Transport East

REGIONAL EVIDENCE BASE

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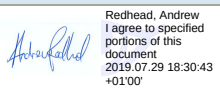
Signature				
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EXECUTIVE SUMMARY

Transport East is a Sub-National Transport Forum covering Essex, Norfolk, Suffolk, Southend-on-Sea and Thurrock. The Transport East economy plays an important role in the overall success of the UK economy. The region is a major global gateway, containing major ports (Tilbury, DP World London Gateway, Felixstowe and Harwich) and international airports (Stansted, Southend-on-Sea and Norwich) providing direct freight and passenger access to international destinations.

The Transport East region is home to some of the fastest growing places in the UK. This multi-centred growth is focused across a relatively small number of primary economic centres, supplemented by a large number of small and medium sized towns and rural communities that define the spatial geography of the region.

The Transport East region benefits from almost 500 miles of coastline, home to leading centres of green energy production and an important focus of the visitor economy. Energised coastal communities such as Lowestoft, Great Yarmouth and tourist centres including Southend-on-Sea are important centres for the energy and tourist economy that along with the wider surrounding rural locations support the growing tourism offer.

The Transport East region is home to some 3.5 million people, with a further 516,000 residents forecast to live in the area by 2041. Growth on such a substantial scale is reflective of the region's economic and quality of life strengths, as well as the region's strong connectivity, including links to London, the Midlands and Cambridgeshire. In addition to this the region benefits from its own diverse economic strengths in manufacturing ICT, Agri-tech, biosciences, green energy production, financial industries and the visitor economy.

To support the continued growth and success of the Transport East economy requires investment in strategic transport infrastructure to enable efficient and reliable movements across the region from its international gateways and between its primary economic centres, numerous small and medium sized towns, coastal communities and rural villages and to the surrounding regions. A resilient and reliable strategic transport network will enable more people to live, work and enjoy the Transport East region and benefit from the proximity to global economic centres of London and Cambridge.

A reliable and resilient transport network unlocks opportunities for multi-centred strategic housing and employment growth, connects businesses with regional and international markets, encourages inward investment and improves the quality of life of local residents.

Transport East will be developing a Transport Strategy to 2050 for the East of England, setting out its vision, objectives, infrastructure schemes and outcomes linked to the delivery of economic and housing growth. The first phase is the development of a Regional Evidence Base.

This Regional Evidence Base has been produced to inform the development of the Transport East Transport Strategy by providing an overview of the existing and future challenges and opportunities for strategic transport infrastructure investment across the Transport East region. It draws on existing plans, strategies and data along with identifying the opportunities arising from future transport trends including wider potential social, economic, environmental and legislative changes.

This report presents an overview of the region today, future growth patterns and the existing and future strategic transport infrastructure problems and opportunities to support growth. This Regional Evidence Base has been produced by WSP based upon an analysis of available evidence provided by local authorities, Highways England, the Department for Transport and publicly available data sources within the region.

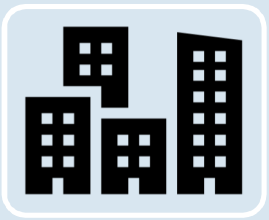
KEY FINDINGS FROM THE REGIONAL EVIDENCE BASE

The People

- 3.5 million live in the region, of which 33% live in rural locations.
- The population of the region has grown by 7.6% between 2001 and 2011 and is forecast to grow by 516,000 by 2041.
- Education attainment is broadly aligned with the national average.
- There are high levels of socio-economic deprivation within coastal communities.

The Place

- There are approximately 1.54 million dwellings in the region.
- The number of dwellings in the region has increased by 5% between 2009 and 2017 and represents an average annual delivery of 8,784 homes.
- Average house prices are 20% higher than the national average and nine times the average salary of workers in the region.



The Economy

- The region has a diverse economic base.
- The unemployment rate in the region is low at 3.7%.
- Job growth in the region is slightly below the national average.
- The region has a Gross Value Added (GVA) of 73.5 billion. This has grown by 28% between 2006 and 2015.

The Transport Network

- There are fifteen strategic road and rail corridors in the region.
- The region has 81.7 km of motorways and 589.1 km of dual carriageway A roads.
- The majority of residents in the region commute by car/van (67%). Only 12% travel by public transport.
- The average distance traveled to work is 14.2 km.

1 INTRODUCTION

1.1 BACKGROUND

1.1.1. WSP has been commissioned by Transport East to produce a Regional Evidence Base (REB) for their region. The purpose of the REB is to:

- Provide a summary of the existing regional social, economic and environmental context including the constraints and opportunities that influence the use, function and future requirements of the strategic transport network;
- Demonstrate the transport needs of the regions international gateways, multi-centred growth locations and coastal communities;
- Provide an overview of the function and performance of the strategic transport network including the strategic and major road network and rail corridors vital for economic activity;
- Identify key planned housing and employment growth along with key development areas;
- Understand the planned transport improvements across the region; and
- Review future transport trends to provide a summary of key trajectories of change and potential social, economic, environmental and legislative impacts.

1.1.2. The REB will facilitate informed dialogue with key stakeholders including Highways England, Network Rail and Central Government as well as support the identification of transport investment priorities including schemes on the Major Road Network (MRN).

1.1.3. This report provides a summary of the key findings from the evidence base research. It draws together baseline and future growth evidence gathered from various data sources which are referenced throughout the report.

1.2 TRANSPORT EAST REGION

1.2.1. The Transport East region is formed of three counties (Norfolk, Suffolk and Essex) and two unitary authorities (Southend-on-Sea and Thurrock). Norfolk, Suffolk, Essex have two tiers of local governance and each county is divided into number of districts and boroughs. Essex has the largest number of districts (12), followed by Norfolk (7) and Suffolk (5). Southend-On-Sea and Thurrock are unitary authorities with single tiers of local governance responsible for all local government functions within their administrative areas.[1]

[1] Suffolk Coastal and Waveney have recently joined together to form East Suffolk District Council and Forrest Heath and St Edmundsbury have joined together to form West Suffolk District Council. Combined datasets for these new Local Authorities are not currently available. As such this REB refers to the previous geographies of these new Local Authorities when discussing socio-economic trends.

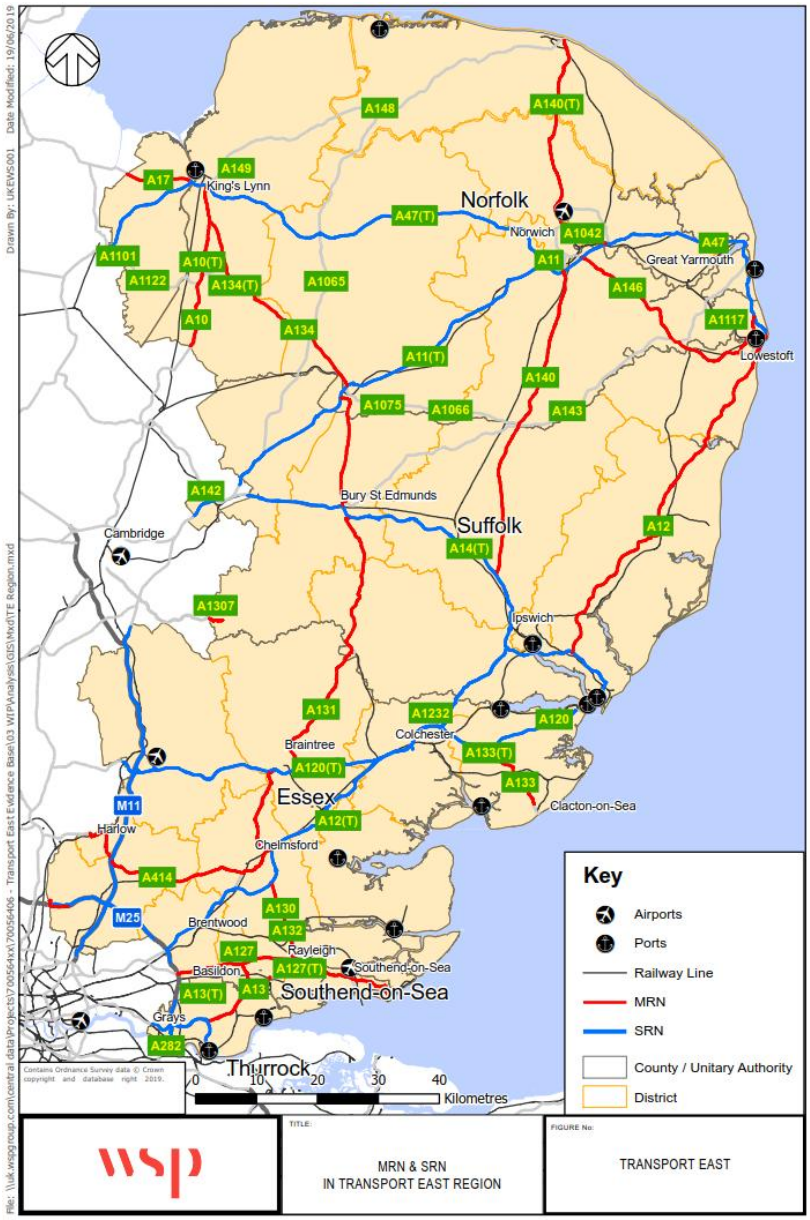
1.2.2. The Transport East region is comprised of two cities and 76 towns, of which the largest concentration of towns is within Essex. The two cities in the region, Norwich and Chelmsford, and along with the historic county town of Ipswich, all have strong rail and road connections to neighbouring towns and cities in the area as well as to other major settlements within the wider south-eastern region.

1.2.3. Two Local Enterprise Partnerships cover the Transport East region, these are:

- New Anglia (Norfolk and Suffolk); and
- South East (East Sussex, Essex, Kent, Medway, Southend-on-Sea and Thurrock).

1.2.4. A plan showing the extent of the Transport East region, including the Strategic Road Network (SRN) and MRN is provided in Figure 1-1 below.

Figure 1-1 – Transport East Region



1.3 MAJOR ROAD NETWORK

1.3.1. A central focus of this REB is to provide a strategic overview of the operation and function of the MRN in the Transport East region. The MRN is a proposed middle tier road network comprised of the country's busiest and most economically important local authority 'A' roads that sits between the SRN and the local road network. The objectives of the MRN are to[2]:

- Reduce congestion
- Support economic growth and rebalancing
- Support housing growth
- Support all road users
- Support the Strategic Road Network

1.3.2. The DfT Guidance on Major Road Network and Large Local Majors (LLM) Programme requires a REB to be produced that facilitates the long-term strategic approach to transport investment needs on the MRN in the region. The REB should provide a strategic overview of the MRN, key housing and employment developments, and problems on the network that need to be solved. The DfT REB minimum expectations are covered within this REB. The DfT also requires an output of the REB to be a list of the top ten priority MRN investments in the Transport East region for the period 2020 to 2025[3]. An appraisal of the Transport East regions MRN schemes is being undertaken and will be submitted alongside this REB.

1.3.3. Whilst this REB will present a strategic overview of the MRN in the Transport East region, the investment case for MRN and LLM schemes will be based on the evidence of individual schemes business cases which are at various stages of development.

1.3.4. An indicative map of the MRN was created by the DfT for the 2017 consultation. The MRN network within the Transport East region is shown in Figure 1-1 above.

1.4 PURPOSE OF THIS REPORT

1.4.1. The purpose of this REB is to provide a summary of the key baseline data gathered from various sources and present the findings to form an evidence base to inform the development of the Transport East Transport Strategy and inform the prioritisation of MRN improvement schemes across the region.

[2] Proposal for the Creation of a Major Road Network: Consultation, 2017, DfT
[3] Investment Planning Guidance: For the Major Road Network and Large Local Major Programmes, 2018, DfT

1.5 REPORT STRUCTURE

1.5.1. The remainder of this REB summary report is structured as follows:

- Section 2 sets out the Vision, Priorities and Objectives of Transport East.
- Section 3 provides the policy context of the study and includes an overview of relevant national, regional and local policies.
- Section 4 provides an overview of the socio-economic regional context and strategic transport network in the Transport East region.
- Section 5 identifies transport issues and opportunities in the Transport East region, in the context of fifteen strategic transport corridors.
- Section 6 sets out the importance of the strategic transport corridors in the Transport East region in providing access to Global Gateways.
- Section 7 provides an overview of how the strategic transport corridors will support multi-centred growth planned in the Transport East region.
- Section 8 sets out how new investment in sustainable energy and visitor economies are helping to create energised coastal communities and the role strategic transport corridors can help support these communities.
- Section 9 sets out the case for strategic infrastructure investment in the Transport East region.
- Section 10 provides a summary of the key future transport trends and potential changing social, economic, environmental and legal changes.
- Section 11 concludes by drawing together the findings of the REB.

2 VISION, PRIORITIES AND OBJECTIVES

2.1 OVERVIEW

2.1.1. To guide the development of Transport East and its emerging Transport Strategy, the following vision statement, strategic priorities and objectives have been developed.

2.2 VISION

2.2.1. The Transport East vision is:

"A thriving economy for the East, with fast, reliable and resilient transport infrastructure driving forward a future of inclusive and sustainable growth for decades to come. "

2.2.2. Over the next 30 years, Transport East want to transform their transport connections to help drive long term economic growth. With fast, reliable and resilient transport infrastructure, Transport East can unlock the opportunities to create a thriving, inclusive and sustainable economy.

2.2.3. To achieve this vision Transport East are developing their Transport Strategy for the region which will set out their ambitions and priority areas for improved connectivity to achieve this vision. During this process Transport East will be engaging with key partners including the DfT, Highways England, Network Rail, transport service and hub operators and local authorities. The Transport Strategy will build upon existing strategic and corridor studies and provides the opportunity to shape the future strategic transport network to support economic growth across the region.

2.2.4. This REB summary provides the initial evidence base to identify the strategic transport and growth challenges and opportunities for the region.

2.3 PRIORITIES

2.3.1. Transport East has identified three key themes that together define the regions unique geography and provide an overarching set of priorities for the region:

Global Gateways: Better connected ports and airports to help UK businesses thrive and boost the nation's economy through greater access to international markets and facilitates Foreign Direct Investment.

Multi-Centred Connectivity: Enhanced links between our fastest growing places and business clusters; enabling the area to function as a coherent economy and improving productivity.

Energised Coastal Communities: A reinvented, sustainable coast for the 21st Century which delivers on our ambition to become the UK's foremost all-energy coast, as well a competitive visitor offer.

2.4 OBJECTIVES

2.4.1. In order to achieve the three priorities, Transport East role will be to:

Connect people and communities: Creating faster, more reliable and resilient, and better connected transport infrastructure both within, and out of our region.

Connect industry and business: Supporting commerce by improving national and international connections into, out of and across the region.

Moving goods: Improving connectivity between our ports and airports to enable freight, goods and people to move more efficiently.

3 POLICY CONTEXT

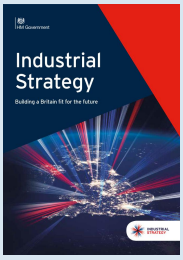
3.1 OVERVIEW

3.1.1. This chapter summarises the main national and regional policies relevant to the Transport East region. It comprises:

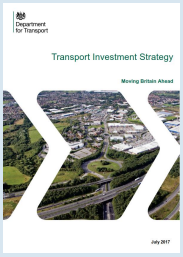
- National plans (e.g. the Industrial Strategy);
- Emerging plans of Sub-National Transport Bodies;
- Regional plans (e.g. New Anglia Local Enterprise Partnership's Norfolk and Suffolk Economic Strategy, and Integrated Transport Strategy for Norfolk and Suffolk, the Joint Strategic Plan for South Essex and Statement of Common Ground prepared by South Essex Councils);
- County Council and Unitary Local Transport Strategies;
- Local Planning Policy.

3.2 NATIONAL POLICY

UK GOVERNMENT INDUSTRIAL STRATEGY

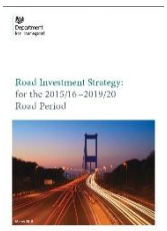
Document	Title	Relevance
	HM Government Industrial Strategy 2017	Five foundations and policies will allow for a transformed economy to be realised: - Ideas: the world's most innovative economy - People: good jobs and greater earning power for all; - Infrastructure – supporting electric vehicles through £400m charging infrastructure investment and an extra £100m to extend the plug-in car grant - Business environment: the best place to start and grow a business; and Places – create a Transforming Cities fund that will provide £1.7bn for intra-city transport. In the 'Future of Mobility' section of the White Paper, four early priorities have been identified to enable the UK to become a world leader in shaping mobility: - We will establish a flexible regulatory framework to encourage new modes of transport and new business models – the Government wants to see fully self-driving cars on UK roads by 2021. - We will seize the opportunities and address the challenges of moving from hydrocarbon to zero emission vehicles – the addition of a new £400m Charging Infrastructure Investment Fund and R&D funding for new charging technologies including on-street wireless projects. - We will prepare for a future of new mobility services, increased autonomy, journey-sharing and a blurring of the distinctions between private and public transport. We will explore ways to use data to accelerate development of new mobility services and enable the more effective operation of our transport system.

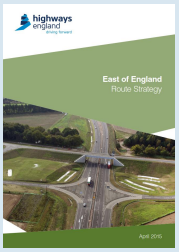
DEPARTMENT FOR TRANSPORT

Document	Title	Relevance
	DfT Transport Investment Strategy	DfT identifies that high performing infrastructure can enable the delivery of the Industrial Strategy and by maintaining and upgrading our transport infrastructure, communities can be connected, so growth can be delivered across the country. Through transport investment, DfT seeks to: ¡ Create a more reliable, less congested, and better-connected transport network; ¡ Build a stronger, more balanced economy by enhancing productivity and responding to local growth priorities; ¡ Enhance our global competitiveness by making Britain a more attractive place to trade and invest; and ¡ Support the creation of new housing. Overcoming the challenges to meeting the priorities for the future of transport can be done by improving the condition and performance of the existing network, expanding existing capacity to ease congestion and enhancing connectivity by adding new capability. Research, innovation and technology can enable improvements in how investment in infrastructure is made and make journeys better for the travelling public. Technology can also deliver more sustainable transport, by better managing demand and being responsive to needs of users.

HIGHWAYS ENGLAND

3.2.1. Highways England are responsible for the SRN within the Transport East region. The main corridors include: the A47 in Norfolk, A11 across Norfolk and Suffolk, A14 in Suffolk, A12 across Suffolk and Essex, the A120 and M11 through Essex; and the A13 and A1089 in Thurrock.

Document	Title	Relevance
	Strategic Business Plan 2015-2020	The Highways England Strategic Business Plan commits the organisation to improving the capacity and performance of the network by: ¡ Modernising the network including new Expressways, environmental improvements and facilities for pedestrians and cyclists; ¡ Maintaining the network including upgrading junctions, alleviating bottlenecks, resurfacing and minimising disruption; and ¡ Operating the network including improving information provision, better planning of roadworks and responding more effectively to incidents. The Highways England Strategic Business Plan commits to: ¡ Support Economic Growth through a modern and reliable network; ¡ Safe and Serviceable Network; ¡ More Free Flowing Network routine delays are more infrequent; ¡ Improved Environment and reduced impact on communities; and ¡ More Accessible and Integrated Network encourage modal choice and safe movement.
	Road Investment Strategy: for the 2015-2019/20 Road Period	Sets out the Government's strategic vision and investment strategy for the SRN in England for the period 2015 to 2020. Relevant to this study the RIS 1 includes the following schemes: ¡ A47 North Tuddenham to Easton; ¡ A47 & A12 junction enhancements; ¡ A47 / A11 Thickthorn junction; ¡ A47 Acle Straight measures; ¡ A12 Chelmsford to A120 widening; ¡ A12 whole-route technology upgrade; and ¡ M11 Junction 7 upgrade.

Document	Title	Relevance
		Schemes in the next Road Period are: ¡ A12 Colchester bypass ¡ A12 M25 to Chelmsford
	East of England Route Strategy (April 2015)	Sets out Highways England's the strategic network route, within the East. The routes link key urban centres across East Anglia and serve the ports of Harwich, Lowestoft and Great Yarmouth. A number of schemes are identified to improve the operation, safety, conditions, capacity and environment along the routes to ensure that they are suitable for future needs. The major schemes include: ¡ 2020 completion – A47 North Tuddenham to Easton, A47 Blofield to North Burlingham dualling, A47 Acle Straight, A47 junction enhancements and A47/A11 Thickthorn junction; ¡ 2019/20 completion – A12 whole route technology upgrade ¡ Road Period 2 – A12 Colchester bypass and A12 M25 to Chelmsford

3.2.2. Highways England are committed to modernising the SRN to support economic growth, improve safety, reliability, the environment, connectivity and modal choice. Within the study area the RIS1 has delivered and commits to a number of schemes that will improve the network operation.

NETWORK RAIL

Document	Title	Relevance
	Anglia Route Study (March 2016)	The Anglia Route Study (ARS) Area covers five key corridors through Greater London, Essex, Cambridgeshire, Suffolk and Norfolk the ports at DP World London Gateway and Felixstowe. The key corridors and their main improvements are: ¡ The Great Eastern Main Line runs between London Liverpool Street and Norwich – improvements to signalling to allow more trains to run between Chelmsford and Stratford, a passing loop north of Witham, the doubling of Trowse Bridge and level crossing closures; ¡ The Cross-Country corridor via Ely supports a nationally important freight route between the Port of Felixstowe – Felixstowe branch capacity enhancements, improvements to signalling to allow more trains to run at Ely and Bury St Edmunds and the doubling of Haughley Junction; ¡ The West Anglia Mainline runs between London Liverpool Street and King's Lynn – longer trains on peak services and line speed improvements; ¡ The Orbital routes – improvements to signalling to allow more trains to run; and The Essex Thameside route – longer trains on peak services and train lengthening. A focus is on journey time improvements for passengers and this can be supported through the Digital Railway programme, which uses technology to manage the railway. The ARS has identified where technology can support more trains and faster journeys; there are opportunities on the Great Eastern Main Line and Cross-Country corridors.
	Freight Network Study (April 2017)	The Freight Network Study (FNS) sets out the rail industry's priorities for enhancing the rail freight network to ensure its future longevity. The study focuses on two main priorities: ¡ Increasing the future capacity of the network – to enable more trains to operate; and ¡ Enhancing its capability – to make more efficient use of the rail freight network. The FNS has developed a series of high priority short term options for investment to ensure the future of the network: ¡ Felixstowe to West Midlands and the North corridor capacity enhancements; ¡ Cross-London (including Essex Thameside) capacity enhancements;

Document	Title	Relevance
		¡ West Coast Main Line double tracking and station area capacity improvements; and ¡ Southampton to West Midlands & West Coast Main Line split level junction improvements. Other improvements could include the use of nodal yards as freight hubs to increase flow across the network and the Digital Railway programme to make more efficient use of the network.

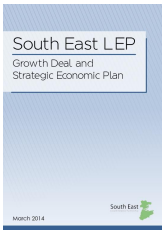
3.3 SUB-NATIONAL POLICY

3.3.1. At a sub-national level there are a number of stakeholders who are working to promote and deliver improved strategic transport infrastructure within the study area and across the wider central belt including:

- New Anglia Local Enterprise Partnership's (NALEP);
- South East Local Enterprise Partnership (SELEP);
- England's Economic Heartland (EEH) who border Transport East; and
- Greater Essex Growth and Infrastructure Framework.

Organisation	Document	Title	Relevance
New Anglia Local Enterprise Partnership		Norfolk and Suffolk Economic Strategy (November 2017)[4]	NALEP's strategy is to generate growth across all sectors, focusing on creating high value, highly skilled jobs and industries. The ambitions for Norfolk and Suffolk are to be: ¡ The place where high growth businesses with aspirations choose to be; ¡ A well-connected place – investment in housing, roads, rail and broadband is coordinated; ¡ A high performing, productive economy – where businesses have invested in new skills, techniques and innovation; ¡ An international facing economy with high value exports; ¡ An inclusive economy with a highly skilled workforce; ¡ A centre for the UKs clean energy sector; and ¡ A place with a clear, ambitious offer to the world – that will drive GVA, businesses and job growth.
		Integrated Transport Strategy for Norfolk and Suffolk (May 2018	The strategy is to provide the foundations for an integrated, total transport solution which serves a growing economy, that links people and provides for the future. It sets out how the transport network can help to continue to make Norfolk and Suffolk a great place to trade, live, work, visit and learn. The strategy looks ahead to 2040 and sets the following key transport themes to be achieved by 2040: ¡ Connecting the East, accessing the world – quicker, more reliable and resilient strategic connections to boost the contribution to the UK;

[4] Norfolk County Council and Suffolk County Council also preparing strategic planning frameworks for the period up to 2036. In March 2018 Norfolk County Council published their Shared Spatial Objectives for a Growing County and Emerging Statement of Common Ground and in May 2019 Suffolk County Council published their updated Suffolk's Framework for Growth.

Organisation	Document	Title	Relevance
			¡ Agile to Change – embracing new technologies and digital connectivity to enable remote access to services; ¡ Regional connectivity and our priority places – keeping people and products moving in and around growing Priority Places and Enterprise Zones; ¡ Local and coastal – innovative on-demand transport solutions; and ¡ Making it happen – an accompanying Delivery Plan for Norfolk and Suffolk to help gain the momentum needed to unlock and deliver strategic interventions.
South East Local Enterprise Partnership		Economic Strategy Statement	The SELEP, which covers Essex, Southend, Thurrock, Kent, Medway and East Sussex, has 5 main priorities: ¡ Creating ideas and enterprise; ¡ Developing tomorrow's workforce; ¡ Creating places; ¡ Accelerating infrastructure; and ¡ Working together. In terms of transport, a number of long-term infrastructure priorities have been identified to take forward in the future: ¡ Lower Thames Crossing – linking Kent, Thurrock and Essex; ¡ Major road corridors (A13, A127, A12, A120, A133, and M11); ¡ Improved rail connectivity; ¡ Improved access by road and rail to our major international gateways; and ¡ Transport infrastructure needed to ensure the existing and new settlements are successful and sustainable.
		Growth Deal and Strategic Economic Plan (March 2014)	SELEP aims to use its scale and ambition to maximise public and community investment. By 2021 it aims to generate an additional 200,000 private sector jobs, complete 100,000 new homes and lever investment totalling £10 billion. As part of the Growth Deal; investment received form Government, the LEP will receive £1.2 billion between 2015 and 2021. Which will enable the LEP to deliver the biggest local transport programme in the country, increase the pace of housing construction and invest £128 million in skills capital projects.
England's Economic Heartland		Planning for Growth (October 2016)	EEH's vision is to build on the world-leading and globally competitive innovation and knowledge-led industries, underpinned by shared goals and strong collaboration. A transport system that integrates infrastructure and services in support of both economic activity and place-shaping in line with the Government's emerging Industrial Strategy. They seek to improve physical connectivity between larger urban centres, with a particular emphasis on east-west connectivity, and improved access into and within larger urban centres.
		Delivering a World Class Heartland	As a strategic, collaborative partnership, EEH is working to realise the region's potential by: ¡ Ensuring investment in digital infrastructure and utilities; ¡ Working with infrastructure owners to accelerate delivery of investment in strategic infrastructure; ¡ Agreeing an overarching Transport Strategy which provides a 30-year framework for the development of the transport system; ¡ Commissioning a 'connectivity study' so that communities not on the Oxford to Cambridge expressway benefit from it; ¡ Working with partners to secure additional investment in strategic transport infrastructure; and

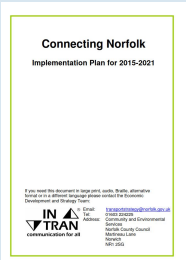
Organisation	Document	Title	Relevance
			¡ Working with Government to ensure needs are reflected in national programmes, including those delivered by Highways England, Network Rail and through rail passenger franchises.
Greater Essex Growth and Infrastructure Framework		2016-2036 Framework	The Greater Essex Growth and Infrastructure Framework (GIF) presents an overview of growth patterns to 2036 for all of the local authorities in Essex and two unitary authorities (Southend-on-Sea and Thurrock). Greater Essex authorities are required to deliver on average 8,980 dwellings per annum, or 179,660 dwellings over the 20-year period of 2016 to 2036. This compares to average annual completions of 4,630 dwellings per year across Essex from 2004 to 2015. Furthermore, 79,000 additional jobs are forecast by the East of England model (2016 run) and a population increase of 298,700 people by 2036. In order to support this growth, delivery the necessary infrastructure is estimated to cost at least £10.4 billion in 2016 terms.

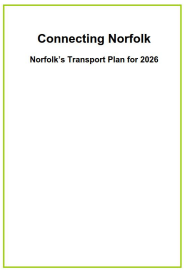
3.4 REGIONAL POLICY

3.4.1. The Transport East region includes the following county and unitary authorities:

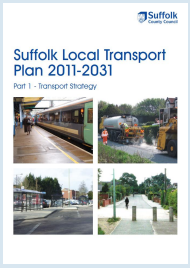
- Norfolk County Council
- Suffolk County Council
- Essex County Council
- Southend-On-Sea Borough Council
- Thurrock Council

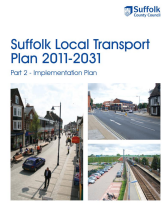
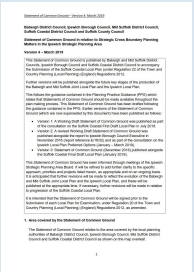
NORFOLK COUNTY COUNCIL

Document	Title	Relevance
	Connecting Norfolk: Implementation Plan for 2015-2021	Norfolk Transport Vision is for" a transport system that allows residents and visitors a range of low carbon options to meet their transport needs and attracts and retains business investment in the county". This will be achieved by: ¡ Making the best use of what they currently have to facilitate reliable journeys; ¡ Reducing the need to travel; ¡ Influencing others and ensuring transport is integrated into development plans; ¡ Working with communities and other partners to seek new solutions and new ways of delivering; and ¡ Lobbying for and pursuing improvements to Norfolk's strategic transport network Furthermore, there are 6 strategic aims that underpin the vision for transport: ¡ Maintaining and managing the highway network; ¡ Delivering sustainable growth; ¡ Enhancing strategic connections; ¡ Reducing emissions; ¡ Improving road safety; and ¡ Improving accessibility.

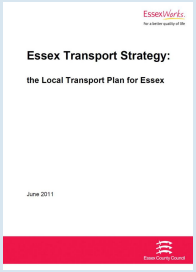
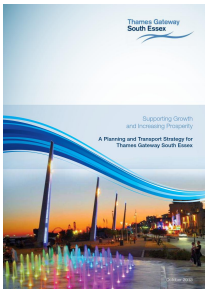
	Norfolk's Transport Plan for 2026	A key aim for the Plan is to manage and maintain the transport network, which will be done by enhancing the community's role in routine maintenance jobs, maintaining and managing the higher status roads and achieving better value by improving targeting and reducing costs. The strategy reflects the importance of using the network to get the most out of the highway network, so as to increase journey time reliability and having a resilient highway network that can respond to the likely impacts of climate change. It identifies the A11, Norwich Northern Distributor Road, Norfolk Gateways, A47, Norwich to London rail line, Norwich to Cambridge rail line and the King's Lynn to London rail line as Norfolk key strategic connections.

SUFFOLK COUNTY COUNCIL

Document	Title	Relevance
	Suffolk Local Transport Plan 2011-2031 Part 1 - Transport Plan	Sets outs SCC's long-term transport strategy for the next 20 years. SCC wants to maintain, and over-time, improve Suffolk's transport networks, reduce congestion, and improve access to jobs and markets. The key areas for growth and development within Suffolk are: ¡ Expansion of the Port of Felixstowe; ¡ The 'Energy Coast', including offshore wind and renewable energy focussed around Lowestoft and the development of Sizewell C nuclear power station; ¡ Construction of SnOasis; ¡ Development of University Campus Suffolk as a research centre; ¡ Development and growth of biotech in wets Suffolk and around UCS; ¡ Tourism, local food and drink; and ¡ Creative industries. Furthermore, the key urban centres for growth where transport interventions can have significant impact within Suffolk are: ¡ Beccles ¡ Brandon; ¡ Bungay; ¡ Bury St Edmunds; ¡ Felixstowe; ¡ Ipswich area; ¡ Haverhill; ¡ Lowestoft; ¡ Newmarket; ¡ Stowmarket; and ¡ Sudbury. The report identifies additional road and rail improvements that are likely to be deliverable in the medium to long term. Within the plan period the following strategic schemes are planned for delivery: ¡ Dualling of the A11 between Barton Mills and Thetford (complete) ¡ Ipswich major scheme, 'Ipswich- Transport fit for the 21st Century' ¡ The Beccles rail loop allowing increased frequency of trains between Ipswich and Lowestoft ¡ The Beccles southern relief road ¡ The Lowestoft northern spine road to help remove through traffic from the town ¡ Ipswich rail chord to improve freight connections from Felixstowe ¡ Copdock A14/A12 junction improvements.

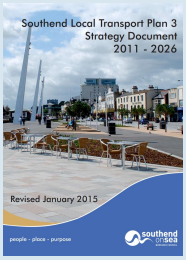
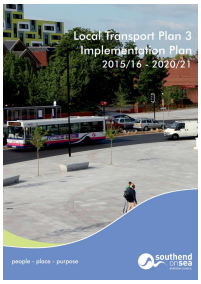
Document	Title	Relevance
	Suffolk Local Transport Plan 2011 – 2031 Part 2 – Implementation Plan	Part 2 of the Local Transport Plan sets out the long-term transport strategy required to support economic growth, reduce the environmental impact of transport and improve health outcomes over the next 20 years. Part 2 includes proposals for transport improvements in the rural areas of the county, so that SCC can be assured that all networks are maintained to a high standard. Furthermore, they want to ensure better access to jobs and services and to help communities to tackle transport issues that affect quality of life.
	Statement of Common Ground (2019)	In March 2019, a Statement of Common ground was written in relation to the Strategic Cross Boundary Planning Matters in the Ipswich Strategic Planning Area. Babergh District Council, Ipswich Borough Council, Mid Suffolk District Council, Suffolk Coastal District Council and Suffolk County Council were involved in the proceedings. The purpose of the Statement of Common Ground (SCG) is to allow local planning authorities to co-operate in relation to strategic planning matters. The SCG will support the production of Local Plans in the Ipswich Strategic Planning Area by setting out those matters which are strategic to Babergh, Ipswich, Suffolk Coastal and Mid Suffolk Districts, outlining the agreements and outcomes in relation to those strategic matters and reflecting the statutory and policy requirements for their duty to co-operate.

ESSEX COUNTY COUNCIL

Document	Title	Relevance
	Essex Transport Strategy: The Local Transport Plan for Essex (June 2011)	Relevant to this study the plan identifies: ¡ The aspirations for improving travel in the county; ¡ Demonstrating the importance of the transport network to achieving sustainable long-term economic growth; and ¡ Enhancing the lives of residents. The transport strategy identifies five broad outcomes; ¡ Provide connectivity for Essex communities and international gateways to support sustainable economic growth and regeneration; ¡ Reduce carbon dioxide emissions and improve air quality through lifestyle changes, innovation and technology; ¡ Improve safety on the transport network and enhance and promote a safe travelling environment; ¡ Secure and maintain all transport assets to an appropriate standard and ensure that the network is available for use; and ¡ Provide sustainable access and travel choice for Essex residents to help create sustainable communities.
	The Planning and Transport Strategy for Thames Gateway South Essex (October 2013)	The Thames Gateway South Essex (TGSE) covers the council areas of Thurrock, Basildon, Castle Point, Rochford and Southend-on-Sea. The Vision of TGSE is to: ¡ Support the strategic objective to raise the overall prosperity levels of Thames Gateway South Essex, and provide a better quality of life for the population by developing and maintaining a sustainable transport system. The delivery of the Vision will be focused on four key objectives: ¡ Economic growth; ¡ Environment; ¡ Accessibility; and ¡ Quality of life, safety and health.

		To achieve the objectives, a number of transport schemes are identified, such as junction improvements, road capacity improvements, enhanced public transport facilities and bus and rail station improvements.

SOUTHEND-ON-SEA

Document	Title	Relevance
	Southend Local Transport Plan 3 Strategy Document 2011 – 2026 (January 2015)	The key themes within this document: ¡ A thriving and sustainable local economy in the Borough; ¡ Minimise environmental impact, promote sustainability for a greener Borough; ¡ A safer Borough; and ¡ Reduce inequalities in health and wellbeing and for a more accessible Borough. In order to realise these themes a number of policies are in place: ¡ Reduce congestion in the Borough; ¡ Encourage and facilitate the use of sustainable modes and public transport for travel; ¡ Increase the resilience of transport networks to climate change; ¡ Reduce health inequalities by increasing the number of residents of all ages who travel actively for work, education, local services and for leisure.
	Local Transport Plan 3 Implementation Plan 2015/16 – 2020/21 (April 2015)	This document sets out a range of transport 'challenges' across the Borough that have been identified for capital investment that support economic growth and other key themes. The Document also sets out for Action Plans that interrelate and contribute to delivering a 'Better Southend': ¡ Action A – better sustainable transport and mobility management; ¡ Action B – Better networks and traffic management schemes; ¡ Better partnerships, engagement and sponsorships to support greater efficiencies in funding and delivery; and ¡ Better operation of traffic control, information and communication systems (including Intelligent Transport Systems and Urban Traffic Management Control).

THURROCK

Document	Title	Relevance
	Thurrock Transport Strategy 2013-2026	The vision within this document is to create a transport system that: ¡ Is fully inclusive, meeting the social needs of resident; ¡ Is integrated to provide seamless multi-modal journeys; ¡ Is accessible for everyone, safe and attractive to use; ¡ Delivers sustainable community regeneration and growth; and ¡ Reflects the exceptional circumstances of Thurrock as an international centre for logistics and commercial development. In order to realise these themes a number of policies are in place: ¡ Deliver sustainable growth ¡ Improve access by sustainable transport to key services and facilities ¡ Integrating with other service providers ¡ Walking and cycling ¡ Demand responsive and community transport ¡ Transport interchange ¡ Mobility and access for all

3.5 LOCAL POLICY

3.5.1. For each local / unitary authority in the Transport East region the most recently available Local Plan has been reviewed. Where the local / unitary authority is in the process of preparing a new local plan, the current draft has also been reviewed.

3.5.2. The local plan provides a framework for shaping future development in each district / unitary authority in the Transport East region over the next 10 to 15 years. The documents set out strategic growth sites (housing and employment) in each district / unitary authority as well as the strategic transport infrastructure required to support them.

3.5.3. In summary, local planning policies in the Transport East region:

- Promote sustainable travel and reduce the use of and reliance on private cars;
- Require new developments to offer residents and workers with a choice of travel modes;
- Set out strategic housing and employment growth sites; and
- Identify any strategic transport infrastructure required to support strategic allocations.

3.5.4. The Local Plan transport and strategic growth policies relevant to this REB are summarised in Appendix A and a summary of the strategic housing and employment growth sites in the Transport East region is provided in Section 7 of this REB.

4 REGIONAL OVERVIEW

4.1 OVERVIEW

AT A GLANCE

4.1.1. This section provides a regional overview of the socio-economic context and identifies the strategic road and rail transport corridors that provide strategic connectivity and have a key role to play in driving economic growth in the Transport East region.

4.1.2. The Transport East region covers the East of England, comprising Norfolk, Suffolk, Essex, Southend-on-Sea and Thurrock. The Transport East region is an attractive and diverse area, with around 140,000 enterprises[5], generating 1.67 million jobs[6] and is home to 3.5 million residents[7] spread over an area covering approximately 1.3 million hectares.

4.1.3. The East is geographically (33% live in rural communities compared to 19% nationally[8]) and socially diverse area comprising relatively few primary economic centres. Norwich, Southend-on-Sea, Ipswich, Colchester, Chelmsford, Grays and Basildon are the primary economic centres of the region, supplemented by a large number of market towns and smaller urban settlements that provide a focus for the rural economies and surrounding rural villages and hamlets providing multi-centred locations for growth.

4.1.4. The region is economically diverse with key strengths in the green energy, agri-tech, food and drink, financial services, construction, manufacturing and ports and tourism. The £73.5[9] billion economy has the potential to deliver substantial housing and economic growth and support the major economic centres in London and Cambridge.

4.1.5. The region is a major global gateway with 13 ports and three international airports providing freight and passenger access to global destinations. These nationally significant international gateways include Stansted Airport and the ports of Tilbury, DP World London Gateway, Felixstowe and Harwich, providing businesses, visitors and freight access to Europe and wider international destinations.

[5] UK Business Counts 2018, Enterprises by industry and employment size band, Office for National Statistics
[6] ONS Total Jobs 2017
[7] Population Estimates, Office for National Statistics, 2017
[8] 2011 Census Usual Resident Population
[9] ONS Regional Gross Value Added (Income Approach) by Local Authority in the UL, 2015

4.1.6. The region also benefits from almost 500 miles of coastline supporting the visitor and developing green energy economy. The visitor economy is an important sector of the Easts economy, with the region boasting an array of historic towns and cities, together with popular seaside resorts. The visitor economy supports approximately 170,000 jobs in Norfolk, Essex and Suffolk and contributes almost £9 billion pounds to the regional economy.

4.1.7. Growth in the Transport East economy will require investment in strategic transport connectivity. Enhancing links between the regions towns, cities, business clusters, international gateways, coastal and rural communities to enable the efficient movement of people and goods, expand markets and workforce catchments, improve business, leisure and tourism connectivity and maximise the benefits of agglomeration.

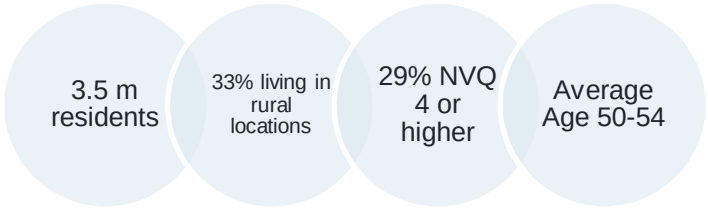
4.1.8. The region benefits from strategic road and rail links with London, Cambridgeshire and the wider UK with the Great Eastern, West Anglia and Essex Thameside rail lines, regional branch lines and the SRN and MRN providing connectivity within the region and to the wider UK.

4.1.9. The existing and future residents, employees and visitors rely on the regional road and rail transport corridors for their day to day activities whether it is getting to work, doing the shopping, forging new business and manufacturing products. The strategic road and rail corridors are therefore vital for the economy of the East.

4.1.10. The remainder of this chapter provides a regional overview of the people, place, economy and strategic transport network that defines the Transport East region as a successful place to live, work and visit.

4.2 PEOPLE

AT A GLANCE

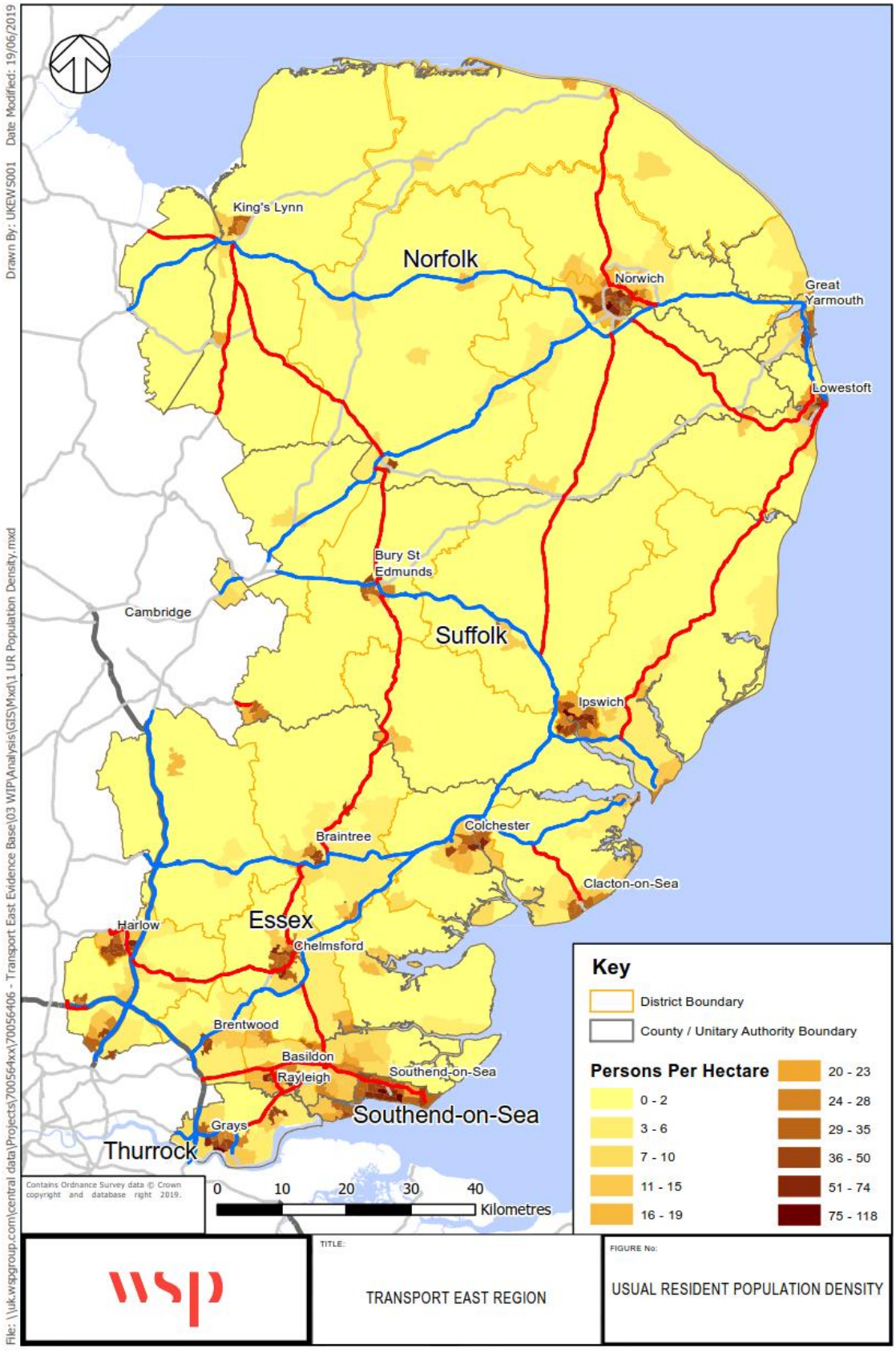


POPULATION

4.2.1. The Transport East region is home to approximately 3.5 million residents, accounting for approximately 18% of the population of England[10]. The residential population density in the region is shown in Figure 4-2 below and is slightly lower than the national average (14.4 per hectare in the Transport East region compared to 15.7 persons per hectare in England[11]).

[10] Population Estimates, Office for National Statistics, 2017
[11] Population Density, Office for National Statistics, 2011

Figure 4-1 – Usual Resident Population Density



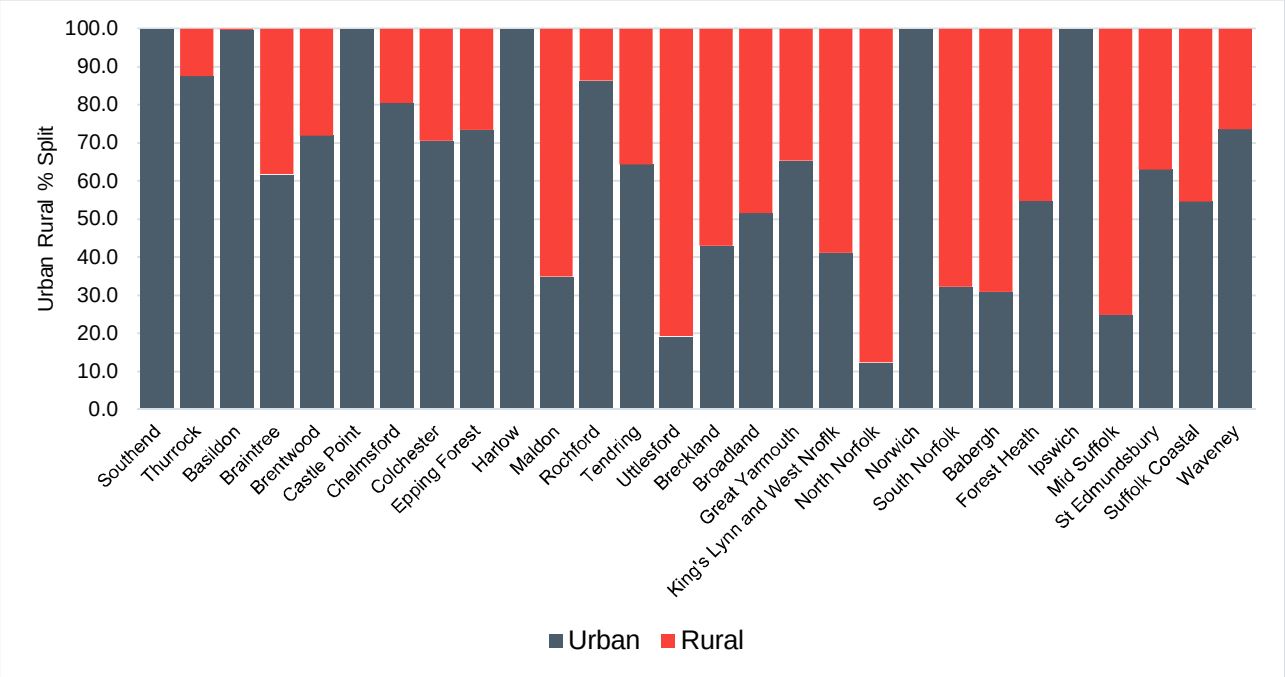
4.2.2.

4.2.3. Figure 4-11 shows the highest residential population densities to be within the main urban settlements in the region. Norwich, Ipswich, Colchester, Chelmsford, Basildon, Harlow, Thurrock, Grays and Southend-on-Sea are large residential centres and are the primary economic centres in each county/unitary supplemented by a large number of towns including King's Lynn, Great Yarmouth, Bury St Edmunds, Lowestoft, Basildon, Braintree, Clacton-on-Sea, Epping, Brentwood, Canvey Island and Harwich.

4.2.4. Figure 4-1 illustrates the diversity of the region, with residents distributed amongst a range of small, medium and large settlements, rather than clustered around one or two large economic centres. The distribution of the population in a range of towns, cities, market towns, rural villages and coastal communities means that good connectivity between settlements is vital for residents to access jobs and services and businesses to access markets. The strategic transport corridors in the region therefore play an important role in facilitating both short and longer distance movements and poor connectivity along these corridors could result in an inability to access jobs and everyday services, in turn leading to socio-economic deprivation.

4.2.5. Transport East has a relatively high proportion of residents living in rural areas, and the proportion of residents living in rural areas varies substantially across the region. In 2011, 33% of the Transport East residents lived within rural areas, this compares with an average of 19% for England as a whole[12]. Figure 4-2 shows the urban and rural residential population split for each of the districts.

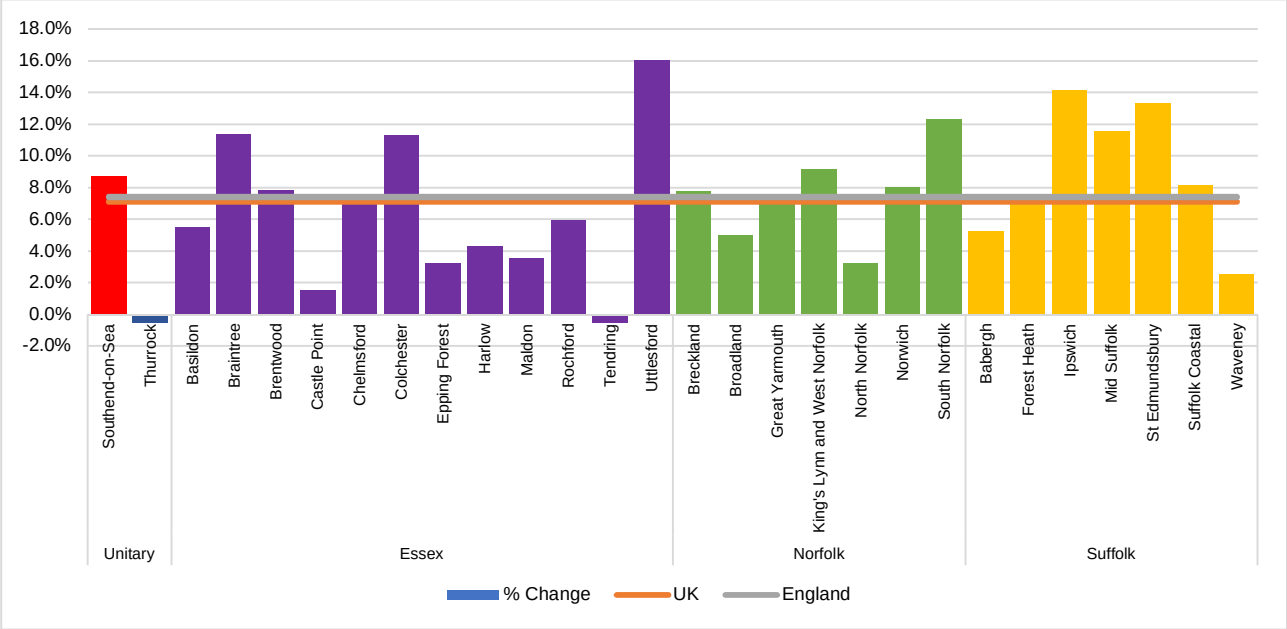
Figure 4-2 – Urban and Rural Population Split by District



[12] Usual Resident Population, Table KS101EW, Office for National Statistics, 2011

4.2.6. Between 2001 and 2011 the population of the Transport East region grew by 7.6%[13]. This is above the level of population growth across England and Wales (7.3%) during the same period. However, across the region, population growth rates have varied substantially by district. Figure 4-3 shows that 13 districts / unitary authorities had population growth rates greater than the national average. The highest proportions of population growth occurred in Uttlesford, Ipswich, St Edmundsbury, South Norfolk[14], Braintree and Colchester. By contrast, Tendring and Thurrock reduced in size during this period with -0.5% growth observed in both areas.

Figure 4-3 - Population Growth between 2001 to 2011



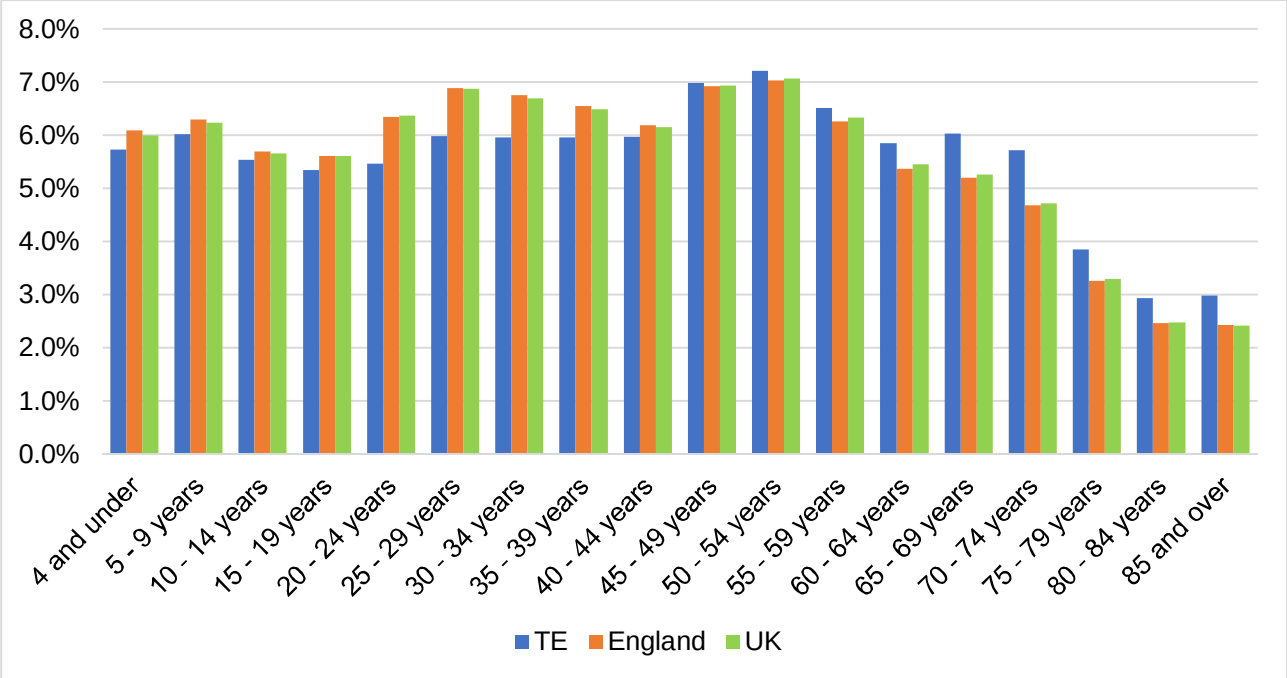
AGE PROFILE

4.2.7. The largest proportion of Transport East residents are within the 50-54 age category (7.2%) and is consistent with the national average[15]. Figure 4-4 shows the 2017 age profile of Transport East residents. The age groups with the smallest number of residents is 15 to 19 and 75+. When compared to the UK average, Transport East is very consistent, the only variances are seen in the ages groups of those 60+, where the Transport East region has a higher than average percentage of older residents.

4.2.8. A higher proportion of older people in the region has implications on the transport network. It could mean fewer commuting trips or increased demand for public transport. The consequences of an aging population on the strategic transport network are considered further in Section 9 of this REB.

[13] Population Estimates – local authority based by single year of age, Office for National Statistics 2017
[14] The main urban area of Norwich extends into the district of South Norfolk. As such it is likely that a significant proportion of growth in this district was concentrated within this area.
[15] UK Population Estimates, Office for National Statistics, 2016

Figure 4-4 - Age Profile of Transport East Residents. Source: UK Population Estimates, ONS, 2017.



EDUCATION ATTAINMENT

4.2.9. The Transport East region has 12 universities and colleges, of which the largest are the University of East Anglia, University of Essex, Norwich University of the Arts, Writtle University College and the University of Suffolk. In the academic year 2017/18, a total of 41,150 students were enrolled within universities across the Transport East region[16].

4.2.10. Education attainment in the Transport East region is broadly in line with the national average, with 43% of pupils in 2018 achieving a 9 to 5 pass in their GCSEs and is consistent with the national average of 43%[17].

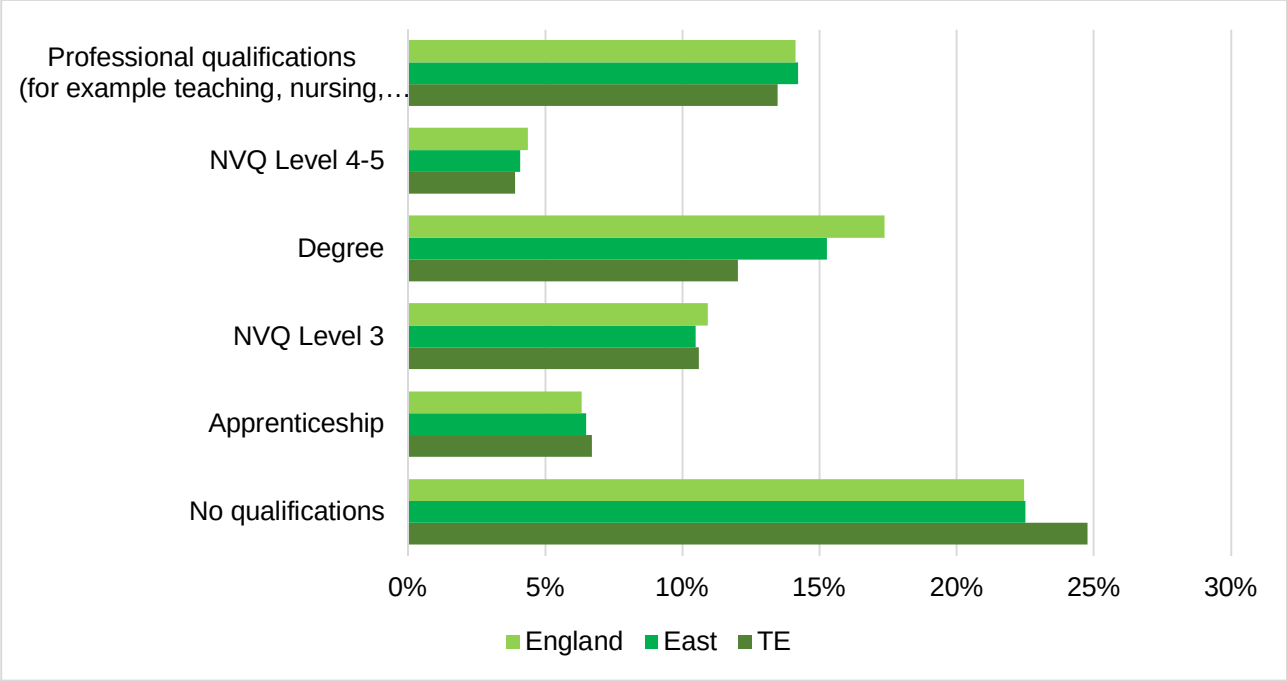
4.2.11. Figure 4-5 below shows education attainment in the Transport East region. Overall the education attainment of residents is below the average for the East of England and England as a whole. With a higher portion of residents holding no qualification, and a lower proportion of residents holding a degree or professional qualification.

4.2.12. The most common qualification held by Transport East residents (35%) is 1-4 O Levels / CSE / GCEs, entry level and foundation diplomas and the qualification level with the lowest attainment was an NVQ Level 4-5 (4%).

[16] Higher Education Statistics Agency, 2019
[17] GCSE and equivalent results in England 2017/18 (provisional), Department for Education, 2018

4.2.13. Poor education attainment has the potential to create a skills deficit in the region, a situation where the workforce does not hold the necessary skills demanded by employers. This has implications for the economic success of the region as it could constrain the expansion of existing business, attraction of new business or even lead to the relocation of business out of the region.

Figure 4-5 – Education Attainment: Transport East, East and England, England



4.2.14. The transport network has a role to play in improving access to skills and employment for Transport East residents. The transport network can help reduce the impact of a skills deficit as it can enable high skilled workers to access high skilled jobs in areas where there is a low supply of high skilled workers. Equally, in areas of low education attainment, improvements in accessibility to jobs and skills can enable residents to participate in the labour market.

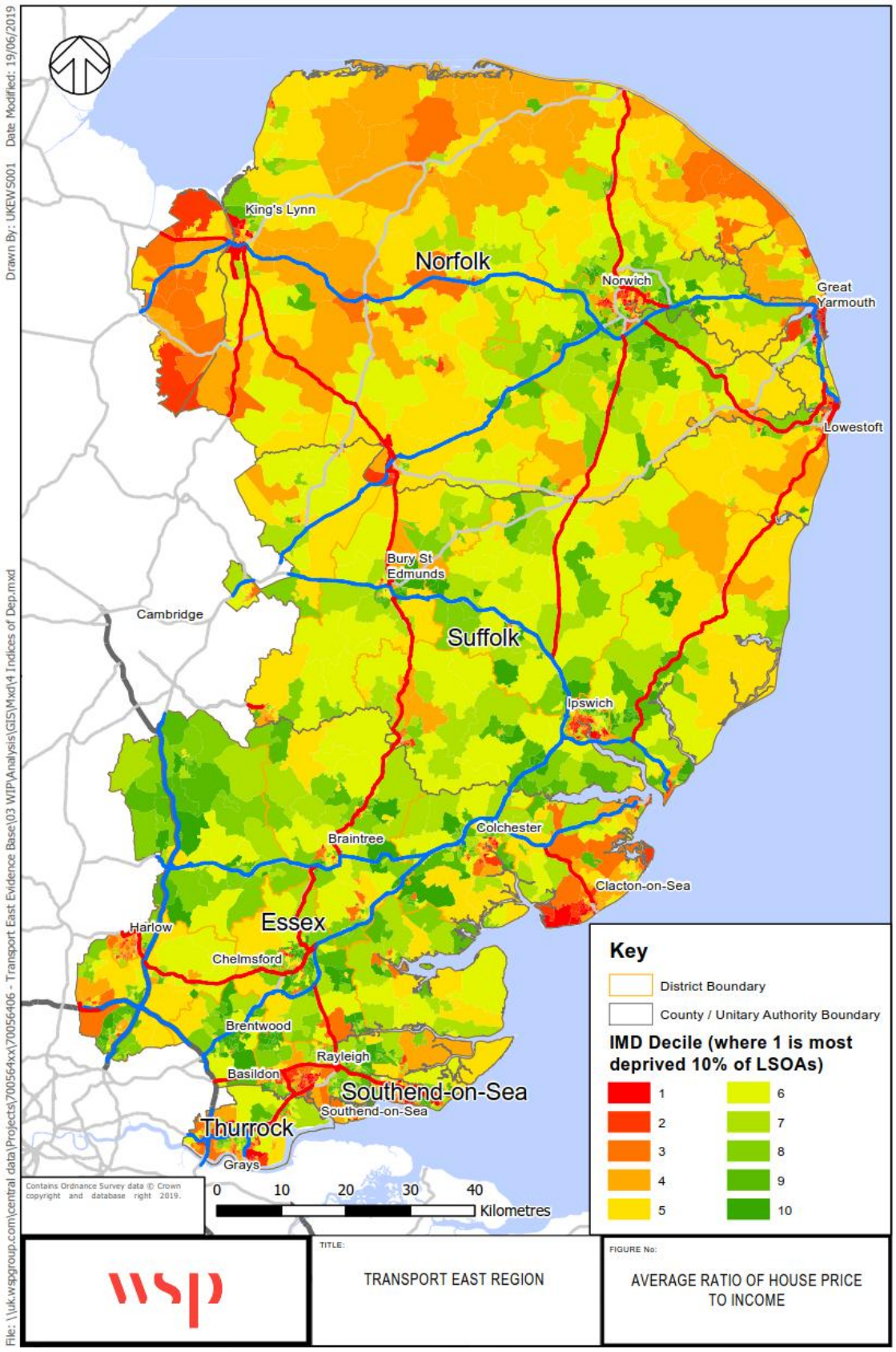
QUALITY OF LIFE

4.2.15. The level of social-economic deprivation in the region has been informed through a review of the Indices of Multiple Deprivation (IMD). The IMD is a measure of the overall deprivation experienced by people living in an area and is ranked for each neighbourhood in England.

4.2.16. Deprivation levels vary considerably across the Transport East region. Two districts are within the 10% least deprived districts /unitary authorities in England (Brentwood and Uttlesford) and one district is within the 10% most deprived districts / unitary authorities in England (Great Yarmouth)[18]. Figure 4-6 shows the IMD deciles in the Transport East region. The lowest decile represents the most deprived Lower-Layer Super Output Areas in England.

[18] Indices of Multiple Deprivation, Department for Communities and Local Government, 2015

Figure 4-6 – 2015 IMD Deciles



Within the Transport East region, the highest levels of deprivation occur within the district of King's Lynn and West Norfolk and within its Coastal Communities (including Great Yarmouth, Lowestoft and Clacton-on-Sea). High levels of deprivation are also recorded in neighbourhoods of some of the largest settlements in the region, with some of the most deprived in Norwich, Ipswich, Thetford, Clacton-on-Sea, Basildon, Southend-on-Sea, Tilbury and Colchester.

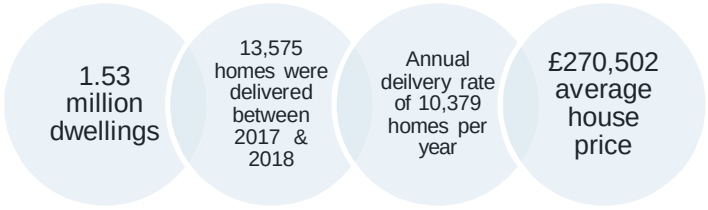
4.2.17. The lowest levels of deprivation occur within settlements on strategic transport corridors, particularly those that provide access to major labour markets (e.g. London). This includes the A12 / Great Eastern Mainline London to Ipswich Corridor, A120 Colchester to Stansted Corridor, A14 / A140 / Great Eastern Mainline Ipswich to Norwich corridor and M11 London to Cambridge Corridor.

4.2.18. Low levels of deprivation along the strategic transport corridors is likely to be reflective of these settlements accessibility to labour markets, goods and services. This in turn is likely to lead to an increase in house prices, which in turn attracts more affluent residents to the area.

4.2.19. On the other hand, many of the most deprived neighbourhoods in the Transport East region have poorer connectivity. For instance, the coastal communities of Clacton-on-Sea, Great Yarmouth and Lowestoft are some of the most deprived in England. These do not have dual carriageway connections and have train services that generally operate a frequency of one train per hour.

4.3 THE PLACE

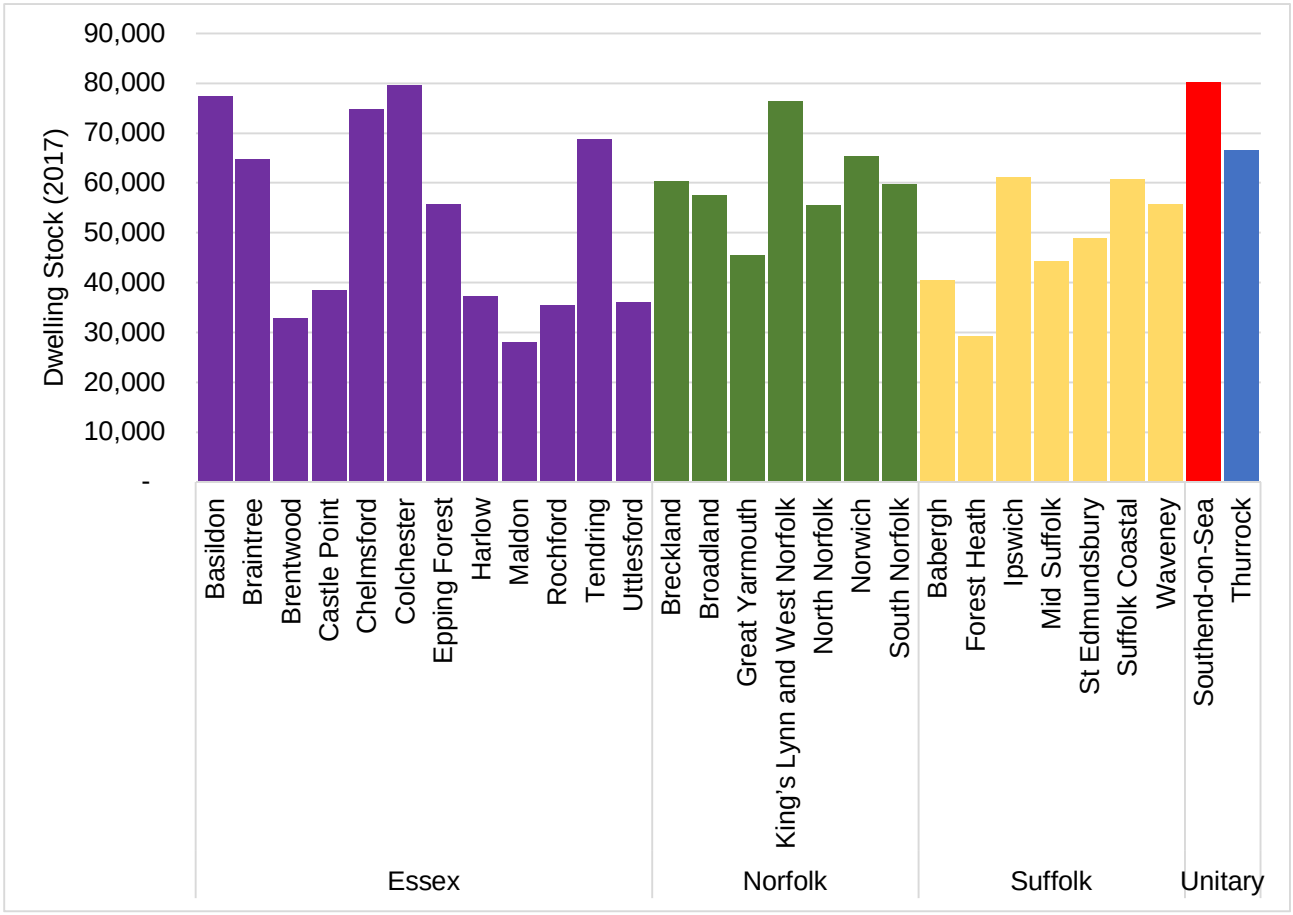
AT A GLANCE



HOUSING STOCK

4.3.1. There are approximately 1.53 million dwellings within the Transport East region. Figure 4-7 illustrates the distribution of the dwellings stock across Transport East region with the largest share located in Southend-on-Sea and the least within Maldon and Forest Heath.

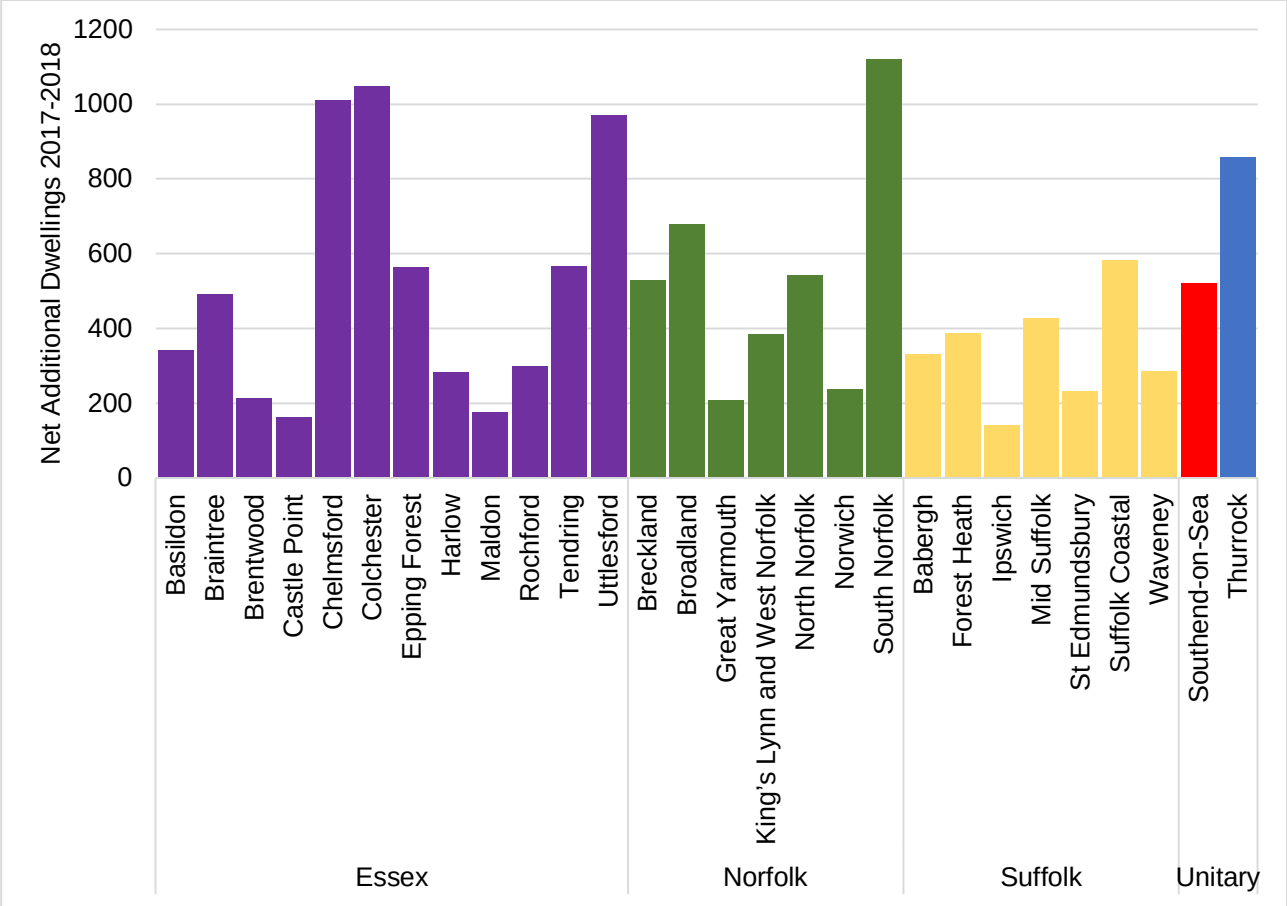
Figure 4-7 – 2017 Dwelling Stock



4.3.2. Within Transport East housing delivery has slightly lagged behind the national average. Between 2009 and 2017 the number of dwellings in the Transport East region increased by 5%, increasing from 1.46 million in 2009 to 1.54 million in 2017 compare to 6% nationally[19]. Between 2017 and 2018, 13,575 additional dwellings were delivered in the Transport East region. This represents 6.1% of the 222,194 dwellings delivered in England during this period[20]. The highest level of dwellings delivered between 2017-2018 was in South Norfolk, with 1,118 dwellings. The area that delivered the fewest dwellings was Ipswich at 141 dwellings (Figure 4-8).

[19] Number of Dwellings by tenure and district: England; 2016, Office for National Statistics, 2019
[20] Net additional dwellings by local authority district, England 2001-02 to 2017-18, Office for National Statistics, 2018

Figure 4-8 – 2017 Dwelling Completions in the Transport East region



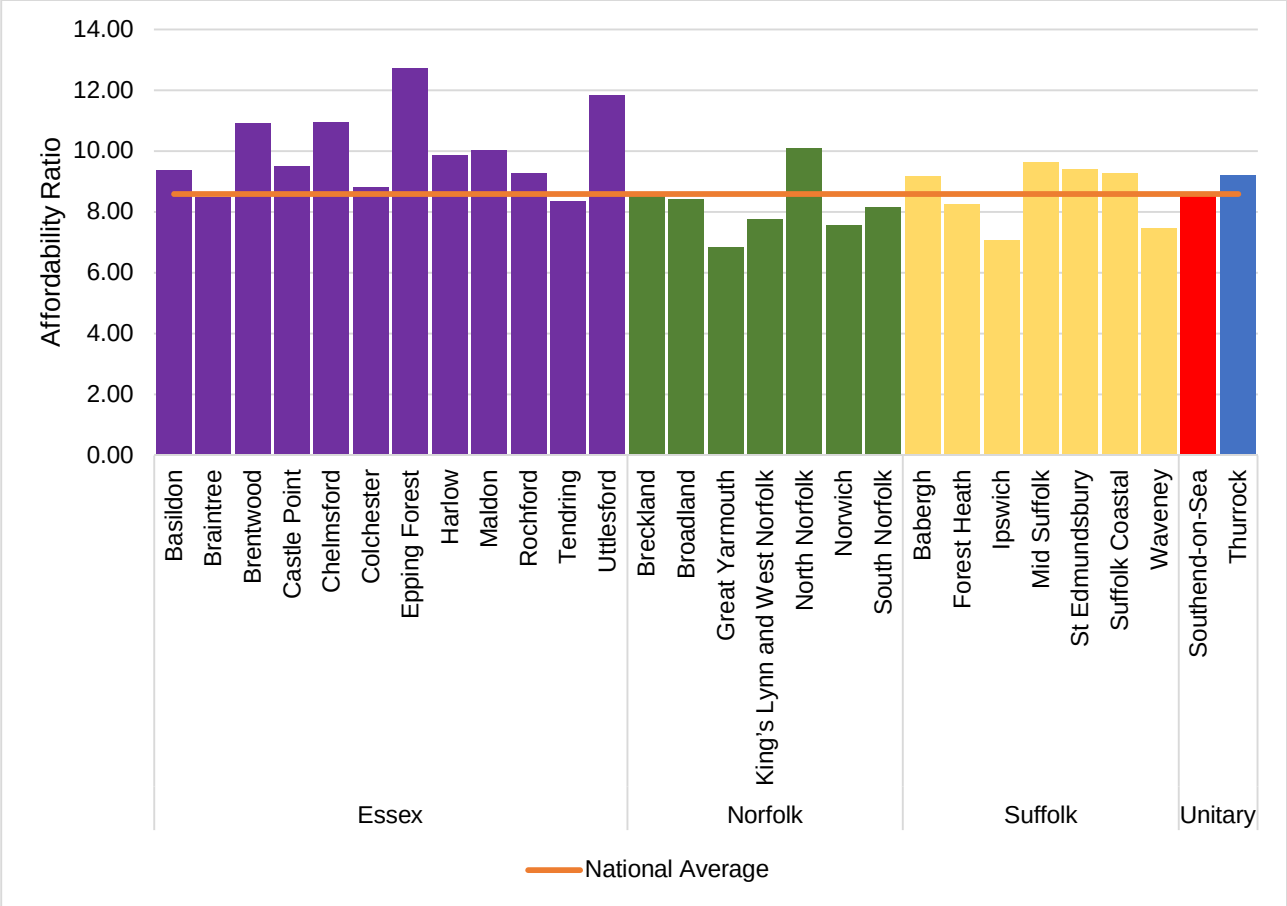
HOUSE PRICES

4.3.3. The Transport East region faces affordability constraints. The average house price within the Transport East region is £270,502 approximately 20% higher than the national average of £226,234[21]. The higher than average house price is reflected by the lower than average affordability of housing in the region. The mean affordability ratio (ratio of average house price to income) in the Transport East region is 9.13 compared to 8.59 for England as a whole[22]. This means that the affordability of an average house in the Transport East region is nine times the average salary.

4.3.4. However, affordability constraints are unevenly distributed across the Transport East region. The variation in the affordability of housing across the Transport East region is shown in Figure 4-9 below.

[21] House Price Statistics, HM Land Registry, 2019
[22] Ratio of houses to residence-based earning (lower quartile and median), 2002 to 2018, Office for National Statistics, 2018

Figure 4-9 – Housing Affordability Ratio, 2018



4.3.5. Figure 4-9 shows that some of the least affordable districts to be situated within Essex and include Epping Forest, Uttlesford, Chelmsford and Brentwood. These districts all have good connectivity to the A12, M11, Great Eastern Mainline and West Anglia Mainline corridors which provide direct connections to London.

4.3.6. The most affordable locations in the Transport East region are Great Yarmouth, Norwich and Kings Lynn and West Norfolk in Norfolk and Ipswich and Waveney in Suffolk. The coastal districts tend to have weak connectivity to the major economic centres in the region, for instance Great Yarmouth has no direct connection to a dual carriageway and low frequency train services.

4.4 ECONOMY

AT A GLANCE

4.4.1. The Transport East region has a strong and diverse economy with key strengths in distribution, manufacturing ICT, agri-tech, biosciences, green energy production, financial industries and the visitor economy. The Transport East region makes a substantial contribution to the UK economy generating a Gross Value Added (GVA) of £73.5 billion (2015) representing approximately 5% of the £1.4 trillion GVA generated by England as a whole[23]. The region supports 1.6 million jobs and provides an important role in providing workers for the surrounding economies in London, Hertfordshire and Cambridge.

4.4.2. The Transport East region benefits from three international airports (London Stansted Airport, London Southend Airport and Norwich Airport) and 13 ports, including the Port of Felixstowe, Harwich Port, Port of Tilbury and DP World London Gateway. The Transport East international gateways provide vital links between the UK and the rest of the world. Not only are the international gateways economic hubs in their own right, but they also accommodate substantial freight traffic for the UK and Europe, with more than 40% of all containerised traffic entering the UK through the Port of Felixstowe[24].

