Socio-economic analysis, future forecasts and the strategic road network

This report was commissioned by Highways England to inform the emerging Strategic Economic Growth Plan (SEGP) and better understand the relationship between economic growth and the strategic road network. This report does not inform or relate to planning matters or investment decisions.

Queries relating to this report should be sent to growthandplanning@highwaysengland.co.uk

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Table of contents

Executive summary

This report presents socio-economic evidence to support the development of the Strategic Economic Growth Plan (SEGP) for Highways England. It describes the pattern of socio-economic and demographic activity across the country and explores the role of the SRN in supporting current economic activity and scenarios of future growth through mapping of sectoral and socio-economic data. It aims to inform understanding of the economic significance of the SRN. It provides a summary of where SRN investment may need to be focused to support economic growth. The analysis also provides evidence and a supporting narrative that explains how the performance of key sectors of the economy is particularly dependent on access to the SRN.

The SRN can support economic growth through four key mechanisms:

- Improving productivity, by improving efficiency, facilitating agglomeration economies and increasing competition;
- Increasing domestic and international trade;
- Facilitating investment by businesses and developers, as well as supporting inward investment;
- Supporting employment growth through better access to employment opportunities.

The SRN is a key determinant of where people choose to live and work and it plays an important part in the commercial and domestic life of residents of England with 95% of residents and 99% of vehicles using the SRN at least once a year, with the vast majority of the population living in close proximity to the SRN.

- 97% of the population live within 15km of an SRN corridor;
- 96% of the population is within one hour's drive from an SRN junction;
- 95% of the population is within one hour from a national or regional interchange rail station; and
- 94% of the population is within one hour from a large airport.

Historic population growth reflects the economic geography of England, which is underpinned by disparity. London and the South East are the most prosperous regions of England. In 2014, London's GVA per head was 68% higher than the average for England. GVA per worker on the whole is higher in the South of England than the North. However, England's core cities are increasingly growing and generating employment and productivity growth. The SRN has an important role in lifting productivity in areas of low productivity and strengthening areas of higher productivity by reducing distances between firms and markets, increasing competition and supporting access to labour markets.

Current and future economic growth is concentrated in town and city centres, business parks, other urban centres, enterprise zones or near to key infrastructure (large industry, port, airport or university). Businesses are also mobile and increased globalisation has led to firms relocating, expanding and spreading their operations across countries and borders.

Economic forecasts indicate that future growth is expected to be highest in Greater London and along routes to the west, north and south, in the major city regions and in other hotspots such as Nottingham, Cambridge, Peterborough and York[1]. Greater London and the South East, Birmingham, Leeds, Liverpool, Manchester, South Gloucestershire and Milton Keynes are forecast to have the highest increases in terms of absolute change in the number of jobs created and in increased intensification of employment. This demonstrates that urbanisation and agglomeration of economic activity is a key driver of future employment growth and highlights the importance of the SRN in serving and connecting concentrations of economic activity across England.

The majority of England's population, employment and businesses are centred on urban agglomerations, with the highest density of population in and around the core cities. As jobs concentrate in city centres, population growth in commuter belts outside these centres will mean that the SRN is needed to connect employees from their homes to employment centres. However, a

[1] Econometric-based economic forecasts produced by Cambridge Econometrics. It should be noted that these forecasts represent only one set of scenarios of possible future economic change. These scenarios are influenced by past trends and do not take account of the impact of policy or other market interventions.

number of important employment areas are more remote: access to the SRN is also critical in connecting these areas to both employees and markets.

Economic growth forecasts provide evidence of economic activity spreading across a wider area around major urban agglomerations. This spread is most evident across the South East on key corridors radiating from London. The Oxford to Cambridge arc, Shropshire, Wiltshire and Gloucestershire are other notable examples of growth areas.

Analysis of growth forecasts demonstrates that the SRN is largely located in the right corridors to serve future growth across England. Future investment should focus on providing efficient connectivity between city regions and growth clusters of urban agglomerations. Growth in employment and GVA in more peripheral regions will be enhanced by focusing on the connectivity needs of different parts of local economies, to include interventions to reduce effective distance with urban agglomerations, improve access to international gateways and reduce journey times for people visiting as tourists.

SRN-dependent sectors

This report explores the role of the SRN in meeting the needs of different parts of the economy. It draws on evidence on supply chain linkages between different sectors of the economy and research into the locational decisions of different sectors. It highlights the fundamental role of the SRN in the operation and competitiveness of particular business sectors.

Cambridge Econometrics has determined the sectors of the economy that are the primary users of road transport services, based upon sectoral interdependencies set out in the UK Input-Output tables. The following are identified as SRN-dependent sectors:

- Land Transport
- Retail and wholesale trade
- Primary materials
- Manufacturing – users of transport services
- Manufacturing – reliant on other sectors which are users of transport services
- Construction

Economic forecasts for sectors dependent on the road network show that concentrations of growth are clustered around the SRN and international gateways. It demonstrates the importance of the network in providing high quality transport connectivity with centres of economic mass and ports and airports to the functioning of these sectors.

GVA forecasts for SRN-dependent sectors show a number of hotspots of growth where advanced manufacturing and high value business clusters are important. These include the West Midlands, Derby, Sunderland and Swindon; and port-related activity in Southampton, Portsmouth and Liverpool. The mapping shows linkages to wider activities in transport sectors such as Motorsport Valley. The maps also highlight the importance of the SRN to the logistics sector and key clusters for this sector in South and West Yorkshire, the M62 Corridor and Essex/Kent.

Growth in employment and GVA for SRN-dependent sectors is strongest around areas that have good access to markets and international gateways. Businesses operating in these sectors tend to concentrate on key nodes on the SRN where they have good access to markets across the country, which is particularly evident in the industrial and logistics markets. Key growth areas are around the M25, particularly east to Dartford and Medway, the Midlands and north and west of London. The London – Bristol – Birmingham triangle is a high productivity area and an important location of future growth in SRN-sensitive sectors.

The SRN is vital to the industrial and logistics markets. These industries have a high level of dependence on the SRN to transport goods and services to markets generating a high frequency of trips that are often long distance. A primary purpose of the SRN is therefore to support SRN-dependent sectors and to provide capacity for growth.

The SRN also plays an important role in the location decisions of major retail and leisure destinations and is important in providing access to these destinations.

The SRN is integral to location decisions and the functioning of key sectors that are dependent on the road network. It plays a critical role in serving and connecting urban agglomerations and international gateways. Analysis shows that the SRN is largely located in the right corridors to serve locations of high growth and to serve future growth in sectors that are dependent on the SRN. The challenge is to ensure enough capacity to support and facilitate growth.

Future growth forecasts provide support for spatial rebalancing of the economy. A number of areas across the Midlands and the North have strong growth dynamics with productivity predicted to grow at a higher rate than in the South. Future investment in the network targeted in the right locations could support productivity growth across regions with low productivity and help balance productivity growth across wider areas of the economy.

1. Introduction

1.1. Study Context

This report presents socio-economic evidence to support the development of the Strategic Economic Growth Plan (SEGP) for Highways England. It describes the pattern of socio-economic and demographic activity across England and takes into account forecasts of sectoral growth and spatial analyses. It explores the relationship between the Strategic Road Network (SRN) and current and future economic growth across England through mapping of sectoral and spatial socio-economic data and future forecasts.

It aims to develop a high level understanding of the economic significance of the SRN. It does not imply causality or provide analysis of how SRN schemes will deliver economic outcomes. It highlights current and future patterns of population and economic growth and provides evidence to support where SRN investment may need to be focused to support economic growth. The analysis also provides evidence to explain how key sectors of the economy are dependent on access to the SRN.

This document forms part of a suite of 6 evidence reports produced to support the production of the SEGP. These are:

- Economic growth and the SRN
- Commercial development and the SRN
- International gateways and the SRN
- Socio-economic analysis, future forecasts and the SRN
- Assessment of growth impacts
- Economic value of the SRN

1.2. Structure of this Report

The report is structured in the following sections:

- **Section 2** – Brief contextual information for the analysis, identifying the current economic development and policy background and the key challenges facing the Strategic Road Network.

- **Section 3** – Socio-economic analysis focusing on:

    - Population – Distribution of population across England and relationship with the SRN.
    - Deprivation – Distribution of deprivation across England and relationship with the SRN.
    - Enterprise and Employment – Distribution of employment, businesses and productivity across England and relationship with the SRN.
    - SRN-dependent sectors – Distribution of business sectors that rely most on the SRN and their performance in terms of employment, business density and productivity.

- **Section 4** – The future of England, exploring the economic future and how the economic geography of the UK could change on the basis of current trends and forecasts.

- **Section 5** – A summary of conclusions from the report.

The report does not aim to cover all socio-economic themes but provides a high level overview of the key issues. It provides an insight into the challenges, drawing linkages between socio-economic themes and the Strategic Road Network (SRN).

1.3. Caveats

There are a number of caveats that should be considered when reading this document. The data that is presented is through Standard Industrial Classifications and in some cases at high geographic levels of detail. The focus of the analysis is comparatively narrow, focusing largely on demographic and economic (employment and productivity) change. The report is also focused on maps generated through research undertaken to support the SEGP.

The forecasts presented in this report are outputs of Cambridge Econometrics local economic forecasting model. These forecasts represent only one illustration of scenarios of possible future economic change. These scenarios are strongly influenced by past trends and existing local structural factors. These do not take account of the potential impact of policy or other market interventions.

This document should be considered alongside the suite of evidence reports that accompany the SEGP and additional data tables produced by Cambridge Econometrics, Atkins, Volterra and Cushman & Wakefield.

2. Report Context

2.1. Study Context

Highways England's Delivery Plan 2016-2017[2] identifies a series of ambitions including the aim to:

"Support the country's economic growth and longer-term vision for our road network"

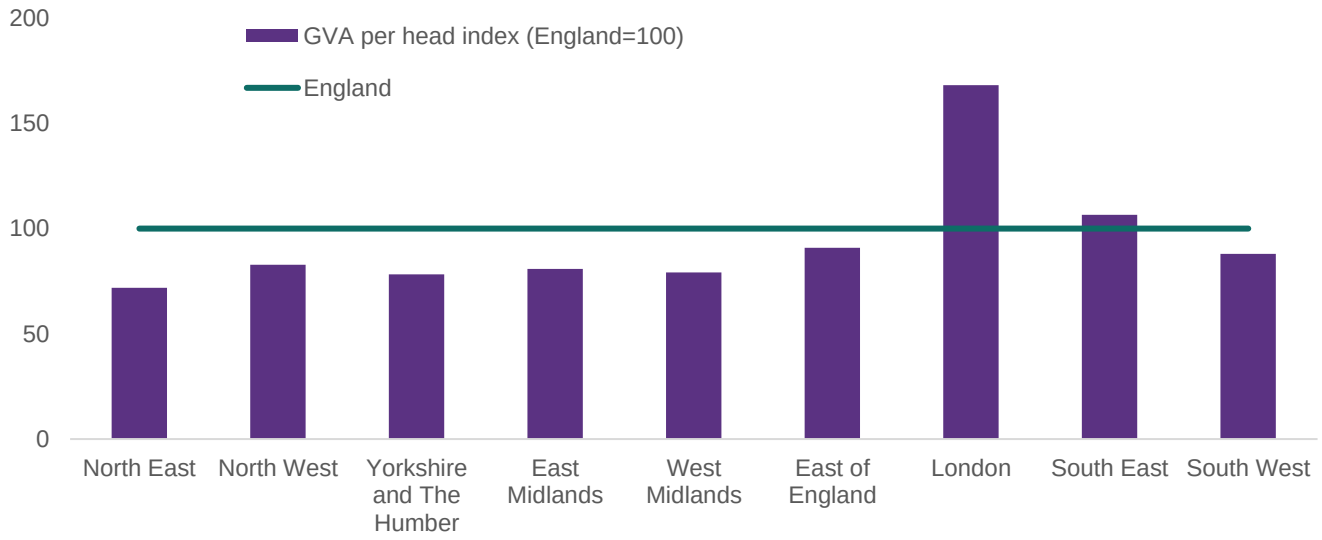
In doing so, it is clear that socio-economic issues are highly important to the work of Highways England due to the interactions between the organisation's activities, assets and work outcomes, and social, economic, cultural and environmental factors in England.

The current political and economic landscape is fast moving and this document should be considered within that context. As such, there is potential for this work to be further enhanced by additional research and assessment of different themes (e.g. industrial strategy themes or opportunities from economic restructuring connected to the UK leaving the European Union).

2.1.1. Socio-Economic Context

The economic geography of England (and the UK) is underpinned by disparity. London and the South East are the most prosperous regions of England. In 2014, London's GVA per head was 68% higher than the average for England. The total output in London accounted for 22.9% of UK Gross Value Added (GVA) (£364 billion of the UK's £1,590 billion)[3]. London and the South East outperform other regions on several measures including employment, job creation, inward investment and economic output (Figure 2-1).

Figure 2-1 GVA per head index (England - 100)



Source: ONS (Atkins 2016)

The focus on this disparity has regained public policy interest in recent years as productivity growth has slowed at a national level. This has led to a renewed focus on economic growth and economic development at a sub-national level. These issues are mainly captured through the work of the Local Enterprise Partnerships (LEPs) and mechanisms for sub-national collaboration including the Northern Powerhouse, Midlands Engine and England's Economic Heartland.

[2] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/538130/S160049_Highways_England_Delivery_Plan_2016_Final_-_Digital_version.pdf

[3] ONS 2015

The Government and LEPs use a range of approaches to economic development to both raise the economic performance of less prosperous areas and support and enhance the performance of more prosperous areas. These approaches include:

- Taxation policy (e.g. reduction of taxes or business rates);
- Education and skills policy (e.g. promoting apprenticeships to support key industries);
- Labour market interventions (e.g. supporting long term unemployed into work);
- Trading liberalisation (e.g. reducing barriers for company establishment or entrepreneurs);
- Diversification (e.g. seeking to support niche and growing industries);
- Regeneration (e.g. revitalising the built environment of an area);
- Infrastructure investment (e.g. investing in broadband to support new and existing businesses);
- Spatial planning (e.g. planning new developments to concentrate activity); and
- Inward investment (e.g. attracting foreign direct investment for projects).

This is not a complete list but demonstrates that a wide range of factors are important to driving economic success. There is no single approach to economic development, but effective transport is cited by many commentators as integral to the success of local economies[4].

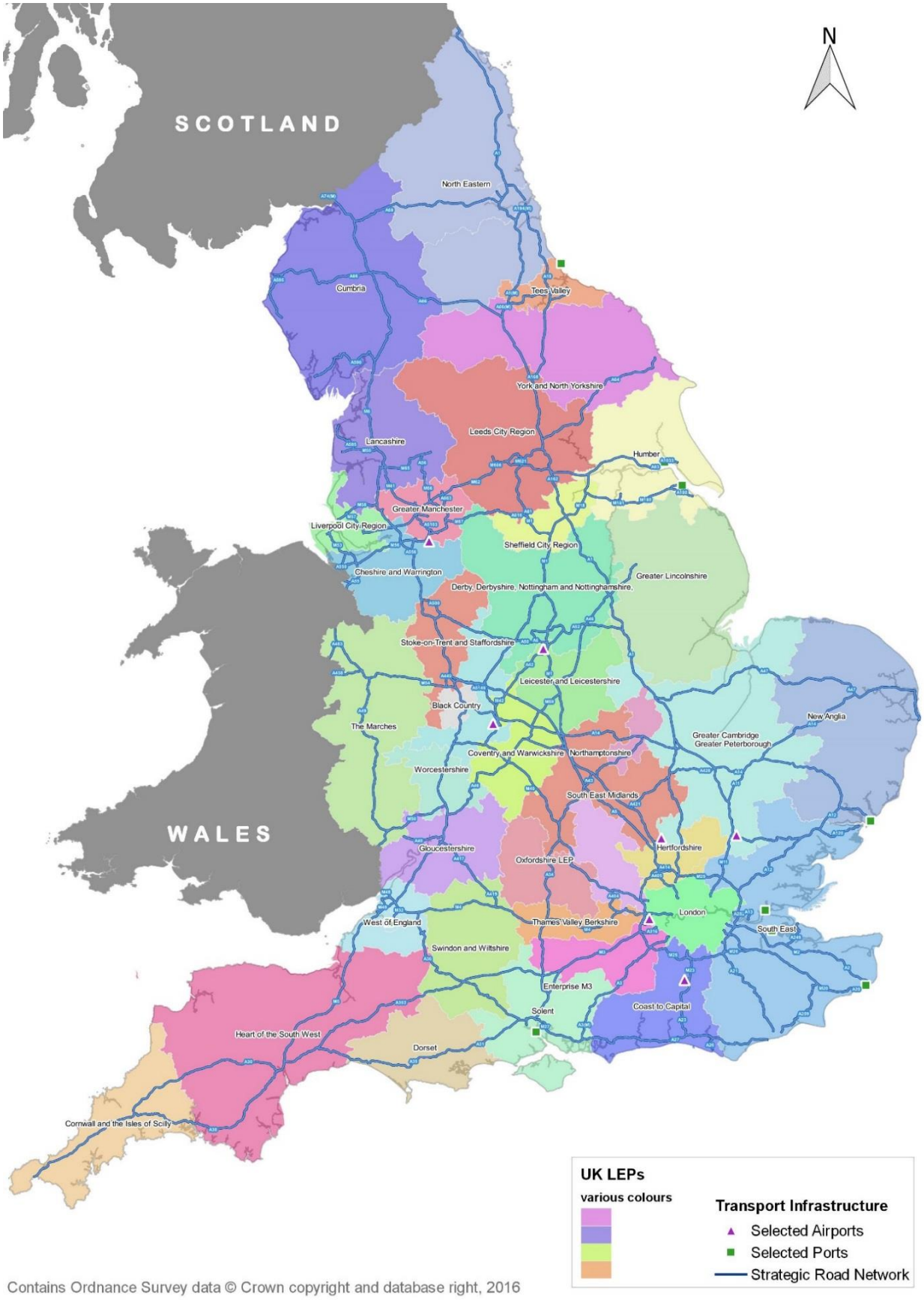
The 39 Local Enterprise Partnerships (LEPs) and the SRN in England are presented in Figure 2-2. This shows that all LEPs have at least one route of the SRN located within their boundaries. The relationships of the LEPs and their local economies are all different.

The map shows that some areas (e.g. Lincolnshire) appear to have fewer linkages to the SRN than others. However, it can be argued that this increases the importance of key SRN routes in enabling these areas to access the rest of the country. For example, in the case of Lincolnshire, the A46 is critical in enabling Lincoln to connect to other parts of the Midlands, the north and south via the A1, and the A47 outside Lincolnshire at Peterborough is critical in connecting the (non-SRN) A16 from the agri-food sector in southern Lincolnshire to the rest of the UK.

Other areas (e.g. South East Midlands) are served by multiple routes, but in many cases the routes in the SRN play different roles, with the A5 catering for sub-regional movements and the M1 carrying longer-distance traffic. The role of the SRN in supporting local economies is therefore unique to each area.

[4] E.g. Venables, A.J. et al, 2014. Transport investment and economic performance (TIEP): Implications for project appraisal. DfT Commission.

Figure 2-2 Local Enterprise Partnerships



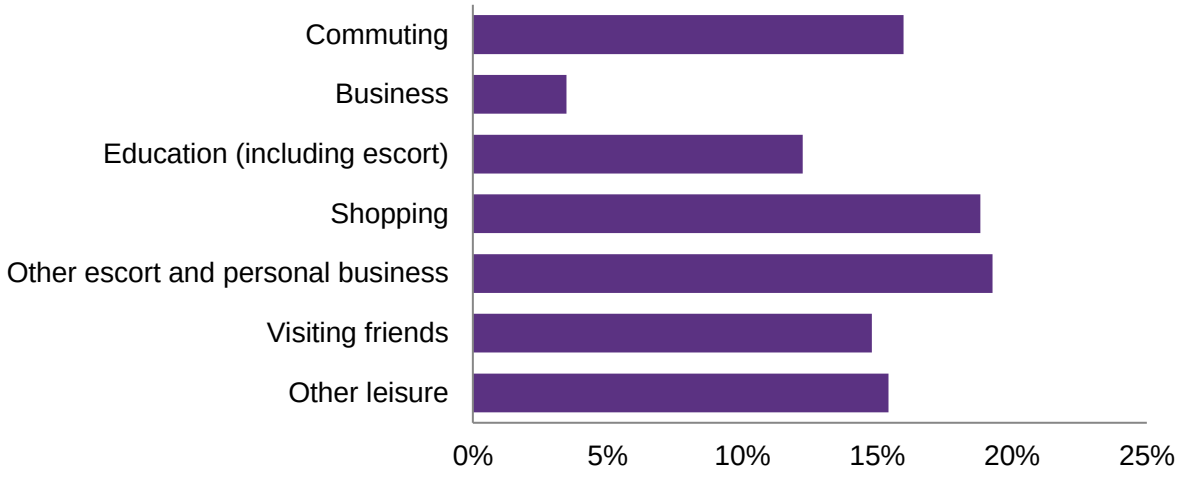
Source: Department for Business, Energy & Industrial Strategy**,** April 2012 **(**https://www.gov.uk/government/publications/local-enterprise-partnerships-local-authority-mapping)

2.2. The Strategic Road Network

Highways England manages the SRN (Figure 2-4) which comprises 4,400 miles of England's motorways and major trunk roads. These roads provide the capacity and connectivity to support national and local economic growth, linking communities and businesses.

The SRN is used for a range of travel purposes. The National Travel Survey provides data on the different purposes for people's journeys, as shown in Figure 2-3. This includes all journeys, including those made on local transport networks, but the SRN is also important in supporting a wide range of travel needs, demonstrating its importance to people and the economy.

Figure 2-3 Purpose share - average number of trips by all travel modes: England, 2014



Source: Department for Transport statistics - National Travel Survey 2014

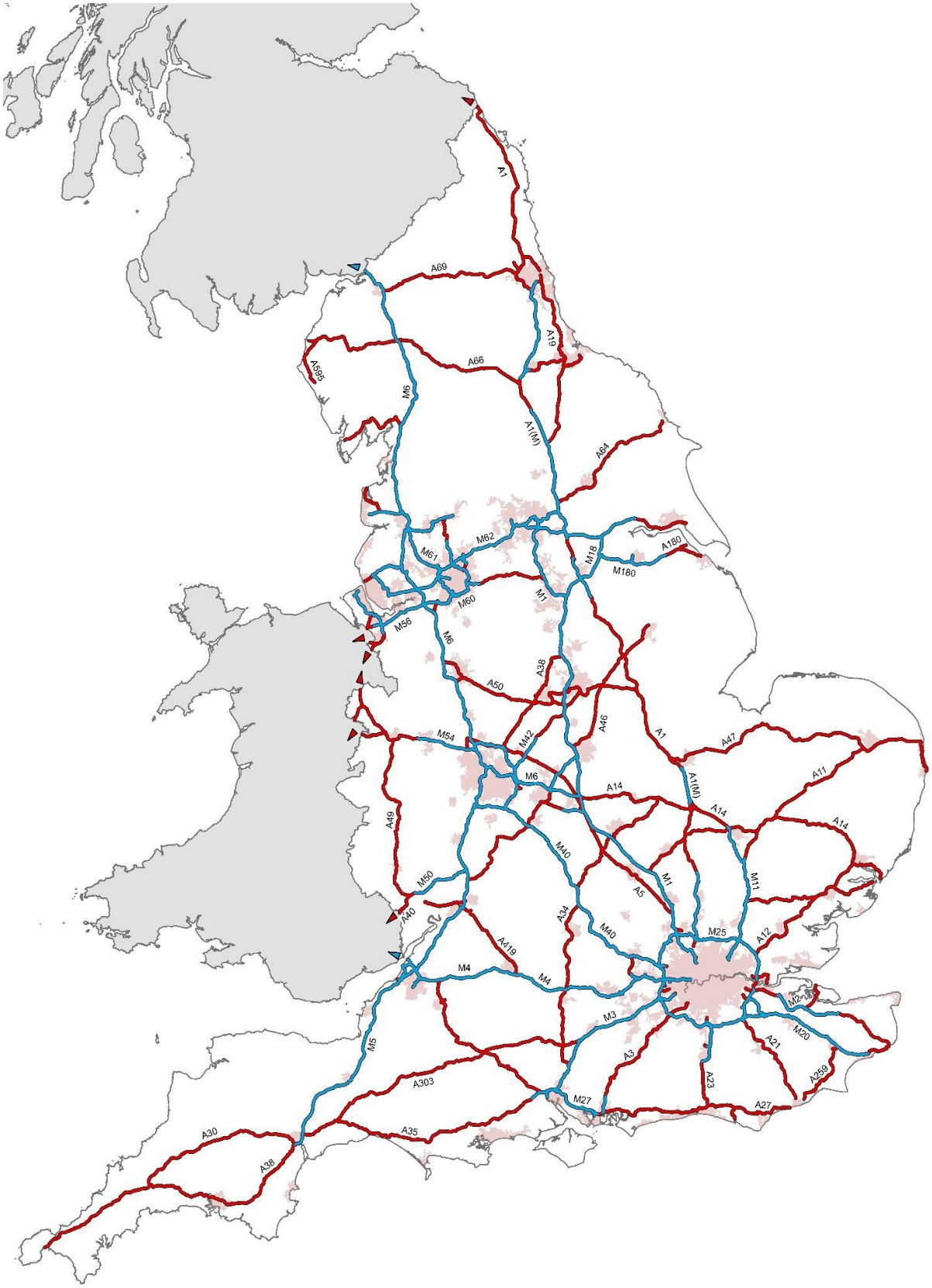
The SRN plays an important part in the commercial and domestic life of residents of England with 95% of residents and 99% of vehicles using the SRN at least once a year.

