Thames Valley – Northamptonshire

Connectivity Study

Evidence Base Report

Prepared in partnership with

steer WSP

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England's Economic Heartland Evidence Base for Thames Valley - Northampton 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. Our strategy sets out that we will work with infrastructure owners and operators to ensure proposals to improve services and develop infrastructure also reduce the region's 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 through to 2050. Their aim is to identify and recommend packages of multimodal infrastructure, service, or policy interventions to help achieve the Transport Strategy objectives.

The "*Thames Valley - Northamptonshire Connectivity Study*" is led by EEH, supported by a consultancy team comprising Steer, WSP, and 5th Studio.

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

- Transport movements in the study area are dominated by significant north-south routes of the M1, M40, M45, West Coast Main Line (WCML) London–Aylesbury Line and Chiltern Main Line (CML) that provide extensive road and rail connectivity between London and across the UK.

- Existing connectivity varies across the study area and in coming years will be transformed through major infrastructure currently under construction, notably High Speed 2 (H2) and East West Rail (EWR) Stage 1 between Milton Keynes and Oxford that also includes a new railway station at Winslow. These schemes are forecast to release capacity on existing local road and rail networks, notably on the M1, M40, M45, and WCML.

- The study area is home to resident population of over 1.9 million people, notably concentrated in the large urban centres of Milton Keynes, Luton, Northampton, and Aylesbury. There is a further concentration to the south in those areas connected to the London transport network.

- An internationally significant innovation powerhouse, there are key differences in characteristics across the study area, such as dense urban

populations compared to rural sparse populations. Income levels and employment varies across the area along with comparative access to key services and jobs by public transport. Improving connectivity and equality of access opportunity across the various socioeconomic groups 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 ranges from key urban employment and education centres to distribution and manufacturing hubs, as well as growing sectors with unique transport challenges such as the growing film and television industry.

- There is a strong national, regional and local policy and strategy landscape shaped around inclusive and sustainable connectivity. The region must decarbonise its transport network with the aspiration to do so by 2040 instead of the legally required 2050. The region can help enable effective delivery of 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 decarbonised 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 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

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

The Ambition

The region England's Economic Heartland (EEH) supports is an economic and innovation powerhouse, home to world-leading universities and businesses. 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 and high private car use within the current transport system acts as a constraint on growth and reduces resilience and reliability, all of which impacts productivity, the environment, and public health. Lack of choice in travel options also act as a constraint on the cost-effective access to the full range of jobs, homes, services and amenities the region has to offer. The environmental impact of the current system is unacceptable, with carbon emissions in parts of the study area being well above the national average.

Steer and WSP have been commissioned by EEH to **undertake a Connectivity Study of the Thames Valley – Northampton study area.** The *Connectivity Study* aims to identify a preferred package of multi-modal interventions that help achieve EEH's objectives identified within its Transport Strategy.

This is the fourth 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 packages of multi-modal interventions 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 'whole system approach' taken in *Connecting People, Transforming Journeys*, this 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 Plans, 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'.

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[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 - 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 - 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) - Documents relevant 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 - Presents the 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 - 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 - 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 - Sets out the next steps with the study.

2   The Study Area

Northampton

Milton Keynes

Aylesbury

High Wycombe

Overview

The study area for the Thames Valley – Northampton Connectivity Study (presented in Figure 1) is between High Wycombe and Northampton and includes the settlements of Milton Keynes, Aylesbury and Luton. Consideration is also given to key trip generators beyond this area, which as Heathrow Airport which sits south of the EEH southern boundary.

North-south movements are a particular focus of this study, with the study area confirmed by the Project Steering Group framed by the key existing routes of the M1 and West Coast Main Line to the east and the M40 and Chiltern Main Line to the west. The substantial new transport infrastructure of HS2 and East West Rail Stage 1 are being constructed through the centre, with both assumed to be complete in the context of this study which looks to 2049 and beyond.

Note: As part of the overall connectivity study programme, a separate study focused on southern east west movements through the EEH region is being conducted in unison with this study.

The study area includes all or part of 12 Local Authorities including Daventry, Northampton, South Northamptonshire, Milton Keynes, Central Bedfordshire, Luton, Dacorum, Chiltern, Wycombe, South Bucks, Aylesbury Vale, and Cherwell.

Several regional and nationally significant road links are also included in the area, including the A41, A45, A43, A413, A418, A507, A508, A509, A428, A421, M1, A5, M40, as well as a portion of the M25. The A41, A45, A43, A428, A421, M1, A5 and M40 roads all form part of the Strategic Road Network (SRN) and are managed by National Highways. Other key regional roads, managed by Local Highways Authorities include the A4146 and A414. National Rail links in the study area include the West Coast Main Line (WCML) through Milton Keynes, and the Chiltern Main Line (CML) through Bicester and High Wycombe, and the Midland Main Line (MML) through Luton (the MML is set to be a focus on a later study in the EEH programme).

London Luton Airport is an international gateway which is situated within the eastern edge of the study area. The 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, this has been a decrease since 2019 by almost 5 million (an almost 27% reduction). The Covid-19 Pandemic severely reduced the total airport usage, with 2020 seeing only more 5.4 million passengers in total.

The effect of the delivery of HS2 is forecast to unlock capacity on existing rail and road networks in the EEH region and within the study area specifically. This provides an opportunity to repurpose the way local infrastructure is used providing opportunities for net zero objectives.

The delivery of East West Rail (EWR) will reduce east-west congestion across the EEH and create opportunities for the study area in terms of improved connectivity to Oxford and Cambridge and repurposing of the local infrastructure network for low carbon mobility.

A new Winslow Station will open up opportunities for residents to access jobs, education and other opportunities more easily and using mass transit instead of the private car.

There is a notable film industry within the study area with major studios including Pinewood studios in Iver Heath and Bovidingdon Airfield outside Hemel Hempstead. There are also new studios planned for development with Wycombe film studios in High Wycombe and Hertswood Studios planned for near Borehamwood.

Figure 1 Study Area Overview Map[2]
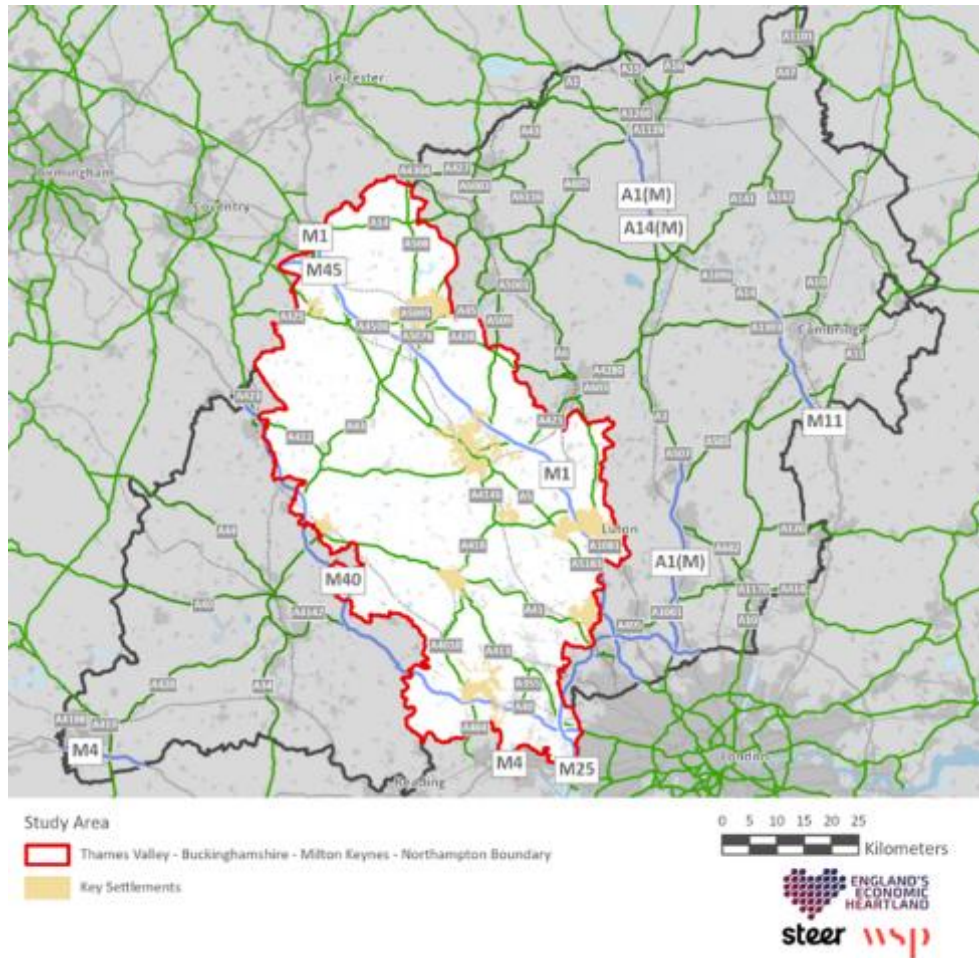
The study area includes a large proportion of the Chilterns Area of Outstanding Natural Beauty (ANOB), which by its nature is relatively rural and lacking in strategic transport infrastructure.

Within the study area itself, there are a number of places of strategic importance, meaning their catchment extends to the wider south England region, including the University of Bedfordshire and University of Northampton. Also within the study area is Caswell Park Science and Technology Park northwest of Towcester. A number of advanced manufacturing industries are located in the north part of the study area such as Nissan Technical Centre, Volvo and Aston Martin. Mid and south areas are characterised by life science and aviation and aerospace industries, for example, Johnson & Johnson and European Astrotech.

The Thames Valley – Northampton study 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,

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

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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. The opening of Winslow Station and East West Rail will address some of the existing connectivity challenges.

- **Innovation**: Harnessing innovation is a key priority for EEH. The study area is a center 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. 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, Current Context (Connectivity).

The study area contains a number of bus operators and services, further details on bus provision within the study area is contained in Part 6.

The study area contains several strategic (serving a regional or national catchment) rail links:

- The **West Coast Main Line** is a major rail corridor in the UK, connecting London to Glasgow and calling at major cities including Birmingham, Liverpool, Manchester and Edinburgh along the way. In the study area, the West Coast Main Line runs north-south, connecting Milton Keynes and Northampton, with wider connectivity to Watford in the south.

- The **Midland Main Line** provides connectivity between London and Sheffield, also calling at Nottingham, Leicester, and Bedford. Within the study area this railway line passes through Luton.

- The **Chiltern Main Line** runs in a northwest direction from London Marylebone to Birmingham via High Wycombe, Bicester, Banbury, Leamington Spa and Solihull. A chord connects the mainline with Oxford Parkway and Oxford. Within this corridor, the Chiltern Main Line connects High Wycombe and Bicester. The line to Aylesbury will provide onward connections to East West Rail.

Detailed further in Part 8, there are two locally and nationally significant rail projects under construction within the study area that will fundamentally change how the existing road and rail networks operate:

- **High Speed 2 (HS2)** is underway and Phase 1 will deliver a new rail line between London and Birmingham passing through the study area. The scheme will allow for road journeys undertaken through the study area to be undertaken by rail and is forecast to release capacity on the existing local and strategic road and rail networks. It is however noted that full strategic transformation benefits may only be achieved with full HS2 scheme delivery i.e. Phase 2b.

- **East West Rail Stage 1** is to be delivered from Oxford to Bletchley/Milton Keynes and Aylesbury to Milton Keynes. EWR will provide a competitive alternative to private car journeys undertaken through and within the EEH region.

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 detailed below. These are routes serving private vehicles including commuters and freight. Roads forming part of the Strategic Road Network managed by National Highways are:

- 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 Watford, Luton, Milton Keynes and Northampton.

- The **A5** provides connectivity between London in southeast England and Anglesey in northwest Wales. Within the study area, the A5 provides connectivity between Luton and Milton Keynes.

- The **A43** connecting Ardley and Stamford, in a broadly north-south orientation. Within the Thames Valley – Northampton Corridor

- 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 this corridor specifically, the section of the M25 surrounding Watford is included.

- The **A404** provides a key link from the M40 at High Wycombe southwards towards Berkshire and Heathrow.

- The **A421** is a major east-west link in the area connecting Buckingham, Milton Keynes and Bedford. This road gives wider strategic connectivity from Oxford, through Milton Keynes to Cambridge. The section of the route between Milton Keynes and Bedford is managed by National Highways.

Key road links managed by Local Highway Authorities:

- The **A414** is a locally important A road which connects the towns of Hemel Hempstead to Maldon in Essex. Only a short portion of this link is included within the study area, mostly in the area surrounding St. Albans.

- The **A4146** is a locally important A-class road which connects Milton Keynes to Leighton Buzzard.

- The **A41** connects London to Birkenhead, running in a north-south orientation. Within the study area, the A41 passes through both Aylesbury and Bicester.

- The **A421** major east-west link is managed by the local highway authority between Buckingham and Milton Keynes.

Where People Live

Figure 2 shows the large population centres based on their residential population as of the 2021 Census. Census data[3] demonstrates that the eleven urban areas shown account for roughly 60% of the total population within the study area. More than one third of the study area population resides within the three main settlements of Northampton, Milton Keynes and Luton. Both Northampton and Luton exceed 200,000 residents, with Milton Keynes nearing a population of 200,000[4].

Almost half of residents in the study area live in urban centres of more than 50,000 inhabitants, with the remainder living within smaller market towns and rural areas. Rural areas (those found outside of the eleven urban areas) constitute 40% of the populations of the study area, with much of the area in the north-west between Daventry and Bicester being sparse in population. The area to the north of Northampton around the A14 and A408 is particularly rural and sparse in population density.

Several smaller settlements such as Silverstone, Buckingham and Brackley can be found in the rural North-West area. Smaller settlements and rural areas have reduced population densities and are likely to have less employment services and amenities. Although several key business parks can be found in Rural areas including Westcott Business Park, Silverstone Innovation centre and Cranfield University. Lower population densities tend to increase car dependency due to it being less viable to run regular bus or rail services without operational subsidy and historically limited investment in safe cycle and walking routes.

Figure 2 Settlement Population 2021[5]

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[3] Source: Population estimates, ONS, 2021,
https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates
[4] [4] Figures quoted refer to the main built-up urban areas only as opposed to the larger local government boundary.

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

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Key settlements

The study area includes 11 key settlements (**Error! Reference source not f ound.**

Table 2) that play an important economic and connectivity role within the region by accommodating transport hubs like railway stations where travellers can change between modes, as well as accommodating large numbers of local residents, services, and employers.

The largest settlement in the study area is Northampton, which is located in the northern section of the study area and has a population of 243,527. Luton and Milton Keynes are the second and third largest settlements, with populations of 233,524 and 197,328 respectively. All three of these are connected by the M1. Key employment sites offered by these settlements include Magna Park in Milton Keynes, Brackmills Industrial Estate in Northampton and Capability Green in Luton.

There are a number of medium size settlements such as Hemel Hempstead, Aylesbury and High Wycombe. These settlements principally function as dormitory towns with large levels of commuting towards London, Northampton and Milton Keynes.

They also provide access to a range of everyday services and have a growing employment offering such as that offered by the Hemel Hempstead Industrial Estate an Cressex Business Park in High Wycombe. Milton Keynes is a key employment hub in the study area with the highest number of employees of all key settlements, at 144,430.

The total number of employees is also approximately 50% higher than the total number of people in employment, suggesting that there is a significant amount of commuting into the own from surrounding

settlements. Milton Keynes offers several notable employment areas including Magna Park, Kingston, Fox Milne and the City Centre.

Another notable settlement within the study area with high levels of in-commuting, is Hemel Hempstead, with 94,780 employees due to the existence and recent growth of Hemel Hempstead industrial estate as well as the town centre amenities. Rural settlements in the study area are also home to unique employment offerings, for example Westcott Innovation Centre and Silverstone Racecourse. There is also a notable film industry within the study area as several major studios located within the corridor including Pinewood studios in Iver Heath and Bovidingdon Airfield outside Hemel Hempstead.

Several studios are also located close to the study area with Leavesden studios in Watford, Elstree Studios in Borehamwood and Ridgeway studios near Iver. There are also new studios planned for development with Wycombe film studios in High Wycombe and Hertswood Studios planned for near Borehamwood.

The study area is a large and complex mix of both urban and rural environments. In addition to major settlements there are significant trip generators and destinations. The study area includes strategic road and rail infrastructure with committed schemes of regional and national importance which seek to increase capacity, connectivity and transition towards a low carbon future.

Table 2 Key urban settlements in study area[6]

Key Settlements	Population (2021)	Employment (2021)	Employees (2021)
Northampton	243,527	123,067	127,810
Luton	233,524	103,059	103,500
Milton Keynes	197,328	100,173	144,430
Hemel Hempstead	95,995	48,494	94,780
Aylesbury	87,966	45,444	45,205
High Wycombe	83,541	41,553	39,485
Bletchley	45,018	21,027	21,110
Leighton Buzzard	42,736	22,146	13,900
Bicester	37,748	21,249	18,420
Dunstable	34,498	17,652	9,410
Daventry	27,783	14,254	14,920
Study Area	**1,917,976**	**948,941**	**968,810**
EEH Total	5,382,136	2,669,816	2,670,345
England & 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.			

3 Policy Context

Northampton

Milton Keynes

Aylesbury

High Wycombe

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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 predicting future demand then delivering the infrastructure required to meet that demand without an attempt to change how people travel. This 'predict and provide' approach has enabled economic growth but also embedded private car dependency in much of the study area.

In line with Department for Transport (DfT) and vision-led good practice, the focus now is on imagining the future transport network we want to see and making policy and investment decisions towards its delivery. For example, more recently policy has made a focus on reducing emissions and car dependency, encouraging active travel, improving access to public transport, and levelling-up access to opportunities.

Some of the key national policies relevant for this study include:

National Planning Policy Framework (2021) sets out the Government's current 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 plan-making and decision-taking. The NPPF recognises 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 zero and low emission public transport vehicles, walking and cycling.

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

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 transport modes and mobility systems (e.g. e-bikes) that further compliment and 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 seek to 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 Programme, 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[7].

Local Enterprise Partnerships

Hertfordshire LEP – Strategic Economic Plan: 2017 – 2030 (2017) identifies potential opportunities and prospects of Hertfordshire by the Hertfordshire Local Economic Partnership (LEP). The plan has four key priorities based around their vision to accelerate business-led growth in Hertfordshire, and to allow Hertfordshire to become a world leading economy.

Buckinghamshire LEP – Strategic Economic Plan: 2016 -2031 (2014) 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 Plan (2017) 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 Thames Valley – Northampton study area encompasses a number of Transport Authorities (Buckinghamshire Council, North Northamptonshire Council, West Northamptonshire Council, Milton Keynes City Council, Central Bedfordshire Council, Luton Borough Council and part of Hertfordshire County Council) all of which have their own Local Transport Plan (LTP) that set out their transport objectives, and the policies and strategies that will enable their achievement.

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

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

Local planning policy documents relevant to this study are identified below, with draft documents or plans out for consultation not listed:

Buckinghamshire County Council (BCC) LTP 2016-2036 (2016), sets out how the County Council will help realise the transport elements of its Strategic Plan. The LTP sets four main local transport plan objectives to achieve 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

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

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.

Mobility Strategy for Milton Keynes (2018-2036) outlines that innovation in the transport sector could help to deliver significant population growth in a sustainable manner within Milton Keynes by 2050 through management of travel demand. New technologies and services such as Mobility as a service (MaaS) and the use of autonomous and connected vehicles are planned to promote better journey times and ensure sustainable growth.

Central Bedfordshire Council Local Transport Plan 3 (2011-2026) This Local Transport Plan establishes a strategic approach to deal with key transport issues through the borough. The document contains a series of objectives, and broad areas of intervention through which schemes will be identified and improvements made to the transport network.

Hertfordshire County Council Local Transport Plan 4 (2018-2031) aims for 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 Plans for specific geographic regions.

Northamptonshire Local Transport Plan (2012) is the overarching strategy document that sets out what the County Council's strategic aims and goals are for Transportation in Northamptonshire. The strategy is an overarching document for a series of smaller documents to outline strategies for different aspects of the transport system. It is noted that since the completion to this Plan, Northamptonshire County Council has been split into two separate unitary authorities, North Northamptonshire and West Northamptonshire.

Luton Local Transport Plan 4 (2020-2040) is the strategic document for Luton Borough and aims to reach three main ambitions of embracing carbon reduction, reducing poverty and improving inclusion and ensuring transport is linked with developments. The local council is aiming for a net zero commitment by 2040 and is connecting with the Strategic Objectives of the Luton Local plan to enable sustainable growth.

Local Cycling & Walking Infrastructure Plans have been developed for locations within the study area, comprising of:

Milton Keynes LCWIP (2023) – The Milton Keynes LCWIP was adopted in February 2023 and has now informed 19 priority schemes which will be further improved to LTN 1/20 levels and will take into account the Milton Keynes County Council Redway Design manual.

Various Local Cycling & Walking Infrastructure Plans (LCWIPs) – Within the study area HCC have developed a programme of LCWIPs covering the settlements of Watford, Stevenage, Welwyn and Hatfield. These LCWIPs are now adopted, and schemes are being developed and delivered within them. LCWIPs are under development for North Herts, Three Rivers, Dacorum and East Herts. Hertsmere LCWIP is yet to commence. LCWIPs are proposed covering Dacroum (Hemel, Berkhamsted, Tring), Brackley, Northampton and Luton.

Various national, regional and local policy and strategy documents set out ambitious objectives, visions and priorities covering the geography of the study area which any potential interventions should align to and contribute towards.

4 Current context (People)
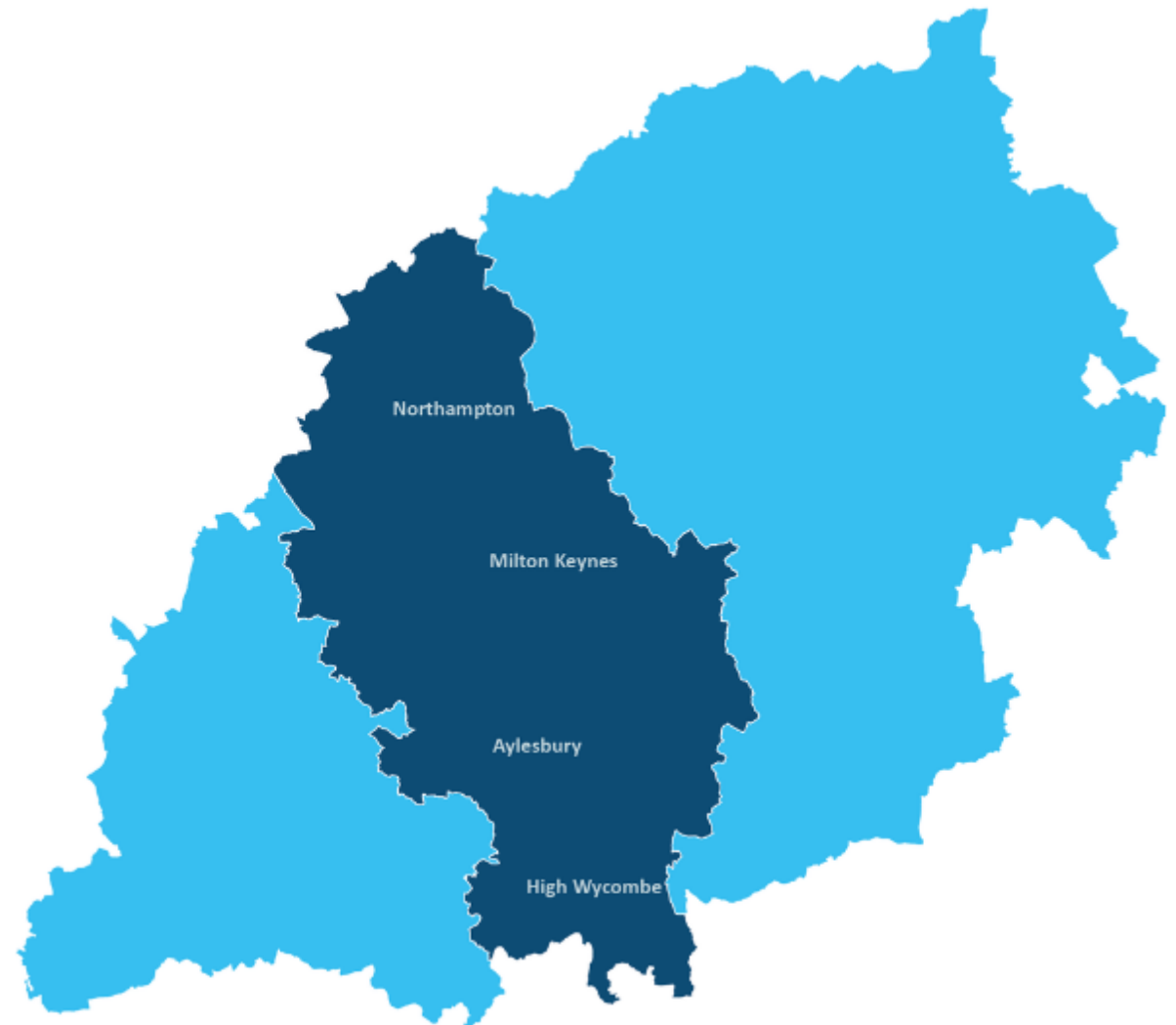
Background

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 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.

This seeks to establish the underlying drivers and the scale of the existing issues, in order to establish the need for intervention, study objectives and Critical Success Factors.

Population

Resident Population

The resident population of the study area is over 1.9 million people. Figure 3 illustrates that the settlements with the largest populations in the study area are located in the urban areas to the north and east, for example, Northampton (with a population of 243,500), Luton (233,500) and Milton Keynes (197,300)[8]. These settlements are connected by the M1 and West Coast Main Line, which also provide inter-urban connectivity within the study area and beyond to other important destinations such as London, Birmingham, Manchester, and Scotland.

Urban settlements to the north, e.g., Northampton and Milton Keynes are surrounded by a network of villages and smaller market towns. These areas are not served by an integrated infrastructure network with provision of public transport services and active travel facilities, as such car dependency is relatively high.

By contrast, in the southern part of the study area there are a number of small and medium size settlements which have better public transport connectivity as a result of radial rail connections to and from London, enabling greater modal choice and potential for sustainable travel.

The larger and denser settlements in the study area, such as Northampton, Milton Keynes and Luton have a high density of services, amenities and employment opportunities, meaning that these areas generate high travel demand from within the settlements and from further afield. The transport infrastructure network is largely highway and rail based.