EMPLOYMENT

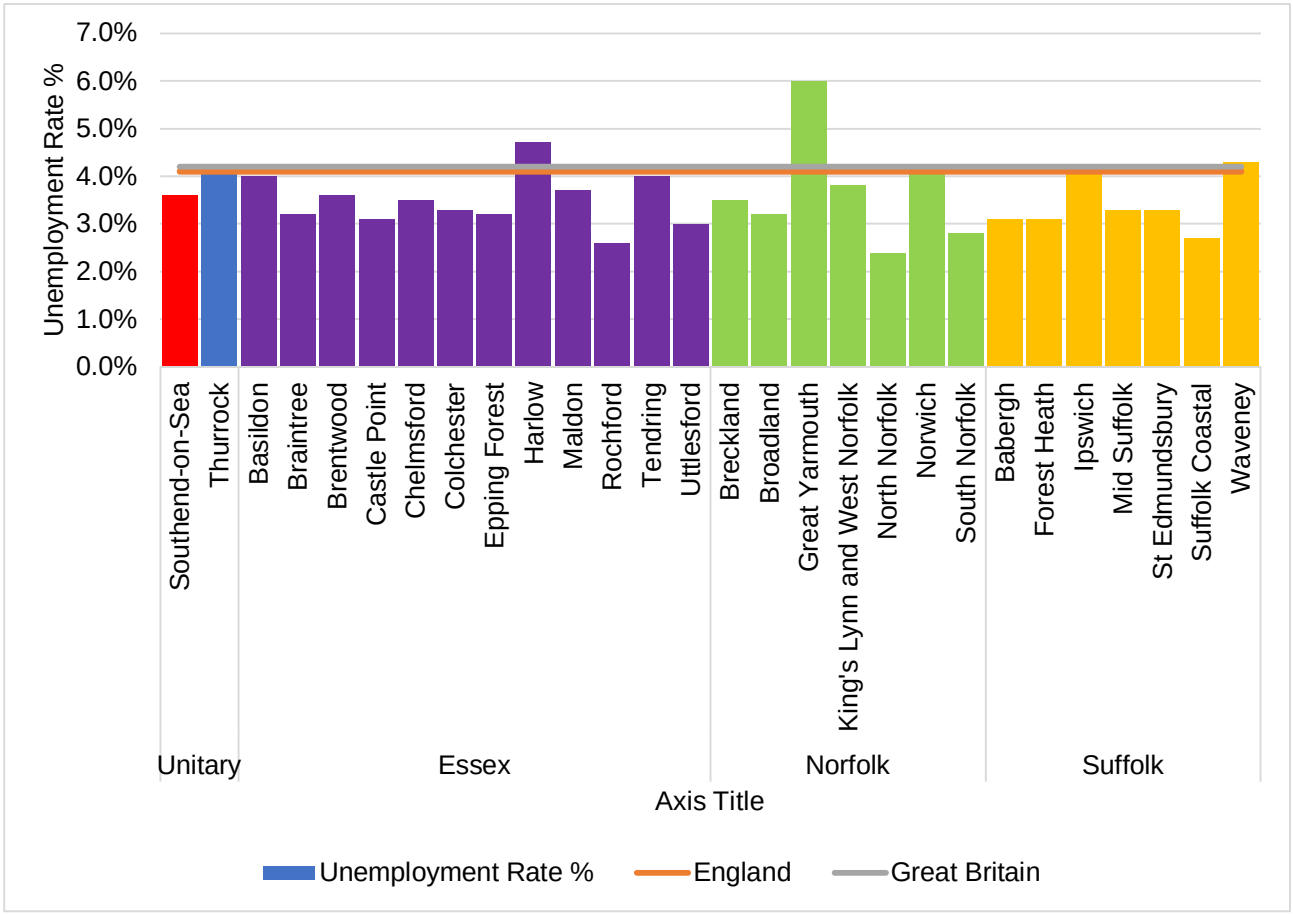
4.4.3. The Transport East region has a large and established population base. The 2011 Census recorded 2.3 million residents aged between 16 and 74 of which 1.7 million were economically active and 710,000 were economically inactive.

4.4.4. Of the economically active population 93,000 were unemployed, 65,000 were students and 1.5 million were either in full or part-time employment[25]. Of those economically inactive, 54% were retired, 13% were students, 15% looked after home/family and 12% were sick or disabled.

4.4.5. Overall 90.7% of the economically active residents in the Transport East region were in employment[26]. This compares to a national average of 88.8% and is reflective of the regions strong labour market. Whilst the region out performs the UK in terms of levels of unemployment, there are disparities in the levels of unemployment across the Transport East region. The variation in 2018 unemployment rates by district are shown in Figure 4-10 and Figure 4-11 below.

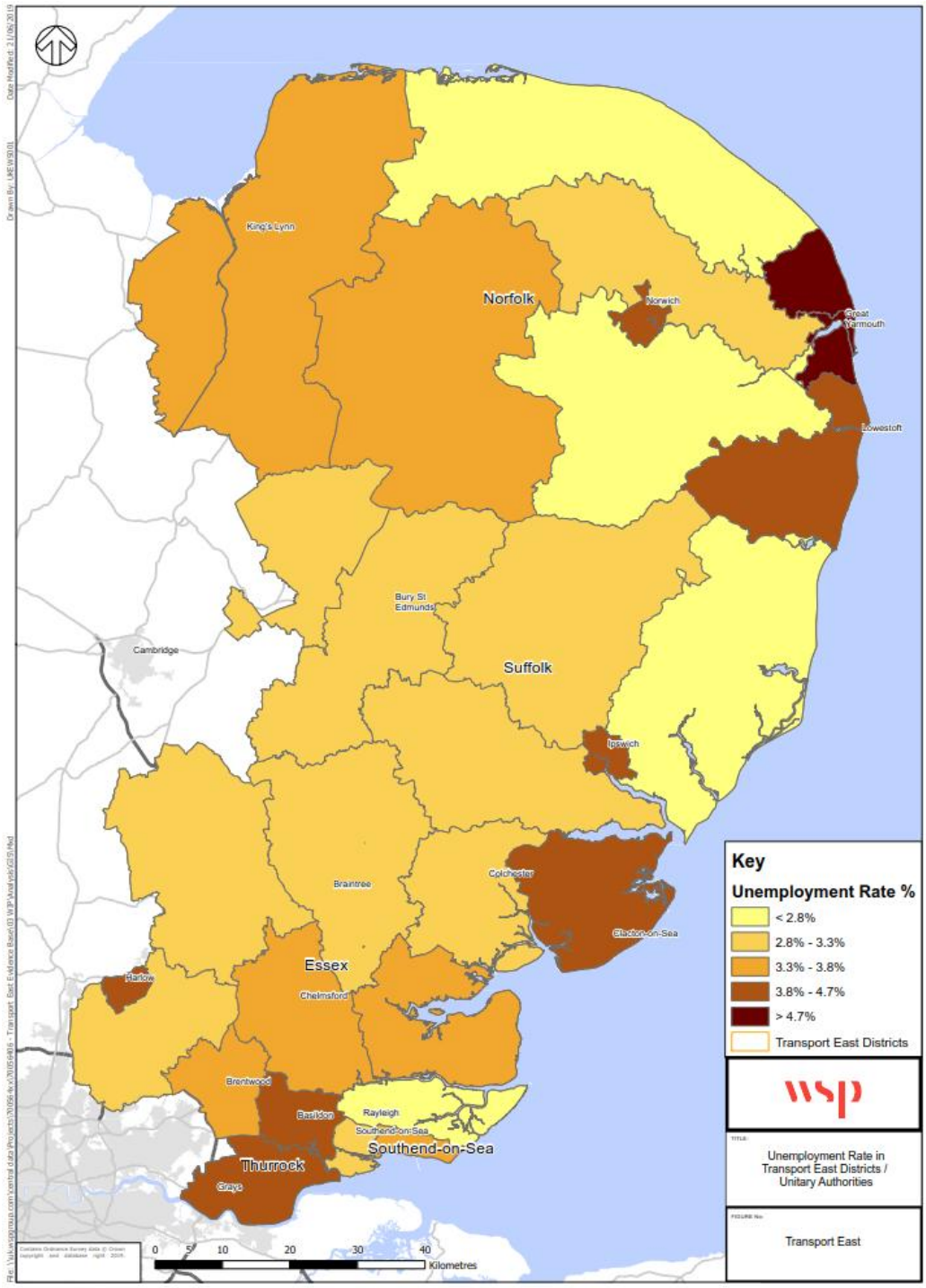
[23] Regional Gross Value Added (Income Approach) by Local Authority in the UK, Office for National Statistics, 2016
[24] UK major port freight traffic by top 30 UK ports for each cargo type, Department for Transport Statistics, 2017
[25] Table QS601EW, Economic activity, Office for National Statistics, 2011
[26] 2011 Census QS601EW Economic Activity all usual residents aged 16 to 74

Figure 4-10 – Percentage of Residents Unemployed in 2018 by District



4.4.6. Figure 4-10 shows that within the Transport East region there are districts that have relatively high levels of unemployment. The 2018 unemployment rates range from 6.0% in Great Yarmouth to just 2.6% in Broadland and Mid Suffolk. Relatively high levels of unemployment have also been recorded in Ipswich, Harlow, Norwich, Southend-on-Sea and Thurrock. A plan showing unemployment rates across the Transport East region is provided in Figure 4-11 below.

Figure 4-11 – Percentage of Residents Unemployed in 2018 by District



4.4.7. Figure 4-11 shows the highest levels of unemployment are recorded within districts on the east coast (Great Yarmouth, East Suffolk and Tendering). These districts are characterised by high levels of socio-economic deprivation and poor connectivity which could be discouraging people and business to located in these coastal districts. As identified earlier, the transport network has a role to play in improving access to skills and employment with the potential to improve access to jobs and skills for residents in these areas.

JOBS

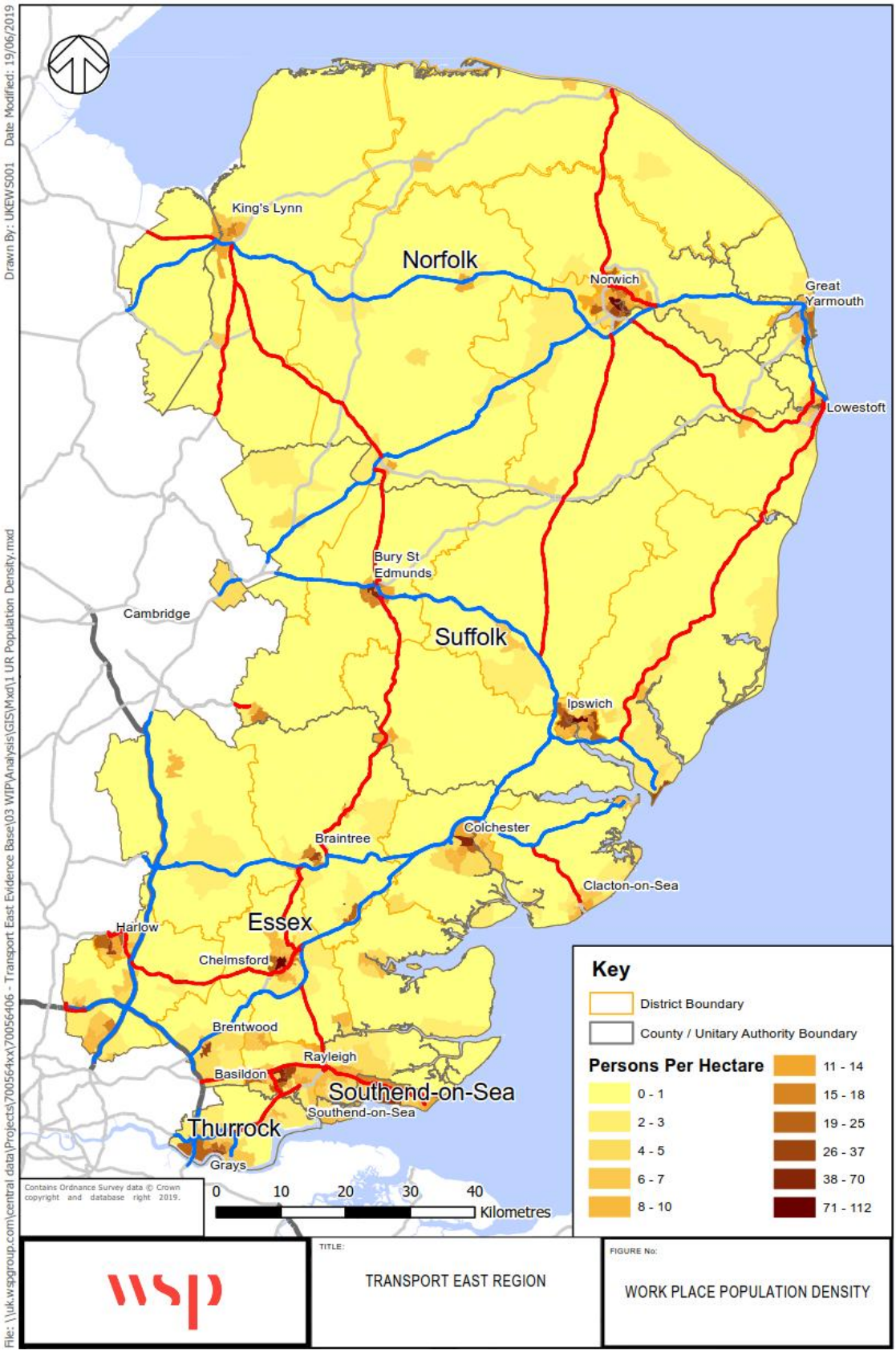
4.4.8. This overall strength of the Transport East local labour market has been supported by strong job growth. An additional 136,000 jobs have been created in the region from 2013 to 2017, increasing from 1.5 million to 1.6 million (an increase of 9.3%)[27]. This is slightly below the national average of 10.1%. The average wage for residents of the region is £29,656. per annum, which is higher than the national average of £28,899[28].

4.4.21. The growth in jobs in the region has exceeded population growth. Between 2013 and 2017 the ratio of jobs to residents aged 16 to 64 has increased 0.75 to 0.81[29]. The significant difference between the workplace population / jobs in the region and total number of residents recorded as being in employment suggests that there is significant out commuting from the region (e.g. to London and Cambridgeshire).

4.4.22. Figure 4-12 below shows the workplace population density in the Transport East region. This shows the workforce to be strongly concentrated in a relatively few medium and large settlements including Norwich, Great Yarmouth, Lowestoft, Bury St Edmunds, Ipswich, Colchester, Chelmsford, Southend-on-Sea, Basildon and Thurrock. These settlements are generally situated where transport corridors converge, providing strong north / south and east / west connectivity via SRN, MRN and Rail Network.

[27] Jobs Density, Office for National Statistics, 2017
[28] Annual Survey of Hours and Earnings – resident analysis, Office for National Statistics, 2018
[29] Jobs Density, Office for National Statistics, 2017

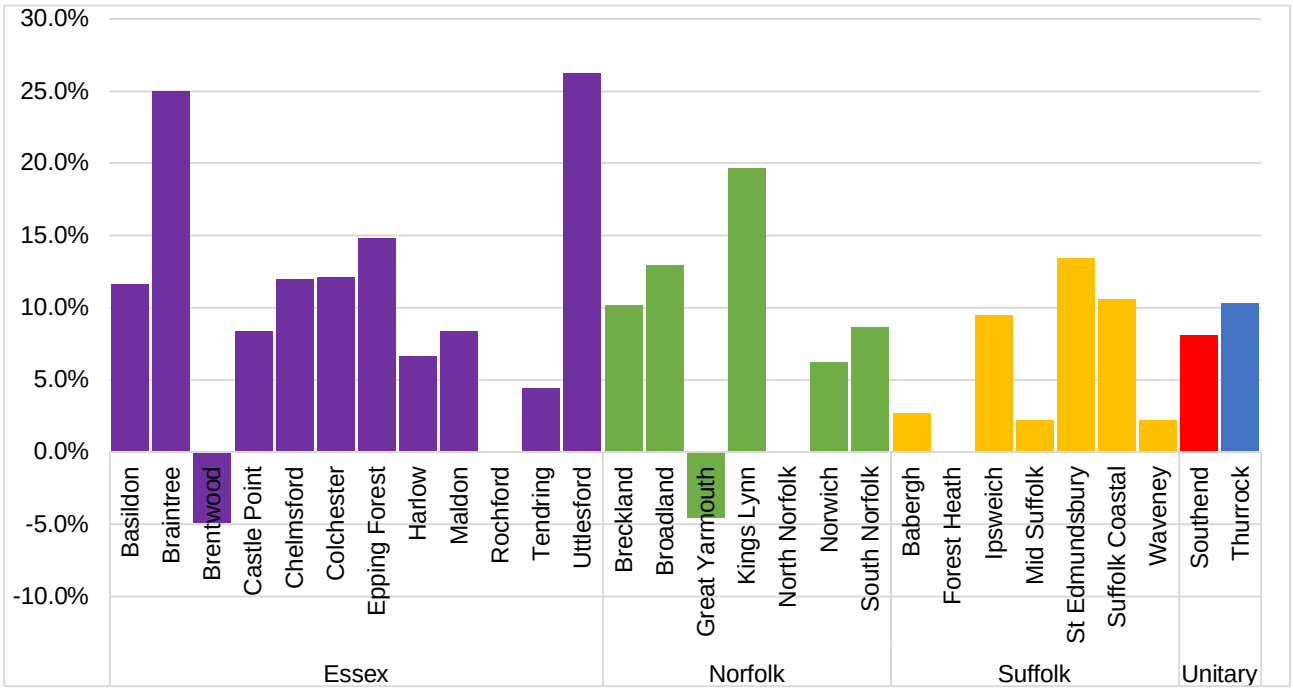
Figure 4-12 – Workplace Population Density



4.4.23. Figure 4-12 below highlights the economic importance of the primary centres of the Transport East region. Improving connectivity between and to the major employment centres will improve access to jobs, education and increase the attractiveness of the East as a place to live, learn, work and invest. Improving connectivity beyond the Transport East region to London, Cambridgeshire and Hertfordshire will open up further opportunities for residents to access jobs and businesses to access new markets.

4.4.24. Across the Transport East region there are wide disparities between the level of new job creation. Figure 4-13 summarises the percentage increase in jobs by district between 2013 and 2017.

Figure 4-13 – Percentage Growth in Jobs between 2013 and 2017



4.4.25. Figure 4-13 shows that job growth ranges from -4.9% to 26.2% across the Transport East region, highlighting the disparity in recent economic performance. Fast growing districts include Uttlesford (highlighting the economic importance of London Stansted Airport), Braintree and Kings Lynn which have achieved over 20% job growth in the past 5 years.

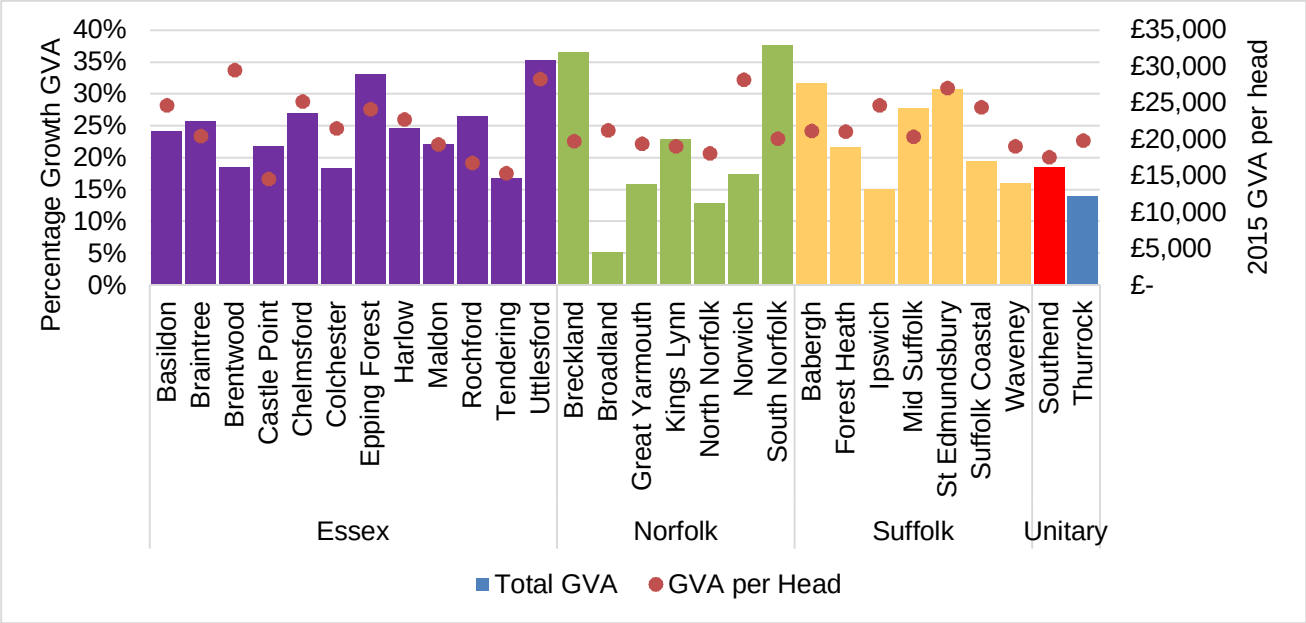
4.4.26. In Essex, districts including Brentwood, Rochford and Tendring have struggled, as has Great Yarmouth, North Norfolk, Forest Heath, Mid Suffolk and Waveney to attract substantial job growth. Whilst a number of these areas are characterised by high levels of socio-economic deprivation and poor strategic transport connectivity (e.g. Great Yarmouth), others have lower levels of deprivation and strong strategic connectivity (e.g. Brentwood). This suggests that factors other than strategic transport connectivity have influenced job growth in the region.

PRODUCTIVITY

4.4.27. The Transport East region makes a substantial contribution to the UK economy generating a Gross Value Added (GVA) of £73.5 billion[30] (2015). The total GVA has grown by 28% in the past 10 years (2006-2015). However, the level of growth in total GVA lags slightly behind the national average (30%). Across the Transport East, total GVA growth has varied substantially.

4.4.28. Figure 4-14 shows that growth in total GVA ranges from 5% in Broadland in Norfolk to 38% in South Norfolk. Strong growth in GVA has also be experienced in Breckland, Uttlesford, Epping Forest and Babergh.

Figure 4-14 – Percentage growth in GVA between 2006 and 2015 and 2015 GVA per head by district



4.4.29. The size of the Transport East's economy is driven by the number of jobs, but also the productivity per worker (GVA per head). The lower level of total GVA growth in the Transport East region is also reflected in the lower GVA per head of £21,524[31] which is below the average for the East of England (£24,101) and England (£41,012). Across the Transport East region, Figure 4-14 shows there is a substantial range in GVA per head, ranging from £14,523 in Castle Point to £26,451 in Brentwood. In Norfolk, Norwich has the highest GVA per head being the main economic centre for the county. In Suffolk, St Edmundsbury achieves the highest GVA per head but is closely followed by Ipswich and Suffolk Coastal.

[30] Regional Gross Value Added (Income Approach) by Local Authority in the UK, Office for National Statistics, 2016

[31] Regional Gross Value Added (Income Approach) by Local Authority in the UK, Office for National Statistics, 2016

4.4.30. Figure 4-14 shows that the coastal districts typically have jobs with lower levels of GVA per worker (Castle Point, Tendring, North Norfolk, Great Yarmouth and Southend-on-Sea). In some cases the coastal communities suffer from poor connectivity to economic centres, whilst others are well connected into London and surrounding centres but likely to have principal industries that provide lower wages, with long distance commuting being prohibitively expensive.

BUSINESS CHARACTERISTICS

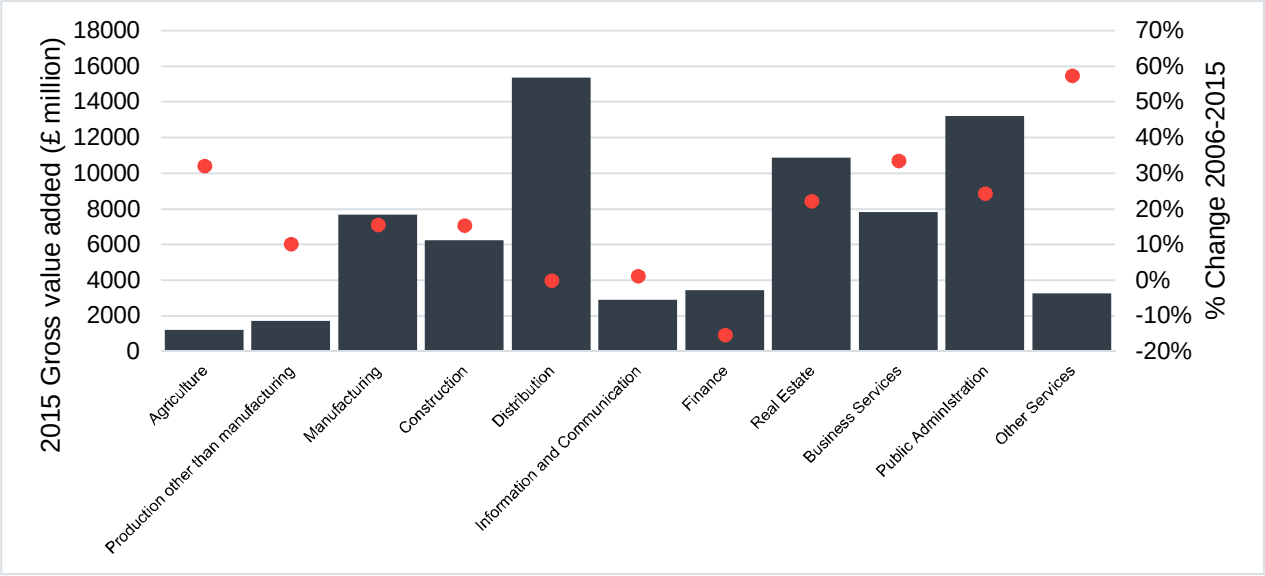
4.4.31. The Transport East region has a large and diverse business population with 140,115[32] enterprises. Of these, 138,895 operate in the private sector and 1,220 in the public sector. Since 2010 there has been a net increase in 21,945 private sector enterprises, a growth of 16%. The growth in the number of private sector businesses in the Transport East region lags behind England which has grown be 28.6% for the same period. Of the private sector enterprises in Transport East, 90% are micro-sized employing nine people or less. This is consistent with the figures for England with 89.8% of businesses being micro in scale.

4.4.32. Large business (greater than 250 employees) are concentrated in the main urbanised districts including Norwich, Southend-on-Sea, Chelmsford, Colchester, Ipswich and Babergh, highlighting their importance as economic centres within the region.

PRIME CAPABILITIES

4.4.33. The Transport East region has a diverse economic base with key strengths in distribution, manufacturing, ICT, agri-tech, biosciences, green energy production, financial industries and the visitor economy. Figure 4-15 shows the total GVA per industry sector for the Transport East region.

Figure 4-15 – Total GVA by Industry in 2015 and percentage change between 2006 and 2015

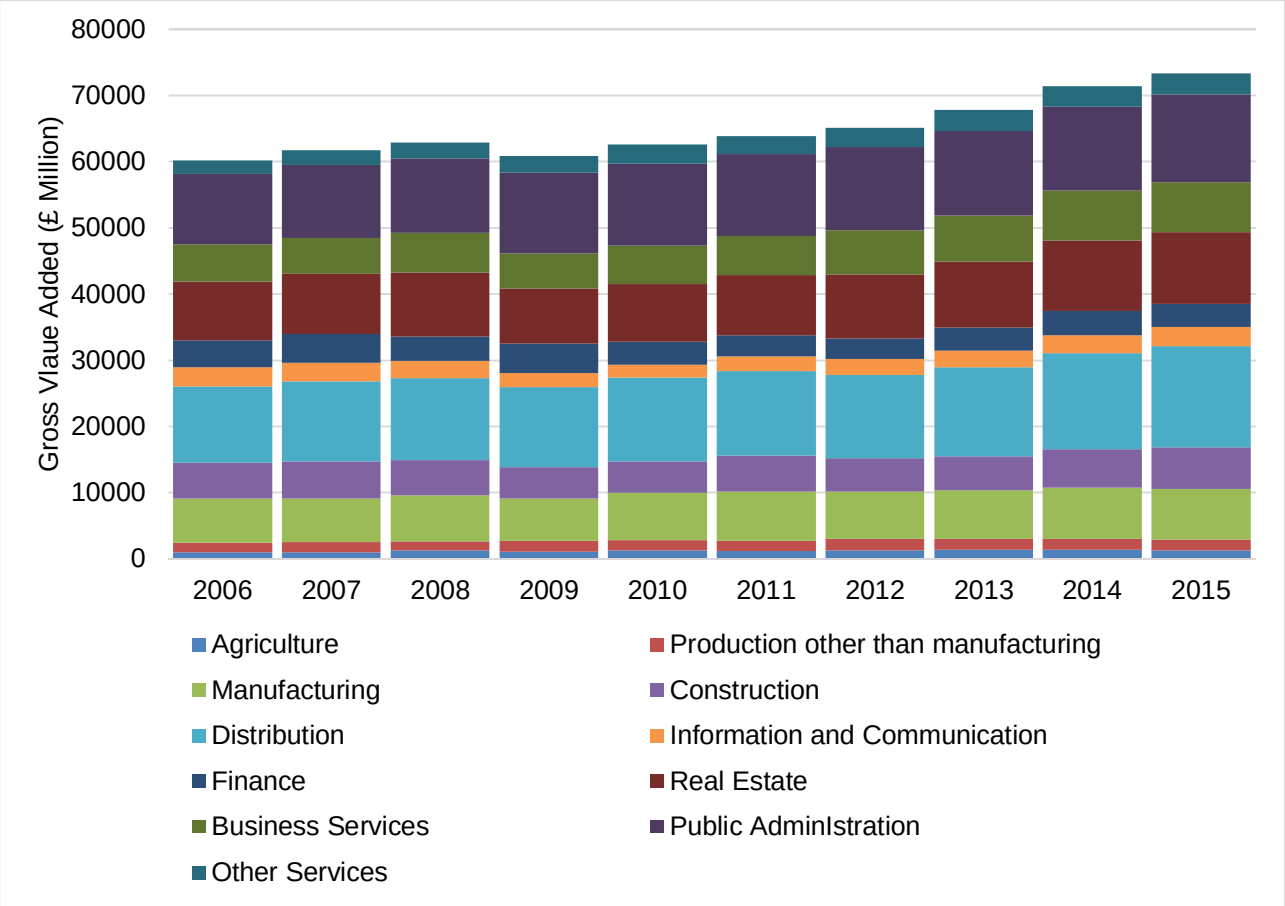


[32] UK Business County Nomis 2018

4.4.34. Figure 4-15 shows the main sectors by total GVA are distribution, public administration real estate and manufacturing. Distribution accounts for approximately 21% of the GVA, with public administration at 18% and real estate at 15%.

4.4.35. Figure 4-16 shows that over the past 10 years agriculture has increased substantially (by over 30%) along with a reduction in the finance sector (-15%). There has been strong growth in other services (+57%), business services (+33%) and distribution (+33%) over this period.

Figure 4-16 - Total GVA by Industry for the Period 2006-2015



4.4.36. Overall Transport East benefits from a diverse economy with significant strengths in the energy sector associated with the nuclear industry (Bradwell and Sizewell) and offshore renewables. There has been dramatic growth in the number of windfarms including Scroby Sands, Sheringham Shoal, Greater Gabbard, London Array, Gunfleet Sands and Galloper.

4.4.37. Construction, transport and logistics have particularly high importance, with the Transport East regions home to the UK's largest container port at Felixstowe and the international shipping ports of DP World London Gateway and Tilbury Ports in Thurrock. These international and national assets have a vital role to play in supporting the region as a global gateway as well as supporting the local manufacturing, food and drink and offshore energy sectors. These sectors are heavily dependent on good road and rail links to enable efficient and reliable access to markets.

4.4.38. Public services including education and health are important (and high-value) sectors in the Transport East region, driven by the presence of universities and regional health facilities. The creative and digital sector is growing. Life sciences including agri-bio tech, food and industrial biotech provides an important high value sector. Food production is a key industry, supporting the agricultural sector. There are significant food and drink companies including Kettle Chips, Britvic, Greene King, British Sugar and Birds Eye.

4.4.39. The Transport East region is a successful tourist destination with a thriving visitor economy that is vital to rural and coastal economies. The region includes holiday destinations on the Norfolk, Suffolk and Essex coastline including Great Yarmouth, Southwold and Southend-on-Sea. The unique natural assists and historical towns and villages plays an important role in making the Transport East region an attractive place to live, work and visit.

4.5 THE ENVIRONMENT

4.5.1. The delivery of transport interventions can be affected by proximity to protected areas such as Areas of Outstanding Natural Beauty, Sites of Special Scientific Interest and Heritage Assets. Transport improvements can also provide environmental benefits to existing communities including locations with designated Air Quality Management Areas and Noise Action Planning Important Areas.

4.5.2. The key environmental constraints within the Transport East region are outlined below and divided into key environmental topics. The information below has been informed by a desktop study undertaken in May 2019 and is supported by a series of Environmental Constraints Maps provided in Appendix B.

AIR QUALITY

4.5.3. There are 46 Air Quality Management Areas (AQMAs) within the Transport East region. The majority of the AQMAs are associated with roads or railways and are concentrated on major roads and / or in the urban centres such as Ipswich. The highest concentration of AQMAs can be found in Thurrock, which has 18. Southend-on-Sea has one AQMA, the rest are divided between Norfolk (4), Suffolk (11) and Essex (13).

NOISE AND VIBRATION

4.5.4. There are more than 100 Noise Action Planning Important Areas (NIAs) in the Transport East region, present in every district with varying concentrations and mostly small in size. All of the NIAs are associated with roads or railways and are mostly concentrated on major roads (most notably the A12, A13 and A127), road junctions / intersections and roads within urban areas. Of the urban areas in the Transport East region, Norwich has the highest concentration of NIAs.

CULTURAL HERITAGE

4.5.5. The Transport East region has a very high number of heritage assets present in all areas, rural and urban. There are hundreds of listed buildings (Grade I, II* and II), spread across most settlements in the Transport East region. The concentration of these listed buildings is highest in urban centres such as Colchester and Norwich.

4.5.6. As well as listed buildings, there are more than 100 Scheduled Monuments distributed throughout the Transport East region. Unlike listed buildings, the density of these assets is relatively consistent in both rural and urban settings.

4.5.7. There are more than 100 designated Parks and Gardens within the Transport East region. These are located mostly near but outside of urban areas, with the highest density of designated Parks and Gardens being found in Norfolk. There are no World Heritage Sites within the Transport East region.

4.5.8. There is one Registered Battlefield site in the Transport East region. This is located adjacent and south of Maldon, Essex.

4.5.9. Conservation areas are present in all the counties in the Transport East region. These conservation areas are concentrated in and around urban centres and villages such as Colchester rather than rural areas.

LANDSCAPE

4.5.10. Much of Essex is within the London Green Belt. Additionally, the Transport East region falls within multiple different National Character Areas (NCAs) which are unique and distinctive geographical areas throughout the UK. The NCAs are titled as follows:

- North West Norfolk;
- Mid Norfolk;
- The Brecklands;
- The Fens;
- South Suffolk and North Essex Claylands;
- South Norfolk and High Suffolk Claylands;
- Central North Norfolk;
- Suffolk Coast and Heaths;
- Northern Thames Basin;
- Greater Thames Estuary;
- The Broads; and
- North East Norfolk and Flegg.

4.5.11. Areas of Agricultural Land Classification are located across all counties in the Transport East region with the exception of Thurrock. Norfolk contains areas of Agricultural Land Class Grade 1 (excellent quality), Grade 2 (very good quality), Grade 3a (good quality), Grade 3b (moderate quality) and Grade 4 (poor quality). The majority of these areas are located adjacent to Norwich with the exception of a large Grade 1 area to the west of Thetford. Essex contains areas of Agricultural Land Class Grade 1, Grade 2, Grade 3a, Grade 3b, Grade 4 and Other, the majority of which are in east Essex. Suffolk contains areas of Agricultural Land Class Grade 2, Grade 3a, Grade 3b and Grade 4, the majority of which are in eastern and southern Suffolk. Thurrock and Southend-on-Sea are mostly urbanised, with no agricultural land classification areas except small portions of Agricultural Land Class Grades 3a in the northern part of Southend-on-Sea.

NATURE CONSERVATION

4.5.12. Multiple European designated sites are present within the Transport East region. Ramsar sites are most heavily concentrated on the Essex and Suffolk coasts, The Broads and North-West Norfolk (namely around King's Lynn). Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) are mostly concentrated around Thetford, The Broads and the coastal regions of Norfolk and Essex (as well as some small areas of Suffolk Coast).

4.5.13. Nationally designated sites are present throughout the Transport East region. Most notable is The Broads National Park, located in eastern Norfolk. Sites of Special Scientific Interest (SSSIs) are located throughout the Transport East Study Area and share similar geographic locations to the SACs and SPAs, being concentrated in the coastal areas of Norfolk, Essex and Suffolk as well as The Broads. National Nature Reserves (NNRs) are present in a few locations in limited numbers, mostly in the coastal region of the Transport East region. The largest area of NNR is located in the Old Lynn Channel near King's Lynn.

4.5.14. Local Nature Reserves (LNRs) are mostly associated with urban areas of the Transport East region, being concentrated on the edge of towns such as Southend, Colchester, Ipswich, Sudbury and Norwich.

4.5.15. There are areas of Ancient Woodland in all counties within the Transport East region, the largest coverage of Ancient Woodland is within Essex.

4.5.16. Areas of Priority Habitat Inventory (PHI) are located throughout the Transport East region. The most commonly occurring of these are Coastal and Floodplain Grazing Marsh (concentrated in river and coastal regions such as The Broads) and Deciduous Woodland.

ROAD DRAINAGE AND THE WATER ENVIRONMENT

4.5.17. The River Thames is located at the southernmost point of the Transport East region and is the largest inland water body. The Thames Estuary is within parts of Southend-on-Sea, Thurrock and Essex. Multiple other river networks run throughout Essex, Suffolk and Norfolk with estuaries along the North Sea coast. As well as rivers, other surface water features such as ponds, reservoirs, lakes and wetland are located throughout the Transport East region, particularly in Norfolk.

4.5.18. Much of Norfolk and Thurrock, correlated to the location of coastal and river waters, is categorised as Flood Zone 3 (high risk – having a greater than 1% annual probability of flooding) as well as a Flood Zone 2 (medium risk – 0.1 to 1% annual probability of flooding). Norfolk and Thurrock contain the largest area of flood zones relative to their size. In addition, Essex, Suffolk and Southend have some Flood Zone 3 and Flood Zone 2 areas, notably eastern Essex, western Suffolk (on the border with Cambridgeshire) and the Thames Estuary.

4.5.19. Large portions of Suffolk and central Norfolk are located within groundwater Source Protection Zones (SPZs). SPZs are groundwater sources that are used for drinking water supply, and are protected by this designation, alongside groundwater protection policy and pollution prevention measures. Most of the groundwater SPZs in the Transport East region are Zone III (total catchment) and Zone II (outer protection).

4.5.20. Norfolk and Suffolk are almost entirely within a Principal (Bedrock) Aquifer designated area. Small areas of Essex, Thurrock, Southend-on-Sea and Suffolk are a Secondary A (Bedrock) Aquifer designation. The remaining area (the majority of Essex, Southend-on-Sea and Thurrock) is all unproductive.

4.5.21. The majority of Essex, Thurrock, Suffolk and west Norfolk are within a Secondary (undifferentiated) (Superficial) Aquifer designated area. The second largest designated area is Secondary A (Superficial), located mostly in East Norfolk and East Essex. Smaller areas of Secondary B (Superficial) and Unknown (lakes and landslip) (Superficial) are also present.

4.5.22. Shoreline Management Plan Areas (SMPAs) cover almost the entirety of the coast and estuaries of the environmental study area; the only significant area without SMPAs is Thurrock.

GEOLOGY AND SOILS

4.5.23. The main characteristics of the geology (superficial and bedrock) underlying the environmental study area are as follows:

- Superficial: The majority is Till (Diamicton); Glacial Sand and Gravel; Alluvium (Clay, Silt and Sand); and Crag Group (Sand and Gravel). It should be noted that are some areas where there are no superficial records.
- Bedrock: The majority is White Chalk Subgroup (Chalk); Thames Group (Clay, Silt, Sand and Gravel); and Neogene and Quaternary Rocks (Undifferentiated Gravel, Sand, Silt and Clay). Smaller areas, mostly in the west and south of the Transport East Study Area, are made up of Bracklesham Group and Barton Group (Undifferentiated Sand, Silt and Clay), Grey Chalk Subgroup (Chalk), Lambeth Group (Clay, Silt, Sand and Gravel); and Gault Formation and Upper Greensand Formation (Undifferentiated Mudstone, Sandstone and Limestone).

4.5.24. The major soil types in the Transport East region are Stagnosols (Essex and Suffolk), Gleysols (Essex and Norfolk), Cambisols (Essex, Norfolk), Luvisols (Essex, Arenosols (Suffolk and Norfolk) and Leptosols (Norfolk).

4.5.25. Contaminated land sites are present within the environmental study area. Known locations of contaminated land are within the districts of East Suffolk, Chelmsford (Essex) and Castle Point (Essex).

4.5.26. Geological SSSIs are located in Norfolk, Suffolk, Essex and Thurrock. There is a total of 40 in Norfolk, 33 in Suffolk, 22 in Essex and 4 in Thurrock.

4.5.27. Southend-on-Sea, Thurrock, western Essex and southern Essex are all an area of medium Unexploded Ordnance Risk (UXO). Areas of high risk are present within Lowestoft (Suffolk), Great Yarmouth (Norfolk), Norwich (Norfolk), Aldeburgh (Suffolk), Southwold (Suffolk), Halstead (Essex), Dovercourt (Essex) and Burnham-on-Crouch (Essex).

PEOPLE AND COMMUNITIES

4.5.28. There is an extensive Public Right of Way (PRoW) (bridleways, cycleways and footpaths) network within the Transport East region. The network is spread throughout the Transport East region but is particularly concentrated around major cities and towns such as Norwich, Ipswich and Colchester. As well as PRoWs, National Trails and National Cycle Network routes are present with the Transport East region. Peddar's Way and Norfolk Coast Path, the National Trail, crosses west Norfolk (beginning east of Rushford) and north Norfolk (ending in Cromer). National Cycle Network routes are present in South Essex, Thurrock, South Suffolk and Norfolk.

4.6 TRANSPORT NETWORK

RAIL NETWORK

4.6.1. The railway network in the Transport East region consists of three main radial routes (Great Eastern Main Line, West Anglia Main Line and Essex Thameside) connecting the main urban settlements with London and a number of limited east-west connections (Felixstowe to Ipswich, Ipswich to Cambridge, Norwich to Cambridge and Norwich to Peterborough via Ely). Each of the main radial routes have a series of branch lines providing connectivity to a range of inland and coastal communities including Sheringham, Great Yarmouth, Lowestoft, Felixstowe, Harwich, London Stansted Airport, Sudbury, Braintree, Walton-on-the-Naze, Clacton-on-Sea, Southminster, Southend-on-Sea, Shoeburyness, Tilbury, Grays and Purfleet in Thurrock. A summary of the network is provided below.

4.6.2. The Great Eastern Main Line (GEML) provides a radial connection through Norfolk, Suffolk and Essex into London Liverpool Street. It serves a number of main settlements including Shenfield, Chelmsford, Colchester, Ipswich, Lowestoft, Norwich, Cromer and Great Yarmouth.

4.6.3. The West Anglia Main Line provides a radial connection through Norfolk, Cambridgeshire, Essex and Hertfordshire into London Liverpool Street. It serves London Stansted Airport as well as Harlow and Kings Lynn.

4.6.4. The Essex Thameside Line provides east-west rail connectivity from Shoeburyness and Southend Central into London (Fenchurch Street). The Essex Thameside route provides connections to the GEML via the Upminster Branch, Thurrock via the Tilbury Loop and orbital London routes (Gospel Oak to Barking) at Barking Station.

4.6.5. The Cross country rail corridor via Ely includes two routes. The southern route is the Haughley Junction corridor via Cambridge, Bury St Edmunds, Stowmarket and Ipswich to Felixstowe, and the northern route is the Breckland Line to Norwich via Thetford and Ely. From Ely, the cross-country rail corridor continues west to Peterborough. Both rail corridors provide direct rail access to the WAML at Ely and Cambridge. These two Cross country routes serve Cambridgeshire, Norfolk and Suffolk and provide wider connectivity towards to Midlands.

4.6.6. In addition to the above, eight London Underground Stations are located in Epping Forrest. All of these stations are situated on the Central Line which runs between Epping and West Ruislip via central London.

STRATEGIC ROAD NETWORK

4.6.7. The SRN, owned and operated by Highway England, is one of the country's most important pieces of economic infrastructure. As the backbone of the UK transport network, the SRN carries more than 30% of journeys and more than 65% of all road freight journeys[33].

4.6.8. In the Transport East region, the SRN provides direct access to London Stansted Airport, three major freight container ports (Port of Felixstowe, Hawich Port and Tilbury) and connects many of the largest towns and cities in the region including Norwich, Ipswich, Colchester, Chelmsford, Thurrock with the rest of the UK. The efficient operation of the SRN network has a key role to play in supporting economic growth in the Transport East region.

4.6.9. In the Transport East region, the SRN comprises of both motorways and A roads. Essex and Thurrock are the only county / unitary authority in Essex that have motorway standard connection. Essex has 76.8km (M11 and M25) of motorway and Thurrock has 4.9 km of motorway (M25)[34]. The rest of the SRN network in the Transport East region is formed of dual and single carriageway standard A roads.

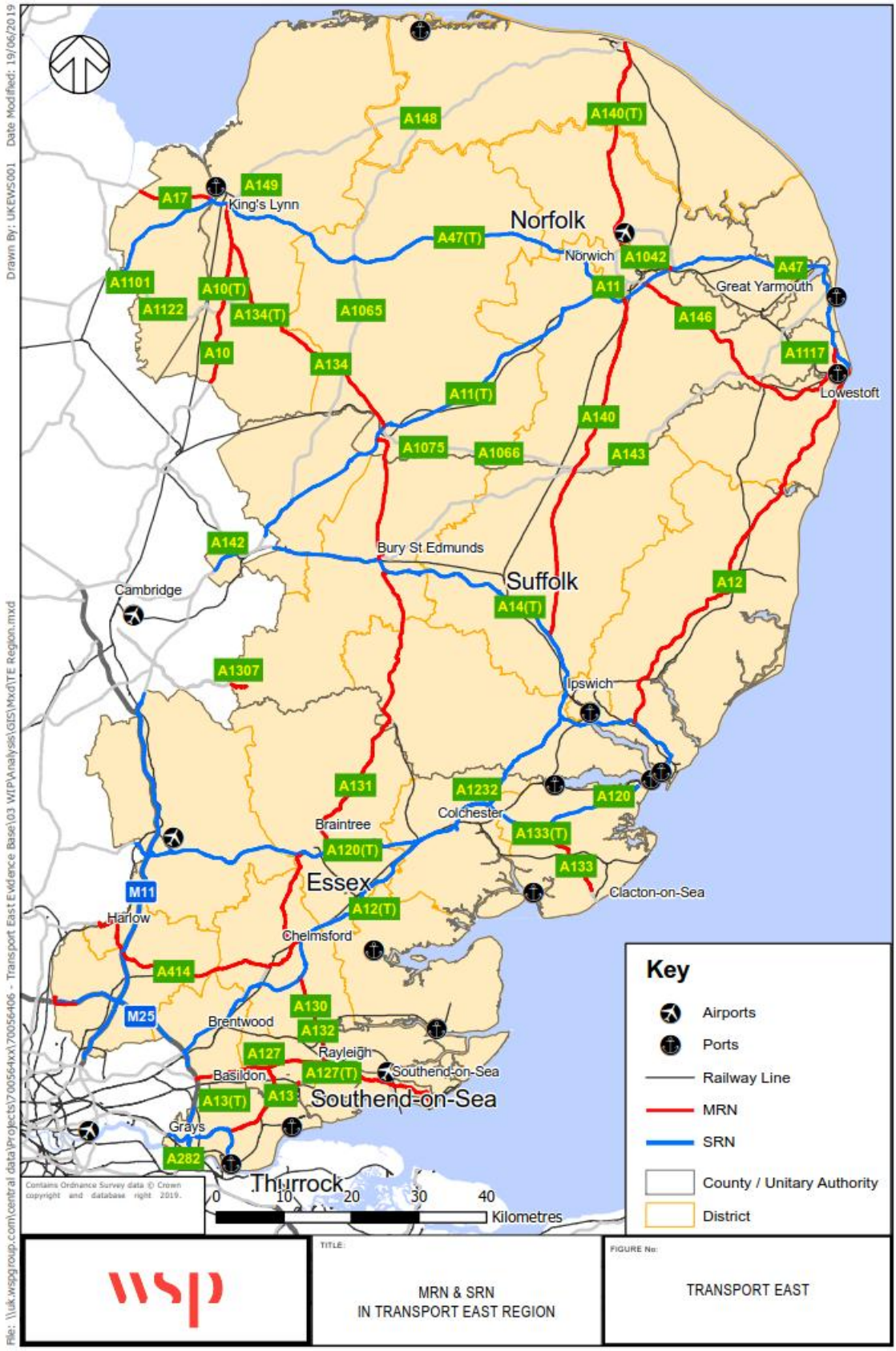
4.6.10. Many of the single carriageway A roads on the SRN are of a poor standard with frequent at-grade junctions and side accesses. This includes the A47 between Acle and Great Yarmouth, A47 between King's Lynn and the A1 and A120 between Mark's Tey and Braintree. At peak times link and junction capacity issues along these links results in high levels of congestion and delay. This is discussed further in Section 5.

MAJOR ROAD NETWORK

4.6.11. The MRN is a proposed middle tier road network comprised of the country's busiest and most economically important local authority 'A' roads that sits between the SRN and the local road network. Whilst the MRN forms a new middle tier road network, the management and responsibility for maintaining this network will remain with the Local Highway Authority. The MRN and SRN in the Transport East region is shown in Figure 4-17 below.

[33] Road Traffic Statistics, Department for Transport, 2015
[34] Table RDL0202b, Major road dual carriageway road length (kilometres) by road type and local authority in Great Britain, Department for Transport, 2017

Figure 4-17 – Major Road Network Map, Transport East region



4.6.12. The map shows the MRN in the Transport East region to consists of a combination of single and dual carriageway A-roads that connect into the SRN, serving major towns and cities across England. In the Transport East region, the MRN provides important north-south connectivity within Norfolk and Suffolk (A140, A12, A146, A131, A134, A1307) and east-west connectivity in Essex, Southend-on-Sea and Thurrock (A127, A13, A130, A133 and A1159).

STRATEGIC TRANSPORT CORRIDORS

4.6.13. The transport network and its strategic road and rails corridors have a key role to play in driving economic growth by providing business connectivity, access to international gateways and supporting labour market commuting catchments. To demonstrate the importance of the strategic transport network in the Transport East region, fifteen strategic transport corridors have been identified, comprised of the north-south, east-west strategic road (SRN and MRN) and rail routes that provide connectivity across the Transport East region and into the neighbouring regions.

4.6.14. The road and rail routes that comprise the fifteen strategic transport corridors, along with the main settlements that they serve, are described in detail below.

1. A17: King's Lynn to A1 (Newark-on-Trent)

4.6.15. This corridor is solely comprised of the A17 MRN.

4.6.16. The corridor runs in a north-west / south-east direction thorough many small towns and villages in Norfolk, Lincolnshire and Nottinghamshire. It connects the A47 at King's Lynn with A1 and A46 at Newark-on-Trent in Nottinghamshire.

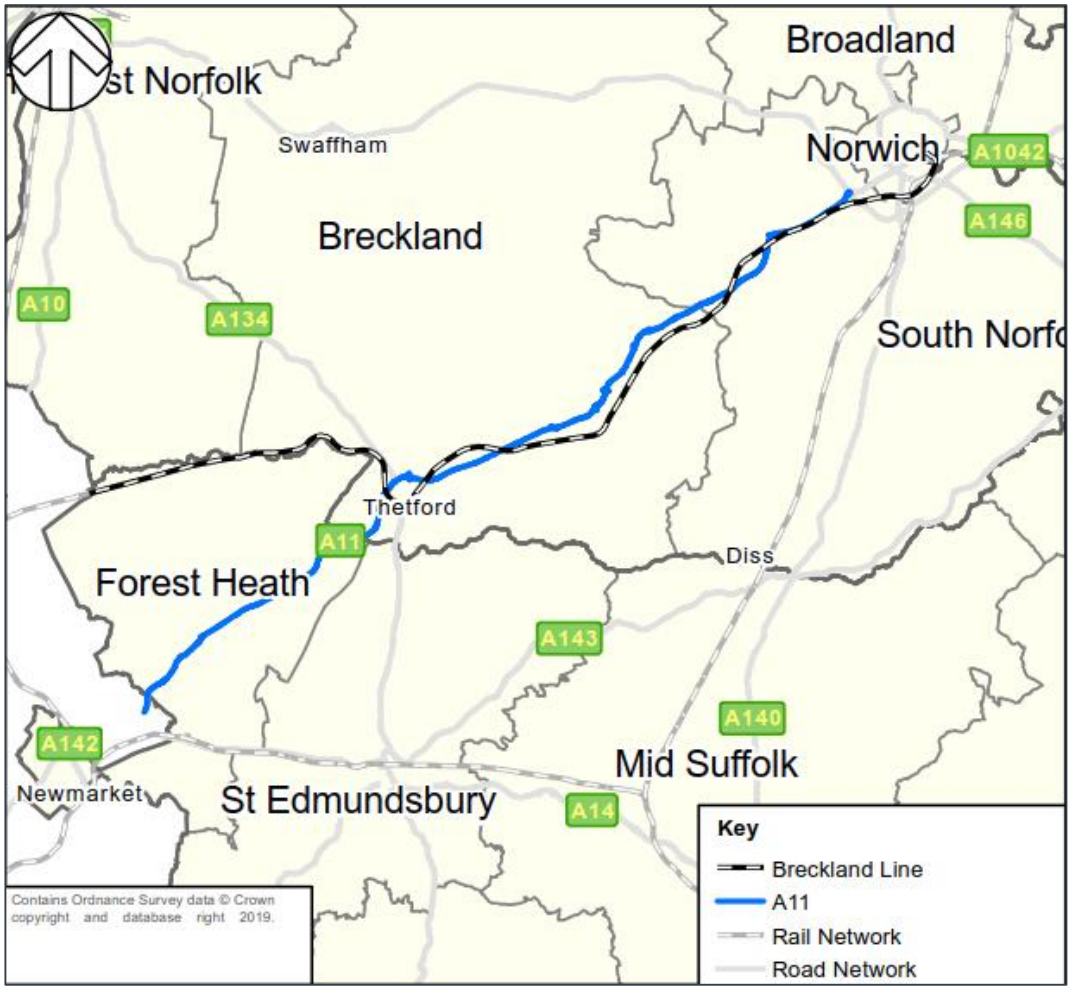
2. A47 / Wherry Line: A1 Peterborough – King's Lynn – Norwich – Great Yarmouth - Lowestoft

4.6.17. The A47 is one of the main east-west economic corridors in the Transport East region. The A47 SRN is a 111-mile (178 km) east-west A-Road connecting the A1 at Peterborough with Lowestoft, via King's Lynn, Norwich and Great Yarmouth. The direct connection to the A1 at Peterborough provides onward connections to the Midlands and north of England. The A47 provides a link to key international gateways including Norwich International Airport and Great Yarmouth, King's Lynn and Lowestoft Ports.

4.6.18. Within the Transport East region this corridor is comprised of the A47 SRN and routes in an east / west direction between Wisbech and Great Yarmouth and north / south direction between Great Yarmouth and Lowestoft. The corridor also includes the Wherry Rail Line between Norwich and Great Yarmouth and Norwich and Lowestoft. The poor standard of the A47 SRN route leads to slow and unreliable journeys.

3. A11 / Breckland Line: Norwich – Cambridge – London

4.6.19. The A11 provides a strategic link between Norwich (a primary economic centre in the Transport East region) and the high performing economy in Cambridgeshire. The A11 also provides a vital connection to the A14 and M11 SRN corridors, which provide links to the north of England, midlands, Port of Felixstowe, Stansted Airport and London.



4.6.20. Within the Transport East Region, the corridor is comprised of the A11 SRN and the Breckland Rail Line. The A11 connects the M11 Junction 9 near Saffron Walden and A47 south of Norwich. The corridor runs in a south-west / north-east direction and is the main route between Cambridgeshire and Norfolk. The corridor serves the settlements of Cambridge, Newmarket, Thetford, Attleborough, Wymondham and Norwich.

4.6.21. The road is a 2-lane dual carriageway for its entirety and partially grade separated. The road is managed by Highways England and forms part of the SRN. It provides connectivity to the wider SRN at Junction 9 of the M11, Junction 36 and 38 of the A14 and at the northern end of the route with the A47.

4.6.22. The corridor also includes the Breckland Line, a cross country rail route that connects Norwich and Cambridge and provides onward links to the Midlands and north of England. For the section between Norwich and Thetford the railway runs parallel to the A11.

4. A14 / Ipswich-Ely Line / Felixstowe Branch Line: Midlands – Cambridge – Ipswich - Felixstowe

4.6.23. The A14 is one of the main east-west economic corridors in the Transport East region. It is a 127-mile (204 km) A-Road that connects the M6 at the Catthorpe Interchange at the end of the M6 and Junction 19 of the M1 in Leicestershire with the Port of Felixstowe.

4.6.24. The road is managed by Highways England and forms part of the SRN. It runs in an east-west direction serving Cambridge, Newmarket, Bury St Edmunds, Stowmarket, Ipswich and Felixstowe. The road provides connectivity to the wider SRN at Junctions 36 and 38 for the A11 and Junction 55 for the A12. The corridor also provides access to the A1 and A1(M) at Huntingdon and M1 and M6 at Catthorpe. These provide links to the West Midlands, north of England and London.

4.6.25. Within the Transport East region, the corridor is comprised of the A14 SRN, Ipswich-Peterborough Rail Line and Felixstowe Branch Rail Line. The corridor is the main route to the Port of Felixstowe. As such the performance and resilience of this corridor to accidents and incidents is vitally important for the success and growth of the Port of Felixstowe and is discussed further in Section 6 of this report.

4.6.26. The corridor includes the cross-country rail line from Felixstowe to Peterborough via Ely and serves freight services travelling to and from the Port of Felixstowe. The cross-county rail line provides passenger services between Felixstowe, Ipswich, Stowmarket, Bury St Edmunds and then splits at Ely towards Cambridge and Peterborough respectively. The cross-county rail corridor is one of the main routes for rail freight services from the Port of Felixstowe to the North and Midlands.

5. A120 / A12 / A133 / Mayflower Rail Line: Harwich / Clacton-on-Sea – Colchester – Braintree – Stansted Airport

4.6.27. The Stansted to Harwich corridor is comprised of the A120 SRN, A12 SRN, Mayflower Rail Line between Manningtree and Harwich and Sunshine Coast Line between Colchester and Clacton-on-Sea and Walton-on-the-Naze. The road provides connectivity to the wider SRN at Junction 8 of the M11 and Junctions 25 and 29 of the A12. This provides links towards Cambridge, Ipswich and London.

4.6.28. The A120 is a major economic corridor connecting business and towns and major international gateways including London Stansted Airport and the Port of Harwich. As such the performance and resilience of this corridor to accidents and incidents is vitally important for the success and growth of London Stansted Airport and Harwich Port. This is discussed further in Section 6 of this report.

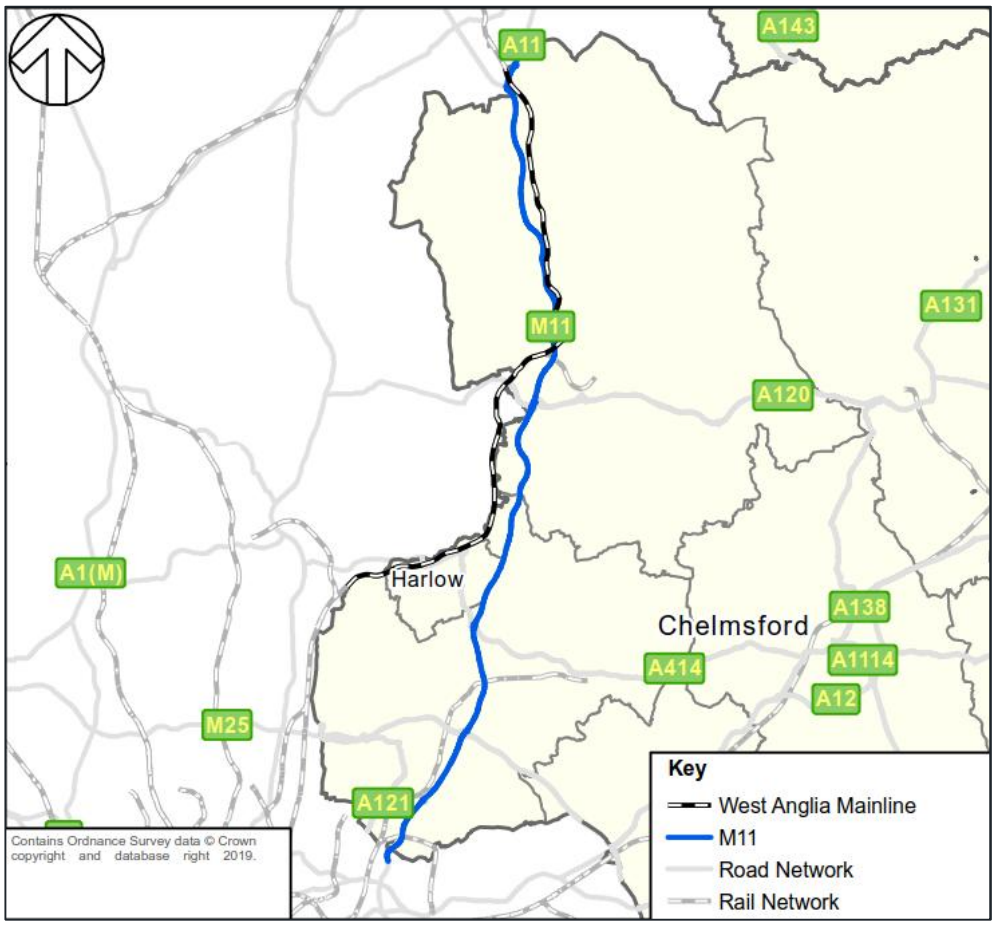
4.6.29. The corridor is principally comprised of the A120. The road runs in an east west direction through Essex and serves the settlements and of Great Dunmow, Braintree, Colchester and Harwich and changes between a 2-lane dual carriageway and single carriageway. Between Mark's Tey (A12 Junction 25) and Colchester (A12 Junction 29) the route joins the A12. Only the section between M11 Junction 8 / Bishop's Stortford and Harwich forms part of the SRN. The section between the A10 at Standon and the M11 Junction 8 / Bishop's Stortford is managed by the Local Highway Authority.

4.6.30. The A133 connects the A120 at Great Bromley with Clacton on Sea and is principally single carriageway. The A133 serves the villages of Weeley, Weeley Heath, Little Clacton and town of Clacton-on-Sea. The A133 is the main route towards Colchester from a number of popular seaside towns and villages along the north Essex coast, including Frinton-on-Sea and Walton-on-the-Naze as well as the seaside resort of Clacton-Sea.

4.6.31. The corridor also includes the Mayflower and Sunshine Coast rail lines. Both lines are branches off the Great Eastern Mainline. The Mayflower Line is a branch line from Manningtree towards Harwich and the Sunshine Coast Line is a branch line from Colchester towards Clacton-on-Sea and Walton-on-the-Naze. At present the Mayflower Line does not serve any rail freight traffic travelling towards the Port of Harwich.

6. M11 / West Anglia Mainline: London – Stansted Airport – Cambridge

4.6.32. The London to Cambridge corridor is comprised of the M11 SRN and West Anglia Main Line and provides the main road and rail connections to London Stansted Airport.



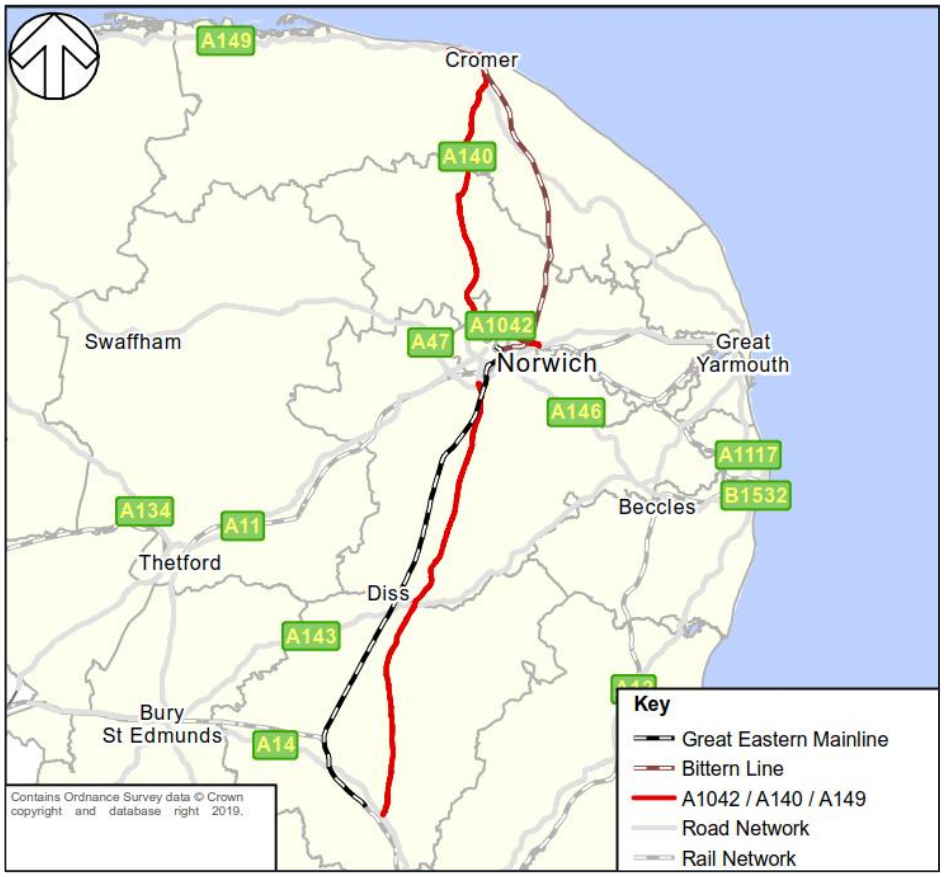
4.6.33. The M11 is 55-mile (89 km) motorway that connects the A406 North Circular in South Woodford, north east London with the A14 northwest of Cambridge. The motorway routes through Essex in a north / south direction providing strategic connectivity between east London, Harlow, Bishop's Stortford, London Stansted Airport and Cambridge. The motorway provides access to the wider SRN at Junction 6 for the M25, Junction 8 for the A120, Junction 9 for the A11 and Junction 14 for the A14. Between junction 4 and 8 the M11 is a three-lane dual carriageway. Between junctions 8 and 14 the M11 is a two-lane dual carriageway.

4.6.34. The corridor also includes the West Anglia Mainline that runs between London and Ely via Cambridge and a single-track spur between Stansted Mountfitchet and Elsenham that serves London Stansted Airport.

4.6.35. The corridor is also the main north-south strategic route to London Stansted Airport. As such the performance and resilience of this corridor to accidents and incidents is vitally important for the success and growth of London Stansted Airport. This is discussed further in Section 6 of this report.

7. A1042 / A140 / A149 / Great Eastern Main Line / Bittern Line: Ipswich – Norwich – North Norfolk

4.6.36. This corridor is comprised of the A1042 MRN, A140 MRN and A149 MRN, Bittern Line between Norwich and Cromer and Great Eastern Mainline between Norwich and London. The corridor also includes the recently opened A1042 Broadland Northway, a new dual carriageway to the north east of Norwich.



4.6.37. The corridor is comprised of two parts, the section between Norwich and North Norfolk and the section between Norwich and Ipswich. The two sections are connected by the A47 which runs in an east-west direction to the south of Norwich.

4.6.38. The section of the corridor between Norwich and North Norfolk is principally comprised of the A140 and A1042 Broadland Northway. The A140 is a single carriageway road that runs in a north-south direction between Norwich and Cromer, providing access to the villages of Hevingham, Marsham, Aylesham, Banningham and Roughton. This section of the corridor serves local traffic travelling to / from Norwich as well as strategic movements to / from holiday destinations along the North Norfolk Coast.

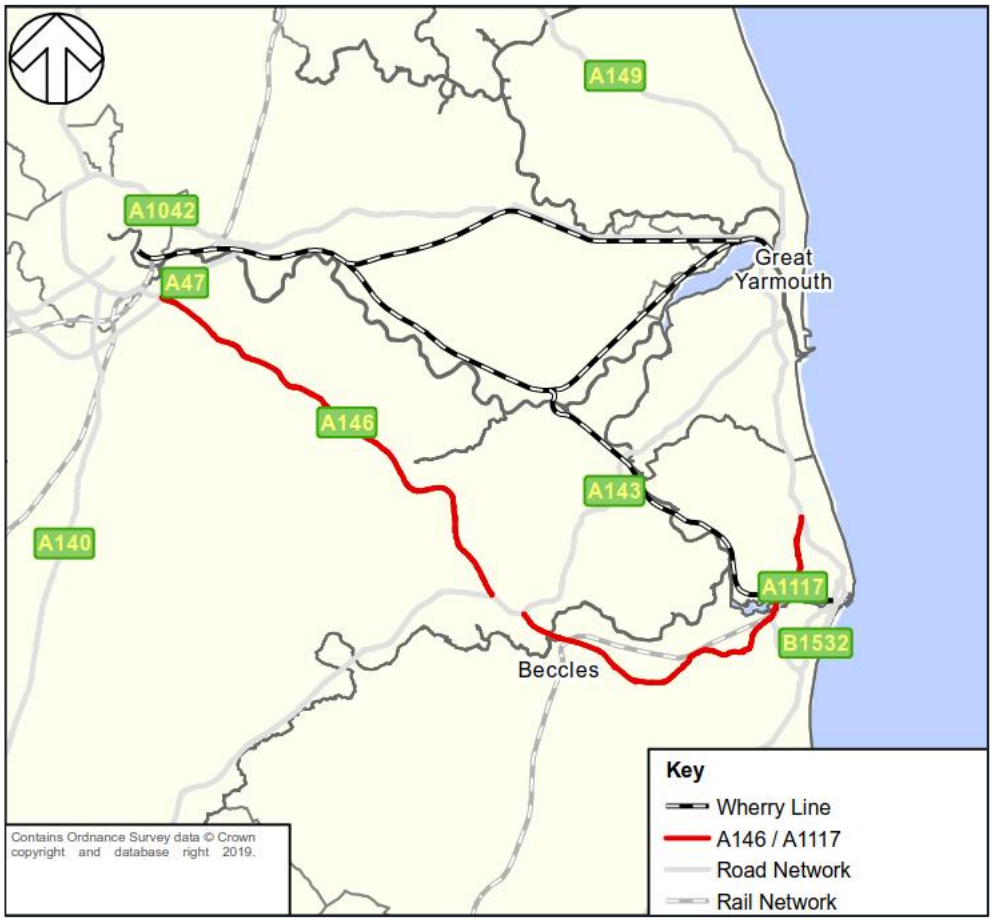
4.6.39. The A1042 Broadland Northway connects the A47 and A140 to the north of Norwich and serves Norwich Airport. The recently opened dual carriageway provides improved strategic connectivity to the airport from the A47 to the south, removing the need to travel through the centre of Norwich via the A140.

4.6.40. The section of the corridor between Norwich and Ipswich is comprised of the A140. It connects the A47 at Norwich with the A14 at Newmarket and which provides onward connectivity towards Ipswich. This section of the corridor serves the settlements of Diss, Scole, Long Stratton and Eye and is one of the primary north-south routes to Norwich and North Norfolk Coast from settlements in Suffolk and Essex. Norfolk and Suffolk local authorities both recognise the strategic importance of this section of the A140 in linking the economic centres of Ipswich and Norwich.

4.6.41. The corridor is also served by the section of the Great Eastern Mainline between Ipswich and Norwich and the Bittern Line between Norwich and Sheringham via Cromer.

8. A146 / A1117 / Wherry Line: Norwich – Lowestoft

4.6.42. This corridor is comprised of the A146 MRN, A1117 MRN and Wherry Line.



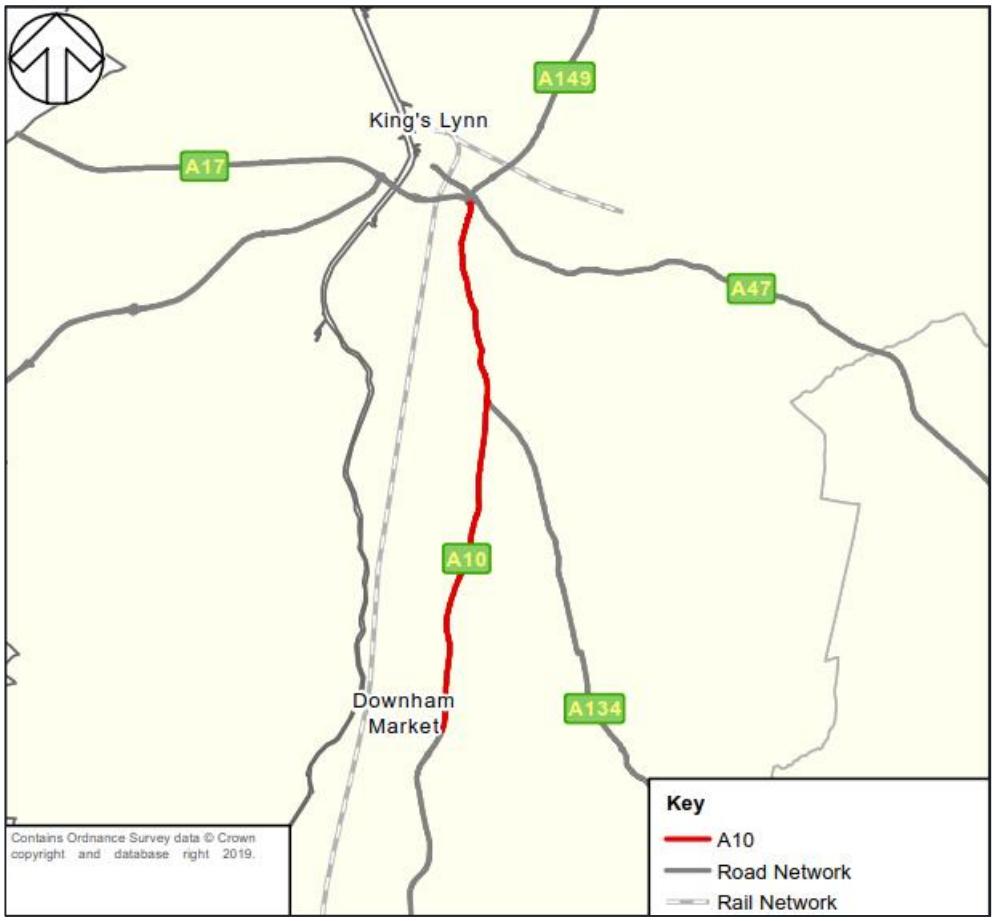
4.6.43. The corridor connects the A47 to the south east of Norwich with the A47 at Lowestoft. The A146 is a single carriageway road that runs in a south-east direction via Loddon, Beccles and Carlton Colville. The A146 connects with the A1117 to the south of Lowestoft. The corridor also provides an alternative route to the Port of Lowestoft that avoids the A47.

4.6.44. The corridor is likely to have a vital role in supporting growth in the Transport East region as both Norwich and Lowestoft have been identified as key growth centres in Norfolk. The corridor is also served by the Wherry Line which runs between Norwich and Lowestoft, with a second branch towards Great Yarmouth.

9. A10 / Fen Line: King's Lynn – Cambridge – London

4.6.45. The A10 provides important north-south connectivity between Kings Lynn and the high performing Cambridgeshire economy. It has an important role in connecting these settlements as well as providing direct access to the A47, A17 and A14 corridors which is also provides strategic connectivity to the M11 corridor.

4.6.46. Within the Transport East region this corridor is comprised of the A10 MRN and Fen Line.

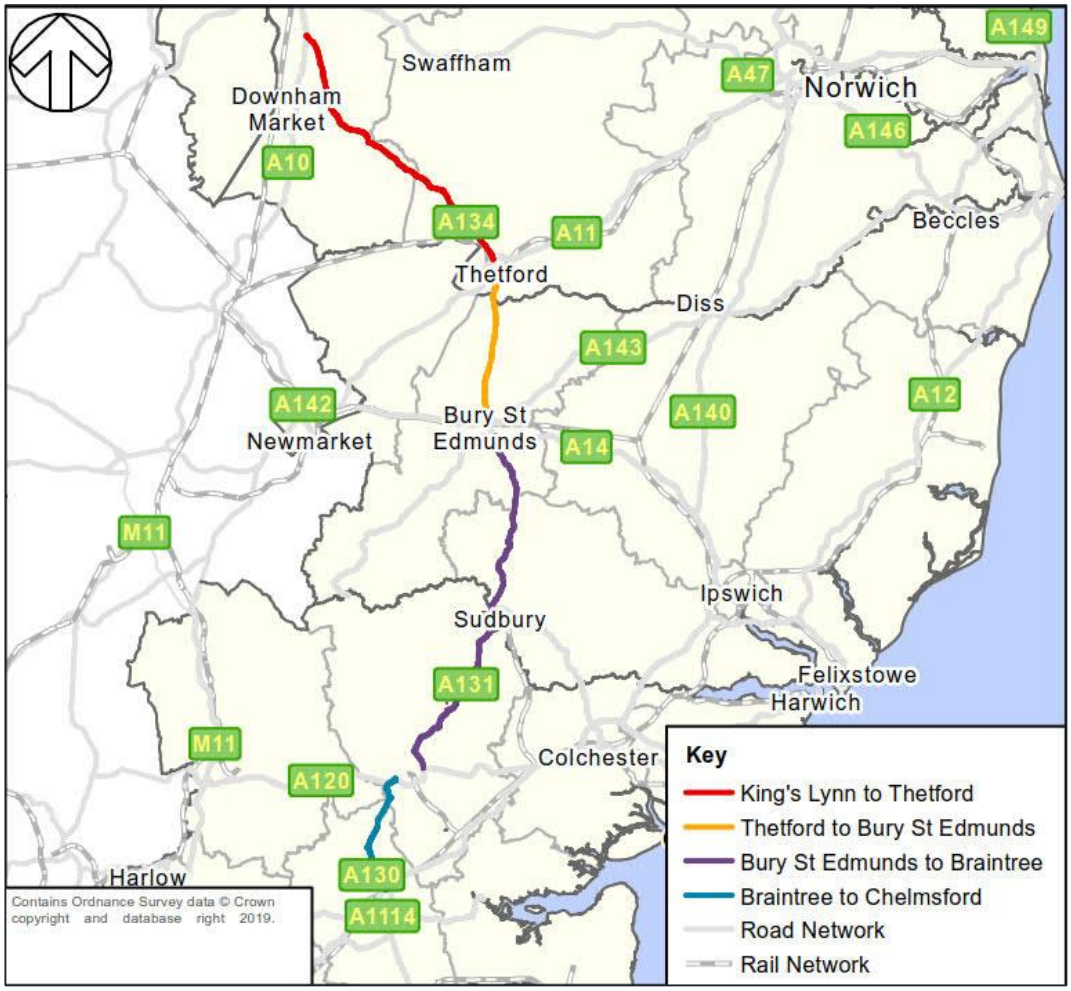


4.6.47. The Downham Market to Kings Lynn corridor is comprised solely of the A10. The A10 connects the A14 at Milton in Cambridgeshire with the A47 and A49 to the south of King's Lynn. It is a single carriageway road connecting the settlements of Cambridge, Ely, Downham Market and King's Lynn.

4.6.48. The corridor is also served by the West Anglia Mainline (between Cambridge and Ely) and Fen Line (between Ely and King's Lynn).

10. A10 / A134 / A131: Kings Lynn – Thetford – Bury St Edmunds – Braintree – Chelmsford

4.6.49. This corridor is comprised of the A10 MRN, A131 MRN and A134 MRN. Whilst this corridor is unlikely to be used by strategic north-south movements through the region (due to the availability of faster alternatives) it plays an important role in providing regional and sub-regional connectivity between market towns and villages in Norfolk, Suffolk and Essex.



4.6.50. The corridor can be divided into four sub-sections that provide important regional and sub-regional connectivity these are:

- **A134 / A10 - King's Lynn to Thetford**: This section of the corridor connects the A11 north of Thetford with the A47 south of King's Lynn. The A134 is a single carriageway road that runs in a north-west direction through Thetford Forest. It provides local connectivity to the villages of Mundford and Northwold. The A134 connects with the A10 between Tottenhill and Setchey.
- **A134 - Thetford to Bury St Edmunds**: This section of the corridor connects the A14 at Bury St Edmunds with the A11 at Thetford via Ingham and Barnham. Between the A14 and B1106 to the north of Bury St Edmunds the road is a dual carriageway. Between the B1106 and the A11 at Thetford the road is a single carriageway.
- **A134 / A131 – Bury St Edmunds to Braintree**: This section of the corridor connects the A14 at Bury St Edmunds with the A120 at Braintree. The A134 and A131 are both single carriageway roads and connecting at Sudbury. The roads provide local connectivity to settlements to the north of Essex / south west of Suffolk including Halstead, Sudbury and Long Melford. Strategic north

south movements within the region are unlikely to route via the A143, as the A12 / A14 and M11 / A11/ A14 routes provide more direct alternatives.

- **A131 – Braintree to Chelmsford**: This section of the corridor connects the A120 at Braintree with the A12 at Chelmsford and is an alternative route for vehicles travelling between the A120 and A12. Between Braintree and Great Leighs the road is a dual carriageway. Between Great Leighs and Chelmsford, the road is single carriageway.

11. A12 / GEML: Lowestoft – Ipswich – Colchester – Chelmsford - London

4.6.51. This corridor is comprised of the A12 MRN and SRN, Great Eastern Mainline between London and Ipswich and the East Suffolk Line between Ipswich and Lowestoft. It is one of the main strategic transport corridors through the Transport East region serving a number of large urban areas including Lowestoft, Ipswich, Colchester and Chelmsford as well as providing direct road and rail connectivity to / from London. Whilst this corridor is unlikely to be used by substantial strategic end-to-end road movements, it plays an important role in providing regional and sub-regional connectivity between Ipswich, Colchester, Chelmsford and London and Ipswich and the Suffolk coast.

4.6.52. The A12 is a 129-mile (208 km) A-Road that connects London with Lowestoft in Suffolk. Only the section between Junction 11 for the M25 and Junction 33 for Ipswich / A14 forms part of the SRN. The remainder of the route is managed by the respective Local Highway Authority.

4.6.53. The section of the A12 that forms part of the SRN runs through Essex and Suffolk providing important connectivity between Transport East economic centres of Brentwood, Chelmsford, Witham, Colchester and Ipswich. The road also provides connectivity to the wider SRN at Junction 11 for the M25, Junction 25 for the A120 and Stansted Airport, Junction 29 for the A120 and Harwich Port and Junction 33 for the A14 and Port of Felixstowe.

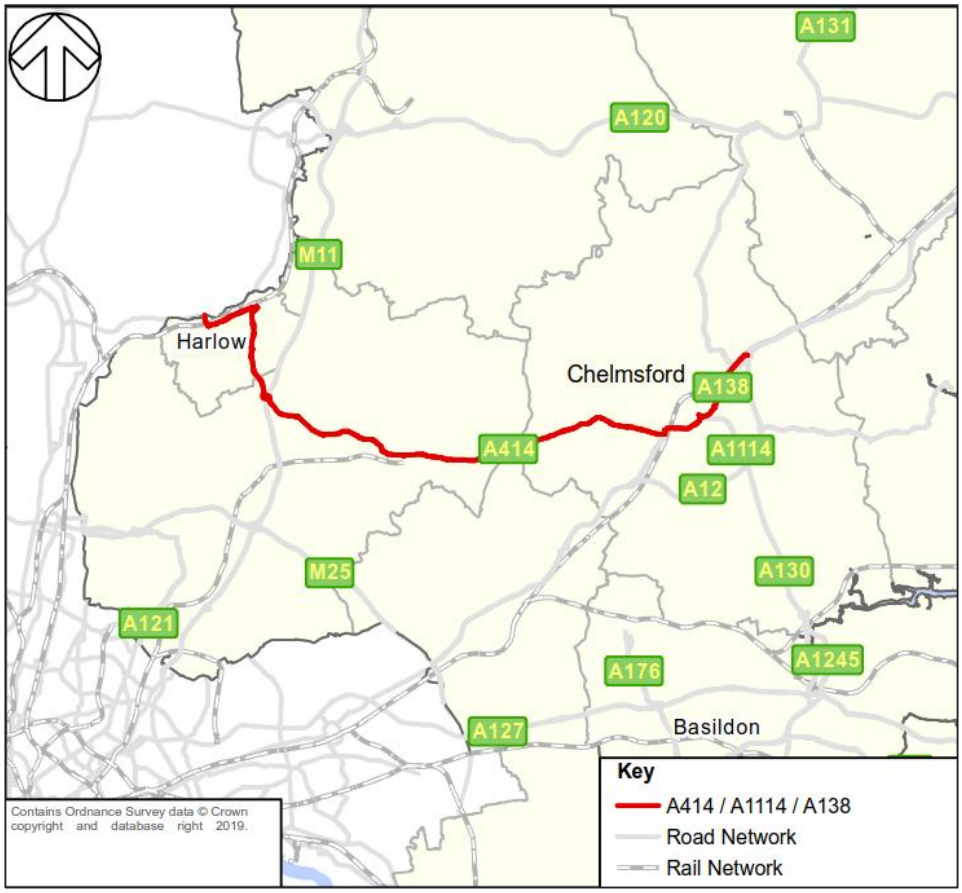
4.6.54. Between Junction 11 for the M25 and Junction 27 for Colchester the route frequently changes between a two and three-lane dual carriageway. Between junction 27 for Colchester and Junction 33 for Ipswich / A14 it the A12 is a two-lane dual carriageway.

