 It can be seen that the fastest flows in the group are those that covers large distances where the effect of interchange is mitigated by long periods spent at high speeds on the main route. In contrast the slowest flows are those which are relatively short distance, for which the length of time spent travelling at speed is insufficient to offset the impact of frequency and interchange. It should be noted that some of the flows identified are not flows that form part of the main ECML route, and therefore do not benefit from any part of the journey being on LDHS services.

Difference between Journey Time and Generalised Journey Time

- 2.20 Clearly factors such as service frequency and interchange have a significant effect on perceived journey times. It is therefore useful to compare the two measures to understand where the greatest impact is with a view to understanding how that impact might be mitigated in the future. To achieve this the ratio of GJT to average journey time has been calculated. In all cases the GJT will be greater than journey time, however the lower the ratio the better the quality of service. In Table 2.7 the top and bottom 40 flows have been highlighted, while in Table 2.8 the top and bottom 20 flows have been highlighted.
- 2.21 It can be seen from Table 2.7 that even within the core directly served network there is a group of stations where the ratio is very high. These are however characterised by being relatively short distance trips where the impact of frequency as a proportion of GJT will be relatively high. In contrast those locations with lowest ratio tend to be much longer distance flows, principally but not exclusively to and from London where relatively frequent fast direct services operate. This therefore presents the trade off within the existing timetables where the longest distance services have the highest speeds and therefore lowest journey times, while locations relatively close together have poorer relationships largely due to a lack of frequency for shorter distance journeys.

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2.22 Interestingly Table 2.8, examining associated stations and routes shows, that the range of results is narrower than for the core and intermediate stations and the ratios tend to be of the same order. This suggests that in spite of the addition of interchanges and also typically lower frequencies journey time journey time is still the main component of GJT. This would suggest that improvements to services on associated stations and routes might be better targeted at the routes off the ECML itself, for example line speed improvements on secondary lines. It should be noted however that the only journeys to key stations have been included in Table 2.8 and the ratios for these stations tend to be lower compared to links to other secondary stations.

Origin/Destination	London King's Cross	Stevenage	Peterborough	Grantham	Newark Northgate	Retford	Doncaster	Wakefield Westgate	Leeds	York	Northallerton	Darlington	Durham	Newcastle	Alnmouth	Berwick upon Tweed	Edinburgh Waverley
London King's Cross	N/A	1.58	1.35	1.33	1.28	1.47	1.16	1.20	1.17	1.20	1.22	1.15	1.18	1.13	1.17	1.15	1.10
Stevenage	1.58	N/A	1.58	1.51	1.50	1.61	1.26	1.32	1.27	1.68	1.61	1.61	1.55	1.50	1.54	1.51	1.43
Peterborough	1.37	1.58	N/A	2.24	2.47	1.38	1.60	1.45	1.36	1.59	1.32	1.27	1.28	1.22	1.26	1.66	1.17
Grantham	1.35	1.51	2.10	N/A	3.38	2.74	1.76	1.76	1.46	2.23	1.93	1.74	1.70	1.56	1.56	1.49	1.51
Newark Northgate	1.30	1.50	1.81	3.38	N/A	4.13	2.00	2.21	1.89	1.55	1.41	1.37	1.31	1.26	1.32	1.56	1.54
Retford	1.51	1.61	1.98	2.74	4.13	N/A	3.47	2.60	2.16	1.72	1.77	1.88	1.73	1.75	1.72	1.64	1.56
Doncaster	1.16	1.26	1.35	1.76	2.00	3.47	N/A	2.28	1.66	1.86	1.69	1.53	1.41	1.33	1.39	1.64	1.51
Wakefield Westgate	1.21	1.32	1.45	1.76	2.21	2.60	2.28	N/A	2.17	1.51	1.70	1.39	1.34	1.29	1.76	1.20	1.16
Leeds	1.18	1.27	1.36	1.46	1.89	2.16	1.66	2.17	N/A	1.56	1.40	1.40	1.30	1.24	1.89	1.61	1.17
York	1.21	1.68	1.39	1.44	1.55	1.72	1.86	2.07	1.56	N/A	2.00	1.52	1.36	1.25	1.43	1.21	1.12
Northallerton	1.68	1.61	1.48	1.93	1.93	1.77	1.69	1.70	1.40	2.00	N/A	3.82	2.03	1.74	1.72	1.65	1.55
Darlington	1.16	1.61	1.84	1.74	1.37	1.88	1.53	1.39	1.40	1.54	3.82	N/A	2.13	1.44	1.46	1.29	1.15
Durham	1.19	1.55	1.86	1.70	1.31	1.73	1.41	1.34	1.30	1.37	2.03	2.20	N/A	1.88	1.89	1.95	1.28
Newcastle	1.13	1.51	1.68	1.56	1.28	1.77	1.35	1.31	1.25	1.25	1.79	1.48	2.08	N/A	2.32	1.53	1.27
Alnmouth	1.19	1.56	1.28	1.59	1.36	1.76	1.43	1.80	1.93	1.48	1.75	1.51	1.98	2.32	N/A	4.68	1.73
Berwick upon Tweed	1.15	1.52	1.59	1.51	1.57	1.67	1.65	1.63	1.23	1.22	1.66	1.29	1.51	1.52	4.68	N/A	1.59
Edinburgh Waverley	1.09	1.44	1.23	1.52	1.55	1.57	1.52	1.17	1.54	1.11	1.56	1.15	1.31	1.28	1.73	1.59	N/A

Table 2.7 Ratio of Generalised Journey Time to Journey Time (Core and Intermediate Stations)



Origin/Destination	London King's Cross	Stevenage	Peterborough	Doncaster	Leeds	York	Newcastle	Edinburgh Waverley
Cambridge	1.44	1.58	1.84	1.65	1.48	1.57	1.44	1.38
Lincoln	1.55	1.51	1.69	1.47	1.52	1.56	1.52	1.40
Grimsby	1.52	1.54	1.46	1.48	1.46	1.52	1.46	1.41
Hull	1.49	1.43	1.48	1.80	1.52	1.44	1.57	1.48
Scarborough	1.66	1.49	1.48	1.52	1.40	1.62	1.59	1.45
Middlesbrough	1.66	1.48	1.40	1.60	1.31	1.52	1.39	1.53
Sunderland	1.55	1.37	1.49	1.53	1.53	1.60	1.33	1.68
Chester-le-Street	1.65	1.62	1.70	1.83	1.52	1.81	4.92	1.85
Dunbar	1.47	1.49	1.47	1.58	1.63	1.35	1.66	2.19
Glasgow Central	1.34	1.37	1.38	1.38	1.37	1.40	1.51	1.28
Perth	1.32	1.30	1.35	1.39	1.39	1.43	1.32	1.34
Inverness	1.23	1.22	1.25	1.29	1.28	1.29	1.33	1.14
Dundee	1.33	1.31	1.35	1.39	1.41	1.48	1.53	1.26
Aberdeen	1.27	1.25	1.30	1.35	1.34	1.38	1.45	1.21
Huntingdon	1.28	1.66	2.28	1.79	1.60	1.77	1.55	1.45
Bradford	1.49	1.46	1.53	1.69	1.64	1.69	1.48	1.44
Harrogate	1.49	1.49	1.42	1.53	1.59	1.78	1.53	1.42
Morpeth	1.47	1.55	1.54	1.73	1.50	1.73	2.32	1.61
Falkirk	1.41	1.40	1.44	1.46	1.39	1.48	1.62	1.27
Stirling	1.36	1.31	1.38	1.33	1.33	1.42	1.46	1.41
Montrose	1.29	1.28	1.34	1.39	1.36	1.35	1.44	1.29

- 2.23 It is useful to also compare locations to understand the relative service levels that existing locations enjoy. An important example of this are flows to and from London, the most important destination on the route, both economically and in terms of demand.
- 2.24 Figure 1.1 compares the generalised journey time to London for key nodes and intermediate stations on the route. Generalised journey time is composed of actual journey time with the addition of weightings for interchange and frequency. The lines across the figure highlight key journey time thresholds of 2 hours and 3 hours.



Figure 2.1 GJT Key Nodes and Intermediate Stations to London

2.25 Figure 2.2 below presents GJT for flows to London but this time for stations on associated routes, which tend to lack direct services to London on a frequent basis.





- 2.26 It can be seen from the above that there is a significant variation between stations in the quality of the service to London. In terms of locations on the route station served by the hourly fast service from Edinburgh to London can be identified by their low GJT values, compared to stations of a similar distance. The stations in this group are York, Darlington, Newcastle, Berwick-Upon-Tweed and Edinburgh. It can also be seen that there are a number of intermediate stations that have a poorer than average service. These tend to be locations with a smaller population and are therefore not served as frequently as other settlements. These include Retford, Northallerton, Chester-le-Street, Morpeth and Dunbar.
- 2.27 In terms of the associated stations it can be seen that these all have higher GJT values than the on-line stations, with all except Cambridge being in excess of three hours. It will also be seen that much of this made of interchange penalty with the exception of stations north of Edinburgh where the issue largely relates to high journey time reflecting the long distances involved, as well as a decline in average speeds as a result of route geometry and track capacity issues.
- 2.28 In recognition of the impact of distance on journey time an alternative approach is to calculate the average speed of journeys, this has been completed using the measure of generalised speed (generalised journey time divided by distance). This gives a comparable measure of service quality; the figure below presents results for trips from all locations to London.



Figure 2.3 Online and Off Line Generalised Speed to London

- 2.29 It can clearly be seen that with a small number of exceptions, locations on the route (the light coloured bars) have a significantly faster service than locations off the route. A number of locations have exceptionally high generalised speeds with five in excess of 80 mph.
- 2.30 Looking beyond London flows it is useful to identify which locations in general have the best and worst range of journey times. The first figure below present the stations which occur most frequently in the top 20 fastest journey times, while the second figure identifies the stations that occur most frequently in the slowest 20 journey times.

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Figure 2.5 Count Frequency of Locations in Slowest 20 Flows

2.31 It can be seen that the result are relatively polarised with few stations having the same frequency in both figures. The main exception to this is Leeds which has a low placing in the fastest flows figure but a high placing in the slowest flows, indicating that while there are a number of reasonably fast flows services from Leeds tend to be slower than elsewhere on the line. The other stations

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occurring in the slowest list tend to be smaller intermediate stations with a more limited range of direct services.

