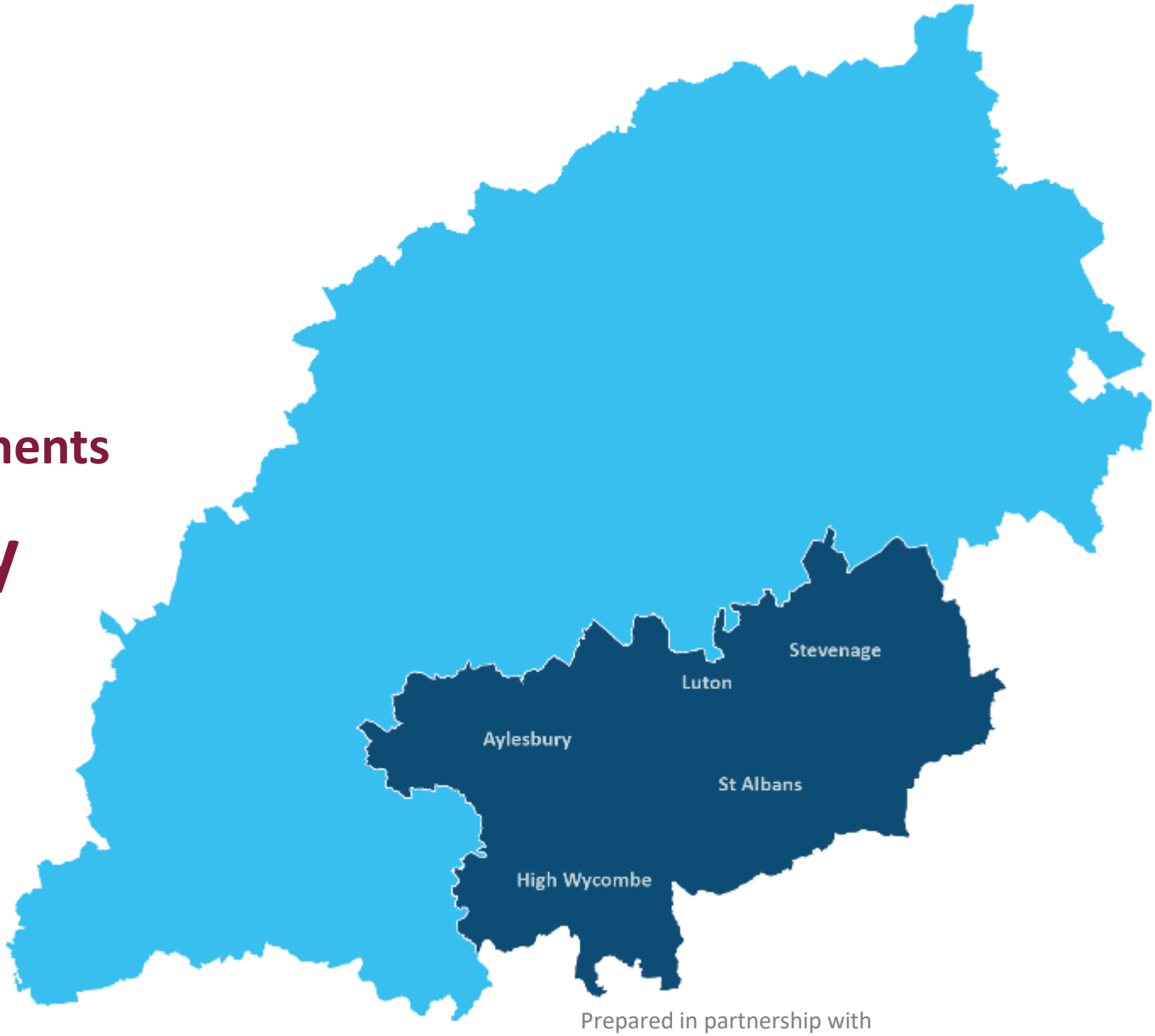
ENGLAND'S ECONOMIC HEARTLAND

Southern East-West Movements

Connectivity Study

Evidence Base Report



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steer wsp

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England's Economic Heartland Evidence Base for South East West Connectivity Study

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Executive Summary

England's Economic Heartland (EEH) is the sub-national transport body responsible for bringing together local transport authorities in a strategic partnership for the region extending from Swindon to Cambridgeshire and North Northamptonshire to Hertfordshire.

Our 2021 Transport Strategy, ***Connecting People, Transforming Journeys***, set an ambitious policy framework with the vision for our transport system:

> *"To support sustainable growth and improve quality of life and wellbeing through a world-class, decarbonised transport system which harnesses the region's global expertise in technology and innovation to unlock new opportunities for residents and businesses, in a way that benefits the UK as a whole."*

Our strategy highlights that ours is **one of the world's leading economic regions**, with its success founded on science and technology innovation, powered by a network of world-leading universities and research centres.

Based on the **requirement to achieve net zero by 2050 at the latest**, and an ambition to reach this by 2040, we are also working to support delivery of a net zero transport network and our strategy sets out that we will work with infrastructure owners and operators to ensure that proposals brought forward for the development of the transport system reduce reliance on the private car.

Advancing on the Transport Strategy is a **programme of Connectivity Studies** to examine key study areas across the region in detail with the aim of identifying a preferred package of multimodal infrastructure, service, or policy interventions to help achieve the Transport Strategy objectives.

The "*South – East - West Connectivity Study*" (S-E-W) is led by EEH, supported by a consultancy team comprising Steer, WSP, 5th Studio and DMS Research & Consulting.

This report presents an evidence base that supports subsequent identification and recommendation of interventions as part of the Connectivity Study. It details existing and growing complex challenges and opportunities facing the study area along with a clear set of 'critical success factors' and objectives to address the identified issues going forward.

Key evidence base findings

- Demand for movement in the study area comprises of east-west and north-south movements with the geography being strategically located to the northwest of London.
- Connectivity varies across the study area with limited east-west public transport services at present. In the coming years a number of planned transport schemes will provide greater travel choice.
- There are key differences in characteristics across the study area, particularly in the west compared to the east relating to average earnings and house prices. These economic differences can mean people travel longer distances for work compared to where they live.
- Improving connectivity and equality of access opportunity across the various socioeconomic groups and across both the urban and rural communities while achieving net zero carbon emissions is a key challenge facing the region.

- The study area contains major origins and destinations, creating a significant volume of road traffic both within and through the area. This includes large settlements such as Luton (including the airport) and Watford as well as Universities, research sites and business parks.
- There is a strong national, regional and local policy and strategy landscape shaped around inclusive and sustainable connectivity. The region must decarbonize its transport network with the aspiration to do so by 2040 instead of the legally required 2050, deliver nationally significant major infrastructure projects and foster future growth in high quality jobs and education opportunities for an increasing number of residents.
- Significant growth of population and housing is forecast and needs to be accommodated in a more sustainable and less private car-centric manner. This creates opportunities to ensure new development and transport infrastructure are integrated and well designed to help facilitate transition to an equitable, accessible and decarbonized region.
- An assessment of the strengths, weaknesses, opportunities, and challenges provides the need for intervention and will shape the identification and recommendation of proposed interventions to improve transport services and infrastructure. It also identifies opportunities to change the embedded patterns of behaviour through policy, scheme and initiative delivery.

Critical Success Factors

Through the project's Steering and Stakeholder Groups, a series of objectives based on the aims of the EEH transport strategy have been developed. Complementing these are a series of Critical Success Factors that progress and proposed interventions can be monitored against. These Critical Success Factors are that by 2050:

1. The carbon emissions from transport are reduced to net zero with an ambition to reach this by 2040.
2. Improved digital infrastructure reduces the need to travel.
3. A high-quality, sustainable, integrated and accessible transport network connects all places of strategic importance.
4. Rural communities are well connected to services and opportunities by a safe and reliable public transport network.
5. The transport network enables safe and sustainable distribution of goods within and through the area via appropriate routes.
6. Everyone can access the benefits of new and improved technologies (e.g. shared electric vehicle services).
7. The benefits of new strategic/ major infrastructure are maximised for the whole study geography (e.g. HS2 creates freight capacity on WCML)
8. Improved transport connectivity enables sustainable and high-quality planned development that improve accessibility and links to improved quality of life.
9. There is a substantial increase in active travel mode share for all local and first mile last mile journeys, contributing to better connectivity, increased health benefits through increasing physical activity and improved air quality.

1 Introduction

The Ambition

The region England's Economic Heartland (EEH) supports is an economic and innovation powerhouse, home to world-leading universities and innovators. It is blessed with a **natural, historic and built environment that makes it an attractive place to live and work.** EEH aims to harness these attributes to the benefit of both existing communities and future generations.

***Connecting People, Transforming Journeys* - EEH's Transport Strategy - emphasises that investment in the transport system will continue to be essential in order to enable economic growth in a sustainable way.** At the same time, changes must be made to the way in which investments are planned, developed and delivered.

Lack of capacity within the current transport system acts as a constraint on growth and reduces resilience and reliability, all of which impacts productivity. Lack of choice in travel options also act as a constraint on access to the full range of jobs, homes, services and amenities the region has to offer. The environmental impact of our transport system is unacceptable, with carbon emissions in many parts of the study area are significantly above the national average.

Steer and WSP have been commissioned by EEH to undertake a Connectivity Study of the South East Western area. The Connectivity Study aims to identify a preferred package of multi-modal interventions that deliver the required connectivity outcomes that help achieve EEH's objectives identified within the Connecting People, Transforming Journeys - EEH's Transport Strategy.

This is the fifth in a series of connectivity studies that along with other work being undertaken by EEH will inform an updated Investment Pipeline Matrix to guide future decision making, prioritisation and funding bids.

The Vision

Connecting People, Transforming Journeys provides the step-change in approach required to seize the opportunity to deliver a transport system that supports a green economic recovery and enables growth, whilst preserving and enhancing the natural, historic and built environment.

The overarching vision is: ***"To support sustainable growth and improve quality of life and wellbeing through a world-class, decarbonised transport system which harnesses the region's global expertise in technology and innovation to unlock new opportunities for residents and businesses, in a way that benefits the UK as a whole."***

This ambition requires a shared commitment between the partners in the region and national government for bold decision making that puts people and the environment at its centre. It looks to realise synergies with other policy areas that have a major impact on the way people travel, including spatial planning, digital infrastructure, utilities, education and health.

Connecting People, Transforming Journeys sets the policy framework, supported by an initial investment pipeline, that will deliver the ambition. It is guided by four key principles:

- **Principle 1**: Achieving net Zero no later than 2050, with an ambition to reach this by 2040.
- **Principle 2**: Improving quality of life and wellbeing through a safe and inclusive transport system accessible to all which emphasises sustainable and active travel.
- **Principle 3**: Supporting the regional economy by connecting people and businesses to markets and opportunities.
- **Principle 4**: Efficient movement of people and goods through the region and to international gateways.

Methodology

This study is being undertaken in four phases:

- **Phase 1**: Methodology Development
- **Phase 2**: Setting the Scene
- **Phase 3**: Producing Recommendations
- **Phase 4**: Final Package of Interventions

This report focuses on Phase 2 which includes a summary of the findings of the first four steps of the Department for Transports (DfT's) *Transport Appraisal Process*, shown in Table 1.

Understanding the policy context, the current and future community and connectivity issues and opportunities within the study area is a vital first step. This information will assist in the **identification of multi-modal intervention packages which seek to address the underlying causes of the identified challenges**, whilst also providing opportunities for existing and future communities.

Our approach to gathering evidence to establish the need for intervention, identify study objectives and critical success factors has been guided by the key principles identified within the EEH's Transport Strategy - net zero carbon, economic, quality of life, wellbeing, inclusive access, sustainable and active travel connectivity and freight.

Table 1 DfT Transport Appraisal Process[1]

Step 1: Understanding the Current Situation	Step 2: Understanding the Future Situation	Step 3: Establishing the Need for Intervention	Step 4a: Identify Intervention Specific Objectives
• Policy context • People • Place • Connectivity • Movement patterns • Issues and opportunities	• Planned growth • Committed transport improvements • Forecast changes in travel demand	• Key issues and opportunities • Underlying causes and drivers • The case for intervention • Critical success factors	• Objectives

Consistent with *Connecting People, Transforming Journeys* 'whole system approach', this Phase 2 report summarises our people, place and connectivity evidence base to demonstrate the existing and growing complex challenges facing the study area along with a clear set of critical success factors and objectives to address the identified problems.

The study recognises that strategic infrastructure issues (and solutions) extend beyond a single area and adopts a cross-border, strategic approach to assessing connectivity and movement. The study goes beyond more localised approaches to addressing transport issues, like Local Transport Maps, to identify strategic interventions that meet the ambitions of the study area. This reflects EEH's function as a Strategic Transport Body which has the aim of ensuring that regional investment in transport is 'joined up'.

[1] Source: The Green Book, HM Treasury, 2022, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1063330/Green_Book_2022.pdf

Report Structure

The remainder of the report is structured as follows:

Part 2: The Study Area - This section identifies the key characteristics and features of the study area in terms of active travel uptake, public transport links and significant road and rail links. It also describes the main population centres and key settlements within the geography.

Part 3: Policy Context - This section reviews relevant National, Sub-national and Local policy and strategy documentation in order to set out the overarching objectives and priorities concerning the study area which will assist in guiding the development of required transport measures and initiatives.

Part 4: Current Context (People) - This section reveals demographic data and information on the people living and working within the study area.

Part 5: Current Context (Place) - The current context in terms of place is discussed in this section with the identification of environmental constraints and opportunities and details of location-based issues such as air quality, safety and carbon emissions.

Part 6: Current Context (Connectivity) - The existing digital and transport network within the study area is presented in section 6. Data on current modal and movement patterns is covered as well as a discussion on connectivity challenges and opportunities within the area.

Part 7: Stakeholder Engagement - This section sets out issues and opportunities raised by stakeholders through a Steering Group and Workshop session. The feedback shapes Objectives for interventions going forward and Critical Success Factors that will be used to determine the success of interventions.

Part 8 Future Context - This section sets out the scale of the growth challenge within the study area. It sets out the potential implications of planned growth if transport interventions are not provided that address the existing issues raised throughout the Evidence Base. Committed and proposed transport interventions which will impact capacity and connectivity for the study area are discussed in order to understand the future baseline position in terms of transport provision and accessibility.

Part 9: Need for Intervention - This section summarises the case for intervention based upon an understanding of the study area today, the scale of the growth challenge and the underlying drivers and causes of the identified issues identified through the Evidence Base. It provides a Strengths, Weaknesses, Opportunities and Constraints (SWOC) analysis of the study area.

Part 10: Next Steps - This section sets out the next steps with the study.

2 The Study Area

Overview

The study area for the South-East-West (S-E-W) Connectivity Study, as is presented in Figure 1. The area extends between High Wycombe and Bishops Stortford, encompassing the urban areas of Aylesbury, Luton, St Albans, Stevenage, Watford, and various commuter towns to the north of London. It spans across several Local Authority areas including Buckinghamshire, Dacorum, St. Albans, Central Bedfordshire, Luton, North Hertfordshire, Stevenage, Welwyn Hatfield, and East Hertfordshire.

East-west movement are a particular focus of this study, with the study area confirmed by the Project Steering Group frames by the M25 and EEH boundary to the south and the southern catchment of East West Rail to the north. Notably the study area currently lacks any east-west rail or dedicated bus routes.

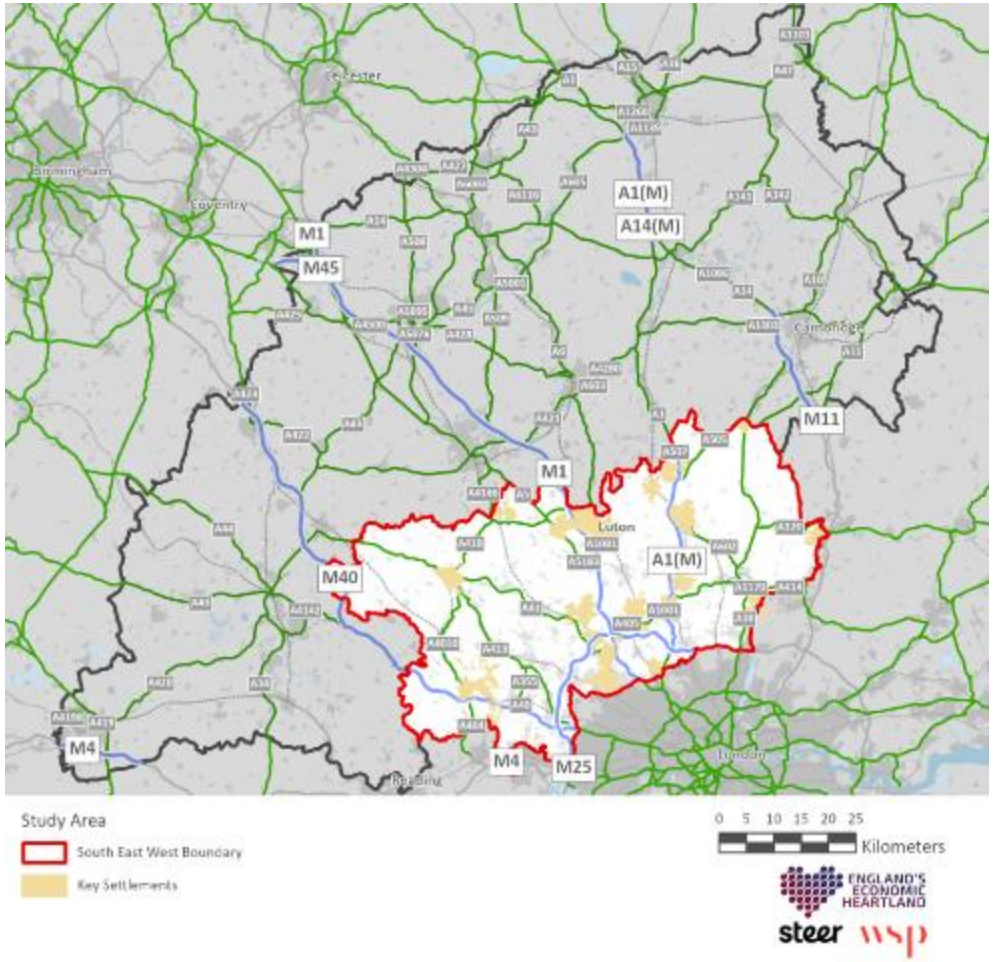
Key rail links in the study area include the Chiltern Main Line (CML), the East Coast Main Line (ECML), the West Coast Main Line (ECML), West Anglia Main Line (WAML), and the Midland Main Line (MML). The MML and connections to it many of its key railway stations will be the focus of a later Connectivity Study.

The area encompasses regional and nationally significant road links, including the M1, A1(M) and the M40, as well as the north west portion of the M25. All of which form part of the Strategic Road Network (SRN) and are managed by National Highways. Other key regional roads, managed by Local Highway Authorities, include A10, A41, A120, A413, A414, A418, A505, A5183 and A602.

Further details on the strategic transport routes connecting the study area with the wider EEH region is provided in section 2 The Study Area.

Note: As part of the overall connectivity study programme, a separate study focused on north-south movements between the Thames Valley and Northampton is being conducted in unison with this study.

Figure 1 Study Area Overview Map[2]



[2] Source: Authority Boundaries, ONS, 2022 https://geoportal.statistics.gov.uk/

Figure 1 shows the red line boundary of the core study area in the context of the wider EEH region. The area forms a transitionary area between the denser suburbs of Greater London in the south and the sparser rural areas to the north which feature intermittent medium and small sized settlements sporadically located along the road networks.

The study area covers a large proportion of the Chilterns Area of Outstanding Natural Beauty (ANOB). Whilst these are not the focus of this study, the rurality of the study area and surrounding areas may influence future decision-making on the extent of transport interventions in the study area.

Within the area there are several places of strategic importance, including: University of Bedfordshire, University of Hertfordshire, BRE Innovation Park, Butterfield Business Park, Hatfield Business Park, Stevenage Bioscience Catalyst, Rothamstead Estate and research farm, Hemel Hempstead Business Park, Elstree Studios, Pinewood Studios, Westcott Venture Park, and Symmetry Park.

The area is an attractive place to live, exhibiting diverse social characteristics, a strong economy and with relatively good transport connectivity. However, the nature of the study area results in complex social, economic and connectivity challenges to be addressed and opportunities to be maximised:

- **Decarbonisation**: EEH are committed to tackling the decarbonisation of the transport system by bringing all greenhouse gas emissions to net zero by 2050 at the latest, with an ambition to reach this by 2040. The study area exhibits a complex pattern of intra and inter-urban movements among a largely rural study area. The product of an existing infrastructure network designed for motorized vehicles and lacking in a comprehensive public transport and integrated active travel network is a dominant presence of private vehicles. As such a significant change in infrastructure, digital connectivity, planning, policy and behaviour change is required to achieve decarbonisation across the study area.
- **Connectivity**: Despite supporting a relatively dense network of highways and rail links, rural areas in the centre of the study area cannot access key services and facilities within 30-minutes travel by foot and public transport. This is a particular issue for smaller towns, particularly those that do not benefit from a nearby local rail station.
- **Innovation**: Harnessing innovation is a key priority for EEH. The study area is a centre for science and technology and there is an opportunity to build on the global leadership of innovation within this field. The aspiration is for the region to grow as an "innovation powerhouse", delivering economic growth, but in a low carbon manner.
- **Levelling Up**: The Indices of Deprivation (IMD) report on the relative level of deprivation in small areas across England. The study area has pockets of areas which are considered both within the top 10% most deprived and the top 10% least deprived across the Country, illustrating varying levels of opportunity and a complex mix of differing needs and challenges. Packages of multi-modal interventions can play a vital role in delivering an affordable and accessible transport network and in turn reducing barriers to employment, education and training, healthcare, social, leisure, physical and cultural activities.

Active Travel and Public Transport

Active travel represents an opportunity for relatively short complete journeys or the 'first and last mile' of journeys using other modes. The study area contains urban conurbations which present an opportunity to undertake trips through active travel, tackling congestion, carbon emissions and boosting health and wellbeing. Further details on active travel provision within the study area is contained in Part 6.

The distribution of active travel infrastructure throughout the study area varies and includes Sustrans National Cycle Routes and nature trails. There is a mix of on-carriageway, segregated and shared-use sections and as such their usability may be limited for some users.

The bus network is relatively dense, however, there is a clear rural / urban divide in respect to the frequency of services. The existing high frequency bus routes all run in a north-south direction. The number of east-west bus services is more limited.

The rail network in the study area is relatively extensive with a high number of north / south rail routes that connect with London. This allows for rail travel to a range of destinations both within and outside of the EEH region.

Significant rail links in the study area include:

- The **West Coast Main Line** is a major strategic rail corridor in the UK, connecting London to Glasgow and calling at major cities including Birmingham, Liverpool, Manchester and Edinburgh along the way. Within this study area connects Leighton Buzzard, Tring, Hemel Hempstead and Watford.
- Within the study area, the **West Anglia Main Line** connects Stevenage to Hertford. This railway line provides wider regional connectivity between London Liverpool Street and Cambridge via Stansted Airport.
- The **Midland Main Line** is a key rail link in England which provides connectivity between London and Sheffield, also calling at Nottingham, Leicester, and Bedford. Within the study area this railway line connects Luton to St. Albans and Watford.
- Within the study area, the **East Coast Main Line** connects Welwyn Garden City, Stevenage and Hitchin. This railway link also provides wider national connectivity between Edinburgh and London's King's Cross, and Cambridge via the **Cambridge Line** north of Hitchen.
- The **Chiltern Main Line** runs in a northwest direction from London Marylebone to Birmingham via High Wycombe, Bicester, Banbury, Leamington Spa and Solihull. Within this study area, the Chiltern Main Line runs through High Wycombe.

Significant Road Links

The study area encompasses both regionally and nationally significant road and rail links. The strategic transport routes connecting the study area with the wider EEH region are:

Roads forming part of the Strategic Road Network managed by National Highways:

- The **A1 (M)** is major, long distance, north-south road in the UK, connecting London in the south and Edinburgh in Scotland. Within the study area, the M1 connects the settlements of Letchworth, Stevenage and Welwyn Garden City.
- The **M1** runs in a north – south orientation between London in the south and Leeds in the north. Within the study area, the M1 provides connectivity between Luton, St. Albans and Watford.
- The **M25** is the major ring road which circles greater London. The north west section of the M25 between Junction 15 at West Drayton and Junction 24 at Potters Bar is included in the EEH study area. Within the study area specifically, the section of the M25 surrounding Watford is included.
- The **M40** is a motorway link providing connectivity between London, Oxford and Birmingham. Within the study area for this corridor, the M40 links High Wycombe and Beaconsfield.

Key road links managed by Local Highway Authorities:

- The **A355** is a north-south road in east Buckinghamshire which connects Eton to Amersham. Within the study area, the A355 connects Beaconsfield to Amersham.
- The **A602** is a key local route which connects the settlements of Ware and Stevenage.
- The **A41** connects London to Birkenhead, running in a north-south orientation. Within the study area, the A41 passes through both Aylesbury, Tring and Hemel Hempstead.

International Gateways

The study area includes the international gateway of Luton Airport and Stanstead Airport whilst being east of the study area generates significant travel demand through the study area, both for passengers and employment.

London Luton Airport offers flights to a variety of destinations, the majority of which are located in Europe. The most popular destinations from this airport in 2022 were Bucharest, Amsterdam, Malaga, and Budapest. Passenger usage of Luton airport saw more than 13 million air passengers in 2022[3], this has been a decrease since 2019 by almost 5 million (Almost a 27% reduction).

More than 23 million passengers made use of Stansted Airport in 2022[4], with Dublin, Istanbul and Budapest being some of the most notable destinations for passengers.

London Heathrow Airport is located to the south west and while outside EEH region, does influence trips in the study area.

[3] Source: UK Civil Aviation Authority, 2022, https://www.caa.co.uk/data-and-analysis/uk-aviation-market/airports/uk-airport-data/uk-airport-data-2022/

[4] Source: UK Civil Aviation Authority, 2022, https://www.caa.co.uk/data-and-analysis/uk-aviation-market/airports/uk-airport-data/uk-airport-data-2022/

Where People Live

New transport interventions will need to take into account future developments in sparsely populated areas (E.G. Buntingford) in order to reduce car dependency and encourage sustainable travel patterns.

Figure 2 Settlement Population 2021

Figure 2 shows the distribution of the Residential population across the study area. Together these account for almost 60% of the total population of the study area. The map highlights that the majority of the population can be found in the central sections of the study area, along the key transport corridors (e.g., along the West Coast Mainline, M1, A1 (M) and M40). The largest settlement in the study area is Luton with a population of approximately 233,500[5].

The population of the other largest settlements in the study area range from 20,000 to 131,000. A number of the largest settlements are relatively close to one another. This provides opportunity for inter-urban commuting by public transport. The largest settlements are generally located in the centre of the corridor. The eastern and western parts of the study area are comprised of smaller settlements and areas of rurality. The border between Buckinghamshire and Hertfordshire / Bedfordshire are sparsely populated with very few large / medium sized settlements.

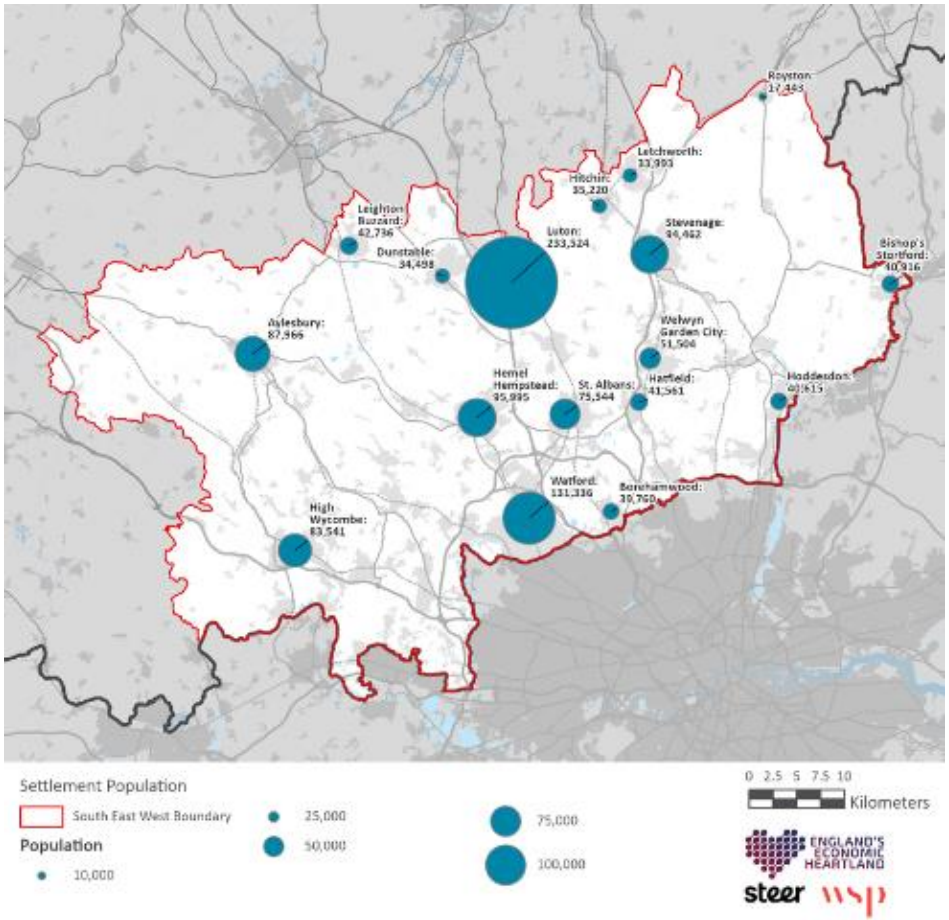
Sparse rural populations on the border of the counties can pose a risk to sustainable connectivity as the proximity to goods, services, education and employment coupled with a lower population density reduces the commercial viability of public transport. It also limits opportunities to travel by active travel.

This has the potential to result in increased levels of car dependency for inter-urban commuting journeys.

New transport interventions will need to take into account future developments in sparsely populated areas (E.G. Buntingford) in order to reduce car dependency and encourage sustainable travel patterns.

[5] Figures quoted refer to the main built-up urban areas only as opposed to the larger local government boundary.

Figure 2 Settlement Population 2021[6]



Key Settlements

The study area includes 17 key settlements (see Table 2) with these playing an important economic role within the study area and wider EEH region by having a significant residential population and/or employment offering.

The largest urban area in the study area is Luton in the north, which has a population of 233,500. This is almost twice the size of the next biggest settlement in the area, Watford. Both Luton and Watford are located close to the M1.

The settlement with the largest number of employees[7] in the study area is Luton, with 103,500 employees (Table 2). In respect to employees Hemel Hempstead has the second highest count of 94,800. Hemel Hempstead has a disproportionality high number of employees relative to its population, assumed to be in part because of the Hemel Hempstead Industrial Estate which includes major employers like Amazon. Both settlements generate in-commuting from surrounding residential areas with fewer employment opportunities.

Other large settlements within the study area include Aylesbury, High Wycombe, St. Albans and Stevenage, all of which have resident populations of between 95,000 and 75,000 people. These are all typically considered "dormitory" commuter towns with large levels of commuting southbound towards London. This is also the case for many of the medium and smaller sized settlements in the study area. **In commuter towns such as St. Albans and High Wycombe, rail travel is a popular and sustainable travel mode (with London being a notable destination). In these settlements there may be opportunities to improve local sustainable travel links to major rail hubs to help improve First mile/Last mile connectivity for local residents.**

[6] Source: Population estimates, ONS, 2021, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates

[7] People who are in full or part time employment, including self-employed in the study area.

Table 2 Key Settlements[8]

Key Settlements	Population (2021)	Employment[9] (2021)	Employees (2021)
Aylesbury	87,966	45,444	45,205
Bishop's Stortford	40,916	21,413	14,220
Borehamwood	39,760	19,907	20,210
Dunstable	34,398	17,652	9,410
Hatfield	41,561	19,724	36,660
Hemel Hempstead	95,995	48,494	94,780
High Wycombe	83,541	41,553	39,485
Hitchin	35,220	18,259	16,120
Hoddesdon	40,615	19,844	14,985
Leighton Buzzard	42,736	22,146	13,900
Letchworth	33,993	16,073	17,385
Luton	233,524	103,059	103,500
Royston	17,443	9,133	7,590
St. Albans	75,544	38,498	36,290
Stevenage	94,462	48,406	48,585
Watford	131,336	67,131	73,885
Welwyn Garden City	51,504	25,629	42,220
Study Area	2,056,610	1,010,974	1,020,780
EEH Total	5,382,136	2,669,816	2,670,345
England and Wales Total	59,597,747	27,773,564	27,704,995
'Employment' refers to the number of people living in the area who are in employment. Figures quoted refer to the main built-up urban areas only as opposed to the larger local government boundary.			

[8] Source: Population estimates, ONS, 2021, https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates

3 Policy Context

Overview

This section sets out the current economic, environmental and transport policies relevant to this study and the study area itself.

National Policy

National transport policy has historically been focused on delivering the infrastructure required to meet future travel demands and to enable economic growth. More recently, policy has made a focus on sustainable modes, reducing carbon emissions and levelling-up access to opportunities.

National Planning Policy Framework (2021) sets out the Government's planning policies for England and how they should be applied. At the heart of the NPPF is the presumption in favour of sustainable development which needs to be applied in map-making and decision-taking. The NPFF recognises that there are three separate, but inter-linked, pillars to sustainability – economic, social and environmental.

Clean Air Strategy, DEFRA (2019), confirms the Government's commitment to encouraging travel by low emission modes of travel, including public transport (bus, light rail, rail) and active modes as these modes are less polluting than private cars.

The Clean Growth Strategy, DEFRA (2018), promotes the shift towards low-carbon transport, including low emission public transport vehicles, walking and cycling.

Transport Decarbonisation Maps, DfT (2021) sets out the Government's commitments and the actions needed to decarbonise the entire transport system in the UK. It includes our pathway to net zero transport in the UK, the wider benefits net zero transport can deliver and the principles that underpin our approach to delivering net zero transport.

UK National Bus Strategy, DfT (2021) sets out the governments vision for better bus services across England through ambitious and far-reaching reform of how services are planned and delivered. Bus services are to be transformed with simpler fares, thousands of new buses, improved routes and higher frequencies.

Road Investment Strategy 2 (2020) Outlines Highways England's (now National Highways) long term strategic vision for how the strategic road network should look like in 2050, using forward thinking and new technologies to promote a safer, more integrated, smarter and greener network for all users and modes, including high quality routes for active travel modes.

Gear Change, DfT (2020), sets out the government's bold future vision for walking and cycling to become the natural first choice for many journeys. The target is for over half of all journeys in our towns and cities to be undertaken on foot or by cycle by 2030. In February 2020, the Transport Secretary announced £5 billion in funding to improve bus and active travel infrastructure.

The Road to Zero, DfT (2018), highlights the importance of bus services in encouraging mode shift to more sustainable and less polluting modes of travel. The document supports and the introduction of zero-emission buses through new funding opportunities.

Future of Mobility: Urban Strategy, DfT (2019), Supports new modes of transport and new mobility systems that encourage walking and cycling for short journeys, provide efficient and low emission mass transit, improve public transport reliability, responsiveness, accessibility, affordability, safety, reduce congestion and support the transition to a low carbon future.

Rail Network Enhancements Pipeline, DfT (2018), sets out an approach that applies for rail enhancements within England and Wales. It represents a rolling programme of investment into new or improved infrastructure that enable service changes and other benefits to passengers, freight users and the economy. The investments will enhance the capability of the railway, typically

adding increased or new capacity or providing technical improvements to the way the railway runs.

Sub-national Policy

EEH Connectivity Studies, EEH (2022), will turn EEH's transport strategy's vision into actions, identifying the investment required to cut emissions while supporting economic growth within this area.

Connecting People, Transforming Journeys, EEH (2021), provides the EEH region and government with an evidence-based, vision-led framework focused on enabling economic growth in a way that delivers a net zero transport system as early as 2040. Enabling growth in a way that improves the environment requires a fundamental switch in the way the region's transport system is planned and delivered.

Passenger Rail Study, EEH (2020). Phase 1 provides a baseline assessment of existing rail networks and levels of service across the EEH region. A number of nodes were identified in the EEH region and generalised journey times were calculated highlighting some key connectivity gaps that exist across the Heartland. In response to this, Phase 2 of the study identified aspirational service levels for priority journey pairs where analysis demonstrated stronger connectivity by rail would generate a significant return on investment.

Pathways to Decarbonisation, EEH (2020) considered the proposed pathway to decarbonisation to help inform the Connecting People, Transforming Journeys Transport Strategy. A total of five pathways (with associated assumptions) were modelled and, in consideration of the outcomes, EEH identified two preferred pathways: Highly Connected Future (increased use of digital communications and embedded technologies in the transport network) and Policy-Led Behaviour Shift (achieved through road pricing and education measures).

EEH Freight Study, EEH (2019) defines a clear starting point for freight sub-nationally. It analyses the implications of future scenario changes and identifies how EEH can capitalise on opportunities and mitigate risk. The study assists in planning the most efficient ways of providing access to goods that unlocks economic potential, protects the environment and communities, and future-proofs networks to accommodate growth and improve efficiency.

EEH Regional Bus Strategy, EEH 2022 is a long-term plan to support the role of schedules bus and coach services in the region. EEH is working with local authorities and EEH Bus Operators Association to support the delivery of Bus Service Improvement Plans (BSIP), improve key strategic intra-regional bus routes and lead options for pan-regional ticketing and integration solutions.

EEH Active Travel Strategy, EEH (2022 and 2023) is split into Part 1 The Ambition and Part 2 The Opportunity. Part 1 of the document describes a high-level ambition for active travel in EEH and explored challenges and opportunities regarding active travel in the region. Part 2 of the document defines in more detail what the region should be aiming towards in terms of achieving excellence in active travel. It seeks to create a clear policy direction for active travel and identify the missing links in the active travel network.

In addition to the above, there are a number of other evidence base studies which EEH have produced, this includes Mobility Hubs Guidance and East West Rail Strategic Narrative[10].

Local Enterprise Partnerships

Hertfordshire LEP – Strategic Economic Map: 2017 – 2030 (2017) The Hertfordshire Local Economic Partnership's (LEP) Strategic Economic Map (SEP) identifies potential opportunities and prospects of Hertfordshire. The map has four key priorities based around their vision to accelerate business-led

[10] EEH Publications: https://www.englandseconomicheartland.com/publications-and-responses/

growth in Hertfordshire, and to allow Hertfordshire to become a world leading economy.

Buckinghamshire LEP – Strategic Economic Map: 2016 -2031 (2014) The Buckinghamshire LEP's SEP supports the four main strategic priorities of the LEP including, business growth and innovation, skills and talent, connectivity and town centre regeneration. These strategic priorities all are in support of the wider LEP vision of creating a vibrant, balanced and resilient economy, underpinned by innovative, high-value, globally orientated firms.

South East Midlands LEP – Strategic Economic Map (2017) The South East Midlands LEP's (SEMLEP) SEP sets out the strategic investments and future actions for the LEP to continue to grow the economy in their area. The SEP details seven priorities across three core themes; growing business, growing people and growing places. This will aid the LEP in its mission to build the reputation of the South East Midlands as a premier location for growth, innovation, creating and world leading technologies.

Local Policy

The South – East – West (S-E-W) study area encompasses two highway authorities (Buckinghamshire Council and Hertfordshire County Council) which both have their own Local Transport Maps (LTP). These documents set out their transport objectives, policies and strategies.

Each district / unitary authority in the study area also has a Local Map which sets out the future land use and planning policies for the area over a set time period.

Buckinghamshire Council and Hertfordshire County Council are both in the process of developing Local Cycling and Walking Infrastructure Maps (LCWIP). LCWIPs are detailed maps that identify where walking and cycling improvements are needed at a local level.

Local planning policy documents relevant to this study are identified below. Noting that draft documents or maps out for consultation are not listed, such as the Welwyn Hatfield Borough Council LCWIP and North Hertfordshire District Council LCWIP.

Hertfordshire County Council LTP 2018-2031 (2018), aims to provide a safe and efficient transport through introducing a more balanced approach that encourages a switch from private car to sustainable transport where possible. The objectives, policies and key schemes set out within the LTP aim to achieve this modal shift and include Growth and Transport Maps for specific geographic regions.

The key transport proposals feature improvements in highways, passenger transport, walking and cycling to key movement corridors. The proposed east west bus rapid transit scheme between Hemel Hempstead and Welwyn Garden City looks to improve the poor east-west connections. Another proposal looks to introduce a package of improvements for walking, cycling and passenger transport in combination with sustainable travel behaviour incentives.

Buckinghamshire County Council (BCC) LTP 2016-2036 (2016), sets out how transport can contribute towards the Council's vision of making Buckinghamshire a great place to live and work. The LTP further looks to address the issues associated with its existing transport system. To help realise the transport elements of BCC's Strategic Map, it sets four main local transport map objectives. These concisely comprise a connected, growing, health, safe and sustainable, and empowered Buckinghamshire.

The policies devised in the LTP consist of 'big picture' policies and policies for specific issues such as particular modes of transport. The 'big picture' ones focus on the efficient and effective transport provision, improved connectivity and managing the transport impact of new developments. The policies specific to issues include maximising the rail network, reliable road travel, maintenance of roads and other transport assets, encouraging walking and cycling, and reduced private car travel through car clubs, car sharing and taxis.

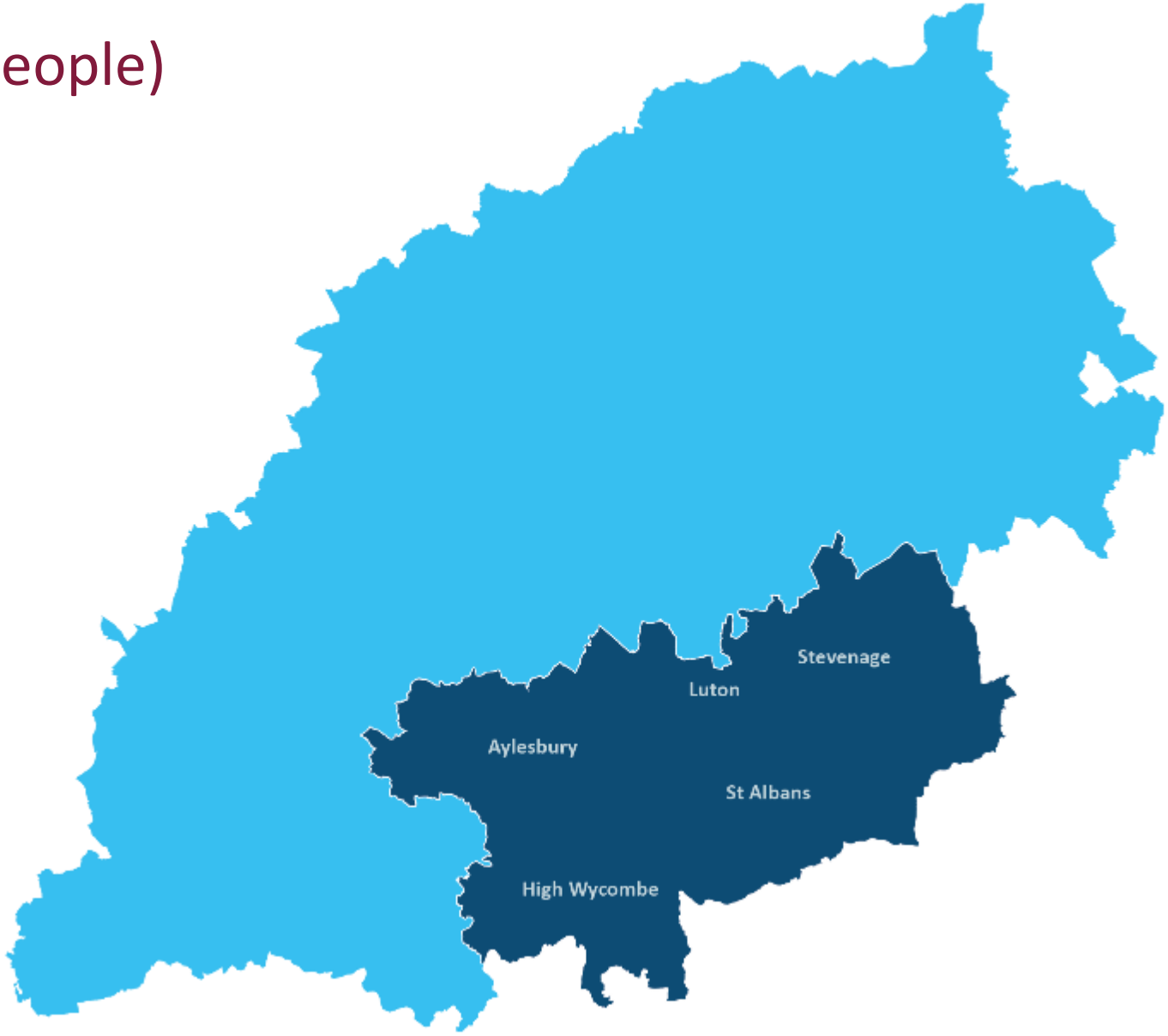
The High Wycombe 2050 Transport Strategy (2022) considers the pathway for its future transport system that unlocks, supports and enhances the wellbeing and prosperity of its residents, visitors and businesses. Its vision is for High Wycombe to be among the best-connected towns in the Thames Valley by 2050.

Its strategy comprises a package of 26 initiatives across walking and cycling, public transport, shared and new mobility, highways and congestion management, land use, planning and parking, and behaviour change. It also looks at opportunities to deploy new technologies in transport such as 'on-demand' services.

Watford Borough Council & Three Rivers District Council LCWIP (2021), looked to identify the existing walking and cycling route networks to ensure that local areas are connected. It aims to support the objective of developing high quality cycling and walking infrastructure to encourage mode shift towards active modes.

The LCWIP produced a 'big picture' of the cycling network in the Watford and Three Rivers area to identify key routes, for example as ones leading to Watford town centre along Clarendon Road, St Albans Road and Vicarage Road.

4 Current Context (People)



Background

In order to understand the study area, a 'whole system approach' has been adopted to gain an understanding of the existing communities and businesses, the natural and historic environment and the levels of connectivity provided by the existing transport and digital infrastructure assets.

This section summarises the existing **people,** evidence base. It demonstrates the social and economic diversity and the existing connectivity of the study area and the challenges and opportunities this creates.

People

The people evidence base presents a set of demographic data to gain an insight into the existing community characteristics of the study area, their needs, and how these can be supported through enhanced connectivity.

Population

Resident Population

Approximately 2,000,000 residents live in the core study area[8]. The most densely populated key settlement within in the study area is Luton, with 233,500 residents (Figure 3). This is almost double the size of the next largest settlement of Watford, which has a population of 131,300 people[11].

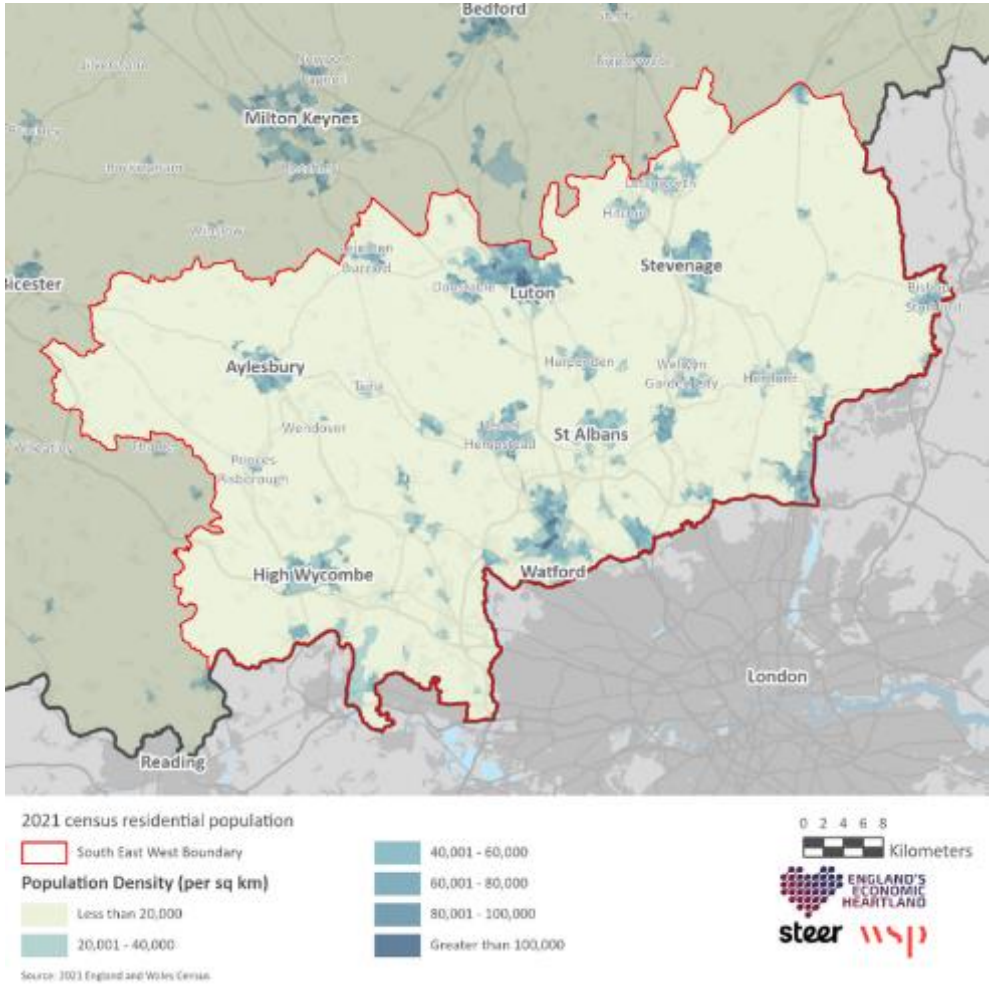
Most major settlements in the south of the study area, are 'dormitory towns', occupied by commuters who travel to London via the strong radial transport links.

Some of the largest settlements in the study area are surrounded by sparsely populated area, for example the area to the west of Aylesbury, and the area to the east of Stevenage. This results in high levels of car dependency by people traveling to / from these areas as public transport options are often limited and active travel is not feasible.

It is likely to be challenging to achieve mode shift away from the private car in smaller isolated settlements like Tring, Wendover and Princes Risborough. This is because compared to denser urban areas and town centres, residential dwellings and employment opportunities are often located further apart.

The densely populated towns in the south of the study area have good connections to London via rail – encouraging the use of sustainable travel for longer distance journeys. However East / West sustainable links are limited between settlements due to lack of rail lines and effective bus services with bus priority. This lack of sustainable travel options and high population density is likely to create high car dependence.

Figure 3 Study Area Population Density[12]



[11] Figures quoted refer to the main built-up urban areas only as opposed to the larger local government boundary.

[12] Source: Population density, ONS, 2021, https://www.ons.gov.uk/datasets/TS006/editions/2021/versions/4

Population Growth (Historic)

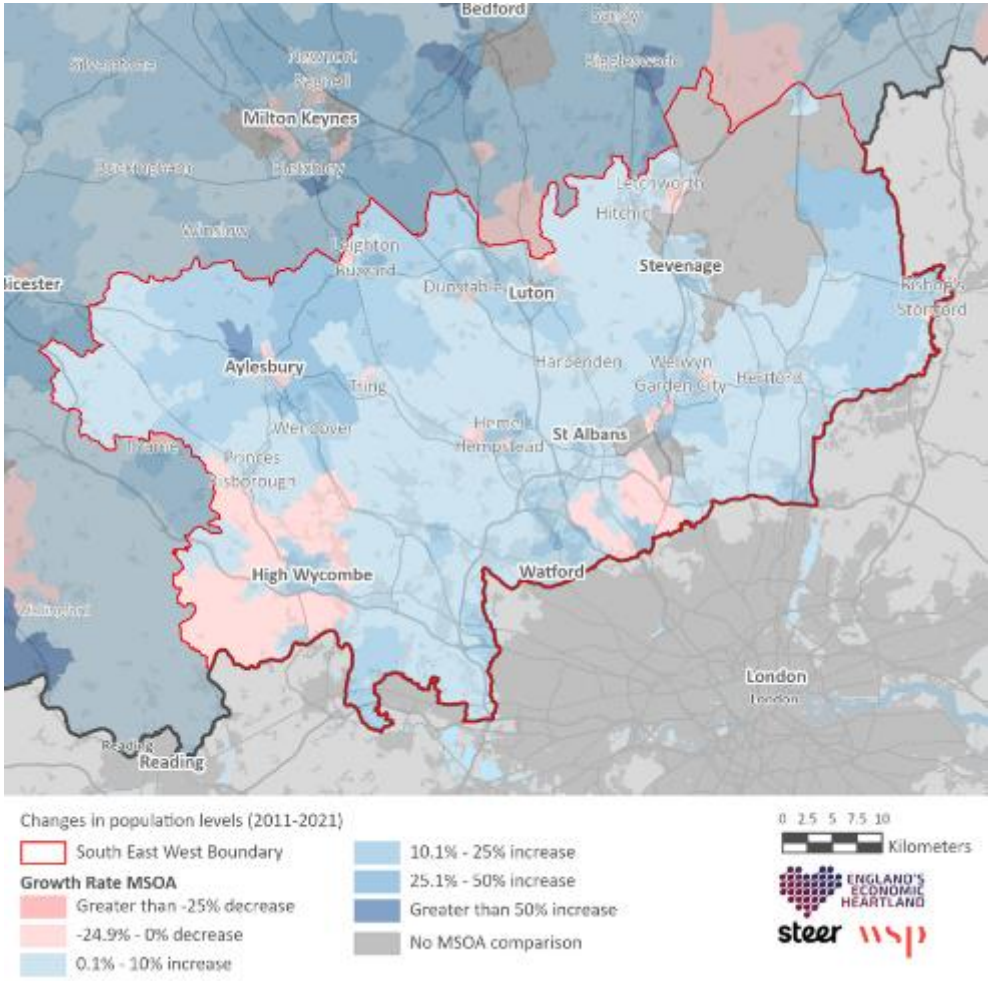
Between 2011 and 2021 the population of the study area has grown by 9%, from approximately 1.8 million people in 2011 to approximately 2 million people in 2021 as shown in Figure 4.

The largest growth in the study area (exceeding 50%) was found to the northwest of Aylesbury. This large population growth has been driven by the delivery of the Berryfields development. Significant population growth has also occurred the east and west of Aylesbury, owing to the Weedon Hill and Aspen Park developments. Moderate growth is also seen in High Wycombe, Luton and north Watford.

Population decline was observed in the rural areas surrounding High Wycombe, including within the Chiltern Hills. This level of population decline was also seen in the area to the east of the M1 in Watford. Other pockets of population decrease were also observed in Tring, Dunstable, Hemel Hempstead and Welwyn Garden City.

Recent Developments located on the edge of towns such as Berryfields outside Aylesbury and Hadley Grange in Leighton Buzzard are often far away from established town centres. Increased populations can often lead to further pressures being exerted on existing transport networks. To address this, innovative forms of mobility including demand responsive and shared transport will need to be considered alongside digital and opportunities for mobility hubs to access public transport services. Improvements could also be made to the availability of everyday services and activities within smaller settlements – reducing the need for residents to travel to larger settlements.

Figure 4 Changes in Population[13]



[13] Source: Population change, ONS, 2021, https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/economicinactivity/datasets/dataonpopulationchangesandeconomicinactivitytrendsuk

Community Characteristics

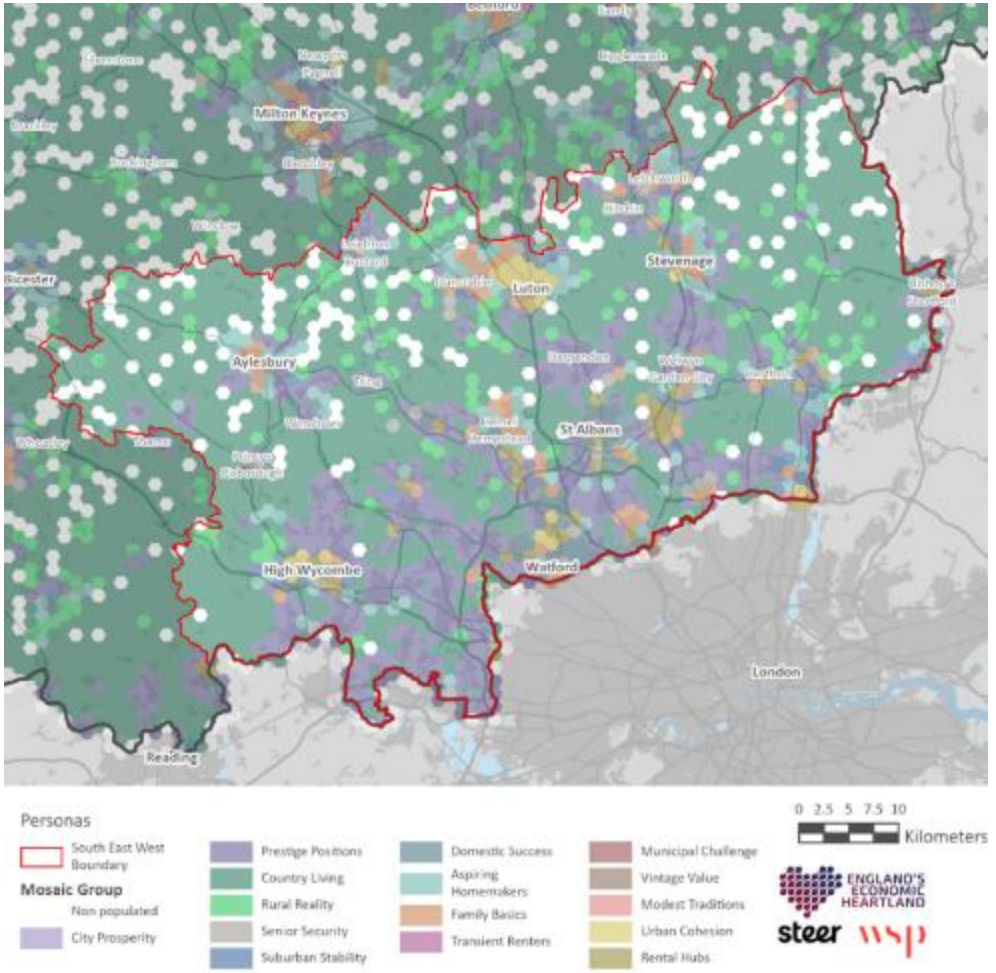
Types of Resident

Existing communities vary significantly in terms of their socio-economic attributes. Experian's Mosaic data has been used to identify the dominant typology of people who live in the study area. The data segments the population into 15 broad persona groups (detailed in the Appendix). The persona groups provide valuable insights into how certain types of people may respond to different transport interventions. The urban centres in the study area like central Luton, High Wycombe, Aylesbury and St. Albans are typically characterised by Urban Cohesion, Family Basics and Modest Traditions population groupings. These groups tend to have lower levels of disposable income comparative to others, members of these groups are likely to be younger adults.

Figure 5 shows that the outskirts of these major towns have high levels of the Prestige Position population grouping, for examples in the suburbs of High Wycombe. This group is characterised by higher incomes, living in high value homes with senior level professional occupations. They also typically have older children who still live at home. The rural sections of the study area are mainly dominated by the Country Living and Rural Reality population groupings. Both population typologies typically have high levels of car dependency.

Community variability brings variable user needs. Younger populations in the Urban Cohesion groupings dominant in urban centres like Luton and High Wycombe may be more likely to uptake new shared mobility interventions which save time and money. Conversely, rural and wealthy populations in the Country Living grouping in rural settlements like Walkern, have different needs, which may require different solutions.

Figure 5 Mosaic Data Personas[14]



[14] Source: Experian Mosaic, 2021, https://www.segmentationportal.com/Mosaic7/uk

Propensity to Travel (By Mode)

As a part of EEH's First Mile Last Mile Strategy, which seeks to encourage greater use of active travel and public transport as part of integrated journeys from doorstep to destination, a framework to represent characteristics of the population in the study area was developed using Experian Mosaic data. Experian Mosaic defines various personas which are deemed to represent common parts of society. Various personas are more prevalent in different areas of the country, and within different settlement types and sizes.

Using this framework, key characteristics related to mobility needs and propensity for changing travel behaviour were established for each persona group. For instance, 'Family Basics' place a high value on cost, and as such, are likely to have a higher propensity to take-up lower cost modes. Alternatively, individuals in areas characterised by 'Prestige Positions' and 'City Prosperity' tend to place a higher value on comfort. As such, these groups tend to have a lower propensity to cycle or use bus services.

These characteristics have been used to establish the propensity of each persona to use different modes of transport, as shown in the table opposite. A score of 1 indicates a low propensity to use that mode of transport and a score of 5 indicates a high propensity.

The propensity scoring is informed by the project teams' professional judgement and interpretation of the Experian Mosaic data at the time of writing this report.

The analysis suggests that different communities may have different propensities to take up certain forms of travel. For example, younger members of the Urban Cohesion group are typically more interested in new technologies and thus may be more inclined to use modern mobility solutions like E-scooters.

In terms of what this means for the study areas' most common make up of personas, the Prestige Positions concentrations would appear to be receptive of light rail and mass transit schemes. The Country Living dominant persona is expected to be more receptive to ride sharing and cycling. In general, there is good propensity across the dominant groups for sustainable and active travel initiatives which provides a good opportunity for delivering schemes going forward.

An understanding of the resident population's propensity to use various modes of travel can assist in informing the development of options which may be more likely to be successfully adopted.