4.6.55. The A12 continues from the A14 at Nacton, to the south east of Ipswich and runs in a north south direction towards Lowestoft. It is the primary route to Lowestoft from the south and provides access to the Suffolk Coastal and Heaths AONB, a popular destination for tourists.

4.6.56. The corridor is also served by the section of the Great Eastern Mainline between London and Ipswich and East Suffolk Line between Ipswich and Lowestoft. The route serves both passenger services as well as freight services travelling to / from Felixstowe via the cross London line.

12. A414 / A1114 / A138: Chelmsford – Harlow

4.6.57. This corridor is comprised of the A414 MRN, A1114 MRN and A138 MRN.

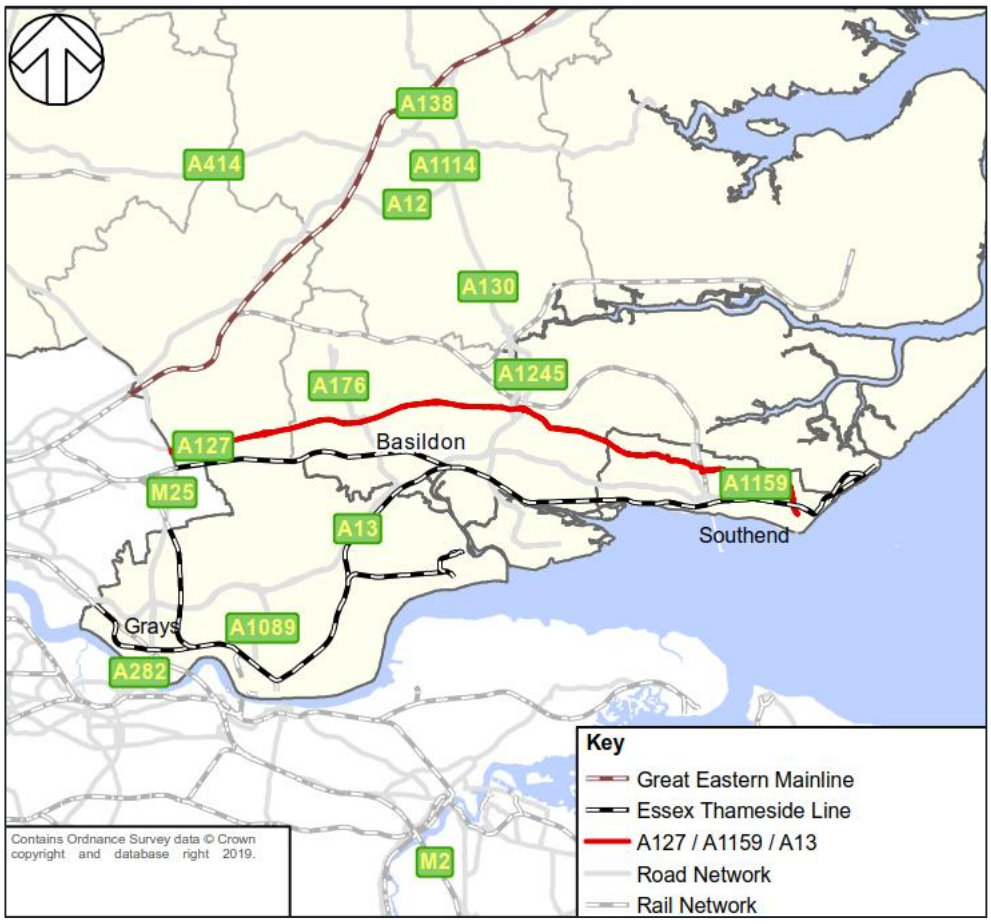


4.6.58. The corridor connects the A12 at Boreham to the north east of Chelmsford with Harlow. It runs in an east / west direction from the A12, through the centre of Chelmsford and connecting with the M11 at Hastingwood, southeast of Harlow. The corridor is partially dualled for the section between the A12 and Chelmer Village.

4.6.59. The corridor provides direct connectivity between key economic centres in Essex and provides important sub-regional east-west connectivity between the A12 and M11 SRN routes as well as local connectivity to many rural towns and villages in south Essex. It is likely that strategic traffic would not use this route and instead use the A12, M25 and M11 or A12, A12 and M11.

13. A127 / Essex Thameside: London – Southend-on-Sea

4.6.60. This corridor is comprised of the A127, A1159 and A13 MRN roads as well as the Essex Thameside line and a branch off the Great Eastern Mainline.



4.6.61. The corridor connects Junction 29 of the M25 near Upminster with the B101 at Shoeburyness via the A1159 and A13. The A127 London to Southend-on-Sea corridor is a major strategic route between East London and Southend-on-Sea, and is one of only two main access routes into the southern part of Essex, including Thurrock.

4.6.62. The A127 is dualled between the M25 and the junction with the A1159 (north) which serves London Southend Airport. The A159 (east) continues towards Shoeburyness, connecting with the A13. The A1159 is dualled for the majority of its length whereas the A13 is principally single carriageway.

4.6.63. The Essex Thameside line connects Fenchurch Street station in London destinations in Thurrock and south Essex. Southend-on-Sea and London Southend Airport area also directly served by a rail connection on the Shenfield to Southend branch of the GEML.

14. A13 / A176 / A130: London – Thurrock – Tilbury - Chelmsford

4.6.64. This corridor is comprised of the A13 SRN, A1089 SRN, A176 MRN, A13 MRN and A130 MRN and is the primary route to two major ports within the Transport East region, the Port of Tilbury and DP World London Gateway.

4.6.65. The A13 connects Purfleet (west of the M25) with the A130 at South Benfleet. It runs in an east-west direction through Thurrock. The A13 provides access to the Port of Tilbury via the A1089 to north east of Grays and DP World London Gateway via the A1014 at Stanford Le Hope (not part of the MRN). As such the corridors performance and resilience to accidents and incidents is vitally important for the growth and economic success of these ports and is considered further in Section 6.

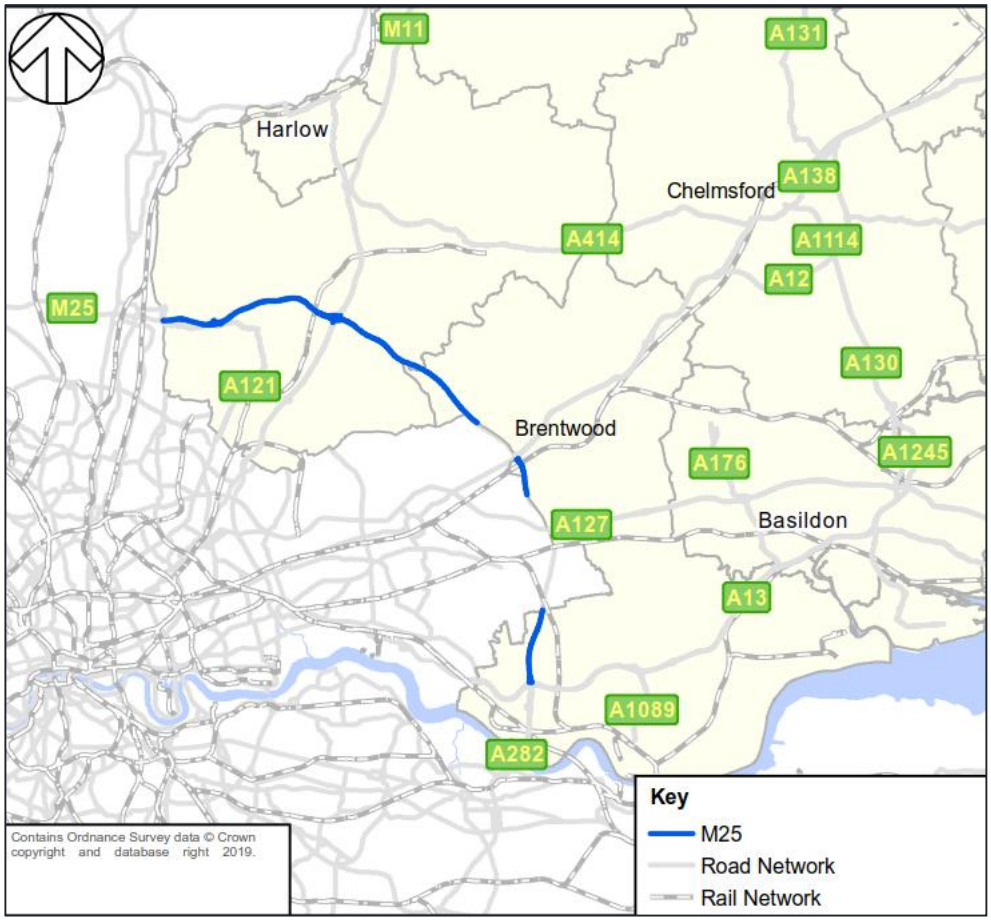
4.6.66. The A13 connects with the A130 at South Benfleet / junction for the A127. The A130 connects the A13 at South Benfleet with the A12 south of Chelmsford. This is the main route towards Southend-on-Sea, Grays, Basildon, Port of Tilbury, DP World London Gateway from the north of the Transport East region.

4.6.67. The A1089 and section of the A13 between the M25 and A1089 form part of the SRN and is managed by Highways England. The A13 east of the A1089 and A130 forms part of the MRN and are managed by the Local Highway Authority.

4.6.68. The corridor also includes the A176 which connects the A127 with the A13 to the west of Basildon. The corridor provides access to the economic centres of Grays and Basildon and provides links to Southend-on-Sea via the A127.

15. M25 North East Quadrant – Thurrock – A12 – M11

4.6.69. This corridor is the northeast quadrant of the M25 SRN. The M25 is a 117-mile (188 km) orbital motorway encircling most of Greater London and providing access to much of the UK via the wider SRN. The stretch of motorway between Junctions 25 and 31 runs through the south west of Essex and Thurrock providing strategic connectivity to north east London and settlements within the south west of Essex.



4.6.70. The motorway provides access to the SRN in the Transport East region at Junction 27 for the M11, Junction 28 for the A12 and Junction 30 for the A13. The motorway is principally a four-lane dual carriageway provides onward connectivity to Kent and south London via the Dartford Crossing. This is the most easterly crossing across the River Thames.

4.7 SUMMARY

- The Transport East region is home to a **population of approximately 3.5 million people** (18% of population of England).
- The **population of the region has grown by 7.6% between 2001 and 2011**. The highest proportions of population growth occurred in Uttlesford, Ipswich, St Edmundsbury, South Norfolk, Braintree and Colchester.
- The region has a rural geography, with **33% of residents living in rural areas** (compared to 19% across England).
- The region has an **aging population**. Between 2016 to 2041, the greatest increase in age categories in absolute terms will be those over 50 years with the biggest increase in the 70-74 years cohort. The greatest contraction in population will be the working age 45-49 years cohort.
- **Education attainment is below the average for the East of England and England as a whole** with a higher proportion of residents having no qualifications and lower proportion of residents having a degree or professional qualification. This has the potential to create a **skills deficit in the region** which in turn could affect the future growth and success of business in the region.
- **Deprivation varies considerably across the Transport East region**. The highest levels of deprivation occur within the district of King's Lynn and West Norfolk and within the coastal communities. High levels of deprivation are also occurring in neighbourhoods of some of the largest settlements in the region. The lowest levels of deprivation are generally observed along the main strategic transport corridors connecting the Transport East region with London.
- An average of **10,379 new homes have been delivered in the region each year**. Between 2017 and 2018 the highest number were delivered in Chelmsford, Colchester, Uttlesford and South Norfolk.
- The region has affordability constraints with the a**verage house prices in the region 20% higher than the national average** and nine times the average salary of the region. Connectivity to London has a strong influence on affordability, with district on the periphery of Greater London and along the major strategic transport corridors being the least affordable.
- The region makes a substantial contribution to the UK **economy generating a Gross Value Added (GVA) of £73.5 billion (2015)** representing approximately 5% of the £1.4 trillion GVA generated by England as a whole. However, **productivity in the Transport East region is lower than the average for the East of England**, with significant variation between districts and unitary authorities, ranging from 5% in Broadland in Norfolk to 38% in South Norfolk. GVA per head varies from 14,523 in Castle Point to £26,451 in Brentwood.
- The region has a **strong labour market** with 90.7% of economically active resident in employment compared to a national average of 88.8%, however there are **disparities in the level of new job creation across the region**.
- The region has a **diverse economic base** with key strengths in distribution, manufacturing, ICT, agri-tech, biosciences, green energy production, financial industries and the visitor economy. However, **business and job growth lags behind national trends.**

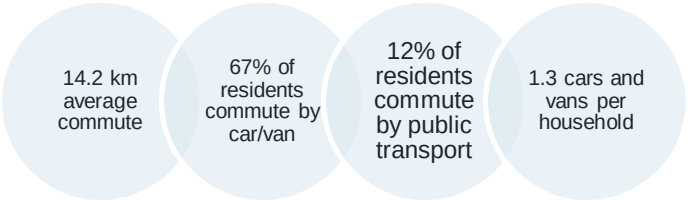
5 TRANSPORT ISSUES AND OPPORTUNITIES

5.1 OVERVIEW

5.1.1. This section presents the transport issues and opportunities in the Transport East region. It summarises the existing travel patterns of residents and workers in the Transport East region and provides an overview of the existing operation and performance of the fifteen strategic transport corridors in the region.

5.2 EXISTING TRAVEL PATTERNS

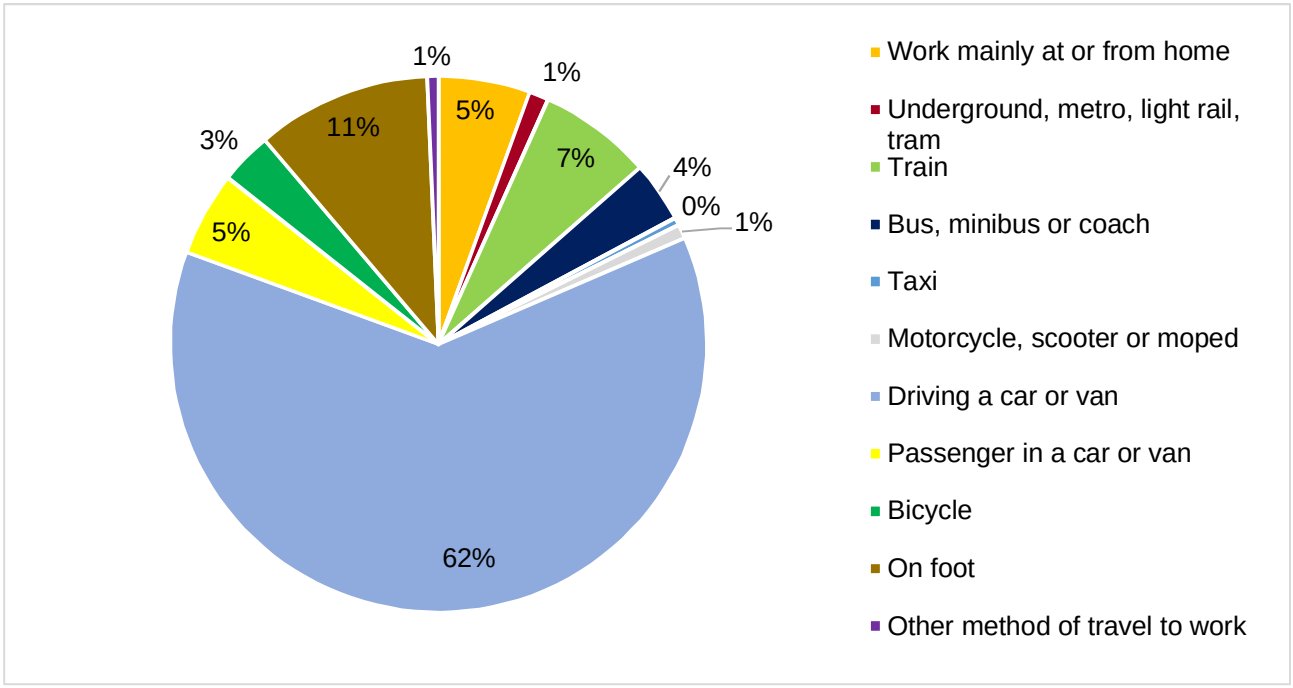
AT A GLANCE



COMMUTING MODE

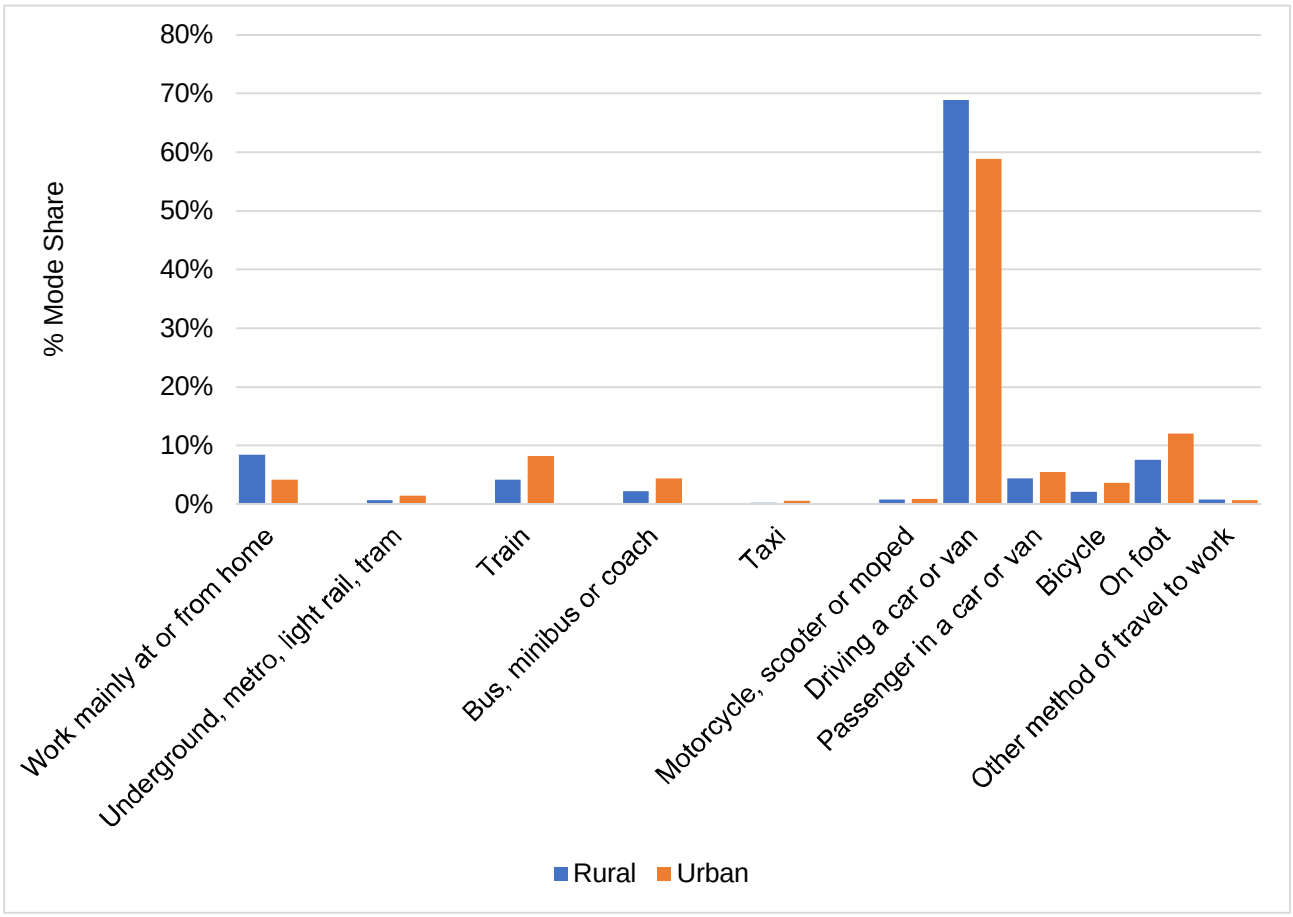
5.2.1. The car is the most common mode of travel used for commuting in the Transport East region, with 67% of residents commuting to work by this mode and is in line with the average for England as a whole. Only 4% of residents in the Transport East region commute by bus, compared to 7% for England as a whole. This highlights the challenges in operating viable and attractive bus services across a relatively rural region. Figure 5-1 shows the journey to work mode share for usual residents in the Transport East region.

Figure 5-1 – 2011 Census Journey to Work Mode Share for Usual Residents in Transport East Region



5.2.2. Figure 5-2 shows the difference in commuting patterns between rural and urban areas in the Transport East region. As expected car travel is more frequently used as a method of travelling to work in rural areas of the Transport East region (69% in rural areas compared to 59% in urban areas). This is likely to be associated with longer commuting distances and limited public transport connectivity. For instance, within rural areas bus services tend to operate more limited hours, have lower service frequency, have fewer routes and tend to have journey times that are significantly longer than travel by private car.

Figure 5-2 – 2011 Census Journey to Work Mode Share for Usual Residents in Urban and Rural Areas in the Transport East Region

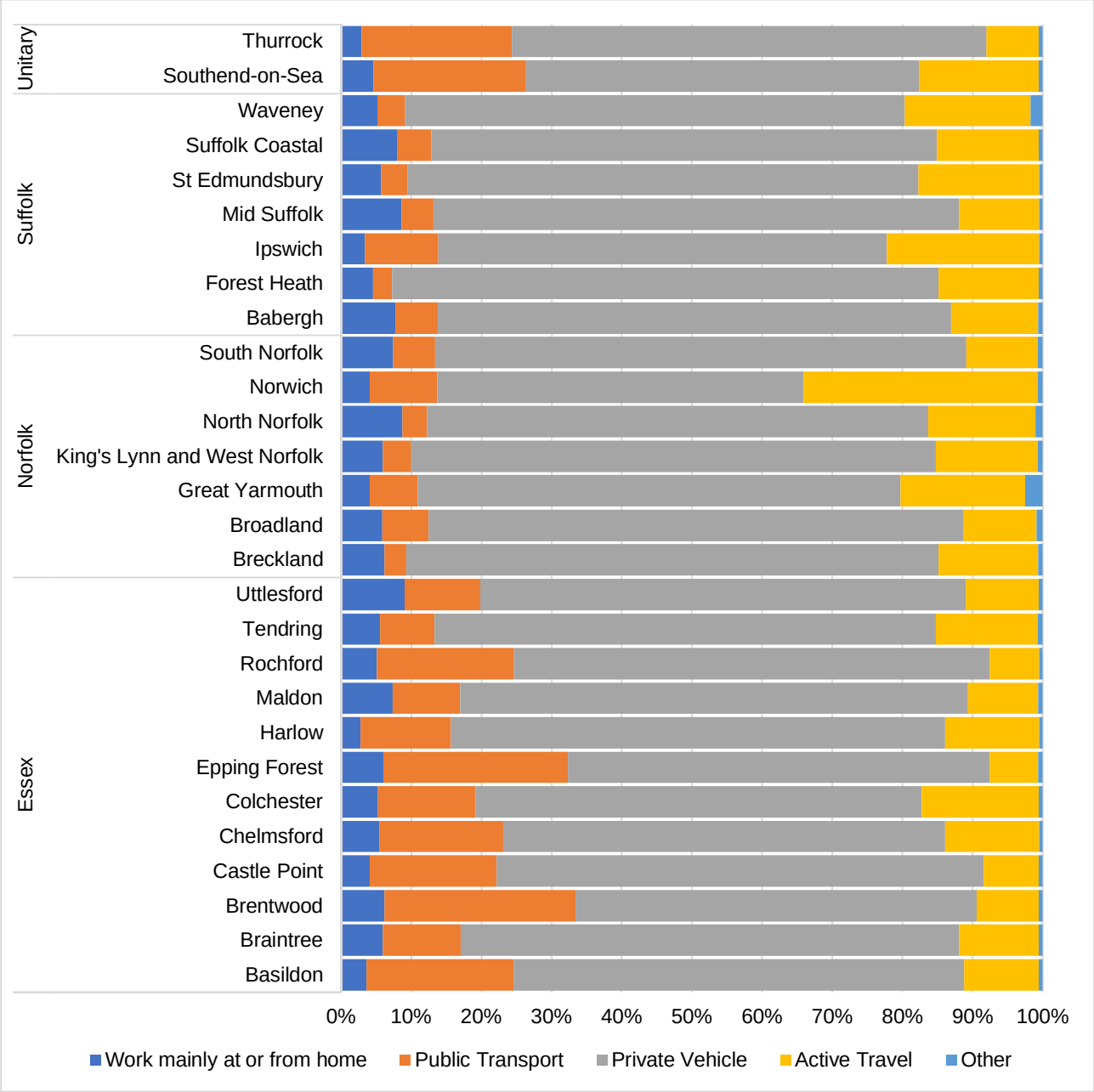


5.2.3. Whilst there is a long term aim to reduce the number of single occupancy car driver trips and encourage the use of non-car alternatives, it is recognised that for many rural settlements this is more challenging. Connecting rural communities to key centres of employment by sustainable modes to improve access to jobs, learning, activities and services is essential for economic growth across Transport East and will require an integrated programme of digital and transport investments across all modes.

5.2.4. The strategic MRN and SRN corridors will continue to have an important role in connecting rural communities with economic centres and are vitally important in facilitating economic, housing and employment growth across the region. Improvements to the network will also help reduce “rat-running” along inappropriate routes, minimising the detrimental impact of vehicle use on the on the environment and local communities.

5.2.5. Across the Transport East region, commuting travel patterns vary significantly, reflecting the variability in accessibility, connectivity and density of employment opportunities in each district. Figure 5-3 shows the variation in journey to work mode shares across the Transport East region.

Figure 5-3 – 2011 Travel to Work Mode Shares by District



5.2.6. Figure 5-3 shows the highest journey to work car mode shares occur in the rural districts in the Transport East region, with the highest journey to work car mode share recorded in South Norfolk (78%). The lowest journey to work mode share was recorded in Southend-on-Sea (56%) and is reflective of the urban geography, public transport connectivity and the greater opportunities for residents to live and work locally.

5.2.7. Public transport use (bus and rail) is highest in urban districts and those with direct rail connectivity to London along the Essex Thameside, GEML and Central Line, including: Southend-on-Sea, Rochford, Epping Forest, Brentwood and Basildon. It is therefore important that future transport investments seek to enhance the key road rail corridors, enabling efficient labour market movements for shorter trips across boundaries and between economic centres as well as longer distance commuting.

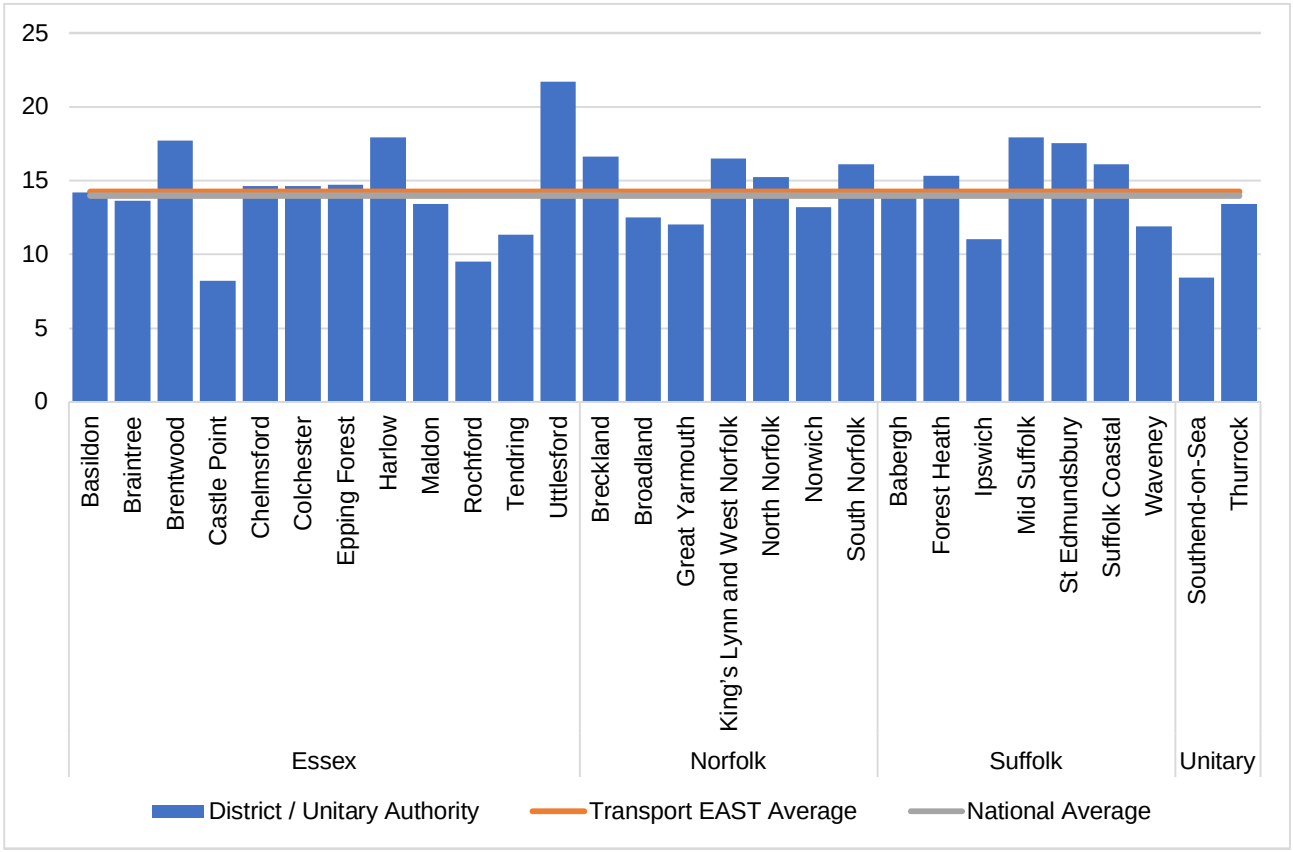
5.2.8. The highest active travel mode share (walking and cycling) occurs in Norwich (33%) with the second highest levels occurring in Ipswich (21%). Essex has some of the lowest active travel mode shares rates with only 7% of people commuting by walking and cycling in Rochford and Epping Forest. However, the lower proportion of residents travelling to work by active modes is off-set by a higher proportion of residents travelling by public transport.

5.2.9. The rural geography of the region and resultant commuting distances results in challenges for increasing active modes for journeys to work and operating traditional viable public transport services. Innovative transport schemes and digital connectivity will have an increasingly important role to play in the future and the Transport East Transport Strategy to 2050.

COMMUTING DISTANCE

5.2.10. Across the Transport East region there is considerable variation in the average distance travelled to work. The average distance travelled to work in the region is 14.2 km and is in line with the national average of 14.0 km. Figure 5-4 shows that there is considerable variation in the average distance travelled to work to work by residents of each district in the region.

Figure 5-4 – Average Distance Travelled to Work (kilometres)



5.2.11. The highest average distance travelled to work is by residents of Uttlesford (21.7 km). The shortest average distance travelled to work is by residents of Castle Point (8.2 km). Whilst on average residents of more rural districts tend to travel further to work (e.g. Uttlesford), this is not exclusive and some of the more urban districts (such as Brentwood, Chelmsford and Harlow) have relatively high averages. The higher averages in these districts are likely to be associated with a large proportion of workers commuting to London and is reflective of the strong rail corridors through these districts.

5.2.12. Overall the average distance travelled appears to be influenced by the following factors:

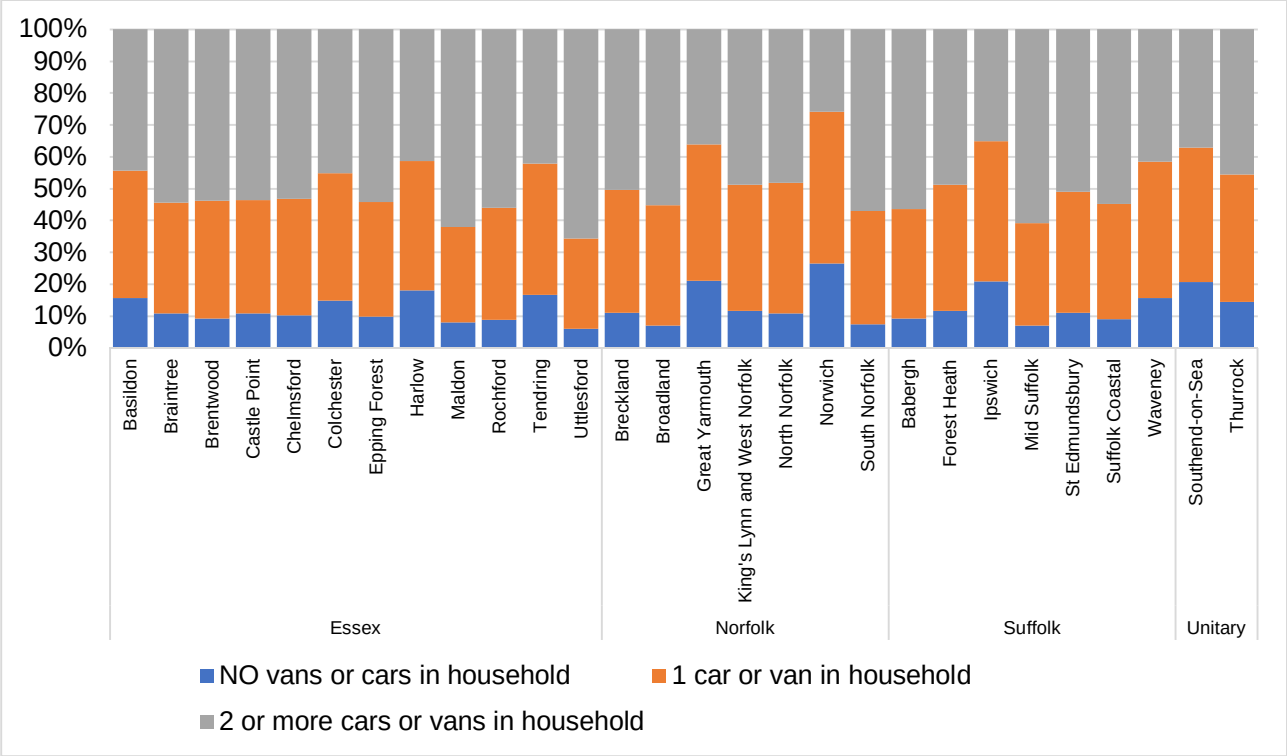
- Availability of jobs – workers in more rural locations are likely to have to travel further to reach their place of work (e.g. Uttlesford).
- Skills of the labour force – more highly skilled workers often are willing to travel further. For instance, the average distance travelled to work is lower in areas of high socio-economic deprivation (e.g. Tendering and Great Yarmouth).
- Strategic connectivity – Strong rail and road connections can lead to a reduction in travel time, in turn encouraging workers to travel further. For instance, the average distance travelled to work by residents of Chelmsford is higher than the average for other large towns and cities in the region. This is likely to be because of the accessibility of London by rail.

CAR & VAN AVAILABILITY

5.2.13. The levels of car and van availability per household provides a good indication of both wealth, accessibility and travel demand. Typically, levels of car availability are lower within towns and cities compared to rural areas due to greater access to public transport and opportunities to walk and cycle.

5.2.14. The Transport East region has higher levels of car and van availability than the average levels for England. In the Transport East region only 13% of households do not have access to a car, across England as a whole 26% do not have access to a car.

Figure 5-5 – Car and Van Availability



5.2.15. Figure 5-5 shows that the districts / unitary authorities with the highest proportion of households with no access to a car or van are Norwich (26%) and Ipswich, Southend-on-Sea and Great Yarmouth (21%).

5.2.16. The average car / van availability for the Transport East region is 1.3 per household, this compares to an average for England of 1.2 per household. The highest availability of cars and vans in the region is within rural districts. For instance, households in Breckland have an average of 1.7 cars and vans per household and households in Mid Suffolk have an average of 1.6 cars and vans per household. This is reflective of limited public transport connectivity of rural settlements and the increased distance to access jobs and everyday services

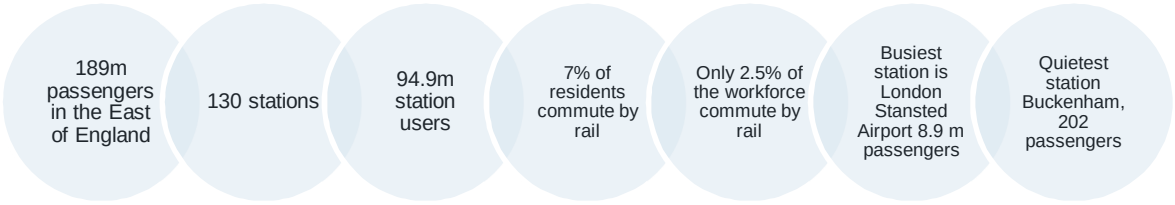
5.2.17. Urban districts in the Transport East region have lower average car and van availability per household. For instance, in Norwich households have an average of 0.9 cars and vans. This is reflective of a denser public transport network, increased opportunities to travel by active modes and better local availability of jobs and everyday services.

SUMMARY

- **Car is the main mode of travel for journeys to work by usual residents** in the Transport East region and is in line with the average for England as a whole (67%).
- A higher proportion of residents in rural areas commute by car. The reliance upon the use of the car in rural areas for journeys to work means that **reliable road connections remain vital for resident to access jobs, education and services**.
- The region has a **lower than average journey to work bus mode share** (4% vs an average of 7% for England as a whole). This is reflective of the regions rural geography and difficulties providing a public transport network in rural areas.
- **Active travel (walking and cycling) is highest within Norwich and Ipswich** and lowest within districts in Essex. Although this is offset by a higher proportion of users commuting by public transport.
- Public transport use is highest along the strategic rail corridors into London. This suggests **improvements to rail corridors connecting major centres of employment are vital to ensuring efficient labour market movements.**
- There is **significant variation in distance travelled to work by residents** ranging between 21.7km by residents of Uttlesford and 8.2 km for Castle Point. This appears to be influenced geography, the skills of the workforce and strategic connectivity.
- **Availability of cars and vans is higher in the region than the average for England as a whole** (1.3 cars and vans per household compared to 1.2 cars and vans per household for England). Car availability is higher in rural areas and is reflective of the increased distance travelled to work and weaker public transport connectivity.
- **Urban areas have lower average car and van availability per household**. In Norwich 33% of households have no access to a car or van, compared to 6% in Uttlesford.

5.3 RAIL NETWORK

AT A GLANCE



POTENTIAL TO DRIVE ECONOMIC GROWTH

5.3.1. An attractive, high quality, fast, frequent and reliable rail network is a key driver of economic growth and vital to the Transport East and UK economy. The rail network provides connectivity between businesses, employees and markets, enables larger commuting catchments, access to more productive jobs and helps unlock housing and employment developments in key settlements. The Transport East rail network is vital to the three Transport East priorities as it connects key settlements within Norfolk, Suffolk, Essex, Southend-on-Sea and Thurrock and provides connectivity to neighbouring highly productive regions including Cambridgeshire and London. The Transport East rail network is also a gateway to five major UK ports and two airports in the region and serves a number of coastal communities in Southend-on-Sea, Thurrock, Essex, Suffolk and Norfolk.

5.3.2. The rail network has an important role to play in providing good connectivity in the international gateways, accommodating business travel between key economic centres, supporting the visitor and leisure economy and labour market catchments both within Transport East and the surrounding economies of London, Hertfordshire and Cambridgeshire.

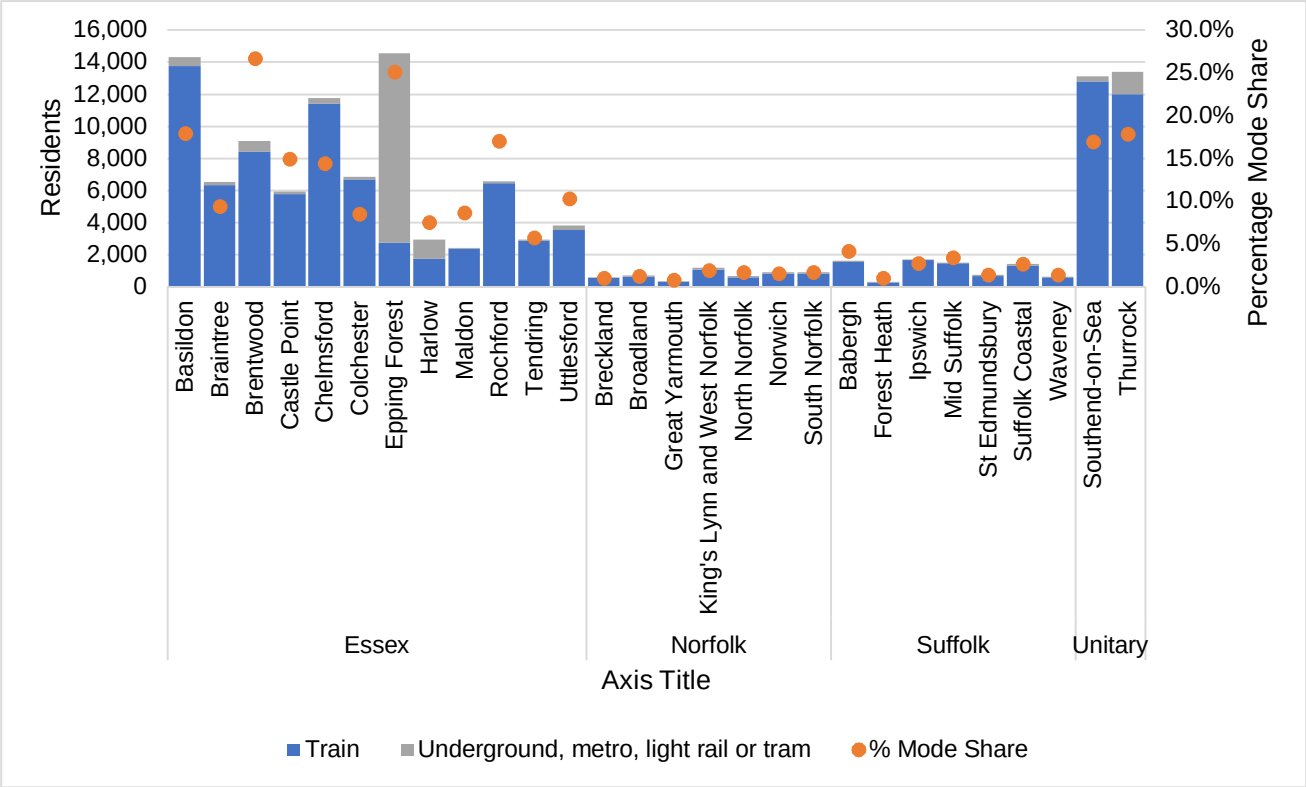
COMMUTER TRIPS

5.3.3. Overall rail accounts for 7% of the residential population commuting trips, slightly higher than the national average of 6%[35]. However only 2.5% of the workplace population in the Transport East region commute by rail highlighting some of the challenges in undertaking local commuting movements between settlements by rail[36]. In particular, the districts of Breckland, Broadland, Great Yarmouth, Kings Lynn and West Norfolk, North Norfolk, South Norfolk in Norfolk, Babergh, St Edmundsbury (West Suffolk) and Waveney (East Suffolk) all have a commuting mode shares of less than 1%, highlighting the challenges of encouraging rail use in the more rural districts in the region.

5.3.4. Across the region there is substantial variability in the level of resident commuting by rail. Figure 5-6 shows then number of residents commuting by rail and underground (main mode) by district along with the percentage commuting mode share.

[35] 2011 Census QS701EW - Method of travel to work (2001 specification) (Resident population)
[36] 2011 Census WP703EW - Method of travel to work (2001 specification) (Workplace population)

Figure 5-6 – 2011 Census Resident Commuting by Train, underground, metro, light rail or tram, and % Mode Share



5.3.5. Figure 5-6 shows that the districts in Essex, close to London and benefiting from direct radial connections, have the highest number of residents commuting by rail and underground including Basildon, Brentwood, Chelmsford, Colchester, Epping Forrest, Rochford and Southend-on-Sea.

5.3.6. The districts in Norfolk and Suffolk have substantially lower numbers of residents commuting by rail. This is likely to be due to a combination of factors, including:

- **Fewer stations**: The rail network in Norfolk and Suffolk is sparser with fewer stations and routes. This results in a smaller proportion of the population living close to a station and being able to make use of rail services for journeys to work.
- **Increased travel times into London**: A high proportion of all journeys to work by rail from Essex, Southend-on-Sea and Thurrock are towards London. Longer journey times by rail from stations in Suffolk and Norfolk towards London is likely to result in fewer journeys to work by rail.
- **Limited number of direct connections between communities and limited frequencies on existing routes**: Rail services in Suffolk and Norfolk tend to converge on Ipswich, Norwich and King's Lyn. Users travelling further afield are often required to change services at one of these stations. The absence of a direct connection and low frequency of services can discourage the use of rail services.

5.3.7. Figure 5-6 shows that the residential train mode share varies from 1% (Great Yarmouth and Forest Heath) to 17% (Basildon and Rochford).

RAIL PATRONAGE

5.3.8. The number of people using the rail network in the East of England has grown substantially over the past 23 years. Increasing by 139%, from 54.6 million passenger journeys in 1995/96 to 106.35 million passenger journeys in 2017/18[37].

5.3.9. Over this same period the number of rail passengers travelling to a from another region has grown by 131% compared to 185% for rail passengers travelling entirely within the East of England. In terms of the split between the two, 82% of rail passenger trips are to/from another region, with only 18% contained within the East of England, highlighting the importance of good connectivity into London and the neighbouring high performing regions.

5.3.10. There are a 130 rail stations within the Transport East region, of these 58 are within Essex, 25 are within Suffolk, 31 are within Norfolk, nine are within Southend-on-Sea and seven are within Thurrock. Station usage varying from 202 passengers per year (Buckenham in Norfolk) to 8.9 million (London Stansted Airport).

5.3.1. In Norfolk, Norwich is by far the busiest station (4.1m passengers) followed by Kings Lynn (1.0m passengers). The busiest of the three coastal stations in Norfolk is Great Yarmouth followed by Sheringham and Cromer.

5.3.2. Ipswich is by far the busiest station in Suffolk (3.4m passengers) followed by Stowmarket (0.9m passengers). The market town stations in Bury St Edmunds, Newmarket, and Sudbury are also well used. The busiest coastal station is Lowestoft followed by Felixstowe.

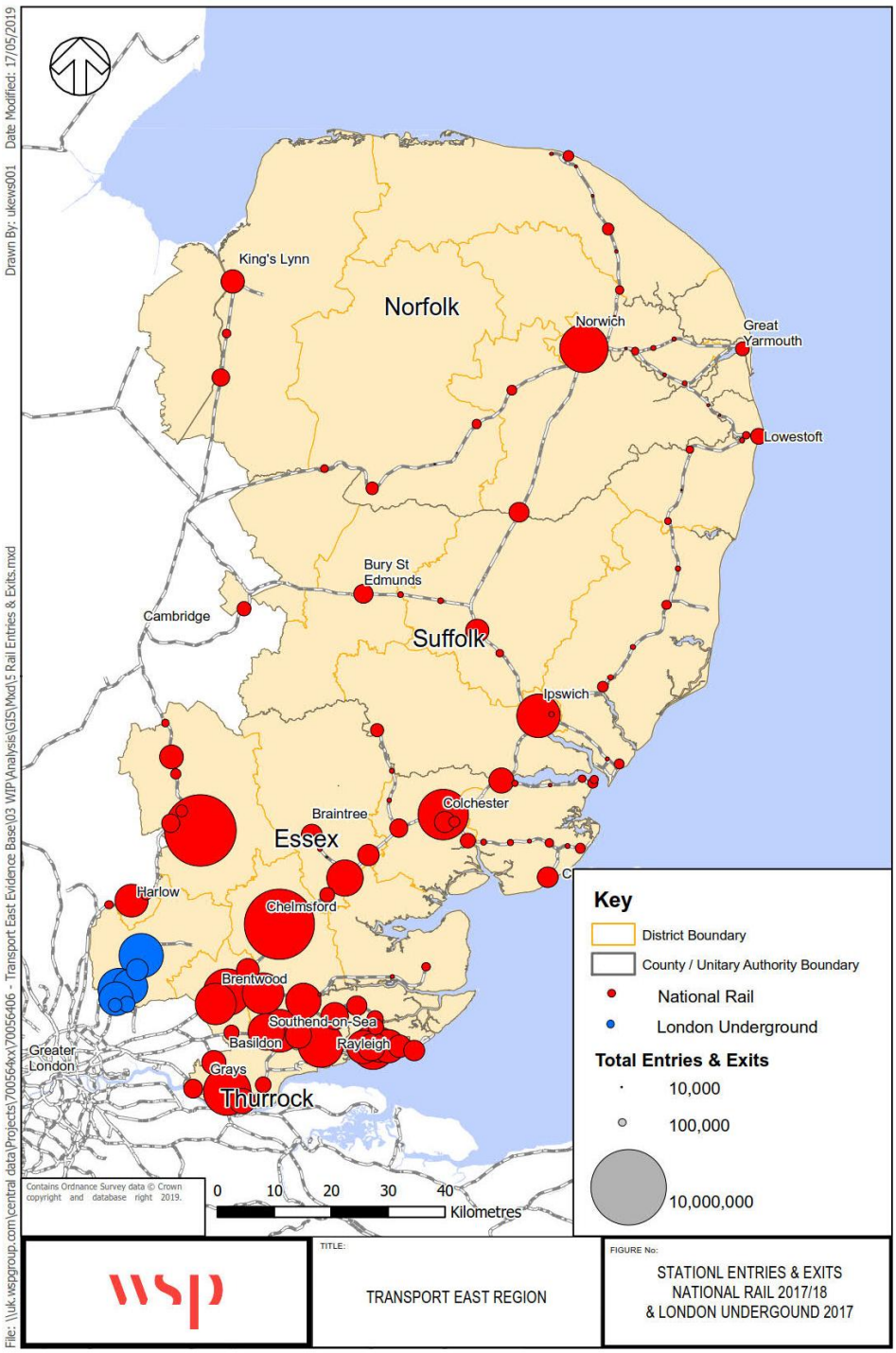
5.3.3. London Stansted Airport and Chelmsford are by far the busiest stations in Essex (8.9m and 8.6m passengers respectively) highlighting the importance or rail connectivity to the Airport and the proximity of Chelmsford to London. The next busiest station is Colchester followed by Shenfield. The settlements close to London including Benfleet, Basildon, Billericay, Brentwood and Laindon are also popular with annual levels of usage exceeding 2 million passengers per year.

5.3.4. In Southend-on-Sea and Thurrock, Southend Central (3.4m) and Grays (4.1m) are the busiest stations. Many of the stations in both unitary authorities recorded more than 1m entries and exits in the year 2017/18 and is reflective of the urban nature of these local authorities and their proximity to London.

5.3.5. In addition to the above there are seven London Underground Railway stations in the region. These are all situated in Epping Forrest in Essex and are on the Central Line. The busiest station is Epping with 3.7 million passengers in 2017 and least used was Rodding Valley with 370,000 passengers in 2017[38]. A plan showing total entry and exits recorded at stations in the region is shown in Figure 5-7 below.

[37] DfT Regional Rail Journeys – East of England
[38] 2017 Annual Entries and Exits, London Underground Limited, 2018

Figure 5-7 – Station Entries and Exits 2017/18 (National Rail services)



5.3.6. Rail stations within the Transport East region have also experienced substantial levels of growth in patronage. In the past five years, 22 stations have experienced rail passenger growth in excess of 20%. The 10 rail stations experiencing the highest increases in usage by local authority are summarised in Table 5-1.

Table 5-1 – Top 10 Stations by Local Authority and Increase in Usage 2013/14-2017/18

Norfolk			Suffolk			Essex			Southend			Thurrock		
Name	Usage 2017/18	% 5 Year Growth	Name	Usage 2017/18	% 5 Year Growth	Name	Usage 2017/18	% 5 Year Growth	Name	Usage 2017/18	% 5 Year Growth	Name	Usage 2017/18	% 5 Year Growth
Spooner Row	1,628	320%	Newmarket	358,798	26%	London Stansted Airport	8,934,250	142%	Southend Central	3,396,032	74%	Stanford-Le-Hope	1,109,214	52%
Buckenham	202	153%	Lakenheath	468	24%	Hythe	234,522	89%	Westcliff	1,299,104	36%	Ockendon	1,054,752	39%
Roughton Road	16,846	42%	Brampton	9,004	24%	Battlesbridge	21,108	43%	Prittlewell	188,044	15%	East Tilbury	443,966	38%
Brundall Gardens	14,022	33%	Melton	77,748	13%	Elsenham	246,268	35%	Chalkwell	1,968,412	13%	Chafford Hundred	2,817,546	35%
Eccles Road	2,700	27%	Bury St.Edmunds	652,084	13%	Wrabness	30,526	32%	Leigh-On-Sea	2,232,070	12%	Purfleet	673,780	34%
Worstead	26,766	24%	Westerfield	11,110	13%	Weeley	33,354	30%	Thorpe Bay	885,608	9%	Grays	4,053,092	26%
Sheringham	221,480	17%	Oulton Broad South	47,996	12%	Rayleigh	1,310,668	27%	Shoeburyness	746,526	8%	Tilbury Town	1,173,778	11%
Downham Market	533,426	16%	Saxmundham	154,322	11%	Hockley	718,934	22%	Southend East	1,926,844	1%			
Haddiscoe	12,924	15%	Needham Market	100,648	10%	Audley End	1,011,626	21%	Southend Victoria	2,098,654	-44%			
Cantley	21,682	15%	Beccles	110,774	9%	Harlow Mill	232,932	20%						

Source: ORR Estimate of Station usage 2017-18

5.3.7. Table 5-1 shows that in Norfolk the largest percentage increase in rail entries and exits has been at predominately small local stations which all have less than 20,000 passengers per year and is likely to be associated with housing growth within these settlements. This includes Spooner Row, Buckenham, Roughton Road, Brundall Gardens and Eccles Road. The large increase in rail patronage at Downham Market suggests rail commuting to destinations including Cambridge has grown rapidly due to the access to lower cost housing. In Suffolk there has been large percentage increase in rail entries and exits within the large towns of Newmarket and Bury St Edmunds and small local stations of Lakenheath and Brampton.

5.3.8. In Essex, the largest percentage increase in rail entries and exits has been at London Stansted Airport, Hythe (Colchester), Elsenham, Rayleigh, Hockley and Audley End. In Southend-on-Sea the largest percentage increase has been at Southend Central and Westcliff. Southend Victoria has seen a reduction in rail entries and exits over the past 5 years. In Thurrock, the percentage growth in rail entries and exits has been relatively consistent across all stations. The largest increase was observed in Stanford-Le-Hope (52%) and is likely to be associated with growth at the nearby DP World London Gateway Port.

RAIL FREIGHT

5.3.9. Rail freight is increasingly economically attractive and environmentally efficient form of transport and the sector is a significant and growing part of the national economy. Network Rails Freight Network Study[39] identifies a geographical shift in freight flows towards busier rail corridors which coupled with passenger growth is leading to increasing capacity constraints on the rail network.

5.3.10. Within the Transport East region, the main rail corridors and their key commodities is summarised below:

- Felixstowe to the West Midlands and the North (via Ely or GEML and North London Line): Ports & domestic intermodal and Construction materials;
- Cross London including Essex Thameside: Ports & domestic intermodal, Construction materials, Automotive and Mail.

5.3.11. These corridors are not mutually exclusive and serve freight traffic from the Ports of Felixstowe, Port of Tilbury and DP World London Gateway. The Felixstowe to the west midlands and the north via Ely corridor is also a core Tran-European Transport Network (TEN-T) rail line.

5.3.12. The major deep-sea container ports in the Transport East region (Port of Tilbury, DP World London Gateway and Port of Felixstowe) are a key driver of economic growth. Rail freight capacity is a fundamental element in ensuring the ports continued success.

5.3.13. In 2015, the Port of Felixstowe rail terminal handled 910 Twenty-Foot Equivalent Units (TEU)[40] (a measure of cargo handling capacity). There is an average of 66 trains in and out per day across the

[39] Network Rail Freight Study Long Term Planning Process April 2017
[40] https://www.portoffelixstowe.co.uk/port/rail-services/, 2019

dedicated rail terminals to 15 national destinations. In total this accounts for 27% of the port's throughput[41].

5.3.14. Investment in enhancements to the rail route are therefore essential to support an increase in number of freight trains per day from ports in the Transport East region to support economic growth in the region.

Accommodating Future Growth

5.3.15. To accommodate growth on the Felixstowe to the West Midlands and the North route, it has been agreed by the industry that growth will be focused on the cross-country route via Ely to certain terminals in the Midlands and North. The provision of increased capacity on the Felixstowe Branch has already been prioritised as a part of Network Rail's current control period. The capacity gaps along this route include: capacity constraints, operational and timetable constraints, line speed constraints, insufficient gauge clearance and electrification of route section.

5.3.16. The development of DP World London Gateway port is expected to result in strong growth in cross London rail freight flows. To accommodate this increase in demand enhancements to the cross-London routes, including Essex Thameside will be required. Due to the constraints on physical space along much of the route improvements are likely to be restricted to junction enhancement and signalling improvements. The capacity gaps along this route include: capacity constraints, diversionary route capabilities and operational and timetable constraints.

CONNECTIVITY

5.3.17. Whilst some of the largest settlements in the Transport East region are connected by a direct rail service, a many are not. This is attributable to a lack of east-west rail routes and low frequency services operating along many of the Region's branch lines. This is particularly evident in Suffolk and Norfolk which has a sparser rail network (only two main lines Fen Line and GEML) and number of low frequency branch lines.

5.3.18. Some of the largest settlements connected by a direct rail service includes:

- Southend-on-Sea and Basildon (via the Essex Thameside Line);
- Norwich, Ipswich, Colchester, Chelmsford and Norwich (via the Great Eastern Mainline);
- Bury St Edmunds and Ipswich (via the Ipswich to Ely Line).
- Norwich and Lowestoft (via the Wherry Line);
- Norwich and Great Yarmouth (via the Wherry Line);

5.3.19. Table 5-2 summarises some examples where there are is a lack of direct rail connectivity between settlements across the region and the associated off-peak rail and car travel times.

[41] https://www.portoffelixstowe.co.uk/port/rail-services/, 2019

Table 5-2 – Rail Connectivity Between Transport East Settlements

Start	End	Crow Fly Distance	Rail Route	Interchange Station	Quickest Rail Off Peak Journey Time	Off Peak Road Journey Time	Difference
Norwich	Kings Lynn	62 km	Norwich-Ely-Kings Lynn	Ely	01:34	01:15	+19 mins
Great Yarmouth	Lowestoft	13 km	Great Yarmouth-Brundall-Lowestoft	Brundall	01:13	00:24	+49 mins
London Stansted Airport	Basildon	39 km	London Stansted Airport-London Liverpool Street-London Fenchurch Street-Basildon	London Fenchurch	01:48	00:43	+65 mins
London Stansted Airport	Chelmsford	23 km	London Stansted Airport-London Liverpool Street-Chelmsford	London Liverpool Street	01:34	00:29	+65 mins
London Stansted Airport	Colchester	45 km	London Stansted Airport-London Liverpool Street-Colchester	London Liverpool Street	02:00	00:40	+80 mins
London Stansted Airport	Ipswich	60 km	London Stansted Airport-London Liverpool Street-Ipswich	London Liverpool Street	02:22	01:03	+79 mins
Sudbury	Colchester	15 km	Sudbury-Marks Tey-Colchester	Marks Tey	00:38	00:32	+6 mins
Braintree	Colchester	23 km	Braintree-Witham-Colchester	Witham	00:40	00:28	+12 mins
Southend	Colchester	41 km	Southend Victoria-Shenfield-Colchester	Shenfield	01:25	00:56	+29 mins
Basildon	Colchester	45 km	Basildon-Upminster-Romford-Colchester	Upminster and Romford	01:32	00:46	+46 mins
Basildon	Braintree	34 km	Basildon-Southend Central-Southend Victoria-Shenfield-Braintree	Southend, Shenfield	01:58	00:45	+73 mins

5.3.20. Table 5-2 shows that in Norfolk, although Great Yarmouth and Lowestoft are only separated by 13km, the rail journey times are over an hour compared to 24 minutes by car. To travel east from London Stansted Airport to the main settlements in Suffolk and Essex required interchanges in London, resulting in journey times taking over an hour longer compared to trips by car. In Essex, trips between North and South are restricted by the lack of direct connectivity resulting in interchange movements at Shenfield, Marks Tey, Southend-on-Sea, Upminster and Romford. For example, a trip from Basildon to Braintree takes nearly 2 hours by train compared to 45 minutes by car due the lack of north-south connectivity.

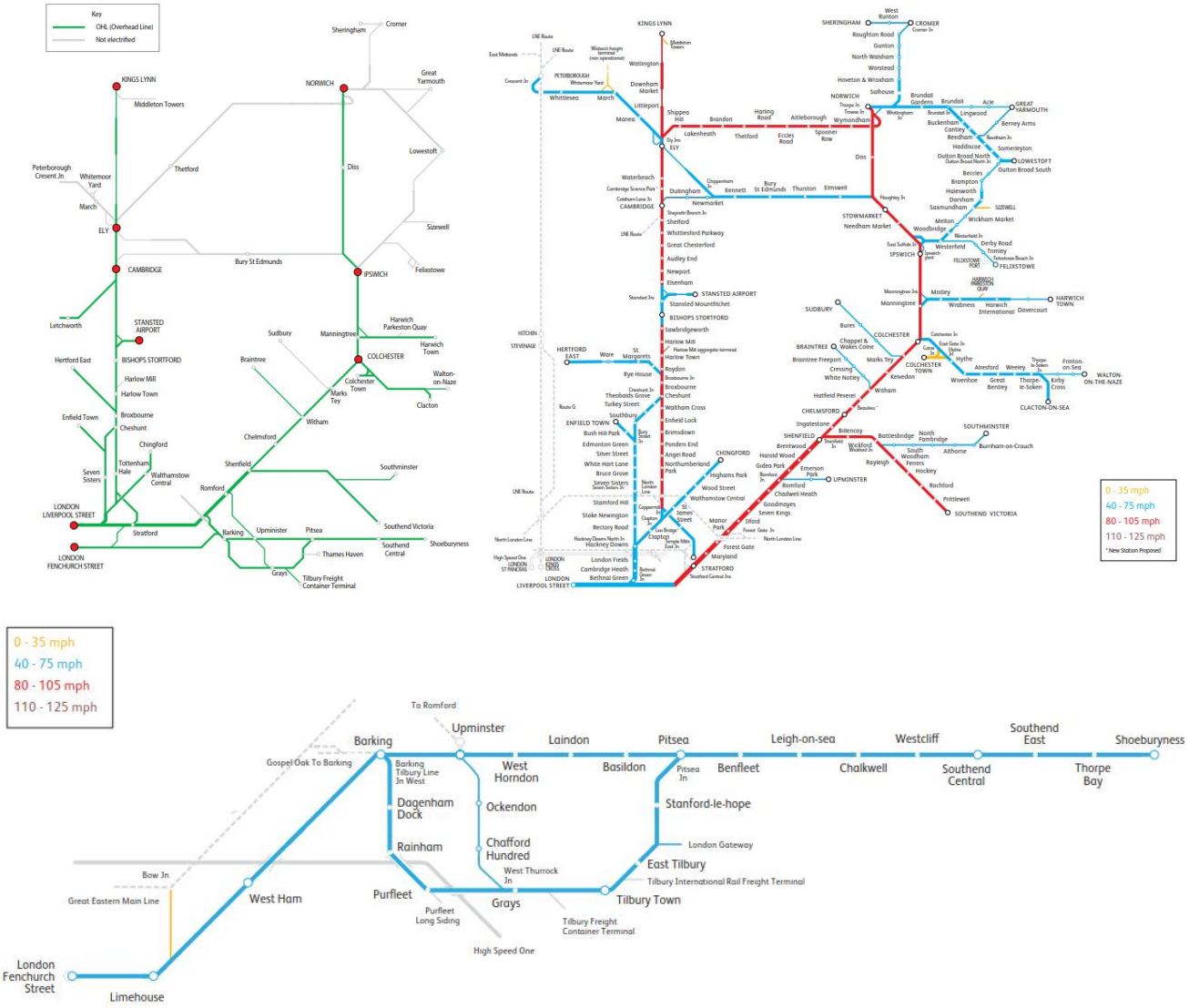
5.3.21. The long travel times between locations results in rail being unattractive for some north-south and east-west movements across Transport East, encouraging car travel for regional commuting trips.

5.3.22. Whilst many of the east-west routes suffer from a lack of rail connectivity, they are served by express bus or coach services (discussed further in Section 5.5).

INFRASTRUCTURE CONSTRAINTS

5.3.23. The existing rail network is also constrained as not all of the routes are electrified and many of the routes have limited line speeds impacting on rail journey times. Figure 5-8 shows the extent of the network that is electrified and the existing line speeds.

Figure 5-8 – Existing Rail Network Constraints – Extent of Electrification and Line Speeds



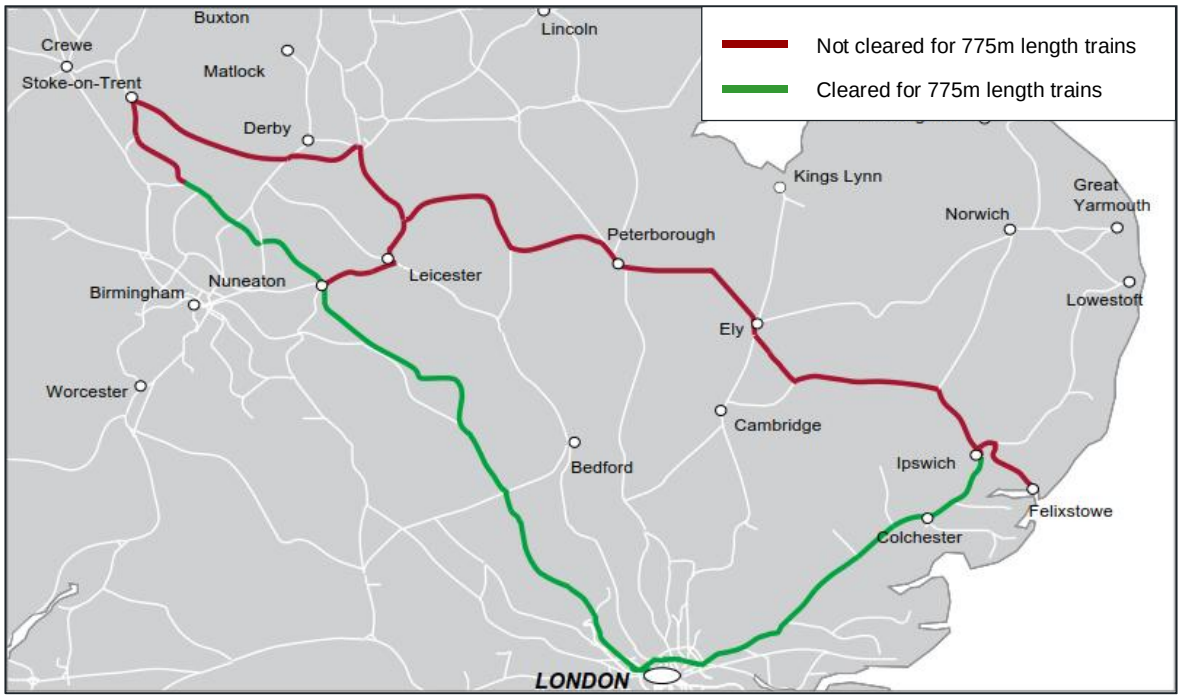
Source: Anglia Route Study

5.3.24. The existing capacity of the rail network also restricts the level of rail freight that can be moved from the Ports of Felixstowe, DP World London Gateway and Tilbury. The future development aspirations of DP World London Gateway and the Port of Felixstowe is expected to increase the number of cross London freight movements. In order to provide sufficient capacity for the growth in freight movements enhancements to existing freight routes from the Port of Felixstowe and cross London are needed.

5.3.25. A key driver of rail freights advantage relative to road is the ability to carry greater volumes of goods per journey. Network Rails current aspiration is to achieve a train length of 775m with a long-term aspiration to reach greater lengths. The primary constraint on train lengths are accommodating loops and chords.

5.3.26. Figure 5-9 shows the existing rail routes between Felixstowe and the West Midlands. The northern route via Ely is not cleared for 775m length trains. However, a southern route from Ipswich via the Great Eastern Mainline, North London Line and West Coast Mainline is cleared for 775m trains. As such 775m trains must currently route via the GEML and cross London. A section of the rail network that is at capacity.

Figure 5-9 - Train Length Restrictions for Felixstowe to the West Midlands and the North



Source: Network Rail Freight Study Long Term Planning Process April 2017

5.3.27. One of the most significant capacity constraints on the Felixstowe cross-country route is the Ely area. Projects required to address capacity issues include Ely North Junction, Ely level crossings, Ely to Soham doubling and Ely area weak bridges. Additional constraints also exist which may require enhancements including Haughley Junction, Syston to Peterborough signalling, Leicester area capacity, doubling of the Felixstowe branch including level crossings and infrastructure capability, and route-wide enhancements.

CAPACITY

5.3.28. The Greater Essex Infrastructure Framework 2016-2036 identifies congestion on the GEML and its key commuter stations as a key issue resulting in poor resilience and frequent delays. This is due to the two-track configuration which limits the line capacity to accommodate intercity and London commuter services along with freight trains. Congestion on the GEML is currently a problem on the section into London. Much of the WAML is also currently two tracks which limits the potential for improvements and additional services. The Essex Thameside Line is constrained by the size of Fenchurch Station which limits line capacity.

5.3.29. The Network Rail Anglia Route Study 2016 congestion modelling shows that in 2019 AM peak hour:

- GEML: From Chelmsford to London Liverpool Street seat utilisation will be full with high levels of standing between Shenfield and Stratford;
- Cross County Corridor: No train passenger capacity issues between Norwich and Ely and Ipswich and Norwich. Some standing is shown from Ely to Cambridge
- WAML: From Kings Lynn to Stansted seating is available, from Bishops Stortford south into London Liverpool Street there are capacity problems with substantial levels of standing;
- Essex Thameside: No capacity issues between Shoeburyness and Benfleet or the Tilbury Loop. However, capacity issues occur from Pitsea into London Fenchurch Street with widespread and substantial levels of standing.

5.3.30. Plots showing the average AM Peak load factor of rail services in the Anglia region in 2013, 2019, 2023 and 2043 is provided in the figures below.

Figure 5-10 – Average Load Factor of all GEML services in AM Peak. Source Network Rail Anglia Route Study, March 2016

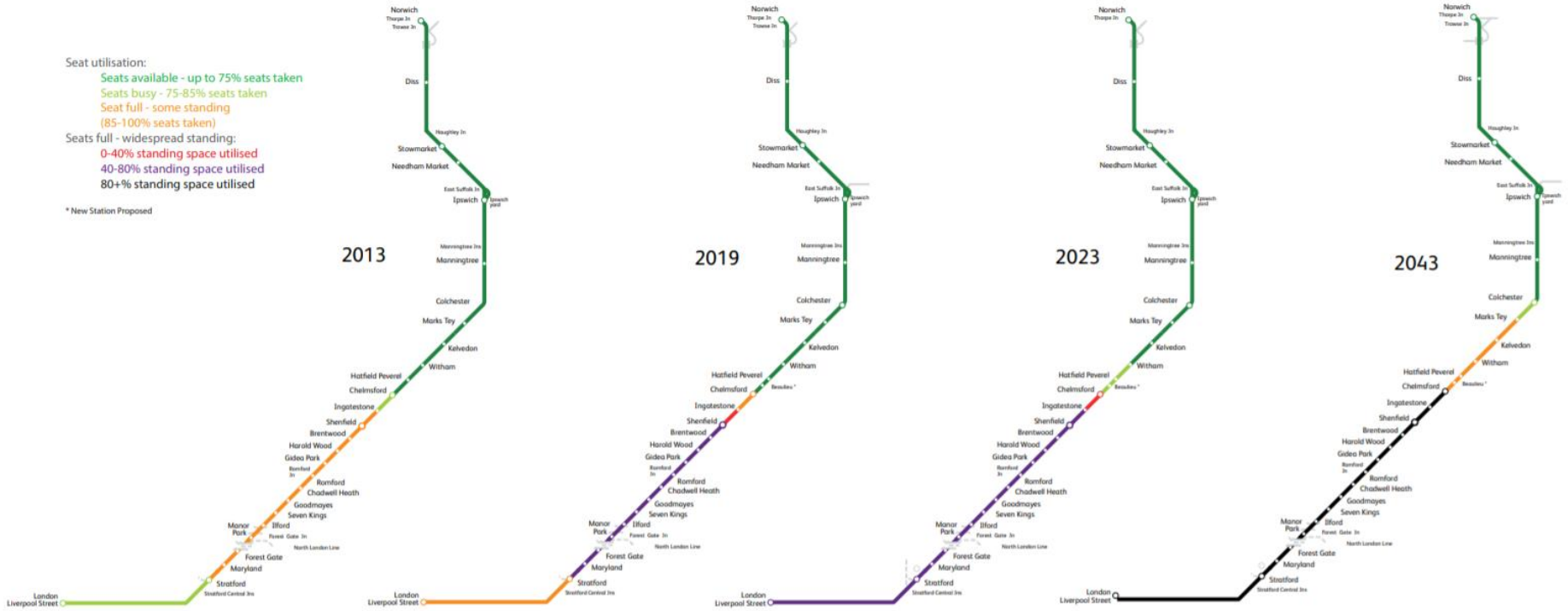


Figure 5-11 – Average Load Factor of all cross-county corridor services in AM Peak. Source Network Rail Anglia Route Study, March 2016

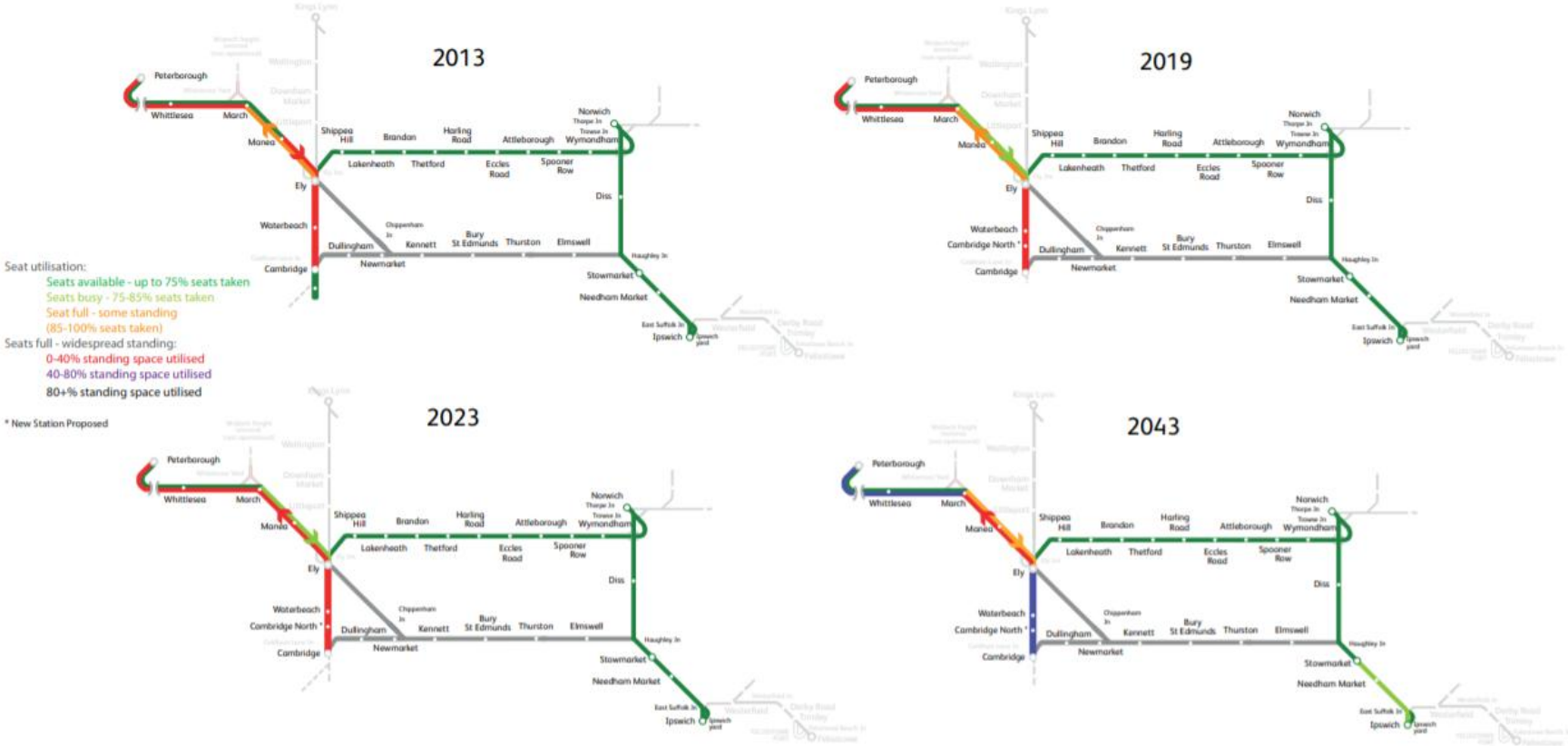
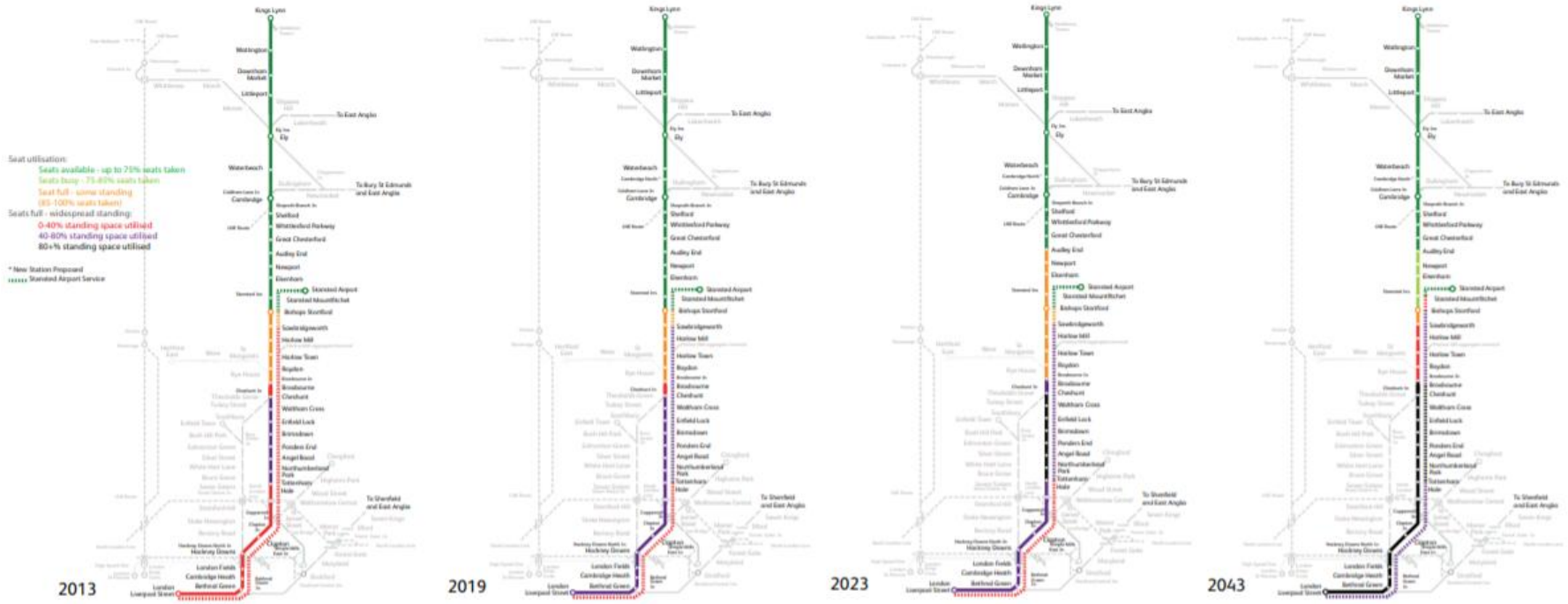


Figure 5-12 – Average Load Factor of all West Anglia Mainline outer services in AM Peak. Source Network Rail Anglia Route Study, March 2016



5.3.31. The level of rail overcrowding for the train operators that run between London and the Transport East area has been analysed using data from DfT. All operators (c2c, East Midlands Trains, Great Northern & Thameslink and Greater Anglia) all show levels of passengers in excess of capacity, averaging at 6.23% in the 3-hour AM peak (07:00-09:59) and 5.80% in the 3-hour PM peak (16:00-18:59)[42].

5.3.32. The Draft Great Eastern Mainline Study has assessed the long-term capacity need of the GEML in consideration of the expected growth in passenger demand over the next 25 years[43]. Over the next 25 years it is estimated that growth in rail demand towards London Liverpool Street will increase by between 40% and 60%. It notes that without changes to timetable, stopping patterns and service uplifts there is likely to be train capacity issues on services to London Liverpool Street as far out as Colchester by 2024, Billericay by 2029, Manningtree by 2033 and Ipswich by 2034. In the evening peak it is expected that there will be train capacity issues on services between Stratford and Chelmsford in the evening peak by 2029, extending to Liverpool Street and Ipswich by 2033.