Figure 3 Study Area Population Density[9]

2021 census residential population

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Population Density (per sq km)

Less than 20,000
20,001 - 40,000
40,001 - 60,000
60,001 - 80,000
80,001 - 100,000
Greater than 100,000

Source: 2021 England and Wales Census

0 3 6 9 12 Kilometers

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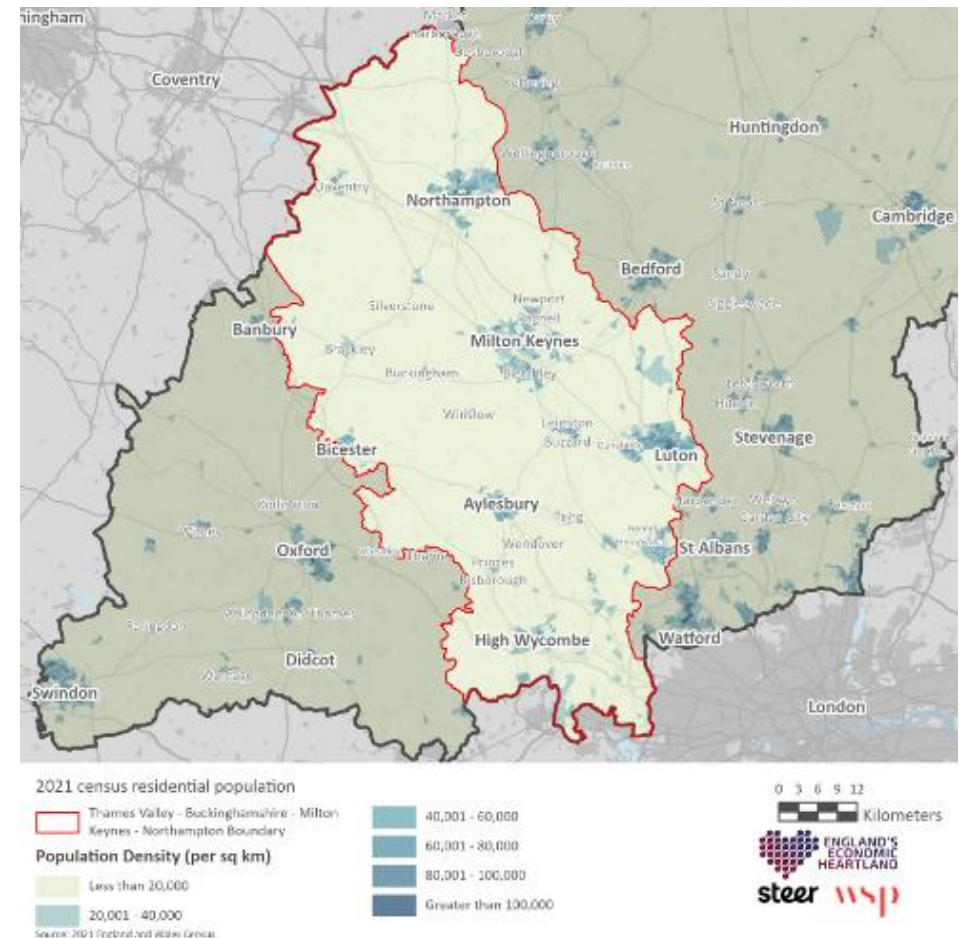
[8] Figures quoted refer to the main built-up urban areas only as opposed to the larger local government boundary.

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

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

Population Growth (Historic)

The resident population of the study area grew by nearly 12% between 2011 and 2021, from 1.7m in 2011 to over 1.9m in 2021, as illustrated in Figure 4. The largest levels of relative growth were observed in Bletchley and Aylesbury (18% growth), followed by Dunstable (14% growth) and Leighton Buzzard (13% growth).

Significant levels of growth have been observed in rural areas surrounding Milton Keynes and Aylesbury (e.g., Bletchley and Berryfields). In these areas, the highest levels of relative growth occurred within rural settlements along key road and rail links such as the A418 between Aylesbury and Leighton Buzzard and M1 between Luton and Northampton.

Population growth at the periphery of existing urban areas such as northwest of Aylesbury and south of Milton Keynes presents challenges to travel sustainability as these areas are often longer distances from everyday services and amenities and are often less well connected by active and public transport, meaning high reliance on private vehicles or a lack of access to opportunity for those without access to a vehicle.

Figure 4 Changes in Population[10]

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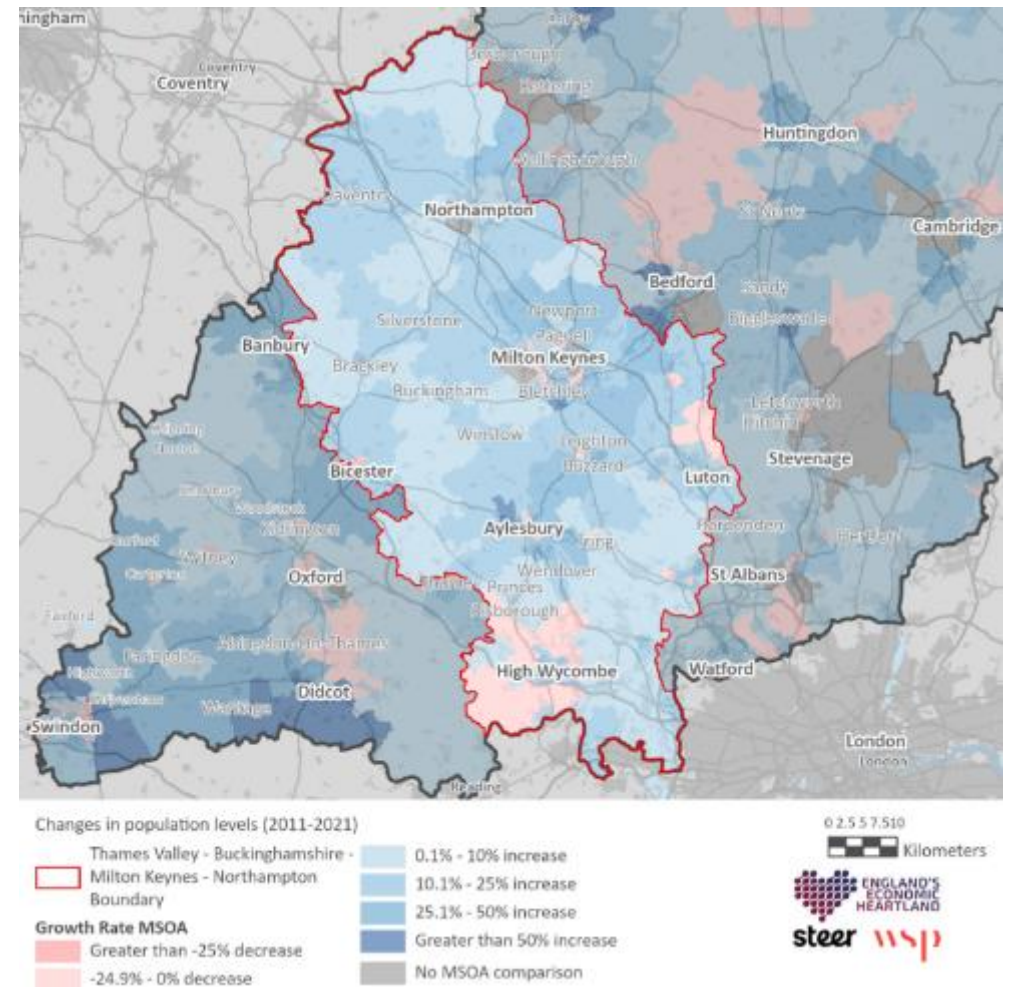
[10] Source: Population change, ONS, 2021,
https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/economicinactivity/datasets/dataon
populationchangesandeconomicinactivitytrendsuk

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 Appendix A). The persona groups provide valuable insights into how certain types of people may respond to different transport interventions, whether they are cost, time or health focussed.

Figure 5 illustrates that larger town centres within the study area, including Northampton, Milton Keynes, Luton, Aylesbury and High Wycombe have a mix of personas comprising of groups such as 'Family Basics', 'Urban Cohesion' and 'Aspiring Homemakers'. These groups tend to have lower levels of disposable income comparative to others, members of these groups are likely to be younger adults.

More rural areas of the study area are mainly comprised of the Country Living population persona, who, based on the traits of this Mosaic persona tend to have higher levels of car dependency.

Community variability brings variable user needs, wants and expectations. Younger populations in urban areas like Luton may be more likely to uptake new shared mobility interventions which save time and money. Conversely, rural and wealthy populations are likely to have different access requirements or expectations, meaning different mobility solutions are required or expected. The propensity of different socio-economic groups to travel by different transport modes is considered on the next page.

Figure 5 Mosaic Data Personas[11]

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[11] Source: Experian Mosaic, 2021, https://www.segmentationportal.com/Mosaic7/uk
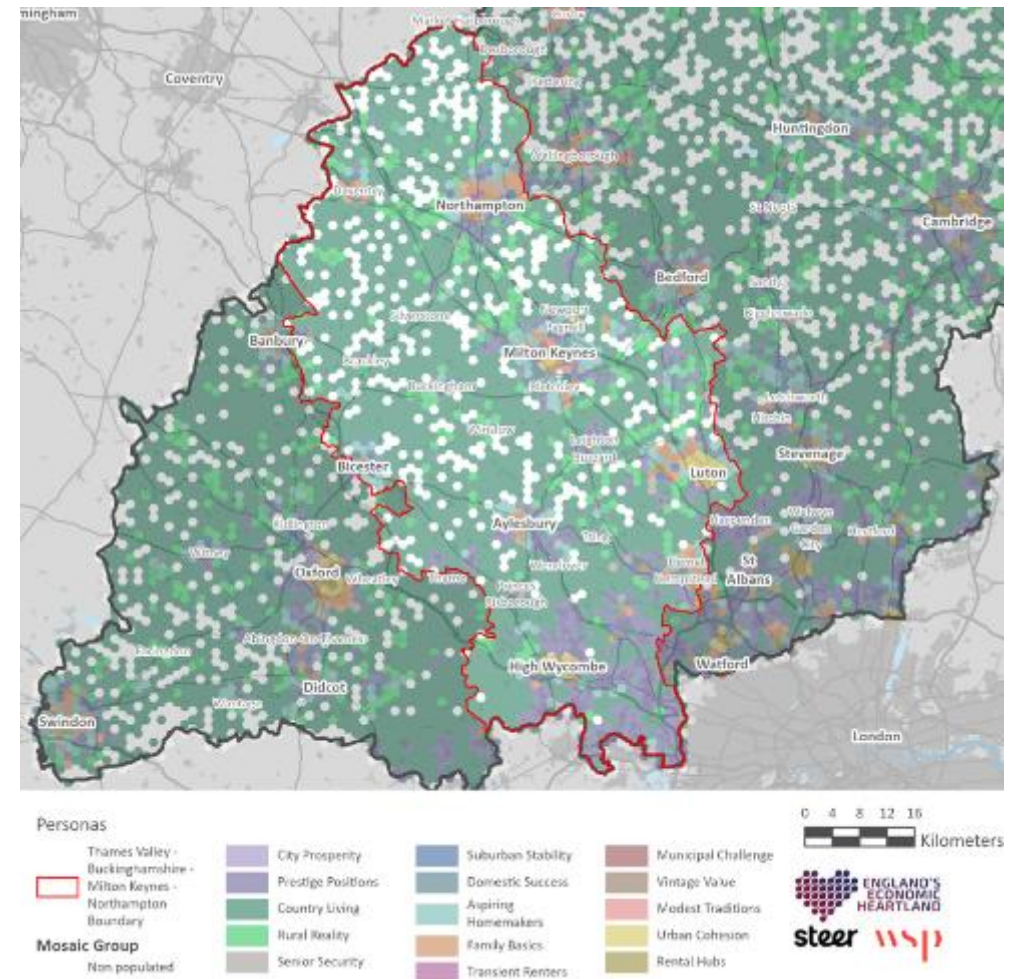
Propensity to Travel (By Mode)

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, the 'Family Basics' persona group places 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 in general.

These characteristics have been used to establish the propensity of each persona to use different modes of transport, this is their openness in general, regardless of what current provision is available to them. Table 3 includes the results of the scoring where a score of 1 indicates a low propensity to use that mode of transport (regardless of current provision and any future changes) 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 levels of propensity or openness to travelling by various modes of travel. These results can be used to make judgements about the potential for modal shift in different parts of the study area based on the most prevalent personas in various locations.

For example, the results show that the Prestige Positions persona does not have cost as a barrier to transport. Reviewing the geography of the study area, the Prestige Positions persona are prevalent in the south of the study area, therefore this information is useful in understanding current travel behaviour in the area and the potential impact of various travel interventions.

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[12]

	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

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

Mode category	Mode	City Prosperity (A)	Prestige Positions (B)	Country Living (C)	Rural Reality (D)	Senior Security (E)	Suburban Stability (F)	Domestic Success (G)	Aspiring Homemakers (H)	Family Basics (I)	Transient Renters (J)	Municipal Challenge (K)	Vintage Value (L)	Modest Traditions (M)	Urban Cohesion (N)	Rental Hubs (O)
Car	Car (Sole Use)	5	3	1	1	3	3	2	3	3	3	3	3	1	4	3
Car	Car (Sole Use & S - P2P)	3	3	2	4	4	1	3	2	1	2	4	4	4	3	3
Car	Car (Sole Use & S - Ride Share)	4	4	4	4	4	4	5	4	4	4	4	4	5	4	4
Car	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 and Wellbeing

Workplace Population

The number of people residing in the study area in employment (full time/part time and self-employed) was 949,000 in 2021, approximately half of the overall population and 60.34% of the population aged between 16 and 65 years. The urban areas with the highest workplace populations are Northampton (128,000 employees), Luton (103,500) and Milton Keynes (144,500), as shown in Figure 6.

Employment opportunities in these settlements area generally concentrated in their centre and on the periphery within logistics and business parks. Milton Keynes and Northampton both experience high levels of in-commuting from surrounding settlements. Lower levels of employment density can be seen in the town centres of rural areas, mostly in the areas west of the study area including Brackley, Buckingham and Daventry. In the south of the study area, the workplace population is distributed across a number of small and medium size settlements such as High Wycombe. These settlements experience high levels of commuting outside of their local authority area, likely to be associated with the proximity of London and availability of a larger and greater range of employment opportunities. Local Film industries play a role in providing key employment at the south of the study area with Pinewood studios and Bovingdon Airfield. Neighbouring Watford and Borehamwood also offer key locations within this industry that are worth noting for potential commuting destinations. **Jobs are predominantly located in the urban centres of the study area, with some smaller clusters in rural areas. To minimise the number of car trips to these centres of employment, interventions should focus on providing move sustainable and efficient alternatives through actions such as improving inter-urban public transport connectivity, intercepting car trips (e.g., via Park and**

Rides), as well as improving walking and cycling connectivity to local travel hubs (e.g., bus stops and rail stations).

Figure 6 Employment Density[13]

Employment - 2021

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Employment Density (per hectare)
Less than 100
101 - 250
251 - 500
501 - 1,000
1,001 - 2,500
Greater than 2,500

0 3 6 9 12 Kilometers

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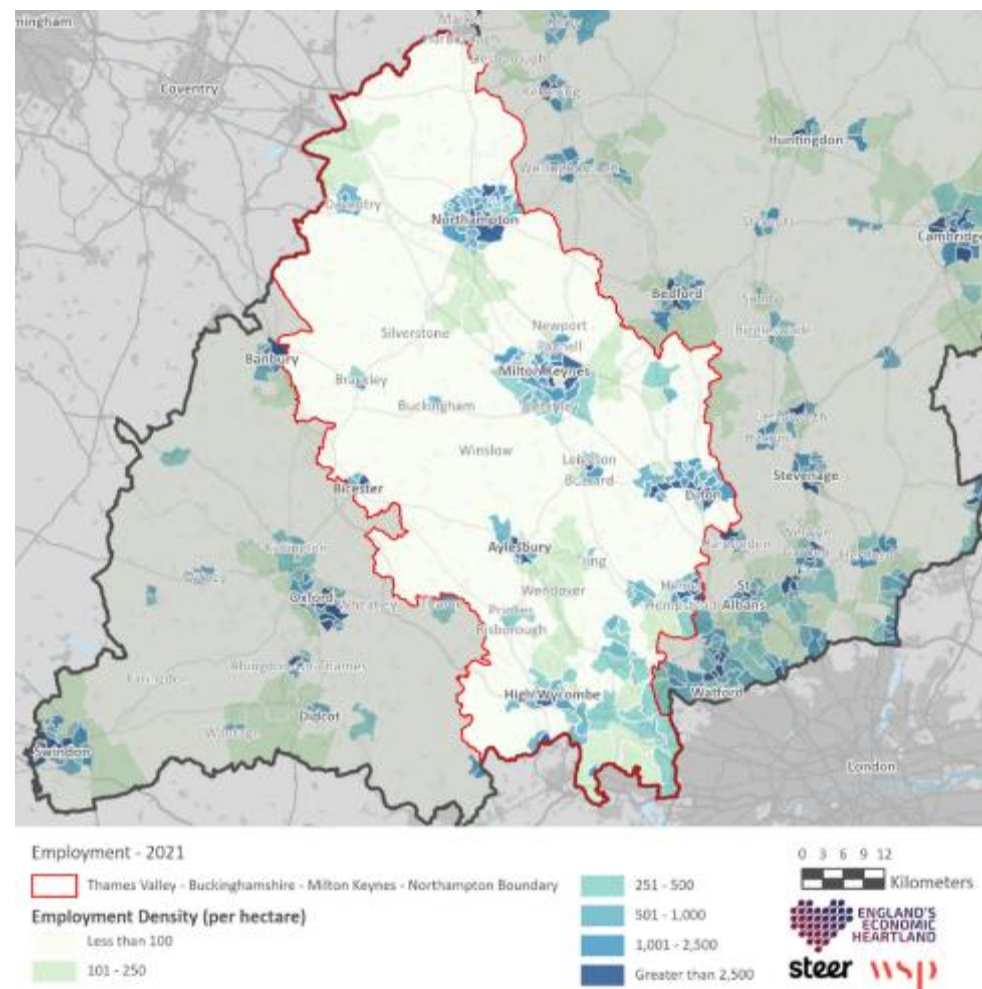
[13] Source: People in work, ONS, 2021, https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork

Average Earnings

In 2018 the average household income across all Middle Super Output Area (MSOA)s within the study area was £50,000 (salary before tax). This was slightly higher than the average of the EEH region (£49,484) and notably higher than the average for England (£43,888). As shown in Figure 7, across the 11 key settlements, the highest average income is recorded in Bicester at £55,975. High average household earnings are also observed in High Wycombe and Aylesbury. This finding aligns with the dominant persona of 'Prestige Positions' identified within the south of the study area through the Mosaic Data analysis.

Relatively low average household incomes are observed in the centres of the larger urban areas such as Daventry, Milton Keynes, Luton and Aylesbury, with the lowest average earnings in Northampton at £40,774. Factors contributing to this may include the proportion of the population that is economically inactive[14] in Northampton which is at 26% compared to 19% in Bicester. There is also a clear north-south disparity in the income profile. Rural areas to the south surrounding High Wycombe consist of a cluster of neighbourhoods with the highest average income across the study area, whereas the lower household income bands can be seen in the north around Daventry and Northampton.

The southern parts of the study area include major business parks and aspects of film industry which include higher paid employment. Fuel poverty considers property energy efficiency rating and disposable income. Households considered fuel poor ranges from 17% in Luton to 5% in Milton Keynes[15]. **The north-south and urban-rural disparity in average income level across the study area may present challenges in respect to successfully decarbonising transport and improving accessibility, as low carbon options will need to be affordable and**

provide an integrated accessible network across the geography. Potential interventions could include affordably priced inter-urban public transport provision to enable low-income groups to access a wider range of employment opportunities. Transport options need to be efficient for populations who may be time poor such as higher income groups.

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[14] People not in employment who have not been seeking work within the last 4 weeks and/or are unable to start work within the next 2 weeks. Source:
https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/economicinactivity

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

Figure 7 Average Earnings[16]

Average annual household income by MSOA - 2018

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Average Household Income

Less than £35,000.00

£35,000.01 - £45,000.00

£45,000.01 - £55,000.00

£55,000.01 - £65,000.00

Greater than £65,000.00
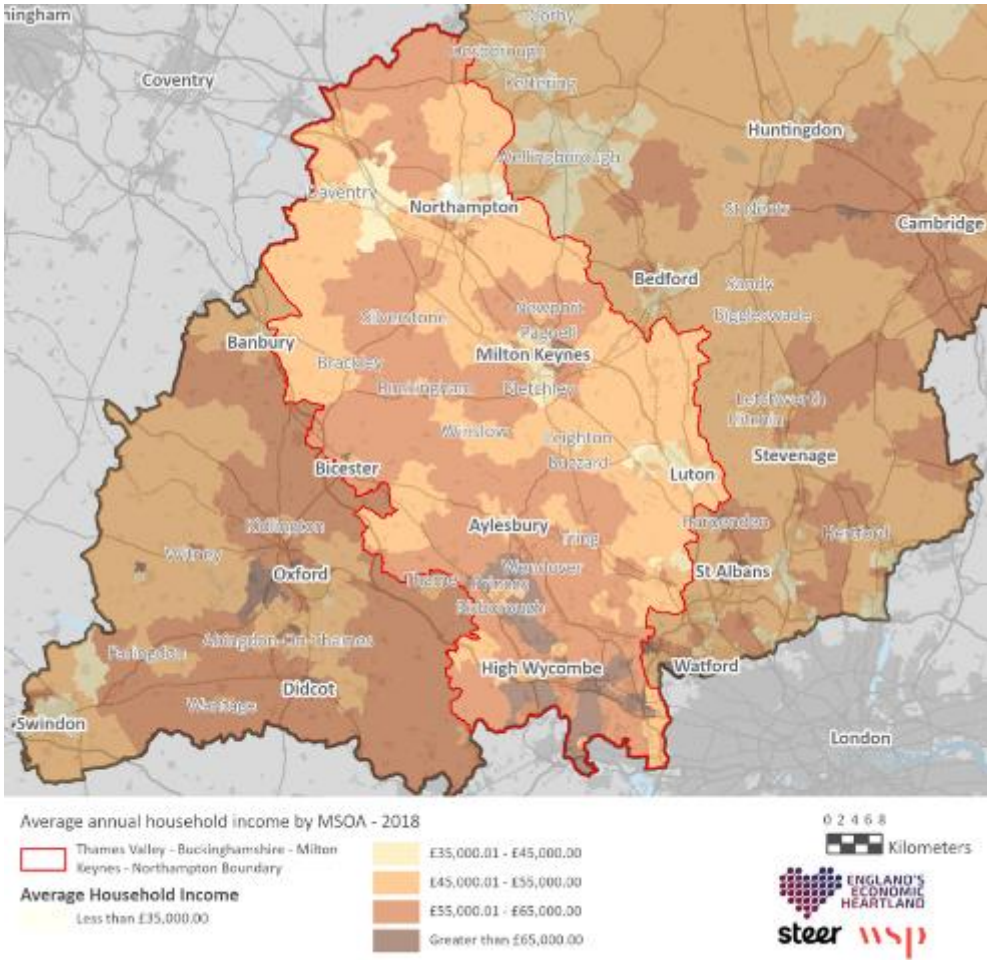
Indices of Multiple Deprivation

The Indices of Multiple Deprivation (IMD), an indicator reported by the ONS[17], includes various factors influencing the level of relative deprivation in an area, including income, employment, education, health, and the living environment. The 32,844 neighbourhoods (defined by the ONS as Lower Super Output Areas LSOAs) in England are ranked from most deprived to least deprived and divided into 10 equal groups to form 'deciles'. This means that in reporting an area can be stated as being in the top 10% most deprived or the top 20% least deprived etc. There is a clear urban / rural divide in respect to deprivation in the study area, with rural areas comparatively less deprived than urban centres (Figure 8). The most deprived neighbourhoods in the study area are clustered in the key settlements of Milton Keynes, Northampton, Luton, and Aylesbury, where some parts rank in the 10% most deprived LSOAs in England.

It can be seen spatially that areas with high levels of relative deprivation are often those where lower-income groups are found. This may be attributed to socioeconomic factors including housing prices, health and employment. Because of their low disposable income, households living in deprived neighbourhoods are less likely to be able to afford to drive. This makes this group likely to be reliant on public transport and active travel as cost-efficient travel modes to access jobs, services and amenities. **Improved connectivity can play an important role in 'levelling up' deprived areas of the study area by providing more equal access to more and higher paid and higher skill employment opportunities as well as services and facilities such as health and retail. To achieve this, it is important that transport options are affordable, inclusive and accessible to all residents, workers and visitors.**

Figure 8 Indices of Multiple Deprivation

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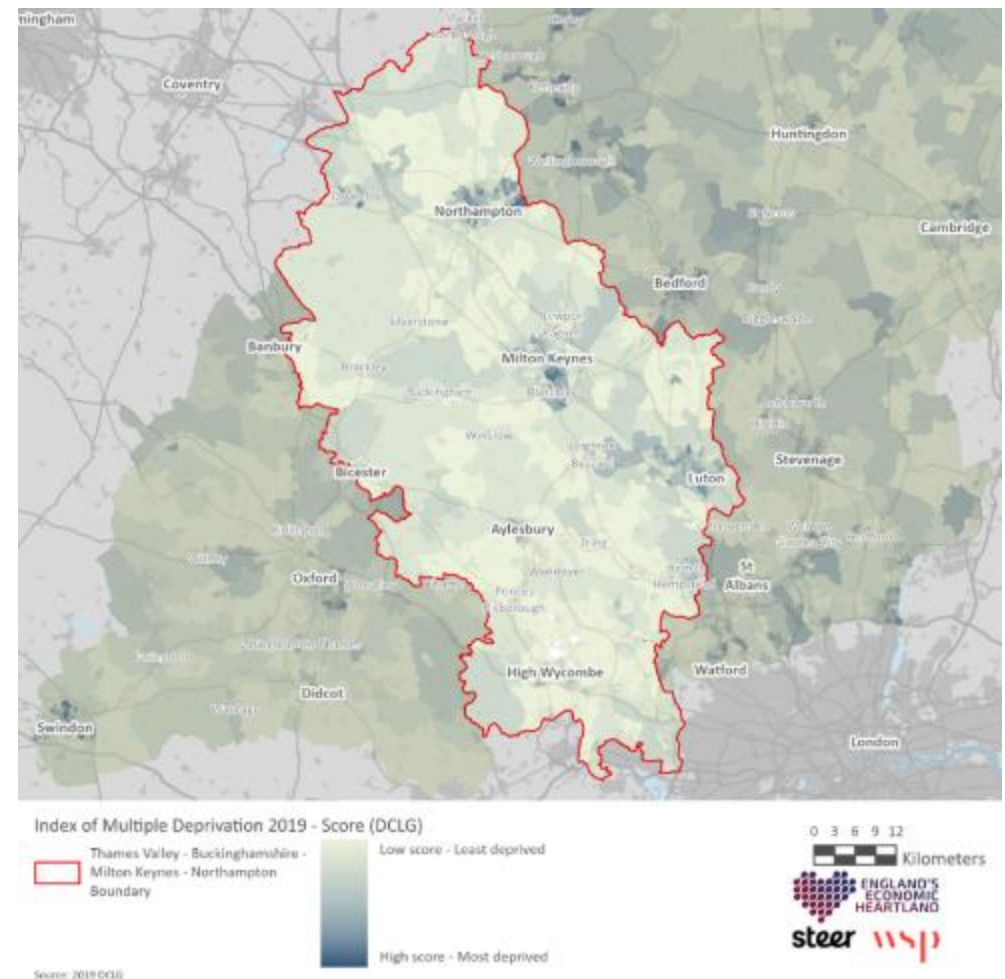
[16] Source: Income Estimates for small areas, FY2018, ONS, 2018, https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/bulletins/smallareamodelbasedincomeestimates/financialyearending2018

[17] 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[18] (states the number of cars/vans available to a household) provides an indication of an area's reliance upon the private car for transportation. Census 2021 data reveals that households in the study area had access to an average of 1.42 cars or vans as shown in Figure 9.