Table 3 WSP Experian Mosaic[15]

	Mode	City Prosperity	Prestige Positions	Country Living	Rural Reality	Senior Security	Suburban Stability	Domestic Success	Aspiring Homemakers	Family Basics	Transient Renters	Municipal Challenge	Vintage Value	Modest Traditions	Urban Cohesion	Rental Hubs
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
On foot	On foot	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Cycling	Cycling (SP & O)	3	4	5	4	4	5	4	5	5	4	4	4	4	4	4
	Cycling (P & O)	2	2	4	2	2	3	3	3	3	3	2	2	2	2	2
	Cycling (SP & S)	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1
	Cycling (P & S)	2	2	3	4	2	2	3	2	2	2	2	2	3	2	2
E-Scooter* (kick-scooter)	E-Scooter (P & O)	2	3	4	4	3	4	3	4	4	3	3	3	2	2	3
	E-Scooter (P & S)	1	2	3	3	1	2	2	1	2	1	2	1	3	1	1
Motorcycle	Motorcycle (PTW - O)	2	1	1	1	1	3	2	3	3	2	2	1	1	2	2
	Motorcycle (PTW - S)	1	1	2	2	1	1	2	1	1	1	1	1	2	1	1
	Motorcycle (PTW - Taxi)	1	1	2	2	1	2	1	1	2	1	2	1	2	1	1
Car	Car (Sole Use)	5	3	1	1	3	3	2	3	3	3	3	3	1	4	3
	Car (Sole Use & S - P2P)	3	3	2	4	4	1	3	2	1	2	4	4	4	3	3

[15] Source: Experian Mosaic, 2021, https://www.segmentationportal.com/Mosaic7/uk

	Mode	City Prosperity	Prestige Positions	Country Living	Rural Reality	Senior Security	Suburban Stability	Domestic Success	Aspiring Homemakers	Family Basics	Transient Renters	Municipal Challenge	Vintage Value	Modest Traditions	Urban Cohesion	Rental Hubs
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	Car (Sole Use & S - Ride Share)	4	4	4	4	4	4	5	4	4	4	4	4	5	4	4
	Car (S - Car Club)	3	3	2	4	4	2	3	2	2	3	3	4	4	3	2
Traditional & Emerging Taxi	Traditional and Emerging Taxi	4	4	3	3	3	3	4	4	3	4	4	3	3	3	4
Ride-hailing (sole use)	Ride-Hailing (Sole Use)	3	2	1	1	2	2	2	2	2	3	3	2	1	3	3
Ride-hailing (shared use) – shared taxi	Ride Hailing (S - Taxi)	4	4	3	4	4	4	4	4	4	4	4	3	4	4	4
Ride-hailing (shared use) – DDRT	Ride Hailing (S - DDRT)	4	5	4	5	5	4	5	5	4	5	5	5	5	5	5
Traditional Bus	Traditional Bus	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1
Bus Rapid Transit	Bus Rapid Transit	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Very Light Rail	Very Light Rail	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Light Rail	Light Rail	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

Health & Wellbeing

Workplace Population

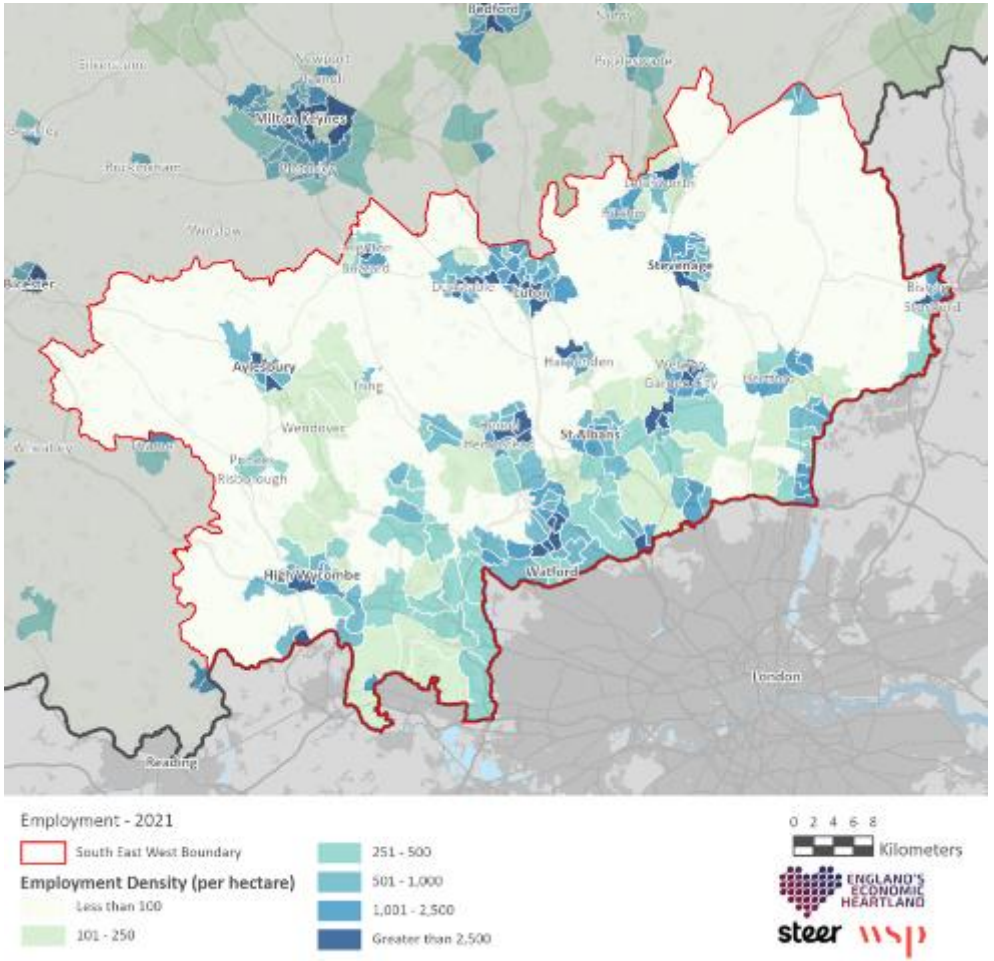
The workplace population of the S-E-W study area in 2021 was approximately 1,021,000, which equates to approximately half of the overall EEH workplace population.

Figure 6 illustrates that the workplace population is concentrated around Luton (103,500 employees), Watford (73,900 employees), and Stevenage (48,600 employees). High levels of employment are also observed within medium sized towns such as Aylesbury (45,200 employees), St Albans (36,300 employees), and High Wycombe (39,400) employees). These settlements all have large business parks / industrial estates (for example, the Gatehouse Industrial Estate in Aylesbury and the Hemel Hempstead Industrial estate in Hemel Hempstead).

In respect to employment in the study area, there are also a larger number of residents who are commuters to larger destinations outside of the study area, for example central London and Milton Keynes.

Jobs are predominantly located in the urban centres of the study area in areas like Luton, High Wycombe and Hemel Hempstead, with some clusters in rural areas like Kings Langley (with Imagination technologies being a key employer). It is necessary to improve transport links from all parts of the study area to key employment centres to unlock the potential economic benefits. To minimise the number of car trips to these centres of employment, interventions must focus on ensuring key local employment destinations, as well as improving connectivity to regional travel hubs which provide linkages to wider employment opportunities via public transport or active travel.

Figure 6 Employment Density[16]



[16] Source: People in work, ONS, 2021, https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork

Average Earnings

Figure 7 shows that in 2018, the average household income across all Middle Super Output Areas (MSOAs) in the South – East – West study area was £51,3340. Average incomes vary considerably across the study area. Higher average incomes are generally observed to the east of the study area surrounding Aylesbury and High Wycombe. The highest level of average incomes is in the Chiltern Hills surrounding High Wycombe, north, south and east of Princes Risborough, and rural hamlets to the northeast and southwest of St Albans. The lowest average household earnings mainly concentrate in the northwest of Luton, the urban centre of Stevenage, and the south of Welwyn Garden City.

Fuel poverty in England is measured using the Low Income Low Energy Efficiency (LILEE) indicator, which considers a household to be fuel poor if it is living in a property with an energy efficiency rating of band D, E, F or G, and its disposable income (income after housing costs and energy costs) would be below poverty line.

The overall level of fuel poverty in England in 2021 was 13.1% using the LILEE fuel poverty metric[17]. Across SEW study area, there is a variation in the rates of fuel poverty between regions. Particularly, the highest rate is found in Luton Borough, where 17% of households are fuel poor.

The regions with the lowest rates are Buckinghamshire, including Aylesbury and High Wycombe settlements, and Broxbourne, including Hoddesdon, with 7% and 9% of households being fuel poor, respectively. In the rest of the study area, including Leighton Buzzard, Dunstable, Hemel Hempstead, Bishop's Stortford, Borehamwood, Hitchin, Letchworth, Royston, St. Albans, Stevenage, Watford, Welwyn Garden City, and Hatfield, the proportion of fuel poor households ranges between 10% and 13%, with the average proportion being equal to 10%.

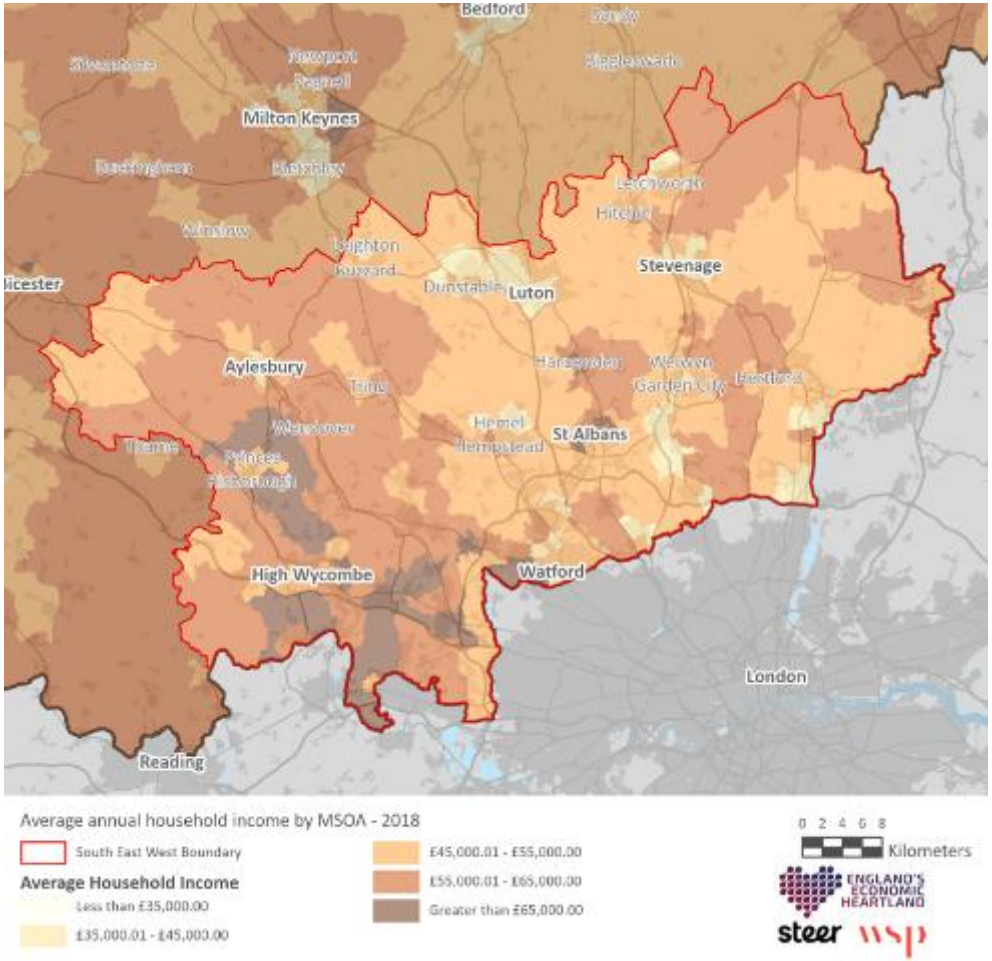
In 2022 the overall level of fuel poverty in England raised to 13,4%. More specifically, the proportion of fuel poor households in East England was 11.2% and in South East 8.6%.

The areas with the lowest average household incomes between Luton and rural areas to the west notably correlate with long-term health problems observed in these areas. Furthermore, in Luton 5% of the population suffer from a general bad or very bad state of health and 2% of the population need to provide 50 or more hours unpaid care a week. This compares to 3% and 1.5%, respectively in the rural hamlets surrounding High Wycombe such as Booker and Downley.

There is a disparity between the west and east of the study area in respect to income. Improved intra-urban connectivity can play an important role in 'levelling up' deprived areas by providing improved inclusive and affordable access to a wider range of employment opportunities. East-west corridors between Aylesbury, Luton and Stevenage could potentially be improved to give residents of more deprived access to a wider range of employment opportunities.

[17] Fuel poverty in England is measured using the Low Income Low Energy Efficiency (LILEE) indicator

Figure 7 Average Earnings[18]



[18] Source: Income Estimates for small areas, FY2018, ONS, 2018, https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/smallareamodelbasedincomeestimates/financialyearending2018

Indices of Multiple Deprivation

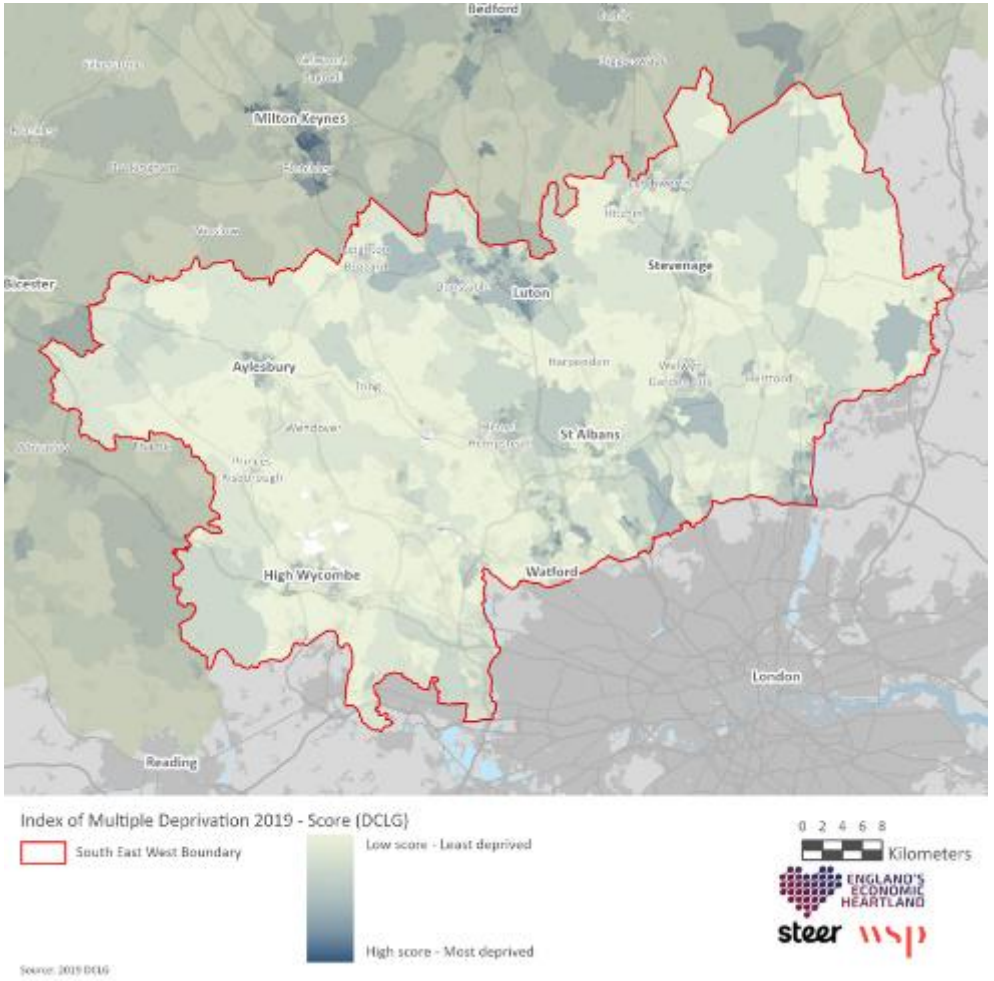
The Indices of Multiple Deprivation (IMD) include various factors influencing the level of deprivation in an area, including income, employment, education, health, and the living environment. Deciles are calculated by ranking the 32,844 neighbourhoods in England from most deprived to least deprived and dividing them into 10 equal groups.

Figure 8 indicates that there is a distinct division between rural and urban areas, with a high level of deprivation concentrated in central urban areas and less deprived neighbourhoods in rural areas. The urban centre of Luton, Stevenage, Aylesbury and the northern part of Watford experience high levels of deprivation and fall within the 10% most deprived areas in England.

Deprivation level varies considerably across the study areas, and this is driven by the underlying socio-economic characteristics that compose the IMD score, such as health level and household average earnings. Deprived populations are more likely to reside in urban areas where house prices are often more affordable.

To support the needs of deprived neighbourhoods and 'level up' existing deprived across the study area in areas like Luton, Stevenage and Aylesbury, interventions including high-quality active travel and public transport services need to be considered. This will enable residents, workers, and visitors to access local and regional opportunities via inclusive and affordable travel options.

Figure 8 Indices of Multiple Deprivation[19]



[19] Source: English Indices of Deprivation, ONS, 2019, https://www.gov.uk/government/statistics/english-indices-of-deprivation-2019

Car and Van Availability

Average car and van availability per household provides an indication of an area's reliance upon the private car for transportation, as well acting as an indicator of overall economic prosperity. As seen in

Figure 9, in 2021, households in the South – East – West study area had access to an average of 1.4 cars / vans per household, with 43.6% of households having access to more than one car[20].

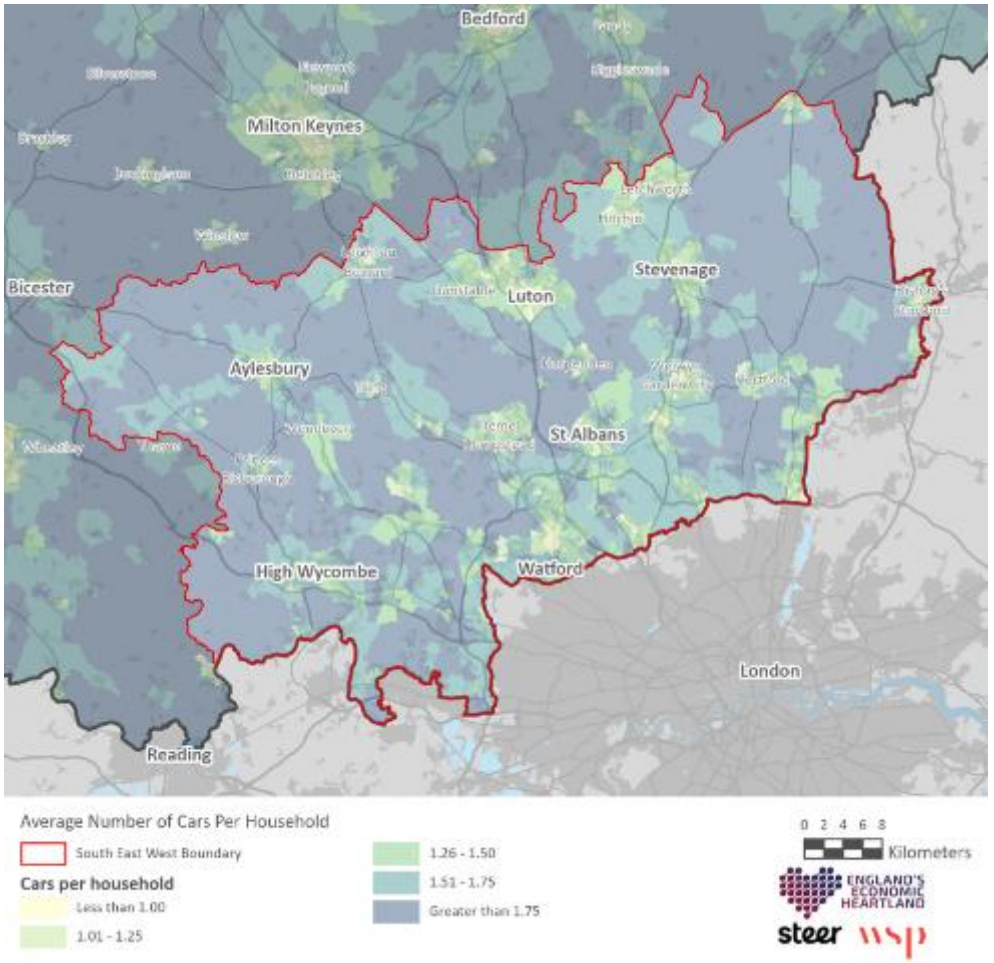
The availability of cars/vans per household is higher outside of the key settlements in the study area, with most households having access to 1.75 or more cars or vans. High availability levels suggest high levels of car dependency in these areas. This is often driven by limited alternatives such as poor public transport availability. Amongst the key settlements, the lowest car or van availability is recorded in Luton, with an average of 1.15 cars or vans per household, followed by Stevenage, where an average of 1.27 was recorded.

This suggests denser population geographies and accessibility to employment allows for more commercial viability and potential for public transport and active travel.

Between 2011 to 2021 there has been a small increase in car / van availability across the study area (an average increase of 0.06 cars or vans per household), being slightly higher in urban areas such as Luton, Stevenage and Aylesbury.

High quality public transport networks should be extended to connect with smaller settlements that surround the larger towns in the area. In suburban and urban fringe areas with lower levels of accessibility to cars and vans (E.G. Harpenden and Dunstable), shared mobility measures should be explored, for example car sharing schemes and car clubs. This will help reduce the need for households in urban areas to own a private car and could encourage people to use active travel and public transport more frequently.

Figure 9 Average number of cars per household[21]



[20] Source: Car or Van availability, ONS, 2021, Car or van availability - Office for National Statistics (ons.gov.uk)

[21] Source: Census QS416EW Car or Van Availability, ONS, 2021, https://www.ons.gov.uk/datasets/TS045/editions/2021/versions/1

Health & Disability Decile

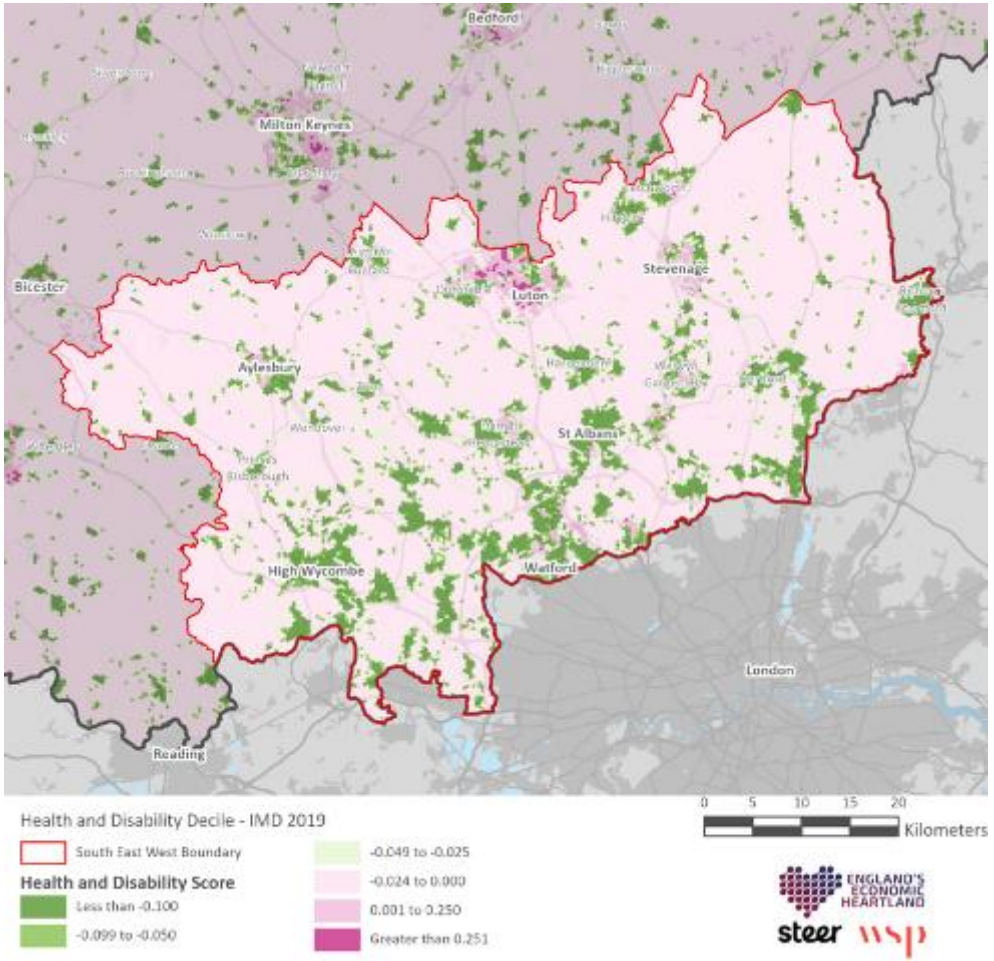
The UK is currently facing a health crisis as a result of growing levels of physical inactivity and poor air quality. The health and disability decile measures the risk of premature death and the impairment of quality of life through poor physical or mental health. This metric is measured on the basis of four main indicators: years of potential life lost, comparative illness and disability ratio, acute morbidity and mood/anxiety disorders.

Figure 10 reveals that the highest levels of health and disability deprivation is in Luton and is likely to be attributable to high levels of economic deprivation in the town. Deprivation is closely linked with poor health outcomes due to poor work environments and reduced access to quality healthcare and food.

The rest of the study area currently has very low health and disability deprivation, with smaller pockets of deprivation found in Stevenage, Aylesbury, Hemel Hempstead and Watford. Lower levels of health and disability deprivation may mean that the population is more willing to use active travel modes if the services and infrastructure is available.

To help promote positive health outcomes, interventions should focus on improvements to active and inclusive travel provision / usage in areas like Luton and Stevenage where health deprivation is prevalent, and low incomes mean low-cost active travel solutions could provide an accessible and healthy transport network for all. There is also the opportunity to capitalise on growing health consciousness amongst already healthy populations in areas like High Wycombe and St. Albans to promote active travel as a way to include healthy movement in day to day routines.

Figure 10 Health & Disability Decile[22]



[22] Source: Health & Disability Decile, ONS, 2021, https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/disability/articles/disabilitybyagesexanddeprivationenglandandwales/census2021

Road Safety

Figure 11 shows the location of Personal Injury Accidents (PIAs) recorded on the Strategic Road Network (SRN) and Major Road Network (MRN) between January 2017 and December 2021. A breakdown of PIAs by mode can be found in the Appendix.

As shown in Figure 11, during the five year period reviewed, a total of 6,557 PIA's were recorded in the study area, with 83% of them resulting in slight injury, 15% serious, and 2% resulting in fatal injury. On an annual basis, the average number of accidents that occurred in the study area was 1,311.

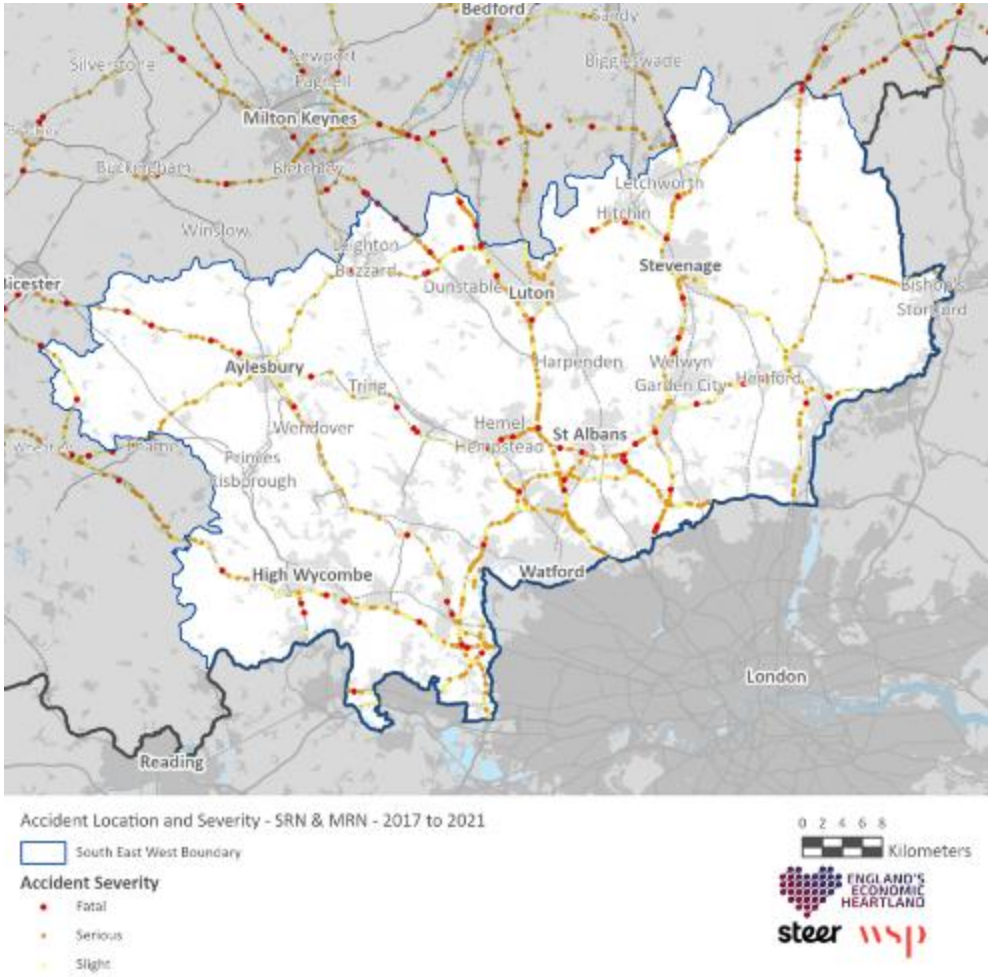
As the map indicates, the number of PIAs generally increases around urban areas, with the highest concentration of PIAs occurring around settlements such as Aylesbury, Luton, and Watford. A large number of PIAs have also be M1 between Watford and Luton, as well along M25 between Uxbridge and Potters Bar, with most of the accidents having taken place close to junctions.

A high number of fatal severity accidents have occurred on:

- The A41 between Bicester and Hemel Hempstead which remains as single carriageway for sections of the route.
- The A414 between Hemel Hempstead and Hertford, which involves numerous Junctions surrounding and within the key settlements.

This review has identified a number of routes within the study area which have high concentrations of fatal and serious severity accidents, particularly around Hemel Hempstead and St. Albans. Infrastructure design based on safety should be adopted, recognising that human error is not the singular cause of collisions. Traffic calming, visibility improvements and transition towards public transport and active travel can help reduce future collision risk.

Figure 11 Accident Location & Severity[23]



[23] Source: Road Safety Data, DfT, 2017 – 2021, https://www.data.gov.uk/dataset/cb7ae6f0-4be6-4935-9277-47e5ce24a11f/road-safety-data

Road Safety – HGVs

Figure 12 shows the location of PIA's involving HGVs (vehicles > 7.5 tonnes) which were recorded on the Strategic Road Network (SRN) and Major Road Network (MRN) within the study area between January 2017 and December 2021.

The number of PIAs that involved at least one HGV during this 5-year period is 533. This number equates to approximately 8% of the total number of accidents which were recorded in the study area during the same period.

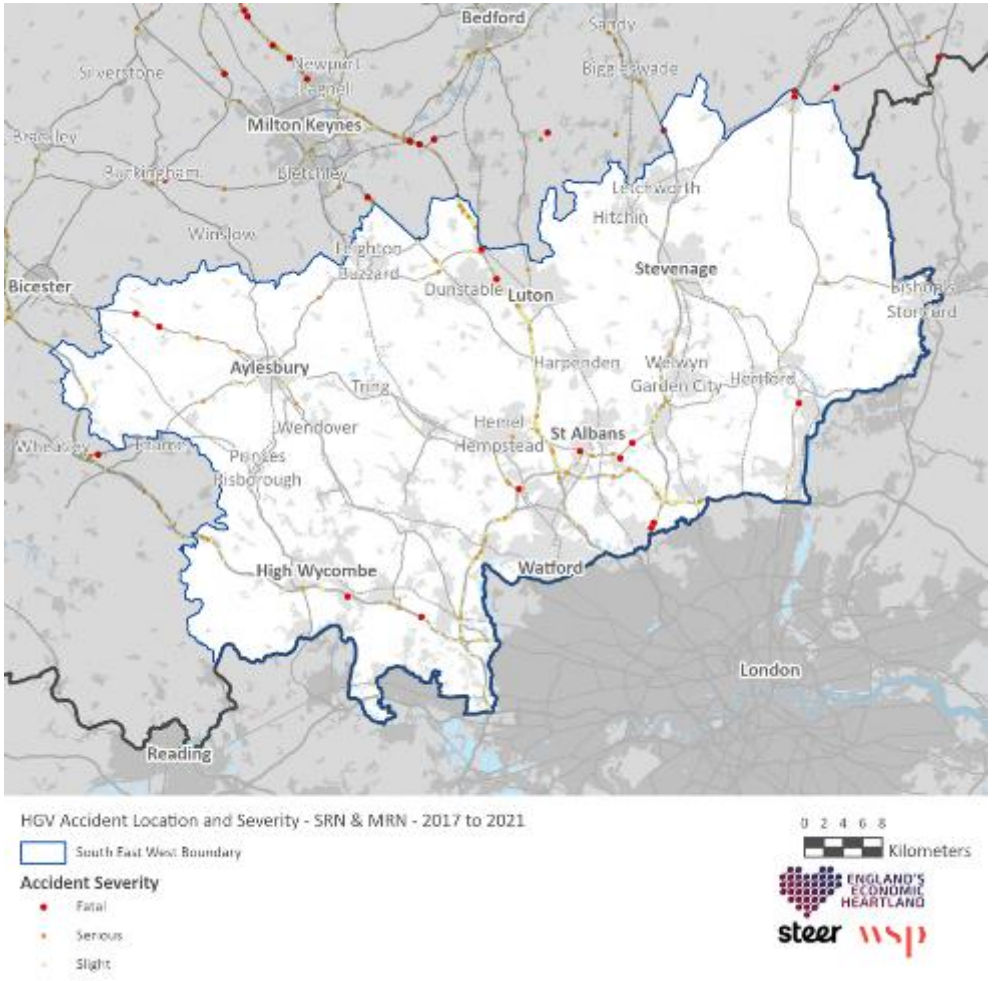
The majority of these accidents were of slight severity (83%), 13% were of serious severity and 4% were fatal. The proportion of fatal accidents is higher than total accidents involving all vehicles.

A large number of PIAs involving HGVs were recorded along:

- The M1, between Watford and Luton, representing one of the main national motorways.
- M25, between Uxbridge and Potters Bar, representing the key orbital motorway route for London
- A414, between St Albans and Hatfield, which is a dual carriageway bypass route closely linked to the M25 with numerous junctions.
- A41 West of Aylesbury, which is a notable single carriageway route.

This information will help with the identification of interventions to improve road user safety. It is suggested that interventions focus on safety improvements for all users along key HGV corridors, particularly the M1 and M25, and major single and dual carriageway roads, such as the A41, A414 and A1(M).

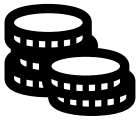
Figure 12 HGV Accidents & Location[24]



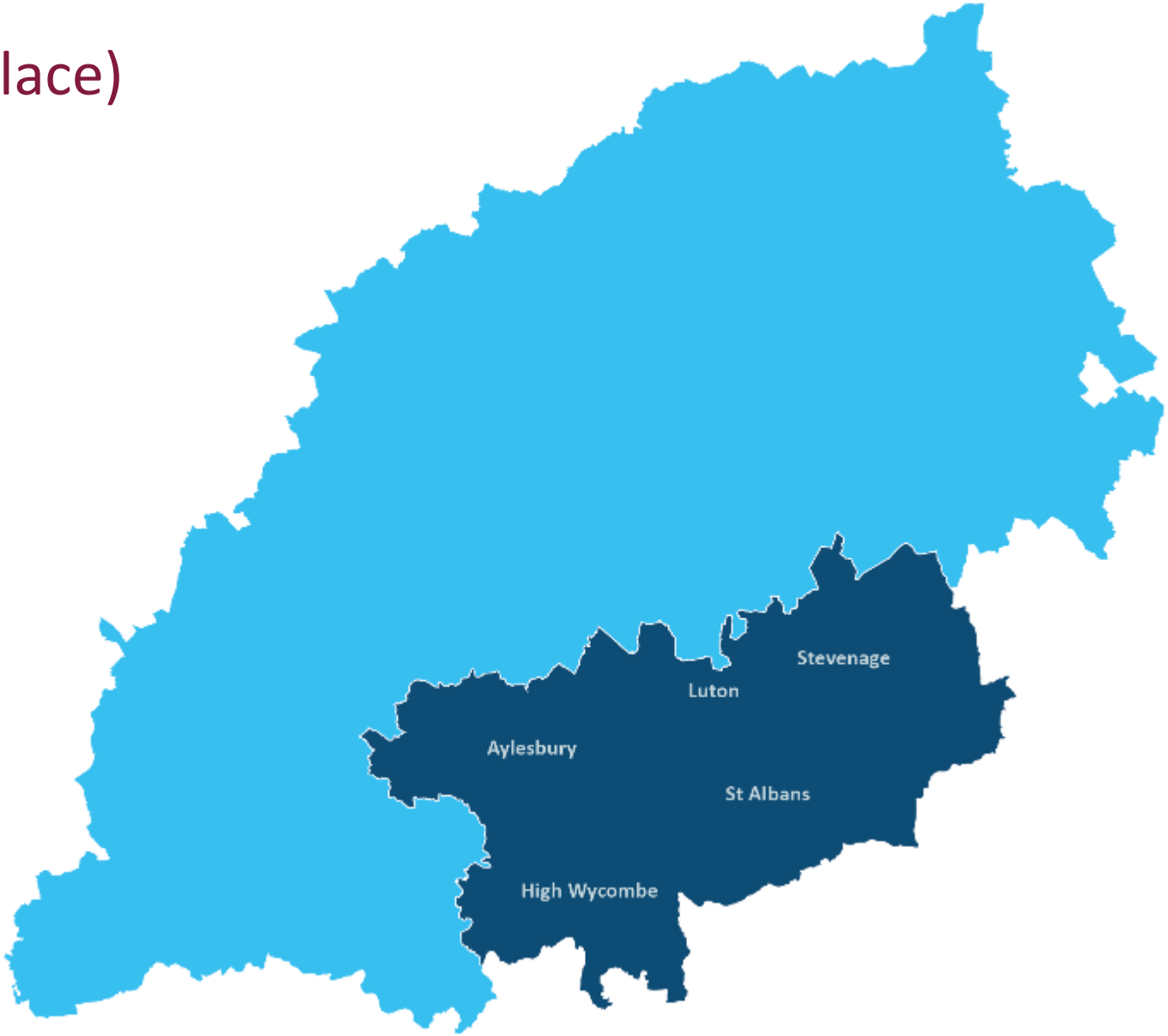
[24] Source: Road Safety Data, DfT, 2017 – 2021, https://www.data.gov.uk/dataset/cb7ae6f0-4be6-4935-9277-47e5ce24a11f/road-safety-data

Table 4 Current Context – People: Summary

Theme	Issues	Opportunities
 POPULATION	**Sparse rural populations with high levels of car dependency** - Much of the study area between major towns is comprised of smaller rural settlements, for example in the area between Luton and Tring. Rural communities have complex needs in respect to travel and accessibility. As such, sustainable mobility solutions which successfully lower car dependency in urban areas may not be as effective in rural settlements. The specific needs of these communities must be considered when assessing the potential feasibility of any future transport interventions.	**High overall population to benefit from transport interventions** – With a total population of approximately two million people, there is a large residential population that will directly benefit from enhanced connectivity within the study area.
 COMMUNITY	**Social diversity requiring a wide range of interventions** - The study area includes a diverse range of personas, each of which can have different propensities to take-up mobility solutions. This ranges from the Country Living persona which dominates the rural parts of the study area for example in the Chiltern Hills, to the Urban Cohesion and Rental Hubs personas which dominate the urban centres in Luton. A 'one-size fits all' approach is unlikely to be successful and the characteristics of the differing population type should be considered against potential transport interventions.	**Improving accessibility for all income groups** – There is an opportunity to implement packages of multi-modal transport interventions targeted to specific communities. For example, low-cost active travel solutions / infrastructure in urban centres could be explored to improve accessibility for low income groups. This would be most successful in urban areas like central Luton and High Wycombe where trip generators and destinations are in close proximity to one another, and where low-income groups are often located. The Urban Cohesion persona typology which specifically dominates central Luton have an interest in new technology, and thus may be more inclined to take up technology driven solutions such as E-scooters.
 EMPLOYMENT	**Car dependant commuters** – There is a high proportion of commuters in the residential populations in the study area, in settlements including Aylesbury, High Wycombe and St. Albans. This can result in high levels of car use between home locations and major regional rail hubs if no effective first mile/Last mile options for connecting to stations is offered to local residents.	**High income commuter group with higher budgets for travel**– Much of the study area have higher than average earning comparative to the wider UK. This is especially true in areas in the southwest of the study area including Red Daws Hill. These areas are typically home to out-commuters to larger employment hubs in London where wages are higher. High income groups are more likely to take up 'high cost' solutions for decarbonisation, like alternatively fuelled vehicles or non-traditional, high quality interurban public transport over traditional bus services.

Theme	Issues	Opportunities
 **DEPRIVATION**	**High levels of car availability results in high levels of car dependency** – Car availability in the study area is high, particularly in the suburban and rural areas in the Chiltern Hills. High car dependency leads to congestion, air quality issues and fuel poverty. There is a strong correlation between car availability car dependency. In order to reduce car usage, it is vital to reduce the attractiveness of private cars comparative to other more sustainable modes.	**Better sustainable transport connection between employers and employees** – Improved public transport connectivity between areas of high and low income can help residents living in lower income areas access employment opportunities, everyday services and facilities. As much of the deprivation in the study area is within the urban centres, like central Luton, affordable inter-urban connectivity between these centres is a key opportunity, as well as affordable transport links to key employment hubs around the wider EEH.
 **HEALTH & WELLBEING**	**Health deprivation is a potential barrier to active travel** – The study area has a typically low levels of health deprivation. The main exception is within Luton which has high levels of health and disability deprivation, this correlates with other factors such as income deprivations and issues of air quality associated with the presence of Luton Airport. Health deprivation may limit the accessibility of active modes to some population groups.	**Capitalising on healthy populations who are conscious about living a healthy lifestyle** – The majority of the study area has low levels of health and disability deprivation. This suggest healthy populations which are likely to have the physical capacity to engage in active modes of travel. Further to this there is an opportunity to capitalise on health consciousness amongst already healthy populations located in areas like St. Albans and High Wycombe to encourage active travel as part of a healthy lifestyle. **Public health benefits of active travel** – Intra-urban active travel connectivity, particularly between Luton and surrounding residential areas, may help to address high levels of health and disability deprivation in the area by encouraging the use of walking and cycling for short and medium distance journeys.

5 Current Context (Place)



Place

The place-based evidence provides an insight into the existing environmental and settlement characteristics of the study area. By identifying existing environmental constraints and opportunities the location and scale of issues including air quality, safety and carbon emissions are better understood.

Environment

Carbon Emissions

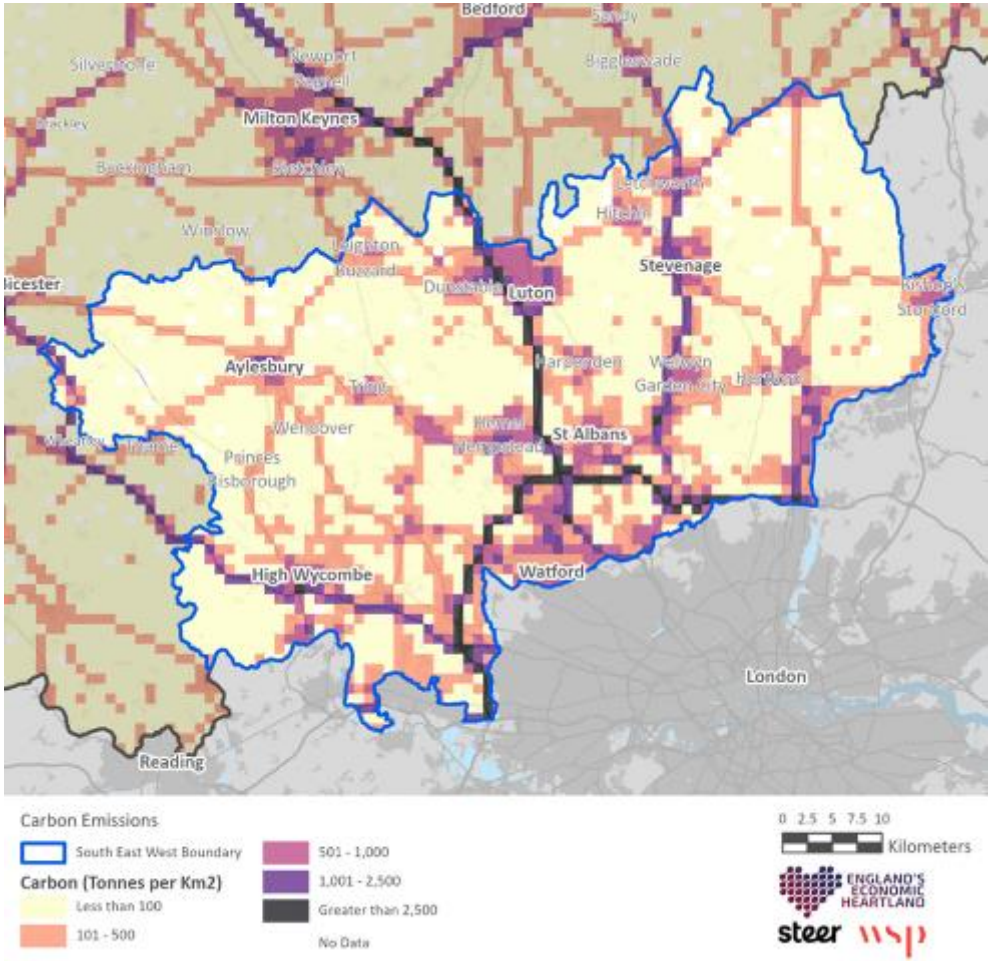
To address the UK's Greenhouse Gas (GHG) emissions the Government set a legally binding target to reach net zero carbon emissions by 2050, with a reduction of 78% required by 2035. In 2019, the total amount of CO_2 (Carbon Dioxide) emissions from road-based sources by local authorities in the study area was 4,147 kT, equating to 41% of all the road-based CO_2 emissions in the EEH region as a whole (Figure 13).

The highest road-based carbon emissions can be found along the major motorways within the study area including the M1, M25 and M40. Radial A-roads also reveal significant carbon emissions including through Watford, Hemel Hempstead and Luton. There are high carbon emissions recorded close to rural settlements which could be attributed to car dependency and dominance of highways infrastructure in these environments such as A roads near Tring. Given the number of strategic through routes in the study area (e.g., M25, M1 etc.), interventions to reduce carbon emissions must also address trips which start and end outside of the study area and EEH (i.e., through trips).

In Luton 8.3% of all transport carbon emissions are associated with "other sources". This excludes road transport and diesel railways and it likely to be attributable to aviation emissions at Luton Airport. This is likely attributable to Luton Airport. There is a key challenge in balancing the local environmental impact of Luton Airport with its economic importance.

There is a need to address high transport carbon emissions throughout the EEH region, high car dependency and traditional combustion engine travel creates heavy carbon emissions. The use of alternative fuel vehicles, in particular by HGV, and a transition to sustainable modes can help with reducing the total carbon emissions.

Figure 13 Carbon Emissions[25]



[25] Source: National Air Quality Emissions dataset, 2020

Flood Risk

Figure 14 illustrates that parts of the study area fall into Flood Zone 2 (1 in 1,000 or greater annual probability of flooding) or Flood Zone 3 (1 in 100 or greater annual probability of flooding).

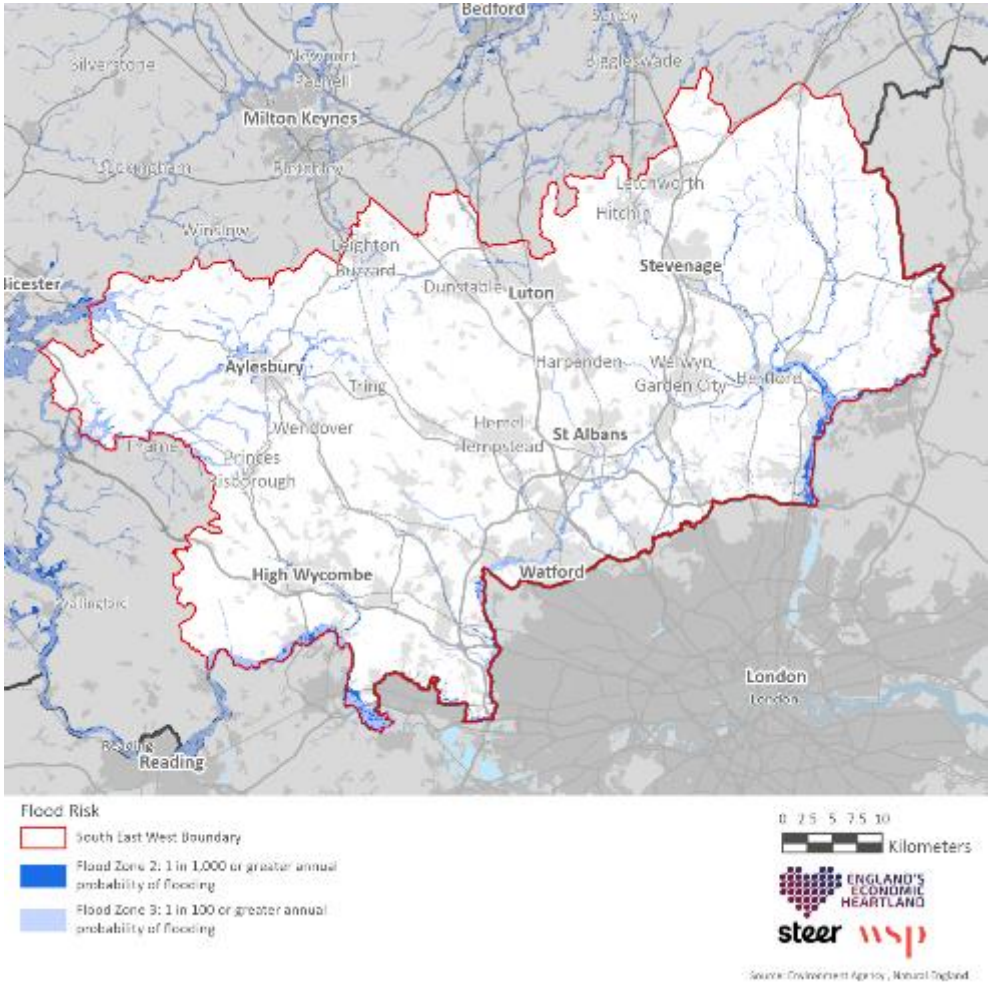
The eastern part of the study area along the River Lea is particularly susceptible to flooding. The river runs through the study area between Chesthunt in the south through Hertford and on towards Greater London, will small sections of the southern border of the study area falling within Flood Zone 3.

Furthermore, small pockets in the north-west of the study area, especially the land surrounding Aylesbury, is susceptible to flooding. This is associated with the River Thame and the land is predominantly categorised as a Flood Zone 2.

Recent severe weather has increased the threat of flooding, and there is a consensus in the scientific community that climate change will only increase threats of extreme weather, further worsening the problem.

The parts of the study area which surround the River Lea and the River Thames fall within designated Flood Zones. An awareness of the impact of climate change is needed to ensure interventions are future proofed from severe weather events. Planned infrastructure will also need to reflect the requirements of flood defence / mitigation needs.

Figure 14 Flood Risk[26]



[26] Source: Flood Risk, Environmental Agency, 2020

Heritage

In total, there are 210 Grade I listed buildings and 13,150 Grade II listed buildings within the study area as shown in Figure 15. A large proportion of listed buildings are situated in the surrounding areas of Stevenage, particularly to the north.

Ecology

The Chilterns is an Area of Outstanding Natural Beauty (AONB), that spans from High Wycombe to Luton and from Luton and Hitchin.

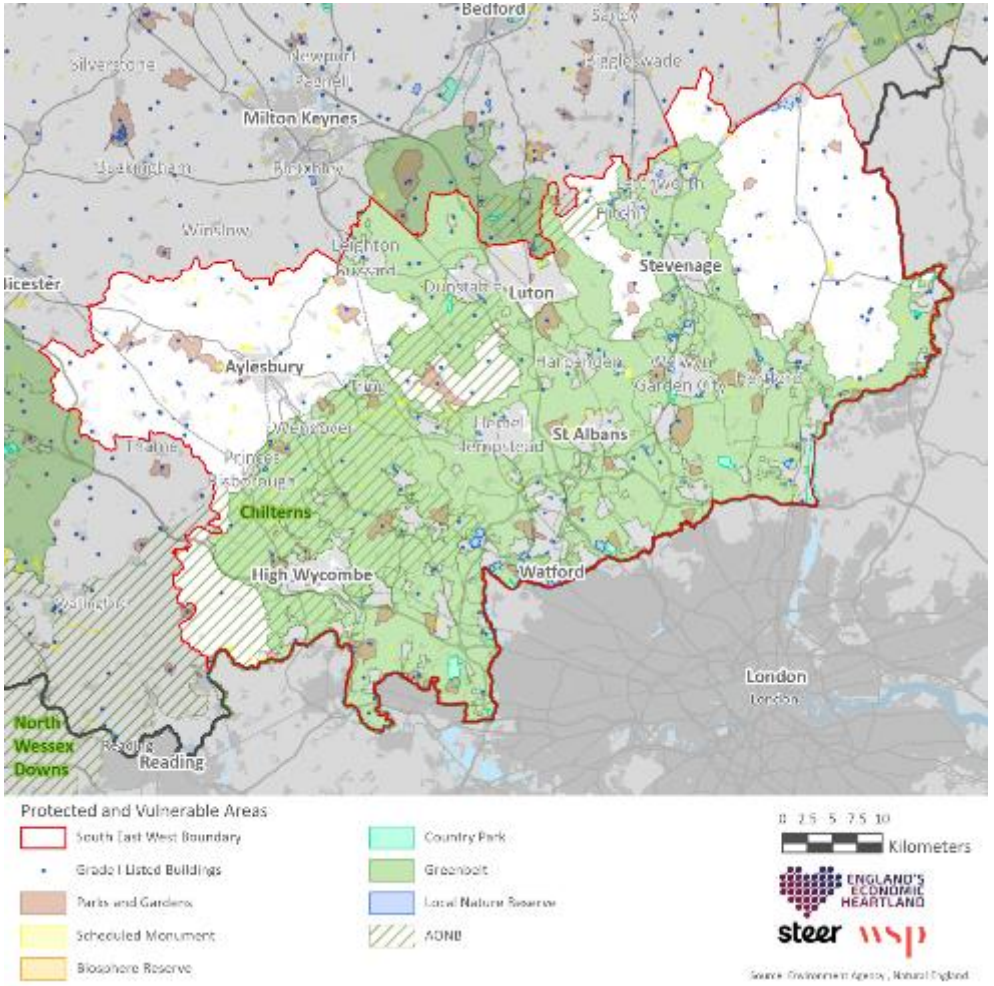
There are numerous parks and gardens in the study area, including Stanborough Park, River Lea Country Park and Black Park Country Park. There are also several country parks surrounding Watford. Protection of these areas is pivotal not only from a public amenity perspective but also from a local biodiversity viewpoint.

Green Belt

A large proportion of the study area is encompassed within the green belt spanning from High Wycombe to Stevenage. This has a substantial influence on the location of planned growth in the study area. The green belt found in the study area is mostly that surrounding the north of London which is in place to to assist in safeguarding the countryside from encroachment and prevent urban sprawl.

The location of protected areas and buildings can create concerns for implementing new transport solutions. New infrastructure proposals will need to take into account the existing greenbelt to ensure minimal impact to the landscape.

Figure 15 Protected and Vulnerable Areas[27]



[27] Source: Protected and vulnerable areas, DEFRA, https://magic.defra.gov.uk/

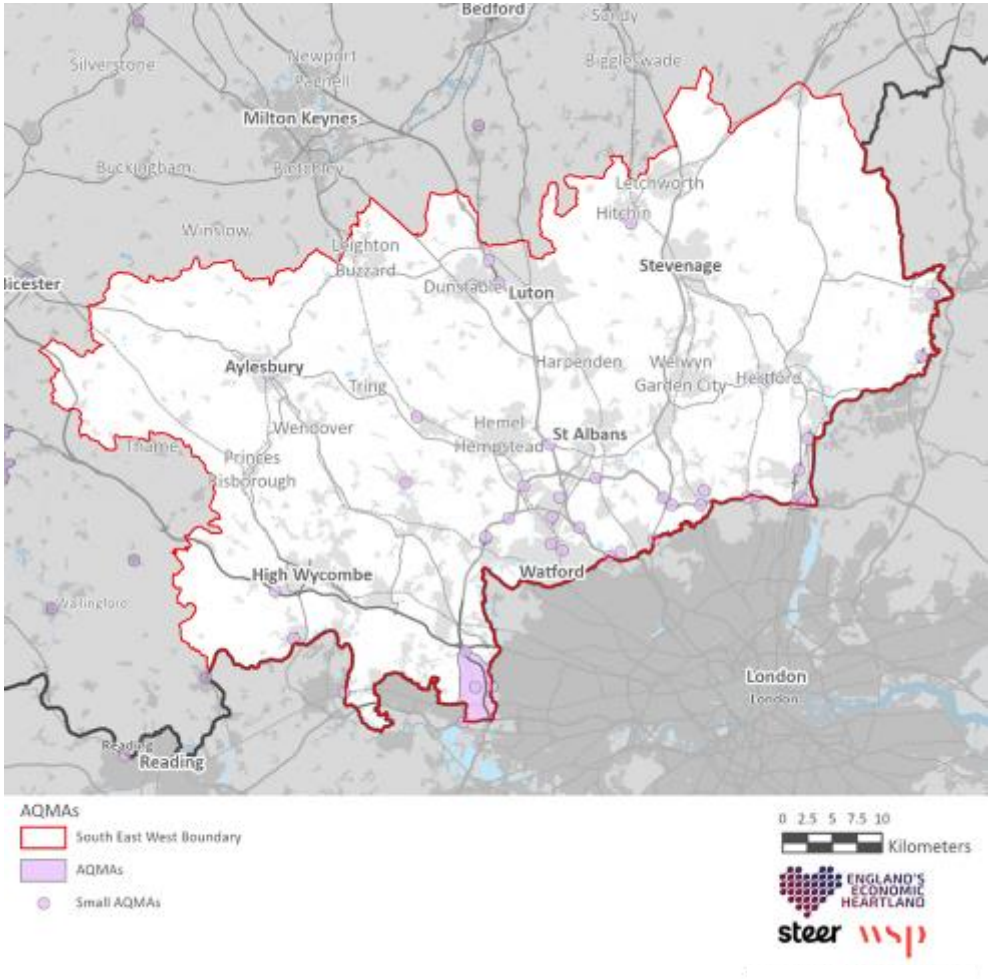
Air Quality

Figure 16 illustrates areas of poor air quality identified from the location of Air Quality Management Area (AQMAs)[28], which are typically located where large inter-urban corridors and strategic roads pass through urban areas (for example, The M25 within Watford). There is a total of 48 AQMAs within the study area, representing a total of 53% of the AQMAs within the EEH region.

Many AQMAs can be found on the southern border of the study area surrounding the M25 and M1. Large area AQMAs can also be found surrounding the M40. AQMAs have been designated in the study area to focus on reducing excess levels of Nitrogen Dioxide (NO^2). It should also be noted that the London Ultra Low emission zone (ULEZ) is planned for expansion, representing congestion charge for heavily polluting vehicles. There could be potential for disbenefits on the edges of the expanded ULEZ due to alternative routing.

The establishment of AQMA highlights the severity of air quality issues in the study area, particularly in the south in areas surrounding the M25. To address this, interventions particularly in existing AQMA areas, must further promote low carbon transport solutions including use of sustainable travel options.

Figure 16 Air Quality Management Areas[29]



[28] An AQMA is designated by DEFRA (2023)

[29] Source: AQMAs, DEFRA, 2023, https://uk-air.defra.gov.uk/aqma/

Economy

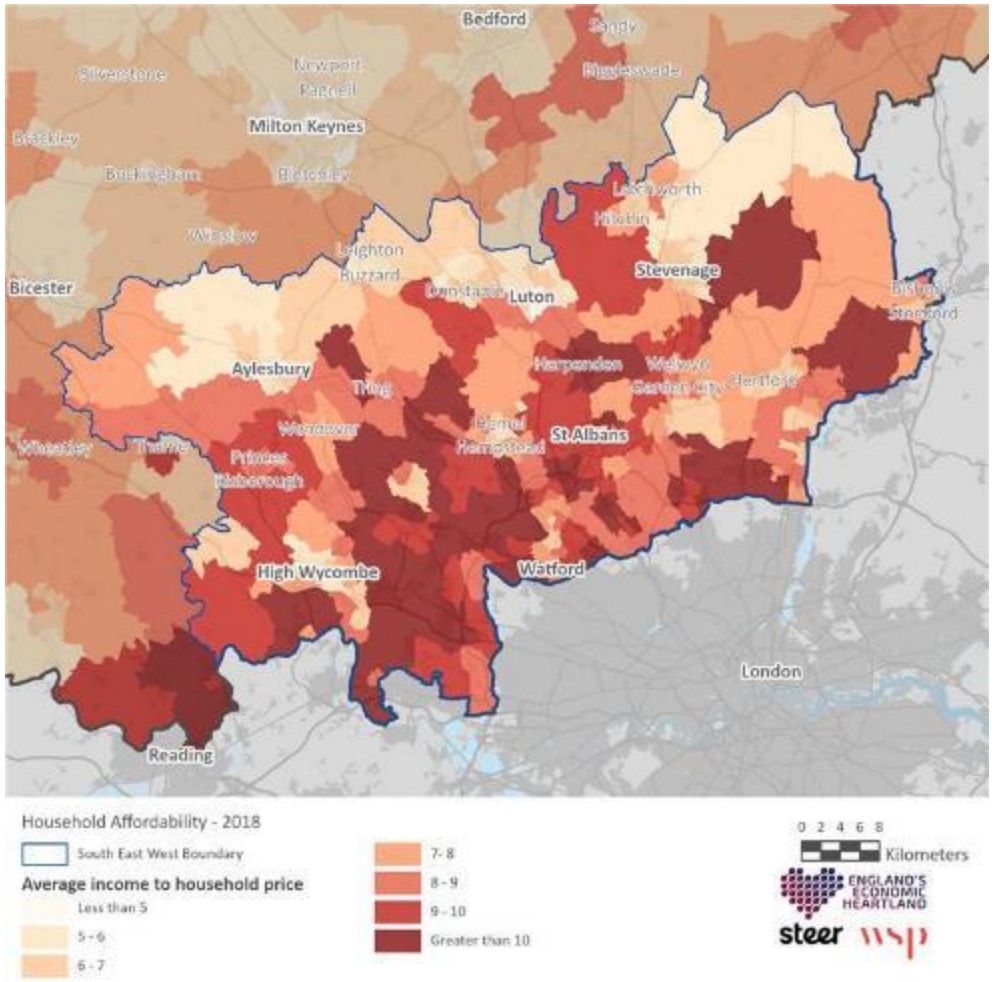
Housing Affordability

In 2018, the average house price in the study area was approximately £413,800, while the annual average household income in the financial year ending 2018 was approximately £51,300, resulting in a study area affordability ratio of eight. Figure 17 shows that the average income to household ratio varies noticeably across the study area, with the south of the study area, closer to London, generally being much less affordable than the north.

The affordability of housing is lowest around key settlements to the south and east of High Wycombe, east to Hemel Hempstead, Harpenden, and east of Stevenage. The highest household affordability ratio is recorded in Radlett at 14.7, resulting from a median housing price of £874,000 and a total household annual income of £59,300. High house prices and income can be found in Northaw and Cuffley to the north of London, as well as areas to the east of High Wycombe, leading to a relatively high ratio that varies between 11-14. The ratio in urban areas is significantly lower, for example, Luton and Stevenage remain relatively low with a ratio of 5-6.

The absence of affordable housing in the south of the study arises from the proximity of these areas to the periphery of Greater London, where house prices are higher due to increased desirability. This can result in more car-dependent intra-urban movement patterns as more affordable areas further away from employment areas are not supplied with effective public transport connections. However, improvements to long distance public transport could make it more attractive for people to live further away from London and in turn potentially contribute to easing housing pressures which provide some relief to affordability pressures, noting that housing markets are complex and demand currently outstrips supply.

Figure 17 Housing Affordability[30]



[30] Source: House Price statistics for Small areas (HPSSAs) – Dataset 2Median Price paid by MSOA (2018)

Industry Split

The EEH region is at the heart of UK's academic and commercial research sector. The region is characterised by a unique combination of scientific and cultural assets, resulting in a highly skilled workforce in the areas of innovation and technology. The industry split across the study area shown in Table 5 reflects this, as business administration and support services and professional, scientific and technical activities are the largest employers in the study area, followed by health and retail. Business administration / support services and scientific and technological activities provide almost one-third of the total jobs. This is likely due to the concentration of a number of advanced manufacturing, life science and aviation and aerospace business such as London Luton Airport, GE Healthcare, Johnson & Johnson, Tesco and Ocado HQ. Prominent industry hubs and business parks within the study area include:

- Life sciences: GE Healthcare and Johnson & Johnson in Buckinghamshire
- Retail/Logistics: Tesco HQ, Ocado HQ in Welwyn-Hatfield
- Aviation and Aerospace: London Luton Airport (Including Easyjet HQ, Airbus Defence & Space MBDA UK Ltd located in Stevenage
- Film Industry: Elstree Studios in Borehamwood and Leavesdon Studios in Watford (including "making of Harry Potter Studios tour")

To maximise the economic potential of key industries within the study area, interventions should focus on connecting centres of employment with a skilled workforce (e.g. creating public transport connections to Borehamwood to East/West settlements that lack rail line connections). Opportunities may exist in the study in respect to the level of high-tech industries within the study area, as these professions may suggests the population of the study area could be more likely to be interested in new technology driven transport interventions. As such, these interventions may be particularly successful in the area.