Route Usage

- 2.32 Having examined the level of service available between a wide range of destinations it is useful to compare this with patterns of usage. East Coast, the main operator on the route kindly provided ticket sales data on flows for which they held full information on the ECML. While much of this data remains commercially confidential it is possible to present some aggregate results to illustrate the patterns of demand that exist.
- 2.33 The table below presents the percentage of trips on the route that pass over certain sections of route.

Route Section	% Total Trips Using Route Section
Kings Cross - Hitchin	59
Hitchin - Peterborough	39
Peterborough - Newark	31
Newark - Doncaster	17
Doncaster - Leeds	11
Doncaster - York	22
York - Leeds	6
York - Northallerton	18
Northallerton - Newcastle	23
Newcastle - Edinburgh	12

Table 2.9 % of East Coast Trips using route sections

- 2.34 The pattern of demand is unsurprising with the majority of trips passing through the south end of the line on route to London. It should be noted that the information presented is not comprehensive for stations at the north end of the line in particular where flows to destinations off the ECML for example to Manchester and Birmingham and provided by different operators will form a substantial proportion of the total number of trips.
- 2.35 The table below presents the trip rates per head of population to London. This is useful for identifying the importance of access to London from location along the route. Clearly it would be expected that trip rates will decline with distance but is it useful to identify any locations that are exceptional.





Figure 2.6 Trip Rate per head to London

2.36 It can be seen that stations south of Newark have a very high trip rate which might be expected, indeed no other station achieves a trip rate per head in excess of 10 per annum. This shows that these locations despite being a significant distance from London are in a position where London is of importance to both the businesses and residents of these settlements. The other locations with comparatively high trip rates to Edinburgh include Retford, Doncaster, York, Darlington, Newcastle, Durham and Berwick-Upon-Tweed. The calling pattern of the fast London – Edinburgh service in these results is apparent along with the frequent (although not as fast) services to Leeds. Durham is likely to be exceptional and is likely to be related to a combination of student and tourism traffic.

Annex 4

Economic valuation of improving rail services




Prospectus for investment in the East Coast Main Line

> Annex 4 Economic Valuation of Service Improvements





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1 Introduction

- 1.1 This annex presents the results of the economic modelling of both business to business agglomeration impacts and labour market impacts for a range of origin-destination (O-D) pairs on the ECML. The results of this assessment are then used to devise conditional outputs (Annex 5) and identify sections of route where investment might be required to deliver these conditional outputs.
- 1.2 The approach taken to this exercise has been based around the process used in Network Rail's long term planning activities as presented in the series of Market Studies produced in 2013. The process has been designed to produce a strategic valuation in a consistent manner across a large number of stations and origin destination pairs. These are then used to help inform and define the conditional outputs for the ECML.



2 Methodology

- 2.1 To estimate the economic (GDP) impacts of service improvements an approach developed by Network Rail for its three Market Studies was adapted.
- 2.2 For labour market impacts (essentially commuting trips) the approach presented in Appendix H of the Regional Urban Market Study was utilised, without alteration. The basis for these labour market benefits as presented by Network Rail is that "As the perceived cost of travel between population areas and urban centres reduces, people are more likely to commute to a job that better matches their skills, this allows employers to match to choose from a greater pool of prospective employees and match those employees to the activities that they will be most productive, increasing the productivity of the business and increasing economic outputs."
- 2.3 To estimate the agglomeration benefits (i.e. the benefits of businesses being better connected with each other) the model in Appendix B of the Network Rail Long Distance Market Study was adapted. Graham and Melo (2010) in Advice on the Assessment of Wider Economic Impacts: a report for HS2 note that "at their broadest level, agglomeration economies occur when individuals benefit from being "near" to other individuals, and exist when the spatial concentration of economic activity gives rise to increasing returns in production."
- 2.4 Both of these approaches deal solely with economic growth and GDP/worker impacts and do not include any form of transport user benefit (time and cost savings) that are normally included within conventional transport appraisal. Such benefits would be additional to those presented here.
- 2.5 In its original form this assessment tool treated all economies in a homogenous manner, that is to say there was no variation applied to deal with issues relating to the differing composition of the economy at different locations (see Annex 1 for more description of the economies along the route). To try and incorporate this factor the Network Rail approach was adapted to incorporate four broad sectors of the economy:
 - Manufacturing
 - Construction
 - Consumer Services
 - Producer Services
- 2.6 While the manufacturing and construction sectors are self explanatory it is useful to define the components of consumer and producer service sectors, this is shown in table 2.1

Consumer Services	Producer Services	
Motor Trade	Financial	
Wholesale	Insurance	
Retail	Auxiliary/Financial	
Hotels/Restaurants	Machinery Renting	
Land Transport	Computer Services	
Water Transport	Research & Development	
Travel Support	Other business services	
Post Telecom		

Table 2.1 Definition of Consumer and Producer Services Sectors

2.7 The approach taken to achieving this "sectorisation" relied on using the DfT Webtag guidance on Wider Impacts and applying the effect of 'distance decay' and agglomeration elasticities' to Network Rail's own distance decay function to produce a series of separate relationships between changes in rail accessibility and GDP growth for each sector. This provides results that are more reflective overall of the composition of the local economies along the route rather than relying on the characteristics of the country as a whole.

Temporal and Spatial Scope of Assessment

- 2.8 To carry out the assessment information was required on the generalised cost of travel between any two locations. This required information on journey travel times, calculated using journey planners, and based on the weekday off peak timetable (described in more detail in Annex 3). Having established journey times and applied appropriate weightings based on the ATOC Passenger Demand Forecasting Handbook, a value of time was applied to the journey times and finally a fare to provide a generalised cost.
- 2.9 Due to the size of the study area it was not feasible to include all stations on the ECML network. Therefore a selection were assessed in detail. This includes all main stations on the "trunk" route (described here as Nodes), locations with infrequent direct services (Intermediate Stations) and other large stations in the greater East Coast catchment area that are typically off the mainline.
- 2.10 These three categories (Nodes, Intermediate stations and Associated stations), shown in Table 2.1 below are used later in Annex 5 to help group the proposed draft conditional outputs.

Nodes and Intermediate Stations	Associated Stations
London King's Cross	Glasgow
Stevenage	Sunderland
Huntingdon	Aberdeen
Peterborough	Perth
Grantham	Dundee
Newark	Inverness
Retford	Bradford
Doncaster	Harrogate
Wakefield	Middlesbrough
Leeds	Hull
York	Grimsby
Northallerton	Scarborough
Darlington	Cambridge
Durham	Lincoln
Newcastle	Stirling
Morpeth	Falkirk
Alnmouth	Montrose
Berwick-Upon-Tweed	Scunthorpe
Dunbar	
Edinburgh	

Table 2.2 Stations within the ECML Valuation Model

2.11 Not all O-D pairs are valid for assessment as they might either be entirely off the ECML (for example Bradford – Leeds) or while they could be routed via the ECML they could also be routed

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via an alternative route (for example Lincoln – Doncaster which could be completed either direct not via the ECML or via Retford.

The Outputs

- 2.12 The outputs are presented in terms of total additional GDP per annum for the origin area arising as a result of the improvement in rail services. This is based on the total number of employees in the stated area. However it should be noted that O-D pairs are reversible and therefore the total value of making an improvement to one O-D pair is the sum of the value in both directions. For example an improvement between Newark and London would produce a GDP uplift between both Newark London and London Newark.
- 2.13 Given the relatively strategic nature of the movements within this study it has been assumed that each station represents a local authority area. For example Leeds represents the whole Leeds City Council area. The only exception to this is London where the values for London boroughs within Travelcard Zones 1&2 have been aggregated and Newcastle (combined with Gateshead) and Middlesbrough (combined with Stockton). Within the selection of stations no local authority area had more than one station within it thus avoiding issues relating to double counting.
- 2.14 Three core assessments were made, based on Network Rail service level conditional outputs used in their Market Studies and known as *Best Possible*, *Best Current* and *Good Current*. For clarity, the terminology has been simplified throughout the narrative that follows to identify the three service level benchmarks as *Gold*, *Silver* and *Bronze*. These three levels are described in the table below:

	Description	Journey Speed	Trains per Hour
>100 Miles	Gold	160	3 or 4
	Silver	100	2 or 3
	Bronze	80	1 or 2
<50 Miles	Gold	60	5 or 6
	Silver	60	3 or 4
	Bronze	45	1 or 2

Table 2.3 Definition of Service Levels

- 2.15 Some discretion was applied to the application of service level definitions under 50 miles where it was felt that the existing characteristics of the service were more closely related to long distance (>100 miles) services than shorter distance services for example this applied to Darlington York where the average speeds are already in excess of the maximum values for under 50 mile trips.. It will also be seen that there is no specific category for trips between 50 and 100 miles in distance. The approach taken, here and in the Network Rail study is to use judgement about individual flows based on their existing characteristics.
- 2.16 The service options all specify a consistent standard across O-D pairs; therefore the closer a particular O-D pair is to a given service level, the lower the level of benefit that will accrue relative to an O-D pair with very poor existing connectivity.
- 2.17 It is acknowledged that these service levels are not necessarily deliverable in all cases for all cityto-city pairs (especially *Gold*) however it is a useful exercise to test all O-D pairs consistently to identify those locations where service improvements would bring the most benefits.

Results of Assessment Modelling 3

Results

3.1 The following sections set out the results of the valuation exercise. Given that there are around 1000 O-D pairs involved it is not practical to include all results individually, however the following sets out the most relevant results and those of greatest significance.

Range of Results

3.2 The scale of results for the O-D pairs varied greatly as might be expected. The largest results were in the tens of millions of pounds per annum while the lowest were in the hundreds of pounds per annum. Table 3.1 below categorises the results into different groups (based on the size of the GDP uplift forecast) for the business to business model.

Group	Level of Benefit	Gold	Silver	Bronze
Large	£5M+	76	32	10
Medium	£1M-£5M	322	191	108
Small	£0-£1M	875	1050	1,155
Total	All Groups	1273	1273	1273

- Table 3.1 Range of Results for Business to Business Model (number of O-D pairs)
- 3.3 Table 3.2 below presents the results for labour markets. These are more limited as the number of O-D pairs where labour markets are relevant is lower as the labour markets generally only operate over shorter distances.