Average car and van availability per household is highest in rural parts of the study area. Outside urban areas, households have access to an average of 1.75 cars or vans. Luton has one of the lowest rates of household car/van availability in the study area, with an average of 1.21 cars or vans per household. Northampton, Milton Keynes, Aylesbury and High Wycombe, also have low levels of car availability (average of 1.2 to 1.4 cars or vans per household). This suggests lower levels of car dependency and greater availability of alternative mode choice such as public transport. Between the 2011 Census and the 2021 Census there has been a small growth in average household availability of cars and vans (+0.07). The increase is highest in urban areas (Milton Keynes, Northampton, Luton, and Aylesbury) and lowest in rural areas (north of Milton Keynes and Northampton) where there has been a reduction of 0.02 in the average number of cars and vans per household. This demonstrates a relatively small change given the overall figures stated above.

The evidence demonstrates that a significant number of households have access to multiple cars. There is a strong correlation between car availability and usage and the negative externalities associated with car use which can result in car dependency. In order to reduce voluntary car usage attractive public transport, shared mobility and active transport options are required. In rural areas of the study area where these options may not be commercially viable, alternatives such as demand responsive transport, car sharing and car clubs should be explored including affordable options to tackle issues of fuel poverty.

Figure 9 Average Number of Cars per Household[19]

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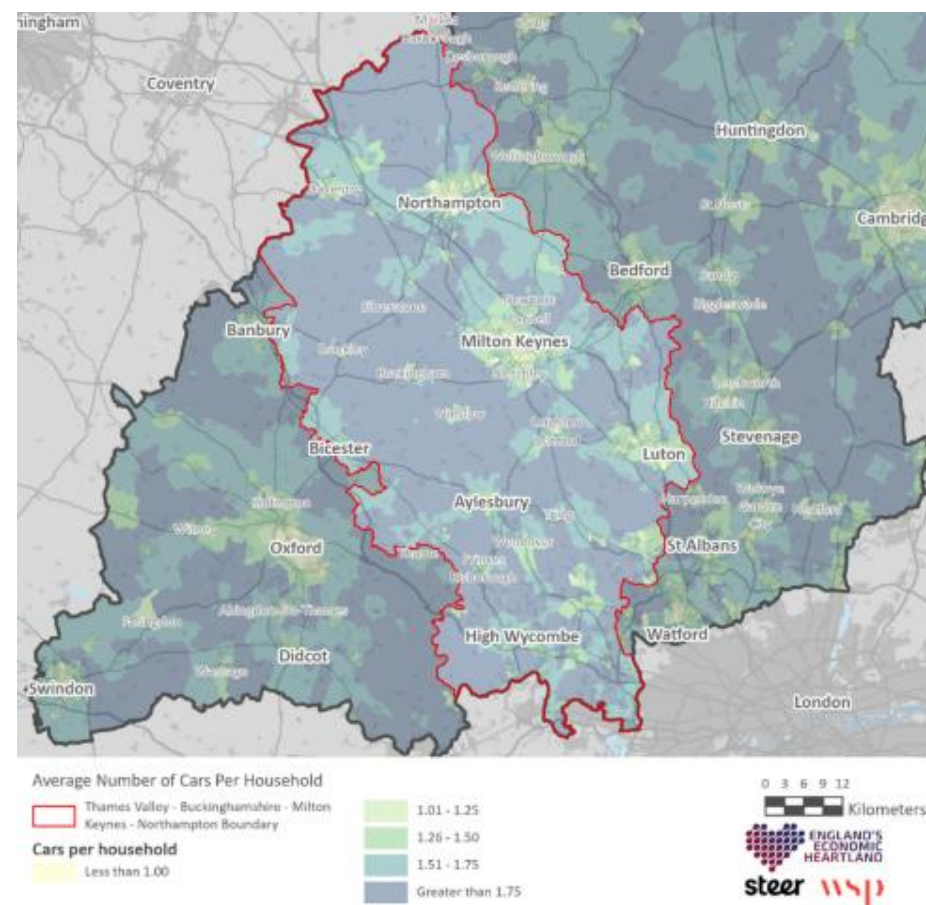
[18] Source: Car or Van availability, ONS, 2021, Car or van availability - Office for National Statistics (ons.gov.uk)

[19] 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 recorded by the ONS[20], measures the risk of premature death and the impairment of quality of life through poor physical or mental health. The lowest levels of health and disability deprivation (less than–0.100) were recorded in Aylesbury and High Wycombe towards the south and west of the study area as shown in (Figure). Luton, Milton Keynes and Northampton have the highest levels of health deprivation.

There is a clear correlation between areas with low average household incomes and areas with high levels of health and disability deprivation, with the lowest average household incomes also recorded in Northampton, Milton Keynes and Luton. Health deprivation also links to environmental factors, for example poor air quality in Luton due to high levels of congestion and the presence of the Airport (See Air Quality section for details of Air Quality Management Areas (AQMAs around Luton). Settlements in the south of the study area have the highest household incomes and in turn lower health and disability deprivation. Historically, urban areas have tended to have a greater availability and access opportunity for those with health conditions, whereas rural areas have tended to have fewer health services provision, which can disadvantage those with health conditions.

To help promote positive health outcomes in areas of high health and disability deprivation, interventions should focus on improvements to active and inclusive travel provision and usage. To encourage positive travel habits, it is

also important that new developments, particularly those on the periphery of existing urban areas, are accessible by sustainable modes of transport from the outset. There is also the opportunity to capitalise on growing health consciousness amongst populations to promote active travel.

Figure 10 Health and Disability Decile[21]

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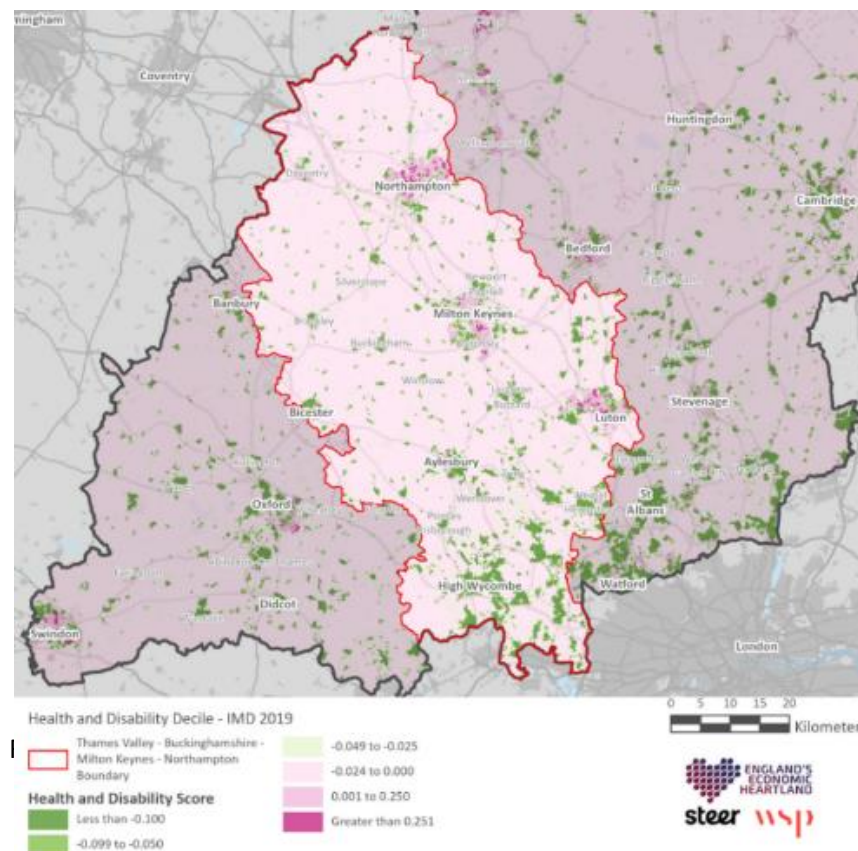
[20] Source: Health & Disability Decile, ONS, 2021, https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/disability/articles/disabilitybyagesexanddeprivationenglandandwales/census2021

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

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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 by the DfT. Appendix H – Accident data by Mode provides a a breakdown of PIAs by mode. During this five-year period a total of 5,955 accidents were recorded in the study area for all vehicle types, with 47% of them occurring on the SRN and 53% on MRN. Of these 82% were of slight severity, 15% serious severity, and 3% were fatal. The average number of accidents that occur in the study area in each year on the SRN and MRN is 1,191.

The number of PIAs generally increases around large urban areas, with the highest concentration of PIAs occurring around settlements of Milton Keynes, Northampton, and Aylesbury. Many fatal PIAs have been recorded along the M1 – one of the most heavily trafficked motorways in the study area – and also along A5 from Dunstable to Rugby – a single carriageway A Road which provides an alternative parallel route to the M1. Most of the accidents on A roads occurred in close proximity to existing junctions. It can be seen that in general the accidents are dispersed along the whole length of the motorways.

The evidence identifies a number of routes within the study area with high concentrations of total fatal and serious severity accidents. To address this, a safer systems approach should be adopted that recognises human error is not the singular cause of fatal and serious collisions – instead they also result from system failure – this may be associated with surfacing, lighting, signage, highway engineering factors etc. Improving Road safety on single-carriageway A roads should be a priority.

Figure 11 Accident Location & Severity[22]
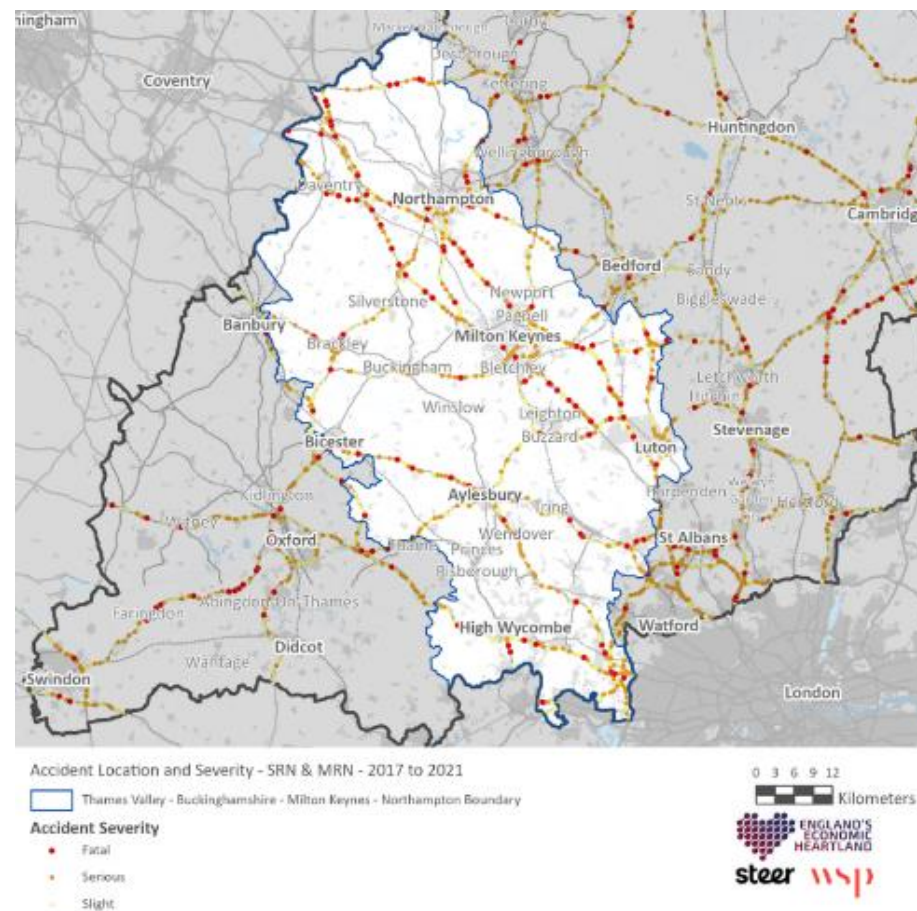
Road Safety – HGVs

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

shows the location of PIAs on the Strategic Road Network (SRN) or Major Road Network (MRN) between January 2017 and December 2021 that involved at least one HGV (vehicle > 7.5 tonnes).

During this 5-year period a total of 662 PIAs involved an HGV. This is 11% of the total number of PIAs recorded in the study area during the same period. Of all PIAs involving a HGV, 77% were of slight severity, 16% were of serious severity, and 7% were fatal - this indicates that whilst most accidents do not involve HGVs, where a HGV is involved the fatality rate is more than double that of involving a car, i.e. 7% compared to 3%.

The majority of PIAs involving a HGV occurred on the M1, between St. Albans and Rugby. This is to be expected as it has the highest HGV traffic flow of all routes in the study area. Notable A-roads such as the A41 West of Aylesbury also saw high levels of HGV accidents. The A41 is a single-carriageway road, which could represent a higher risk of collisions for HGVs which are slower moving, longer vehicles. As a single carriageway the resilience of the route is also limited when collisions occur, i.e. inability to use other lanes to keep traffic flowing if lane closure is required.

This information will help with the identification of interventions that specifically target a reduction in accidents involving HGVs along strategic roads, such as the M1, A5/A508 and A41. Although motorways can show slightly higher resilience to accidents due to increased traffic lanes, single carriageway A and B roads show limited resilience to accidents and can restrict all transport movements.

A summary of the issues and opportunities covered with the Current Context – People chapter is provided in .

Table 4.

Table 4 Current Context – People

Theme	Issues	Opportunities
POPULATION	**Sparse, car dependant rural populations** – Much of the study area, especially in the northwest is comprised of smaller rural settlements. Rural communities have complex needs in respect to travel and accessibility. 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 populations** – 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. **Improved shared and public transport connectivity to/from large urban areas** - Active travel solutions for rural populations are often not realistic due to the distances which must be travelled. Alternative interventions that may be more viable include demand responsive transport, car clubs and car sharing schemes, high quality bus services, e-bikes and other new mobility options.

Theme	Issues	Opportunities
COMMUNITY	**Different interventions needed to target different groups of people** – The study area includes a diverse range of personas, ranging from the rural based Country Living / Rural Reality typologies in the rural northwest to the Urban Cohesion typology which dominates town centres. Each of these can have different propensities to take-up mobility solutions. 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 population 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 Northampton where trip generators and destinations are in close proximity to one another, and where there are low-income groups for example the Urban Cohesion typology are typically dominant. Younger members of the Urban Cohesion typology typically have high levels of interest in new technologies and thus emerging mobility solutions like E-scooters may be particularly successful.
EMPLOYMENT	**Income disparity** –There is high levels of income disparity in the study area. Average earnings of residents living in central Northampton and Milton Keynes have lower than the study area average earnings comparative to residents living in High Wycombe in the south. Rural areas generally have higher average earnings than urban areas and may be less inclined to use public transport. This issue is exacerbated by many of these groups being time poor in accessing employment, facilities, and services.	**High quality inter-urban public transport serving commuters** – Much of the study area have higher than average earning comparative to the wider UK, with particularly high-income groups located in and around High Wycombe/ Princes Risborough. There may be an opportunity to provide high quality inter-urban public transport links to attract these populations away from driving, for example bus rapid transit systems which are more attractive to high income groups than traditional bus services.
DEPRIVATION	**High car availability leading to car dependency** – Car availability in the study area is high, particularly in the suburban and rural areas in the north west between Milton Keynes and Banbury. High car availability can lead to car dependency and resulting levels of a predominant private car modal share. A cycle of car availability and car dependency is driven by the way our infrastructure network has been planned and where development has been allocated. Cars are not the most efficient use of road space for mass movement of people, therefore congestion can occur as well as air quality issues. In order to reduce car dependency and usage, it is vital to improve the availability, reliability and attractiveness of alternative modes such as public transport, cycling and walking.	**Creating social cohesion and providing choice** – Improved public transport connectivity between areas of high and low income can help create social cohesion. Providing choice of transport options can connect people to a greater number of employment opportunities. As much of income deprivation in the study area is in urban centres, including in central Luton and Milton Keynes, 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.

Theme	Issues	Opportunities
HEALTH & WELLBEING	**Health deprivation as a barrier to active travel** – The study area has a diverse range of health deprivation, with high levels of health and disability deprivation found in predominantly urban areas including Northampton, Milton Keynes and Luton. Health issues may limit public transport options and the potential for active modes of travel for some population groups.	**Public health benefits from increased levels of active travel** – Intra-urban active travel connectivity, especially within larger urban centres like Milton Keynes and Northampton may help to address the high levels of health and disability deprivation which is present in these areas by encouraging the use of walking and cycling for shorter and medium journey distances, which are more realistic distances for these modes. An accessible transport network or access to services needs to be provided in rural areas to ensure this population is not disadvantaged in terms of access to opportunities, including health services provision.

5 Current Context (Place)
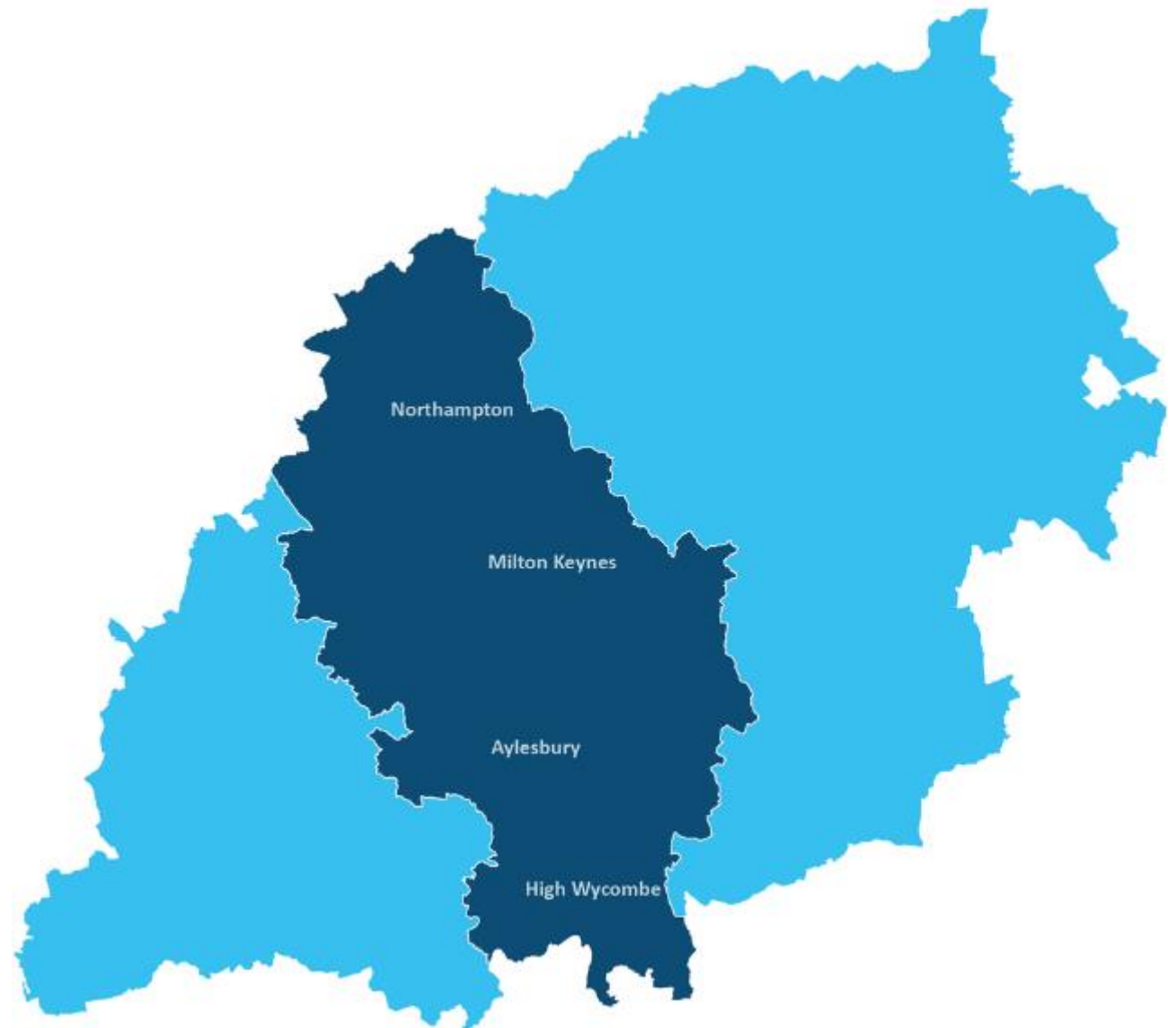
Place

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 equivalent emissions by 2050, with a target to reach 78% reduction by 2035. In 2020 the total amount of road-based Carbon Dioxide emissions within local authorities in the study area was 1,367Kt, representing 41% of road-based emissions in the EEH region. The average transport carbon emission per capita for the study area was 2.23 Kt per person exceeding the EEH average of 1.9Kts.

Figure 12 illustrates that the highest levels of road-based carbon emissions are in the immediate vicinity of the M1, a key long-distance strategic route. There are opportunities to consider trips starting and ending outside of the study area in terms of interventions to reduce road-based carbon emissions. It should also be noted that diesel trains and aircraft are a considerable contributor to transport carbon emissions. There is a need for decarbonisation/electrification of the national vehicle fleet in terms of transport as a whole.

Urban settlements such as Northampton also have high levels of carbon emissions, possibly due to the large industrial / freight presence in these settlements. Rural car dependency and busy A roads leads to rural settlements having notable levels of carbon emissions such as Silverstone. 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. There is a key challenge in balancing the local environmental impact of Luton Airport with its economic importance. In 2020 total CO_2 emissions in the EEH region stood at 25,593kt, equating to 10% of all emissions in the UK. Over the last five years CO_2 emissions have fallen at a slower rate in the study area than the comparative average for the UK – 11% compared to 13% between 2012-2017.

Reducing transport carbon emissions is a substantial challenge for the study area due to high car dependency and lack of sustainable travel connections within and between them. There are however opportunities for vehicle electrification and rail decarbonisation. Interventions focused on reducing the need to travel, enabling behaviour change to active and sustainable modes of travel and switching car and HGV travel to use alternative fuel types will assist in the strategy to reduce carbon emissions from transport. Reducing the carbon intensity of journeys by providing higher capacity vehicles (public transport/mass transit), decarbonising private vehicles, and encouraging/facilitating as many trips as possible to be made by walking or cycling in combination is a strategy to reduce carbon emissions.

Figure 12 Carbon Emissions[23]

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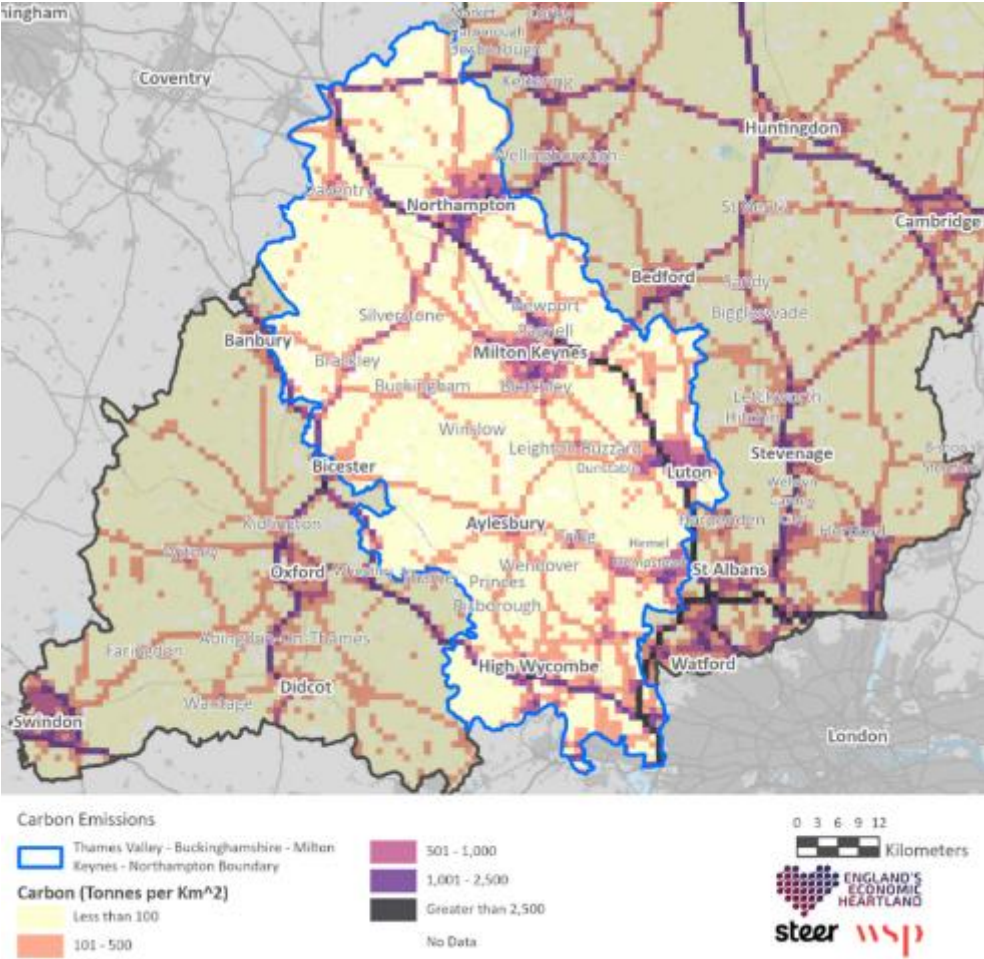
[23] Source: UK Local Authority and Regional Carbon Emissions, 2020,

Flood Risk

Parts of the study area fall into Flood Zone 2 (a 1 in 1,000 year or greater annual probability of flooding) or Flood Zone 3 (1 in 100 or greater annual probability of flooding) as shown in Figure 13. Areas of flood risk surround the key rivers of the study area including the River Nene near Northampton, River Great Ouse near Milton Keynes and Newport Pagnell as well as the River Thames found at the southern border of the study area. This presents a risk to existing urban settlements, but also restricts future urban expansion. Other areas of flood risk can be seen in the centre of the study area surrounding Bicester, Aylesbury and Buckingham. The River Ray found near Bicester poses a large flood risk. The flood risk area covers the A41 as well as the Chiltern Mainline. The River Thames presents a flood risk in Aylesbury and Princes Risborough. In recent years the impact of climate change has made some weather and flooding events more severe than was historically the case. There is a consensus in the scientific community that climate change will only increase threats of extreme weather, further increasing the need for a more resilient transport network that can withstand and recover from severe flooding.

The parts of the study area which surround the River Nene, River Great Ouse and the River Thame 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 work around planned flood defence / mitigation plans.