Table 5 Industry Sectors[31]

Industry	Study Area %	EEH Region %	England %
Agriculture, forestry and fishing	0.1%	0.1%	0.1%
Mining, quarrying and utilities	0.1%	1.0%	1.2%
Manufacturing	5.7%	7.4%	7.5%
Construction	5.9%	4.9%	4.8%
Motor trades	1.7%	2.0%	1.7%
Wholesale	5.1%	4.6%	3.7%
Retail	8.5%	8.7%	9.1%
Transport and storage	4.2%	5.8%	5.2%
Accommodation and food services	5.9%	6.0%	7.5%
Information and communication	5.1%	4.8%	4.7%
Financial and insurance	1.7%	2.3%	3.7%
Property	1.9%	1.7%	1.8%
Professional, scientific and technical activities	11.3%	10.4%	9.3%
Business administration and support services	17%	12.2%	9.0%
Public administration and defence	2.3%	2.8%	4.3%
Education	8.3%	10.0%	8.8%
Health	10.5%	11.1%	13.4%
Arts, entertainment, recreation and other services	4.0%	4.1%	4.3%
TOTAL	***100%***	***100%***	***100%***

[31] Source: Business Register and Employment Survey, ONS, 2020, https://www.ons.gov.uk/surveys/informationforbusinesses/businesssurveys/businessregisterandemploymentsurvey

Gross Value Added

The Gross Value Added (GVA) is a measure of the value of goods and services produced in an area, industry or sector of the economy. Table 6 shows the GVA (£ million) split for each industry as of 2019. The study area is a significant contributor to the success of the EEH region, contributing 40% of the region's total Gross Value Added in 2019.

Table 6 shows that in 2019 the study area had a total GVA of £69,984 million. Of this, 'Real Estate Activities', 'Wholesale and Retail Trade', and 'Manufacturing' are the top three contributing factors (accounting for 14.9%, 13.7%, and 10.6% of the total GVA, respectively), demonstrating the popularity of the study area as a place of living as well as the importance of manufactory and retail industry in the area such as Tesco HQ and Vauxhall.

Construction, Scientific & Technical Activities, and Administration & Support Services are also key sectors that contribute between 7% to 10% towards the total GVA in the study area (Construction and Support services is higher than the EEH level and Scientific Activities are around the average level of EEH).

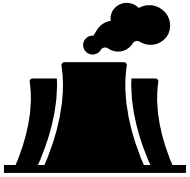
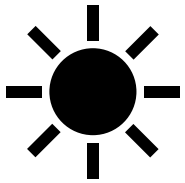
It is important that transport services and infrastructure support the continued growth and expansion of sectors, such as retail and manufacturing, that play a key role in contributing to the success of the EEH region. As manufacturing is an important industry in the study area, there is opportunities to provide decarbonised freight solutions in this industry.

Table 6 GVA by Industry[32]

Industry	Study Area		EEH Region		England	
	GVA (£million)	%	GVA (£million)	%	GVA (£million)	%
Agriculture, mining, electricity, gas, water and waste	1,091	1.6%	5,577	3.3%	55,590	3.2%
Manufacturing	7,426	10.6%	19,690	11.7%	167,185	9.6%
Construction	6,576	9.4%	12,536	7.4%	112,352	6.5%
Wholesale and retail trade; repair of motor vehicles	9,622	13.7%	22,358	13.2%	183,407	10.6%
Transport & storage	2,692	3.8%	6,575	3.9%	70,899	4.1%
Accommodation & food services	1,717	2.5%	4,016	2.4%	50,574	2.9%
Information & communication	4,307	6.2%	9,490	5.6%	115,661	6.7%
Financial & insurance	2,967	4.2%	8,629	5.1%	147,534	8.5%
Real estate activities	10,426	14.9%	21,441	12.7%	234,058	13.5%
Professional, scientific & technical Activities	5,168	7.4%	13,128	7.8%	136,637	7.9%
Business administration & support services	4,963	7.1%	10,127	6.0%	92,527	5.3%
Public administration & defence	2,254	3.2%	6,234	3.7%	76,453	4.4%
Education	3,996	5.7%	11,771	7.0%	102,668	5.9%
Human health and social work activities	3,776	5.4%	10,428	6.2%	125,655	7.2%
Arts, entertainment & recreation	1,517	2.2%	3,175	1.9%	29,146	1.7%
Other service activities	1,336	1.9%	3,413	2.0%	30,153	1.7%
Activities of Households	150	0.2%	410	0.2%	3,603	0.2%
TOTAL	69,984	100%	168,998	100%	1,734,102	100%

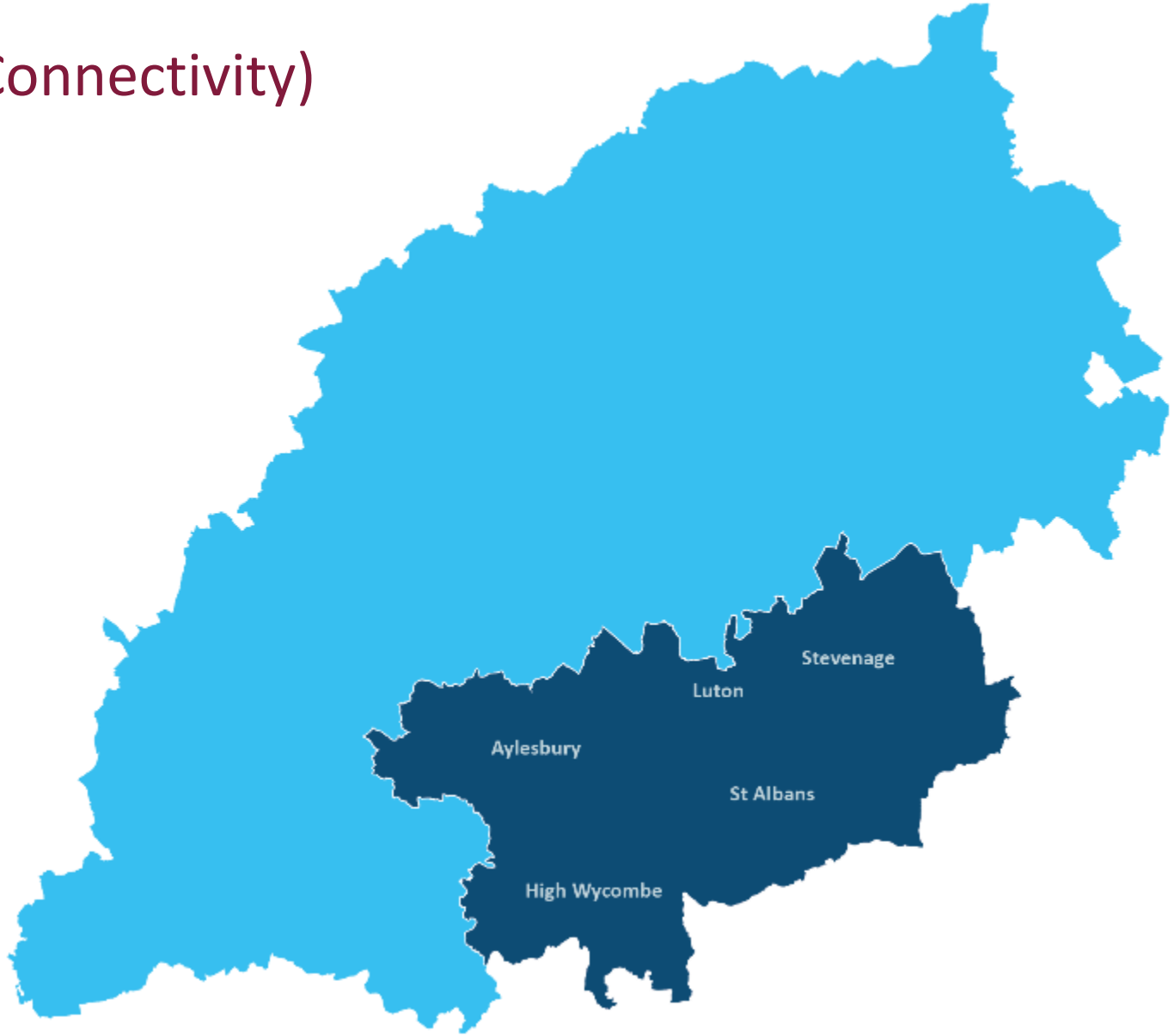
[32] Source: GVA (balanced) by industry: local authorities by ITL1 region, ONS, 2019

Table 7 Current Context – Place: Summary

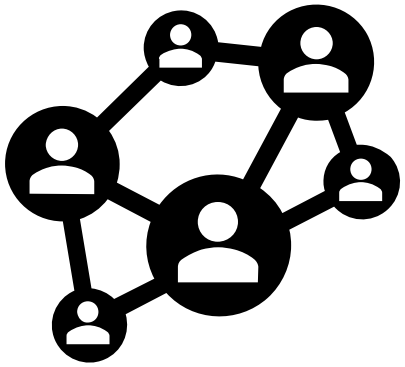
Theme	Issues	Opportunities
 **Air Quality**	**Emissions from through traffic which the EEH have little influence over** – Much of the traffic in the study area is through traffic travelling on the major road network between origins and destinations which lie outside of the study area. This is as the study area contains key national road connections between London and the north of the England / Scotland. This is an issue as EEH is likely to have a lesser ability to influence these trips than if they were to either start or end within the area. **Emissions from London Luton Airport –** In Luton, 8.3% of all transport carbon emissions are associated with "other sources", this is likely attributable to London Luton Airport. The balance between the economic importance of the Airport and local air quality concerns remains a challenge.	**Opportunity to decarbonise through new mobility solutions** – to help improve air quality and decarbonise the transport network there are opportunities to implement new shared mobility solutions in urban areas (e.g., e-bikes, e-scooters etc.), particularly in locations where they could form the first or last part of a longer journey by bus or rail. This would be particularly useful in dormitory suburbs with high levels of out commuting, like St. Albans and High Wycombe. In rural areas to the east of Stevenage there are opportunities to explore demand responsive services, car clubs and car sharing schemes. Across the study area there are opportunities to explore the rollout of EV charge points. **London Luton Airport –** Although it may be difficult to reduce aviation related emissions from London Luton Airport, the use of sustainable travel connections over private car usage can reduce surface transport emissions resulting from the airport and in turn reduce the Airport's overall environmental footprint.
 **Climate Change and Protected Areas**	**Increased flooding risks could lead to infrastructure damage** – The parts of the study area which surround the River Lea and the River Thame fall within designated Flood Zones. An awareness of the impact of climate change is needed to ensure any proposed interventions are future proofed from severe weather events. **Green belt Challenges**– A large proportion of the study area is designated green belt surrounding Greater London. This substantially influences the location of planned growth likely resulting in long-distance car commutes. It may also make the delivery of new infrastructure more challenging. Areas within the Greenbelt are also very unaffordable, and in-turn lead to longer car-dominated journeys as employees find more affordable areas away from key employment areas.	**Active travel greenways in green belt land** – with the greenbelt surrounding London influencing the spatial distribution of new housing and employment growth in the area, there are opportunities to link these new settlements via attractive mass transit system and cycling 'greenways'. This would aid in the decarbonisation of the transport system within the study area.

Theme	Issues	Opportunities
Built Environment 	**Low housing affordability prompting long distance travel for work** - Much of the south of the study area, on the periphery of Greater London has high house prices comparative to income. As such, for many people working in these areas housing will be unaffordable, prompting them to live in other more affordable settlements within the corridor. This has the potential to result in longer, car based, inter-urban commuting journeys.	**Uptake of new technologies by tech-friendly communities** – There is a high level of high-tech industries within the study area including Airbus Defence and Space in Stevenage. This suggests the population of the study area could be more likely to be interested in new technology driven transport interventions, for example Mobility as a Service interventions. As such, these interventions may be particularly successful in the area. **Long distance public transport opportunities to ease affordability pressures** - Improvements to long distance public transport as the potential to make it more attractive for people to live further away from desirable areas to the South EEH Border and in turn potentially ease housing pressures and affordability issues. However, demand for housing is still likely to be high in this area given population growth and pressures in the London market.

6 Current Context (Connectivity)



Connectivity



The connectivity evidence presents a set of transport network, modal and movement data to gain an insight into the current pattern of travel, connectivity challenges and opportunities within the study area.

Digital Connectivity

Average Download Speeds

In the digital connectivity arena, the pace of technological development has led to order-of-magnitude changes in broadband speeds and usage over the course of a relatively few years. Substantial improvements in fixed and mobile connectivity are being driven by a combination of commercial roll-outs and policy action.

In terms of fixed broadband, the coverage of superfast services (offering 30Mbps+ download speeds) is now nearly ubiquitous across the UK. The focus has shifted to the roll-out of gigabit-capable services offering 1,000 Mbps+ download speeds.

The largest players in this are BT Openreach which is rolling out Fibre-to-the-Premises (FTTP) services, and Virgin Media which is upgrading its existing cable network to gigabit-capable DOCSIS 3.1 technology and is also using FTTP to extend its footprint.

In addition, there has been a welcome increase in the number of independent fibre network operators over the last few years. In EEH these include: CityFibre, Gigaclear, Tove Valley Broadband, Glide, and Hyperoptic.

Recognising that commercial roll-outs are likely to leave harder-to-reach premises unable to access gigabit services, the government has established the £5 billion Project Gigabit which maps to subsidise coverage for the 'final 20%' of premises; with the project's initial procurements for subsidised roll-outs already getting underway.

The EEH area will be addressed through five separate Regional Supplier procurement lots. The government's aim is to achieve gigabit coverage for 85% of UK premises by 2025 and to push towards 100% nationwide coverage as soon as possible.

For mobile connectivity, the UK's four mobile network operators are currently rolling out 5G services, which offer higher speeds and lower latency and which are expected to have a variety of applications from health care to agriculture to advanced manufacturing.

It is not yet certain how far these commercial roll-outs will extend, but EE has recently stated that it expects their 5G services to cover half of the UK population by early 2023, and 90% of the UK landmass by 2028. In parallel, the publicly-subsidised £1 billion Shared Rural Network initiative between the Government and the mobile operators is seeking to address areas of the UK where 4G coverage is currently non-existent or partial.

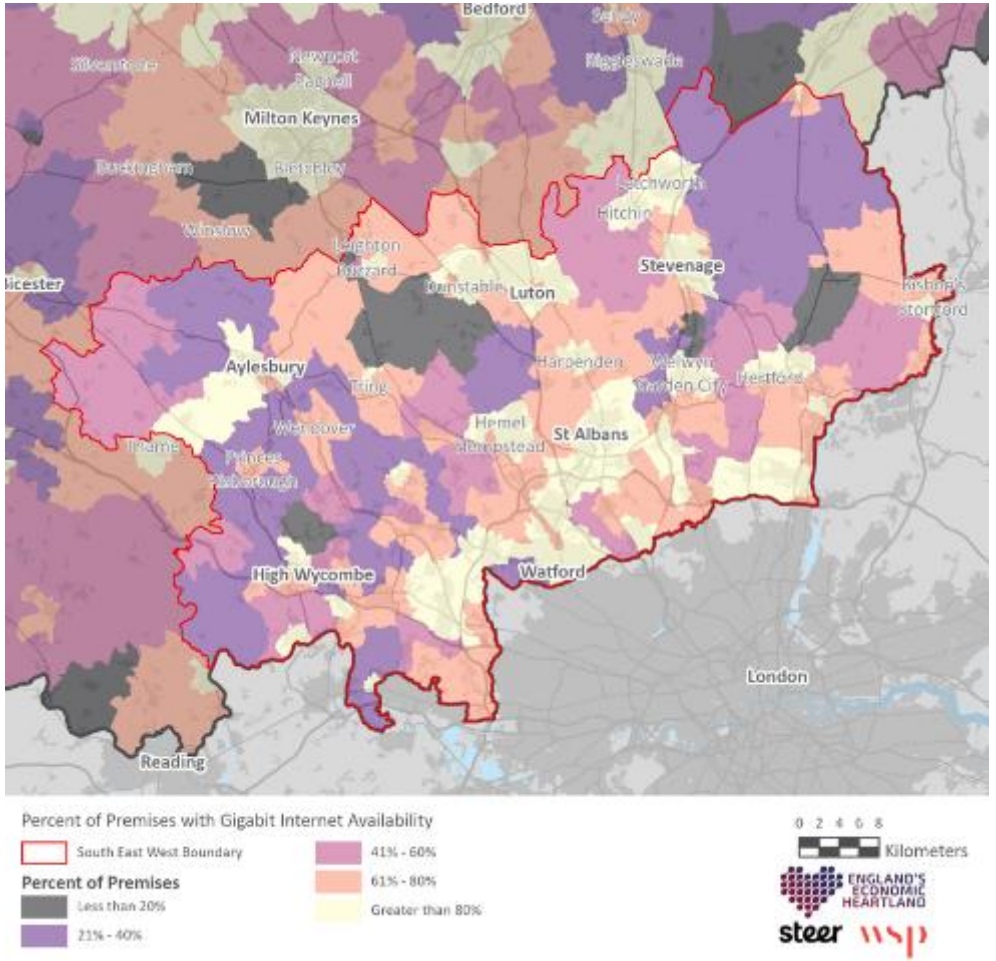
Gigabit Connectivity Coverage

Figure 18 highlights the proportion of households within each of the Lower Super Output Areas (LSOAs) in the study area which have access to gigabit internet. Access to gigabit internet speeds in the study area shows a clear urban / rural split with the larger key settlements having the highest proportion of Gigabit availability, for example within Luton, Watford, St. Albans and Stevenage. Whereas more rural areas like Eaton Bray can be seen to have the lower coverage.

Access to high-speed internet connections is crucial in enabling remote access to service and workplaces. EEH's "Working from Home Propensity and Capacity Release report" (dated July 2021) estimates that if those who used to commute by car and who (as a result of the COVID-19 pandemic) started to work from home were to continue to do so for two days per week, then there is the potential for between 10% to 12% of peak hour traffic to be removed. The use of hybrid working can help to reduce the need for travel at peak times and in turn reduce carbon emissions and traffic congestion.

Improved digital connectivity, particularly in rural areas like Eaton Bray, further from the main urban centres where the lowest coverage of connectivity can be found, will help facilitate the adoption of agile and hybrid working practices. In turn, this will reduce the need to travel. If workers living in rural areas, who usually commute via car, have the capacity to continue hybrid working, there is likely to be a substantial reduction in the number of trips undertaken by car, in turn reduced peak hour traffic. This would in turn reduce the requirement for new highway capacity interventions.

Figure 18 Internet Availability[33]



[33] Source: Connected Nations Report Performance Data, OFCOM, 2023

Active Travel Network

The distribution of strategic active travel infrastructure throughout the study area varies as displayed in Figure 19. The map shows the Sustrans National Cycle Routes and National Trails that are contained within or pass through the study area. These routes provide strategic connectivity between settlements on foot and cycle, being comprised of a mix of on-carriageway, segregated and shared-use sections.

Several urban settlements are connected by Sustrans routes. This includes a direct connection between Milton Keynes, Luton, St Albans and Watford, as well as a connection from Harpenden to Hertford via Welwyn Garden City.

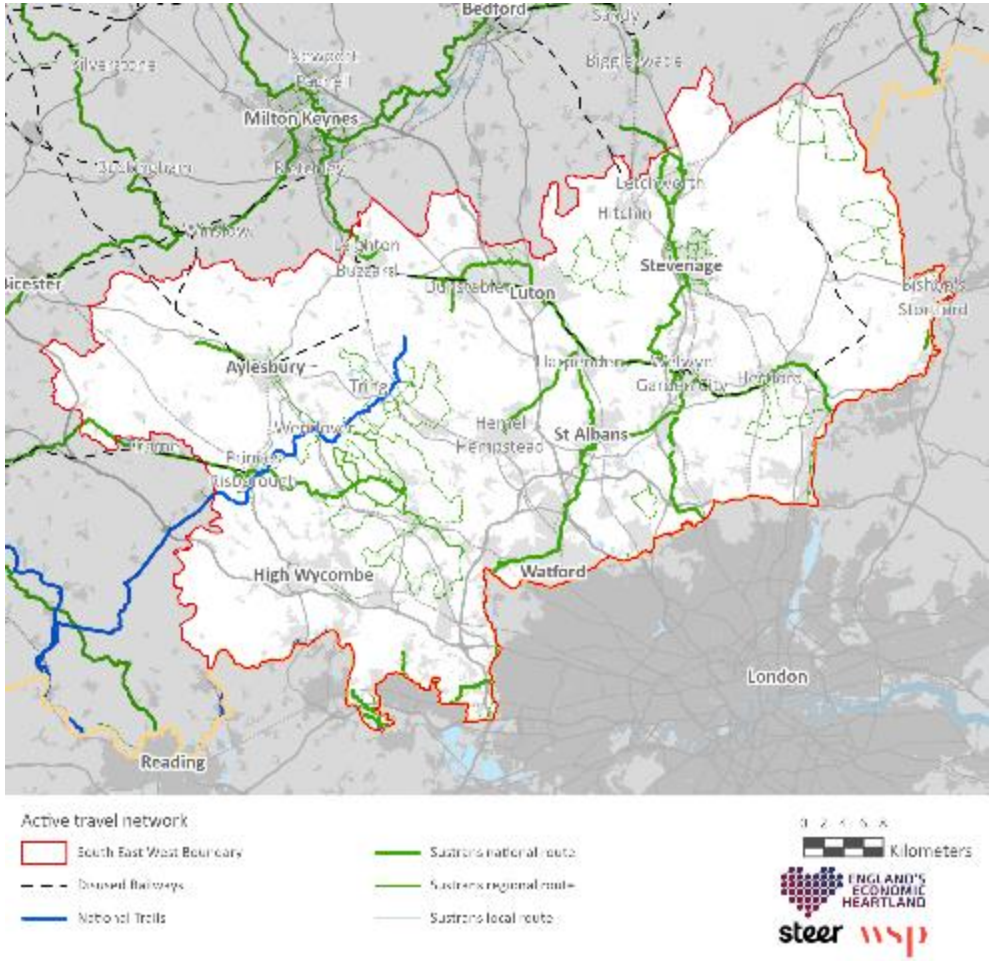
A number of medium size settlements are poorly connected by active travel routes, notably High Wycombe and surrounding settlements. This potentially limits opportunities for users to undertake medium and long distance trips by cycle or other micro-mobility modes (e.g., e-bikes).

There are opportunities for new inter-urban active travel routes to be developed between settlements, including making use of former rail alignments as occurs with the Alban Way.

The EEH Active Travel Strategy sets out a high-level ambition for active travel in the region. The document defines how to achieve excellence in active travel. It seeks to create a clear policy direction for active travel and identify the missing links in the active travel network.

To help facilitate longer-distance sustainable movements it is important that active travel networks provide high quality local connections between rail stations and residential and employment areas. New active travel infrastructure between small and medium size settlements could help reduce the reliance upon private car and improve the sustainability of rural areas.

Figure 19 Active Travel Network[34]



[34] Source: Active Travel Network, Sustrans, https://data-sustrans-uk.opendata.arcgis.com/

Micro-Mobility

Micro-mobility modes are small lightweight personal vehicles such as e-bikes and e-scooters and are becoming increasing popular for first mile / last mile journeys.

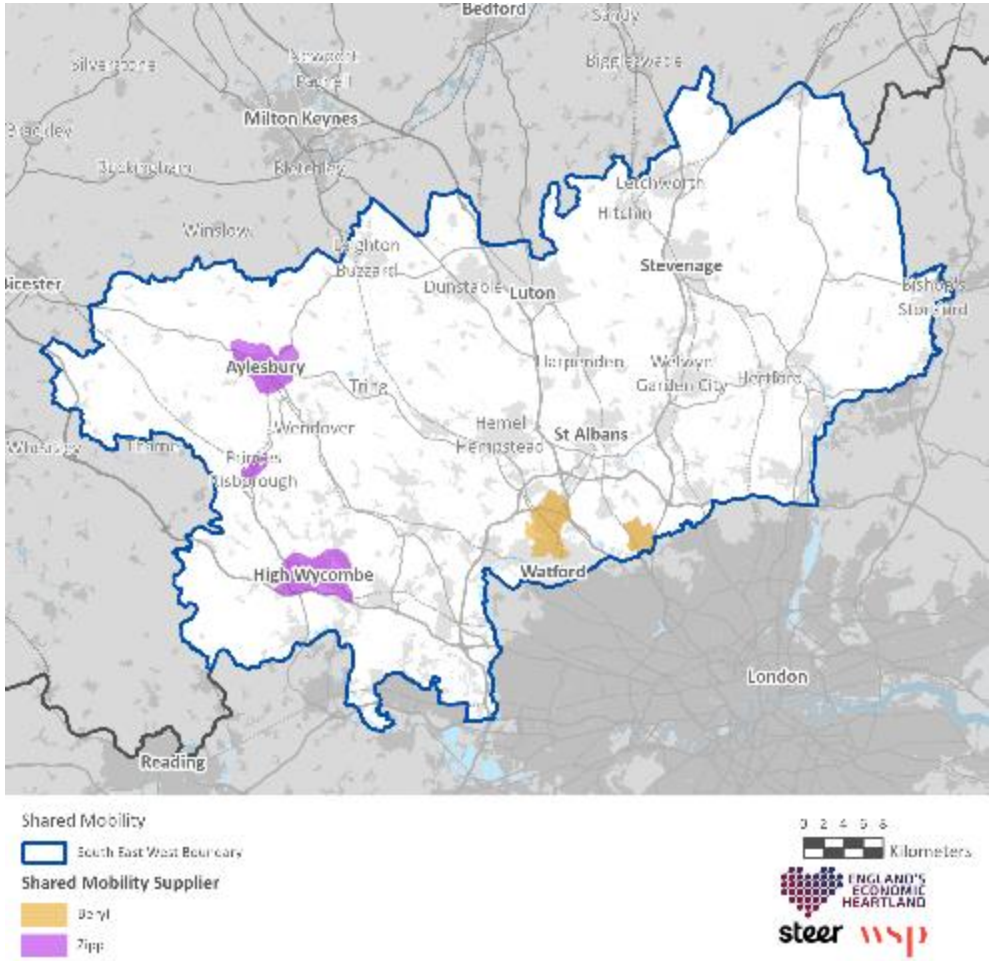
A number of shared micro mobility schemes operate throughout the study area as set out in Figure 20. These schemes generally operate in large and medium size urban areas and include:

- A dockless e-scooter scheme is operated (under UK Government trials) by Zipp in Aylesbury, Princes Risborough and High Wycombe.
- A cycle hire scheme is operated by Beryl in Watford and Hertsmere.

Despite large populations, no similar schemes have been identified in Luton, Hemel Hempstead, St Albans or Stevenage.

Micro-mobility solutions can form the first / last mile of a longer distance journey undertaken by public transport. They can also help to replace short and medium length journeys that would otherwise be undertaken by car. New shared mobility schemes should be considered in urban areas where no existing services are available, including Luton, Hemel Hempstead, St Albans or Stevenage. To maximise mode shift, these services must be implemented alongside wider improvements to active travel infrastructure.

Figure 20 Shared Mobility[35]



[35] Source: Zipp, Voi, Santander, Lime, Tier, Ginger, BikeSharingWorldMap, 2023

Cycling Propensity

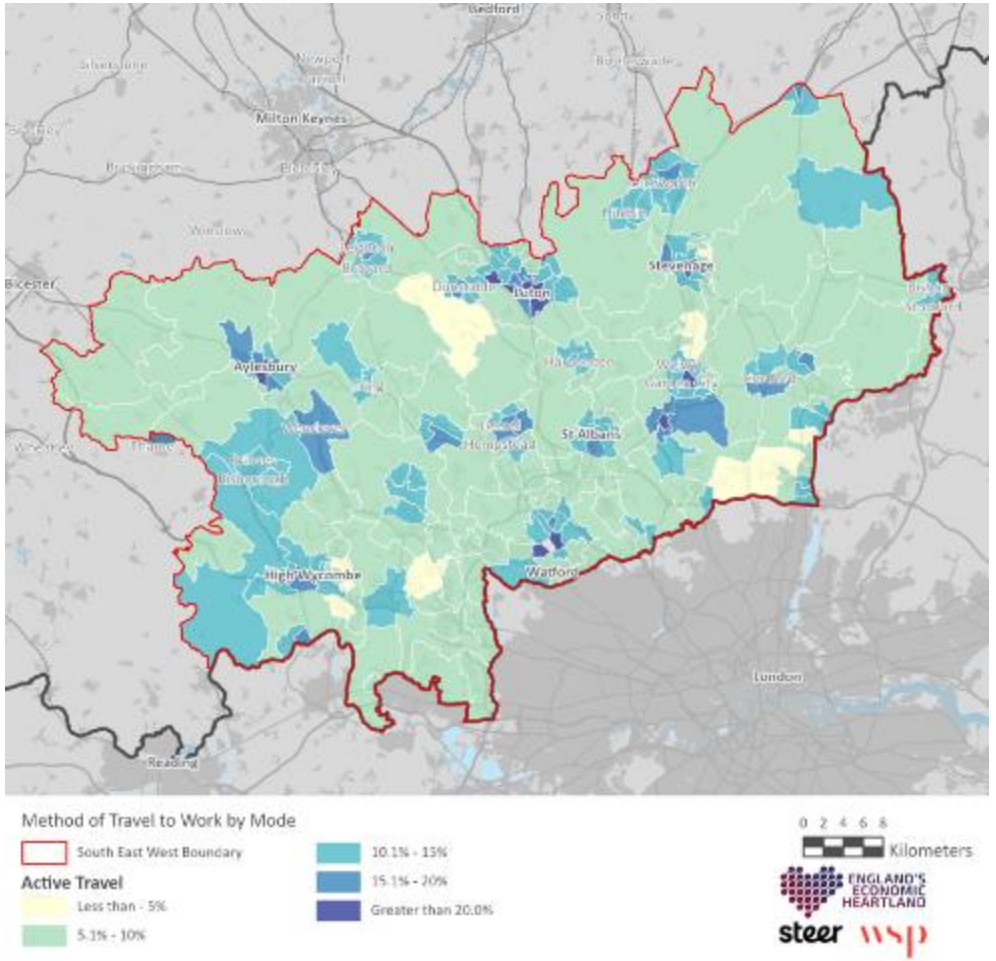
There are numerous benefits to using cycling as a mode of travel, including improved health, reduced pollution and often, quicker journey times.

Figure 21 shows percentage of journeys to work (JTW) currently undertaken by bicycle (as per the 2011 Census). This provides an insight into the existing levels of cycling within the study area. High proportions of the population currently cycling to work is only seen in dense urban centres, for example in the centre of Luton and Aylesbury. Cycling to work is currently much less common in rural areas surrounding settlements including south of Dunstable, West of Hoddesdon and East of High Wycombe, due mostly to lack of adequate active travel infrastructure connecting these areas to key destinations.

The Cycling Propensity Toolkit (CPT) has considered the cycling JTW mode share in a number of future scenarios where the population acquires a different propensity to travel. The CPT suggests that if the population of the study area acquired the same propensity to cycle as that of the Dutch population, the JTW cycle mode share would increase to 16% across the entire study area. The largest increases in cycling could take place in settlement centres with relatively high existing cycle modal share such as Luton, Hatfield, Welwyn Garden City, Stevenage and Aylesbury.

Existing use of cycling as a mode of travel to work in the study area is low. Even if the population developed a higher propensity to cycle, high quality cycling infrastructure is needed to facilitate these trips. As such high quality, Local Transport Note 1/20 compliant, cycle infrastructure must be provided to encourage increased uptake for commuting and other journey purposes. Key settlements such Hemel Hempstead, Dunstable and Hoddesdon which have high usage of cars and lack of active travel infrastructure require improved walking and cycle routes to help increase active travel mode shares.

Figure 21 Travel to Work mode[36]



[36] Source: Method of Travel to Work, ONS, 2021

Catchments (E-Bikes)

E-bikes are electrically assisted pedal bicycles that can travel up to 15.5mph or 25km/h. This makes them an attractive commuting option not only for local but also for inter-settlement movements.

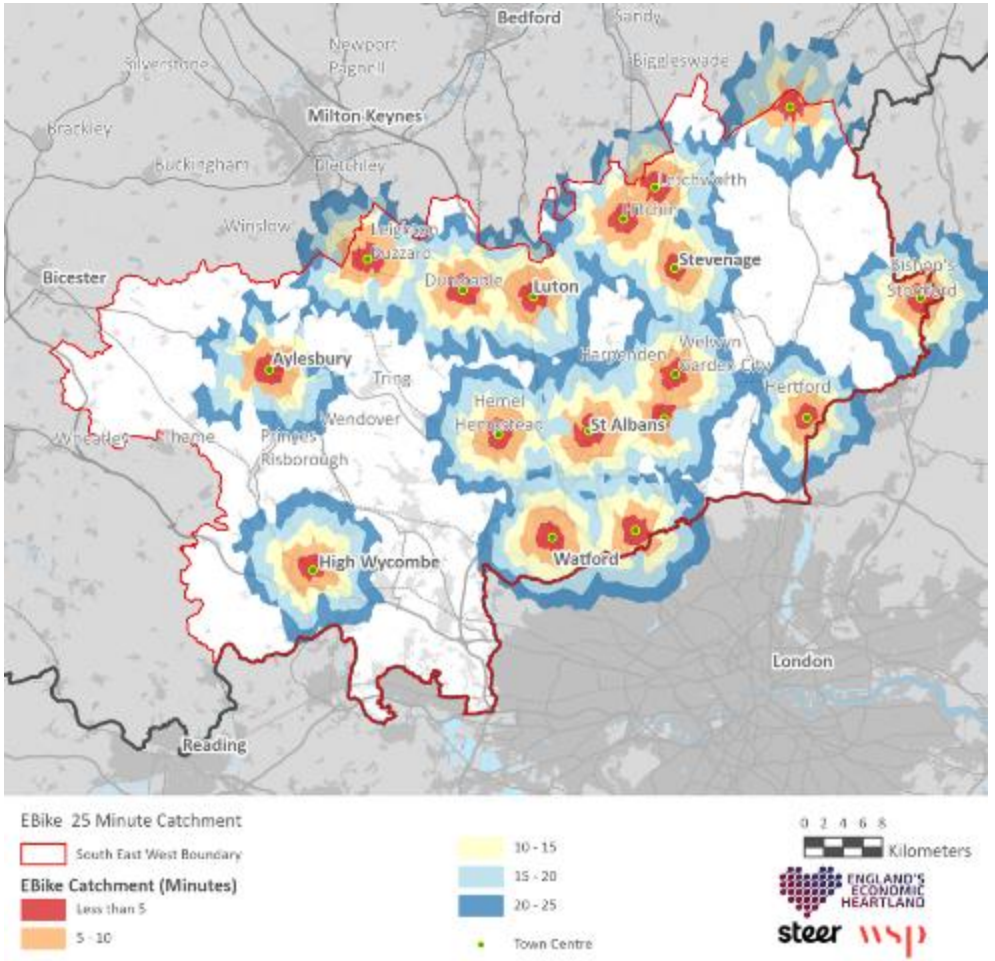
Figure 22 shows the potential for e-bikes to support trips within the study area. As the map indicates, many of the key settlements are located close to each other, making inter-urban e-bike travel a realistic option. Notable opportunities for inter-urban e-bike trips within 25 minutes can be seen between:

- Letchworth, Hitchin, and Stevenage;
- Welwyn Garden City, Hatfield and St. Albans;
- St Albans and Hemel Hempstead;
- Watford and Borehamwood; and
- Dunstable and Luton.

Further to this, several key settlements are located within 15 minutes cycle catchment of one another including Letchworth/Hitchin, Welwyn Garden city / Hatfield and Luton/ Dunstable.

The increased travel distances that e-bikes facilitate means that they have the potential to replace short/medium distance car journeys within the study area. There is significant potential to increase cycling participation within due to the close proximity of several of the key settlements in the centre of the study area, for example, the centres of Luton and Dunstable are both within a 15-minute e-bike ride from one another. To increase inter-urban cycling participation in these areas, safe and segregated infrastructure should be provided. Moreover, to ensure cost is not a barrier, low cost or subsidised e-bike schemes should be considered.

Figure 22 E-bike Catchment[37]



[37] Source: Open Route Services, 2023

Public Transport

Rail Network

The rail network in the study area is extensive as shown in

Figure 23. This is associated with the high number of north / south rail routes that connect with London. This allows for rail travel to a range of destinations both within and outside of the EEH region. The railway lines which can be found within the study area are:

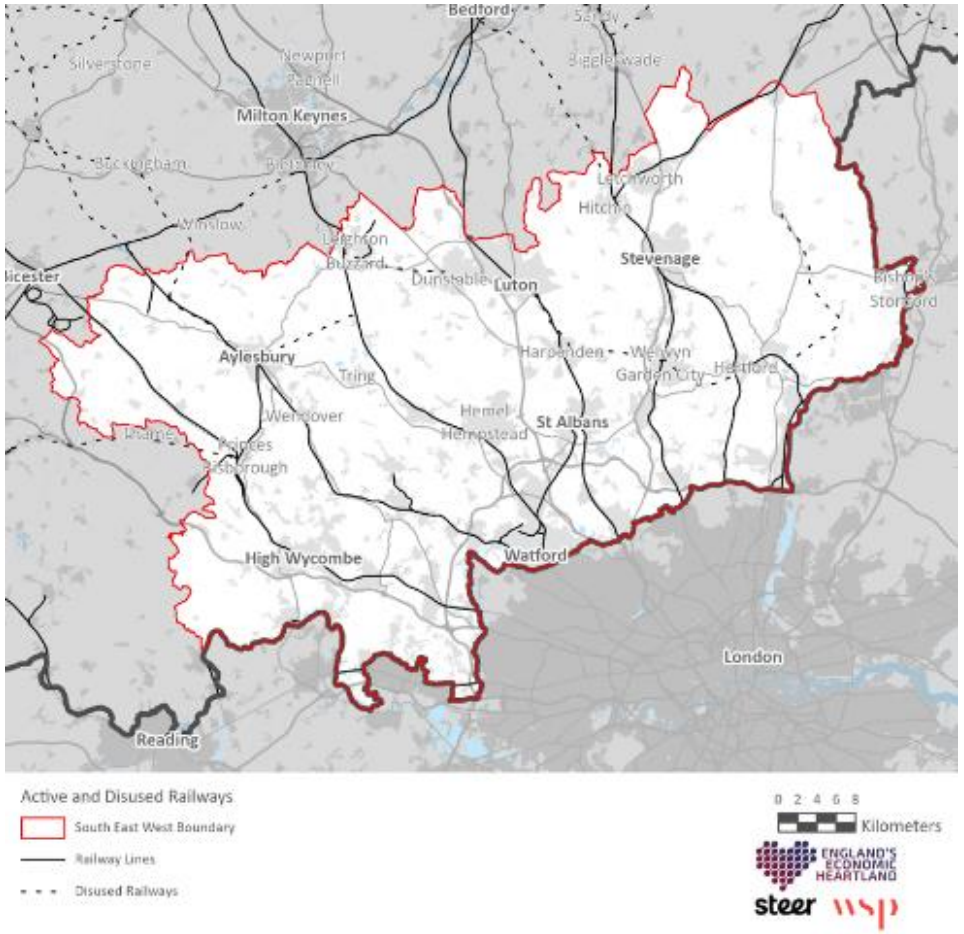
- The West Coast Mainline;
- The Midlands Mainline;
- The East Coast Mainline;
- The London – Aylesbury Line;
- The Chiltern Mainline; and
- The Cambridge Line.

In addition to the larger railway lines, smaller branch / metro lines operate in the study area including the St. Albans Abbey Line (single track), the Hertford East Branch Line; and the section of the London Overground and Metropolitan line which can be found between Watford and Chesham. Whilst there are numerous railway lines within the study area, the vast majority of these are north/south in orientations. At present, east-west rail connectivity is limited and require length detours via London. For example, there is no direct connection between Luton, Aylesbury and Stevenage.

The delivery of HS2 is expected to help release capacity, particularly on the West Coast Mainline, providing the opportunity for improved services to places such as Watford Junction. The delivery of EWR is forecast to improve rail access to the study area through the proposed Aylesbury Link (to Milton Keynes/ Bedford), as well via the planned interchange station at Tempsford.

In order to help promote increased rail usage in the study area, effective interchange opportunities for east – west movements should be explored. This could be achieved via new mass rapid transit solutions or new railway lines.

Figure 23 Active and Disused Railways[38]



[38] Source: Open Street Map, https://www.openstreetmap.org/

Rail Station Usage

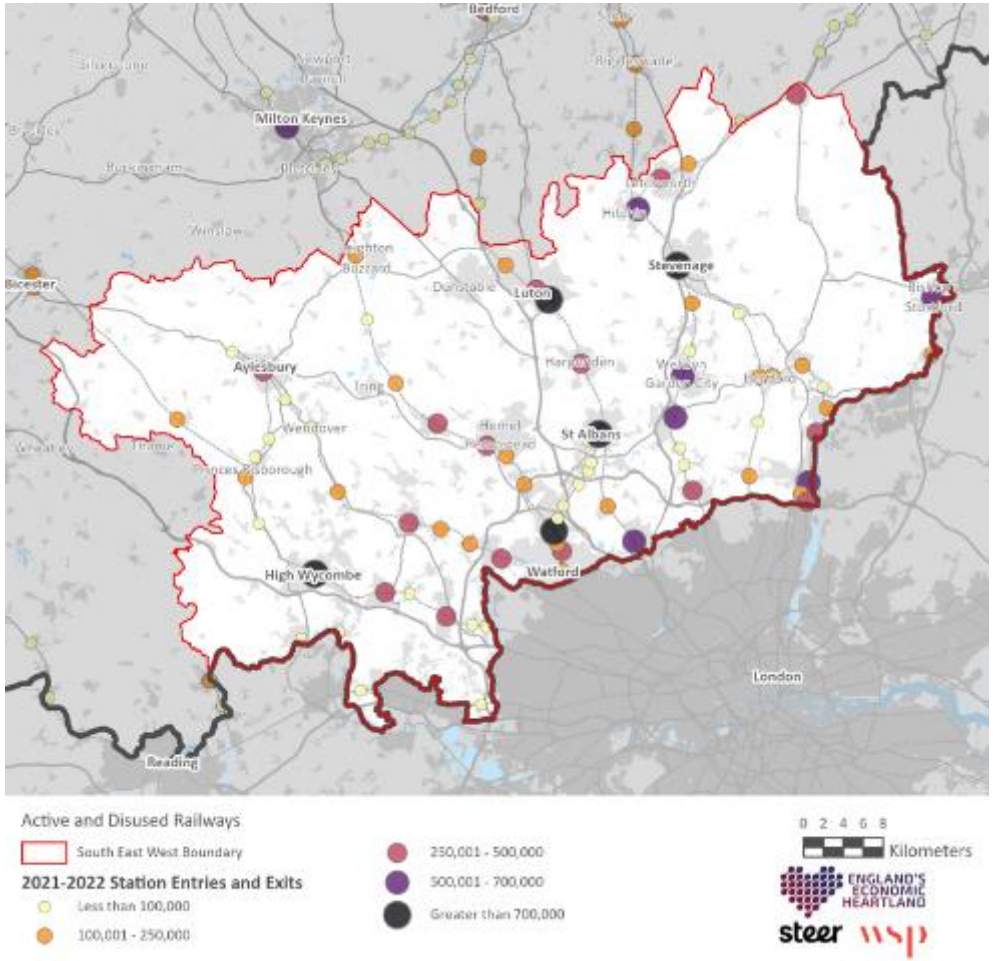
Over 56,500,000 entries and exits to railway stations in the study area took place in the 2021-2022 financial year, this represents 56% of all station usage in the EEH region (Figure 24). The most used station in the study area is Watford Junction, with over four million entries and exits alone, representing 7% of the total entries and exits in the study area.

The least used stations within the study area include Little Kimble, Park Street and How Wood, with all receiving less than 50,000 entries and exits or less. Low station usage at Park Street and How Wood is likely to be associated with a bus replacement service operating along the Abbey Line in 2021-2022.

Town centre railway stations are typically better used than smaller local stations as they serve large populations. There is opportunity for converting existing smaller stations (or implementing new stations) into parkway stations, allowing for rural rail opportunities and replacing car journeys by public transport. Connectivity between the separate railways within the study area is also limited, further increasing car usage. Local first mile/last mile connectivity in settlements is also limited, with poor quality bus services and lack of micro mobility solutions available.

High station usage on the main railway lines shows that rail travel is an important mode of transport for the study area. Although there is a relatively high number of existing railway stations, connectivity to and between the stations remains an issue, particularly for east-west movements. The delivery of HS2 and EWR could provide some benefit to other lines in terms of releasing capacity.

Figure 24 Station Entries and Exists[39]



[39] Source: Station Exists and Entries, DfT, 2022

Bus Network

Overall, the bus network appears relatively dense, as almost all settlements and villages within the study area shown in Figure 25 are served by a bus service in the AM peak. However, there is a clear rural / urban divide in respect to the frequency of these services. All key settlements in the study area are served by high frequency bus services in the AM Peak (routes with 11+ buses per hour 2-way).

AM peak Inter-urban bus connectivity is more limited, however there are three high frequency bus corridors – these are routes with >6 buses per hour 2 way:

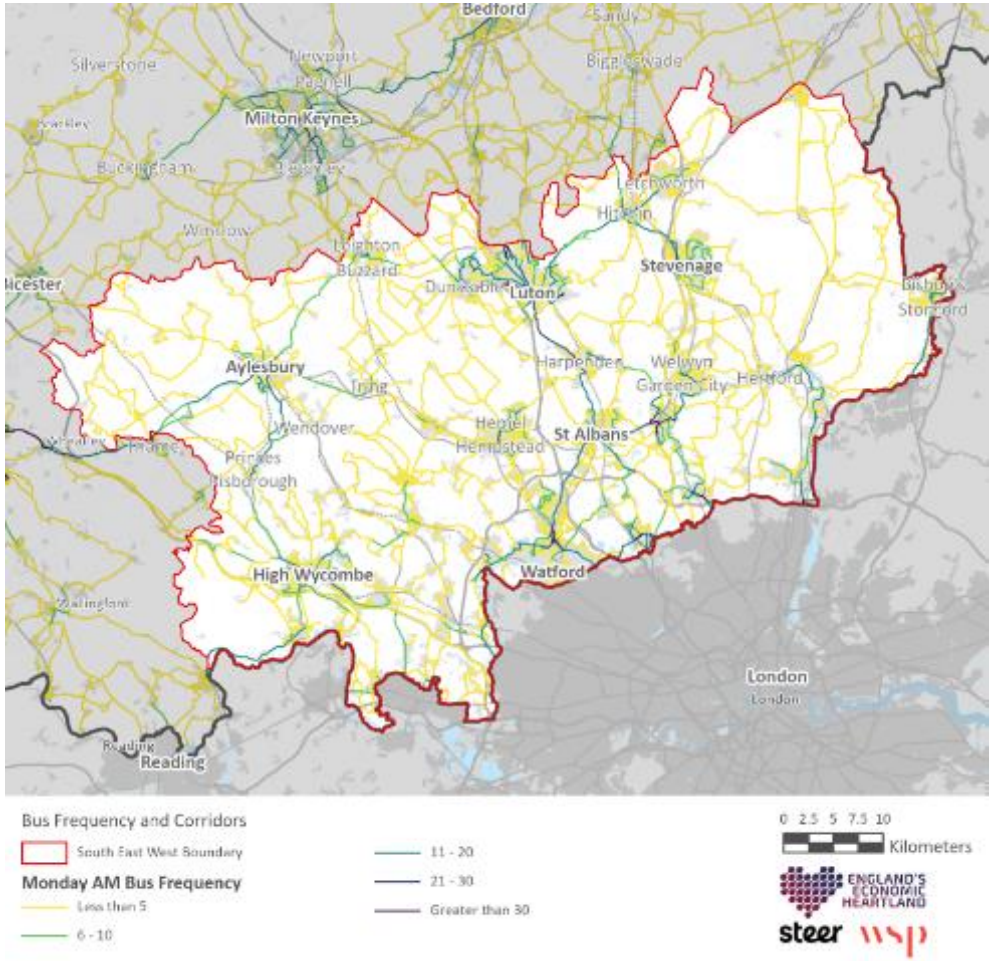
- High Wycombe – Princes Risborough – Aylesbury;
- Luton – Harpenden – St. Albans – Watford; and
- Letchworth – Stevenage – Hitchin.

The existing high frequency bus routes all run in a north-south direction. The number of east-west bus services is more limited, with less than 5 buses per hour 2 way operating along the corridors between Luton and Stevenage and High Wycombe and St Albans.

Demand Responsive transport (DRT) Pilot schemes have been established in North/East Hertfordshire (HertsLynx) and Buckinghamshire (PickMeUp) to serve surrounding rural communities where traditional bus services lack frequency due to less commercial viability.

There are opportunities to enhance inter-urban bus services through improved frequencies and new dedicated bus infrastructure, particularly along east-west corridors. Mobility hubs could also be established in suburban and rural fringe areas. This will make it easier for people to undertake multi-modal journeys by public transport (e.g., cycling to the bus stop).

Figure 25 Bus Frequency[40]



[40] Source: Bus Route Lines, Basemap, Q1 2022

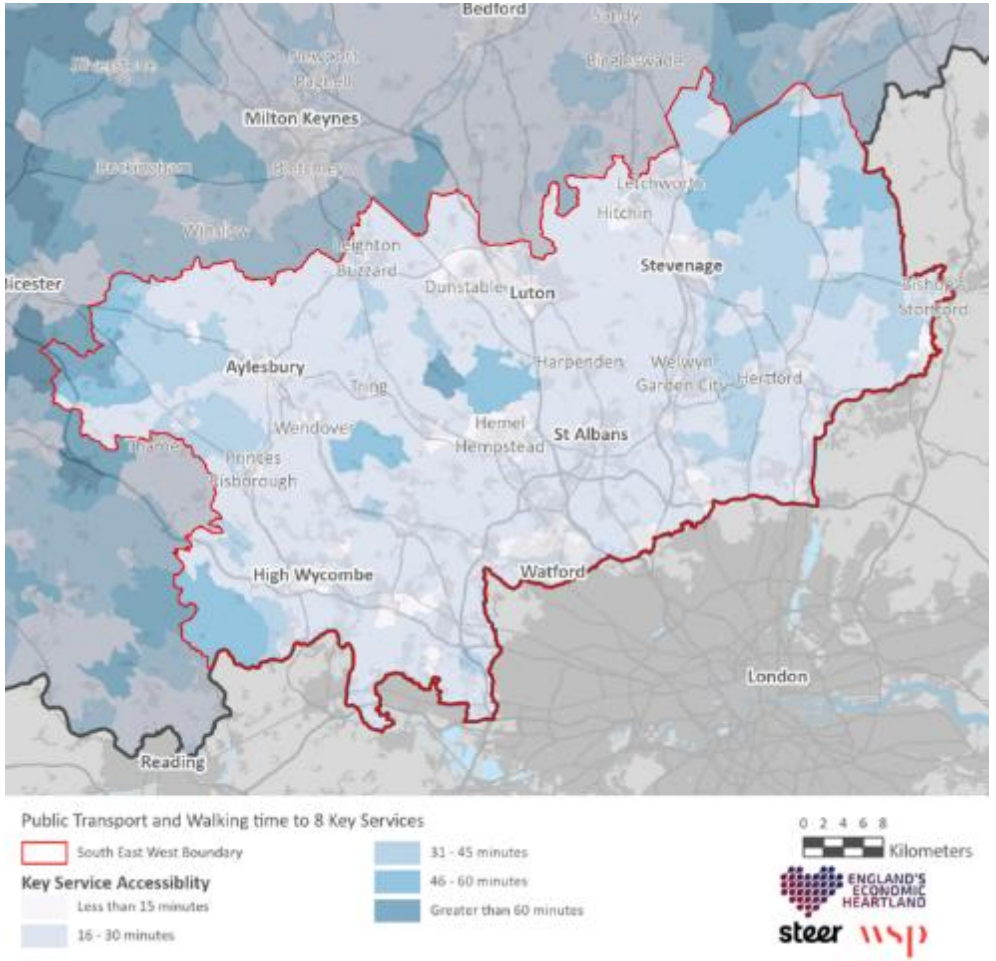
Access to Everyday Services

Mode choice is heavily influenced by the accessibility of everyday services and amenities by different transport modes. For sustainable modes to be an attractive alternative to the private car, the journey times must be comparable.

Figure 26 shows the minimum average accessibility by walking and public transport to eight key services and facilities: medium sized employment centres; primary schools; secondary schools; further education colleges; GPs; hospitals; supermarkets; and town centres. As can be expected, accessibility is best in larger urban centres such as Luton, Stevenage, Watford and Aylesbury where services more densely located, and bus services are more frequent. Most of the study area can access key services within 45 minutes. However, some rural areas on the east and west peripheries of the study area cannot, this includes Flamstead, Jockey End and Cheverell's Green. This is attributable to both a lack of local services in these areas, as well as relatively poor bus coverage.

To reduce car-dependency, it is important that public transport and active travel journey times are competitive with that of non-car modes, particularly to / from smaller settlements in the study area such as Little Gaddesden. However, in these locations high-frequency bus services may not be financially viable. As such, alternative bus-based arrangements should be explored, for example, demand responsive transport and micromobility last mile solutions. However, the success of micro-mobility modes is dependent upon the provision of high quality active travel infrastructure to support these journeys.

Figure 26 Public transport and walking times[41]



[41] Source: Journey Time Statistics, DfT, 2016

Road

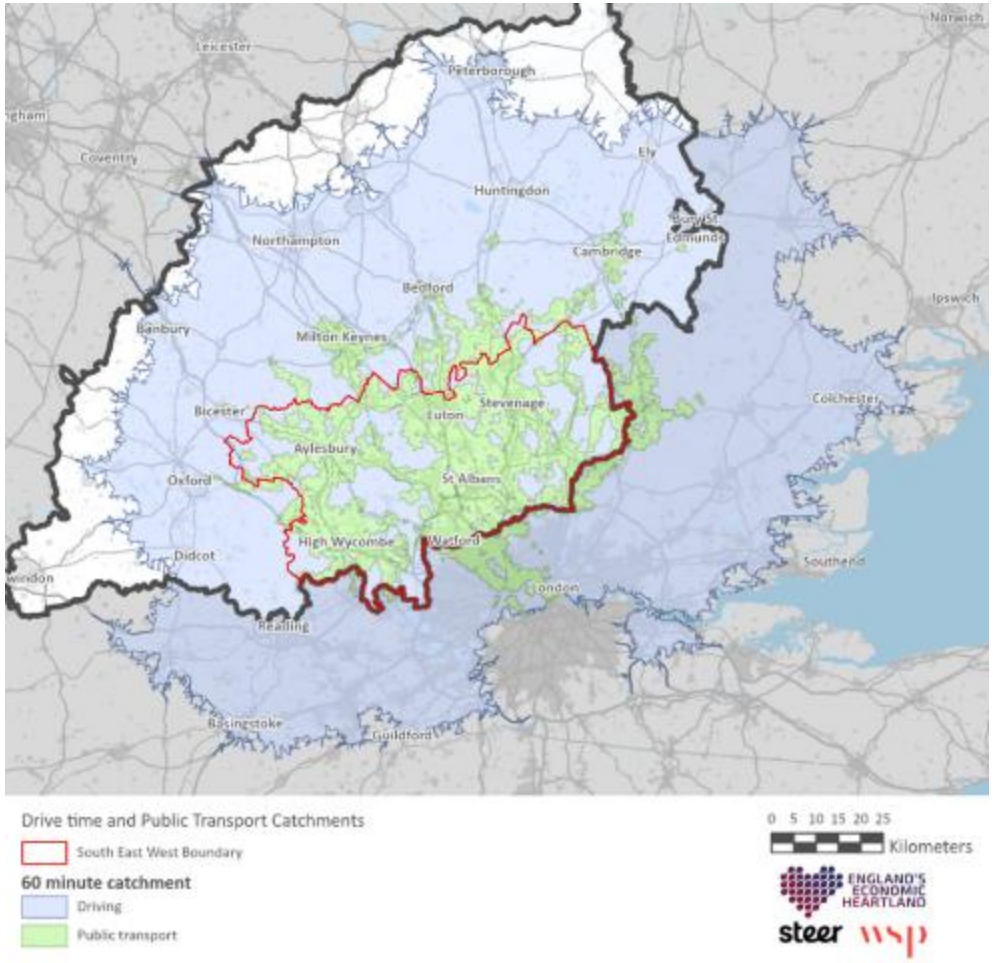
Driving and Public Transport Catchment

For public transport to be an attractive alternative to private car travel it must provide a comparable journey time. Figure 27 shows the combined 60-minute AM peak public transport (bus and rail) and car driving catchments for traveling between the 17 key settlements in the study area. A full list of these settlements and separate maps setting out the individual catchments for each centre are provided in the Appendix.

As can be seen, the catchment size of the private car is over double that of public transport, covering almost the entirety of the wider EEH region and the majority of the north of Greater London. From central settlements like St. Albans key regional destinations like Oxford, Guildford, Colchester and Cambridge can be accessed within in an hour drive time by private car. Comparative public transport only gives access to more local destinations, like Milton Keynes and Cambridge. Within the study area itself, the public transport catchment has clear limitations where private car provides a much more attractive journey time. This includes for example, Chesham having bus journey times 35 minutes longer than car journeys, almost twice the duration. This is a further example of poor east-west connectivity in the study area.

Public transport accessibility needs to be improved in order for public transport to become a more attractive alternative to private car. Rural areas like Eaton Bray are currently 'public transport deserts' which foster car dependency through the lack of realistic alternatives. There are opportunities to address this with demand responsive, shared or community led transport interventions.

Figure 27 60-minute drive time and public transport catchments from 17 key settlements[42]



[42] Source: Speed Profile Data, TRACC / ESRI, 2019

Road Network Capacity and Congestion

To understand the performance of the local and strategic road network through the corridor and identify existing pinch points, the congestion level of service for the AM peak condition has been reviewed.

The map opposite highlights that the largest amounts of congestion in the study area can be found in mostly in the urban centres, where there is likely to be more demand for travel due to increased employment density. The most notable settlements with high congestion are Aylesbury, High Wycombe, Luton, Stevenage and St. Albans. Several smaller settlements such as Radlett, Chesham, Harpenden, Berkhamstead, Hitchin and Bishops Stortford.

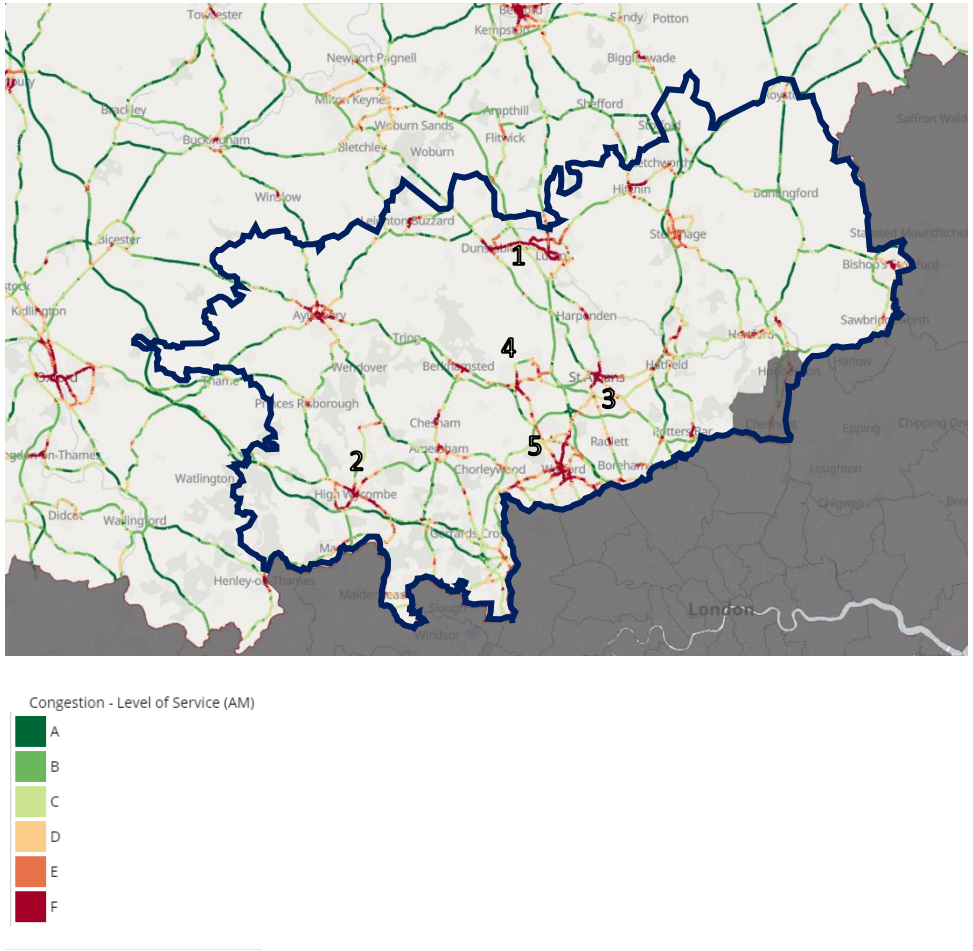
Several key highway junctions outside of the main settlements also have high congestion including:

1 – A505 Between Luton and Dunstable
2 – M40 Junction 1 near Denham
3 – M25 junction 23 near South Mimms
4 – M25 Junction 18 near Chorleywood
5 – M1 Junction 5 Near Watford

The evidence suggests that congestion remains issues surrounding town centres and at junction of major motorway and highways, notably closer to London. This results in increased journey times, collision risk and carbon emissions for many settlements and surrounding areas.

There is a risk that highway improvement schemes to address existing capacity constraints on the local and strategic highway network could encourage more people to travel by car. Public transport and active travel interventions should be explored as an alternative to capacity improvement schemes to aid with decarbonisation of the transport sector.

Figure 28 Level of Service Indicating Congestion – AM Peak[43]



[43] Source: EEH Benefits of Smart Junctions, City Science, 2023

Freight Movements

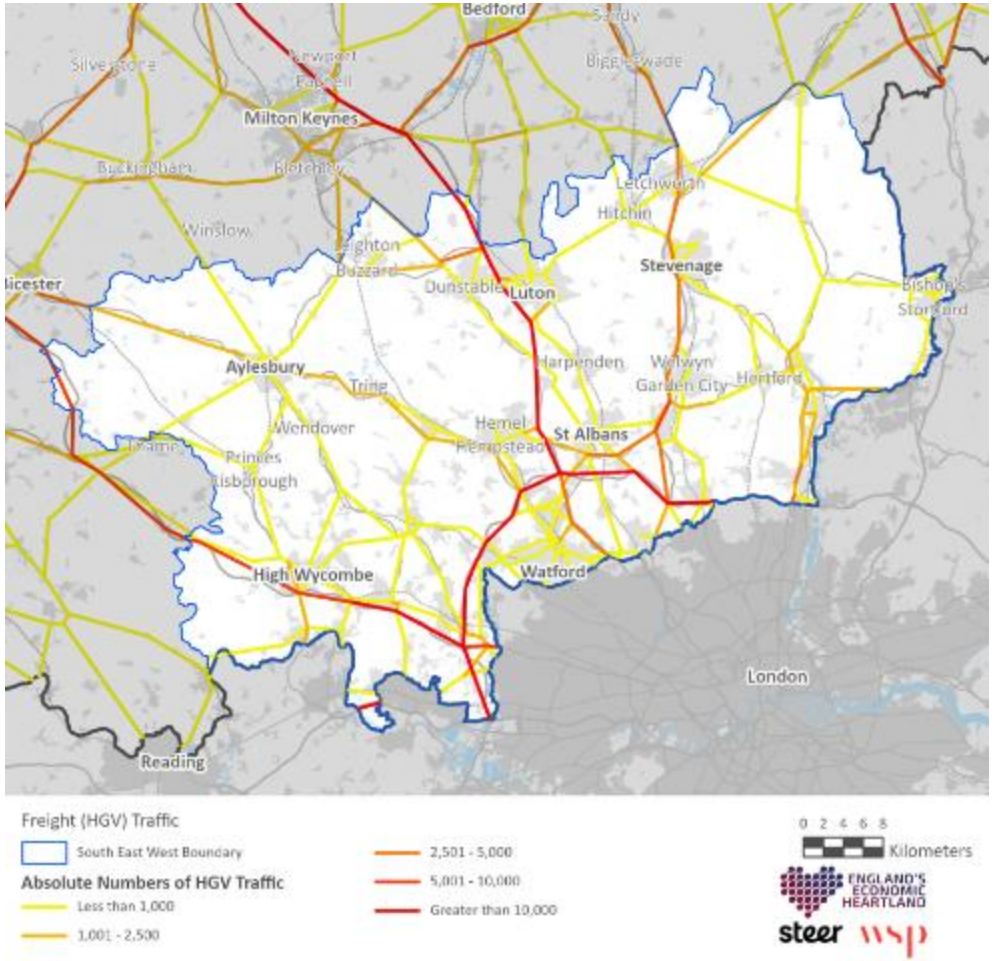
Whilst road haulage is essential to the growth and success of businesses in the study area it is important that any adverse impacts on the environment and local communities are minimised as far as possible.