The SRN can support economic growth through four key mechanisms:

- Improving productivity, through improving efficiency, facilitating agglomeration economies and increasing competition;
- Increasing domestic and international trade;
- Facilitating investment by businesses and developers, as well as supporting inward investment; and
- Supporting employment growth through better access to employment opportunities.

Of these, improving productivity and increasing trade are likely to be of the greatest importance to national economic growth. The SRN is also important in supporting investment by domestic firms and attracting inward investment. This is key for supporting local and regional economic growth, although may be less relevant in increasing overall national output (due to potential displacement effects). The evidence suggests that the ability of SRN investment to reduce unemployment is less significant, although employment growth is possible through reducing costs of commuting and improving access to employment areas.

Figure 2-4 Strategic Road Network (SRN, 2014)



Source: © Crown Copyright and database rights 2014. Ordnance Survey Licence Number 100039241 Department for Transport gisu1112j178

2.2.1. Strategic Road Network Challenges

The SRN faces challenges linked to socio-economic factors, particularly population growth and economic growth. These factors (and other social trends) drive a series of pressures on the SRN which include congestion, delays and poor journey reliability.

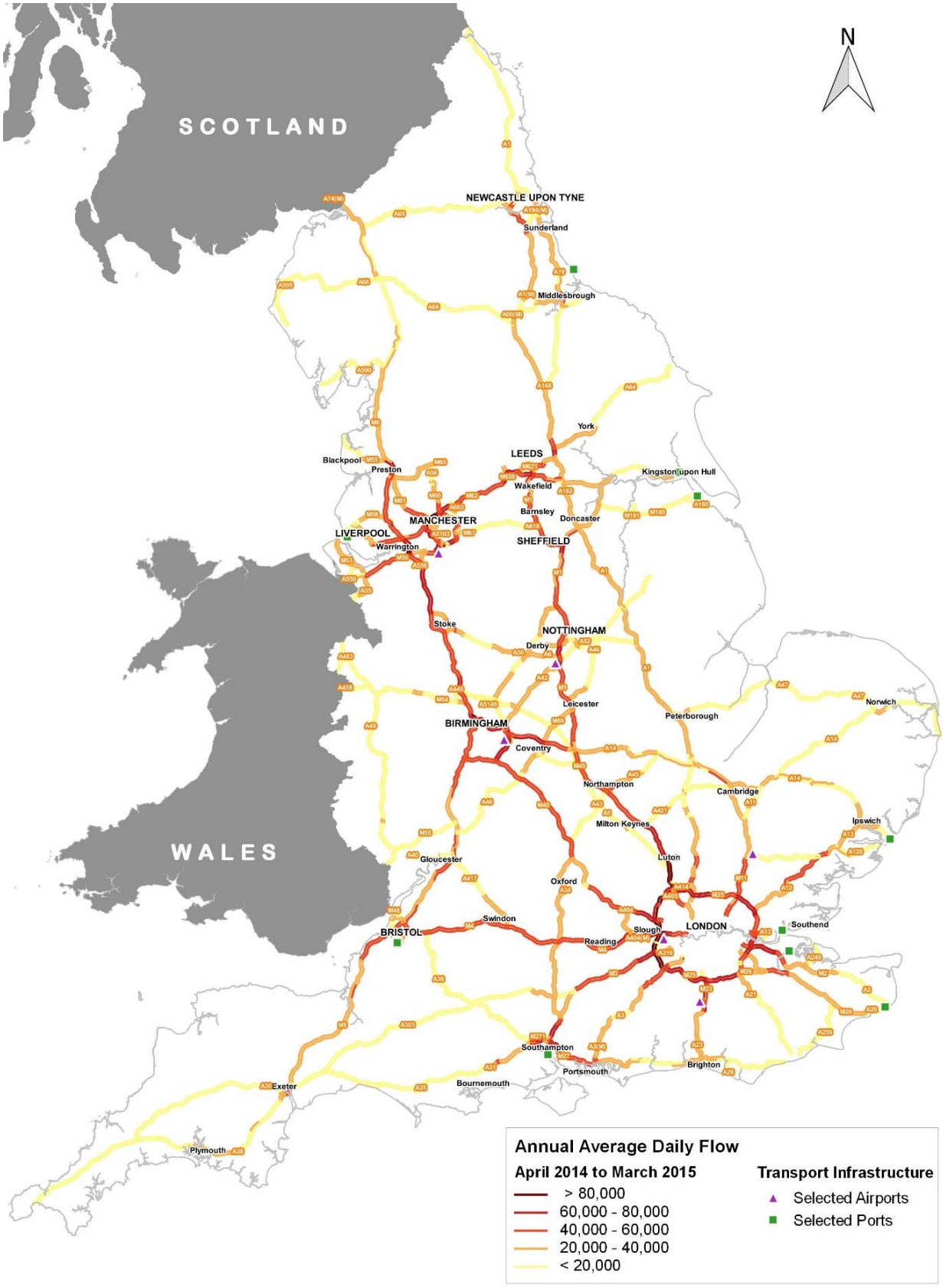
The maps on pages 14 to 17 highlight the key challenges for the SRN:

Table 2-1 Challenges for the SRN

Map[5]	Comment
Figure 2-5: Annual Average Daily Traffic Flows Volume of traffic on each link of the SRN (Page 14) (Source: Highways England)	This map shows the heaviest traffic volumes on the SRN, on which there are lower traffic speeds due to high levels of congestion. The busiest sections of the SRN are: - M25 Junctions 10-17 (west of London, Heathrow Airport) - M1 Junctions 6-9 (Watford to Luton) - M6 Junctions 20-21 (Warrington) - M60 Junctions 15-18 (North Manchester) This map clearly shows that traffic flows are heaviest in the vicinity of major cities, reflecting concentrations of people living and working in these areas.
Figure 2-6: Annual Average Daily Traffic Flows – Percentage HGV: Proportion of HGVs on each link of the SRN (Page 15) (Source: Highways England)	Large amounts of HGVs are indicative of trade of goods across the country. The sections of the SRN with the highest proportion of HGVs show where goods have entered or are leaving the country by road, rail and air and travelling along key distribution routes. The highest proportions of goods traffic are on: - M25 Junctions 17-21 (near Heathrow) - M25 Junctions 28-29 (connecting to London ports) - M50 Junctions 2-3 (connecting South Wales to the Midlands) - M62 Junctions 21-24 (connecting Manchester to Leeds) Higher proportions of goods traffic are also likely to impact on operating conditions on the road, due to overtaking of lorries and lower average speeds.
Figure 2-7: Total Delay to Vehicles: Delay in hours to vehicles on each link of the SRN (Page 16) (Source: Highways England)	Delays to traffic impact on the movement of goods, business journeys and commuting to work. The sections of the SRN with the highest total delays reflect both high traffic volumes and congested conditions. These include the M25 (numerous sections), M1 (Northampton, South Yorkshire), M3 (Surrey), M6 (Staffordshire and Cheshire), M62 (north and west of Manchester) and A1 (Gateshead). This again demonstrates that the greatest challenges are on parts of the network near to or connecting major urban areas, which impacts on commuting, business trips and movement of goods.
Figure 2-8: Annual Average Speed: Average vehicle speed on each link of the SRN (Page 17) (Source: Highways England)	There are some parts of the SRN with low average speeds, highlighting bottlenecks and concentrations of vehicle traffic. Low average speeds are indicative of capacity issues, accident 'black spots' or ongoing maintenance issues. The sections of the SRN with the lowest average speeds are: - A46 Coventry South - A52 Nottingham South - A63 / A1033 Hull - A1 Junctions 68-72 Furthermore, there are areas of the SRN with low average speeds across the country, including many single carriageway routes (e.g. A49 in the Marches, A36 Bath to Southampton, A47 through Cambridgeshire and A64 in North Yorkshire).

[5] Source of data: Highways England, HATRIS Data April 2014 – March 2015, revised March 2016

Figure 2-5 Annual Average Daily Traffic Flows



Source: Highways England, HATRIS Data for April 2014 to March 2015. Received March 2016.

Figure 2-6 Annual Average Daily Traffic Flows – Percentage HGV

Source: Highways England, HATRIS Data for April 2014 to March 2015. Received March 2016.

Figure 2-7 Total Delay Hours

Source: Highways England, HATRIS Data for April 2014 to March 2015. Received March 2016.

Figure 2-8 Annual Average Speed

Source: Highways England, HATRIS Data for April 2014 to March 2015. Received March 2016.

3. Socio-Economic Analysis

3.1. Overview

This section presents an analysis of key socio-economic factors in relation to the SRN. It focuses on the following topics:

- **Population –** There are several aspects of population that are of interest to policy makers in transport infrastructure including skills profile and age composition. It is also important to assess population growth, as this is one of the key drivers for infrastructure investment and underpins investment in housing and economic change.

- **Deprivation –** Deprivation is caused by lack of income and other resources, which cumulatively can be seen as living in poverty[6]. Deprivation is often identified using the Indices of Multiple Deprivation which take a wide-ranging approach to identifying poverty through different indicators of poverty or deprivation[7].

- **Enterprise & Employment** – The current and future economic development of local areas in England is one of the main drivers for infrastructure investment. Rather than undertaking a full assessment of economic drivers the analysis is focused on:

    - Productivity (as measured by GVA per employee) highlighting the most economically productive areas of England;

    - Employment growth and density highlighting areas which have concentrations and potential future (or further) concentrations of employment; and

    - Density of businesses and commercial accommodation.

We also focus further analysis on key sectors of the economy that are most reliant on the SRN and wider transport infrastructure, together with the retail & leisure and energy sectors.

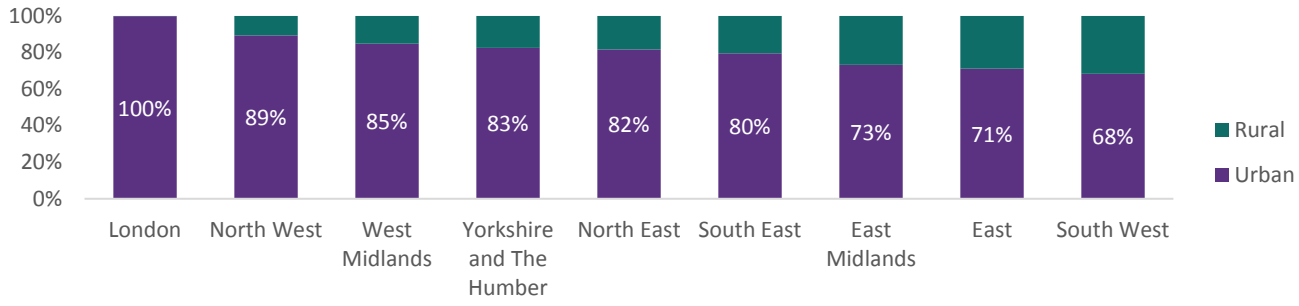
3.2. Population

The population of England is 53 million, making England one of the most densely populated countries in the world. However, despite this, there are large sparsely populated rural areas and urban areas with available space. People live in different areas for a multitude of cultural, historical, economic, environmental and social reasons.

The vast majority of England's population is centred on urban agglomerations, with the highest density of population in and around the core cities. Cities are seen as the key drivers of population and are where the majority of the population live. Given the structural trend of urbanisation (Figure 3-1 shows the proportions of urban dwellers in each English region in 2011) and growth of agglomeration economies this is expected to continue. This is further reinforced by current trends in the business and commercial office development market of developers and tenants preferring city centre locations.

[6] http://www.poverty.ac.uk/definitions-poverty/deprivation-and-poverty
[7] Maps of Deprivation in England can be viewed here: http://dclgapps.communities.gov.uk/imd/idmap.html

Figure 3-1 Proportion of the usual resident population living in urban & rural areas, 2011



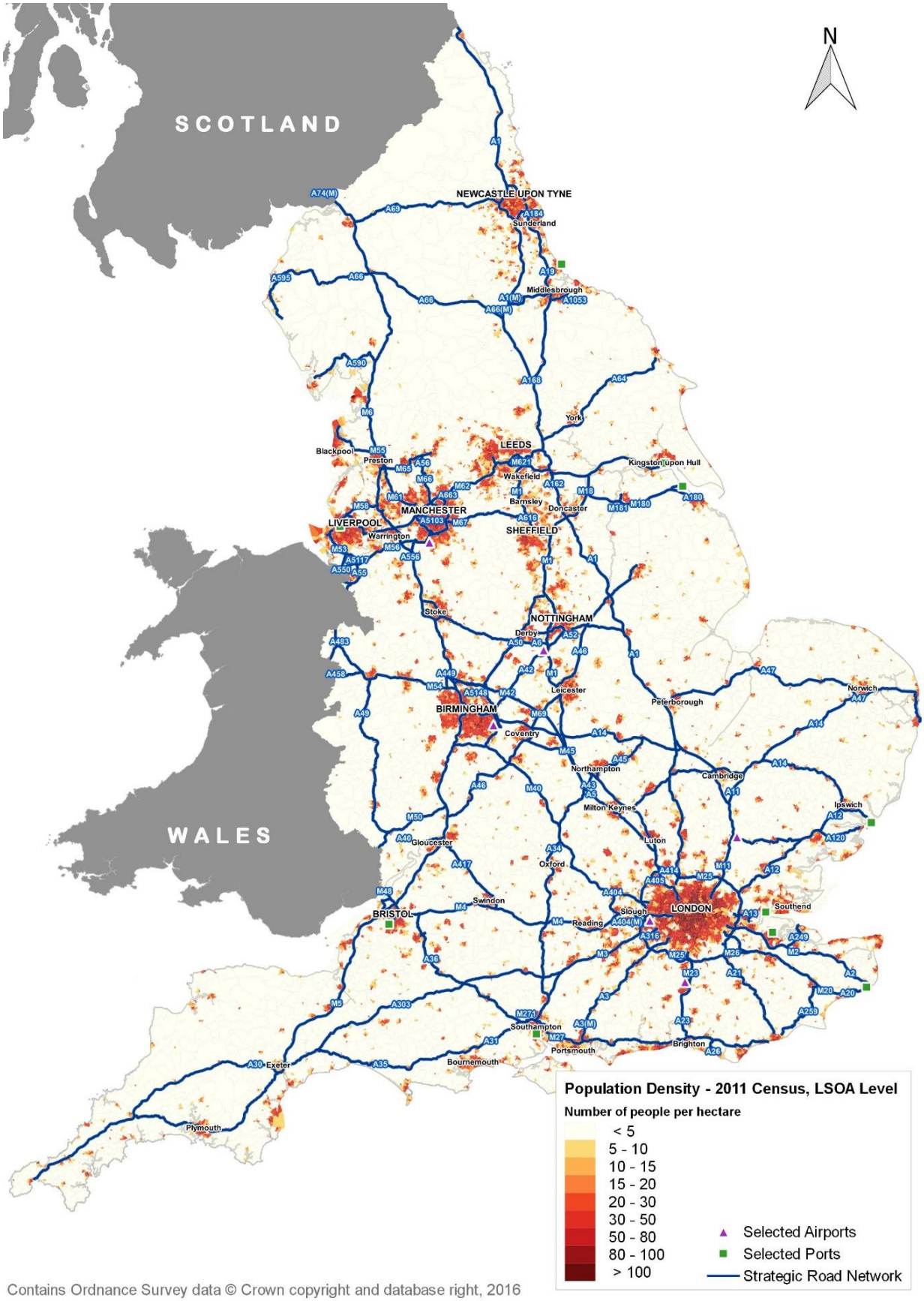
Source: ONS Census 2011

Figure 3-2 shows population density in relation to the SRN. Analysis of the data that underpin this shows that 97% (51.3 million people) of the population live within 15km of the SRN and 70% (37.2 million people) live within 5km of the SRN. This shows the importance of the SRN for the movement of people for leisure and work activities. Further work by Highways England shows that:

- 94% of population of England within an hour of a large airport;
- 95% of the population within one hour of national or regional interchange rail station; and
- 96% of the population of England are within one hour's drive of a SRN junction.

Figure 3-2 also shows that the SRN connects key urban populations including London, Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield. It also connects and transects rural and smaller urban areas.

Figure 3-2 SRN and Population Density



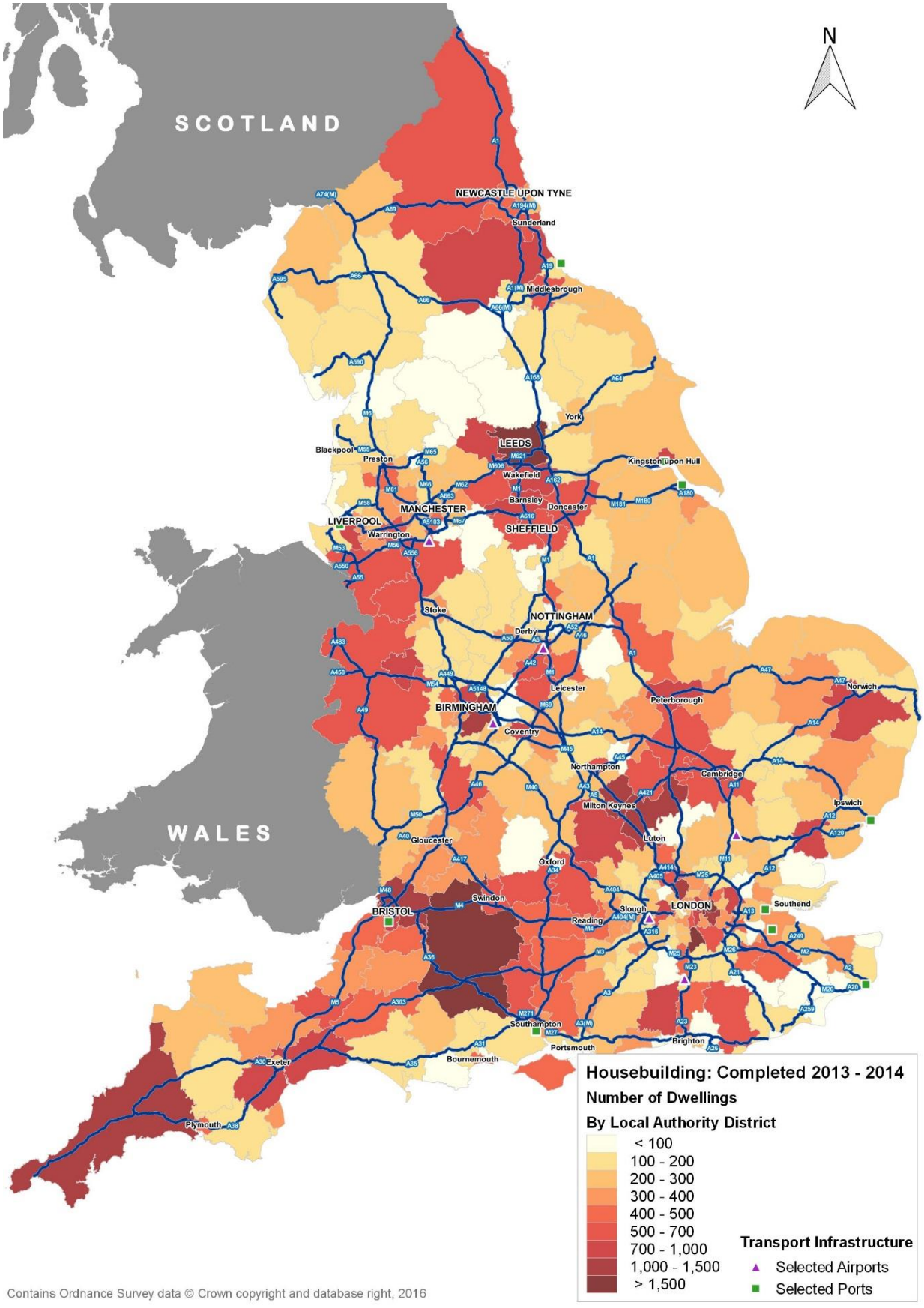
Source: ONS, Table KS101EW - Usual resident population from the 2011 Census.

Population density identifies where people live but is limited by presenting a snapshot of existing population. England's population is growing and there is a need for new housing. Housebuilding has been a key topic for several years with housebuilding experiencing sustained growth in the early 2000s, but hitting a trough in 2009 as the economic downturn affected the whole economy. There is recognition by policy makers and other commentators that England is facing a 'housebuilding crisis' with estimates of the number of new houses needed to meet demand of around 250,000 per annum. The lack of housebuilding has driven rising house prices and demographic trends with people moving out of expensive housing areas.

Despite a 'housebuilding crisis', many areas of England are building houses. Figure 3-3 presents the volume of housebuilding in England between 2013 and 2014. This shows areas that can be expected to see increased population increase and resultant road infrastructure pressures. Several of these areas of growth are in urban areas (e.g. Leeds and Birmingham) whilst some are in more rural areas (e.g. Wiltshire and areas of Northamptonshire) highlighting the desire for homes in wider growth areas.

Areas of predicted housebuilding growth could be areas of pressure on the SRN. Housing targets outlined in local plans provide evidence on the scale of this in the future but there is difficulty in meeting targets with economic conditions and planning regulations identified as key barriers to meeting housing requirements.