Figure 13 Flood Risk[24]

Flood Risk

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

■ Flood Zone 2: 1 in 1,000 or greater annual probability of flooding

■ Flood Zone 3: 1 in 100 or greater annual probability of flooding

Source: Environment Agency , Natural England

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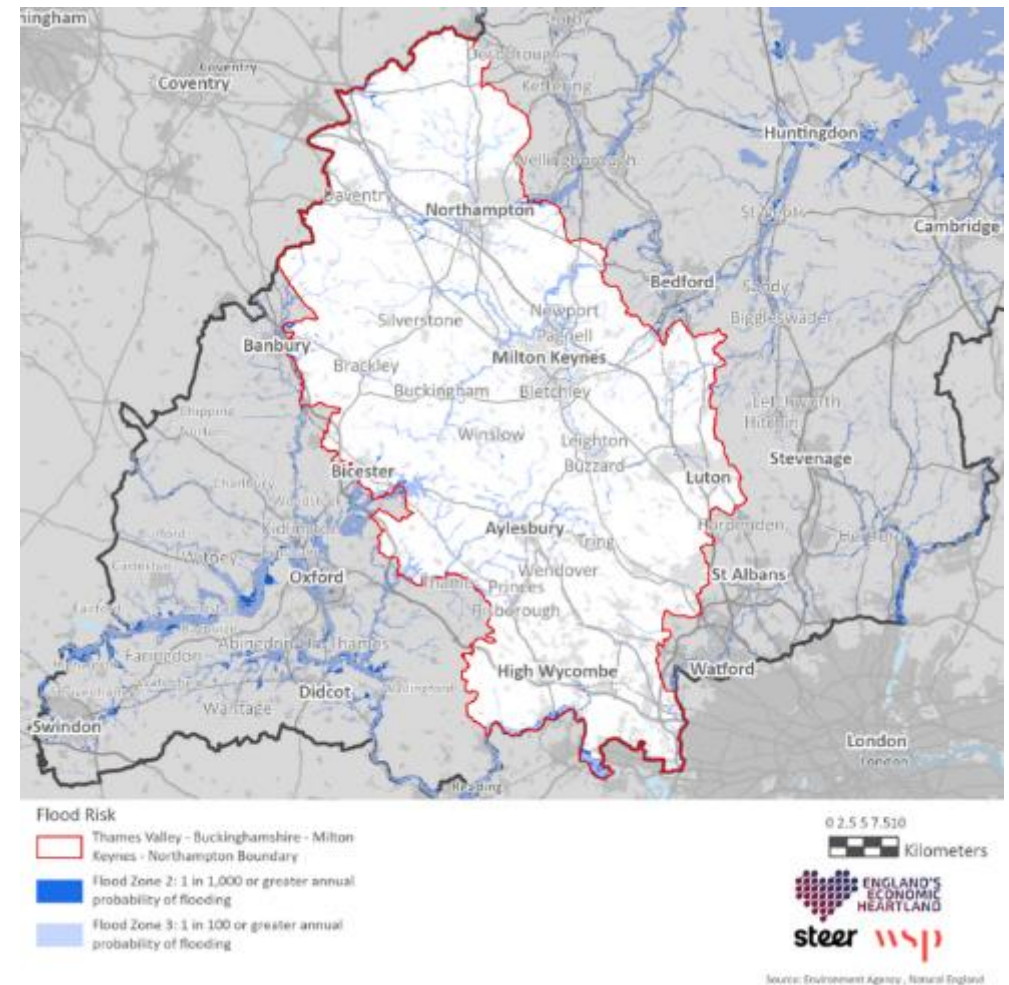
[24] Source: Environment Agency Flood Zones

Figure 14 Protected and Vulnerable Areas[25]
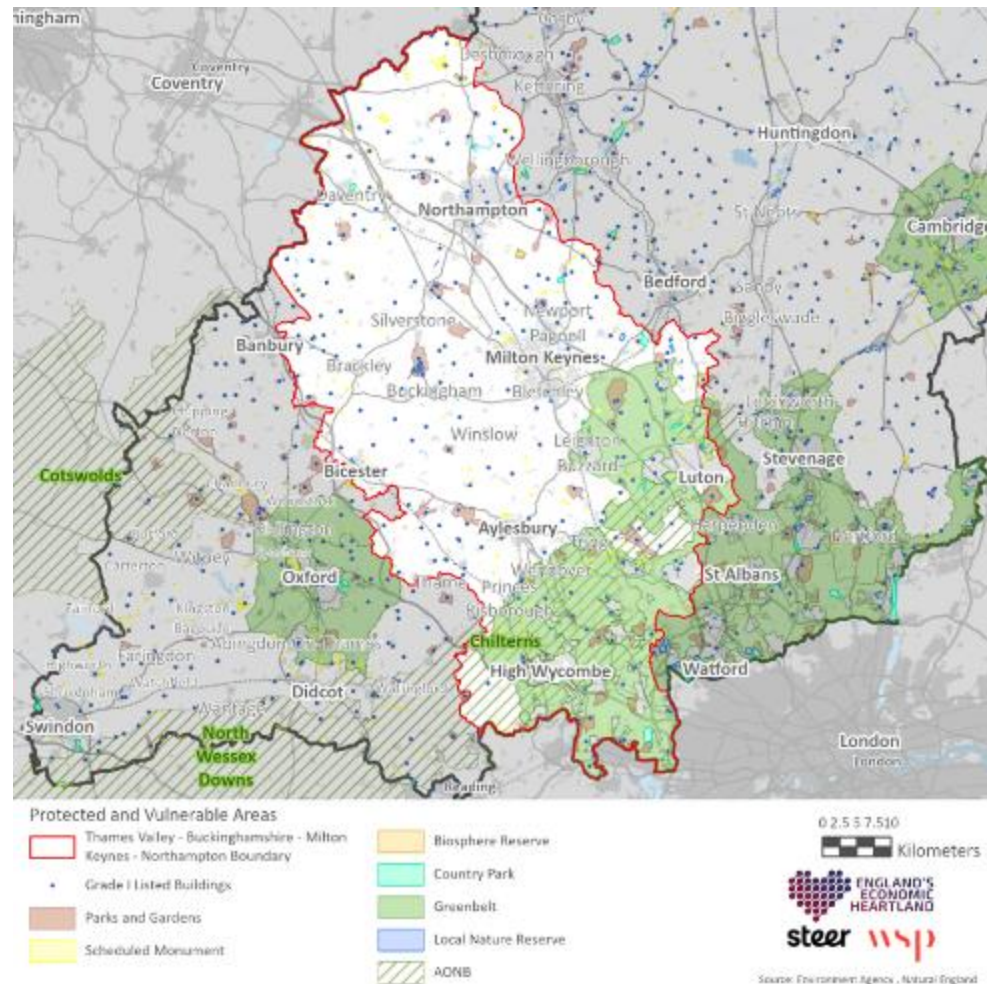
Heritage

In total, there are 323 Grade I and 12,997 Grade II listed buildings within the study area (Figure 15). There are a cluster of listed buildings situated in Stowe School located north-West of Buckingham. Listed buildings can be found throughout the study area in both rural and urban areas.

Ecology

A large amount of the southern section of the study area is currently represented as the Chilterns area of outstanding natural beauty (AONB).

There are several parks and gardens in the study area, including the Ashridge Estate Near Berkhamstead, Woburn Abbey near Leighton Buzzard and Stowe near Buckingham.

Green Belt

A large area of green belt (designated area within Local Plans with limits on any permitted development) surrounds the southern section of the study area, around High Wycombe, Luton, Princes Risborough and Leighton Buzzard. The green belt found in the study area is mostly that surrounding the north of London which is in place to assist in safeguarding the countryside from encroachment and prevent urban sprawl.

The locations of protected areas and buildings can create concerns for implementing new transport solutions. New infrastructure proposals will need to ensure as little impact on local environments and heritage as possible.

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

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Air Quality

There is a total of 27 Air Quality Management Area's (AQMAs[26]) within the study area, representing a total of 30% of the AQMAs within the EEH region (Figure 16).

Most of the AQMAs are clustered within either Luton or Northampton, with others located on major road links in the study area including on the M40, M25 and M4. South Buckinghamshire has also established a large area AQMA on the southern border of the study area, surrounding the M25.

All of the AQMAs within the study area have been designated as a result of excessive levels of Nitrogen Dioxide (NO_2). This is produced when fuel is combusted in an engine in the presence of air and its presence is mostly attributable to road traffic. It is also produced from particulate matter from vehicle tyres and wood burning.

The establishment of AQMAs highlights the severity of air quality issues in the study area. To address this, interventions should explore opportunities to reduce the need to travel, promoting alternatives to car use, such as public transport, walking or cycling or through measures to increase the uptake of alternately fuelled vehicles. However, AQMAs associated with the strategic road network (e.g., M1 southwest of Northampton) are likely to be more challenging to address as these roads often support longer distance through trips.

Figure 15 Air Quality Management Areas[27]

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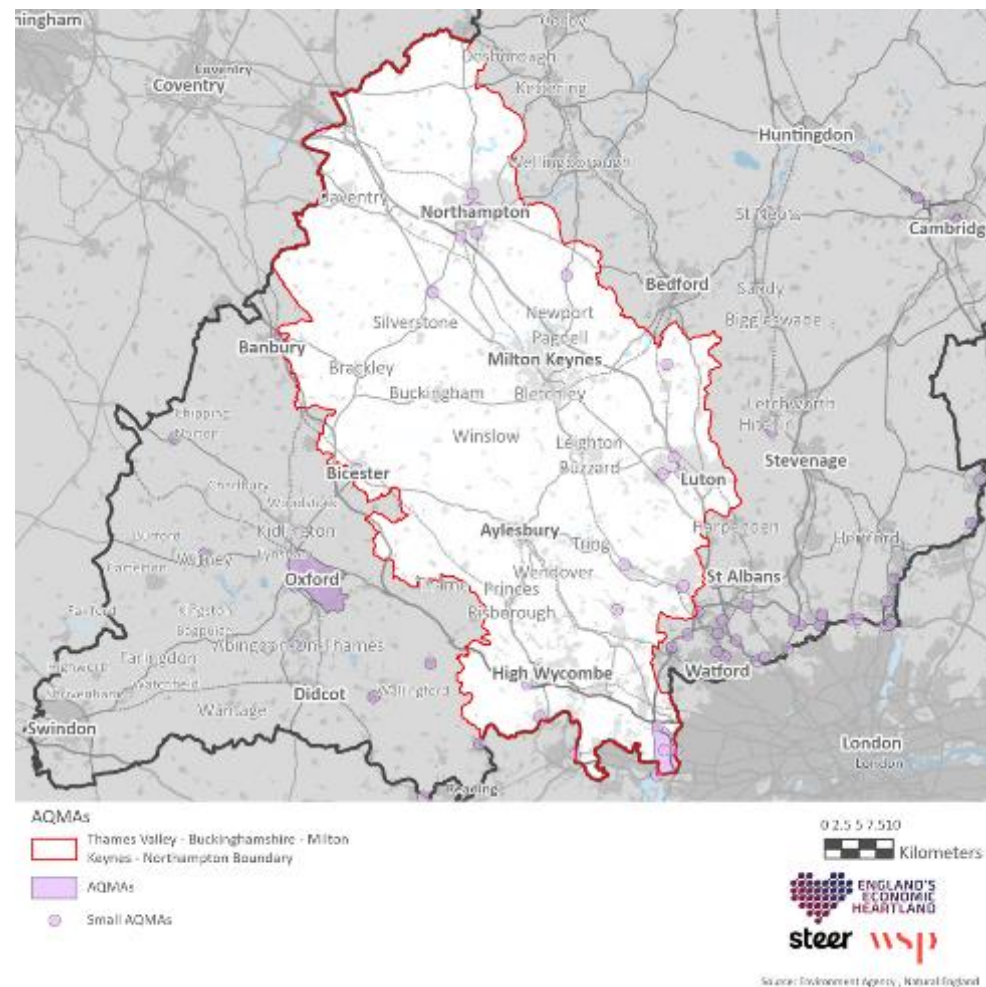
[26] Source: An AQMA is designated by DEFRA (2023)

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

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Economy

Housing Affordability

In 2018, the average house price in the study area was £336,117, whilst the average household income in 2021 was £50,016 (Figure 17). This results in an average affordability ratio of 6.6, which is slightly lower than the EEH average ratio at 6.7. The affordability ratio is average house price divided by average household income and can be used as an indicator of affordability across different geographic areas.

The south of the study area, for example the area to the southeast of Aylesbury (e.g., Long Marston, Hedgerley, Fulmer and Gerrards Cross) is the least affordable area of the study area with an affordability ratio >10. This is largely attributed to very high average house prices (>£500,000) driven by proximity of this area and its direct transport links to London.

The key urban settlements are generally more affordable. Aylesbury, Bicester and Milton Keynes have an affordability ratio of between 5.1 - 5.4. This is associated with lower average house prices across the three areas (£270,000). A ratio of 6 is recorded in Northampton, however this is attributable to both lower average household incomes (£40,774) and relatively low average house prices (£205,949).

There is a clear north/south divide in the study area is respect to housing affordability, with properties in the south of the study area being disproportionately higher than earnings. This is likely driven by proximity of these area to London, with the south of the study area being in easy commuting distance of the capital. 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. 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 16 Housing Affordability[28]
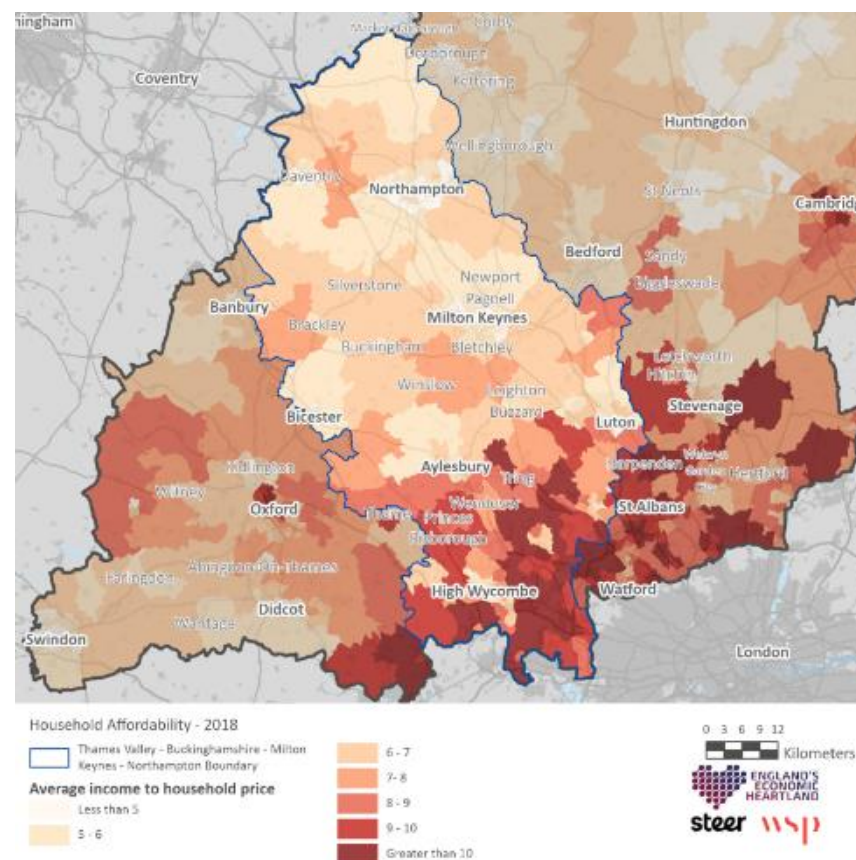
Household Affordability - 2018

Industry Split

The EEH region is the heart of UK's academic and commercial research sector. The EEH has a clear strategy to enhance the area as an 'innovation powerhouse', building on the region's combination of scientific and cultural assets, resulting in a highly skilled workforce.

As identified in the data in Table 5, the "Business administration and support services" industry is the largest employer in the study area (16.3%) and higher than the average for England. The "Transport and Storage" industry also has higher than average representation in the study area, Prominent industry hubs within the study area include:

1. Magna Park in Milton Keynes offering one of the largest distribution centres in the UK.

2. Motorsports in the North of the study area: Red Bull Racing in Milton Keynes, Aston Martin in Silverstone.

3. Digital Creative: Atos in Milton Keynes and McAfee in Aylesbury.

4. Life Science: Johnson & Johnson, GE Healthcare located in Buckinghamshire and Omron in Milton Keynes.

5. Aviation and Aerospace: Easyjet in Luton, Safran in Aylesbury, and Rockwell Collins in Milton Keynes.

6. Northampton University: holding 12,060 students in 2019/20. In the 2012 Guardian University League Table, ranked first for 'value added' in the UK.

To maximise the economic potential of key industries within the study area and support decarbonisation, interventions should focus on better connecting existing and emerging industry hubs with a skilled workforce via more sustainable modes of transport, particularly those situated outside large urban areas (e.g. Silverstone).

Table 5 Business Register[29]

Industry	Study Area (%)	EEH Region (%)	England (%)
Agriculture, forestry and fishing	0.1%	0.1%	0.1%
Mining, quarrying and utilities	0.7%	1.0%	1.2%
Manufacturing	6.7%	7.4%	7.5%
Construction	4.4%	4.9%	4.8%
Motor trades	2.1%	2.0%	1.7%
Wholesale	5.4%	4.6%	3.7%
Retail	8.5%	8.7%	9.1%
Transport and storage	7.3%	5.8%	5.2%
Accommodation and food services	5.9%	6.0%	7.5%
Information and communication	4.4%	4.8%	4.7%

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

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Industry	Study Area (%)	EEH Region (%)	England (%)
Financial and insurance	2.7%	2.3%	3.7%
Property	1.8%	1.7%	1.8%
Professional, scientific and technical activities	8.1%	10.4%	9.3%
Business administration and support services	16.3%	12.2%	9.0%
Public administration and defence	2.9%	2.8%	4.3%
Education	8.5%	10.0%	8.8%
Health	10.2%	11.1%	13.4%
Arts, entertainment, recreation and other services	4.0%	4.1%	4.3%
TOTAL	**100%**	**100%**	**100%**

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. The table alongside 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 towards 39% of the region's GVA as shown in Table 6. In 2019 the study area had a total GVA of £65,495 million. Wholesale and retail trade / repair of motor vehicles contributed a large proportion (16.2%) of GVA comparative to both the wider EEH (13.2%) and England as a whole (10.6%). This can be attributed the presence of large businesses such as Nissan Technical Centre and Volvo as well as the motorsport industries in Northamptonshire. Whilst the prominence of the motoring trade in the study area may negatively influence public attitudes

towards non-car modes of transport, it may also help encourage the uptake of zero emission vehicles. The "Finance and Insurance" industry has a lower-than-average presence in the study area, however the "Business administration and support service sector" has a significant presence in the study area at 16.3% compared to the regional 12.2% and 9.0% Nationally. Transport and Storage is also a significant business type in the study area at 7.3% - this type of industry is typically difficult to reduce travel demand and does not allow for remote working, however vehicles could be decarbonised.

It is important that interventions support the growth of key industries and economic hubs in the study area. Interventions must focus on connectivity improvements that support the movement of both people and goods whilst supporting decarbonisation.
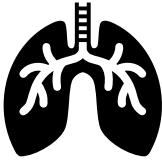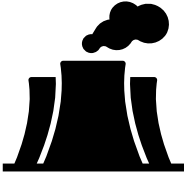
Table 6 GVA by Industry by area[30]

Industry	Study Area		EEH Region		England	
	GVA (£million)	%	GVA (£million)	%	GVA (£million)	%
Agriculture, mining, electricity, gas, water and waste	1,312	2.0%	5,577	3.3%	55,590	3.2%
Manufacturing	7,063	10.8%	19,690	11.7%	167,185	9.6%
Construction	4,755	7.3%	12,536	7.4%	112,352	6.5%
Wholesale and retail trade; repair of motor vehicles	10,604	16.2%	22,358	13.2%	183,407	10.6%
Transport and storage	3,534	5.4%	6,575	3.9%	70,899	4.1%
Accommodation and food services	1,568	2.4%	4,016	2.4%	50,574	2.9%
Information and communication	3,368	5.1%	9,490	5.6%	115,661	6.7%
Financial and insurance	3,758	5.7%	8,629	5.1%	147,534	8.5%
Real estate activities	8,476	12.9%	21,441	12.7%	234,058	13.5%
Professional, scientific and technical activities	3,769	5.8%	13,128	7.8%	136,637	7.9%
Business administration and support services	3,782	5.8%	10,127	6.0%	92,527	5.3%
Public administration and defence	2,907	4.4%	6,234	3.7%	76,453	4.4%
Education	3,859	5.9%	11,771	7.0%	102,668	5.9%
Human health and social work activities	3,672	5.6%	10,428	6.2%	125,655	7.2%
Arts, entertainment and recreation	1,351	2.1%	3,175	1.9%	29,146	1.7%
Other service activities	1,560	2.4%	3,413	2.0%	30,153	1.7%
Activities of households	157	0.2%	410	0.2%	3,603	0.2%
TOTAL	**65,495**	**100%**	**168,998**	**100%**	**1,734,102**	**100%**

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

A summary of the issues and opportunities covered with the Current Context – Place chapter is provided in Table 7.

Table 7 Current Context – Place: Summary

Theme	Issues	Opportunities
Air Quality	**High proportion of through traffic –**The highest level of air pollution in the study area is in the immediate vicinity of the M1, a key long distance strategic route. This is reflected in the presence of 27 AQMA's in the study area, all of which were designated as a result of excess Nitrogen Dioxide levels, which is typically released from traditional combustion engines and thus is associated with road traffic. As such, much of the air pollution is likely to be associated with journeys both starting and ending outside of the study area. **Freight and Logistics Industries attract significant volumes of HGV trips** – The logistics and freight industry have a strong presence in the study area, due to the large number of distribution centres along the M1 corridor. Milton Keynes is home to large distribution centres for Amazon, John Lewis / Waitrose and River Island in Magna Park. This results in a large volume of HGV movements on local and strategic road network in the study area. This in turn has an adverse impact on air quality.	**Shared mobility solutions for the decarbonisation of intra-urban trips**– 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. In rural areas there are opportunities to explore demand responsive services, car clubs and car sharing schemes. **Support the uptake of electric vehicles –** there are opportunities to explore the rollout of EV charge points along the MRN and SRN in the study area. This will help support the uptake of zero emission vehicles, particularly by users travelling through the study area (e.g., along the M1 corridor).
Carbon and Climate Change	**Higher than average carbon emissions per capita** – The average transport carbon emission per capita for the study area was 2.23 Kt per person, exceeding the average for the EEH of 1.9Kts. This is likely to be associated with the presence of a number of key strategic roads in the study area and high proportion of through trips. **London Luton Airport** – In Luton 8.3% of all transport carbon emissions are associated with "other sources", which is likely attributable to London Luton Airport. There is a key challenge in balancing the local environmental impact of Luton Airport with its economic importance.	**Strength of the motor trade in the study area** – GVA split indicates the great potential of developing high-tech vehicle research and manufacturing activities within the study area. Whilst the prominence of the motoring trade in the study area may negatively influence public attitudes towards non-car modes of transport, it may also help encourage the uptake of zero emission vehicles. Interventions of decarbonization technology and green energy associated with the car industry could boost a sustainable transport network across the EEH region. **Surface transport improvements at London Luton Airport –**There is limited opportunity for EEH to address carbon and air quality impacts associated with the aviation industry. However, there are opportunity for interventions to improve the sustainability of surface transport to / from London Luton Airport.
Built Environment	**Housing Affordability –**There is a clear north/south divide in the study area in respect to housing affordability. For many people working in the higher than average priced southern part of the study area, housing in this location will be unaffordable, prompting them to live in other more affordable settlements	**London Green Belt –** A large proportion of the southern section of the study area is designated green belt surrounding Greater London, especially in the southern section of the study area. This could be an opportunity for the provision of active travel 'greenways' within these areas.

Theme	Issues	Opportunities
	within the study area. This has the potential to result in longer, car based, inter-urban commuting journeys.	**Improved inter-urban public transport –** Improvements to long distance public transport could help address housing pressures (affordability) in the south of the study area by making long distance travel quicker and easier.

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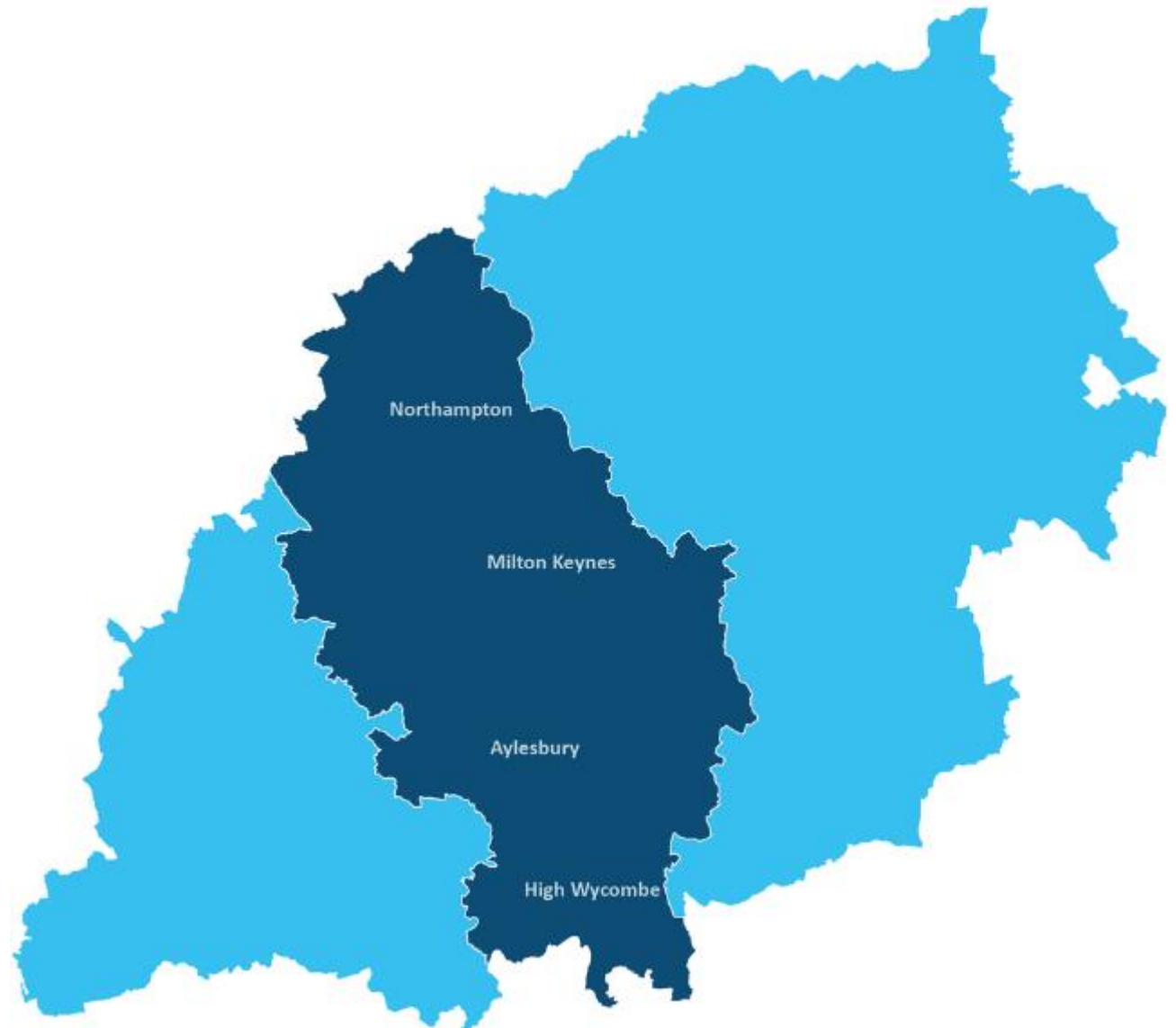
Connectivity
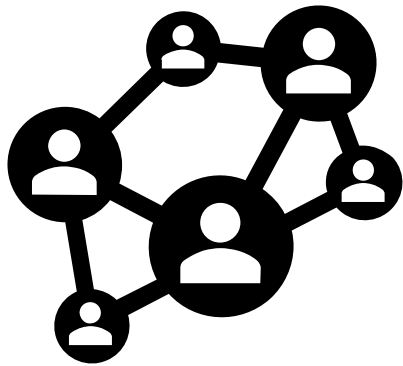
The connectivity evidence presents a set of transport network, modal and movement data to gain an insight into the current pattern of travel, connectivity challenges and opportunities within the study area.