SERVICE FREQUENCY AND SPEED

5.3.33. One of the contributory factors to low levels of rail travel in the region, and in particular across Norfolk and Suffolk are the low frequencies and comparable travel speeds to the road network. For example, a number of routes have typical rail frequencies of one direct train per hour including:

- Great Yarmouth / Lowestoft – Norwich
- Felixstowe – Ipswich
- Norwich – Cambridge
- Clacton-on-Sea – Colchester
- Ipswich – Cambridge
- Ipswich - Lowestoft
- Harwich – Colchester
- Witham – Braintree

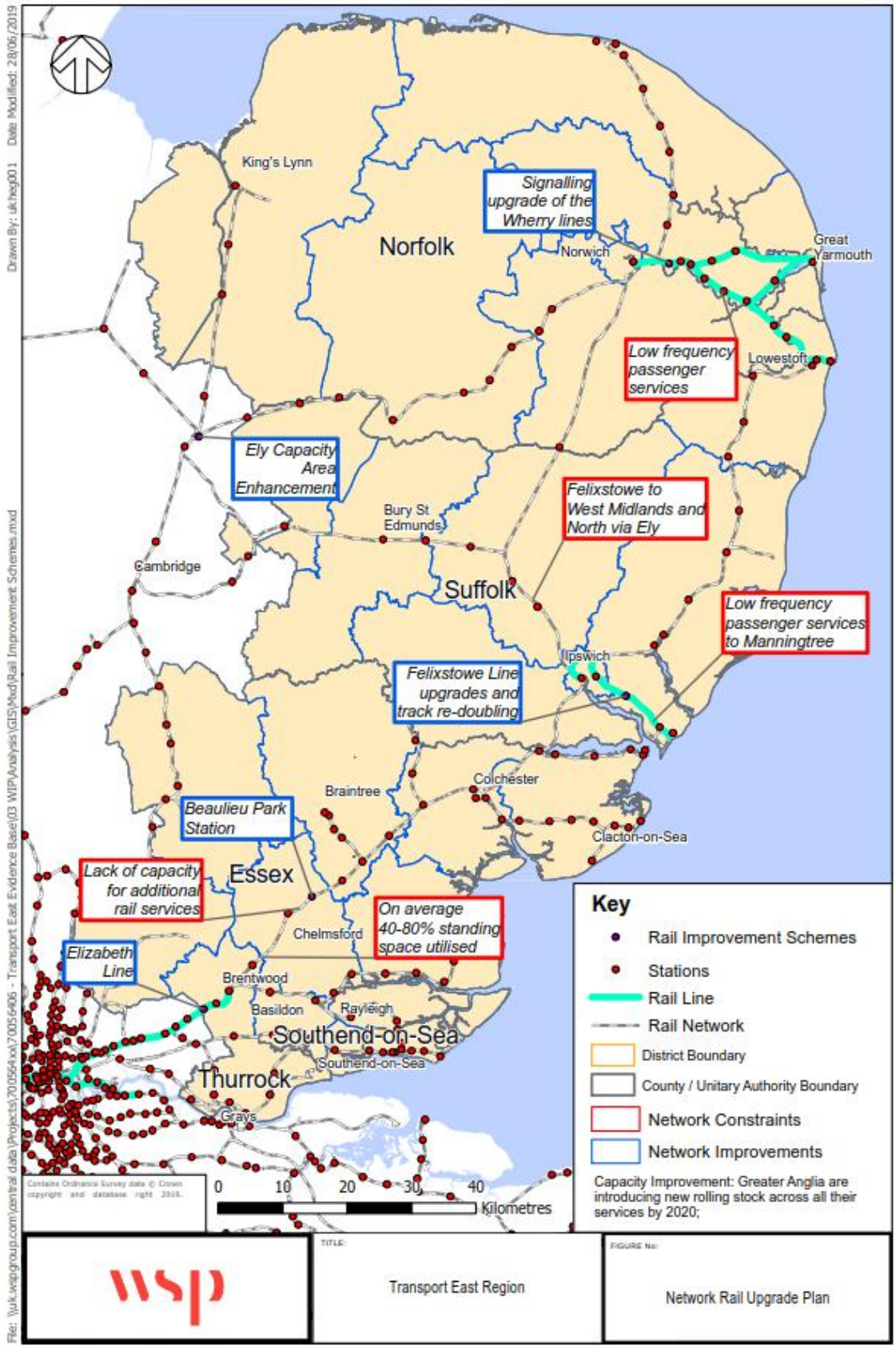
5.3.34. The limited number of direct connections between the main settlements also means that train journey times can be substantially longer than the comparative car journeys, reducing the attractiveness of rail for commuting and accessing key service centres, international gateways and coastal communities.

PLANNED IMPROVEMENT SCHEMES

5.3.35. To address existing capacity issues, improve journey times and journey time reliability a number of improvement schemes are planned in the Transport East region. A summary of the existing issues and planned improvement schemes is summarised below and shown in Figure 5-13.

[42] Table RAI0214, Peak crowding on a typical autumn weekday by city and train operator: 2017, Department for Transport, 2017
[43] Draft Great Eastern Main Line Study: Railway Investment Choices. Network Rail, 2019.

Figure 5-13 – Network Rail Planned Improvement Schemes



Network Rail upgrade plan

5.3.36. Network Rail's Railway Upgrade Plan set out railway schemes that are currently being delivered within the Anglia region, these are summarised below:

- **Wherry Line**: Network Rail are installing a new signalling system on the Wherry Line between Norwich, Great Yarmouth and Lowestoft to improve infrastructure reliability.
- **Felixstowe**: Network Rail are planning to build additional track, upgrade and closure of level crossings to enable more freight trains to run and to improve the reliability of passenger services.

Network Rail Control Period 6 (2019 to 2024)

5.3.37. Network Rail has just submitted their plans for the Anglia region in Control Period 6, 2019 to 2024. A high-level summary of the projects identified for progression during this control period is provided below.

- Increase capacity through the Anglia region through the introduction of Elizabeth Line. This includes power upgrades and re-signalling.
- 1,000 new carriages on Greater Anglia services by 2020, resulting in a 17% to 36% increase in seating on suburban services.
- Travel time reductions between Norwich, Ipswich and Colchester; and
- Ely Area Capacity Enhancement scheme to enable additional freight and passenger train paths.

Elizabeth Line

5.3.38. The Crossrail project is the construction of the Elizabeth Line to provide a new route linking Reading and Heathrow in the west with Shenfield and Abbey Wood in the east via central London. The Crossrail scheme involves the construction of 21km of new track under London and is estimated to increase capacity in the peak hour by 30%.

5.3.39. The Elizabeth Line will replace existing services operated by TfL Rail between Shenfield and London Liverpool Street and greatly improve the accessibility of central London and Heathrow Airport by rail from the Transport East region.

Beaulieu Park Railway Station

5.3.40. This scheme is the delivery of a new railway station to support the development of 3,600 homes in North East Chelmsford. The station is being delivered by ECC, Chelmsford City Council, Network Rail and Countryside Zest. The intention is for the station to act as a new transport hub, where passengers can complete their journey using sustainable modes of transport. The proposed scheme also includes a bus interchange and substantial cycle parking. The proposals consist of three platforms and a central passing loop.

ACCOMMODATING FUTURE SERVICES

5.3.41. One of the main challenges to increasing capacity along the GEML is the two-track section of the route between Colchester and Shenfield. To address this the Draft Great Eastern Main Line Study has considered what the most efficient changes would be to existing infrastructure to increase capacity along the GEML[44]. A summary of schemes identified as a part of this study is provided below:

- **Bow Junction remodelling**: Potential to remodel the junction following opening of Elizabeth Line to make use of lines currently used for TfL Rail Services. This could allow for an additional 10 services per hour between Shenfield and London Liverpool Street.
- **Loops between Chelmsford and Witham**: A passing loop is needed between Witham and Chelmsford to allow faster trains to overtake slower trains. The current proposals for Beaulieu Park include a passing loop.
- **Passing loops south of Colchester**: The need for a second passing loop has also been identified closer to Colchester. Marks Tey has been suggested as a possible location, with the possibility of adapting the Sudbury line platform.
- **Haughley Junction doubling**: This scheme would provide additional track capacity at Haughley Junction near Stowmarket. The scheme would replace an existing single lead track junction into a twin lead track arrangement to provide future increase in demand for future rail freight services from Felixstowe to the West Midlands and the north. This would also increase frequency of Ipswich to Cambridge and Peterborough services.
- **Additional track and reduction in headways between Shenfield and Colchester**: Assessment has indicated that further additional tracks and reduction in headways between Shenfield and Colchester would increase capacity on the GEML. This could include the addition of a third or fourth track.
- **Trowse Bridge**: Assessment work did not identify a need for double tracking and replacement of Trowse Bridge in Norwich as a result of an increase in GEML services; however, should franchise commitments seek addition off-peak intercity services and the potential extension of east-west rail there is likely to be a need to create additional capacity and flexibility at this location.

[44] Draft Great Eastern Main Line Study. Network Rail, 2019

SUMMARY

- The **journey to work rail mode share of residents in Transport East is slightly higher than the nation average** (7% vs 6%). However only 2.5% of the workplace population in the Transport East region commute by rail.
- The **highest journey to work rail mode share is recorded in districts in Essex, Southend-on-Sea and Thurrock** which have direct rail connections to London.
- **Rail journeys in the region have increased by 139% over the last 10 years** with large levels of growth recorded at a number of rural stations.
- There are a **limited number of direct rail services between major settlements in the region**. This is attributable to poor east-west rail connectivity and low frequency services operating along many of the Region's branch lines. As a result, **rail journey times between some of the largest towns and cities in the region are significantly higher than the same journey if travelling by car**.
- The rail network in the south of the Transport East region provides a larger number of stations and route options compared to the north, where a smaller proportion of the population live in close proximity to a station and the range of destinations is more limited.
- **Capacity issues are restricting the ability to increase the number of passenger and freight services**. For instance, existing railway infrastructure from the Port of Felixstowe cannot accommodate 775m length trains and the double track arrangement of GEML and WAML limits the ability to introduce additional passenger services.
- Committed **rail improvement schemes address pinch-points on the existing rail network and provide additional capacity** through new rolling stock and opening of Elizabeth Line services

5.4 OPERATION AND PERFORMANCE OF THE MAJOR AND STRATEGIC ROAD NETWORKS

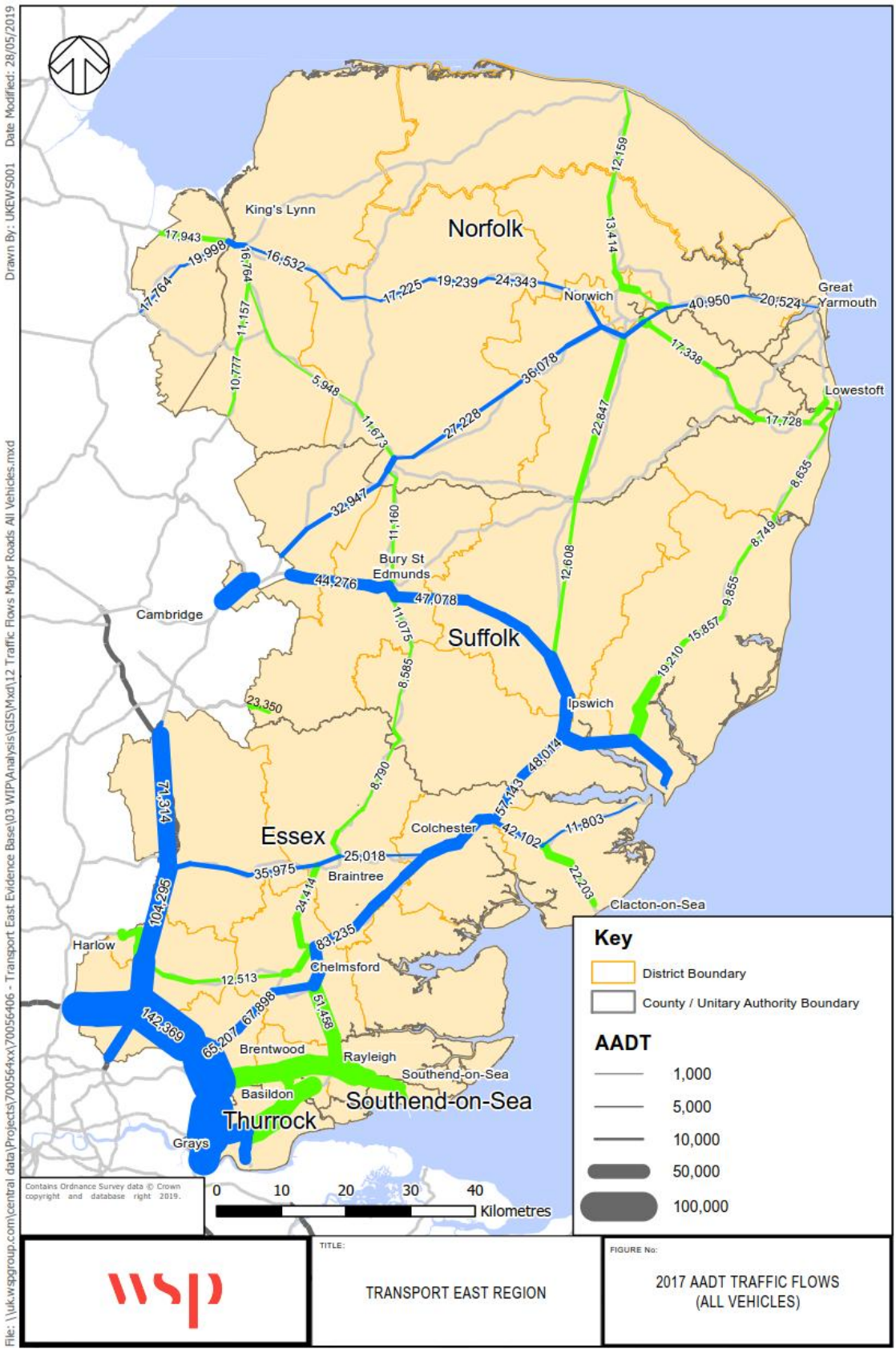
5.4.1. This section summarises the operation and performance of the SRN and MRN in the Transport East region. It sets out the key challenges and opportunities along the fifteen strategic corridors. The analysis has been informed by DfT's Average Annual Daily Traffic Flows and Trafficmaster GPS data, and a review of outputs from Highway England's South East Regional Transport Model (SERTM).

TRAFFIC FLOWS

All Vehicle

5.4.2. In order to identify the most strategically important links on the MRN in the Transport East region, Average Annual Daily Traffic Flows (AADF) have been reviewed. These are 2-way traffic flows produced by the DfT on an annual basis for all junction to junction motorway and 'A' road links in the Great Britain. A plan showing the 2017 all vehicle AADF on the SRN and MRN in the Transport East region is provided in 5-14 below. It should be noted that DfT's traffic estimates for individual road links and small areas are less robust, as they are not always based on up-to-date counts made at these locations. As such the plan below should be regarded as an estimation of daily traffic flows on the SRN and MRN and not taken as absolute.

Figure 5-14 – 2017 Average Annual Dailty traffic Flows (AADF) All vehicles, DfT



Strategic Road Network

5.4.3. The corridors with the highest traffic flows in the Transport East region are all on the SRN, with the highest traffic flows recorded along:

- The M25 corridor between junctions 26 and 31, with an AADF of between 124,500 and 142,500;
- The M11 corridor between junction 5 for the M25 and junction 8 for the A120, with an AADF of between 104,500 and 121,500;
- The A12 corridor between M25 junction 27 / Brentwood and the A14 / Ipswich, with an AADF of between 39,000 (between junction 29 and 30, north of Colchester) and 102,500 (between junction 26 and 28, east of Colchester); and
- The A14 between Felixstowe and Newmarket, with an AADT of between 32,500 (between junction 47 and 49, east of Bury St Edmunds), and 77,000 (between junction 37 and 39, east of Newmarket).

5.4.4. The above corridors are some of the most important economic routes in the Transport East region. They are the main north-south and east-west routes through the region serving major international gateways such as London Stansted and the Port of Felixstowe. These routes also provide access to wider the SRN and MRN within the Transport East region.

Major Road Network

5.4.5. The corridors on the MRN with the highest traffic flows are:

- The A127, A1159 and A13 between Upminster and Shoeburyness, with an AADF of between 70,000 and 61,500 on the A127 between Upminster and Southend-on-Sea.
- The A13 Purfleet to South Benfleet corridor, with an AADF of 86,000 east of Grays;
- The A130 between Chelmsford and Rayleigh, with an AADF of 52,500 on approach to the junction with the A127 at Rayleigh.
- The A12 between Ipswich and Lowestoft, with an AADF of 45,000 to 38,500 between the A14 at Nacton and A1152 at Woodbridge.

5.4.6. The MRN corridors with the highest traffic flows are generally along routes that serve highly populated areas of the Transport East region with limited connectivity to the SRN (e.g. Basildon, Castle Point and Southend-on-Sea; offer a significant journey time saving when compared to travel by the SRN (e.g. it is quicker to travel between Ipswich and Norwich via the A140 rather than via the A14 and A47); and serve significant urban populations (e.g. A12 between the A14 Nacton and Woodbridge).

5.4.7. The corridors on the MRN with the lowest traffic flows in the Transport East region are:

- The A134 between Thetford and King's Lynn, with an AADF of 6,000 near the village of Northwold.
- The A146 and A1117 corridor between Norwich and Lowestoft, with and AADF of 7,500 along the A1117 through Lowestoft.
- The A134 between Bury St Edmunds and Thetford, with an AADF of between 9,000 and 11,000.

5.4.8. The corridors on the MRN with the lowest traffic flows are all single carriageway roads. These corridors generally serving a single destination (e.g. coastal towns along the Norfolk and Suffolk coast) or relatively lightly populated areas. These links, however provide important local connectivity between settlements and to the wider SRN corridors.

5.4.9. Along many of the MRN corridors in the Transport East region, traffic flows tend to increase on approach to major urban settlements, suggesting that they are attracting trips towards these settlements from the wider local road network.

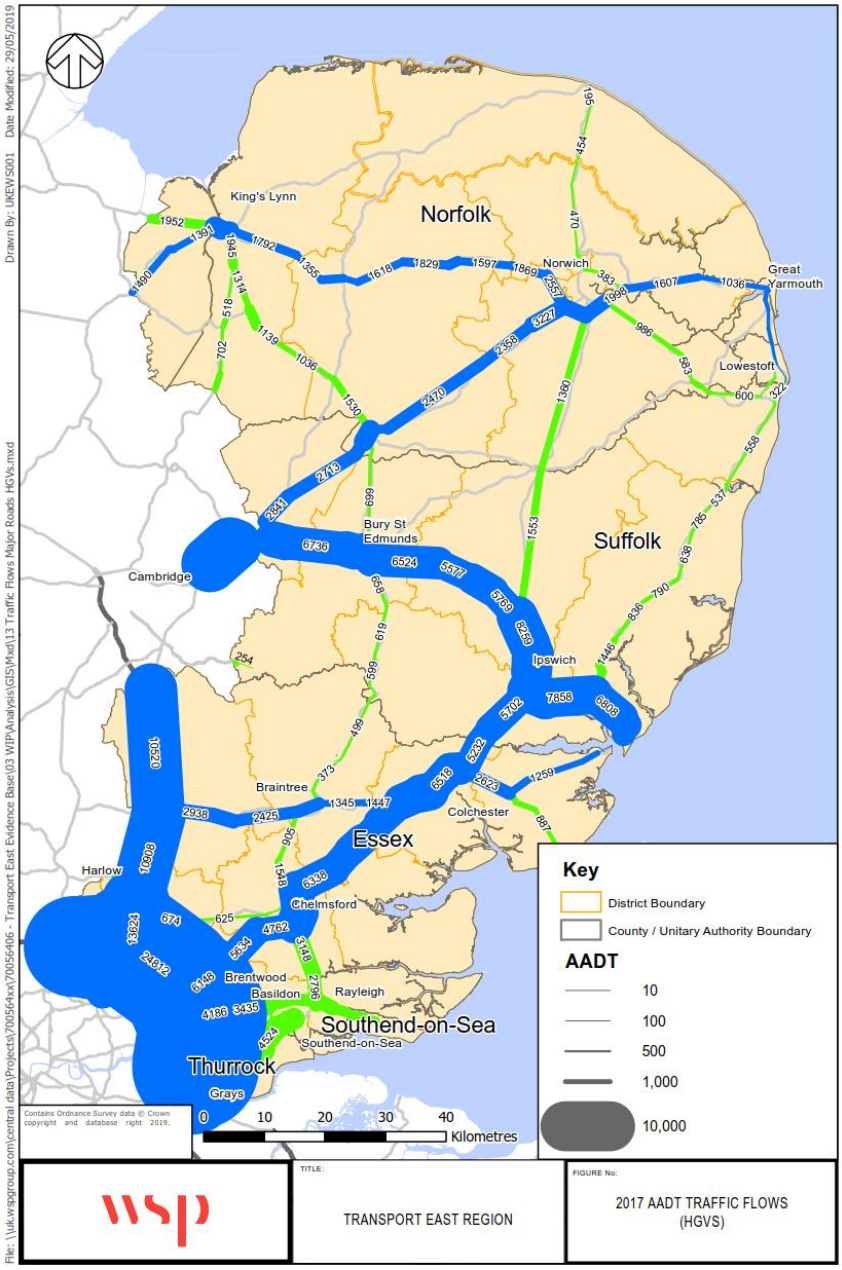
5.4.10. A number of corridors on the MRN have relatively consistent traffic flows along their entire length suggesting that these corridors are used less by local traffic. High usage by local traffic would typically lead to variability in traffic flows along a corridor, with the highest flows recorded between closely spaced urban settlements (e.g. the A12 corridor, between Colchester and Chelmsford). The corridors with relatively consistent traffic flows are:

- The A130 corridor between Chelmsford and Rayleigh: This is the primary route between districts in the south of Essex, Southend-on-Sea and Thurrock and the wider Transport East region.
- The A127, A1159 and A13 between Upminster and Shoeburyness: This is the primary route between districts in the south of Essex, Southend-on-Sea and Thurrock and M25 which provides connectivity to the wider UK.
- The A140 between Needham Market and Norwich: This is the primary route between Ipswich and Norwich.

HGV Flows

5.4.11. Figure 5-15 below shows the 2017 HGV AADF on the MRN and SRN in the Transport East region, demonstrating the importance of the strategic corridors in transporting freight across the region.

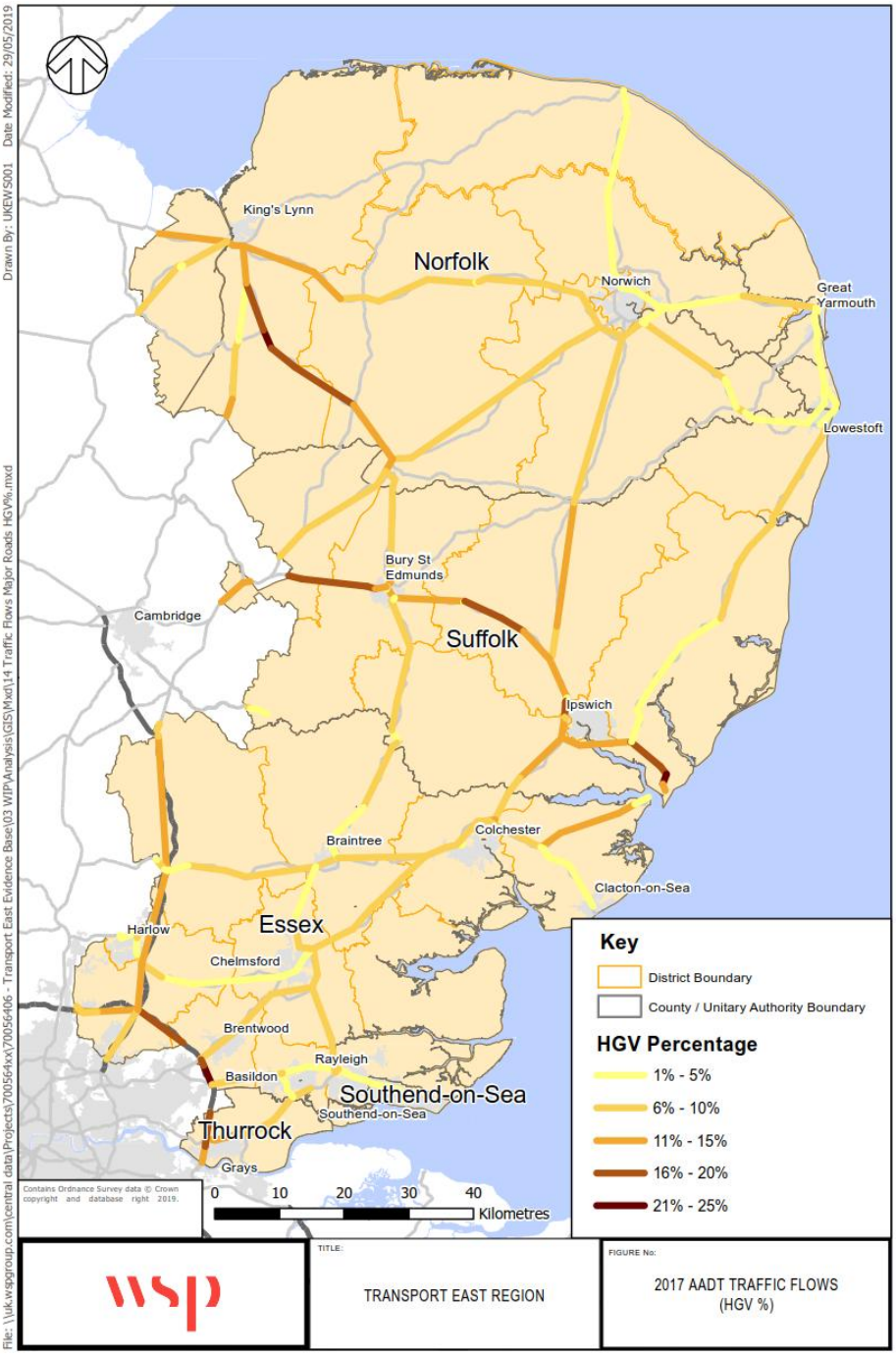
Figure 5-15 – 2017 Average Annual Daily Traffic Flows (AADF) HGVs, DfT



5.4.12. Figure 5-15 demonstrates the importance of the M11, A12 and A14 corridors for transporting goods and freight. Some of the highest HGV flows in the Transport East region are along the A14 between Ipswich and Felixstowe and reflective of the large number of HGV movement to / from the Ports of Felixstowe on the east coast.

5.4.13. The highest HGV flows on the MRN are generally along the corridors with the highest all vehicle traffic flow and includes the A130 between Chelmsford and Rayleigh and along the A127, A1159 and A13 between Upminster and Shoeburyness. This is reflective of the urban nature of the Thurrock and Southend-on-Sea, but also the presence of the Port of Tilbury and DP World London Gateway on the River Thames. To further understand HGV movement through the Transport East region, the percentage of HGVs on all SRN and MRN links in the Transport East region has been plotted and is shown in Figure 5-16 below.

Figure 5-16 – 2017 Average Annual Daily Traffic Flows (AADF) HGV %, DfT



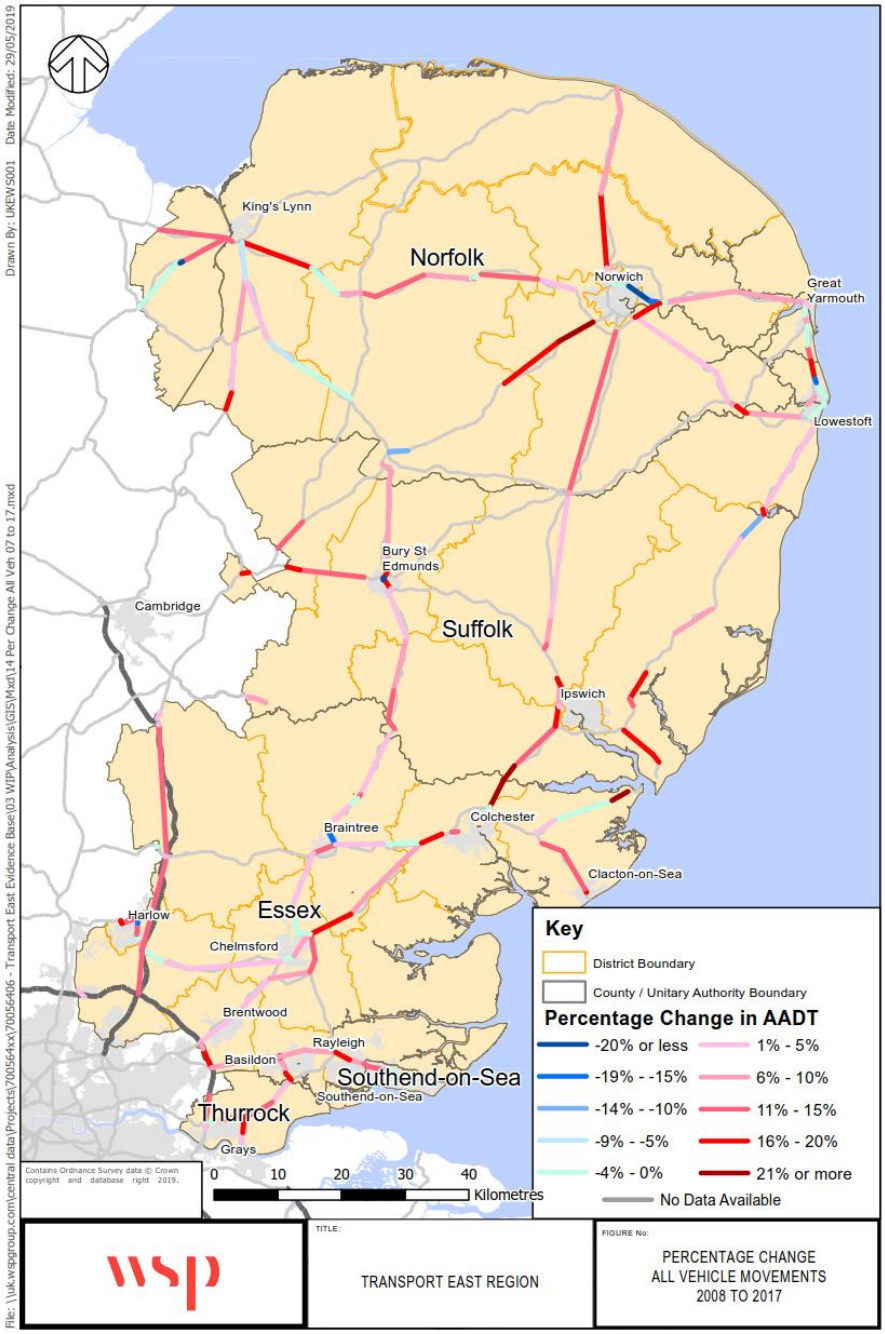
5.4.14. Figure 5-16 above shows the highest percentage of HGVs to be along the A14 between Ipswich and Felixstowe, with HGVs comprising 15% to 25% of all vehicle movements along this corridor demonstrating its importance for serving the international gateway of the Ports of Felixstowe.

5.4.15. A high proportion of HGVs were also recorded on the A134 between Thetford and Kings Lynn. The traffic flow on this link is relatively low, as such a modest number of HGV movements is likely to represent a relatively high proportion of vehicle movements on this link.

HISTORIC TRAFFIC GROWTH

5.4.16. To understand the change in the use of the strategic road network over the past 10 years (2008 to 2017), the percentage change in traffic flows on both the SRN and MRN in the Transport East region has been reviewed and is shown in Figure 5-17 below.

Figure 5-17 –Percentage Change AADT 2008 to 2017, DfT



5.4.17. Figure 5-17 shows there has been substantial growth in AADF flows across the Transport East region, particularly on approach to major towns and cities in the region. This growth is reflective of the increased workplace and residential population in the region, but also an increased number of workers living within rural settlements commuting to / from sub-regional employment centres.

5.4.18. On the MRN the largest percentage growth (a 16% or more increased in the AADF) occurred on the following corridors:

- A130 between Chelmsford and Rayleigh.
- A176 west of Basildon.
- A13 south of Basildon.
- A12 between Ipswich and Lowestoft.
- A146 and A1117 between Norwich and Lowestoft, in particular the section between Beccles and Lowestoft.
- A1042, A140 and A149 corridor between Norwich and Cromer.
- A134 between Thetford and King's Lynn, in particular the section between the A1065 and A11. The change in traffic flow along the A134 is likely to be associated with the new A11 Fiveways to Thetford bypass that opened in 2014.

5.4.19. The lowest growth on the MRN was observed along the following corridors:

- A131 and A130 between Braintree and Chelmsford.
- A414, A1114 and A138 between Chelmsford and Hastingwood, south east of Harlow.
- A134 and A131 between Bury St Edmunds and Braintree, in particular the section between Braintree and Sudbury.
- A140 between Needham Market and Norwich, in particular the section between Needham Market and Diss.
- A146 and A1117 between Norwich and Lowestoft, in particular the section between Norwich and Beccles.

JOURNEY TIME RELIABILITY

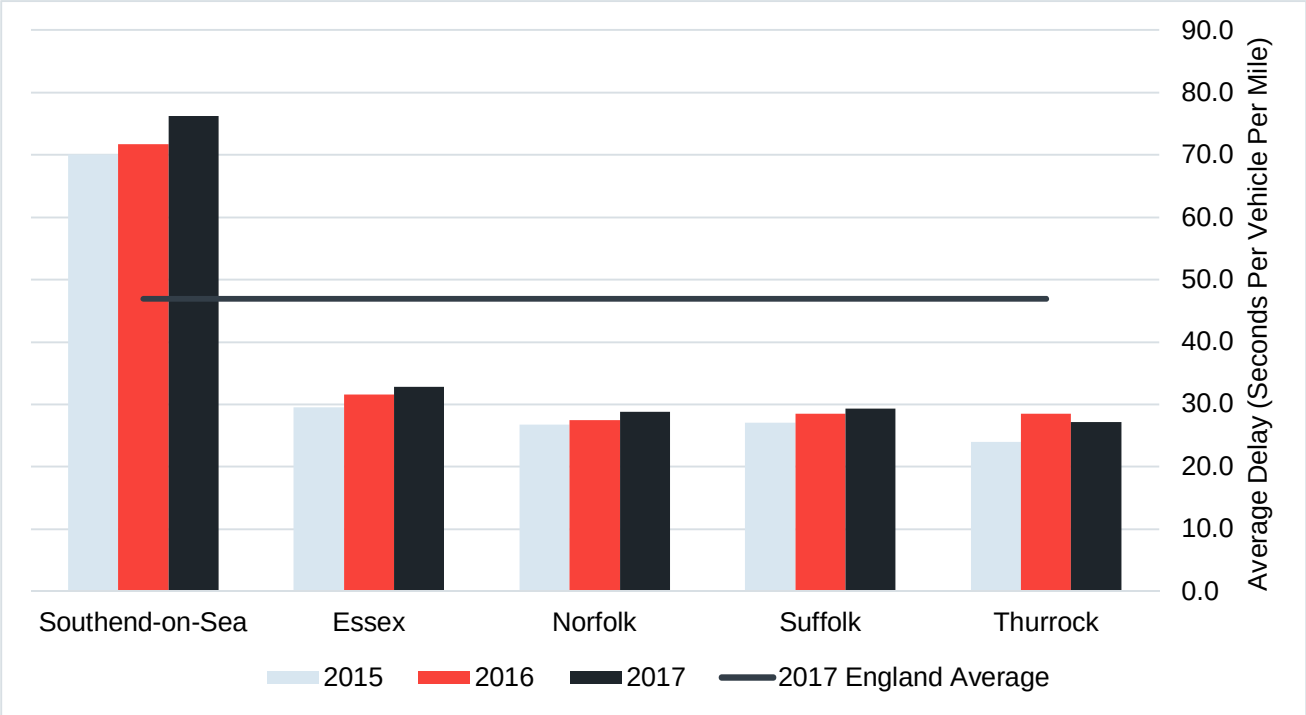
5.4.20. Access to a reliable and resilient transport network is essential for providing access to labour markets and keeping supply chains, many of which operate on a just-in-time basis, functioning effectively. This sub-section explores journey time reliability on the SRN and MRN in the Transport East region, identifying "pinch points" that could potentially constrain future housing, employment and economic growth in the region.

Average Delay

5.4.21. Traffic congestion in the Transport East region is worsening. Figure 5-18 shows that the average delay experienced per vehicle per mile on 'A' road managed in the Transport East region has, with the exception of Thurrock, increased every year for the past three years in each county / unitary authority in the Transport East region. Of the five counties / unitary authorities in the region, Southend-On-Sea is the only areas which has documented delays greater than the average of England (46.9 seconds)[45].

[45] Office for National Statistics (2011). LC6602EW - Industry by Economic Activity. [online] Nomisweb.co.uk. Available at: https://www.nomisweb.co.uk/query/construct/submit.asp?menuopt=201&subcomp= [Accessed June 2019].

Figure 5-18 – Average Delay on Locally Managed 'A' Roads in the Transport East Region 2015-2017



Source: Department for Transport Table CGN0502

Trafficmaster Data

5.4.22. To understand the location of "pinch points" on the SRN and MRN and identify where peak hour congestion is currently occurring, Trafficmaster GPS journey time data sourced from the DfT has been analysed. The Trafficmaster data is very detailed, therefore for the purpose of this REB, journey times for each 15-minute period for all nine vehicle classes for January 2018 to December 2018 has been processed for the following periods:

- Weekday AM Peak Hour (median journey time between 08:00 and 09:00)
- Weekday PM Peak Hour (median journey time between 17:00 and 18:00 – excluding Bank Holidays)
- Overnight "free-flow" Conditions (median journey time between 23:00 and 05:00)

5.4.23. To avoid outliers skewing the results, the highest and lowest 5% of values have been removed from the data.

Peak Hour Congestion

5.4.24. Peak hour pinch points on the MRN and SRN have been identified by comparing the median weekday AM Peak and weekday PM Peak all vehicle speed with the overnight all vehicle speed for each link on the network. Figure 5-19 to 26 show the percentage change between the weekday AM Peak and weekday PM peak and all-day vehicle speeds.

Figure 5-19 –Change in median vehicle speed between overnight ("free flow conditions") and AM Peak – Norfolk

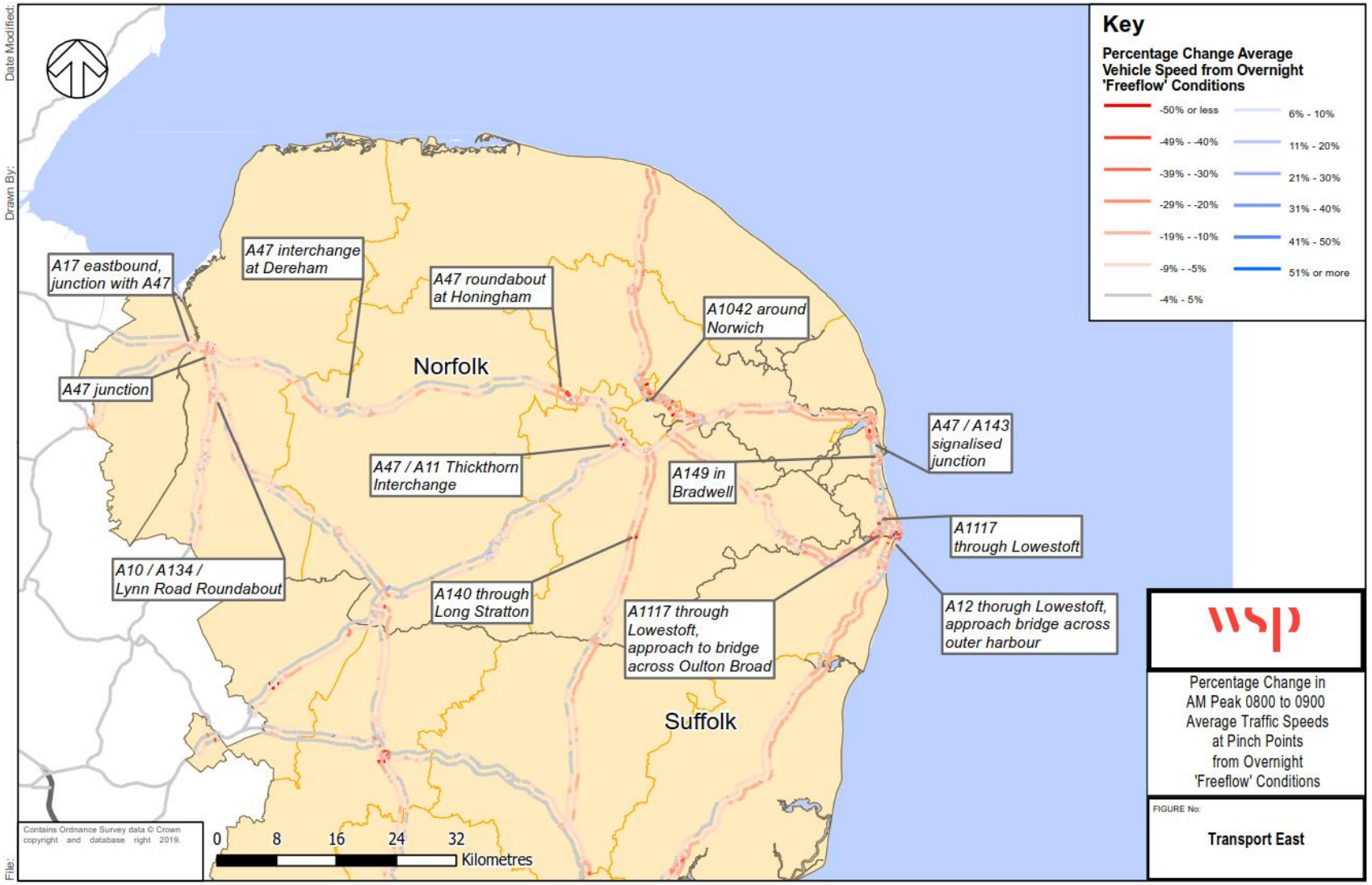


Figure 5-20 –Change in median vehicle speed between overnight (“free flow conditions”) and AM Peak – Suffolk

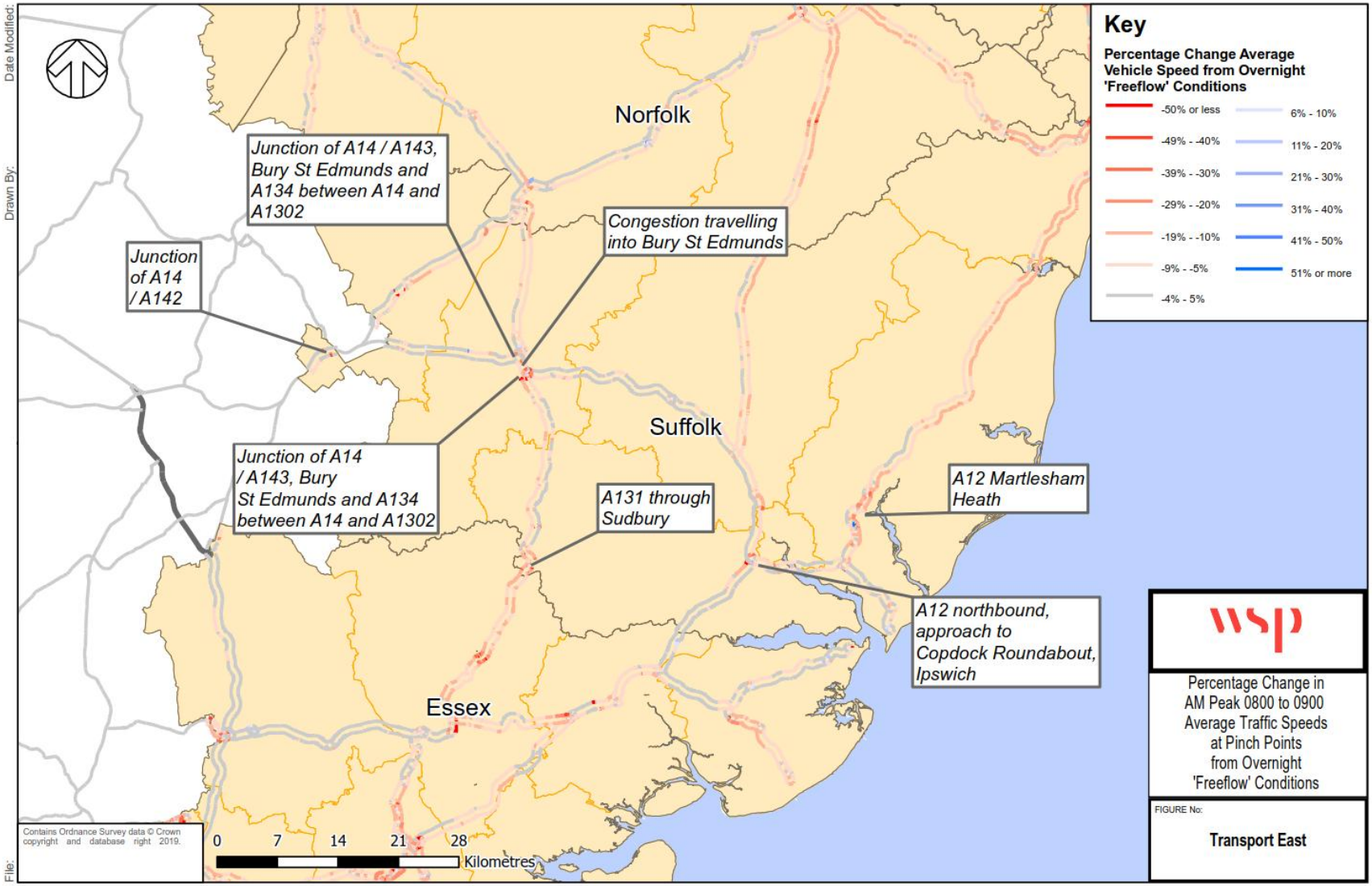


Figure 5-21 –Change in median vehicle speed between overnight ("free flow conditions") and AM Peak – Essex

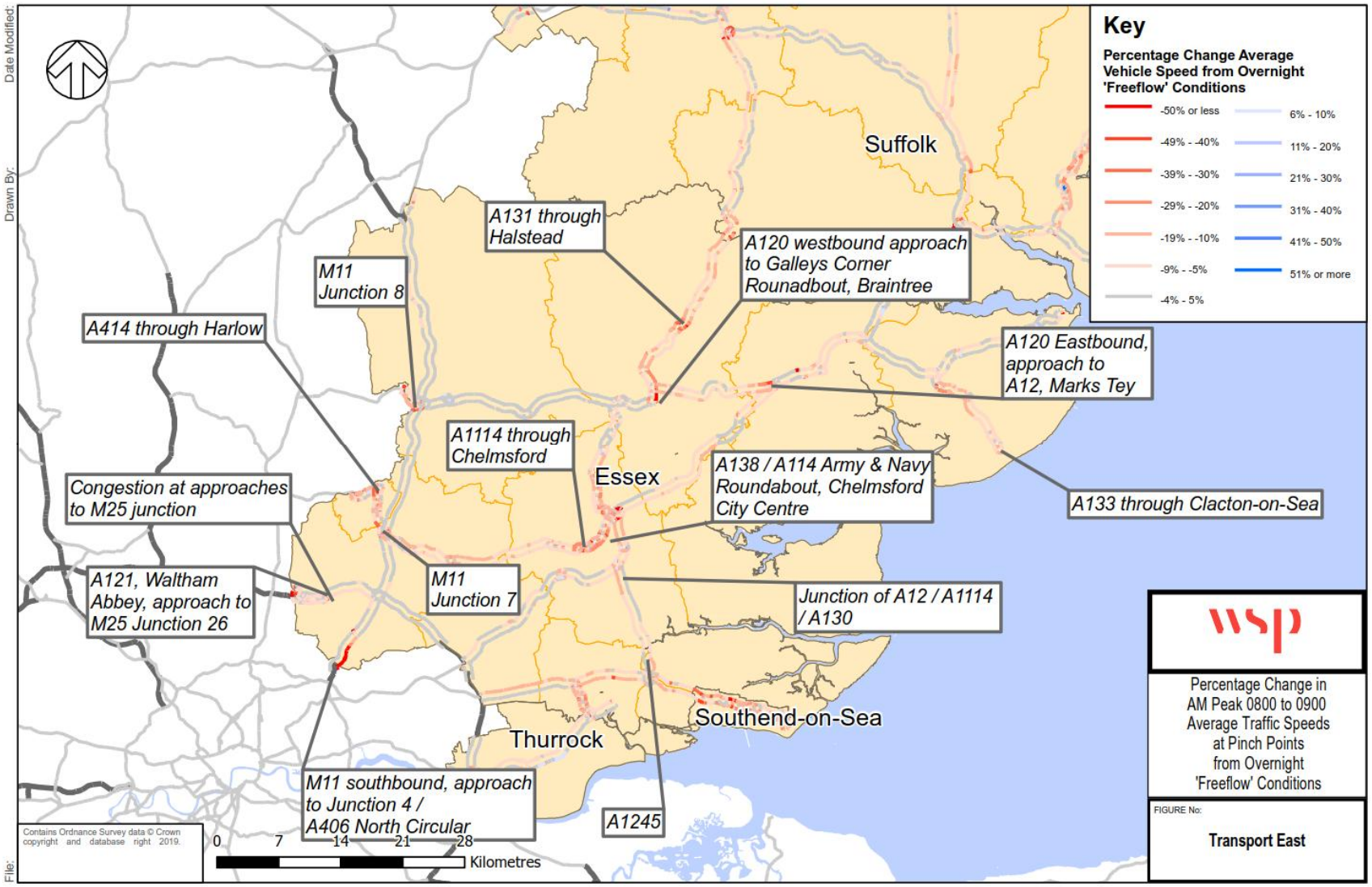


Figure 5-22 –Change in median vehicle speed between overnight ("free flow conditions") and AM Peak – Southend-on-Sea and Thurrock

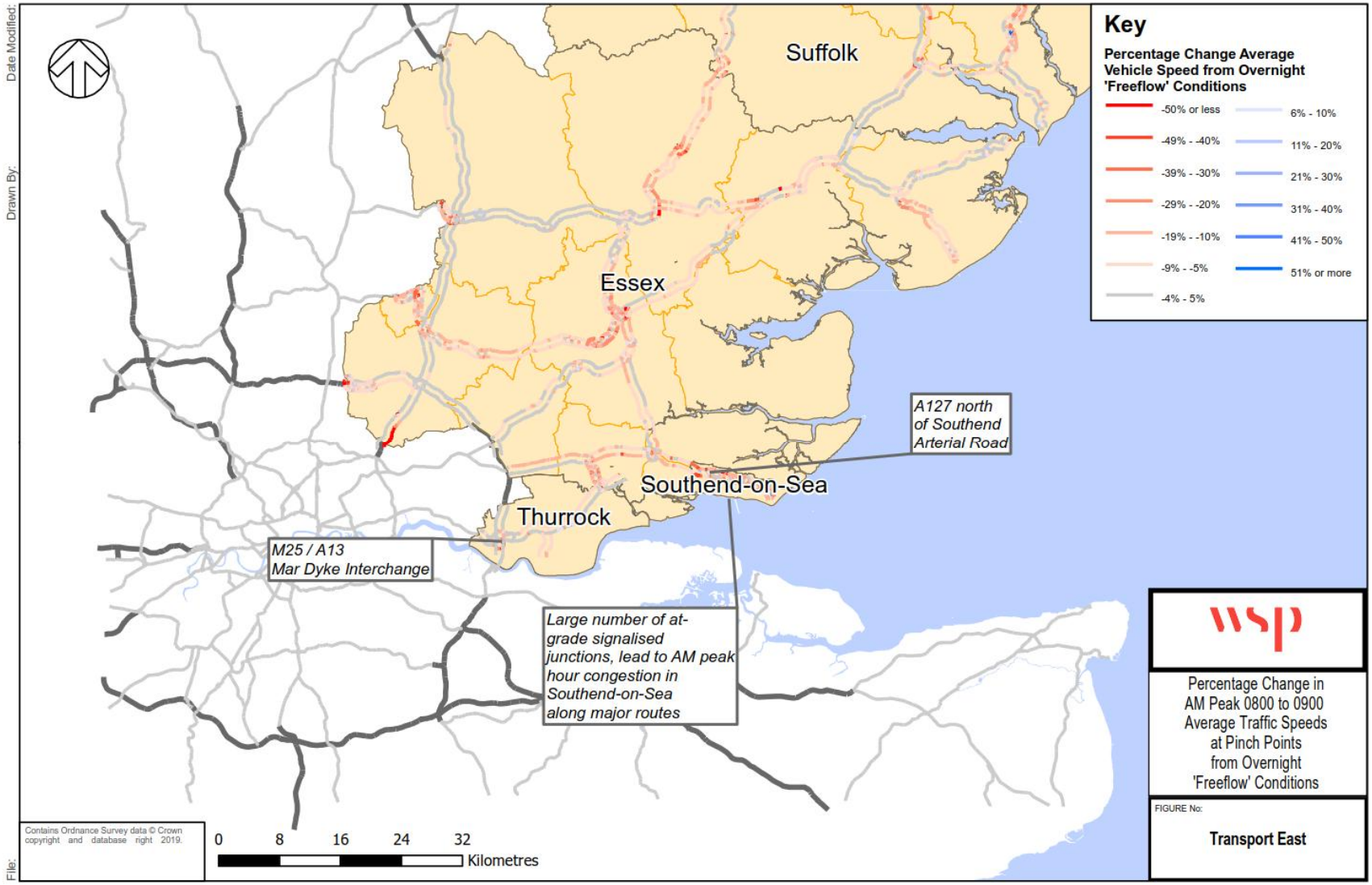


Figure 5-23 –Change in median vehicle speed between overnight ("free flow conditions") and PM Peak - Norfolk

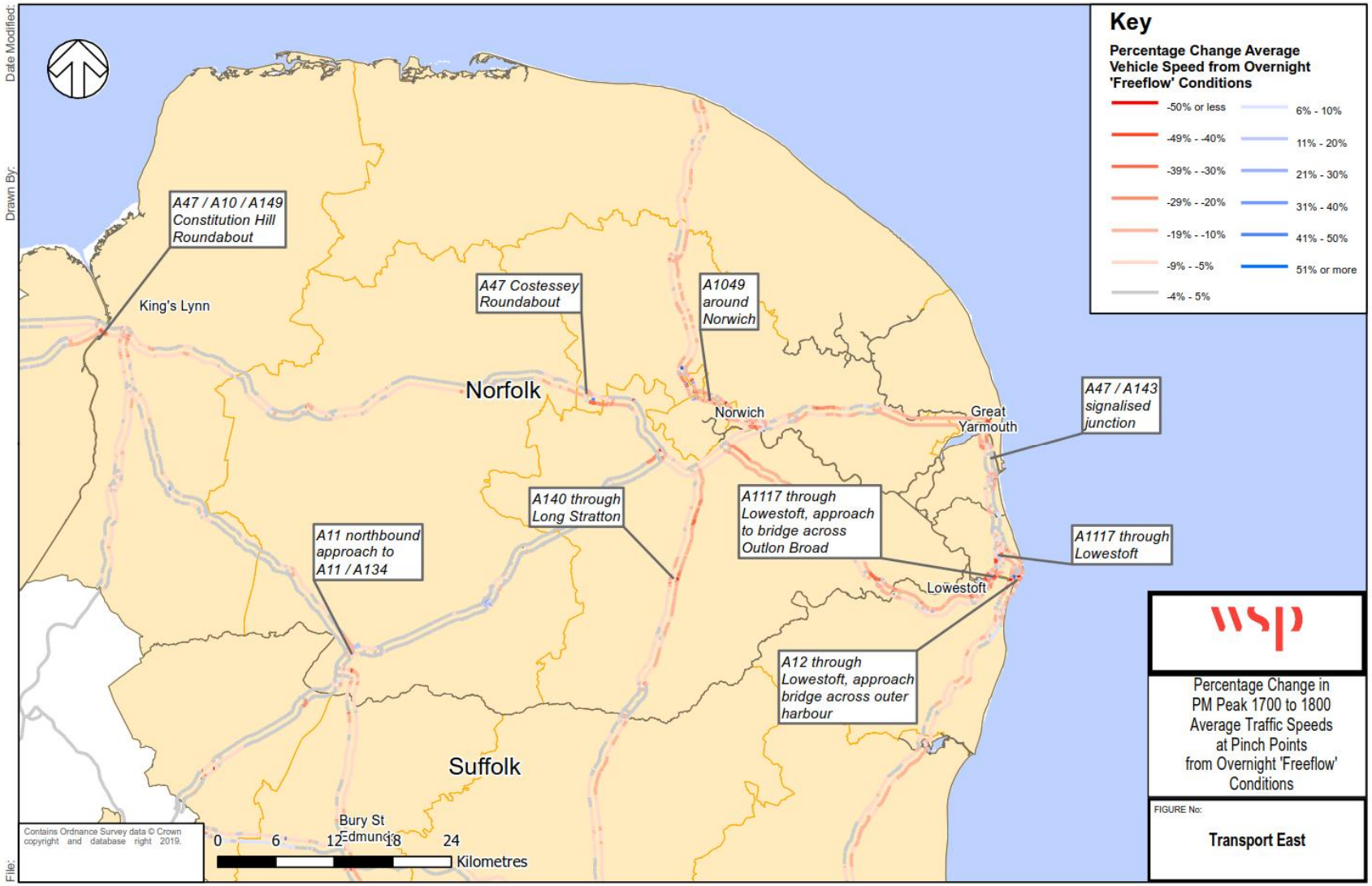


Figure 5-24 –Change in median vehicle speed between overnight (“free flow conditions”) and PM Peak – Suffolk

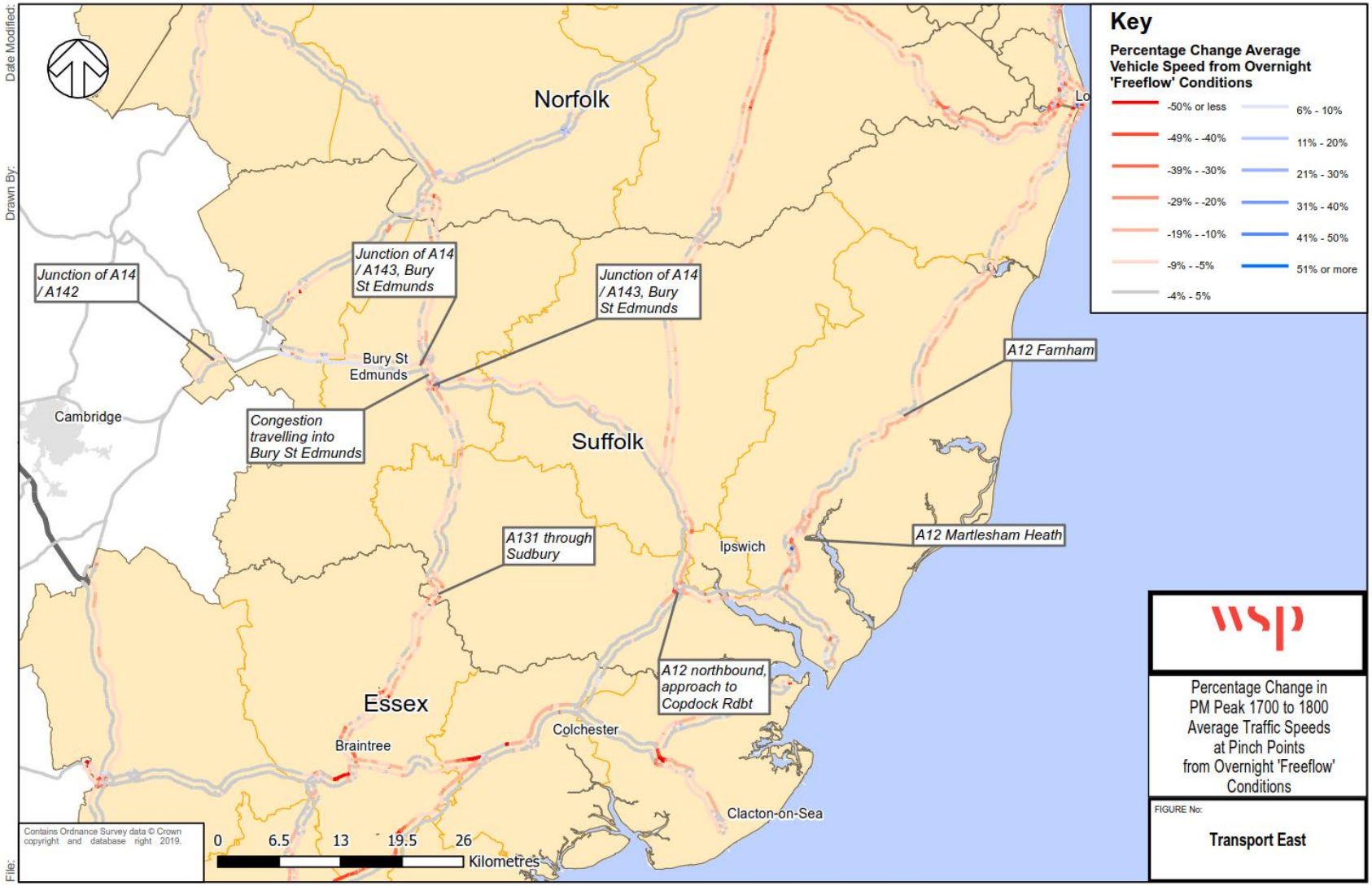


Figure 5-25 –Change in median vehicle speed between overnight ("free flow conditions") and PM Peak – Essex

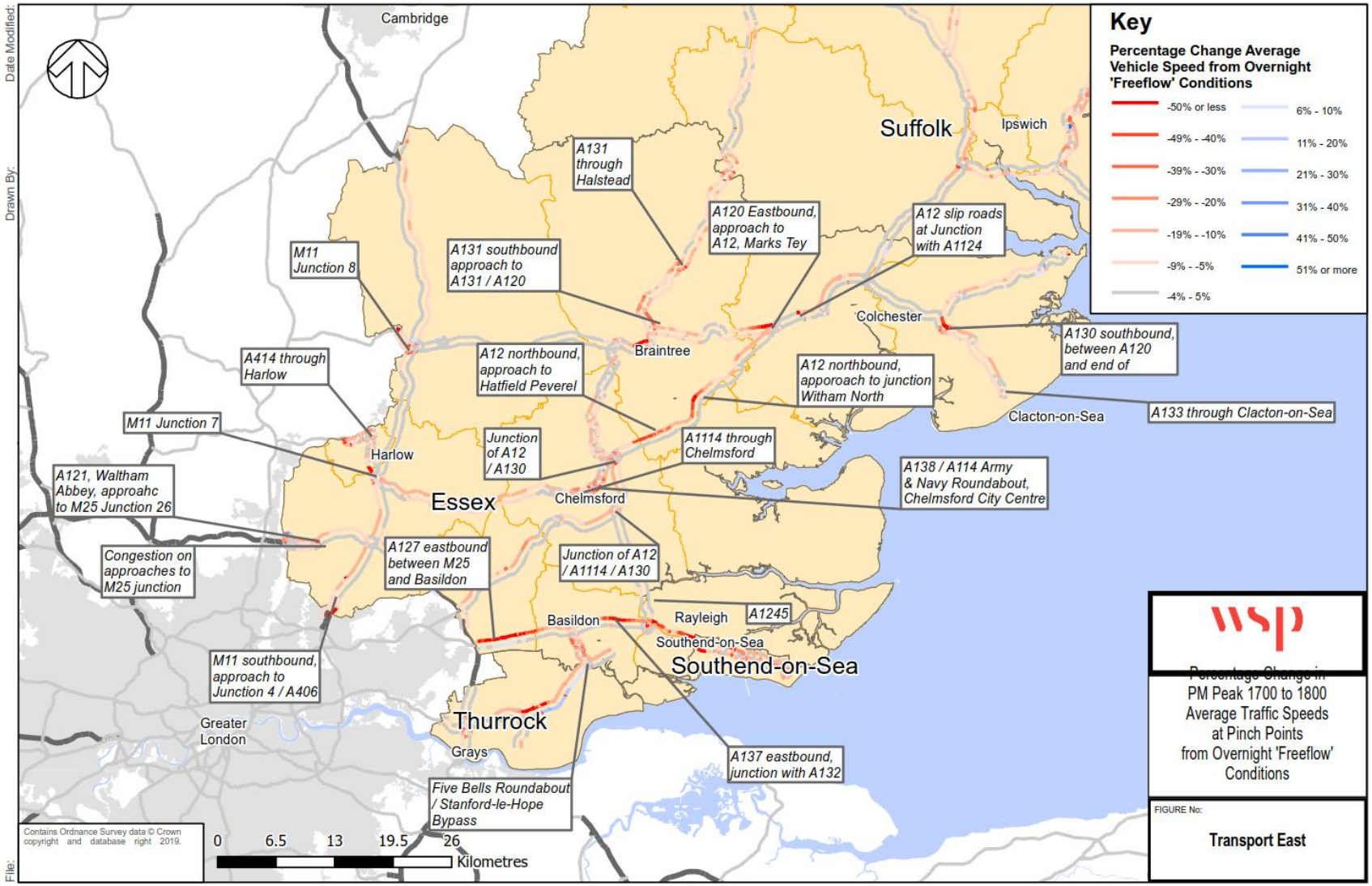
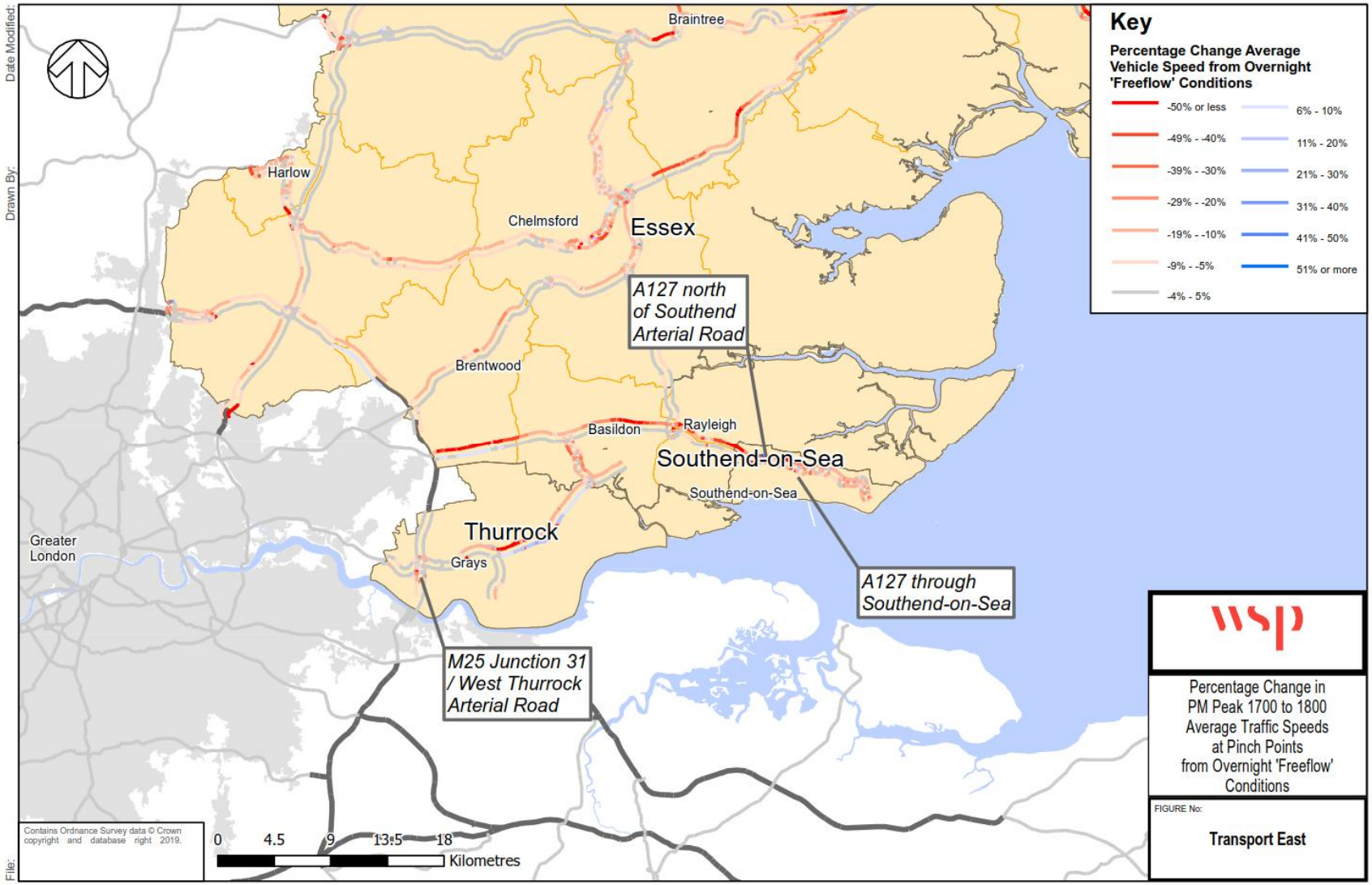


Figure 5-26 –Change in median vehicle speed between overnight (“free flow conditions”) and PM Peak – Southend-on-Sea and Thurrock



5.4.25. The strategic performance of each strategic transport corridor during the AM and PM Peaks is discussed below.

Performance of Strategic Corridors

1. A17 – King's Lynn to A1 (Newark-on-Trent)

5.4.26. This corridor performs well during the AM and PM peak with average speeds less than 10% slower than overnight "free-flow" conditions. The performance of this corridor is reflective of the route principally serving small rural towns and village in Norfolk and Lincolnshire. The largest variation in average speeds is observed at the junction of the A17 and A47 to the south west of King's Lynn.

2. A47 – Peterborough – King's Lynn – Norwich – Great Yarmouth - Lowestoft

5.4.27. The performance of the corridor is mixed and is reflective of the varying standard of the route (frequently changing between a single and dual carriageway and containing a combination of at-grade and grade-separated junctions). Average speeds along the corridor are generally between 5% and 20% lower than overnight "free-flow" conditions, with many links showing a change in median vehicle speed of less than 5%.

5.4.28. The largest reductions in average vehicle speed is generally observed along the single carriageway sections of the A47 and on approach to at-grade junctions. Pinch-points along the corridor include:

- A47 Acle Straight and approach to Vauxhall Roundabout;
- A47 / A143 grade separated signalised junction, in Great Yarmouth; and
- A47 west of Honingham at junction with Norwich Road.

5.4.29. A number of committed improvement schemes will address existing pinch points along the corridor. However, there is no committed improvement scheme to address delay and congestion recorded along the A47 Acle Straight between Acle and Great Yarmouth. This could constrain future housing and employment growth within Great Yarmouth, particularly any growth associated with the expansion of the off-shore energy sector.

3. A11 – Norwich – Cambridge – London

5.4.30. The A11 corridor generally performs well at peak times. Along the majority of links, the AM peak speeds are less than 10% slower than overnight "free-flow" conditions and the PM peak hour vehicle speeds generally match overnight "free-flow" conditions, suggesting that there is limited link congestion along this corridor at peak times.

5.4.31. The largest reduction in average vehicle speed during the peak hours is at an on approach to at-grade junctions along the route in particular:

- A11 northbound, south of Norwich, on approach to the grade separated signalised junction with the A47: During the PM Peak vehicle speeds are 20% to 30% lower than the overnight average. A capacity improvement scheme has been identified by Highways England to address this pinch point as a part of their RIS 1.
- Thetford roundabouts: During the AM Peak vehicle speeds at and on approach to these at-grade junctions are between 10% and 30% slower than overnight "free-flow" conditions. The largest reduction in average speeds are observed on the minor arms of these junctions, particularly the A134.
- A11 southbound on approach to the Mildenhall Fiveways junction: Vehicle speeds in the AM and PM peak on the A11 southbound on approach to the junction are between 10% and 30% slower

than overnight “free-flow” conditions. In the AM Peak vehicle speeds on the roundabout at more than 50% slower, suggesting that there are capacity issues at this junction.

4. A14 – Midlands – Cambridge – Ipswich - Felixstowe

5.4.32. The A14 corridor is the primary route to the Port of Felixstowe. The Trafficmaster GPS journey time data indicates that the corridor generally performs well. A small reduction in peak hour average speeds along sections of the corridor, but generally the magnitude of any reduction is low (less than 10%).

5.4.33. The largest reduction in vehicle speeds during the peak hours is on the off-slips at junctions for Ipswich, Stowmarket, Bury St Edmunds and Newmarket. This corridor is the main access to the Port of Felixstowe from the midlands and the North. As such the continued strong performance of this corridor at peak times is vital to the future success and expansion of the port.

5.4.34. The corridor includes the Orwell Bridge. This is bridge over the River Orwell to the south of Ipswich. The crossing is prone to accidents and incidents and is often closed in adverse weather conditions. This results in traffic routing through the centre of Ipswich.

5.4.35. The pinch-points include:

- A14 between junction 43 and 44 around Bury St Edmunds;
- A14 junction 37 for Newmarket; and
- A14 Orwell Bridge.

5. A120 / A12 / A133 – Harwich / Clacton-on-Sea – Colchester – Braintree – Stansted Airport

5.4.36. The performance of the corridor in the AM and PM peaks is mixed and is generally reflective of the varying standard of the route. It features a combination of single and dualled carriageway sections and mixture of grade and at-grade junctions.

5.4.37. Along the single carriageway sections of the corridor and on approach to at-grade junctions between Marks Tey and Braintree there is a significant reduction in the average speed of vehicles compared to overnight “free-flow” conditions (50% slower). Whereas along the dualled section of the A120 between the M11 and Braintree, the peak hour average speed generally matches overnight “free-flow” condition (less than 5% slower).

5.4.38. The corridor provides access to London Stansted Airport. The connectivity of the airport from the east is constrained by the single carriageway section of the A120 between Marks Tey and Braintree and the connectivity of the airport from the west is constrained by the capacity of M11 Junction 8. Whilst there is a fly-over of M11 junction 8 for vehicles travelling to / from the M11 south, vehicles travelling to / from the M11 north must travel through the junction. This junction experiences severe congestion in the peak hours, particularly on the A120 westbound approach in the AM Peak.

5.4.39. ECC are currently delivering a capacity improvement scheme at this junction, however it is likely further improvements would be required in future to facilitate significant growth at London Stansted Airport and additional housing and employment growth along the corridor.

5.4.40. The corridor also provides access to Harwich Port. The A120 between Colchester and Harwich generally performs well at peak times with vehicle speeds less than 20% slower than overnight “free-flow conditions”. The largest reductions in average speed are observed near Horsley Cross where the road changes from dual to single carriageway.

5.4.41. The section of the corridor leading to Clacton-on-Sea section is comprised of the A120 and A133. Significant delay and congestion are recorded on approach to the junction of the A120 / A133 at peak time. In the AM Peak vehicle speeds are 20% to 30% slower on the northbound A133 and more than 50% slower on the southbound A120 in the PM Peak. A large reduction in vehicle speeds (more than 50% reduction) during the peak hours is also recorded on the A133 through Clacton-on-Sea.

5.4.42. The main pinch-points along the corridor are:

- M11 Junction 8, near London Stansted Airport (particularly on the M11 northbound off-slip and A120 Thremhall Avenue westbound approaches);
- A120 Galleys Corner Roundabout, Braintree (with highest levels of congestion on the A120 westbound approach in the AM and eastbound A120 approach in the PM);
- A120 through Mark's Tey (single carriageway section of the corridor with large number of side access junctions);
- Roundabout at the junction of the A120 / A133; and
- A133 through Clacton-on-Sea.

6. M11 – London – Stansted Airport – Cambridge

5.4.43. Peak hour vehicle speeds along the corridor generally match overnight 'free flow' conditions. Although on the M11 southbound between Junctions 9 and 8 there is a small reduction in average speed, suggesting some link capacity issues along this section (5% to 20% reduction).

5.4.44. There is a significant reduction in vehicle speeds during the peak hours on the M11 southbound between junctions 5 and 4 on approach to the A406 North Circular (> 50% reduction). The reduction in vehicle speeds on approach suggests link capacity issues at the interchange of the M11 / A406.

5.4.45. The corridor provides access to Stansted Airport via the A120 and M11 Junction 8. As noted above this currently experiences significant delay at peak times and hinders accessibility between the M11 North and A120 East.

7. A1042 / A140 / A149 – Ipswich – Norwich – North Norfolk

5.4.46. This corridor is principally comprised of the A140, but also includes the A149 near Cromer and A1042 through Norwich. The corridor is single carriageway with large number of at grade junctions and side access. The corridor routes through Norwich via the A1042 and many other rural towns and villages in Suffolk and Norfolk.

5.4.47. Peak hour vehicles speeds along the corridor are generally 10% to 30% slower than overnight 'free flow' conditions. This does suggest link capacity issues along the corridor but could also be reflective of junction capacity issues and large number of side access junctions.

5.4.48. The largest reduction in average speeds is on the A140 through Long Stratton and Norwich, with peak hour speeds 50% slower than the overnight 'free-flow' speed.

5.4.49. It should be noted that the A1270 Broadland Northway opened in April 2018. The impact of this new distributor road on peak hour vehicle speeds on the A1042 through Norwich is not fully captured in the Trafficmaster GPS data but is likely to have reduced traffic congestion on the A1042 through Norwich. The A1270 also provides improved strategic connectivity to Norwich Airport from the A47.

5.4.50. The main pinch-points along the corridor are:

- A1042 through Norwich; and
- A140 through Long Stratton.

8. A146 / A1117 – Norwich – Lowestoft

5.4.51. This corridor is comprised of the A146 and a short section of the A1117 through Lowestoft. In the AM Peak, vehicle speeds are generally 5% to 30% lower than the overnight 'free-flow' speed along the entire corridor. The PM Peak speeds generally match those observed in the AM Peak, however there are a number of links along the corridor where speeds are more than 30% slower than the overnight 'free-flow' speed. In particular:

- The A146 eastbound on approach to the roundabout at the junction with the A143, near Beccles; and
- The A146 eastbound on approach to the roundabout at the junction with the A1145, south of Lowestoft.

5.4.52. The largest percentage reduction in peak hour vehicle speeds is observed on the A1117 through Lowestoft on approach to the bascule bridge across Lake Lothing. This is one of only two crossings across Lake Lothing and likely to be attributable to much of the peak hour congestion observed in the town. To address the existing traffic congestion in the town SCC are currently progressing a scheme to provide a third crossing across Lake Lothing.

9. A10 – King's Lynn – Cambridge – London

5.4.53. Peak hour speeds along the corridor are generally between 5% and 20% slower than overnight 'free-flow' conditions. This is reflective of the single carriageway nature of the corridor and the high frequency of at grade junctions and side accesses.

5.4.54. The largest reduction in peak hours speeds was recorded on approach to the junction of the A10 and A47 at West Winch, south of King's Lynn. Peak hour vehicle speeds are between 20% and 40% slower than overnight "free-flow" conditions, suggesting that there are link and junction capacity issues at this location.

10. A10 / A134 / A131 – Kings Lynn – Thetford – Bury St Edmunds – Braintree – Chelmsford

5.4.55. This corridor is served by the A10, A134 and A131. The corridor generally performs well during the AM and PM peaks, with pinch points at major at-grade junctions and where the corridor routes through towns and villages. The relatively good performance of the corridor is reflective of its rural situation and the proximity of alternative strategic north-south routes which offer reduced journey times (e.g. A10, A11, M11, A14 and A12).

5.4.56. Specific pinch points along the corridor are identified below:

- Roundabout at the junction of the A11 / A134 in Thetford. In the AM and PM peaks A143 southbound vehicle speeds are 20% slower than overnight 'free-flow' conditions.
- Approach to the grade separated roundabout at the junction of the A14 / A134 / A1302.
- Link between the A14 and A1302 in Bury St Edmunds.
- The A131 through Sudbury. Peak hour speeds are between 40% and 50% slower than overnight 'free-flow' conditions.
- The A131 through Halstead.

- A131 southbound on approach to Marks Farm Roundabout at the junction of the A131 / A12 / B1256.
- On approach to, and along the A130 between Great Leighs and Chelmsford where the A130 changes from a dual to single carriageway at Great Leighs.

11. A12 – Lowestoft – Ipswich – Colchester – Chelmsford - London

5.4.57. In the AM Peak average speeds along the corridor are generally between 5% and 20% slower than the overnight 'free-flow' conditions. The exception is A12 northbound approach to the A12 / A14 Copdock interchange, where speeds are more than 50% slower, and southbound A12 north of Ipswich, near Woodbridge, where speeds are between 20% and 40% slower. In both cases, delays appear to be associated with existing at-grade junctions, suggesting significant capacity issues at junctions along the corridor.

5.4.58. The corridor performs significantly worse in the PM Peak, particularly on the northbound A12 between London and Ipswich. On approach to Hatfield Peveril and Witham north vehicle speeds are more than 50% slower than overnight 'free-flow' conditions. The delays are associated with junctions on the A12, suggesting link capacity issues, or that the existing merge / diverge arrangement is not appropriate for the traffic flows. In the PM peak delays are also recorded on the A12 Northbound on approach to the Copdock Interchange and A12 near Woodbridge.

5.4.59. In addition to the above, significant delay and congestion is recorded on the A12 through Lowestoft and is likely to be associated with the operation of the Bascule Bridge across the outer harbour.

5.4.60. The main pinch-points along the corridor are:

- A12 / A14 Copdock Interchange, particularly the A12 northbound approach;
- A12 north of the A14, particularly on approach to at-grade junctions near Woodbridge;
- A12 northbound between Chelmsford and Colchester in the PM Peak only; and
- A12 through Lowestoft on approach to the bascule bridge across the outer harbour.

5.4.61. To address the capacity issues on the A12 between Colchester and Chelmsford Highways England are currently progressing a capacity improvement scheme as a part of RIS1.

12. A414 / A1114 / A138 – Chelmsford – Harlow

5.4.62. This corridor is principally comprised of the A414 in addition to the A1114 and A138 through Chelmsford. Compared to the A120 between Braintree to London Stansted Airport corridor, an east-west corridor to the north, the Chelmsford to Harlow corridor performs relatively poorly during the peak hours. This is likely to be attributable to this corridor being principally single carriageway road with at grade junctions. Generally, vehicle speeds are between 5% and 30% slower than overnight 'free-flow' conditions in the peak periods.

5.4.63. The largest reductions (more than 50% slower) are observed on the A1114 through the centre of Chelmsford, on approach to the M11 junction 7, along the A414 through Harlow, and on approach to the roundabout at the junction of the A414 / B184 in Chipping Ongar.

5.4.64. The main pinch points along the corridor are:

- A138 / A1114 Army and Navy Roundabout, Chelmsford City Centre;
- A1114 through Chelmsford;
- A414 eastbound on approach to the A414 / B184 roundabout in Chipping Ongar;
- Approach to M11 Junction 7;

- A414 through Harlow, particularly in the northbound direction from M11 junction 7 on approach to the roundabout at the junction of the A1169.

13. A127 – London – Southend-on-Sea

5.4.65. This corridor is principally comprised of the A127 in addition to a short section of the A1159 and A13 through Southend-on-Sea and Shoeburyness. The largest reduction in peak hour vehicle speeds from overnight 'free-flow' conditions is observed within the main urban area of Southend-on-Sea and Shoeburyness (more than 50% reduction). This is likely to be attributable to the large number of at grade signalised junctions operating at, or close to capacity, along this section of the corridor and large number of side access roads.

5.4.66. In the PM peak vehicle speeds are also reduced by more than 50% along the A127 compared to overnight 'free-flow' conditions. The speed reductions are observed along significant stretches of the corridor, suggesting that there are link and junction capacity issues.

5.4.67. The main pinch points along the corridor are:

- A127 eastbound on approach to Southend-on-Sea in the PM Peak only;
- A127 eastbound on approach to the junction of the A132, north of Basildon in the PM Peak only;
- A127 eastbound between the M25 and Basildon in the PM Peak only;
- A127 eastbound and westbound on approach to the A127 / Progress Road / The Fairway signalised junction; and
- A127, A1159 and A13 through Southend-on-Sea and Shoeburyness.

14. A13 / A176 / A130 – London – Thurrock – Tilbury - Chelmsford

5.4.68. This corridor includes the A13 between the M25 and A130, A130 between the A13 and A12, A176 through Basildon and A1089 between the A13 and the Port of Tilbury. At peak times vehicle speeds along the A13 are generally between 5 and 20% slower than overnight 'free-flow' conditions. However, in the PM peak vehicles speeds are more than 50% slower on the A13 eastbound west of the junction with the A1089. This hinders vehicles travelling from the Port of Tilbury and vehicles travelling to DP World London Gateway.

5.4.69. The A1089 between the A13 and Port of Tilbury performs well at peak times with vehicles speeds between 5 and 20% slower than overnight 'free-flow' conditions. Vehicle speeds along the A176 through Basildon are generally, 5% to 30% slower than the overnight 'free-flow' conditions. This section of the corridor routes through a built-up urban area with a number of at grade junctions. The reduction in vehicle speed is likely to be attributable to junction capacity issues through the centre of Basildon.

5.4.70. The A130 between South Benfleet and A12, south of Chelmsford performs well at peak times with average vehicle speeds less than 5% slower than overnight "free-flow" conditions.

5.4.71. The main pinch points along the corridor are:

- A13 eastbound, west of Grays and the junction for A1089 in the PM peak only; and
- A176 through Basildon.

15. M25 North East Quadrant – Thurrock – A12 – M11

5.4.72. The north-east quadrant of the M25 performs relatively well in the peak periods, with speeds generally less than 10% slower than overnight 'free-flow' conditions. The largest reduction in vehicle speed is observed on the anti-clockwise M25 in the AM Peak and the clockwise M25 in the PM Peak.

LINK CAPACITY

South East Regional Transport Model

5.4.73. To further understand the performance of the MRN the outputs from the South East Regional Transport Model (SERTM) have been reviewed. The SERTM is a Regional Traffic Model (RTM) for the south east of England developed for Highways England. The purpose of the RTM is to enable Highways England to progress the schemes identified in the Road Investment Strategy (RIS) within the Road Period (2015 to 2020) which is discussed in more detail below.

5.4.74. The model has been calibrated to a base year of 2015 and considers a future situation in 2031 and 2041 with and without mitigation. For the purpose of this report, a cordon isolation was undertaken of the full SERTM model to extract the network coverage within the Transport East region.