Figure 29 shows annual average HGV flows on motorways and A-roads in the study area. Roughly 900,000 daily HGV movements travel through the study area. The map shows the highest flows to be on the major motorways including the M1, M25 and M4 with maximum flows reaching an average of greater than 10,000 HGV vehicles per day.

These routes are directly parallel to railway links in the study area. With M40 running parallel to the Chiltern Mainline, the M1 running parallel to the Midland Mainline and the A1(M) parallel to the East Coast Main Line. Although no rail freight terminals exist in the study area, key destinations for HGVs including Southampton, Milton Keynes, Birmingham and Felixstowe are likely to make use of the road network (especially as no East/ West rail connections exist noting however that EWR is progressing just outside of the study area.) A Rail terminal is proposed for Radlett (south of St. Albans) which may allow for increased demand for freight movements.

There are opportunities to reduce and decarbonise freight movements through the study area. Joint working with Network Rail, National Highways, local and freight operator stakeholders will be required to increase rail network and interchange capacity and availability. The highest HGV flows within the study area run parallel with major railway lines, this makes rail freight transportation a realistic alternative to road freight and opportunities for new rail/road interchanges should be explored.

Figure 29 Freight Movements[44]



[44] Source: GB Road Traffic Counts, DfT, 2021

Freight Movements - Proportion

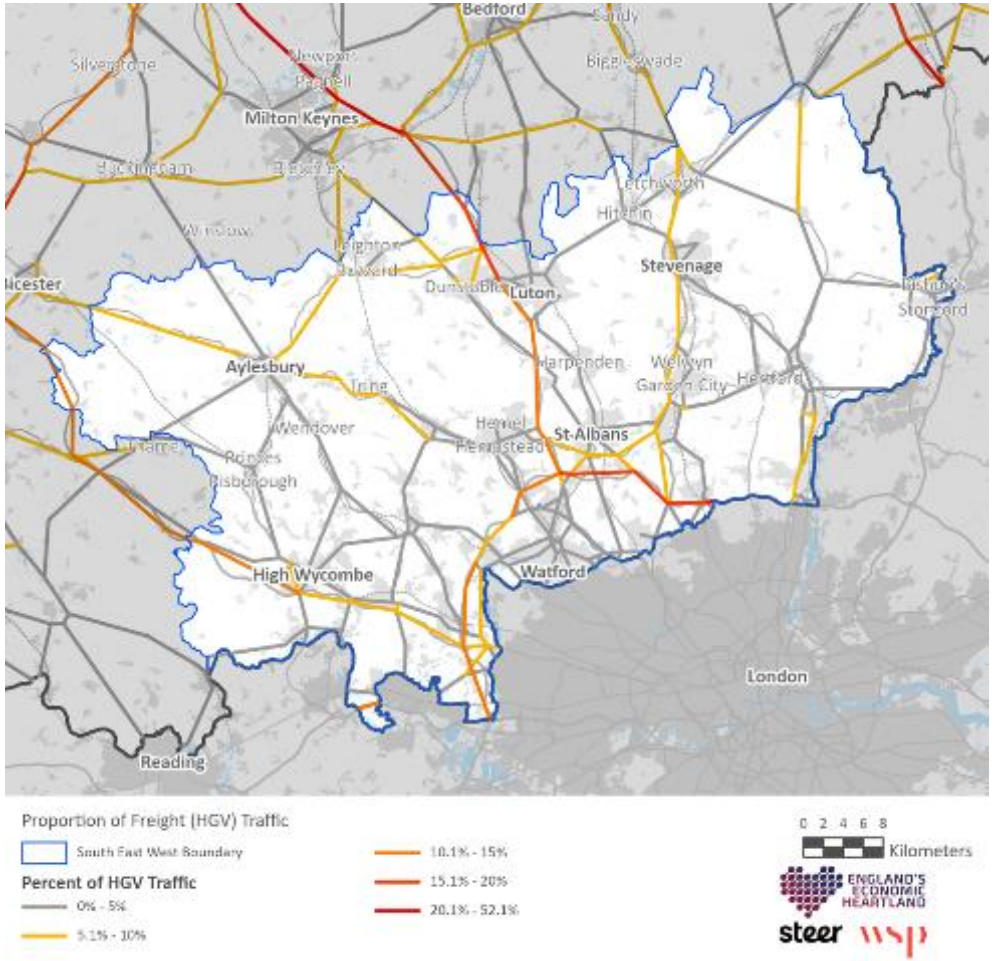
Figure 30 shows the proportion of freight traffic on major routes in the study area in respect to total traffic carried. In total there are nearly 900,000 HGVs travelling through the study area, representing 7% of all motor traffic in the study area.

The largest flows of HGV movements can be found along the main motorways (M1, M25 and M40) with more than 60% of the HGV movements found within the study area. However, there are several smaller single carriageway roads which have relatively high HGV flows. The A10, A505, A41 and A5 are examples of roads with HGV proportions exceeding 5% of local traffic. This remains an issue as such roads do not include the resilience for withstanding HGV breakdowns/accidents. Many of the smaller roads also run through settlement centres, creating road safety and carbon emission concerns for residents.

The distribution of these roads indicates mostly East/West movement, highlighting a potential lack of adequate HGV opportunities for these movements. The lack of rail lines in East/West direction also restricts freight options towards Felixstowe and Bristol outside of the study area via rail.

HGV freight movements remain as a barrier for many of the EEH's future sustainability principles due to high carbon emissions and road safety concerns. There is a notable lack of variety in HGV models for freight movement in the UK (especially zero emission). This limits opportunities for sustainable and decarbonised long haul freight movements within and outside the EEH region. The use of rail freight and other sustainable options are required for the future.

Figure 30 Freight % of Traffic[45]



[45] Source: GB Road Traffic Counts, DfT, 2021

Electric Vehicle Charge Points

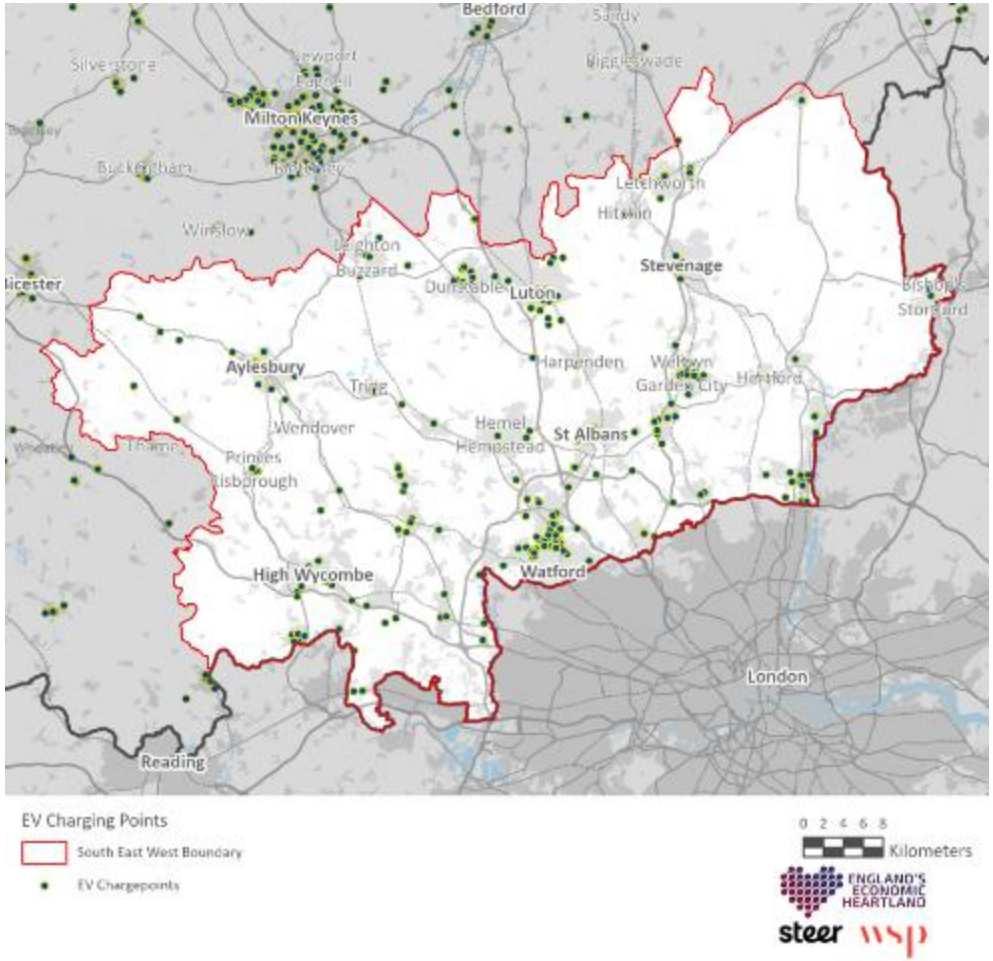
Electric vehicles (EV) are a key component in reaching a net zero targets within the study area. Figure 31 shows the distribution of non-residential Electric Vehicle Charge Points (EVCP) within the study area and across the wider EEH region. Approximately 521 non-residential EVCPs are in place, accounting for 30% of the total volume throughout the EEH area.

The distribution of EVCP across the study area shows a clear urban / rural divide. Most EVCP are located within larger key settlements, or alongside the major roads in between these settlements. The largest proportion of EVCP can be seen in Watford (15%), Luton (12%), Hatfield (9%) and Leavesden (7%). Clusters of EVCP can also be found in Aylesbury, High Wycombe, St Albans and Stevenage. In comparison, there is a distinct lack of EVCP in rural sections of the study area with no EVCP in Mill End or Hertford, creating a potential barrier for the uptake of zero-emission vehicles in these smaller settlements.

Accessible charging stations along the major road network are also inconsistent with the A1 and M1, and M25 lacks charging infrastructure outside major urban areas. Another notable cluster of EVCP can be found at Leavesden Warner Bros. Studios with 7% of all EVCP in the study area. This highlights an example of a workplace offering zero emission transport infrastructure for both employees and visitors.

To help facilitate the transition to zero-emission vehicles, transport interventions should consider how EVCP can be best delivered in residential areas where no-off street parking is available and less populated rural areas where EVCP may not be commercially viable but is most needed by car-dependent residents, for example in the rural areas to the east of Stevenage. Consideration must also be given to the capacity of the national grid to accommodate an increase in EVCP along major roads as well as the provision of EVCP for buses, LGVs and, as technology progresses, for HGVs.

Figure 31 Electric Vehicle Charge Points[46]



[46] Source: National Charge Point Registry, DfT, 2023

Travel Patterns & Behaviour

Journey to Work Origin – Destination Flows

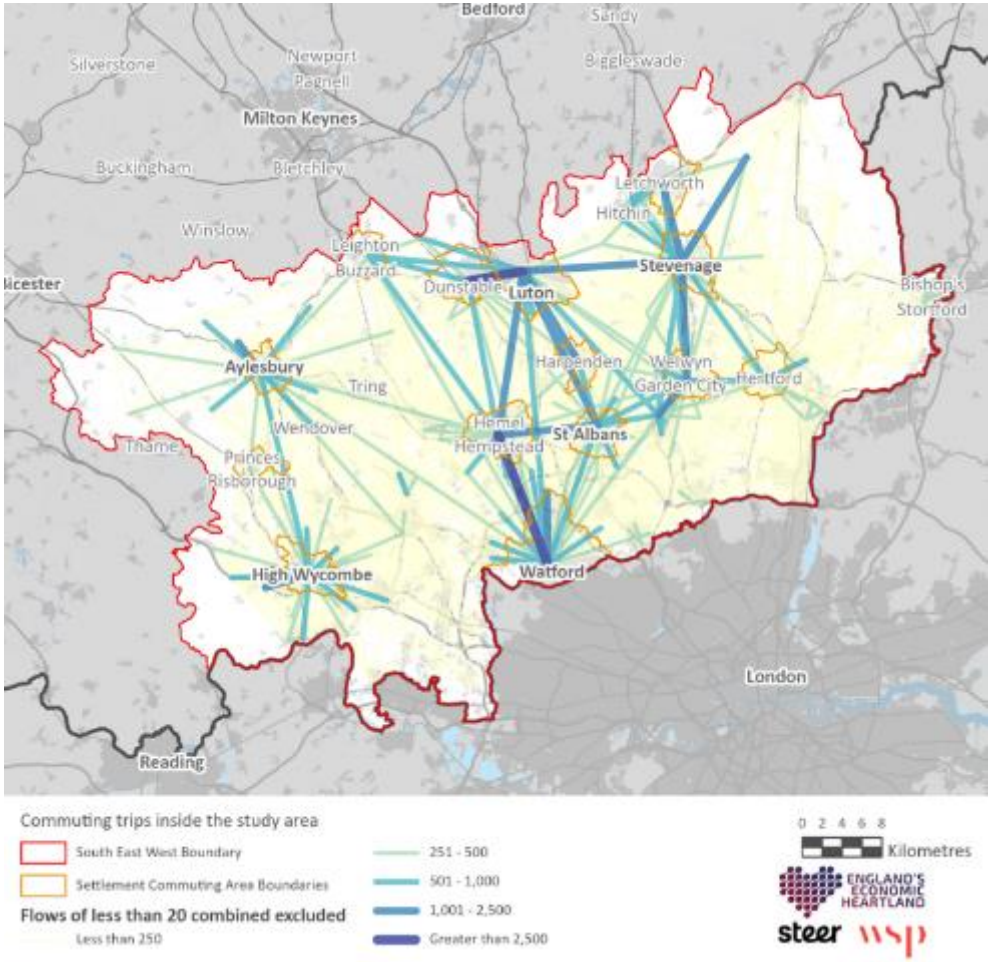
Figure 32 sets out the commuter movements from the 2011 Census. In 2011, the total number of commuter movements within the study area was approximately 500,098 (trips with both origins and destinations within the study area). Of these, 35% were intraurban trips, with the origin and destination being within one of the 17 key settlements with the study area. A further, 15% were people commuting between these centres.

The highest number of commuter trips within just one settlement within the study area took place in Luton (43,973 commuting trips), which represents 25% of all movements within the study area. The largest number of commuter trips between settlements was between Luton and Dunstable (7,641 commuter trips). High flows are also observed in between urban corridors including Watford-Hemel Hempstead, Hemel Hempstead-St Albans, Luton-Stevenage, and Stevenage-Welwyn Garden City.

The evidence suggests that 65% of trips within the study area happened across urban-rural settlements, with most trips commuting between Luton, Stevenage and Watford, some travelling surrounding Aylesbury and High Wycombe and the rest complex pattern of flows incorporating small rural villages. These trips are more likely to be achieved by private cars as active travel modes are less viable in such distances.

Transport interventions which could decarbonise these trips include the consistent provision of EVCP throughout the study area, as well as improved east-west bus connectivity between rural settlements and prominent workplace destinations.

Figure 32 Commuting Trips[47]



[47] Source: WU03EW Location of Usual Residence and place of work (MSOA Level), ONS, 2021

The OD matrix shows the number of workers travelling between 12 key settlements and other geographical areas in the study area and UK by all modes of travel.

Table 8 Origin Destination Matrix[48]

Major Urban Settlements	Aylesbury	Bishop's Stortford	Hatfield	Hemel Hempstead	High Wycombe	Hoddesdon	Leighton Buzzard	Luton	St Albans	Stevenage	Watford	Welwyn Garden City	Rural Area	London	Corridor total	EEH	EEH Excluding Corridor	England and Wales
Aylesbury	14777	3	42	395	1118	7	178	188	55	21	230	44	7091	2009	24149	27889	3740	1116
Bishops Stortford	2	5037	97	22	7	250	1	64	44	143	32	167	1966	3964	7832	8545	713	5515
Hatfield	8	10	4241	184	13	60	11	104	1024	352	187	1486	1983	2396	9663	10087	424	593
Hemel Hempstead	209	6	471	15130	113	42	99	634	1438	185	2438	359	6974	5151	28098	29266	1168	1088
High Wycombe	508	1	23	101	14966	7	4	53	28	18	110	31	8972	4742	24822	26116	1294	4103
Hoddesdon	4	134	141	55	4	3366	0	24	87	172	49	340	4093	4620	8469	8700	231	1783
Leighton Buzzard	570	1	60	577	62	9	5249	1039	116	54	240	53	1774	1740	9804	14365	4561	426
Luton	149	4	1152	1940	73	178	555	43973	1397	1128	714	541	5623	6879	57427	68350	10923	1985
St Albans	31	20	1382	878	49	71	18	797	9829	438	995	1187	4237	9557	19932	21355	1423	1046
Stevenage	10	63	1145	197	21	256	19	513	484	17491	251	1988	4124	3974	26562	30623	4061	1419
Watford	83	7	504	1289	119	33	22	442	1067	321	18767	369	8582	15915	31605	33222	1617	1700
Welwyn Garden City	8	25	2007	205	9	160	5	168	771	757	203	7405	2751	3479	14474	15193	719	654
Rural Area	6868	1317	4491	6201	10137	3705	1229	6186	7052	5186	9402	6646						
London	453	351	2540	2040	1749	1361	103	2554	2185	1461	8577	2588						
Corridor total	23227	6628	15756	27174	26691	8144	7390	54185	23392	26266	33618	20616						
EEH	27541	7035	17819	29392	28773	8684	9842	70046	25415	34872	35662	23789						
EEH Excluding Corridor	4314	407	2063	2218	2082	540	2452	15861	2023	8606	2044	3173						
England and Wales	851	4611	1711	2079	3966	2531	260	7037	1170	1906	3147	1727						

Key:
The darker colours in the matrix represent the highest flows.
- Red highlights the highest flows between the Settlements of Strategic Importance
- Green highlights the highest flows between the Settlements of Strategic Importance and the rural areas (the rest of the study area).
- Grey highlights the highest flows between the Settlements of Strategic Importance and London.
- Orange highlights the highest flows between the Settlements of Strategic Importance and the study area, EEH region and EEH region excluding the study area.
- Pink highlights the highest flows between the Settlements of Strategic Importance and England & Wales excluding EEH and London

[48] Source: Method of Travel to Work, ONS, 2021 * The Rural Area includes all MSOAs inside the study area, excluding the MSOAs that comprise the 12 key settlements.

Mode Share by Settlements

Table 9 shows the journey to work mode share of the key settlements in the study area.

In every key settlement in the study area, car driving is the most common method of travel to work, and an average of 64% of all commuter journeys are undertaken by private car. The highest car dependency was seen in Dunstable (seven percentage points higher than the average for EEH), followed by Hemel Hempstead and Hoddesdon (four percentage points higher), whilst St. Albans and Hatfield had the lowest car dependency recorded in the study area.

Cycling has a particularly low mode share in the study area comparative to the overall mode share for the EEH, with all settlement assessed having a lower mode share for cycling than the EEH. Travelling to work via train is relatively popular in the study area comparative to the wider EEH, with St. Albans in particular having a rail mode share which is 16 percentage points higher than the average for England and Wales. This is likely reflective of the number of commuters in this settlement commuting to destinations such as London, which have significant trip-end restraints which consequently discourage in-commuting via private car.

The evidence shows the journey to work mode share varies significantly across the study area. St Albans has the highest levels of sustainable travel supported by a dense residential population, good bus network and high frequency rail services. In comparison Dunstable has a high car dependency, possibly due to the absence of rail provision in this settlement.

Table 9 Modal Share by Settlement

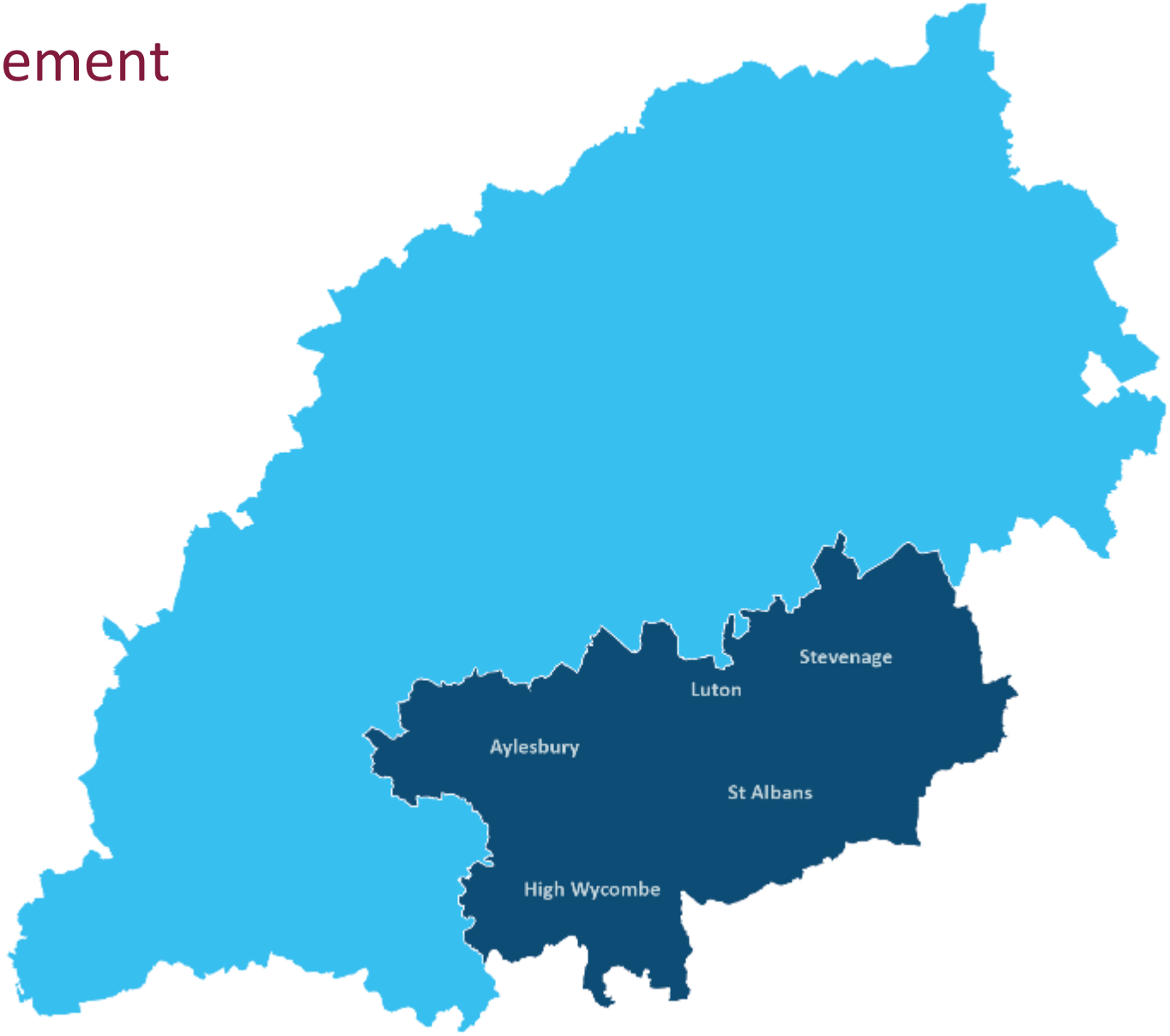
Settlement	Car / Van (Driver)	Car / Van (Pass.)	Bus	Train	Cycling	Walking	Work From Home
Aylesbury	65%	6%	4%	4%	2%	15%	4%
Bishops Stortford	60%	4%	3%	16%	1%	10%	7%
Borehamwood	59%	4%	7%	14%	1%	9%	6%
Dunstable	71%	6%	4%	2%	1%	11%	4%
Hatfield	54%	6%	8%	8%	3%	17%	4%
Hemel Hempstead	68%	6%	4%	6%	1%	11%	5%
Hitchin	58%	4%	2%	12%	2%	12%	6%
Hoddesdon	68%	5%	2%	12%	2%	7%	4%
Leighton Buzzard	66%	5%	5%	6%	1%	11%	5%
Letchworth	63%	5%	2%	10%	3%	11%	6%
Luton	60%	9%	8%	6%	1%	14%	3%
Princes Risborough	65%	3%	2%	9%	1%	11%	8%
Royston	63%	5%	1%	11%	2%	13%	5%
St Albans	53%	3%	3%	21%	2%	10%	8%
Stevenage	65%	6%	6%	7%	3%	9%	3%
Watford	61%	4%	5%	11%	2%	13%	5%
Welwyn Garden City	62%	5%	4%	10%	3%	11%	5%
Study Area Total	**64%**	**5%**	**4%**	**10%**	**2%**	**10%**	**7%**
EEH Total	**64%**	**5%**	**5%**	**6%**	**4%**	**10%**	**6%**
England and Wales Total	61%	5%	8%	5%	3%	11%	6%
Key	Highest Mode Share		←		→		Lowest Mode Share

Table 10 Current Context – Connectivity: Summary

Theme	Issues	Opportunities
 **ROADS**	**High levels of freight movements through the study area** - HGV freight movements remain as a barrier for many of the EEH's future sustainability principles due to high carbon emissions and road safety concerns. In the study area the M1 and A1 (M) in particular are heavily traffic HGV routes between London and the north of England. Issues also persist with HGV movements on more local roads, through the centre of settlements. **Existing public transport catchments are limited and not competitive with the private car** – At present, the catchment of the private car is over double that of public transport, with destinations outside of the EEH including Colchester and Basingstoke being accessible with 60 minutes of driving. In order for public transport to form a realistic alternative to driving, journey times must be comparable.	**Opportunities to move existing road traffic onto railways–** The most heavily used road freight links in the study area all run directly parallel to railway lines, for example the M1 running parallel to the West Coast Main Line. This could mean that the removal of some of this road freight onto rail links could be a realistic opportunity to decarbonise freight in the study area. **Expansion of existing public transport networks to serve larger areas** – There is large variation in car dependency across the study area, with settlements including St. Albans and Hertford having lower than the national average car use, whereas in the more rural parts of the study area have high car dependency. Links between rural settlements and better-connected urban areas could reduce this car dependency.
 **PUBLIC TRANSPORT**	**Existing east-west severance in the public transport network leading to lengthy transfers** - At present, east-west railway and bus connectivity is limited and as such lengthy detours are required to travel between settlements such as Luton, Aylesbury and Stevenage via both rail and bus as there are no direct routes currently available.	**Urban centres which have density to support micromobility solutions** - Micro-mobility solutions can form the first / last mile of a longer journeys being undertaken by public transport, thereby supporting a holistic transport network. There is the potential to explore shared micromobility interventions in both Luton and Stevenage, which currently have no such provision. These locations are also dominated by the Urban Cohesion persona typology, of which younger members are more likely to be more interested in new technologies and thus be faster to take these up. There are opportunities for the study area presented by the delivery of Nationally significant infrastructure projects such as HS2 and EWR.
 **ACTIVE MODES**	**Existing east-west severance in the active travel network** - At present the active travel network has clear gaps connecting settlements in east west orientations. For example, there are no existing east-west links between Aylesbury, Luton and Stevenage, three key settlements in the area. This presents a barrier to inter-urban active travel at present.	**Disused railways lines presenting an opportunity to provide direct sustainable travel links** - Disused railway lines in the area, for example the Watford to Croxley Branch line and the Cheddington – Aylesbury Line, present a great opportunity to implement new, direct sustainable travel links between settlements. **Realistic opportunity for E-bikes to replace existing car trips between nearby settlements –** Many of the larger key settlements in the study area are located within relatively close proximity to one another, making inter-urban travel by e-bike a realistic opportunity for mode shift. This includes St. Albans

Theme	Issues	Opportunities
		/ Watford / Hemel Hempstead / Welwyn Garden City / Harpenden as well as Luton / Dunstable / Leighton Buzzard.
 **TRAVEL PATTERNS & BEHAVIOUR**	**Rural populations located far away from goods and services which leads to car dependence** – Smaller rural communities between larger key settlements in the east and west of the study area are located further distances away from services and workplaces, whilst also having less frequent public transport services. These factors drive continued car dominance in these areas.	**Opportunity to reduce commuting trips through increased levels of hybrid working** - Improved digital connectivity, particularly in rural areas further from the main urban centres in areas like Eaton Brae and Upper North Dean where the lowest coverage of connectivity can be found, will help facilitate the adoption of agile and hybrid working practices, and in turn, reduce the need to travel.

7 Stakeholder Engagement



Call for Evidence

Steering Group

To gain insight into the key trip attractors within the study area and connectivity issues and opportunities two Steering Group Workshops have been undertaken along with separate engagement with Swindon Borough Council. A summary of the key findings from these sessions is provided below.

Strategic Trip Attractors

- Stanstead airport
- Bishops Stortford North Development
- Major development at Gilston 10,000 homes
- Princess Alexander Hospital Harlow – relocation to M11 Jct 7a
- 1,800 dwelling mixed use development North & East of Ware
- GSK Ware
- Brookfield mixed use development & current retail park
- Park Plaza employment sites
- Sunset Studios opening 2025
- Large development site at Baldock
- 4,250 dwellings and 78ha employment allocated in Biggleswade-Arlesey area of south-eastern CBC
- Lister Hospital
- Biosciences cluster in Stevenage
- Houghton Regis North – 5,000 homes and 32ha employment allocated
- Hatfield Galleria
- Colney Fields Retail Park
- Strategic rail freight interchange to the south of St Albans
- Centennial Park employment site
- Watford general hospital
- Proposed Sundon Rail Freight Interchange + 40 hectares employment
- Proposed development – 3,600 dwellings & 7 hectares of employment north of Luton in Central Bedfordshire.
- London Luton airport expansion
- Rothamstead to the southeast of Luton
- Hemel Garden community
- The University of Hertfordshire and Oaklands College
- Hatfield Business Park
- Office in St Albans centre
- Herts IQ and green triangle
- Leavesden Studios – due to expand
- Hemel Garden community with new employment area next to Maylands in Hemel Hempstead
- Luton DART (Direct Air-Rail Transit)
- Pinewood studios (expanding)
- Marlow studios (expanding)
- Heathrow Airport generates EW traffic through back roads
- HS2 sites (lorry movements)
- RAF Halton redevelopment
- High Wycombe: Hospital, Cressex business park; various housing development sites

- Stoke Mandeville hospital
- Aylesbury: Various new housing developments, enterprise parks
- Waddesdon Manor (can get very busy at key times of the year)
- Bicester factory outlets can attract from a distance

General Issues

- Handy Cross A4010/A404/M40 junction congestions
- M1 creates local severance within the urban area
- Lister hospital is hard to access from a distance other than by car
- Need for improved passenger transport links between Luton and Stevenage
- London Colney is a larger settlement and needs better transport options
- Implications of Luton airport expansions
- HGC employment area and Mayland needs better transport for London
- Congestion on A418 between Aylesbury/Leighton Buzzard
- Low NE/SW connectivity between High Wycombe/Amersham/Chesham/Berkhamsted
- Road size constraints through Chilterns AONB
- Through traffic and congestion on A505 in Hitchin
- Congestion on A1 junctions 6-8
- Congestion on A414 in Hertford
- Congestion, severance, and air quality issues at A10 junctions Waltham Cross
- Lack of East-West connectivity
- Congestion A120/M11 – Stansted Airport permission to expand to 43 million passengers per annum

General Opportunities

- Sustainable links to the airport - especially for staff
- Letchworth sustainable travel town
- Stevenage sustainable travel town
- Royston sustainable travel town
- Air Quality Management Area (AQMA) Hertford A414 linked to congestion
- AQMA Hockerill junction Bishop's Stortford
- E-scooter schemes (Aylesbury, High Wycombe, Princes Risborough) – expansion of Aylesbury scheme to provide EW Waddesdon connection
- DRT schemes in High Wycombe (active) and Aylesbury (re-tendering)
- Hertfordshire Essex Rapid Transit (HERT)
- Better sustainable transport links to the Herts IQ location
- Gunnels Wood Road junction improvements to provide access to Bio park
- M1 junction 8 improvements – project "Breakspear"
- M1-A6 link road maps
- A1(M) all land running junction 6-8
- A10 Broxbourne Major Road Network (MRN)

Bus Issues

- Competing priority for the bus scheme
- Watford hospital public transport previous scheme did not go ahead – go to reinstate

- Lack of reliable and regular EW public transport in Hertfordshire

Bus Opportunities

- Bus Rapid Transit (BRT) solution identified in the A505 corridor study

Rail Issues

- Linking out of centre key destinations with train station, e.g., St Albans by fast sustainable mode
- Aylesbury congestion exacerbated by HS2 works
- Low rail capacity between Princes Risborough/Aylesbury
- Low rail capacity on Chiltern Main Line in general
- Potential closure of Hollow Hill Lane into Slough if Western Rail Link to Heathrow (WRLtH) goes ahead.
- Abbey Line needs increased frequency at St Albans to Watford

Rail Opportunities

- Electrification of Chiltern Main Line (very low priority currently)
- Rail link High-Wycombe-Old Oak Common (very long term, after HS2 opens)
- Watford to Croxley link
- East West Rail Aylesbury link as an onward link from London/High Wycombe

Active Travel Issues

- LCWIP will identify issues and options for schemes for intra- and inter-travel
- New development with good internet to help avoid journeys and design principles for 20 minutes neighbourhoods
- Competing priority for bike scheme
- Poor NE-SW road connectivity without going in and out of Aylesbury (with its congestion), weekend conflict between motorists and leisure cyclists on circumventing B-roads
- Heathrow / Colne Valley active travel links needed; river cycle network proposal

Active Travel Opportunities

- Buckinghamshire Greenway
- Stansted to Rye House cycle route
- Aylesbury congestion, exacerbated by HS2 works
- Encouraging school travel by active mode or public transport, especially secondary school

Private Vehicle Issues

- M25 M1 and A414 congestion is an issue especially re-routed traffic if blocked
- Congestions on M25 leads to rerouting onto A414 and rat running on local roads
- Congestions on M25 leads to rat running on local roads Potters Bar to A10

Private Vehicle Opportunities

- Exploring options for rapid EV charging on Bucks section of M25
- Potential Park and Ride sites – Watford -M1 junction 5 & M25 junction 20

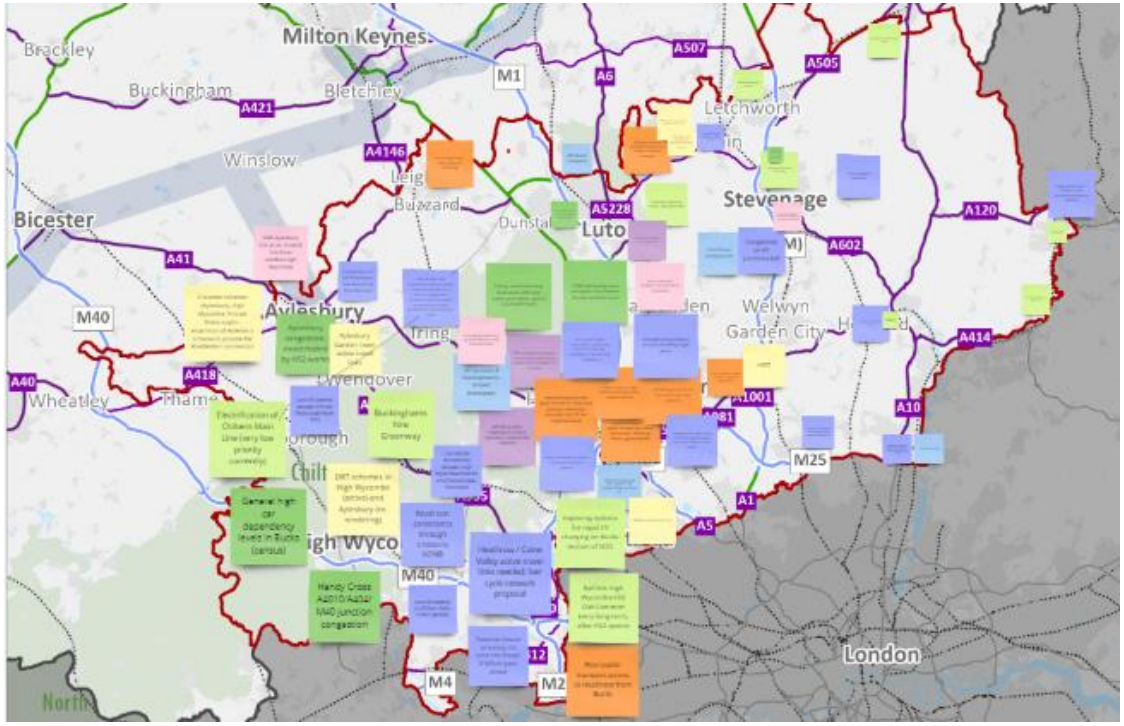
Freight Issues

- Some calls for A5 detrunking
- Lorry and freight movements associated with Strategic Rail Freight Interchanges (SRFIs) and new employment at HGC and Maylands
- Overnight lorry parking is an issue and likely to get worse

Freight Opportunities

- Some calls for A5 detrunking

Figure 33 Steering Group Miro Board[49]



[49] Steering Group Workshop feedback

Stakeholder Group

A Stakeholder Group Workshop has been held on the study to gain insight into the issues and opportunities in the study area. A summary of the key findings from the stakeholder group workshops is provided below.

General Issues

- Not clear what historic environment evidence base, or how knowledge of historic environment has informed this work? The need for an integrated impact assessment?
- Better public transport links to Heathrow employment area
- Better & more integrated public transport to Stansted Airport

General Opportunities

- Regeneration opportunities – new homes – Aylesbury and High Wycombe
- Luton Airport expansion: employment and connectivity opportunities
- Rail road interchange at M1
- Improve public transport interchange in Aylesbury TC and connect town to wider growth
- Fair and inclusive fares for public transport across modes and areas
- Micromobility, travel hubs, Mobility as a Service (MaaS) opportunities across the area
- M1-A6 Link Road

Bus Issues and Opportunities

- Demand responsive transport (DRT) rather than conventional bus for rural areas

Rail Issues and Opportunities

- Ensure realised capacity on West Coast Main Line (WCML) from HS2 opening is reserved for freight
- Local connectivity onto East West Rail (EWR) to maximise benefit of that new line

Freight Issues and Opportunities

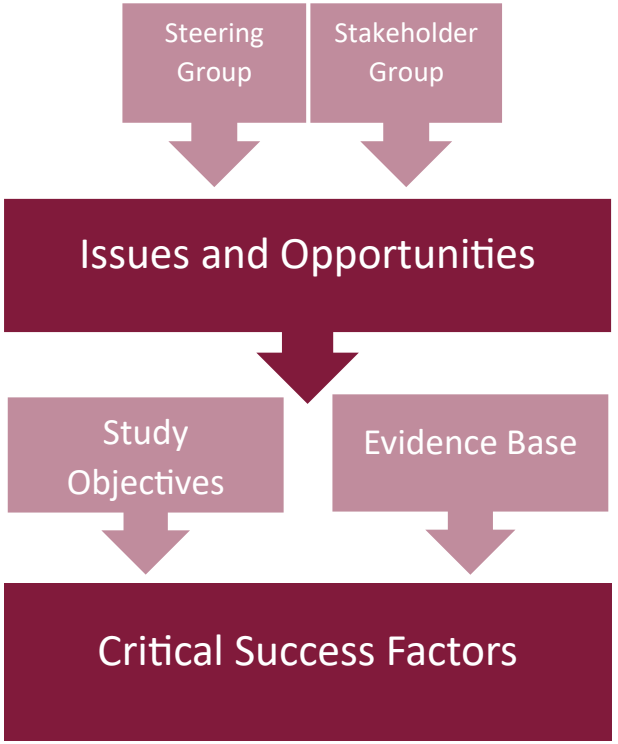
- Strategic Rail freight Interchange at Bicester (MOD) site to create blue collar jobs
- Ensure EWR is fully freight compatible and used to max effect - at least one freight path an hour in each direction
- Work closely with TfL/GLA on freight & logistics into/out of London, especially intermodal facilities
- Safe freight routes (i.e. protecting other users, including Non-Motorised Users) into Stansted Airport for airfreight connectivity

Figure 34 Stakeholder Group Miro Board[50]

Summary

The feedback received from the Steering Group and Stakeholder group have been used to gain an understanding of the connectivity issues and opportunities within the study area which has helped inform the development of the evidence base, which has in turn informed the development of the study objectives and critical success factors.

Figure 35 Steering and Stakeholder Input Process



[50] Stakeholder Group Workshop feedback

Table 11Table 11 sets out a summary of the outputs of the Steering Group and Stakeholder Group sessions against the EEH principles.

Table 11 EEH Principles, Issues and Opportunities

EEH Principle	Issues Summary	Opportunities Summary
Achieving Net Zero	• General high car dependency to access living facilities in rural areas (e.g., Stevenage and Buckinghamshire) • Need more public transport options for travel to London that are competitive to the car. • Competing priority for the bus scheme • Low rail capacity	• E-scooter schemes • DRT scheme • Infrastructures on rapid EV charging • Potential Park and Ride sites
Sustainable and Active Travel	• Lack of links by sustainable travel modes between key destinations and train stations particularly in St Albans • Competing priority for the bike scheme • Active travel links needed	• Sustainable travel town in Letchworth, Stevenage, and Royston • Infrastructure on greenway and cycle roads • Encouraging school travel by active mode or public transport • Better sustainable transport links to the key employment site
Connecting people and businesses to opportunities	• Congestions in many junctions across the study area (e.g., Handy Cross A4010/A404/M40, A418 between Aylesbury/Leighton Buzzard, A1 junctions 6-8, Congestion on A414 in Hertford, and Congestion A120/M11) • Low NE/SW connectivity • Lack of connectivity between key employment sites to large residential settlements (e.g., HGC employment area to London)	• Better rail links to London in the long term • Employment and connectivity opportunities associated with Luton Airport expansion • Improve public transport interchange
Efficient Movement of People and Goods	• DRT rather than conventional bus for rural areas • Maximise the benefit of EWR	• Strategic Rail Freight Interchange • Freight compatible in EWR and operate in sufficient frequency • Cooperate with TfL/GLA on freight & logistics into/out of London

Study Objectives

The following objectives for this study were developed with the Steering and Stakeholder Group, based on the four principles within the EEH Transport Strategy.

Table 12 Objectives for the Study

Key Principle 1: **Achieving net zero no later than 2050, with ambition to reach this by 2040.**	**Key Principle 2:** **Improving quality of life and wellbeing through a safe and inclusive transport system which emphasises sustainable and active travel.**	**Key Principle 3:** **Supporting the regional economy by connecting people and business to markets and opportunities.**	**Key Principle 4:** **Efficient movement of people and goods through the region and to international gateways**
Objectives			
1a – Harness innovation to reduce all emissions including carbon and manage transport demand to make more efficient use of existing network capacity **1b** – Promote and enable the use of more sustainable travel modes and transport technologies	**2a** – Create a transport network that reduces car dependency and provides comprehensive, equitable, and sustainable access to services and opportunities for all **2b** – Improve public health and individual wellbeing outcomes by minimising road traffic danger, and transport-related air and noise pollution	**3a** – Better connect people and businesses through sustainable modes to help create more employment, innovation, and collaboration opportunities **3b** – Ensure planned development is part of a well connected, sustainable, and accessible transport network	**4a** – Enable efficient, safe and sustainable movement of people and goods through the study area and to key international gateways, ensuring impacts on local communities from freight traffic are minimised **4b** – Facilitate sustainable first mile/last mile connectivity for people and goods in both urban and rural areas

Critical Success Factors

To help shape the development of this Connectivity Study and the development of a long list of transport interventions for the study area, eight **Critical Success Factors have been identified**.

They have been developed to provide:

- an articulation of the **need for intervention**;
- specificity around the **outcomes that need to be achieved** through the Connectivity Study without defining what interventions are required for achieving those outcomes;
- the "**missing step**" between issues and opportunities and option development; and
- a **basis for the multi-criteria assessment framework** that will be used to assess the long list of transport interventions.

The Critical Success Factors are drawn from:

- The Evidence Base (this report);
- Previous Steering Group inputs;
- 1st Stakeholder workshop inputs; and

The following provides a more detailed overview of the challenges associated with each Critical Success Factors.

By 2050:

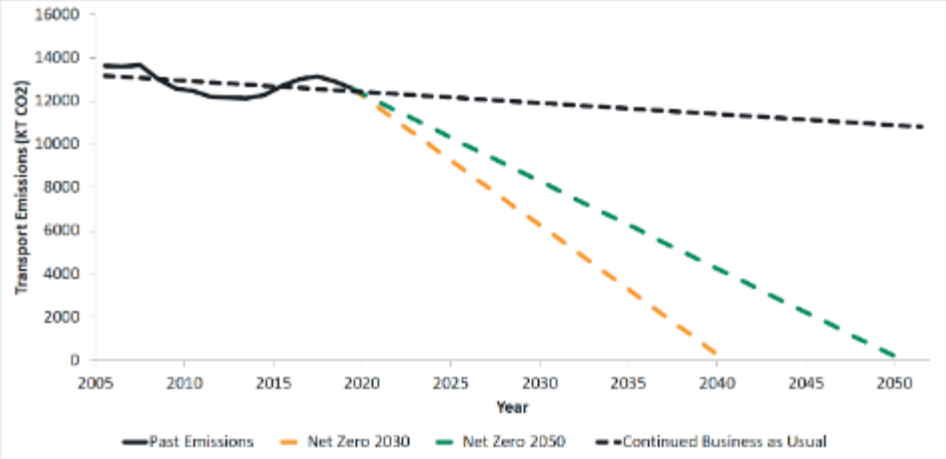
1. The carbon emissions from transport are reduced to net zero with an ambition to reach this by 2040
2. Improved digital infrastructure reduces the need to travel
3. A high-quality, sustainable, integrated and accessible transport network connects all places of strategic importance
4. Rural communities are well connected to services and opportunities by a safe and reliable public transport network
5. The transport network enables safe and sustainable distribution of goods within and through the area via appropriate routes.
6. Everyone can access the benefits of new and improved technologies (e.g. shared electric vehicle services)
7. The benefits of new strategic/ major infrastructure are maximised for the whole study geography (e.g. HS2 creates freight capacity on WCML)
8. Improved transport connectivity enables sustainable and high-quality planned development that improve accessibility and links to improved quality of life
9. There is a substantial increase in active travel mode share for all local and first mile last mile journeys, contributing to better connectivity, increased health benefits through increasing physical activity and improved air quality.

1: The carbon emissions of transport are reduced to zero with an ambition to reach this by 2040.

To address the UK's Greenhouse Gas (GHG) emissions, the Government has set a legally binding target of reaching net zero carbon emissions by 2050, which is a challenging target for the transport sector, the largest carbon-emitting sector of the UK economy.

In terms of total transport carbon emissions in 2020, per capita average within the study area was 2.09 Tonnes. This compares with an average of 6.66 Tonnes for the UK as a whole and an average of 1.95 Tonnes for the EEH.

Figure 36 Transport Emission Scenarios



Carbon emissions within the study area are heavily focused on the major road network, notably on the M25, M1 and A1(M), these form key national road links between London and the north of England / Scotland. Luton Airport is also a is a key emitter in the study area, with 8.3% of the carbon emission in Luton coming from this one source.

To achieve net-zero there must be reduction in the number trips made using internal combustion engine cars, vans, LGVs and HGVs and a substantial change in the vehicle fleet towards zero emission vehicles. This will need to encompass both internal trips within the study area, and through trips which start and end outside of the EEH region. This must be coupled with technological solutions to improve vehicle efficiencies and the use of the road and rail networks.

Challenge – Significant intervention is required to move away from Business as Usual and reduce CO2 emissions from transport by 2050. **How can we achieve this alongside EEHs other priorities?**

2: Improved digital infrastructure reduces the need to travel

The impact of Covid-19 has increased the attractiveness of working from home (WFH), increased usage of e-commerce facilities and increased communications via digital platforms – highlighting the importance of access to superfast and ultrafast broadband. The DfT's "All Change?" document outlined the reluctancy of many workers to return to the office on a regular daily basis. As a result, many companies have adopted hybrid working practices, with workers only required to go into the office two or three days a week. This is likely to be the case for many of the historic 'commuters' who reside in the study area. As hybrid working practices become the new "norm", there will be increased pressure on digital infrastructure – particularly in households where multiple occupants are working from home.

The evidence demonstrates that access to high quality internet connectivity across the study is highly spatially varied. The larger urban centres like Luton, Stevenage, Watford and St. Albans all have greater than 80% gigabit connectivity were as more rural areas including Whipsnade and Holywell have less than 20%. These areas also have less access to services and facilities in general and thus typically already have to travel further to meet their day-to-day needs, the availability to undertake some of these tasks remotely via high-speed internet connections would improve access and productivity.

Improved digital infrastructure has the potential to reduce demand for transport but also support new transport technologies and businesses that require high speed internet, creating a future demand.

Challenge – Evidence indicates that access to digital infrastructure is variable across the study area, increasing the need for those to travel where availability is low. **How can we make high speed digital infrastructure more accessible?**

3: A high-quality, sustainable, integrated and accessible transport network connects all places of strategic importance

Currently, jobs within the study area are predominantly located within urban centres, as well as grouped on the southern periphery of the study area, on the boundary of Greater London.

Large employment developments are proposed along major road links, for example those proposed around the A1(M) (1) as well on the outside of Aylesbury, Hemel Hempstead and Welwyn Garden Village. Without intervention, these employment sites could naturally develop car dependency. As such interventions should focus upon connectivity between settlements / employment sites where there is a high theoretical demand. The interventions should seek to take up opportunities to improve existing road-based connections for example, road space allocation to bus-based transit on roads which run parallel to the A1(M), like the B197.

However, the use of public transport services (notably buses) run into issues of funding and affordability. Proposals for extensive public transport systems will need to consider funding arrangements to ensure consistent and affordable transport for the study area. Consideration must also be given to the affordability of fares. High fares are likely to discourage the use of public transport, particularly by those who currently travel by car.

Challenge – Potential demand between our key settlements is constrained by the transport network. **How can we ensure high quality connections are provided that sustainably meet needs, whilst also being affordable and economically viable?**

4: Rural communities are well connected to services and opportunities by a safe and reliable public transport network

Rural communities are characterised by high journey to work car mode share, high levels of household car and van availability and low use of active travel modes. This presents a challenge for achieving a net zero transport system.

Sustainable travel interventions struggle with taking a foothold in rural communities within the study area (similar to the rest of the UK) as the low population densities create concerns for economic viability for suppliers to provide effective transport solutions. The rural areas found far from the Key settlements within the study area have very little active travel provision and/or public transport services. Most small hamlets and villages normally have limited bus routes with low frequencies, creating very unviable options for commuting by public transport. This further reduces the interest in adopting sustainable travel options as well as isolating local residents from services and employment.

Expansion of active travel and public transport services should be considered to rural areas to help with reducing car dominance and to create effective connections. The use of Demand Responsive transport (DRT) services can help to replace and/or complement existing bus services in rural communities with a more commercially viable and effective alternative. Two notable DRT services operate within the study area, with Herts Lynx in East and North Hertfordshire and PickMeUp in Buckinghamshire. Expansions of these schemes throughout the study area to cover more rural areas will help to improve public transport connectivity.

Challenge – Sustainable travel has historically been absent from rural communities due to lack of population density and commercial viability. **How can we supply commercially viable sustainable travel to rural communities throughout the study area that rivals private car travel?**

5: The transport network supports safe and sustainable distribution of goods within and through the study area via appropriate routes.

Freight connectivity is essential to growth and success of businesses across the study area, with the study area containing nationally important road links for freight providing connectivity between London in the south and the north of England / Scotland. Furthermore, key industries such as automobile and logistics/modern manufacturing present both within the study area and particularly in nearby Milton Keynes.

The map opposite shows the highest flows to be on the major motorways including the M1, M25 and M4 with maximum flows reaching an average of greater than 10,000 HGV vehicles per day. These are the routes with the highest HGV flows within the study area and are directly parallel to railway links in the study area. With M40 running parallel to the Chiltern Mainline, the M1 running parallel to the Midland Mainline and the A1(M) parallel to the East Coast Main Line.

To ensure adverse impacts on the environment and local communities are minimised, interventions should explore opportunities to manage HGV demand along local A-roads, particularly where they route through or close to urban areas.

Interventions must be investigated both to decarbonize road freight within the study area, as well as to achieve modal shift for freight on to parallel railway lines, without impact upon the ability of these railway line to deliver high quality passenger services.

Challenge – The M1 and A1(M) are both nationally important road links in the study are which carry high volumes of road freight. **How can we ensure goods are transferred efficiently within and through the study area in a way that supports our four principles?**

6: Everyone can access the benefits of new and improved technologies (e.g. shared electric vehicle services)

Electric vehicles, E-bikes and other shared micro-mobility schemes are key component of a future multi-modal net-zero transport network.

At present, shared micromobility schemes have a very limited presence across the study area, with Beryl being present in Watford and Borehamwood only, and Zipp being limited to High Wycombe, Princes Risborough and Aylesbury only. The populations of Luton, St. Albans and Stevenage as likely above the critical density which would allow shared micromobility schemes to be commercially viable. E-bikes in particular could be a great benefit in the study area, as many of the key towns are within close enough proximity to one another to allow for travel by e-bike with a journey time of 25 minutes.

E-bikes are an attractive alternative to a traditional push bike and can help replace short and medium distance journeys that may otherwise have been undertaken by car. However, to encourage the uptake of E-bikes and other forms of micro-mobility, high quality cycle infrastructure must be provided (e.g., routes, charging points and changing facilities).

The low volume of EV charging points, particularly outside of larger urban areas, in the study area could potentially limit the uptake of EVs – particularly in rural areas where car dependency is highest.

Challenge – Current provision of infrastructure to support low carbon travel modes ranges across the study area and is lower than other areas. **How can we narrow this gap in provision?**

7: The benefits of new strategic/ major infrastructure are maximised for the whole study geography (e.g. HS2 creates freight capacity on WCML)

Although no direct stations will be present within the study area, HS2 is expected to have an impact on the transport system within not only the study area, but the UK as a whole. HS2 is planned to create high speed rail connection between London-Birmingham-Manchester, to help create a fast connection between the south, Midlands and North of England. The current connection used "West Coast Mainline" is likely to receive an increase in capacity as existing journeys can be replaced with HS2 journeys.

This can allow for the existing mainline to be utilised for other journey methods, including the potential for rail freight. At present, there is an intermodal rail freight terminal in on the West Coast Mainline in Daventry. New rail commuting opportunities can arise with potential new destinations and stations on the West coast mainline, notably for the area surrounding Silverstone, Buckingham and Brackley.

There are also opportunities to improve surface access to existing railway station on the West Coast Mainline in the study area. The study area should be aiming for the delivery of HS2 by improving connectivity from local settlements to both Old Oak Common and the Birmingham Interchange stations to allow for improved access to the service without the need of a car.

Challenge – HS2 will help to release capacity on the West Coast Mainline for more rail travel. **What opportunities arise for both passenger and freight rail services with this new capacity being available?**

8: Improved transport connectivity enables sustainable and high-quality planned development that improve accessibility and links to improved quality of life

A key factor influencing the use of the private car is the accessibility of everyday services and amenities. If everyday services and amenities are easily accessible on foot or by a fast and frequent public transport, sustainable travel patterns can be promoted.

The map opposite shows the minimum average accessibility by walking and public transport to eight key services and facilities, alongside bus frequency. This evidence shows accessibility in the study area is worst in rural areas and on the periphery of existing settlements. Areas with existing poor accessibility including Flamstead, Jockey End and Cheverell's Green.

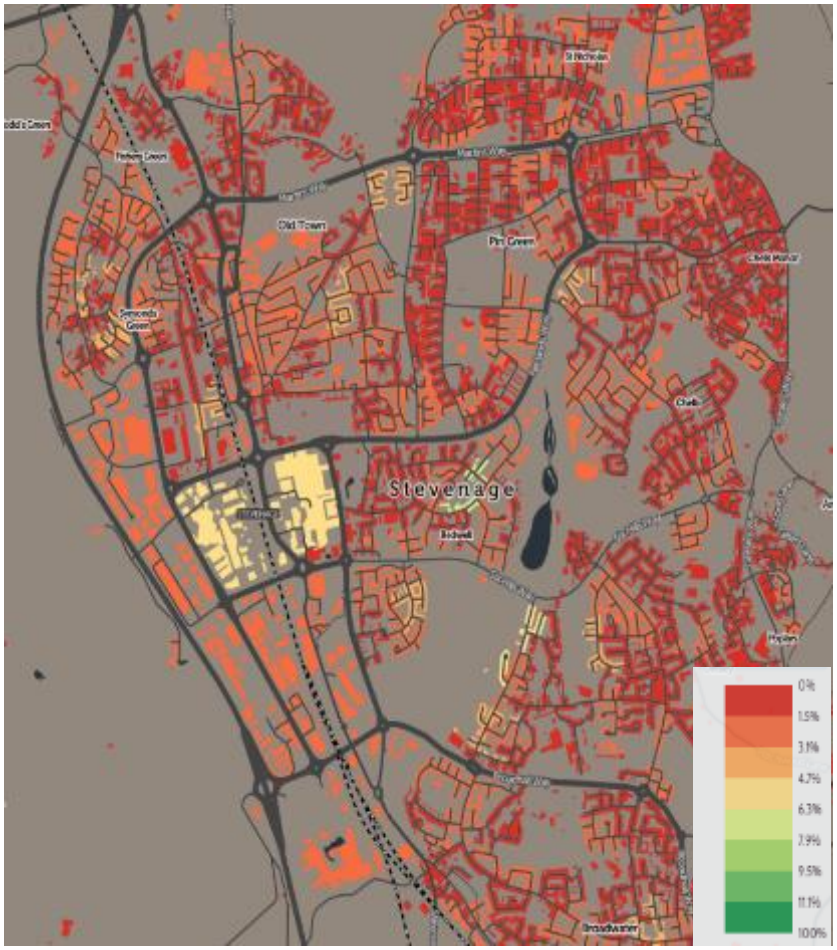
Proposed housing development locations in the area are often located on the periphery of existing settlements, where existing accessibility is poor. This is likely to result in residents, visitors and workers of these developments relying heavily on private vehicles if accessibility is not considered at the very forefront of development design and placement.

Sustainable transport interventions must target areas where existing accessibility to services and amenities is poor, particularly areas where public transport and active travel does not offer a viable alternative. Furthermore, new housing developments must consider accessibility from the outset and be designed to minimise long distance journeys by incorporating easy access to everyday services and amenities into the developments design.

Challenge – Development is often located where existing accessibility is poorest. To tackle this, issues of accessibility must be considered from the outset when planned growth. **How can we best improve transport connectivity to address inequalities and accessibility issues for planned development?**

9: There is a substantial increase in active travel mode share for all local and first mile last mile journeys, contributing to better connectivity, increased health benefits through increasing physical activity and improved air quality

Figure 37 Cycle to Work in Stevenage[51]



Active travel is one of the most sustainable forms of transport. With the recent publication of the DfT's "Gear Change, the Transport Decarbonisation Map" and the funding which has recently been made available via the Active Travel Fund there is currently substantial governments support for the improvement and advancement of active travel infrastructure.

Error! Reference source not found. sets out existing cycling to work mode share at settlement l evel in Stevenage and demonstrates a clear connectivity issue. As is evident, those residing in the residential suburbs in the east of the settlement are much less likely to cycle to work compared to those residing in more central areas. At this local level, cycling severance may be being caused by the presence of steep topography associated with Fairlands Valley.

On a wider scale, the distribution of active travel infrastructure varies throughout the study area. National cycle routes provide connections between some of the built-up areas. However, these connections are mostly north-south orientated, like National Cycle Network routes 6, 12 and 57.

At present there is a severance east-west between settlements (for example, between Aylesbury, Luton and Stevenage). Considerations should be given to the propensity for new active travel 'greenways' to improve the existing east-west severance in the study area. This could make use of existing disused railway lines, such as the Watford to Croxley Branch Line.

Challenge – The map shows that cycling at present is not a prominent mode of travel within the study area. How can we take advantage of the opportunities presented by new forms of mobility and what can be done to ensure affordable options?

[51] Datashine.org.uk Census data, 2011

Table 13 Current Context: People, Place, Connectivity: Summary

Current Context: People, Place, Connectivity: Summary		
People	**Place**	**Connectivity**
		
• The evidence base presented shows that the study area is socially diverse, with a mixture of high-income groups residing in High Wycombe and Princes Risborough, and lower income urban dwellers in the urban centres of Luton, Stevenage, Aylesbury and northern Watford. • Much of the population of the study area located in rural areas. Rural communities have complex needs in respect to travel and accessibility. As such, sustainable mobility solutions which successfully lower car dependency in urban areas may not be as effective in rural settlements. The specific needs of these communities must be considered when assessing the potential feasibility of any future transport interventions. • There is a high proportion of commuters in the residential populations in the study area, especially in larger towns like St. Albans and Watford. Improved public transport and active travel connectivity between residential areas and major rail hubs could decarbonise the first mile of these longer rail journeys.	The study area contains 17 major settlements, as well as several regionally and nationally important road and rail links between London and the north of the UK. As such, many of the movements which pass along these major road and rail links are through trips, particularly of road and rail traffic. This is a key challenge as it is something that the EEH has lesser influence over. • Much of the south of the study area, on the periphery of Greater London has high house prices comparative to income. As such, for many people working in these areas housing will be unaffordable, prompting them to live in other more affordable settlements within the study area. This has the potential to result in longer, car based, inter-urban commuting journeys. • Much of the study area is comprised of the greenbelt surrounding the north of Greater London. This has a substantial influence on the location of planned growth within the corridor. This may result in more medium and long-distance commuting journeys and restrict opportunities to undertake journeys by active travel modes. It may also make the delivery of new infrastructure more challenging. • Place-based transport interventions are needed to enable the high number of internal movements in the key settlements in the study area, as well as for inter-urban movements, to enable the transition away from car dependency to more sustainable modes of travel.	• At present the major movements in the area are all north-south in orientation, radiating in and out of greater London to the immediate south of the study area. This reflected in the rail, road, and HGV movements presented within this evidence base. At present, there are limited east-west opportunities for inter-urban trips within the study area between major settlements like Luton, Stevenage and Aylesbury. Disused railway lines in the area, for example the Cheddington – Aylesbury Line, present a great opportunity to implement new sustainable travel links east-west in the study area. • The most heavily used road freight links in the study area all run directly parallel to railway lines for example the M40, which runs an almost directly parallel route to the Chiltern Main Line Railway. This could mean that the removal of some of this road freight onto rail links could be a realistic opportunity to decarbonise freight in the study area. • Improved digital connectivity, particularly in rural areas further from the main urban centres like Eaton Bray to the west of Dunstable, where the lowest coverage of connectivity can be found, will help facilitate the adoption of agile and hybrid working practices, and in turn, reduce the need to travel.

Sub area profiles

Combining observations from the previous analysis has helped us to identify six sub-areas, each with their own place quality, challenges and opportunities. These are set out in Figure 38 and described below.