Table 3.2 Range of results for Labour Market Model (number of O-D pairs)					
Group	Level of	Gold	Silver	Bronze	
-	Benefit				
Large	£5M+	17	2	0	
Medium	£1M-£5M	100	27	2	
Small	£0-£1M	1156	1244	1271	
Total	All Groups	1273	1273	1273	

T $c \sim r$

3.4 It should be noted that all the benefits presented here could not necessarily be delivered in practise due to the conflict between different O-D pairs in delivering outputs. However, as an initial prioritisation exercise it is informative to compare the total value of improvements in the different categories to identify the proportion of benefits that come from particular ranges of benefit. The tables below set these out for business to business trips only.

Table 3.3 Comparison of Proportion of Benefits: Gold						
Business to O-D Total Net GDP						
Business	Count	(£M)	% Total Net GDP			
Large	76	1 212	58			

Business to	O-D	Total Net GDP		
Business	Count	(£M)	% Total Net GDP	% O-D Count
Large	76	1,212	58	6
Medium	322	649	31	25
Small	875	230	11	69
Total Value	1273	2,091	100	100

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Business to Business	O-D Count	Total Net GDP (£M)	% Total Net GDP	% O-D Count
Large	32	345	38	3
Medium	191	371	41	15
Small	1050	193	21	82
Total Value	1273	909	100	100

Table 3.4 Comparison of Proportion of Benefits: Silver

Table 3.5 Comparison of Proportion of Benefits: Bronze

Business to Business	O-D Count	Total Net GDP (£M)	% Total net GDP	% O-D Count
Large	10	89	29	1
Medium	108	201	65	8
Small	1155	20	6	91
Total Value	1273	310	100	100

3.5 It can be seen that in all cases a very small number of O-D pairs represent a very large proportion of the total benefits of improving services. In the case of the *Silver* option for example 38% of the GDP uplift is attributable to only 3% of the O-D pairs. This therefore provides some level of prioritisation of investment. This is not to say however that O-D pairs where the benefits are large should be the only locations where improvements are brought about. It is likely that the level of investment required to deliver these larger benefits will be high in absolute terms. In contrast a range of smaller benefits could be delivered through lower levels of investment and will bring benefits that have a proportionately larger impact on the economies served.

Route Section Results

- 3.6 To provide an understanding of the spatial distribution of benefits and the locations where the most benefits accrue an assessment of benefits allocated to route sections was carried out.
- 3.7 The ECML route from London to Edinburgh was divided into sections of line based around the locations of key junctions and the sum of benefits from O-Ds that would use those sections was assessed. This is useful for identifying approximate benefits for sections of route where interventions might be required to deliver benefits, and aligns with the operational geography and constraints of the network. The table below presents the absolute values for business to business and labour market benefits combined for the three tests. These are a summation of all the value of all O-D flows that would pass along a particular section of route.

	Gold	Silver	Bronze	
Kings Cross - Hitchin	1,049	231	-248	
Hitchin - Peterborough	1,113	375	36	
Peterborough - Newark	1,344	485	134	
Newark - Doncaster	1,045	405	155	
Doncaster - Leeds	841	353	66	
Doncaster - York	745	373	93	
York - Leeds	337	135	43	
York - Northallerton	814	312	151	
Northallerton - Newcastle	671	248	108	
Newcastle - Edinburgh	399	179	90	

Table 3.6 Route Section Results (£M)

3.8 The following table presents these results by rank. The ranking process demonstrates that investment in the route between Peterborough and Newark, Hitchin and Peterborough and London and Hitchin would deliver the greatest level of benefits. These sections of route are the ones with the largest number of O-D pairs passing through them, which also have the largest absolute values from improvements. London flows are clearly driving this as the valuations for these flows tend to be higher than for other flows.

	Gold	Silver	Bronze
Kings Cross - Hitchin	3	8	10
Hitchin - Peterborough	2	3	9
Peterborough - Newark	1	1	3
Newark - Doncaster	4	2	1
Doncaster - Leeds	5	5	7
Doncaster - York	7	4	5
York - Leeds	10	10	8
York - Northallerton	6	6	2
Northallerton - Newcastle	8	7	4
Newcastle - Edinburgh	9	9	6

Table 3.7 Route Sections Ranked by O-D Wider Economic Value

- 3.9 The tables present an interesting set of results. It might be expected that the section from London to Hitchin would have the greatest level of benefit; however this is not the case. The reason for this is that flows to London already represent a relatively high level of service therefore the marginal benefit of moving to an improved level of service is lower. The section from Peterborough to Newark however performs well reflecting the larger number of O-D pairs that operate over this section than south of Peterborough.
- 3.10 When the number of O-D pairs using a section of line is taken into account the section from Doncaster to Leeds is the strongest performer (given the lower number of O-D pairs using this

Job No NEA7026 section), in part reflecting the relative level of service to Leeds compared to other East Coast destinations and the comparatively long journey times from Leeds to Doncaster compared for example to Doncaster – York.

- 3.11 The rankings for *Bronze* present what might superficially be thought of as 'unusual' results, with London Peterborough ranking lowest. This is because the *Bronze* level of service would represent a significant deterioration for many of the O-D pairs on the route and some results are therefore negative.
- 3.12 The section from York to Leeds performs less well compared to the Doncaster Leeds section. This is perhaps due to the limited number of O-D pairs using the line compared to other sections but also due to the generally higher average speeds that already exist over this section.

Station Rankings

- 3.13 In an attempt to identify the locations where service improvements would have the greatest impact on the economy the benefit accruing to each station has been calculated. This is useful for presenting both the absolute value to the economy of service improvements but also the proportional increase to the value of the economy as a whole at that location. Using two approaches is appropriate as it allows locations which have a lower absolute value (because of their size) but a proportionately greater impact on their economy to be identified.
- 3.14 Table 3.8 presents the total absolute value for stations including ranking, expressed in £ per annum for both labour market and business to business impacts, while Table 3.9 presents the relative impact on GDP expressed in %.



	Gold		Sil	ver	Bronze		
Total GDP (£)	Total (£M)	Rank	Total (£M)	Rank	Total (£M)	Rank	
Aberdeen	45	26	21	25	13	18	
Alnmouth	9	37	4	35	2	29	
Berwick	8	38	3	36	1	30	
Bradford	261	3	142	3	82	1	
Cambridge	39	27	19	27	12	19	
Darlington	87	21	23	24	0	31	
Doncaster	235	5	96	4	14	16	
Dunbar	17	34	10	32	6	26	
Dundee	24	31	11	31	6	25	
Durham	63	25	24	23	4	27	
Edinburgh	140	12	65	11	25	11	
Falkirk	37	28	20	26	12	20	
Glasgow	103	18	52	17	35	8	
Grantham	147	10	46	20	11	21	
Grimsby	104	17	60	13	40	5	
Harrogate	98	19	49	18	28	10	
Hull	122	15	61	12	34	9	
Huntingdon	91	20	53	16	17	14	
Inverness	31	29	15	28	10	22	
Leeds	560	2	196	2	-27	33	
Lincoln	107	16	55	15	35	7	
London	1022	1	224	1	-248	37	
Middlesbrough	178	8	83	6	48	3	
Montrose	13	36	6	34	3	28	
Morpeth	21	33	13	29	7	23	
Newark	145	11	55	14	18	13	
Newcastle	185	6	66	10	19	12	
Northallerton	86	22	35	21	13	17	
Perth	17	35	3	37	-3	32	
Peterborough	85	23	7	33	-38	36	
Retford	139	13	69	9	35	6	
Scarborough	68	24	30	22	17	15	
Scunthorpe	132	14	81	7	57	2	
Stevenage	29	30	-99	38	-269	38	
Stirling	23	32	12	30	7	24	
Sunderland	156	9	72	8	46	4	
Wakefield	239	4	90	5	-37	35	
York	184	7	48	19	-35	34	

Table 3.8 Station Maximum Net GDP Impact (£M). Top 10 Highlighted in Green

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- 3.15 Unsurprisingly in terms of absolute values (Table 3.8 previously) London produces the single largest GDP uplift, followed by Leeds, Wakefield and Bradford. This result is unsurprising, as London has the single largest economy in the country while the other locations are located relatively centrally, with the vast majority of locations assessed being within 2.5 hours travel time. However there is significant scope for improving connectivity to and from these locations which are presently hindered by comparatively long journey times compared to other locations on the ECML. In addition these three locations are some of the largest economies on the line outside London.
- 3.16 It will also be seen that the ranking of locations change when Bronze is examined. As many of the locations on the ECML already have services that are better than Bronze it is likely there largest gains in this category fall on locations where services are of a much poorer guality. These locations tend to be either intermediate stations or associated stations off the mainline. For example Middlesbrough, Retford, Grimsby and Scunthorpe.
- 3.17 In terms of proportional changes in the size of economies, (Table 3.9 over), the results are very different. In all cases Lincoln receives the greatest benefit. This is due to the poor existing levels of connectivity that presently exist to and from Lincoln. While the Gold option is clearly not deliverable even the Bronze option delivers a 2.7% increase in GDP. This would suggest that a case exists for examining in detail connectivity to Lincoln and mechanisms for improving it further. Other rankings vary somewhat, however Retford and Newark both score highly. In the case of Newark this is likely to be due to a lack of direct connectivity to Leeds and West Yorkshire in the existing weekday off peak timetable, while in the case of Retford it may well be linked to the low frequency of services that serve the station and the lack of direct services to West Yorkshire. It is noticeable that the majority of the larger stations such as Leeds, Edinburgh and London rank very poorly, emphasising that these locations already have a good level of service.
- 3.18 The largest proportional increases tend to be characterised by locations with poorer services, and therefore the list is very different from the absolute impacts. The exception to this is Bradford which scores in the top 10 for Bronze in both the proportional increase and absolute increases, suggesting that there is scope for significant improvement at this location.