5.4.75. It should be noted that the SERTM is intended to be used as a high-level tool to help identify particular parts of the SRN that are operating close to capacity and where further intervention and investigation is required. As such the flows from the SERTM do not represent a definitive Highways England Statement of existing conditions on the SRN or MRN.

5.4.76. The ratio of flow to capacity (RFC) is a good indication of network performance and can help indicate whether the current road network is congested and operating with capacity issues. The Design Manual for Roads and Bridges (DMRB) TA 79/99 defines capacity as "the maximum sustainable flow of traffic passing in 1 hour, under favourable road and traffic conditions". A RFC in excess of 100% would suggest that the flow along a section of road is likely to break down at peak periods, leading to queuing and delays.

5.4.77. It is generally considered that an RFC of 85% is the threshold at which a road network begins to experience congestion. The plots of RFC capacity from the SERTM model indicate escalation in RFC to capacity from 85%, through 90% and those exceeding 100%. An RFC of more than 100% would be indicative of severe congestion. The RFC of links on the SRN and MRN in the Transport East region in the 2015 base year is shown in Figure 5-27 and Figure 5-28 and discussed below.

Figure 5-27 – Ratio of Flow to Capacity 2015 Base AM Peak, SERTM, Highways England

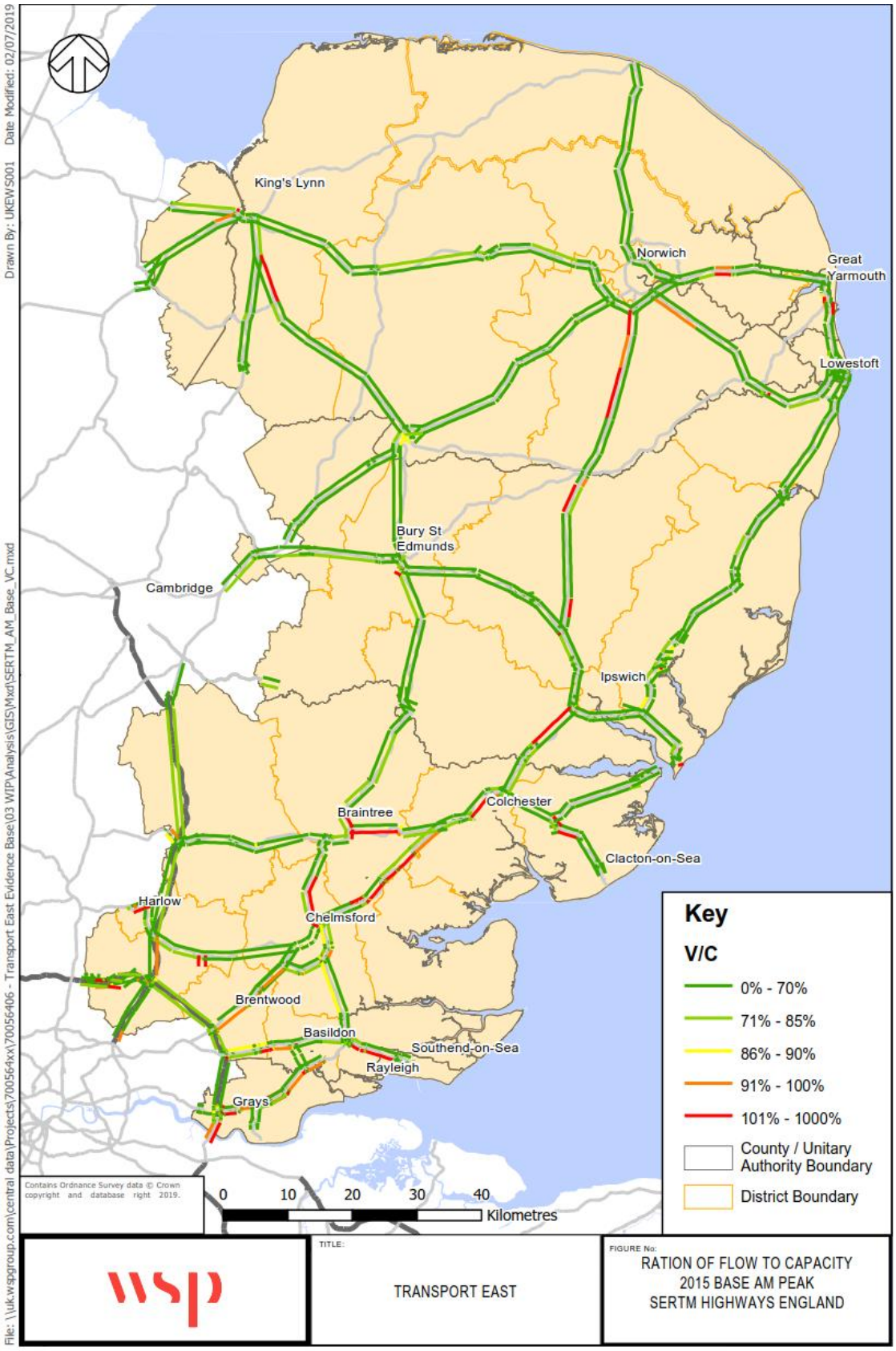
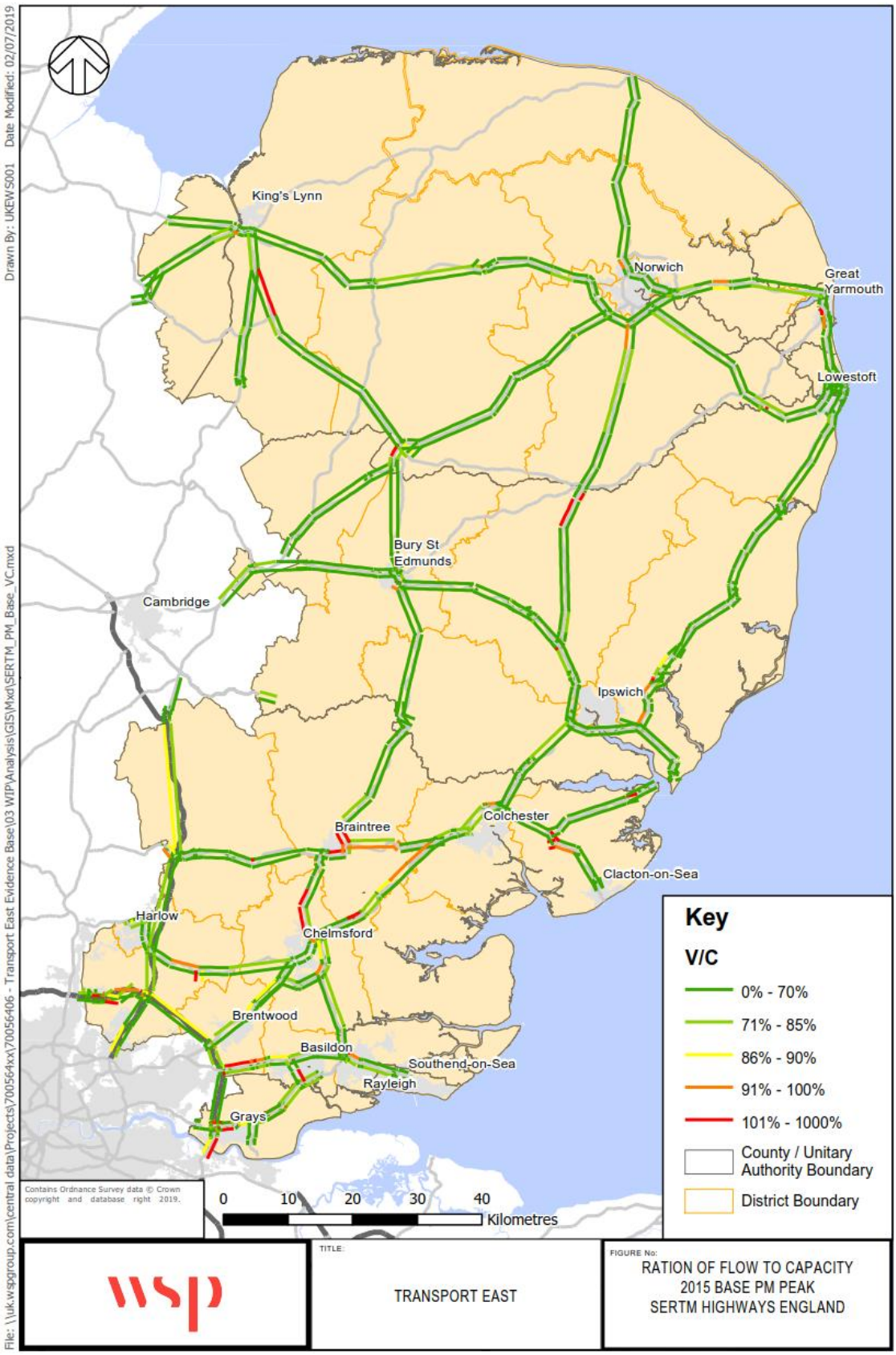


Figure 5-28 – Ratio of Flow to Capacity 2015 Base PM Peak, SERTM, Highways England



Strategic Road Network

5.4.78. The 2015 base year SETRM outputs show congestion on the SRN to be more prevalent in the south of the region, with capacity issues shown along the following links:

- A12 between the M25 and Ipswich (including the approaches to Chelmsford and Colchester);
- A13/A1089 between the M25 and Tilbury;
- Sections of the M25, including that between Junction 25 and Junction 26;
- A120 between Marks Tey and Braintree;
- A47 between Acle and Blofield; and
- A47 through the main urban area of Great Yarmouth and Goreleston-on-Sea.

Major Road Network

5.4.79. On the MRN significant congestion is shown on the A13 and A127 between the M25 and Basildon. There are also localised problems with capacity at the following locations:

- A133 near Fratting, Colchester;
- A130 to the north of Chelmsford;
- A131 north of Braintree;
- A134 south of Tottenhill, King's Lynn;
- A12 at Woodbridge north east of Ipswich;
- A120 at Bishop's Stortford on the Essex / Hertfordshire border; and
- Portions of the A140 between Norwich and Needham Market.

Planned Transport Improvements

5.4.80. To address link and junction capacity issues on the MRN and SRN a number of transport infrastructure schemes are proposed by Highways England and the Local Highway Authorities. This information has been sourced from Local Transport Plans, LEPs and Highways England RIS1.

Strategic Road Network

5.4.81. The transport improvements planned in each local authority on the SRN in the Transport East region is shown in Figure 5-29 to Figure 5-30 below.

Figure 5-29 – Planned Transport Improvements – Norfolk and Suffolk

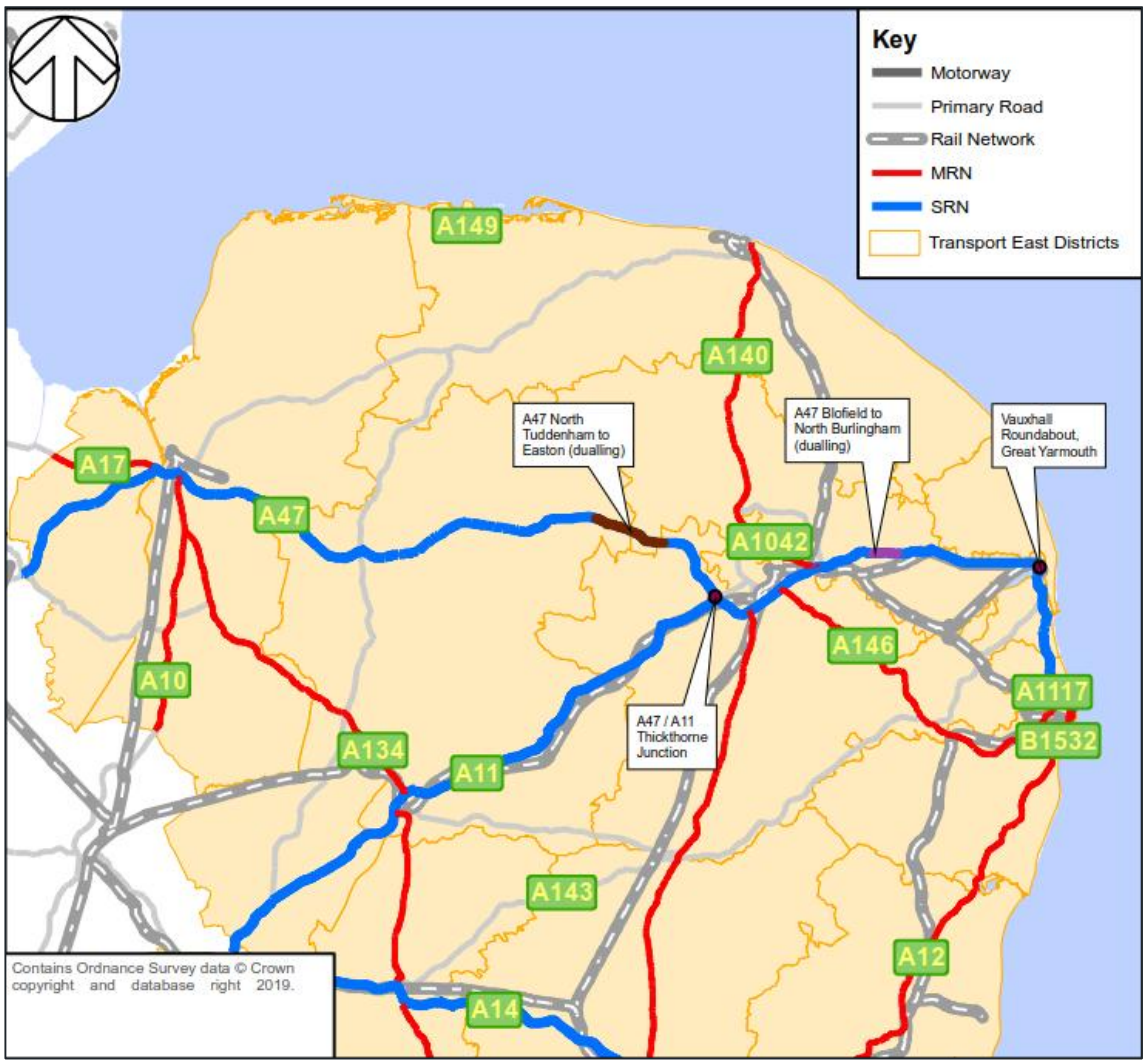
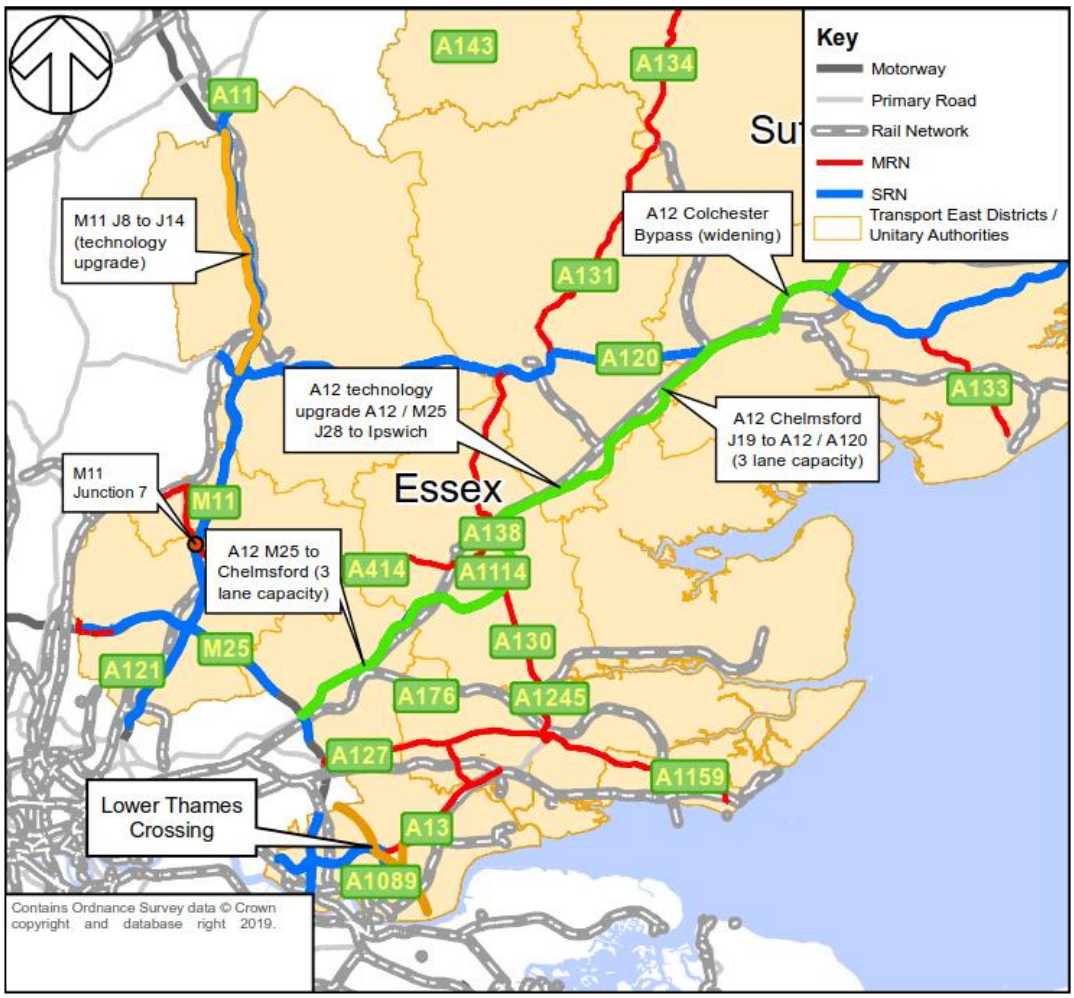


Figure 5-30 – Planned Transport Improvements – Essex and Thurrock



5.4.82. Highways England's Road Investment Strategy 2015 to 2020 (RIS1) sets out a multi-year investment plan for the strategic road network in England that will see £15.2 billion invested in over 100 major schemes to enhance, renew and improve the network.

5.4.83. The schemes included within Highway England's RIS1 in the East of England is summarised below.

A47 (between Peterborough and Lowestoft)

- **Great Yarmouth Junction Improvements:** Capacity improvements at A47 Vauxhall Roundabout and Gapton Hall Roundabout; (Norfolk)
- **Blofield to North Burlingham:** Dualling to complete a gap in the dual carriageway between Norwich and Acle. Combined with the North Tuddenham to Easton Scheme this will provide full dualling between Dereham and Acle. (Norfolk)
- **A47 / A11 Thickthorn junction:** Improvement of the interchange between the A47 and A11 improving access into Norwich. (Norfolk)
- **North Tuddenham to Easton:** Dualling of the A47 to provide continuous dual carriageway between Norwich and Dereham. Combined with the Blofield to North Burlingham Scheme, this will provide full dualling between Dereham and Acle. (Norfolk)

A12 (Between M25 Junction 28 and Ipswich)

- **Colchester bypass widening**: Widening Colchester bypass to three lanes with attendant junction improvements; (Essex)
- **Whole route technology upgrade between A12 / M25 Junction 28 and Ipswich**. This will include traffic management technology, CCTV cameras and variable message signs; (Essex and Suffolk)
- **Chelmsford Junction 19 to A12 / A120 Junction 25.** Carriageway widening to provide three lanes of capacity; (Essex and Suffolk) and
- **M25 to Chelmsford**: Raising 2 lane sections of the A12 from M25 to Chelmsford to three lane capacity. (Essex and Suffolk)

M11 (Harlow Junction 7 to Cambridge Junction 14)

- **Junction 7 upgrade**: Extra capacity on junction 7 near Harlow through significant upgrades and more technology. This scheme is largely being addressed through M11 J7A scheme being delivered by Essex County Council (Essex and Hertfordshire).
- **Junction 8 to 14**: Technology upgrade (Essex and Cambridgeshire)

Lower Thames Crossing (Essex and Thurrock)

5.4.84. This is a proposed new crossing to reduce congestion at the existing Dartford Crossing. The new crossing will create a new link between the A2 and M25 relieving congestion at the existing Dartford Crossing. The preferred route will run from the M25 near North Ockendon, cross the A13 at Orsett before crossing under the Thames east of Tilbury and Gravesend. A new link road will then take traffic to the A2 near Shorne, close to where the route becomes the M2. A statutory consultation was launched in October 2018, with the crossing expected to open in 2027 subject to planning consent and finance arrangements.

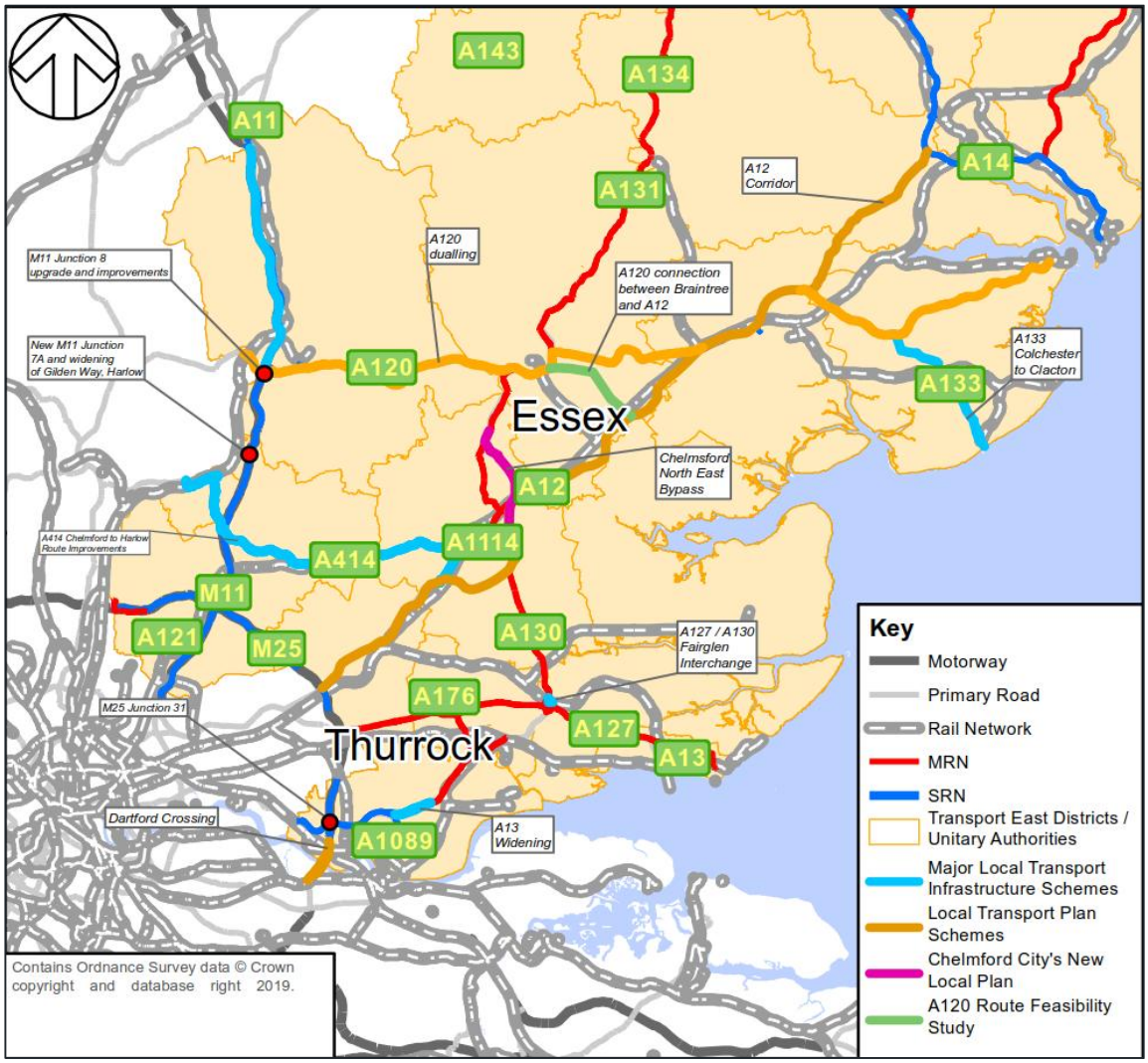
M25 Junction 31

5.4.85. Migration of traffic signals and associated civil works are proposed at the junction with the A13.

Major Road Network

5.4.86. The transport improvements planned in each local authority on the MRN in the Transport East region is shown in Figure 5-31 to Figure 5-34 below.

Figure 5-31 - Planned Transport Improvements – Essex & Thurrock



5.4.87. The following transport infrastructure schemes are proposed on the local transport network in Essex. Most of these schemes are being promoted and funded by Essex County Council and / or South East Local Enterprise Partnership. These are discussed below.

- **A414 Chelmsford to Harlow Route Improvements**: A number of improvements have been identified for the A414, designed to increase safety, highway capacity and encourage the use of sustainable transport along this route to support the future growth and regeneration. Proposals include Four Wantz Roundabout (Ongar) layout improvements, Widford Roundabout (Chelmsford) improvements, bus and safety improvements and widening of the A414 between Southern Way and Second Avenue in Harlow.
- **M11 Junction 8 upgrade**: A scheme has been developed to: improve access between the M11 and A120 with London Stansted Airport, Bishop's Stortford, Birchanger Services and Takely; reduce congestion and improve capacity on the M11 Junction 8 exit slips and A120; and support future plans for housing, employment and business developments.

- **A13 Widening**: This scheme is to widen the A13 from 2 to 3 lanes between the A1089 (Tilbury) and A1014 (Standford le Hope) to increase highway capacity on the A13. This will reduce congestion and enable development and growth along the corridor.
- **New Junction 7A on the M11 and widening of Gilden Way, Harlow**: This scheme will create a new east-west link, which will move traffic smoothly out of Harlow onto the M11, reduce congestion on the north-south links through Harlow towards Junction 7 and provide new opportunities for housing and business development. Announcement of a contractor is expected in 2020. This scheme largely replaces the Junction 7 upgrade scheme identified by Highways England in their RIS 1.
- **A127/A130 Fairglen Interchange**: Proposals are for a new Southend link road linking the A130 southbound to a new signalised junction on the A1245 where traffic must turn right (southbound), widened slip roads on most of the arms of the Fairglen Roundabout, additional and/or longer slip lanes on both A127 on-slip roads, improvements at the Rayleigh Spur Roundabout and new bridge for pedestrians and cyclists linking to existing routes alongside the A127. The existing arrangement experiences high levels of congestion during peak periods. This will provide significant relief to a major junction that experiences significant congestion and delays.
- **A133 Colchester to Clacton**: ECC and South East Local Enterprise Partnership have made £5.43m available to fund improvements along this route to improve journey time reliability through highway capacity, improved signage and revising the cycling provision.

5.4.88. In addition to the above schemes Essex County Council's current Transport plan sets out the County's long-term aspirations for improving travel in the County. The plan sets out a number of additional priorities for the strategic transport corridors in the County. This includes:

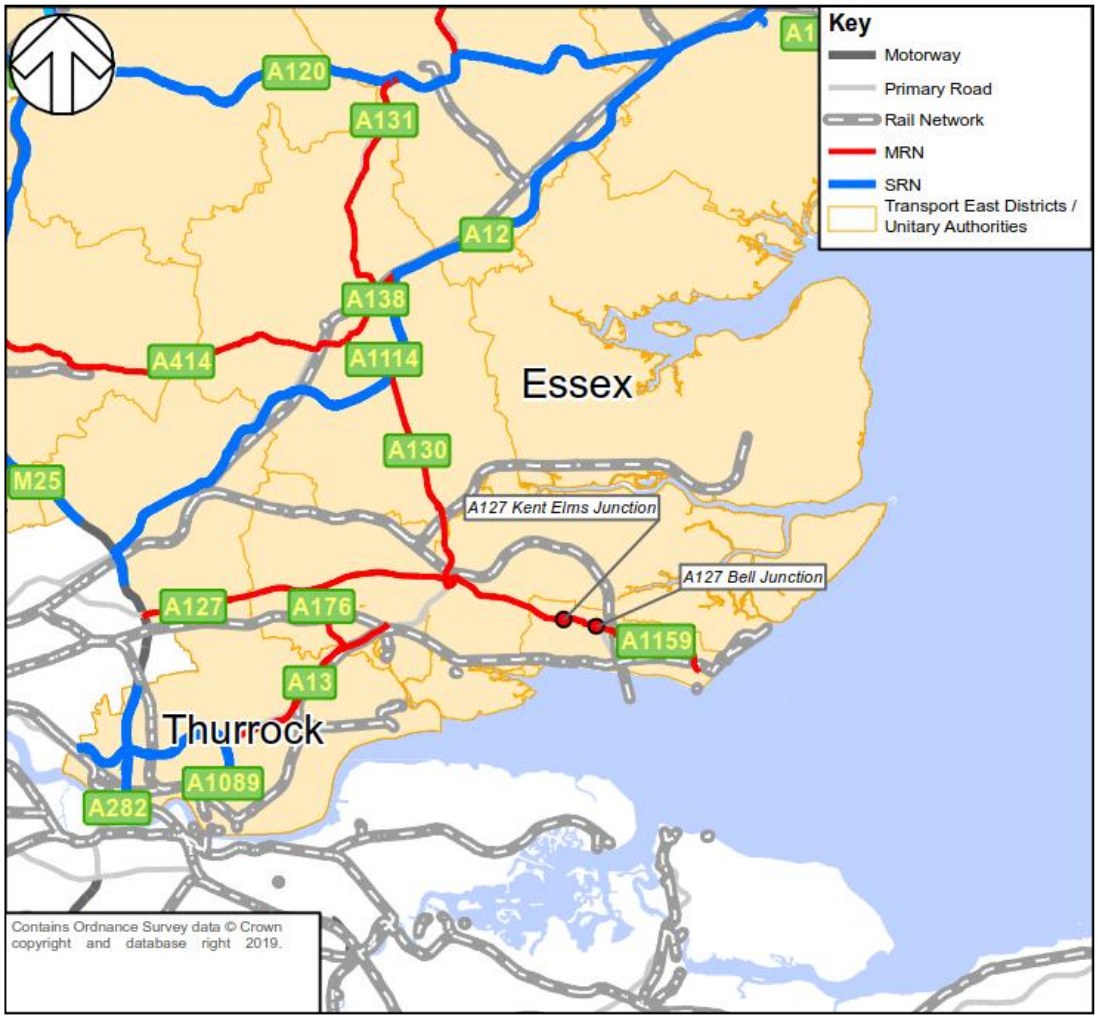
- Improvements to the Dartford Crossing;
- A12 corridor, including a long-term investment plan; and
- A120 (including dualling of the A120 at single carriageway sections).

5.4.89. In June 2018 ECC identified a favoured route option for a new dual carriageway between Braintree and the A12. This would run from Galleys Corner at Braintree to a junction with the A12 to the south of Kelvedon. ECC will recommend this route option to Highways England and the DfT for inclusion in RIS2.

5.4.90. In 2015/16 work was undertaken to safeguard the corridor footprint for a north-eastern bypass of Chelmsford. It is proposed that this safeguarded corridor will be allocated in Chelmsford City's new Local Plan.

Southend-on-Sea

Figure 5-32 - Planned Transport Improvements – Southend-on-Sea

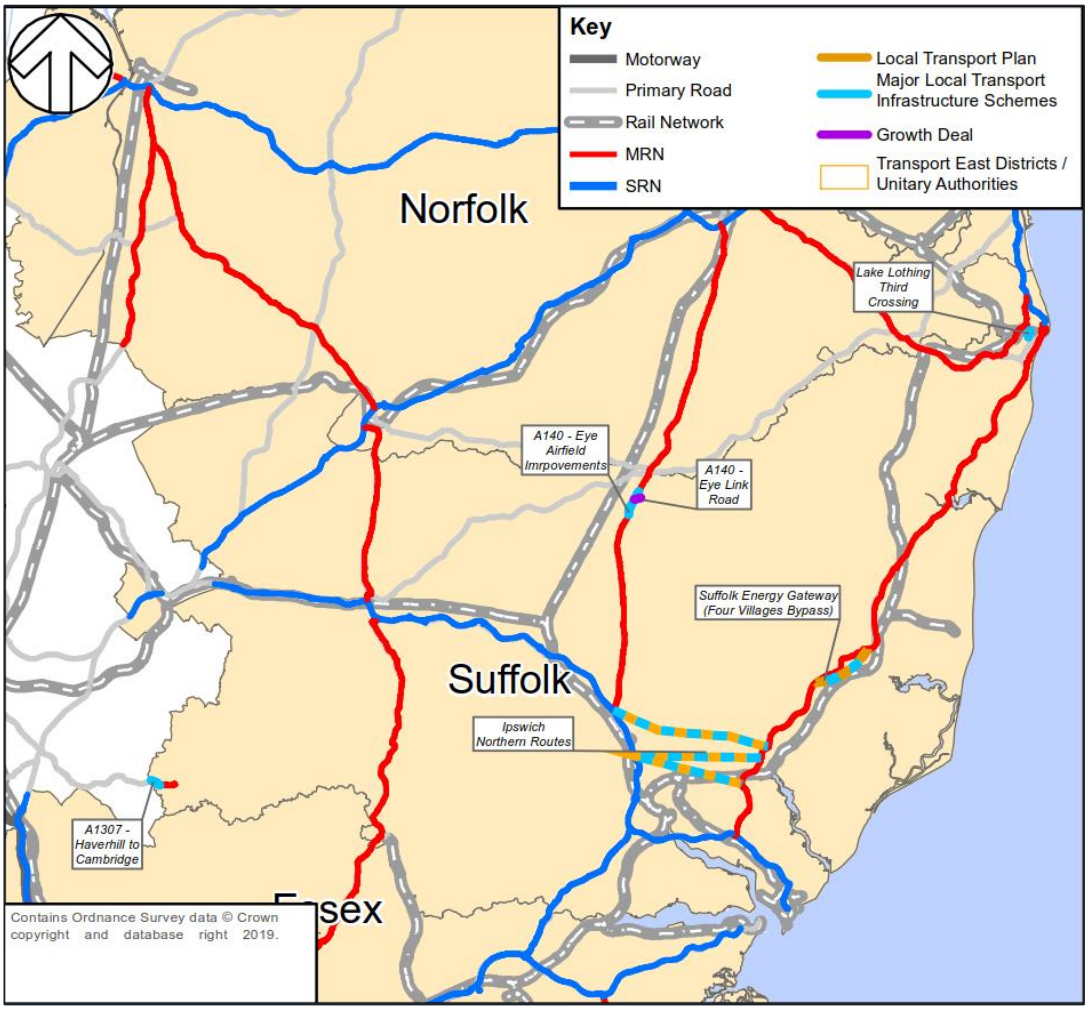


5.4.91. The following transport infrastructure schemes are proposed on the local transport network in Southend-on-Sea:

- **A127 Bell Junction**: This scheme seeks to improve the movement of vehicles through the junction and improve experience of pedestrians. Funding is being sought by South East Local Enterprise Partnership from the Local Growth Fund; and
- **A127 Kent Elms Junction**: This scheme seeks to improve traffic flows across Kent Elms junction into and out of the town. The scheme includes the construction of a new footbridge. This scheme is being funded by Local Growth funding from the South East Local Enterprise Partnership.

Suffolk

Figure 5-33 - Planned Transport Improvements – Suffolk



5.4.92. The following major transport schemes are being progressed by Suffolk County Council.

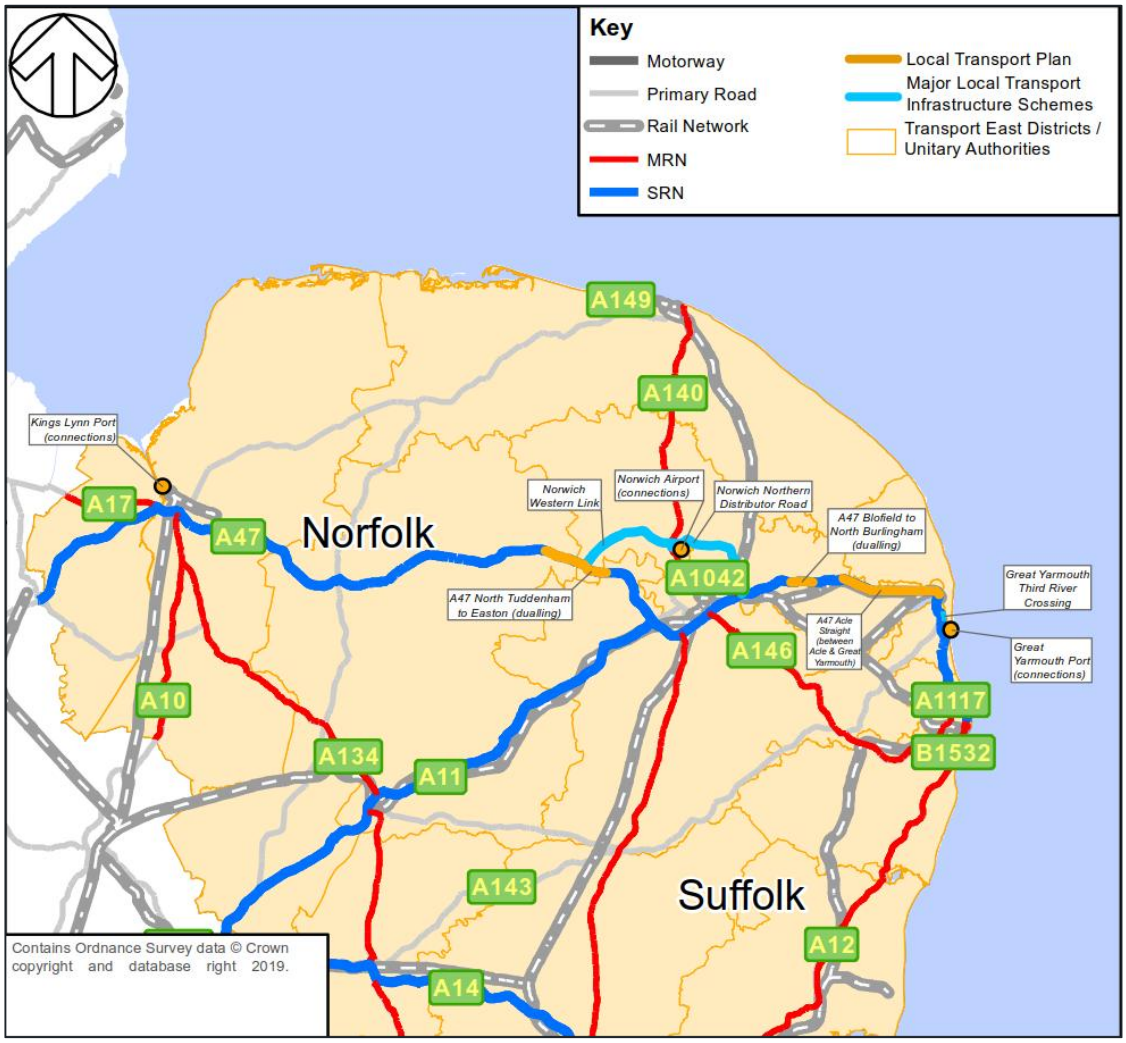
- **Lake Lothing Third Crossing**: This comprises proposals for a new crossing linking Waveney Drive on the south side to Denmark Road and Peto Way on the north side.
- **A140 Eye Airfield Junction Improvements and Link Road**: The improvements include two new roundabouts on the A140 at Castleton Way and south of Rectory Road, a link road through to B1077, restrict movements at the A14/B1077 junction and restrict movements at the A140/Rectory Road junction.
- **Suffolk Energy Gateway**: This comprises improvements to a 4.5-mile section of B1078 at Wickham Market and the A1094 in East Suffolk, bypassing communities of Little Glemham, Marlesford, Stratford St Andrew and Farnham. In June 2019 the Government announced that the Outline Business Case submitted for this scheme was not successful.
- **Ipswich Northern Routes**: A study is currently ongoing to examine options for additional road capacity to the north of Ipswich.
- **A1307 Haverhill to Cambridge**: A pre-strategic outline business case for the A1307 Haverhill to Cambridge dualling scheme has been prepared.

5.4.93. In addition to the above schemes being progressed, SCC's LTP also identifies a number of additional transport infrastructure priorities. This includes:

- **A12 Four Villages Improvement (now Suffolk Energy Gateway)**: A Dual carriageway road that would run for four miles linking the end of the Wickham Market bypass near Marlesford with the start of the Saxmundham by-pass near Farnham; and
- **Major capacity improvements to the A14 / A12 Copdock Interchange**.

Norfolk

Figure 5-34 - Planned Transport Improvements – Norfolk



5.4.94. The following major transport infrastructure schemes are being progressed in Norfolk:

- **Norwich Western Link**: This is a new link to connect the Norwich Northern Distributor Road (NDR) from the A1067 to the A47 west of Norwich. NCC are currently consulting on existing transport issues in the area.
- **Great Yarmouth Third River Crossing**: The crossing would connect Harfreys Roundabout in Great Yarmouth and South Denes Road.
- **Norwich Northern Distributor Road**: This is a new dual carriageway link between the A1067 Fakenham Road to the A47 at Postwick. The final section of the route opened in April 2018.

5.4.95. Norfolk's third Local Transport Plan covers the period 2011 to 2026 and is a guide for transport investment and is considered by other agencies when determining planning or delivery decisions. Policy 7 of Norfolk's LTP identifies the following strategic connections that would bring about journey time reliability improvements in and around Norfolk. This includes:

- Connection's to Norfolk's gateways, including Norwich Airport and the ports at King's Lynn and Great Yarmouth, including a Third River Crossing for the River Yare.
- Improvements to the A47, including long term ambition of dualling of the remaining single carriageway sections.

FUTURE PERFORMANCE AND OPERATION

5.4.96. To understand the future operation of the SRN and MRN in the Transport East region, outputs from the SERTM for the 2041 "Do-Minimum" and "Do-All scenarios" have been reviewed. These compare the situation in 2041 with and without the transport infrastructure schemes listed in Table 5-3 below. It includes all schemes in Highways England's RIS1 in addition to several non-committed strategic improvement schemes.

Table 5-3 – Transport Infrastructure Schemes included within the SERTM "Do All" scenario

Schemes	
A11 Five Ways Roundabout near Thetford	A47 North Tuddenham to Easton
A12 Chelmsford to A120 widening (Phase A)	A47/A11 Thickthorn Junction
A12 Chelmsford to A120 widening (Phase B)	Lower Thames Crossing
A120 between Braintree and A12 J25	M11 J8-9 smart motorway
A14 J55 (Copdock)	M11 junction 7A
A47 & A12 junction enhancements	M25 Junction 28 improvement
A47 Acle Straight	M25 Junction 30
A47 Blofield to North Burlingham dualling	

2041 "Do Minimum"

5.4.97. Figure 5-35 and Figure 5-36 show the link capacity of the SRN and MRN in the Transport East region in the 2041 "Do Minimum" scenario.

Figure 5-35 - Ratio of Flow to Capacity 2041 DM AM Peak, SERTM, Highways England

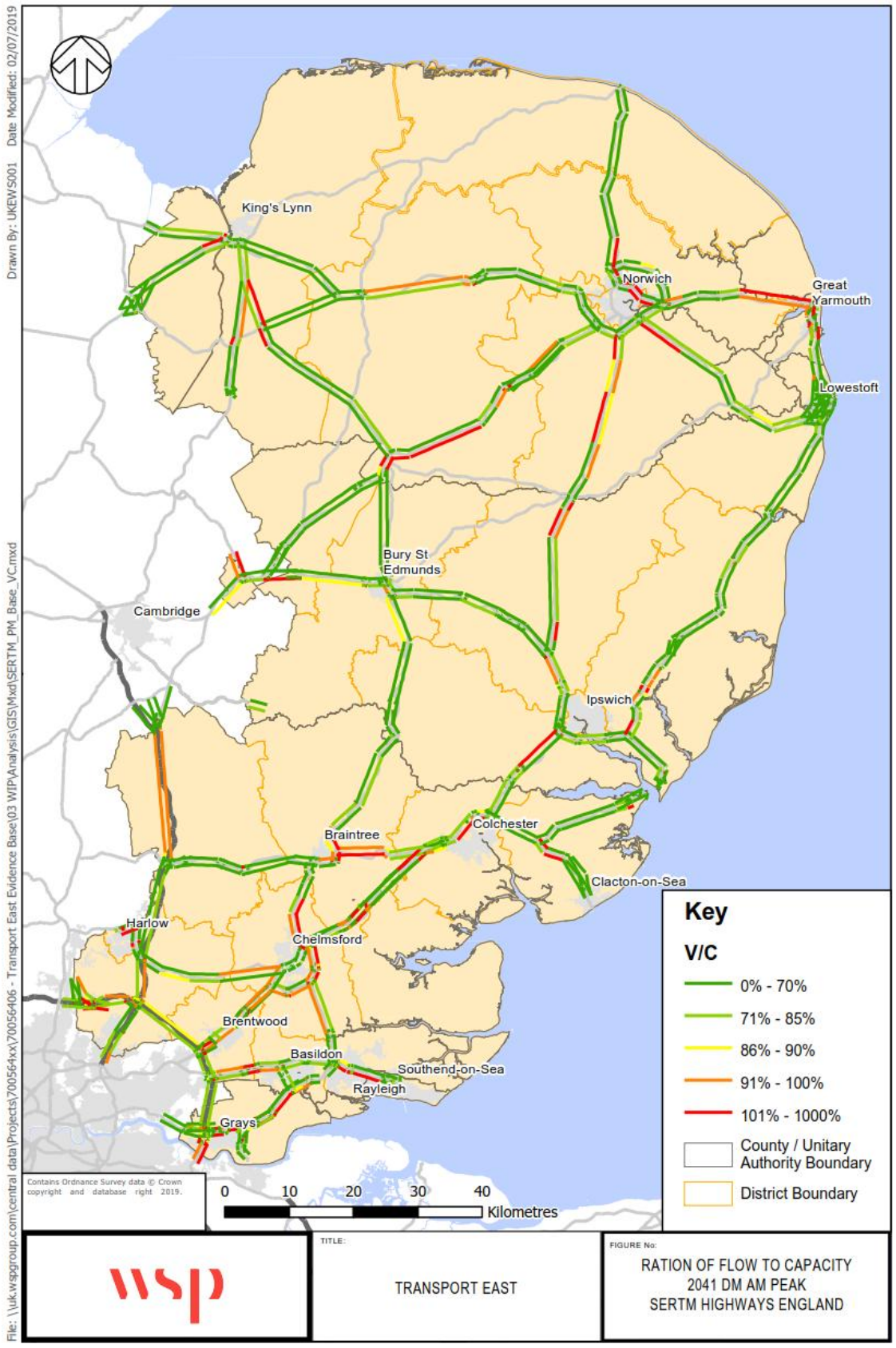
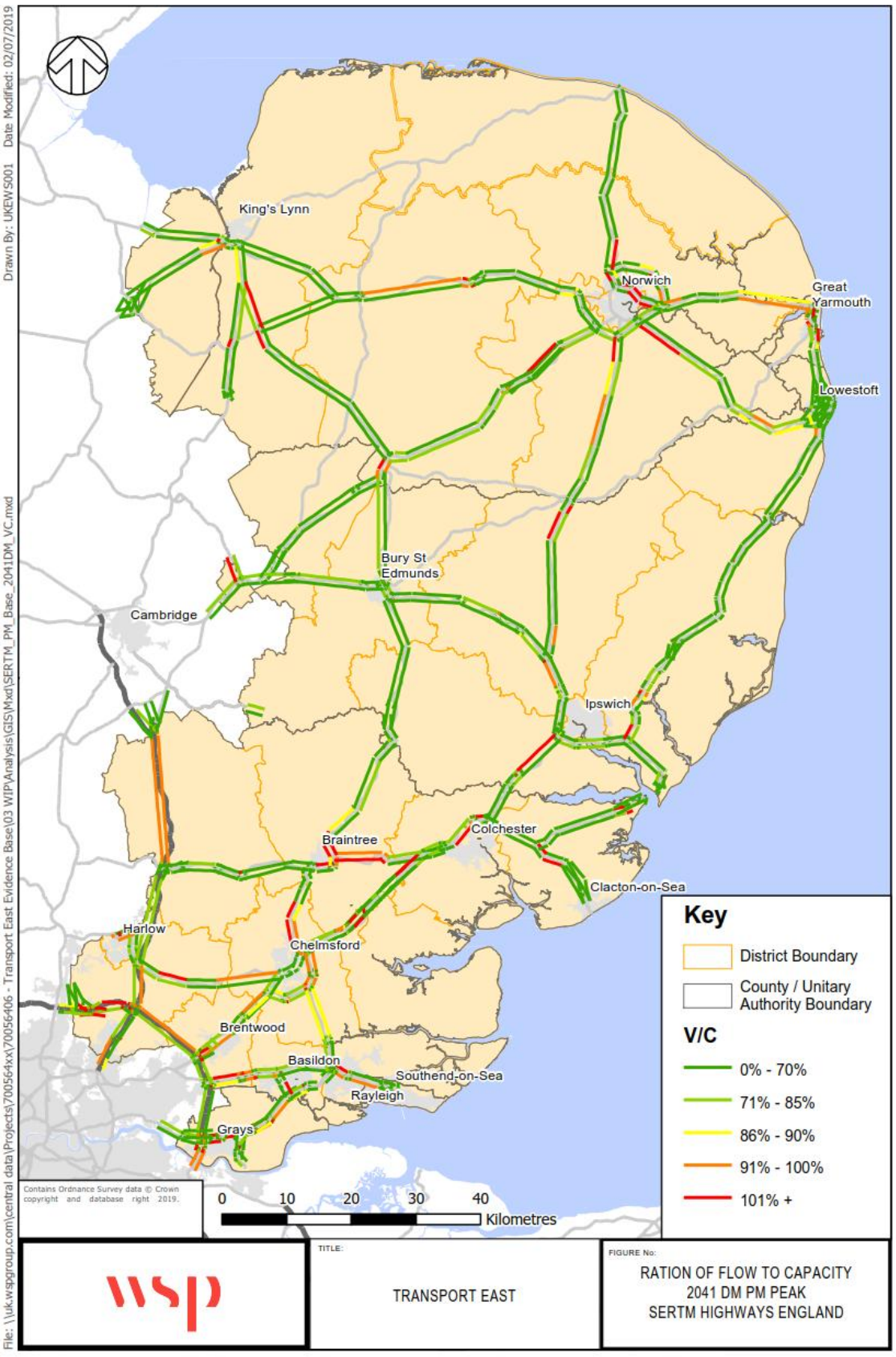


Figure 5-36 - Ratio of Flow to Capacity 2041 DM PM Peak, SERTM, Highways England



Strategic Road Network

5.4.98. In 2041 “Do-Minimum” scenario the SERTM mode outputs show a number of additional links to operate over capacity on the SRN and the performance of links already close to or over capacity in the 2015 Base Year have worsened.

5.4.99. As per the 2015 base year, the main capacity issues on the SRN in the Transport East region are within the southern portion of the region on the M25 between Epping and Upminster, A13 between Basildon and Purfleet, A12 between London and Ipswich and A120 between Marks Tey and Braintree.

5.4.100. In addition to the above capacity issues are shown along the following links:

- A47 Acle Straight between Acle and Great Yarmouth;
- A47 through the main urban area of Great Yarmouth and Gorleston-on-Sea; and
- A11 between Thetford and Wymondham.

Major Road Network

5.4.101. In the 2041 “Do-Minimum” scenario the performance of corridors which had capacity issues in the 2015 base have worsened. The highest levels of congestion are recorded along the following links:

- A13 between Basildon and Purfleet
- A127 between Upminster and Southend-on-Sea
- A133 near Fratting, Colchester;
- A130 between Colchester and Braintree;
- A130 between Braintree and Chelmsford
- A131 on approach to the A120 north of Braintree;
- A134 south of Tottenhill, King’s Lynn;
- A12 at Woodbridge north east of Ipswich;
- A120 at Bishop’s Stortford on the Essex / Hertfordshire border; and
- A140 between Norwich and Needham Market.

5.4.102. The SERTM 2041 “Do Minimum” outputs show that without the delivery of new transport infrastructure improvement schemes, the performance of many of the main strategic transport corridors in the Transport East region will worsen significantly.

2041 “Do All”

5.4.103. Figure 5-37 and Figure 5-38 show link capacity of the SRN and MRN in the Transport East region in the 2041 “Do All” scenario.

Figure 5-37 - Ratio of Flow to Capacity 2041 DS AM Peak, SERTM, Highways England

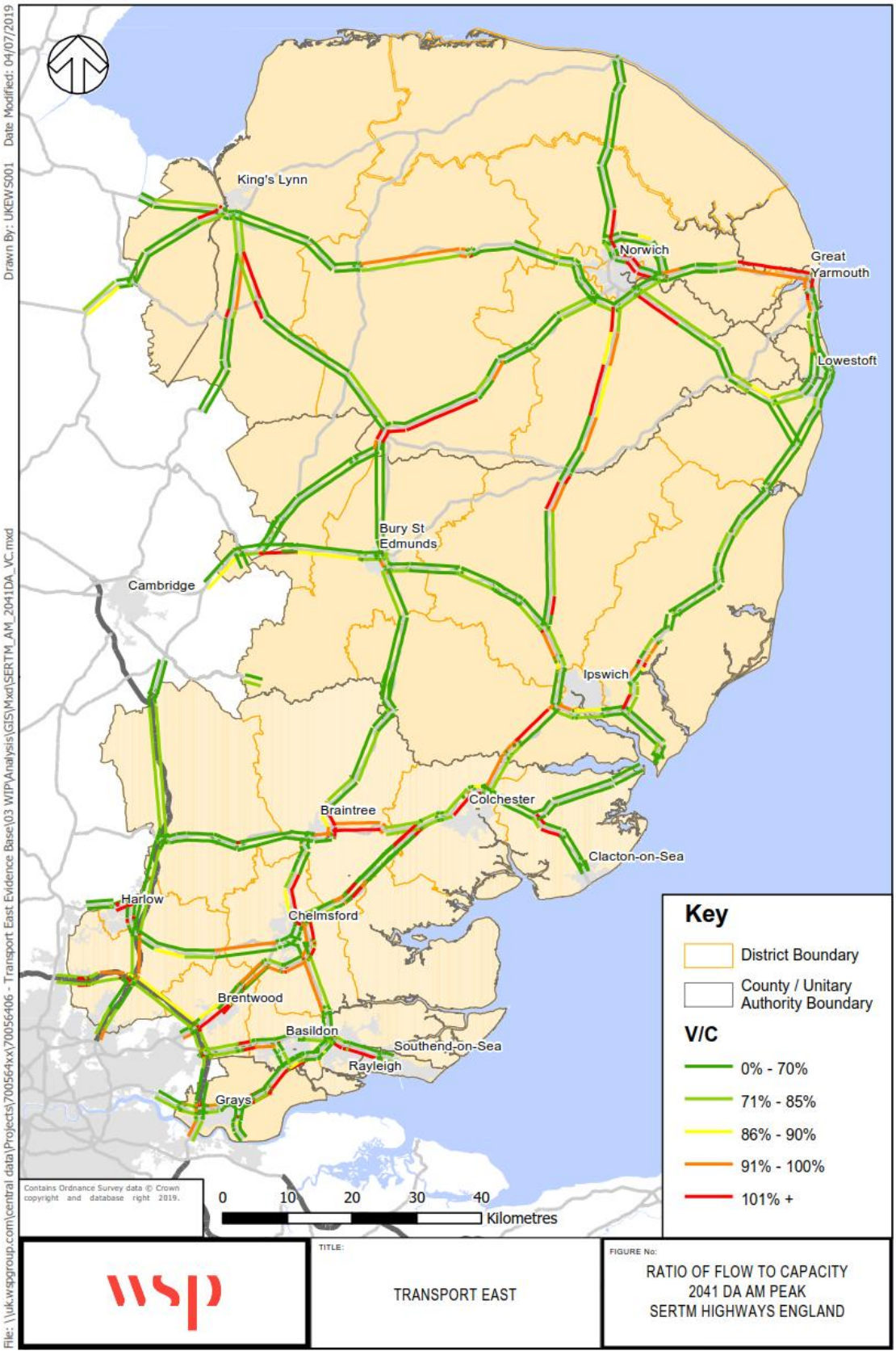
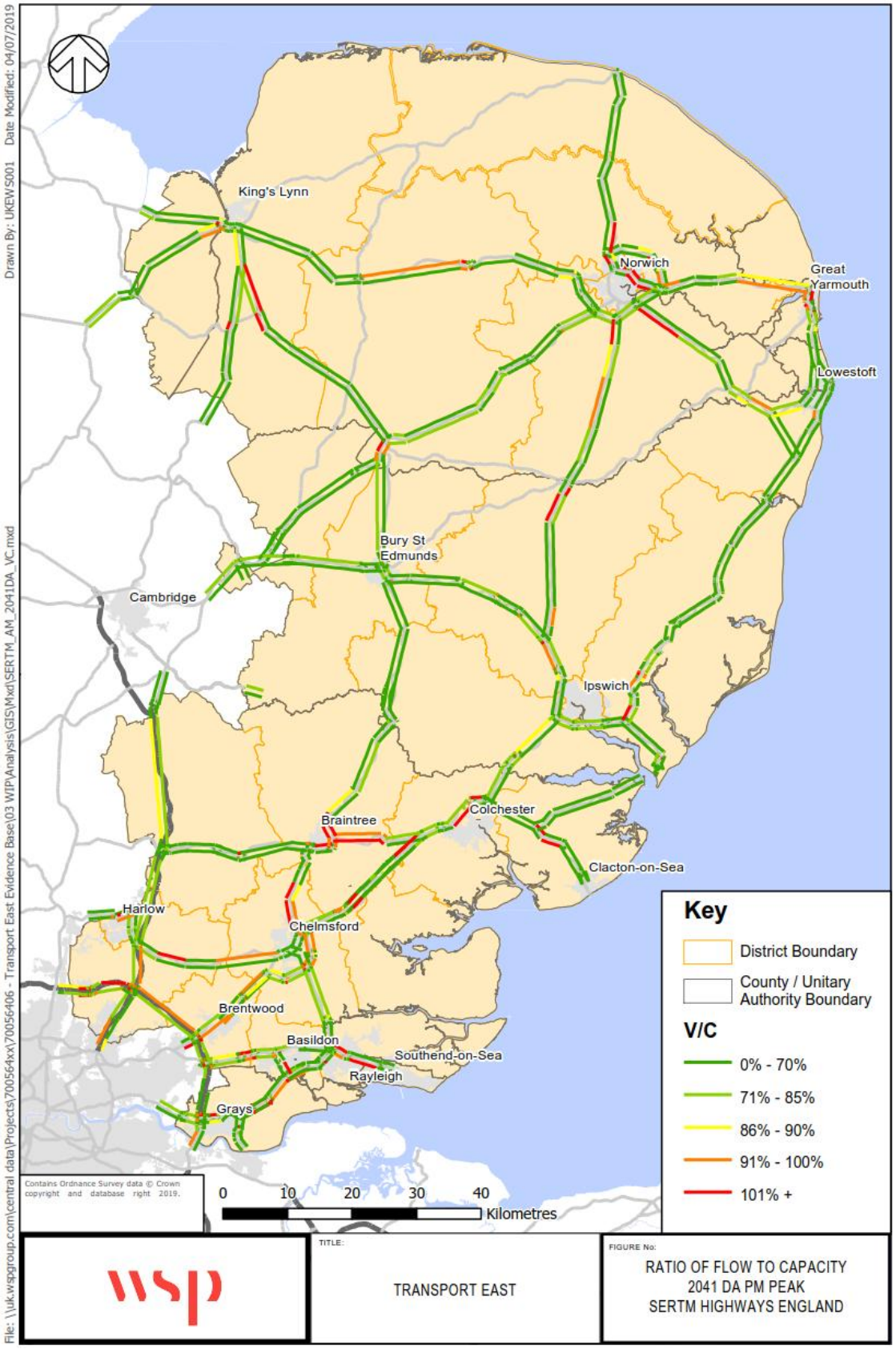


Figure 5-38 - Ratio of Flow to Capacity 2041 DS PM Peak, SERTM, Highways England



Strategic Road Network

5.4.104. There are only a very small number of links on the SRN where the network performance changes between the “Do-Minimum” and “Do-All” scenarios. On the A12 northeast bound on the approach to Ipswich the network performance improves considerably. Between junction 31 and junction 33 (also the A14 junction 55) the RFC reduces from 120% to about 100% in the AM Peak, which is still a very high value and suggests network congestion but is vastly improved on the Do Minimum scenario. There is a planned scheme at this location, namely the A14 J55 (Copdock) improvement, which comprises the provision of a dedicated flyover from the A12 northeast bound to the A14 southeast bound.

5.4.105. There is also a significant improvement in the performance of the M11 between junctions 8 and 9. The values RFC reduced from 90%-95% to less than 70%. At this location a scheme is planned, the M11 J8-9 Smart Motorways, which appears likely to be responsible for the improved performance and predicted elimination of traffic congestion.

Major Road Network

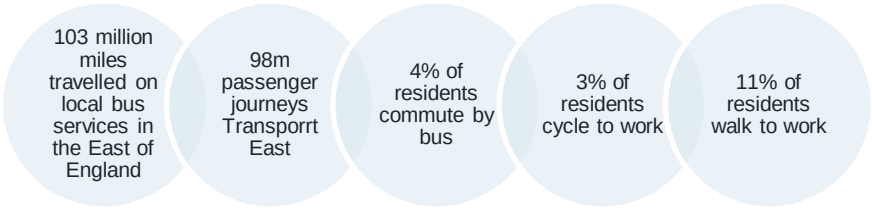
5.4.106. There is no change in performance of the MRN between the “Do-Minimum” and “Do-All” scenarios. This is likely to be associated with the limitations of the SERTM and its focus for assessing schemes on the SRN.

SUMMARY

- DfT Trafficmaster GPS data has been used to identify the location of peak hour pinch-points on the fifteen strategic transport corridors in the region. **Delays are principally associated with single carriageway sections of dual carriageway routes and at-grade junctions**.
- The SERTM shows many **links on the SRN and MRN to be at or approaching their theoretical capacity in the AM and PM peaks**. Traffic flows along these links will start to break down along these links and high levels of queuing and delay should be expected.
- A number of **transport infrastructure improvement schemes are being promoted by strategic and local transport bodies**. Many of these schemes address pinch-points identified on the SRN and MRN and in the process of being delivered. However, there are also a number of schemes that are **aspirational with no committed timescale or funding**.
- There are a **number of locations where no improvement scheme has been identified**.
- **The performance of the SRN and MRN in the Transport East region is forecast to worsen significantly by 2041**. The corridors most effected are those in the southern portion of the Transport East Region (in particular the M25, A12, A120, A127, A13 corridors).
- **Additional transport infrastructure improvement schemes beyond those included in Highways England RIS 1 will need to be delivered** to address link capacity issues on the SRN and MRN in the Transport East region.
- Not addressing existing and future pinch-points on the SRN and MRN could **constrain housing and economic growth, hinder the success and growth of global gateways and deter investment in coastal communities**.

5.5 LOCAL TRANSPORT NETWORK

AT A GLANCE



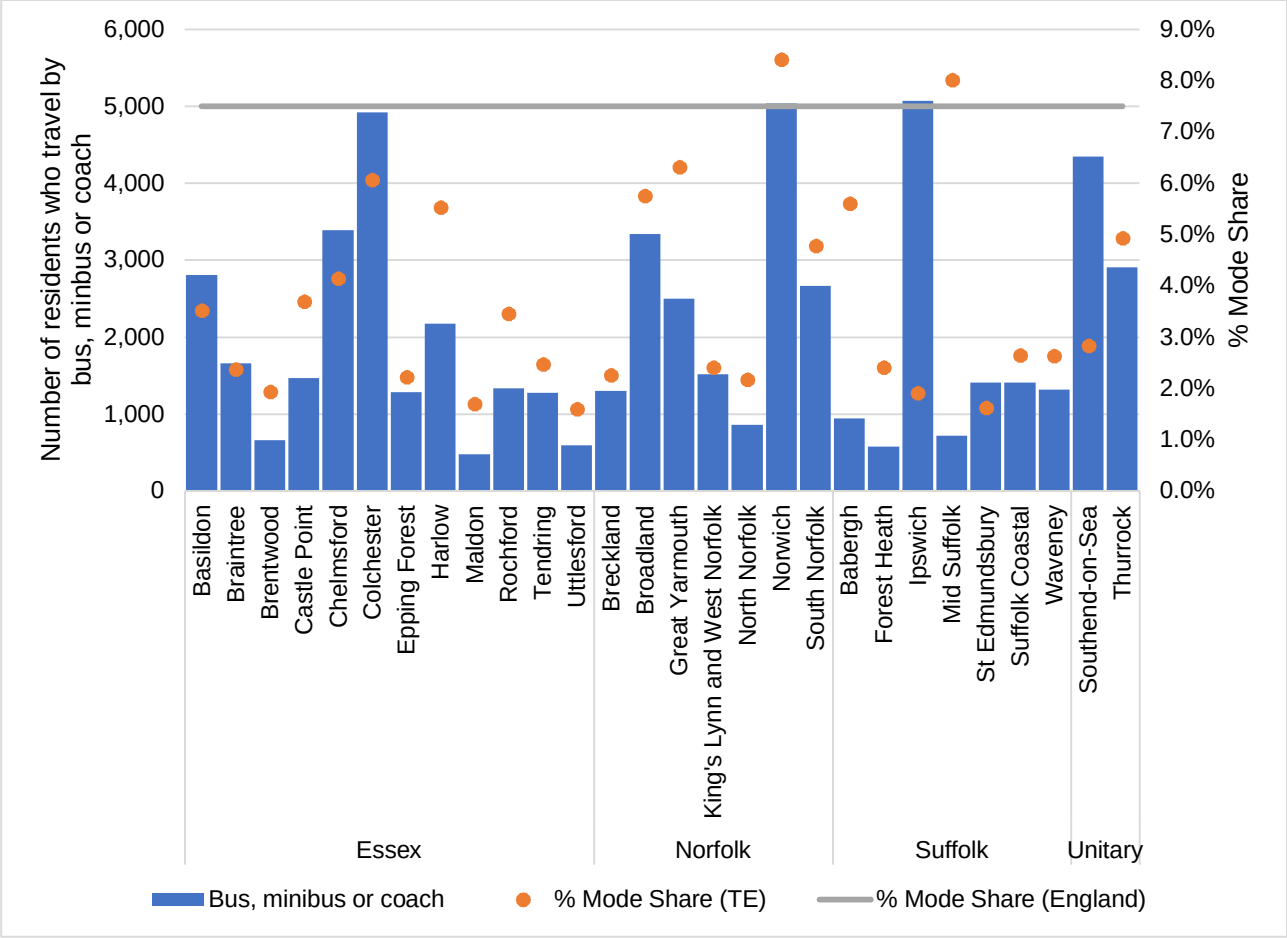
BUS SERVICES

5.5.1. Bus services provide local and sub-regional transport connectivity in the Transport East region. Journeys to work by bus only account for 4% of all commuting trips in the Transport East region and is below the national average of 7%[46]. Furthermore, between 2009/10 and 2017/18 the total number of bus journeys has fallen by 6.3% from 100.8 million to 94.4 million[47].

5.5.2. The low proportion of all journeys to work undertaken by bus and the declining patronage is reflective of the rural nature of the region and a decline in local authority funding to support rural bus services. The journey to work mode share (absolute number of residents and percentage) is shown in Figure 5-39 below, alongside the average or England.

[46] Table QS701EW, Method of Travel to Work, Office for National Statistics, 2011
[47] Table BUS0109a, Passenger journeys on local bus services by local authority: England from 2009/10, Department for Transport, 2018

Figure 5-39 - 2011 Census Mode Share Travel to Work by Bus and % Mode Share



5.5.3. Figure 5-39 above shows the highest number of journeys to work by bus to be undertaken within districts that are comprised of a single town or city (e.g. Colchester, Norwich and Ipswich). The district with the highest journey to work mode share was recorded in Norwich (8%) and Ipswich (8%). The lowest journey to work bus mode share was recorded in Uttlesford (1%) and Mid-Suffolk (1%).

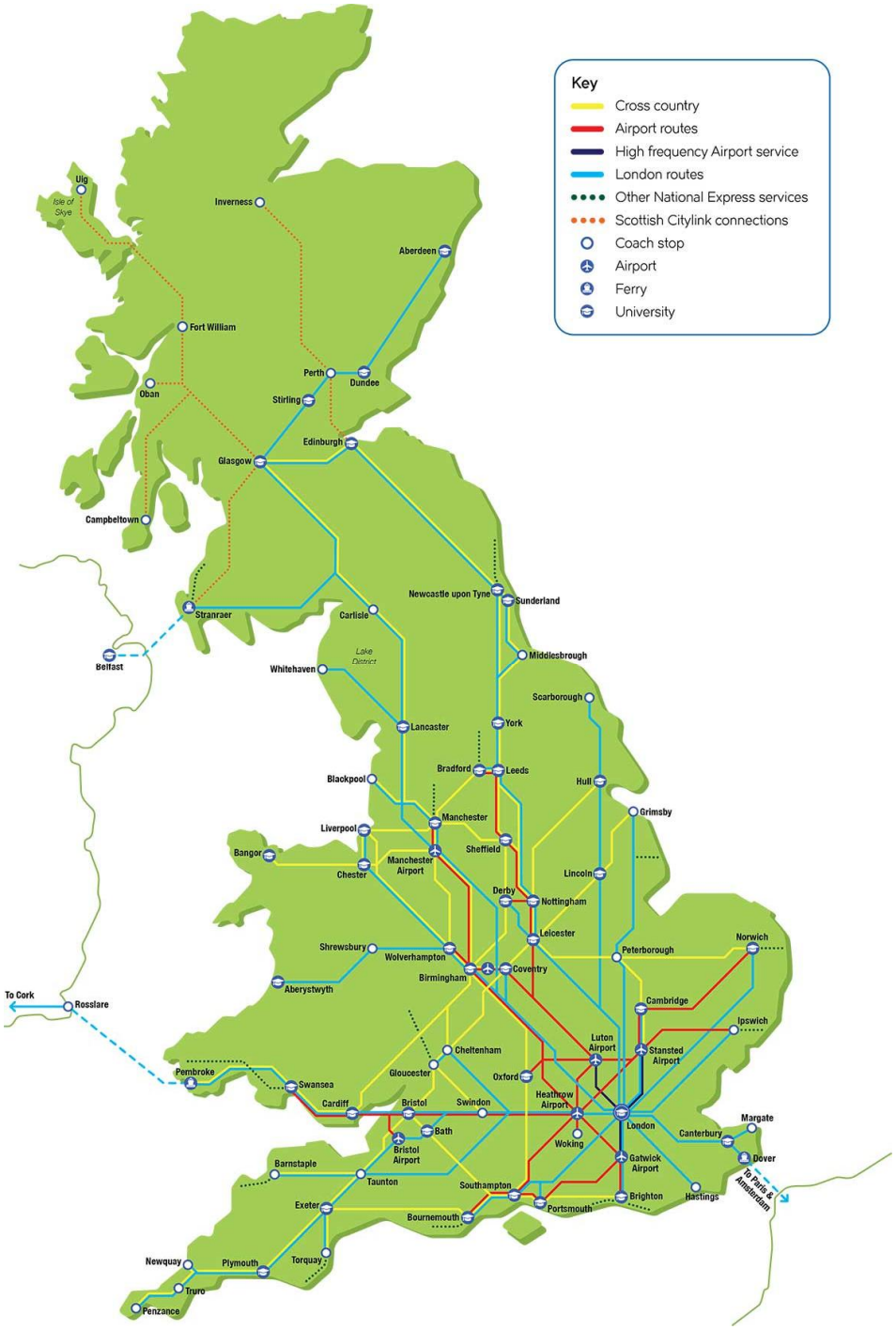
COACH SERVICES

5.5.4. As noted in Section 5.3 above, the Transport East region has relatively poor east-west rail connectivity. This is attributable to the low frequency of rail services that operate along existing east-west rail routes (e.g. between Ipswich and Cambridge and Norwich and Cambridge) and absence of east-west rail infrastructure in many parts of the region (e.g. no east-west rail connection between GEML and WAML south of Bury St Edmunds).

In many instances the absence of a direct rail connection between major settlements in the Transport East region is supplemented by direct coach services.

5.5.5. Figure 5-3940 shows a plan of National Express coach services operating in the UK. This shows several east-west coach services to operate in the region where there is no direct rail connection. This includes between Norwich and Peterborough and Ipswich and London Stansted Airport

Figure 5-40 – National Express Coach Routes

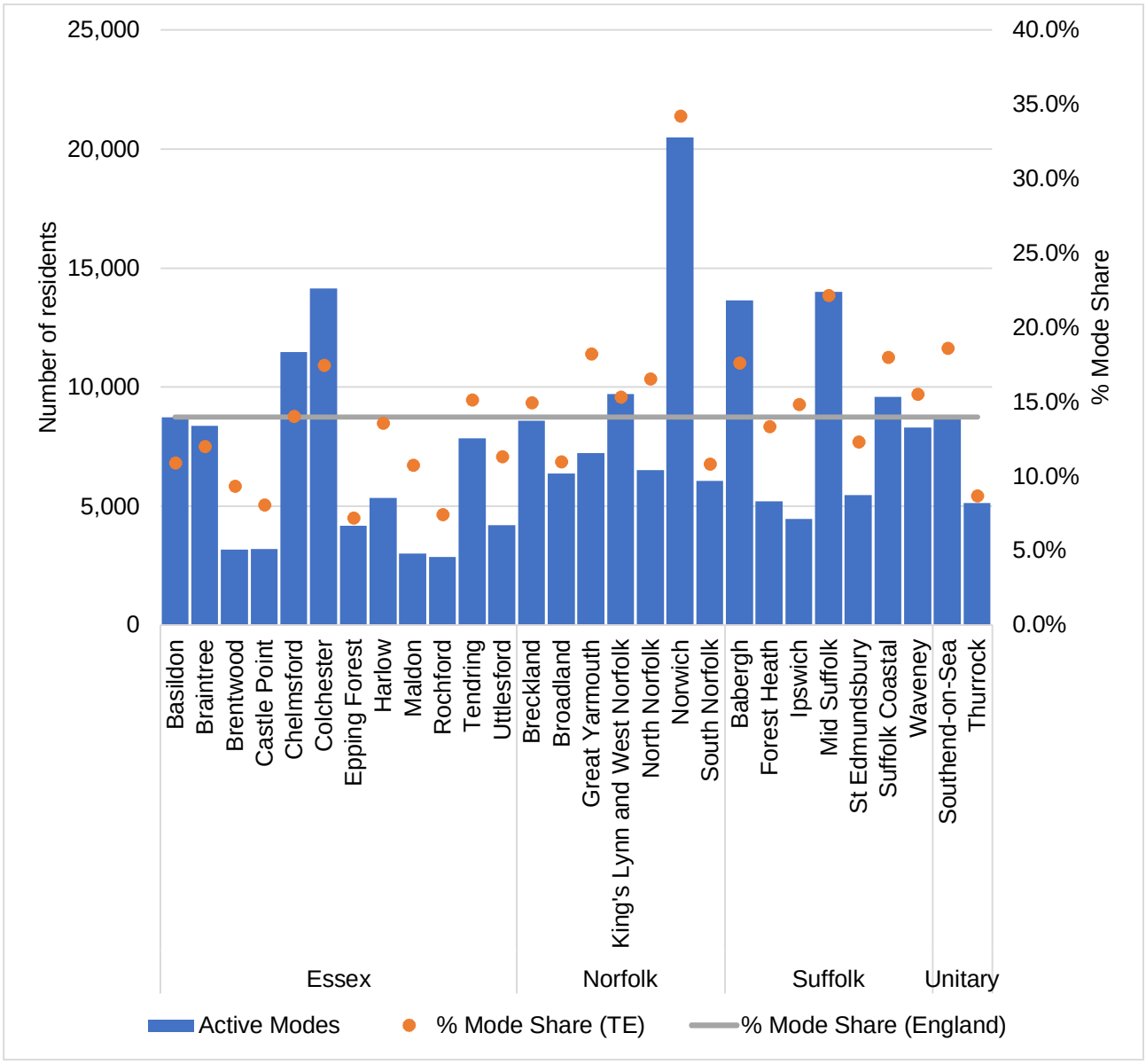


5.5.6. Long-distance coach services typically route along the main MRN and SRN corridors and therefore the reliability and performance of these services is directly affected by congestion on the existing strategic corridors, particularly during peak travel periods.

ACTIVE MODES

5.5.7. Walking and cycling both have the potential to replace shorter journeys that may otherwise be undertaken by car. In the Transport East region walking and cycling comprise 14% of all journeys to work. The journey to work mode share (absolute number of residents and percentage) is shown in Figure 5-41 below, alongside the average for England.

Figure 5-41 - 2011 Census Mode Share Travel to Work by Active Modes and % Mode Share



5.5.8. Similar to the journeys made by bus, the highest number of residents using active travel are within districts that are comprised of a single town or city (e.g. Norwich, Chelmsford and Colchester). The district within the highest number of active travel journeys is Norwich (34%) and Mid Suffolk (22%). The area that had the lowest journey to work active travel mode share was Epping Forest (7%) and Rochford (7%).

SUMMARY

- The journey to work bus mode share is lower than the average for England as a whole (7% vs 4%). This is reflective of the **difficulties operating a comprehensive public transport network** in a relatively rural region.
- The **journey to work bus and active travel mode shares are highest within districts that cover major urban settlements in the region** (e.g. Colchester, Great Yarmouth, Norwich and Ipswich).
- The journey to work **active mode share was highest within districts comprised of a single town or city** and where there are more opportunities to live and work within walking and cycling distance.
- **Coach services help supplement the lack of east-west rail connectivity,** and rely on the performance of the MRN and SRN to provide efficient public transport connectivity.

6 GLOBAL GATEWAYS

6.1 OVERVIEW

Global Gateways: Better connected ports and airports to help UK businesses thrive and boost the nation's economy through greater access to international markets and facilitates Foreign Direct Investment

6.1.1. An efficient and reliable transport network connecting a wide range of strategic locations to the Transport East's international gateways is a key requirement to support the region's economy and the UK's wider international competitiveness. This section considers the importance of strategic transport corridors in providing access to global gateways within the Transport East region.

6.2 ACCESS TO INTERNATIONAL GATEWAYS

6.2.1. The Transport East region contains nationally significant international gateway assets that perform an important role in the overall success of the UK economy. They provide substantial benefits to the Transport East region in terms of productivity, employment and the supply chain including transport and logistics.

6.2.2. The international gateways rely on the SRN, MRN and rail network for passenger and freight movements. The performance of the A14, A47, A11, A13, A1089 and M11 road corridors and the Great Eastern Mainline (and branch lines to Felixstowe and Harwich), West Anglia Mainline (and branch to London Stansted Airport), Fen Line, Essex Thameside line Wherry Line are vital in supporting these important national assets. A plan showing the location of ports and airports in the Transport East region is provided in Figure 6-1 below.

Figure 6-1 – Ports and Airports

6.3 PORTS

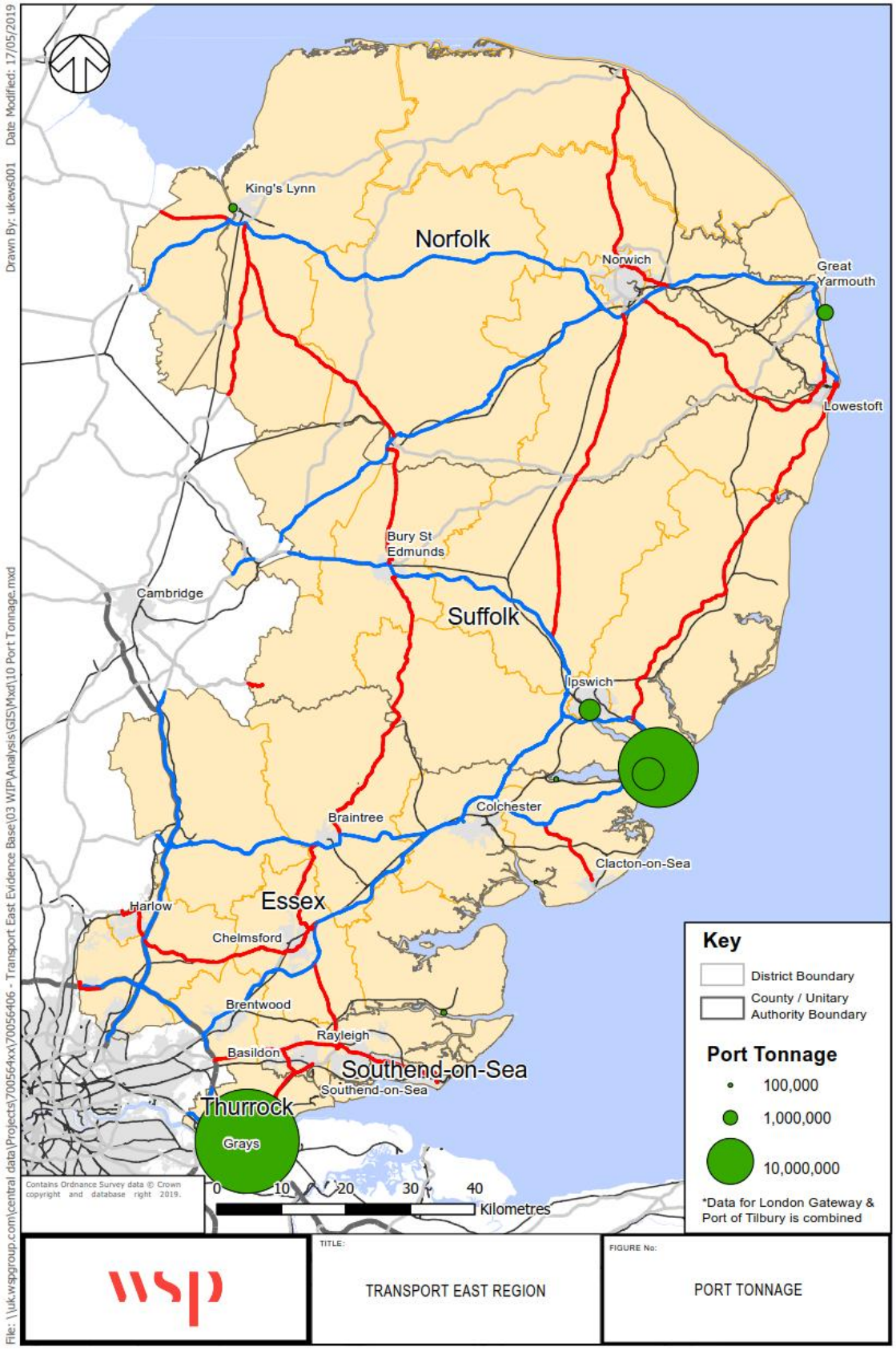
6.3.1. Currently 95% of all goods entering and leaving the UK are moved by sea[48]. Reliable strategic connectivity to the Ports in the Transport East region is vital to realising the full economic and growth benefits of these national assets.

6.3.2. In total there are 13 ports within the region, six of which are classified as major (Felixstowe, Great Yarmouth, Harwich, Ipswich, Tilbury and DP World London Gateway). The UK's largest container port is located at Felixstowe which handled 29 million tonnes of freight in 2017[49] and is undergoing significant investment and expansion. Alongside the Port of Felixstowe the other major ports are Great Yarmouth, Port of Harwich, Port of Ipswich, Port of Tilbury and DP World London Gateway. The minor ports (in terms of freight) include Lowestoft and Kings Lynn. Great Yarmouth and Lowestoft play a vital role in supporting the local food and drink and offshore energy sectors. In total, all 13 ports in the Transport East region handled 87.0 million tonnes of freight in 2017.

6.3.3. Harwich Port also provide passenger services carrying a total of 695,000 passengers are carried each year[50]. The main passenger route is from Harwich to the Hook of Holland. The total tonnage of cargo handled by ports in the Transport East region is shown in Figure 6-2 below.

[48] UK Port Freight Statistics: 2016 (Revised), Department for Transport, 2017
[49] Department for Transport All UK major and minor port freight traffic by port and year
[50] Maritime Statistics, Department for Transport, 2018

Figure 6-2 – 2017 Port Tonnage



6.3.4. In 2017 the DfT published a report on port connectivity in England[51]. The purpose of this report was to gain a greater understanding of the key transport and economic corridors which serve the Ports in England. The report included regional case studies on the connectivity of ports in England. The key findings of this report and the main transport issues affecting connectivity and the future growth of major ports in the Transport East region are summarised below.