1 London Ring: This territory is immediately outside of the continuously urbanised area of London itself, between approximately 12 and 24 miles from Charing Cross. It is nonetheless substantially urbanised, with a large number of distinct settlements held within an often narrow matrix of green belt designated countryside. Segments of the overall ring are differentiated by variations in their landscape character and development histories, and strong, and separate, radial movement patterns into the capital:

- **Thames Valley** - Just outside of the EEH area a cluster of settlements and major employment locations centred on Slough, Maidenhead and Windsor - that together have an existing population of c.300,000 - together exert a strong influence on the south of the region. These places are closely connective to the major east-west transport corridor of the Great Western Railway and M4, and the economic attractor of Heathrow. There is significant potential for continued growth, but this is constrained, in particular by the green belt and important landscapes. Slough is under-bound, so as any review of options for growth here, consideration could be given to coordinating potential expansion northwards into the EEH area, with opportunities to improve public transport between Slough, Pinewood Studios, Gerrards Cross, and onwards towards Watford, intersecting with radial rail routes to London.
- **Outer Metroland** - collection of smaller rail connected settlements clearly separated within areas of undulating countryside. These operate largely as discontinuous suburbs (ex-urbs) of London, with no major economic centre/s and with a strong orientation to London via the Metropolitan Line.
- **Dacorum + Caishowe** - The closely related settlements of St. Albans, Watford and Hemel Hempsted together have a population of over 400,000 within a 10km radius, making this the greatest concentration of population within the EEH area, at a key nexus of the national motorway network - and c. 20mins from central London by train. Given the constraint of the green belt, the best opportunities for growth are probably intensification within existing urban areas, or in compact form around existing stations, potentially allied to initiatives to better integrate or otherwise improve orbital public transport services between centres.
- **Great North/ern Corridor** - This area consists of a necklace of closely spaced, but distinct, small and medium sized rail connected settlements, alongside the A1, set within the green belt - with limited opportunities for outward growth, but a significant need for improved east-west connectivity.
- **Lea Valley** - this area is characterised by a continuous ribbon of urban development mostly contained by the A10 and the north-south railway and bracketed by (green belt designated) open space of lakes and country park along the river Lee to the east and the higher, partially wooded areas to the west. Intensification and improvements within the existing urban areas, in particular around existing or potential new stations, is a key opportunity here.

These different sections of the ring are all connected by the M25, but there is little in the way of continuous orbital public transport. As a whole this portion of London's periphery is bracketed by 3 of London's 4 busiest airports, handling over 40% of all UK air passenger traffic.

A new strategic public transport connection across this zone, stitching together the existing radial connections and settlements - has the potential to act as an efficient armature for future growth, as well as offering improved choice, helping combat congestion and increasing economic connectivity/agglomeration.

2 Luton + Dunstable: Surrounded by green belt and bracketed by the Chilterns, much of Luton's potential future growth will be accommodated through intensification and renewal within the existing urban area, particularly around its two main stations. Connecting existing and new population and employment

points from Leighton Buzzard in the west via the existing busway through Dunstable and Luton, and towards through east Luton to Hitchin/ Stevenage) in the east, could help address congestion in these areas, alleviate pressure associated with Luton's constrained setting, as well as addressing a gap in strategic public transport network east and west from Luton.

3 Baldock-Letchworth-Hitchin-Stevenage: Already well connected to the strategic road and rail network the main opportunity here is to improve active and public transport connectivity within and between this collection of four settlements, including by leveraging change and investment provided by planned growth sites among and around the existing places, that already have a combined population of 170,000. Improved public transport towards Luton would address a gap in the strategic network and the interaction between these two significant centres of population.

4 Stortford: Bishops Stortford is a relatively isolated stand-alone settlement set within a rural hinterland, equidistant from London and Cambridge, both of which it is well connected to by road and rail. The town is strongly influenced by the presence of the economic cluster associated with Stansted Airport. There may be a connectivity and planning opportunity to consider this area as an extension of the east-west corridor identified in 1 (above), potentially helping address the relative dislocation of the area from Stevenage, despite its relative proximity.

5 Chilterns: Apart from the valley towns of High Wycombe and Berkhampsted, on their respective train lines to London, there are no major centres in this Area of Outstanding Natural Beauty but rather a fine grain of villages folded into the landscape. Compared to other areas of countryside in the study area this is a relatively populated landscape, and a notable visitor destination, but is also, by its dispersed nature, difficult to serve by traditional forms of public transport. DDRT - perhaps running on flexible routes between the larger centres/rail stations - may provide an opportunity to increase choice and reduce reliance on private motor vehicles.

6 Aylesbury Vale: This area comprises scattered stand-alone settlements in a rural hinterland, centred on Aylesbury, with some orientation to neighbouring centres at Milton Keynes, Oxford and Bicester, with which it is relatively poorly connected, an issue that could be addressed through extending services over East West Rail once complete. Aylesbury is undergoing significant growth at its edges, which ought to be accompanied with changes to tackle relatively poor means of access to, and routes around the town centre for those on foot and cycle. Improved strategic public transport connectivity between Thame in the west and Leighton Buzzard/ Dunstable/Luton would enable a wider set of journeys that currently are only realistic by car and could be mutually beneficial in economic and housing market terms.

Figure 38 Location of sub areas

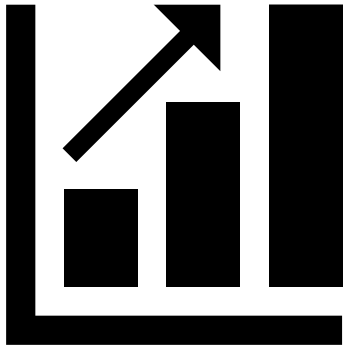
8 Future Context

Overview

Background

This chapter sets out the scale of the growth challenge and provides an understanding of the committed transport improvements schemes within the study area. It also demonstrates the potential implications of planned growth if they are not provided alongside high quality transport infrastructure and implemented without the premise of reducing the high levels of car dependency identified in Part 2.

Growth Challenge



The study area faces substantial levels of housing and employment growth that will result in considerable increases in population, jobs and travel demand. Unsustainable car-dependent developments will negatively impact upon the local environment, levels of sustainable travel and the quality of place. This section will assess the implications of planned growth against the extent of committed transport improvement through the study area.

Covid-19

The undesirable arrival of a shock event, such as the 2019 Covid-19 Pandemic, required a fundamental shift in how society and business operate on a day-to-day basis. The pandemic resulted in the acceleration of several mobility patterns such as working from home, active travel, increased freight and increased local deliveries. Whilst some of these trends were short lived, some have persisted to at least some degree including increasingly flexible, remote and hybrid working practices.

Future Growth Sites

Residential Sites

Figure 39 illustrates that within the study area, a total of 554 residential developments have been identified and details published by local authority planning departments for construction between 2022 – 2031. Through the construction of the new developments, almost 140,000 new dwellings will be added to the study area. This represents 27% of the proposed development in this period within the entire EEH region.

The majority of proposed residential dwellings are located on the outskirts of existing key settlements. The largest development within the study area is found in Houghton Regis and offers more than 5,000 dwellings.

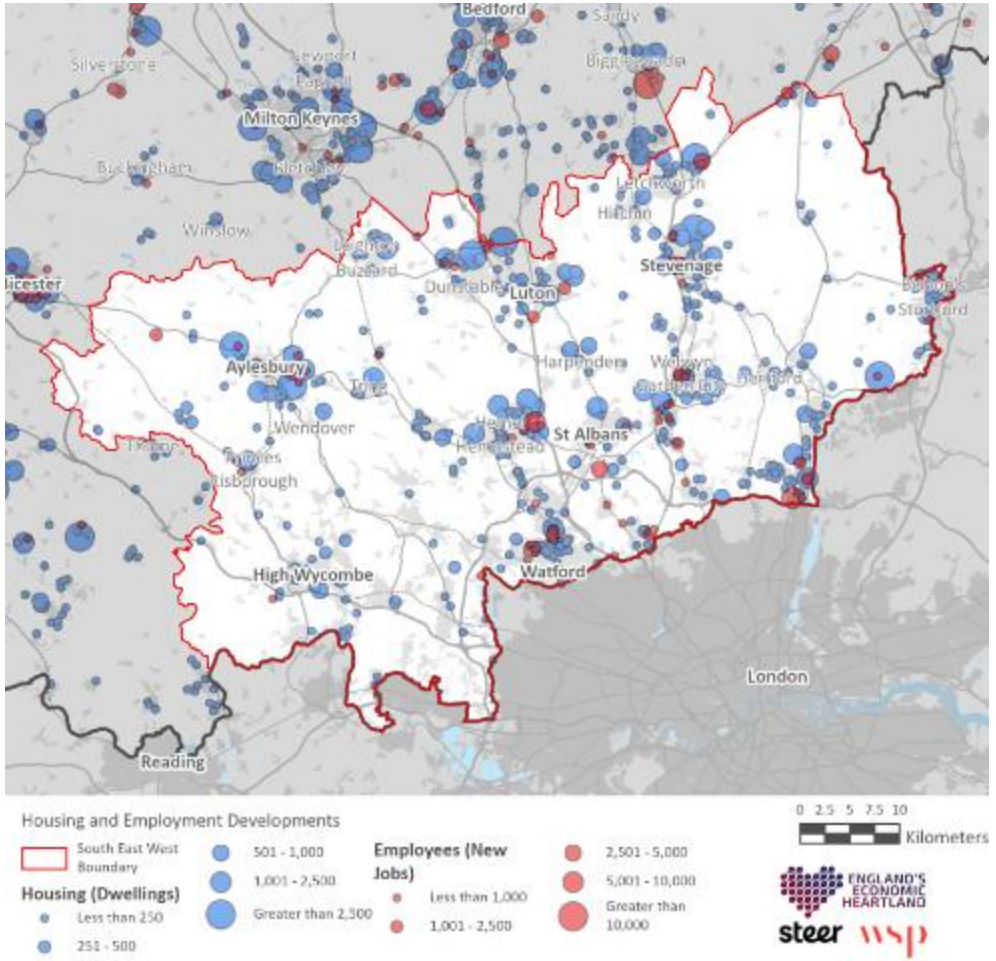
Employment Sites

Within the study area, a total of 75 employment sites are planned for construction between 2022-2031 within the study are. Almost 93,000 new jobs are estimated to be created through the planned development, representing 30% of the planned employment development in the overall EEH region.

The largest amount of employment is proposed for St. Albans, with smaller pockets of planned employment development also being found in Luton, Watford and Aylesbury. Most employment developments are proposed on the outskirts of existing key settlements.

The majority of planned developments are to be located on the outskirts of existing key settlements, for example surrounding Hemel Hempstead and Aylesbury. If new housing and employment developments are not connected with sustainable modes, car dominance will remain an issue and existing issues of congestion will continue to be exacerbated.

Figure 39 Housing and Development Sites[52]



[52] Source: EEH Databank, 2021

Future Population

TEMPro Working Age Population Forecasts

The Trip End Model Presentation Program (TEMPRO) is a DfT software tool which provides forecasts of trip ends by mode, time, trip purposes and by area.

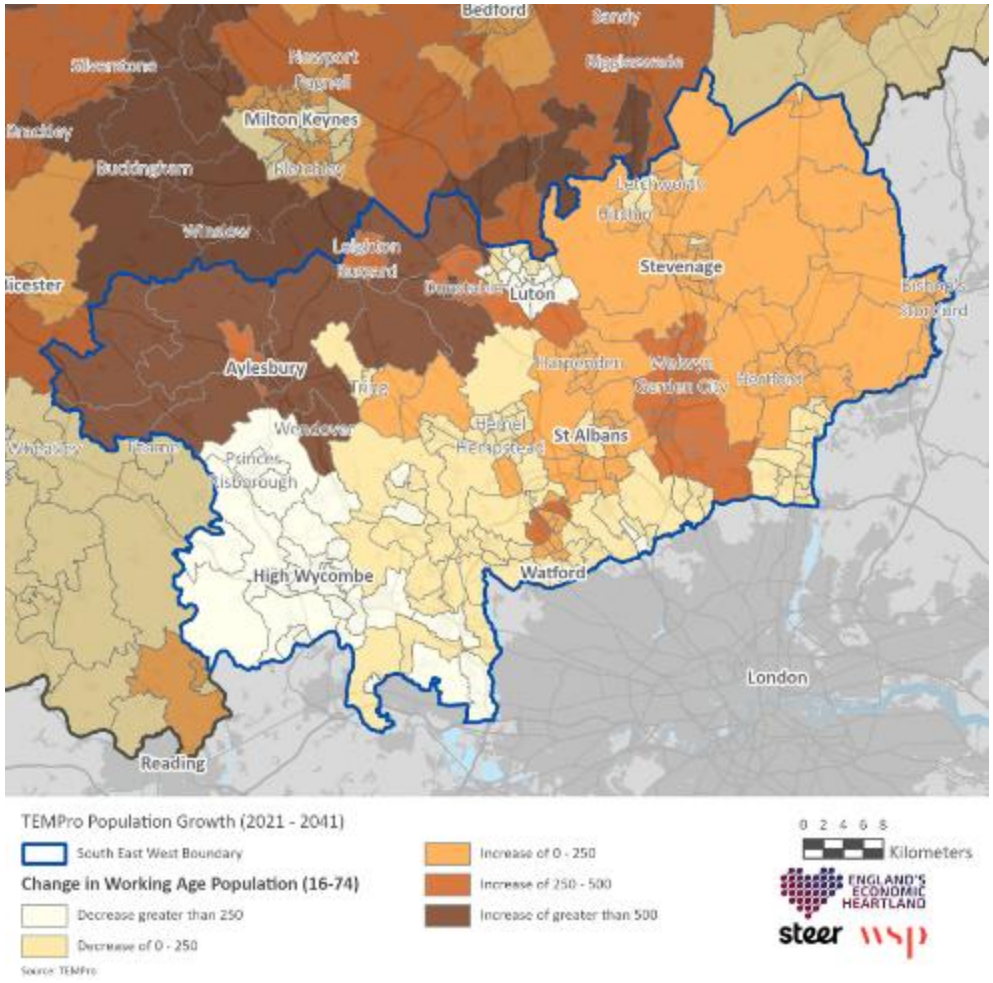
The MSOAs within the study area that are expected to experience the largest growth in working age population (people aged 16 – 74) are mostly situated in the north-west as shown in Figure 40. The largest levels of growth are observed in rural areas surrounding Aylesbury and running north to Milton Keynes. Moderate levels of population growth are also expected in the eastern half of the study area in and around the district of Welwyn-Hatfield.

Despite the significant levels of housing growth forecast in parts of the study area, the working age population is expected to fall in some areas – notably central Luton and within the district of South Buckinghamshire. This is likely to be associated with an aging population, rather than decreasing population, as the number of people aged 75+ is expected to increase in these areas.

Without mitigation, population growth in the rural areas and on the outskirts of existing key settlements in the north is likely to results of high levels of car dependency (e.g., in the villages of Eaton Bray, Buntingford and Cottered). To address this and encourage mode shift, new developments and areas where significant population growth is forecast, should be well supplied with high quality public transport and active travel infrastructure / services from the outset.

An aging population will also create new challenges. In areas with an aging population there is likely to be a lower demand for active travel and micro-mobility modes (e.g. e-scooters, e-bikes and push bikes) and higher demand for accessible transport options (e.g., traditional bus services and demand responsive services).

Figure 40 Population Growth[53]



[53] Source: TEMPro Population, ONS, 2021

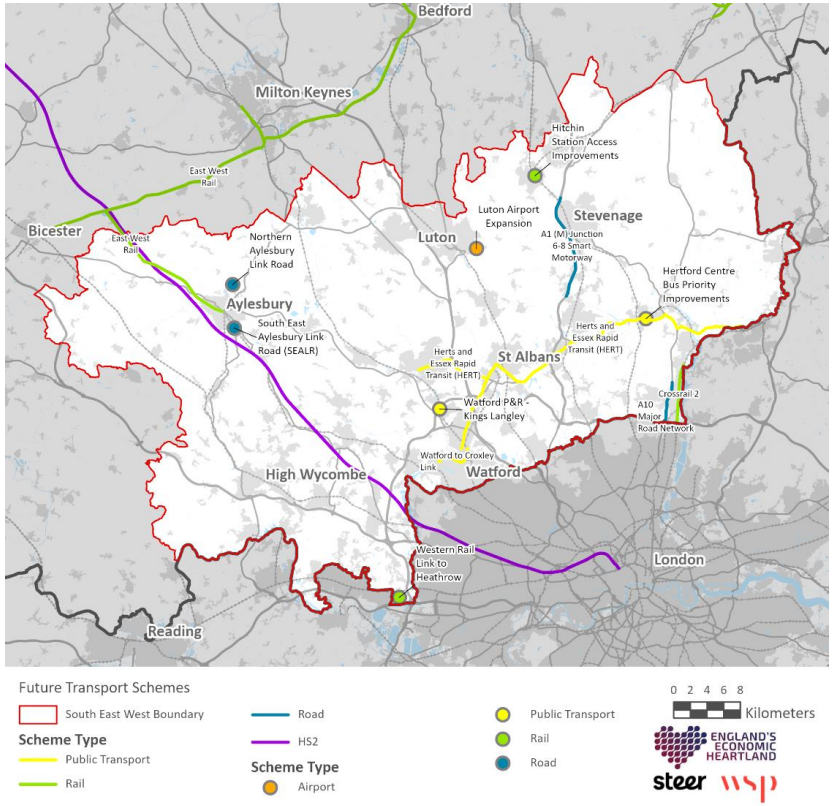
Transport Improvement Schemes

A number of strategic transport improvement schemes are planned for the study area as shown in Figure 41. These include:

- **Herts and Essex Rapid Transit (HERT):** New mass rapid transit system proposed for the A414 to connect Watford, Hemel Hempstead, St. Albans, Hatfield, Welwyn Garden City, Hertford, Ware and to Harlow.
- **London Luton Airport Expansion:** Expansion to Luton airport services to allow for a new terminal as well as people mover transport system.
- **Watford Park and Ride:** New Park and ride proposed for Watford to be located near Kings Langley Station.
- **Aylesbury Link Road projects:** two link road projects are planned for surrounding Aylesbury including the Southeast Aylesbury link Road (SEALR) and the Northern Aylesbury Link Road.
- **East West Rail –** Stage 1 of EWR covering Oxford to (including Winslow station) is under construction and as such is covered as part of the current context sections. Stages 2 and 3 are a future improvement for a new connection between Oxford and Cambridge. A preferred route alignment for the section between Bedford and Cambridge was published in May 2023.
- **Other Schemes Include:** HS2, East- West rail Aylesbury Branch, A1(M) Smart Motorways, A10 Improvements, Possible Hitchin Station access improvements.

Future transport improvements proposed within the study are cover a mix of modes, including road, rail and air. Road improvements still taking place include the Aylesbury Link Road projects and the A1(M) Smart Motorways programme. Future investment should be focused, prioritising active travel and public transportation instead of increasing highway capacity in order to reduce car dependency, congestion and promote a decarbonised transport system.

Figure 41 Future Transport Schemes[54]



[54] Source: Local Authority Major Transport Schemes, Highways England RIS 2, Network Rail's 2019-2024 Delivery Plan

COVID-19 Recovery

The start of the Covid-19 Pandemic in 2020, required a fundamental shift in how society and business functions advance through a difficult period of uncertainty. Under the resulting lockdowns, some mobility trends were accelerated (for example: working from home; active travel; increased freight and more local deliveries) whilst others were paused or moved in the other direction. Whilst some of these trends were short lived, such a fundamental pause in everyday life has undoubtedly led to some longstanding lifestyle changes in behaviour.

The outbreak of COVID-19 and the measures taken by the government to suppress the spread of the virus has exerted a far-reaching impact on people's job, livelihood and well-being. Society and the economy have gradually opened up since 2022 and the UK government has another shift in measures to help restore the largest fall in GDP in 300 years in the UK[55]. These measures have adapted changes in work-life daily routines through the pandemic period. Some of them are in particular related to transport issues, which allow more flexibility in time and workplace of job, as well as in daily behaviours. Examples of measures taken by organisations include:

- Investing in IT systems to support remote working
- Maintain the capacity of home delivery services
- Reinstate or increase the frequency of bus services in medium-long term
- Restored local services after lockdown, e.g., GP, shopping, and schooling
- More room for industries to choose their preferable hybrid working style
- Remove restrictions on compulsory self-quarantine for patients who test positive

Attitudes to Public Transport

Traffic volume of different transport modes in the UK has shown great variations through pre- and post-COVID periods. According to Department for Transport data,[56] compared with the traffic volume just before the pandemic, typically the first week of February 2020, traffic volume in February 2023 suggests:

- Car reliability is slightly lower on both weekdays (approximately 91% of pre-COVID volume) and weekends (about 95% of the pre-COVID level).
- Light commercial and heavy goods vehicles have recovered – even exceeding the pre-COVID level (around 110% and 100%, respectively).
- The volume of public transport including national rail, bus and London tube fluctuates at 80% to the pre-COVID level.
- Cycling recovered to above 85% during weekdays and the usage is higher during weekends – approaching 100%.

Although physical restrictions on travel have been removed, there has been a reluctance to return to public transport use, partly due to the adoption and continuation of hybrid working. Careful consideration will need to be given to how public attitudes on the safety of travelling by rail and bus can be improved.

Consideration will also need to be given to the provision of more flexible ticketing, as with the adoption of hybrid working, many people are only commuting a few days a week and no longer buying season tickets. There is a risk that high single-day public transport tickets could encourage the use of a car.

[55] Office for Budget (2020), Fiscal Sustainability Report. [Online]. Available at: **Fiscal sustainability report 2020 - Office for Budget Responsibility (obr.uk)** [Accessed 29 March 2023].

[56] Source Daily domestic transport use by mode - GOV.UK (www.gov.uk)

Work From Home

The biggest impact of Covid-19 has been the increased usage and attractiveness for work from home (WFH) behaviours. A total of 40% of all adults began working from home at the start of the first lockdown. The DfT's "All Change?" document has outlined the reluctancy of many workers returning to the office on a regular daily basis.

Several large companies have established policies outlining WFH patterns that can be allowed for employees in the future. British Airways, BP, and Nationwide have outlined that WFH will become an accepted practice for at least a few days a week. As more organisations embrace the use of WFH, total commuting trips will fall. Ideas surrounding agile working are also starting to appear, with locations and hours dictated by the employee. WFH and Agile working will have several impacts on the future of transport and developments:

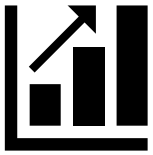
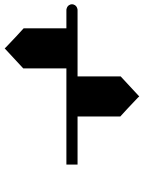
- **Significantly reduced greenhouse gas emissions from reduction in commuting**. Covid-19 lockdown led to a 42% reduction in Nitrogen Dioxide levels.[57]
- **Changes to the way offices are structured**: Savills found that office vacancy rate increased from 4.9% to 8.9% from early 2020 to 2022 in London, gradually recovering from its peak in 2021.[58]
- **Back to the office:** Many businesses are now trying to slowly get employees to return to the office. Large companies such as Amazon have recently been re-implementing an 'office -first' policy.[59]

[57] Lee, J. D., Drysdale, W. S., Finch, D. P., Wilde, S. E., Palmer, P. I. (2020) UK surface NO2 levels dropped by 42% during the COVID19 lockdown: impact on surface O3. Atmospheric Chemistry and Physics Discussions. [Online]. Available at: **https://acp.copernicus.org/preprints/acp-2020-838/acp-2020-838.pdf** [Accessed 1 September 2021].

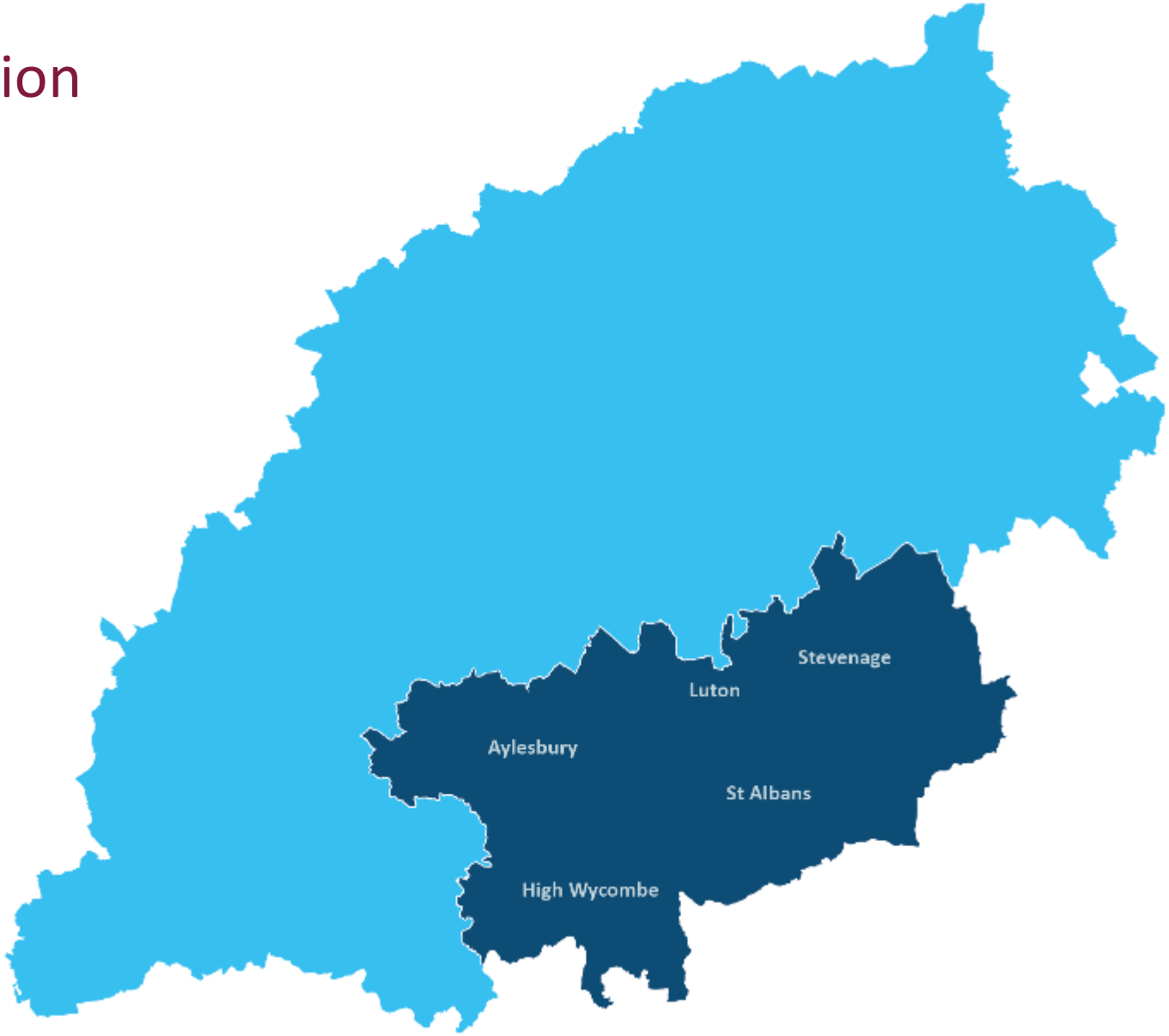
[58] Savills (2022) Market in Minutes: City Office Market Watch. [Online]. Available at: **https://www.savills.co.uk/research_articles/229130/325540-0** [Accessed 1 September 2021]

[59] CNBC (2023) Amazon employees express dismay, anger about sudden return-to-office policy. [Online]. Available at: **https://www.cnbc.com/2023/02/21/amazon-employees-express-dismay-about-sudden-return-to-office-policy.html** [Accessed 24 September 2023]

Table 14 Future Context: Summary

Future Context: Summary		
Theme	**Issues**	**Opportunities**
 **FUTURE GROWTH**	**Increasing pressures on the existing transport network due to growth -** substantial levels of housing and employment growth are planned within the study area. Most of this development is proposed are on the outskirts of existing key settlements, like Aylesbury. This will result in substantial increases in population, jobs and travel demand. There is a risk of increases in car dependency if sustainable travel and/or mixed land use is not provided. **Lingering impact of the movement restrictions associated with the COVID-19 pandemic -** Bus and rail patronage is still below pre-Covid-19 levels. Lower levels of demand for existing bus and rail services threatens the commercial viability of existing services. Traditional commuter travel patterns are changing with an increasing proportion of people adopting hybrid working arrangements and only commuting a few days a week.	**Opportunity to deliver well planned developments which minimise the need to travel –** the creation of '20-minute neighbourhoods' would provide residents day-to-day needs within a short walk or cycle distance – reducing the need for residents to undertake these journeys by car. To support this master planned must embrace LTN 01/20 guidance. New developments must also support high quality public transport connections, where public transport offers a real alternative (in terms of cost and journey time) to private car for everyday journeys. For example, new housing developments on the outskirts of Aylesbury should consider first and last mile connections to key regional commuter hubs like Aylesbury Railway Station. **Capitalising upon hybrid working practices which saw a strong uptake during the pandemic –** New residential developments have to the opportunity to provide high quality broadband infrastructure which would allow greater volumes of people to work remotely, thus removing the need to commute whilst simultaneously improving residents access to employment opportunities.
 **TRANSPORT SCHEMES**	**Investment is still focussed on delivering improvements which benefit the private car -** Some planned interventions within the study area remain as road-based solutions. This includes the Aylesbury Link Road projects. Such interventions offer little focus on reducing car-based commuting. **East-west severance leading to public transport being an unrealistic method of travel for settlements which are relatively close to one another –** Key urban settlements in the study area lack sustainable east-west connectivity, with lengthy diversions required to move between Aylesbury, Luton and Stevenage via public transport. At present, no sustainable transport interventions are proposed within the study area to combat this severance.	**Opportunities for modal shift to new Mass Rapid Transit schemes –** New mass rapid transit schemes can help to connect settlements which lack existing public transport / Active travel connectivity. The Herts and Essex Rapid transit system is planned to help connect the key settlements within Hertfordshire. This will help to promote a move away from car dependency for where rail infrastructure doesn't exist. **Opportunities to improve place making –** New bypass schemes including Aylesbury Link Roads present an opportunity to improve place making along existing local roads, therefore making these local roads more attractive and suitable for walking and cycling. This would further encourage shorter intra-urban trips to be undertaken by active travel.

9 Need for Intervention



SWOC Analysis

A summary of the highlighted strengths, weaknesses, opportunities and challenges for the study area are provided below. As discussed below, significant challenges are faced due to the high levels of car dependency including travel within the existing settlements and a lack of good quality public transport and active travel connectivity within and between existing settlements.

Strengths	Weaknesses
• With a total population of approximately two million people, there is a large residential population that will directly benefit from enhanced inter and intra urban connectivity in the study area. • The EEH region is the heart of the UK's academic and commercial research sector, having a unique combination of scientific and cultural assets, resulting in a highly skilled workforce in the areas of innovation and technology. • Much of the study area have higher than average earning comparative to the wider UK. High income groups are more likely to take up 'high cost' solutions for decarbonisation, like alternatively fuelled vehicles. • North-south connectivity in the study area is good for all modes, with direct and frequent public transport links between Luton and Watford / London, Aylesbury and High Wycombe as well as between Harpenden and St. Albans. • There is high railway station usage across much of the study area, with notably high use being seen at High Wycombe, Watford, St. Albans and Luton. St Albans has the highest levels of sustainable travel supported by a dense residential population, good bus network and high frequency rail services to popular destinations like Oxford and London.	• Car availability in the study area is high, particularly in the suburban and rural areas. High car dependency leads to congestion, air quality issues and fuel poverty. There is a strong correlation between car availability car dependency. There was no significant change in the study area in car ownership in the decade between the 2001 and 2011 census. • There is an urban / rural divide in the distribution of ECVP points across the study area and an inconsistency in provision along the major road network. • At present, the catchment of the private car is over double that of public transport. In order for public transport to form a realistic alternative to driving, journey times must be comparable. • The mapped future transport interventions including the Aylesbury Link Road projects, A10 Improvements and A1(M) Smart Motorways scheme are road orientated and thus will support existing car dependency within the study area. • Bus and rail patronage is still below pre-Covid-19 levels. Lower levels of demand for existing bus and rail services threatens the commercial viability of existing services. Traditional commuter travel patterns are changing with an increasing proportion of people adopting hybrid working arrangements and only commuting a few days a week.
Opportunities	**Challenges**
• Targeted rural mobility interventions including Mobility Hubs, shared and demand responsive transport, combined with improved rail and inter urban bus access. • Many of the larger settlements in the study area are located within relatively close proximity to one another, for example Luton and Dunstable, Watford and St. Albans as well as Stevenage and Hitchin making inter-urban travel by e-bike a realistic opportunity for mode shift. To support this opportunity, there is a need to improve supporting active travel infrastructure between key settlements. • Disused railway lines in the area, for example the Watford to Croxley Branch line and the Cheddington – Aylesbury Line, present a great opportunity to implement new	• At present, there is clear east-west severance within the study area for all modes other than cars between the major towns of Aylesbury, Luton and Stevenage, with lengthy diversion required to travel between these towns by public transport and via cycling routes. • Rural communities between larger key settlements in the study area are located further distances away from services and workplaces, whilst also having less frequent public transport services. These factors drive continued car dominance in these areas. • Much of the traffic in the study area is through traffic travelling on the major road network between origins and destinations which lie outside of the study area, for example on the M1 and A1 (M). This is as the study area contains key national road

sustainable travel links including designated active travel greenways, or direct bus rapid transit links. • Micro-mobility solutions can form the first / last mile of a longer journeys being undertaken by public transport, thereby supporting a holistic transport network. There is the potential to explore shared micromobility interventions in both Luton and Stevenage, which currently have no such provision. • The most heavily used road freight links in the study area all run directly parallel to railway lines. This could mean that the removal of some of this road freight onto rail links could be a realistic opportunity to decarbonise freight in the study area. EEH has the opportunity to support new inter-modal freight terminals along existing rail lines close to major strategic roads. • The new Herts and Essex Rapid Transit (HERT) project, proposed to create a mass rapid transit connection between St. Albans, Hatfield, Welwyn Garden City, Hertford, Ware and Harlow is a great opportunity to promote high quality sustainable transport within the study area and decarbonise the transport system. • EEH could support the delivery of improved digital connectivity in the study area for areas with existing poor connectivity including Eaton Brae. This would support the digital 'travel' and enable remote access to services and employment.	connections between London and the north of the England / Scotland. This is a challenge as EEH is likely to have a lesser ability to influence these trips than if they were to either start or end within the area. • In Luton, 8.3% of all transport carbon emissions are associated with "other sources", this is likely attributable to Luton Airport. The balance between the economic importance of the Airport and local air quality concerns remains a challenge. Whilst EEH is unlikely to be able to influence emissions arising from the aviation industry, there may be opportunity to support the decarbonisation of surface travel to and from the airport. • Car travel makes a substantial contribution to carbon emissions and therefore has a huge impact on achieving net zero. Achieving net zero in the study area will be a significant challenge given the large residential population living in smaller car-dependent communities and the high flow of through traffic on the SRN. In these locations achieving net zero will be dependent upon the uptake of zero emission vehicles. EEH can support the uptake of zero emission vehicles through supporting the role out of Electric Vehicle Charging Infrastructure.

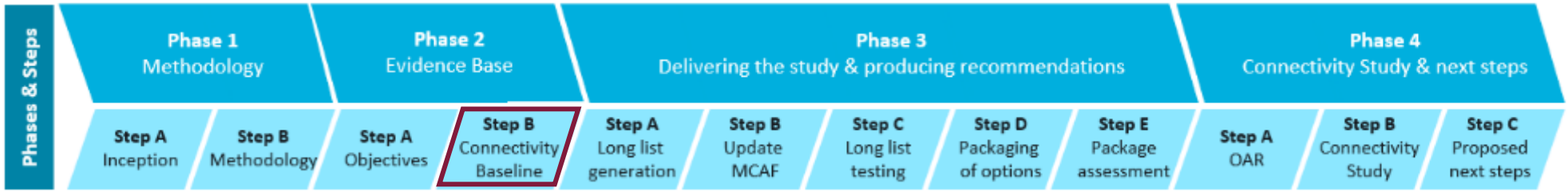
10 Next Steps

Overview

This report provides the evidence base that helps to set the scene for the identification of possible 'interventions' to improve transport services and infrastructure and or services in the study area.

Its findings will be used to inform a Long List of potential interventions that will be taken forward through a Multi-Criteria Assessment Framework (MCAF) process, leading to the selection of recommended interventions packaged together to form the basis of the Connectivity Study.

Figure 42 Connectivity Study development process



11 Appendices

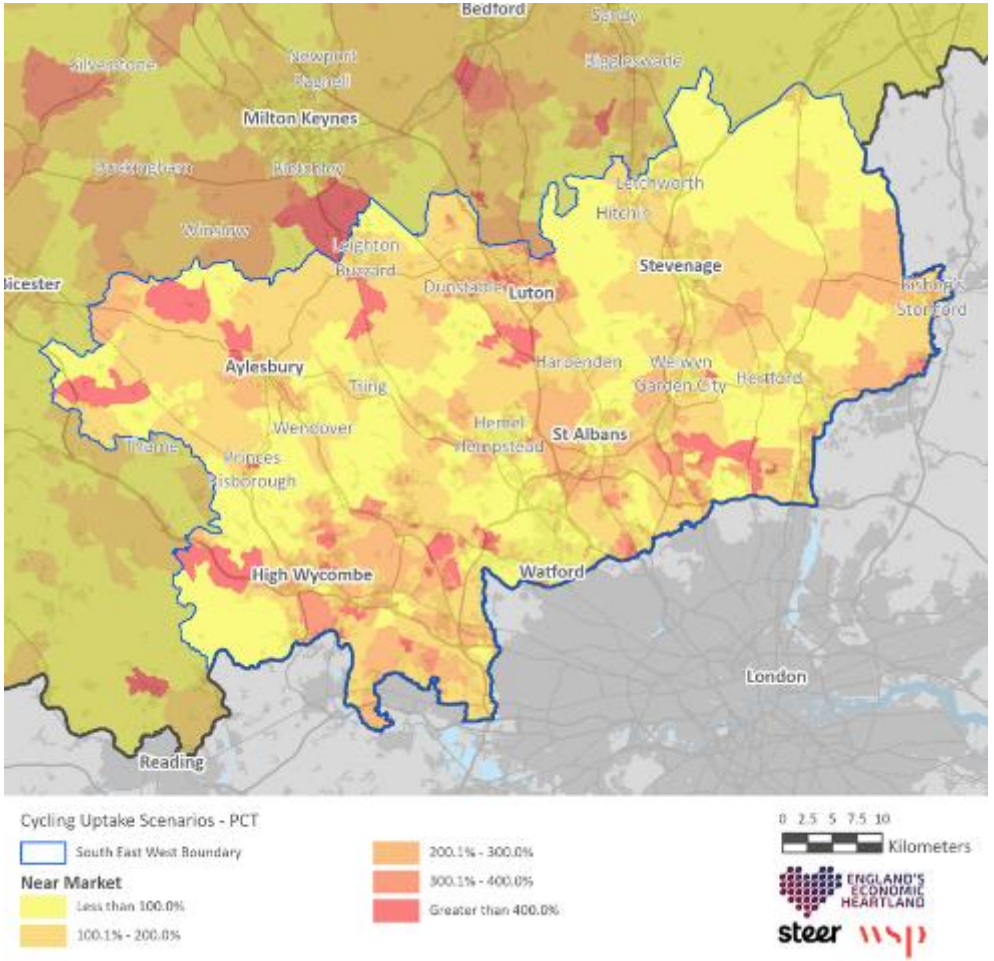
Appendix A – Mosaic Groups

Mosaic Group	Description
City Prosperity	City dwellers are characterised by living in central locations and pursuing careers with high rewards. Likely to be married couples, in managerial / senior positions, supporting students or older children, and are used to using online services
Prestige Positions	They are characterised by living in a high value detached homes, being employed in managerial or senior positions and supporting students/older children.
Country Living	These residents are characterised as well-off owners in rural locations enjoying the benefits of country life. High car ownership and high levels of internet use.
Domestic Success	They are characterised as thriving families who are busy bringing up children and following careers. They are likely to have children and own new technology.
Suburban Stability	This persona is characterised by living in a suburban mid-range home, which they've lived in for several years with older children.
Aspiring Homemakers	They are characterised as younger households, in full time employment, settling down in housing priced within their means, which may be in the suburbs.
Urban Cohesion	They are characterised as residents of settled urban communities with a strong sense of identity. They are likely to be multicultural and reside in the suburbs. Younger family members are likely to have an interest in new technology.
Rural Reality	This persona is characterised by householders living in inexpensive homes in village communities or outlying houses. Experience slower internet speeds.
Transient Renters	This persona is characterised by single people privately renting low cost homes, often in terraced housing, for the short term.
Modest Traditions	This persona typically lives in smaller terraced properties located in the outskirts of urban areas. They tend to be composed of couples with no children (or with children who have left home). They are quite likely to have access to a car.
Rental Hubs	This persona is characterised by educated young people privately renting in urban neighbourhoods. They are likely to be single or sharing accommodation. They have high smart phone use.
Senior Security	They are characterised by being elderly and who are enjoying a comfortable retirement. These more elderly households have lower mileage and less likely to take up new technology.
Family Basics	These families are characterised as those with limited resources who have to budget to make ends meet. Likely to have children, limited resources. squeezed budgets.
Municipal Challenge	They are characterised by mature residents living in affordable suburban housing.
Vintage Value	This persona is characterised by people living alone, in small homes or flats, on low income and need of support.

Appendix B – Cycling uptake scenarios

Near Market Scenario

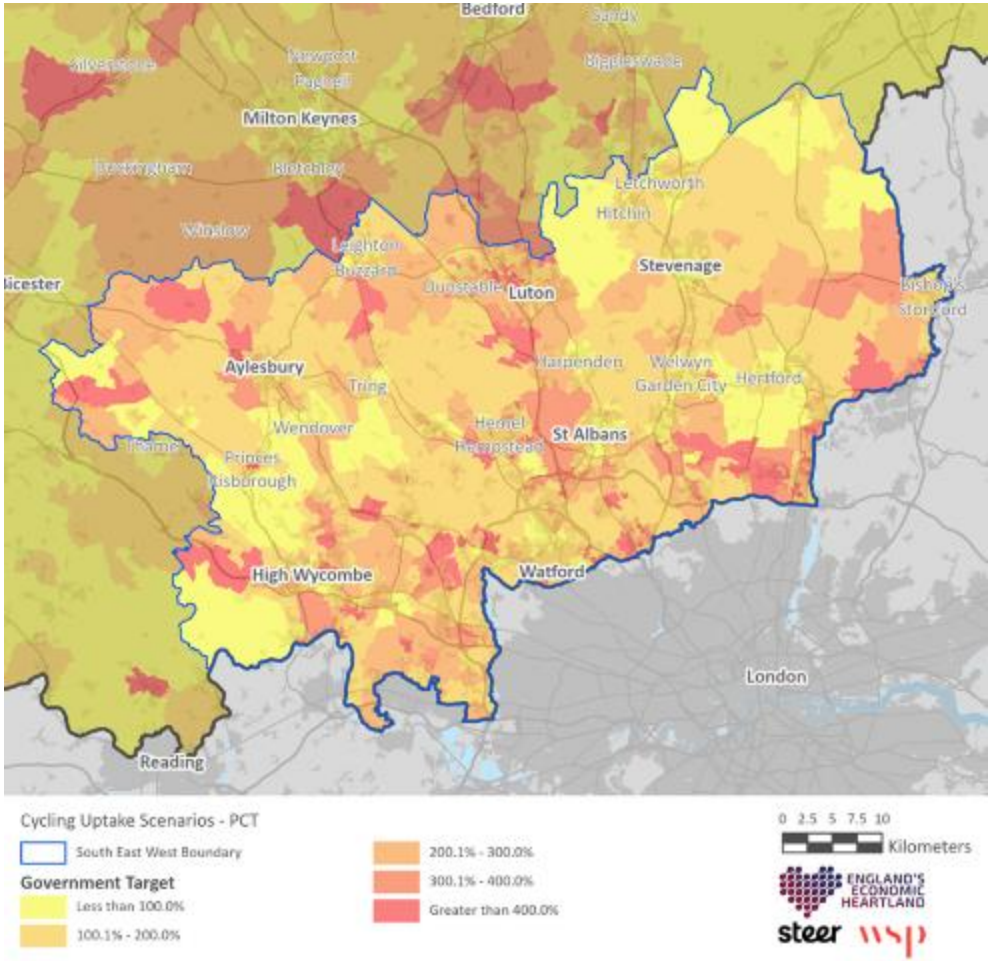
This map shows the level of change in cycling between the current situation and a scenario that reflect the government's target to double cycling levels by 2025. It models the overall doubling of cycling as a function of trip distance and hilliness plus various sociodemographic and geographical characteristics (including age, sex, ethnicity, car ownership, and income deprivation) that are currently associated with propensity to cycle commute in England and Wales.



Data Source: Propensity to Cycle Toolkit

Government Target Scenario

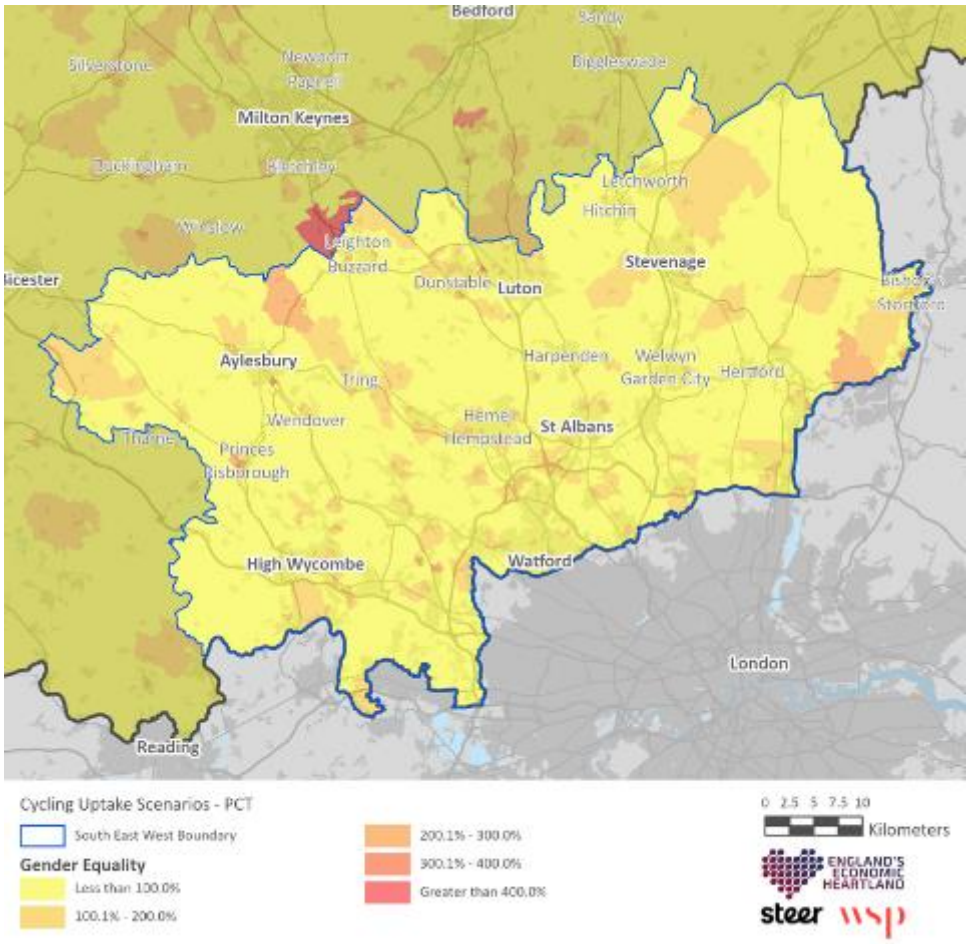
This map shows the level of change in cycling between the current situation and a scenario that reflect the government's target to double cycling levels by 2025. It models the overall doubling of cycling as solely a function of trip distance and hilliness.



Data Source: Propensity to Cycle Toolkit

Gender Equality Scenario

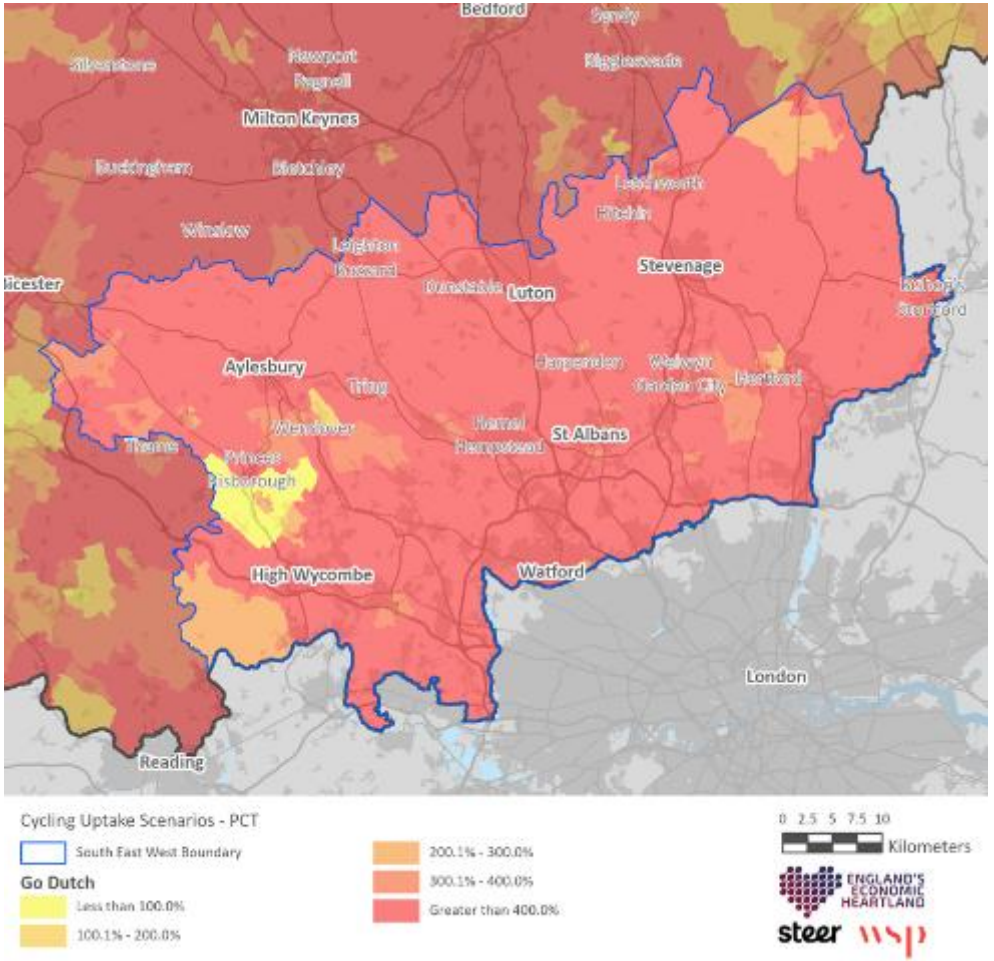
This map shows the level of change in cycling between the current situation and a scenario where gender disparities are eliminated.



Data Source: Propensity to Cycle Toolkit

Go Dutch Scenario

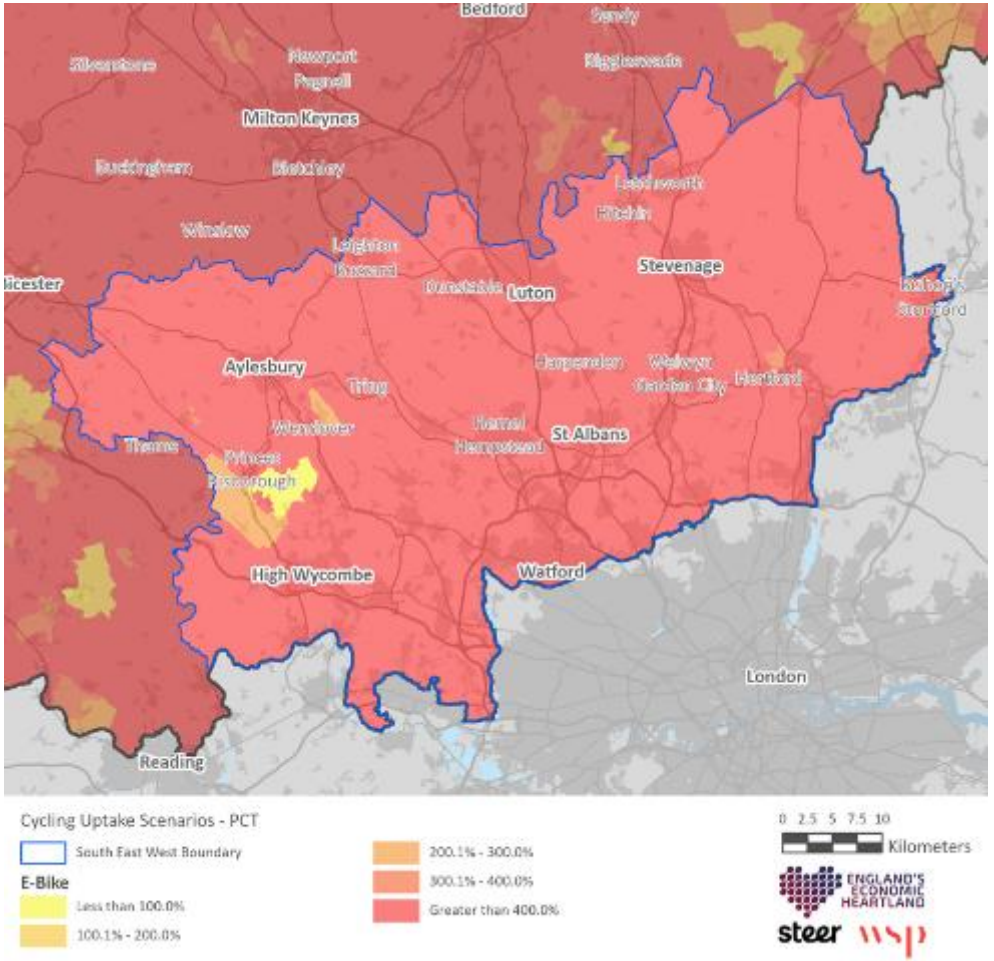
This map shows the level of change in cycling between the current situation and a scenario based on cycling records from the Netherlands, whilst still considering local geography.



Data Source: Propensity to Cycle Toolkit

E-Bikes Scenario

This map shows the level of change in cycling between the current situation a scenario where there is the widespread uptake of electric cycles.

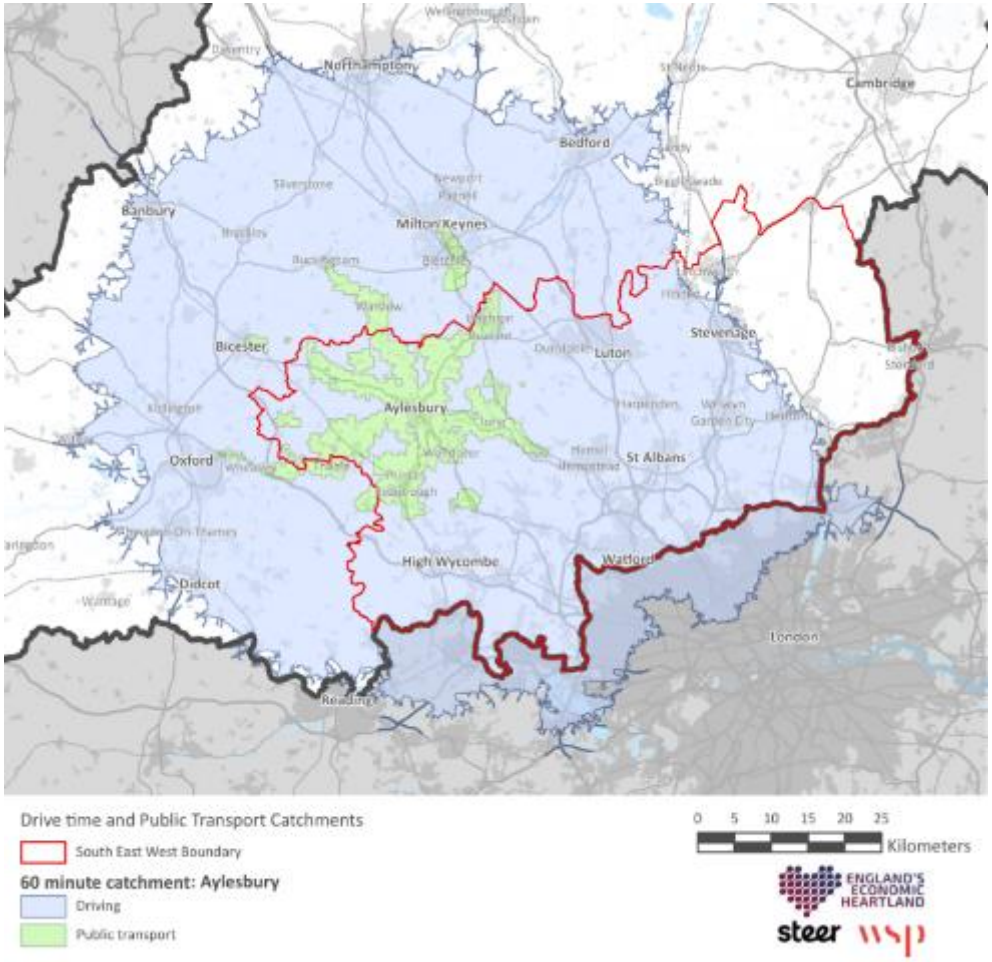


Data Source: Propensity to Cycle Toolkit

Appendix C – 60 minute Public transport and Drive time catchments

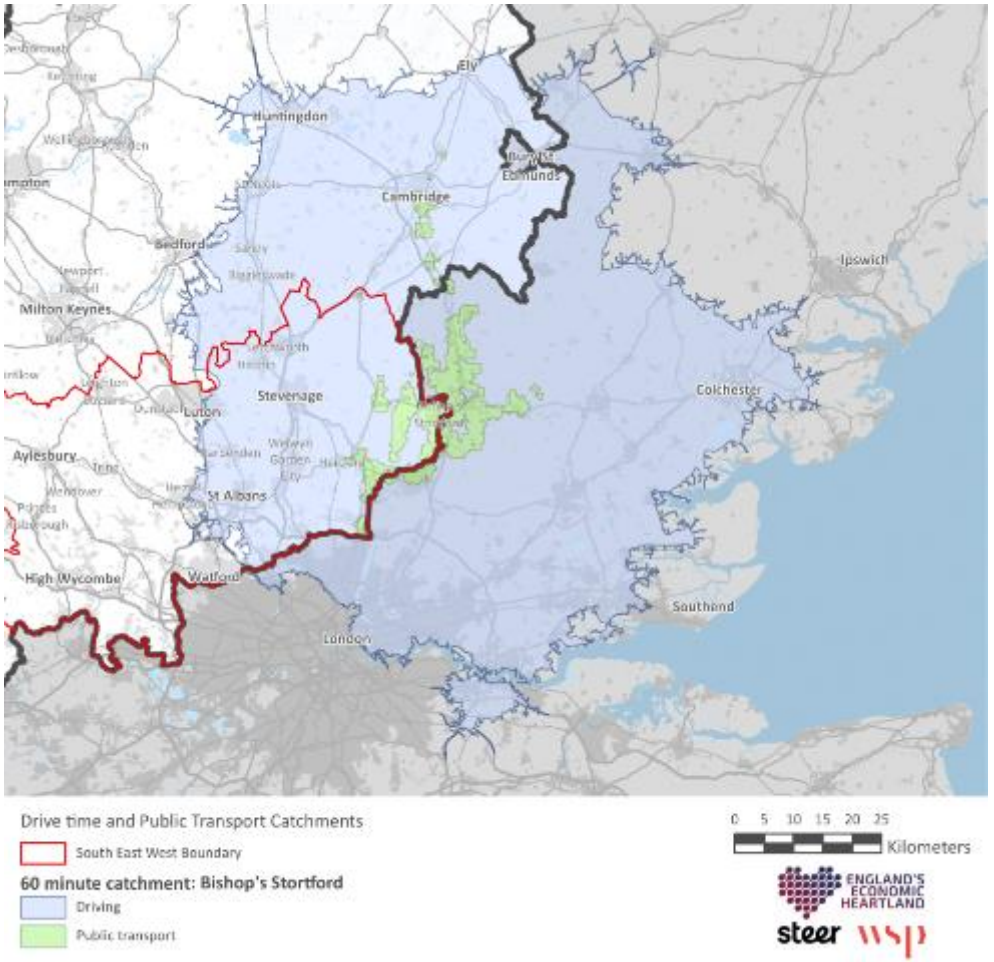
Aylesbury

The plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Aylesbury.



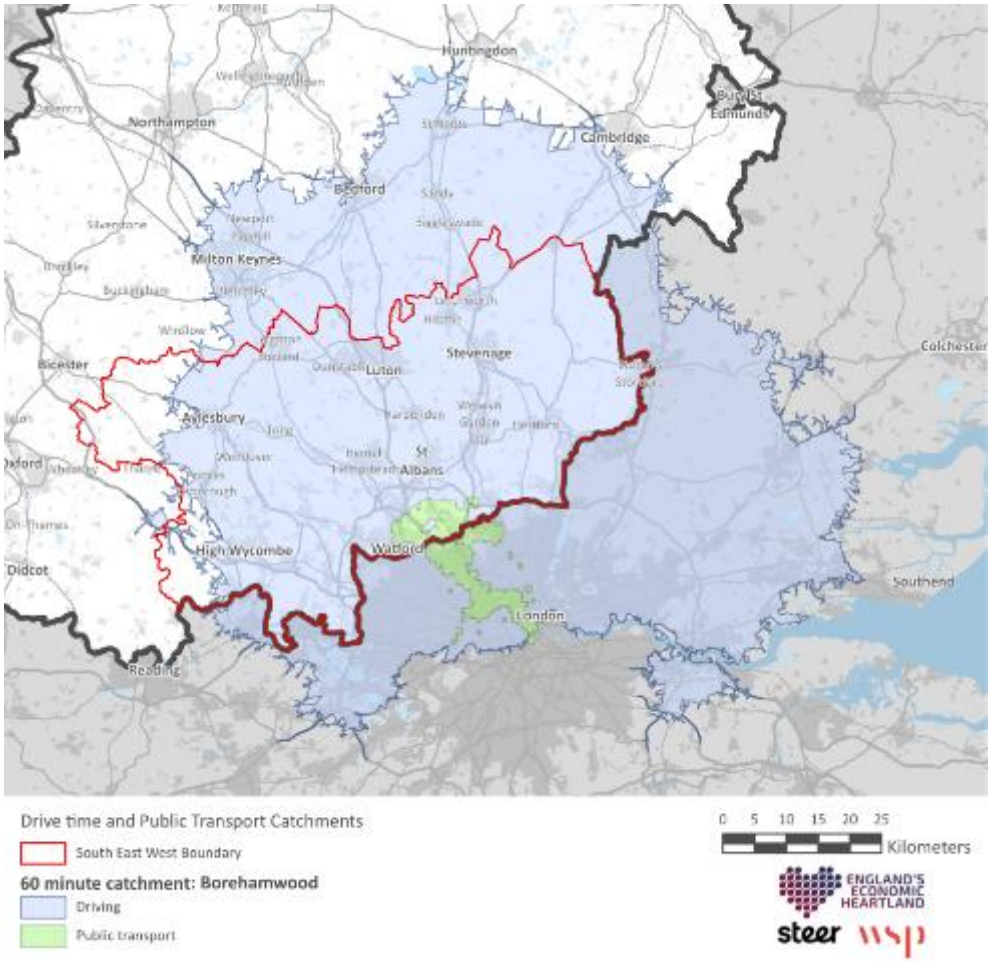
Bishop's Stortford

The Plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Bishop's Stortford.