A4



	Go	old	Sil	ver	Bro	nze
% GDP (%)	Total (%)	Rank	Total (%)	Rank	Total (%)	Rank
Aberdeen	0.65%	37	0.30%	34	0 19%	29
Alnmouth	4 01%	16	1.81%	14	0.92%	13
Berwick	3 57%	19	1 39%	22	0.52%	18
Bradford	3 73%	17	2 02%	12	1 18%	7
Cambridge	1 49%	27	0.73%	27	0.46%	19
Darlington	5 71%	8	1.54%	20	0.02%	31
Doncaster	6.1.3%	7	2.51%	7	0.37%	23
Dunbar	1 64%	25	0.93%	24	0.52%	17
Dundee	0.88%	32	0.00%	31	0.02%	28
Durham	5.56%	9	2 07%	11	0.38%	22
Edinburgh	0.84%	34	0.39%	32	0.00%	30
Falkirk	1 43%	28	0.78%	26	0.45%	20
Glasgow	0.72%	35	0.76%	33	0.40%	25
Grantham	7.64%	4	2 39%	8	0.24%	15
Grimsby	4 02%	15	2.00%	10	1 54%	5
Harrogate	3.56%	21	1 79%	15	1.04%	11
Hull	3.11%	21	1.75%	19	0.87%	14
Huntingdon	3.06%	22	1.30%	16	0.57%	16
Inverness	0.85%	33	0.41%	30	0.27%	24
Leeds	3.62%	18	1 27%	23	-0.17%	.34
	8.59%	1	4 42%	1	2.81%	1
London	0.43%	.38	0.09%	37	-0.10%	32
Middlesbrough	4.06%	14	1 90%	13	1 09%	8
Montrose	0.96%	31	0.44%	29	0.24%	26
Morpeth	6.20%	6	3.84%	3	2.08%	4
Newark	7.99%	3	3.03%	4	0.99%	12
Newcastle	2.26%	24	0.80%	25	0.23%	27
Northallerton	7.04%	5	2.90%	6	1.08%	9
Perth	0.70%	36	0.12%	36	-0.12%	33
Peterborough	1.61%	26	0.14%	35	-0.72%	36
Retford	8.45%	2	4.19%	2	2.13%	2
Scarborough	5.34%	11	2.38%	9	1.35%	6
Scunthorpe	4.87%	12	3.00%	5	2.11%	3
Stevenage	1.29%	29	-4.36%	38	-11.86%	38
Stirlina	1.27%	30	0.67%	28	0.39%	21
Sunderland	3.57%	20	1.64%	18	1.05%	10
Wakefield	4.59%	13	1.72%	17	-0.70%	35
York	5 55%	10	1 43%	21	-1 05%	37

Table 3.9 Station % Impact on Local GDP. Top 10 Highlighted in Green

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Breakdown by Sector

3.19 In the business to business sector it was possible to divide the results into four economic sectors as described above. While the main purpose of this was to attempt to provide a more tailored approach overall in modelling the impact on specific economies it is useful to present the aggregated results for each sector and some specific examples to show the difference between certain economies. Table 3.10 below presents the proportion of the total increase in GDP attributable to each of the four sectors for the three scenarios.

Sector	Gold	Silver	Bronze
Manufacturing	17	19	25
Construction	16	15	11
Consumer Services	42	44	48
Producer Services	25	22	16
Total	100	100	100

Table 3.10 % of Business to business benefit attributable to four main sectors

3.20 The table shows the dominance of consumer services amongst the four sectors, reflecting both the ubiquity of this sector across all economies but also the relative sensitivity of this sector to changes in transport costs. It can be seen that producer services represents a comparatively large part of the increase in GDP particularly for *Gold* and *Silver* with a decline in the *Bronze* category this is related to the extreme sensitivity of this sector to changes in transport cost but also to the dominance of this sector in locations that already have a high level of service.

Largest Absolute GDP Gain (O-D pairs)

3.21 The following tables present the O-D pairs with the largest absolute changes in GDP for the business to business sector for each of the three service level categories. Table 3.11 deals exclusively with London flows as these are generally an order of magnitude larger than for other locations.

Gold	Silver	Bronze
Leeds	Bradford	Bradford
Bradford	Leeds	Scunthorpe
Wakefield	Scunthorpe	Lincoln
Scunthorpe	Hull	Hull
Hull	Lincoln	Grimsby
Doncaster	Grimsby	Harrogate
Middlesbrough	Harrogate	Middlesbrough
Grimsby	Middlesbrough	Retford
Harrogate	Retford	Sunderland
Lincoln	Doncaster	Aberdeen

 Table 3.11
 Top 10
 Largest Improvements in Economic Value (London Flows)

3.22 Given the dominance of London within the flows it is useful to present a list of the top 10 flows excluding London (Table 3.12). This can help to define conditional outputs for non-London flows.



Gold	Silver	Bronze
Middlesbrough – Leeds	Doncaster – Leeds	Sunderland – Leeds
Doncaster – Leeds	Middlesbrough – Leeds	Middlesbrough – Leeds
Sunderland – Leeds	Sunderland – Leeds	Glasgow – Sunderland
Newcastle – Leeds	Glasgow – Sunderland	Scunthorpe - Leeds
Glasgow – Sunderland	Leeds – Retford	Leeds – Retford
Edinburgh – Leeds	Newcastle – Glasgow	Middlesbrough – Bradford
Leeds – Retford	Bradford – Doncaster	Bradford – Doncaster
Newcastle – Glasgow	Newcastle – Leeds	Leeds – Grimsby
Leeds – Glasgow	York - Bradford	Newcastle – Glasgow
Leeds - Newark	Scunthorpe - Leeds	York - Bradford

Table 3.12	Top 10 Largest Im	provement in Economic	ا میراد/	(Non-London Flows)	
	TOP TO Largest III		value		

3.23 It is noticeable that in both tables there is a strong grouping in the Yorkshire & Humber area, with the addition of Lincoln. Bradford is present in all of the first three groups in Table 3.12 suggesting a strong case for more direct services from Bradford to London in particular to improve the generalised journey time. In terms of non-London flows there is a dominance of comparatively flows in the Yorkshire & Humber area and the North East, including a number of key flows such as Doncaster – Leeds and Middlesbrough – Leeds. Much of this relates to the relatively poor connections in this area and therefore the large gains that might be made with improved linkages.

Benefits of Station Improvements

- 3.24 In addition to the benefits brought about by the direct improvements to journey times and service frequency it is also possible to improve services through making alterations to improve the quality of stations and the surrounding build environment. Improvements in this area may not deliver such large absolute benefits; equally the costs associated with delivery will not be so significant. Improvements might include access to WiFi, improved waiting areas or the presence of staff. Going beyond this it might also include the relationship between the station and its surroundings in terms of access to urban centres and the environment that pedestrians have to use to access the station. Such issues are likely to have an impact on the perception of visitors to the area.
- 3.25 Using the ATOC Passenger Demand Forecasting Handbook and by applying the Network Rail agglomeration model it has been possible to assess the impact of station improvements. As the impact is a fixed value per trip the impact for different flows varies with distance, reflecting the fact that the impact relating to the station will form a decreasing proportion of the valuation of the journey as distance and journey time increases. The table below sets out some examples of this for trips from Doncaster, these are expressed as an absolute value but also as a proportion of the valuation of the Silver option for each O-D pair as a comparison.

Doncaster to	Annual Absolute Impact (£)	% of Silver	
York	70,722	41	
Peterborough	33,254	26	
Edinburgh	8,133	1.3	
London	481,175	8	

Table 3.13 Example of Impact of Station Improvements: Doncaster

Job No NEA7026 3.26 It can be seen that the impact clearly tapers with distance. The GDP uplift of station improvement on flows to Edinburgh being much lower than for improvements to York. It is likely that each station on the route is at a different position in terms of the existing quality provided. For example London King's Cross, following its refurbishment is probably very close to providing the best quality possible. In contrast some other stations have a relatively poor environment, therefore each station needs to be assessed on an individual basis to understand what is required to improve it. Improvements to stations do however have the potential to be part of the wider delivery of benefits, especially for relatively short distance flows where large improvements in journey time may not be feasible.

Benefits of Reliability Improvements

- 3.27 An important factor in the perception of rail services is their reliability. For a number of reasons the East Coast Main Line presently suffers from a comparatively low level of reliability, with particular issues relating to the frequency and impact of major incidents as well as other issues relating to background levels of poor punctuality, perhaps reflecting the relatively constrained capacity of the route.
- 3.28 To illustrate the scale of the potential impact of this issue the Network Rail agglomeration model has been used to assess the impact of delays. It should be noted that this is not part of the intended role of the model and therefore the results are presented as illustrative to provide an indication of the impacts. Using information available on the target level of punctuality for East Coast services in Control Period 5 and the target value for all other services nationally it is possible to estimate the average difference in delay per train, which equals 1.8 minutes per service. While the modelling of reliability is more complex than this, the result provides a useful approximation. The table below presents the impact of lower levels of reliability on the ECML for flows from Leeds and Edinburgh to and from London at a *Silver* level of service.

	,		1 /
Flow (To London)	CP5 National PPM Value	East Coast CP5 PPM Value	Difference
Leeds	£45,540,786	£42,593,061	-£2,947,725
Edinburgh	£3,552,184	£3,357,496	-£194,688

Table 3.14	Impact of reliability on	agglomerations values	(Key Stations to London £	E pa)
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3.29 It can be seen that the potential impact of differences in reliability is potentially significant, although it should be considered that these results are illustrative and the impacts of reliability are relatively complex.

Impact on Conditional Outputs

3.30 Much of the above has related to identifying the largest flows and largest benefits from the range of O-Ds that have been modelled. This forms a useful basis for identifying the theoretical benefits of improving linkages. However it is clearly not feasible to provide the highest level of service for all O-D pairs. This is partly due to conflicts arising between O-D pairs but also due to the practical constraints on investing in the network to deliver on these benefits. Therefore while the above informs the conditional outputs it may not be possible to deliver all of the biggest benefits. Equally, some smaller benefits might be delivered as a by-product of other changes.



- 3.31 The conditional outputs defined have attempted to maximise the level of benefits achievable. With the delivery of HS2 it would be possible to provide *Gold* levels of service to a number of locations, while also allowing a range of other O-D pairs to receive a *Silver* level of service.
- 3.32 Table 3.15 below identifies the monetised economic benefits per annum as a result of the conditional outputs identified in Annex 5. These are presented for options both with and without HS2.