Digital Connectivity

Average Download Speeds

The map shows the proportion of household premises with gigabit internet availability (Figure 17). The map shows a clear urban / rural split with the larger urban settlements such as Northampton, Luton and Milton Keynes having better availability (>80% of premises have gigabit internet availability) and more rural areas such as Brackley having much lower availability (21% to 41% of premises have gigabit internet availability).

EEH's Working From Home Propensity and Capacity Release report (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.

As report on in EEH's Working From Home Propensity and Capacity Release report, there is an opportunity to reduce congestion and facilitate business growth in areas currently underserved in terms of bandwidth.

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 an 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 plans 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.

Improved digital connectivity, particularly in rural areas like Nash / Great Horwood, where there is the lowest availability gigabit internet, will help facilitate the adoption of agile and hybrid working practices. This in turn will help reduce the need to travel, particularly at peak times.

Figure 17 Gigibit Internet Availability[31]
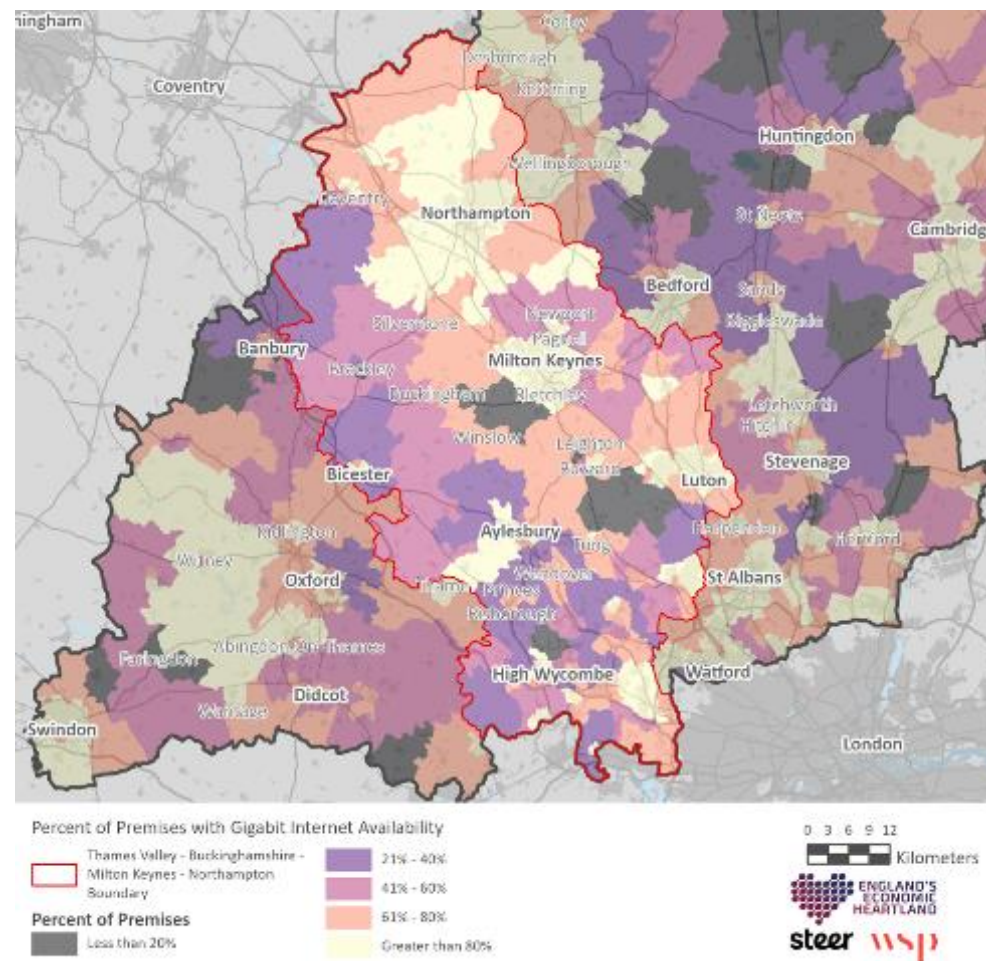
Networks

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 Luton, Milton Keynes and Northampton as well as a connection from Bicester to Buckingham and Daventry.

A number of medium size settlements are poorly connected by active travel routes, including Aylesbury and High Wycombe. 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 and likely making use of disused railway lines. Disused railway lines could provide new connections between Aylesbury and Winslow as well as between Northampton and Silverstone.

The EEH Active Travel Strategy sets out a high-level ambition for active travel in the region. The document defines 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.

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

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 centres of employment in Silverstone.

Figure 18 Active Travel Network[32]

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 by Zipp in Aylesbury, Princes Risborough and High Wycombe.

- A cycle hire scheme is operated by Santander and Lime in Milton Keynes.

- Docked e-Scooters schemes are operated by Tier and Ginger in Milton Keynes.

- A docked e-scooter scheme is operated by Voi in Northampton.

Luton and Hemel Hempstead are two of the largest settlements in the study area. Despite these settlements having the critical urban density required to support shared micro-mobility schemes – no services operate in these areas.

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 and Bicester. To maximise mode shift, these services must be implemented alongside wider improvements to active travel infrastructure.

Figure 19 Shared Mobility[33]

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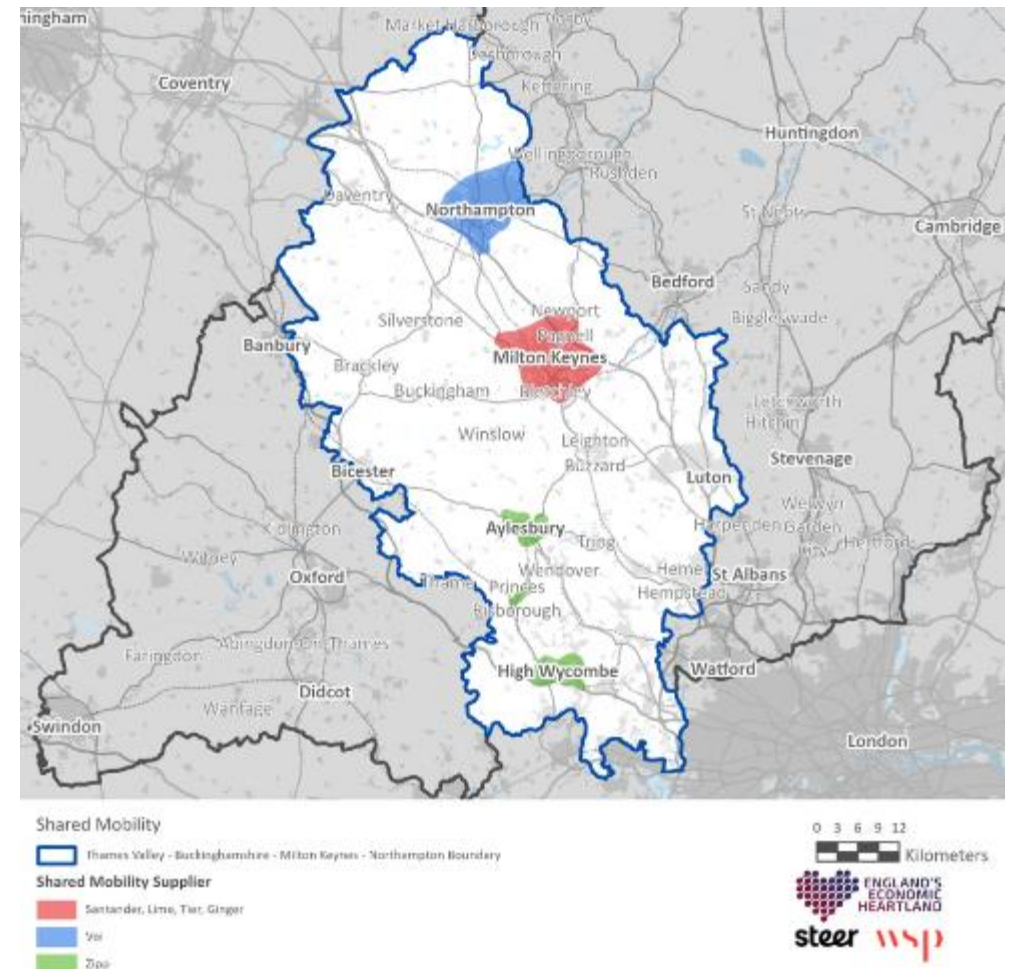
[33] Source: Zipp, Voi, Santander, Lime, Tier, Ginger, BikeSharingWorldMap, 2023

Cycling Propensity

Several benefits for both the individual and the community arise from increased use of cycling as a mode of travel, including public health benefits, reduced pollution, reduced congestion, and money savings.

The map shows the percentage of work commutes undertaken by bicycle as per the 2011 Census (Figure 21). This shows the highest level of cycling in the urban centres of Milton Keynes, Luton, Aylesbury and High Wycombe. The Propensity to Cycle Tool (PCT[34]), funded by the DfT, considers the cycling mode share in a number of future scenarios where the population acquires a different propensity to travel. Maps showing the cycling propensity of the population in these scenarios are in Appendix B – Cycle Uptake Scenarios **.**

The CPT suggests that if the population of the study area acquired the same propensity to cycle as that of the Dutch population, 20% of all commuter trips would be undertaken via cycling. The largest increases in cycling propensity in the "Go-Dutch" scenario are in the centres of Luton, Milton Keynes, Northampton, Daventry, Aylesbury, Bicester and High Wycombe. In this scenario an increase of 326,000 more cyclists is expected.

At present, cycling to work is most common in small urban pockets of Milton Keynes, Luton, Northampton and Aylesbury. The CPT suggests that if the population acquired a higher cycling propensity, a much higher proportion of journeys to work could be undertaken by cycle. However, to deliver this mode shift, high quality LTN 1/20 compliant active travel infrastructure is required alongside revenue measures such as behaviour change, information and training.

Figure 20 Active Travel Modal Share[35]

Method of Travel to Work by Mode

- Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Active Travel Mode Share
- Less than 5%
- 5.1% - 10%
- 10.1% - 15%
- 15.1% - 20%
- Greater than 20%

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[34] Source: https://www.pct.bike/

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

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**
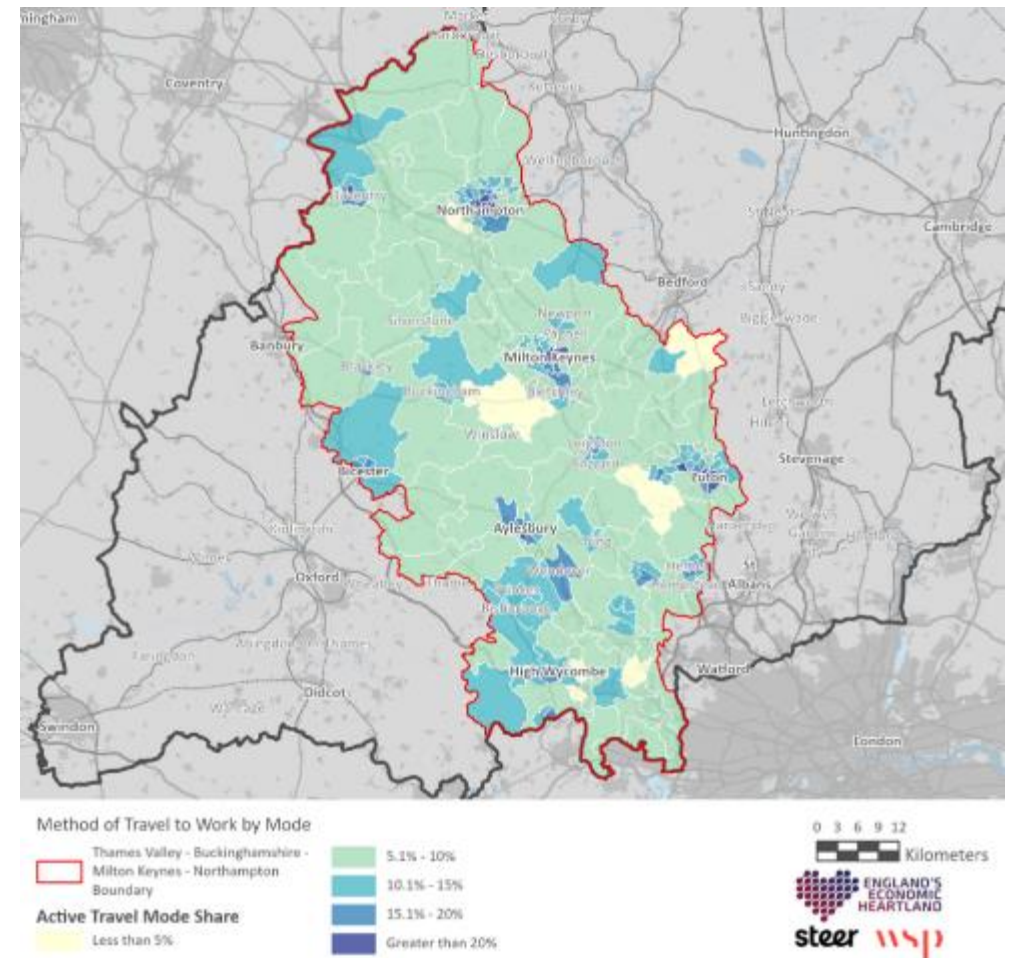
Catchments (E-Bikes)

E-bikes are electrically assisted pedal bicycles that can travel up to 25km/h and make it easier for people to travel longer distance by bike. This makes them an attractive commuting option not only for local but also for inter-urban movements.

The map shows a string of settlements between Luton and Milton Keynes to be accessible within 25 minutes journey by e-bike – offering the potential for inter-urban journeys to be undertaken by e-bike (Figure 22). The map also shows the settlements of Northampton, Daventry and Aylesbury to be relatively isolated. Whilst e-bikes have the potential to support trips from surrounding villages, opportunities for inter-urban journeys by e-bike is more limited. Separate catchments by settlement can be seen in Appendix D – 25 minute E-Bike Catchments.

Based on the above-mentioned e-bike accessibilities, there is potential to increase e-bike cycling in the corridors of Milton Keynes and Bletchley, and Luton and Dunstable, where more than 2,500 commuting trips are daily recorded, with more than 60% of them being made by car.

The increased travel distances that e-bikes facilitate means that they have the potential to replace short to medium distance car journeys within the study area, especially between settlements located within close proximity of one another between Milton Keynes and Luton. To increase 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 21 e-bike Catchment[36]

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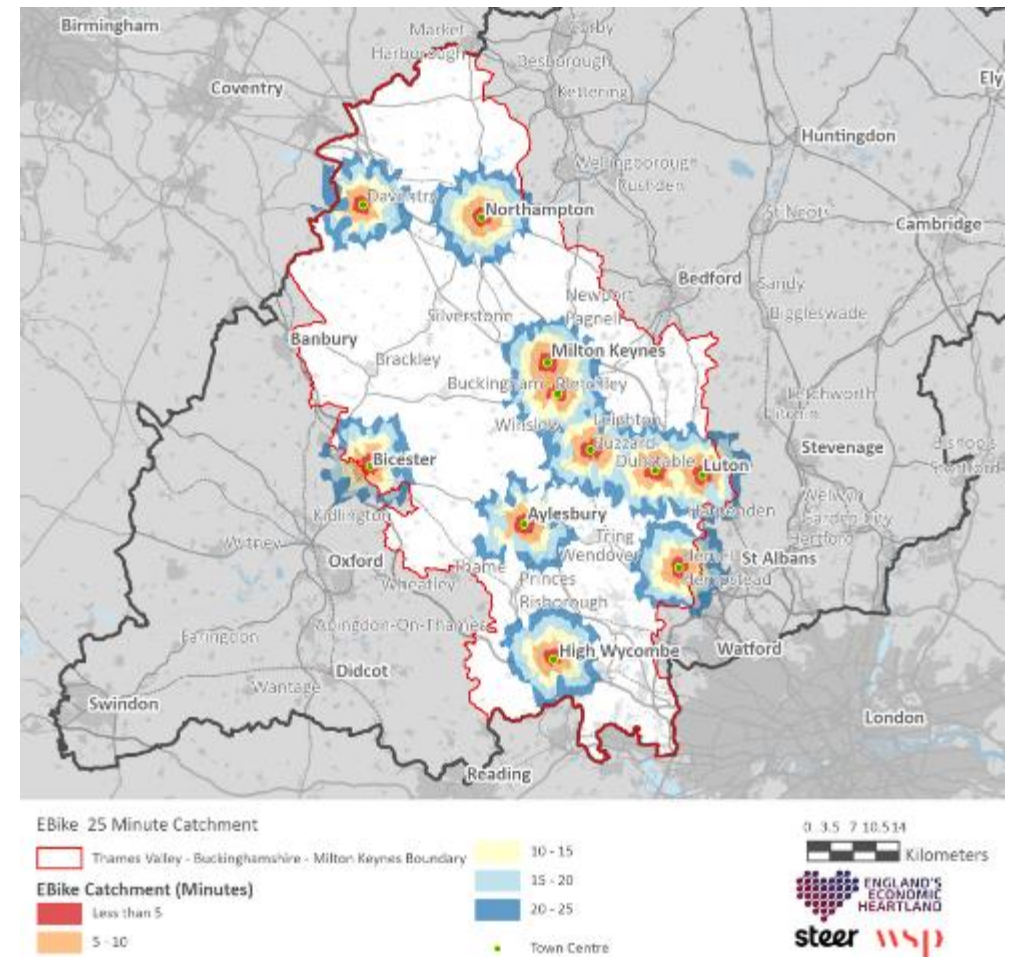
[36] Source: Open Route Services, 2023

Public Transport

Rail Network

As shown in Figure 23, the main railway lines within the study area are Midlands Main line; West Coast Main line; London – Aylesbury line; Cherwell Valley line; and Marston Vale line.

The majority of rail lines in the study area radiate north-south from London, with relatively few rail lines providing east-west connectivity - limiting opportunities for inter-urban travel by rail to key settlements within the study area.

For users travelling between unconnected locations, significant diversions can be required. For example, it is 3.8km via the road network between Bicester and Milton Keynes, however the equivalent journey by rail is 140km, requiring a change at Wembley. The northwest of the study area has very poor cycling accessibility with settlements such as Silverstone, Brackley and Buckingham having no direct rail access.

There are two major railways being built within the study area which will fundamentally change the existing network and how it is used. HS2 will unlock capacity on the WCML and road network within the study area. EWR will provide improved connectivity across and through the study area providing the potential for modal shift from vehicular to rail travel.

A large number of disused railway lines exists within the study area. There is the potential for these to be repurposed as new direct, high quality mass transit routes (e.g., a busway, light rail system or new rail line). This includes the former Great Central Main line, the Stratford-Upon-Avon and Midland Junction Railway.

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

In order to help promote increased rail usage in the study area, interventions must enhance opportunities to undertake east-west movements by rail. This could be facilitated by new rail lines, such as East West Rail, reopening of disused rail lines, or improved interchanges.

Figure 22 Active and Disused Railways[37]

Active and Disused Railways

- ☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary
- —— Railway Lines
- - - - Disused Railways
- —— East West Rail (under construction)

Railway Station Usage

In the 2021-2022 financial year over 27.2 million railway station entries and exits to took place in the study area as illustrated in Figure 24. This represents 27% of all station entries and exits in the EEH region. The most used station within the study area is Milton Keynes Central, which had 4 million entries and exits. This represented 16% of all station entries and exits the study area.

The least used stations within the study area were Millbrook and Apsley Guise. Both of these stations are situated in rural locations on the Marston line between Bletchley and Bedford and had less than 5,000 entries and exits, however these stations will form part of the next section of EWR. With the exception of Milton Keynes, the most used stations are situated in the southern part of the study area. This is likely to be associated with the use of rail services for commuting journeys towards London.

Railway stations situated in towns and cities are more frequently used than those situated in smaller settlements. This suggests that smaller stations are not being used as "parkway stations" with people travelling to these stations by car and public transport. Improved connectivity to rural stations could encourage more multi-modal journeys by rail. HS2 and EWR provide the opportunity to increase the number of local/stopping services available within the study area. The new Winslow station will provide access and egress opportunities.

Station usage varies across the area. The absence of rail stations in the north west of the study area is likely to result in high levels of dependency on the private car. Improved connectivity to the rail network from these locations could reduce the number of longer distance car journeys.

Figure 23 Station Usage[38]

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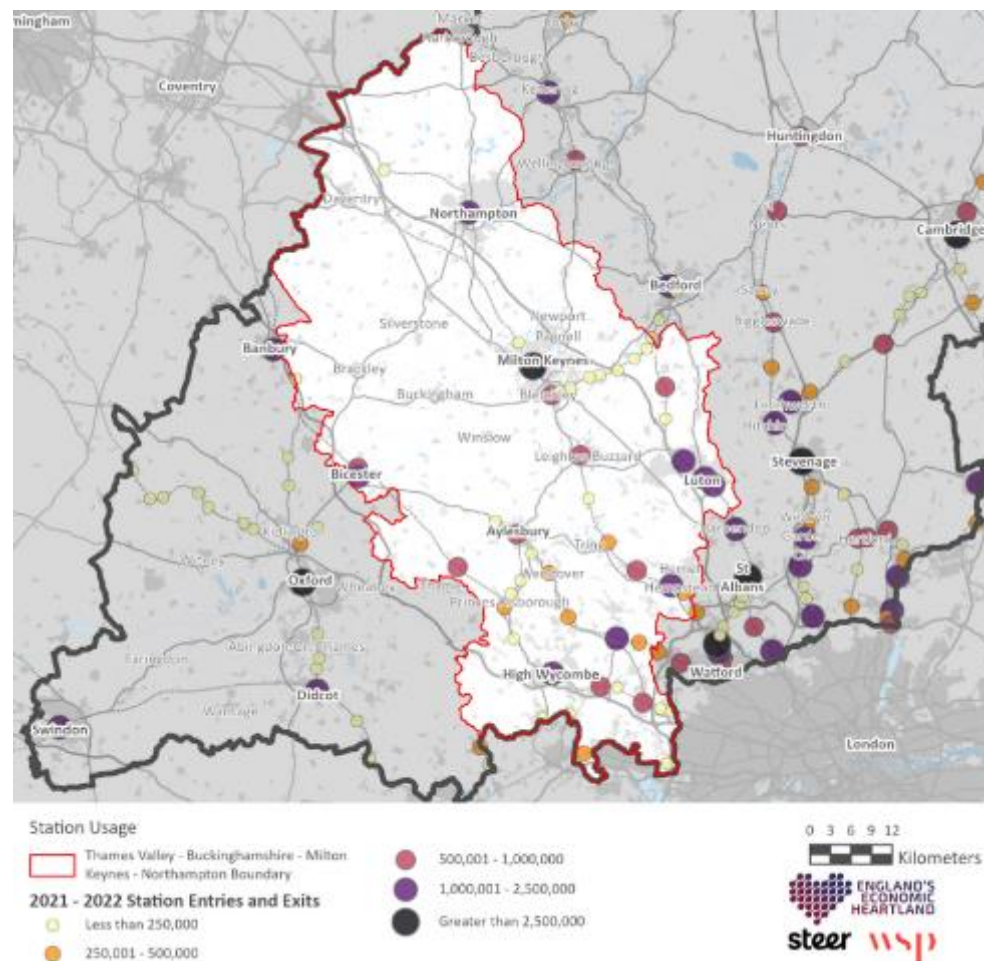
[38] Source: Station Exists and Entries, DfT, 2022

Bus Network

Bus services provide a more sustainable alternative to the private car for short and medium length journeys. The map shows the frequency of local bus services (two-way total) on in the morning peak hour (0700 to 0859) on Monday 9th January 2023 (Figure 25). It should be noted that bus frequency does not reveal details on bus occupancy.

High frequency (over 20 buses per hour) local bus routes serve the major settlements of Northampton, Luton and Milton Keynes. However, direct inter-urban bus connections between the largest three settlements are relatively limited (less than five buses per hour). The map shows limited (less than five buses per hour) service provision in the north west of the study area, in areas such as Silverstone, Brackley and Banbury.

A relatively high frequency (more than 10 buses per hour) inter-urban bus service exists between Leighton Buzzard, Aylesbury, Princes Risborough and High Wycombe. Interventions that address congestion and provide priority to buses along this route could encourage mode shift from cars onto buses.

Several Demand Responsive Transport (DRT) services operate within the area, including Milton Keynes Connect and High Wycombe PickMeUp. These are suitable for both commuting trips and leisure trips, and can booked in advance, or in real-time.

New high quality, direct and non-traditional bus services could provide an attractive alternative to the private car, especially to the higher income areas the south like Aylesbury and High Wycombe. Expansion of DRT could also help enhance public transport connectivity in rural areas in the northwest where traditional bus services may be less commercially viable.