PORT OF FELIXSTOWE

Strategic Connectivity

6.3.5. The Port of Felixstowe is situated at the mouth of the River Orwell and River Sour, approximately 17km to the south east of Ipswich. Vehicular access to the port is from the A14, a dual carriageway that provides strategic east-west connectivity to the port that connects with the M6 and M1 in Lincolnshire. This is the main route for approximately 70% of road freight traffic to Felixstowe.

6.3.6. The A14 connects with the A12 at the Copdock Interchange to the south of Ipswich which provides connectivity to the M25 and London. The A12 / A14 Copdock Interchange is a pinch point on the SRN, with significant delay and queuing observed in peak hours on the A12 northbound approach. Trafficmaster GPS data shows average peak hour journey times to be more than 50% slower than the overnight 'free flow' conditions. Currently Highways England have no committed improvement scheme for this junction.

6.3.7. The A14 crosses the River Orwell to the south of Ipswich via the Orwell Bridge. The height of the bridge means that during high winds the bridge can be closed, requiring all strategic traffic to route on local roads through the centre of Ipswich. Whilst this is infrequent, any closures can lead to significant delays and congestion on approach to the port. Furthermore, the A14 and A12 do not have a hard shoulder, this means that vehicle breakdowns or accidents can lead to significant delay and congestion.

6.3.8. Rail connectivity to the port is from the Felixstowe Branch line off the Great Eastern Mainline and via the Felixstowe to Nuneaton and Great Eastern Mainline to London rail corridors. Capacity constraints on the Felixstowe to West Midlands and North via Ely corridor limit the potential for growth in rail freight movements to the port. Addressing constraints at Ely, Leicester, Haughley Junction and Ely to Soham would allow more trains to serve Felixstowe and enable a timely rail service for effective competition with road[52].

6.3.9. To increase the number of rail freight movements to / from the Port of Felixstowe, Network Rail is currently investing £60.4 million to install 1.4 km of track loop between Trimley and Levington. This will allow the line to more flexibility to run more freight trains as well as improve reliability of existing passenger services. Network Rail expect the work to enable 10 additional trains per day in each direction, with each train estimated to take up to 76 HGVs off the road[53].

[51] Transport Infrastructure
[52] England Port Connectivity the Current Picture, Department for Transport, 2017
[53] https://www.networkrail.co.uk/running-the-railway/our-routes/anglia/felixstowe-branch-line/

Planned Growth

6.3.10. The Felixstowe Peninsula Area Action Plan[54] and the Local Plan, produced by Suffolk Coastal District Council[55], identify the Port of Felixstowe as Strategic Employment Area (Policy FPP9) and notes that port growth and development should be safeguarded to protect the economic interest of the port. Ensuring that there is enough infrastructure to support the Port of Felixstowe will be fundamental to ensuring the continued success of the Strategic Employment Area.

6.3.11. A number of sites around the Port of Felixstowe have been allocated for employment development that will offer services and opportunities required to widen the economic base across the Felixstowe Peninsula:

- Policy FPP11 Land at Carr Road / Langer Road
  - Use class proposals (B1 and B2) will be supported
  - Proposals which generate large numbers of heavy traffic movements will be resisted
- Policy FPP12 Land at Haven Exchange
  - Use class proposals (B1 and B2) will be supported
  - Uses which are complimentary tot the Port of Felixstowe will be supported

6.3.12. A report produced by Suffolk Coastal, 'Port of Felixstowe Growth and Development Needs'[56], forecasts the levels of growth that the port could experience during the plan period of 2016 to 2036. Three scenarios were produced, using national forecasts and uncertainties created from Brexit those from competitor ports.

- **Scenario 1**: Central Case
  The Central Case forecasts that the Port of Felixstowe will reach 5.1m TEU (Twenty-foot Equivalent Units, the measure of containers handled by the port) by 2036, which represents an increase of 1.4m TEU compared to its 2017 volumes.
  This result was calculated using the potential impact of Brexit on lowering GDP, a slower growth rate and the assumption that Felixstowe's Market Share of the UK's container volumes will continue to be at the historical average of 39.12%.
- **Scenario 2**: High Case
  A more optimistic approach, where Felixstowe achieves 5.7m TEU by 2036.
  This result was calculated by assuming that GDP and TEU growth will not be impacted as badly as that seen in the Central Case and that important trade partners are secured after Brexit.
- **Scenario 3**: Low Case
  This case assumes that Felixstowe only achieves 4.5m TEU by 2036, due to reduced GDP and the arrival of Liverpool 2, which will decrease Felixstowe's market share.

[54] Felixstowe Peninsula Area Action Plan, Development Plan Document, January 2017
[55] Suffolk Local Transport Plan 2011-2031, Suffolk County Council
[56] Port of Felixstowe Growth and Development Needs, Suffolk Coastal District Council, July 2018

6.3.13. Furthermore, the report highlights future areas of land supply that could provide sites to meet future of-port land demand. The site allocations have been included in the Suffolk Coastal Local Plan and just over 67ha is considered to be suitable for port-related activities. However, the land requirement expected if the High Case Scenario is met, then 103.8ha of land could be required.

Strategic transport issues important to the future growth and success of the port:

- Safeguarding the performance of existing road and rail corridors;
- Addressing junction capacity issues at the A12 / A14 Copdock Interchange;
- Improve resilience of the SRN to accidents and incidents (e.g. providing alternative routes to the port in the event that the Orwell Bridge is closed or providing hard shoulder on A12 and A14).
- Increasing capacity of the Felixstowe Branch line and Felixstowe to Nuneaton rail corridor to accommodate growth in rail services to the port.
- Improving connectivity to the wider rail network.

HARWICH INTERNATIONAL PORT

Strategic Connectivity

6.3.14. Harwich International Port is one of the UK's main ferry ports and received 676,000 passengers in 2018 and transported 4,755,000 tonnes of freight in 2017. The port is situated on the south bank of the River Stour, opposite the Port of Felixstowe approximately 25km to the north east of Colchester.

6.3.15. Vehicular access to the port is via the A120 which connects with the A12 at Junction 29 north of Colchester. Whilst the A120 between Stansted and Harwich are partially dualled, the final section between Little Bentley and Harwich it is single carriageway. DfT's Trafficmaster GPS data shows there to be a modest reduction in eastbound journey times during the peak periods (5% to 20% reduction) along the single carriageway section of the A120 between Little Bentley and Harwich. Peak hour delays of a similar magnitude are also experienced on the A12 northbound on approach to the A120 at junction 29.

6.3.16. Wider east-west connectivity to the port is provided by the A120 corridor between Stansted and Harwich. The section of the A120 between Marks Tey and Braintree experiences significant delays at peak times on along the single carriageway sections and on approach to the at-grade junctions. This could constrain future growth at the port or result in freight being transported by an alternative port. Currently there is no committed scheme to address this.

6.3.17. Rail connectivity to the port is via the Mayflower Line, a branch off the Greater Eastern Mainline. Harwich International railway station serves the port and is the eastern terminus of the Dutchflyer services between London and Amsterdam. This is an integrated rail / sea / rail service.

6.3.18. The station is typically served by one train per hour in each direction between Harwich Town and Manningtree. However, there are additional direct services from London Liverpool Street and Cambridge as a part of the Dutchflyer service.

Planned Growth

6.3.19. Within the Local Transport Plan (LTP) for Essex, the Port of Harwich is identified as an area in need of strategic transport improvements, noting that enhancements to the A120 is vital for access. The LTP confirms that planning approval has been granted for the construction of the Bathside Bay Container Terminal (BBCT) which could provide a major increase in UK container handling capacity, however the timeline for implementation is currently unknown due to a time extension to 2021 for commencement of work; this work is also linked to strategic improvements to the A120.

6.3.20. The future expansion plans for the port are also included in the 'International gateways and the strategic road network' report, produced by Highways England[57], which suggests that the port operator has plans to build container facilities across the estuary from the main port, north of Harwich. The improvements will generate additional container capacity and involve improvements to ten kilometres of the A120 trunk road to serve the town and port of Felixstowe.

Strategic transport issues important to the future growth and success of the port:

- Maintain and improve frequency of direct rail passenger services to Harwich International.
- Work to sustain and grow patronage of multi-modal services such as the Dutchflyer.
- Improve junction and link capacity of the A120 corridor between Stansted and Harwich, particularly along single carriageway sections between Braintree and Marks Tey and Colchester and Harwich.

PORT OF TILBURY

Strategic Connectivity

6.3.21. The Port of Tilbury is one of London's major ports, and the South East Local Enterprise Partnership identifies the port as a key component of the area's importance as a logistics hub for London. The port is served by the A1089 which connects with the A13 4.5km to the north. DfT's Trafficmaster data shows the section of the A13 between the M25 and A1089 and A1089 towards Tilbury Docks to perform well during the peak periods, with average vehicle speeds typically 5 to 20% higher than overnight "free-flow" conditions.

6.3.22. Peak hour congestion is experience on the A13 eastbound, west of the A1089, during the AM and PM peaks. Whilst this does not affect vehicles routing toward the port, it is likely to impact vehicles exiting the port and routing north through the Transport East region via the A130.

6.3.23. The Dartford Crossing is situated approximately 4km to the south of the Junction 30 for the A13. It is a major road crossing of the River Thames and connects Junctions 1 and Junctions 31 of the M25. It is a major pinch point on the SRN. It is unreliable, has a high accident rate, congestion and incurs repeated closures.

[57] International Gateways and the strategic road network, Highways England, November 2016

6.3.24. The Lower Thames crossing would help alleviate congestion at the Dartford Crossing and help improve connectivity to both the Port of Tilbury and the DP World London Gateway.

6.3.25. The cross London rail line via the North London line is vital for the movement of rail freight between the Port of Tilbury and Midlands distribution centres and other destinations in Yorkshire and the North West via the ECML and WCML. Capacity on this line needs to grow in line with port growth.

Planned Growth

6.3.26. The SELEP's 2014 Economic Plan[58] identifies that the expansion to the port would generate up to 1,200 new jobs and attract new investment. The owner of Tilbury, Forth Ports, have purchased land adjacent to the port which used to house Tilbury power station. The expansion on the site is suggested to increase the port's size by 25%. Tilbury2 will be built on 150 acres of the total 930-acre site, with operation expected to begin in Spring 2020[59]. It is envisaged by Forth Ports that Tilbury2 will be the UK's largest unaccompanied port and the country's biggest construction processing hub. Tilbury2 is central to the Port of Tilbury's £1 billion investment programme.

Strategic transport issues important to the future growth and success of the port:

- Address capacity issues on the A13, west of the A1089.
- Address capacity issues at Dartford Crossing (e.g. through provision of Lower Thames Crossing).
- Increase capacity of cross London rail routes in line with port growth.

DP WORLD LONDON GATEWAY

Strategic Connectivity

6.3.27. The DP World London Gateway is a deep-sea port that opened in 2013. The port is accessed via the A1014 from the A13. The A1014 does not form part of the MRN. The port is located approximately 10km to the north east of Tilbury Docks.

6.3.28. DfT's Trafficmaster data shows traffic speeds on the A13 eastbound, west of the A1089, to be more than 50% slower than the overnight "free flow" conditions during the AM and PM peaks.

6.3.29. The station has a rail terminus accessible via the Tilbury Loop of the Essex Thameside Line. The cross London rail line via the North London line is vital for the movement of rail freight between DP World London Gateway and Midlands distribution centres and other destinations in Yorkshire and the North West via the ECML and WCML. Capacity on this line needs to grow in line with port growth.

[58] South East LEP Growth Deal and Strategic Economic Plan, 2014
[59] https://www.forthports.co.uk/latest-news/new-london-port-tilbury2-gets-go-ahead/ Forth Ports, February 2019

Planned Growth

6.3.30. Within Thurrock's current adopted Local Plan Core Strategy[60], the site is allocated a key area of regeneration and growth, with an ambition to create between 11,000-13,000 jobs as part of an import-export employment area. The Council has also identified that to secure the future viability of the port, there will need to be improvements to the main A1014 access road and to the rail freight terminals. To further ensure the future of the port, the Council has identified the need for between 45.2 and 82.8ha of employment land outside of the DP World London Gateway over the Local Plan period and beyond to accommodate employment growth in B-class uses.

Strategic transport issues important to the future growth and success of the port:

- Address capacity issues on the A13, west of the A1089.
- Provide direct connection to the MRN and SRN.
- Increase capacity of cross London rail routes in line with port growth.

PORT OF GREAT YARMOUTH

6.3.31. The Port of Great Yarmouth is situated at the mouth of the River Yare within the town of Great Yarmouth. It is the largest port in the north East Anglia region and provides support to the offshore energy sector and automotive sector, as well as handling bulk cargos including aggregates. Major growth in the off-shore energy sector is anticipated over the next 20 years. This growth is also expected to benefit the Port of Lowestoft in Suffolk.

6.3.32. The Port of Great Yarmouth is poorly served by the main strategic transport corridors in the region. Great Yarmouth is principally served by the A47 which runs in an east-west direction between Norwich and Great Yarmouth and north-south direction between Great Yarmouth and Lowestoft. The A47 between Norwich and Great Yarmouth is only partially dualled, with the single carriageway section between Acle and Great Yarmouth experiencing congestion at peak times. A minor incident on the A47 Acle Straight can lead to significant delays and disruption.

6.3.33. The Port of Great Yarmouth is accessed via local roads from the A47. Congestion within the town centre traffic and on approach to existing crossings of the River Yare restricts the accessibility of the port at peak times. The committed Great Yarmouth Third River Crossing scheme will provide a new crossing over the River Yare and help improve accessibility between the port and the A47.

6.3.34. Great Yarmouth railway station is situated to the north west of Great Yarmouth. It serves passenger services between Norwich and Great Yarmouth only. At present there is no infrastructure to accommodate freight services on this line.

[60] Thurrock Local Development Framework, Core Strategy and Policies for Management of Development, January 2015

Strategic transport issues important to the future growth and success of the port:

- Improve strategic transport connectivity of the port.
- Address junction and link capacity issues along the A47 (e.g. dualling the Acle Straight)
- Address congestion within Great Yarmouth Town Centre and pinch points on approach to existing crossings of the River Yare (e.g. Great Yarmouth Third River Crossing Scheme).

PORT OF IPSWICH

6.3.35. The Port of Ipswich is situated on the bank of the River Orwell in Ipswich. The port specialises in dry bulks and aggregates. The port is situated towards the centre of Ipswich and accessed via local roads from the A14.

6.3.36. The port is reliant upon the same strategic road corridors as Felixstowe with the A12 / A14 Copdock roundabout and Orwell Bridge acting as pinch points on the network. Furthermore, the absence of hard shoulders on the A12 and A14 means that minor incidents can lead to significant delay and disruption.

Strategic transport issues important to the future growth and success of the port:

- Safeguarding the performance of existing road and rail corridors;
- Improve resilience of the SRN to accidents and incidents (e.g. providing alternative routes to the port in the event that the Orwell Bridge is closed or providing hard shoulder on A12 and A14).
- Providing alternative routes to the port in the event that the Orwell Bridge is closed.

6.4 AIRPORTS

6.4.1. The Transport East region has three international airports:

- London Stansted Airport (Essex);
- Norwich Airport (Norfolk); and
- London Southend Airport (Southend-on-Sea).

6.4.2. The largest of these airports is London Stansted which carried 28 million passengers in 2018[61]. In comparison Southend carried 1.5 million and Norwich 536,000 passengers. In 2018 the airports in the region carried a total of 30 million passengers, an increase of 8% from 2017.

LONDON STANSTED AIRPORT

6.4.3. London Stansted is one of the UK's major hubs serving mainly low-cost European business and holiday markets, but is also a hub for air freight (over 264,000 tonnes in 2018). London Stansted is the fourth busiest in the UK serving over 200 destinations and 40 countries. The airport generates substantial employment and GVA for the Transport East region. It employs over 12,000 people across 200 companies, provides a regional economic contribution of £1bn per year.

Strategic Connectivity

6.4.4. Vehicular access to the airport is via the A120 and M11. The airport is situated immediately to the east of the M11, which is accessed via the M11 junction 8-grade separated junction. For vehicles travelling to / from the M11 south there is a grade separated connection between the A120 and M11. Vehicles travelling to / from the M11 must use the roundabout.

6.4.5. M11 Junction 8 is a pinch point on the local road network with delays on the A120 west approach and M11 north off-slip during the peak periods. The A120 between Braintree and Marks Tey is also a pinch point on the network, constraining east-west connectivity to the airport. This is a single carriageway section of the A120 that serves local and strategic traffic with a number of at-grade junctions.

6.4.6. Rail connectivity to the airport is via single track branch line off the West Anglia mainline. The airport is served by a service of four trains per hour from London Liverpool Street and one train per hour from Birmingham New Street via Leicester, Peterborough and Cambridge. An hourly service also operates between Cambridge and London Stansted Airport. There is no east-west rail connection.

Planned Growth

6.4.7. The Aviation Policy Framework highlights the need to increase capacity at London Stansted, as its current capacity of 29 million passengers per annum will be reached in the early 2030s[62]. London Stansted is expected to grow to 31 million passengers in 2030 and 35.5 million in 2050[63].

[61] Size of UK Airports February 2017 – January 2018, Civil Aviation Authority, 2018
[62] Aviation Policy Framework, UK Government, 2013
[63] UK Aviation Forecasts, UK Government, 2017

6.4.8. A planning application has been submitted to increase the capacity of Stansted to 43 million terminal passengers per year and increase from the current cap of 35 million. This will generate an additional 5,000 jobs and include access improvements to the M11, A120 and M11.

6.4.9. London Stansted Airport is reliant on rail and road access for passenger and freight access. The Stansted Express runs from the airport from Cambridge and Liverpool Street providing good north-south connectivity, but poor east-west connectivity. Road access is provided by the M11 and A120 corridors.

6.4.10. In 2018, upgrades to London Stansted were approved to meet the levels of demand currently experienced at the airport. A new terminal is under construction, which is due to open in 2020, which will increase capacity for arrivals and provide convenient access to train station and other onward travel modes[64]. Remodelling of the existing terminal will also be undertaken to house 134 check-in desks, a larger departure lounge, shops, bars and restaurants to accommodate growth in passenger numbers. Improvements will also be made to increase car parking and aircraft parking stands so that the airport can handle more flights per day.

Strategic transport issues important to the future growth and success of the airport:

- Addressing capacity issues at M11 Junction 8;
- Increase capacity of A120 corridor between Braintree and Marks Tey;
- Improve rail connectivity and address rail capacity issues associated with the single-track branch line off the West Anglia mainline; and
- Improve east-west rail connectivity.

LONDON SOUTHEND AIRPORT

Strategic connectivity

6.4.11. London Southend Airport is situated to the north of Southend-on-Sea in the district of Rochford. The airport is served by the A127, an east-west link on the MRN, connecting the M25 at Upminster with Southend-on-Sea. The A130 connects with the A127 at South Benfleet providing connectivity to A12 south of Chelmsford. Between the M25 and the west of Southend-on-Sea the route is principally a grade separated dual carriageway, however through the main urban are of Southend-on-Sea it is an urban dual carriageway with at grade junctions.

6.4.12. DfT Trafficmaster data shows average vehicle speeds on the A127 to be significantly reduced during the peak periods. Through the main urban area of Southend-on-Sea vehicle speeds are more than 50% lower than the overnight 'free flow' conditions on much of the route. In the PM Peak there is significant delay on the A127 eastbound at the junction with the A132 north of Basildon and along the link between he A127 eastbound between the M25 and Basildon. The A130, which provides north-south connectivity to the airport performs well in the peak periods, with less than a 5% reduction in vehicles speeds compared to overnight 'free-flow' conditions.

[64] https://www.stanstedairport.com/transformation/, 2019

6.4.13. London Southend airport has recently benefited from the development of its own dedicated rail station. The station is situated on the Shenfield to Southend line, a branch line off the Great Eastern mainline. This provides a direct rail connection to London Liverpool Street and is typically served by three trains per hour in each direction.

Planned Growth

6.4.14. A new terminal at the airport opened in February 2014. This has led to an increase in the number of passenger flights from the airport. The airport has a target of 2 million passengers by 2020. In December 2017 the airport obtained permission to extend their existing terminal building, but this did not include any change to existing operational controls (which includes a limit 53,300 Air Transport Movements and 2,150 x 737-300 Air Transport Movements).

6.4.15. A Joint Area Action Plan (JAAP) was prepared by Rochford District Council and Southend-on-Sea Borough Council and adopted in December 2016 and establishes planning policies up to 2031. The central principle of the JAAP is that the airport can expand operations to enable up to 2 million passengers to be carried annually.

6.4.16. In 2019, maintenance was undertaken at London Southend to enable the airport to continue serving increased passenger traffic into the future. The upgrade will enable more flights to arrive and depart from the airport and will help create 750 on-site jobs annually through the opening of a new Ryanair base at the airport in mid-2019.

6.4.17. DfT has forecasted that patronage will grow to 0.8 million in 2030 and a further increase to 5.1 million in 2050[65].

Strategic transport issues important to the future growth and success of the airport:

- Address junction and link capacity issues along the A127 corridor; and
- Maintain and where possible increase number of direct rail services to London.

NORWICH AIRPORT

Strategic connectivity

6.4.18. Norwich Airport is the smallest of the three airports in the Transport East region and currently employs 260 people. Norwich airport is located 2.5 mile north of central Norwich. Strategic connectivity to the Airport is from the A140 and the recently opened A1270 Broadland Northway to the north east of Norwich. Both routes connect with the A47 to the south east of Norwich.

6.4.19. There is no strategic route between the A47 and Norwich Airport to the west of Norwich. For vehicles travelling towards the airport from the west this can result in additional travel distance or lead to vehicles routing through Norwich City Centres or via other local roads unsuitable for strategic traffic.

[65] UK Aviation Forecasts, UK Government, 2017

6.4.20. The airport has the second biggest heliport in the UK serving the North Sea oil and gas industry as well as the East Anglia Air Ambulance. The growth in the offshore sector represents a significant proportion of passengers at Norwich Airport. In 2015, over 22% of all terminal passengers at the Airport were travelling to and from the offshore gas platforms[66].

6.4.21. The Airport is developing an aviation cluster and is home to the International Aviation Academy Norwich (IAAN) a new world-class training centre for aviation professionals.

Planned Growth

6.4.22. In 2017 Norwich Airport published their Draft Masterplan setting out a vision for the airport's continued growth over the next 30 years. The airport's vision is to be "the passenger airport of choice for Norfolk, Suffolk and adjoining counties; a leading provider of aircraft maintenance, repair and overhaul services; a supplier to the oil and gas industry and a location for business growth".

6.4.23. To provide for growth to 2030, there will be expansion of the existing terminal. The airport would also seek to explore lengthening the operational hours to allow for scheduling of flights beyond the current 23:00 hours restriction for four days a week in the summer months, in order to retain current operators.

6.4.24. The airport will encourage the greater use of public transport, although the levels of passenger parking will increase in line with forecasted growth to add an extra 750 spaces, taking capacity to 1,734 spaces.

6.4.25. To provide for growth to 2045, it is proposed that a 500m extension to the eastern runway is undertaken to accommodate larger aircraft in the future. Furthermore, an additional 1,250 spaces will be added for passenger parking, to bring the total parking capacity to 2,234 spaces.

Strategic transport issues important to the future growth and success of the airport:

- Monitor levels of congestion along A1270 Northern Distributor Road to ensure it continues to provide good strategic connectivity to the airport at peak periods;
- Address strategic connectivity of the airport from the west;
- Work to maintain and increase park and ride services operating to / from the airport; and
- Improve public transport connectivity between Norwich railway station and Norwich Airport.

CAMBRIDGE AND LONDON CITY AIRPORTS

6.4.26. Two additional airports are situated on the periphery of the Transport East region, these are Cambridge Airport to the west and London City Airport to the south. In 2018 London City Airport carried 4 million passengers[67]. Whilst Cambridge Airport is operational, publicly available passenger services ended in January 2016.

[66] Norwich Airport Draft Masterplan, Norwich Airport, 2017
[67] Size of UK Airports February 2017 – January 2018, Civil Aviation Authority, 2018

SUMMARY

6.4.27. This section has identified that high-quality connectivity to the global gateways in the Transport East is vital to supporting inward and outward investment into the UK. The section has identified the strategic transport corridors that serve the global gateways perform important regional and national functions in accommodating freight movements, business and leisure travel to airports and local connectivity into these important employment hubs. For all these connectivity demands a reliable a reliable transport network is required with sufficient capacity to support planned growth.

7 MULTI-CENTRED GROWTH

7.1 OVERVIEW

Multi-Centred Connectivity: Enhanced links between our fastest growing places and business clusters; enabling the area to function as a coherent economy and improving productivity

7.1.1. This section explores:

- The multi-centric nature of residential and workplace populations
- The commuter flows between major urban settlements and how the strategic transport corridors have influenced this;
- The distribution of planned growth in the Transport East region; and
- The implications of multi-centred growth on strategic transport corridors in the region.

7.2 DISTRIBUTION OF THE REGION'S POPULATION

MULTI-CENTRED ECONOMY

7.2.1. The population of the Transport East region is spatially diverse. The region is made up of a small number of larger settlements (towns and cities with a population over 100,000) and a relatively high number of smaller towns, markets towns, villages and hamlets. The six settlements with a population greater than 100,000 are: Basildon, Chelmsford, Colchester, Southend-on-Sea, Norwich and Ipswich.

7.2.2. These six settlements are key regional employment and service centres, drawing in employment, retail and leisure trips from their surrounding sub-regions. These large settlements are surrounded by a range of small and medium sized towns and rural settlements resulting in multiple locations for employment and housing growth across the region.

7.2.3. The spatial typology of the Transport East region has resulted in a multi-centred economy with a range of towns and cities functioning as sub-regional focal points for business and leisure activities.

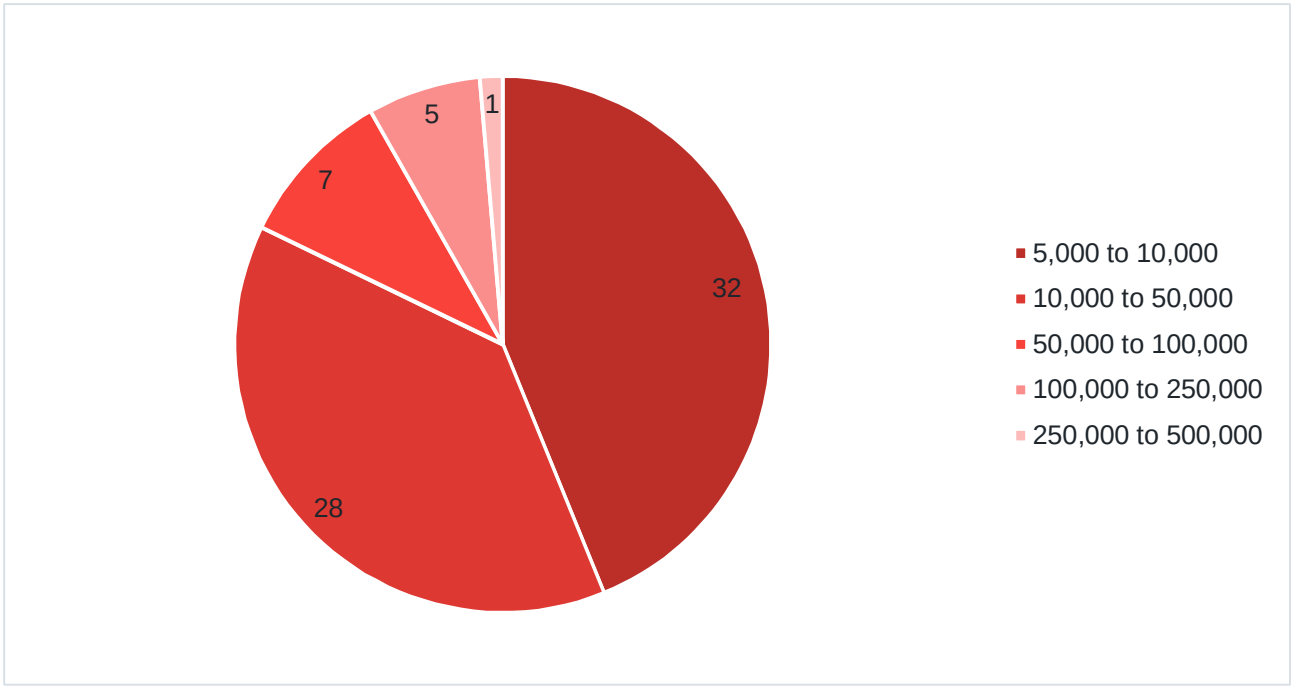
7.2.4. Table 7-1 summarises the ten largest urban settlements in the Transport East region based on usual resident population. These settlements have been identified from the 'Built-up Urban Areas' (BUA) spatial geography.

Table 7-1 – Primary Urban Areas in Transport East region

Built Up Urban Area	Usual Residents
Southend-on-Sea	295,310
Norwich	213,166
Ipswich	178,835
Basildon	144,859
Colchester	121,859
Chelmsford	111,511
Grays	89,755
Harlow	82,059
Lowestoft	70,945
Great Yarmouth	63,434
Braintree	53,477
Brentwood	52,586
Clacton-on-Sea	50,548

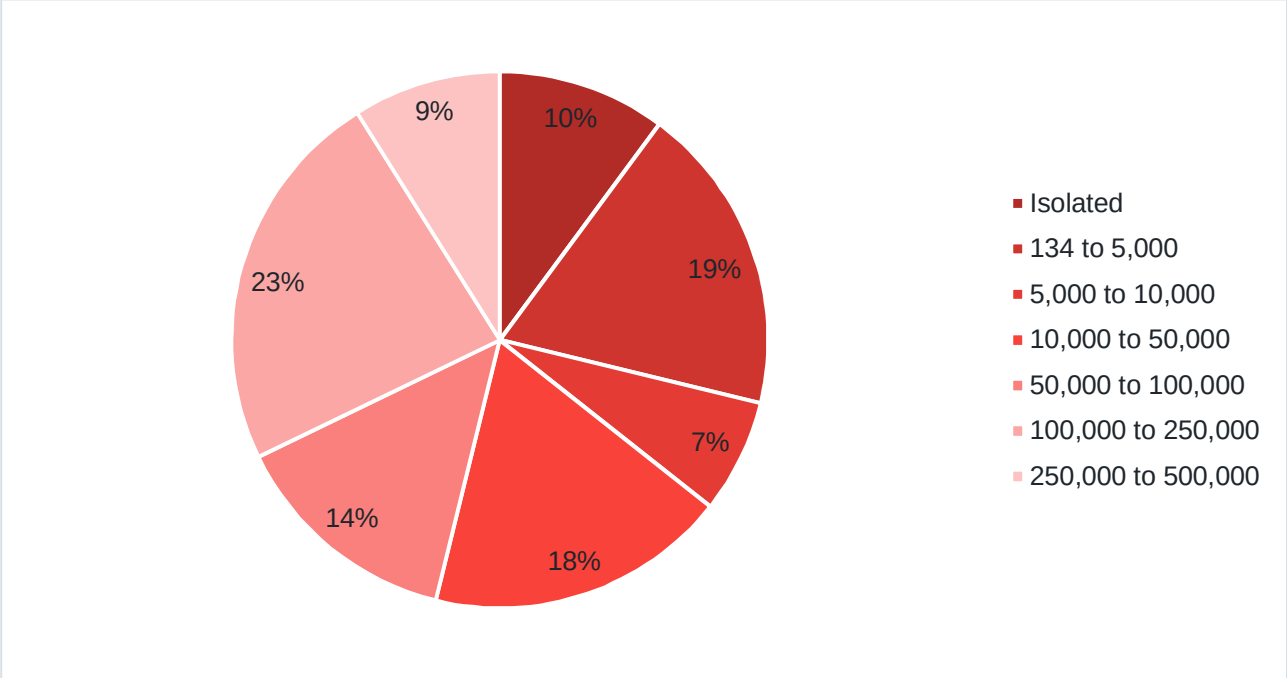
7.2.5. The population ranges of BUA in the Transport East region with a usual resident population of more than 5,000 is shown in Figure 7-1 below.

Figure 7-1 – Population ranges of BUA in the Transport East region



7.2.6. Figure 7-1 above demonstrates that the region is principally comprised of small to medium size settlements, with 28 BUAs with a usual resident population of between 10,000 and 50,000. Only 12 BUAs have a usual resident population of between 50,000 and 250,000 and only 1 BUA has a usual resident population of more than 250,000 (Southend-on-Sea). The proportion of residents within the Transport East region living within different size BUAs in the Transport East region is shown in Figure 7-2 below.

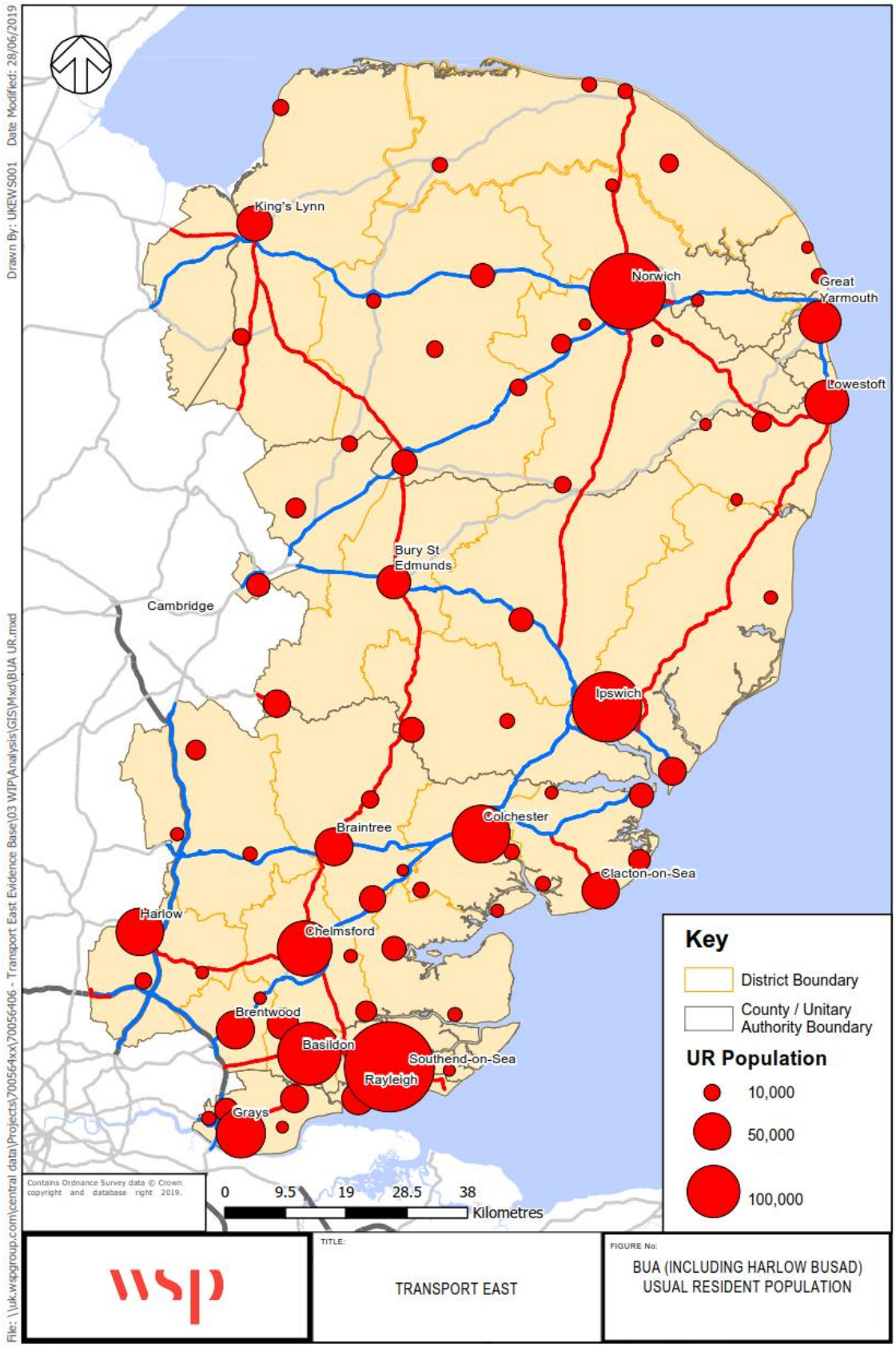
Figure 7-2 – Percentage of residents living within different size urban areas in the Transport East region



7.2.7. Figure 7-2 above demonstrates that the majority of the population of the Transport East region lives within BUA small to medium size settlements. 32% of residents live within BUA of between 5,000 and 50,000 in size and 37% of residents live within BUA of between 50,000 and 250,000. Only 9% of the population live in BUA of more than 250,000 in size. The split of residential population between the settlement sizes demonstrates the importance of small and medium size owns as well as the larger settlement to the economic performance of the region.

7.2.8. Figure 7-3 below shows the distribution of Built-up Urban Areas) with a usual resident population of more than 5,000. These settlement account for 78% of the Transport East residential population and are therefore important settlements for housing and economic growth and support the primary economic centres.

Figure 7-3 – Built-Up Urban Areas Usual Resident Population (including Harlow Sub Division)



7.2.9. Figure 7-3 above shows the highest concentration of BUAs with a population of more than 100,000 are within Essex and Southend-on-Sea. The BUAs with the largest populations are all located on strategic transport corridors, with only Southend-on-Sea and Basildon not directly served by the SRN. The largest BUAs in the Transport East region are typically surrounded by a number of smaller BUAs with a population of between 5,000 and 50,000, demonstrating the importance of good connectivity by road and rail between the major centres the enable access to jobs, education and other opportunities making the East.

7.3 JOURNEY TO WORK TRAVEL PATTERNS

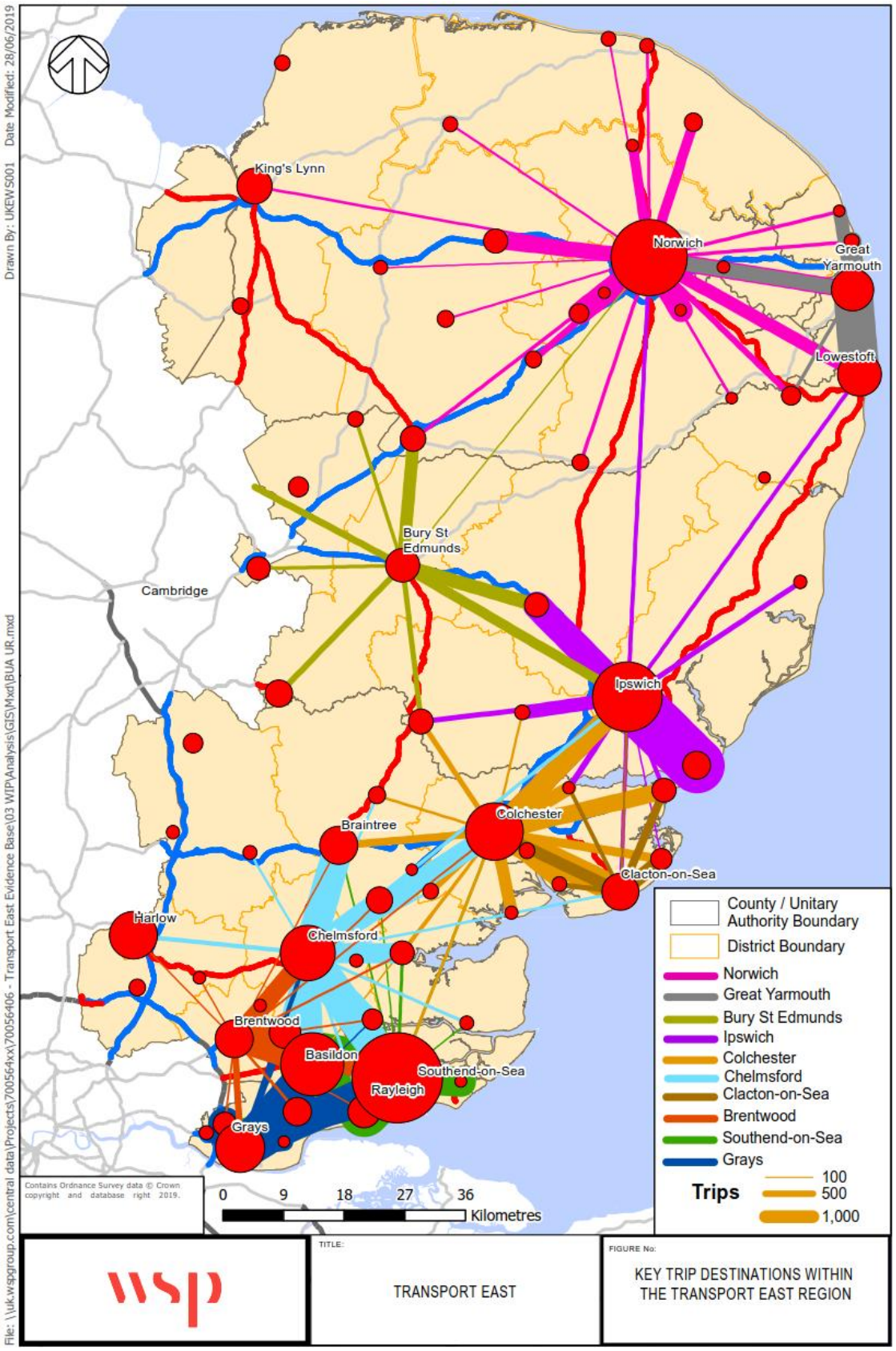
EMPLOYMENT CATCHMENTS

7.3.1. The transport network plays a key role to play in the efficiency of the labour market. Improved transport connectivity can increase the size of the labour market catchment area and as a result provide residents and employers with increased opportunities to access jobs and potential employees.

7.3.2. Labour market catchments are influenced by the location of jobs and housing and the efficiency of the transport network to access these opportunities. To understand the movement of workers within the Transport East region and the labour market catchment of the largest BUAs, journey to work origin destination flows from the 2011 census have been analysed. The large urban areas are important centres for business activity, attracting workers from the surrounding settlements drawn by a wider range of job opportunities as shown by Figure 7-4. Figure 7-4 shows the journey to work flows towards the 10 largest BUAs in the Transport East region.

7.3.3. Figure 7-4 shows origin destination flows to be closely aligned with the strategic transport corridors in the largest commuter flows to be between the major urban settlements in Suffolk, Essex, Southend-on-Sea and Thurrock and between the settlements of Great Yarmouth, Lowestoft and Norwich in Norfolk. The high levels of intra-urban travel to work trips highlights the importance of the connectivity between settlement to support local labour market efficiency.

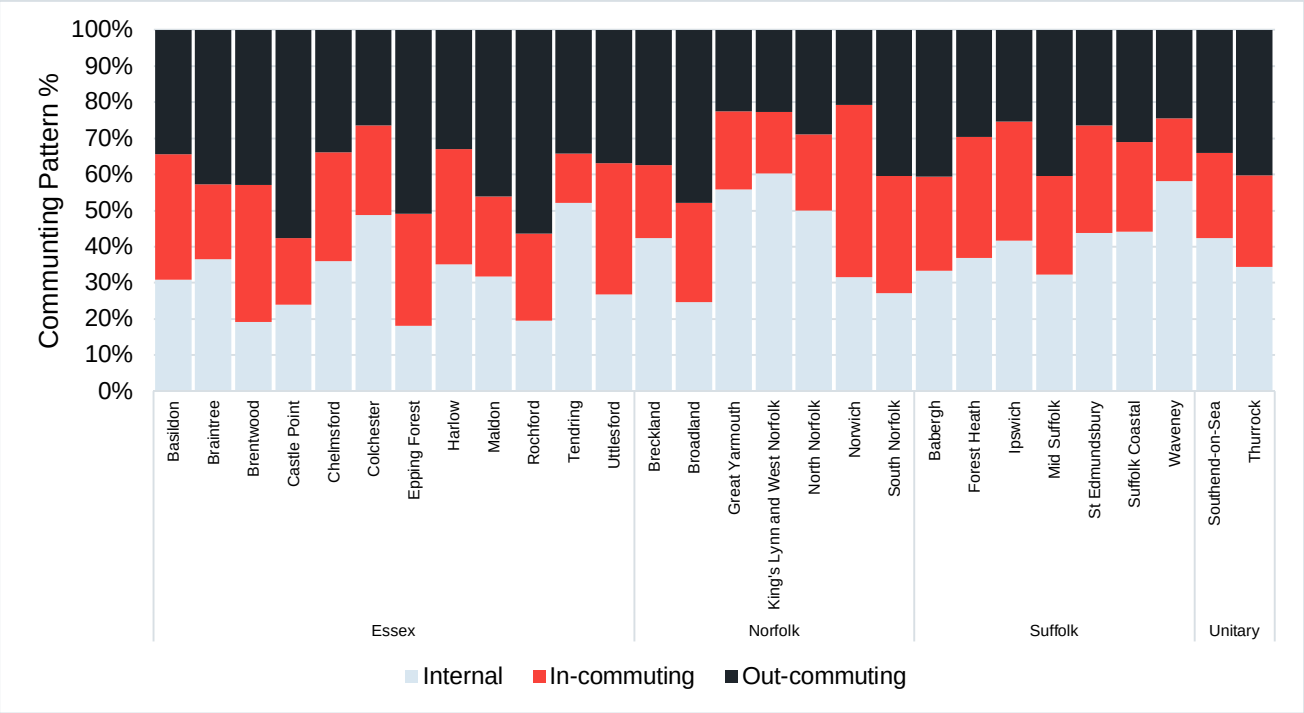
Figure 7-4 – Key Trip Destinations in the Transport East Region



COMMUTER FLOWS IN AND OUT OF THE TRANSPORT EAST REGION

7.3.4. Approximately 83% of all residents living within the Transport East region work within the Transport East region and approximately 91% of all workers in the Transport East region live within the Transport East region. The commuter patterns for each of the districts in the Transport East region is shown in Figure 7-5 below.

Figure 7-5 – 2011 Commuting Patterns by District / Unitary Authority



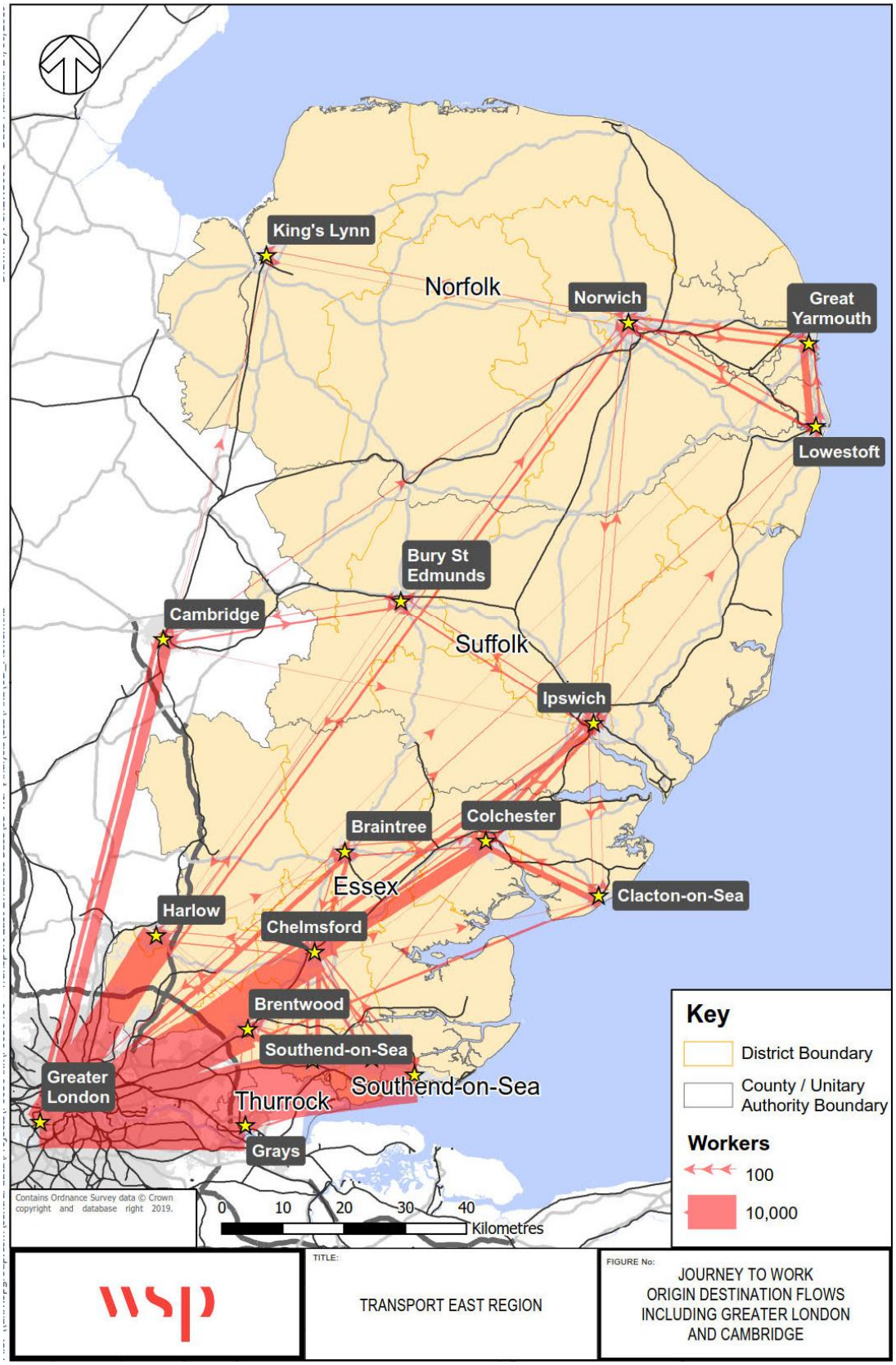
7.3.5. Figure 7-5 shows that the level of self-containment for each district ranges from 18% in Epping Forest to 60% in Kings Lynn and West Norfolk. Districts with relatively high levels of in-commuting include Norwich (48%), Brentwood (38%), Uttlesford (36%), Basildon (35%), Forest Heath (34%) and Ipswich (33%) highlighting the importance of Norwich, London Stansted Airport and Ipswich as employment centres in Norfolk, Suffolk and Essex respectively.

7.3.6. Figure 7-5 also shows that some districts have relatively high proportions of out-commuting including Castle Point (58%), Rochford (56%), Epping Forest (51%), Broadland (48%), Maldon (46%), Brentwood (43%) and Thurrock (40%). The high levels of out-commuting from Castle Point, Rochford and Epping Forest, Brentwood and Thurrock will be influenced by their proximity to London while Broadland surrounds both Great Yarmouth and Norwich.

7.3.7. The in and out-commuting movements will occur by a number of modes and on a range of local roads, however strategic road and rail corridors linking these districts and their main economic centres are vital to support labour market efficiency.

7.3.8. London and Cambridgeshire are global economic hubs which have an important influence on the labour market catchments, particularly in the south and west of the region. To understand the influence of large urban areas on the periphery of the Transport East region, journey to work origin destination flows between the largest BUAs in the Transport East region, Cambridge and Greater London (excluding Harlow) have been analysed. These are shown in Figure 7-6 below.

Figure 7-6 – 2011 Commuter Flows between Major Urban Settlements within the Transport East Region (including London and Cambridge)

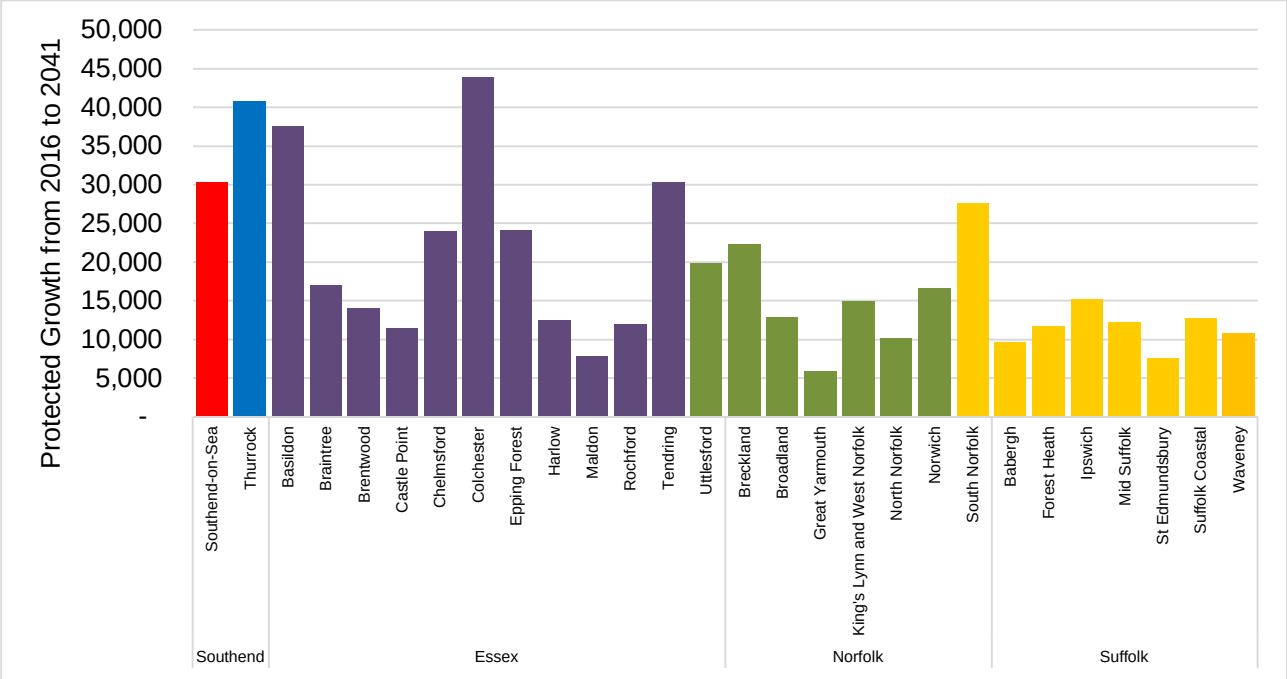


7.3.9. Figure 7-6 shows the influence of the Greater London area on journeys to work in the Transport East region. **The highest flows are from the major urban settlements in Essex, Thurrock and Southend-on-Sea; highlighting the importance of the strategic radial road and rail links into London from these locations.** Cambridge has a smaller influence on journeys to work in the Transport East region, with the main flows from Bury St Edmunds, Ipswich and King Lynn. This analysis demonstrates that the strategic road and rail infrastructure, particularly in Essex and Suffolk is a key contributor to supporting the economies of London and Cambridgeshire.

7.4 FORECAST POPULATION GROWTH

7.4.1. The population of the Transport East region is forecast to grow by up to 516,600 people between 2016 and 2041[68]. Figure 7-7 shows the levels of growth distributed in each of the 28 districts / unitary authorities using 2016 statistics.

Figure 7-7 - Projected Growth from 2016 to 2041



7.4.2. Growth is not predicted to be distributed evenly across the Transport East region, with the highest levels of growth are expected to be occur in Colchester, Thurrock and Basildon, with approximately 43,900, 30,400 and 37,500 people in each area respectively. The area with the lowest projected growth is Great Yarmouth, with the population predicted to increases by 5,900 people.

[68] Table 2, 2016-based subnational population projections for local authorities and higher admirative areas in England, Office for National Statistics, 2018

7.4.3. Figure 7-7 highlights that substantial levels of population growth are forecast unevenly across Southend, Thurrock and Essex, with the main locations being Colchester, Thurrock, Basildon, Tendering and Southend-on-Sea. Across Norfolk, South Norfolk and Breckland are predicted to experience the highest increases in population. In Suffolk population increases are predicted to be more evenly distributed, with the biggest increases in Ipswich and Suffolk Coastal.

7.5 FORECAST HOUSING GROWTH

IDENTIFIED HOUSING NEED

7.5.1. The NALEP Economic Strategy sets out the Objectively Assessed Need (OAN) for housing in Norfolk and Suffolk to be 140,000 homes by 2036 and the Greater Essex Growth and Infrastructure Framework sets out the need to be 179,000 across Essex, Southend and Thurrock. This equates to 15,950 dwellings per year across the Transport East region which need to be fulfilled by 2036.

7.5.2. Compilation of the various assessments of housing need across Transport East from NALEP and the Greater Essex Growth and Infrastructure Framework indicate an objectively assessed need for around 319,000 additional dwellings across the region between 2016 and 2036[69][70].

7.5.3. To deliver the OAN scale of new housing would require a completion rate of approximately 15,950 dwellings per annum. This is considerably higher than the average completions achieved between 2010/11 and 2017/18 which was an average of around 10,379 dwellings per annum.

HOUSING FORECASTS

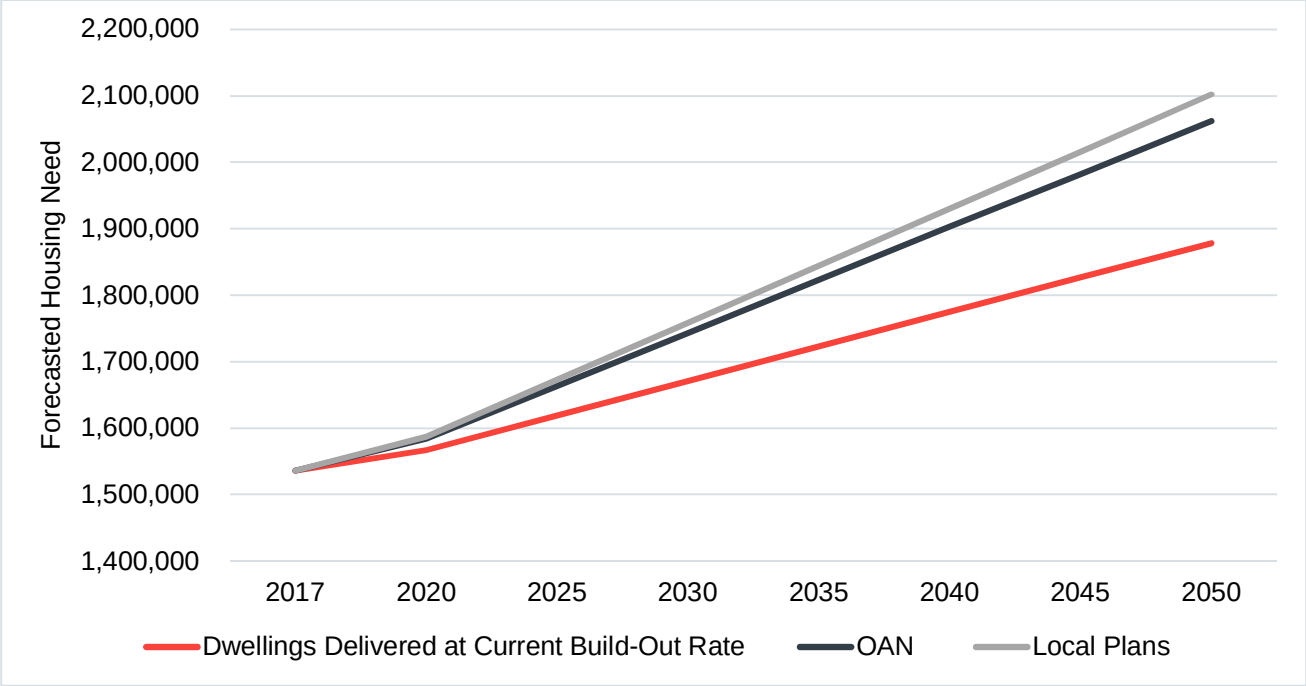
7.5.4. Three housing forecasts have been used to assess how the levels of housing will change using the number of houses forecasted from the Local Plans, those from the OAN and the current build-out rate of housing. The figures for level of housing forecasted per year are shown below:

- Current Build-Out Rate - 10,379[71]
- Local Plans - 17,155
- OAN - 15,950[72] [73]

7.5.5. As shown above, the current build-out rate is below that specified in the Local Plans and OAN, suggesting not enough homes will be built to match the forecasted levels of need. Figure 7-8 below compares this forecasted demand of the Local Plans to that of the OAN and the current build-out rate to see whether Transport East region is on track to meet the ambitious targets.

[69] Norfolk and Suffolk Economic Strategy, NALEP, November 2017
[70] Greater Essex Growth and Infrastructure Framework 2016-2036, February 2017
[71] Table 122, Net additional dwellings by local authority district, England 2001-02 to 2017-18, Office for National Statistics, 2018
[72] Norfolk and Suffolk Economic Strategy, New Anglia Local Enterprise Partnership, November 2017
[73] Greater Essex Growth and Infrastructure Framework 2016-2036, February 2017

Figure 7-8 - Future Housing Need



7.5.6. The OAN forecasts produced by NALEP shows that 179,000 dwellings will be needed in Norfolk and Suffolk by 2036 and a further 140,000 will be needed in Essex, South-on-Sea and Thurrock to support levels of future growth (Greater Essex Growth and Infrastructure Framework).

7.5.7. Figure 7-8 shows that if the current level of build-out continues then the Transport East region will not meet the targets set in the Local Plan, or that of the OAN. However, if dwellings are built out at the level of the Local Plans – 17,155, an increase of 6,776 dwellings per year, the region will exceed the housing demand forecasted by the OAN.

STRATEGIC HOUSING SITES

7.5.8. The Local Plan and Core Strategy documents for each district and unitary authority in the Transport East region has been reviewed to identify strategic housing sites expected to be built out over the current local plan period (up to 2038 in Southend-on-Sea).

7.5.9. Ambitious targets have been set by the district, borough and unitary authorities within the Transport East region. A total of 325,312 dwellings have been forecasted for the Transport East region during the Local Plan Periods.

7.5.10. Within districts that are 100% urban (Southend-on-Sea, Castle Point, Harlow, Norwich and Ipswich) growth is focused in these established urban areas. In districts which are substantially rural in nature (including Uttlesford, North Norfolk and Mid Suffolk) growth is distributed around a range of new garden settlements, market towns and service centre extensions and village expansions.

7.5.11. In addition to the strategic housing allocations set out by each district and unitary authority in their Local Plan and Core Strategy documents, a number of Garden Communities are proposed.

Garden Communities

Braintree District Council, Colchester Borough Council and Tendering District Council are collaborating alongside Essex County Council to identify an agreed strategic approach to the allocation and distribution of large-scale housing led development.

In 2017 North Essex Garden Communities Ltd was set up to take forward proposals for three new garden communities across North Essex. It is estimated that they could help deliver up to 43,000 new homes along the A120 corridor.

The three sites are:

- West of Braintree – delivery of up to 10,000 homes.
- Braintree / Colchester border – delivery of up to 24,000 homes.
- Colchester / Tendering border – delivery of up to 9,000 homes.
- Garden Communities

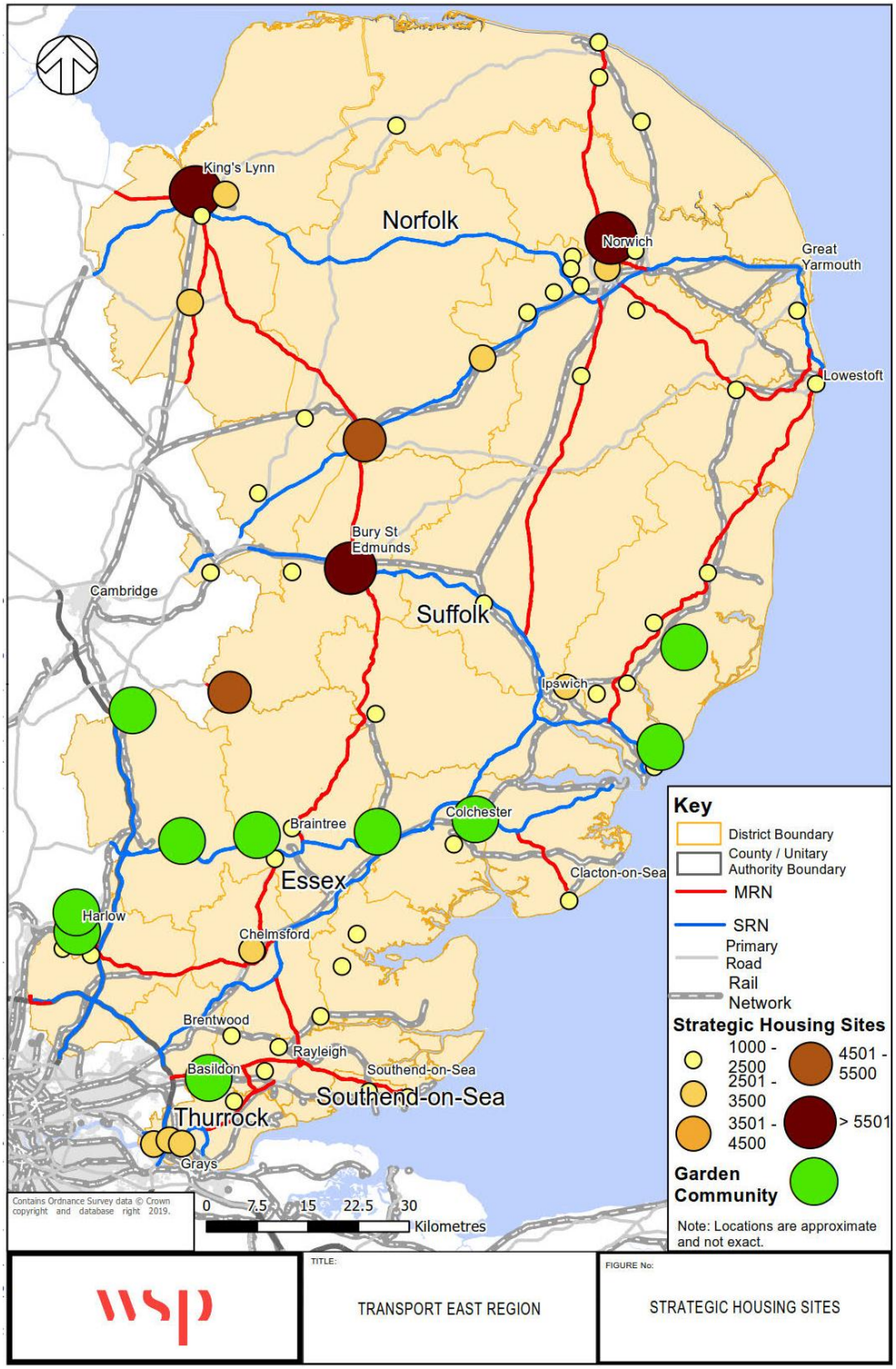
Suffolk Coastal (now part of East Suffolk District Council) is also planning two smaller Garden Communities, located close to Felixstowe. The Garden Communities will have access to two strategic corridors; the A14 and A12.
The two communities are:

- North Felixstowe – delivery of up to 2,000 homes
- South of Saxmundham – delivery of approximately 800 homes

Ipswich Borough Council are planning a garden suburb to the north of Ipswich. This is an area of approximately 200ha and has a planned delivery of 3,500 homes. This site is identified in the adopted Ipswich Borough Council Core Strategy and Policies Development Plan Document.

7.5.12. A plan showing the strategic housing sites in the Transport East Region (sites greater than 1,000 dwellings) is provided in provided in Figure 7-9 below. The information shown in the plan has been sourced directly from each Local Authority. For Local Authorities where no data was provided, housing growth forecasts have been taken from adopted or emerging Local Plan. Further detail on local housing need and strategic housing sites in each district and unitary authority in the Transport East region is provided in Appendix C.

Figure 7-9 – Local Plan Strategic Housing Allocations, Transport East region



7.5.13. Figure 7-9 shows that the majority of the strategic developments are located on the key strategic road and rail corridors. Additional development on these corridors, will result in increased travel demands and a worsening of existing capacity issues. Without sufficient investment to increase the capacity of strategic SRN, MRN and rail corridors, congestion will worsen, constraining the potential for economic growth in the region.

IMPLICATIONS ON STRATEGIC TRANSPORT CORRIDORS

7.5.14. Transport connectivity and capacity is vital to enabling development. A reliable and efficient transport network providing modal choice can unlock sites for housing and employment development.

7.5.15. Figure 7-9 shows forecast growth in the region to be distributed throughout a large number of towns and cities in the Transport East region with the highest number of dwellings proposed in areas on or near to the MRN and SRN routes and the existing rail corridors. This suggests that the road and rail networks will continue to play an important role in supporting future multi-centred growth across the Transport East region. A summary of the key transport corridors required to support the strategic housing allocation sites and garden communities is summarised in Table 7-2 below.

Table 7-2 – Key Transport Corridors Supporting Multi-Centred Growth

Corridor	Mode	Main Settlements
A146	Road	Norwich, Lowestoft
A47	Road	Lowestoft, Great Yarmouth, Norwich, Kings Lynn
A11 & Cross County rail	Road Rail	Norwich, Thetford, Newmarket
A14 & Cross County rail	Road and Rail	Felixstowe, Ipswich, Stowmarket, Bury St Edmunds, Newmarket
A140 and Great Eastern Mainline	Road and Rail	Cromer, Norwich, Ipswich
A134/A131/A130	Road	Kings Lynn, Thetford, Bury St Edmunds, Sudbury, Braintree, Chelmsford, Rayleigh
A12 & Great Eastern Mainline	Road and Rail	Lowestoft, Ipswich, Colchester, Chelmsford, Brentwood
A120 Haven Gateway Corridor	Road	Stansted, Braintree, Colchester, Harwich
M11 Corridor and West Anglia Mainline	Road and Rail	London, Harlow, Stansted, Cambridge
A127 and A13 Corridors and Essex Thameside	Road and Rail	London, Basildon, Southend, Thurrock, Grays
A414 Corridor	Road	Chelmsford, Harlow

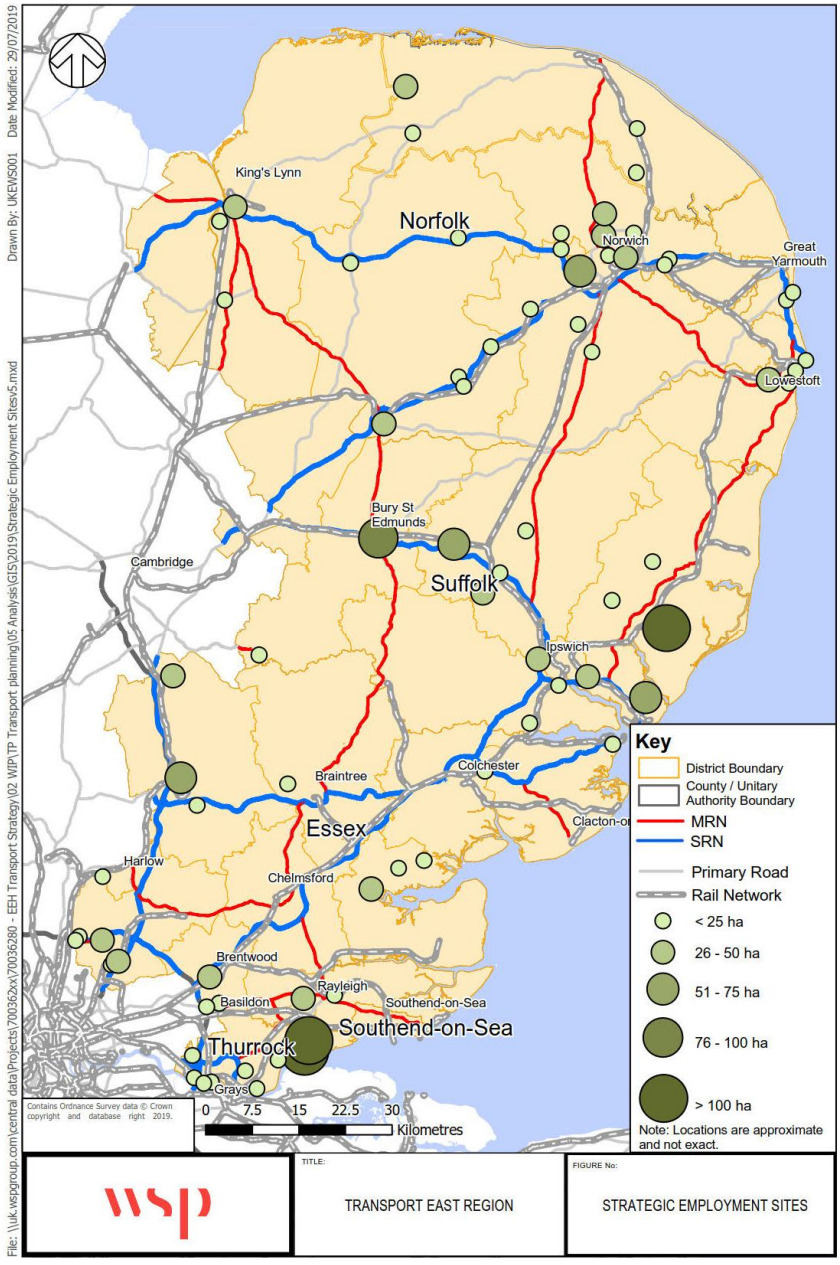
7.5.16. These identified key transport corridors are formed of the SRN, emerging MRN and rail corridors. They serve the main growth locations where large-scale housing and employment growth is planned including Norwich, Great Yarmouth, Lowestoft, Thetford, Kings Lynn, Bury St Edmunds, Felixstowe, Colchester, Chelmsford, Braintree, Basildon, Grays and Southend-on-Sea. The capacity, reliability and resilience of these key corridors are therefore vital to supporting strategic multi-centred growth across the region.

7.6 EMPLOYMENT GROWTH

7.6.1. Analysis of the Local Plans for the authorities within the Transport East region, shows that 256,893 jobs will need to be created to support future population growth. The greatest number of jobs is forecasted in Basildon, with 20,000 expected to be achieved by 2034. The area that expects the lowest increase in employment is Maldon, with jobs growth of 1,134 by 2029.

7.6.2. A plan showing the location of strategic employment growth (greater than 5 hectares) is provided in Figure 7-10 below. This information is based on information directly provided by each Local Authority. For Local Authorities where no data was provided, information has been obtained from each Local Authorities adopted or emerging Local Plan. The source of forecast employment growth for each Local Authority in the Transport East region is provided in Appendix D.

Figure 7-10 – Strategic Employment Sites



7.6.3. Figure 7-10 above shows that a substantial number of strategic employment sites are planned alongside the key strategic transport corridors. Strategic employment sites are planned in North Walsham, Fakenham. Stowmarket, Newmarket and Basildon at over 60ha each. Further smaller sites are located around key service settlements; Epping, Colchester, Lowestoft and around the city of Norwich. A summary of the key transport corridors required to support the strategic employment allocation sites is summarised in Table 7-3 below.

Table 7-3 - Key Transport Corridors Supporting Multi-Centred Growth - Employment

Corridor	Mode	Main Settlements
A146	Road	Norwich, Lowestoft
A47	Road	Lowestoft, Great Yarmouth, Norwich
A11 & Cross County rail	Road Rail	Norwich, Thetford, Newmarket
A14 & Cross County rail	Road and Rail	Felixstowe, Ipswich, Stowmarket, Bury St Edmunds
A140 and Great Eastern Mainline	Road and Rail	Cromer, Norwich, Ipswich
A134/A131/A130	Road	Thetford, Bury St Edmunds, Sudbury, Braintree, Chelmsford, Rayleigh
A12 & Great Eastern Mainline	Road and Rail	Lowestoft, Ipswich, Colchester, Chelmsford, Brentwood
A120 Haven Gateway Corridor	Road	Stansted, Braintree, Colchester, Harwich
M11 Corridor and West Anglia Mainline	Road and Rail	London, Harlow, Stansted, Cambridge
A127 and A13 Corridors and Essex Thameside	Road and Rail	London, Basildon, Southend
A414 Corridor	Road	Chelmsford, Harlow
A148 and the Bittern Line	Road and Rail	Cromer, Holt, Fakenham

7.6.4. These identified key transport corridors are formed of the SRN, emerging MRN and rail corridors. They serve the main growth locations where large-scale employment growth is planned includes Norwich, Great Yarmouth, Lowestoft, Thetford, Colchester, Basildon and Southend. The capacity, reliability and resilience of these key corridors are therefore vital to supporting strategic multi-centred growth across the region.

7.7 SUMMARY

- The spatial typology of the Transport East region results in **multiple regional residential and employment centres** that rely on transport connectivity to enable residents to access work and services.
- **London is major employment destination** for workers in the Transport East Region, particularly in Essex, Southend-on-Sea and Thurrock, demonstrating the importance of strategy road and rail connectivity into the Capital.
- The **highest commuter flows are along the major transport corridors in south east Essex, Southend-on-Sea and Thurrock.**
- **Commuter flows between the major urban settlements in Norfolk and the rest of the Transport East region are low**. In Norfolk the highest commuter flows are between Great Yarmouth, Lowestoft and Norwich.
- **Forecast housing growth is multi-centred and distributed across a large number of towns and cities across the region**, principally along the strategic transport corridors.
- If the **current level of build-out continues then the Transport East region will not meet the targets set in the Local Plan, or that of the OAN**.

7.7.1. Further detail on local employment need and strategic employment sites in each district and unitary authority in the Transport East region is provided in Appendix D.

8 ENERGISED COASTAL COMMUNITIES

8.1 OVERVIEW

Energised Coastal Communities: A reinvented, sustainable coast for the 21st Century which delivers on our ambition to become the UK's foremost all-energy coast, as well a competitive visitor offer.

8.1.1. This section discusses the importance of the strategic transport corridors in delivering Transport East's ambition of becoming the UK's foremost all-energy coast as well as providing a competitive visitor offer.

8.2 COASTAL ENERGY

8.2.1. The Transport East region has substantial experience in the oil and gas sector, nuclear energy and offshore windfarms off its coast, supported by an international facing renewables supply chain and support industry. The industry has a highly skilled workforce which generates high GVA per job. The industry has massive growth potential with the proposed development of Sizewell C Nuclear Planning in Suffolk, Bradwell B in Essex and new windfarms being planned of the North Norfolk Coast (Hornsea Project Three and Four).

8.2.2. The coastal energy industry is a key growth industry within Transport East with the dramatic recent growth in the number of offshore windfarms including Scroby Sands, Sheringham Shoal, Greater Gabbard, London Array, Gunfleet Sands and Galloper windfarms.

8.2.3. NALEP notes in their 2019 report[74] that the East of England has become the UK's epicentre or energy generation, due to the unique mix of renewable energy, gas and nuclear production. NALEP supports the creation of an All Energy Industry Council to capitalise the opportunity for offshore wind and the opportunities created by the Offshore Wind Sector Deal.

8.2.4. Spatially, these industries cluster at coastal towns around Sizewell in Suffolk, Great Yarmouth in Norfolk as well as Clacton-on-Sea. These coastal locations along with the surrounding towns and villages are well placed to support the further development of the all-energy coast economy.

8.3 FORECASTED GROWTH IN THE COASTAL ENERGY SECTOR

8.3.1. The UK's leading offshore energy ports of Great Yarmouth, Lowestoft and Wells, are seen by NALEP as strategic centres for the offshore wind sector. Peel Ports Great Yarmouth is planning an expansion to the outer harbour to create a centre of excellence for operation and maintenance, and expansions to provide 350m of extra berthing space and 100,000sqm of additional land.

[74] Norfolk and Suffolk Offshore Wind Cluster, NALEP, January 2019

8.3.2. NALEP estimates that with all the current portfolio of consented offshore wind projects installed and commissions, it could be worth in the region of £1.3 billion per year to the region. The cluster of wind projects is also an opportunity to create more than 6,000 skilled jobs by 2032.

8.3.3. Proposed new wind farm sites are outlined below:

- East Anglia ONE North – will cover 208km^2 (67 turbines) and an operational capacity of 800 MW to power 659,000 UK households[75]
- East Anglia TWO – will cover 255km^2 (75 turbines) and an operational capacity of 900 MW to power 742,413 UK households[76]
- East Anglia THREE – will cover 305km^2 (172 turbines) and an operational capacity of 1,200 MW and power 890,000 UK households[77]
- Norfolk Boreas – proposed to supply 1,800 MW[78]
- Norfolk Vanguard – proposed to supply 1,800 MW[79]
- Hornsea Three – will cover up to 696 km^2 and an operational capacity of 2,400 MW to supply over 2 million UK households[80]

8.3.4. The transport issues effecting the future growth and success of coastal communities in the Transport East region is discussed in Section 8.5 below.

8.4 VISITOR ECONOMY

8.4.1. Transport East has a successful visitor and tourist economy and is a key employer in coastal communities. In total it is estimated that the sector supports approximately 170,000 jobs in Norfolk, Essex and Suffolk in and contributes almost £9 billion pounds to the regional economy.

County / Unitary Authority	Year	Jobs	Estimated Value
Norfolk[81]	2017	65,398 jobs (18% of all employment)	£3.245 billion
Essex[82]	2017	64,649 jobs (9% of all employment)	£3.316 billion

[75] https://www.scottishpowerrenewables.com/pages/east_anglia_one_north.aspx
[76] https://www.scottishpowerrenewables.com/pages/east_anglia_two.aspx
[77] https://www.scottishpowerrenewables.com/pages/east_anglia_three.aspx
[78] https://corporate.vattenfall.co.uk/projects/wind-energy-projects/vattenfall-in-norfolk/norfolkvanguard/about-the-project/
[79] https://corporate.vattenfall.co.uk/projects/wind-energy-projects/vattenfall-in-norfolk/norfolkvanguard/about-the-project/
[80] https://hornseaproject3.co.uk/en/About-the-Project#0
[81] Economic Impact of Tourism 2017 Results – Norfolk, Visit Norfolk, 2017
[82] Economic Impact of Tourism 2017 Results – Essex, Visit Essex, 2017

Suffolk[83]	-	38,369 jobs (12.3% of all employment)	£2 billion

8.4.2. Coastal communities are an important part of the leisure and tourism economy in the Transport East region and provide a substantial tourism offering. Destinations include: the North Norfolk Coast (Wells-next-the-Sea, Blakeney, Sheringham, Cromer and Great Yarmouth), Suffolk Coast (Lowestoft, Southwold and Aldeborough), Essex coast (Walton-on-the-Naze, Frinton-on-Sea, Clacton-on-Sea) and Southend-on-Sea. The region also benefits from the Broads National Park and several Areas of Outstanding Natural Beauty. The visitor and tourism economy is particularly important to Norfolk, accounting for 18% of all employment in the county.

8.4.3. A combination of holiday makers and day trippers puts substantial seasonal strains on the main road corridors to the coast. Seasonal congestion occurs along the A10 corridor and A149 corridors to Kings Lynn and towards the Norfolk coast and along the A148/A49 corridor to Cromer and the A140 from Norwich to Cromer. The A12 corridor provides direct access to the Suffolk Coast including Aldeburgh, Southwold and Lowestoft. There are significant increases in traffic using the A12 corridor in the summer. The A127 towards Southend-on-Sea also experiences substantial increases in flows during peak seasonal periods.

8.5 STRATEGIC TRANSPORT ISSUES EFFECTING THE FUTURE GROWTH AND SUCCESS OF COSTAL COMMUNITIES

8.5.1. The largest coastal communities in the Transport East Region are:

- Great Yarmouth
- Lowestoft
- Clacton-on-Sea
- Southend-on-Sea

8.5.2. The strategic transport issues effecting the future growth and success of the largest coastal communities in the Transport East region is discussed below.

GREAT YARMOUTH

- The A47 provides strategic east-west connectivity to / from Great Yarmouth by road. Between Acle and Great Yarmouth the A47 is single carriageway with at-grade junctions. This results in significant delay at peak times on approach to Great Yarmouth.
- North South connectivity is provided by the A47 toward Great Yarmouth and A143 towards Beccles.
- Great Yarmouth station has a typical service frequency of one train per hour. This has the potential to be unattractive to commuters in the off-shore energy sector who require more flexibility.

[83] https://www.visiteastofengland.com/explore/Suffolk.aspx

LOWESTOFT

- Strategic connectivity to Lowestoft is via the A47
- Lowestoft station has a typical service frequency of one train per hour to / from Ipswich and one train per hour to / from Norwich. This has the potential to be unattractive to commuters in the offshore energy sector who require more flexibility.

CLACTON-ON-SEA

- Strategic connectivity to Clacton-on-Sea is via the A133. This is a single carriageway road that connects with the A120 (dual carriageway) east of Colchester. The roundabout at the junction of the A120 / A133 is a pinch-point leading to significant delay and congestion, particularly on the A120 southbound approach in the PM Peak.
- Lowestoft station has a typical service frequency of one train per hour. This has the potential to be unattractive to commuters in the offshore energy sector who require more flexibility. However, the service does provide direct connectivity to Colchester, Chelmsford and London Liverpool Street.