	With	HS2	Witho	ut HS2
Standard	No. O-D Pairs Upgraded	Total Monetary Value (£M) pa	No. O-D Pairs Upgraded	Total Monetary Value (£M) pa
Gold	5	264.2	0	0
Silver	36	96.3	41	152.3
Bronze	34	155.1	34	155.1
Total	75	515.6	75	307.4

Table 3.15 Economic Value of O-D Pairs Improved in Conditional Outputs with/without HS2

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Annex 5

Conditional Outputs

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Prospectus for investment in the East Coast Main Line

Annex 5 Draft Conditional Outputs





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1 Introduction

- 1.1 The following sets out some draft conditional outputs based on the evidence from the economic growth and productivity assessment exercise (Annex 4). Conditional outputs are broad outcomes that identify what difference interventions will make. These conditional outputs have been derived through collating and analysing the relevant evidence from stakeholder requirements (see Annex 6 for a summary); the existing rail service levels, infrastructure conditions and constraints; the rail connectivity in terms of journey times, frequencies and interchanges provided by existing services; and an economic evaluation of the benefits of improving rail service levels to Network Rail specified standards. The economic analysis and evaluation has identified where agglomeration and labour market benefits can be achieved through improved rail provision between city pairs on the ECML and within the associated corridor, and conditional outputs have been identified in terms of the improvement of service levels to achieve the next highest level of service (defined by Network Rail). The conditional outputs provide a vision for the longer term, from which a long term strategy can be developed in partnership with the rail industry. From this, the rail industry can develop appropriate service improvements and infrastructure investments that will enable the achievement of the defined conditional outputs.
- 1.2 Reference is made in the text to different levels of output *Best Possible, Best Current* and *Good Current*. These are based on the Network Rail definitions of service levels on which the economic growth assessment is based. For clarity, the terminology has been simplified throughout the narrative that follows to identify the three service level benchmarks as *Gold, Silver* and *Bronze*. The table below specifies the definitions of the three service levels.

	Description	Journey Speed	Trains per Hour
>100 Miles	Gold	160	3 or 4
	Silver	100	2 or 3
	Bronze	80	1 or 2
<50 Miles	Gold	60	5 or 6
	Silver	60	3 or 4
	Bronze	45	1 or 2

Table 1.1 Definition of Service Levels

- 1.3 The conditional output statement sets out to try and maximise the level of benefit obtainable, while acknowledging that it is not practical for all locations to receive the same level of service.
- 1.4 The conditional outputs are divided into two key sections. To begin conditional outputs for each station or group of stations are defined; these are divided into spatial groups based broadly on the operational geography of the route. Significant node stations are dealt with first followed by intermediate stations on the ECML itself and then locations on associated routes. London itself is not treated specifically as a grouping but services to London are dealt with through each spatial group. The second section deals with significant changes in the service provision that have been identified as being of importance to delivering the conditional outputs.
- 1.5 All of the conditional outputs represent potential improved levels of service, and assume that all increases in frequency and service levels are additional to existing services, and that there will be no detriment to those existing services.

Glossary

1.6 The following abbreviations are used throughout this document:

EC – East Coast JT – Journey Time LDHS – Long Distance High Speed services TPD – Trains per day TPE – Trans Pennine Express TPH – Trains per hour XC – Cross Country

2 Peterborough & the East

2.1 The following table sets out the conditional outputs for stations within the area covered by Peterborough and the East. This includes the stations at Peterborough, Stevenage, Huntingdon, Cambridge and Grantham. This section of line is already served by a high frequency and high speed service and therefore conditional outputs focus on optimising this as well as improving connectivity towards East Anglia, the North of England, and Scotland.

Group	Station	Destination Service	Conditional Output
Node	Peterborough	West Yorkshire	Improved services up to <i>Silver</i> level to West Yorkshire including Leeds, Wakefield and Bradford. Direct services to Bradford and journey time to Leeds ultimately to be reduced to 65 minutes, with two trains per hour.
		Grantham, Newark, Retford, Doncaster	Aim to improve journey times to <i>Silver</i> level with two trains per hour (1TPH to Retford) to these stations and journey times reduced to the following times: Grantham 17, Newark, 26, Retford, 37. Retain existing minimum journey times between Peterborough and Doncaster.
		London	Retain journey times and frequencies at present levels, aim to increase speeds of Great Northern services to reduce journey times and increase line capacity by operating at a speed closer to East Coast services.
		York, North East and Scotland	Reduced journey times to move average journey time closer to minimum journey, at least hourly service to Edinburgh aiming at journey times below 3h 30 minutes. Improvements in connectivity to Aberdeen and Inverness and intermediate destinations should also be considered.
Intermediate station	Stevenage	West Yorkshire	Improved services up to <i>Silver</i> level to West Yorkshire including Leeds, Wakefield and Bradford. Direct services to Bradford; and journey time to Leeds ultimately to be reduced to 95 minutes, with two trains per hour.
		London	Retain journey times and frequencies at present levels, aim to increase speeds of Great Northern services to reduce journey times and increase line capacity by operating at a speed closer to East Coast services. Maximise benefits of Thameslink through increased connectivity to destinations south of London.
		York, North East and Scotland	Introduction of regular direct services to York and Newcastle, and direct peak services and improved connections to Edinburgh. Aim for <i>Silver</i> average journey times of 96 minutes to York and 2h24min to Newcastle.
		Huntingdon and Peterborough	Retain existing service quality to Peterborough, work towards reduced journey times to Huntingdon and Peterborough through increased maximum speed of Great Northern services.
	Huntingdon	Peterborough and London	Work towards reduced journey times on Great Northern services through higher maximum speeds.
		North of Peterborough	Introduce LDHS calls for services at least as far north as Doncaster either as part of the Leeds service or services to York and the North East. Frequency of 1TPH.
	Grantham	West Yorkshire	Improved services up to <i>Silver</i> level to West Yorkshire including Leeds, Wakefield and Bradford. Direct services to Bradford and journey time to Leeds ultimately to be reduced to 48 minutes, with two trains per

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			hour.
		Grantham,	Aim to improve journey times to Silver level with two trains per hour to these stations and journey times
		Newark, Retford,	reduced to the following times: Peterborough 17, Newark, 9, Retford, 20, Doncaster 30.
		Doncaster	
		London	Retain existing minimum journey time of 65 minutes, but increase services at this speed to 2 TPH
		York, North East	Introduction of 1TPH direct service at least as far as Newcastle, working towards a journey time of 1h
		and Scotland	40min.
Associated Route	Peterborough	West Yorkshire	Introduction of hourly direct services to Leeds via Wakefield. Journey times should aim for Bronze level of
	- Cambridge		1h55min
		York, North East	Aim to reduce journey times working towards a Bronze level journey time to York of 1h55min. Examine
		and Scotland	case for direct services in commercial terms.
		Grantham,	Introduction of hourly direct service working making stops within the proposed direct Cambridge – Leeds
		Newark, Retford,	service.
		Doncaster	

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3 Doncaster, Nottinghamshire and Lincolnshire and the Humber

3.1 The following table sets out the conditional outputs for stations within the area covered by Doncaster, Nottinghamshire, Lincolnshire and the Humber. This includes the stations at Doncaster, Newark, Retford, Lincoln, Scunthorpe and Grimsby and Hull. The conditional outputs in this area focus on optimising the existing service where it is already of a high quality, and also providing improved direct connectivity to a number of locations, especially those places not presently well linked to London.

Group	Station	Destination	Conditional Output
		Service	
Node	Doncaster	London	Retain existing frequency but work towards incremental journey time reductions to a minimum
			journey time of 1h33min. This JT should apply to 2TPH
		West Yorkshire	Work towards a <i>Bronze</i> level of service between Doncaster and Leeds (Journey Time 25 minutes)
			and introduce direct service to Bradford. Retain existing Wakefield service, but additional service
			to Leeds may be routed via Hambleton junction, avoiding Wakefield.
		York, North East &	Reduced journey times to move average journey time closer to minimum journey, at least hourly
		Scotland	service to Edinburgh aiming at journey times around 2h30 minutes. Improvements in connectivity
			to Aberdeen and Inverness and intermediate destinations should also be considered.
		Retford, Newark,	Provide an hourly direct link to these stations, utilising the proposed Cambridge service, and
		Grantham,	provide 2TPH to Newark, Grantham and Peterborough through stops in other LDHS services.
		Peterborough	Work towards journey times of: Peterborough as now, Grantham, 30 minutes, Newark 22 min,
			Retford 10min.
		Cambridge	Introduction of hourly direct service to Cambridge originating at Leeds. Journey time to Cambridge
			of 1h35min.
Intermediate	Newark	London	Retain existing frequency of service but both services should have a journey time of 72 minutes
Stations		West Yorkshire	Introduce a minimum frequency of 1TPH to Leeds, this can be achieved through the direct
			Cambridge service described below
		York, North East &	Retain existing service to York and Newcastle, but with all Newcastle services extended to
		Scotland	Edinburgh, work towards improving journey times lowering York journey time to 41 minutes and
			attempting to lower Newcastle and Edinburgh journey times.
		Doncaster, Retford,	Increase service level to 2TPH to all locations (Retford 1TPH) utilising both LDHS services and the
		Grantham,	proposed Cambridge direct service. Journey times as follows: Peterborough: 26 minutes,
		Peterborough	Grantham 9 minutes, Retford 11 minutes, Doncaster 22minutes.
		Cambridge	Introduction of hourly direct service to Cambridge originating at Leeds. Journey time to Cambridge
			of 1h6min.
	Retford	London	Increase in service frequency to 1TPH with journey time of 1h25min

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		West Yorkshire	Introduction of 1TPH service to Leeds as part of Cambridge direct service.
		York, North East &	Aim to retain existing through service to York, increased to an hourly frequency.
		Scotland	
		Doncaster, Newark,	Introduction of hourly service to these locations through development of Leeds - Cambridge
		Grantham,	service. Journey times as follows: Doncaster 10min, Newark 11min, Grantham, 20 min,
		Peterborough	Peterborough, 37min
		Cambridge	Introduction of hourly direct service to Cambridge originating at Leeds. Journey time to Cambridge
			of 1h20min.
Associated	Lincoln	London	Introduction of direct services from Lincoln to London, initially of a two hourly frequency building up
Stations and			to 1TPH. Journey times should be targeted at around 1h40minutes. Service to call at Newark and
Routes			Peterborough.
		West Yorkshire	Improve journey times and service frequencies to nodes at Newark and Doncaster to maximise
		York, North East &	range of potential destinations that receive an improvement in connectivity. In the longer term give
		Scotland	consideration to new direct services to West Yorkshire
	Scunthorpe &	London	Introduction of direct services to London with a journey time target of 2h30 from Grimsby and 2
	Grimsby		hours from Scunthorpe. Services to call at Peterborough. Service frequency of two hourly.
		West Yorkshire	Improve journey times and service frequencies to Doncaster to maximise range of potential
		York, North East &	destinations that receive an improvement in connectivity.
		Scotland	
	Hull	London	Increase frequency of direct services to hourly, journey times should be reduced to 2h30min.
		York, North East &	Improve journey times and frequencies between Hull and York to provide an improvement in
		Scotland	journey times to a range of destinations north of York.