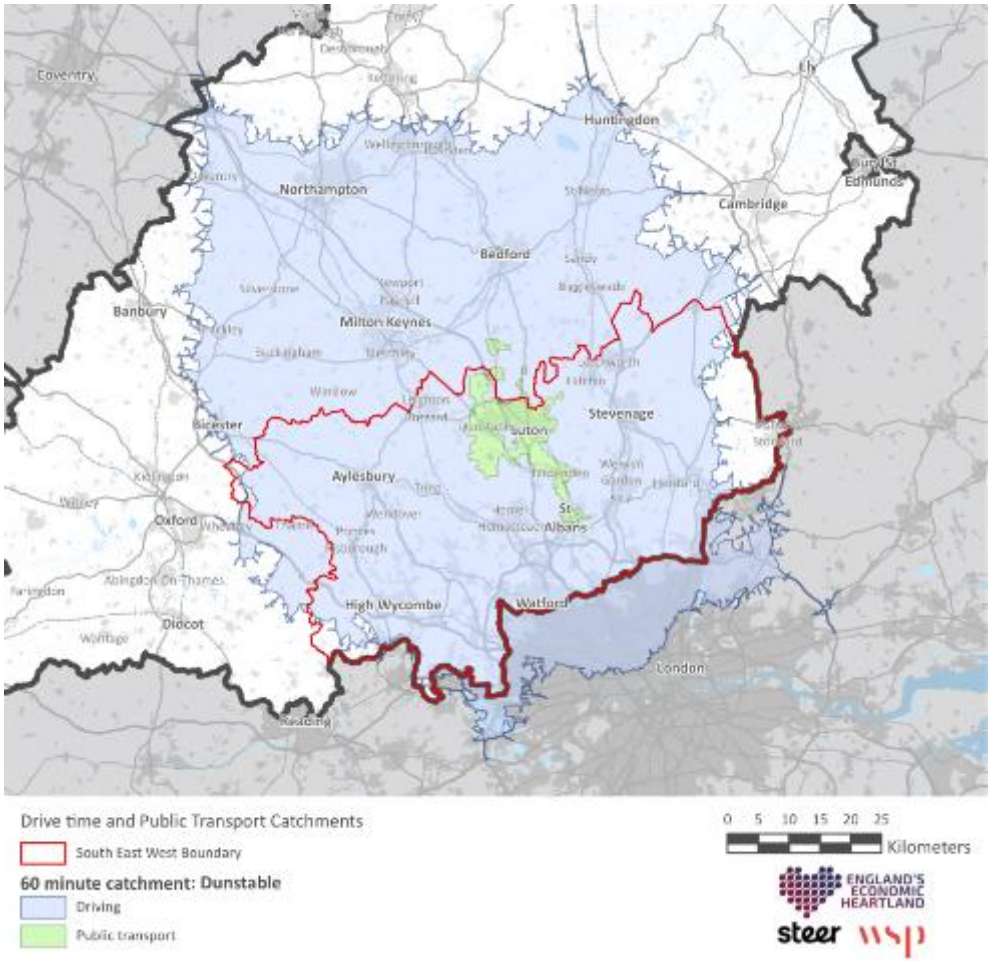
Borehamwood

The Plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Borehamwood.



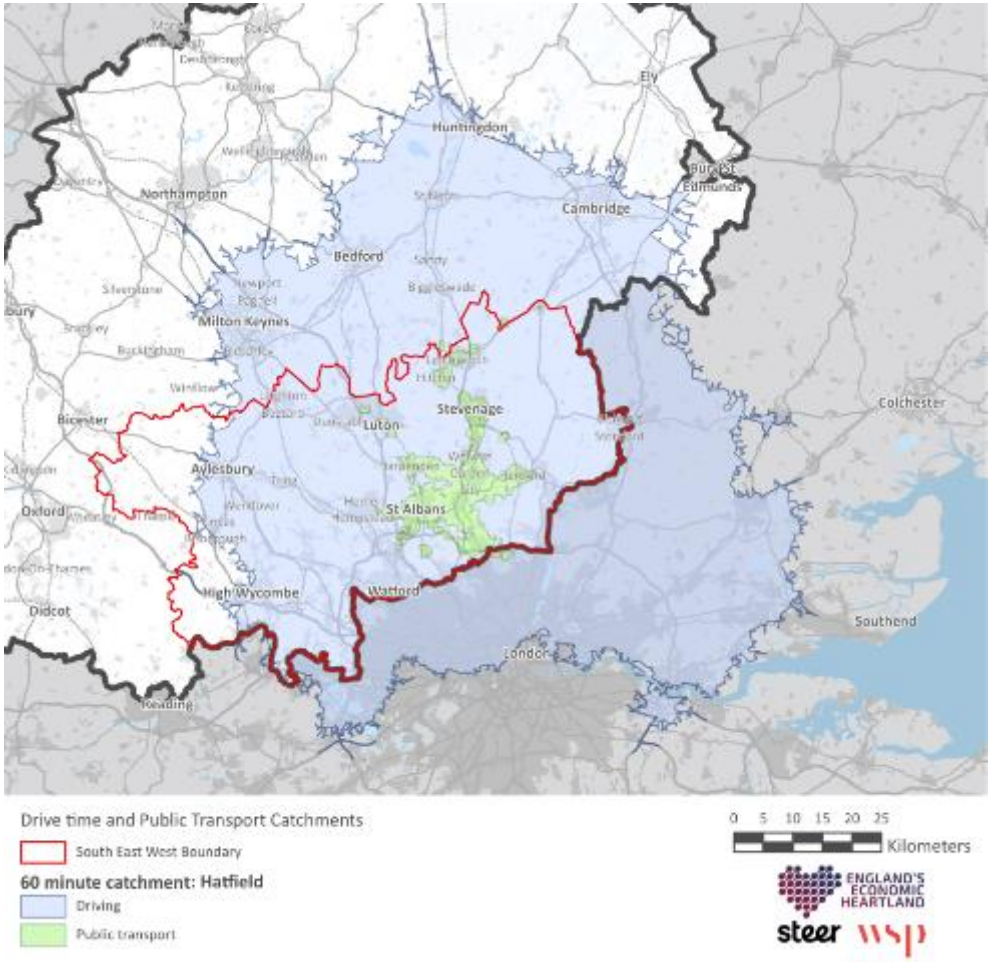
Dunstable

The Plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Dunstable.



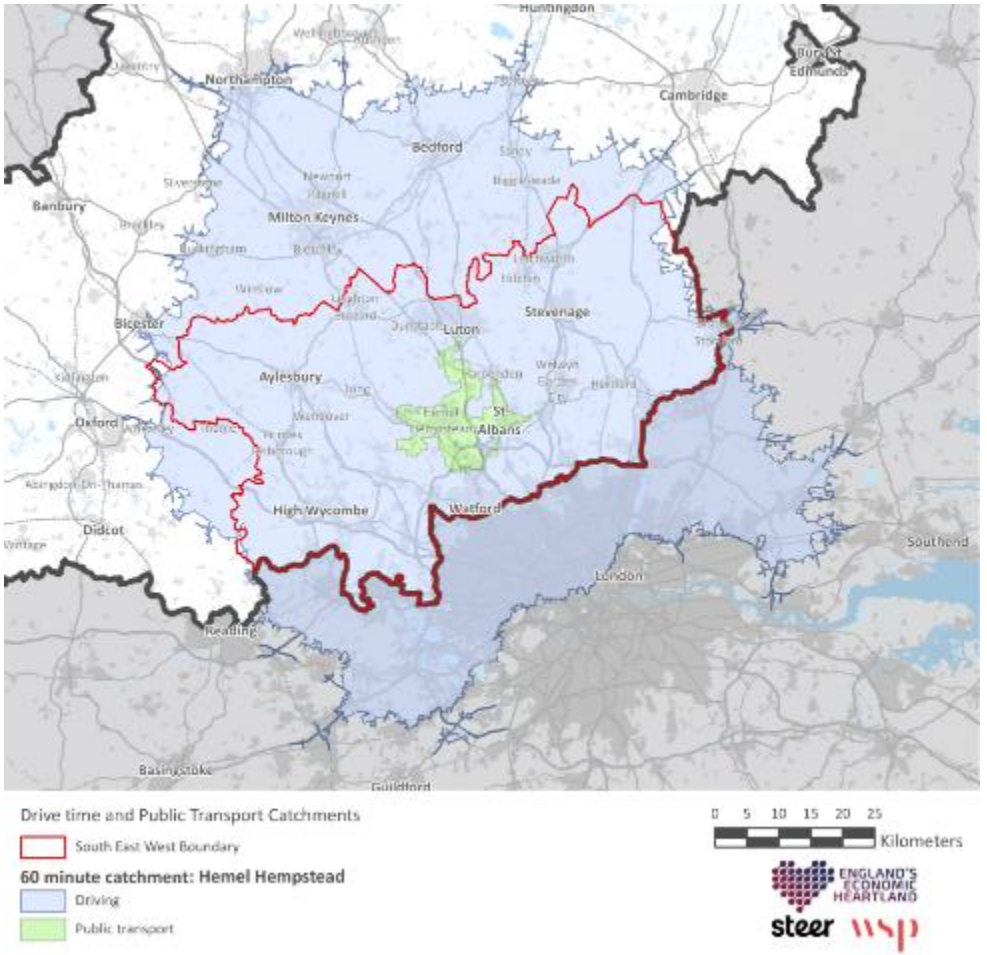
Hatfield

The Plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Hatfield.



Hemel Hempstead

The Plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Hemel Hempstead.



High Wycombe

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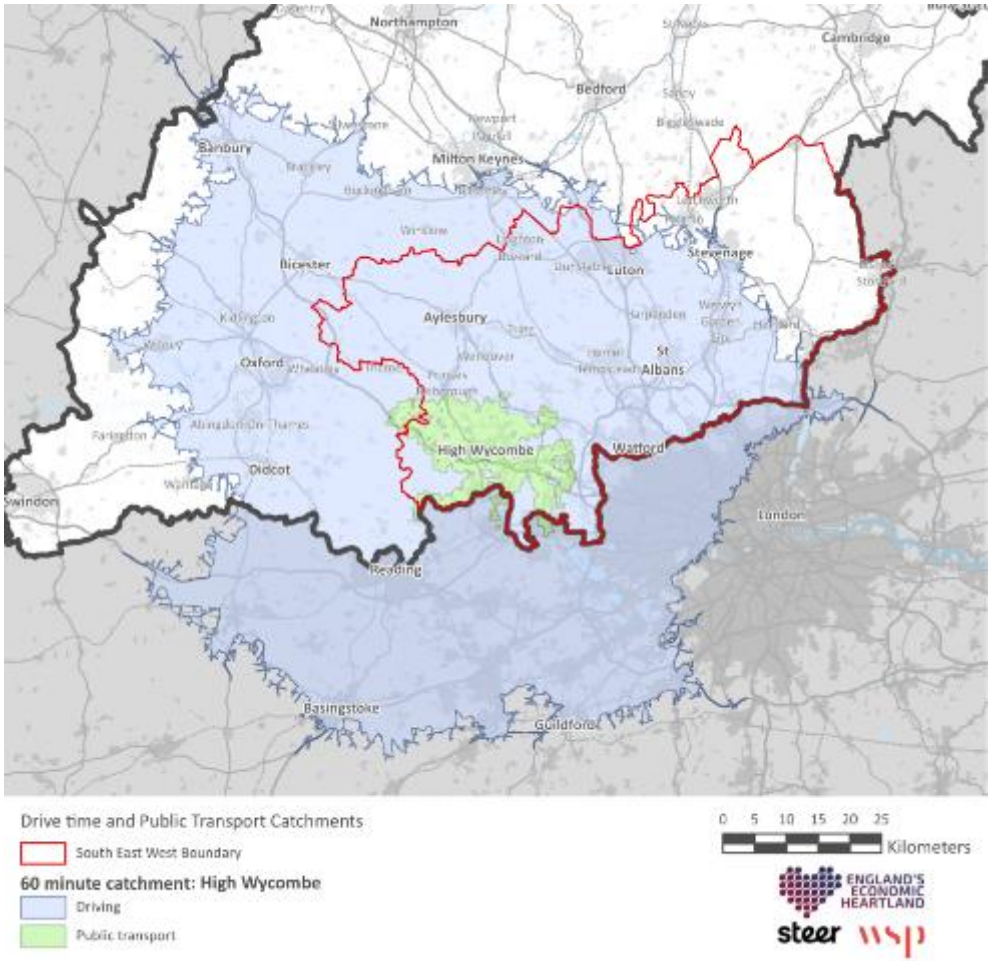
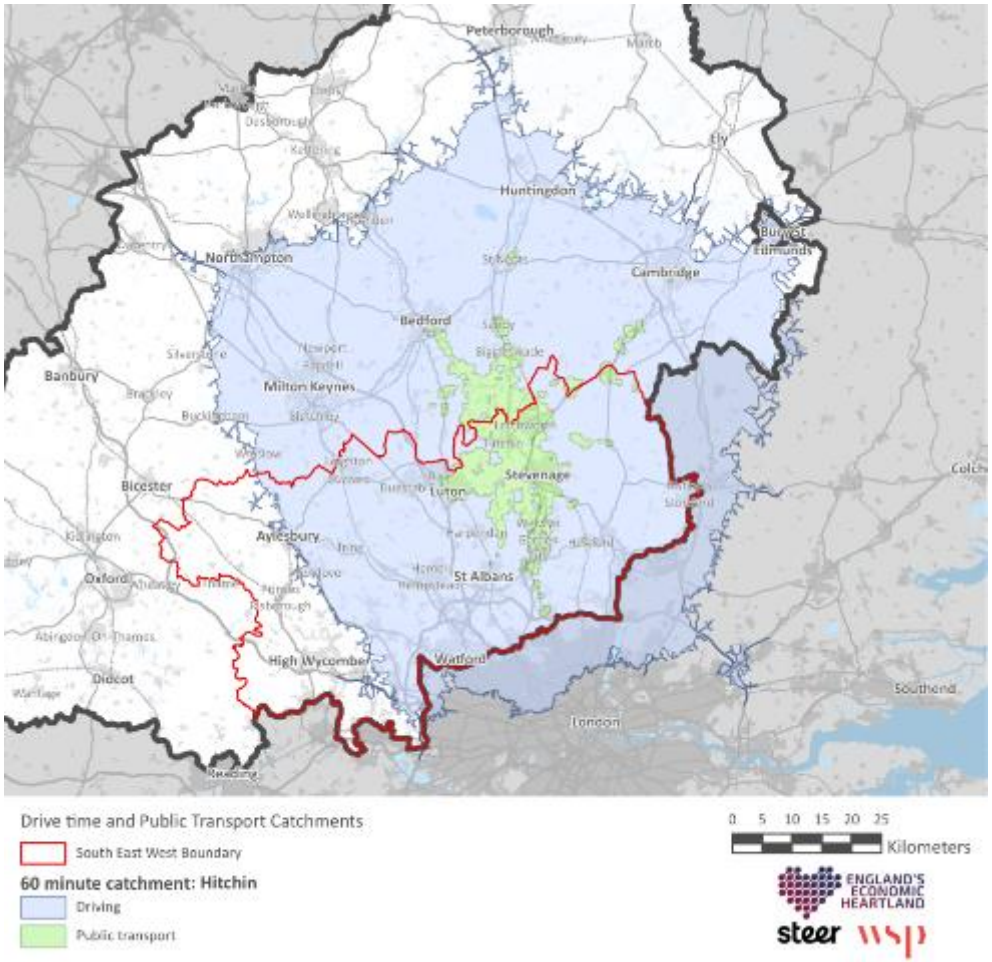


Hitchin

The Plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Hitchin.



Hoddesdon

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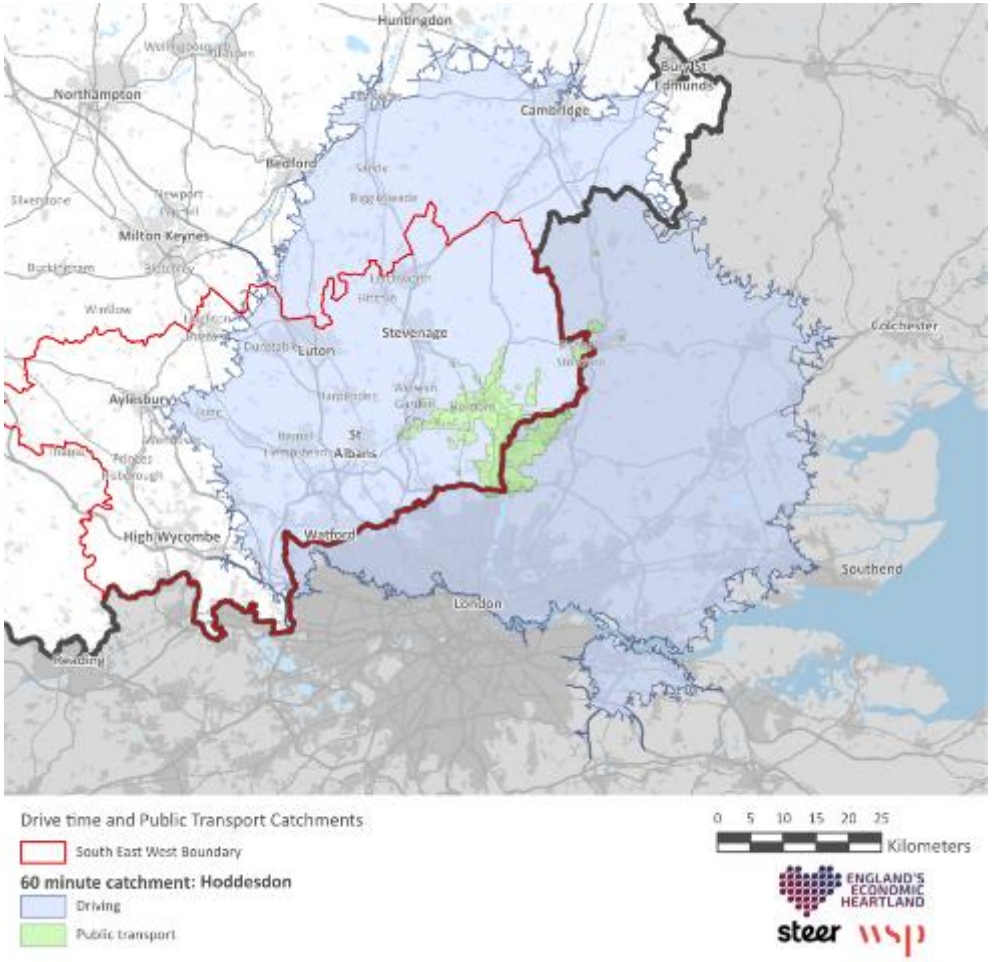
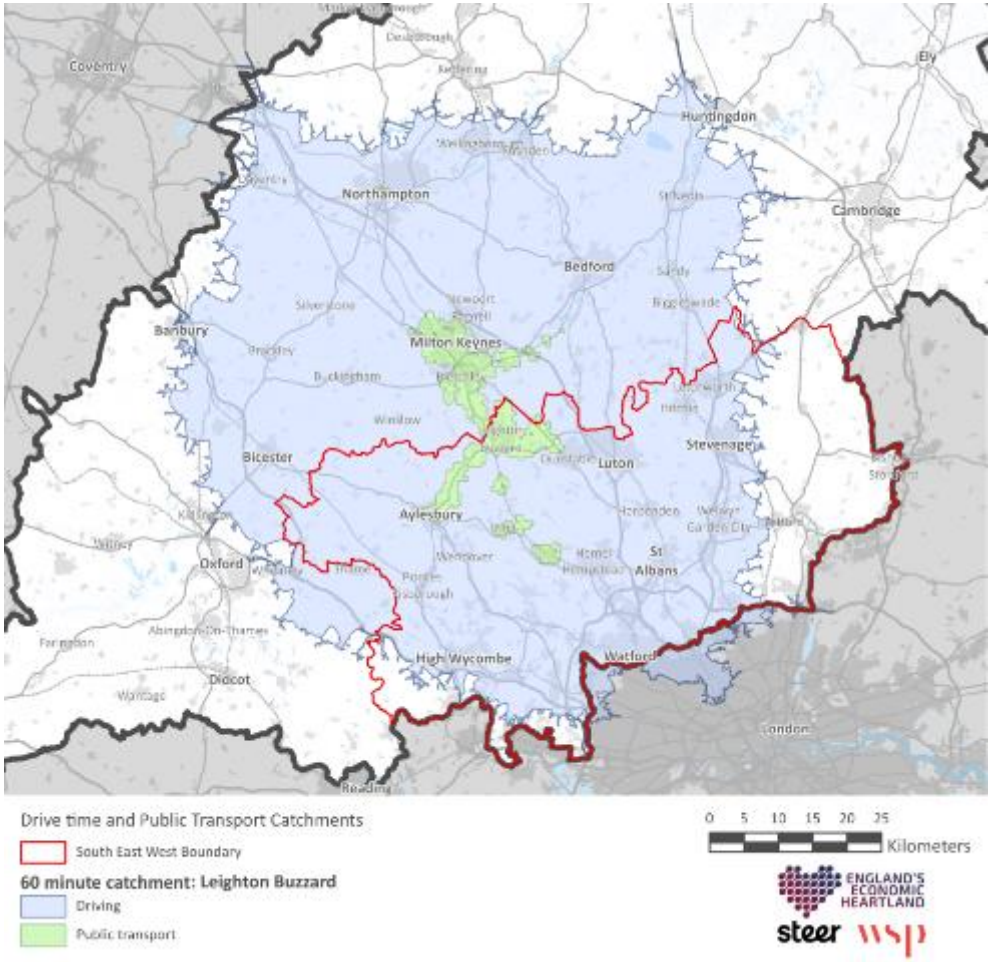


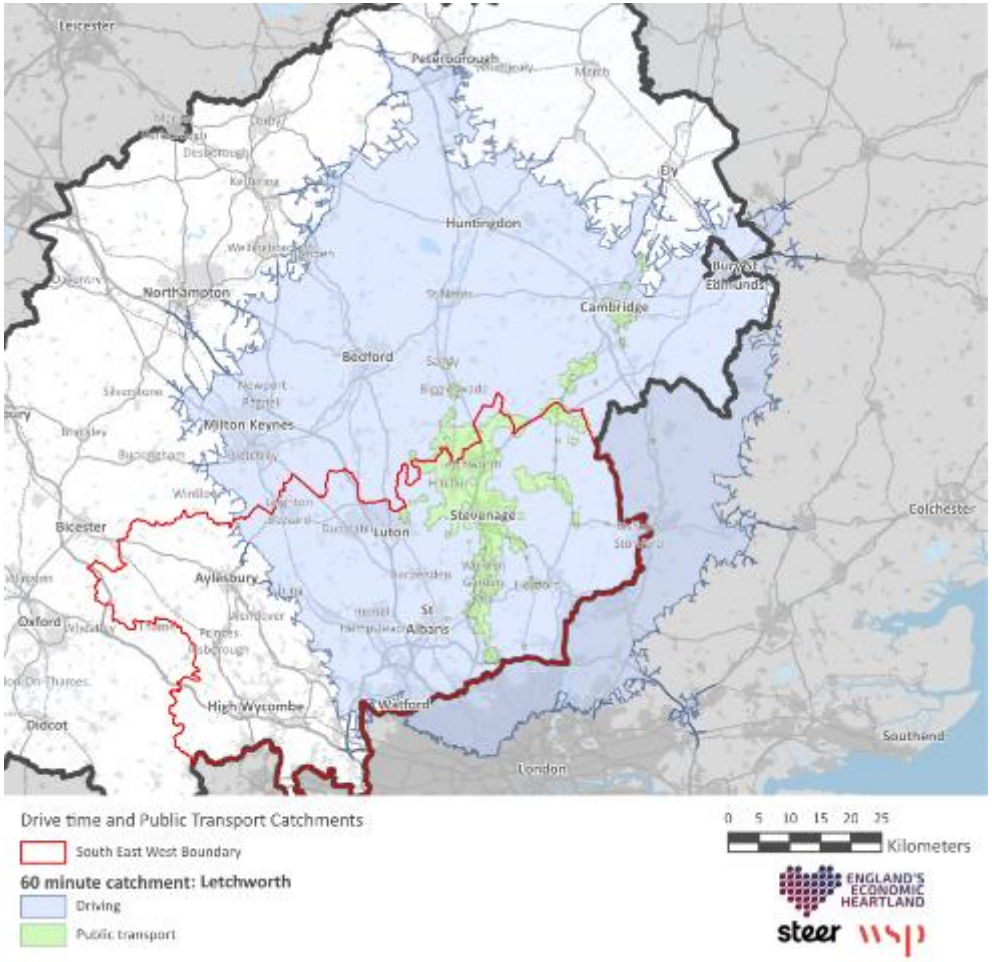
Leighton Buzzard

The plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Hoddesdon.



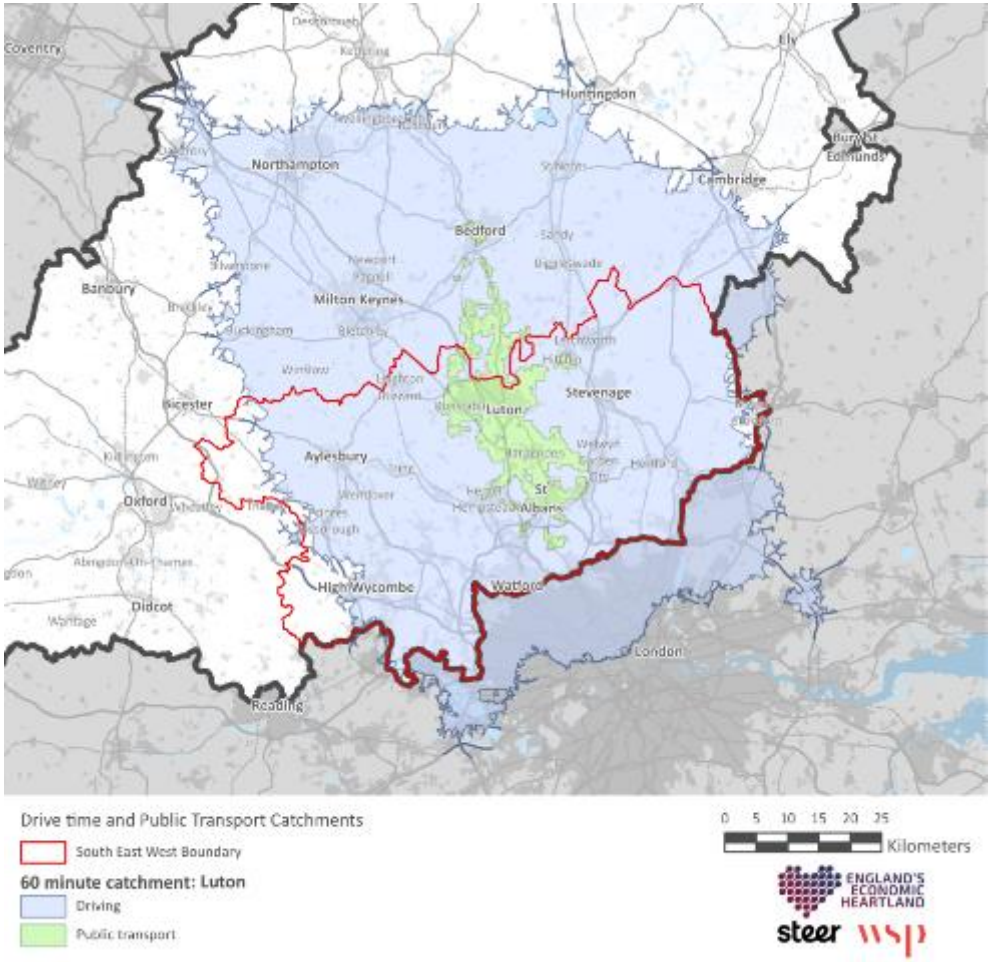
Letchworth

The plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Letchworth.



Luton

The plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Luton.



Royston

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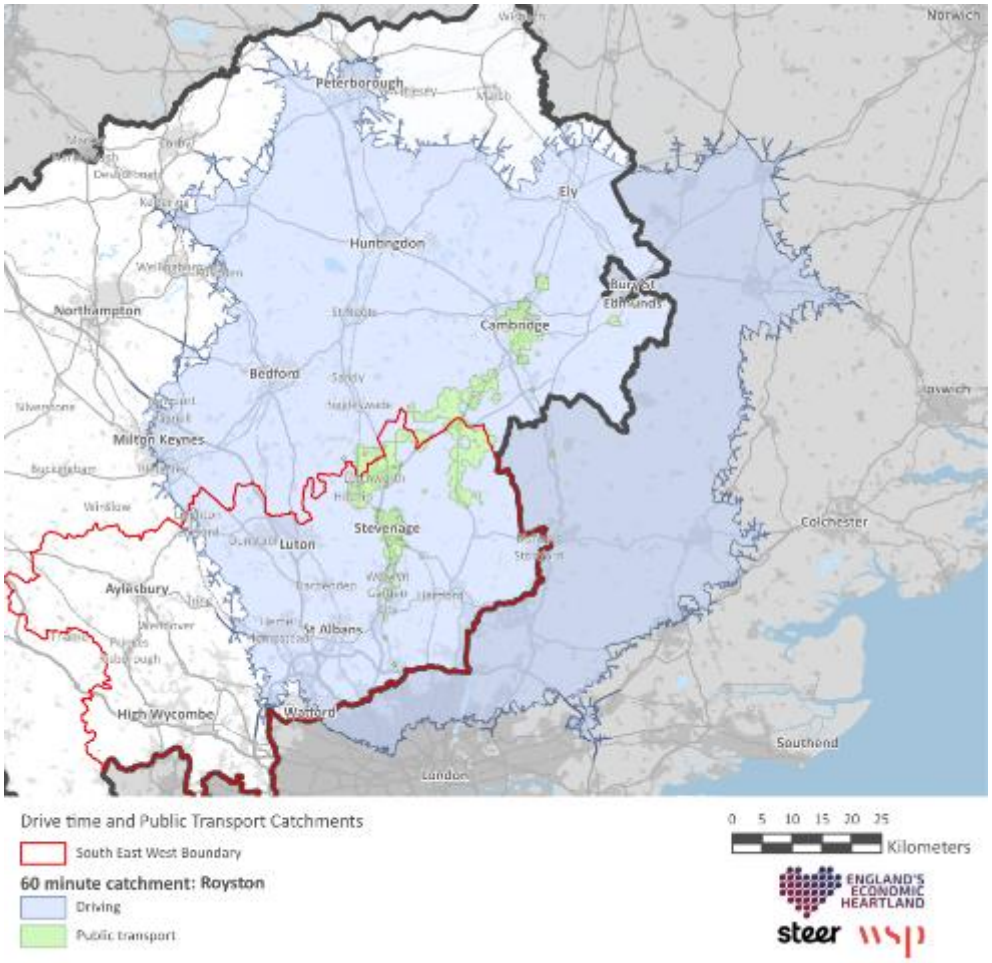
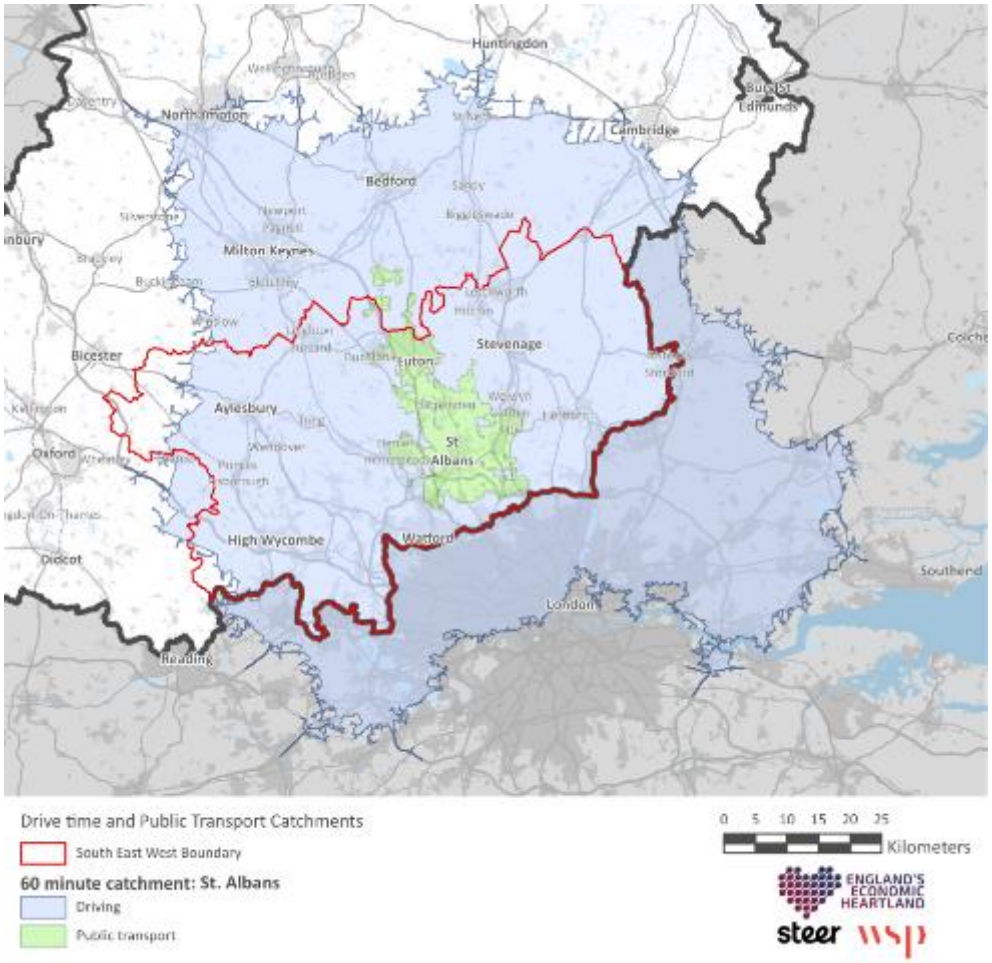


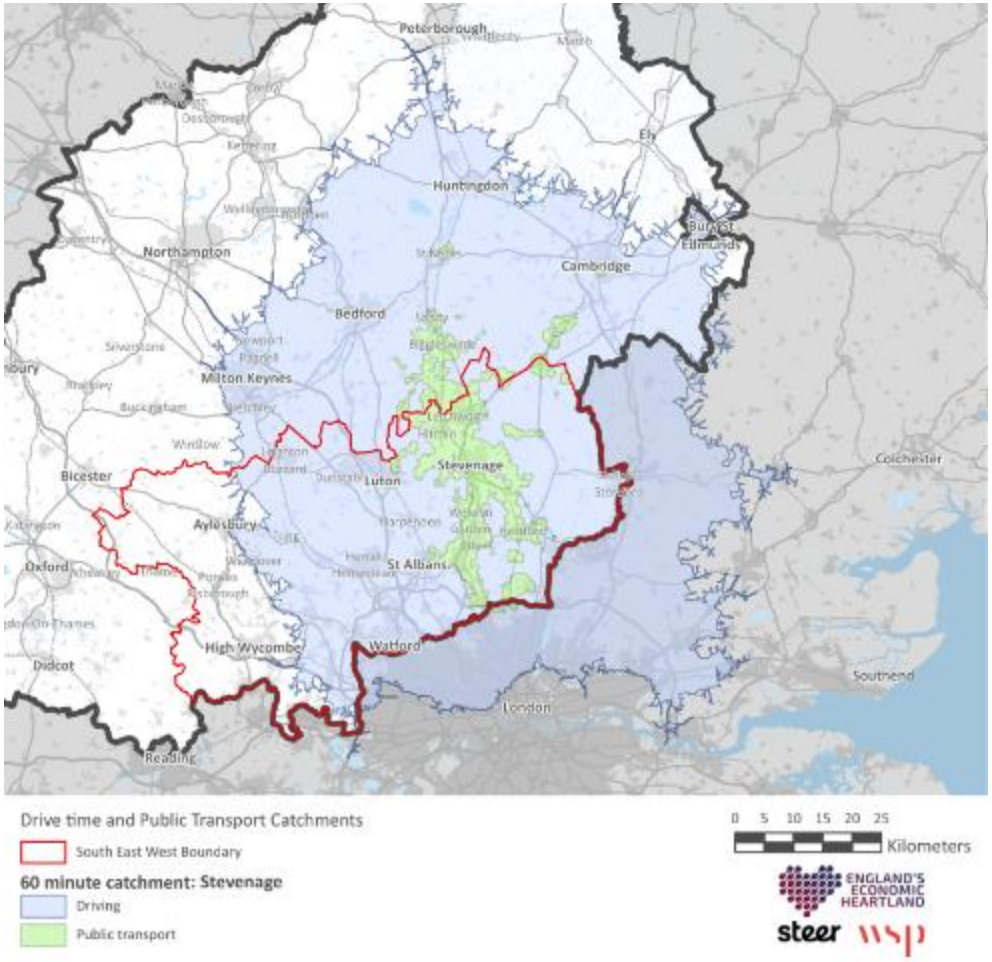
St. Albans

The plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of St. Albans.



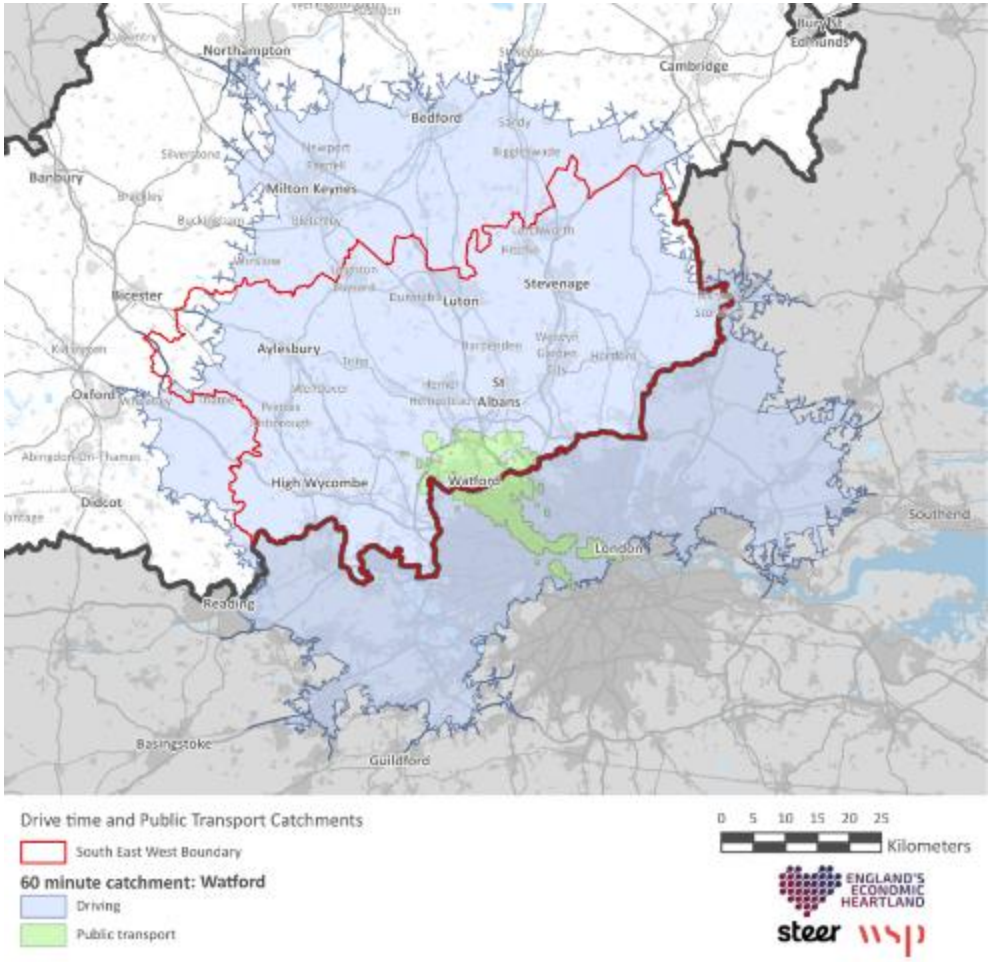
Stevenage

The plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Stevenage.



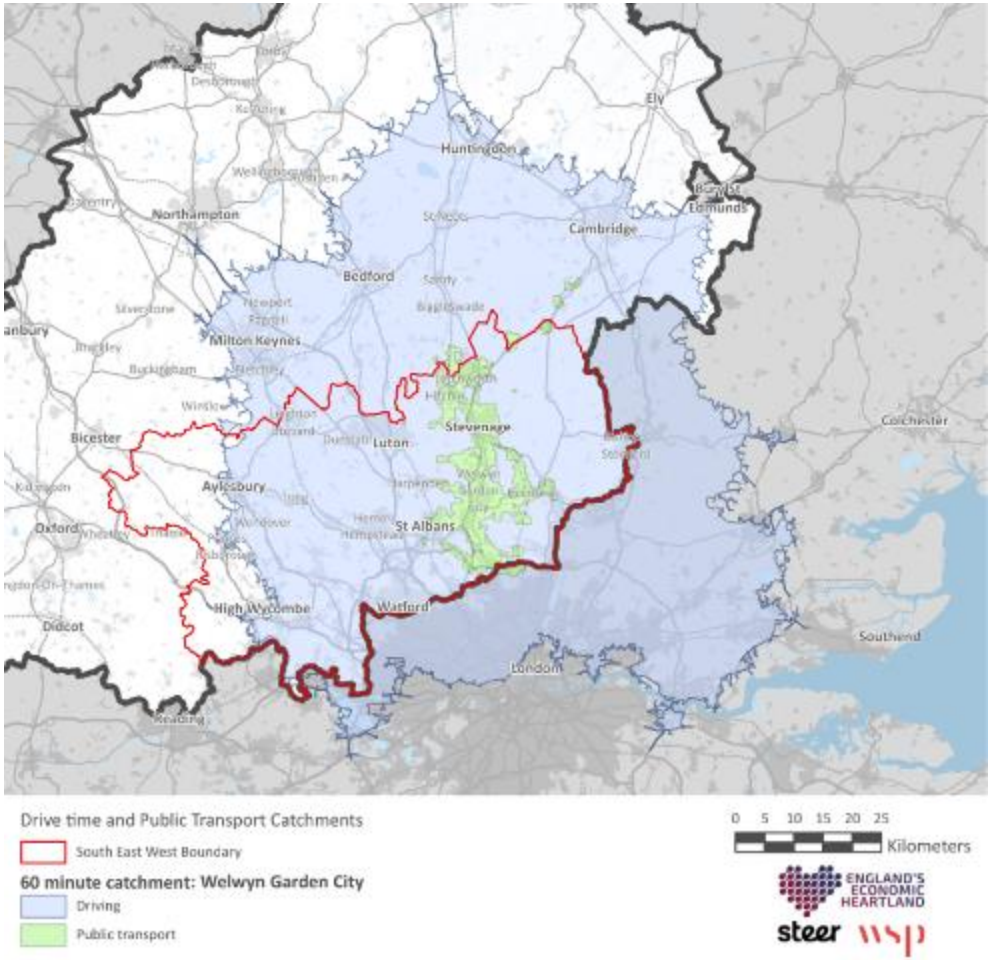
Watford

The plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Watford.



Welwyn Garden City

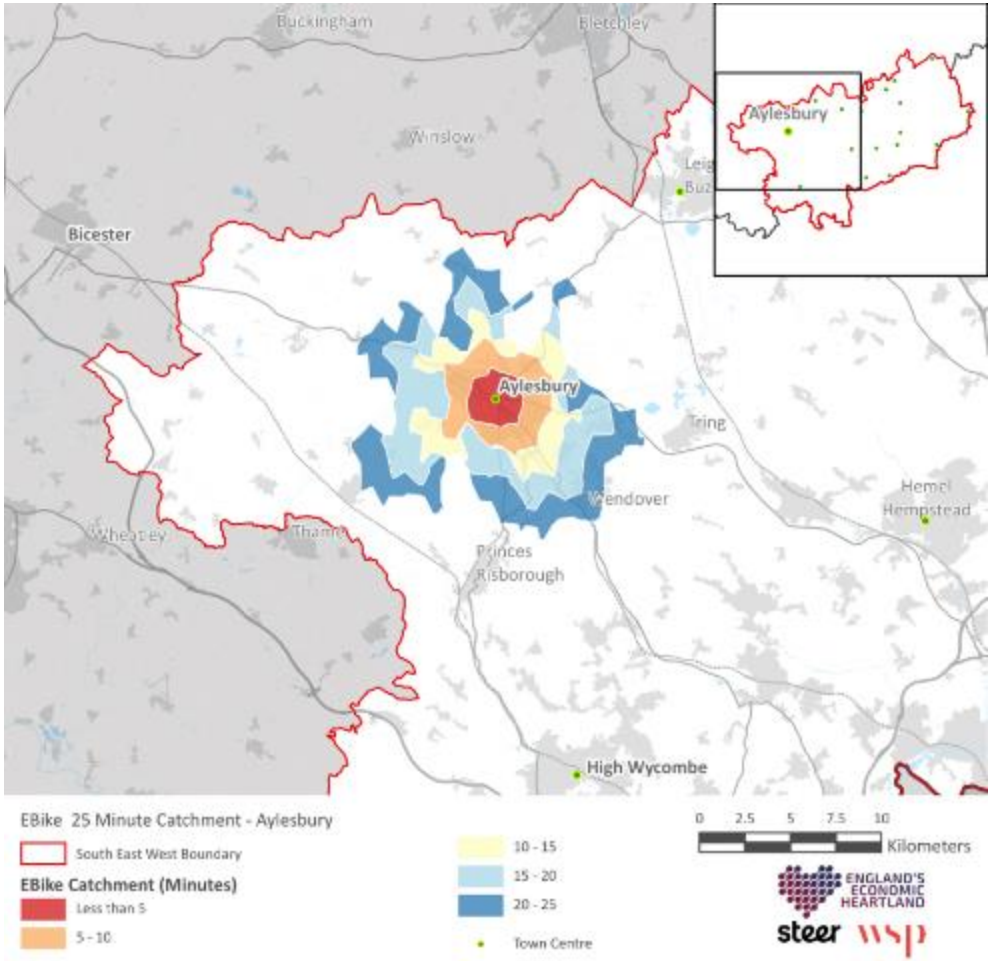
The plan opposite compares the potential distance someone can travel for 60 minutes by both public transport and private car from the centre of Welwyn Garden City.



Appendix D – 25 minute E-bike Catchment

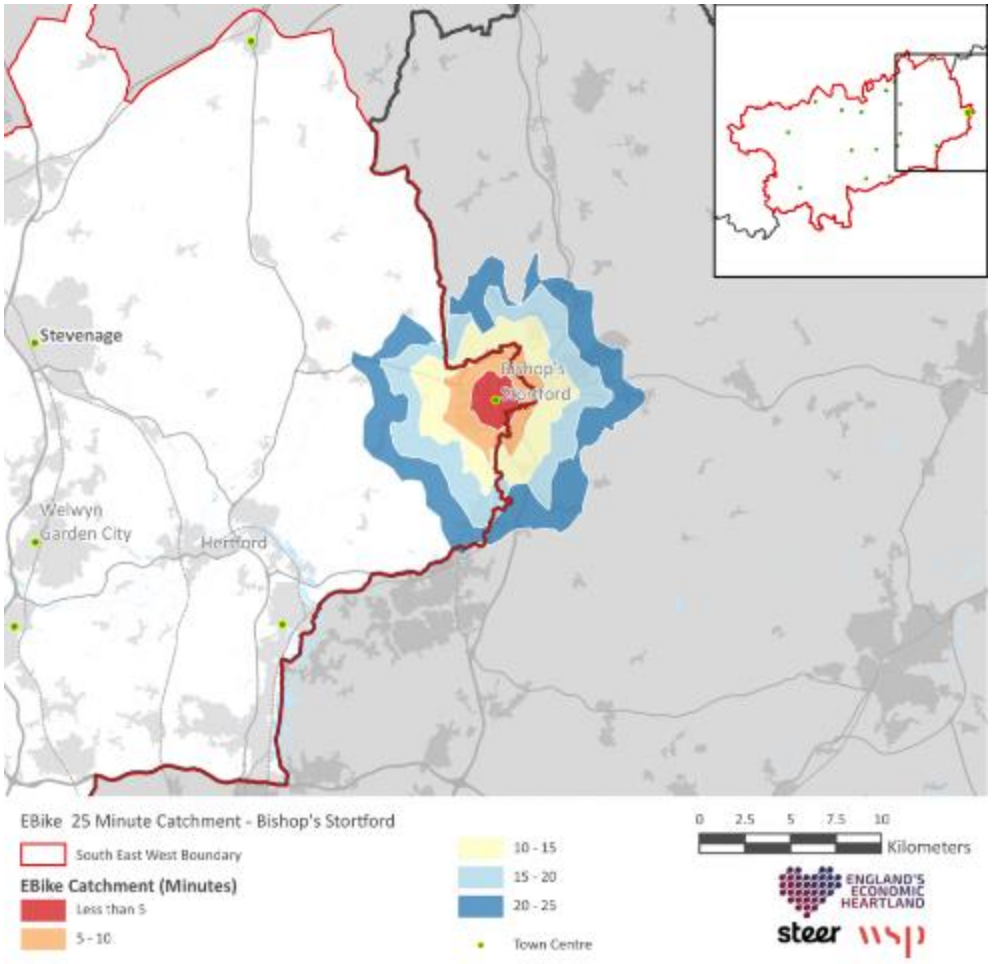
Aylesbury

The plan opposite identifies the areas which lie within a 25-minute journey from Aylesbury by electric Bike.



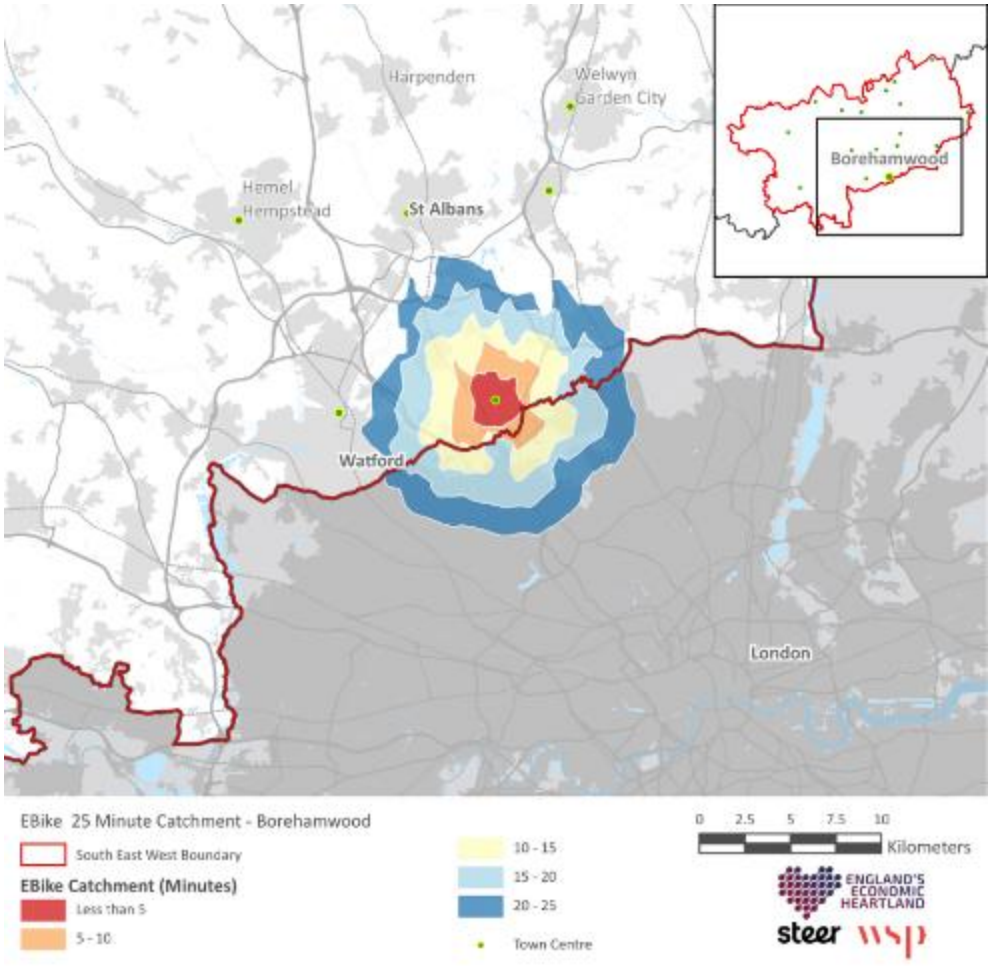
Bishop's Stortford

The plan opposite identifies the areas which lie within a 25-minute journey from Bishop's Stortford by electric bike.



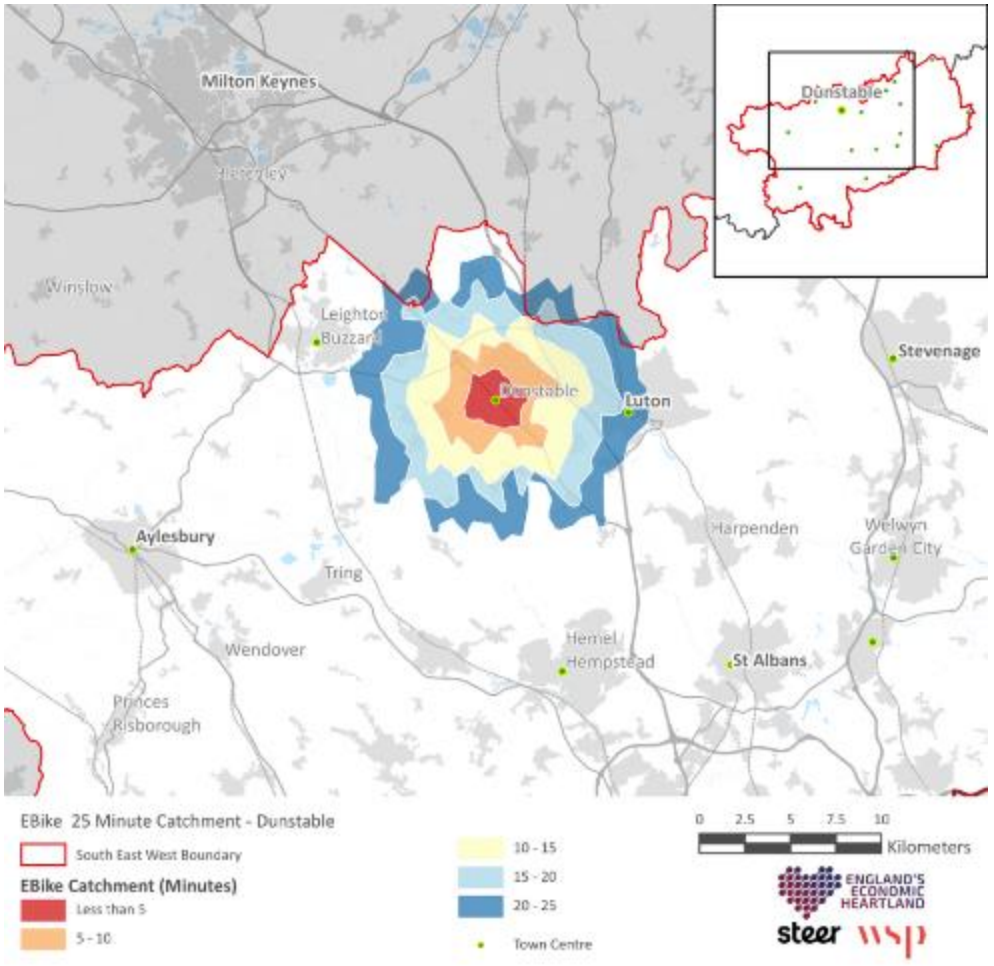
Borehamwood

The plan opposite identifies the areas which lie within a 25-minute journey from Borehamwood by electric bike.



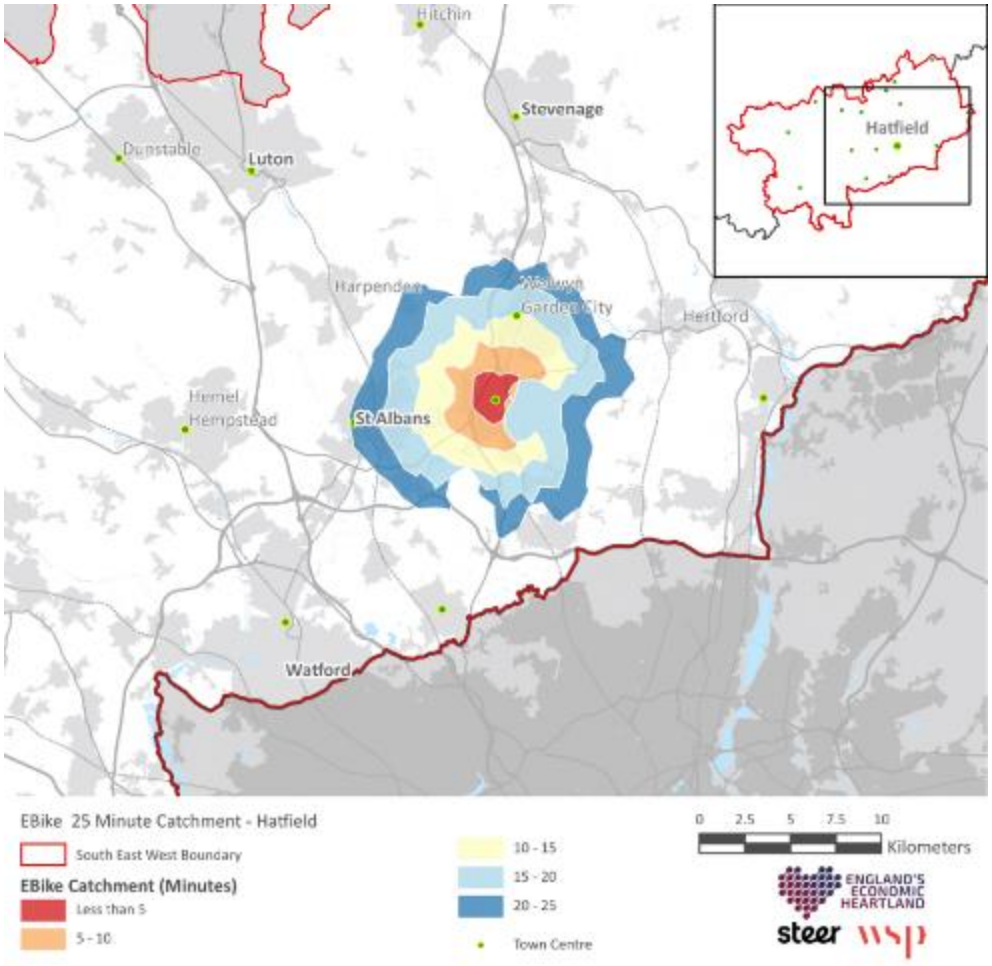
Dunstable

The plan opposite identifies the areas which lie within a 25-minute journey from Dunstable by electric bike.



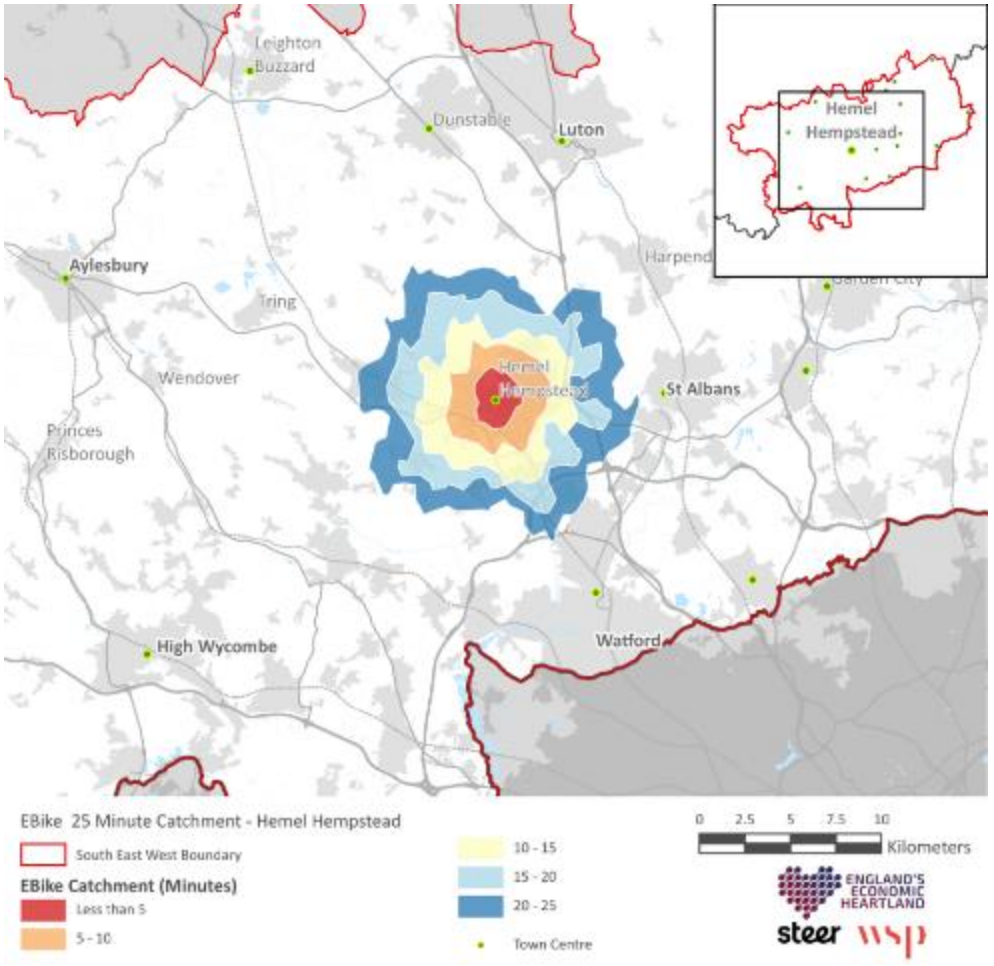
Hatfield

The plan opposite identifies the areas which lie within a 25-minute journey from Hatfield by electric bike.



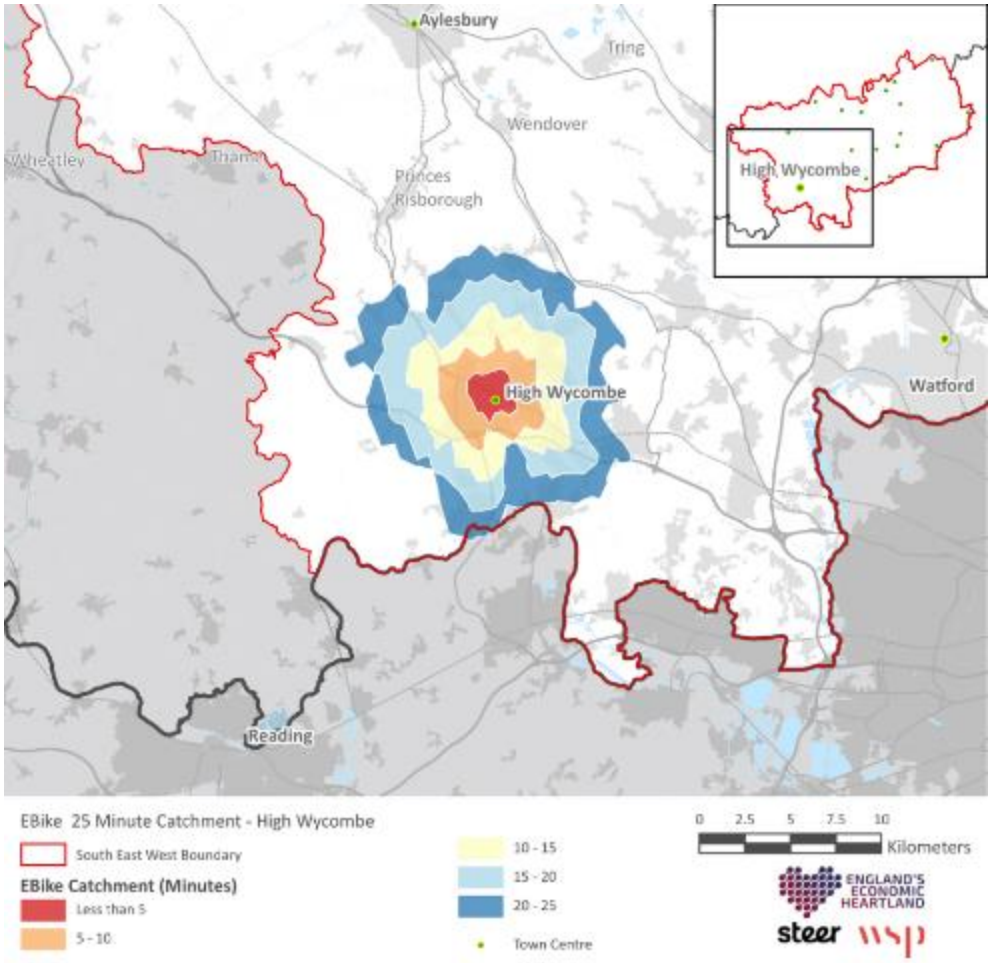
Hemel Hempstead

The plan opposite identifies the areas which lie within a 25-minute journey from Hemel Hempstead by electric bike.