Figure 24 Bus Frequency and Corridors[39]

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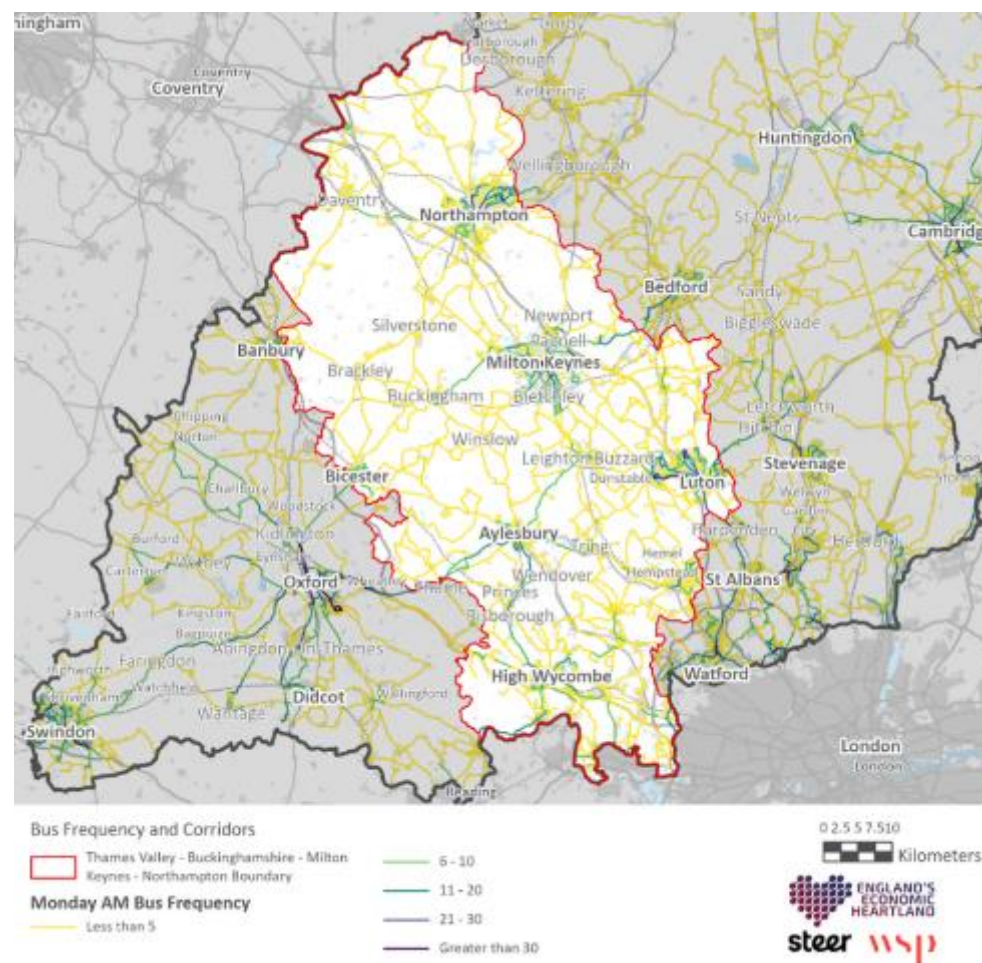
[39] Source: Bus Route Lines, Basemap, Q1 2022

Access to Everyday Services

Car dependency and mode choice is heavily influenced by the accessibility of everyday services and amenities by different transport modes. For more sustainable modes like public transport 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 which comprise medium sized employment centres (500 to 4,999 jobs); primary schools; secondary schools; further education colleges; GPs; hospitals; supermarkets; and town centres. As expected, higher levels of accessibility are observed in denser urban areas such as High Wycombe, Milton Keynes and Luton. This is also informed by greater levels of access in the southern part of the study area to London Underground and London bus services. Key services in suburban areas surrounding these urban centres typically have accessibility to all eight services within 30 minutes.

By contrast, smaller rural communities in the north west of the study area, with residents having more than 60 minutes of travel time to reach daily facilities by public transport or walking, which lead to a high possibility of car dependency. It should be noted that the opening of Winslow Station will provide a revised baseline in terms of accessibility and patterns of movement.

To reduce the car-dependency, it is important that public transport and active travel journey times are competitive with that of car journeys, particularly to smaller settlements like Wendover which currently have poor accessibility where interventions could be targeted. To achieve this, express bus services and bus priority measures should be considered. In smaller villages in the northwest of the study area like King's Sutton and Farthinghoe, high-frequency

bus services may not be financially viable. In these locations alternative bus-based arrangements should be explored, for example, demand responsive transport and micromobility last mile solutions.

Figure 25 Public Transport and Walking times to key services[40]

Public Transport and Walking time to 8 Key Services

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Key Service Accessiblity
Less than 15 minutes
16 - 30 minutes
31 - 45 minutes
46 - 60 minutes
Greater than 60 minutes

0 3.5 7 10.5 14 Kilometers

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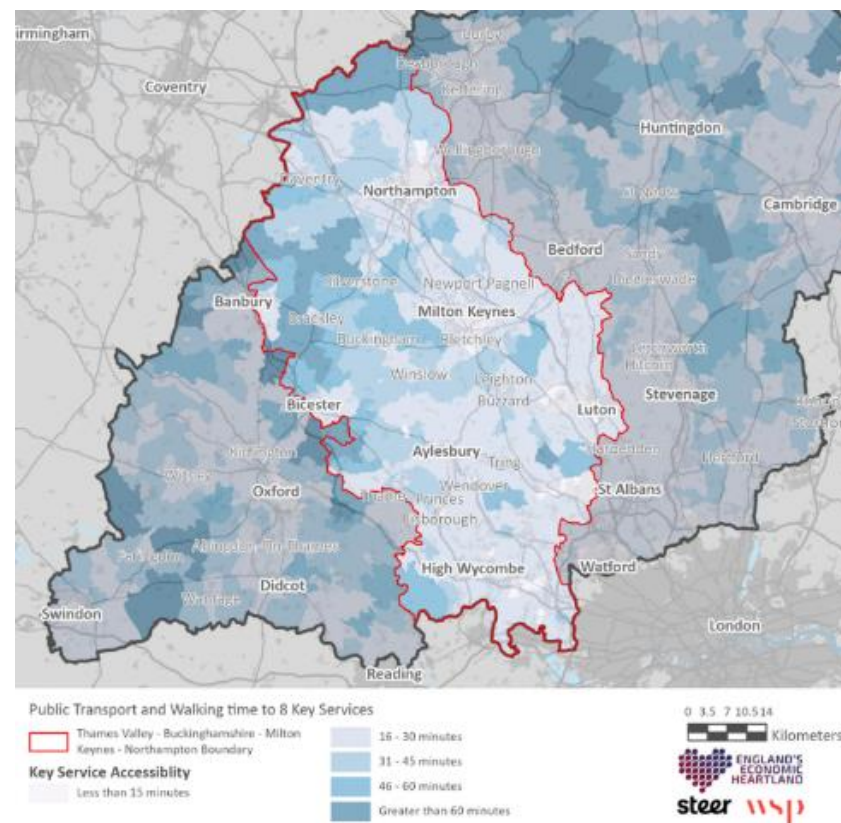
[40] Source: Journey Time Statistics, DfT, 2016

Road

Driving and Public Transport Catchments

Figure 27 shows the combined 60-minute AM peak public transport (rail and bus) and car driving catchments for traveling between the 11 key settlements of the study area listed in Catchments as well as separate catchments for each centre.

The map shows that car provides much better accessibility than public transport, with the vast majority of the study area (and a considerable area beyond it) accessible from at least one key settlement within 60 minutes driving.

Only 42% of the study area can be reached within a 60-minute journey by public transport from at least one key settlement. It is mainly rural areas in the centre and north west of the study area that cannot be accessed within 60 minutes travel by public transport. However, there are a number of small and medium size settlements that cannot be reached included Silverstone and Towcester.

At present in the study area, accessibility by private car is much vaster than via public transport with Leicester, Coventry and Reading being fully accessible with 60 minutes of driving. Public transport accessibility needs to be improved in order for this to become a more attractive alternative to private car, especially for longer inter-urban travel to the wider region and rural areas. There are opportunities to address poor existing public transport provision in the northwest of the study area, in areas like Silverstone and Towcester with demand responsive, shared or community led transport interventions.

Figure 26 Drive time and Public Transport catchments[41]

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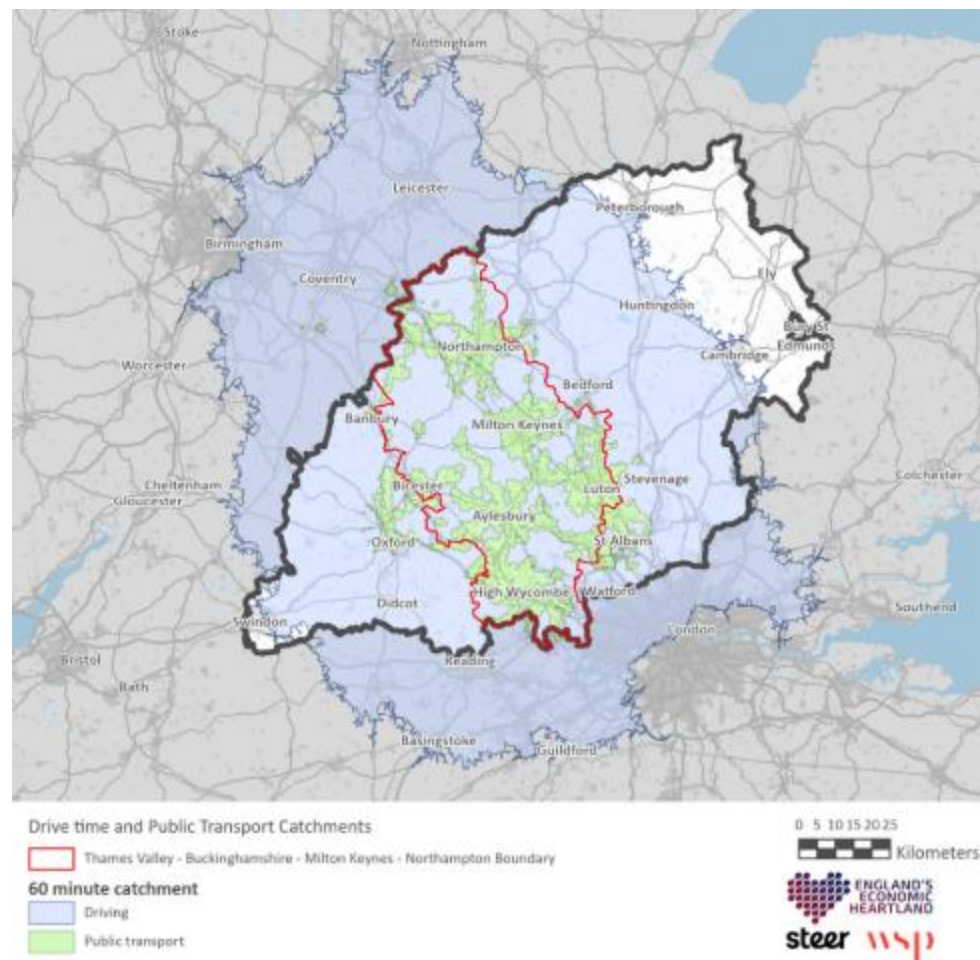
[41] Source: Speed Profile Data, TRACC / ESRI, 2019

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 Northampton, Buckingham, Princes Risborough, Aylesbury, High Wycombe and Luton.

Other notable areas of congestion outside of the main settlements include:

1 – A505 between Luton and Dunstable
2 – M1 Junction 15 & 15a south of Northampton.
3 – A509 through Olney
4 – M40 Junction 1 South of Denham
5 – M40 Junction 10 (onto A43) Northwest of Bicester

The evidence suggests that congestion remains issues surrounding town centres and at junction of major motorway and highways. 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. Along select corridors (e.g. A505 Luton-Dunstable) public transport and active travel interventions should be explored as an alternative to capacity improvement schemes. This will aid the decarbonisation of the transport system across the corridor.**

Figure 27 Level of Service Indicating Congestion – AM Peak[42]

Congestion - Level of Service (AM)

- A
- B
- C
- D
- E
- F

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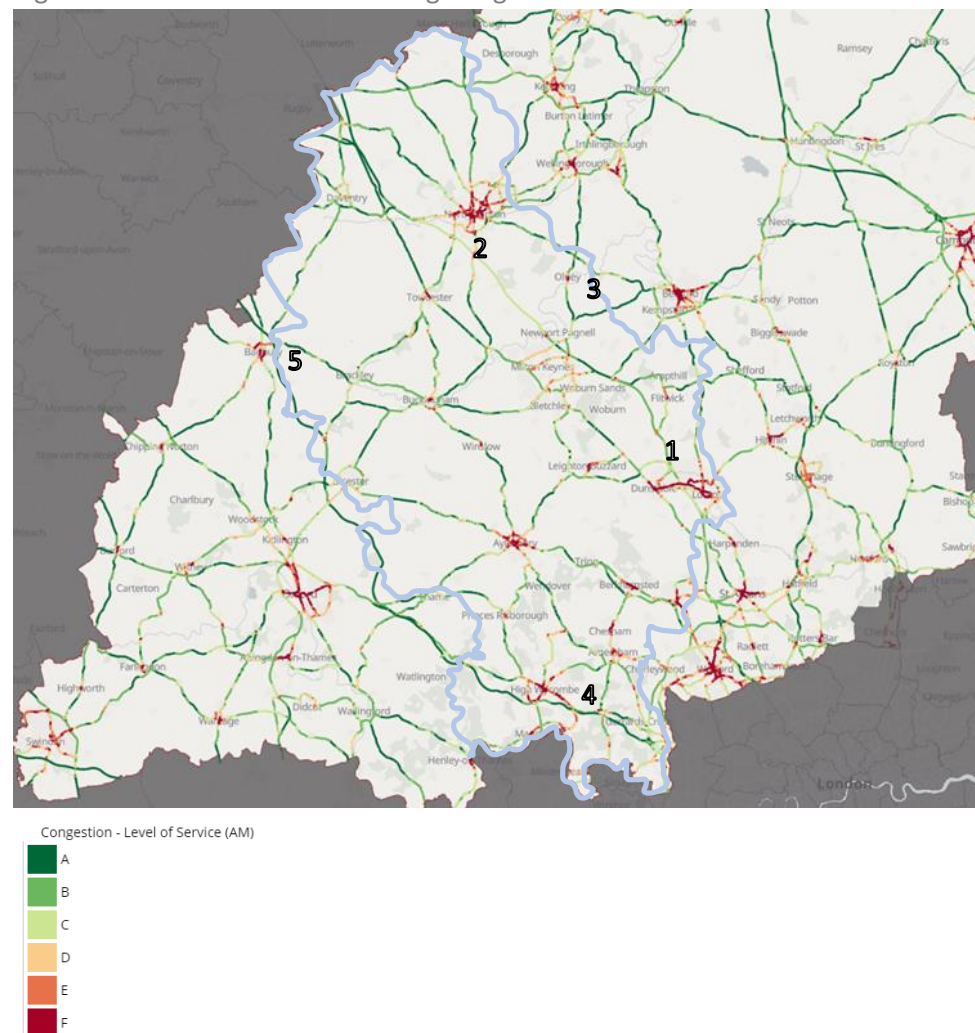
[42] Source: EEH Benefits of Smart Junctions, City Science, 2023

Freight Movements

Figure 28 shows annual average HGV flows on motorways and A-roads in the study area. The highest flows are on the major motorways including the M1 and M4 with estimates of greater than 10,000 HGV vehicles/day. These high HGV flows are likely associated with the large number of distribution and logistics parks along the M1, including for example Magna Park in Milton Keynes which is home to distribution centres for River Island, Amazon and John Lewis.

The M1 within the study area runs parallel to the West Coast Main Line, and as such there may be opportunities to decarbonize freight through mode shift to rail at existing and/or proposed intermodal freight terminals such as DIRFT in Daventry.

Other notable roads within the study area which have high HGV flows include the A14, A421 A43 and the A45. Smaller roads with high HGV flows pose a risk to road safety within urban areas as well as potentially lack resilience to HGV accidents/breakdowns. Most of these roads favour east-west movements, highlighting a lack of HGV movements for these directions.

Of all traffic travelling on the A14 in the north of the study area, 24% is HGV's. The A14 is a dual carriageway, however with such high HGV usage (mostly due to connections to Felixstowe) road safety and resilience concerns arise.

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 28 Freight Traffic[43]

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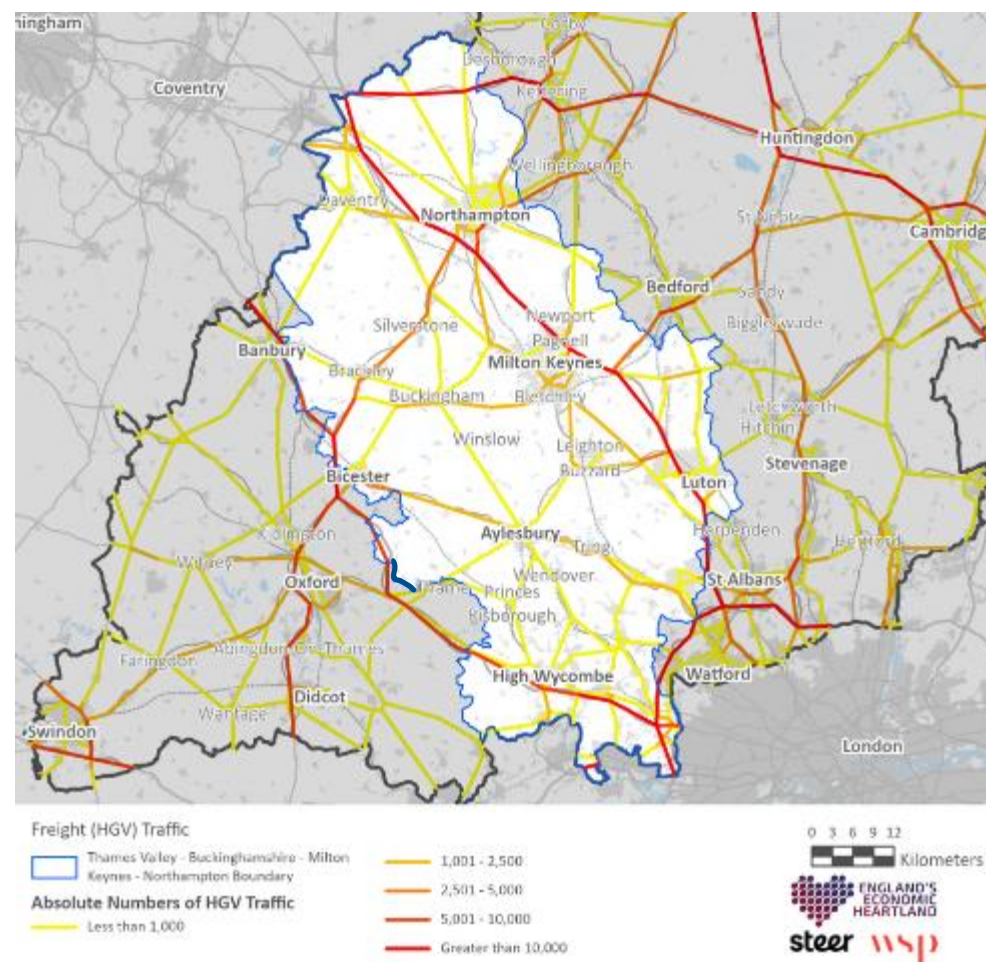
[43] Source: GB Road Traffic Counts, DfT, 2021

Freight Movements

Figure 29 shows freight traffic as a proportion of overall traffic on major routes. In total during 2021 there was more than 1,000,000 HGV movements on the SRN and MRN in the study area, representing 9% of all motor traffic. The largest flows of HGV movements can be found along the main motorways with the M1 and M4 being notable examples. Motorways make up more than 60% of the HGV movements in the study area. However, there are several smaller single carriageway roads which have high proportion of HGV traffic. The A41, A421 and A418 are examples of roads with HGV proportions exceeding 5% of local traffic (likely due to lack of effective East/West HGV options). These routes are less resilient to accommodating HGV breakdowns/accidents. If breakdowns and accidents occur along these routes it can result in significant levels of delay. Many of the smaller single carriageway roads also run through the centre of urban areas (E.G. A41 in Aylesbury, A45 in Daventry). This has an adverse impact on road safety and air quality. The volume and impact of HGV movements on local roads is an important issue within the study area and not one which is captured through this data. This can have a disproportionate impact on residents and communities.

HGV freight movements remain as a barrier for many of the EEH's future sustainability principles due to high carbon emissions of the existing vehicle fleet and road safety concerns. There are opportunities to decarbonise freight movements throughout whilst acknowledging the economic importance of freight industries along the M1. Joint working with Network Rail, National

Highways, local and freight operator stakeholders will be required to increase rail network and interchange capacity and availability.

Figure 29 Proportion of freight traffic[44]

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

Proportion of Freight (HGV) Traffic

	Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Percent of HGV Traffic
— 0% - 5%
— 5.1% - 10%
— 10.1% - 15%
— 15.1% - 20%
— 20.1% - 52.1%

0 3 6 9 12
Kilometers

Approximately 731 non-residential EVCPs exist within the study area, accounting for 42% of the total volume of the EEH corridor.

The distribution of EVCP points shows a clear urban / rural divide. EVCPs are predominantly concentrated in Milton Keynes, with this settlement alone having 293 charging points, accounting for 40% of the total volume in the study area. Clusters of charging points can also be observed in other major urban settlements, such as Luton, Northampton, Aylesbury and Bicester, contributing 7%, 7%, 4% and 3%, respectively. By contrast, there is a notable shortage of EVCPs provision in small rural communities such as Flitwick and Ampthill, creating a potential barrier for the uptake of zero-emission vehicles in smaller settlements. Accessible charging stations along the major road network are inconsistent with the A421 and A43, and A418 lacking charging infrastructure outside major urban areas.

Milton Keynes has established a solid infrastructure foundation for the uptake of EVs, which can be set as a pilot city and promote the transition to zero-emission vehicles across the study area. Consideration should be given to taking advantage of the strength of the motor industry in the study area, to push forward the build-up of EVCP networks and technologies for buses, LGVs and HGVs. EEH could support the uptake of EV's in the study area through the further roll out of EVCP infrastructure.

Electric Vehicle Charge Points

Electric vehicles (EV) are a key component in reaching net zero by 2050, which can be supported by EEH. The map sets out the distribution of non-residential Electric Vehicle Charge Points (EVCP) within the study area (Figure 30).

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

Figure 30 EV Charging points[45]

EV Charging Points

⬭ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

• EV Chargepoints
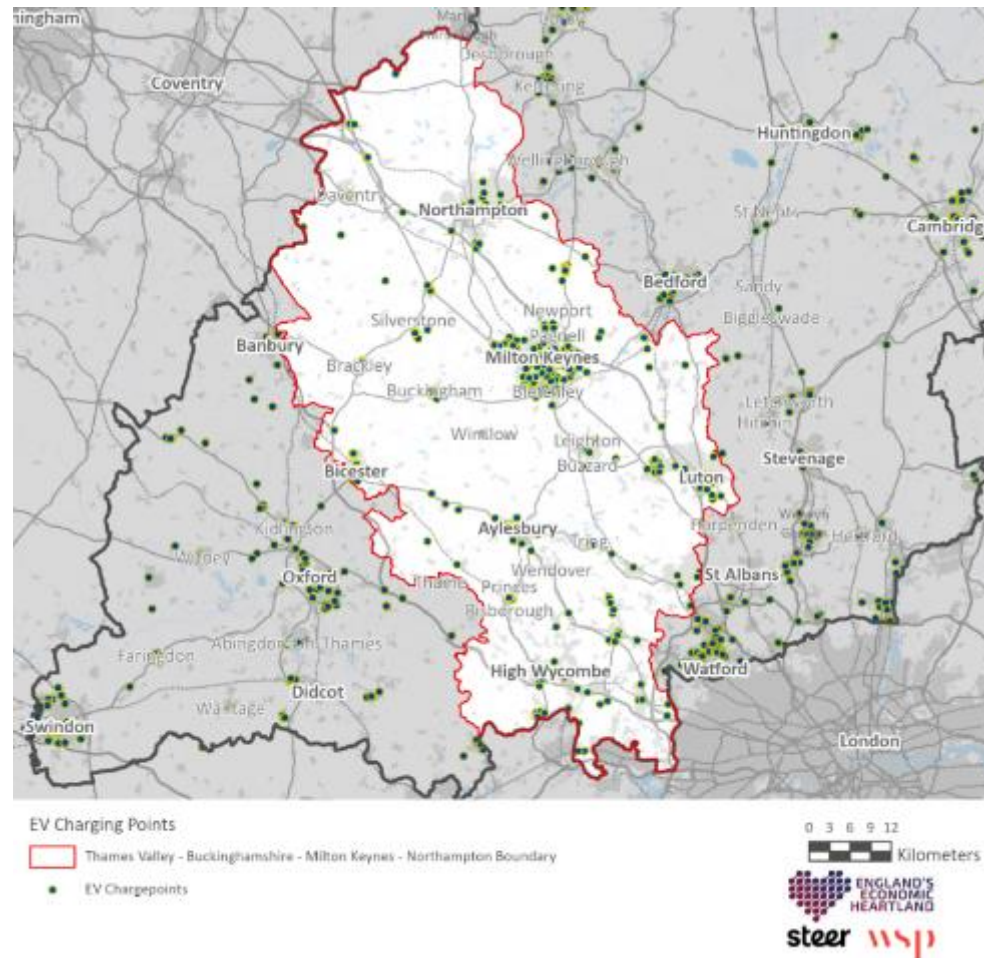
Travel Patterns & Behaviour

Journey to Work Origin – Destination Flows

Figure 31 shows historic commuter movements between the key settlements and rural areas north-south of the study area. This mainly reflects the strategic transport routes both road and rail which primarily run in north / south directions. In 2011 the total number of commuter movements with both the origin and destinations within the study area was approximately 498,000.

There are a number of distinct travel-to-work corridors visible, including Milton Keys – Northampton, Milton Keynes – Luton – Dunstable – St Albans – Hemel Hempstead and Milton Keynes – Bletchley. The largest volume of commuting movements was between Milton Keynes and Bletchley and Dunstable and Luton. Movements between these settlements accounted for 43% of all movements between the eleven main urban settlements (23,000 commuting trips). A large number of commuting movements were also recorded between Northampton and its surrounding small rural settlements.

A high volume of complex travel patterns can also be observed between the study area and its adjacent larger employment destinations like London, Oxford and Bedford, identifying high demand for sustainable travel to connect resident populations to regionally significant employment areas.

Key settlements within the study area including Northampton, Milton Keynes, and Luton see notable commuting to/from smaller peripheral settlements and suburban areas. This presents a challenge as car dependency is often prevalent in these periphery communities. Infrastructure interventions such as new express bus services/mass rapid transit schemes may not be cost-efficiently

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[45] National Charge Point Registry, DfT, 2023

viable in these areas as there is only a limited number of people commuting from smaller settlements.

There are high numbers of inter-urban commuters between Milton Keynes and Northampton. To encourage mode shift along this corridor transport interventions should be based on high quality, direct and frequent public transport links. The OD matrix (Table 8) shows the total number of workers travelling between the eleven key settlements and other geographical areas in the study area and UK by all modes of travel.

Data from the 2021 Census reveals high levels of working from home. This indicates great potential for a longer-term hybrid working mode in areas with higher car dependency. Urban settlements and rural areas to the north and west (e.g., Luton Airport) tend to have a lower proportion of WFH (i.e., between 10% to 40%). People who are more reliant upon physically being present drive higher requirements to travel.

It should be noted that use and interpretation of 2021 data should be considered within the context of the COVID-19 pandemic and potential latent impacts of this.