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4 Leeds & West Yorkshire

4.1 The following table sets out the conditional outputs for stations within the area covered by Leeds and West Yorkshire. This includes the stations at Leeds, Wakefield and Bradford. Conditional outputs are focussed on journey time and connectivity, partially as a result of the existing services to Leeds being relatively slow compared to other location on the ECML due to the Doncaster – Leeds route being relatively slow.

Group	Station	Destination Service	Conditional Output
Node	Leeds	London	In the long term deliver <i>Gold</i> output of 3TPH and journey time of 1h18 through completion of HS2. Prior to this work towards <i>Silver</i> journey time of 1h51min and 3TPH
		Doncaster	Work towards reduced journey times between Doncaster and Leeds including a journey time to Doncaster of 20 minutes. LDHS frequency to Doncaster should be increased to 3TPH while
		Retford, Newark, Grantham	Introduce hourly direct service to these locations as part of the Cambridge service described below.
		Tees Valley	Retain existing direct links to Middlesbrough, and work towards reducing journey times through improvements in maximum permissible speeds.
		Tyne & Wear & Scotland	Retain existing connectivity to Darlington and the North East. Extend 1TPH forward to Edinburgh in addition to existing Cross Country service. In the long term work towards a Leeds Newcastle journey time of 65 minutes – this would only be achievable with significant investment in line speeds and alignment. In the short term aim for a journey time of 1h20minutes. Improvements in connectivity to Aberdeen and Inverness and intermediate destinations should also be considered.
		Cambridge	Introduce hourly direct service from Leeds to Cambridge calling at Wakefield, Doncaster, Retford, Newark, Grantham, Peterborough and Cambridge. Journey time should be targeted at 1h55min.
Intermediate Station	Wakefield Westgate	London	Work towards journey time reductions between Wakefield and London with a target journey time of 1h45 min. Frequency to remain at 2TPH
		Doncaster	Work towards journey time reductions between Leeds and Doncaster with a target minimum journey time between Wakefield and Doncaster of 12 minutes. Increase frequency to 3 fast trains per hour
		Retford, Newark, Grantham,	Introduce hourly direct service to all these locations as part of the proposed Leeds – Cambridge service.
		Tees Valley & North East Scotland	Reduce journey times of existing direct Cross Country services to Edinburgh, and take advantage of other journey time improvements through interchange with other services at Leeds.
		Cambridge	Introduce direct hourly service from Wakefield to Cambridge with a journey time of around 1h50 min

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Associated Stations	iated Bradford London		Introduce hourly direct service from Bradford to London working towards a journey time 2h26 minutes. Such a service would operate via Hambleton junction, to avoid reversal at Leeds and minimise journey time.
		Doncaster	Provide direct access to Doncaster via the proposed London service above, at an hourly frequency.
		York, North East and Scotland	Provide a minimum 2TPH between Bradford and York to provide connections to the North East and Scotland. These services should be fast between Leeds and York. It is noted that this may conflict with existing proposals for services between Leeds and York.

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5 York & North Yorkshire

5.1 The following table sets out the conditional outputs for stations within the area covered by York and North Yorkshire. This includes the stations at York, Northallerton, Scarborough and Harrogate. Services from York are presently of a very high standard particularly towards London, and therefore outputs focus on optimisation. In contrast there is scope for larger improvements from other stations.

Group	Station	Destination Service	Conditional Output
Node	York	London	In the long term deliver <i>Gold</i> output of 3TPH and journey time of 1h19 through completion of HS2. In the meantime existing service levels and frequencies should be maintained, and line speed enhancements investigated to further lower journey times.
		West Yorkshire	Existing connectivity to Leeds should be maintained while services to Bradford should be increased to 2TPH both of which would operate fast between York and Leeds
		Tees Valley & North East	Existing service frequencies should be maintained from York to Darlington, Middlesbrough and Newcastle. However journey times should be reduced with a target journey time of 48 minutes from York to Newcastle.
		Scotland	The service frequency from York to Edinburgh should be increased to 3TPH by extending the existing London – Newcastle services to Edinburgh. In addition journey times should be reduced with a long term aim of reducing journey times to around 2h5min. Improvements in connectivity to Aberdeen and Inverness and intermediate destinations should also be considered.
Intermediate Station	Northallerton	London	Services to London should be moved towards the <i>Silver</i> level of service with a service of 1TPH and a journey time of 2h10min.
		West Yorkshire	The existing service frequency should be maintained of at least 2TPH, however journey times should be reduced with a target journey time of around 35 minutes.
		Darlington & Tees Valley	Improve service frequency from Northallerton to Darlington, above the existing 1.5 trains per hour. Also improve both frequency and journey time from Northallerton to Middlesbrough
		North East & Scotland	As part of other enhancements to Scottish services a service of 1TPH should operate from Northallerton to Newcastle.
Associated Stations and Routes	Harrogate & Scarborough	London	Both locations should receive more direct services to London. Services from Harrogate should operate at a two hourly frequency with services routed either via Leeds or York. Scarborough should receive a lower number of direct services, perhaps 2 trains per day in each direction, providing both a business and a leisure service. Journey times from Harrogate to London should be targeted to be around 2h25 and from Scarborough around 2h40.
		North East & Scotland	Services to the North East and Scotland should be improved by lowering journey times and enhancing frequencies on the routes from York to Harrogate and York to Scarborough to help lower journey times.

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6 Darlington & Tees Valley

6.1 The following table sets out the conditional outputs for stations within the Darlington and Tees Valley area. This includes the stations at Darlington and Middlesbrough. The present service from Darlington southwards is of a high quality, in contrast there is scope for further work to services to the north.

Group	Station	Destination Service	Conditional Output
Node	Darlington	London	In the long term deliver <i>Gold</i> output of 3TPH and journey time of 1h50 through completion of HS2. In the meantime existing service frequencies should be increased to 3TPH, to further maximise the benefits of HS2 and also to bring a range of journey time improvements to a variety of locations journey time reduction between Darlington and York should also be investigated.
		York & North Yorkshire	Maintain existing levels of service frequency and journey time between Darlington and York
		West Yorkshire	The post May 2014 service frequency to Leeds should be maintained of at least 3TPH, however journey times should be reduced with a target journey time of around 45 minutes.
		Tyne & Wear	Existing service levels to Newcastle should be maintained, however improvements should be made to journey times. A long term target journey time of 25 minutes should be set; this however would only be achievable with substantial investment in infrastructure.
		Scotland	The service frequency from Darlington to Edinburgh should be increased to 3TPH by extending the existing London – Newcastle services to Edinburgh. In addition journey times should be reduced with a long term aim of reducing journey times to around 1h40min; this however would only be achievable with substantial investment in infrastructure. Improvements in connectivity to Aberdeen and Inverness and intermediate destinations should also be considered.
Associated Route and Station	Middlesbrough	London	Direct Middlesbrough – London services should be introduced, ideally such services would operate at a two hourly frequency providing a core hourly service between Eaglescliffe and London, in parallel with the Sunderland – London service, alternatively a portion working approach could be applied, with Sunderland and Middlesbrough services working as a single service to Eaglescliffe before splitting into portions for Middlesbrough and Sunderland. The target journey time should be 3 hours
		York & West Yorkshire	Existing services to York and West Yorkshire should be retained with as a minimum the same level of service frequency. Middlesbrough – London services described above may form part of the solution to frequency between Middlesbrough and York. Reductions in journey time should be investigated both between York and Northallerton and Northallerton and Middlesbrough. A target journey time of 57 minutes from Middlesbrough to Leeds and 40 minutes from Middlesbrough to York should be achieved.
		Tyne &	Journey time improvements from Middlesbrough to Darlington and Newcastle in addition to

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	Wear/Scotland	journey time improvements on the ECML itself will assist in delivering improved access to
		Scotland from Middlesbrough. Improved connections between local services on long distance
		services at Darlington.

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7 Newcastle & the North East

7.1 The following table sets out the conditional outputs for stations within for the Newcastle and North East area. This includes the stations at Newcastle, Sunderland, Morpeth, Alnmouth and Berwick-Upon-Tweed. The existing service from Newcastle is of a relatively high standard, however there is scope for significant improvement through substantial investment in line speed improvements, and potentially new alignments. For Newcastle in particular to maximise the benefits of HS2 there is a need to examine improvements between Newcastle and York to benefit both HS2 services and "classic" services.

Group	Station	Destination Service	Conditional Output
Node	Newcastle	London	In the long term deliver <i>Gold</i> output of 3TPH and journey time of 2h10 through completion of HS2. In the meantime existing service frequencies should be increased to 3TPH. To further maximise the benefits of HS2 and also to bring a range of journey time improvements to a variety of locations journey time reductions between Newcastle and York.
		Darlington & Tees Valley	Existing service levels to Darlington should be maintained, however improvements should be made to journey times. A long term target journey time of 25 minutes should be set, this however would require a significant investment in infrastructure to achieve this. Improved journey times to Middlesbrough,, including improved connection to local services at Darlington.
		York & West Yorkshire	The post May 2014 service frequency to Leeds should be maintained of at least 3TPH, however journey times should be reduced with a target journey time of around 65 minutes.
		Scotland	Service frequency to Edinburgh should be increased to 3TPH by extending the existing London – Newcastle service to Edinburgh. Journey times should also be improved by minimising intermediate stops and also by investment in higher line speeds where possible. At least 1TPH should be extended to serve Glasgow. Improvements in connectivity to Aberdeen and Inverness and intermediate destinations should also be considered.
		Morpeth, Alnmouth, Berwick-Upon- Tweed, Dunbar	As part of a mechanism to improve journey times from Newcastle to Edinburgh for LDHS services it is suggested that 1TPH should operate from Newcastle to Edinburgh calling at intermediate stations this would help to deliver improved connectivity between these locations.
Intermediate Stations	Durham	London	In the long term deliver <i>Gold</i> output of 2TPH and journey time of 2hours through completion of HS2. In the meantime existing service frequencies should be increased to 2TPH, to further maximise the benefits of HS2 and also to bring a range of journey time improvements to a variety of locations journey time reduction between Durham and York should also be investigated with a view towards 140mph running where possible.
		West Yorkshire	A service frequency of 3TPH should be worked towards in conjunction with a reduction in journey times with a target journey time of around 55 minutes.
		Tyne & Wear	Existing service levels to Newcastle should be maintained, however improvements should be made to the spread of services through each hour to maximum the benefits of high frequency.