Figure 3-3 Housebuilding Completed (2013-2014)



Source: Table 253 Housebuilding: permanent dwellings started and completed, by tenure and district, 2013-14 (https://www.gov.uk/government/statistical-data-sets/live-tables-on-house-building)

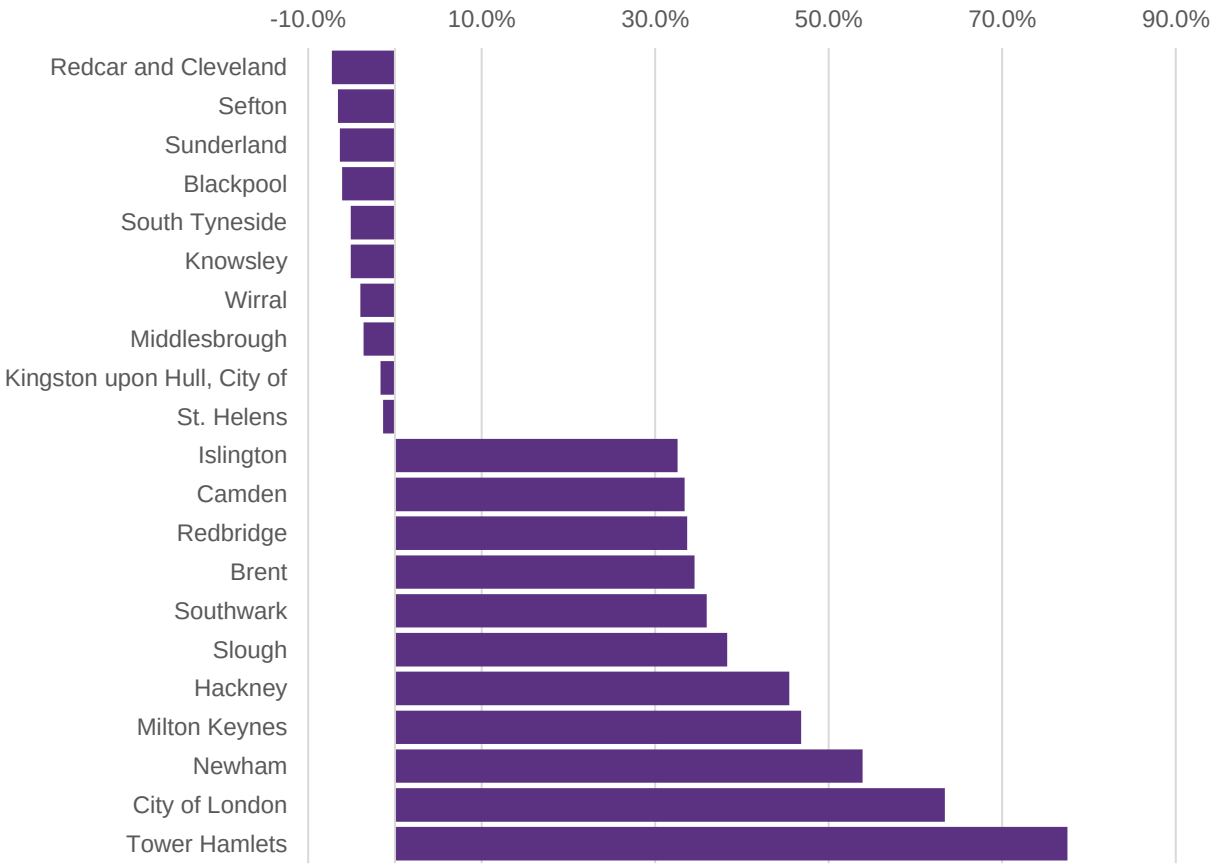
The SRN is a key determinant of where people choose to live and work, with the majority of the population living in proximity to the SRN[8]. Figure 3-5 shows population growth in the past 24 years. Population growth has been uneven with several areas in London, Cambridgeshire and Lincolnshire growing quickly whilst several urban areas in the North of England have seen population decline or little growth including Sunderland, Hull and parts of Merseyside.

Figure 3-5 shows that some areas have grown in the North, including York, Manchester, Warrington and North and East Yorkshire. Across the rest of England other areas that stand out for population growth include Bristol, Milton Keynes and Swindon. Several of these areas are also expected to see population growth in the future (see section 4) although this is not uniform. Warrington is an example of a place planning to grow its population, whilst York is seeking to check growth to protect the green belt, address the shortage of housing and balance future economic development and employment.

There are a number of causes of population change:

- High birth rates in cities are sometimes driven by higher birth rates from migrant populations.
- Increased immigration to England and especially to urban areas (e.g. core cities) as well as areas of seasonal employment (e.g. Lincolnshire) has driven population increases.
- Migration *within* England has seen population in areas like London grow with people moving to London to further their career or seek employment.
- Certain areas are experiencing out-migration of young people and other areas have seen an influx of older people following retirement leading to an ageing population

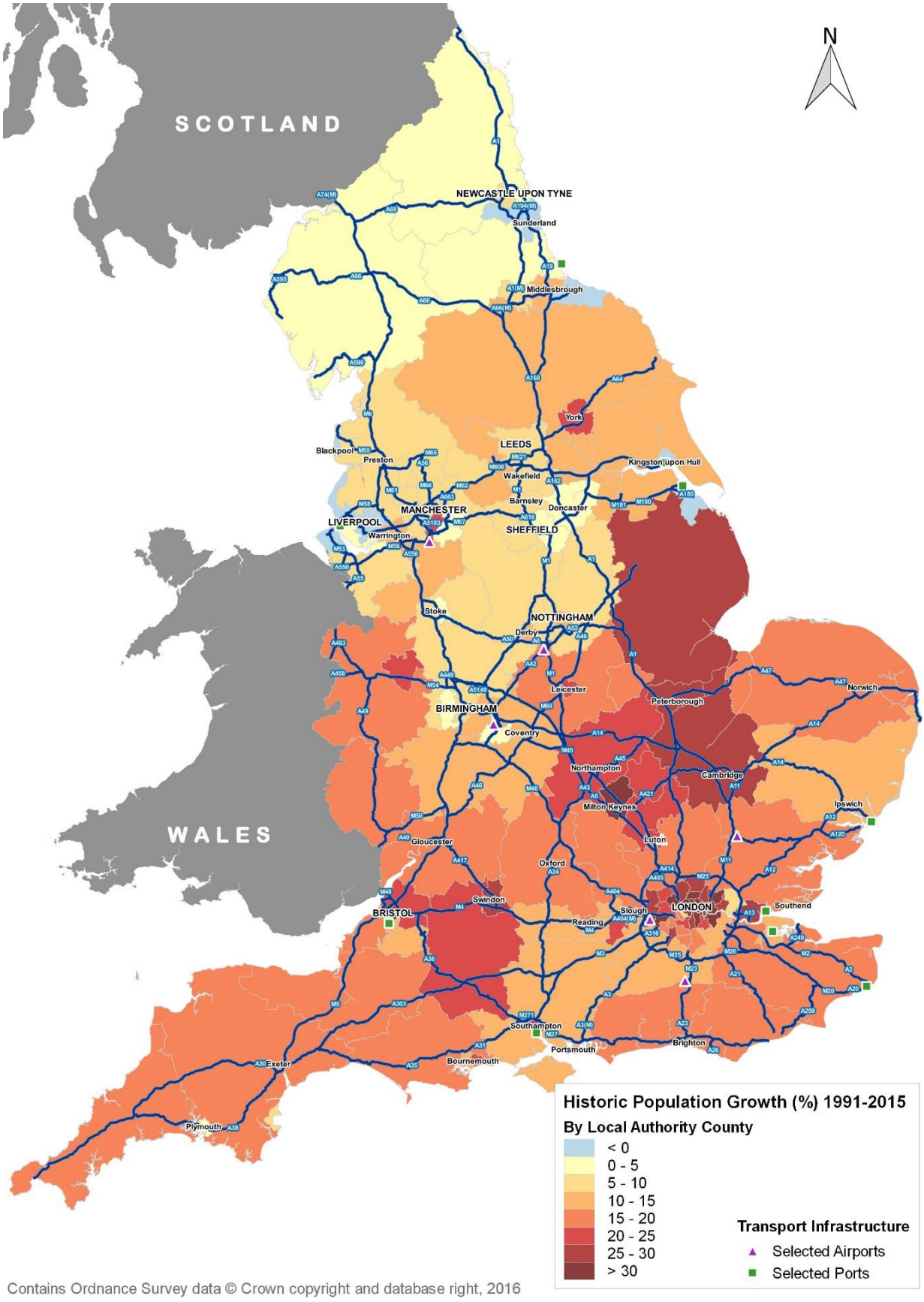
Figure 3-4 Top 10 and Bottom 10 Local Authorities for Population Growth (1991-2015)



Source: ONS Population Estimates (Atkins 2016)

[8] Commercial Development and the SRN, SEGP report 2016

Figure 3-5 Historical Population Growth (1991-2015)



Source: Historic local authority based population estimates with single year of age (https://www.nomisweb.co.uk/articles/934.aspx)

3.3. Deprivation

Deprivation can be quantitatively assessed using the English Indices of Deprivation 2015. These indices help to identify areas of poverty across 37 separate indicators which fit into seven distinct domains (which combine to produce the overall index – 100%):

- Income Deprivation (22.5%)
- Employment Deprivation (22.5%)
- Education, Skills and Training Deprivation (13.5%)
- Health Deprivation and Disability (13.5%)
- Crime (9.3%)
- Barriers to Housing and Services (9.3%)
- Living Environment Deprivation (9.3%)

The Indices of Deprivation 2015 provide a set of relative measures of deprivation for local areas across England and mapping can be used to identify where the SRN could potentially be an important feature in helping to address issues of deprivation.

Figure 3-6 overlays the SRN with the distribution of measured deprivation. The deprivation geography of England is complex. Many highly deprived areas are found in and around urban areas (e.g. core cities) although there are several rural and coastal areas of deprivation (West Midlands, East Yorkshire, parts of Lincolnshire, and in the south west across Devon and Cornwall). The SRN crosses and connects deprived and less deprived areas.

Linkages between the SRN and deprivation are complex. The SRN plays a role in impacting on all of the deprivation domains. However, there is no clear correlation between deprivation and access to the SRN. For example, two of the most deprived areas in England are:

- Oldham which is less than 5 minutes' drive from the SRN
- Jaywick near Clacton which is 25 minutes' drive from the SRN.

This indicates that there is not a simple correlation between SRN access and deprivation. Table 3-1 presents data on the most and least deprived areas in the country.

Table 3-1 Least and Most Deprived Local Authorities by Rank of local concentration

Most deprived Local Authorities	Least deprived Local Authorities
Blackpool	Vale of White Horse
Middlesbrough	Rutland
Knowsley	Chiltern
Great Yarmouth	Waverley
Kingston upon Hull, City of	Uttlesford
Thanet	South Cambridgeshire
Liverpool	Wokingham
Burnley	South Northamptonshire
North East Lincolnshire	Hart

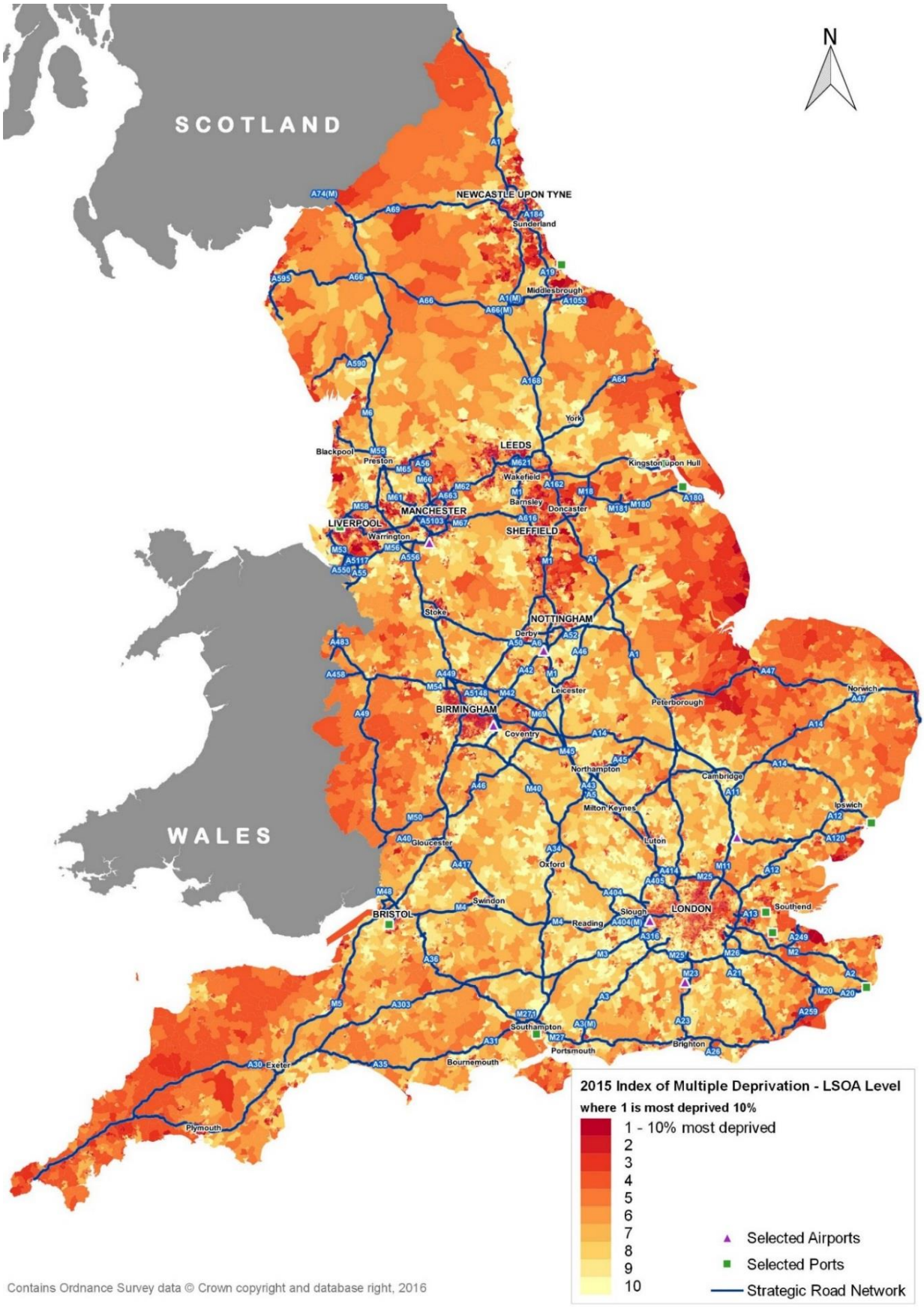
Source: IMD 2015

Improving access to the SRN could help to tackle deprivation but is not the only element: other factors are highly important in tackling deprivation including improving people's health, tackling skills problems and attracting new jobs. The transport network plays a key role in each of these aspects and the SRN is important for:

- Access to jobs, services and education;
- Social cohesion (e.g. family & friendships);
- Business connectivity; and
- Movement of goods.

Deprivation is usually explored as part of impact assessments for Highway England schemes. However, the links between deprivation and the SRN are not fully understood. Several further metrics could be explored including access to employment, the rural and urban deprivation component and the cost of travelling (e.g. cost of fuel and car ownership).

Figure 3-6 Deprivation Analysis



Source: English indices of deprivation 2015 (https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015)

3.4. Enterprise and Employment

This section examines the relationship between employment and economic activity and the SRN. Employment and economic centres have historically focused on proximity to:

- Resources (e.g. coal or food);
- Markets (e.g. concentrations of people);
- Workforce (e.g. accessible workforces);
- Transport routes (rivers, roads, rail); and
- Sources of innovation or technological developments (e.g. power stations).

These factors remain important but in modern times other factors have become important (e.g. access to broadband or concentrations of knowledge workers). As such, most employment is concentrated in city centres, business parks, other urban centres, enterprise zones or near to infrastructure (large industry, ports and airports). The rise of out of town office locations in the 1980s and 1990s has been replaced by reurbanisation as jobs have shifted to city centre locations. Businesses are also mobile and increased globalisation has led to firms relocating, expanding and spreading their operations across countries and borders.

A high proportion of people in England travel to work using a car or other vehicle (40.7%). Figure 3-7 shows the significant differences in car use between London and other regions (in some London Boroughs only 2% of residents use a car). Levels of car use are highest in the more rural regions, including the South West, East and East Midlands, whilst car use is lower in urban areas.

Figure 3-7 Travel to work using car or other vehicle (2011)

Source: ONS Census (2011)

3.4.1. Business Density

The table below helps understand the location of enterprise units[9] relative to the SRN. It shows the number of businesses located with 5km, 10km and 15km of the SRN. Across England 91% of businesses are within 15km of the SRN whilst 55% are within 5km. This reflects the coverage of the SRN in rural areas and limits of the SRN in accessing urban centres.

Table 3-2 Number of Enterprises in close proximity to the SRN

Buffer	% within proximity to SRN	Number of enterprises
5km	55.5%	1,224,015
10km	80.7%	1,779,730
15km	91.4%	2,015,402

Source: Highways England and ONS Business Counts (2014)

Roads are vital to the business community. The Confederation of British Industry (CBI) describes how roads are the "backbone for trade, helping to attract inward investment and supporting economic growth"[10] (CBI) and the Institute of Directors (IOD) states that "The UK is utterly dependent on road transport".[11]

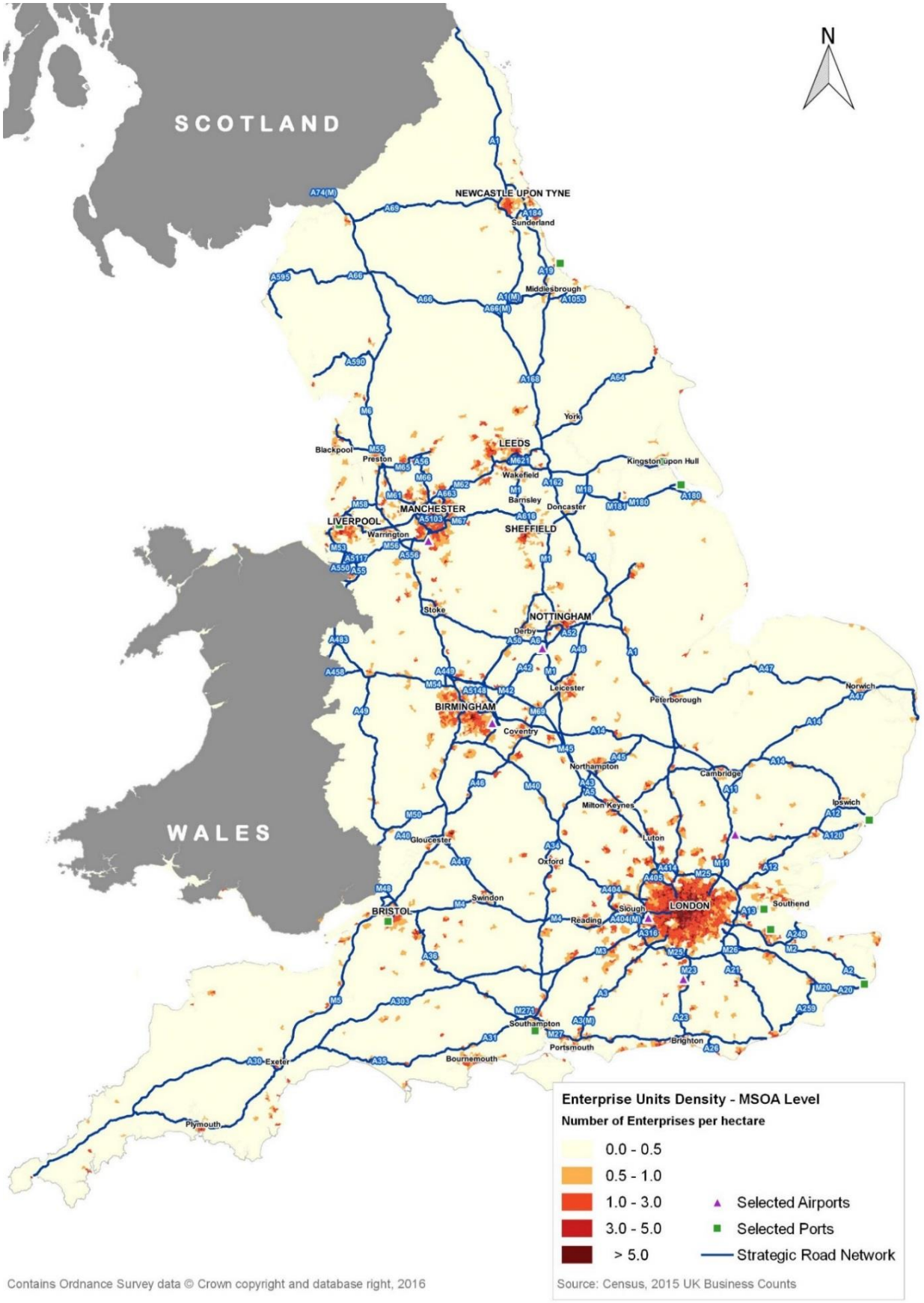
Almost all areas of major business density are connected by the SRN (Figure 3-8). There are key areas of business density in major cities, which are well connected by the SRN. However, there are a number of areas of business density scattered across England, which are not close to the SRN. These include areas of the South East Midlands, South Coast and towns north of Leeds. However, there is not a direct correlation between proximity to the SRN and use of the SRN. Many businesses in areas close to the SRN will not need to use the SRN. Conversely, many businesses in areas more distant from the SRN will have a strong need to use the SRN.

[9] Enterprises are defined in the Census as the smallest combination of legal units which have a certain degree of autonomy within an Enterprise Group.

[10] Leighton Jenkins | Assistant Director Policy | CBI Wales – Response to SENNED (2013)

[11] The Big Picture (IOD) 2014 - James Sproule, Chief Economist and Director of Policy at the IoD

Figure 3-8 Business Density



Source: UK Business Counts – Enterprises
(https://www.nomisweb.co.uk/query/construct/summary.asp?mode=construct&version=0&dataset=142)

Recent trends in the commercial office market indicate that a key determinant of location is quality of place and environment. Activity in the commercial office sector is therefore forecast to continue concentrating development in urban areas, in particular city centres and other major urban centres. Locational decisions are increasingly driven by human resource considerations with businesses choosing to locate in vibrant and attractive office locations, which are easily accessible by public and private transport, and provide cultural and leisure facilities for staff. This is driving a pull back to large town and city centre locations and away from car-dominated, poorly serviced out of town business parks.

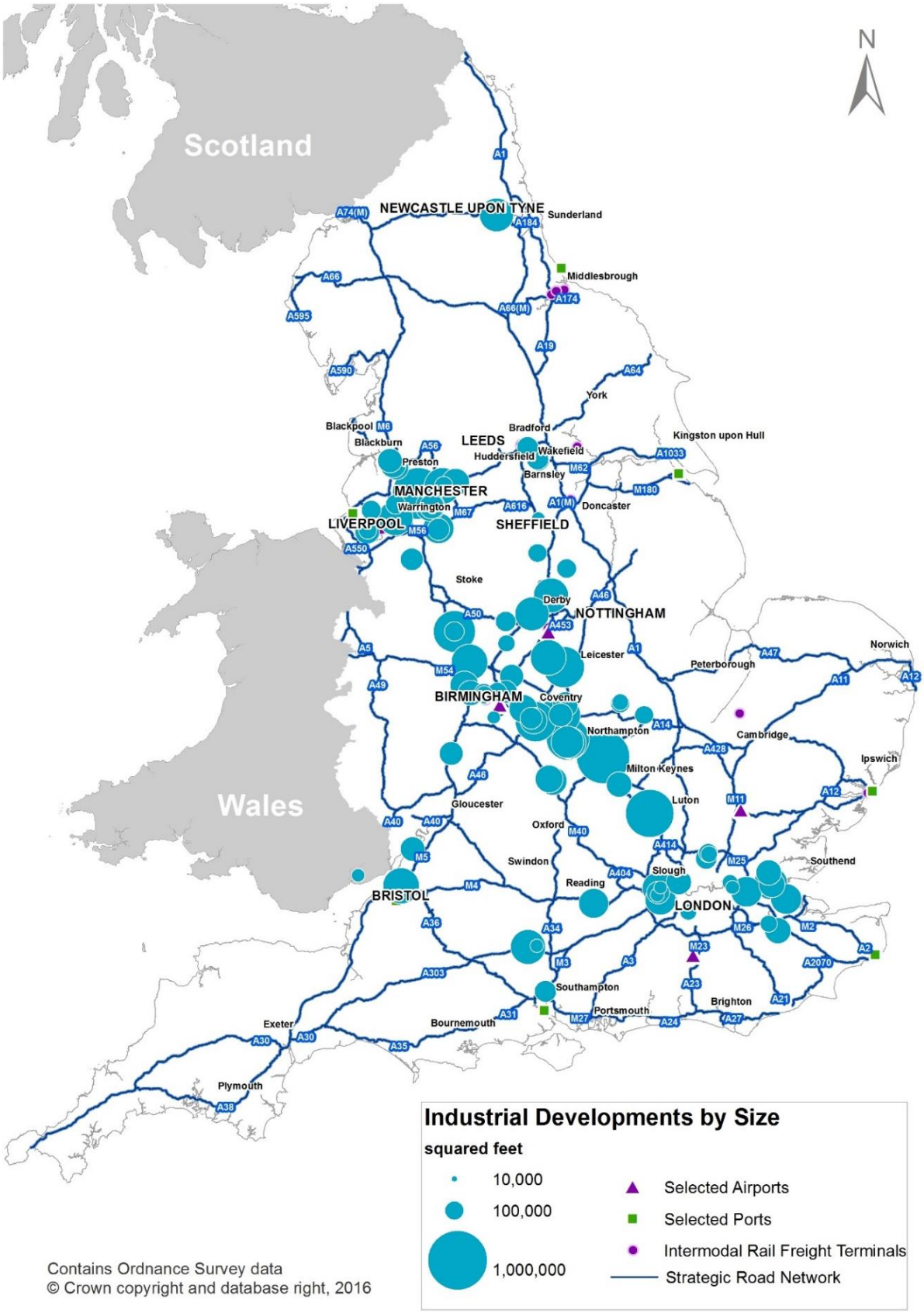
The following key points are identified as important for business location:[12]

- Improving economic conditions are resulting in rising employment and growing business confidence leading to an increased demand for office space;
- Market demand for office space is increasingly focused on large town and city centre locations, fuelled by knowledge based jobs clustering in central locations;
- High demand for new Grade A schemes; influenced by increase in on-shoring/north-shoring[13];
- Most successful business parks are highly accessible and established with a strong sector specialism and of a scale and critical mass to support a wider amenity offer; and
- Technological and infrastructure advancements support increasingly globalised businesses.