Figure 31 Commuting trips within the study area[46]

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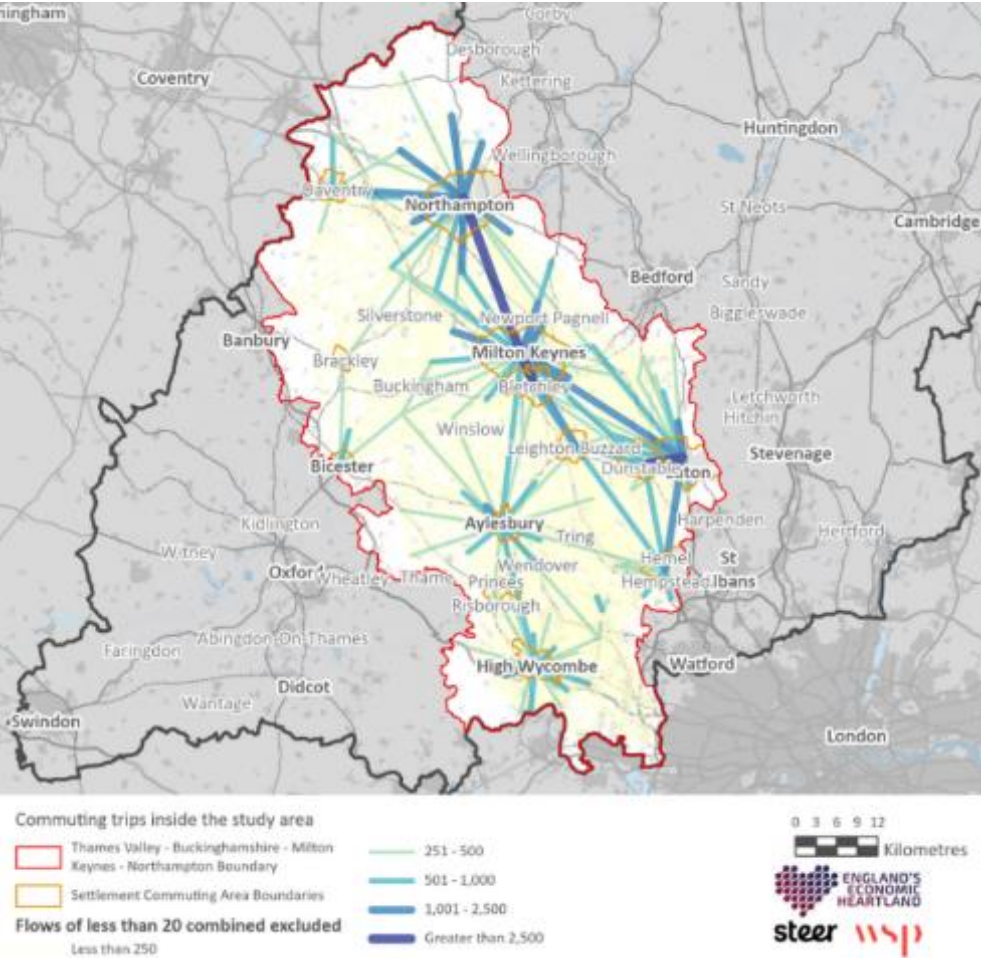
[46] Source: WU03EW Location of Usual Residence and place of work (MSOA Level), ONS, 2021

Table 8 Origin and Destination Matrix[47]

Major Urban Settlements	Aylesbury	Bicester	Bletchley	Daventry	Dunstable	Hemel Hempstead	High Wycombe	Leighton Buzzard	Luton	Milton Keynes	Northampton	Rural Area (corridor ex. Major urban settlements) *	London	Corridor total	EEH	EEH exc. corridor	England and Wales exc. EEH
Aylesbury	7481	221	106	1	55	350	924	148	168	574	45	6531	933	16604	18182	1578	922
Bicester	195	2585	30	5	4	12	71	8	15	147	46	1546	164	4664	9318	4654	544
Bletchley	142	22	2574	6	64	61	18	155	185	5370	170	1008	227	9775	10381	606	339
Daventry	2	12	21	3089	5	4	3	2	9	148	918	1588	71	5801	6300	499	1375
Dunstable	93	8	130	5	1958	470	22	389	3187	524	50	1538	626	8374	10234	1860	304
Hemel Hempstead	189	5	42	2	126	8799	102	87	583	183	30	3454	2545	13602	20696	7094	905
High Wycombe	400	23	12	1	19	86	8074	4	47	66	16	7063	2720	15811	16981	1170	3523
Leighton Buzzard	500	14	484	6	439	500	53	2746	860	1828	72	1826	417	9328	10506	1178	339
Luton	114	10	231	15	2254	1372	61	399	23263	1332	170	2994	2773	32215	41204	8989	1354
Milton Keynes	503	127	5560	50	264	228	84	525	1016	29542	1172	5509	1118	44580	47731	3151	1771
Northampton	52	57	378	717	48	67	19	43	262	2784	38670	6623	603	49720	56589	6869	3042
Rural Area (corridor ex. Major urban settlements) *	7606	1914	2520	1934	1866	3898	8911	1607	6858	15654	11124						
London	300	56	62	18	228	1476	1272	70	1556	703	355						
Corridor total	17277	4998	12088	5831	7102	15847	18342	6113	36453	58152	52483						
EEH	18248	7213	13049	6257	8181	20828	19674	6560	44991	65260	66068						
EEH exc. Corridor	971	2215	961	426	1079	4981	1332	447	8538	7108	13585						
England and Wales exc. EEH & London	682	432	398	2474	423	1718	3432	220	4967	4080	5966						

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

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

Mode Share by Settlements

Table 9 shows the journey to work mode share of the eleven key settlements in the study area. The figures should be used with some caution due to the impact of the COVID-19 pandemic. The car is the dominant mode of transport used by people travelling to work in the study area, with 64% of all commuting movements being made by a car driver. This is likely due to the rurality of large parts of the study area, as well as comparatively poor rail and bus connectivity between many of the key settlements. Dunstable has a particularly high reliance on the private car (74%), with the mode share for car in this area being 10% higher than for the overall EEH, and 13% higher than England as a whole.

Public transport usage in the study area varies, with bus and train use in the key settlements mostly being lower than the national average. Exceptions include Leighton Buzzard which has a particularly high rail usage, this is likely associated with the high number of commuters from Leighton Buzzard to Milton Keynes / London. Bletchley / Luton which both have higher than average bus usage for the EEH. However, whilst higher than the average bus mode share comparative to the wider EEH, Luton and Bletchley are on par with the overall average for England and Wales.

Walking is most prevalent mode in Aylesbury, with this settlement having a 5% higher share than the wider EEH, with Daventry and Luton also having high mode shares for walking.

The data reveals that the study area has an average working from home percentage of 6%. Whilst the impact of the COVID-19 pandemic should be taken into account this demonstrates 'digital as a mode' and highlights opportunities for reducing travel demand on the network.

The evidence shows the journey to work mode share varies significantly across the study area. Luton, Aylesbury and Leighton Buzzard have the highest levels of sustainable travel. Luton is likely to be able to support sustainable travel due to the size and density of this settlement, coupled with higher levels of deprivation which may lead to greater reliance on walking, cycling or bus travel. Aylesbury and Leighton Buzzard are more affluent settlements with high levels of commuting towards London and Milton Keynes respectively. Aylesbury is also a medium sized development and able to support active travel trips due to this.

Table 9 Mode Share by Settlement[48]

Settlement	Car / Van (Driver)	Car / Van (Pass.)	Bus	Train	Cycling	Walking	Work From Home
Aylesbury	65%	6%	4%	4%	2%	15%	4%
Bicester	66%	7%	6%	4%	4%	10%	4%
Bletchley	66%	8%	8%	4%	3%	8%	4%
Daventry	70%	7%	1%	1%	2%	14%	4%
Dunstable	74%	6%	4%	2%	1%	11%	4%
Hemel Hempstead	68%	6%	4%	6%	1%	11%	5%
High Wycombe	66%	6%	6%	5%	1%	12%	5%
Leighton Buzzard	66%	4%	2%	9%	2%	11%	5%
Luton	60%	9%	8%	6%	1%	14%	3%
Milton Keynes	66%	7%	6%	5%	3%	8%	5%
Northampton	66%	7%	7%	2%	3%	11%	4%
Study Area Total	67%	6%	4%	5%	2%	10%	6%
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

48 Source: Method of Travel to Work, ONS, 2021

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

A summary of the issues and opportunities covered with the Current Context – Connectivity chapter is provided in Table 10.

Table 10 Current Context – Connectivity: Summary

Theme	Issues	Opportunities
ROADS	**Rural car dependency for access to services** – Much of the northwest of the study area has journey times to access key daily services by public transport/walking of over 60 minutes. This includes small villages to the north of Silverstone and Brackley, including Helmdon and Wappenham. The relatively significant time needed to access key services in these areas by public transport and active travel is a deterrent for trying to encourage modal shift away from private car use for this population. The existing infrastructure network and spatial provision of services creates car dependency.	**Transfer of road freight to the railways**– The most heavily used road freight link in the study area is the M1, which runs directly parallel to the West Coast Main Line. This could mean that the removal of existing HGV traffic onto rail links could be a realistic opportunity to decarbonise freight in the study area. This opportunity could be realised through the introduction of new inter-modal freight depots to aid the transfer of freight from roads to rail. A key change for the study area with the delivery of HS2 will be the benefit of unlocking more freight paths. **Prescence of existing electric vehicle infrastructure** - Milton Keynes currently has 293 public Electric Vehicle Charge Points at present. This is a solid infrastructure foundation to support the wide scale uptake of Electric Vehicles. There is further opportunity to expand the existing Electrical Vehicle Charge Point network into rural areas where public transport options are more limited and active travel is less viable. This would support the decarbonisation of the transport network.
PUBLIC TRANSPORT	**East- west public transport severance** –There is existing east-west rail severance within the study area, with opportunities for transfers between the different north-south orientated railway lines being limited. This can lead to the requirement for lengthy diversions which diminishes the attractiveness of travel by rail. The delivery of EWR will assist in tackling this.	**Delivery of East West Rail Stages 2 and 3** – This would deliver a complete east-west connection from Oxford to Cambridge. **Increased bus connectivity** – There is potential for increased services and routes to provide an opportunity for modal shift away from private car use. This could also provide access opportunities to populations who may not previously had the feasibility of access. **Potential for the uptake of micromobility solutions** – There is the potential to explore shared micromobility interventions in both Luton and Hemel Hempstead, which currently have no such provision. Micro-mobility solutions can form the first / last mile of a longer journeys being undertaken by public transport in these locations, for example long distance commuting trips by which the majority of distance is travelled by train, thereby supporting a holistic transport network.

Theme	Issues	Opportunities
ACTIVE MODES	**Isolated settlements with no long distance active travel links** – Northampton, Daventry and Aylesbury are all relatively isolated settlements, which are not located within close enough proximity to travel by E-bike to other nearby settlements. This can foster car dependency for those wishing to travel outside of the settlement boundaries.	**Use of disused railway lines for new sustainable transport links** – Disused railway lines in the area, for example the routes between Aylesbury and Northampton, present a great opportunity to implement new sustainable travel links (e.g. new bus rapid transit links or active travel routes). New direct routes via disused railways line would in particular be a good opportunity for increased e-bike usage for settlements which are located within close proximity to one another.
TRAVEL PATTERNS & BEHAVIOUR	**High levels of working from home (WFH) in rural areas** – Data from the 2021 census shows that over half of the study areas have a proportion of WfH over 40%, especially in the southern part where the percentage is approaching 60% influenced by the Covid national lockdown restrictions. This indicates great potential for a longer-term hybrid working mode in areas with higher car dependency. Urban settlements and rural areas to the north and west (e.g., Luton Airport) tend to have a lower proportion of WFH (i.e., between 10% to 40%). People who are more reliant upon physically being present drive higher requirements to travel.	**Opportunity to improve digital connectivity and encourage working from home** – Improved digital connectivity is required, particularly in rural areas further from the main urban centres where the lowest coverage of gigabit connectivity can be found for example in the rural areas which are sited between Banbury and Milton Keynes. This will help facilitate the adoption of agile and hybrid working practices, and in turn, reduce the need to travel.

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

7 Stakeholder engagement
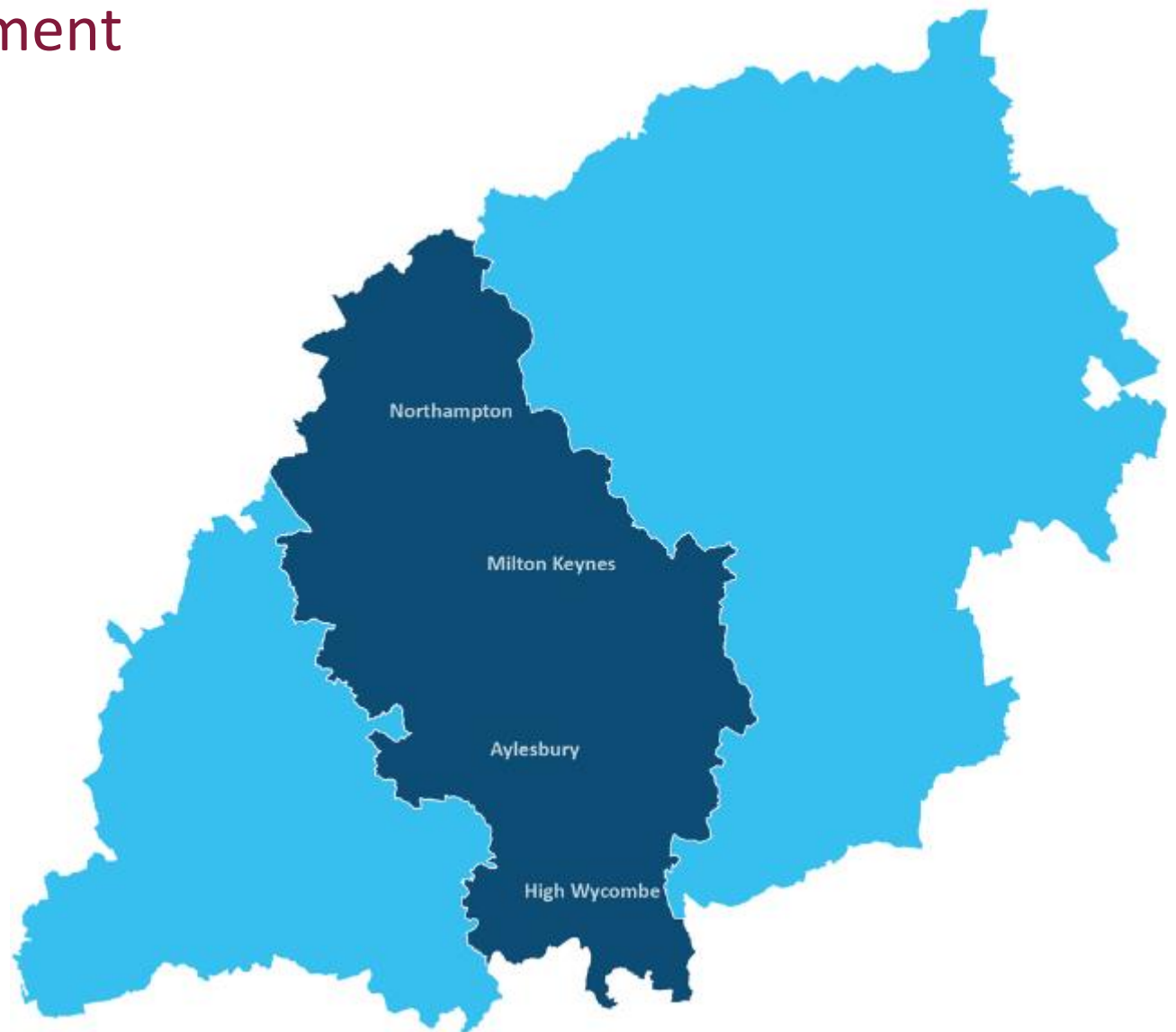
Call for Evidence

Steering Group

To gain insight into the key trip attractors within the study area and connectivity issues and opportunities a steering group and stakeholder group was convened and asked for their thoughts. A summary of the key findings from these sessions is provided below.

Strategic Trip Attractors

- Pinewood and Marlow film studios – tourism attractor
- Princes Risborough Expansion - 1,100 homes and a new primary school
- RAF Halton Redevelopment - 1,000 homes, local centre and a primary school
- Hemel Garden Communities – significant future development to the north and east of Hemel Hempstead - more than 11,000 homes and 10,000 new jobs by 2050
- Maylands Business Park
- Various major housing developments in and around Aylesbury
- Tring station – attractor of commuters from Buckinghamshire
- Buckinghamshire Enterprise Zone: Silverstone and Westcott Venture Park - over 1,200 new jobs for each one
- Luton Airport
- Houghton Regis North (HRN) Development (two sites) - in total up to 7,000 new homes
- Waddesdon Manor and Stowe National Trust – tourism attractor
- Proposed development north of Luton, in Central Bedfordshire Council - 3,600 homes and 7 hectares of employment land

- Proposed Rail Freight Interchange - approximately 40 hectares of employment land
- Shenley Park Development - 73 new homes
- Marston Vale Development - up to 5,000 new homes and 30 hectares of employment land
- New Warehouse at Brackmills Industrial Estate
- Northampton – key destination for education from a wide surrounding area
- Daventry International Rail Freight Terminal (DIRFT)
- West Hertfordshire Teaching Hospitals NHS Trust – Agglomeration of health services in Watford hospital
- Watford Junction Railway Station – major NS Rail hub
- Rail freight terminal at Radlett Aerodrome – strategic interchange
- Leicester, Coventry, and Birmingham – key destinations beyond the study area
- Birmingham Interchange – link between WCML and HS2
- Stations served by HS2
- Planned housing development off A41 at Bicester

Rail Issues

- Underutilised Bedford – Northampton corridor

Rail Opportunities

- West Coast Main Line – links between Northampton, Milton Keynes, and Leighton Buzzard for local commuter trips within EEH area

Private Vehicle Issues

- Closure of local roads in Iver if Western Rail Link to Heathrow goes ahead
- National Highways RSI3 works between Handy Cross roundabout and Bisham roundabout
- Highly constrained A4010 corridor between High Wycombe and Aylesbury– it passes through AONB and is a single carriageway with 50mph speed limit.
- Congestion at A41/M25 junction
- Expected raise in traffic in and around Aylesbury due to HS2 works
- Wing bypass close to Leighton Buzzard
- Expected raise in traffic along A421 due to Milton Keynes expansion
- Traffic in M1 junction 13, and along A421 through to A1

Private Vehicle Opportunities

- A404 - access to Thames Valley
- Hemel Hempstead economic potential unlock through M1 Junction 8 Improvements
- A5 / A5183 – links between Luton and St Albans
- A5 corridor

- M1 – A6 link road plans
- Under construction Roade bypass in A508 corridor

Figure 32 Steering Group feedback

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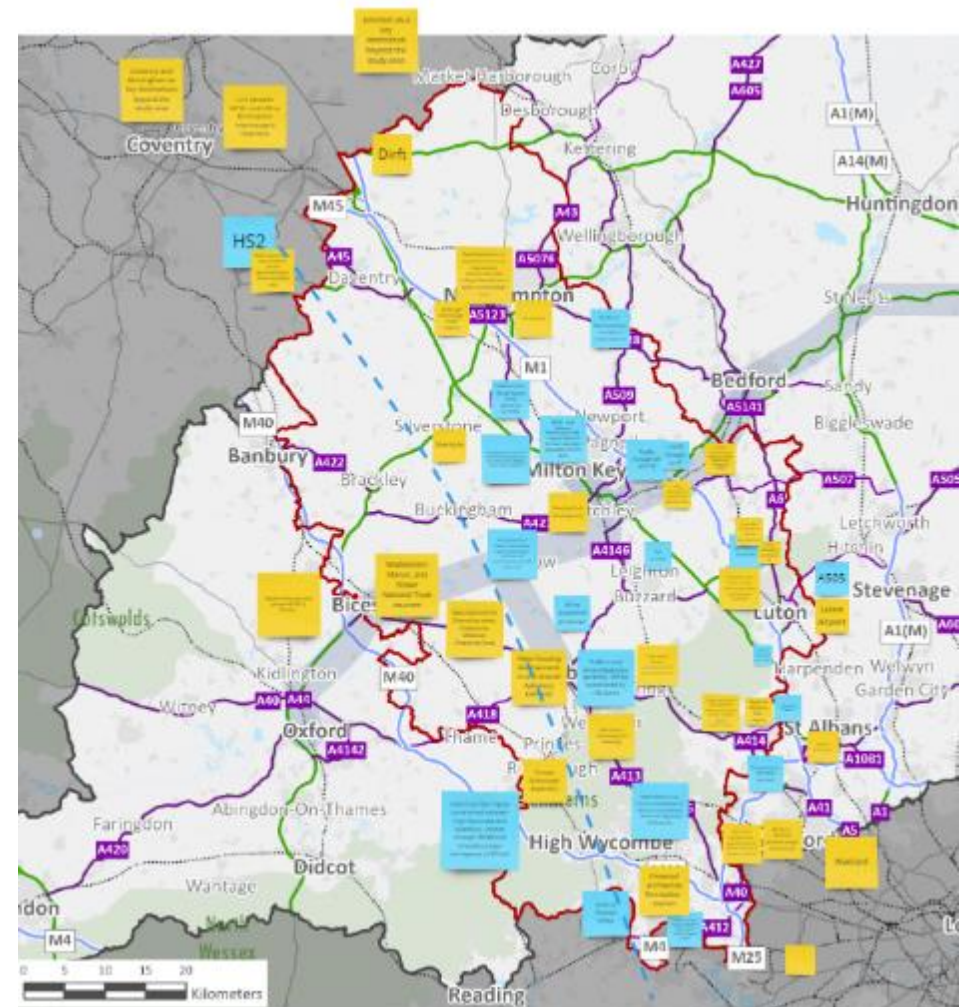
Stakeholder Group

A Stakeholder Group met to debate the issues and opportunities in the study area. A summary of the key findings from the stakeholder group session is provided below.

General Issues

- Poor connectivity from Buckinghamshire to Thames Valley by public transport

- Poor connectivity between Luton and Buckinghamshire, except Milton Keynes

- Poor connectivity from Aylesbury to Northampton by public transport

- Public transport interchange improvements

- Consideration of climate change resilience of proposed infrastructure measures

- Avoid harm to heritage assets, and public benefit from archaeological work

General Opportunities

- Promotion of EEH vision and validate approach across the region

- Social equity (not just inclusivity) not only about economy but also about green spaces

- Habitat creation alongside new infrastructure (e.g., species rich grassland/tree and shrub) – link to National Pollinator Strategy and Environmental Improvement Plan

- Opportunity to support other ambitions in the geography – e.g., New Environment Principles across the Arc region

- Opportunities for multifunctional infrastructure solutions with other providers (water, energy, utilities) – less CO_2, best use of available space etc.

- Reduction of the number of drivers by using TfL end of line car parks, rather than stations close to their homes

- Proposed rail/road interchange at M1

Bus Issues

- Connection of bus services to new Winslow Railway Station

Bus Opportunities

- Regional connecting bus services like X5

Rail Issues

- Connection of Aylesbury to East West Rail

Rail Opportunities

- Potential EWR expansion to Old Oak Common through Aylesbury Link

- Claydon junction modification, to allow routes from High Wycombe and Aylesbury towards Oxford

- Possibility of connecting High Wycombe to Bourne End and Maidenhead, and onwards to Great Western Rail line.

- Electrify Oxford – Bletchley line and onwards to Bedford

- Bletchley - Bedford gauge clearance for providing high gauge link to Kettering/Corby – very little work required as there are almost no bridges between Bletchley and Bedford

Active Travel Opportunities

- Opportunity for major shifts in urban transport – safer cycle/ scooter routes

Private Vehicle Issues

- Impact on people traveling to London due to ULEZ expansion.

- Traffic from the construction of logistics operations – Construction should take into account other programmes

Private Vehicle Opportunities

- Proposed M1 – A6 Link Road

Freight Opportunities

- Modal shift of trunk haul freight (>250 km) to rail

- Daventry International Rail Freight Terminal (DIRFT) – shift of freight to rail

- Battery HGVs for local and regional distribution (<250 km)

- Strategic Rail Freight Interchange (SRFI) in Bicester – Milton Keynes – Bedford corridor (potentially one at each end of this corridor)

- Last mile delivery opportunities in local town centres

- Innovative solutions for last mile delivery

Figure 33 Stakeholder Group Comments

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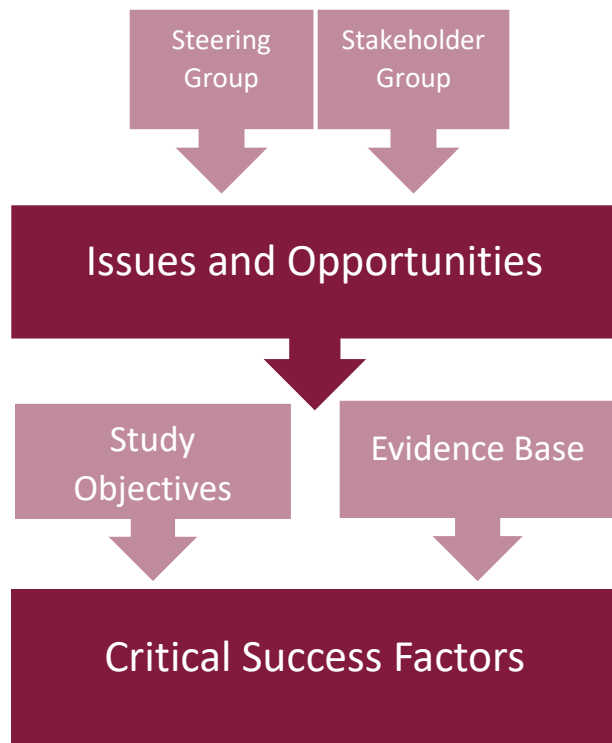
Table 11 sets out a summary of the outputs of the Steering Group and Stakeholder Group sessions against the EEH principles.

Table 11 EEH Principles, Issues and Opportunities

| EEH Principle	Issues Summary	Opportunities Summary
Achieving Net Zero	• Lack of public transport connection between Buckinghamshire and several destinations, e.g., rest of Thames Valley and Luton • Lack of public transport interchange points	• Regional connecting bus services like X5 • Electrify the EWR part between Oxford and Bletchley, and onwards to Bedford • Battery HGVs for local and regional distribution (<250 km)
Sustainable and Active Travel	• Traffic in several key junctions of the study area, such as M25/A41 junction, and M1 junction 13 • Expected raise in traffic in and around Aylesbury due to HS2 works, and along A421 due to Milton Keynes expansion	• Opportunities for major shifts in urban transport through safer cycle/scooter routes • West Coast Main Line provides links between Northampton, Milton Keynes and Leighton Buzzard for local commuter trips within the study area • Opportunities for modal shift of trunk haul freight (>250 km) to rail, e.g., connection with Daventry International Rail Freight Terminal
Connecting people and businesses to opportunities	• Lack of public transport interchange points, e.g., connection of bus services to new Winslow Railway Station • Closure of local roads in Iver if Western Rail Link to Heathrow goes ahead • Highly constrained A4010 corridor between High Wycombe and Aylesbury, since it passes through AONB and is subject to 50 mph speed limit	• Locating, designing and connecting strategic housing development sites with sustainable transport links • Potential EWR expansion to Old Oak Common through Aylesbury Link • Possibility of connecting High Wycombe to Bourne End and Maidenhead, and onwards to Great Western Rail line • Calydon junction modification, to allow routes from High Wycombe and Aylesbury towards Oxford • Proposed M1-A6 Link Road • M1 junction 8 improvements
Efficient Movement of People and Goods	• Impact on people travelling to London due to ULEZ expansion • Traffic from the construction of logistics operations. Construction should take into account other programmes	• Last mile delivery opportunities in local town centres • Innovative solutions for last mile delivery • Strategic Rail Freight Interchange in Bicester – Milton Keynes – Bedford corridor

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; and

- Stakeholder workshop inputs

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. Figure 35 shows the trajectories required to achieve decarbonisation from transport by 2040 and 2050 and the extent these deviate from EEH's "Business as Usual" situation. The trajectory shown indicates that, at the current rate, EEH will not reach its net-zero carbon target.