SOUTHEND-ON-SEA

- The A127 and A13 are major pinch points on the MRN. Journey times along these links are significantly slower than overnight “free-flow” conditions.
- Southend-on-Sea has good rail connectivity (via Great Eastern Mainline and Essex Thameside line), providing direct rail connections to London, Thurrock and Essex offering attractive alternative to the car for workers and visitors travelling to / from Southend-on-Sea.

8.5.3. Improvements to the strategic transport connectivity can provide a number of benefits to coastal communities, including improving access to skills and employment, support the visitor and green energy economy and attract inward investment. Improvements to the road and rail corridors need to be combined with local improvements to sustainable travel options to encourage modal shift.

8.6 SUMMARY

- Great Yarmouth and Lowestoft are two of the **leading centres for offshore wind energy** in the UK.
- The **leisure and tourism sector is an important part of Transport East’s Economy** supporting 170,000 jobs in Essex, Suffolk and Norfolk and contributing almost £9 billion.
- The largest coastal communities in the Transport East region (Great Yarmouth, Lowestoft, Clacton-on-Sea and Southend-on-Sea) have **poor connectivity to the MRN and SRN**, with significant delay and congestion observed at peak time along corridors that connect these settlements.
- **Many of the largest coastal communities in the Transport East region have poor rail connectivity**, with slower journey times than by car and typical off-peak frequencies of one train per hour.

9 ANTICIPATING THE FUTURE

9.1 OVERVIEW

9.1.1. Transport is a means to an end, it connects people with places and the things they need to do, raw materials to manufacturers, and goods to market. For the last 60 years, traditional transport planning methods have been focussed on the 'commuting' peak, with the network designed and built around private vehicles powered by internal combustion engines. However, the way people and organisations access and use transport is undergoing change.

9.1.2. Over the last twenty years we have seen the explosion of digital technologies, opening new opportunities, new ways of doing things, creating new business opportunities, and, coupled with air quality concerns and a move towards a low carbon agenda, has led to some significant advances.

9.1.3. Arguably the transportation sector has been late to the digitisation agenda but it is now clear that considerable changes are anticipated over the coming decades which will impact every aspect of how people engage with and access their mobility needs, needs which in turn serve society and the wider economy.

9.1.4. These changes are not happening in isolation, they are influenced by wider global trends and disruptors which are in turn influenced, in, part by the transportation response to them. It is this complex set of interactions that underpins technological and associated economic change and growth.

9.1.5. Transport and mobility is at the genesis of a revolution that provides an unprecedented opportunity to allow for a wider consideration of land use, activity and mobility needs - all within the context of enabling economic growth across the Transport East region. Planning for people's needs, rather than just traditional transportation modes provides for an integrated approach. At the heart of this is a fundamental assumption that transport / mobility (in all its guises) is an economic enabler facilitating thriving communities, citizens and commerce.

9.1.6. Although we are already seeing the impact of these key changes today – for example, the adoption of electric vehicles and the take up of ride-sharing platforms - we are still in the early stages of the 'mobility revolution'. Despite identifying the 'key changes', no one knows exactly what transport and mobility will look like in 10, 20 or 30 years plus – creating uncertainty for those making decisions about tomorrow based on the transport network of today – but we can be certain that transport and mobility is changing rapidly and those changes are observable today.

9.1.7. It is impossible to predict with any degree of certainty when and where these changes will first occur, whether they will ultimately be successful and how long they will take to become the norm. What is clear though is that significant amounts of investment are being made in both the private and public sectors to examine the potential impacts, challenges and opportunities so that networks and services are 'future ready'.

9.1.8. As a first step towards managing this uncertainty, this chapter sets out future mobility trends as a foundation towards developing a Future Ready approach towards mobility for the Transport East region.

9.2 POLICY ON THE FUTURE OF MOBILITY

9.2.1. Table 9-1 provides a summary of the key national policy and strategy developments relating to the future of mobility.

Table 9-1 – National Overview of Policy and Strategy Developments

Item	Summary
Future of Mobility: Urban Strategy – Department of Transport (2019)	The 'Future of mobility: urban strategy' outlines the government's approach to maximising the benefits from transport innovation in cities and towns. It sets out the nine principles that will guide government's response to emerging transport technologies and business models. The document also presents the 6 high-level 'key changes' that are fuelling the evolution of transport, which are: cleaner transport, new modes, data & connectivity, new business models, automation, changing attitudes.
Mobility as a Service, Transport Committee (4th March 2019)	In November 2017, the Transport Committee launched an inquiry into the 'transformative potential of integrated, multi-mode MaaS apps and overcoming barriers to implementation in UK cities and regions'. Following the inquiry, the report was published in March 2019 and highlights why it could be important and is worth investing time and effort to understand; and clarifies the Department for Transport's (DfT) role in shaping its development in the UK.
Strategic Business Plan 2019-2024, Network Rail (February 2018)	The report presents the plan for Britain's railways between 2018 and 2024, with the focus on improving collaborative working between track and train through shared targets and priorities. The plan for Britain's railways is built around four key themes; safety, reliability, efficiency and growth and highlights that the application of new technologies will be employed as a method of enhancing these key responsibilities. The plan highlights that R&D spend on technology in the rail industry is at the lower end of the scale compared to other sectors, however that Network Rail are committed to transforming the Britain's railways to 'reap the benefits from emerging trends in automation, intelligent mobility and mobility as a service'. £440m is forecast to be spent on internal research and development activity which will be matched by third party funding and the result will feed into major industry programmes e.g. Digital Railway.
Regulatory Review for Autonomous Vehicles, Law Commission (March 2018 & June 2019)	As part of the Future Mobility Grand Challenge, the Government commissioned a three-year detailed review of driving laws to ensure the UK continues to offer a conducive environment for developing, testing and driving connected and autonomous vehicles. The review aims to examine any legal obstacles to the widespread introduction of self-driving vehicles and identify where reforms may be required. A preliminary report from the initial stakeholder consultation provides analysis of 178 responses received as part of the process. These responses will form part of the final recommendations published in 2021, but some immediate steps have been identified for the Government to implement, including: ¡ Identification of how to establish a safety assurance scheme ¡ Consideration of establishing a forum for collaboration on the application of road rules to self-driving vehicles
Call for Evidence on Maritime 2050, Department for Transport (March 2018)	The Government ran a consultation on 'Maritime 2050' between March-May 2019, which is a long-term strategy to secure the future of the UK Maritime sector. The report acknowledges that disruptive technologies have the potential to threaten the UK's position as a leading maritime nation and therefore a long-term strategy is essential. The results from the consultation are expected sometime in 2019.

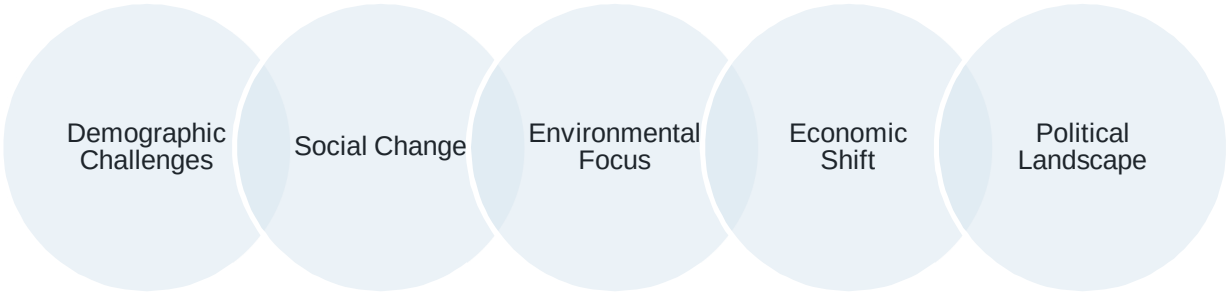
Item	Summary
Mayor's Transport Strategy, Greater London Authority (March 2018)	Whilst not within the region covered by this evidence base, the London Mayor's Transport Strategy is likely to be influential in shaping transport strategy outside of London. The strategy's primary aim for 80% of all trips in London to be made on foot, by cycle or using public transport by 2041. The strategy acknowledges that engaging with trends such as 'new economic models based on shared access rather than private ownership will continue to evolve and new technologies and increasing digital connectivity' is essential.
Beyond the Horizon: The Future of UK Aviation, HM Government (April 2018)	The report outlines that the aim of the new aviation strategy is to achieve a safe, secure and sustainable aviation sector, outlining six objectives in detail. New and emerging technologies are identified as a means of addressing some of the challenges facing the sector such as empowering passengers through information at all stages of their journey, minimising delays at borders, developing innovative solutions for aviation security, encourage data sharing between aviation sector organisations and advancing automation and electrification of aircraft. The strategy will focus on: ¡ developing a partnership for sustainable growth which meets rising passenger demand, balanced with action to reduce environmental and community impacts ¡ improving the passenger experience, including through technology and innovation, a new passenger charter and action to reduce delays at the border ¡ building on the UK's success to establish new connections across the world and create greater choice for consumers The consultation period has been extended until July 2019, with a final white paper version of the aviation strategy published in the second half of 2019.
Digital Rail Strategy, Network Rail (April 2018)	Digital Railway is the proposal for the UK to adopt modern digital signalling and train control within the next 25 years and create credible options to upgrade the railway to next generation technology as it becomes available. The programme itself is enabling the delivery of benefits to the industry by embedding new technologies and operational methods to enable greater integration across track and train operations. In terms of future mobility, the Digital Railway Strategy refers mainly to the introduction of interventions relating to enhancing connectivity and increasing automation on Britain's railways. With regards to the progress of the transformation and the extent of the technology implementation and associated outcomes, the programme is currently still in the preliminary stages of delivery, with an ongoing commitment to learning lessons from select projects. This is despite that fact that the Digital Railway Programme has been in existence in various forms for over 15 years. For example, the report recounts that 'sound progress' has been made in fitting trains with some digital capability (ETCS in-cab equipment) such as on the Cambrian Line but that the transition from location-specific signalling to an integrated whole-system is a complicated endeavour.
Four Grand Challenges within the Industrial Strategy, Department for Business, Energy and Industrial Strategy (June 2018)	The 'Future of Mobility' Grand Challenge outlined in the Industrial Strategy outlines the Government objective to keep the UK at the forefront of transport innovation, stating that 'we will become a world leader in the way people, goods and services move'. Opportunities to dramatically reduce congestion, carbon emissions, improve customer experience, drive efficiency and enable access for all through innovation in engineering, technology and business models will be encouraged by a flexible regulatory framework, testbed funding and research & development investment.

Item	Summary
Response to Call for Evidence: The Last Mile, Department of Transport (March 2019)	The Last Mile' call for evidence was also launched in July 2018. The call aimed to ascertain evidence on the opportunities available to deliver goods more sustainably as well as some of the barriers. The DfT published its response in March 2019. The main success factors highlighted by respondents were: ¡ The use of incentives for the purchase of electric vehicles and e-cargo bikes ¡ Adopting a strategic and holistic approach to last mile deliveries and ensuring an appropriate regulatory regime was in place ¡ Co-operation and partnership working both between local bodies to share lessons and between local bodies and logistics operators to align infrastructure and encourage the sharing of facilities such as micro distribution hubs.
National Infrastructure Assessment, National Infrastructure Commission (July 2018)	The report makes recommendations on the infrastructure needs and priorities of the UK. In relation to the future of mobility, the commission commends the Government for positioning the UK as a leader of connected and autonomous vehicle innovation however recommends that 'the implications of technological innovation in long term transport planning processes' are addressed.
Road to Zero, Department for Transport (July 2018)	The Government outlined its ambition to see at least 50% of new cars and 40% of new vans to be ultra-low emission by 2030 and end the sale of new conventional petrol and diesel cars and vans by 2040. The strategy also sets out plans to enable massive expansion of green infrastructure and reduce extant vehicle emissions to help the government achieve elements of the Industrial Strategy.
Draft Road Investment Strategy 2: Government Objectives, Department for Transport (October 2018)	The Draft RIS2 Government Objectives publication states that the SRN needs to be able to accommodate today's demands but also those in the future and that the UK can become a world leader in responding to and implementing technological developments. The report recognises that Highways England has already responded to the increasing digitisation of society 'with a combination of innovation and flexibility' but also outlines some objectives to continue this preparation for technological change including: ¡ 'Be empowered to develop the infrastructure standards of the connected and autonomous era, by identifying how new technology can be effectively rolled out across the network in a way that is both safe and speedy. ¡ Supporting vehicle manufacturers as they work to create the right flows of data and information to and from connected and autonomous vehicles. ¡ Making smart motorways suitable for regular use by automated vehicles as soon as possible in RP2, to meet the Government's ambition to see fully self-driving cars, without a human operator, on UK roads by 2021. ¡ Making all-purpose trunk roads suitable for regular use by automated vehicles without the need for major upgrades to their physical infrastructure. ¡ Creating guidance or standards that local authorities can use to bring autonomy to their network. ¡ Continue with existing provision of data, and ensure an open architecture that allows software developers to provide users with new services.'
Technology and RIS2, Department for Transport (October 2018)	The paper discusses several developments in technology that affect mobility, stressing that the resulting policy environment is highly uncertain and that this uncertainty will persist despite championing research in the area. The report also highlights the importance on being flexible and setting a vision, with a focus on outcomes. Key technology developments outlined in the report are grouped into five key areas: ¡ Connectivity – The number and capabilities of connected vehicles is expected to grow rapidly; however, it is not yet clear which applications will prove. ¡ Automation – Sophisticated driver assistance car features are already emerging and 'most observers now accept that the technology required to deliver fully automated vehicles is achievable'.

Item	Summary
	¡ Sharing – The report recognises that there has been a rise in new shared-access mobility models, such as dockless bikes, which have been enabled by digital innovations and highlights how planners are beginning to investigate potential implications on road utilisation and layout of a more widespread shift from private vehicles to shared transport. ¡ Electrification & Alternative Fuels – Already several types of electric vehicles are on the market and there is debate surrounding which will prove to be the most effective, with different OEMs backing different technologies. ¡ Business Models - There has been advances in payment mechanisms with a general move away from cash, in addition to digitally enabled shared access business models and device enabled applications providing real-time information.
Taking Flight: The Future of Drones in the UK Government Response, Department for Transport (January 2019)	The Government ran a consultation between July - September to develop policy and regulation surrounding drones and other unmanned aircraft to foster responsible usage. Government action to date on drones has included updates to the Air Navigation Order (ANO) and Aviation & Maritime Security Act stating that a person much not use a device to endanger people or operations, height and aerodrome restrictions, drone size requirements which require Civil Aviation Authority (CAA) registration, product standards enhancement and development of geo-fencing capabilities and data availability.
Clean Air Strategy, Department for Environment, Food and Rural Affairs (January 2019)	The report outlines the UK strategy to tackle sources of air pollution and reduce emissions, highlighting how the priority has shifted from large individual sources of pollution to the contribution of smaller, more diffused sources of air pollution. The report complements the Industrial Strategy, the Clean Growth Strategy and the 25 Year Environment Plan and will be underpinned by new England-wide legislation and local powers. The report highlights the key role that transport must play in reducing emissions, with the sector (inclusive of road transport, domestic shipping, aviation and rail) currently being responsible for 50% of nitrogen oxides, 16% of fine particulate matter (PM2.5) and 5% of non-methane volatile organic compounds (NMVOCs). Below are the policy perspectives from the report: ¡ Consider transport as a system, rather than loosely connected modes. ¡ Consider the wider objectives that the transport system can help to achieve. ¡ Outline a clear long-term national vision and goals that are mindful of diverse local priorities. ¡ Understand that geography is key to ensuring outcomes are practical at local and regional levels. ¡ Examine the challenges and opportunities by rural areas. ¡ Integrate passenger transport with freight, alongside housing priorities, when making planning decisions. ¡ Use a scenarios approach to explore different futures, identify opportunities, and help mitigate the unintended consequences of new transport modes, technologies and/or trends. ¡ Use both hard and soft measures to achieve the scale of change needed. ¡ Consider the impacts of future technologies on revenues and costs. ¡ Consider prioritising walking and cycling when allocating land use for transport, to promote wider social benefits.

9.3 MEGA TRENDS

9.3.1. The access and mobility needs of our society are increasingly influenced by several mega trends that are shaping many aspects of society, which in turn influence how, when, and where people will need to travel. These can be broadly categorised as follows:



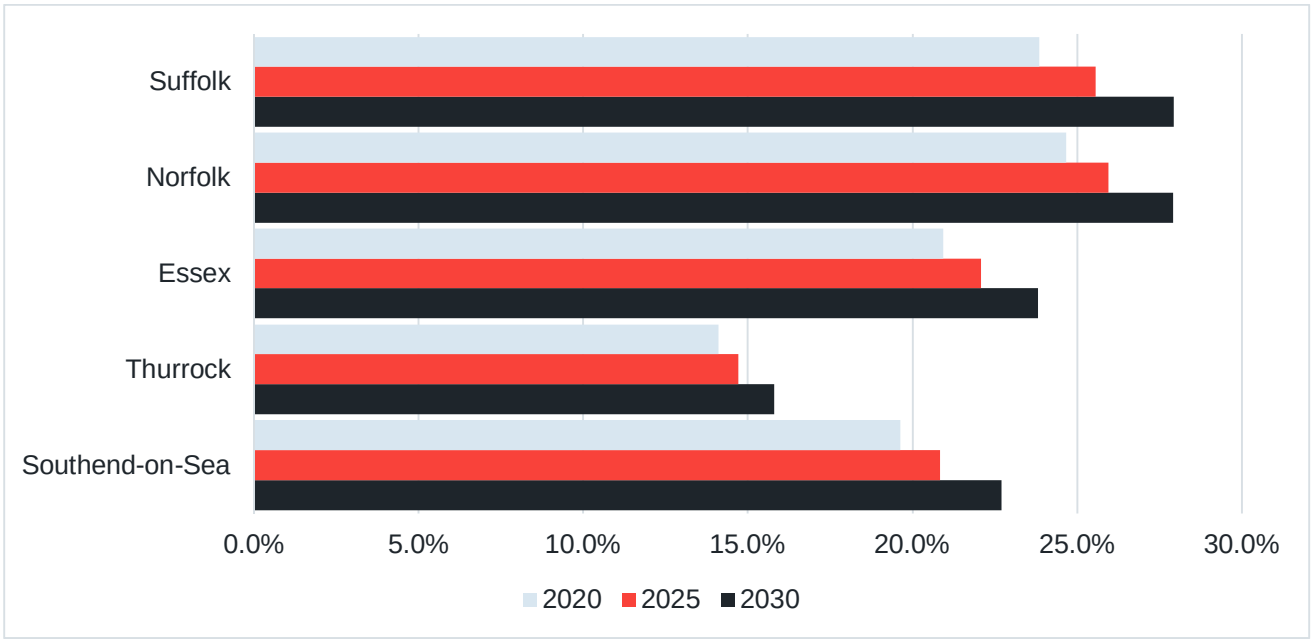
DEMOGRAPHIC CHALLENGES

Growing & Ageing Population: An increasingly ageing population will have different transport needs and expectations (Emerging)

9.3.2. Across the UK our population is growing and indications from ONS data is that it is ageing. In 2019 the over-65 population resident in the Transport East region is predicted to account for 22% of the population (based on the 2011 census), however by 2030 this is set to increase to 25.3%.

9.3.3. The extent of this trend however is not homogenous across the region as illustrated by Figure 9-1 which shows the proportion of the population expected to be aged above 65 in 2020, 2025 and 2030.

Figure 9-1 – Percentage of population aged over 65 in 2020, 2025 and 2030 in Transport East Local Authorities



Source: ONS 2016-based subnational population projections for local authorities and higher administrative areas in England

9.3.4. The populations of Norfolk and Suffolk are predicted to have the highest proportion of residents over 65 by 2030 in the Transport East region, with approximately 28% of the population in both areas to be more than 65 years old in this timeframe. Contrastingly only 15.8% of Thurrock's population is predicted to be aged over 65 in 2030.

9.3.5. All areas in the Transport East region are predicted to observe an increase of between 1% and 4.5% in the proportion of over 65-year olds as a proportion of their populations compared to proportions in 2019 (with Suffolk at the top end).

Potential Impacts

An ageing population will have different expectations and needs of all modes of transport and we will have to consider their vulnerability in design and other assumptions. For instance:

- It could change travel patterns; with more people retired it could lead to fewer journeys being undertaken at peak times.
- It could change where people are travelling to; with fewer people in employment it may reduce demand on transport corridors connecting major centres of employment.
- It could increase pressure on strategic public transport; older people may be more reluctant to drive or own a car.

Aging Economically Active Population: Increasing retirement age and taking on larger financial burdens later in life means that people will need to work for longer (Emerging)

9.3.6. By 2020, the retirement age for both men and women, will be 66 and this is planned to increase to 67 by 2028 and to 68 by 2039, thus delaying the age at which individuals can claim their state pension.

9.3.7. Additionally, people in the UK are increasingly having to take on larger financial burdens as housing affordability reduces for first-time house buyers. In some local authorities, an average first-time buyer spent more than five times their income on buying a property with a mortgage in 2017, compared to the increasing national average of 4.3 times. [84] Subsequently in 2017, the average age of someone buying their first home in the UK was 30 years old, seven years older than the 1960s. [85]

[84] Office for National Statistics (2017). *First-time buyer housing affordability in England and Wales - Office for National Statistics*. [online] Ons.gov.uk. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/housing/articles/firsttimebuyerhousingaffordabilityinenglandandwales/2017 [Accessed 3 Jan. 2019].
[85] UK Finance (2017). *UK and Irish Housing Markets: A First-Time Buyer Perspective*. [online] London. Available at: https://www.cml.org.uk/news/cml-research/uk-and-irish-housing-markets-a-first-time-buyer-perspective/ [Accessed 3 Jan. 2019].

9.3.8. Longer mortgage terms are also becoming increasingly popular, with 60% of first-time buyers choosing mortgages longer than 25 years which is double the proportion of a decade ago.[86] Consequently, this could mean homeowners are paying off mortgages till a later age and therefore need to continue working for longer to do so. Mortgage debt held by 65 years olds in turn is projected to nearly double by 2030 from 2014 levels.[87]

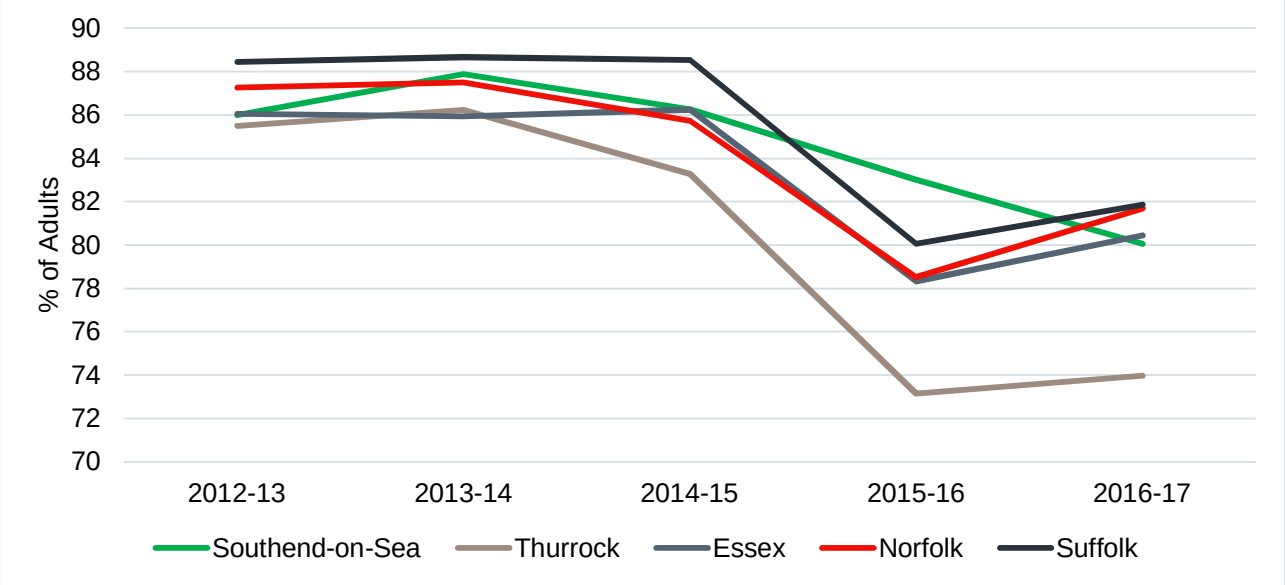
Potential Impacts

An increasingly financially burdened ageing population who still need to commute to work, will have different expectations and needs of all modes of transport and we will have to consider their vulnerability in design and other assumptions.

Health & Wellbeing: Less people are undertaking physical activity and many are suffering ill effects of an unhealthy, inactive lifestyle (Emerging)

9.3.9. It has been suggested that a combination of factors is leading to a reduction in walking and cycling in some areas. The Figure 9-2 illustrates the proportion of adults in Transport East Local Authorities who walk or cycle at least once a month between the years 2012-2017, and confirms that this trend is present in the region, although not homogenously.

Figure 9-2 – Percentage of adults who walk or cycle at least once a month in Transport East Local Authorities



Source: Department for Transport, Table CW0301, 2012-2017

[86] Pickford, J. (2016). *Mortgage terms lengthen as house prices rise | Financial Times*. [online] Ft.com. Available at: https://www.ft.com/content/eefcc9aa-11e7-11e6-91da-096d89bd2173 [Accessed 10 Jan. 2019].
[87] Intermediary Mortgage Lenders Association (2018). *Bridging the gap: Developments in later life lending to an ageing population*. [online] Available at: http://www.imla.org.uk/resources/publications/imla-white-paper-developments-in-later-life-lending.pdf [Accessed 10 Jan. 2019].

9.3.10. All Local Authorities in the Transport East area have seen a reduced level of walking and cycling activity in their adult populations between 2012-2017 with Thurrock reporting the biggest decrease of 11.5% followed by Suffolk of 6.6%.[88] [89]

9.3.11. Declining levels of walking and cycling, coupled with concerns over obesity levels, which has increased from 15% of the UK population to 26% since 1993, has led to an increased focus on growing active travel.[90]

> **Potential Impacts**
>
> An increasing reliance of motorised transport, even for shorter trips, could lead to the danger of widespread 'fitlessness' and increased car dependency. Conversely there is a trend towards the 'quantified self' with people measuring their daily steps, miles cycled and calories consumed as part of an interest in maintaining a healthier lifestyle.

Loneliness: Increasing numbers of people, across all ages and socio-economic groups, are living alone with adverse effects (Emerging)

9.3.12. The impacts of loneliness, particularly in the elderly, is beginning to be understood. Isolation from family and community can result in poor mental and physical health, with studies indicating that lonely people are more likely to suffer from dementia, heart disease and depression.[91] Loneliness, living alone and poor social connections are as bad for your health as smoking 15 cigarettes a day[92].

9.3.13. A study by The Co-op and the British Red Cross reveals over nine million people in the UK across all adult ages – more than the population of London – are either always or often lonely.[93] A recent survey by the British Red Cross found that 51% of adults feel lonely always, often or sometimes, highlighting that it's not only older people who feel isolated at times.[94]

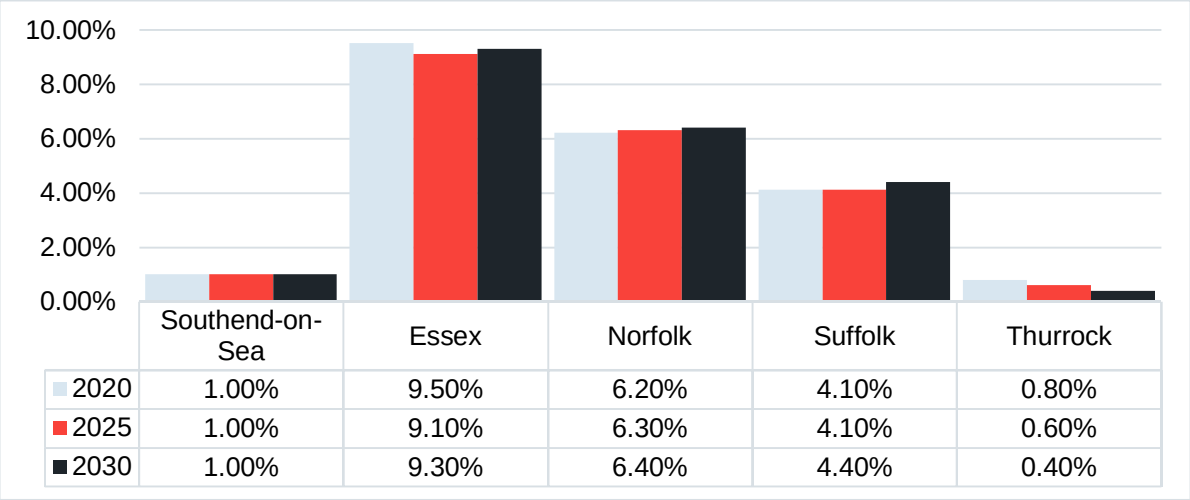
> **Potential Impacts**
>
> Severance in communities can also lead to physical isolation. Driven by concerns over an increasing ageing population, the needs of the lonely (of all ages) will need to be addressed through the changes to the built environment and with specific mobility interventions.

[88] Department for Transport (2014). *Local area walking and cycling in England: 2014 to 2015*. [online] GOV.UK. Available at: https://www.gov.uk/government/statistics/local-area-walking-and-cycling-in-england-2014-to-2015 [Accessed 11 Jan. 2019].
[89] Department for Transport (2017). *Walking and cycling statistics, England: 2017*. [online] GOV.UK. Available at: https://www.gov.uk/government/statistics/walking-and-cycling-statistics-england-2017 [Accessed 4 Jan. 2019].
[90] Baker, C. (2018). Briefing Paper: Obesity Statistics. London: House of Commons Library.
[91] Valtorta, N., Kanaan, M., Gilbody, S., Ronzi, S. and Hanratty, B. (2016). Loneliness and social isolation as risk factors for coronary heart disease and stroke: systematic review and meta-analysis of longitudinal observational studies. Heart, [online] 102(13), pp.1009-1016. Available at: https://www.ncbi.nlm.nih.gov/pubmed/27091846 [Accessed 7 Dec. 2018].
[92] Campaign to End Loneliness accessed at: https://www.campaigntoendloneliness.org/the-facts-on-loneliness/ [Accessed on 05/06/2019]
[93] Campaign to End Loneliness accessed at: https://www.campaigntoendloneliness.org/the-facts-on-loneliness/ [Accessed on 05/06/2019]
[94] Tijou-Smith, B. (2018). *Alarming figures highlight loneliness in the South East*. [online] UNIfied News. Available at: https://unified.org.uk/2018/12/south-east-loneliness-figures-released/ [Accessed 10 Dec. 2018].

Net Migration: Net migration will continue to fluctuate, region by region, conurbation to conurbation (established)

9.3.14. In recent years, the population of the East of England has been shaped by net in-migration from within the UK as well as from abroad. ONS data predicts this net migration to the Transport East region will continue, with populations increasing by 6.4% between 2020 and 2030 due to positive net migration.[95]

Figure 9-3 – Net Migration in 2020, 2025 and 2030 as components of total population in Transport East Local Authorities



	Southend-on-Sea	Essex	Norfolk	Suffolk	Thurrock
2020	1.00%	9.50%	6.20%	4.10%	0.80%
2025	1.00%	9.10%	6.30%	4.10%	0.60%
2030	1.00%	9.30%	6.40%	4.40%	0.40%

Source: ONS Table 5: 2016-based subnational population projections with components of change (births, deaths and migration) for local authorities and higher administrative areas in England

9.3.15. Figure 9-3 shows that net migration as a proportion of total population change in the region is predicted to remain constant up to 2030. Proportions, however, do vary across the Transport East region, with approximately 9% of population change attributable to net migration in Essex, but in Thurrock this component is predicted to be less than 1% and is on the decline.

Potential Impacts

Ongoing political uncertainty could see this change with impacts in certain towns and cities where migrant labour has been relied upon. These changes may have impacts upon labour markets and associated mobility needs particularly where cost is a key driver.[96]

[95] Analysis using: Office for National Statistics (2018). *Population projections incorporating births, deaths and migration for regions and local authorities: Table 5*. [online] Ons.gov.uk. Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationprojections/datasets/componentsofchangebirthsdeathsandmigrationforregionsandlocalauthoritiesinenglandtable5 [Accessed 11 Jan. 2019].

[96] Nygaard, C. and Francis-Brophy, E. (2014). Profile of migrant labour in the South East of England: skills, industry and occupation. [online] Reading: University of Reading. Available at: https://www.secouncils.gov.uk/wp-content/uploads/2012/04/web-exec-SESPM-Report-Skills-industry-and-occupation-of-migrant-labour-in-the-SE.pdf [Accessed 10 Dec. 2018].

Urbanisation: Cities are growing at a rapid pace (Emerging)

9.3.16. Residential populations are growing at a rapid pace. It is reported that the population growth of city regions across the UK has grown by 885,000 or 3.4% between 2011 and 2015[97]. Sixty-seven percent of this increase is apportioned to net migration, with the remaining 33% reported as related to births and deaths. The data suggests that this this expansion is generally driven by younger people.

> **Potential Impacts**
>
> This trend will likely have positive impacts for both daytime and night-time economies, but will put pressures upon services and infrastructure, such as healthcare, data networks and emergency services. A growing resident population place greater demand and pressure on a future transport network as more and more people look to utilise the network.

Social Inequality: Still exists within and between areas (established)

9.3.17. The investment in, and expansion of cities centres, has put pressure on smaller conurbations as well as less desirable areas within city centres and city regions. Social inequalities impact transport choices with a dependency on traditional public transport modes even though costs may represent a large portion or expenditure.

9.3.18. There is also an argument that the dawn of smart technologies and the requirement for new energy infrastructure has the potential to polarise areas further. Research by Localis highlights that despite smart technologies having the potential to result in more equitable outcomes for all (e.g. predicting energy use and bills), those people in higher income areas could be more willing and able to invest in smart technologies, in turn encouraging wider area re-investment in energy infrastructure. Thus, the location of upgrades to energy distribution networks could deepen existing socio-economic differences if areas characteristics are not considered.[98]

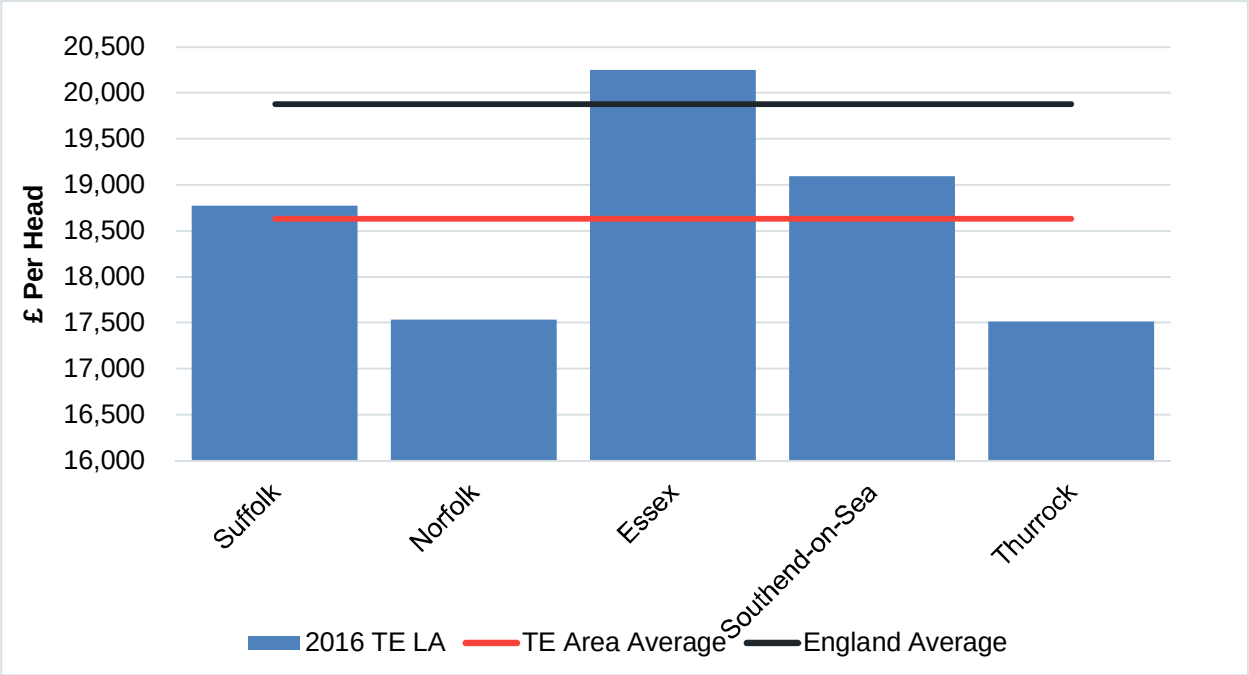
9.3.19. Figure 9-4 shows the gross disposable income per person in Transport East region in 2016 and indicates that the average disposable income per person is lower than the England average of £19,878 at £18,630. The average gross disposable income per person in Essex is above the English average at £20,249, but individuals in Suffolk, Southend-On-Sea, Thurrock and Norfolk have less disposable income on average than the English average.[99]

[97] ONS Data Accessed on 01/07/2019 Available at: https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/articles/populationdynamicsofukcityregionssincemid2011/2016-10-11

[98] Localis (2019). *Smart Cities: Fair Investment for Sustainable Growth*. [online] London: Localis. Available at: http://www.localis.org.uk/wp-content/uploads/2019/01/026_SmartCities_WEBAWK.pdf [Accessed 11 Jan. 2019].

[99] Office for National Statistics (2016). *Regional gross disposable household income - Office for National Statistics*. [online] Ons.gov.uk. Available at: https://www.ons.gov.uk/economy/regionalaccounts/grossdisposablehouseholdincome/datasets/regionalgrossdisposablehouseholdincomegdhi [Accessed 11 Jan. 2019].

Figure 9-4 – 2016 Gross Disposable Household Income per person in Transport East Local Authorities



Source: ONS Regional gross disposable household income (GDHI)

Potential Impacts

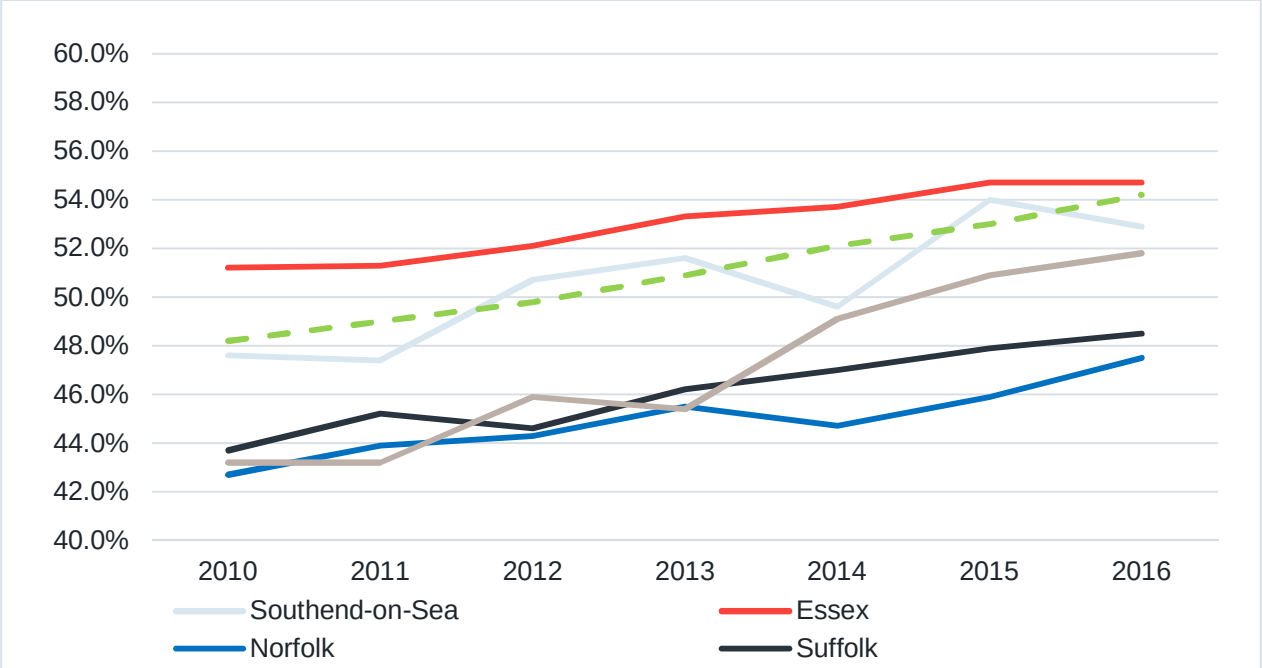
Certain individuals and communities could miss out on the benefits of developments in new technology and approaches relating to transport if the infrastructure is only rolled out reactively rather that proactively. Rather than provide a more equitable solution for all, this trend has the potential to deliver a less equitable situation for individuals and communities.

Changing Family Compositions: Motherhood is increasingly occurring later or not at all and competing with employment which is having impacts on family compositions, roles and intergenerational mixing (Emerging)

9.3.20. In 2017, the average age of mothers in UK was 30.5 years compared to 26.4 years in 1975. Several reasons for this increase in age have been cited, however an antiquated world of work and cost of childcare are reoccurring themes. Although the age of mothers in Transport East Local Authorities follows the upward national trend, with 51.1% of mothers aged 30 or older in 2016, this is below the UK average of 54.2%. ONS data shown in Figure 9-5 below shows that the trend is not uniform across the region, with 54.7% of mothers in Essex aged 30 or older in 2016, compared to 47.5% in Norfolk[100]

[100] Analysis using: Office for National Statistics (2016). *Births by parents' characteristics in England and Wales*. [online] Ons.gov.uk. Available at:

Figure 9-5 – Percentage of mothers aged 30+ in Transport East Local Authorities



Source: ONS Live births by mothers' usual area of residence

Potential Impacts

Future mobility offerings need to cater for these changing family configurations and norms. The trend has the potential to have a range of knock on effects if it continues across generations, altering the natural chronology of life and making extended families more fragile.[101] Childcare requirements for example could increase if grandparents are too elderly to help with childcare; at present 40% (5 million) of grandparents in the UK are estimated to provide regular childcare for their grandchildren.[102] This in turns risks reducing intergenerational mixing which itself has huge benefits for society, from helping to tackle poor health, loneliness and ageism and could place more pressure on mothers/fathers who may have to look after young children and elderly parents concurrently.[103]

In addition to the increasing age of mothers, the proportion of couples with children with only one adult in employment has halved from 47% to 27% between 1985 and 2015 in the UK, meaning is a decreasing proportion of stay-at-home parents and increasing the reliance of families on childcare services furthermore.[104]

ttps://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/bulletins/birthsbyparentscharacteristicsinenglandandwales/2016 [Accessed 11 Jan. 2019].

[101] Roberts, Y. (2018). *Late motherhood is on the rise, but as one who knows, it has its downsides | Yvonne Roberts*. [online] The Guardian. Available at: https://www.theguardian.com/commentisfree/2018/mar/31/late-motherhood-is-on-the-rise-but-as-one-who-knows-it-has-its-downsides [Accessed 14 Jan. 2019].

[102] Age UK (2017). *5 million grandparents take on childcare responsibilities | Latest news | Age UK*. [online] Ageuk.org.uk. Available at: https://www.ageuk.org.uk/latest-news/articles/2017/september/five-million-grandparents-take-on-childcare-responsibilities/ [Accessed 14 Jan. 2019].

[103] Coughlan, S. (2019). *Overstretched 'sandwich carers' trying to help parents and children*. [online] BBC News. Available at: https://www.bbc.co.uk/news/education-46866341 [Accessed 15 Jan. 2019].

[104] Institute for Fiscal Studies (2018). *The rise and rise of women's employment in the UK*. [online] Institute for Fiscal Studies. Available at: https://www.ifs.org.uk/uploads/BN234.pdf [Accessed 14 Jan. 2019].

SOCIAL CHALLENGES

Acceptance of 'sharing': Many people are increasingly happy to share assets and services if it is convenient and the price is right (Emerging)

9.3.21. The rise of shared, on demand transportation services such as bike hire, car hire, lift sharing and 'UberPool' type services have tapped into a willingness for people to share assets and services for financial benefit. There is evidence that there is a willingness to experiment with a number of these shared mobility services in the Transport East region, despite not having any performance statistics. This is demonstrated by the liftshare car sharing in Norfolk and Suffolk and Enterprise car club in Norwich, Dereham, Lowestoft and Wroxham, however other services such as 'UberPool' are not yet available, potentially a reflection of the market readiness or geographical feasibility in the area.

9.3.22. At a wider geographical scale, a global survey carried out by Dalia Research in 2017 documented that 30% of the UK population have used a mobility app to hail, rent or share a ride in some form.[105] Whilst some business models are in their infancy this willingness to 'access' rather than 'own' has the potential to dramatically reduce car dependency in certain conurbations in some use cases.

Potential Impacts

Sharing of mobility assets is likely to become essential for our future transport network to enable it to operate effectively and efficiently. For example, as the population and urbanisation increases – transport assets will need to be more efficient in terms of transporting people and goods. However, this does bring its own challenges – such as 'zero-occupancy' vehicles in the case of ride hailing services. Increased sharing will see a shift from individuals making transport decisions based on the transport they 'own', to individuals being able to make more flexible and on-demand decisions based on their requirements at the time of the journey. For example, an individual owning a small city car might choose to make all journeys using this mode to release the investment. However, the sharing economy could provide an opportunity to select the most appropriate travel mode for their journey type.

Expectation of 'immediacy' and always being 'on-demand': People want everything on-demand (Maturing)

9.3.23. With the rise of the internet and increasing levels of almost real-time consumption of everything from information to food, there is an increasing expectation for immediate access to products and services. Online sales for example, accounted for 21.5% of all UK retailing sales in November 2018, increasing from 19.9% in November 2017.[106]

9.3.24. This also translates to the workplace, where employees are more connected to their workplace than ever, with a growing expectation of being 'always available'.

[105] Dunn, J. (2017). Most people in America still don't use ride-hailing apps like Uber. [online] Business Insider. Available at: http://uk.businessinsider.com/uber-lyft-ride-hailing-apps-car-ownership-chart-2017-3 [Accessed 7 Dec. 2018].
[106] Office for National Statistics (2019). *Internet sales as a percentage of total retail sales (ratio) (%)*. [online] Ons.gov.uk. Available at: https://www.ons.gov.uk/businessindustryandtrade/retailindustry/timeseries/j4mc/drsi [Accessed 11 Jan. 2019].

Potential Impact

With 'Just Eat' and 'Deliveroo' type fast food deliveries and 'Amazon Prime' type 1-hour deliveries, there is potential for a myriad of extra transportation trips meeting demand. Whereas in the past, an individual might travel to a retail outlet and purchase many items at once, the on-demand and immediate culture means that it is possible for them to purchase and have them delivered separately – creating further trips. This trend is also seeing rise to the 'serial returner'[107] – where shoppers order multiple products to try at home, with a view to returning unwanted items later.

Although technology has brought about many workplace benefits such as physically freeing employees from desks, it has also brought with it the expectation of immediacy and always being 'available' to the workplace. A report by Deloitte highlights that technology eliminates the natural breaks employees would previously have taken during the workday and that the freedom given to employees by technology leads to the merging of work and leisure time and more working hours.[108]

'Customer' centricity: The customer is always right (Established)

9.3.28. Transportation has been late in recognising users of networks as customers but with the rise of feedback and sentiment analysis via social media (Twitter and Facebook) and other channels (such as the GrumpNow app), customers now have near real time relationships with network and service operators across all modes. The DfT has realised the benefits of real-time mapping at times of major incidents and disruption and has announced it is investing £10 million to create a real-time map of traffic congestion, however they will have to overcome the challenge of providing consistent information and messaging.[109] The Highways England Customer Strategy in turn aims to develop their relationship with customers through building strong dialogues with users and improving the quality of information reaching the customer through the provision of real-time traffic updates via channels such as the Variable Message Signs (VMS).[110]

Rise of the 'experience' economy: People are buying less 'stuff' but spending more doing things (Emerging)

9.3.29. Many retailers have described a shift from customers consuming products to more disposable income being spent on 'experiences'. This is resulting in a shift within our retail centres, towns and cities with a focus on leisure rather than shopping activities with an associated rise in food, drink and leisure activities.

[107] https://www.telegraph.co.uk/fashion/style/confessions-serial-returner-people-like-could-ruining-clothes/
[108] Chung, H. (2017). *Flexible working is making us work longer*. [online] Quartz. Available at: https://qz.com/765908/flexible-working-is-making-us-work-longer/ [Accessed 14 Jan. 2019].
[109] French, K. (2018). Drivers will beat traffic jams through new app which maps UK's most congested roads, minister vows. [online] The Telegraph. Available at: https://www.telegraph.co.uk/news/2018/09/01/drivers-will-beat-traffic-jams-new-app-maps-uks-congested-roads/ [Accessed 3 Jan. 2019].
[110] Highways England (2016). *Customer Service Strategy*. [online] London: Highways England. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/490538/S150470_Customer_Service_Strategy.pdf [Accessed 14 Jan. 2019].

9.3.30. As customers choose to spend their money on experiences, retailers have started to react. Some stores have started offering more immersive retail experiences, branded 'retailtainment' a mix of retail and entertainment, which aims to entice customers back into stores.[111] At Bluewater Shopping Centre in Kent for example, customers to the Virgin Holidays store can try premium class seats, use virtual reality to research holidays destinations and make use of the free 'Taste Your Holiday Bar'. Virgin executives maintain that people do not want to do everything online and by offering customers fun and unique in-store experiences, they do not only leave a store with a product or service but also a memory. A new trend called 'reverse showrooming' has also been cited to be benefiting stores, where customers research products and services online first before going into the shop to try products or receive tailored advice, challenging 'death of the high street' testimonies.[112]

> **Potential Impact**: The evolution of retail trends like those mentioned above, have the potential to disrupt transport networks if not monitored, whether that be through person trips or logistics, posing questions as to the extent to which people are content with buying online.

Need for Life-Long Learning: Changes in technology means a career for life may not exist (Emerging)

9.3.31. With rapid changes in digital technologies and automation there may be a need for learning to be undertaken throughout or at regular intervals during an elongated (due to trends described above) work life. Employees are increasingly aware of the rapidly changing, impermanent nature of jobs and the need to make oneself indispensable. A survey by Investec in turn found more than half of British employees were planning a career change in the next five years.[113] This may result in changes to how, when and where learning is undertaken with subsequent impacts upon digital and physical access.

9.3.32. Educational institutions are also expanding their course offerings to include courses focused on the changing mobility ecosystem such as 'Smart, Connected and Autonomous Vehicles (SCAV)' at the University of Warwick.

Trend to Simplicity: Real demand for cutting out the complexity and making it as easy as possible to carry out the essentials (Emerging)

9.3.33. New technologies are making it possible to reduce the complexity in products, services, procedures and communications. Consumers in turn are no longer willing to accept complexity, instead demanding transparency, simplicity and availability in everything. In the context of transport, new mobility business models, enabled by innovative digital technology, have challenged long-established transport players and are increasingly offering personal simplified user experiences.[114]

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[111] Storefront (2018). *7 Case Studies That Prove Experiential Retail Is The Future*. [online] Storefront. Available at: https://www.thestorefront.com/mag/7-case-studies-prove-experiential-retail-future/ [Accessed 14 Jan. 2019].
[112] Hemsley, S. (2018). *Why the high street is the home for holidays*. [online] The Telegraph. Available at: https://www.telegraph.co.uk/business/business-club/consumer-retail/in-store-shopping-experience/ [Accessed 14 Jan. 2019].
[113] Barrett, H. (2018). Plan for five careers in a lifetime. [online] Ft.com. Available at: https://www.ft.com/content/0151d2fe-868a-11e7-8bb1-5ba57d47eff7 [Accessed 7 Dec. 2018].
[114] Deloitte (2015). *Transport in the Digital Age: Disruptive Trends for Smart Mobility*. [online] London: Deloitte. Available at: https://www2.deloitte.com/content/dam/Deloitte/uk/Documents/bps/deloitte-uk-transport-digital-age.pdf [Accessed 15 Jan. 2019].

9.3.34. However, despite technology being able to offer access and simplification to many aspects of life, it has also been the source of a barrage of notifications and content that many people have deemed to clutter their daily existence. There is an increasing awareness of personal technology usage, fake news and privacy concerns amongst other issues that has led to growing numbers of people disconnecting and unsubscribing from the digital world.

9.3.35. Recent digital wellbeing updates to popular smartphone software reportedly surprised many by putting a numerical figure on the amount of time they spend on their phone, with the average British person checking their phone every 12 minutes. [115] Emerging mobility companies and organisations must in turn put human value at the forefront of their innovation so to develop 'technology with respect for users' time, attention and privacy'.

Potential impact

Digital wellbeing needs to be central in thinking around the future of mobility to make sure technology improves lives rather than distracting from, so to not inhibit the digital mobility revolution and the opportunities for society that come with it.[116]

ENVIRONMENTAL FOCUS

Climate Change: Climate change and associated weather events will increasingly impact the UK (Established)

9.3.36. Major weather events such as extreme heat waves and flooding impact the reliability and resilience of our digital, energy and transport networks and services. With a predicted increase in extreme weather events being attributed to climate change, impacts of events such as heatwaves on vulnerable areas are likely to be exacerbated.[117]

Potential Impact

If global temperatures rise by 2°C or less, the Committee on Climate Change predict between 700-1,000 more heat-related deaths annually in the East of England, many of which will be linked to the resilience of local infrastructure.[118] The relationship between weather and road, rail and air (high and low level) network operations is well established but designing-in resilience may be required to avoid disruptions and closures of key links or in those areas prone to flooding for example, not just during prolonged rainfall but at times of extreme events.

[115] Hymas, C. (2018). *A decade of smartphones: We now spend an entire day every week online*. [online] The Telegraph. Available at: https://www.telegraph.co.uk/news/2018/08/01/decade-smartphones-now-spend-entire-day-every-week-online/ [Accessed 14 Jan. 2019].
[116] Fjord Trends (2019). *Trends 2019*. [online] Accenture. Available at: https://trends.fjordnet.com/Trends_2019_download.pdf [Accessed 14 Jan. 2019].
[117] Bourke, I. (2018). A new age of extreme weather: the dangerous consequences of Britain's heatwave. [online] Newstatesman.com. Available at: https://www.newstatesman.com/politics/uk/2018/07/new-age-extreme-weather-dangerous-consequences-britain-s-heatwave [Accessed 3 Jan. 2019].
[118] Committee on Climate Change (2016). UK Climate Change Risk Assessment 2017. [online] London: Committee on Climate Change. Available at: https://www.theccc.org.uk/wp-content/uploads/2016/07/UK-CCRA-2017-Synthesis-Report-Committee-on-Climate-Change.pdf [Accessed 11 Dec. 2018].

Air Quality: Air quality is impacting urban areas and at key locations on the network (Established)

9.3.37. Road based transport is one of the biggest contributors to poor air quality, the recent opening of smart motorways demonstrates how increasing capacity and air quality demands currently compete. Emerging trends away from diesel and petrol propulsion (as seen through policy initiatives in places like Paris and London, the consideration of Low and Ultra Low Emission Zones, the phasing out of diesel rail vehicles and increasing levels of research into greener fuels and technologies for ships) coupled with commercially viable environmentally alternatives could see reductions start to occur as the fleet changes. Between August 2017-2018 there was a 32.6% increase in the number of electric vehicle registrations in the UK, indicating an increasing preference for alternative propulsion vehicles.[119]

9.3.38. Particulate emissions from non-exhaust sources resulting from the friction required for braking are also harmful to the environment and human health, and the UK is working with international partners to develop regulation for particulate emissions from tyres and brakes.

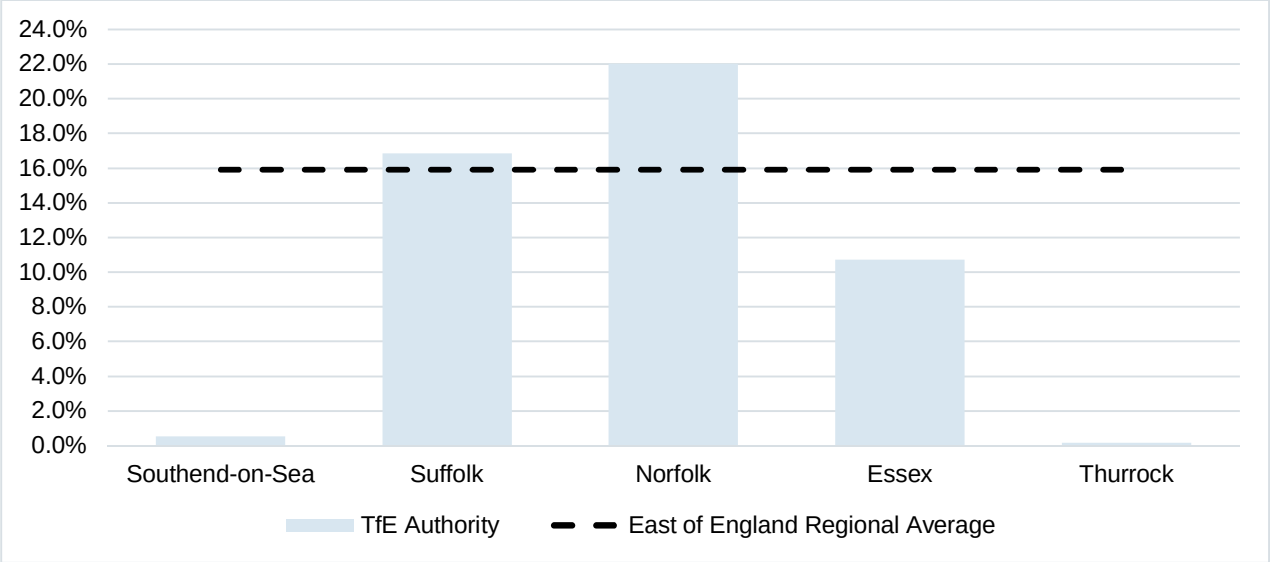
Role of Renewables: Wind, wave and solar power will reduce reliance on carbon derived fuels (Maturing)

9.3.39. Alternative forms of electricity generation, storage and consumption are undoubtedly having an impact on the energy market and whilst electric propulsion is commercially viable for cars and vans, small goods vehicle technology is in its infancy and HGVs even less developed. On the railways hybrid, battery and hydrogen technologies are being tested to supplement areas of electrification. Policy interventions such as planned bans on petrol and diesel road and rail vehicles will potentially accelerate renewable alternatives but growth will result in challenges to energy generation, storage and distribution networks. In 2016, the South-East region had the second highest renewable energy capacity in England and Wales, with the highest proportion of installed renewable capacity coming from solar photovoltaics.[120]

9.3.40. Approximately, 12.5% of the electricity consumed in local authorities in the Transport East region in 2016 was generated by renewable sources, with some authorities having larger proportions of the electricity consumption generated by renewables than others. Figure 9-6 shows that Suffolk and Norfolk exceed the average for the East of England, with 17% and 22% of consumed electricity generated by renewables respectively, in turn only 0.5% and 0.1% of electricity consumed in Southend-on-Sea and Thurrock is from renewable energy sources.

[119] SMMT. (2018). August - EV registrations. [online] Available at: https://www.smmt.co.uk/2018/09/august-ev-registrations/ [Accessed 7 Dec. 2018].
[120] Green Alliance (2016). Renewable Energy Locator. [online] Green Alliance. Available at: https://renewablelocator.green-alliance.org.uk/area/302 [Accessed 11 Dec. 2018].

Figure 9-6 – Percentage of Electricity Consumption that is from Renewable Sources



Source: https://renewablelocator.green-alliance.org.uk/

Scarcity of Resources: There won't be enough rare earth metals to sustain technological need (Emerging)

9.3.41. With the rise of smartphone and battery propulsion several commentators have speculated about the availability and cost of the constituent materials that are needed in new technology. A single Tesla for example, requires about 15lbs of lithium and, thin solar panels require tellurium which is one of the rarest elements on Earth.[121]

9.3.42. Many companies are examining their supply chains to allow for the repurposing of batteries and other items from heavy duty to lighter duties over their lifespans as well as the recycling and reclaiming of materials. Whilst such concerns aren't unique to the East they will influence supply and demand for new solutions.

Low carbon energy: Adoption of low carbon energy sources reduces reliance on other geographies (Emerging)

9.3.43. Since 2008, reducing the carbon emissions from electricity generation has been the focus of Government, picking up much of the burden for decarbonisation in the UK. The UK Committee on Climate Change in turn reports that progress in cutting emission in the transport, industry and buildings sectors however has effectively stalled.[122]

[121] Than, K. (2018). Critical minerals scarcity could threaten renewable energy future. [online] Stanford Earth. Available at: https://earth.stanford.edu/news/critical-minerals-scarcity-could-threaten-renewable-energy-future [Accessed 3 Jan, 2019].
[122] Committee on Climate Change (2018). *2018 Progress Report to Parliament*. Reducing UK Emissions. [online] London. Available at: https://www.theccc.org.uk/wp-content/uploads/2018/06/CCC-2018-Progress-Report-to-Parliament.pdf [Accessed 4 Jan. 2019].

9.3.44. A variety of low carbon energy sources for transportation are being developed, electric vehicles are described above, and hydrogen propulsion is also gaining interest and investment. Small Modular Reactors for example, similar in form to the nuclear reactors used to power submarines could power local communities and the technology is expected to be commercially available for construction within 10 years.[123] Decentralisation of power generation through the deployment of energy technologies for generation and storage has the potential to give public bodies, businesses and industry the opportunity to take control of their own energy use, possibly offering new revenue streams and boosting competitiveness.[124]

9.3.45. The Gyle Premier Inn, Edinburgh for example has a five-tonne lithium ion battery that is charged from the national grid in off-peak periods and powers the hotel for several hours during the day and is predicted to save £20,000 annually on its bills.[125] These alternative energy sources require changes to distribution infrastructure and delivery models which will impact mobility take-up and efficiencies.

ECONOMIC SHIFT

Rise of the 'gig' economy: People may have multiple jobs being paid for the tasks they undertake (Emerging)

9.3.46. Over recent years there has been a rise in the 'gig' economy where individuals are paid for the tasks they undertake rather than being traditionally 'salaried'. It is estimated that 2.8 million people in the UK currently work within it, 11% of which are in the East, the region with the second highest proportion behind London (24%).[126]

Data outlining the estimated proportion of adult employees working within the gig economy in each local authority however is not yet available. This shift, which is the subject of political challenge now, may result in increased trip making depending upon the location and type of 'gigs' undertaken. An obvious example is the rise in home shopping deliveries which are undertaken by white and 'grey' vans ('grey' being cars being used as vans) with drivers paid by the item. These single item short trips are impacting local areas, shifting what might have been walk, cycle or short car trips to commercial trips.

[123] Hicks, M. and Miller, J. (2018). Small Modular Nuclear Reactors. PostNote. [online] London: Houses of Parliament: Parliamentary Office of Science & Technology. Available at: https://researchbriefings.parliament.uk/ResearchBriefing/Summary/POST-PN-0580 [Accessed 3 Jan. 2019].
[124] Ross, K. (2018). *Centrica says distributed energy tech could slash UK emissions*. [online] Power Engineering International. Available at: https://www.powerengineeringint.com/articles/2018/10/centrica-says-distributed-energy-tech-could-slash-uk-emissions.html [Accessed 15 Jan. 2019].
[125] BBC News (2019). *Hotel to operate on battery power*. [online] BBC News. Available at: https://www.bbc.co.uk/news/uk-scotland-edinburgh-east-fife-46749022 [Accessed 15 Jan. 2019].
[126] Department for Business, Energy and Industrial Strategy (2018). *the Characteristics of those in the Gig Economy*. [online] London: Department for Business, Energy and Industrial Strategy. Available at: ff [Accessed 16 Jan. 2019].

'New' business models: Disruptive business models will change the way businesses and markets work (Emerging)

9.3.47. The rise in digital technologies has seen numerous disruptive business models emerge in everything from fast food, to holidays and hotels, to the taxi trade. For example, since February 2016 aggregator delivery companies such as Deliveroo, Just Eat and UberEats, have increased the number of takeaway orders by more than 20% in the UK.[127]

Potential Impact

Whilst impacts in the mobility space have been limited thus far, it is reasonable to expect further new entrants with different offers and ideas as to how mobility can be provided. Some business model solutions may be only applicable for a short period of time or adapt to provide additional functionality or services.

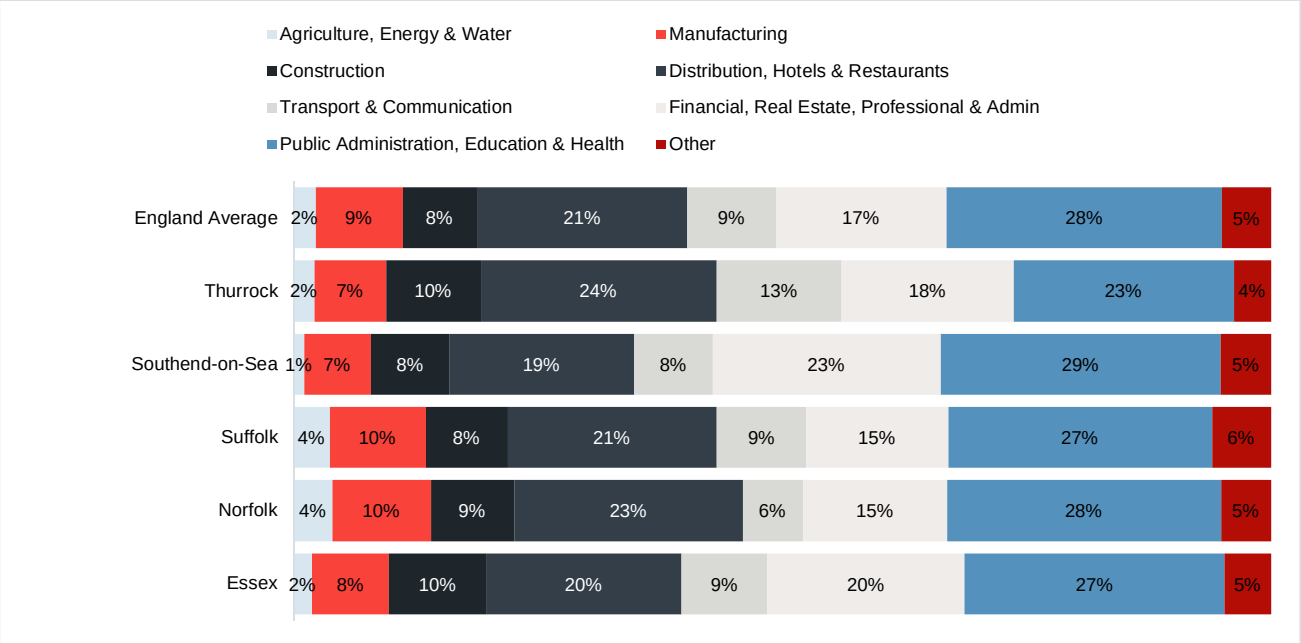
Impact of automation: Automation will hollow out manufacturing and administrative jobs (Emerging)

9.3.48. There have been several studies and projections over the last year estimating the impacts of automation (both robotic and digital artificial intelligence) on the existing jobs market, such as PwC's analysis that over 30% of existing UK jobs are susceptible to automation.[128] In the short term data-driven industries such as financial services are likely to be most affected by algorithmic developments however in the long run, those industry jobs in transportation and storage, manufacturing and construction are at a higher risk of automation. Those less at risk in turn include education, human health and social work and accommodation and food services. Research indicates that this risk to jobs is not spread evenly across the country, with jobs in southern cities threatened less than cities elsewhere.[129]

9.3.49. 2011 Census data reveals that local authorities in the Transport East region are slightly less dependent on at-risk industries than other areas in England, such as Norfolk which has 6% of its workforce employed in transport and communications, compared to the 9% average for England. The next generation of robotic solutions are already displacing manufacturing and warehousing jobs and AI is undertaking decision based tasks in the financial and legal sectors. Projections estimate that these changes could be significant in some sectors, directly impact land use and associated trip making.

[127] The NPD Group (2018). The unstoppable rise of the takeaway delivery phenomenon means the market is now worth £4.2 billion. [online] The NPD Group. Available at: https://www.npdgroup.co.uk/wps/portal/npd/uk/news/press-releases/the-unstoppable-rise-of-the-takeaway-delivery-phenomenon-means-the-market-is-now-worth-4-2-billion-up-73-in-a-decade/ [Accessed 3 Jan. 2019].
[128] PwC (2018). *Will Robots Really Steal our Jobs?*. [online] London. Available at: https://www.pwc.co.uk/economic-services/assets/international-impact-of-automation-feb-2018.pdf [Accessed 17 Jan. 2019].
[129] Centre for Cities (2018). The rise of the robots could compound Britain's North/South divide – with 1 in 4 jobs at risk in cities outside the South. [online] Available at: https://www.centreforcities.org/press/rise-robots-compound-britains-northsouth-divide-1-4-jobs-risk-cities-outside-south/ [Accessed 11 Dec. 2018].

Figure 7-11 – Employment Industries by Transport East Local Authority



Source: ONS LC6602EW - Industry by economic activity

On-demand manufacturing: Products will be made on demand to meet customer needs on a just in time basis (emerging)

9.3.50. As an extension of the above the capabilities of 3D printing and on-demand manufacturing are rapidly increasing. Plastics, metals and even food can now be 3D printed, some products such as books are produced on demand. More than two-thirds of house-building companies in the UK are investing in industrial pre-fabrication and modular techniques using off-site factories for rapid production. The UK Government has also created a new £72million Core Innovation Hub to help transform the construction industry, making it more productive and create new high-value jobs. These developments could alter the traditional movements of raw materials and products but could also lead to re-manufacturing where logistics and high-speed digital networks converge.

POLITICAL LANDSCAPE

Devolution of decision making: More decisions will be made at the regional or city level (Established)

9.3.51. Devolution could have positive impacts where powers are granted. The Government is increasingly supportive of Sub-National Transport Bodies (STBs) such as Transport East as outlined in the Transport Investment Strategy and aims to 'open government decision making to ensure that infrastructure investment takes account of regional transport strategies'.[130] It should be noted however that no STB exists in isolation and each has relationships and dependencies which need to be acknowledged and integrated in the decision-making process. Transport also must be considered in concert with energy, healthcare, education and other primary needs as the mobility will become facilitators (or inhibitors) to economic and social prosperity.

Globalisation of markets: Markets will become increasingly global (Established)

9.3.52. With an increasingly global marketplace and consumer desire to have near instant access to products (including food), fast, reliable and resilient connectivity to ports and airports will be crucial. The East's coastal location provides opportunity to link the UK with the rest of world. In 2017, less than half of the food consumed in the UK was supplied domestically, revealing the deep routed nature of the global marketplace.[131] As conurbations expand it will be essential that those flows are kept moving, particularly in relation to food and critical heath related consumables, will be essential.

Protectionism of markets: An increasing desire to shop and trade locally (Established)

9.3.53. Conversely there is a growing movement relating to production and consumption of products and services at a local level as part of a desire to consume 'artisanal' or 'different' products from those supplied within an increasingly global marketplace. These local supply chains may be small and diverse with variable supplier and customer trip making needs. It should be noted however that the British Independent Retailers Association reported that although more independent shops opened in the first 6 months of 2018, compared to the same period in 2017, that a record number of stores were also closed over the same period. Most of these were located on high streets across the country. Specifically, there was a 0.5% net change in the number of independent shops, which equates to 1,554-unit closures and highlights the uncertainty in the market.[132]

[130] Department for Transport (2017). Transport Investment Strategy. Moving Britain Ahead. [online] London: Department for Transport. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/624990/transport-investment-strategy-web.pdf [Accessed 3 Jan. 2019].
[131] Department for Environment Food and Rural Affairs (2018). Food Statistics in your pocket 2017 - Global and UK supply. [online] GOV.UK. Available at: https://www.gov.uk/government/publications/food-statistics-pocketbook-2017/food-statistics-in-your-pocket-2017-global-and-uk-supply [Accessed 7 Dec. 2018].
[132] British Independent Retailers Association (2018). Independent retail hit by a loss of -1,554 units in first six months of 2018. [online] Available at: https://bira.co.uk/openings-closures-h12018/ [Accessed 11 Dec. 2018].

TAKING A CITIZEN AND BUSINESS CENTRIC APPROACH

9.3.54. The rate of change of some of these trends will vary enormously from place to place and whilst some may induce significant change others will not. Many if not all on the trends described above either directly or indirectly influence the mobility agenda and decisions by communications providers, vehicle manufacturers, network operators and service providers.

9.3.55. Traditionally transportation has primarily considered the needs and demands of the AM and PM peak periods considering the 'commute' as being the key concern. With Transport East's aspiration that transport is an enabler to the economy it is therefore an imperative that we consider all areas where access and mobility contribute to fundamental economic and social activities, namely;

- Employment opportunities;
- Educational attainment;
- Healthcare needs;
- Goods and services, retail and leisure;
- Raw materials, crops, products & waste;
- Tourism; and
- Social interactions.

9.3.56. The mobility needs of these various segments vary greatly and technology will have a role to play in meeting both digital and physical access needs to them all. By adopting a people and business centric approach to the overall needs of the transport network right through the week we can truly consider the expectations and demands placed upon it. Generational priorities will also vary between people undertaking activities in these areas and this is a key consideration in enabling mobility equity, this being of vital importance considering future economic needs and activities of an ageing population.

9.3.57. Considering these areas within a wider mobility agenda there will be opportunities to not only improve access and mobility using technology but to also improve place-making and the built environment through careful and considered planning. Table 9-2 outline the potential mobility needs, challenges and opportunities for each of the areas listed in the context of ongoing change in the Transport East region and enabling economic activity and growth.

Table 9-2 – Challenges and Opportunities

Item	Summary
Employment Opportunities	Access to employment, the commute, will continue to have the largest impact across all modes however 'digital as a mode' will have an increasing role to play in some sectors of the job market, offering the opportunity to not commute for at least part of the time although this may result in other trips making use of additional time. Between 2012 and 2016 the proportion of employees working flexi-time in the UK rose by over 12% and some projections predict that half of the UK workforce could be working remotely in some respect from 2020. A relaxation of traditional '9 to 5' working hours is already starting to result in longer 'peak hours' with a lengthening of the 'shoulders'. Looking ahead working from home (or hub), virtualisation and digital collaboration will all have a role to play in providing alternatives to the

Item	Summary
	commute but it will continue to be driven by the location and form of jobs which are governed by national and global trends and needs.[133]
Educational Attainment	Access to education is vital in equipping people with the skills they need to meet the needs of the Transport East economy. With ongoing changes in the education sector offering digital access to courses and course modules, the need to travel to facilities is changing. With projected changes in the jobs market due to automation and AI there will be a potential need for life-long learning with regular re-skilling becoming the norm for some people. Digital and physical access to educational opportunities will be ever more vital with needs for those unable to travel or in areas of lesser physical connectivity.
Healthcare Needs	Our growing, ageing population is going to need access to quality healthcare. As previously mentioned, the number of people aged 65 or over in the Transport East region for example is estimated to increase by 25.6% between 2020 and 2030. There are already pressures on the social care system in terms of care provision which is providing an impetus for digital and remote healthcare provision for some conditions. The use of automation, sensors and AI in caring will help in part reduce the need for human intervention but there will still be considerable transportation needs for social, patient care and home visit needs. The role of healthcare technology and mobility solutions working collaboratively will be a key part of the solution.[134]
Goods and Services, Retail and Leisure	Reliable, resilient and timely access to goods and services (particularly food) is crucial to economic performance. The retail and services sectors have seen seismic shifts of the last two decades with the advent of home shopping (home delivery, click and collect) and digital access to services (banking, local authority services etc.). These changes have seen significant behavioural change by consumers with convenience being a key factor in decision making. Trip making has been impacted with a shift from consumer trips to retailer led trips however this revolution hasn't negated the need for people to visit 'bricks and mortar' retail establishments to browse, compare and in many cases still purchase. Retailers have recognised this trend with a move to a more 'experience' led approach where food, drink and other activities are embedded within the 'shopping' experience. Within the service sector online access has impacted the need for a 'high street' presence in many places but human interactions are still crucial for many transactions especially for those uneasy or unable to engage with online solutions. Trip making will continue to evolve particularly as retailers move to longer

[133] Gough, O. (2017). Half of the UK workforce to work remotely by 2020. [online] Small Business. Available at: http://smallbusiness.co.uk/half-uk-workforce-remotely-2020-2540827/ [Accessed 7 Dec. 2018].
[134] Office for National Statistics (2018). *Subnational population projections for England - Office for National Statistics*. [online] Ons.gov.uk.

Item	Summary
	opening hours with ever more diverse offers. It should also be noted that the logistics industry is evolving rapidly to meet demands with 24/7 operations, locational trends and automation in warehousing impacting trip making.
Raw materials, crops, products and waste	Although only 6.2% of residents in the Transport East region are employed in agriculture and manufacturing, the sectors are key to economic performance. The movement of crops from field, to processing to retailers is essential in maintaining food resilience (in dense urban centres) and is increasing reliance on a complex supply chain extending well beyond the Transport East region and the UK via our ports and airports. Similar manufacturing supply chains are complex, bringing together remotely sourced raw materials together for product and onward transhipment. Changes in manufacturing may impact where, when and how manufacturing takes place with on-demand solutions being applicable for some low volume products. Access to a reliable and resilient network is essential in keeping supply.
Tourism	Tourism is an essential part of the economy. Hassle free access to tourist attractions by all modes is vital in maintaining competitive advantage. Key airports and ports in the East, such as Norwich International Airport, Stansted International Airport, Southend-on-Sea Airport and Harwich provide outward journey opportunities not only for tourism but for business purposes and international connectivity is well established. How the regions network serves these needs is important and technology will have a role to play in simplifying wayfinding, ticketing and payments as well as enabling access.
Social interactions	It is important not to forget the inherent need for social interactions when considering mobility. The human need to be with family and friends, to share, learn and gossip is a factor that drives ad-hoc trip making. Whilst social media and digital technologies can replace face-to-face interactions, they also streamline planning, community cohesion and allow people to come together more easily than ever before. Mobility is crucial for social interaction whether it be via digital, sustainable or motorised modes.

9.4 MOBILITY TRENDS

9.4.1. The future of mobility and transport is largely being driven by advances in technology and changing human behaviour – summarised by The DfT in its Future of Mobility: Urban Strategy[135]. Table 9-3 summarises the six high-level 'key changes' / trends in mobility identified in the DfT's strategy.

Table 9-3 – Key Changes in Mobility

High-level Change	Description
Data and Connectivity	Equipping the transportation network (road, rail and potentially low-level air) with high quality, continuous digital connectivity will aid the delivery of capacity, safety and productivity benefits. Continuous connectivity also provides the foundations (in some use cases) for autonomous functionality.
Cleaner Transport	The development of technologies to make transport cleaner is rapidly developing – most visible at present with the roll out of low emission and electric vehicles.
Automation	The replacement of 'mundane' human tasks with technology, such as choosing travel routes and modes, as well as operation of vehicles.
New Modes	Shared mobility solutions are blurring traditional transport modes and testing existing regulatory and other frameworks.
New Business Models	New technology and trends are disrupting the traditional models of booking, paying for and access transport and mobility new business models are starting to emerge offering improved customer choice, flexibility and experience.
Changing Attitudes	Customer attitudes and expectations are changing, which are driving transport and delivery innovations to become increasingly affordable, convenient and personalised. Public perceptions and willingness to engage with new technologies, modes and business models is a fundamental aspect successful of deployment and should not be taken as a given.

[135] Department of Transport (2019), Future of Mobility: Urban Strategy [Online] Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/786654/future-of-mobility-strategy.pdf [Accessed 05/06/2019].

9.4.2. As described above many mega trends are having a direct bearing on changes within the mobility sector capitalising upon technological trends that are rapidly emerging within the sector itself. In turn some of the anticipated changes and benefits with these technology trends will have wider impacts on society and the economy. We have broadly grouped these trends into five principles as illustrated below.

9.4.3. The following pages provide an overview of the primary trends in technology change that are expected over the coming decades within the Transport East region and beyond. The rate of success with these solutions will vary, the applicability to different socio-geographic areas will also vary and the rate at which they penetrate the market has yet to be determined or fully understood. Some trends are already established in the market place but have yet to reach maturity, others are at the beginning of their gestation and ultimately deployment.

9.4.4. These key trends are already delivering changes through widespread commercial application, selective deployment through trials or academic and industrial research. The UK government is investing in many of the areas to encourage innovation, R&D, and enable positioning and differentiation within the global marketplace.

9.4.5. It should be noted that these trends are all occurring in their own right. In some use cases they are developing interdependently, in others they are not. The market is moving fast with long established and new entrants pushing the boundaries not only of technological possibility and how they might be deployed and commercialised.

DATA AND CONNECTIVITY

9.4.6. Digital connectivity is already underpinning many of our daily activities where access to communications networks (fixed or mobile) is possible. Music, video and other services are now available on the move and journey planning is readily available to all. Equipping the transportation network (road, rail and potentially low-level air) with high quality, continuous digital connectivity will aid the delivery of capacity, safety and productivity benefits. Continuous connectivity also provides the foundations (in some use cases) for autonomous functionality. Digital connectivity will be essential in providing the digital backbone that will allow many other innovations to be fully developed in both mobility and wider applications across the economy.

Table 9-4 – Data and Connectivity: Issues and Opportunities

Issues and Opportunities	
Rate of change	§ Digital connectivity continues to progress with faster broadband speeds over copper and fibre connections § The progression from 3G to 4G (although this is incomplete in many corridors) § Emerging 5G technology and roll out to 2025, and ongoing thereafter
Applicability	§ All areas, urban, inter-urban and rural § Homes, hubs, businesses and people on the move
Benefits	§ Improved safety through sharing of traffic / movement data

Issues and Opportunities	
	§ Using 'big data' to manage supply and demand § Improved productivity on the move § Enhanced customer and user experience on the move § Access to goods, services and activities irrespective of location § Improved personal and community connectivity § Reduced 'traditional' infrastructure needs (information, signals, signage etc.)
Dis-benefits	§ Cost of access / functionality precludes those with low incomes § Danger of digital inequity, particularly in hard to reach and/or rural areas § Potential reduction in face-to-face human interactions § Resilience of digital networks, key to maintaining service § No escape from always 'being connected' § Dependence upon (in some cases) 3rd party communications infrastructure § High level of data confidence and integrity essential
Interdependencies	§ Roll out and priorities largely dictated by private companies and commercial drivers § Land and access to Local Authority, Highways England and Network Rail estates to achieve full coverage in all corridors
Risks	§ Public acceptance of a 'connected' culture § Privacy concerns and the right to 'opt-out' § Cyber security particularly in relation to payments § Resilience of networks and 'up time' § Risk of underserved 'dark' places and areas § Fragmentation along national boundaries and between operators § Market development outrunning regulation
Impetus	§ Communications agenda driven by public expectations and met by telecommunications companies § Vehicle manufacturers driving connected vehicle agenda to differentiate in the market place, to deliver bundled services (for instance infotainment) and to deliver safety benefits, but with a primary focus of increasing and sustaining sales.
Mode Applicability	**Road:** § A2/M2 Connected Vehicle Corridor, DfT - Project aims to create a 'WIFI road' between the Blackwall Tunnel and Port of Dover in Kent that connects vehicles and infrastructure wirelessly to improve driver awareness of road closures and congestion. § 5G Trials, Centre for Connected & Autonomous Vehicles e.g.

Issues and Opportunities	
	— AutoAir: 5G Testbed for Connected and Autonomous Vehicles – Aim to make 5G technologies available for the validation and development of CAVs **Rail:** § European Train Control System (ETCS), Cambrian Line - Allows trains to run closer together and travel at their optimal speeds and provides enhanced train protection. § Network Rail Digital Signalling – part of Network Rail's Digital Railway programme to transform the rail network. The objective is to replace traditional lineside train signals with modern technology to increase capacity, improve performance and enhance safety. § Connected Driver Advisory System (C-DAS), South Western Railway– System provides decision support to drivers in the cab to improve timetable adherence and therefore overall performance.