Figure 3-9 plots the distribution of major speculative industrial development that has taken place in England between April 2014 and April 2016. It demonstrates a clear relationship between industrial development and the SRN. Geographically, this shows that there is a South East to North West corridor (approximately Kent to Merseyside) where the largest developments are largely focused. This has implications on the SRN routes that are near to these developments, such as the M6, M25 and M1. Larger industrial developments are also more likely to be related to the warehousing and logistics sector which makes heavy use of the SRN.[14]

[12] Commercial Development and the SRN, 2016 report
[13] North shoring is when a southern company relocates to a more peripheral regional economy, such a decision is typically made to reduce costs
[14] Commercial Development and the SRN, 2016 report

Figure 3-9 Speculative Industrial Development & the SRN 2014-2016



Source: Cushman and Wakefield, 2016.

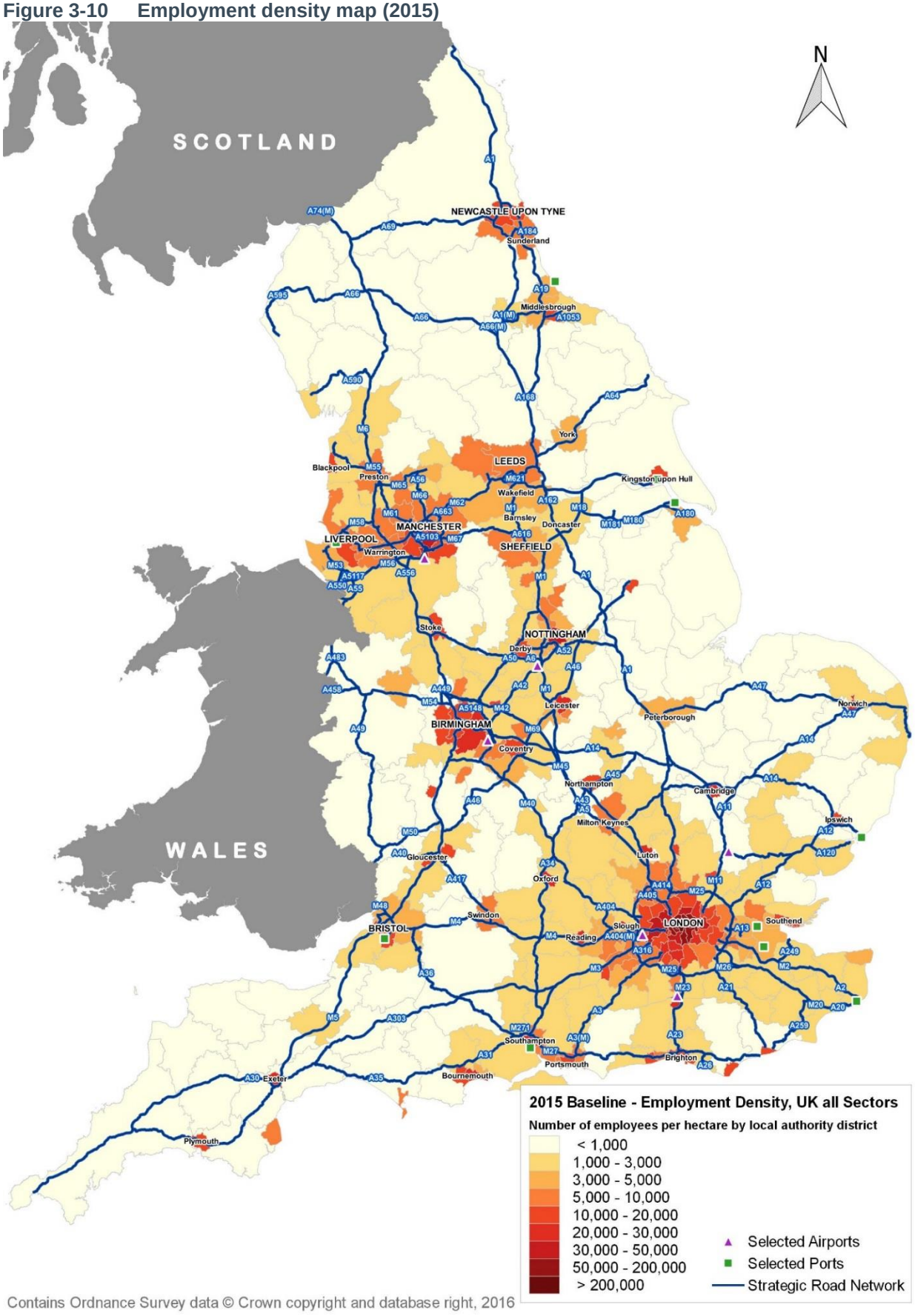
3.4.2. Employment Density

The SRN connects people to jobs. Many people, especially outside of London, travel to work by car (Census 2011). Almost all employment centres (as defined by employment density) are connected by the SRN (Figure 3-10). Key areas of employment density include the core cities, M62 corridor, M1 Leeds to Nottingham, Birmingham to Manchester and Nottingham, routes between London and Southampton, areas around Swindon, Milton Keynes, Birmingham and the Bristol city region. These are all located close to the SRN.

However, there are a number of areas of employment that are not close to the SRN. These include specific larger towns, such as Torbay and Weymouth on the South Coast, although access to these towns has been improved in recent years with the completion of road improvements by the local authorities. There are also other areas – including parts of the South East Midlands and East Anglia, which are located between routes on the SRN but are not directly served.

This does not imply that the SRN is not important to the operation of businesses in these locations. In many cases, the SRN is important for both employees travelling to work and for access to markets. Access to the SRN is important to firms in rural (often remote) locations to that deal with agricultural, raw materials or other large manufactured goods.

Figure 3-10 Employment density map (2015)



Source: Cambridge Econometrics Data

3.4.3. Productivity (GVA)

There is a strong relationship between productivity and connectivity. A 2014 study for the Department for Transport by Laird, Overman and Venables identified that:

"if all other drivers of growth were to increase by 10% and transport infrastructure were to stay constant, then realised growth in income would be just 9%, i.e. 1% point less than it otherwise would have been"

Productivity, as measured by GVA per worker, is a key component of current Government policy with economic scale and density (often agglomeration) central to productivity growth**.** Transport is a key factor for productivity growth through supporting agglomeration economies by supporting economic interactions between businesses, consumers and markets.

Figure 3-11 shows that GVA per worker on the whole is higher in the South of England compared to the North (as demonstrated in section 2.1.1). This is a critical issue for the future of the UK: in order to drive the success of the UK it is critical to improve productivity in the North and the Midlands, which is one of the main reasons behind the Northern Powerhouse and Midlands Engine agenda and ambitions to lift productivity across the country.

Transport plays a role in lifting productivity in areas of low productivity and strengthening areas of higher productivity. Better transport is key to productivity growth through supporting agglomeration economies by supporting economic interactions between businesses, consumers and markets by:

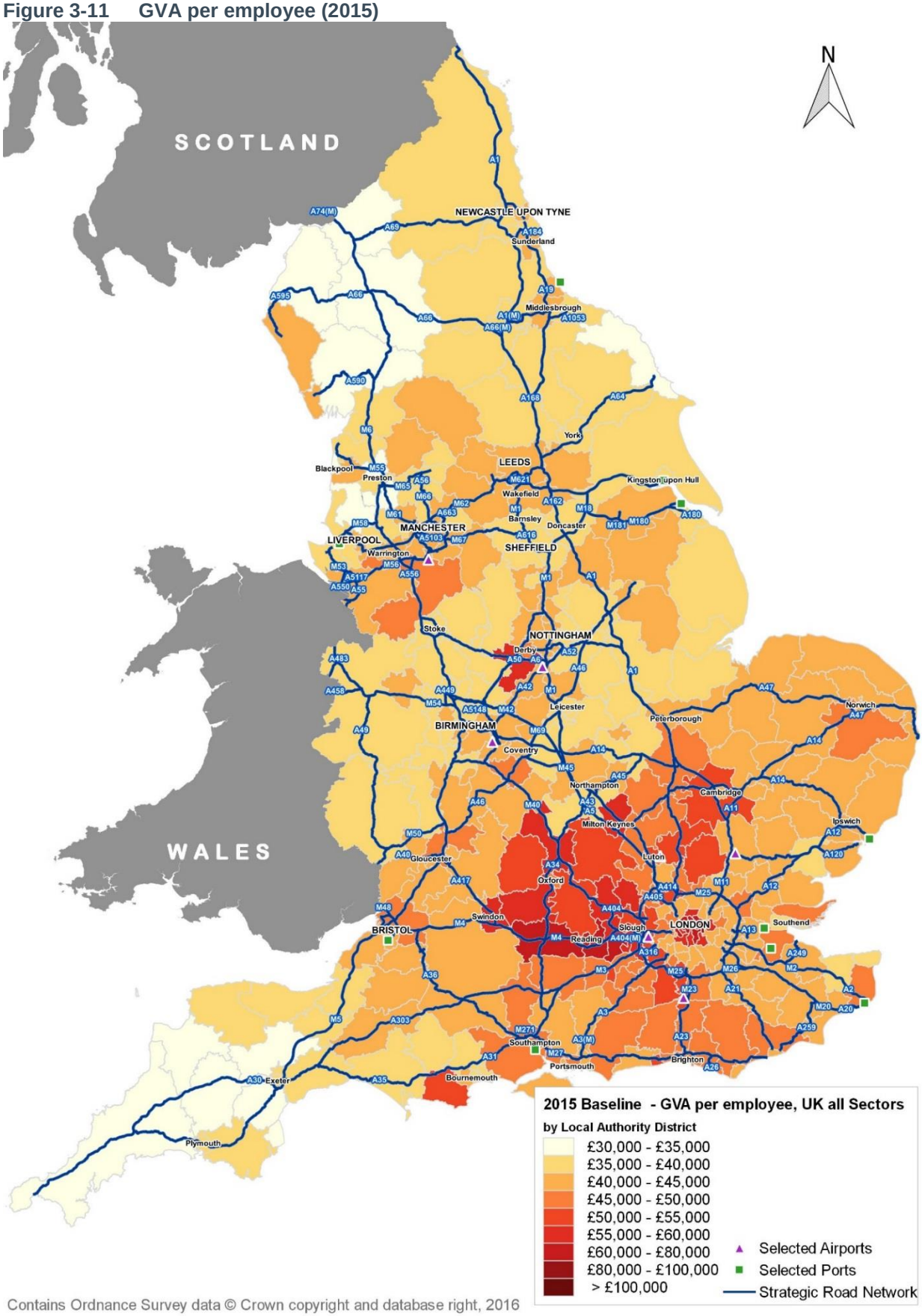
- Reducing distances between firms and market and increasing competition; and
- Supporting access to labour markets;

Transport fosters economic interaction that raises productivity. Effective connectivity is an essential component in attracting highly productive businesses, which require easy access to markets, supply chains and skilled workers. Good transport links are not sufficient in their own right: a number of factors influence productivity, including sector mix, investment, innovation and workforce skills. The drivers of productivity across England are therefore complex, but effective connectivity is essential.

Areas with good access to domestic and global markets and high quality skills generally have high productivity and business growth. Figure 3-11 shows that areas of highest productivity include Central London, the area west and north of London, the arc between Swindon and Cambridge, and hotspots near Derby and Bournemouth. Areas of lower productivity include the area north of Birmingham, the North East and far North West. The more peripheral areas, including Cornwall, Devon and Cumbria, have the lowest productivity. This demonstrates the effect of peripherality on economic performance. Conversely, the highest levels of productivity are along the M4 corridor, which benefits from easy access to Heathrow, and has therefore attracted global businesses.

Remote areas of low productivity are often characterised by a dependency on a sector mix with lower GVA per worker. However, the economies of these areas are based on sectors that rely on effective access to the SRN. For example, Cumbria, Cornwall and Devon have a strong dependence on the visitor economy, which requires effective access from the rest of the UK. Other sectors of the economy also require the SRN to connect with supply chains and national international markets, for example transport of seafood from Cornwall to the markets of major cities. Congestion and disruption on the SRN can therefore have significant impacts on the economies of these areas.

Figure 3-11 GVA per employee (2015)



Source: Cambridge Econometrics Data

3.5. Business Sectors Dependent on the SRN

This section explores the role of the SRN in meeting the needs of different parts of the economy. It draws on evidence on supply chain linkages between different parts of the economy and detailed research into the locational decisions in different sectors. It highlights the fundamental role of the SRN in the operation and competitiveness of particular sectors of the economy.

3.5.1. Economic Analysis

Cambridge Econometrics has determined the sectors of the economy that are the primary users of road transport services, based upon sectoral interdependencies in the UK Input-Output tables[15].

These tables capture the linkages between different actors in the economy, including the value of inputs of each sector of the economy (across 105 disaggregated sectors) into each other's sector. The Input-Output tables were used to assess the extent to which different sectors of the economy demand Land Transport Services (excluding rail)[16]. This was used as a proxy for demand for the SRN, based on the assumption that the vast majority of freight is moved by specialist hauliers, and that the SRN provides the key routes used by these hauliers.

The major users of the SRN were then identified as SRN dependent sectors. Table 3-3 below sets out each sector identified as a major user through the Input-Output analysis, and the rationale for their inclusion in this classification (i.e. why the data highlights them as being key users of the SRN).

Table 3-3 SRN Dependent Sectors

Sector	Rationale for inclusion
Land transport	Businesses in the land transport sector are the primary users of the SRN – they include specialist hauliers, postal and courier activities, as well as warehousing, storage and other support activities to land transportation.
Retail & wholesale trade	Many retail goods are moved along the SRN, both when moving from distribution centre to retail location and from distribution centre direct to consumer.
Primary materials	Primary materials include extraction of coal, petroleum, natural gas, metal ores and other mining & quarrying activity, reflecting the fact that large quantities of these goods are moved using the SRN.
Manufacturing – users of transport services	This sector, including manufacture of food, beverages, tobacco, wood & wood products, paper & paper products, rubber & plastic products and other non-metallic mineral products (such as construction materials) are included as they are substantial users of land transport services, with large quantities of the manufactured goods being moved along the SRN.
Manufacturing – reliant on other sectors which are users of transport services	This sector, which includes motor vehicles, includes sectors that take a substantial proportion of inputs from the manufacturing sectors (identified above) that are heavy users of the SRN. These firms are therefore indirectly dependent upon the SRN.
Construction	Construction is both a direct user of the SRN (in terms of moving vehicles used in construction) and heavily reliant on inputs of manufactured goods (such as non-metallic mineral products) which use the SRN.

Figure 3-12 and Figure 3-13 show the distribution of employment density and GVA per employee for these sectors. This shows employment and productivity concentrations including Birmingham, Derby, Leicester, London, Luton and Manchester. These are likely to be linked to concentrations of SRN-

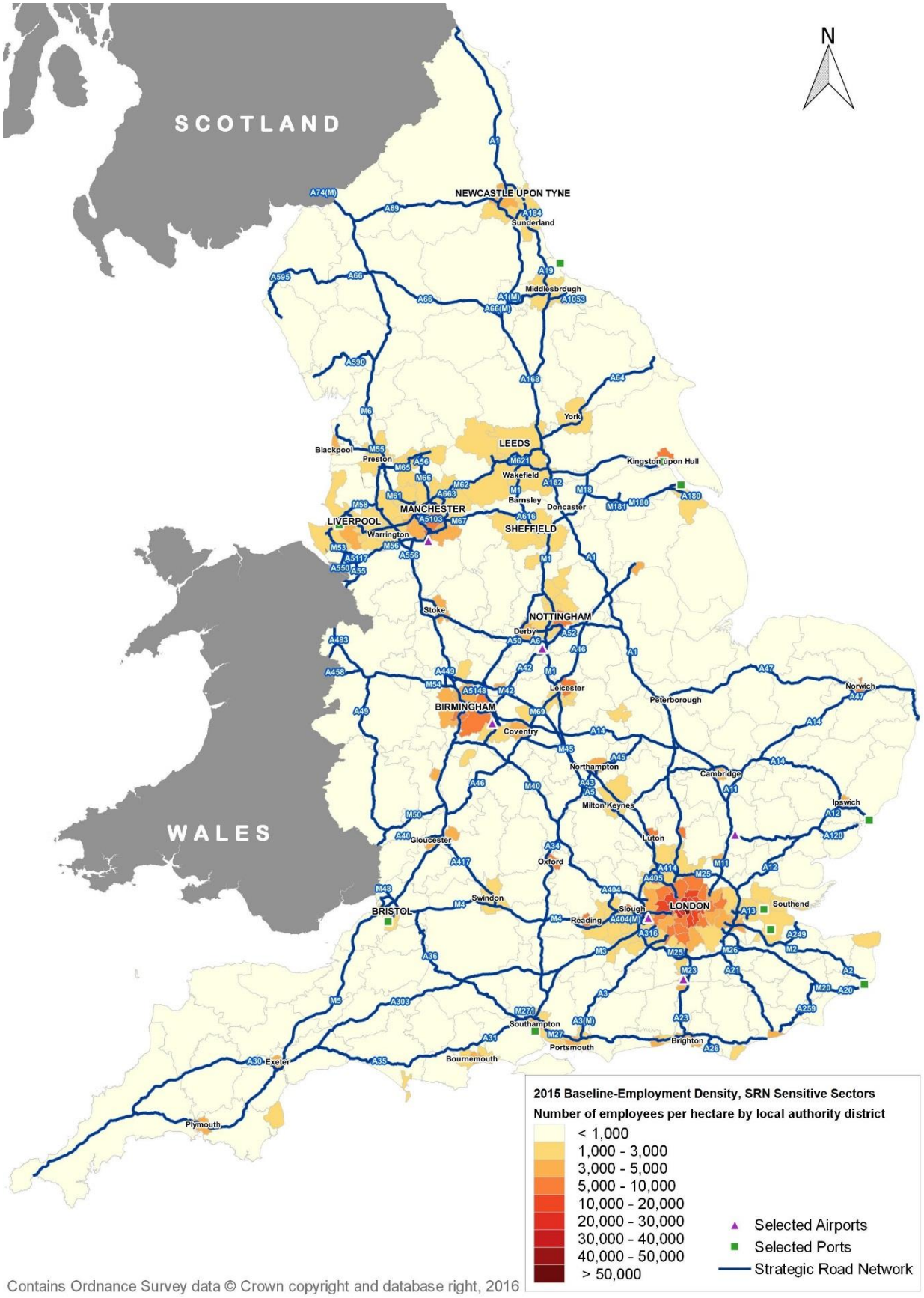
[15] See http://www.ons.gov.uk/economy/nationalaccounts/supplyandusetables/datasets/inputoutputsupplyandusetables
[16] SIC codes 49.3-5

dependent sectors clustered around areas of economic mass, in locations with access to a wide range of markets, and specific business clusters, for example:

- Car (e.g. Nissan in Sunderland) and train manufacturing (e.g. Bombardier in Derby);
- Aerospace and defence (e.g. BAe Systems in Preston and Hampshire); and
- Airport activities (around large international and regional airports).

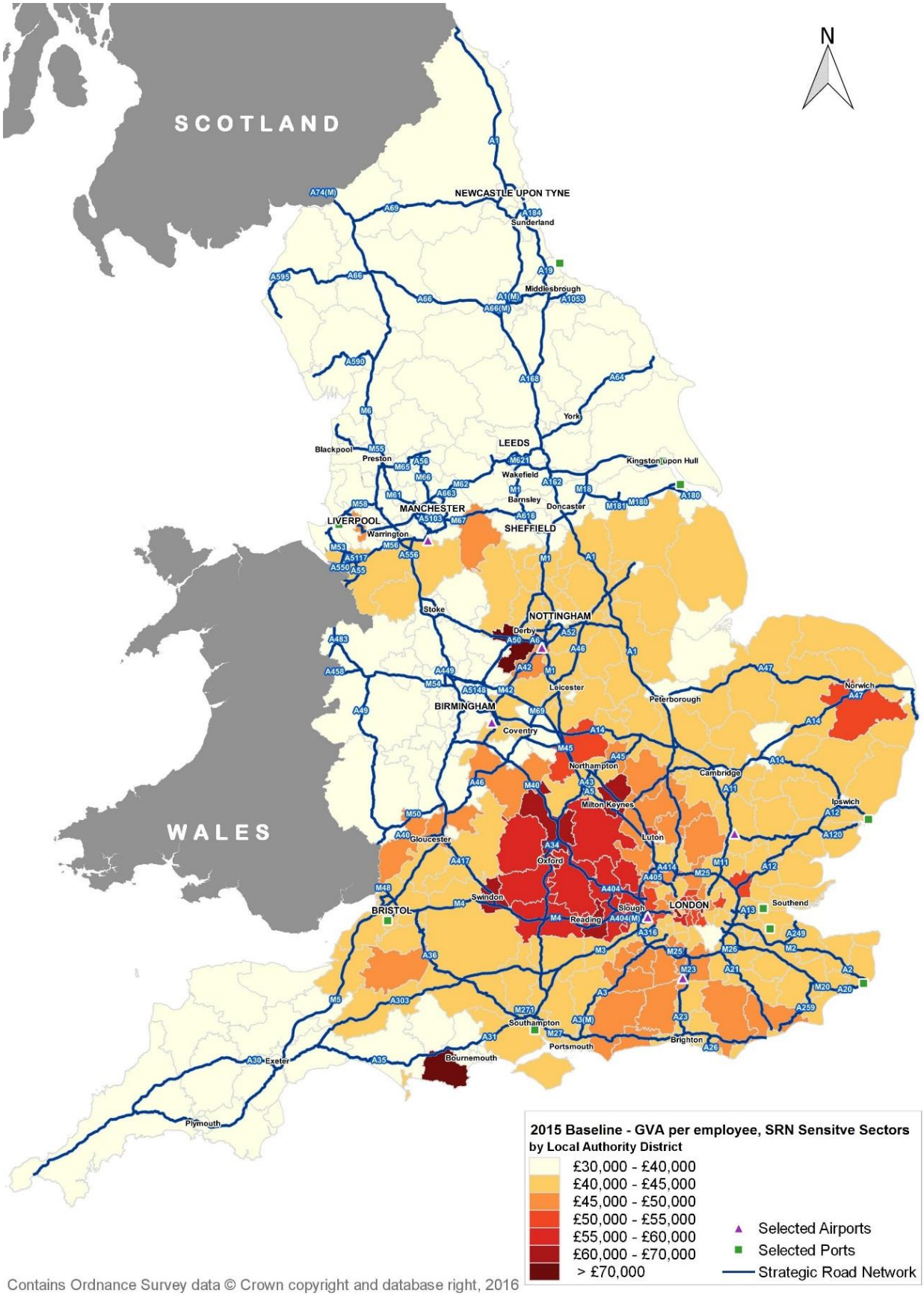
The maps show linkages to wider activities in transport sectors such as Motorsport Valley. Motorsport Valley is often referred to as the largest concentration of UK motorsport firms and is located in the Midlands and centre of England. The maps also highlight the logistics sector and key clusters for this industry in South/West Yorkshire, the M62 Corridor and Essex/Kent.