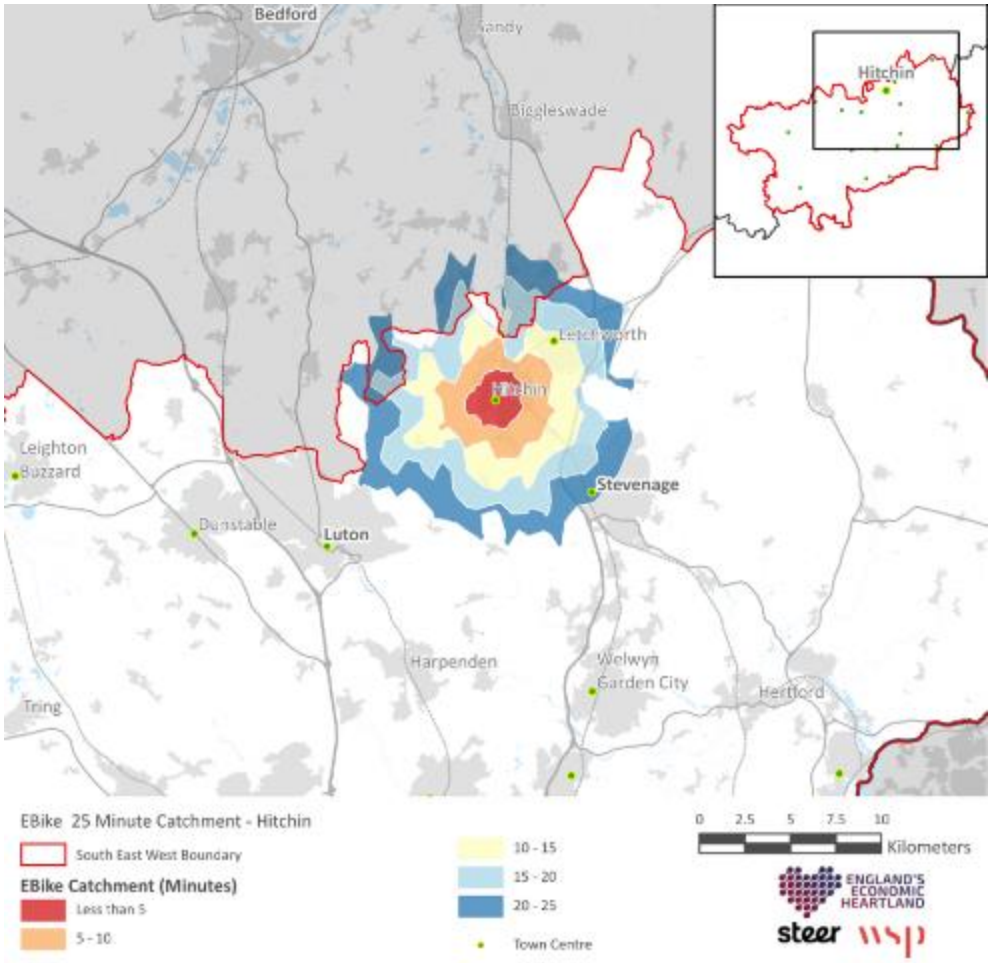
High Wycombe

The plan opposite identifies the areas which lie within a 25-minute journey from Hemel Hempstead by electric bike.



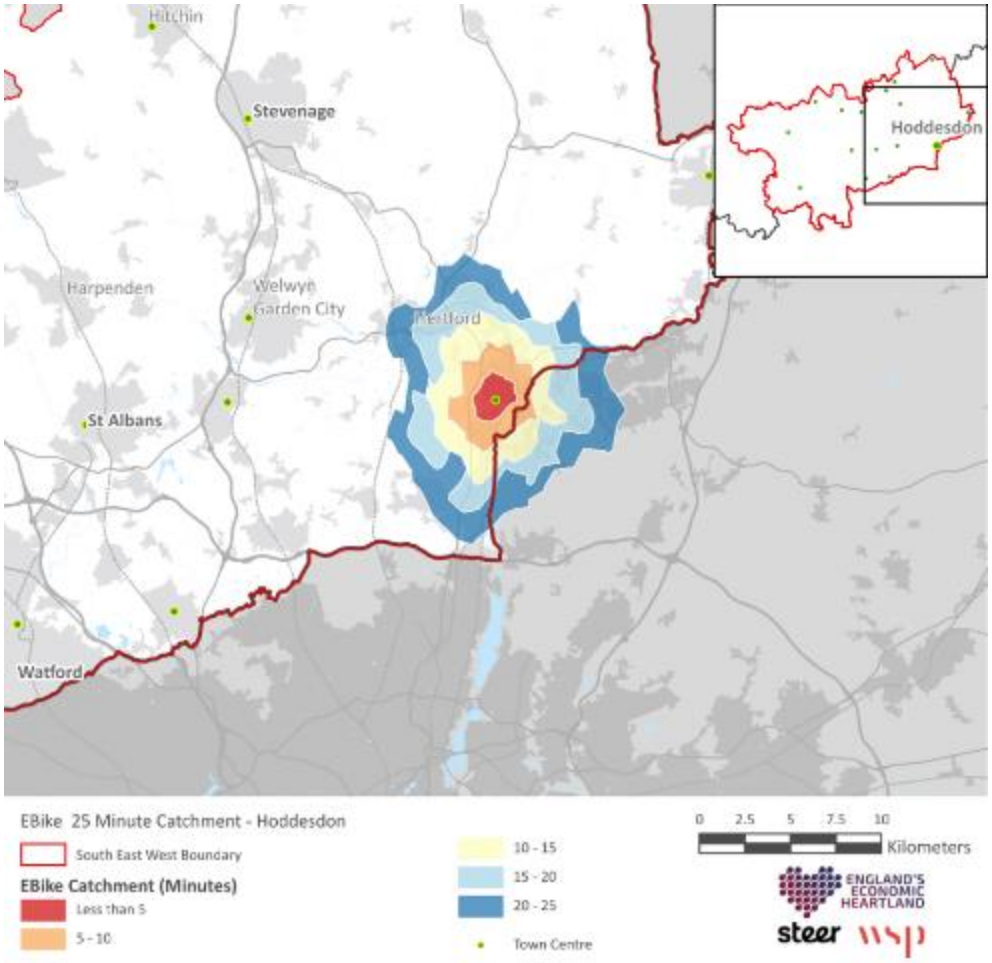
Hitchin

The plan opposite identifies the areas which lie within a 25-minute journey from Hitchin by electric bike.



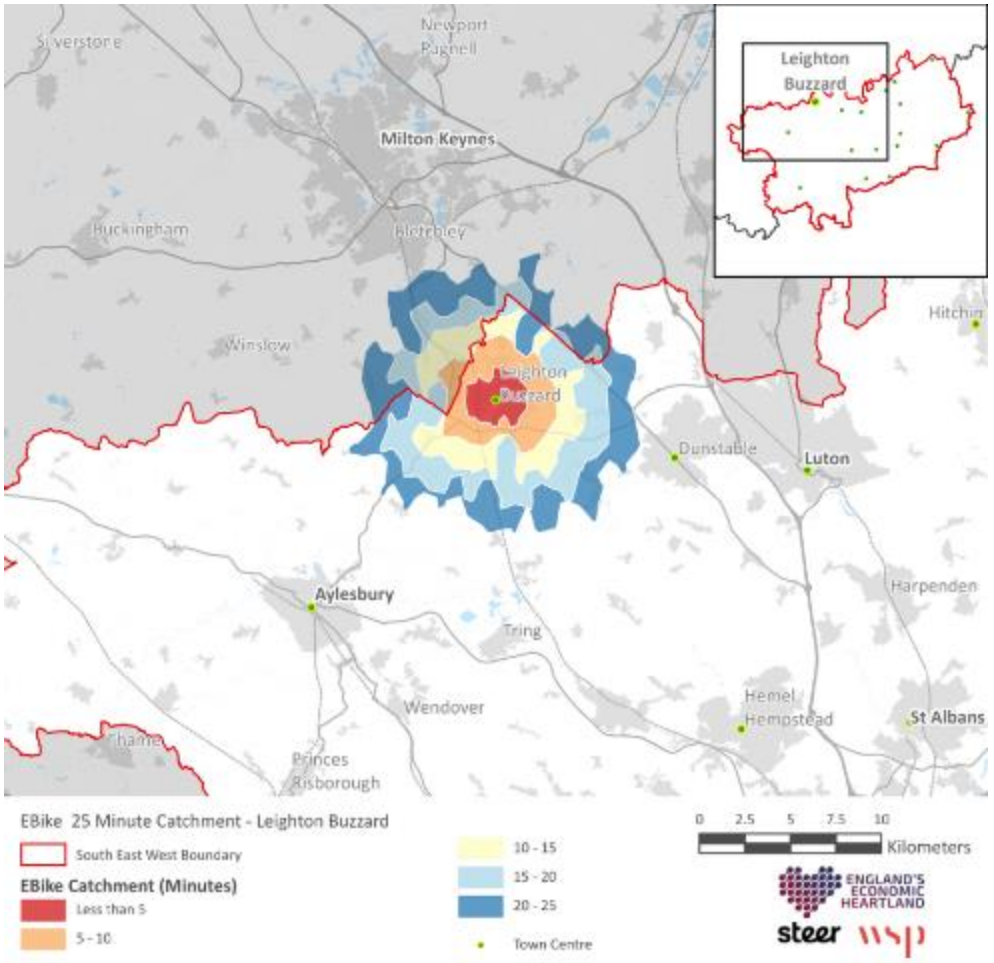
Hoddesdon

The plan opposite identifies the areas which lie within a 25-minute journey from Hoddesdon by electric bike.



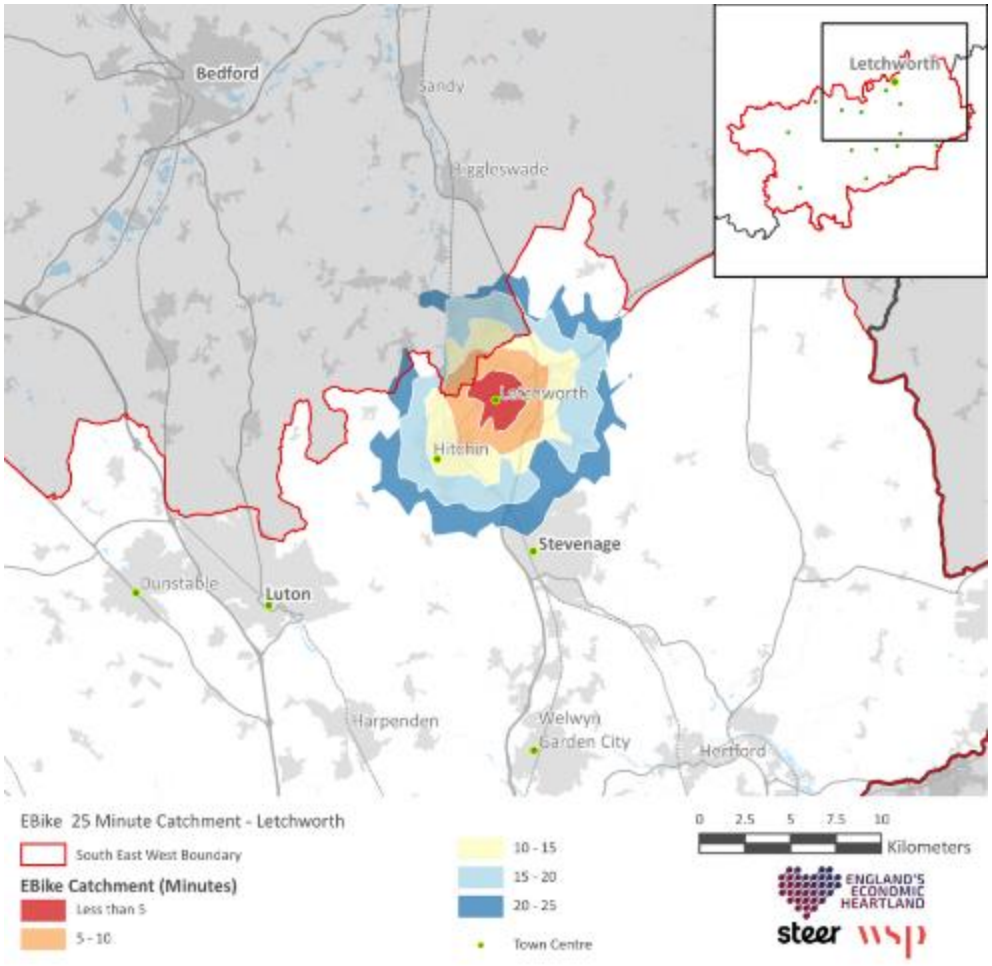
Leighton Buzzard

The plan opposite identifies the areas which lie within a 25-minute journey from Leighton Buzzard by electric bike.



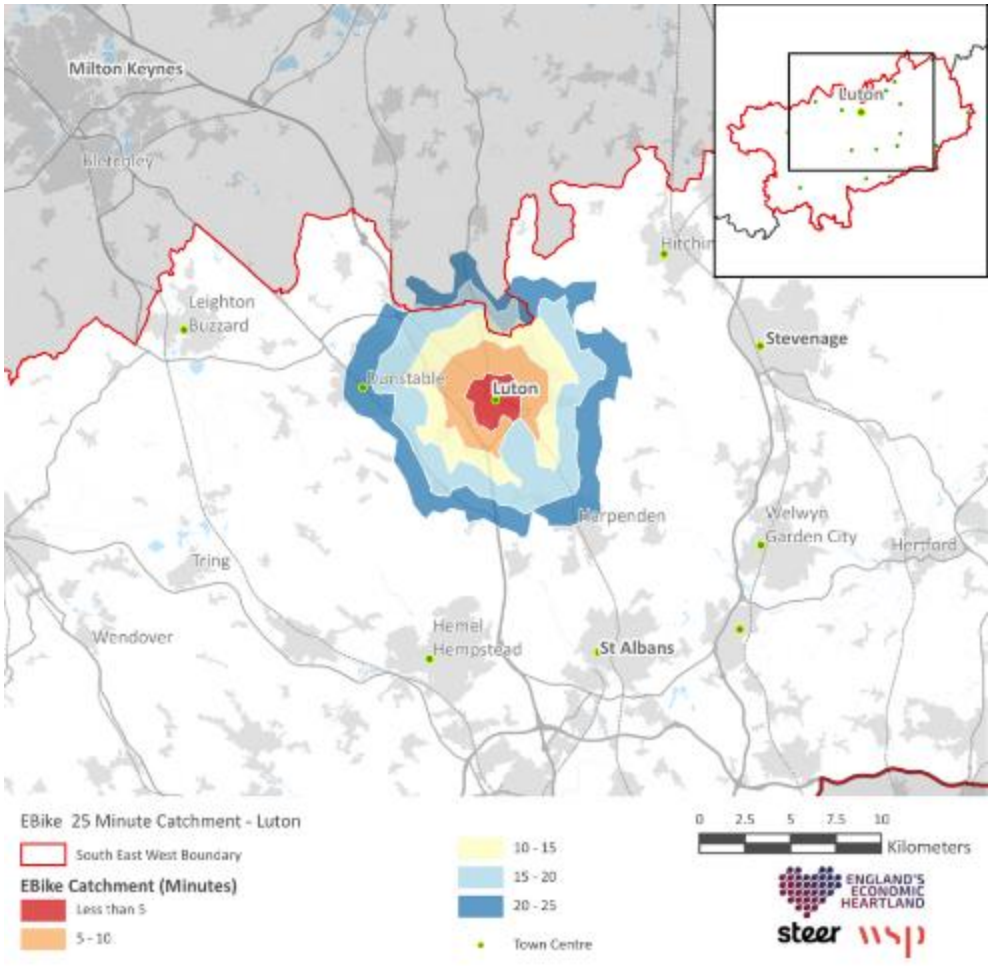
Letchworth

The plan opposite identifies the areas which lie within a 25-minute journey from Letchworth by electric bike.



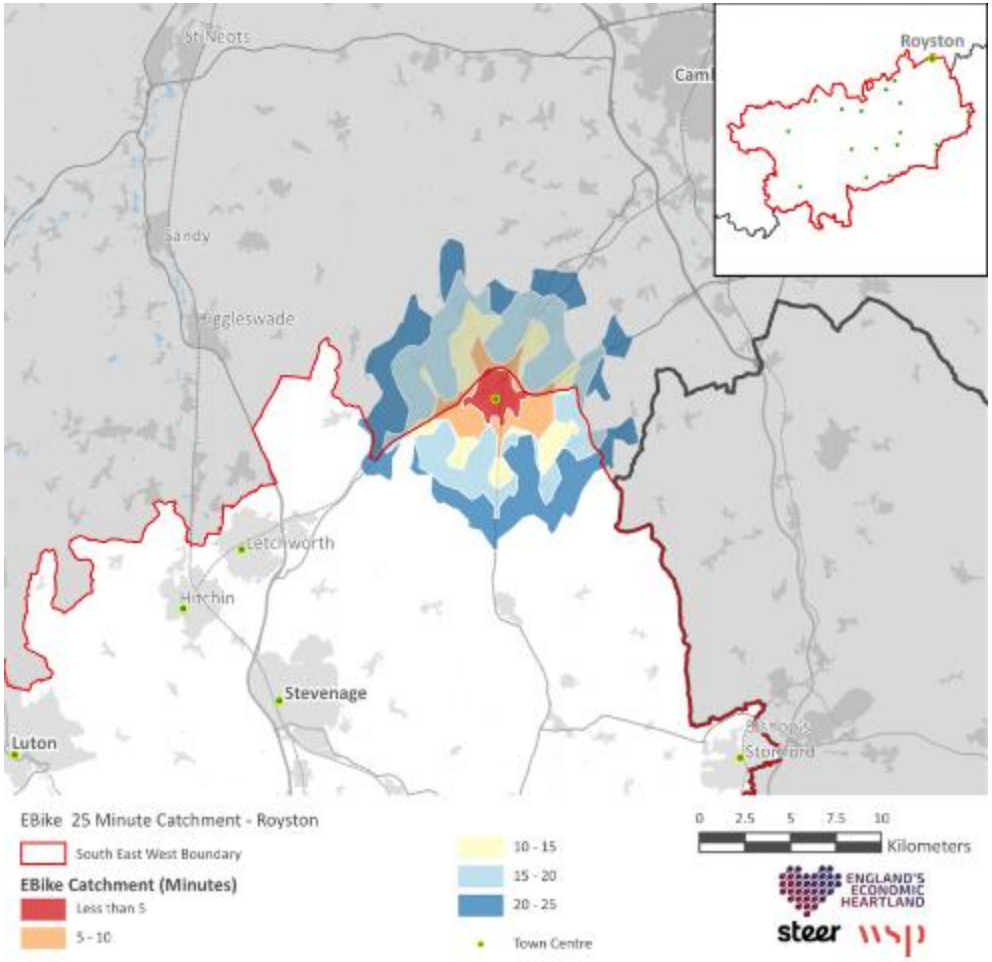
Luton

The plan opposite identifies the areas which lie within a 25-minute journey from Luton by electric bike.



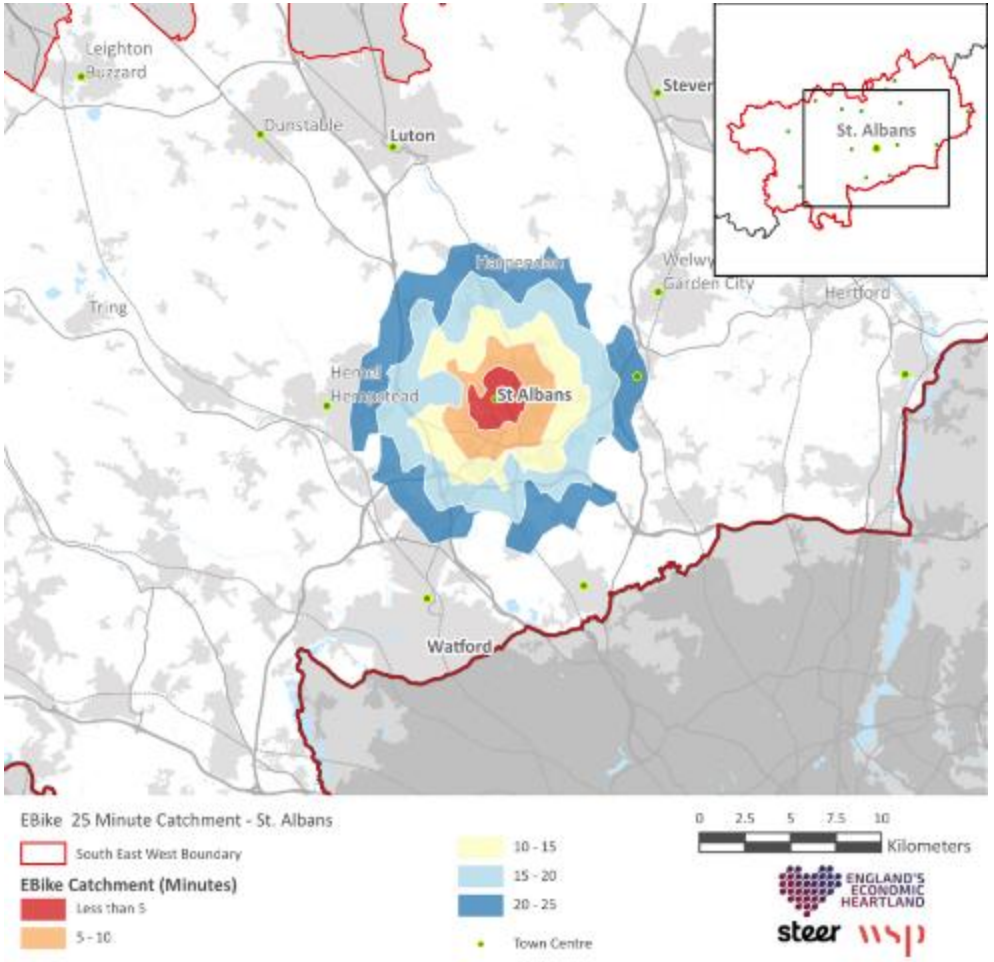
Royston

The plan opposite identifies the areas which lie within a 25-minute journey from Royston by electric bike.



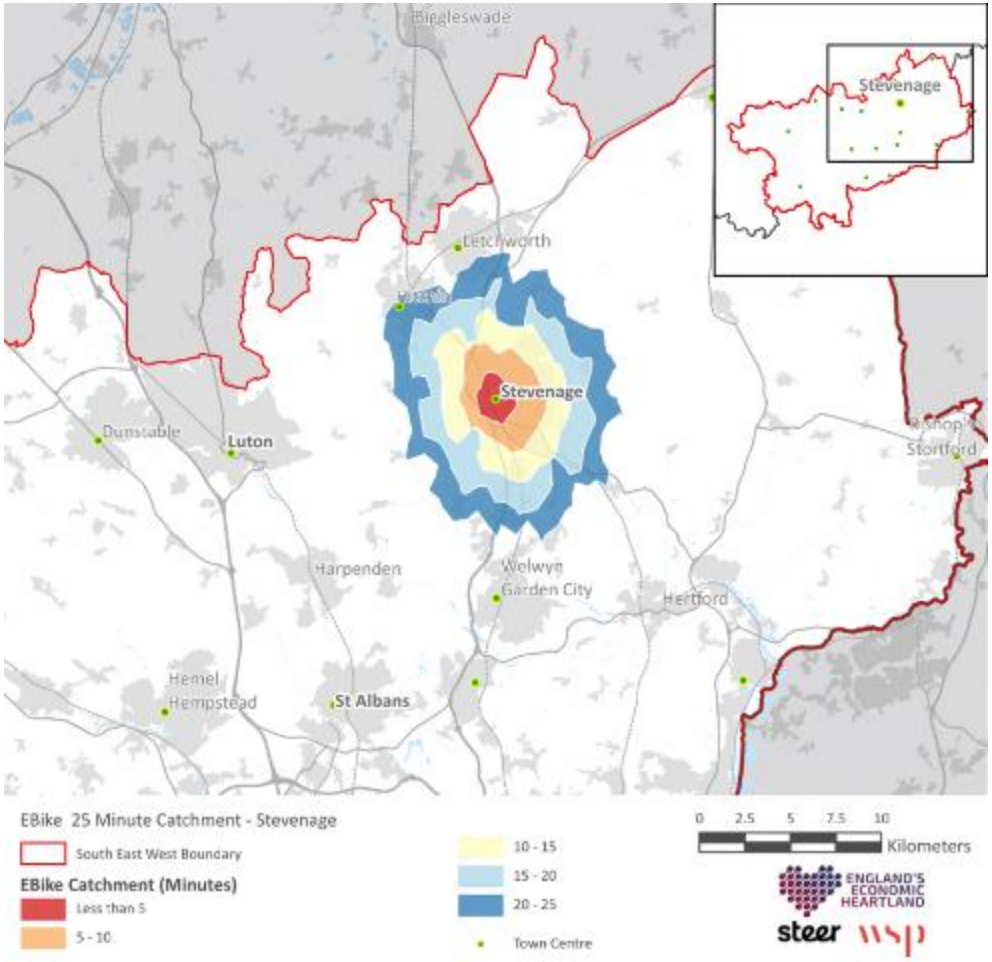
St. Albans

The plan opposite identifies the areas which lie within a 25-minute journey from St. Albans by electric bike.



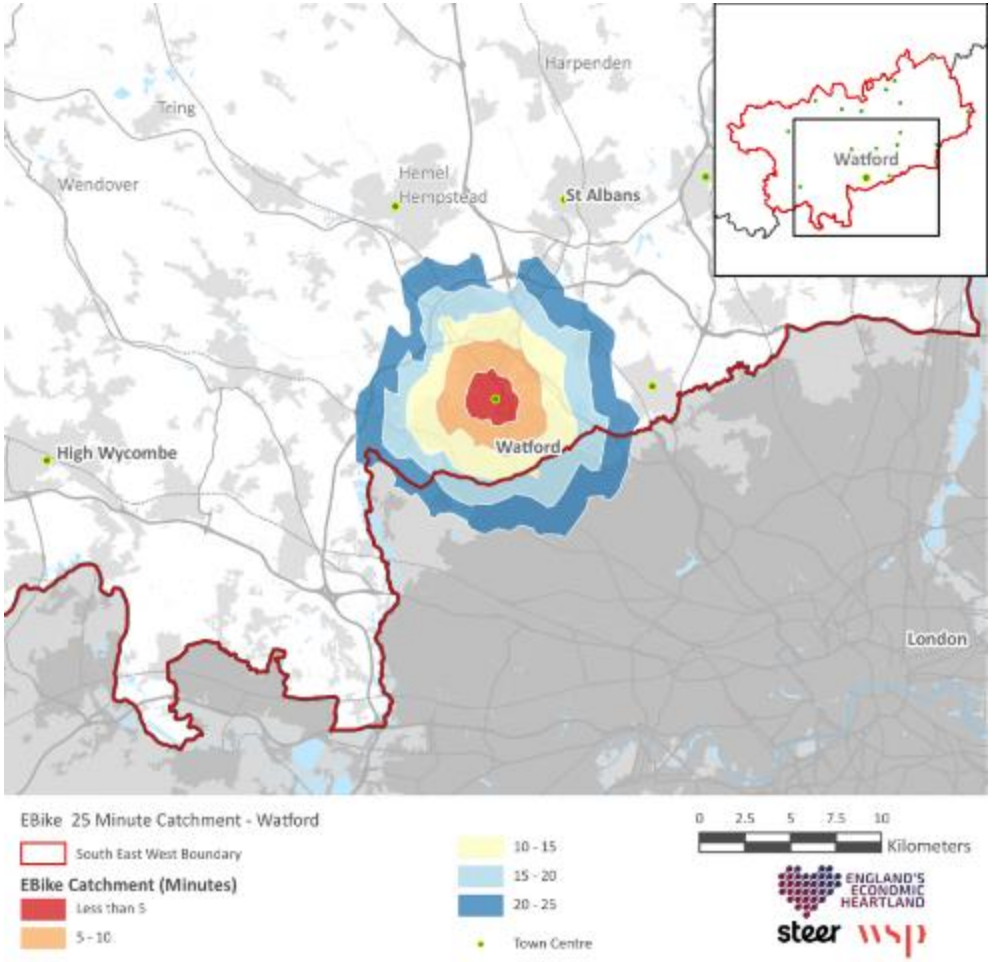
Stevenage

The plan opposite identifies the areas which lie within a 25-minute journey from Stevenage by electric bike.



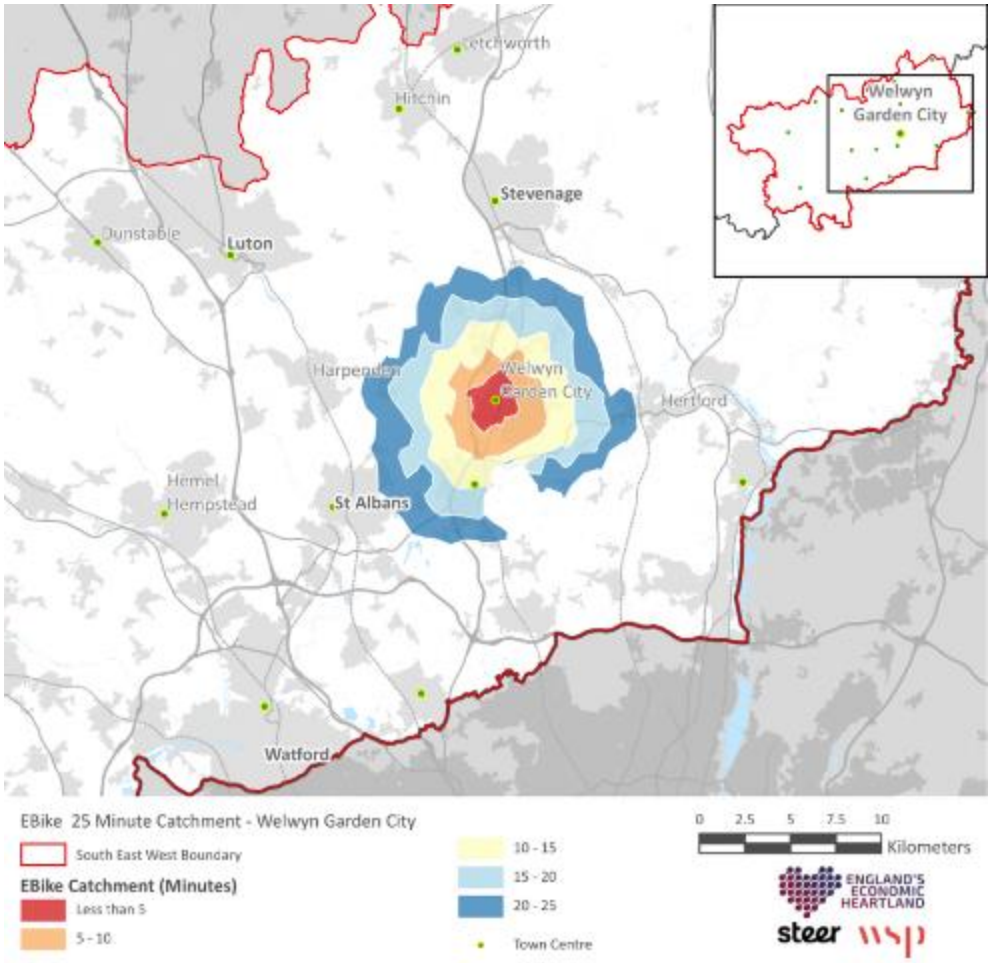
Watford

The plan opposite identifies the areas which lie within a 25-minute journey from Watford by electric bike.



Welwyn Garden City

The plan opposite identifies the areas which lie within a 25-minute journey from Welwyn Garden City by electric bike.



Appendix E – Travel Patterns and Behaviours

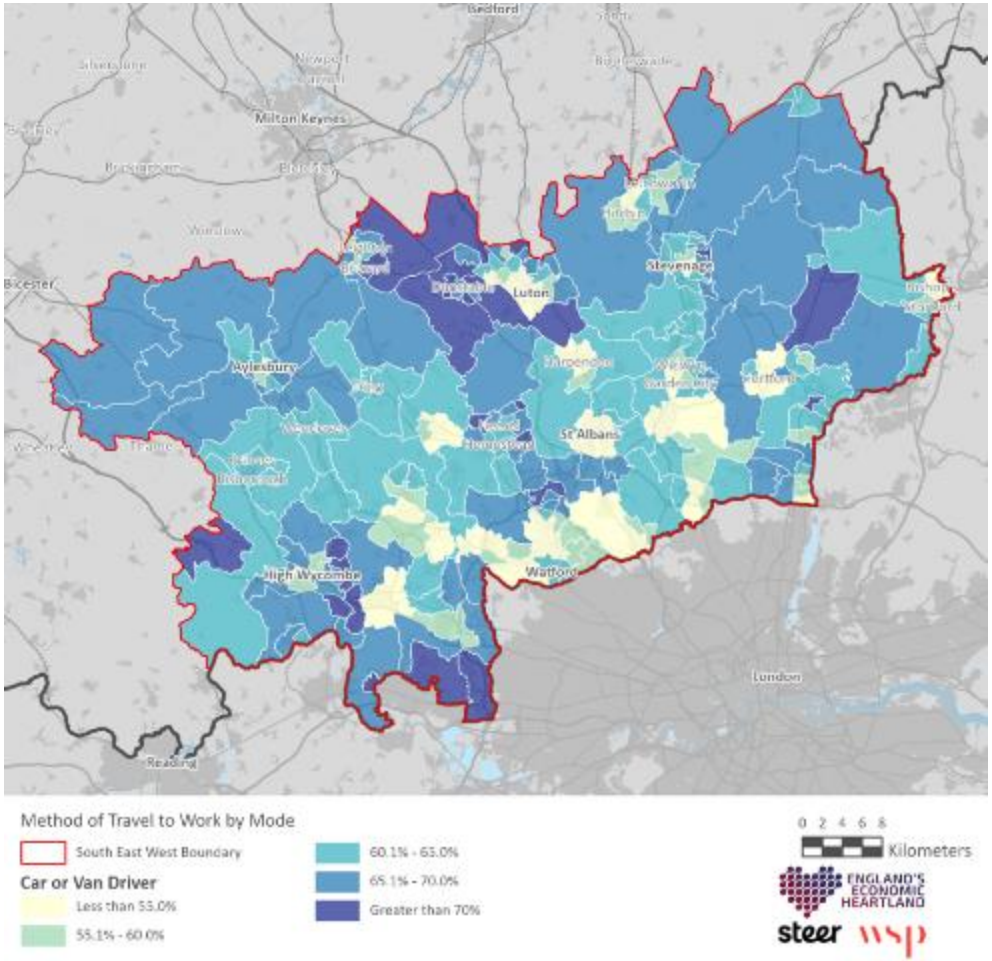
Car Driver

Most Commuting Trips within the South-East-West corridor study area were undertaken as a car driver. The 2011 Census* recorded 591,000 commuter trips by car. This represented 62% of all commuter trips within the study area.

The map opposite shows the journey to work car and van driver mode share in the study area. The map shows the highest journey to work car and van driver mode share to be in more rural areas. Notable areas of high car usage can be seen surrounding Dunstable as well as south Buckinghamshire. These areas see more than 70% car driver mode share.

Areas with lower car driver mode share can mostly be seen along the southern border of Hertfordshire for settlements such as Watford, Borehamwood and St. Albans. This is likely due to the close proximity to London and high quality rail connections being the dominant form of commuting for the area.

High quality public transport infrastructure has the potential to reduce the number of car and van driver trips in the study area, particularly between rural / suburban areas and town / city centre locations.



Source: 2011 Census

*Note: 2011 Census was used over the 2021 Census as mode share data was skewed by the impacts of the Covid-19 Pandemic.

Car Passenger

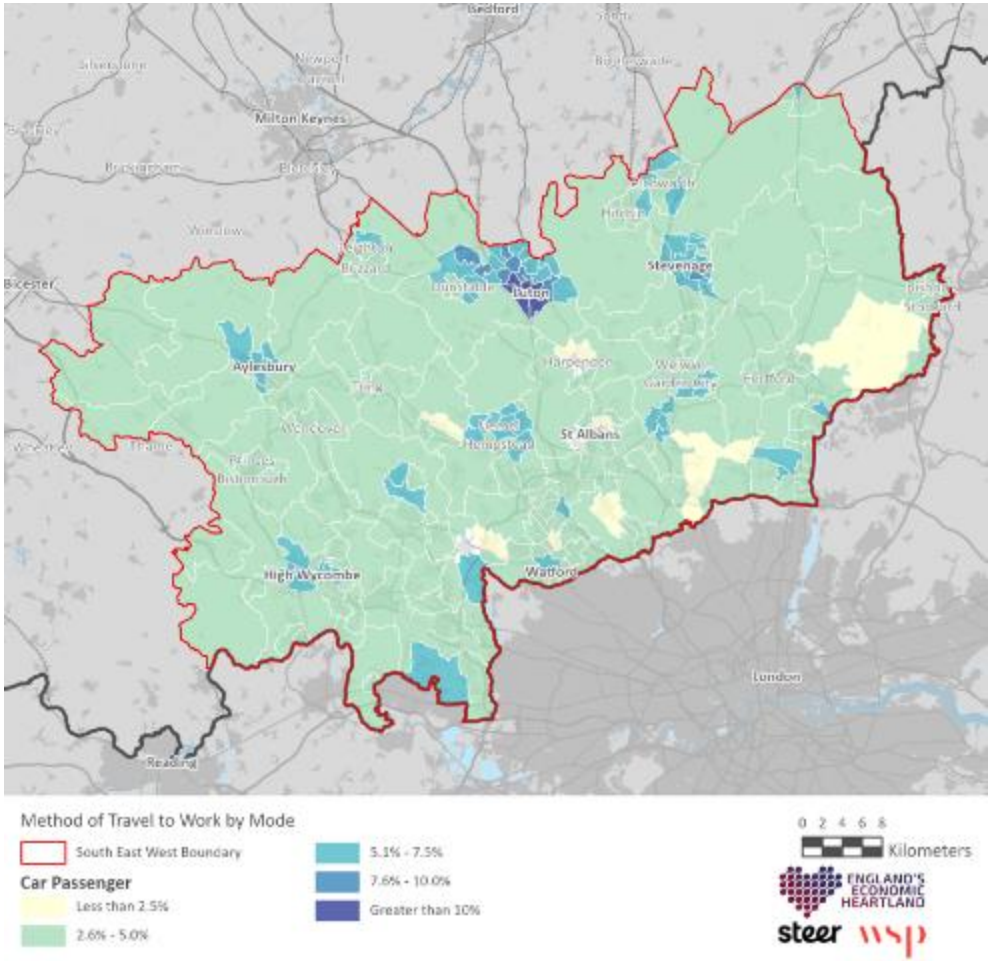
The 2011 Census* recorded 44,000 commuter trips as a car passenger within the Swindon – Didcot – Oxford study area. This represents 5% of all movements.

The car passenger journey to work mode share was highest in large and medium size urban areas. This included Luton, Stevenage, Hemel Hempstead and Aylesbury.

In rural areas the proportion of all journeys to work undertaken as a car passenger was low. This is likely to be associated with lower population densities and a lower likelihood of residents travelling in the same direction.

Car passenger trips account for a low proportion of all commuter trips in the study area. However, with high proportion of all journeys to work undertaken by car (either as a driver or passenger), there is an opportunity to increase the number of car trips that include a passenger.

Interventions to increase car sharing could include incentives (e.g., vouchers), services that make it easier for user to share their journey with another person (e.g., new apps) and priority parking for people car sharing.



Source: 2011 Census

*Note: 2011 Census was used over the 2021 Census as mode share data was skewed by the impacts of the Covid-19 Pandemic.

Bus, Minibus and Coach

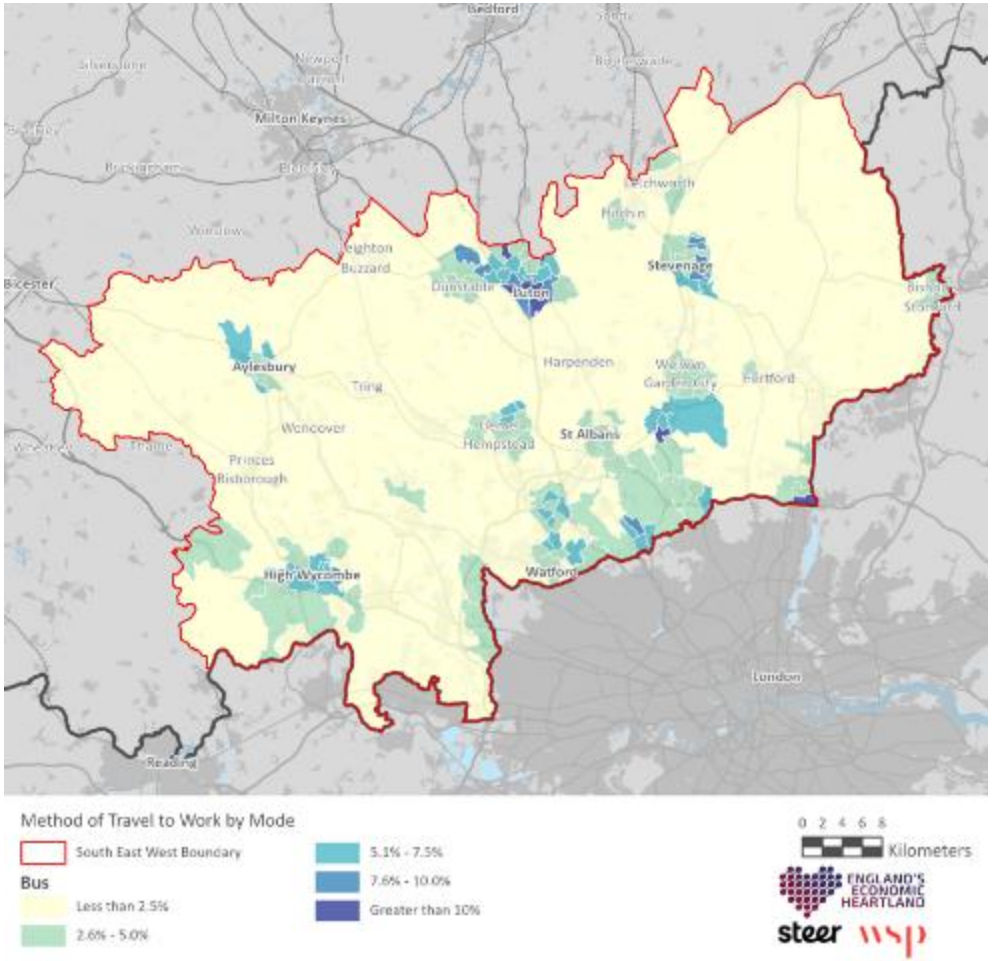
The 2011 Census* recorded 34,000 commuter movements by bus. This represented 4% of all commuter movements in the study area and 28% of all public transport commuter movements.

The largest mode share for bus usage can be seen in urban centres with Luton, Stevenage and Hatfield being the highest. The larger population density allows for more potential for bus travel other sparsely populated rural areas and smaller settlements.

Some Urban settlements within the study have very limited bus usage including St. Albans, Hertford and Harpenden all having mode shares for bus comparable to rural areas. Low levels of bus usage is likely caused by lack of bus priority In congestion hotspots along with lack of frequent services to key destinations making private car travel more appealing. Bus usage is much lower than Rail usage within the corridor, likely due to rail being a more effective option for commuting between towns as well as London.

Bus use currently represents the most utilised public transport option within the study area. Improvements to local bus services and infrastructure has the potential to reduce travel by car, improve air pollution and facilitate equitable growth within the study area.

*Note: 2011 Census was used over the 2021 Census as mode share data was skewed by the impacts of the Covid-19 Pandemic.



Source: 2011 Census

Train

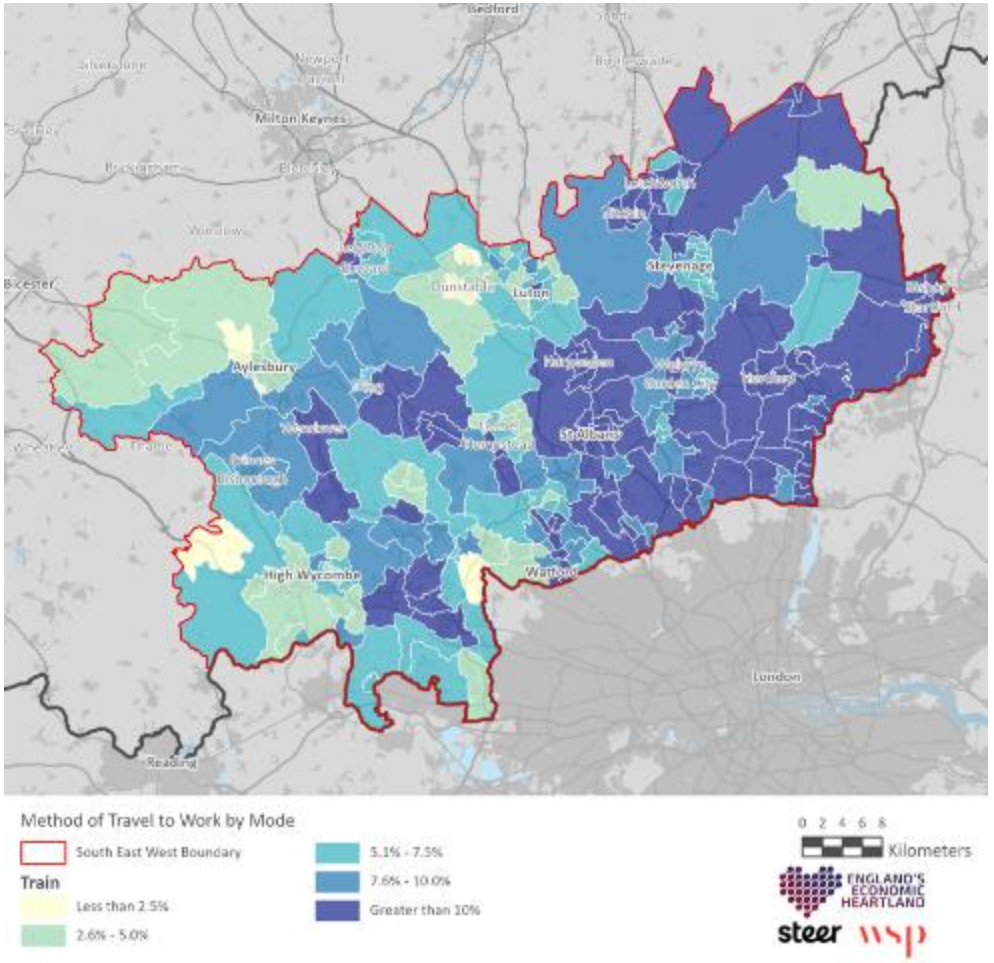
The 2011 Census* recorded 88,000 commuter trips by train within the South-East-West study area. This represented 9% of all commuter movements. Travel by train accounts for 72% of all public transport movements within the study area.

The rail journey to work mode share is highest in settlement with good rail connectivity such St. Albans (Representing more than 20%), Bishops Stortford, Borehamwood, Hitchin, Hoddesdon and Royston. The rail connectivity to key destinations (Notably to London) is likely the key driver of higher rail modal share. The Ares close to London highlight high levels of modal share with the East Coast Mainline, Midlands Mainline and West Coast mainline all highlighting goo rail usage.

Low rail use in the North and West of the study area is likely to be associated with poor inter-urban rail connectivity as well as lack of rural rail services. Rail services and/or connectivity to Aylesbury and high Wycombe, should be assessed to help reduce car dominated trips.

Interventions should explore opportunities to improve inter-urban rail connectivity within the study area, particularly between for the West and north of the study area. There is also a distinct lack of East-West rail connection, which could help replace existing car tips

*Note: 2011 Census was used over the 2021 Census as mode share data was skewed by the impacts of the Covid-19 Pandemic. The completion of the Thameslink programme in 2018-2020 (as well as the Elizabeth line in London in 2022) is likely to make rail usage in the corridor more appealing.



Source: 2011 Census

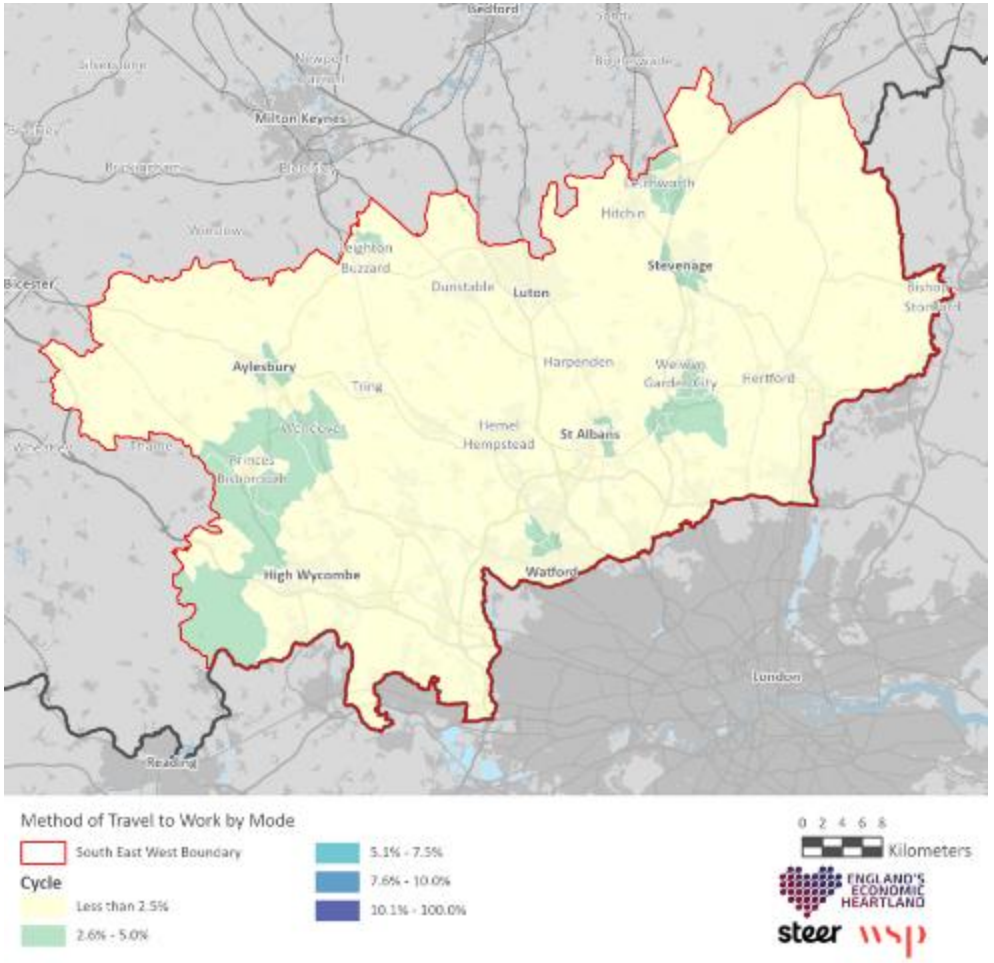
Cycling

The 2011 Census* recorded 15,000 cycling commuter movements within the South-East-West study area. This represented 2% of all active travel commuter trips.

Cycling Modal share is relatively limited throughout the study area, with only a few settlements highlighting at least 3% cycle mode share including Hatfield, Welwyn Garden City, Stevenage and Leighton Buzzard

The cycling to work mode share is generally low in Rural areas as well as numerous settlements throughout the study area such as Hemel Hempstead, Luton, Borehamwood and Bishops Stortford.

Emphasis on increasing active travel infrastructure can help to promote cycling as a viable alternative to private car travel. Segregated cycle lanes and junction improvements at LTN 1/20 levels of quality can help to increase cycling modal share by allowing unconfident cyclists to safely cycle without the threat of car collisions.



Source: 2011 Census

*Note: 2011 Census was used over the 2021 Census as mode share data was skewed by the impacts of the Covid-19 Pandemic.

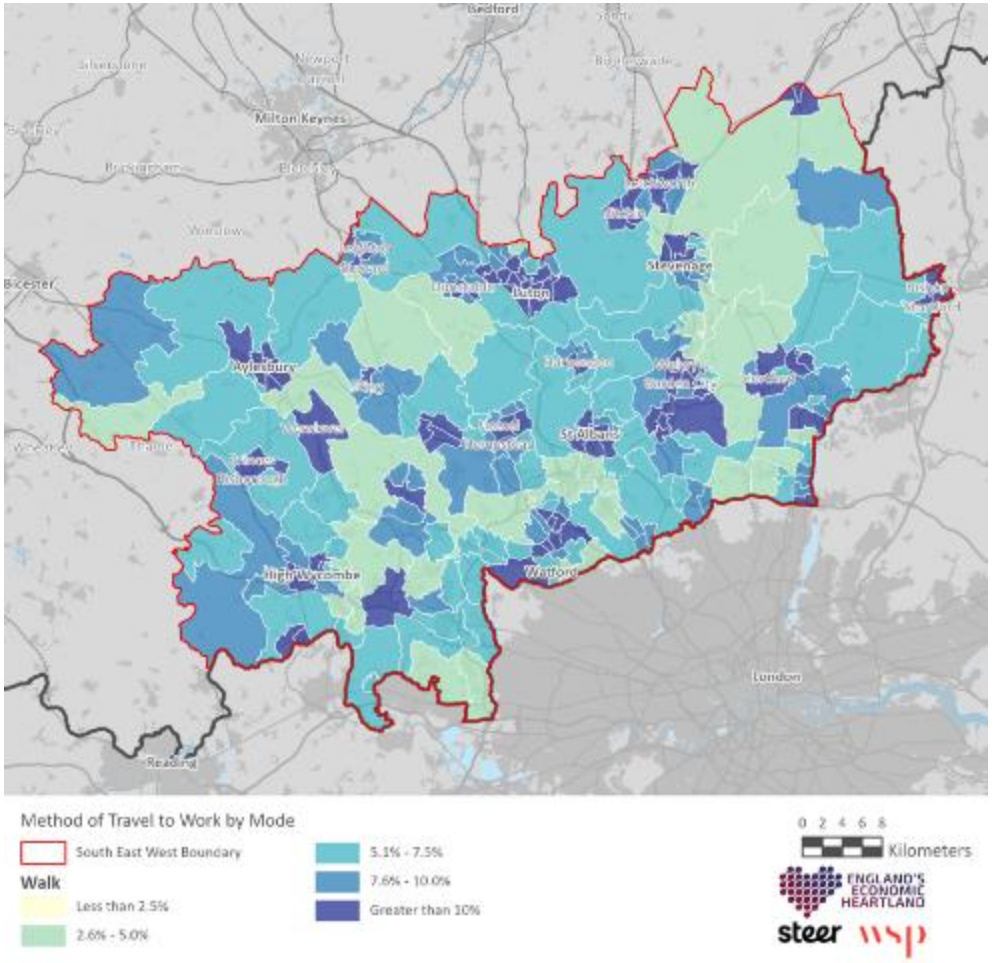
Walking

The 2011 Census* recorded 92,000 commuting movements on foot within the Swindon – Didcot – Oxford study area. This represented 5% of all movements within the study area.

Pedestrian movements within the study area make up 86% of all journeys by active travel. The highest journey to work walking mode share was within urban areas. Pedestrian modal share is generally highest in Urban settlements throughout the study area. Hatfield and Aylesbury have been identified as having the highest amount of walking modal share.

The evidence shows that commuter trips on foot are less common in rural areas. In rural areas the lower journey to work walking mode share is likely to be attributable to longer commuting distances. East of Stevenage and the Hertfordshire/Buckinghamshire border have been identified as notable areas lacking pedestrian mode share.

The accessibility of everyday services and facilities is a key factor influencing mode choice. In rural areas were travel on foot is not a realistic option, interventions should focus on improving accessibility of these services and facilities by non-car modes of transport.



Source: 2011 Census

*Note: 2011 Census was used over the 2021 Census as mode share data was skewed by the impacts of the Covid-19 Pandemic.

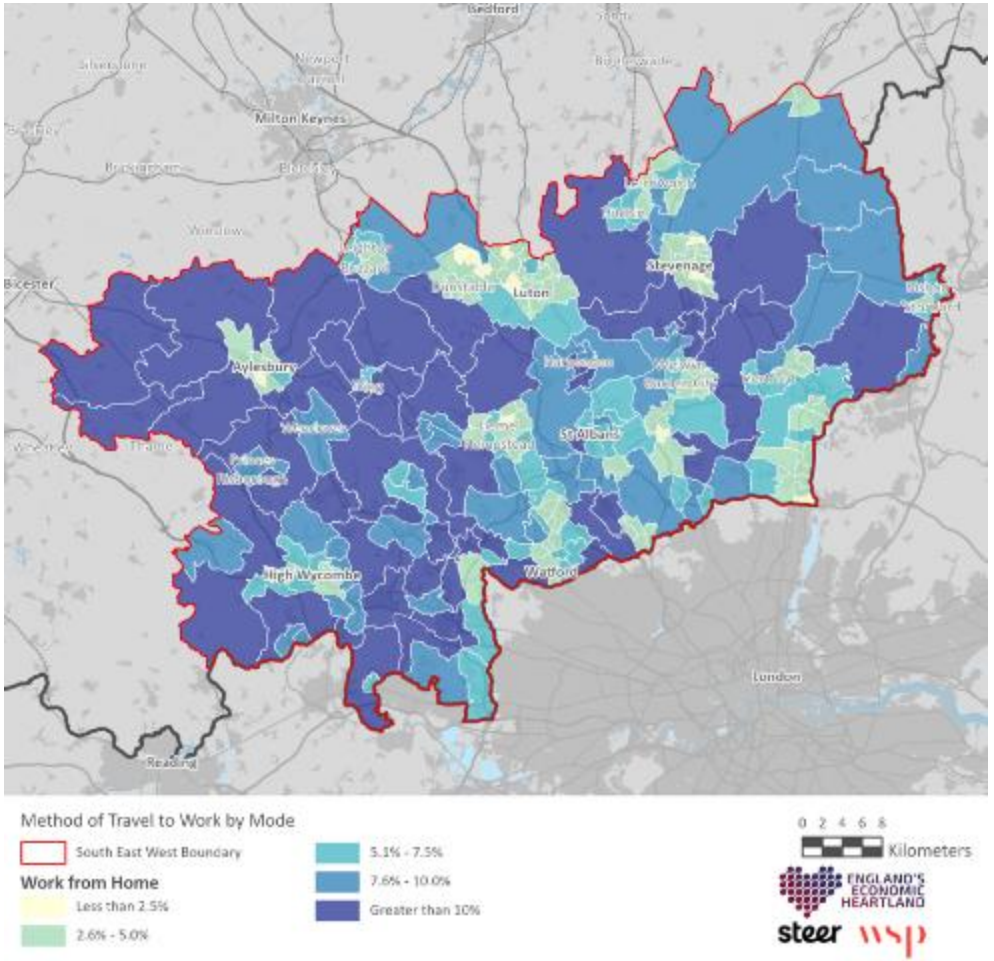
Work from Home

One of the most significant changes to transport patterns as a result of Covid-19 is the increase in working from home (WfH). It is difficult to predict the longer-term impacts on travel patterns, however it is likely that hybrid working will remain a common workplace arrangement.

The pre Covid-19 patterns of WFH behaviours show that 61,000 people worked from home. This represented 6% of all commuter journeys within the South-East-West study area.

There is a significant difference in levels of working from home between rural and urban areas, with a higher proportion of residents in rural areas working from home.

Covid-19 is likely to have resulted in a much larger proportion of residents working from home. If agile working remains a long-term workplace pattern, it has the potential to be a key component in reducing the number of car trips undertaken in the study area, which could help ease congestion and reduce transport's carbon emissions.



Source: 2011 Census

Appendix F – Mode of Travel Origin – Destination Matrices

Key:

Key:
The darker colours in the matrix represent the highest flows.

- Red highlights the highest flows between the Settlements of Strategic Importance
- Green highlights the highest flows between the Settlements of Strategic Importance and the rural areas (the rest of the study area).
- Grey highlights the highest flows between the Settlements of Strategic Importance and London.
- Orange highlights the highest flows between the Settlements of Strategic Importance and the study area, EEH region and EEH region excluding the study area.
- Pink highlights the highest flows between the Settlements of Strategic Importance and England & Wales excluding EEH and London

Car / Van Driver

Major Urban Settlements	Aylesbury	Bishop's Stortford	Hatfield	Hemel Hempstead	High Wycombe	Hoddesdon	Leighton Buzzard	Luton	St Albans	Stevenage	Watford	Welwyn Garden City	Rural Area	London	Corridor total	EEH	EEH Excluding Corridor	England and Wales
Aylesbury	7481	3	40	350	924	7	148	168	49	18	211	41	5619	933	15059	18182	3123	922
Bishops Stortford	2	2612	90	20	7	227	1	53	39	128	26	149	1675	1176	5029	5615	586	4355
Hatfield	6	8	1602	153	8	46	10	86	618	254	141	952	1380	1066	5264	5580	316	351
Hemel Hempstead	189	6	415	8799	102	40	87	583	1199	169	1961	329	5813	2545	19692	20696	1004	905
High Wycombe	400	1	21	86	8074	6	4	47	23	17	103	27	7072	2720	15881	16981	1100	3523
Hoddesdon	4	104	136	50	3	2027	0	21	80	157	43	316	3205	2212	6146	6347	201	1517
Leighton Buzzard	500	1	52	500	53	9	2746	860	107	49	157	49	1534	417	6617	10506	3889	339
Luton	114	4	793	1372	61	131	399	23263	986	850	586	437	4173	2773	33169	41204	8035	1354
St Albans	30	16	1087	765	47	67	18	638	4975	379	790	1052	3467	2200	13331	14547	1216	820
Stevenage	8	58	951	170	18	247	17	446	404	9641	195	1665	3418	1619	17238	20631	3393	1075
Watford	79	7	405	1051	111	26	21	380	822	230	9120	320	6417	7710	18989	20283	1294	1323

Welwyn Garden City	8	23	1479	180	9	147	5	151	643	607	169	3762	2289	1318	9472	10099	627	533
Rural Area	5658	1048	3761	5322	8384	3055	1039	5238	5716	4393	7305	5720						
London	300	228	1668	1476	1272	936	70	1556	1497	908	5165	1460						
Corridor total	14479	3891	10832	18818	17801	6035	4495	31934	15661	16892	20807	14819						
EEH	18248	4226	12599	20828	19674	6530	6560	44991	17338	23907	22437	17541						
EEH Excluding Corridor	3769	335	1767	2010	1873	495	2065	13057	1677	7015	1630	2722						
England and Wales	682	3835	1346	1718	3432	2199	220	4967	878	1537	2281	1444						

Key:
The darker colours in the matrix represent the highest flows.