CLEANER TRANSPORT

Electric and Alternatives: Decarbonisation of energy production, storage and consumption

9.4.7. The development of technologies to make transport cleaner is rapidly developing – most visible at present with the roll out of low emission and electric vehicles. Cleaner transport offers local air quality and pollution benefits, allowing new applications of transport modes given their low or 'zero' emissions. The adoption and integration of cleaner transport will be essential to support a thriving economy and a healthier environment.

9.4.8. Alternative propulsion systems in transport are rapidly expanding. Hybrid, self-charging and plug-in electric cars are readily available, hybrid, electric and hydrogen buses are on the UK roads and hybrid and battery trains have been tested on the rail network and battery shipping is being trialled. Fuel cell vehicles (FCV) or fuel cell electric vehicles (FCEV), which generally use hydrogen instead of a battery or in combination with a battery, are due to be available in the next few years and advances in LGV and HGV technologies will see wider deployment of alternative fuelled freight including on the railway.

9.4.9. E-bike sales are on the increase with electric bikes being used for personal and commercial cargo use, and the UK has also experienced the initial trialling of shared e-scooters in Queen Elizabeth Olympic Park, London. This seismic shift away from fossil fuels, driven in part by policies such as taxation, low emission zones and the planned phasing out of petrol and diesel will lead to new infrastructure needs in terms of electricity generation, distribution and storage (particularly for high load vehicles such as freight) and in the case of hydrogen, new distribution and filling networks. There may also need to be different service operating patterns to allow for difference in fuelling frequencies. Whilst the benefits are obvious there will be challenges for rapid and wide scale deployment.

Table 9-5 – Cleaner Transport: Issues and Opportunities

Issues and Opportunities	
Rate of change	¡ Alternative fuelled vehicles account for 4.7% of sales in 2017, a rise of 36% year in year ¡ The range of EVs will continue to expand over the period to 2025 and beyond; ¡ Hydrogen vehicles will come to market in the early 2020s but like EVs in their infancy will be dependent upon availability of re-fuelling facilities ¡ Cleaner transport is high up on the agenda across the UK, with electric and low emission vehicles becoming normalised in society. ¡ More than half of new car sales globally will be electric by 2040[136] ¡ The Government has set a 'mission' to ensure that all new cars and vans are effectively zero emissions by 2040[137].
Applicability	¡ Private car EVs will be leased / bought by those who can afford them (costs remain higher than regular vehicles) and have access to or can make access to charging facilities at home and or work ¡ Commercial fleet take up will be dependent upon duty cycles and the availability of charging infrastructure and in the case of LGV/HGV a suitably resilient grid connection
Benefits	¡ Zero emissions at point of use and associated air quality improvements ¡ Reduced noise at point of use ¡ Recued maintenance cycles and consumables
Dis-benefits	¡ Inequality due to cost and access to charging / fuelling infrastructure ¡ Street clutter with EV charging infrastructure ¡ Impacts on and capabilities of local electricity grids ¡ Need for new hydrogen fuelling infrastructure ¡ Taxation impacts and associated incentives
Interdependencies	¡ Range anxiety – however, the perception of range anxiety is reducing amongst the general public ¡ Home / workplace / parking charging infrastructure (until all ranges are increased) ¡ Grid capacity, capabilities and means of payment for energy used for private and commercial use cases ¡ A network of hydrogen fuelling stations
Risks	¡ Public perception and take up ¡ Commercial availability – vehicles and charging / fuelling infrastructure ¡ Electrical resilience and capacity in some areas
Impetus	¡ Policy move from fossil fuels

136 Bloomberg New Energy Finance (2018). Electric Vehicle Outlook 2018 (online). Available at: https://about.bnef.com/electric-vehicle-outlook/.

137 Department of Transport https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/786654/future-of-mobility-strategy.pdf Accessed on 14/06/2019

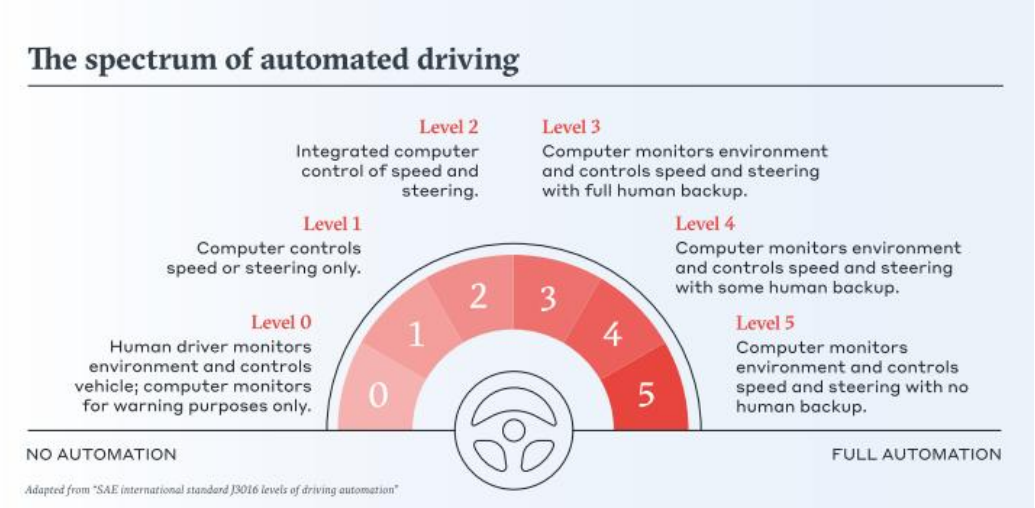
Issues and Opportunities	
	¡ Urban air quality concerns ¡ Some vehicle manufacturers capturing an early market share ¡ 'Green' credentials personal and corporate

AUTOMATION

9.4.10. The automated agenda is gathering pace with advances in computing power and sensor capabilities having led to well publicised advancements in road, rail, water and aerial technology. Automation in the transport sector will significantly impact how they function and perform as well as having potential impacts on place-making and utilisation of space.

9.4.11. The spectrum of automation for road vehicles is illustrated in the Figure9-7 below, as defined by SAE International. Whilst full autonomy of road vehicles (Level 5) may well be some way off (2030 and beyond), lower scale applications (Autonomous Emergency Braking, self-parking, lane follow/keep etc.) are available now and manufacturers are suggesting commercialisation of Level 3 vehicles (autonomy with human supervision) in the next few years. Freight vehicle platooning trials are due to commence on the Highways England network and autonomous 'droids' are delivering groceries in South London.

Figure 9-7 – The Spectrum of Automated Driving



9.4.12. Increasingly autonomous trains in turn have been commercially viable for some time (Dockland Light Rail and Thameslink central core being UK examples) and present the opportunity to make trains more predictable, improve energy optimisation and increase passenger safety to name a few of the potential benefits. The grades of train automation (GOA)[138]:

[138] Powell, J., Fraszczyk, A., Cheong, C. and Yeung, H. (2016). Potential Benefits and Obstacles of Implementing Driverless Train Operation on the Tyne and Wear Metro: A Simulation Exercise. *Urban Rail Transit*, [online] 2(3-4), pp.114-127. Available at: https://eprints.ncl.ac.uk/file_store/production/230330/1ABA7AEA-8AFD-4465-8317-1A1E6DC84A31.pdf.

- GOA0: Manual operation without automatic train protection
- GOA1: Manual operation with automatic train protection
- GOA2: Automatic train protection and automatic train operation with driver
- GOA3: Driverless train operation with attendant for door closure and in event of disruption (e.g. Docklands Light Railway)
- GOA4: Unattended train operation (e.g. Dubai metro)

9.4.13. Significant investment is also going into the construction and trialling of increasingly automated maritime vessels. The world's first electric autonomous containership, Yara Birkeland for example, is expected launch in early 2020 in Norway, becoming incrementally automated by 2022. The stages of automation for maritime vessels that are broadly adopted by the shopping industry are[139]:

- Degree one: Shop with automated processes and decision support
- Degree two: Remotely controlled ship with seafarers on board
- Degree three: Remotely controlled ship without seafarers on board
- Degree four: Fully autonomous ship

9.4.14. Automation is also impacting other sectors, the use of AI for decision making in service, financial and legal sectors could potentially see the elimination of certain types of jobs which will inevitably impact mobility needs. The use of autonomous vehicles and robotics in warehousing is helping drive the home shopping revolution and robots are being developed and deployed in many hazardous environments to improve human safety.

Table 9-6 – Automation: Issues and Opportunities

Issues and Opportunities	
Rate of change	- The Government has stated an expectation of autonomous vehicles being on UK roads by 2021, a date confirmed by some manufacturers. However, it is likely that large scale fleet penetration will occur in the period of 2025 to 2035 and in the case of HGVs and trunk haul freight probably beyond 2035 - Artificial Intelligence in service industries is already starting to develop and is expected to gain pace in the period to 2025 - Automation and robotics in industrial applications will continue over the coming decades
Applicability	- Pilot deployments of autonomous technologies will take place in urban areas an on the SRN - It is likely that the first large scale autonomous deployments will be in urban areas where a commercial case can be made for the investment in vehicles - Use cases will be varied however the role for autonomy on long distance journeys (SRN and MRN) will appeal to some drivers and applications for shared transit solutions in urban and perhaps rural (where costs could be reduced) are likely to emerge.

[139] World Maritime News (2018). *IMO MSC Identifies 4 Degrees of Ship Automation*. [online] World Maritime News. Available at: https://worldmaritimenews.com/archives/266898/imo-msc-identifies-4-degrees-of-ship-automation/ [Accessed 16 Jan. 2019].

Issues and Opportunities	
	¡ Autonomous private vehicle technology is being largely driven by vehicle manufacturers and enthusiastic early adopters with the means to engage, situated over a diverse geography (in a similar way to hybrid and more recently electric vehicles).
Benefits	¡ Potential safety benefits (between 80% and 95% of vehicle collisions are due to human error, depending on source) as a result of autonomous systems ¡ Productivity benefits on the move (with high levels of automation) ¡ Capacity benefits once large-scale fleet penetration is established ¡ Removal of humans from undesirable industrial applications ¡ Improved access to independent mobility for those currently excluded (the young, the elderly, the disabled) ¡ Improvements to the built and highway environment due to reduced need for space
Dis-benefits	¡ Inequality and social exclusion due to cost of access / ownership of AVs and service models ¡ Disparity between city and non-city take-up and deployment for 'public transport' solutions ¡ Potential trend to sole-use vehicles and resultant increased traffic ¡ Potential to reduce active transport
Interdependencies	¡ Some autonomous vehicle solutions are dependent upon digital connectivity, others are self-sustaining ¡ The legislative, regulatory and policy issues for wide-scale deployment are considerable ¡ Rate of development of detectors / sensors and commercial cost ¡ Public trust and acceptance
Risks	¡ Safety ¡ Cyber security ¡ Pace of legislation ¡ Insurance issues and liabilities ¡ Testing and homologation ¡ Public perceptions
Impetus	¡ The autonomous agenda (vehicular, AI and robotics) is largely being driven by commercial entities with their own agendas and needs. ¡ In the UK, Government is investing heavily in the sector with an aspiration to lead the world
Mode Applicability	Road ¡ Four Cities Trials – GATEway Project, UK Autodrive and Venturer are all completed trials however demonstrated that passenger cars could operate part of the time on UK roads without driver control. ¡ Centre for Connected and Autonomous Vehicle Competitions 1-4 Rail ¡ Supervised Automatic Train Operation (ATO), Thameslink Central Core - Technology provides the ability to control trains to a finer resolution in order to run to the maximum capability of the infrastructure in a more consistent way; and

Issues and Opportunities	
	Low-level Air ¡ Automated UK drone-tracking system under development – Developed by Air Traffic Control service NATs and start-up Altitude Angel Maritime ¡ Marine & maritime autonomy test bed, Southampton - £1.5 million invested by The Solent Local Enterprise Partnership to create an environment in which unmanned boats, air vehicles and autonomous sensors can be tested. ¡ Autonomous Shipping Project launched by UK government to research the potential of autonomous navigation in ships.[140] ¡ Norwegian & Finnish autonomous ferry trials in December 2018 - Can navigate independently and dock[141]

NEW MODES

New Modes: the sharing of services vs. traditional 'ownership'

9.4.15. Sharing of assets between users has been a developing and disruptive trend in transportation over the last few years. Facilitated by digital connectivity solutions match demand (customers) with supply (available assets or journeys) generally via app-based solutions. Many feature on-account payment systems streamlining the customer experience and some encourage feedback or incentivise positive customer behaviours. Shared access to mobility solutions in the form of bike hire, car hire, taxi or pooled transit and bus offer people alternatives to 'owning' a car particularly in urban areas where services are accessible most of the time. Many shared mobility solutions are blurring traditional transport modes and testing existing regulatory and other frameworks. In addition, new transport modes are emerging, such as Hyrodgen Fuel Cell Trains[142], BEV Trains[143] and EV coaches[144].

Table 9-7 – New Modes: Issues and Opportunities

Issues and Opportunities	
Rate of change	¡ There are numerous new entrants in this space and this is expected to continue over the period to 2025
Applicability	¡ It is expected that shared solutions will be deployed in urban areas where large customer bases exist or people willing to share assets and services

[140] Port Technology (2018). *UK Government Launches Autonomous Shipping Project*. [online] Porttechnology.org. Available at: https://www.porttechnology.org/news/uk_government_launches_autonomous_shipping_project [Accessed 17 Jan. 2019].
[141] BBC (2018). *The Finnish ferry that sails itself*. [online] BBC News. Available at: https://www.bbc.co.uk/news/av/technology-46350188/the-ferry-using-rolls-royce-technology-that-sails-itself [Accessed 17 Jan. 2019].
[142] https://www.telegraph.co.uk/cars/news/hydrogen-fuel-cell-trains-run-british-railways-2022/
[143] https://www.railwaygazette.com/news/traction-rolling-stock/single-view/view/fuel-cell-proof-of-concept-train-to-be-tested.html
[144]

Issues and Opportunities	
	¡ That said there is potential for shared services to tackle rural challenges with flexible, on-demand type services ¡ Shared and digital-enabled access to homes and cars will provide flexibility and support new e-commerce delivery services
Benefits	¡ Provides alternative to low utilised vehicles (2nd and 3rd cars) ¡ Reduced dependency on the private car and could potentially reduce overall numbers ¡ Provides a suite of choices for different mobility needs and circumstances ¡ Provides sustainable solutions (in the case of bike hire)
Dis-benefits	¡ Impact of 'parked' assets on the built environment ¡ Competing suppliers in some areas confuses the overall offer ¡ Ease of engagement for new or traditional customers ¡ Dependency of app-based technology may exclude some
Interdependencies	¡ Smartphone and app-based access ¡ Underlying communications and data – assets, systems and customers ¡ Availability of 'parking' during periods of low utilisation
Risks	¡ Public acceptance and trust ¡ Local regulation and licensing ¡ Demand meeting supply or vice versa
Impetus	¡ The market is driving innovation with significant investment by 3rd parties
Mode Applicability	Road ¡ Expansion of car clubs such as DriveNow and ZipCar Flex, London ¡ Arriva Click[145], Sittingbourne – Demand responsive, flexible minibus service ¡ CityMapper Smart Ride, London – Shared hybrid bus-taxi service operating like a ride-hailing app and limited to a specific catchment area. ¡ Launch of ViaVan, London - On-demand shared transit service It should be noted that some early movers have experienced failures: ¡ Bikes – Ofo UK wide, MoBike Manchester; theft and vandalism ¡ Micro transit – Ford Chariot London, RATP Slide Bristol; failing to compete with other transport modes and not getting sufficient ridership

[145] https://www.arrivabus.co.uk/arrivaclick/

NEW BUSINESS MODELS

New Business Models: New consumer models of access, consumption and payment

9.4.16. With the trends above disrupting the traditional models of booking, paying for and access transport and mobility new business models are starting to emerge offering improved customer choice, flexibility and experience. Largely driven by underlying data aggregation such solutions not only simplify ticketing but also provide tailored and personalised travel information. In addition, bundled energy generation and storage solutions are being offered with new electric vehicles offering a completely different mobility model.

Table 9-8 – New Business Models: Issues and Opportunities

Issues and Opportunities	
Rate of change	¡ New models are emerging, it is expected that some of these will be commercially mature in the period to 2025
Applicability	¡ It is expected that new business models are likely to be most relevant to the urban and inter-urban markets particularly into the city regions
Benefits	¡ Truly seamless and integrated access to a choice of mobility solutions ¡ On account, single payment across multiple (or ultimately all) modes ¡ Improved operator understanding of customer choices ¡ Potential ability to balance supply and demand across all modes
Dis-benefits	¡ Public acceptance and willingness to use ¡ Privacy and data concerns ¡ Cyber security and fraud
Interdependencies	¡ Digital communications and energy networks ¡ Open access to fares, timetable and other data ¡ Access to banking and payment systems
Risks	¡ Consistency of deployment ¡ Ease of use for customer and subsequent uptake ¡ Willingness of operators to engage
Impetus	¡ From private sector mobility disruptors looking to offer something new ¡ From local authority promoters looking to improve public transport uptake
Mode Applicability	Road: ¡ Whim MaaS pilot, Birmingham – App-based platform that allows users to subscribe to monthly transport packages (including bus, train, tram, taxi, hire car and cycle hire) ¡ Citymapper – Public transport app and mapping service ¡ Vamooz – App-based bus crowd funding bidding platform, being used to develop new school contracts etc.

9.5 TRAJECTORIES OF CHANGES IN THE TRANSPORT EAST REGION

9.5.1. Considering the above potential changes in the future mobility realm it is important to consider the fact that many of the Transport East's authorities have been supportive of and involved with technological and policy driven mobility solutions. Investments and forward thinking, and the region's proximity to UK research centres and London have provided the conditions for innovation.

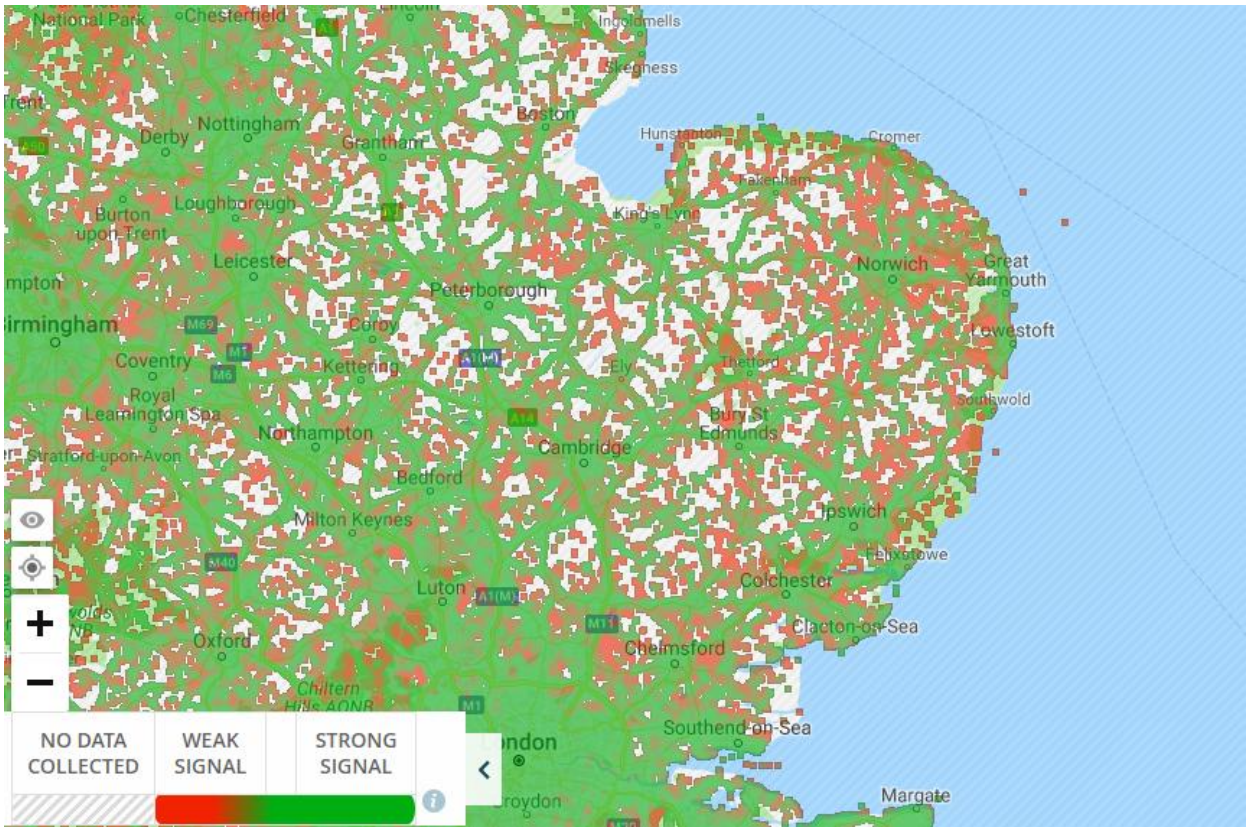
9.5.2. The following pages provide an overview of the broad trajectories of change within the primary pillars of future mobility as well as a commentary on the emerging models.

DATA AND CONNECTIVITY

9.5.3. Like many places in the UK the Transport East region has seen significant investment in its digital communications over recent years. Future combinations of 4G, 5G and broadband connectivity will provide the foundations for many technologies and associated services which will gather pace over the coming years.

9.5.4. Figure 9-8 provides an overview of 4G connectivity across the region, with green denoting strong signal and red weak. It should be noted that whilst mobile connectivity overall is very good that are still patches where the signal is weak potentially being a future restriction. Whilst next generation 5G is being explored in various geographies now it is more infrastructure heavy and potentially, certainly in the early days, costly.

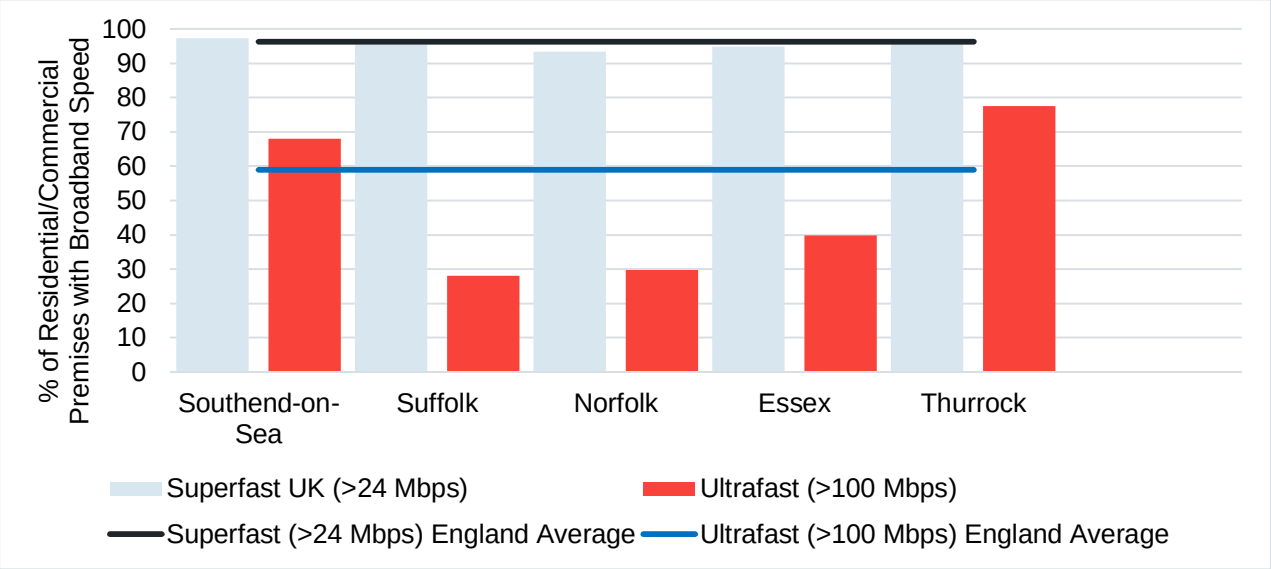
Figure 9-8 – 4G Network Coverage, Transport East Region



Source: https://www.which.co.uk/reviews/mobile-phone-providers/article/mobile-phone-coverage-map

9.5.5. With regards to broadband coverage Figure 9-9 provides a snapshot of current broadband speeds in the Transport East region. Of the five local authorities in the Transport East region, over 90% of residents and commercial premises experience Superfast broadband speeds of over 24Mps, with all local authorities other than Southend-on-Sea falling slightly short of the average for England of 96.3%. However, the data shows that the proportion of residents experiencing ultrafast broadband speeds of over 100Mbps varies more widely geographically, ranging from nearly 78% in Thurrock to just 28% in Suffolk (well below the average for England at 58.9%).

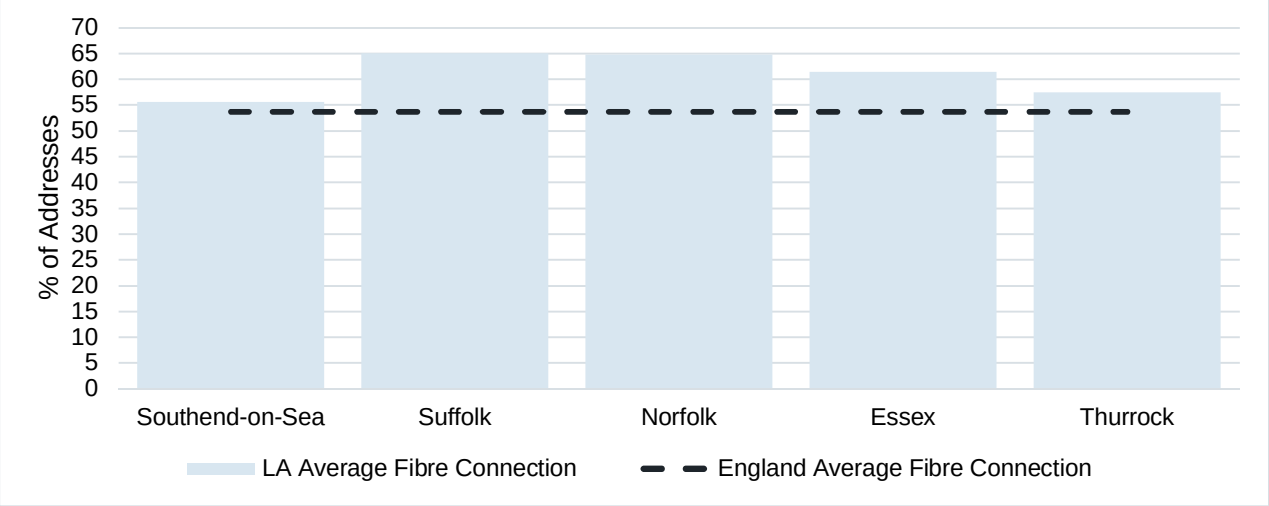
Figure 9-9 – Broadband Speed in Local Authorities in the Transport East Region



Source: http://maps.thinkbroadband.com/ retrieved June 2019

9.5.6. Figure 9-10 shows the proportion of addresses that have some form of fibre connection, Fibre to Cabinet (FTTC) or Fibre to Home (FTTH), by local authority in the Transport East region. Fibre optic cables can deliver high speed data across large distances which can result in much faster download speeds compared to other types of connectivity delivery such as ADSL broadband, Cable or Wireless. Southend-on-Sea is the local authority in the region that ranks lowest in the proportion of residents with access to fibre connections whilst Suffolk ranks highest.

Figure 9-10 – Proportion of Addresses with Fibre Connections (FTTC or FTTH)



9.5.7. Fast, reliable and resilient digital connectivity will be essential in the home, businesses and centres of education and healthcare to enable new access models to services both physically and digitally. Digital connectivity coupled with Internet of Things (IoT) devices could be a major element in catering for an ageing population.

9.5.8. With regards to vehicle connectivity, many new models of cars, vans, trucks and buses are now equipped with always-on digital connectivity allowing them to share and receive data on the move. The ability to link vehicles to networks and to each other provides potential benefits in terms of network operations and safety as well as providing enhanced customer and user experience.

9.5.9. For example, in February 2019 Essex Highways placed a bid to develop an open data feed for connected vehicles. The data feed would enable real time information on road closures, incidents, roadworks etc. to be disseminated to the travelling public ensuring that they can make informed judgements on their journeys to avoid or mitigate any disruptions. Additionally, by using the latest CAV standards, the data feed is intended to act as a potential national standard for how traffic management information is set-up and dispensed to the travelling public for all vehicles, including autonomous connected vehicles[146].

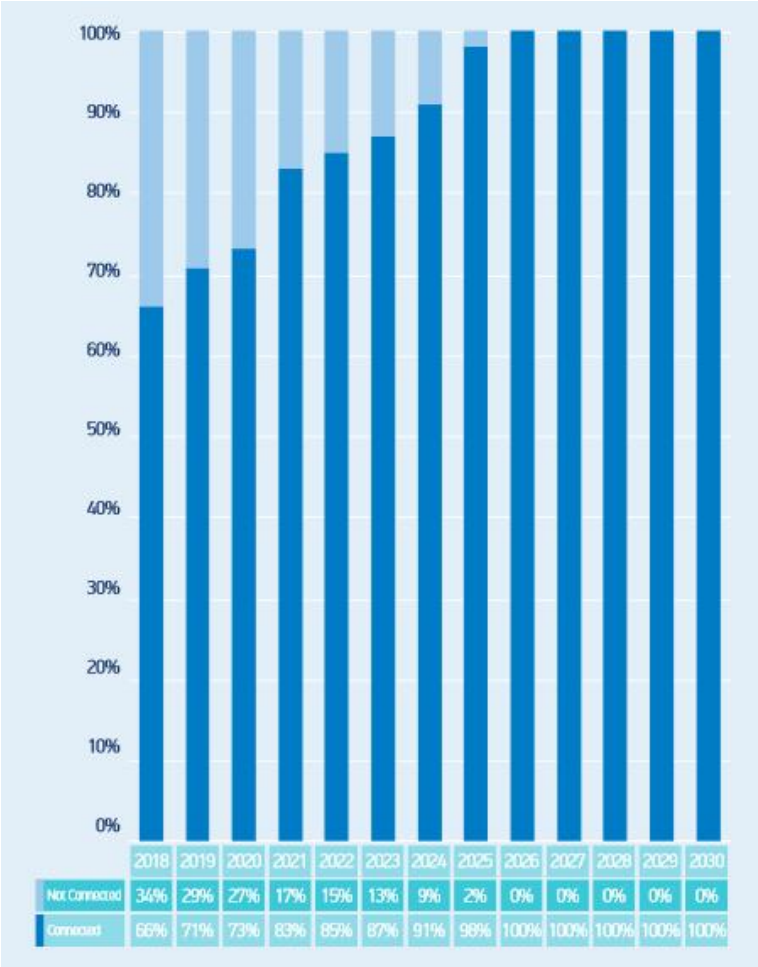
9.5.10. The Association of Directors of Environment, Economy, Planning and Transport's (ADEPT) SMART Places Live Labs is a £22.9million programme will see eight local authority led projects develop and test prototypes and applications across SMART materials, communications, energy and mobility. Suffolk County Council were one of the eight successful applications of the programme and were allocated £4.41 million to adapt light columns to make them suitable for use for EV charging and/or data hubs[147].

9.5.11. Figure 9-11 provides a projection of anticipated uptake of Connected Vehicle technology between now and 2030 reflecting a normalisation of the technology in new vehicles. In 2019, it is predicted that ~71% of vehicles on the UK roads will already be connected vehicles.

[146] "Ford to test driverless cars in Europe next year | Smart Highways Magazine: Industry News", in *Smarthighways.net*, 2016, <http://smarthighways.net/ford-to-test-driverless-cars-in-europe-next-year/> [accessed 25 June 2019].

[147] https://www.adeptnet.org.uk/news/adept%E2%80%99s-live-labs-launched-%C2%A3229million-smart-places-programme-goes-live

Figure 9-11 – Predicted Uptake of Connected Vehicle Technology in the UK



Source: SMMT Connected Report 2019: https://www.smmt.co.uk/wp-content/uploads/sites/2/SMMT-CONNECTED-REPORT-2019.pdf

AUTOMATED

9.5.12. Automation, as it applies to vehicle technology that can be observed on the transport network, is of an early maturity. There is limited evidence of the levels of testing CAVs under specific conditions on the public road network given commercial sensitivities. The New Anglia LEPs Integrated Transport Strategy reflects the potential for automation, citing the importance and potential:[148]

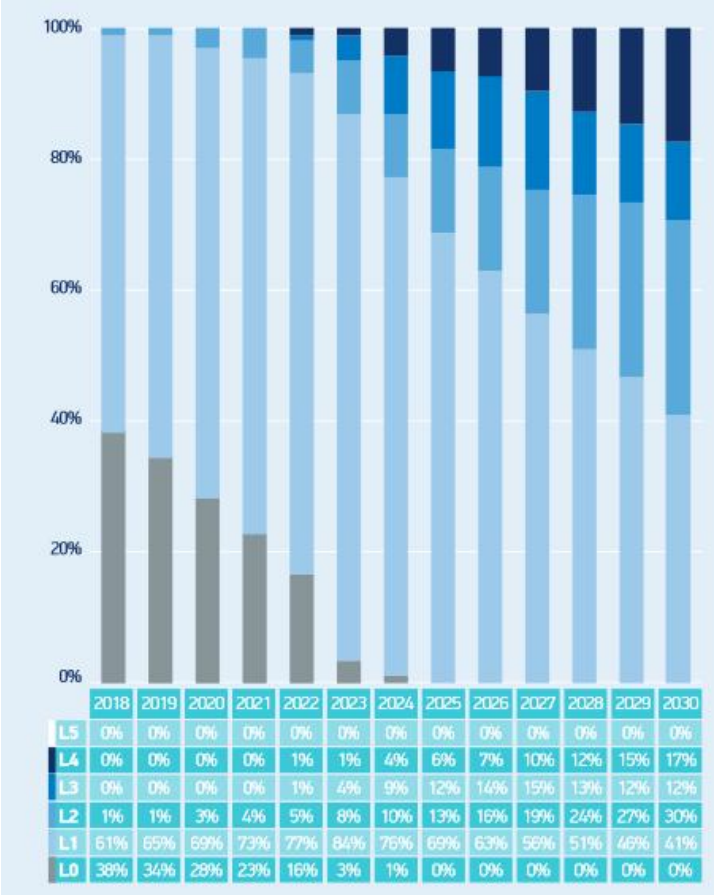
9.5.13. "Automation and robotics have the potential to improve maintenance and safety - The most visual aspect of this change will be Autonomous Vehicles"

[148] https://newanglia.co.uk/wp-content/uploads/2018/07/ITS-FINAL-280618.pdf

9.5.14. Private sector trials in the vehicle automation space are underway within the Transport East region such as those announced by Ford at the end of 2016 at its research engineering centre in Dunton, Essex. Fords Dunton Technical Centre has already been involved in the testing of Ford's current and future driver-assist technologies and therefore is well-positioned to lead the autonomous driving efforts for Ford in Europe as well[149].

9.5.15. Figure 9-12 provides a projection of anticipated uptake of Connected Vehicle technology between now and 2030 reflecting a normalisation of the technology in new vehicles. The data suggests that by 2024, all newly registered vehicles on UK roads will have at least Level 1 automation. Whilst the numbers of Level 3 and above of automation begins to grow in 2021, reaching a significant percentage (5%+) from 2023 onwards.

Figure 9-12 – Predicted Uptake of Automated Vehicle Technology in the UK



Source: SMMT Connected Report 2019: https://www.smmt.co.uk/wp-content/uploads/sites/2/SMMT-CONNECTED-REPORT-2019.pdf

[149] "Ford to test driverless cars in Europe next year | Smart Highways Magazine: Industry News", in *Smarthighways.net*, , 2016, <http://smarthighways.net/ford-to-test-driverless-cars-in-europe-next-year/> [accessed 25 June 2019].

9.5.16. Innovate UK funding allocated through Connected and Autonomous Vehicle challenges since 2015, also provides a useful representation of the extent of research and trialling in the vehicle automation space that is underway in the Transport East region.

9.5.17. Table 9-9 shows the projects which are currently live in the LEPs within the Transport East region and the amount of funding they have been allocated for each project. Full details of each of the projects (in addition to those which are now closed or on hold) including the specific companies, organisations or academic institution in each region that is associated with each project is outlined in the table and provided in Appendix E.

9.5.18. Most of the Innovate UK funded projects are collaborative endeavours, with multiple partners from different regions. Thus, the physical outputs of some projects are not actually located in the Transport East region but companies, organisations or academic institutions based in the Transport East region are contributing to the overall study/trial.

Table 9-9 – INNOVATE UK projects in region

LEP	Competition	Grant Offered	Project	Participant Name & Location
South East	Connected and Autonomous Vehicles - CRD	£519,676	UK Connected Intelligent Transport Environment (UK CITE)	Visteon Engineering Services Limited, Chelmsford, Essex
	Connected and Autonomous Vehicles 2 - Stream 2	£409,186	Smart ADAS Verification and Validation Methodology (SAVVY)	AVL Powertrain UK Limited, Basildon, Essex
		£55,846	Connected Fully Integrated Driver Ecosystem (Con-FIDE)	Revolve Technologies Limited, Chelmsford, Essex
	Connected and Autonomous Vehicles Test Bed (Phase 2)	£346,125	UK Central CAV Testbed (Midlands Future Mobility)	AVL Powertrain UK Limited, Basildon, Essex
New Anglia	No Innovate UK CAV competition funding			
TOTAL		**£1,330,833**		

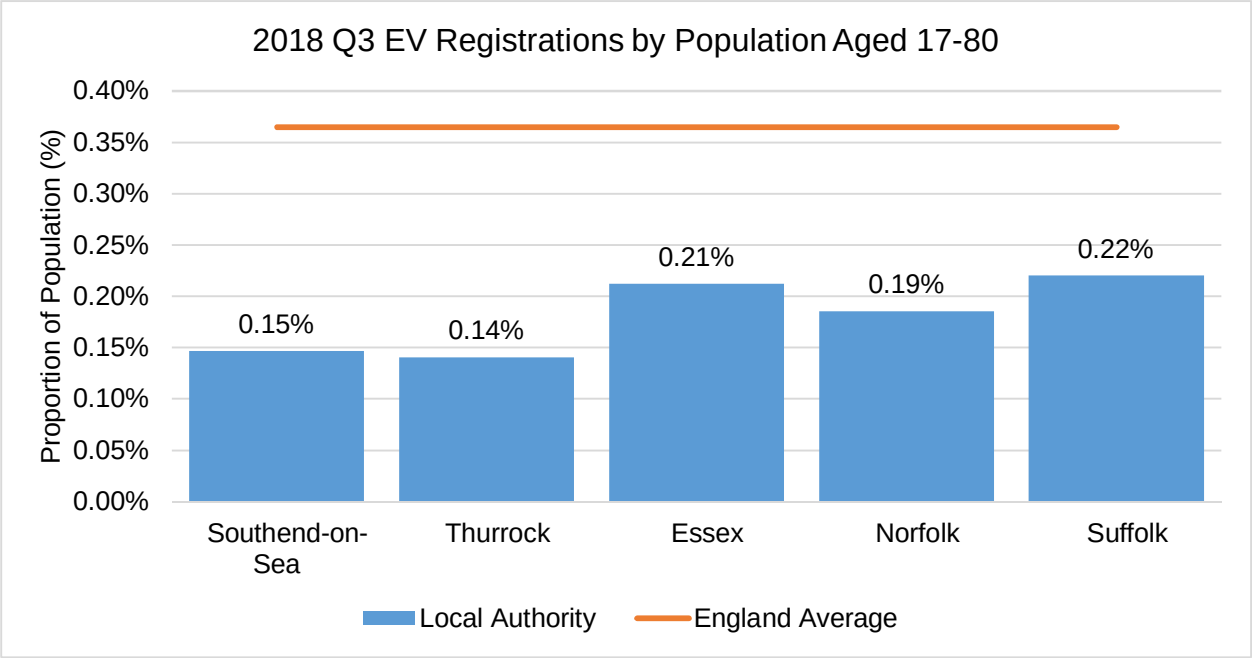
9.5.19. The companies, organisations and academic institutions in the region have been granted over £1.3 million worth of Innovate UK funding in Connected and Autonomous Vehicle competitions since 2015 which are attributable to a wide range of projects. This equates to just under 1% of the total amount of CAV funding granted in England over the period.

ELECTRIC (AND ALTERNATIVES)

9.5.20. The electrification agenda is gathering pace across the UK. Over the last year an additional 1,522 plug-in EV cars and vans have been registered in the Transport East region with the current overall fleet of 5,241 vehicles representing 29.2% of the total in England.

9.5.21. Figure 9-13 in turn illustrates new eligible vehicles under the plug-in car/van initiative registered in Local Authorities in the Transport East region from the end of 2011 to Q3 2018 by population. In terms of absolute numbers, Essex has the largest number of plug-in vehicles, with 2,343 vehicles (accounting for 0.21% of the driving population), however in terms of uptake, Suffolk has the highest percentage with 0.22% of the driving age population owning EV's. Thurrock has the lowest proportion of EVs as a proportion of the population.

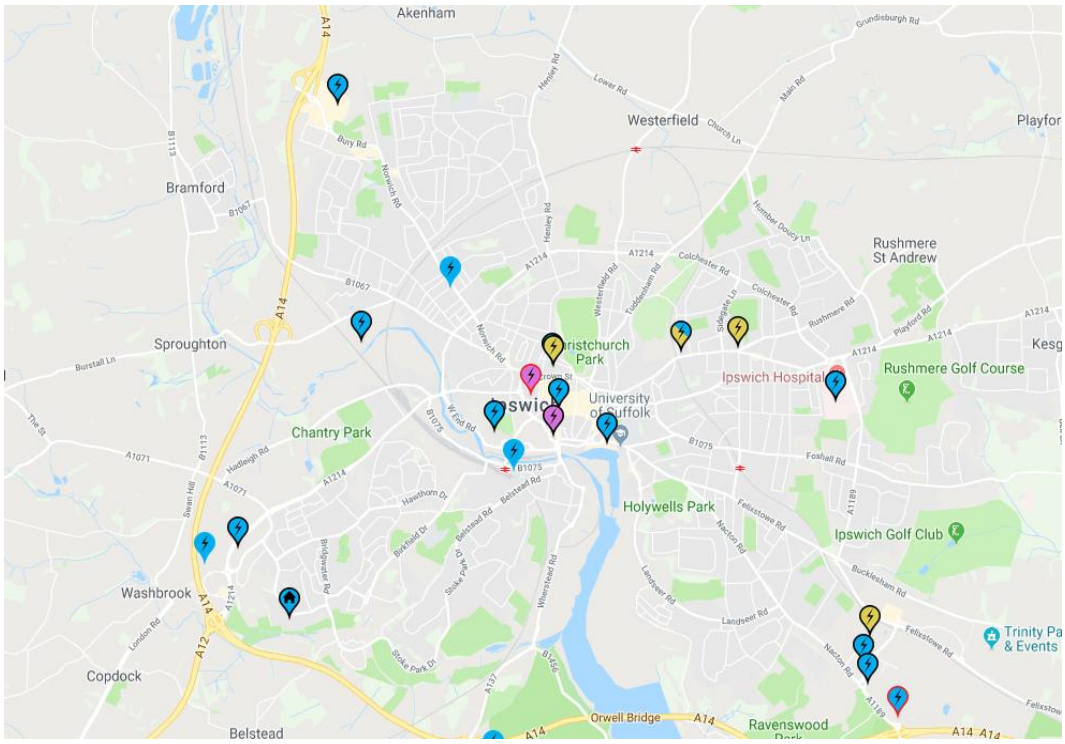
Figure 9-13 – 2018 Q3 EV Registrations by Population Aged 17 to 80



Source: Department for Transport, VEH 0131, Q3 2018 registered new vehicles, Local Authorities

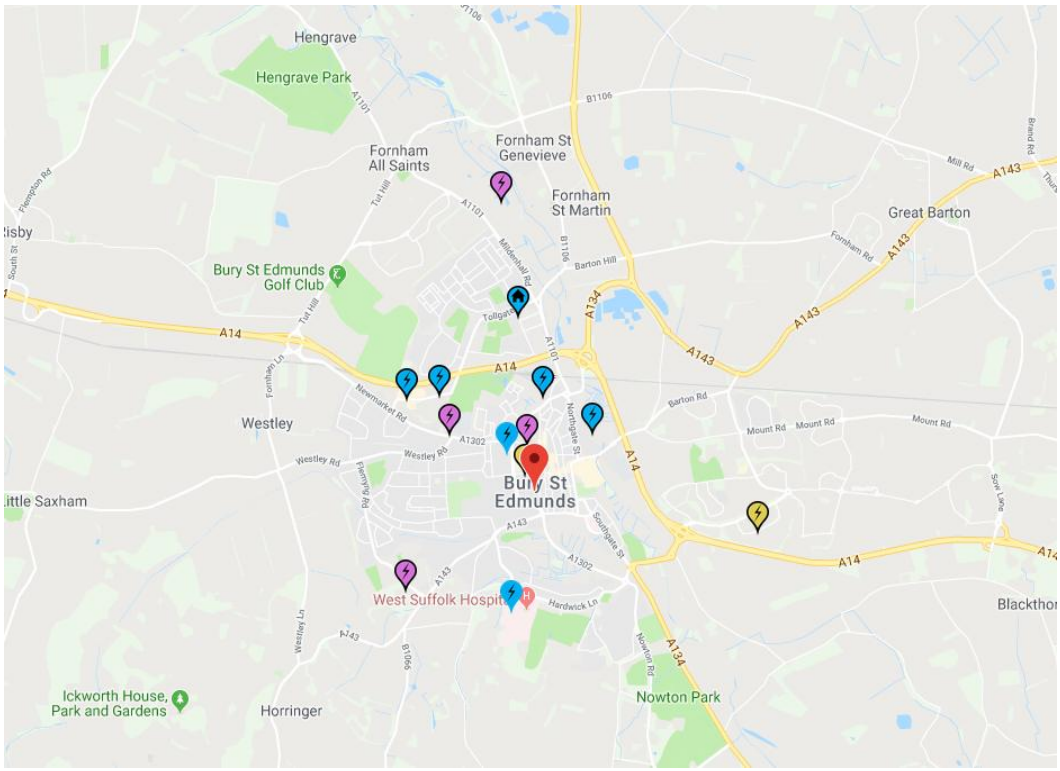
9.5.22. Figure 9-14 and Figure 9-15 provide overview maps of electric charging facilities for Ipswich and Bury St Edmunds and illustrate the density of infrastructure within the city cores in addition to the spread in surrounding suburban areas.

Figure 9-14 – Electric Charging Facilities for Ipswich



Source: Zap Map EV Infrastructure ***https://www.zap-map.com/live/*** *accessed June 2019*

Figure 9-15 – Electric Charging Facilities for Bury St Edmunds

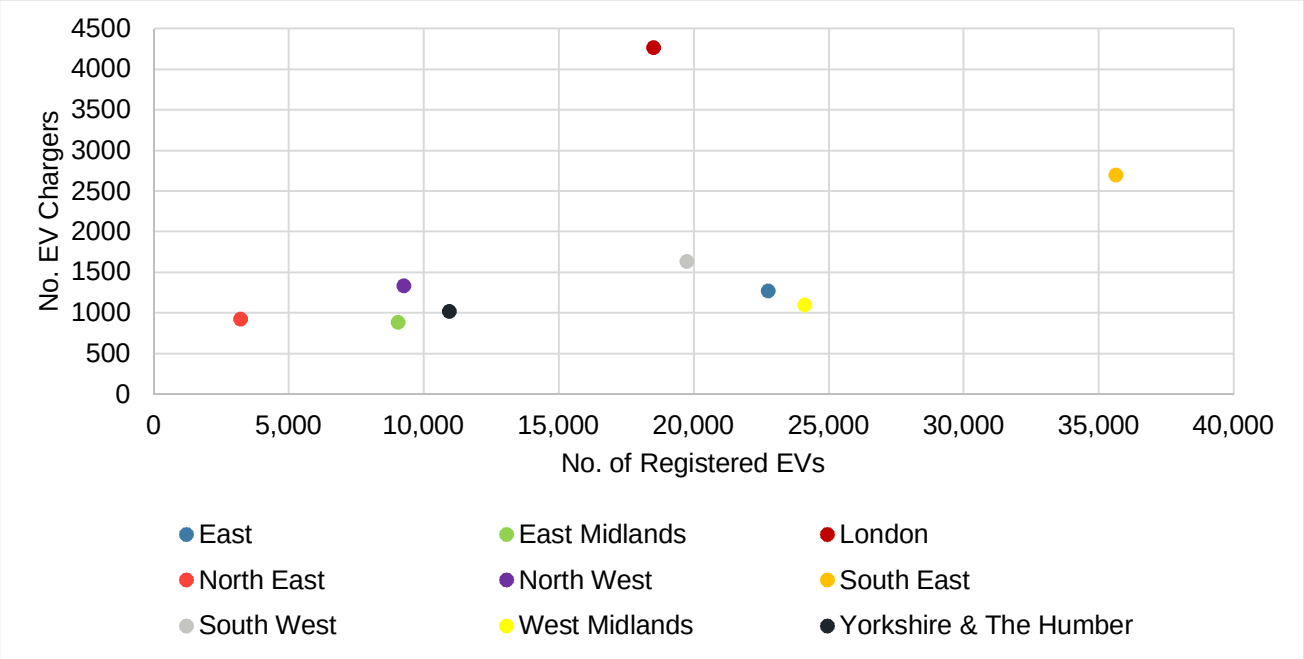


Source: Zap Map EV Infrastructure ***https://www.zap-map.com/live/*** *accessed June 2019*

9.5.23. The prevalence of EV infrastructure has previously been cited as a key determinant of plug-in vehicle uptake. Detailed data regarding the amount of available EV charging in each local authority in the Transport East region is not yet available. However, Figure 9-16 illustrates that the notional relationship between the number of electric vehicle chargers and the number of registered electric vehicles is not so straightforward.

9.5.24. There has been a substantial amount of investment in electric vehicle charging infrastructure in London for example however the uptake of plug-in vehicles does match investment in the infrastructure. The East region of the country in turn has seen much higher proportion in uptake in electric vehicles against the number of charging points.

Figure 9-16 – Number of EV Chargers Vs. Registered EVs (as of Q3 2018)



Sources: Profile of charging connectors across the UK regions: Zap-Map, January 2019 https://www.zap-map.com/statistics/ and Department for Transport, VEH 0131, Q3 2018 registered new vehicles, Local Authorities

9.5.25. The relative level of uptake in the Transport East region does not negate the need for interventions in some places. Local Authorities in the Transport East region are also beginning to invest in electric public transport. Essex County Council have installed electric car charging points at both their Chelmsford Park and Ride sites. Each park and ride site has two dual 7kW eVolt charge points operated by Electric Blue[150]. In addition, many rapid chargers have been installed across Norfolk as part of a Highways England funded installation project involving Norfolk, Suffolk and Essex[151].

[150] https://www.essexhighways.org/highway-schemes-and-developments/bids-and-funding/Low-Emissions-Buses-Scheme-LEBS.aspx
[151] https://www.edp24.co.uk/news/politics/new-rapid-charging-points-installed-1-6040930

NEW MODES AND BUSINESS MODELS

9.5.26. Limited data is available on the true extent of ride-sharing in the Transport East region due to the typically informal nature of how it is arranged and operates but also due to the limited data disclosure by ride-sharing platforms. Multiple platforms however are in operation in the region, offering both employee-led and peer-to-peer (P2P) ride-sharing schemes, such as Liftshare – who offers a ride-sharing platform to facilitate P2P and employee led ride-sharing across the UK. The platform has over 600,000 members and works with 900 employer clients to provide them with individual car share platforms. The organisation is headquartered in Norwich and have significant presence the in the region. Others operating in the region Scoop, BlaBlaCar, goCarShare, and Faxi.

9.5.27. Since ride-sourcing services rely upon high density of travel demand and supply, their initial implementation and usage growth in the UK has occurred in dense urban areas.

9.5.28. The Transport East region is no different. Using DfT published Private Hire Vehicle (PHV) licence data as a proxy for ride-sourcing services, the extent of services in the region can be assessed. In the East between 2017 and 2018, PHV driver licences in the region increased by +10.2% compared to a -0.3% decrease in taxi driver licences and vehicle licences increased +2.6%[152].

9.5.29. Although the entirety of this growth cannot be directly attributed to ride-sourcing services, the large increase in demand in licences does correspond to visible, popular services available in the region.

9.5.30. Mobility asset sharing allows users to access and share the use of different mobility modes without having to own them. However, the wider implications and market conditions associated with mobility asset sharing models can vary dependent on the mode.

9.5.31. For example, bike sharing schemes are a type of mobility asset sharing model that have faced a number of market challenges over the past few years; lack of take-up and vandalism has contributed to a number of the larger operators pulling out of UK cities, with Ofo (ceasing operations back to China) and Mobike (pulling out of Manchester) being the most notable. However, despite these market failures, bike sharing schemes in the Transport East region have continued to grow - Broads By Cycle is the self-service bike share scheme around the Broads in Norfolk. There is a total of 18 bikes at the docking stations in Hoveton, Horning and at Ludham Bridge.

9.5.32. With regards to car based mobility asset sharing schemes, the market has faced less challenges. For example, Co-Wheels is a social enterprise operating the only independently owned national car club in the UK. The car club operates across 60 locations including Norwich, Ipswich and Chelmsford in the Transport East Region. The service offers members pay-as-you-go access to low-emission cars available by the hour or by day. Each vehicle has its own designated bay which customers can pick them up from and drop them back to the same bay at the end of the reservation.

[152] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/751202/taxi-and-phv-england-2018.pdf

9.5.33. A Report by Big Issue Invest for Co-Wheels indicated that members are less likely to buy a car in the future after joining the club, and that between 2016-17, 42% of members stated that they drive less.[153] Additionally, Turo is a peer-to-peer car sharing platform that launched in the UK in September 2018 and allows private car owners to rent out their vehicles via an online and mobile interface. As of January 2019, the firm had added more than 1,000 privately owned cars and 75,000 users to the UK platform, and is available in locations such as Norwich and Thurrock.[154] The firm has also recently taken over EasyCar Club's 80,000 strong customer base.

9.5.34. Additionally, Enterprise Car Club operates in the East region, and offers more environmentally friendly vehicles; the company states that over 23% of their fleet are either electric or hybrid.[155]

9.5.35. Mobility as a service (MaaS) is focused on providing customers with seamless access and consumption of mobility services enabling them to undertake end-to-end journeys based on their individual preferences such as quality, cost and speed. MaaS services are in their relative infancy with Whim being the only commercial service operator active in the UK.

9.5.36. However, journey planning applications and travelcard schemes tend to be considered the precursor of MaaS platforms. Citymapper with its anticipated Citymapper card in London, is a key example of how these platforms are progressing towards MaaS. Furthermore, in the Transport East region, there are a number of journey planning applications and travelcard schemes available; for example, the First Bus app provided by the First Buses (who operate trains and buses in the East), enables users to store their train and bus tickets on their smartphone allowing for better modal integration. The app also makes it easier for customers to make claims as it automatically works out if a user is owed any compensation for travel delays.

9.5.37. Parking platforms provide consumers with information and app-based payment functions to reduce the traditional problems associated with finding and paying for parking. The extent of parking platforms in the Transport East region is growing, with services available in locations such as Norfolk, Suffolk, Thurrock and Essex.

9.5.38. One example parking platform that is operating in the region is AppyParking; founded in London in 2013. AppyParking provides products such as parking apps and services for drivers that involve software showing on-street and off-street parking (including disabled, electric and motorcycle bays) as well as yellow line and loading rules in major cities in the UK. Additionally, products include digital kerbside maps, cashless parking applications and real-time analytics to monitor on-street and car park occupancy.

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[153] Big Issue Invest, Big Issue Invest Social Enterprise Investment Fund L.P., in , Big Issue Invest, 2017, <https://images.bigissueinvest.com/2017/04/Big-Issue-Invest-SEIF-I-Annual-Report-2016-2017.pdf> [accessed 11 June 2019].

[154] "Turo expands car-sharing platform by taking on rival rental firms' customers", in Uk.news.yahoo.com, , 2019, <https://uk.news.yahoo.com/turo-expands-car-sharing-platform-taking-rival-rental-firms-customers-134458545.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAANH8dF1QLdEZzyPjLQH_FSLZ42kk0QZHBtpARie9ydjVwSFwOjFAWxraVk0BoXS14IC4KNrM5i9l6yMF4SlwacoNjEb3cyJlRtaxdgJVJm4bOSeA4RVDP9kmpOqAbBKfNbiSXX9uhzX8vGDrQlcVrz_roiPQiCaeWYb_JNRxuZA1> [accessed 11 June 2019].

[155] Enterprise Holdings, "Enterprise Car Club - Electric vehicles", in Enterprisecarclub.co.uk, , 2019, <https://www.enterprisecarclub.co.uk/gb/en/programs/promotion/electric-vehicles.html> [accessed 11 June 2019].

9.5.39. JustPark is another service that is available throughout the Transport East region. Founded in 2006, JustPark enables drivers to find, reserve and pay for available parking spaces. The app boasts over 20,000 reservable parking locations (including those within the Transport East region) and 2.5 million registered drivers. Additionally, the service (primarily WebApp) enables space owners to rent out their parking spaces (e.g. driveways) to make profits. The service also offers parking management solutions to help companies with under-utilised car parks. This involves real time reporting on car park performance, online payment platforms and targeted promotion.

SUMMARY

The way transport is delivered and is consumed is undergoing significant change – which is likely to accelerate in the coming years. The megatrends affecting how, when and where people will travel that are highlighted in this chapter demonstrate the externalities that should be considered as part developing the Transport Strategy to 2050. At the same time, new modes, mobility offerings and transport technologies are emerging at different levels of maturity and coming to market. Although it is not possible to predict exactly what the transport network will look like in the coming years, the status quo in unlikely to maintained.

Therefore, with this new landscape, sub regional bodies such Transport East, are under pressure to identify their role in shaping and influencing the future transport network. There will be areas that they seek to influence, areas which they will be required to monitor, and areas which will be left to the market to decide. Ultimately, what level of control do they need to adopt to ensure an outcome fitting with their vision for transport going forward.

10 SUMMARY AND CONCLUSION: THE CASE FOR INVESTMENT

10.1 STRENGTH OF THE TRANSPORT EAST REGION

- The Transport East region has a strong and diverse economy and makes a substantial contribution to the UK economy. The main sectors by GVA being distribution, public administration, real estate and manufacturing. This diversity is a strength and will help provide resilience to the region's economy in the event that an industry experiences decline.
- The region has a strong labour market with a higher than average proportion of economically active residents in the region in employment.
- Growth in jobs and GVA in the region over recent years has been strong but is slightly lower than the average for England as a whole.

10.2 THE STRATEGIC TRANSPORT CORRIDORS IN THE REGION ARE NOT PERFORMING

- The Transport East region has fifteen strategic transport corridors, comprised of the rail network, SRN and MRN. Sections of the road and rail corridors are operating at or close to capacity, particularly those corridors connecting the region with Greater London. Strategic transport investments in the road and rail capacity is therefore needed to address existing pinch-points on the network and accommodate future growth.
- A range of committed infrastructure improvement schemes are being progressed by local and strategic transport bodies to address a number of pinch-points along the strategic transport corridors. However, many of these schemes do not address the wider capacity issues along the corridor.
- Significant population growth is forecast across the Transport East region, with housing and employment growth focused along the MRN and SRN. Link and junction capacity issues on the MRN will potentially restrict the region to fully capitalise on its strengths and deliver housing, employment and economic growth.

10.3 GROWTH IN THE TRANSPORT EAST REGION WILL BE MULTICENTRED AND STRATEGIC TRANSPORT CORRIDORS MUST REFLECT THIS.

- The Transport East region is multi-centred and comprised of a large number of small to medium sized settlements with a smaller number of sub-regional centres that act as centres for sub-regional employment.
- Housing and employment growth is dispersed across the Transport East region and not solely focused around the major centres of population. As a result, connectivity between small and medium size settlements and the sub-regional centres will be vital for facilitating new housing and employment growth and supporting economic growth.
- London has a strong influence on the Transport East region with a significant proportion of the workforce commuting to / from London each day. Many of the road and rail transport corridors connecting the region with London being close to or at capacity and significant infrastructure intervention is needed to capitalise on a growing London labour market – particularly within Essex, Southend-on-Sea and Thurrock.
- The rural geography of the region results in a high reliance upon the car for journeys to work. This is reflective of the difficulties providing an attractive public transport network in these areas.

For this reason, the strong performance of the SRN and MRN connecting rural settlements is vital for economic, housing and employment growth in the region.

10.4 CONNECTIVITY TO GLOBAL GATEWAYS IN THE REGION NEEDS TO BE IMPROVED

- Maintaining and improving national and regional transport connectivity to the Transport East's global gateways is vital for supporting a growing regional and national economy.
- The majority of the major ports and airports in the region have good connectivity to the major strategic transport corridors. However, freight traffic movements are impacted by the capacity, reliability and resilience of the strategic transport corridors (e.g. capacity and gauge of rail corridors or junction capacity).
- Significant growth is forecast at many of the major ports and airports over the next 20 to 30 years and maintaining and improving access to these global gateways is vital to ensuring the success of the ports and airports in the Transport East Region.

10.5 ENERGISING COASTAL COMMUNITIES

- Coastal communities in the region are a centre for investment in the nuclear and offshore energy sector. Significant growth is forecast in the off-shore energy sector, with more than 6,000 skilled jobs expected to be created in the region by 2032.
- Many of these coastal communities have poor strategic transport connectivity and high levels of socio-economic deprivation. Improvements to the strategic transport corridors connecting coastal communities will not only help facilitate growth in the off-shore energy sector, but also reduce socio-economic deprivation by providing improved access to jobs and services.

10.6 ISSUES AND OPPORTUNITIES ALONG STRATEGIC TRANSPORT CORRIDORS

10.6.1. Table 10-1 below summarises the key transport issues and opportunities identified on the fifteen strategic transport corridors that have emerged from this REB. It should be noted that in many instances forecast housing and employment growth is shared across multiple corridors.

Table 10-1 – Issue and Opportunities along Strategic Transport Corridors

Strategic Transport Corridor	Global Gateways (major ports & airports)	Major Centres of Population Served by the Corridor	Forecasted Growth along the corridor in current local plan period		Existing Pinch Points	Committed Transport Infrastructure Schemes	Issues and opportunities
			Housing (total of sites > 1,000)	Employment (total of sites > 5ha in size)			
1. A17 – King's Lynn to A1 (Newark-on-Trent)		King's Lynn	11,990	50ha	§ Capacity issues at A17 / A147 roundabout		§ Significant employment growth is forecast in King's Lynn. Likely to attract increased number of trips towards the town from rural towns and villages along the A17 corridor.
2. A47 / Wherry Line – King's Lynn – Norwich – Great Yarmouth - Lowestoft	Peel Ports Great Yarmouth Norwich Airport	Norwich Great Yarmouth Lowestoft King's Lynn	20,770	274ha	§ Link capacity of A47 Acle Straight § Capacity issues at at-grade separated junctions throughout Great Yarmouth § Capacity issues at A47 Easton to Tuddenham and Blofield to Bulingham § Capacity issues at A47 / A10 junction south of King's Lynn. § Capacity issues on A17 on approach to junction with A47.	§ Capacity Improvements at A47 Vauxhall and Gapton Hall Roundabout § Great Yarmouth Third River Crossing § Blofield to North Burlingham dualling § North Tuddenham to Easton dualling § Capacity improvements at A47 / A11 Thickthorn junction § Lake Lothing Third River Crossing	§ Significant growth in the off-shore energy sector is forecasted in Great Yarmouth. § Capacity issues along A47 Acle Straight and congestion within Great Yarmouth currently constrains access to Peel Ports Great Yarmouth. § Great Yarmouth Third River Crossing will improve connectivity of the port from the SRN, but it does not improve sub-regional connectivity of the town. § North Tuddenham to Easton dualling should address junction capacity issues on the A47 west of Honningham. However, there is no committed improvement scheme for A47 Acle Straight. § Low frequency of rail services between Norwich and Great Yarmouth places increased importance on performance of the A47. § Large number of commuter movements between Norwich and Great Yarmouth and Great Yarmouth and Lowestoft. As such

Strategic Transport Corridor	Global Gateways (major ports & airports)	Major Centres of Population Served by the Corridor	Forecasted Growth along the corridor in current local plan period		Existing Pinch Points	Committed Transport Infrastructure Schemes	Issues and opportunities
			Housing (total of sites > 1,000)	Employment (total of sites > 5ha in size)			
							strong connectivity via the A47 between these settlements important. § Capacity issues need to be addressed on A47 at King's Lynn to help facilitate forecasted housing growth. § Capacity Issues on approach to Bascule Bridge. The proposed Third River Crossing will help relieve congestion in the town.
3. A11 / Breckland Line – Norwich – Cambridge - London		Norwich	14,880	104ha	§ Capacity issues at the A11 /A47 Thickthorn junction § Capacity issues at A11 roundabouts at Thetford § Capacity issues at Fiveways roundabout near Mildenhall	§ Capacity improvement at A11 /A47 Thickthorn junction	§ Corridor is dualled and currently performs well at peak times. § Forecast growth along the corridor will place increased pressure on existing at-grade junctions on the A11. Currently there are no committed transport infrastructure improvement schemes for these junctions. § Planned improvements at the A11 / A47 Thickthorn junction should address capacity issues. § Link capacity issues are forecast on the A11 on approach to Thetford in 2041 DM scenario.
4. A14 / Ipswich-Ely Line / Felixstowe Branch Line – Midlands – Cambridge – Ipswich - Felixstowe	Port of Felixstowe Port of Ipswich	Ipswich Bury St Edmunds	21,275	344	§ Capacity of Felixstowe Branch Line. The line is principally single tracked. § Capacity issues on the wider rail network between Felixstowe, the West Midlands and the North (e.g. train length restrictions on the Felixstowe to West Midlands and North via Ely route and line capacity of the GEML). § Capacity issues at A14 / A12 Copdock Interchange.	§ Capacity improvements along the Felixstowe Branch Line (line upgrades and track re-doubling). § Ely Junction Capacity Area Enhancement (rail).	§ The A14 is the primary east-west route for HGVs accessing the Port of Felixstowe. § Need to address gauge and line capacity restrictions on wider rail network between Felixstowe, the West Midlands and the North. § The A14 has poor resilience to accidents and incidents. There is no hard shoulder on A14 and the Orwell Bridge can be closed in adverse weather. § Rail improvement schemes will facilitate increased number of freight movements to the Port of Felixstowe. This will help facilitate growth at the port and reduce pressure on the SRN and MRN. § A14 Copdock Improvement scheme needed to help facilitate employment and housing growth within Ipswich and along wider A14 corridor.

Strategic Transport Corridor	Global Gateways (major ports & airports)	Major Centres of Population Served by the Corridor	Forecasted Growth along the corridor in current local plan period		Existing Pinch Points	Committed Transport Infrastructure Schemes	Issues and opportunities
			Housing (total of sites > 1,000)	Employment (total of sites > 5ha in size)			
					§ Orwell Bridge (closures during adverse weather). § No hard shoulder on A14.		
5. A120 / A12 / A133 / Mayflower Rail Line – Harwich / Clacton-on-Sea – Colchester – Braintree – Stansted Airport	London Stansted Airport Harwich Port	Braintree Colchester Clacton-on-Sea	14,175	84ha	§ Capacity of M11 Junction 8 § Junction and link capacity along single carriageway section of A120 between Braintree and Marks Tey § Link and junction capacity issues at and on approach to the A120 / A133 roundabout § Junction and link capacity of A133 through Clacton-on-Sea	§ M11 Junction 8 capacity improvements. § A133 Colchester to Clacton Improvements	§ There is poor east-west connectivity along the corridor. This is because of the single carriageway section of the A12 between Braintree and Mark's Tey (A12) which experiences significant delay and congestion at peak times. § London Stansted Airport and Harwich Port have poor east-west rail connectivity. § Significant growth is forecast along the corridor, with a number of Garden Towns proposed. It will not be possible to accommodate proposed growth without significant improvements to the A120 between Braintree and Marks Tey / A12. § The capacity improvements proposed at M11 Junction 8 are relatively small and unlikely to unlock significant housing and employment growth. Capacity of M11 Junction 8 could potentially constrain growth and expansion at London Stansted Airport. § The performance of the A120 between Colchester and Harwich is important for the future success and growth of Harwich Port. This will also help facilitate the large number of commuter flows between Harwich and Colchester. § The accessibility of Clacton-on-Sea is poor, with high levels of congestion and delay recorded at and on approach to major at-grade junctions. § There are high levels of commuting between Clacton-on-Sea and Colchester. § Clacton-on-Sea suffers from high levels of socio-economic deprivation. Improvements to the connectivity of settlements along the corridor will help improve the accessibility of jobs and services as well as attract new inward investment into the town.

Strategic Transport Corridor	Global Gateways (major ports & airports)	Major Centres of Population Served by the Corridor	Forecasted Growth along the corridor in current local plan period		Existing Pinch Points	Committed Transport Infrastructure Schemes	Issues and opportunities
			Housing (total of sites > 1,000)	Employment (total of sites > 5ha in size)			
							§ Unlike many coastal communities in the Transport East region, Clacton-on-Sea benefits from direct train services to London Liverpool Street, Chelmsford and Colchester making it an attractive location for commuters. § To address capacity issues along the corridor ECC are delivering an improvement scheme along the A133 corridor. § Improvements to the connectivity of Clacton-on-Sea will also help the town take advantage of the significant investment in off-shore energy in the region.
6. M11 / West Anglia Mainline – London – Stansted Airport - Cambridge	London Stansted Airport	Harlow	8,750	120ha	§ Capacity of M11 Junction 8 § Capacity of M11 / A406 interchange	§ New Junction 7A on M11	§ The corridor has strong north-south rail connectivity, providing direct connectivity to London Stansted Airport. § The M11 generally performs well at peak times. § Capacity of M11 Junction 8 could potentially constrain growth and expansion at London Stansted Airport. § Link capacity issues are forecast along the 2-lane dual carriageway section north of London Stansted Airport at peak times in the 2041 DM scenario. § A new junction proposed on the M11 will improve the accessibility of Harlow, facilitate growth in the town and help relieve congestion at other junctions along the corridor.
7. A1042 / A140 / A149 / Great Eastern Mainline / Bittern Line – Ipswich – Norwich – North Norfolk	Norwich Airport	Norwich Ipswich	16,628	157ha	§ Junction and link capacity issues on A140 through Norwich § Junction and link capacity issues on A140 through Long Stratton	§ A140 Eye Airfield Junction Improvements and Link Road	§ The corridor is single carriageway that routes through Norwich and many other towns and villages. There are frequent side access and at-grade junctions. At peak times this leads to a reduction in average journey times along the entire corridor. § Link capacity issues are forecast on the A140 north and through Norwich at peak times in the 2041 DM scenario. § The recently opened A1270 Broadland Norwthway improves connectivity between

Strategic Transport Corridor	Global Gateways (major ports & airports)	Major Centres of Population Served by the Corridor	Forecasted Growth along the corridor in current local plan period		Existing Pinch Points	Committed Transport Infrastructure Schemes	Issues and opportunities
			Housing (total of sites > 1,000)	Employment (total of sites > 5ha in size)			
							the A140 to the north and A47 to south of Norwich, removing the need for vehicles to route through the city. § There is no strategic connection between the A47 and A140 to the west of Norwich. For vehicles travelling to / from the west this leads increased journey distances via the NDR, traffic to route through Norwich City Centre or via other local routes not suitable for strategic traffic. § The NDR has improved the connectivity of Norwich Airport to the wider SRN. § The frequency of rail services between Norwich and Sheringham is low. Improvements would help facilitate growth at settlements along these corridors. § Significant growth is forecast to the north of Norwich, this will place increased pressure on the A1270 (NDR) and A140 west of Norwich. § Norwich Western Link scheme would help facilitate housing growth to the north of Norwich by providing a new connection to the A47 to the West. This would reduce pressure on the A140 and A1270 to the west and reduce the amount of through traffic travelling through the centre of Norwich. § There is a relatively low number of commuter movements towards Norwich from settlements to the south of Norwich. This may be attributable to poor connectivity along the A140. § A140 at Long Stratton is an existing pinch point and significant growth is forecasted in the settlement.
8. A146 / A1117 / – Norwich - Lowestoft	Port of Lowestoft	Norwich Lowestoft	4,430	81ha	§ Capacity of the A146 / A143 junction near Beccles § Capacity of the A146 /A1145 junction near Lowestoft	§ Lake Lothing Third River Crossing	§ The existing bascule bridges across Lake Lothing and the Inner Harbour creates a pinch point and leads to significant congestion at peak times on approach. The Lake Lothing Third River Crossing Scheme would improve north-south connectivity

Strategic Transport Corridor	Global Gateways (major ports & airports)	Major Centres of Population Served by the Corridor	Forecasted Growth along the corridor in current local plan period		Existing Pinch Points	Committed Transport Infrastructure Schemes	Issues and opportunities
			Housing (total of sites > 1,000)	Employment (total of sites > 5ha in size)			
					§ Existing Bascule Bridges across Lake Lothing and Inner Harbour create pinch points and leads to congestion through centre of Lowestoft		within the town and help facilitate housing and employment growth. § Housing growth forecast in Beccles will place increased pressure on the A146 corridor and existing at-grade junctions which already experience delay at peak times. § Link capacity issues are forecast along the A146 near Beccles and on approach to the A47 in the 2041 DM scenario. § A large number of commuter movements are currently recorded from Beccles and Lowestoft towards Norwich. Commuter flows along this corridor are likely to increase with proposed housing growth. This will place increased pressure on A146.
9. A10 / Fen Line – King's Lynn – Cambridge - London		King's Lynn	14,700 of which 1,600 are planned to be delivered in West Winch by the end of the current local plan period in 2026 (in total 4,000 new homes are planned in a strategic growth area which includes West Winch and the nearby village of North Runcton).	67ha	§ Approach to at-grade junctions. § A10 / A47 junction, south of King's Lynn.		§ The A10 corridor generally performs well at peak periods, with delay on approach to the at grade junctions. § Housing growth forecast in Downham Market and wider A10 corridor in Cambridgeshire is likely to generate a significant number of additional vehicle movements on the A10 to / from King's Lynn. This is likely to place increased pressure on existing at-grade junctions along the corridor, particularly the A10 / A47 junction. § To support the proposed level of growth in West Winch (4,000 dwellings), a new access road is proposed.
10. A10 / A134 / A131 – King's Lynn – Thetford – Bury St Edmunds – Braintree – Chelmsford		King's Lynn Bury St Edmunds Braintree Chelmsford	34,268	178ha	§ Capacity issues at A11 / A134 roundabout. § Capacity issues at A14 / A134 / A1302 grade separated junction. § Link and junction capacity issues between		§ Forecasted growth is principally within the major towns and cities along the corridor where there are additional connections to the SRN (e.g. Thetford, Bury St Edmunds, Braintree and Chelmsford). § Sudbury is one of the few settlements along the corridor where housing growth is forecast and there are no other connections

Strategic Transport Corridor	Global Gateways (major ports & airports)	Major Centres of Population Served by the Corridor	Forecasted Growth along the corridor in current local plan period		Existing Pinch Points	Committed Transport Infrastructure Schemes	Issues and opportunities
			Housing (total of sites > 1,000)	Employment (total of sites > 5ha in size)			
					the A14 and A1302 in Bury St Edmunds. § Link and junction capacity issues along the A131 through Sudbury § Link and junction capacity issues along the A131 through Halstead. § Junction capacity issues at A131 / A12 / B1256 roundabout. § Link and junction capacity issues along A130 between Great Leighs and Chelmsford (change from dual to single carriageway).		to the SRN or MRN. A feasibility study of a new western bypass at Sudbury to alleviate congestion along the corridor at this location is ongoing. The bypass would help facilitate growth within Sudbury as well as other settlements along the Braintree to Bury St Edmunds section of the corridor. § Peak hour delay and congestion is experienced along single carriageway sections and on approach to major at-grade junction and where the corridor routes through towns and villages. § Chelmsford City's new local plan will look to safeguard a new north-east bypass. This would relieve existing congestion through Chelmsford and help facilitate significant housing and employment growth along the corridor. § The performance of the corridor is important for the economy of the Transport East region. There are a significant number of commuter movements towards Chelmsford from settlements along the corridor (Basildon, Rayleigh and Braintree).
10. A12 / GEML – Lowestoft – Ipswich – Colchester – Chelmsford - London	Port of Ipswich Port of Felixstowe	Brentwood Chelmsford Colchester Ipswich Lowestoft	18,670	552ha	§ Capacity of two tracked section of GEML between Shenfield and Colchester § Capacity issues at A14 / A12 Copdock Interchange. § Link and junction capacity issues along the A12 near Woodbridge. § Link and junction capacity issues through Lowestoft on approach to the bascule bridge across the outer harbour.	§ New rolling stock § Elizabeth Line § Beaulieu Park Station § Lake Lothing Third River Crossing § A12 Colchester Bypass Widening § Whole route technology upgrade between the M25 and Ipswich § Widening of the A12 between Colchester and Chelmsford to three lanes.	§ Large number of commuter movements along the corridor between the major towns and cities in Essex and Suffolk and Greater London. § Peak hour passenger services on GEML at capacity. In 2019 seat utilisation will be full between Chelmsford and London Liverpool Street and high levels of standing between Shenfield and Stratford. § There is no ability to introduce additional train services on the GEML due to track capacity constraints. In particular the two-tracked section between Shenfield and Colchester. § To facilitate increased train movements on the GEML new passing loops are needed. A number of locations have been identified,

Strategic Transport Corridor	Global Gateways (major ports & airports)	Major Centres of Population Served by the Corridor	Forecasted Growth along the corridor in current local plan period		Existing Pinch Points	Committed Transport Infrastructure Schemes	Issues and opportunities
			Housing (total of sites > 1,000)	Employment (total of sites > 5ha in size)			
					§ Link capacity of A12 between Chelmsford and Colchester		including at the proposed Beaulieu Park station. § The Elizabeth line will provide capacity enhancement on the line between Shenfield and London Liverpool Street. § New rolling stock being introduced by Greater Anglia will provide network wide capacity improvements. § Sections of the A12 are already at capacity, with significant delay and congestion recorded at peak times between Colchester and Chelmsford. Planned improvement schemes by Highways England will increase the capacity of this section of the corridor. § Two Garden cities are proposed along the corridor near Colchester and Marks Tey. This will place increased pressure on the A12 and existing services on the GEML. § Without the delivery of transport infrastructure improvement schemes along the corridor, capacity constraints are likely to constrain future housing and employment growth. § Potential for Suffolk's Energy Gateway to support proposed for Sizewell C Nuclear Power Station.
§ 12. A414 / A1114 / A138 – Chelmsford - Harlow		Chelmsford Harlow	12,850	19ha	§ Capacity issues at A138 / A1114 Army and Navy Roundabout § Link and Junction capacity issues along A1114 through Chelmsford § Capacity issues at A414 / B184 roundabout in Chipping Ongar § Capacity issues at M11 Junction 7 § Link and junction capacity issues on A414 through Harlow	§ New Junction 7A on M11	§ Number of junction and link capacity issues along the corridor with no planned improvement scheme. § The new Junction 7A on the M11 will help relieve congestion at existing junctions on the M11 and though Harlow. § Significant levels of housing and employment growth are forecast in Chelmsford and Harlow. Congestion on the A12 corridor may encourage residents travelling to / from London to route via the M11 and the Chelmsford to Harlow corridor. § There is currently a relatively low number of commuting movements between Harlow and Chelmsford. Link and junction capacity

Strategic Transport Corridor	Global Gateways (major ports & airports)	Major Centres of Population Served by the Corridor	Forecasted Growth along the corridor in current local plan period		Existing Pinch Points	Committed Transport Infrastructure Schemes	Issues and opportunities
			Housing (total of sites > 1,000)	Employment (total of sites > 5ha in size)			
							improvements may increase flows between these two settlements.
13. A137 / Essex Thameside – London – Southend-on-Sea	London Southend Airport	Southend-on-Sea Basildon	9,328	88ha, with significant proportion proposed within Rayleigh plus 3,400 new jobs in Southend-on-Sea	§ Link and junction capacity on the A127 on approach to Southend-on-Sea § Link and junction capacity on the A127 between the M25 and Basildon § Link and junction capacity on the A127 on approach to A132 at Basildon § Capacity of A127 / Progress Road / The Fairway signalised junction § Link and junction capacity on the A127, A1159 and A13 through Southend and Southend-on-Sea § Capacity of Fenchurch Street Station to accommodate additional services	§ Capacity improvement at A127 / A130 Fairglen Interchange § Capacity improvement at A127 Bell Junction § Capacity improvement at A127 Kent Elms Junction	§ The corridor serves a highly populated area of south Essex, Thurrock and Southend-on-Sea. It also provides connectivity to London Southend Airport. § The corridor benefits from strong rail connectivity to / from London with a dedicated rail station serving London Southend Airport. § The road corridor experiences significant delay and congestion at peak times. With peak hour vehicle speeds significantly lower than overnight “free-flow” conditions. This hinders the peak hour accessibility of London Southend Airport. § Planned improvements at the A127 / A130 and at junctions within Southend-on-Sea will help relieve some of the traffic congestion and delay experienced along the corridor. § There is a significant number of commuter movements from Southend-on-Sea towards London as well as between the main urban settlements within south Essex, Thurrock and Southend-on-Sea. § Future growth forecast along the corridor, including significant employment growth near Rayleigh and a new garden community of Dunton Hills, is likely to place increased pressure on the A127 and Essex Thameside services as a result of increased movements towards London and surrounding urban areas.
14. A13 / A176 / A130 – London – Thurrock – Tilbury - Chelmsford	Port of Tilbury DP World London Gateway	Grays Basildon	15,148	529ha (of which a significant proportion is associated with the growth of DP	§ Capacity on Essex Thameside line from Pitsea into London Fenchurch Street with widespread and substantial levels of standing	§ Lower Thames Crossing § A13 Widening § Capacity improvements at A127 / A130 Fairglen Interchange	§ Capacity issues on the A13 constrain the accessibility of the Port of Tilbury and DP World London Gateway from the north and east of the region. § Significant employment growth is forecast within DP World London Gateway. To facilitate this improvement are needed to the existing A1014 access from the A13.

Strategic Transport Corridor	Global Gateways (major ports & airports)	Major Centres of Population Served by the Corridor	Forecasted Growth along the corridor in current local plan period		Existing Pinch Points	Committed Transport Infrastructure Schemes	Issues and opportunities
			Housing (total of sites > 1,000)	Employment (total of sites > 5ha in size)			
				World London Gateway)	§ Link and junction capacity of A13 south of Basildon § Link and junction capacity of A176 through Basildon. § Capacity of the cross London rail line to facilitate freight movements from the Port of Tilbury and DP World London Gateway.		§ The Lower Thames Crossing Scheme will help relieve congestion on the A13 and M25 at and on-approach to the existing Dartford Crossing as well as improve the accessibility of DP World London Gateway and Port of Tilbury and accommodate future housing growth forecast within Thurrock and Grays. § There is a need to increase the capacity of the cross-London rail lines serving the Port of Tilbury and DP World London Gateway to increase the number of freight movements to and from the ports. There is also a need to increase freight capacity on the wider rail network in line with this growth.
15. M25 North East Quadrant – Thurrock – A12 – M11			13,355	166ha	§ Dartford Crossing	§ Lower Thames Crossing	§ The corridor generally performs well in the peak periods. § Congestion and delay are principally associated with the Dartford Crossing. The new Lower Thames Crossing will provide an alternative route for strategic traffic travelling towards the Port of Dover. § The M25 connects major strategic routes in the UK together. As such the corridor is of vital importance for maintaining strong connectivity between the Transport East region and the rest of the UK.

10.7 NEXT STEPS

10.7.1. This REB has set out the regional context, the strategic transport corridors, existing network issues, planned improvements. key strategic housing and employment developments, significant trade and gateways for international connectivity, environmental constraints and future externalities that could disrupt strategic transport infrastructure in the future including factors such as an aging population and digital technologies.

10.7.2. Transport East will build on the work summarised in this REB to develop their Transport Strategy, identifying the strategic transport investment requirements to 2050. This REB also provides a strategic overview of the MRN to inform the prioritisation of MRN investments in the region for the period 2020 to 2025. A prioritisation assessment of the MRN schemes within the region will be undertaken using a multi-criteria assessment informed by the analysis in this REB.