Figure 3-12 Employment Density. SRN Sensitive Sectors – 2015



Source: Cambridge Econometrics Data

Figure 3-13 GVA per employee. SRN Sensitive Sectors – 2015



Source: Cambridge Econometrics Data

3.5.2. Other Sectors

In addition to the transport sensitive sectors, consideration should be made to other sectors that rely on transport and particularly the road network. The section that follows provides a high level assessment of how the energy and retail & leisure sectors interact with the SRN.

3.5.2.1. Energy

The energy sector is reliant on the SRN to move people and materials. The UK imports nearly half its energy supply: oil, biofuels and coal are transported by boat, train and lorry to power stations. The renewable energy sub-sector is also dependent on the SRN with specialist companies involved in the transport of renewable energy equipment including offshore wind turbines and blades.

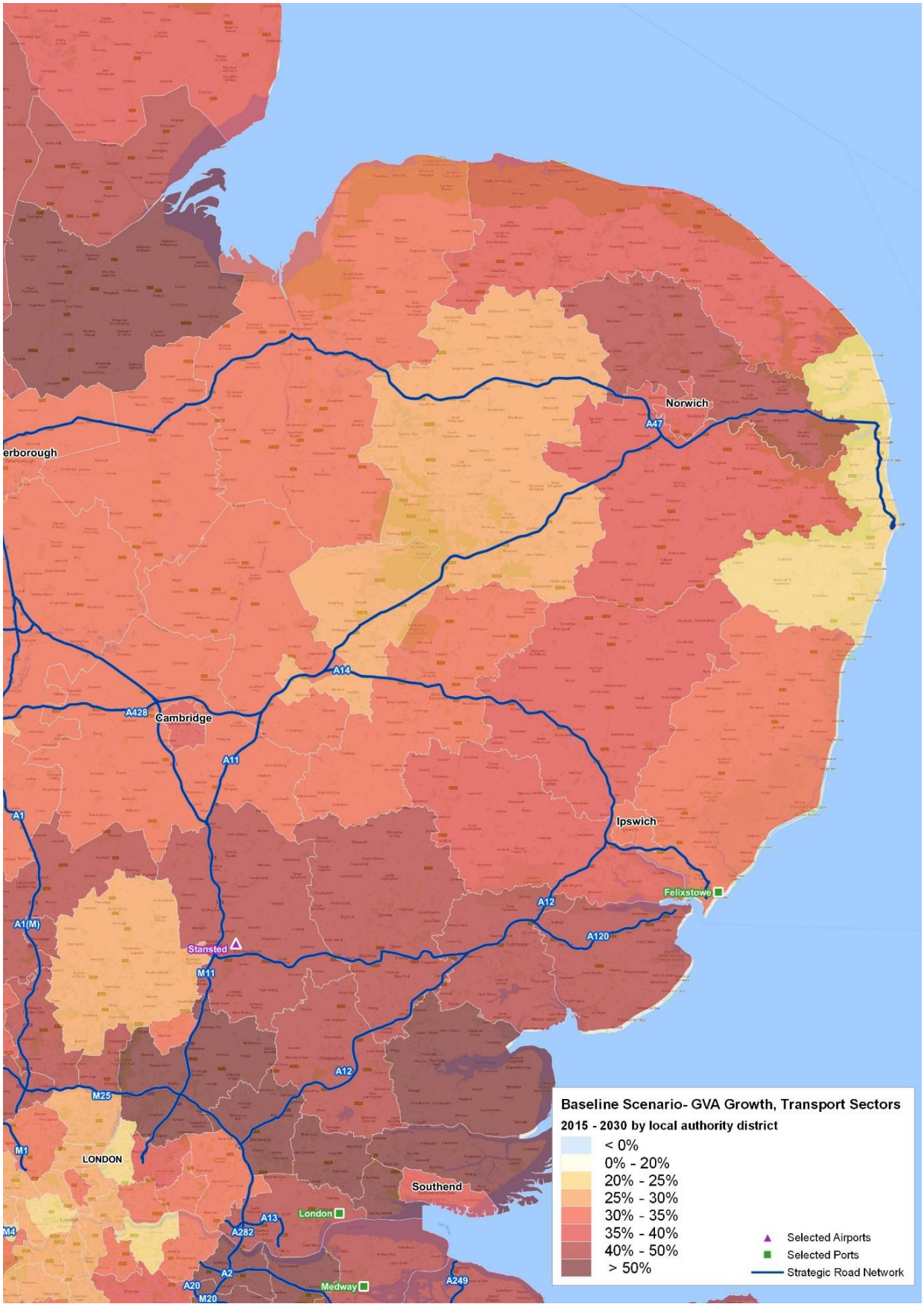
The UK energy system depends on effective access by the road network. The location of several power stations away from large urban areas (particularly nuclear power stations) means that staff working in the operation of the power stations use the road network to commute to work. Several power stations are also near to the SRN and depend on effective access to the SRN in their operations.

The UK Government is increasing its focus on cost-effective and efficient energy generation and supply. New nuclear energy generation in Somerset and Cumbria will be dependent on skilled workers living in these areas commuting to these locations. The M5 and M6/A66 are therefore likely to be key to how materials and people are transported.

There is little research evidence on the linkages between the energy network and transport. The construction phase for energy generating plants is lengthy and requires high levels of physical capital and labour inputs. These plants are often in more remote areas where local labour and product markets are not of sufficient size to support these requirements. Materials and workers therefore come from further afield and the SRN performs a vital function in supporting this movement of goods and people. As such, further work is required to understand how the energy sector will use the SRN and develop in the future, including how the network can enhance the economic competitiveness of this sector.

The relationship between the energy sector and the SRN is explored, for the East of England, in the figure on the following page. Figure 3-14 shows the forecast GVA growth across the East of England between 2015 and 2030. This covers an area that includes key energy assets (e.g. Sizewell B Power Station) and transport infrastructure (e.g. Port of Felixstowe). The forecasts indicate slight GVA growth for this area. However, GVA growth could change if a Sizewell C power station is planned and built. This would require a construction workforce, operating workforce and associated transport infrastructure and activity. The resulting GVA growth could therefore be greater and the SRN (A12 and A14) in this area could face challenges in supporting the needs of this energy project.

Figure 3-14 GVA Growth – SRN Dependent Sectors - East of England (2015-2030)



Source: Cambridge Econometrics

3.5.2.2. Retail and Leisure

The SRN plays an important role in the location decisions of major retail and leisure destinations as well as being important to providing access to these destinations. Out of town shopping centres and visitor economy assets are often accessed by car. Research by the National Trust suggests that more than seven out of ten tourism day trips and nearly eight out of ten holiday visits are made by car[17].

Within the retail sector there is an observed trend of retail and leisure occupiers wanting to cluster in sub-regional destinations that are highly accessible from a range of transport modes. The role of the SRN is to allow efficient movement of people and products to and from these destinations.

Research for the Strategic Economic Growth Plan has identified a range of drivers for retail and the SRN. These include the future importance of online shopping and how this impacts on journeys to retail centres and the number of delivery vehicles. The rise in demand for next/same day deliveries and returns of goods is rapidly changing the retail landscape and consequently demand for the SRN by the retail and distribution sector. The food and leisure offer within shopping centres is increasingly important to policy makers who are considering how transport hubs can also become retail destinations. Grand Central in Birmingham is one such example.

Leisure attractions are often concentrated where there is good accessibility, significant catchment populations and clusters with a critical mass of attractive retail, leisure or tourism destinations. The leisure and visitor economy offer is important to the national economy and reliant on the SRN. Table 3-4 highlights the proportion of visitors by residence and destination, showing large cross-regional visits that are likely to use the SRN. For example visitors to the Lake District (in the North West) are likely to use the M6 if coming from most parts of Britain. Although there are significant cross regional visits the majority of visitors to destinations originate within the same region, indicating the importance of local connections. Future research would help to better understand the factors influencing travel from further afield and if this could be increased by improved public transport or SRN provision in turn generating additional wealth.

Table 3-4 % of Visitors by Residence and Destination

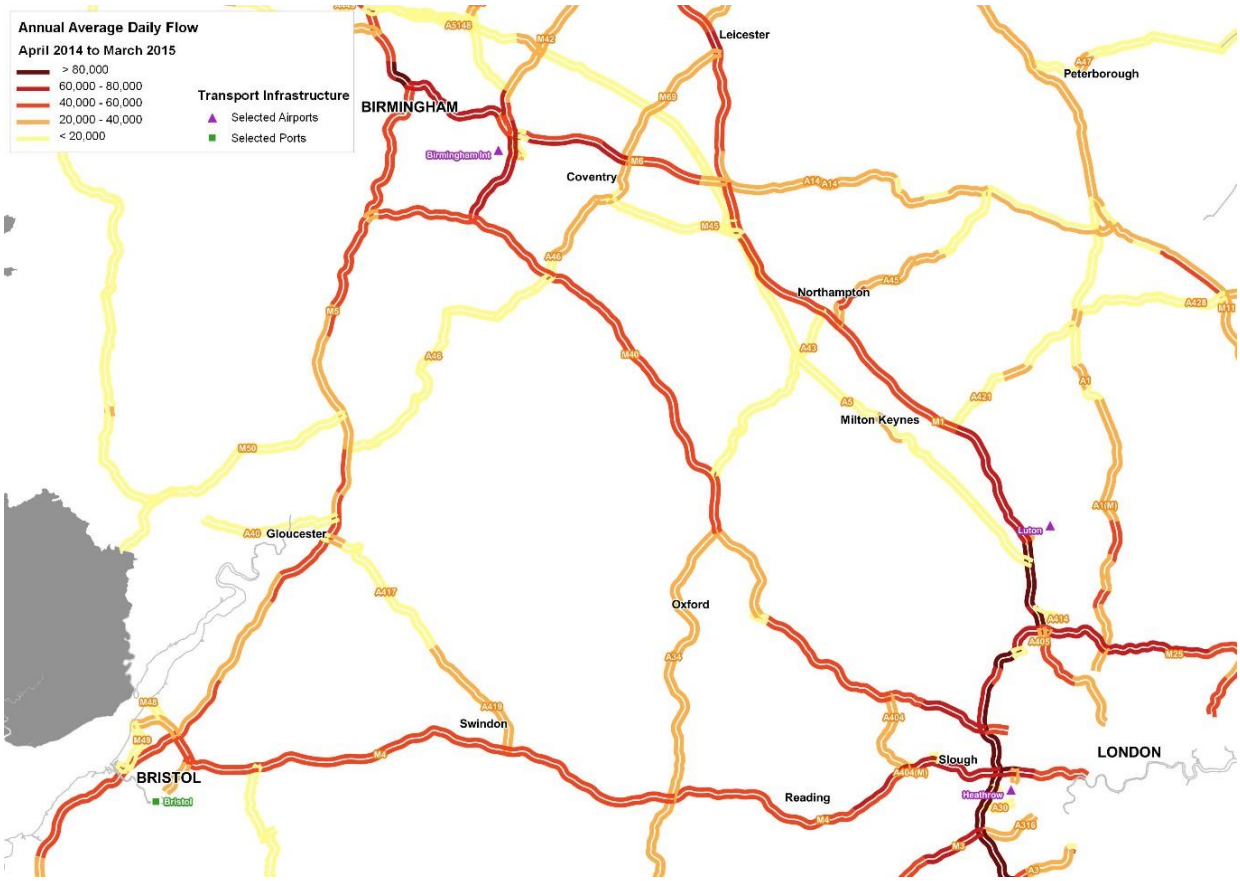
	Destination									
Region of Residence	**North East England**	**North West England**	**Yorkshire and The Humber**	**East Midlands**	**West Midlands**	**East of England**	**London**	**South East England**	**South West England**	**Northern Ireland**
North East England	69.5%	1.5%	2.7%	1.%	0.7%	0.5%	0.4%	0.8%	0.2%	7.4%
North West England	8.5%	79.3%	4.7%	2.0%	1.9%	1.4%	1.1%	0.8%	2.8%	1.5%
Yorkshire & The Humber	7.3%	4.8%	76.5%	6.1%	2.1%	3.5%	1.2%	1.1%	1.0%	12.4%
East Midlands	1.8%	2.3%	4.7%	70.2%	6.0%	5.0%	3.0%	1.3%	1.6%	18.0%
West Midlands	3.2%	3.5%	2.8%	6.1%	75.8%	1.2%	1.8%	2.2%	3.7%	0.7%
East of England	0.9%	0.7%	1.7%	4.6%	2.8%	75.1%	4.9%	4.9%	2.0%	18.2%
London	1.8%	2.0%	2.5%	3.6%	3.3%	7.1%	73.1%	14.1%	6.7%	13.1%
South East England	1.9%	1.1%	1.6%	3.6%	2.2%	4.7%	9.8%	70.2%	7.5%	14.2%
South West England	0.2%	0.9%	1.3%	1.2%	1.8%	1.2%	3.0%	3.4%	71.6%	0%

Source: Visit Britain UK

[17] National Trust evidence submission into Rural Tourism Submission for Wales.

Figure 3-15 highlights an area of the country where there are several tourism, retail and leisure attractions. The Cotswolds, to the east of the M5, are bound by the SRN. Several stretches of the SRN near to the Cotswolds have high average daily flows. Traffic has increased in the Cotswolds and its accessibility from Birmingham, Bristol and London has resulted in increased congestion, noise and visual disturbance.[18] Several of the routes near to and traversing the Cotswolds are busy throughout the year, with problems exacerbated during holiday periods.

Figure 3-15 Annual Average Daily Flows Bristol-Birmingham and London



Source: Highways England, HATRIS Data for April 2014 to March 2015. Received March 2016.

[18] http://www.cotswoldsaonb.org.uk/userfiles/position-statements/transport-2013.pdf

4. Economic Futures

4.1. Overview

This section assesses the demographic and economic future of England, highlighting key areas of growth and potential areas of importance for future analysis. It examines growth in population, economic activity and GVA in the whole economy, before then examining specific growth forecasts for SRN-sensitive sectors.

It should be highlighted the economic forecasts (GVA and employment) presented in this report are outputs from the Cambridge Econometrics local economic forecasting model. These forecasts represent only one illustration of scenarios of possible future economic change. These scenarios are strongly influenced by past trends and existing local structural factors, and do not take account of potential impact of policy or other market interventions.

4.2. Population Growth

As discussed in the previous chapter, 97% (51.3 million people) of England's population live within 15km of the SRN.[19] Area based population growth forecasts provide an indication of areas that are most likely to experience the strongest population growth. Connecting areas of future population growth with key employment locations is an important requirement of the SRN.

Key factors driving population growth include higher birth rates, rising life expectancy and increased migration. High population growth can place pressure on housing and services, including schools and healthcare. Areas with lower population growth (or population decline) can face challenges of reducing local tax base and increased pressure on services from increased proportions or numbers of older people.

Historic population growth shows that over the previous 25 years the population in and around key northern cities has declined (e.g. Newcastle, Liverpool, and Middlesbrough). In more recent years this trend has begun to reverse. Forecasts indicate this reversal in trend will continue with the urban areas forecast to have the highest growth rates. In some cases inward migration is a cause with people from outside the UK settling in cities, especially where housing is available. The long term trends for population change from migration are uncertain with limits on migration and free movement of people uncertain following the vote to leave the European Union.

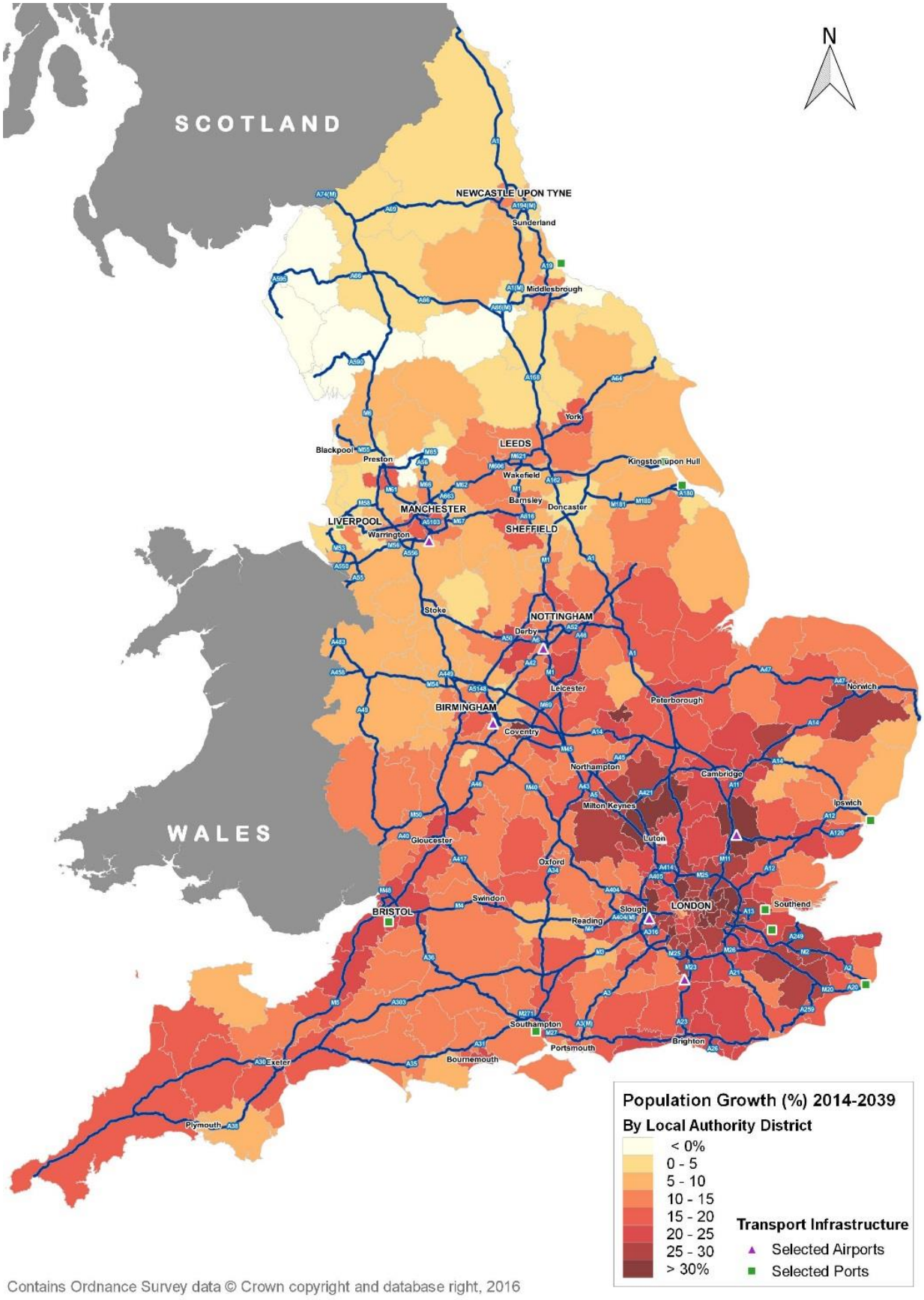
4.2.1. Population Growth and the SRN

Figure 4-1 shows the forecast pattern of future population growth. There are distinct patterns of population change: growth is strongest across the wider South East, East of England and South Midlands, with several areas of growth concentrated in urban areas in the South West, the Midlands and the North. Population is forecast to decline in some areas particularly rural parts of the North of England.

In the South, high growth is forecast in and around London, Kent, and north of London in Hertfordshire, Northamptonshire, Oxfordshire and Bedfordshire. The population in the South West and East Midlands has been growing strongly in recent years (see section 3.2). Growth is likely to continue in the South West, concentrated in the corridor between Somerset and Gloucester. The concentration in areas around the SRN is also evident in the Midlands around Birmingham, Coventry, Leicester and Nottingham. The corridor running north-east from the South West through Gloucester to Birmingham and Nottingham is forecast to experience significant population growth. Significant growth is also forecast in Cambridgeshire, Lincolnshire, Nottinghamshire and Leeds City Region.

[19] Based on 2011 Census data

Figure 4-1 Population growth (2014-2039)



Source: 2014SNPP Projected Population, 2014-based Subnational Population Projections (http://web.ons.gov.uk/ons/data/dataset-finder/-/q/dcDetails/Social/2014SNPP?p_auth=c4NIxraw&p_p_lifecycle=1&_FOFlow1_WAR_FOFlow1portlet_dataset_navigation=datasetCollectionDetails)

Areas with a high level of growth (>15%) and a significant base population are identified as key population growth areas. Parts of the network connecting these areas likely to be impacted by future growth are identified below. Key growth areas (and potentially impacted areas of the SRN) are:

Greater South East:[20]

- London
- Kent – London: M2, M20, A249
- Cambridge – London: M11, A11, A14
- Norwich area: A11, A47

South West:

- Cornwall and West Devon: A30, A38
- Exeter and East Devon: M5, A38, A30
- Taunton – Bristol – Gloucestershire: M5, M4

Central England:

- South East Midlands (including Oxford – Cambridge arc): M1, A5, A1, A428
- Birmingham and Coventry: M42, M6, A46
- Nottingham, Leicester and Derby: A50, A6, A52, A42, A46, A38, M1, M69
- Lincolnshire and eastern Nottinghamshire: A1, A46

North of England:

- Liverpool – Preston – Manchester: M6, M58, M60, M61, M62
- Leeds – Sheffield: M1, M62, M621

These areas indicate where the SRN could face increased demand in the future and where the SRN will need to support residential growth. It also highlights areas where wider infrastructure needs (e.g. schools or healthcare) could exert pressures on the SRN.

The drivers of population change are numerous with ageing population, social mobility, migration, affordability and access to jobs likely to be key influences on where people locate in the future. There is a predicted increase in the proportion of people aged 60 and over and this will have far reaching economic and social effects including use of services and housing. Areas of ageing population are (broadly) rural and coastal areas. There has been strong population growth in some coastal areas, notably Lincolnshire, and parts of Devon and Cornwall, driven by older people retiring to the coast.[21].

4.3. Future Employment and GVA Growth

This section presents evidence of future economic growth. It draws on detailed district level economic growth forecasts of GVA and employment, prepared by Cambridge Econometrics, to identify high growth areas and explores the role of the SRN in supporting the economy of England.