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- Orange highlights the highest flows between the Settlements of Strategic Importance and the study area, EEH region and EEH region excluding the study area.
- Pink highlights the highest flows between the Settlements of Strategic Importance and England & Wales excluding EEH and London

Car / Van Passenger

Major Urban Settlements	Aylesbury	Bishop's Stortford	Hatfield	Hemel Hempstead	High Wycombe	Hoddesdon	Leighton Buzzard	Luton	St Albans	Stevenage	Watford	Welwyn Garden City	Rural Area	London	Corridor total	EEH	EEH Excluding Corridor	England and Wales
Aylesbury	951	0	0	18	54	0	11	3	5	1	6	2	466	46	1517	1721	204	33
Bishops Stortford	0	313	1	1	0	6	0	2	1	4	1	5	78	51	412	429	17	242
Hatfield	0	0	228	4	1	2	0	2	96	14	11	133	136	65	627	645	18	50
Hemel Hempstead	5	0	13	1234	5	1	6	15	70	3	91	13	416	112	1872	1912	40	28
High Wycombe	23	0	1	2	1121	0	0	1	2	1	2	0	584	105	1737	1794	57	172
Hoddesdon	0	4	3	1	0	191	0	1	4	7	1	9	262	123	483	488	5	109
Leighton Buzzard	18	0	0	26	4	0	326	57	3	1	8	1	83	14	527	745	218	15
Luton	18	0	240	361	3	38	58	3627	81	138	41	47	574	229	5226	6395	1169	177
St Albans	0	1	48	23	0	3	0	25	549	14	28	38	182	76	911	953	42	10
Stevenage	1	2	72	6	2	2	0	23	17	1442	9	122	251	76	1949	2145	196	78
Watford	2	0	20	58	0	0	0	14	43	6	990	12	453	317	1598	1648	50	38
Welwyn Garden City	0	0	140	2	0	2	0	7	32	42	8	531	142	63	906	929	23	24
Rural Area	346	84	190	306	577	186	77	292	381	241	516	312						
London	15	22	79	61	51	54	6	67	49	31	237	78						
Corridor total	1364	404	956	2042	1767	431	478	4069	1284	1914	1712	1225						
EEH	1537	421	1029	2115	1819	446	605	4860	1361	2317	1782	1337						
EEH Excluding Corridor	173	17	73	73	52	15	127	791	77	403	70	112						
England and Wales	29	281	58	66	138	142	10	560	61	83	122	39						

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Bus, Minibus and Coach

Major Urban Settlements	Aylesbury	Bishop's Stortford	Hatfield	Hemel Hempstead	High Wycombe	Hoddesdon	Leighton Buzzard	Luton	St Albans	Stevenage	Watford	Welwyn Garden City	Rural Area	London	Corridor total	EEH	EEH Excluding Corridor	England and Wales
Aylesbury	890	0	0	11	63	0	8	9	0	0	1	0	342	28	1324	1487	163	18
Bishops Stortford	0	90	2	1	0	2	0	1	1	4	1	1	44	48	147	151	4	328
Hatfield	0	1	182	17	2	9	0	5	210	32	16	171	186	165	831	851	20	38
Hemel Hempstead	9	0	28	815	3	1	1	16	113	5	198	7	200	253	1396	1418	22	20
High Wycombe	45	0	0	3	1303	1	0	0	1	0	1	0	674	106	2028	2073	45	150
Hoddesdon	0	5	1	0	0	79	0	0	1	1	0	4	186	69	277	280	3	28
Leighton Buzzard	31	0	0	0	0	0	65	53	0	0	0	0	15	34	164	258	94	5
Luton	7	0	59	120	2	1	53	4171	45	85	39	20	379	260	4981	5751	770	136
St Albans	0	1	137	51	0	0	0	8	419	18	45	57	181	65	917	941	24	15
Stevenage	0	0	50	6	0	1	0	20	26	1848	8	74	115	60	2148	2288	140	45
Watford	0	0	32	93	2	0	0	17	85	17	1239	9	547	370	2041	2117	76	45
Welwyn Garden City	0	0	174	7	0	5	0	7	60	38	7	313	82	26	693	703	10	11
Rural Area	303	47	124	198	557	106	29	282	380	160	540	178						
London	22	13	183	120	70	67	4	197	100	72	809	168						
Corridor total	1285	144	789	1322	1932	205	156	4589	1341	2208	2095	834						
EEH	1418	148	843	1347	1969	206	223	5223	1404	2405	2181	849						
EEH Excluding Corridor	133	4	54	25	37	1	67	634	63	197	86	15						
England and Wales	32	143	64	46	127	36	4	552	42	70	242	56						

Key:
The darker colours in the matrix represent the highest flows.

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- Grey highlights the highest flows between the Settlements of Strategic Importance and London.
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- Pink highlights the highest flows between the Settlements of Strategic Importance and England & Wales excluding EEH and London

Train

Major Urban Settlements	Aylesbury	Bishop's Stortford	Hatfield	Hemel Hempstead	High Wycombe	Hoddesdon	Leighton Buzzard	Luton	St Albans	Stevenage	Watford	Welwyn Garden City	Rural Area	London	Corridor total	EEH	EEH Excluding Corridor	England and Wales
Aylesbury	39	0	0	3	44	0	0	2	0	0	5	0	121	870	214	249	35	31
Bishops Stortford	0	50	2	0	0	5	0	8	2	4	1	5	48	2457	125	221	96	405
Hatfield	0	0	33	3	0	2	1	1	10	43	7	90	55	817	245	278	33	22
Hemel Hempstead	3	0	3	79	1	0	2	6	9	3	112	4	83	1903	305	355	50	44
High Wycombe	25	0	0	0	51	0	0	0	1	0	1	1	122	1471	201	233	32	80
Hoddesdon	0	10	1	3	0	37	0	1	0	1	1	4	112	1792	170	182	12	33
Leighton Buzzard	3	0	5	18	1	0	34	14	4	2	70	2	39	1207	192	403	211	43
Luton	2	0	22	18	1	2	7	593	228	14	15	16	209	3231	1127	1414	287	109
St Albans	1	1	14	13	1	1	0	106	147	11	84	13	108	6759	500	578	78	114
Stevenage	1	1	40	3	1	1	0	4	8	122	6	87	116	2041	390	587	197	72
Watford	1	0	15	37	4	4	0	6	50	13	418	10	223	4579	781	876	95	134
Welwyn Garden City	0	0	23	7	0	1	0	2	5	46	3	67	59	1836	213	250	37	36
Rural Area	102	57	74	71	147	108	13	117	199	187	228	168						
London	72	53	439	160	199	168	10	483	332	307	1331	624						
Corridor total	177	119	232	255	251	161	57	860	663	446	951	467						
EEH	213	154	339	307	313	173	97	1359	796	1145	1137	730						
EEH Excluding Corridor	36	35	107	52	62	12	40	499	133	699	186	263						
England and Wales	23	202	89	119	52	64	9	291	76	77	247	94						

Key:
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Cycling

Major Urban Settlements	Aylesbury	Bishop's Stortford	Hatfield	Hemel Hempstead	High Wycombe	Hoddesdon	Leighton Buzzard	Luton	St Albans	Stevenage	Watford	Welwyn Garden City	Rural Area	London	Corridor total	EEH	EEH Excluding Corridor	England and Wales
Aylesbury	632	0	0	6	5	0	3	0	0	1	0	0	112	9	759	792	33	19
Bishops Stortford	0	146	0	0	0	2	0	0	0	0	1	1	29	6	179	180	1	41
Hatfield	0	0	258	2	0	0	0	4	50	1	2	58	68	18	443	449	6	16
Hemel Hempstead	1	0	3	313	1	0	0	2	8	1	18	0	99	24	446	454	8	10
High Wycombe	0	0	0	0	274	0	0	0	0	0	0	0	97	13	371	379	8	15
Hoddesdon	0	0	0	0	0	132	0	0	0	0	0	0	83	22	215	217	2	20
Leighton Buzzard	6	0	0	4	2	0	283	11	0	1	0	0	20	2	327	355	28	5
Luton	1	0	3	8	0	0	3	921	3	5	3	2	55	11	1004	1120	116	16
St Albans	0	0	65	8	0	0	0	8	490	5	18	13	94	34	701	712	11	9
Stevenage	0	0	8	2	0	2	0	5	3	830	2	12	52	18	916	943	27	38
Watford	0	0	5	15	1	0	0	3	17	4	766	1	231	121	1043	1060	17	24
Welwyn Garden City	0	0	98	3	0	1	0	0	12	5	3	479	50	11	651	654	3	9
Rural Area	131	11	69	61	90	57	25	66	100	82	184	81						
London	1	4	12	12	6	11	1	10	10	13	37	9						
Corridor total	771	157	509	422	373	194	314	1020	683	935	997	647						
EEH	795	163	518	429	379	195	342	1192	696	1033	1012	652						
EEH Excluding Corridor	24	6	9	7	6	1	28	172	13	98	15	5						
England and Wales	10	32	33	20	37	29	1	90	20	33	38	16						

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Walking

Major Urban Settlements	Aylesbury	Bishop's Stortford	Hatfield	Hemel Hempstead	High Wycombe	Hoddesdon	Leighton Buzzard	Luton	St Albans	Stevenage	Watford	Welwyn Garden City	Rural Area	London	Corridor total	EEH	EEH Excluding Corridor	England and Wales
Aylesbury	4354	0	2	4	17	0	2	3	0	0	2	1	283	43	4668	4791	123	70
Bishops Stortford	0	1779	1	0	0	6	0	0	0	2	2	4	79	40	1873	1877	4	91
Hatfield	1	1	1862	4	2	1	0	4	22	7	9	62	123	66	2098	2121	23	103
Hemel Hempstead	1	0	3	3634	1	0	2	4	22	4	21	1	255	29	3948	3975	27	66
High Wycombe	13	0	0	9	3860	0	0	4	1	0	3	3	306	59	4199	4232	33	106
Hoddesdon	0	9	0	0	0	862	0	1	1	5	2	3	185	31	1068	1072	4	42
Leighton Buzzard	7	0	3	19	2	0	1749	37	1	1	3	1	57	13	1880	1964	84	14
Luton	5	0	14	26	6	4	20	10289	23	21	12	7	137	106	10564	10889	325	151
St Albans	0	1	6	13	0	0	0	4	3149	6	18	5	153	49	3355	3386	31	56
Stevenage	0	2	5	5	0	0	1	9	15	3324	27	14	106	30	3508	3561	53	90
Watford	1	0	18	21	1	1	1	10	34	38	5876	12	498	151	6511	6559	48	79
Welwyn Garden City	0	2	62	3	0	1	0	1	11	12	10	2158	83	21	2343	2352	9	32
Rural Area	225	60	207	169	259	127	39	99	207	72	435	126						
London	13	5	21	36	25	15	2	48	29	31	69	32						
Corridor total	4607	1854	2183	3907	4148	1002	1814	10465	3486	3492	6420	2397						
EEH	4746	1861	2221	3927	4187	1008	1915	10984	3526	3592	6457	2428						
EEH Excluding Corridor	139	7	38	20	39	6	101	519	40	100	37	31						
England and Wales	62	67	87	69	117	31	14	409	61	79	161	48						

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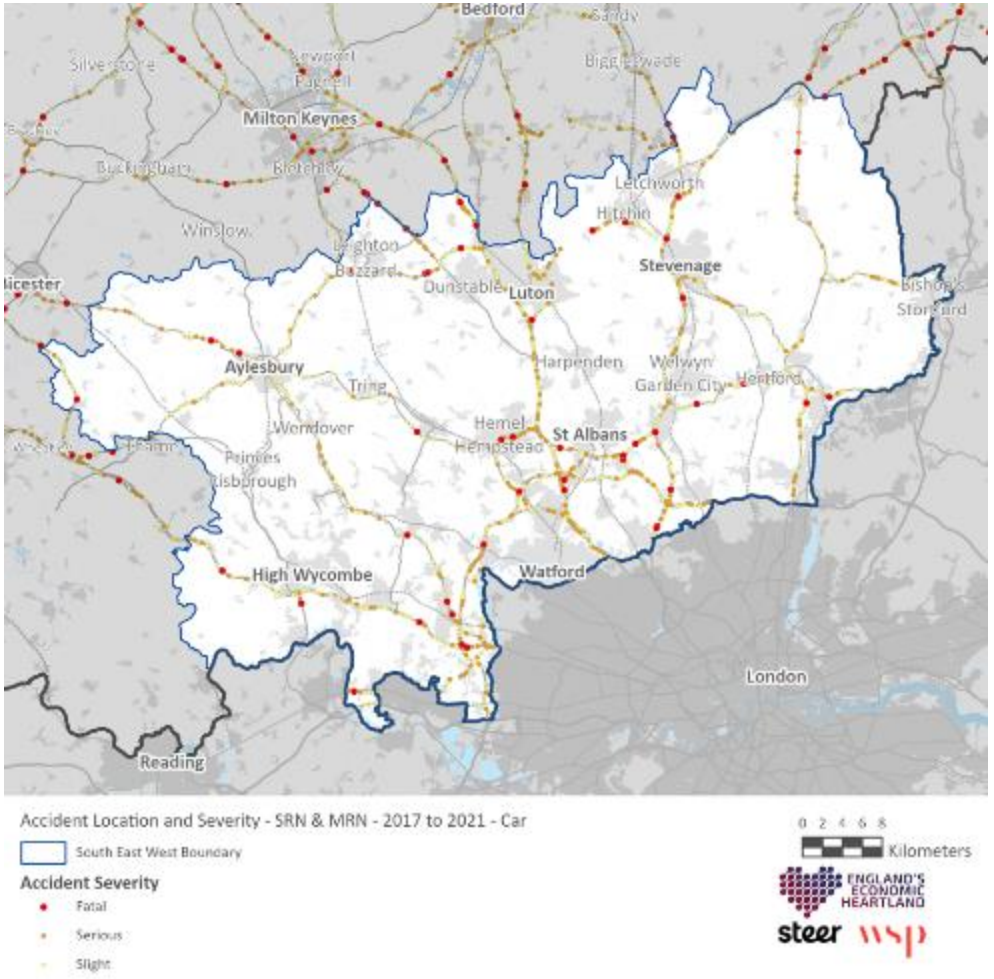
- Pink highlights the highest flows between the Settlements of Strategic Importance and England & Wales excluding EEH and London

Appendix H – Accident Data by Mode

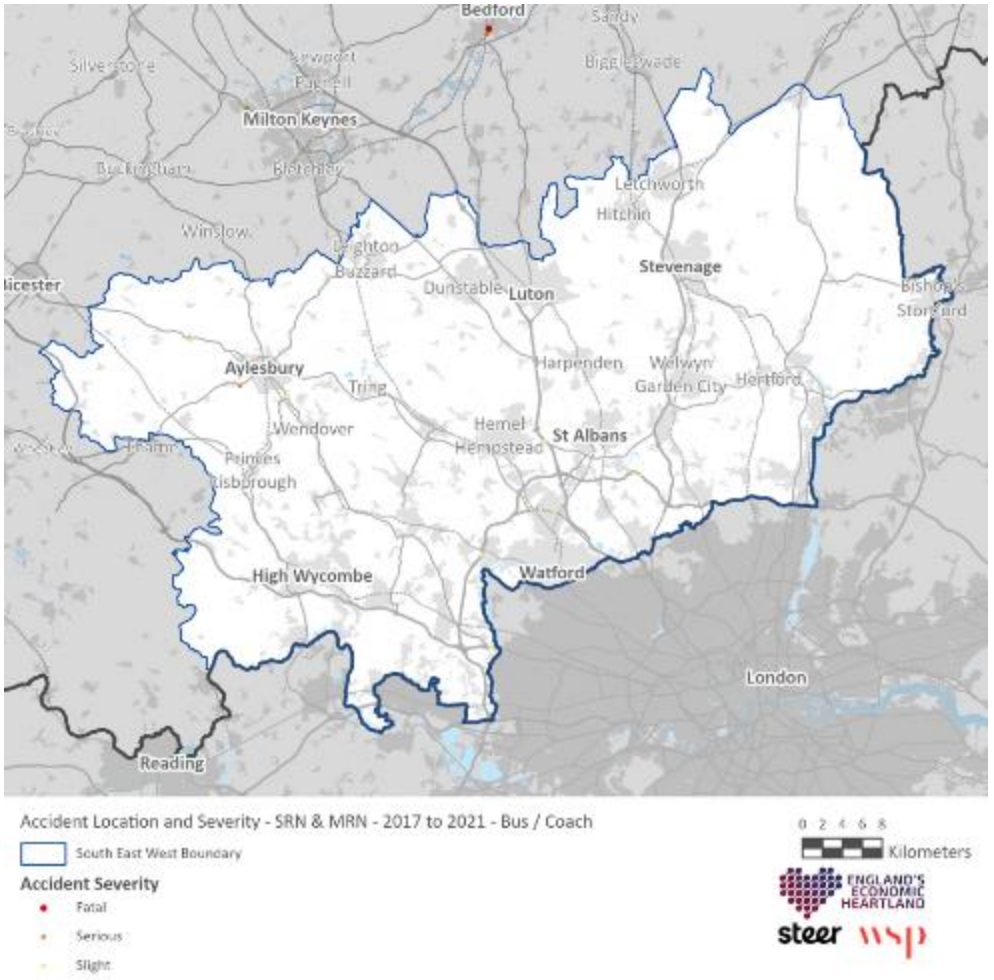
Car

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for private cars.



Bus/ Coach

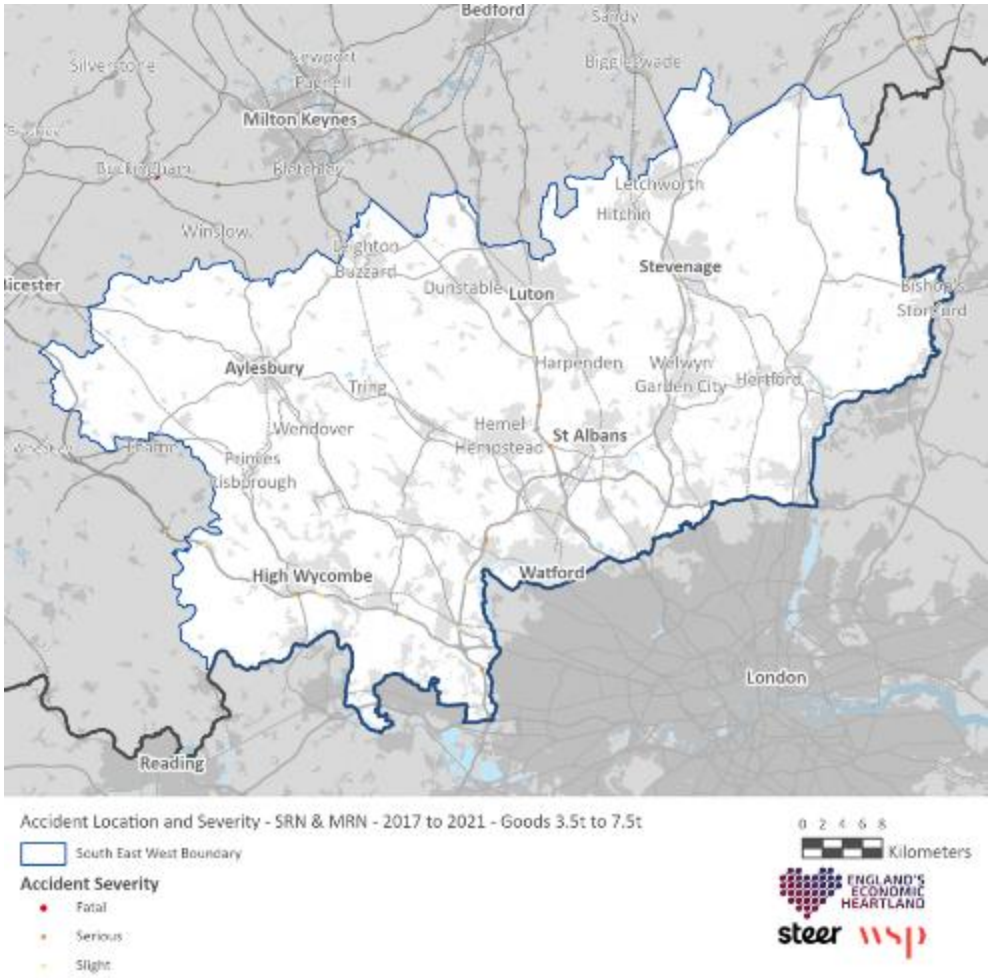
The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for buses and coaches.



Goods vehicle 3.5 – 7.5t

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for goods vehicles weighing between 3.5t and 7.5t.

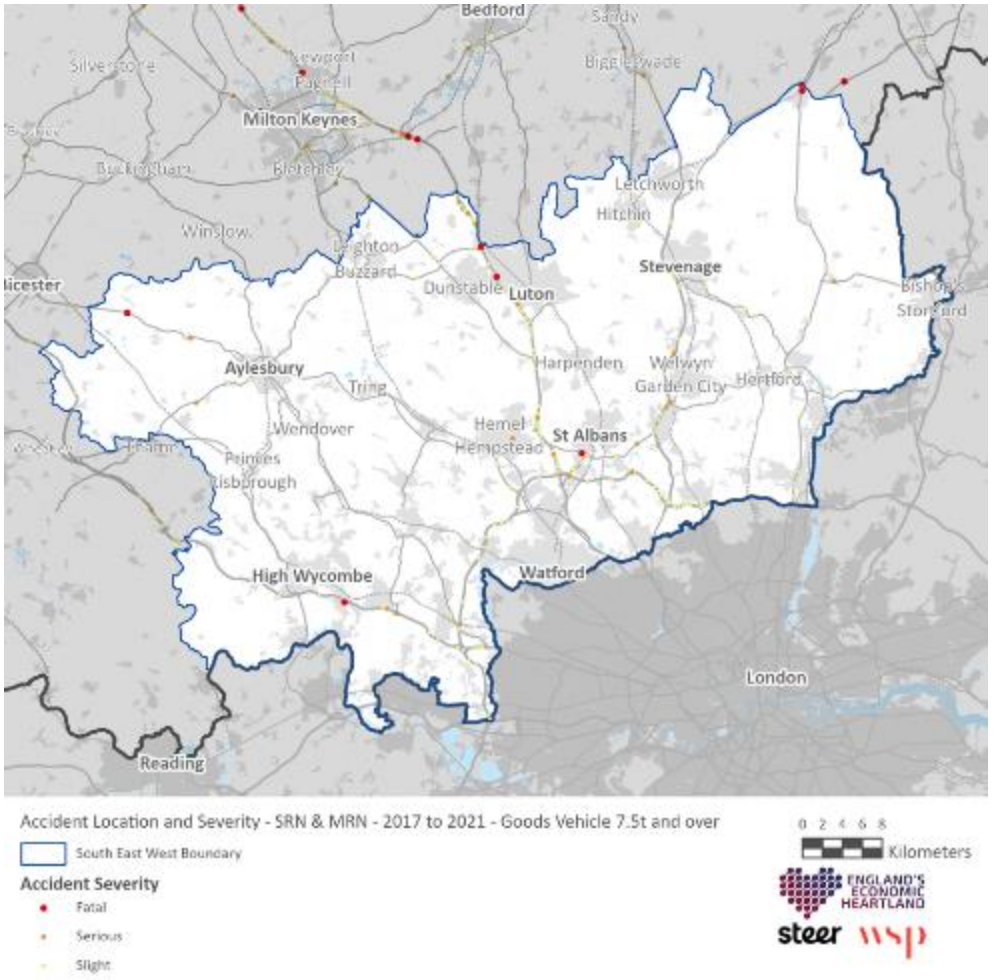
The types of vehicles within this weight class include Luton Box trucks and pickup trucks.



Goods vehicle 3.5 – 7.5t

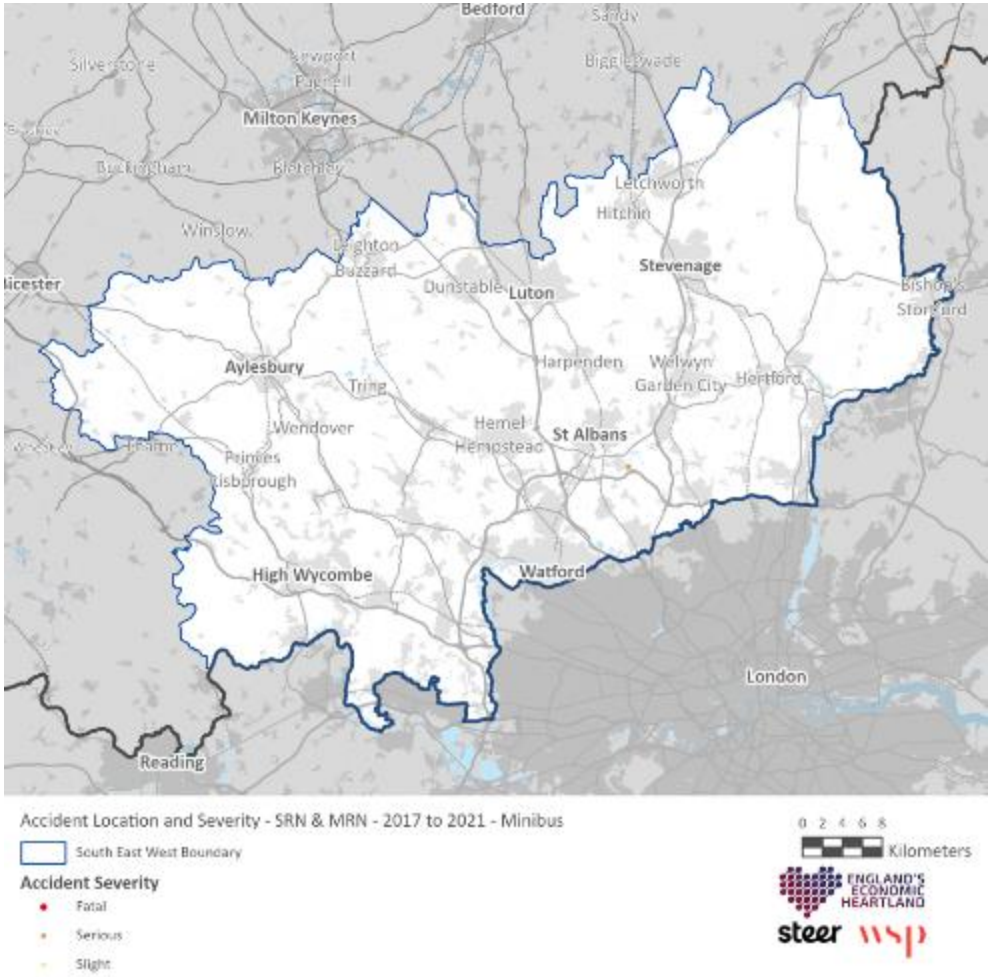
The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for goods vehicles that weight above 7.5t.

The types of vehicles within this weight class include larger trucks and HGVs.



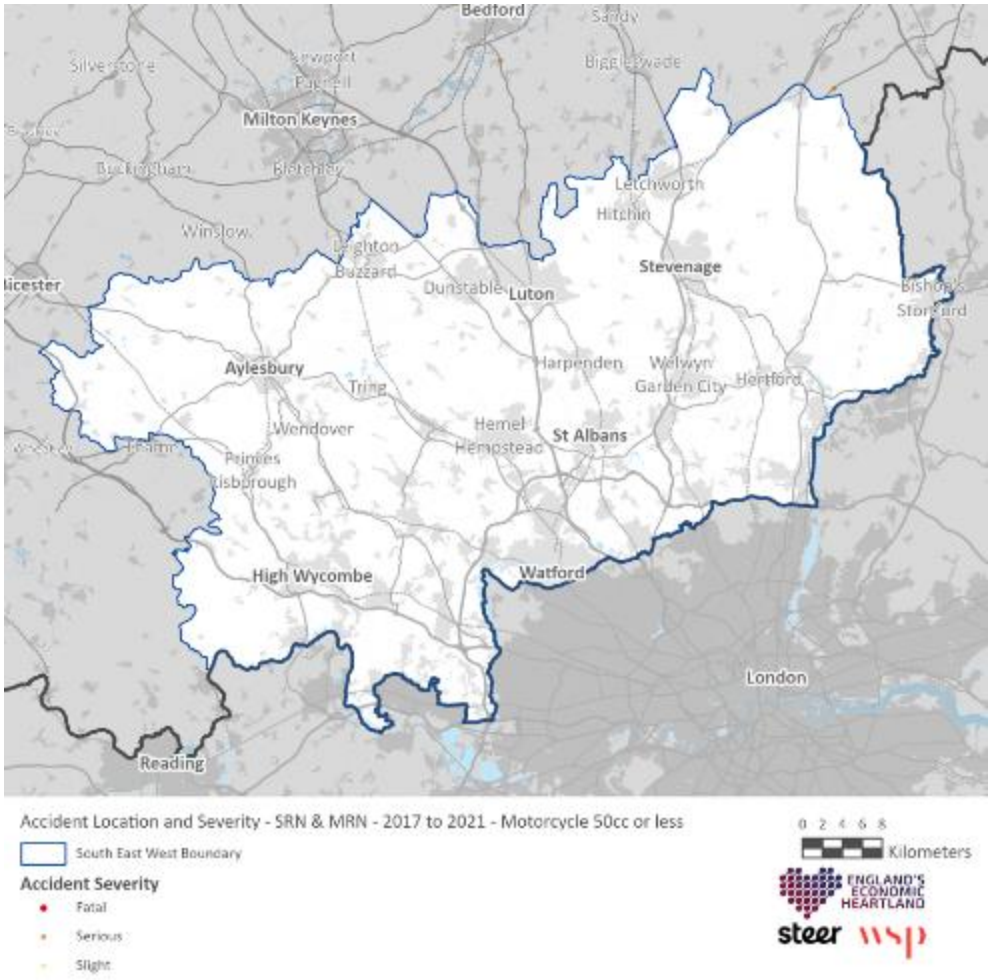
Minibus

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for minibuses.



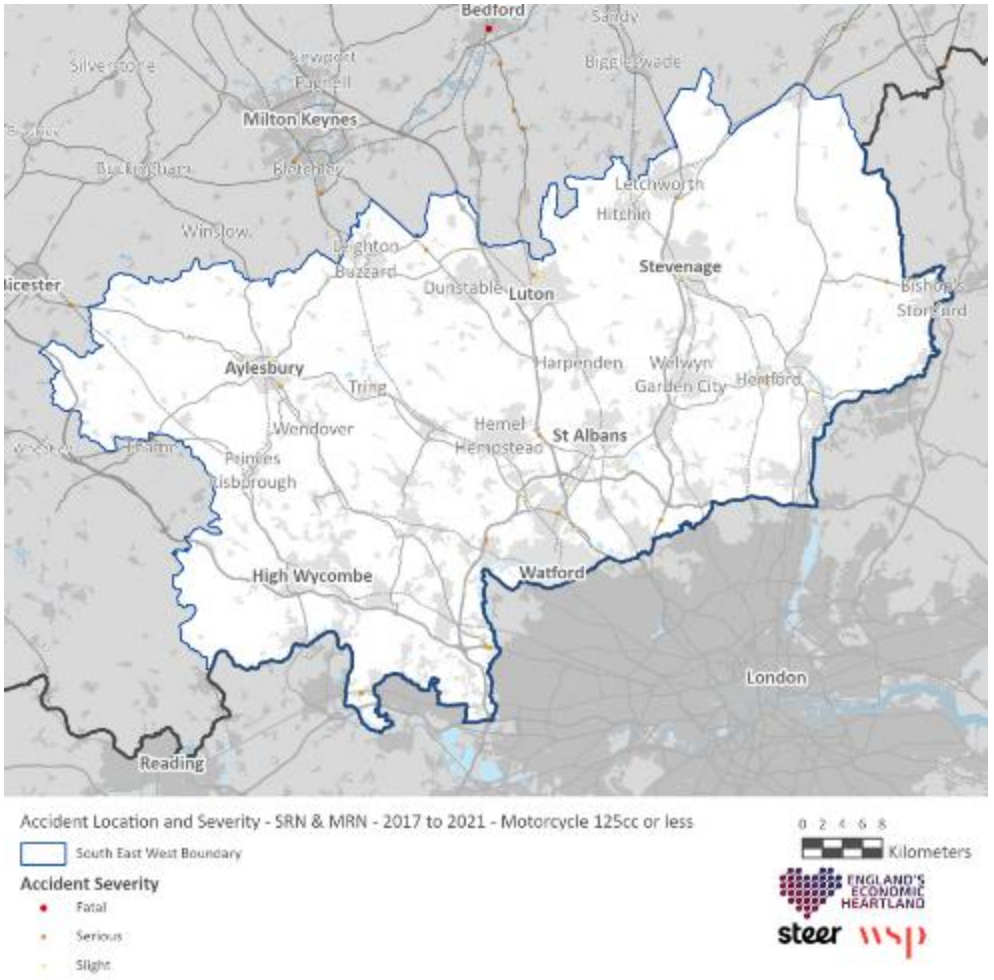
Motorcycle (50cc or less)

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for motorcycles with an engine size of 50cc or less.



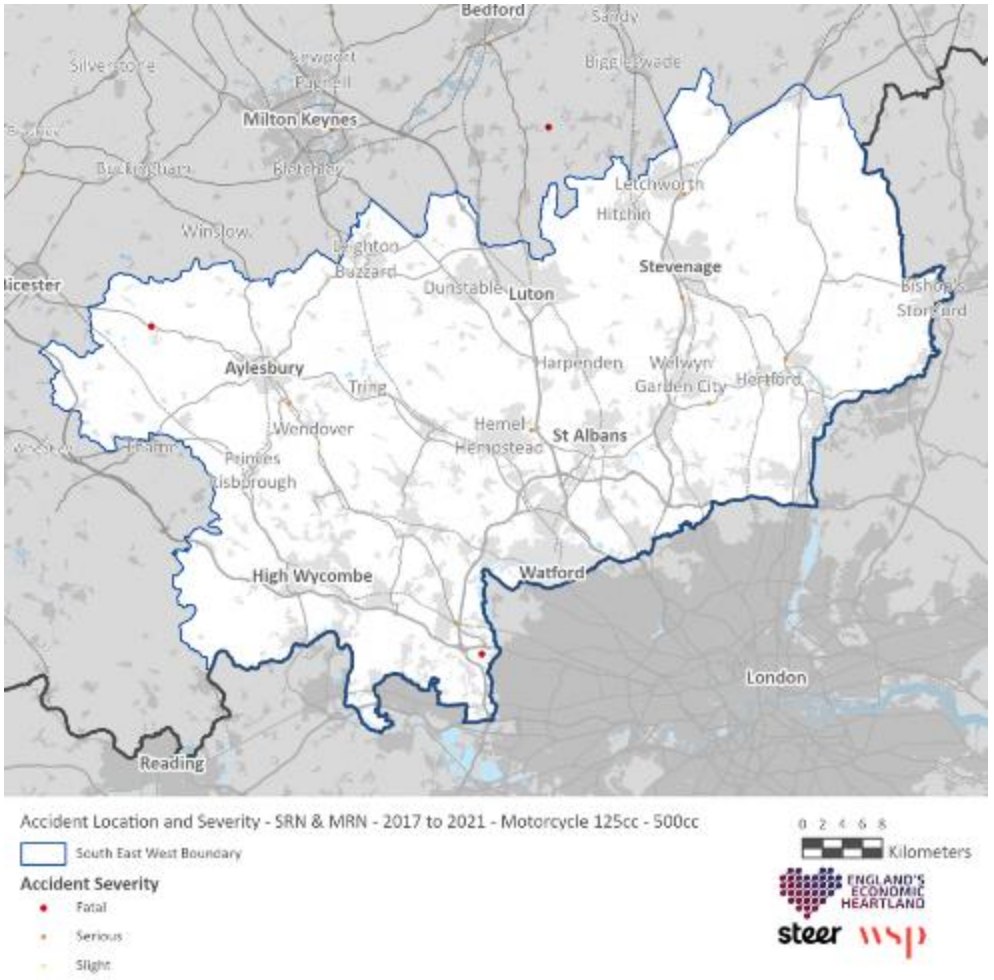
Motorcycle (125cc or less)

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for motorcycles with an engine size of 125cc or less.



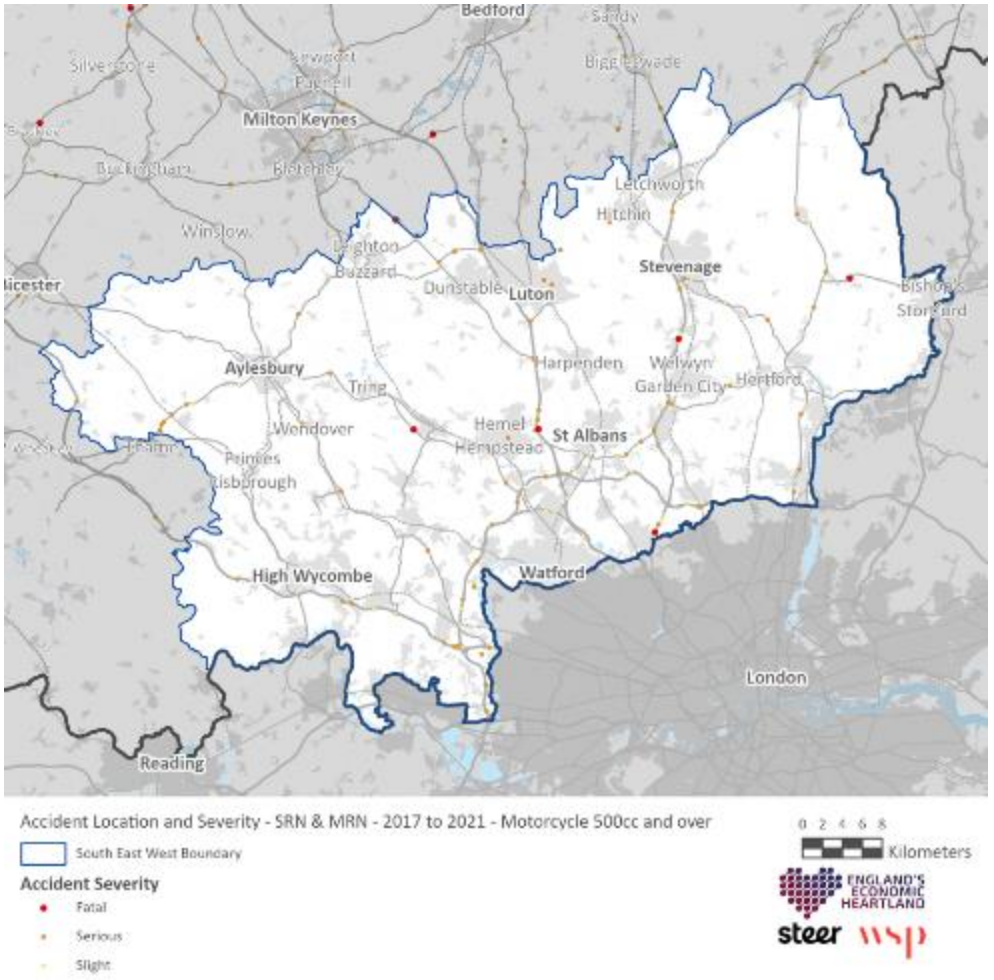
Motorcycle (125cc – 500cc)

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for motorcycles with an engine size of 125 – 500cc.



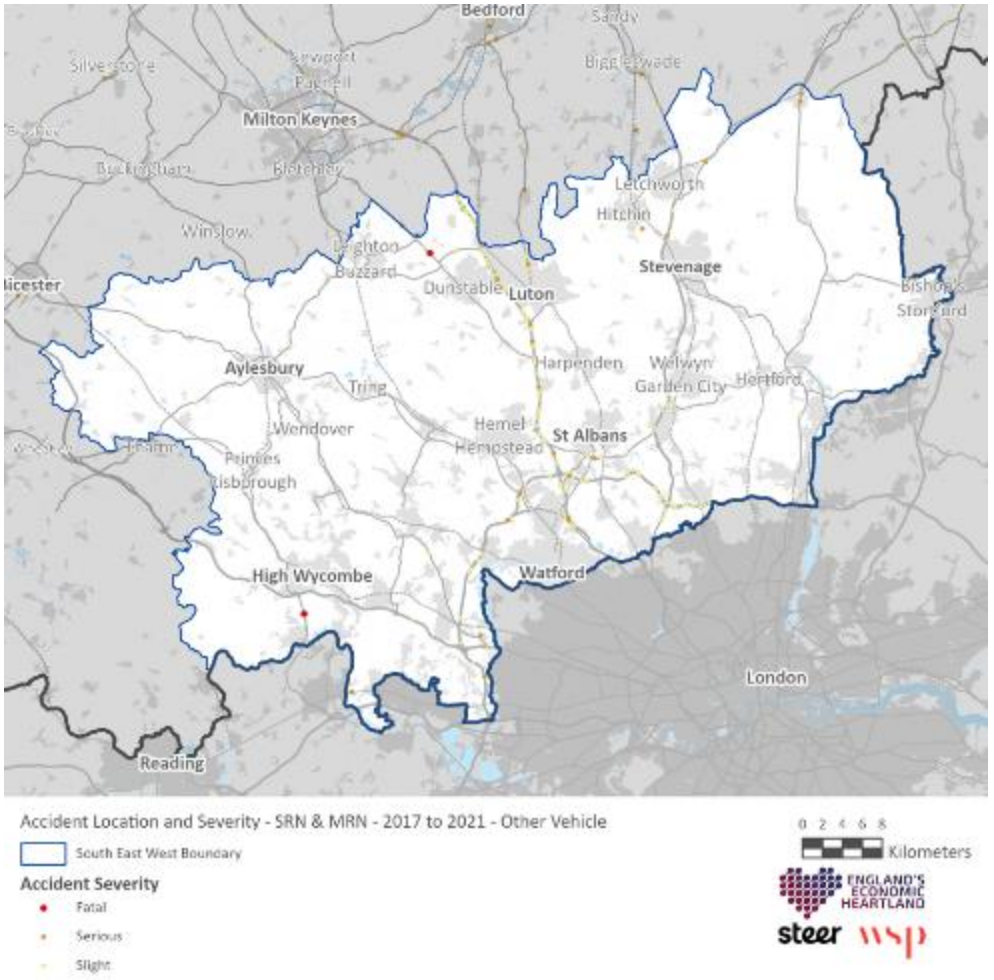
Motorcycle (500cc or more)

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for motorcycles with an engine size of 500cc or more.



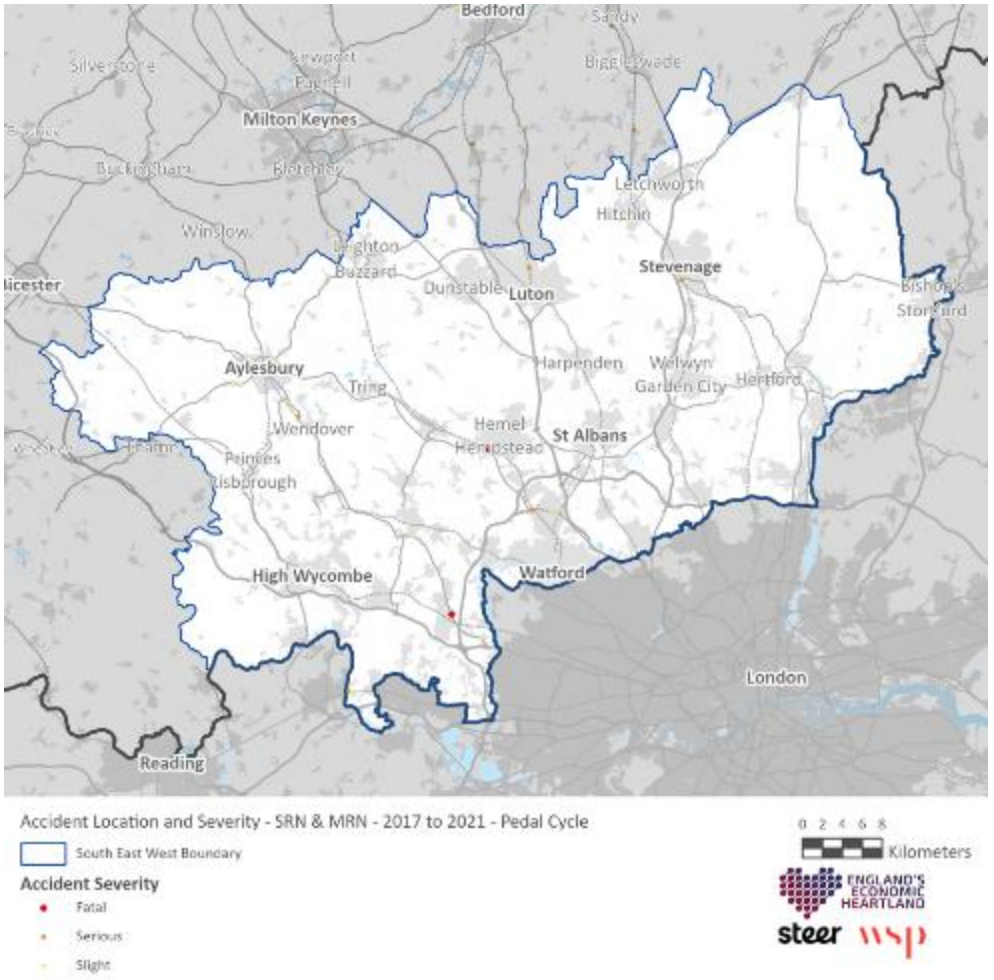
Other Vehicle

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for other vehicle classifications.



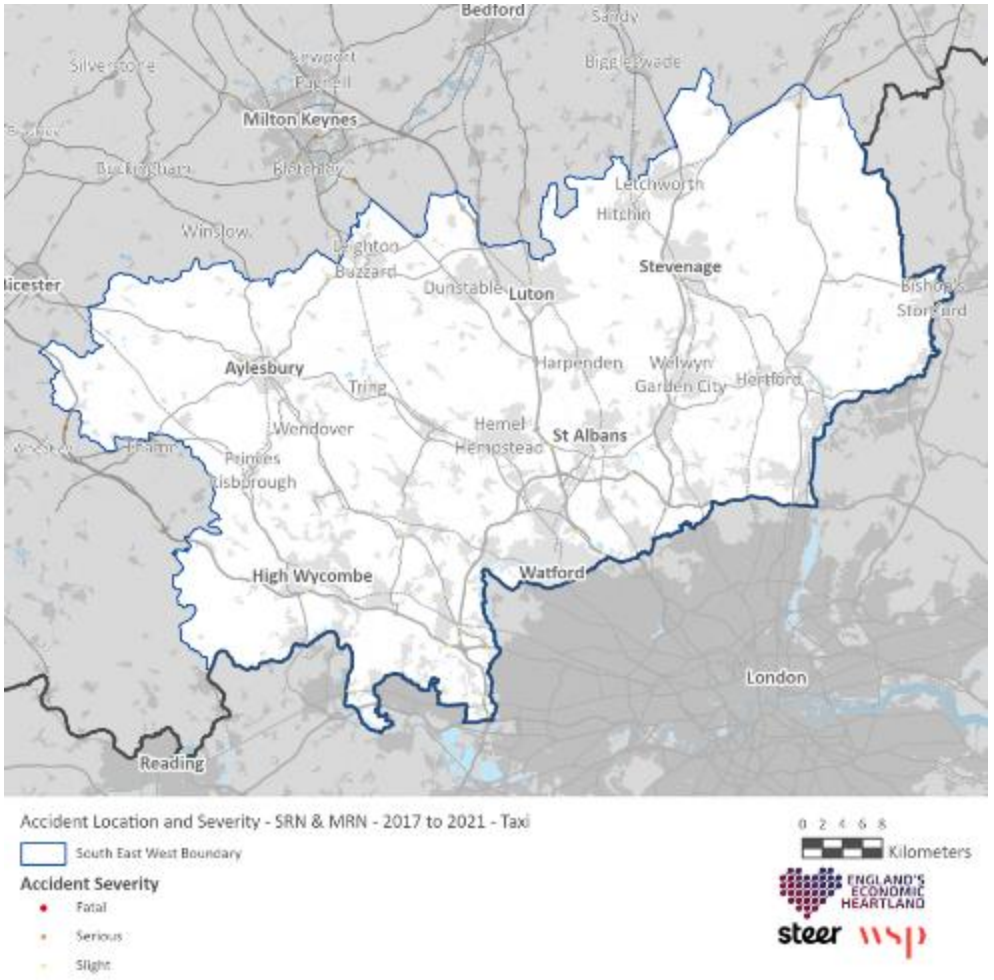
Pedal Cycle

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for bicycles.



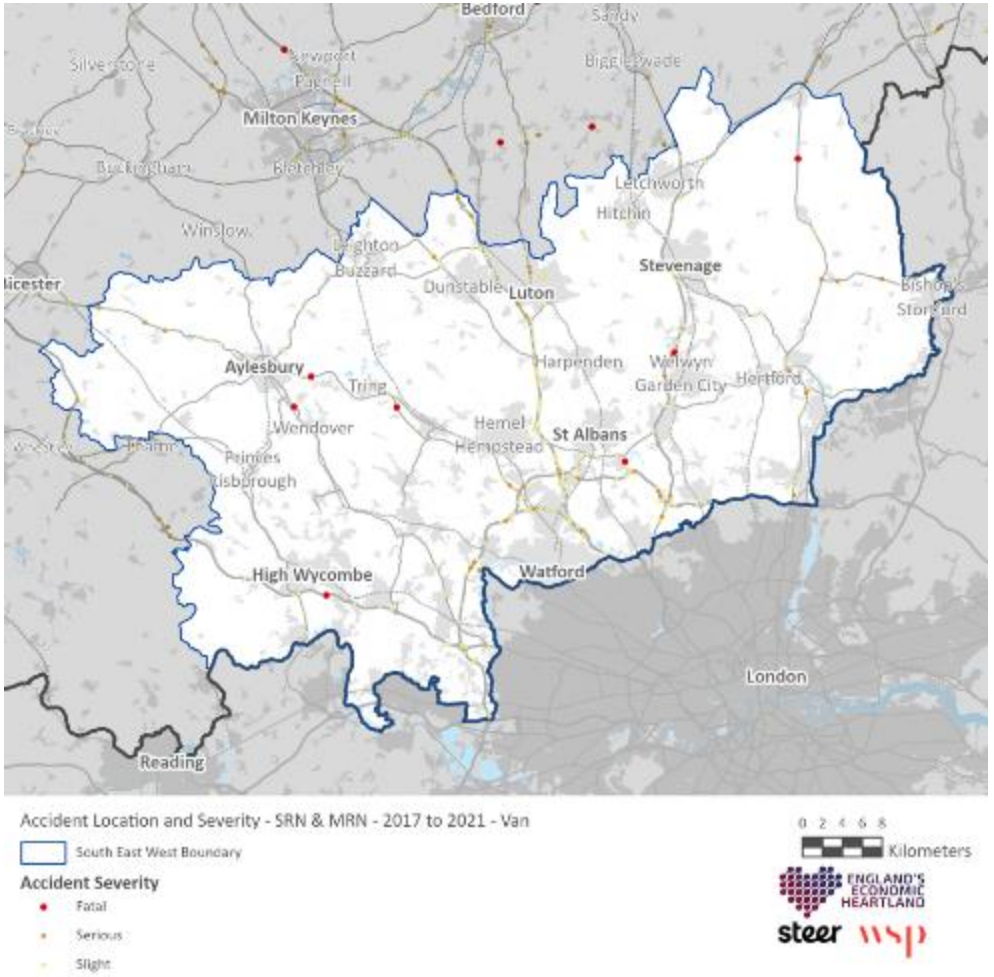
Taxi

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for Taxis.



Van

The plan opposite highlights the distribution of slight, serious and fatal collisions which took place along the Strategic Road network (SRN) and Major Road Network (MRN) within the study area between 2017 and 2021 for van.



Appendix I – Broadband Speed availability

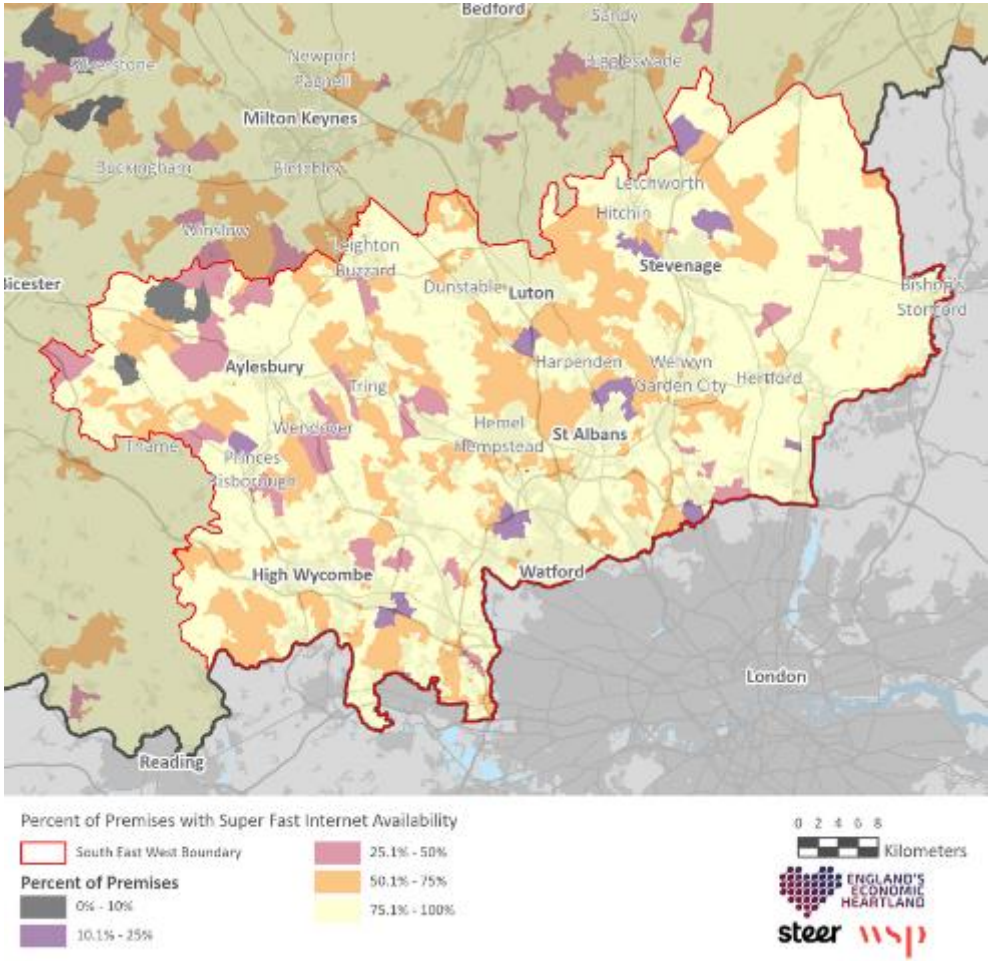
Superfast Broadband Availability

The map opposite shows the percentage of premises in the study area that have Superfast coverage from fixed broadband (proportion of premises that currently receive this speed). A superfast broadband connection can provide download speeds of at least 30 megabits per second.

The map shows that in most areas between 75% and 100% of premises have superfast broadband. The main exception is rural areas surrounding several Buckinghamshire settlements such as Aylesbury, Princes Risborough and Tring. A notable area within the centre of the study area has 25-75% within the rural areas surrounding St. Albans, Luton and Harpenden.

In areas where superfast broadband is not available home / hybrid working is likely to be challenging, particularly for workers / employees who need access to centralised digital resources (i.e. the cloud). As a minimum superfast broadband should be available to all premises in the study area.

Data Source: OFCOM Connected Nations 2023 Report Performance Data

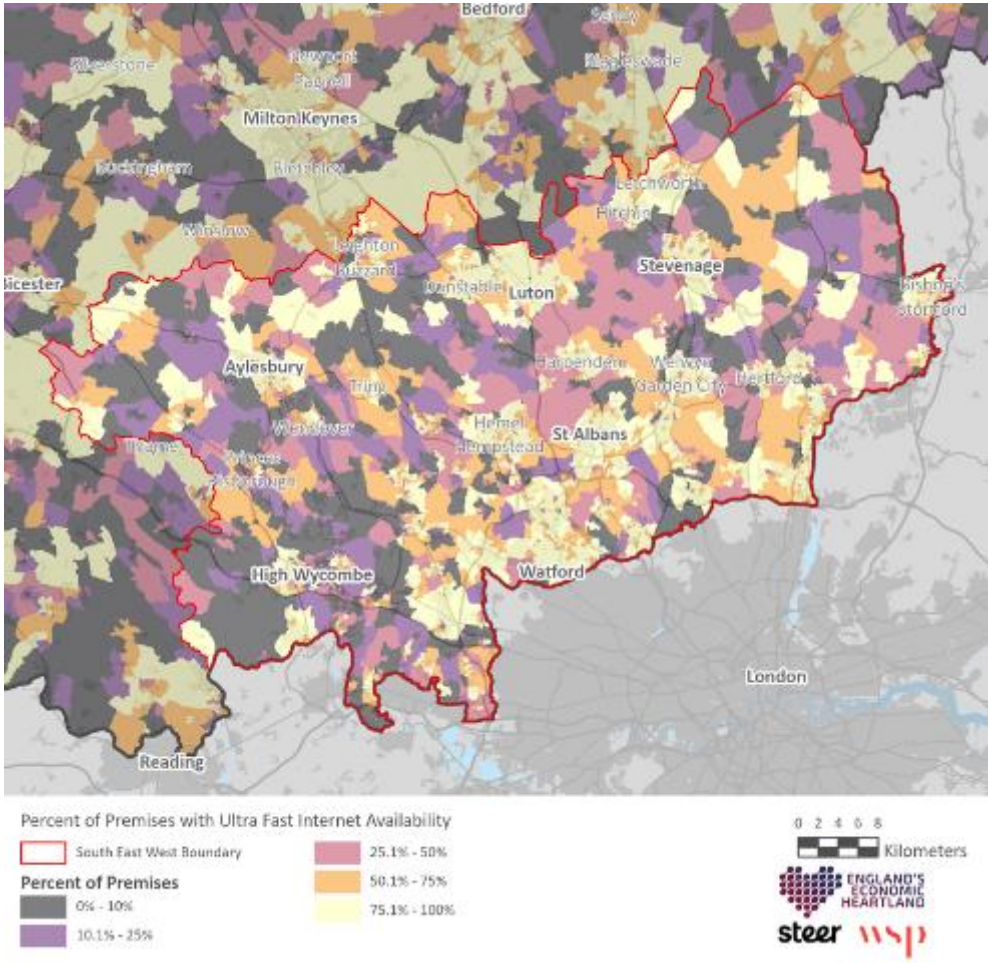


Ultrafast Broadband Availability

The map opposite shows the percentage of premises in the study area that have ultrafast coverage from fixed broadband (proportion of premises that currently receive this speed). A ultrafast broadband connection can provide download speeds of at least 300 megabits per second.

The map opposite generally shows a rural / urban divide, with higher coverage in the key settlements such as Watford, St. Albans and Luton and a lower coverage in rural areas. Areas with low availability tend to be located in the Rural western areas of the corridor surrounding Aylesbury, High Wycombe and Prices Risborough. Rural areas found outside of the main urban centres also have reduced availabilities, with Luton, Stevenage and Hatfield showing notable low levels of availability so close to an urban centre.

Ever increasing reliance upon cloud computing and cloud resources is likely to result in increased demand for ultrafast broadband, particularly by home workers and businesses in the study area. Low availability of ultrafast broadband could potentially limit the expansion of businesses in the corridor, particularly in rural areas on the periphery of major urban areas.



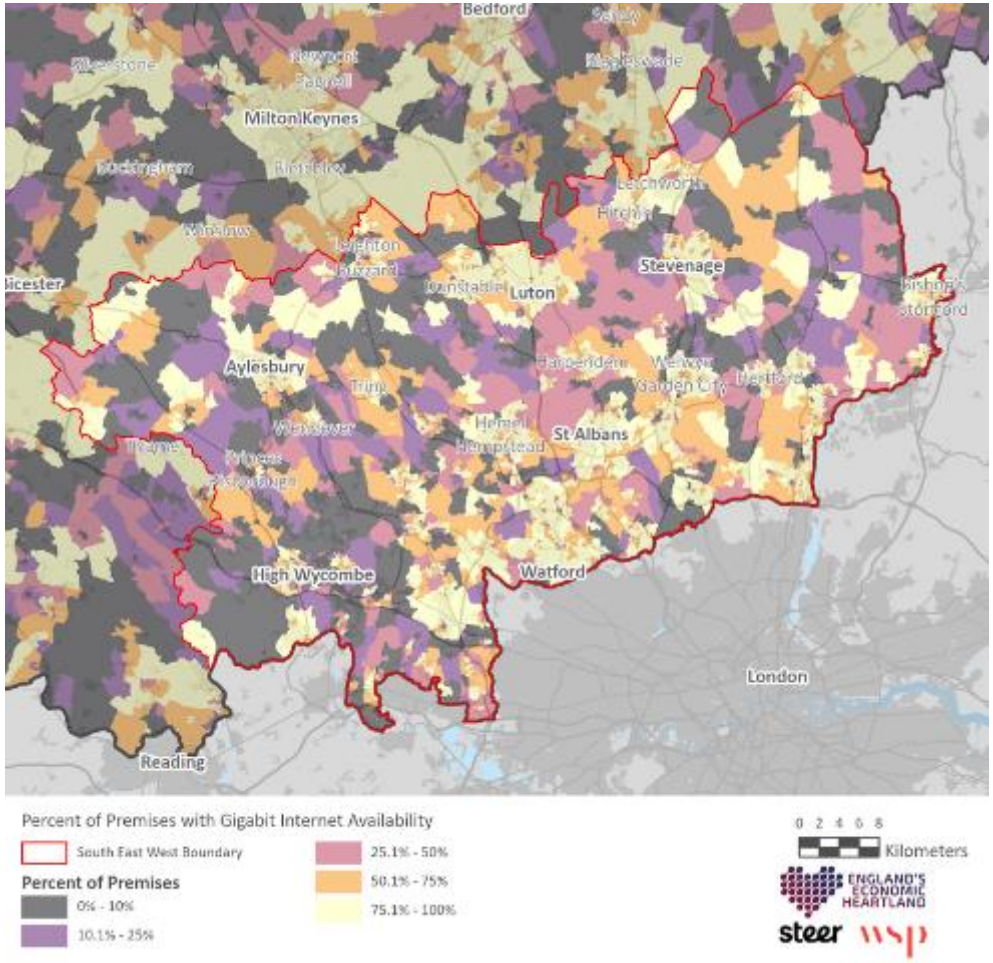
Data Source: OFCOM Connected Nations 2023 Report Performance Data

Gigabit Broadband Availability

The map opposite shows the percentage of premises in the study area that have gigabit capable services from fixed broadband. These are premises that could receive gigabit broadband from their Internet Service Provider without any additional infrastructure, but at present may not necessarily receive those speeds (i.e. they have opted for a slower package. A gigabit broadband connection can provide download speeds of at least 1,000 megabits per second.

The availability of gigabit capable broadband is generally higher in urban areas and lower in rural areas. However, there are exceptions, with good availability of gigabit broadband in rural areas surrounding the Southern Border. The Rural areas surrounding High Wycombe are showing notably low levels of availability.

The UK Government has pledged a £5 billion Project Gigabit Rollout, with an aim to provide more reliable and faster connections across the UK, including harder to reach areas. However, in harder to reach area, which are generally remote rural and deeper rural settlements, there are greater infrastructure challenges.



Data Source: OFCOM Connected Nations 2023 Report

Appendix J – Source list

Evidence Type	Source
Settlement Population 2021	2021 Population data, 2022 Built Urban area geography boundary
Population, employment & employees in key urban settlements in study area	ONS 2021 Census population and ONS Business Register and Employment Survey 2021
Resident Population	2011 Census
Population Growth	2011 & 2021 Census
Type of Resident	Segmentation Portal
Propensity to Travel (By Mode)	First Mile Last Mile Strategy for England's Economic Heartland, 2020
Workplace Population	2021 Census
Average earning	Income estimate for small areas, England & Wales, FY2018
Indices of Multiple Deprivation	English Indices of Deprivation 2019
Car and Van Availability	2011 Census QS416EW Car or Van Availability
Health & Disability Decile	English Indices of Deprivation 2019
Road Safety – All Vehicles	DfT Road Safety Data 2017 - 2021
Road Safety – HGVs	DfT Road Safety Data 2016 - 2020
Carbon Emissions	UK Local Authority and Regional Carbon Emissions 2020
Flood Risk	Environmental Agency
Protected and Vulnerable Areas	Natural England, Historic England, Environmental Agency
Air Quality Management Areas (AQMAs)	DEFRA AQMAs 2023

Evidence Type	Source
Housing Affordability	House Price statistics for Small areas (HPSSAs), Dataset 2Median Price paid by MSOA (2018)
Industry Split	Business Register and Employment Survey (2020)
Gross Value Added	ONS - Regional gross value added (balanced) by industry: local authorities by ITL1 region
Average Download Speeds	OFCOM Connected Nations 2023 Report Performance Data
Active Travel Network	SUSTRANS (2023)
Shared Mobility Supplier	Zipp, Voi, Santander, Lime, Tier, Ginger, BikeSharingWorldMap (2023)
Cycling Propensity (active travel mode share)	2011 Census: Method of Travel to Work
E-bike Catchment	Open Route Services (2023)
Rail Network	Open Street Map
Railway Station Usage	DfT Station Exists and Entries
Bus Network	Basemap Bus Route Lines (Q1 2022)
Public Transport and Walking times to key services	DfT Journey Time Statistics 2016
Drive time and Public Transport catchments	TRACC / ESRI Speed Profile Data (2019)
Freight Traffic	UK Government – GB Road Traffic Counts (2021)
Electric Vehicle Charge Points	National Charge Point Registry (2023)
Commuting trips within the study area	Census 2011 - WU03EW - Location of usual residence and place of work by method of travel to work
Mode Share by Settlements	2011 Census: Method of Travel to Work
Residential Sites	EEH Databank
Forecast Population Growth	TEMPro, 2021 Census - Population
Future Transport Schemes	Local Authority Major Transport Schemes, Highways England RIS 2, Network Rail's 2019-2024 Delivery Plan