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		Scotland	Service frequency to Scotland should be increased to 2TPH by extending the existing London - Newcastle services to Edinburgh. In addition journey times should be reduced with a long term aim of reducing journey times to around 1h30min; this however would only be achievable with substantial investment in infrastructure.
	Morpeth, Alnmouth, Berwick-Upon-	London	Existing journey times and frequencies should be maintained from these stations to London including the hourly Berwick – London service. Existing services should benefit from further improvements in journey times south of Newcastle.
	Tweed	Newcastle, Morpeth, Alnmouth, Berwick-Upon- Tweed York and West Yorkshire Scotland	As part of a mechanism to improve journey times from Newcastle to Edinburgh for LDHS services it is suggested that 1TPH service should operate from Newcastle to Edinburgh calling at intermediate stations this would help to deliver improved connectivity between these locations. To further increase connectivity it is suggested that such a service should be an extension of TPE services from Manchester to Newcastle giving greater connectivity from Northumberland to the south.
Associated Stations	Sunderland	London York and West Yorkshire	Sunderland – London services should be improved to a standard two hour frequency timetable, with journey times reduced to 3h18min. To achieve these improvements in line speeds between Sunderland and Northallerton may be required, but any broader improvements in line speeds on the ECML would also contribute to this. To improve connectivity to York and West Yorkshire a direct service should be developed between Sunderland and Leeds. This could either be through the extension of TPE Middlesbrough or Newcastle services to Sunderland. A journey time of 90 minutes would be required.
		Scotland	Improvements to services from Newcastle to Scotland would contribute to improving connectivity between Sunderland and Scotland.

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8 Edinburgh & Scotland

8.1 The following table sets out the conditional outputs for stations within Scotland. This includes the stations at Edinburgh, Dunbar, Glasgow, Stirling, Perth, Dundee, Inverness and Aberdeen. There is scope for further improvements to services to and from England on the ECML. This largely relates to improvements in journey times from Edinburgh to York which would bring useful time savings and increase rail mode share. For services north of Edinburgh there is a case for examining improvements to internal services and journey times as well as improving the range of departure times from Edinburgh to the south to increase the scope for making connections from the north of Scotland onto Anglo Scottish services.

Group	Station	Destination Service	Conditional Output
Node	Edinburgh	London	In the long term deliver <i>Gold</i> output of 2TPH and journey time of 3h38 through completion of HS2. In the meantime existing service frequencies should be increased to 2TPH. To further maximise the benefits of HS2 and also to bring a range of journey time improvements to a variety of locations journey time reductions between Edinburgh and York should also be investigated. The present proposals for HS2 show services as being routed via the WCML, however if sufficient journey time reductions could be delivered on the ECML routing via the ECML may be justified, helping bring broader benefits.
		North East & York & West Yorkshire York & West Yorkshire	Improved LDHS service frequency to 4TPH, formed of 2TPH to London and potentially 1TPH Cross Country Service to Birmingham via Leeds and 1TPH TPE to Manchester via Leeds. A target journey time of 2h5min to Leeds should be worked towards.
		Morpeth, Alnmouth, Berwick-Upon- Tweed, Dunbar	As part of a mechanism to improve journey times from Newcastle to Edinburgh for LDHS services it is suggested that 1TPH service should operate from Newcastle to Edinburgh calling at intermediate stations this would help to deliver improved connectivity between these locations. To further increase connectivity it is suggested that such a service should be an extension of TPE services from Manchester to Newcastle giving greater connectivity from Northumberland to the south.
		North and North East Scotland	Improvements in connectivity to Aberdeen and Inverness and intermediate destinations should be considered.
Intermediate Stations	Dunbar	Morpeth, Alnmouth, Berwick-Upon- Tweed, Edinburgh	As part of a mechanism to improve journey times from Newcastle to Edinburgh for LDHS services it is suggested that 1TPH service should operate from Newcastle to Edinburgh calling at intermediate stations this would help to deliver improved connectivity between these locations. To further increase connectivity it is suggested that such a service should be an extension of TPE services from Manchester to Newcastle giving greater connectivity from Northumberland to the

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			south. Improved connections for London services would be possible at Berwick.
Associated	Glasgow	Anglo-Scottish	To improve links between Glasgow and the North East and Yorkshire 1TPH from the ECML
Stations and		Services	should be extended forward to Glasgow throughout the day.
Routes	Perth & Inverness	Anglo-Scottish Services	The existing through services be maintained as a minimum, with a view to introducing an additional service each day to and from both Inverness and Aberdeen, with an arrival in London from Aberdeen before 13:00. Local investment in journey time improvements between the Inverness/Aberdeen and Edinburgh would bring benefits to both Scottish internal services and Anglo Scottish services. To complement this more services should operate from Yorkshire and the North East to Edinburgh in the early morning with later return workings at night to increase the range of journey possibilities.
	Dundee & Aberdeen	Anglo-Scottish Services	
			Consideration be given to improvements in service quality of ScotRail services to be aligned with the present quality delivered by East Coast services and also maintaining through ticketing between East Coast and Caledonian Sleeper services.

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9 Route Length Outputs:

Direct Services

9.1 There are a number of journey opportunities where it is appropriate to consider developing new direct services. Some of these services might be developed by extending existing services, linking separate services together or in some cases developing capacity for an entirely new service. Services outlined here build on the suggestions set out in the sections above. The outputs indicate the potential for consideration of the following new direct services for the ECML.

Leeds – Cambridge

9.2 A direct service linking West Yorkshire to Cambridge and potentially Stansted Airport could be introduced. This would make a significant difference to connectivity to Cambridge in particular and East Anglia in general. Such a service could operate at an hourly frequency throughout the day and specified to call at Wakefield, Doncaster, Retford, Newark, Grantham, Peterborough and Ely. The service would provide a "semi fast service" between Doncaster and Peterborough improving connectivity between the local economies of the area. Simultaneously it would allow a review of the stopping patterns of London services allowing these to be speeded up, for example the York/Newark – London service could reduce the number of calls made north of Peterborough on some services. All of the options for accommodating additional services such as this in the future would lead to a service pattern that is no worse, and in many cases better, at all existing stations.

Manchester - Leeds - Newcastle - Edinburgh

9.3 Improved linkages between West Yorkshire and Scotland (and in particular Edinburgh) have been identified as being of importance. There would be benefits to both local and regional economies (from improved local connectivity) and long distance rail services (through reducing intermediate stops) from improved services at stations between Newcastle and Edinburgh. One approach to achieving this would be through the extension of Trans Pennine Express services that presently operate from Manchester to Newcastle through to Edinburgh calling at Morpeth, Alnmouth, Berwick-Upon-Tweed and Dunbar. Such a service would bring a useful improvement in connectivity between West Yorkshire and Scotland, the far North East of England and Yorkshire and the North West. With the electrification of the Trans Pennine route from 2019 this service could be electrically operated throughout, helping to reduce journey times through higher maximum speeds and better accelerations than existing TPE diesel services.

Station & Onboard Outputs

- 9.4 In addition to improvements to service levels there is scope to deliver further improvement in the quality of service provided on trains and at stations. This could take the form of the following:
 - Free wifi that works consistently, is high quality and continuous for all long distance services in both standard and First Class, and at all staffed stations on the route;
 - Phone reception that works consistently, is high quality and continuous;
 - An "office like" environment for work during a journey;
 - Stations and terminals that provide a consistently high quality waiting environment with good means of access, connections within the station, and high quality spaces for people to work, wait, meet and spend time;

- Station and gateway access should be quick and easy by a variety of modes, including sufficient parking, and seamless interchange with other trains and public transport;
- Sufficient seat capacity should be provided at peak times;
- The design of new trains used on the route should aim to maximise passenger amenity by providing comfortable accommodations including legroom not less than that currently provided; charging points for each seat; sufficient space for laptop computers and other portable devices to be used comfortably; provision of suitable facilities for passengers with disabilities.
- 9.5 In Scotland in particular, where there are a number of long distance flows that are shared between services using the ECML and internal Scotrail services it is suggested that an enhancement in the quality of rolling stock used on Scotrail services is worked towards to provide a closer alignment with the quality provided by East Coast services.

Journey Time Reductions on Key Route Sections:

- 9.6 There are a number of key sections of the route where investment would bring useful benefits to a large number of O-D pairs particularly through reduced journey times. The route sections where investment is most relevant and there would seem to be scope for improvement are:
 - Leeds Doncaster
 - Northallerton Newcastle
 - Newcastle Edinburgh
- 9.7 These sections of route are the sections which are most constrained in terms of line maximum speed at the present time. It is important to improve journey times on these sections if a large number of O-D pairs are to move from a *Bronze* service towards a *Silver* level of service, it would also be necessary to invest in the latter two sections in the above list if operating HS2 services from Edinburgh via the ECML were considered, and also to maximise the benefits of HS2 to Newcastle in all circumstances. Other sections of route would also benefit from improvements if it were possible to increase line speeds above 125mph, indeed it is possible that certain sections such as York Northallerton would lend themselves well to such higher speeds.
- 9.8 If it were possible to increase line speeds above 125mph, for example to 140mph then investment should be prioritised in the following order:
 - 1. Doncaster Leeds
 - 2. Hitchin Peterborough
 - 3. London Hitchin
 - 4. Peterborough Newark
 - 5. York Leeds
 - 6. Newark Doncaster
 - 7. Doncaster York
 - 8. York Northallerton
 - 9. Northallerton Newcastle
 - 10. Newcastle Edinburgh

9.9 This prioritisation is based on the net economic benefit of improving services over these sections.

Improvements to Connecting Routes from the ECML

- 9.10 The economic growth forecasting exercise highlighted the level of benefit accruing to stations from improvements to all other locations within the group of assessed stations. Clearly it is not possible to provide direct services to all locations, and equally improvements on the trunk route may bring only incremental improvements to locations off the main ECML route. However it is possible that reasonable improvements may be delivered by investing in the links to the ECML where the length of the connecting route makes a useful journey time reduction possible.
- 9.11 The following provides a ranked order of priority based on existing average speeds on connecting routes, as a proxy for the size of the marginal gains in investment. Investment in these route sections would not just benefit connectivity to ECML locations but all locations accessible by rail.
 - 11. Cambridge Peterborough
 - 12. Harrogate York
 - 13. Lincoln Newark
 - 14. Lincoln Retford
 - 15. Hull Doncaster
 - 16. Lincoln Doncaster
 - 17. Hull York
 - 18. Middlesbrough Northallerton
 - 19. Doncaster Grimsby
 - 20. Scarborough York
- 9.12 Improvements on these sections of routes would deliver a range of local benefits as well as the strategic benefits identified in this work.