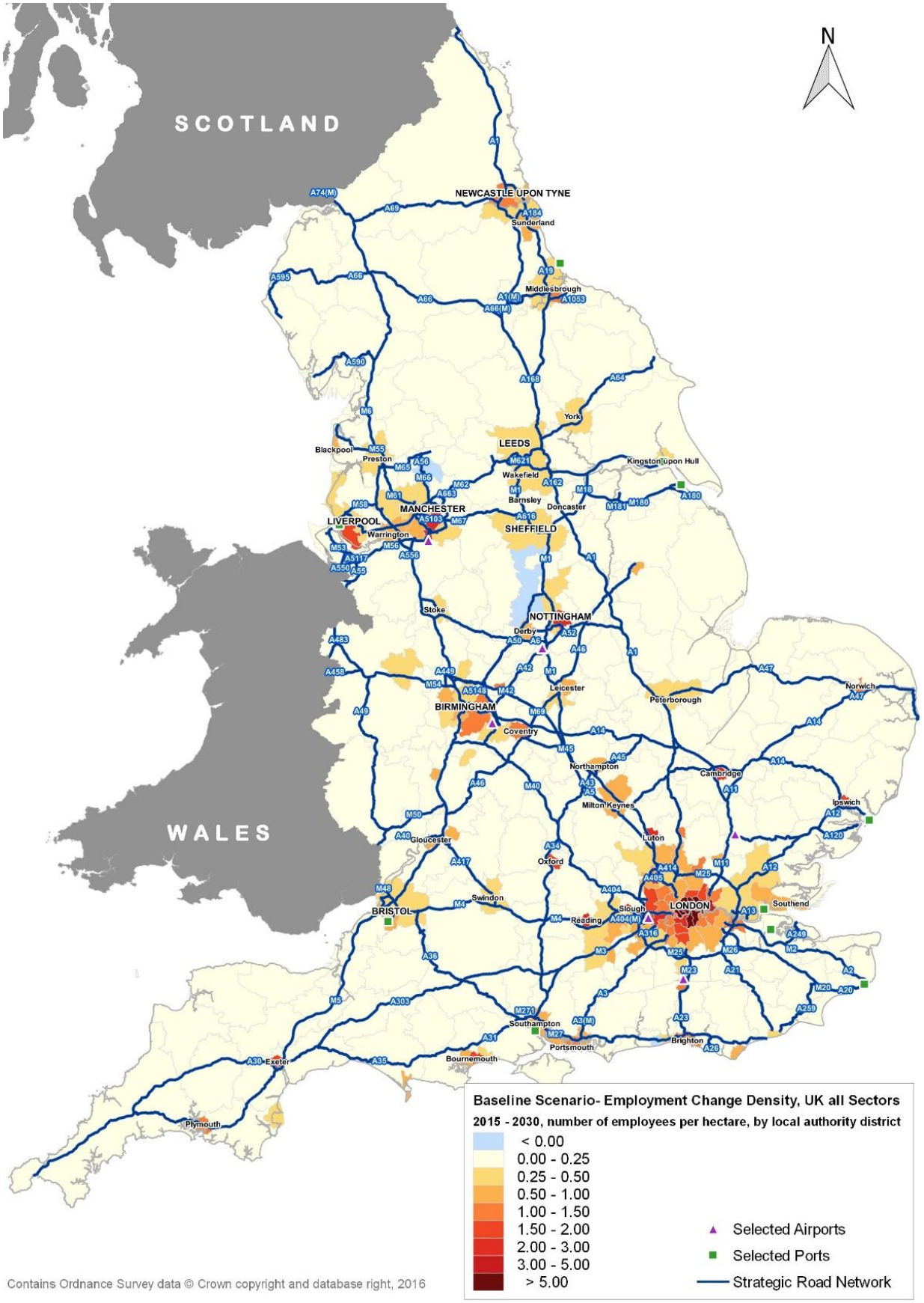
4.3.1. Employment Growth

An effective road network is critical in connecting businesses with their labour markets, and people to employment opportunities. Growth in city regions and inter-connectivity between them are key drivers of employment growth. Figure 4-2 shows the forecast increase in density of employment between 2015 and 2030 by mapping the change in the number of employees per hectare. It demonstrates that future employment growth will be concentrated in and around core cities and fast-growing centres such Oxford, Cambridge and York.

[20] Note: this is a broad order categorisation, it does not follow strict regional definitions or boundaries as a number of these corridors span regional borders.

[2121] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/514912/road-use-statistics.pdf

Figure 4-2 Change in Employment Density (2015-2030) Baseline Scenario - All Sectors [22]



Source: Atkins analysis of Cambridge Econometrics economic forecast data

[22] Econometric forecasts are to 2030 in contrast to population forecasts that are to 2039.

The map shows a strong relationship between employment density and the SRN, including routes radiating from the M25; the M1, M6 and M42 in the Midlands Engine; M5 in the West; the M62 belt connecting major cities in the Northern Powerhouse; and A1 and A19 in the North East. This confirms that concentrations of economic activity tend to be in close proximity to the SRN emphasising the enabling role of the network in supporting economic growth.

Forecasts indicate that growth is likely to be concentrated in Greater London and along routes to the west, north and south, in the major city regions, and in other hotspots such as Nottingham, Cambridge, Peterborough and York. Greater London and the South East, Birmingham, Leeds, Liverpool, Manchester, South Gloucestershire and Milton Keynes are forecast to have the highest increases in employment in terms of absolute change in the number of jobs created and in increased intensification of the number of workers per hectare (Table 4-1). This demonstrates that urbanisation and agglomeration of economic activity is a key driver of future employment growth and shows the importance of the SRN in serving and connecting concentrations of economic activity across England.

Table 4-1 shows that 25% of England's future employment growth will be concentrated in 15 locations[23]. The high representation of London boroughs and major cities demonstrates the role of large urban areas (in particular urban cores) in driving economic growth.

Table 4-1 Top 15 Employment Growth Districts 2015-2030

Top 15 Employment Growth areas	absolute change in employment 2015-2030 (number of jobs)	% of UK change
City of London	45,372	3%
Westminster	43,575	3%
Tower Hamlets	40,96	2%
Birmingham	32,317	2%
Camden	30,718	2%
Islington	29,401	2%
Leeds	26,386	2%
Cornwall UA	26,029	2%
Southwark	24,575	1%
Manchester	24,093	1%
Wiltshire UA	21,951	1%
Liverpool	20,930	1%
South Gloucestershire UA	20,416	1%
Hillingdon	19,931	1%
Milton Keynes UA	18,643	1%
top 15 total	**425,297**	
total England change	**1,726,895**	
top 15 as % of England total		**25%**

Source: Cambridge Econometrics Economic Forecasts 2016

Table 4-2 includes the top 15 employment growth areas outside Greater London. It shows that the highest employment growth is forecast in most (but not all) Core Cities, Cornwall, Wiltshire, Milton Keynes, Warrington, Peterborough and Shropshire. Even though they do not feature in the top 15 locations, Cambridge, Northampton, Norwich, Ipswich, York and coastal towns on the South coast are also have high forecast employment growth.

[23] Cambridge Econometrics economic forecasts produced for 326 local authority districts in England.

Table 4-2 Top 15 Employment Growth Districts outside Greater London 2015-2030

Top 15 Employment Growth areas outside Greater London	Absolute change in employment (total number of jobs)	% share of change in England
Birmingham	32,317	2%
Leeds	26,386	2%
Cornwall UA	26,029	2%
Manchester	24,093	1%
Wiltshire UA	21,951	1%
Liverpool	20,930	1%
South Gloucestershire UA	20,416	1%
Milton Keynes UA	18,643	1%
Nottingham UA	18,623	1%
Bristol, City of UA	16,496	1%
Newcastle upon Tyne	16,318	1%
Sheffield	12,855	1%
Warrington UA	12,837	1%
Peterborough UA	12,578	1%
Shropshire UA	12,222	1%
top 15 non-London total	292,694	17%
total England change	1,726,895	
top 15 as % of total UK		17%

Source: Cambridge Econometrics Economic Forecasts 2016

There forecasts provide evidence of economic activity spreading across a wider area around major urban agglomerations, particularly across the wider South where employment growth is strong in the Bristol to London corridor (Figure 4-3). There are a number of reasons for this spread of economic activity: although these can be location specific there are some common features. These include:

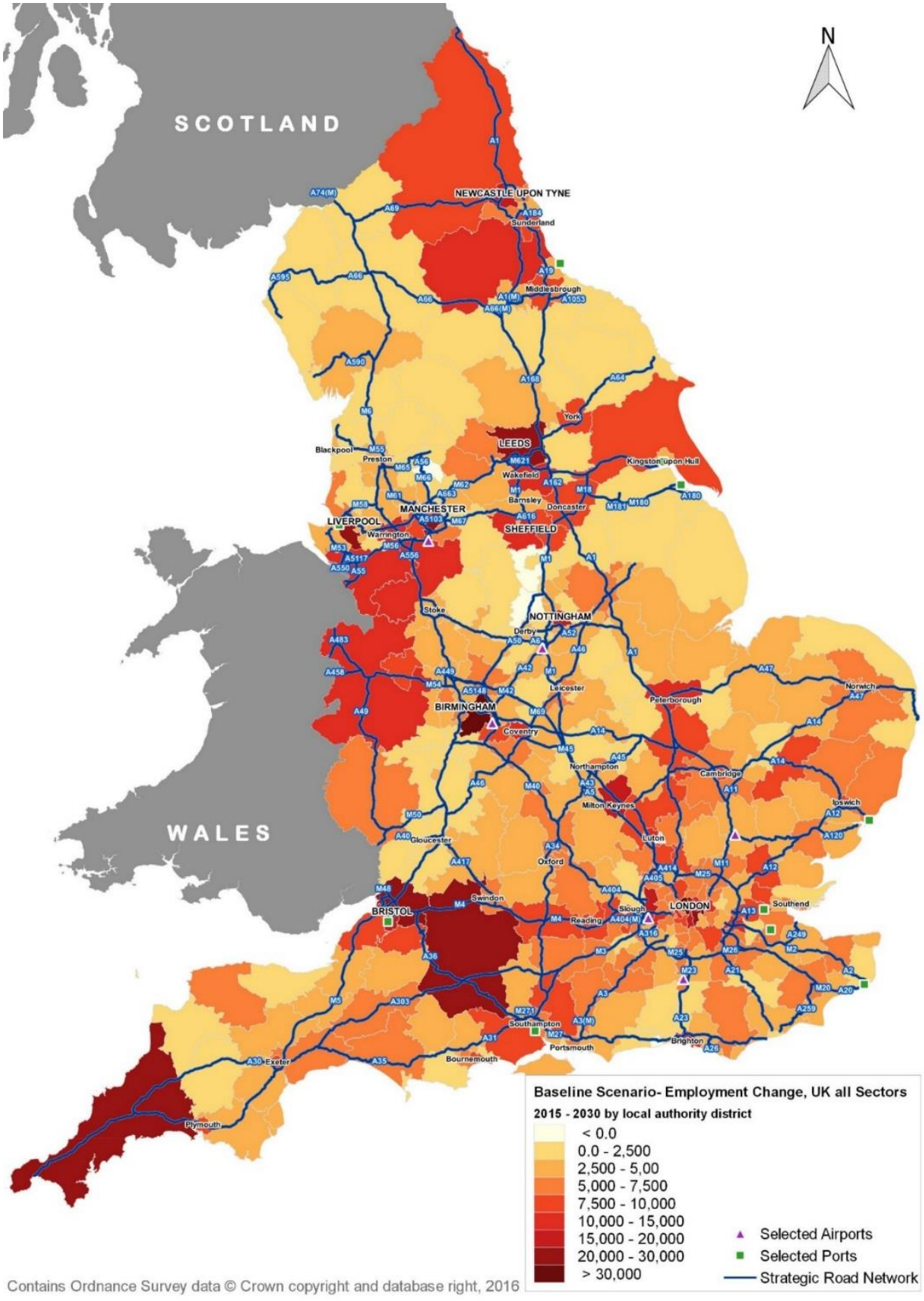
- Continued growth where economic dynamics are positive and supported by market forces;
- Increased local specialisation and clustering of economic activity outside the core cities but where there are specific locational advantages, e.g. being close to international gateways; and
- Spillover benefits of agglomeration through connectivity with centres of high economic mass and access to a large pool of skilled labour.

This spread is most evident across the South East on key corridors radiating from London. The Cambridge-Oxford arc, Shropshire, Wiltshire and Gloucestershire are examples of notable growth areas benefiting from proximity to core cities that have positive economic dynamics and are important areas for future employment growth. Employment growth in the North of England is less spread than in the South, however there is evidence of similar dynamics with areas that surround the core cities experiencing significant growth in employment. These include Cheshire (linked to growth in Greater Manchester) and Wakefield (as part of the Leeds City Region).

Access to high quality labour markets is an important determinant of business success. The development market analysis undertaken for the Strategic Economic Growth Plan highlights the trend of north-shoring and housing growth outside the major cities (mostly in the South) due to commercial and cost considerations. It will be important to ensure that future employment growth is matched by growth in a suitably skilled labour market to meet business needs. A potential area of future research would be to examine in more detail how forecast employment growth will be met by a skilled labour force with appropriate connectivity between jobs and labour markets. For example, employment growth across Cornwall is predicted to be relatively strong[24] and population growth is predicted to be moderately strong. However, if the growth in population is driven by an aging demographic, it will be necessary to consider if the labour supply will be sufficient to support predicted employment growth.

[24] Although it is recognised this growth is spread over a wider geographic area.

Figure 4-3 Employment Growth (2015-2030) Baseline Scenario - All Sectors



Source: Atkins analysis of Cambridge Econometrics economic forecast data

4.3.2. GVA and Productivity Growth

Economic output, as measured by GVA, is forecast to increase by 33% from 2015 to 2030. This means that economic output is expected to increase by c£450 billion over the 15 year period to c£1.8 trillion from the 2015 level of £1.3 trillion. This growth will be concentrated in the urban areas of England. It demonstrates that agglomeration economies and major urban conurbations will continue to be important drivers of growth in GVA and productivity.

Locations that have strong economic dynamics in place will continue to prosper and economic activity will intensify in these locations. Table 4-3 shows that growth in the major cities accounts for a significant proportion of GVA growth across England. The top 15 locations are forecast to account for 25% of total GVA growth across England. Eight of the top 15 locations within Greater London: these collectively account for 13% of the country's GVA growth to 2030. This will increase even more when the remaining districts of Greater London are added, demonstrating the continuing importance of London as a key driver of economic growth.

Table 4-3 Top 15 GVA Growth Districts 2015-2030

Top 15 GVA growth districts by value	Increase in total GVA (£m, 2015 prices)	% of England Growth
City of London	23,025	5%
Westminster	17,020	4%
Tower Hamlets	14,406	3%
Camden	8,450	2%
Birmingham	7,213	2%
Islington	7,118	2%
Leeds	6,376	1%
Southwark	5,882	1%
Manchester	5,083	1%
Bristol, City of UA	4,063	1%
Lambeth	3,989	1%
Wiltshire UA	3,845	1%
Milton Keynes UA	3,806	1%
Hammersmith and Fulham	3,598	1%
Sheffield	3,568	1%
Top 15 total	**117,442**	
England	**462,682**	
% of GVA growth in England		**25%**

Source: Cambridge Econometrics Economic Forecasts 2016

Table 4-4 includes the top 15 growth locations outside Greater London. Again, these are mainly located in city regions or areas neighbouring major cities (e.g. South Gloucestershire, Wiltshire and West Berkshire). Together these account for 12% of England's growth in GVA to 2030. Cornwall is an exception, partly due to it covering a large geographic area and therefore growth occurs over a wider area. However, Cornwall's contribution to GVA and employment growth is not negligible and, as shown in Figures A-2 and A-3, Cornwall is forecast to have high percentage growth. It is an important economic growth area for different reasons, more to do with local strengths as a visitor economy than urban agglomeration, nevertheless it is forecast to contribute significantly to future GVA growth.

Table 4-4 Top 15 GVA Growth Districts outside Greater London 2015-2030

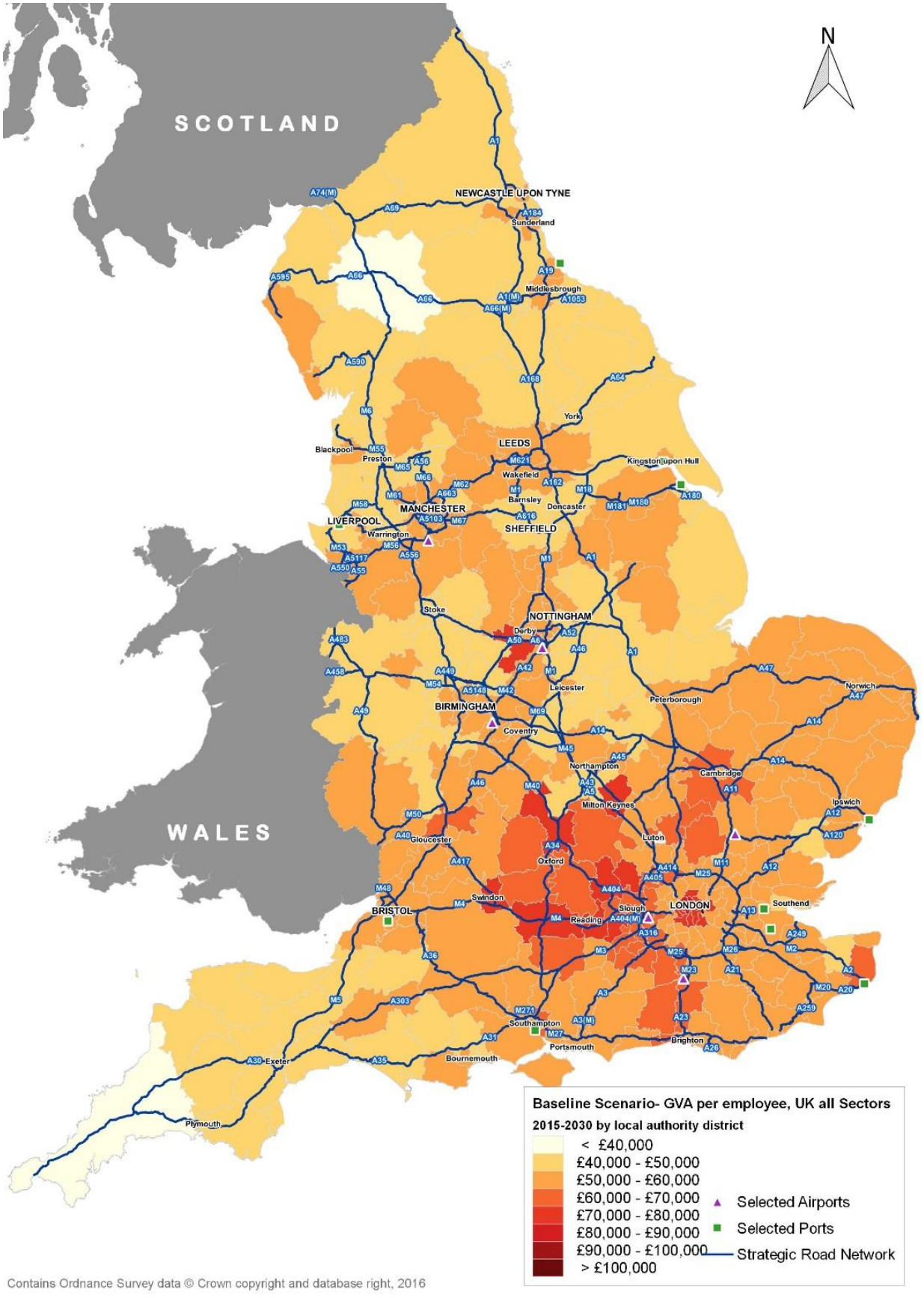
Top 15 GVA growth by value (outside Gtr London)	Increase in total GVA (£m, 2015 prices)	% of England Growth
Birmingham	7,213	1.6%
Leeds	6,376	1.4%
Manchester	5,083	1.1%
Bristol, City of UA	4,063	0.9%
Wiltshire UA	3,845	0.8%
Milton Keynes UA	3,806	0.8%
Sheffield	3,568	0.8%
Liverpool	3,452	0.7%
Cornwall UA	3,179	0.7%
Bradford	3,018	0.7%
Cheshire East UA	2,998	0.6%
South Gloucestershire UA	2,930	0.6%
Nottingham UA	2,747	0.6%
Swindon UA	2,625	0.6%
West Berkshire UA	2,571	0.6%
Top 15 total	**57,475**	
England	**462,682**	
% of GVA growth in England		**12%**

Source: Cambridge Econometrics Economic Forecasts 2016

Effective transport connectivity is an essential component in attracting highly productive businesses, which require easy access to markets, supply chains and skilled workers. A number of factors influence productivity, including sector mix, investment, innovation and workforce skills. International connectivity and access to global product and labour markets is an important factor in driving innovation and attracting investment. This is a key driver of GVA and employment growth in the area west and north of London, resulting in the continued growth of high value generating economic activity.

There is a strong relationship between connectivity and productivity in the economy. Intensification of business to business interaction leads to innovation, driving greater efficiencies and higher value business activities. Figure 4-4 shows forecast GVA per worker at local authority level, across England. This shows that differences between high productivity areas west and north of London, and low productivity in more peripheral areas, including Cornwall, Devon and Cumbria, will continue. It illustrates the effect of peripherality on economic performance. Conversely, the highest levels of productivity will be along the M4 corridor, which benefits from easy access to Heathrow.

Figure 4-4 GVA per employee 2030



Source: Atkins analysis of Cambridge Econometrics Economic forecast data

Property market analysis provides evidence of 'north-shoring' and relocation of higher value functions spreading across the area north and west of London and to Birmingham, Leeds, Liverpool, Manchester, Nottingham and Sheffield. This is a positive sign of an improving sector mix leading to higher productivity, wages and GVA growth across the country. Cambridge Econometrics forecasts support this analysis and show these locations to have high GVA and employment growth. Improvements in the network in parallel with wider policy support, investment in rail and local transport infrastructure, and expansion of the region's ports and airports will support productivity growth across the North and Midlands supporting the Northern Powerhouse and Midlands Engine concepts.

4.3.3. Summary

An effective road network is vital to the business community and therefore to employment growth. Businesses require effective connections to customers, supply chains and employees, and well-connected places tend to attract more businesses. Economic forecasts show that future growth will be concentrated around England's major cities (where the majority of the population is concentrated), including London, Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle, Nottingham and Sheffield. There are other important hotspots in other cities and towns. These are England's most important agglomerations of business activity, which are characterised by both businesses serving local needs and specialist activities due to the competitive strengths of each location.

GVA growth increases are important for future SRN investment as this indicates higher growth in business and commuting related travel and in the movement of goods and services. Growth forecasts show a continued strengthening across the South. High value growth areas are concentrated around London and the South East with strong growth spreading across the wider region radiating out from London. The area north and west of London is a key area for GVA and productivity growth.

Analyses of economic growth forecasts demonstrate that the SRN is largely focused on the right corridors to serve future growth across England and that future investment should be focused on providing efficient connectivity between key growth clusters of urban agglomerations and connectivity between city regions to support economic growth. Growth in employment and GVA in peripheral regions would be enhanced by effective connections focused on particular needs of the local economy that reduce effective distance with urban agglomerations, improve access to international gateways and reduce journey times for tourists and leisure travellers.

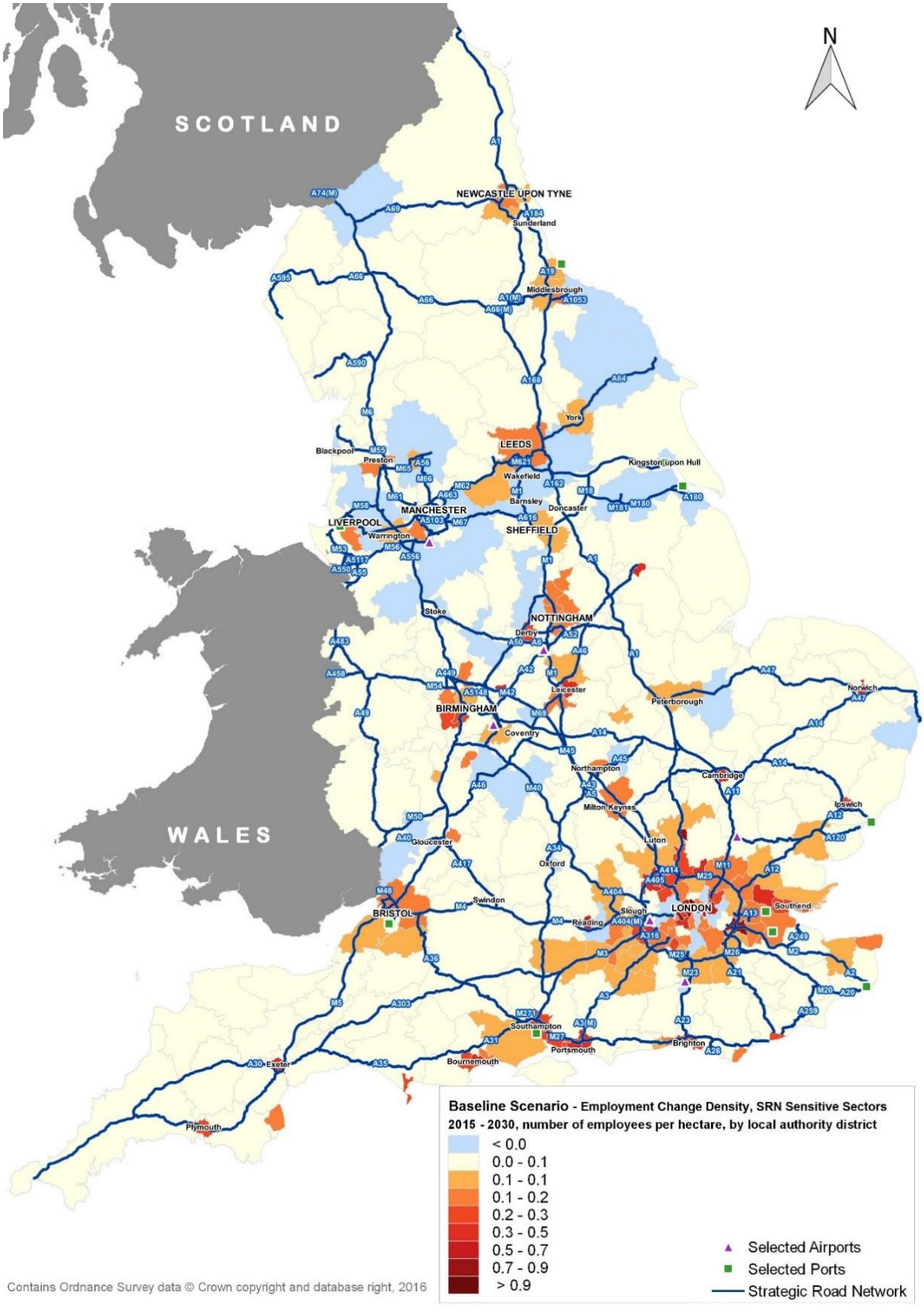
4.4. Future Growth in SRN Sensitive Sectors

This section presents forecasts in SRN-sensitive sectors. These were introduced in Section 3.5. The first part of this section discusses forecasts of employment growth, and the second part discusses GVA and productivity growth in these sectors.

4.4.1. Employment Growth in SRN Sensitive Sectors

Economic forecasts of SRN dependent sectors show that employment growth in these sectors will be increasingly concentrated around key nodes on the SRN and in close proximity to key cities. Figure 4-5 shows predicted change in employment density of SRN sensitive sectors across England. It shows that growth in SRN sensitive sectors will be concentrated on key corridors and nodes served by the SRN, including routes in the South East radiating from Greater London and around the city regions of Birmingham, Bristol, Leicester, Nottingham and Leeds. Other hotspots are Milton Keynes, Manchester, Liverpool, York, Middlesbrough, Newcastle and the southern coastal towns. Many areas are forecast to experience reductions in employment, indicating that future growth will be increasingly concentrated in key areas where there are locational advantages.

Figure 4-5 Change in Employment Density in SRN Sensitive Sectors 2015-2030



Source: Atkins analysis of Cambridge Econometrics economic forecast data

This demonstrates the importance of the network in providing high quality transport connectivity with centres of economic mass and ports and airports to the functioning of these sectors. South Gloucestershire is forecast to be an important growth area for SRN sensitive industries. It is the highest employment growth location and in the top ten locations for GVA growth. Greater London and the wider South East have high concentrations of SRN dependent businesses that provide goods and services to high density business and resident populations. Connectivity to the key ports and airports is critically important, for example south east of London through Dartford to London and Medway ports.

A notable pattern of future growth is that key growth locations are not concentred *within* core cities but are located *around* them. This reflects the locational advantages of having access to and being able to serve a range of markets. It enables businesses in these sectors to avoid high rents and input costs of city centre locations. Each SRN sensitive sector requires effective connectivity but the industrial and logistics sectors have a particularly strong dependence on the SRN, with good quality access to international gateways and domestic markets. Future employment in SRN sensitive sectors is likely to further concentrate in areas with good access to the SRN.

Patterns of future growth show the importance of manufacturing in the West Midlands, Derby, Sunderland and Swindon, logistics hubs along the M1, M6 and M62, and port-related employment in Southampton, Portsmouth and Liverpool. Table 4-5 includes the top 15 employment growth areas in terms of absolute change in employment numbers. It shows that growth in these sectors is not strongest in the major cities (in contrast to that for employment growth across all sectors of the economy). In the case of Greater London, areas on the M25 and to the east of London are the focus for growth. Leeds and Milton Keynes are the only cities that feature in the top 15. Areas around key ports and airports are forecast to have high employment growth highlighting the importance of international gateways as key drivers of future growth in SRN dependent industries.

Table 4-5 Top 15 SRN Sensitive Employment Growth Districts 2015-2030

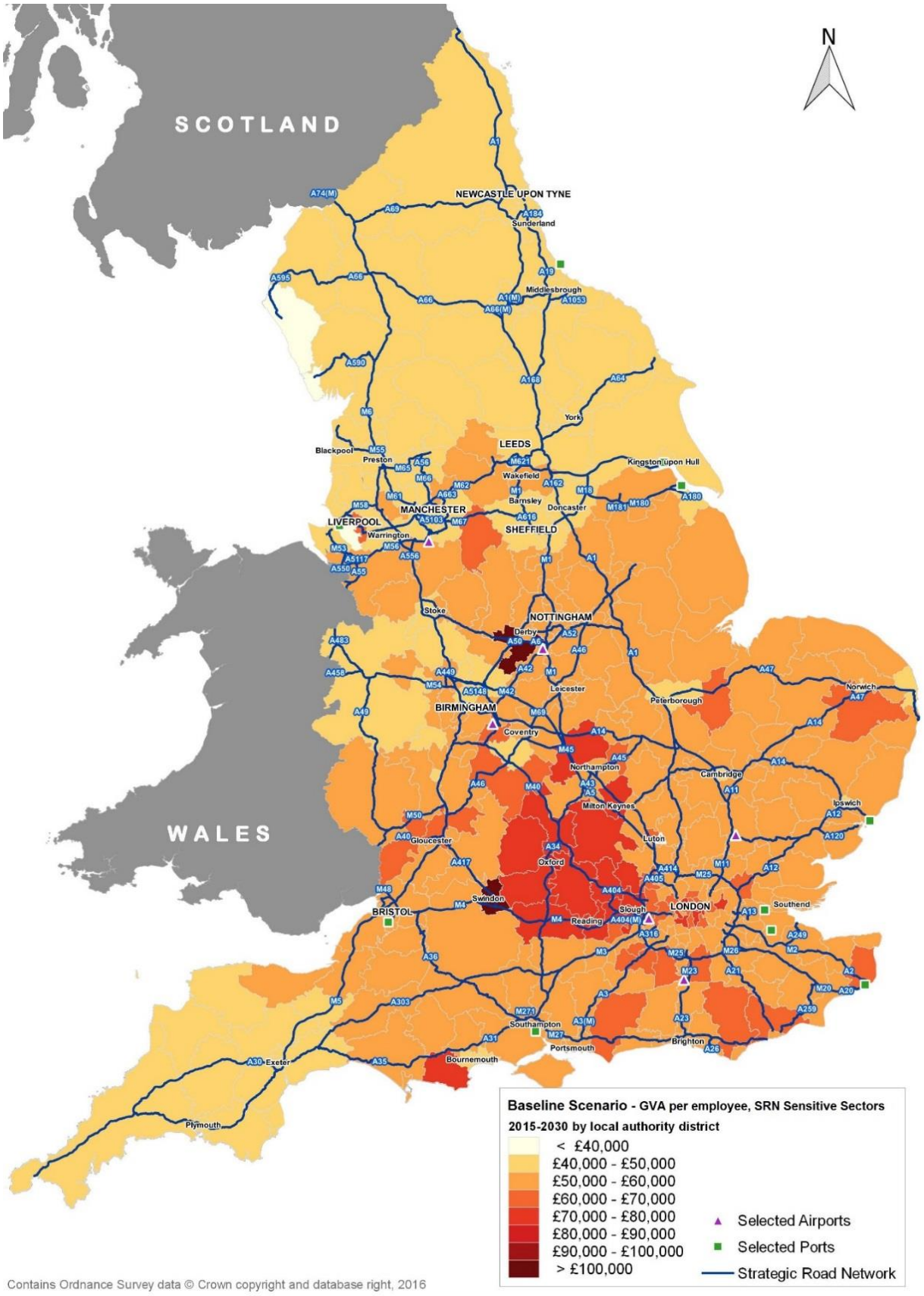
Top 15 Employment Growth areas	Change in employment (SRN sensitive sectors)	% of England change
South Gloucestershire UA	6351	1.9%
Leeds	5836	1.8%
Dartford	5386	1.6%
Basildon	4300	1.3%
Epping Forest	3916	1.2%
New Forest	3909	1.2%
Thurrock UA	3658	1.1%
Milton Keynes UA	3641	1.1%
Basingstoke and Deane	3211	1.0%
Leicester UA	3173	1.0%
Kirklees	3028	0.9%
East Devon	3019	0.9%
Portsmouth UA	2925	0.9%
Medway UA	2853	0.9%
Three Rivers	2848	0.9%
top 15 total	**58054**	
total SRN sectors change	**328021**	
top 15 as % of England total		**18%**

Source: Cambridge Econometrics Economic Forecasts 2016

4.4.2. GVA and Productivity Growth in SRN Sensitive Sectors

Figure 4-6 shows the forecast productivity in 2030 for SRN sensitive sectors.

Figure 4-6 GVA per Employee SRN Sensitive Sectors 2030



Source: Atkins analysis of Cambridge Econometrics Economic forecast data

The highest levels of productivity are in the area to the north and west of London. The M5, M40 and M42 corridors are also forecast to have high levels of productivity, including SRN dependent industries. This demonstrates the significant locational advantages of this area, with good reach and accessibility to the capital, Heathrow and a number of England's other major cities. There are notable hotspots of high productivity in Derby[25] and Swindon. Productivity is forecast to be significantly lower in the far South West and far North of England where peripherality is a challenge with long distances and journey times to markets. Productivity will also be lower in the West Midlands and urban areas in the North, indicating that other factors will also be important in driving performance.

GVA and productivity growth is highest where there are high value sectors that benefit from international connectivity, good access to major domestic markets and specialised business clusters. High growth is predicted where high value business clusters in logistics, advanced manufacturing and aerospace are located around the western and eastern edges of the M25, benefiting from close proximity to the country's main airports and ports and access to highly skilled labour.

The SRN is vital to the industrial and logistics markets. These industries have a high dependence on the SRN to transport goods and services to key markets generating a high frequency of trips that are often long distance. A primary purpose of the SRN is therefore to support these sectors and to provide capacity for growth.

Table 4-6 shows the top 15 highest GVA growth areas for SRN sensitive sectors.

Table 4-6 Top 15 SRN Sensitive GVA Growth Districts 2015-2030

Top 15 SRN sectors GVA growth by value	Increase in total GVA (£m, 2015 prices)	% of total SRN sectors growth
Birmingham	1,646	1.5%
Westminster[26]	1,451	1.3%
Leeds	1,425	1.3%
Swindon UA	1,161	1.1%
Milton Keynes UA	961	0.9%
Wiltshire UA	958	0.9%
Cornwall UA	881	0.8%
Bristol, City of UA	875	0.8%
Bradford	826	0.7%
South Gloucestershire UA	811	0.7%
Kirklees	809	0.7%
Cheshire East UA	758	0.7%
Camden	743	0.7%
Ealing	738	0.7%
Sheffield	737	0.7%
top 15 total	**14,780**	
total 6SRN change	**110,333**	
top 15 as % of total England		**13.4%**

Source: Cambridge Econometrics Economic Forecasts 2016

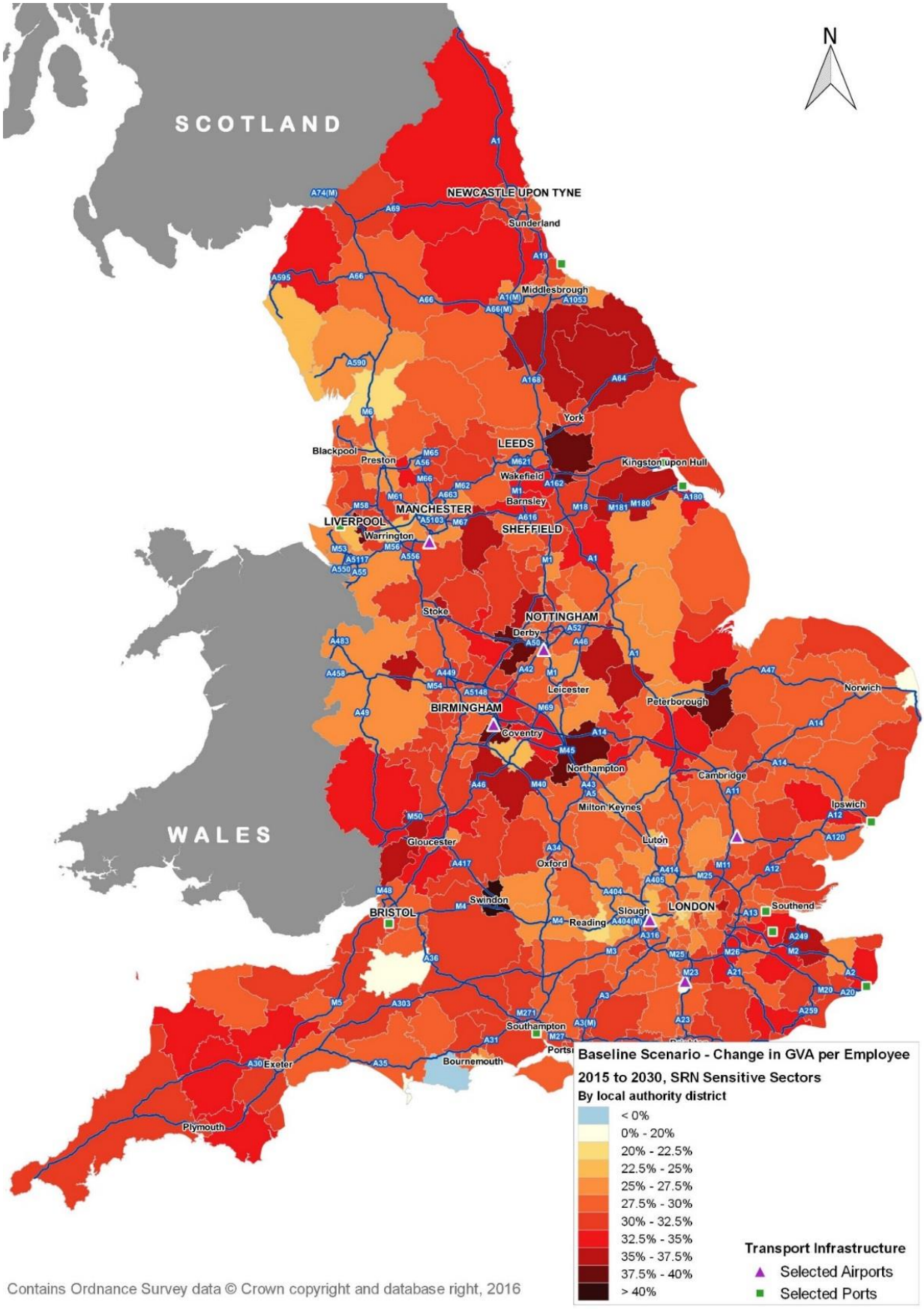
[25] Toyota and Bombardier are examples of major businesses located in Derby.
[26] The large growth in Westminster is likely to be due to the large presence of the retail industry (one of the SRN-dependent sectors) and Headquarters of organisations located in Central London.

Birmingham is predicted to have the highest growth in GVA demonstrating the importance of the Midlands as a growth area for manufacturing and logistics companies. Bradford, Kirklees, Leeds and Sheffield and are all in the top 15 locations demonstrating that this is a key area for growth in SRN dependent sectors. The appearance of London boroughs in this list indicates the economic strength of these areas and the relatively high proportion of SRN dependent sectors in their sector mix.

The SRN is vital to support business growth and spread of high value sectors that underpin improvements in productivity and spatial rebalancing of the economy. Productivity in key SRN sectors across large parts of the North is lower, reflecting lower value business activity. Peripherality, sector mix and distance from areas of high economic mass are key issues. However there is evidence of future productivity growth in the Midlands, Yorkshire and the North East suggesting the potential to rebalance the economy and reduce the productivity gap between these regions and the South.

Figure 4-7 shows the forecast change in productivity of SRN sensitive sectors across England. This shows a number of areas in the North and Midlands where productivity is forecast to grow at a faster rate than in the South. Notable areas are around Northampton, Solihull, Telford and South Derbyshire in the Midlands, and Selby and North Lincolnshire in the North. National infrastructure projects such as HS2 and predicted growth in Manchester Airport, Immingham, Tees and Liverpool Ports have the potential to drive productivity growth across the North. The SRN will need to support these expansion plans to drive economic growth in the North and sectoral and spatial rebalancing of the economy.

Figure 4-7 Change in Productivity in SRN Sensitive Sectors 2015-2030



Source: Atkins analysis of Cambridge Econometrics Economic forecast data

4.4.3. Summary

Growth in employment and GVA for SRN sensitive sectors is forecast to be strongest around areas that have good access to markets and international gateways. Businesses operating in these sectors tend to concentrate on key nodes on the SRN where they have good access to markets across the country, which is particularly evident in the industrial and logistics markets. Key growth areas are around the M25, particularly east to Dartford and Medway port; and the heart of England, north and west of London. The London – Bristol – Birmingham triangle is a high productivity area and an important location of future growth in SRN sensitive sectors.

The advanced manufacturing, aerospace and automotive sectors, together with specialised business clusters that are frequent users of the SRN, are key industries with strong growth dynamics where economic growth will be driven by gains in productivity. Particular hotspots are around Derby, Swindon, West Midlands and Sunderland, and port-related activity in Southampton, Portsmouth and Liverpool. Derby has a high concentration of businesses in advanced transport manufacturing (including rail, aerospace and automotive) and has particularly strong growth potential. Motorsport Valley also has a strong concentration of businesses in the advanced automotive sector with strong growth potential.

GVA and employment growth is predicted to strengthen in areas where it is currently strong, across London and the South East, and west of London. However, in contrast to growth across all sectors of the economy, there is a wider spread of growth in the SRN sensitive sectors. West Yorkshire, around Leeds and Sheffield; and the South West around Bristol, Wiltshire and Gloucestershire will be important growth areas for SRN dependent industries.

Future growth forecasts provide support for spatial rebalancing of the economy. A number of areas across the Midlands and the North have strong growth dynamics with productivity predicted to grow at a higher rate than the South. Future investment in the network targeted in the right locations could support productivity growth across regions with low productivity and help balance productivity growth across wider areas of the economy.

4.5. Economic Growth Areas

Table 4-7 provides a summary of important areas of economic growth identified through analysis of economic and population data. Each area represents a cluster where economic growth dynamics are strong and future growth will impact on the SRN. The table identifies key routes that could be identified by growth in each area. It does not aim to identify exact links or locations with specific congestion issues.

The SRN is integral to location decisions and the functioning of key business sectors that are dependent on the road network. It plays a critical role in serving and connecting urban agglomerations and international gateways. The above analysis shows that the SRN is largely in the right places to serve locations of high economic growth and is largely focused on the right corridors to serve future growth in sectors that are particularly dependent on the SRN. There are a number of primary users of the SRN – manufacturing and primary materials are examples – that are concentrated in locations for historical reasons or for access to raw materials and for specific needs of the manufacturing process. It is important the SRN serves the needs of these sectors to support their future growth.

The prevalence of congestion in each area suggests that traffic conditions on the network could be a constraint on economic growth. However, there are number of RIS1 schemes addressing congestion and capacity issues within important growth areas. The challenge is for the SRN to provide sufficient capacity and quality to support future economic growth.

The following table summarises findings from the preceding analysis. A key economic growth area is defined as having strong population and economic growth dynamics, proximity to international gateways and a high concentration of SRN dependent sectors. Congestion in these areas is indicative of the need for interventions to support economic growth. Highways England is already addressing issues on parts of the network identified through current or planned RIS1 investments. This could form the basis for directing more detailed future research into investigating the extent to which RIS1 and future RIS programmes support economic growth across the country.

Table 4-7 Key Economic Growth Areas

Key Growth Areas	Roads impacted	Population Growth – is it a high population growth area?	GVA and Employ-ment – Is it an area of strong economic growth?	SRN sensitive sectors – Is it a key location for SRN sensitive sectors?	International Gateway – is there a significant port or airport in or close to the area?	High Congestion / Delays – Is congestion an issue?	RIS 1 Scheme – Is a there a RIS1 scheme in the area?
Greater London and the South East: Routes radiating from London • East of London – Dartford, Medway • Surrey, Sussex, Kent to London • North of London	M25, A12, A13, M2 M20, M26, A21, M23, A23, M1	Yes	Yes	Yes	Yes	Yes	Yes
North and West of London: • Berkshire, Oxfordshire, Buckinghamshire	M4, M3, A404, A34, A303	Yes	Yes	Yes	Yes	Yes	Yes
Bristol, Swindon, Gloucester, Wiltshire	M5, M4, A417/ A419	Yes	Yes	Yes	Yes	Yes	No
Oxford–Cambridge arc – Luton, Milton Keynes, Peterborough	M40 A34, M1 A5, A41, A421 A428	Yes	Yes	Yes	Yes	Yes	Yes
Birmingham, Leicester, Derby, Nottingham and Coventry	M6 A6 A50 A42, A52, A46, A38	Yes	Yes	Yes	Yes	Yes	Yes
Manchester, Liverpool, Warrington, Leeds, Sheffield, York, West Yorkshire and Cheshire	M62, M621, M1, M58, M56, , M60, A5103, M6, A1, A64	Yes	Yes	Yes	Yes	Yes	Yes
Newcastle, Sunderland, Middlesbrough	A1, A19, A66, A69	No	Yes	Yes	Yes	Yes	Yes
Portsmouth and Southampton	A3, A34, M3, M27, M271	Yes	Yes	Yes	Yes	Yes	Yes
Cornwall - Devon	A38, A30, M5, A303	Yes	Yes	Yes	No	Yes	Yes

5. Conclusions

The SRN supports economic growth through four key mechanisms:

- Improving productivity, through improving efficiency, facilitating agglomeration economies and increasing competition;
- Increasing domestic and international trade;
- Facilitating investment by businesses and developers, as well as supporting inward investment; and
- Supporting employment growth through better access to employment opportunities.

The SRN is a key factor in location decisions of firms and workers and therefore plays a critical role in supporting the location of economic activity. The data and maps presented in this report indicate that the SRN is a key determinant in shaping the pattern of economic activity across the country – particularly for certain sectors. A primary purpose of the SRN is therefore to support these and related sectors and to tackle the barriers to growth caused by the transport system.

Urbanisation and growth in city regions are key drivers of population and economic growth. Analysis of employment density, business density and trends in the commercial property market support the focus on England's main city regions as the primary location for future growth. Current trends indicate that employers and employees increasingly prefer city centre locations for office-based activities. Market demand for office space is focused on large town and city centre locations, fuelled by knowledge based jobs clustering in central locations. Activity in the office sector is forecast to continue concentrating developments in urban areas, in particular city centre locations. The SRN has a limited role in supporting movement within city centres. However as jobs concentrate in city centres, the growth of wider city regions means that the SRN plays a key role in connecting different parts of the city region, for both business and commuting trips. There is also a strong interdependency between the SRN and the local road network in reinforcing the roles of each in supporting economic growth.

Future employment growth will be concentrated in and around core cities and other growing centres. The top 15 districts are forecast to contain 25% of total employment and GVA growth across England, indicating a concentration of economic activity in key locations. This shows a strong relationship between employment density and the SRN, including routes radiating from the M25, M1, M6 and M42 in the Midlands, M5 in the West, the M62 belt connecting major cities in the Northern Powerhouse, and A1 and A19 in the North East. London and the South East are the most prosperous regions in England and are forecast to be the highest growth areas in terms of economic contribution.

Economic data indicates a strong relationship between productivity and international connectivity. GVA and productivity growth is forecast to be highest where there are high value industries and business sectors that benefit from international connectivity, good access to the major domestic markets and specialised business clusters. High growth is predicted where high value business clusters in logistics, advanced manufacturing and aerospace are located. The corridors radiating north, west and east from the M25 benefit from close proximity to the country's main airports and ports, and access to highly skilled labour. Economic forecasts indicate these areas will continue to generate productivity and employment growth in the future and are therefore important for future economic growth.