Freight

9.13 In addition to identifying conditional outputs for passenger traffic a series of outputs for freight traffic has also been developed based largely on the results of the stakeholder consultations and also on information presented in Annex 1 The Economies of the East Coast Corridor. The following table sets out the conditional outputs for the freight sector.

Location	Output	Justification
All port locations	Gauge	Completion of gauge enhancement to all port locations to
	Enhancement	ensure rail can contribute to the inter modal freight sector
All port locations and core route sections	Freight capacity	Ensure capacity is available to facilitate the expected growth in Biomass fuel sector and the required linkages between East Coast ports and power stations
Sheffield - Doncaster	Electrification	Electrification to allow operation of through electric freight services from the electric spine to the ECML.
Newcastle - Edinburgh	Freight Loops	Construction of further freight loops to allow freight market to develop in parallel with passenger markets.
Doncaster	Freight Capacity	Ensure adequate capacity and access to Rossington Inland Port is provided

Table 9.1 Freight Conditional Outputs

Retford	Freight Access	Ensure adequate capacity for freight traffic is provided for access to potential logistics parks at Retford. Given existing constraints on daytime ECML freight, this may need to be via access to the Joint Line via Lincoln.
Peterborough	Access to Werrington Jn	Ensure appropriate infrastructure is provided at Peterborough to allow freight to pass from the west to east side to allow access to the Joint Line at Werrington Junction.
York - Newcastle	Freight Capacity	Ensure that freight capacity is maintained and enhanced and is not eroded by passenger growth. Give consideration to enhancements between Northallerton and Newcastle

9.14 Many of the outputs specified above align with enhancements that are likely to be required as part of the passenger conditional outputs, and therefore enhancements to freight traffic can be complementary to passenger enhancements and need not conflict. This has already been seen through the upgrade of the Joint Line from Peterborough to Doncaster. While the route is less direct it provides a significant enhancement in the capacity available to freight traffic.

Paths Required to Facilitate these Outputs

- 9.15 To deliver journey time improvements and capacity it is likely that infrastructure schemes will be required at a number of locations. An initial assessment of the conditional outputs listed above suggests that 8 LDHS train paths per hour would be required between London and Peterborough, rising to a peak of 9 between Peterborough and Newark. This would deliver enhanced frequencies to key nodes while also allowing the development of more direct services from intermediate stations and on associated lines. By the end of Control Period 5 existing committed schemes will have delivered a capacity of 7 LDHS paths per hour from London to Doncaster. Therefore one additional path would be required from London in each hour.
- 9.16 It has been assumed that HS2 will be constructed and therefore investment prior to HS2 will bring benefits to Leeds and Newcastle services and not all additional London services from associated routes will be able to operate, while after HS2 is completed some existing services will be diverted and further services from associated routes could be introduced.

Annex 6 Summary of stakeholder events





Prospectus for investment in the East Coast Mainline 

Business Stakeholder Meetings Summary of key findings January 2014 Martin Revill, JMP Consultants Ltd



The need for a strategic business case





- There are a lot of positives to the existing services
- But the ability of the East Coast Mainline to fully realise its economic value is currently constrained
- The opportunity to realise that economic value is <u>now</u> – can deliver short to medium term benefits that complement the longer term investment in HSR

The importance of ECML



Very clearly stated how important the line is



- Significant high level representation at stakeholder meetings – company CEOs and senior executives; Council leaders; MSPs and MPs
- Important to retain the quality of the service as an existing high speed railway

Journey times



Many places directly served believe that journey times are excellent



- Especially true from York southwards includes Stevenage, Peterborough, Doncaster, York (with respect to London)
- Especially true of the 'fastest' trains, but there is a desire to see all services meet this standard

Journey times



2 hours is an often quoted psychological journey time



Journey time improvements should not be at the expense of intermediate stops

Journey times



Places that do not have a direct service see journey time improvement as more important



- There has been an increase in journey times in recent years – many would like to see a return to former standards
- Journey times north of Edinburgh are perceived to be poor
- Leeds-Doncaster speed and capacity results in poorer journey times to Leeds City Region

Reliability



Reliability is seen as a more significant problem



- Often quoted that the service is excellent when it works, but problems when they occur are often significant
- Resilience to unforeseen "events" is poor

Service quality



FCM

- Service quality, both on train, in the stations, and on the journey to the station, are issues that are universal
- Seamless, high quality journeys are important, especially to business users
- Reputational impact of service quality, including to potential investors
- Current offer is often poor in terms of customer service and comfort

Service quality – on train



Wifi – must be a priority, must be high quality and continuous, needs a good signal



- Phone reception again need for quality and consistency
- Seating from being available, to comfort, and a table
- All contributing to an "office like" environment for work during a journey

Service quality – on train



- Better facilities needed for luggage, parcels, and packages
- Better facilities needed for cycles



Service quality – stations



Often poor image even at main line stations



- Contrast with high quality at King's Cross
- Reputational issues for the towns and cities served, including for inward investors
- Whole journey issues at these gateways include access by various modes and parking

Service quality – stations



Improvements to stations represent an opportunity



- Could benefit journey times as well as overall journey experience
- In station improvements could include train capacity and passenger capacity

Service quality – service timings



- Later services would be welcomed, southwards towards London from the north and midlands
- Late trains out of London are valued



Capacity



- Seat capacity is an issue at peak times
- Includes northern Scotland to Edinburgh – complicated by quality issues, as demand for higher quality service puts pressure on capacity of East Coast services
- Includes peak trains to and from London



Capacity



ECM

- Capacity (and other limitations of services in the corridor) does act as a constraint to economic growth
- Affects southern sections including Newark, Peterborough, Stevenage; and further north too
- Implications for housing growth

Fares





- 🔻 Is an issue
- Affordability is critical, as well as 'value for money'
- Is an issue for business, as well as private travellers and visitors – important with the rise of micro businesses and SMEs

Fares – transparency is poor



FCM

 Clarity of fare structure is an issue
Complexity of the fares available
A deterrent to occasional users
Reputational damage from poor experiences resulting from failure to understand fare structure and options

Understanding of the (good) value of some available fares is poor

The importance of London





↗ Is universally recognised

Most discussions focused on the service to and from London, even if not directly referencing

The importance of other connections: Scotland





- In Scotland, the importance of links to the capital, Edinburgh, has a similar resonance
- Direct connections to Edinburgh important for business and tourism in northern Scotland
- Aberdeen-Edinburgh

The importance of other connections: Scotland and the North of England



FCM



- Leeds Edinburgh
- Increased importance of connections to Edinburgh if 'true' capital

The importance of other connections: North of England



- Newcastle and north eastern England – Leeds and Yorkshire
- Leeds York in Leeds City Region, and other direct connections to ECML such as Middlesbrough, Harrogate, Bradford, Hull, Grimsby

The importance of other connections: South of England



- Multiple connections are identified as important, including Stevenage-Peterborough; Peterborough-Leeds; Newark & Grantham to the north
- Improved connectivity to and from Cambridge is a common theme from a number of places



The importance of other connections: international





- Connections to Heathrow and other London airports are fundamentally important to business
- Connectivity to London St.Pancras and Eurostar is excellent
- Connections to some airports close to, or in, the corridor are poor (Luton, Stansted, RHADS, Leeds-Bradford)

The importance of other connections: into the ECML corridor



- East-west services are seen as poor (at a number of connections along the length of the corridor)
- Good connectivity to and from the ECML is seen as vital in most areas and city regions along the corridor
- In southern England having to travel into London from Stevenage etc. to change and go east or west is a problem

Features of the economic geography of ECML corridor





- Range and variety of connections between the areas is complex
- Common theme of the importance of access to London runs through the connectivity priorities of all areas



Potential transport markets





- Freight movements
- Passenger services for commuters
- Passenger services for business-tobusiness connections
- Services for tourists and visitors
- Were highlighted by JMP, and are all important to a greater or lesser extent

Transport markets - freight



Containers to/from ports (Tees, Humber, Felixstowe) ECMA

- East Coast ports to the national distribution depots in the Midlands
- Scotland to north east England and Yorkshire
- Capability and capacity of the ECML to carry large, modern containers is important which means W12 gauge throughout

Transport markets - commuting

- Important into London from Stevenage to Peterborough, and flows both ways; also significant commuting from further north
- Also significant commuter demands into Edinburgh, Leeds and many more
- Better quality commuter services/trains will help relieve pressure on long distance capacity



JMP

Potential transport markets - commuting



- Expanding the labour pool is important in some areas to meet economic growth potential
- In Aberdeen, connectivity is important to help extend the labour pool
- In Doncaster, the opportunity to extend labour markets is aided by the good connectivity

Economic sectors and connectivity - tourism

JMP





- Is universally important along the corridor, with a huge variety of different attractors
- East Coast corridor is an important artery for international visitors – London, York, Durham, Edinburgh – but could include others
Economic sectors and connectivity - universities



- Higher education and student travel
- A number of key attractors: London, Cambridge, York, Durham, Edinburgh, Leeds, St.Andrews (and more)
- Inks to commercial R&D activity



Economic sectors and connectivity – science clusters



- Medical, bio-science and life sciences are important
- Stevenage, Cambridge, Peterborough has strong cluster, part of biosciences 'golden triangle' of Oxford-London-Cambridge
- Leeds and York is another cluster

Economic sectors and connectivity – science clusters



Strong desire for better Peterborough-Cambridge and Stevenage-Cambridge links to help connectivity to successful Cambridge science city

Strong desire for a better connection between Cambridge and Yorkshire cluster – represents significant economic potential Economic sectors and connectivity – finance and business services



- London is a global financial centre
- Economies close to London have strong connections and a strong FBS sector
- Leeds has a strong FBS sector
- Edinburgh has a strong FBS sector
- Strong business-to-business rail demands between these areas – London-Leeds-Edinburgh
- Many areas have a strong desire to grow their FBS sector



Key sectors – growth ambitions





- Many areas have strong ambitions to grow digital technology and low carbon sectors; and creative industries too
- All generate significant demands for business-to-business connections

Key sectors – manufacturing and logistics





- Manufacturing specialisms include automotive in the North East, petrochemicals in the Tees Valley, advanced and applied manufacturing in Sheffield City Region
- Often not as well linked to rail logistics and freight operations as they might be

Key sectors – energy





- Oil and gas: Aberdeen strong links to petrochemical industries in Tees Valley
- Strong growth sector in renewable energy along the east coast, common to the Highlands & Islands, North East Scotland, the North East of England, Tees Valley and the Humber