The SRN is vital to support business growth and spread of high value sectors that underpin improvements in productivity and spatial rebalancing of the economy. Productivity in key SRN sectors across large parts of the North of England is lower, reflecting lower value business activity. Peripherality, sector mix, and distance from areas of high economic mass are key issues. However there is evidence of future productivity growth in the Midlands and the North, suggesting the potential to rebalance the economy and reduce the productivity gap between these regions and the South.

Illustrative scenarios of future economic growth support recent Government initiatives aimed at encouraging the spatial rebalancing of the economy. A number of areas across the Midlands and the North have strong growth dynamics with productivity predicted to grow at a higher rate than in the South. Future investment in the network targeted in the right locations could potentially support

productivity growth across regions with low productivity and help balance productivity growth across wider areas of the economy.

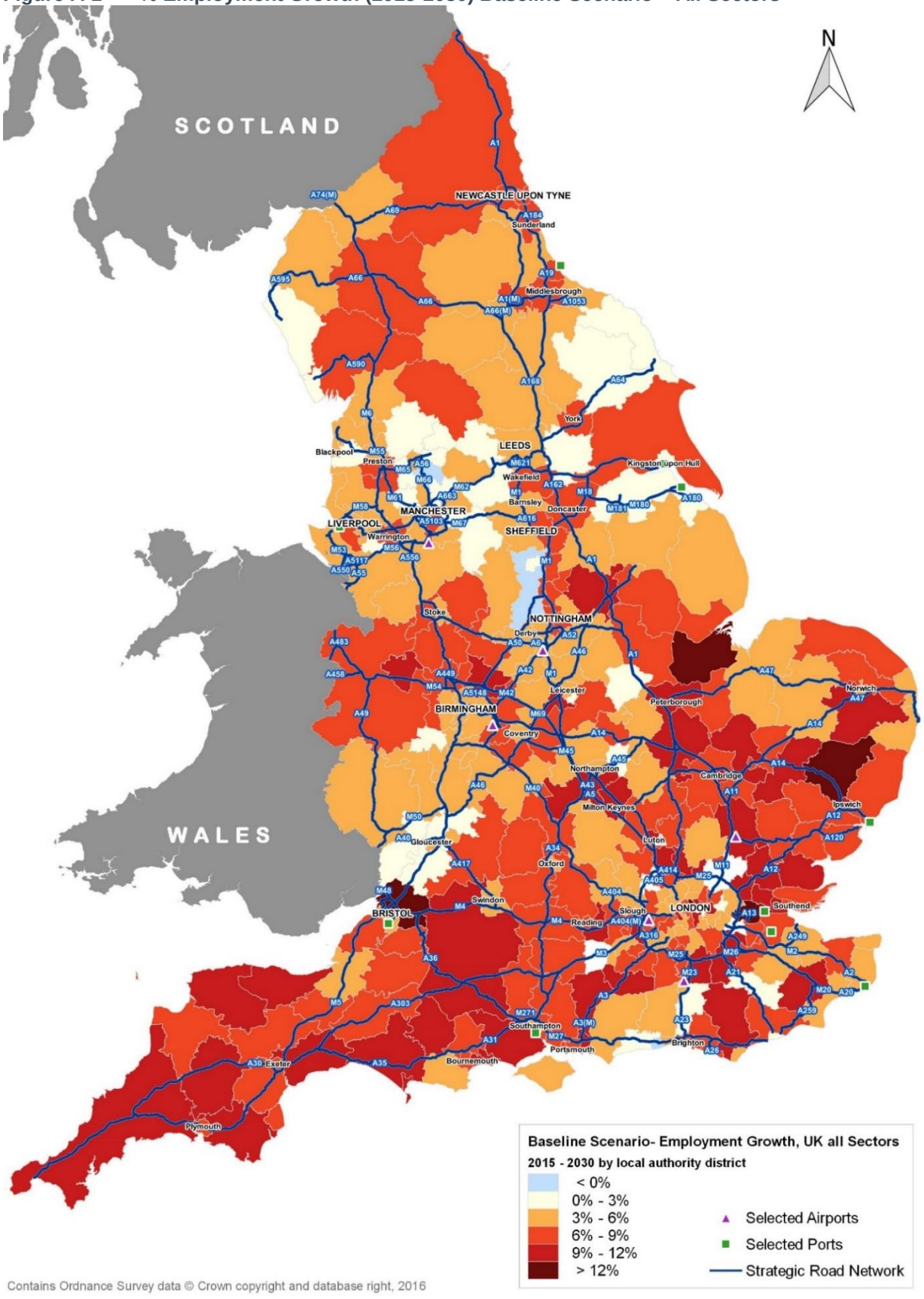
Economic forecasts for sectors dependent on the SRN show that concentrations of growth are clustered around the SRN and international gateways. A notable pattern of future growth in SRN dependent sectors is that key growth locations are not concentred within core cities *themselves* but are located *around* them. This reflects the locational advantages of having access to and being able to serve a range of markets. It demonstrates the importance of the network in providing high quality transport connectivity with centres of economic mass and ports and airports to the functioning of these sectors.

There are signs of growth spreading across a wider area around major urban agglomerations, particularly across the South, where employment growth is strong along the Bristol to London corridor. There are a number of reasons for this spread of economic activity and although these can be location-specific there are some common features. These include continued growth where economic dynamics are positive and supported by market forces; increased local specialisation and clustering of economic activity outside of the core cities but where there are locational advantages of being in proximity to international gateways and high quality transport links; and spillover benefits of agglomeration through connectivity with centres of high economic mass and access to a large pool of skilled labour.

Analyses of economic growth forecasts demonstrate that the SRN is largely focused on the right corridors to serve future growth across England. Future investment should be focused on providing efficient connectivity between key growth clusters of urban agglomerations and connectivity between city regions to support economic growth. Growth in employment and GVA in peripheral regions would be enhanced by effective connections that reduce effective distance with urban agglomerations, improve access to international gateways and reduce journey times for tourists and leisure travellers.

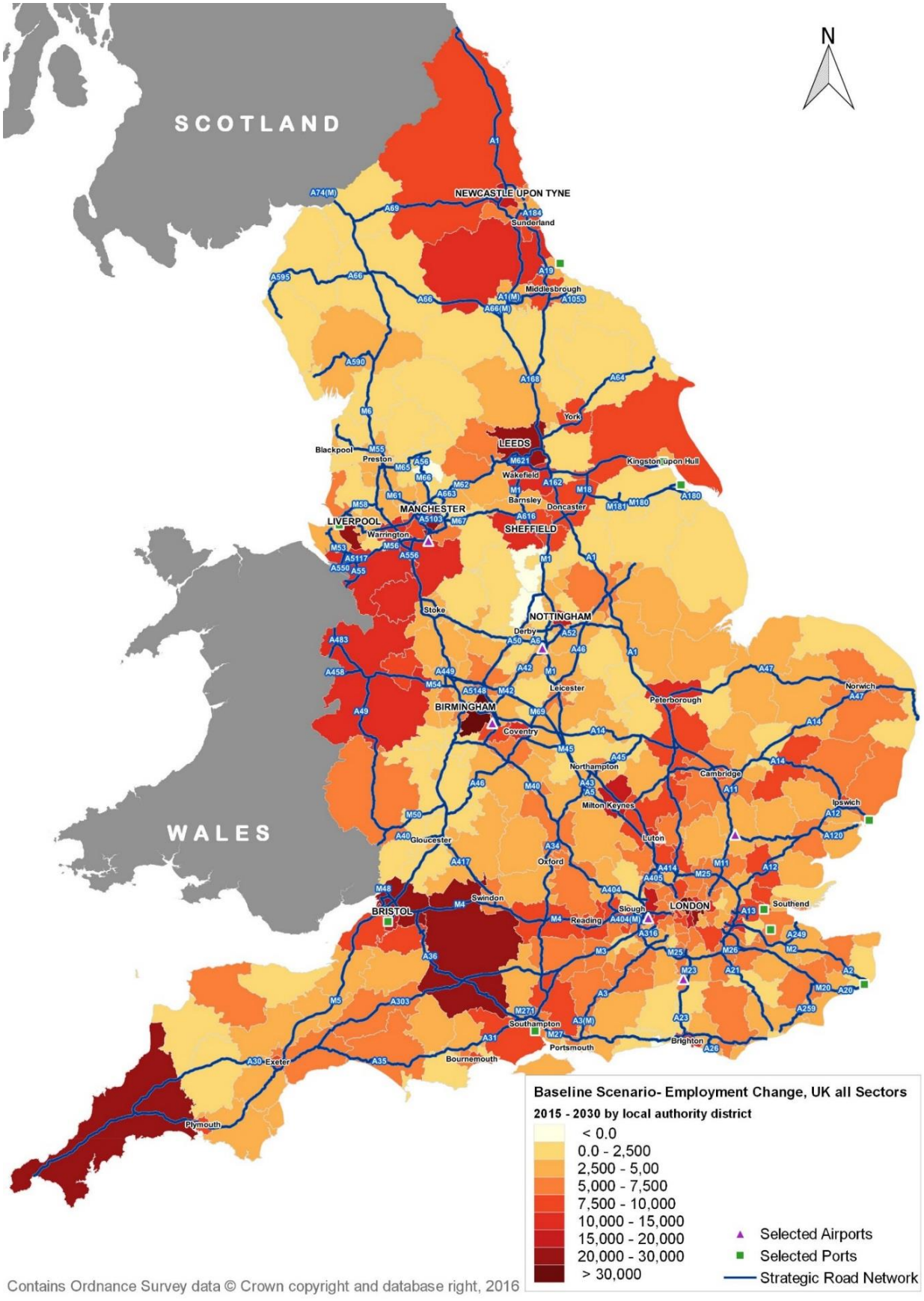
Appendix A. Growth Forecast Maps

Figure A-1 % Employment Growth (2015-2030) Baseline Scenario – All Sectors



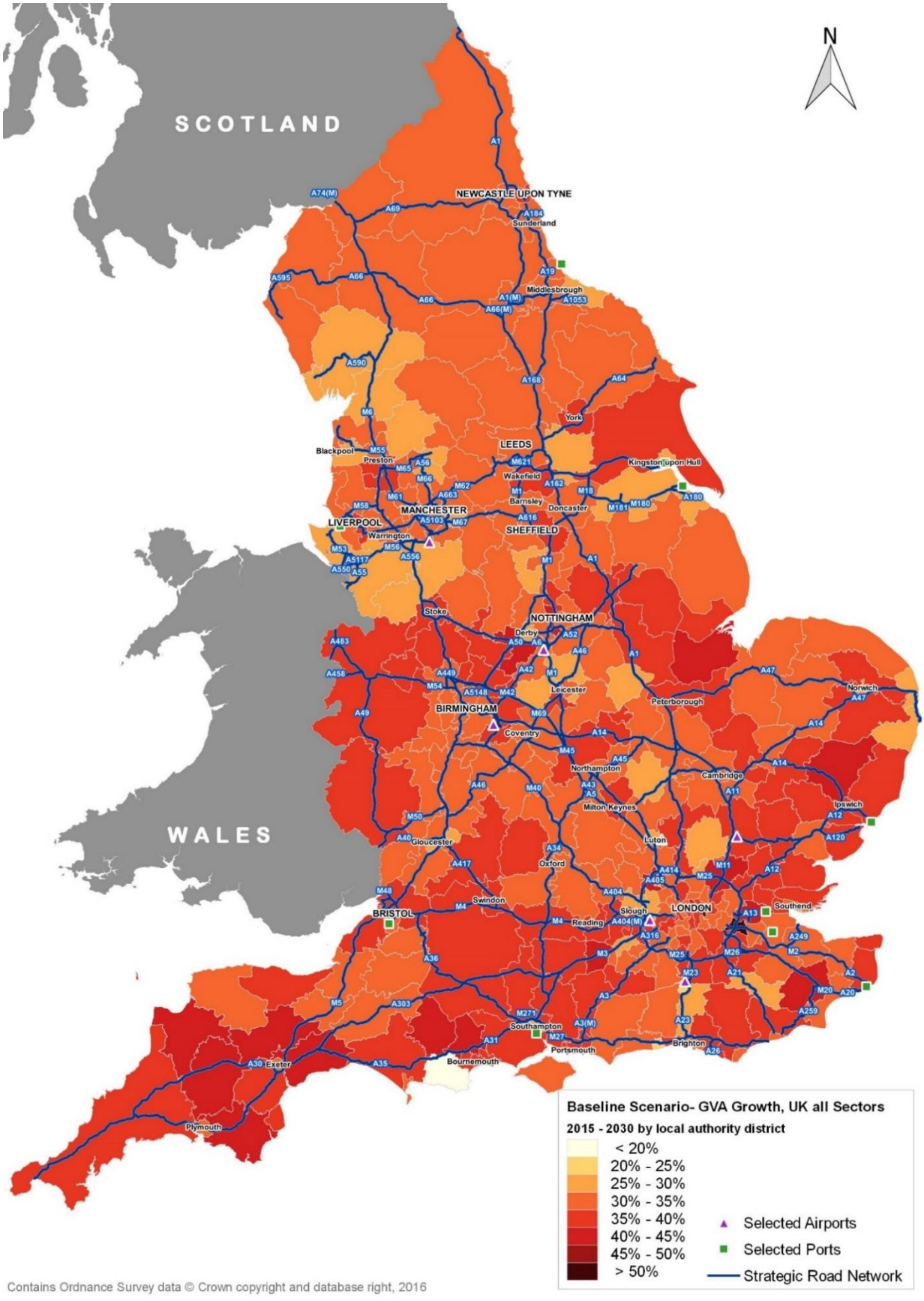
Source: Atkins analysis of Cambridge Econometrics Economic forecast data

Figure A-2 Employment Growth (2015-2030) Baseline Scenario- All Sectors



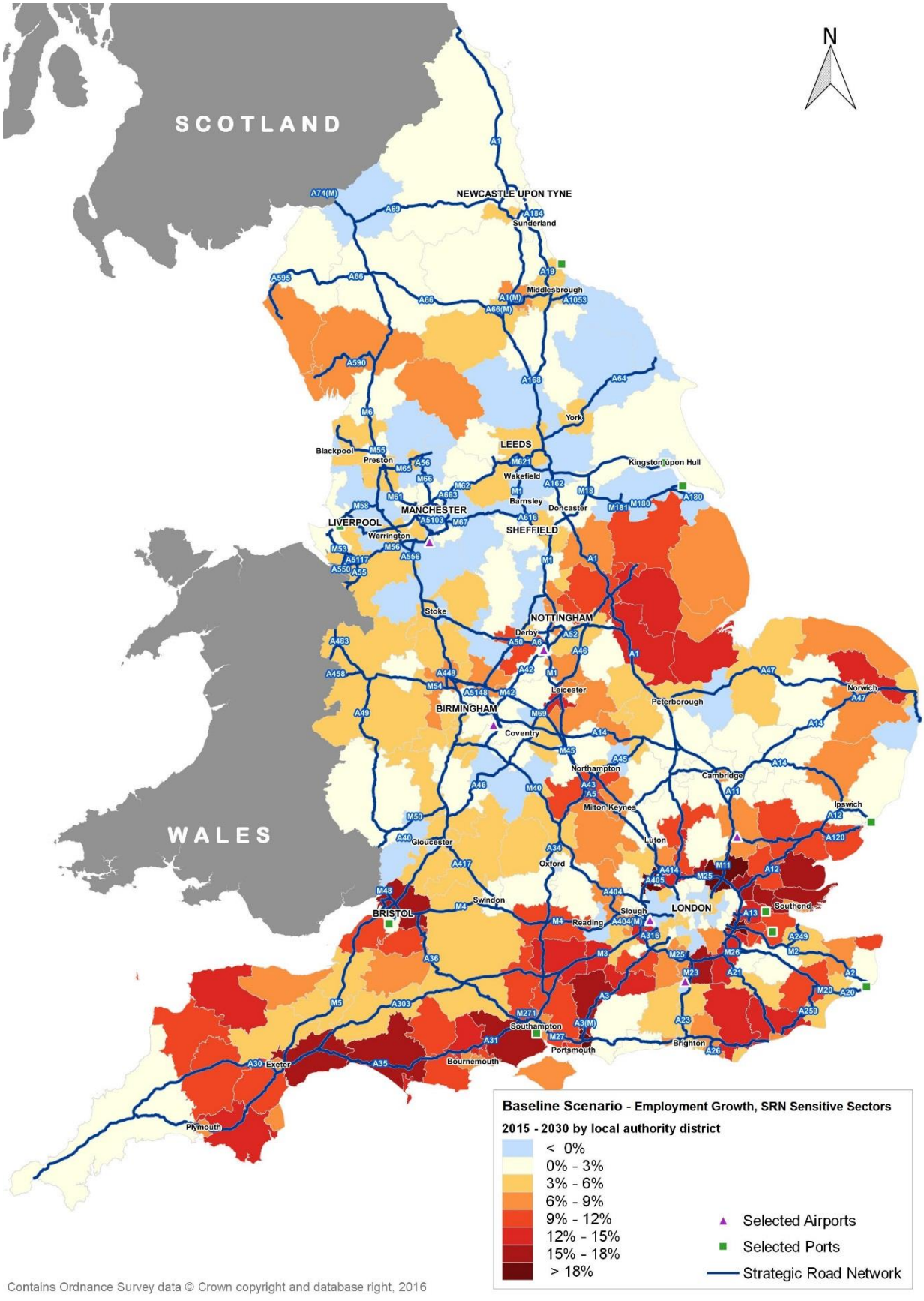
Source: Atkins analysis of Cambridge Econometrics Economic forecast data

Figure A-3 % GVA Growth (2015-2030) – All Sectors



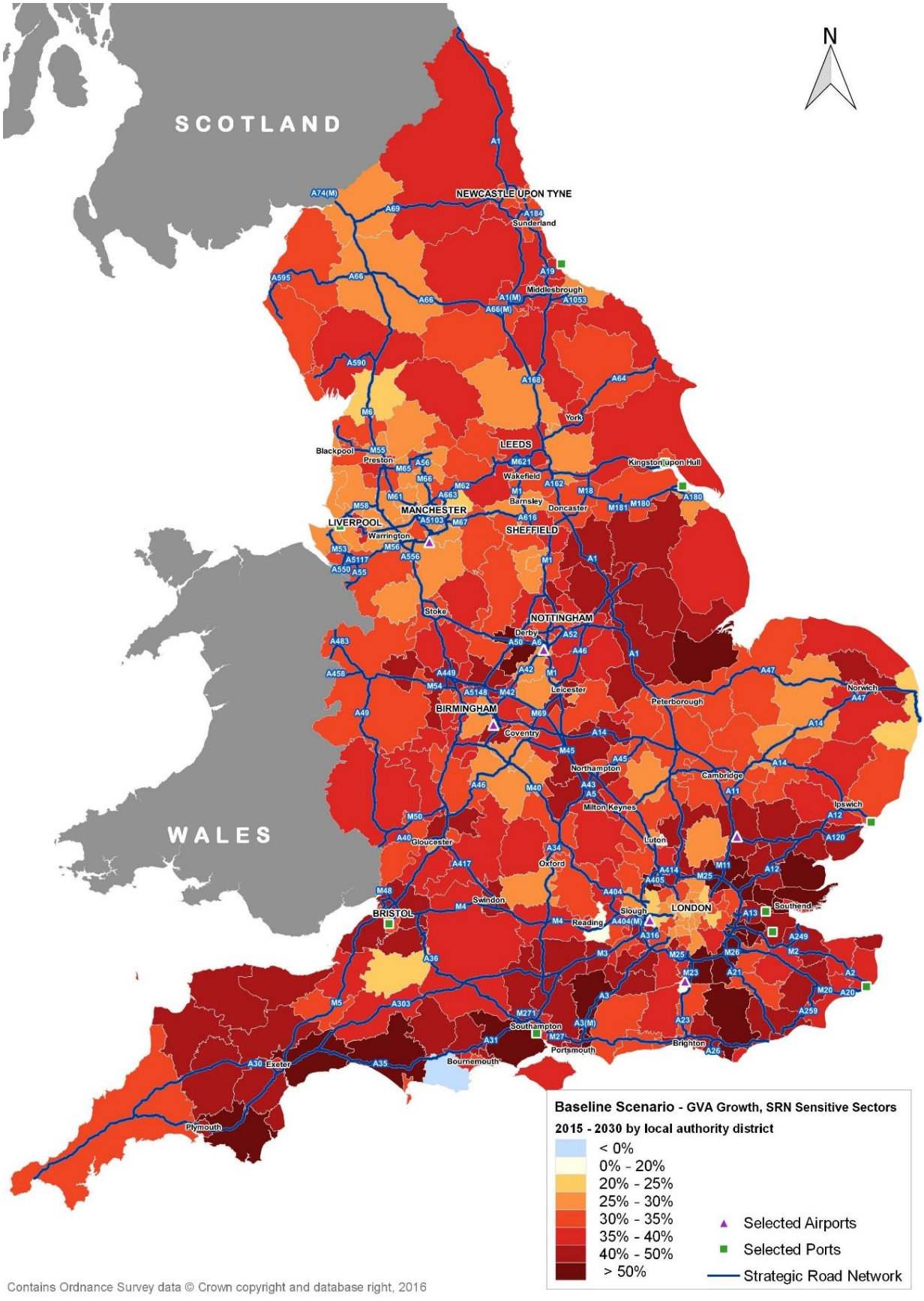
Source: Atkins analysis of Cambridge Econometrics Economic forecast data

Figure A-4 % Employment Growth (2015-2030) – SRN Sensitive Sectors



Source: Cambridge Econometrics Economic Forecasts 2016

Figure A-5 % GVA Growth (2015-2030) – SRN Sensitive Sectors



Source: Cambridge Econometrics Economic Forecasts 2016

Appendix B. SRN Dependent Sectors

Category	SIC07 Sector(s)
Land transport	49 Land transport
Warehousing and storage	52.1 Warehousing and storage
Support activities for transportation	52.2 Support activities for transportation
Postal and courier activities	53 Postal and courier activities
Retail & wholesale trade	45 Wholesale And Retail Trade And Repair Of Motor Vehicles And Motorcycles
	46 Wholesale Trade, Except Of Motor Vehicles And Motorcycles
	47 Retail Trade, Except Of Motor Vehicles And Motorcycles
Primary materials	05 Mining of coal and lignite
	06 Extraction of crude petroleum and natural gas
	07 Mining of metal ores
	08 Other mining and quarrying
	09 Mining support service activities
Manufacturing – users of transport services	10 Manufacture of food products
	11 Manufacture of beverages
	12 Manufacture of tobacco products
	16 Manufacture of wood and of products of wood and cork
	17 Manufacture of paper and paper products
	22 Manufacture of rubber and plastic products
	23 Manufacture of other non-metallic mineral products
Manufacturing – reliant on other sectors which are users of transport services	29 Manufacture of motor vehicles, trailers and semi-trailers
Business services	58 Publishing activities
	59 Motion picture, video and television programme production, sound recording and music publishing activities
	60 Programming and broadcasting activities
	61 Telecommunications
	62 Computer programming, consultancy and related activities
	63 Information service activities
	64 Financial service activities, except insurance and pension funding
	65 Insurance, reinsurance and pension funding, except compulsory social security

Category	SIC07 Sector(s)
	66 Activities auxiliary to financial services and insurance activities
	68 Real estate activities
	69 Legal and accounting activities
	70 Activities of head offices; management consultancy activities
	71 Architectural and engineering activities
	72 Scientific research and development
	73 Advertising and market research
	74 Other professional, scientific and technical activities
	75 Veterinary activities
	77 Rental and leasing activities
	78 Employment activities
	79 Travel agency, tour operator and other reservation service and related activities
	80 Security and investigation activities
	81 Services to buildings and landscape activities
	82 Office administrative, office support and other business support activities
Construction	41 Construction of buildings
	42 Civil engineering
	43 Specialised construction activities

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Atkins contact

Richard Coburn
Atkins
Euston Tower
286 Euston Road
London
NW1 3AT

Email: richard.coburn@atkinsacuity.com
Tel: +44 (0)20 7121 2374
Tel: +44 (0)7803 609059