Figure 35 Transport Emission Scenarios [49]
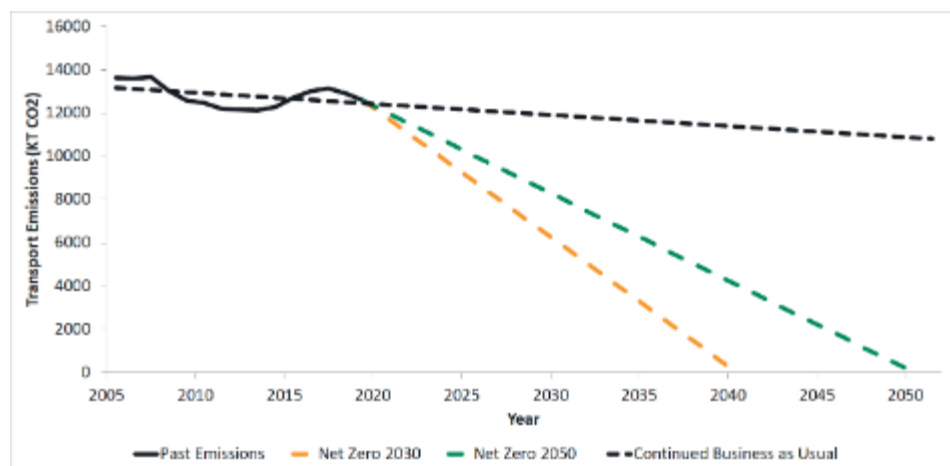
The evidence base identified that road-based carbon emissions is highest along the main motorways, A roads as well as the key settlements of the study area. In total, only 41% of road based carbon emissions within the EEH region as a whole result from trips which start or finish in the study area, this is likely due to the large number of heavily trafficked nationally and regionally important roads meaning the a large proportion of means result from trips that pass through the area. The M25, M1 and M40 indicate the major sources of carbon emissions. Larger urban settlements including Luton, Milton Keynes and Northampton also generate significant volume of carbon

[49] Source: Decarbonising Transport Plan, DfT, 2021

emissions. Luton Airport also produces a large amount of carbon emissions. This is associated with aviation related emissions and surface transport emissions of trips to / from the airport.

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 must be coupled with technological solutions to improve vehicle efficiencies and the use of the road and rail networks. Improvements in energy infrastructure in the study area is also required to support the provision of EVCPs.

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?[50]" 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. 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 base identified that accessibility of gigabit internet for households varies throughout the study area with rural areas found on the Western side of the study area showing roughly only 50% with gigabit access. Notable rural areas outside of the main urban centres also show limited access, with Milton Keynes and Luton specifically identified. It is likely that investment into gigabit access has prioritised urban areas where the largest populations could benefit.

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. In the short-term, targeted improvements in rural areas should be made to bring connectivity to a good baseline, whilst medium / long-term solutions should focus upon bringing all infrastructure up to a gigabit standard.

Challenge – Evidence indicates that access to digital infrastructure is variable across the study area. Large urban settlements including Northampton, Milton Keynes and Luton generally have good gigabit coverage whereas more rural areas including Great Horwood have less than 20% such coverage, increasing the need for those to travel where availability is low. How can we make high speed digital infrastructure more accessible?

[50] Source: DfT, Travel behaviour, attitudes and social impact of COVID-19 - GOV.UK (www.gov.uk)

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

Ensuring sustainable future growth within the corridor will be reliant upon an effective transport network. At present, jobs within the corridor are predominately located in urban centres (Northampton, Milton Keynes and Luton), with clusters in mid-sized towns and pockets in more rural areas like Silverstone.

At present, poor public transport connectivity between places of strategic importance may be constraining demand and restricting opportunities for people to access employment and economic assets. In this corridor, poor public transport connectivity specifically exists between Milton Keynes and Aylesbury, Luton and Aylesbury as well as between High Wycombe and Luton. All of these origin-destination pairings have existing poor connectivity by both bus and rail, and also have a relatively low number of inter-urban commuters, despite being within relatively close proximity to one another.

Public transport interventions, specifically buses may not be feasible due to issues of funding and affordability. This could be attributed to sparse rural populations in the areas between these places of strategic importance which do not have the population to support bus services. Proposals for extensive public transport systems will need to consider funding arrangements to ensure consistent and affordable transport in the corridor.

Challenge – Potential demand between our strategic economic assets is constrained by the transport network. How can we ensure high quality connections are provided that meet sustainability 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

Public transport connectivity is one of the most important aspects in promoting an inclusive and net zero transport system. Rural areas across the UK have historically had limited adequate public transport services due to the lack of financial feasibility produced from low population density.

Rural public transport services are relatively limited within the study area. Most rural areas outside of urban centres within the study area have very little public transport access with minimal bus routes and low frequencies. The lack of bus services makes public transport less viable for commuting / accessing services, creating increased car usage.

Lack of rail access is also a notable issue, with no local rail stations and/or no first mile/last mile opportunities to rail opportunities. Rail connectivity is particularly poor for east-west orientated trips at present in the study area. Although, the proposed East-West Rail scheme should improve this aspect of rail connectivity.

The recent development of demand responsive transport (DRT) has helped to create a possible opportunity for accessible and financially feasible public transport service for less populated areas. DRT allows for passengers to book bus services from a custom pick-up point and destination. Currently DRT operates within Buckinghamshire and Milton Keynes as "PickMeUp" and "Milton Keynes Connect" Respectively. These services both run between 06:00 and 19:00 and can be pre-booked and thus are suitable for daily or hybrid commuters. Rural areas within the study area need to be considered in future transport interventions in order to help create a fully decarbonised and inclusive transport system. The delivery of high quality, reliable and frequent public transport networks is often economically challenging in rural areas. There is opportunity however to expand upon the existing DRT schemes in the study area to provide better public transport options.

Challenge – Public transport in Rural areas has historically been financially unfeasible due to lack of patronage and reduced funding. How can sparsely populated areas be connected with public transport connections to reduce car dependency?

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

The study area is a both regionally and nationally important location for road freight, with key national routes like the M1, which has several large distribution centres located along it. Within the EEH specifically, this sector is of vital economic importance. However, there is a need to balance the economic importance of this industry with the negative externalities which are often associated with road freight.

The existing freight movement patterns within the study area indicate that HGV movements are concentrated on major north-south routes like the M1. However, there are almost no major road routes that travel east-west within the study area, and as such HGVs are often disproportionately present on inappropriate routes, for example on the A421 between Buckingham and Bletchley. This is a single carriageway road and thus is 'less appropriate' for HGV traffic than the SRN. There is increased risk of accidents as well as reduced resilience for the rest of the network if an accident/breakdown were to occur. This is particularly important when considering a disproportionately high number of accidents involving HGV's result in fatalities. HGV traffic within the study area leads to issues surrounding both carbon emissions and road safety. The majority of HGV's are still fuelled using combustion engines, meaning they are a key source of nitrogen dioxide and air pollution.

Another aspect of the freight movement transport system which will need to be addressed within the study area is local deliveries. First mile/last mile deliveries are currently mostly undertaken via petrol or diesel fuelled LGVs. There are opportunities to move HGVs to lower emission traction which the government have long term targets for. There is also scope to help promote cleaner and safer urban environments with the use of zero emission vehicles

and e-cargo bikes. E-cargo bikes would particularly be useful in easing congestion in areas like Aylesbury, which are historic towns and thus typically have narrower roads, less suited to larger vehicles like typical delivery vans.

Challenge – Many of the identified HGV routes within the study area run alongside existing rail links, like the M1 and the West Coast Mainline How can current HGV routes be transferred efficiently to cargo rail routes to enable a decarbonised freight movement system.

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

Figure 36 Shared Mobility Suppliers
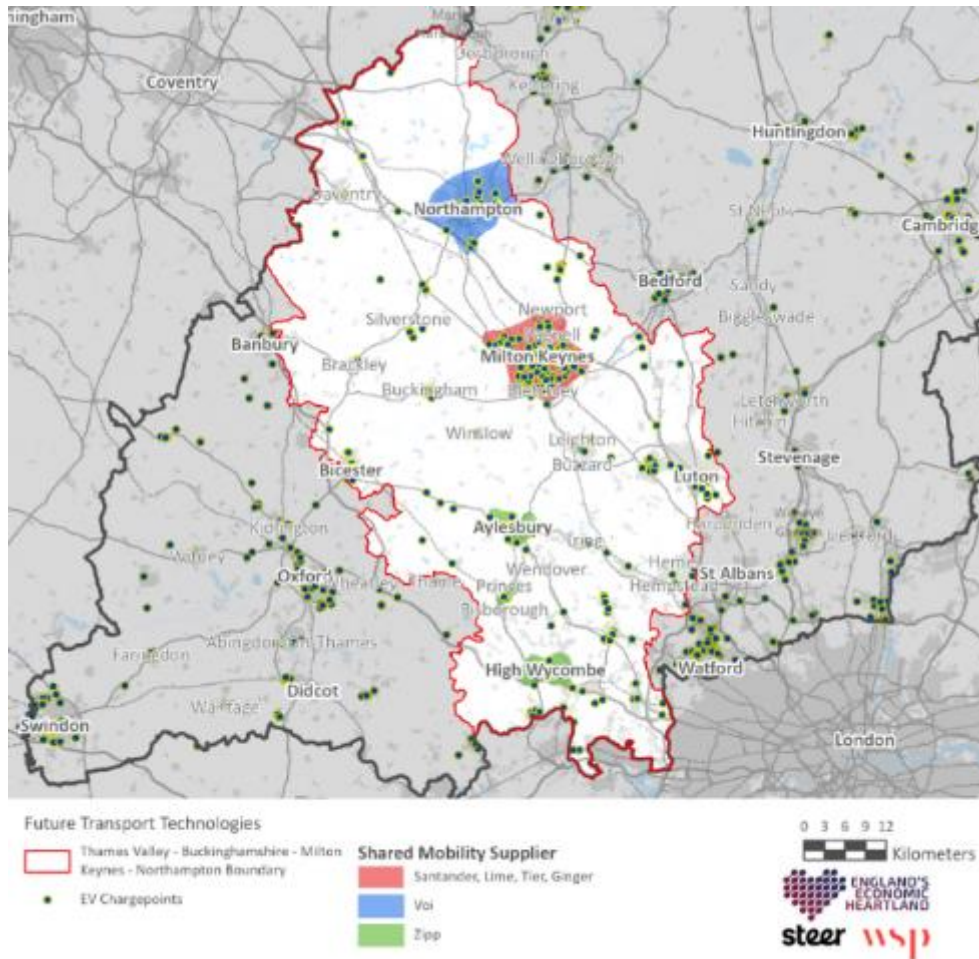
Electric vehicles, e-bikes and micro-mobility schemes represent a key component of a future multi-modal transport network that is capable of achieving net zero targets. In the corridor at present, there are pockets of shared mobility scheme availability in Northampton, Milton Keynes, Aylesbury, Princes Risborough and High Wycombe as shown in Figure 36. Expansions of these schemes could help provide first / last mile connectivity, forming part of longer distance commutes undertaken by public transport and thereby creating a holistic sustainable transport network. However, considerations should be given to the critical population densities required to support these schemes and give them commercial feasibility. E-bikes are also an attractive option for commuting over traditional cycling, allowing good connectivity when commuting within urban areas as well as offering opportunities to support inter-urban trips. In this corridor, E-bikes could be particularly successful in urban centres within close proximity to one another, for example Milton Keynes and Bletchley, Luton and Dunstable and Bletchley and Leighton Buzzard. To support the use of ebikes, appropriate and attractive infrastructure (routes, charging points and changing facilities) are required.

Challenge – Ensure that new technologies promoting low-carbon travel modes can form part of an inclusive, affordable and connected transport network.

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

Figure 37 High Speed Rail UK

Although no direct stations will be present within the study area (Figure 37), 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 "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 and more local rail services. 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 – As the development of HS2 has no plans for implementing direct station access within the EEH region, how can the study area and EEH region as a whole help to develop connections to the proposed railway line as well as sustainably utilise the existing West Coast Mainline?

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

Accessibility to local services, employment and amenities is a key factors influencing travel mode choices. Areas which lack high quality public transport services and active travel infrastructure are more likely to see heavy car usage and dependence, highlighting the need for good accessibility in a sustainable transport network.

The evidence base identified that the accessibility to key services throughout the study area varies, with the major urban centres seeing the highest levels of accessibility with only 15-minute journeys required. The eastern section of the study area has relatively high accessibility, with the western side having lower accessibility. Significant reduction in accessibility can be seen in the rural areas surrounding Brackley, Silverstone and Buckingham. Local bus services as well as rail access is limited in this area, indicating less overall accessibility and an increased need for car usage.

Major growth is proposed on the periphery of key settlements, with Milton Keynes Urban Extension particularly seeing the placement of dwellings further and further from established urban centres. The siting of new developments is likely to create car dependency if high quality sustainable travel options are not provided to nearby centres of employment and other everyday services and activities.

Sustainable transport interventions must also target areas where existing accessibility to services and amenities is poor, particularly areas where public transport and active travel does not currently offer a viable alternative. Opportunities exist to improve accessibility in currently deprived areas, for example that which sits on the north west edge of Luton, in order to allow greater access to education and employment opportunities.

The development of long distance bus services as well as first mile/ last mile transport can help to allow for better access to the HS2 route from the study area. This will help to improve connectivity with the largest urban settlements within the UK to the study area with much shorter journey times than are currently possible. These opportunities could be presented by improved mass transit/public transport and walking and cycling links to rail hubs such as Milton Keynes and Watford allowing for onward journeys.

Challenge – Development is often located in areas where existing sustainable transport options and access to key services are more limited. 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

The distribution of active travel infrastructure varies throughout the study area. National cycle routes provide connections between some of the built-up areas in the study area, however some key gaps are present, particularly on the periphery of key settlements like Aylesbury which are present has no inter-urban active travel connections at all.

Several key settlements have been identified which have realistic E-bike potential, including Luton and Dunstable as well as Milton Keynes and Bletchley. The development of high-quality active travel infrastructure both within and between settlements can help to empower people to cycle who would normally not be confident enough. Infrastructure at LTN 1/20 levels of quality will help to protect cyclists and pedestrians from motor vehicles and enable safer and more direct cycle and walking routes to key destinations and employment areas.

The use of E-bikes allows for notable new opportunities in cycling for local populations. With electrically assisted bicycles (as well as E-scooters) cycling can become a much more attractive for everyone as less physical effort is required to travel, making elevated terrain easier to traverse. The expansion of public micromobility services to offer bicycle and preferably E-bikes and E-scooters available to the public can help give another transport opportunity within urban settlements. Public micromobility is currently limited as it is only available in Aylesbury, Princes Risborough, High Wycombe, Milton Keynes and Northampton. The level of provision also varies, with only standard bicycles being available in Buckinghamshire. The expansion of public e-bikes/e-scooters in urban areas throughout the study area can offer an effective first mile/ last mile transport option to help increase active travel mode share but must be supported by accompanying improvements in active travel infrastructure to become a realistic alternative.

> **Challenge –** Many of the settlements within the study area have narrow carriageway widths, car parking and heavy car usage, making the implementation of cycle infrastructure difficult. How can existing settlements be planned for implementation of cycle lanes and footway with LTN 1/20 quality?

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 39 and described below.

1 Northampton: This important county town has a compact, historic centre, with space for redevelopment at its edges, that may help overcome the dislocation of the inner ring road, and reconnect the centre with the river, particularly the expanding university. This core is surrounded by a substantial suburban outskirt, principally from the large-scale expansion the town experienced as a third wave new town. Improving active travel and public transport is a challenge due to the post-war urban form being principally oriented towards car use, but with latent segregated cycle networks and plenty of space for reallocation of road space along the parkway system. The distance/dislocation of some of the outer suburbs to the town centre, particularly to the east and west, and the use of peripheral urban extensions as a means to grow the city, could be addressed by the creation of a new strategic public transport connection improving access to the rail network and potentially onwards to neighbouring towns (e.g. Daventry/Wellingborough).

2 Milton Keynes and Marston Vale: Milton Keynes, the UK's largest and arguably most successful new town, has achieved a high level of self-containment, with a strong, mostly landscape and infrastructure derived sense of place, but challenges associated with its low density, zonal planning and the legacy of car-oriented development forms, but plenty of scope for intensification, growth and the retrofit of the grid roads to support public transport. The projected completion of East West Rail would place Milton Keynes mid-way on a new public transport link between Oxford and Cambridge and improve access to growth sites in Marston Vale and new/ relocated stations in the growth area south of the city - supporting more intense land usage, and higher population densities than have perhaps been assumed to date.

Figure 38 Locations of sub areas
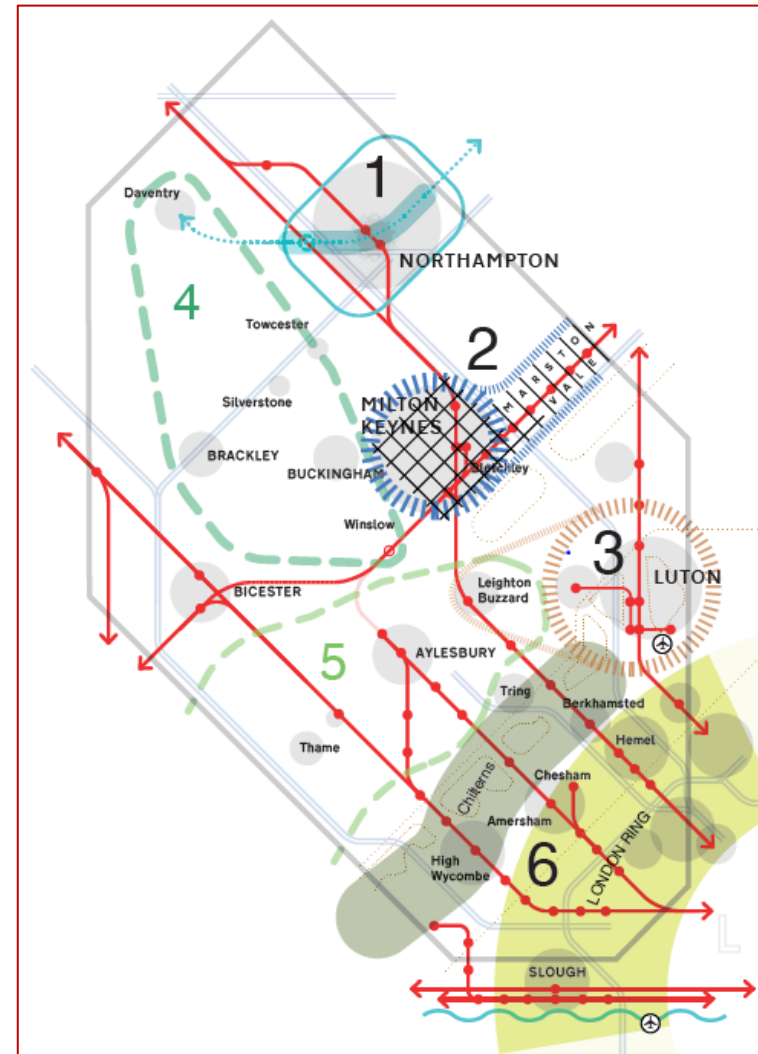
3 Luton + Dunstable: Surrounded by green belt and bracketed by the Chilterns, much of Luton's potential future growth will be accommodated through intensification and renewal within the existing urban area, particularly around its two main stations. Connecting existing and new population and employment points from Leighton Buzzard in the west via the existing busway through Dunstable and Luton, and towards through east Luton to Hitchin/Stevenage (and hence East Coast and West Anglia rail corridors) 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.

4 Daventry-Winslow: This extensive area of relatively open countryside contains a collection of dispersed smaller towns and employment/visitor destinations (e.g. Silverstone). Each is relatively unconstrained in terms of their ability to accommodate future growth and could sustain expansion on their edges with a compact settlement model focussed on encouraging active travel for local journeys. They are however all relatively difficult to serve by public transport in terms of connections to neighbouring centres and the wider rail network - so may benefit from a larger-than-local strategy for high quality bus/coach connectivity and/or a shuttle to East West Rail at Winslow, which as the location for a new station, has the greater potential for well-connected development.

5 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.

6 Chilterns and London Ring: This area comprises an inner zone, closer to London, of sizable tightly packed, yet discrete settlements close to the M25, and an outer area, further from the capital, of less developed, more precious landscape along the Chilterns, with just two larger settlements. Despite these differences almost all non-urban land within both bands is green belt, so opportunities for growth are constrained to existing urban areas. In both sub-areas this could be an opportunity to improve existing places and movement patterns through renewal and intensification of existing underutilised or brownfield sites within existing urban areas. Another notable commonality in this area is that settlements have strong radial connections into London, but poor direct connections north-south / south-west to north-east - for instance from High Wycombe to Luton - by public transport and by road - exacerbating pressure on the M25 and on the fine-grained network of small country roads that criss-cross the area.

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

Current Context: People, Place, Connectivity: Summary		
People	**Place**	**Connectivity**
• The evidence presented shows that the study area is socially diverse, with a mixture of high income groups located in suburbs on the periphery of Greater London in the south in and High Wycombe, and lower income urban dwellers in the larger urban centres in Milton Keynes, Northampton and Daventry. • The study area has a mix of larger urban settlements, including the city of Milton Keynes and large towns of Luton and Northampton and smaller rural communities which dominate the northwest. 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. • Car availability in the study area is very high, particularly in the suburbs, edges of towns and rural areas in the Chiltern Hills.	• The study area includes 11 key settlements, as well as several regionally and nationally important road/rail links which provide connectivity between London to the south of the study area and the north of England and Scotland. This includes major freight routes along the M1 and around Milton Keynes. These long distance freight trips typically start and end outside of the study area as through traffic. This is a key challenge, for example in terms of carbon, as it is something that the EEH has lesser influence over. • GVA split in the study area indicates a high presence of car manufacturing and research technology. This is a challenge in respect to the inherent generation of road traffic by these industries. However, it is also an opportunity in respect to the potential of developing high-tech vehicle research and manufacturing activities within the study area. Interventions of decarbonization technology and green energy associated with the car industry could boost a sustainable transport network across the EEH region. • 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.	• Rail connectivity at present is heavily north-south orientated, with opportunities to transfer between the different east-west routes being limited. This can lead to unnecessary lengthy diversions being required to travel what should be a relatively short east-west distance. • Improved digital connectivity, particularly in rural areas 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, and in turn, reduce the need to travel. • High frequency bus links in the study area typically do not extend far beyond urban centres, with the one exception being the corridor between Aylesbury and High Wycombe. • Access to key services in the study area varies greatly. The rural areas in the northwest of the study area is a 'transport desert' in relation to sustainable transport links, with access to daily services via public transport / walking taking in excess of one hour. This creates car dependency. • HS2 and EWR are committed strategic infrastructure improvements which will enhance sustainable connectivity within and through the study area.

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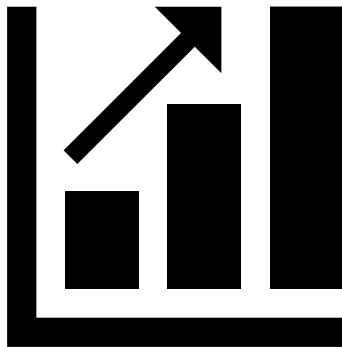
The study area faces substantial levels of housing and employment growth that will result in considerable increases in population, jobs and travel demand. Unsustainable car-dependent developments will negatively impact upon the local environment, levels of sustainable travel and the quality of place.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

Covid-19
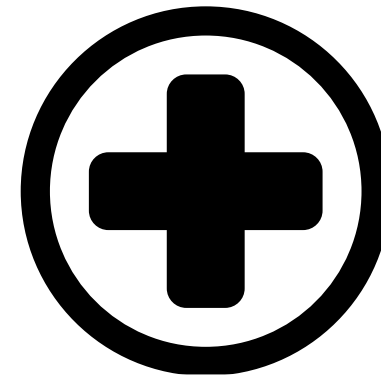
The undesirable arrival of a shock event, such as the 2019 Covid-19 Pandemic, required a fundamental shift in how society and business operate on a day-to-day basis. The pandemic resulted in the acceleration of several mobility patterns such as working from home, active travel, increased freight and 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 40 illustrates that within the study area, a total 487 new housing developments sites (based upon local authority planned growth figures) are expected to be delivered between 2021 and 2031. This equates to approximately 162,000 new dwellings. This represents approximately 32% of total number of proposed dwellings in EEH region in this time period. Proposed developments are typically located on the outskirts of existing key settlements including Milton Keynes, Northampton and Aylesbury.

In the areas adjacent to Milton Keynes alone, Major Development Areas (MDAs) including Milton Keynes East and Milton Keynes West comprise over 33,650 new dwellings. This equates to 21% of all the homes proposed in the study area. Substantial residential growth is also planned around Silverstone, a smaller settlement which currently has no rail connections and is poorly served by existing bus services.

Employment Sites

Within the Study area, a total of 63 employment sites (based upon local authority planned growth figures) are proposed for implementation between 2021 and 2031. A total of 95,000 new jobs are expected to be created through the new developments, representing 30% of the total proposed EEH employment growth. The largest development sites tend to be located on the outside of urban settlements. Silverstone Business Park, Millbrook Technology Park and Westcott Venture Park are examples of notable employment developments within a more rural context.

Urban extensions like that planned for Milton Keynes face transport sustainability challenges unless high quality sustainable travel connections are provided from the outset. Planned growth in smaller settlements within rural areas like Silverstone and Millbrook will likely result in high levels of car dependency unless attractive sustainable travel opportunities to nearby urban centres like Milton Keynes and Northampton are provided. East-West Rail may provide some opportunity for sustainable travel, but this must be accompanied by first mile / last mile solutions to ensure whole trip connectivity.

Figure 39 Housing and Employment development[51]

Housing and Employment Developments

Thames Valley -
Buckinghamshire -
Milton Keynes -
Northampton
Boundary

Housing (Dwellings)
- Less than 250
- 251 - 500
- 501 - 1,000
- 1,001 - 2,500
- Greater than 2,500

Employees (New Jobs)
- Less than 1,000
- 1,001 - 2,500
- 2,501 - 5,000
- 5,001 - 10,000
- Greater than 10,000

0 4 8 12 16 Kilometers

ENGLAND'S ECONOMIC HEARTLAND

steer WSP

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[51] Source: EEH Databank

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

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 planned increases in working age population (aged 16-74) will result in additional intra-urban and inter-urban travel demands that will put further pressure on the existing transport networks. Figure 41 shows that the MSOAs which are expected to experience the largest population growth in this age range within the study area are mostly situated within the centre and north of the study area. This includes areas surrounding Milton Keynes, Buckingham, Aylesbury and Bicester, as well as surrounding Northampton and Daventry.

The lowest levels of growth as well as decrease can be found in the southern area of the study area, with south Buckinghamshire highlighting high levels of decrease. This indicates that these areas will experience aging populations in the next 20 years as the population aged 75 and over is expected to increase, a pattern that is being seen throughout the UK.

Without mitigation, population growth in the centre of the study area between Milton Keynes, Aylesbury and Bicester will increase demand for car travel and increase congestion. Forecast population growth in rural areas, for example surrounding Buckingham and Silverstone will increase congestion issues on major routes also, including A43 towards Northampton. To address this, improved sustainable transport connectivity from these developments to local urban centres and everyday services and facilities. This will prevent car dependency forming in new populations as there will be a number of realistic options to choose from in respect to travel modes.

Figure 40 Forecast Population Growth[52]

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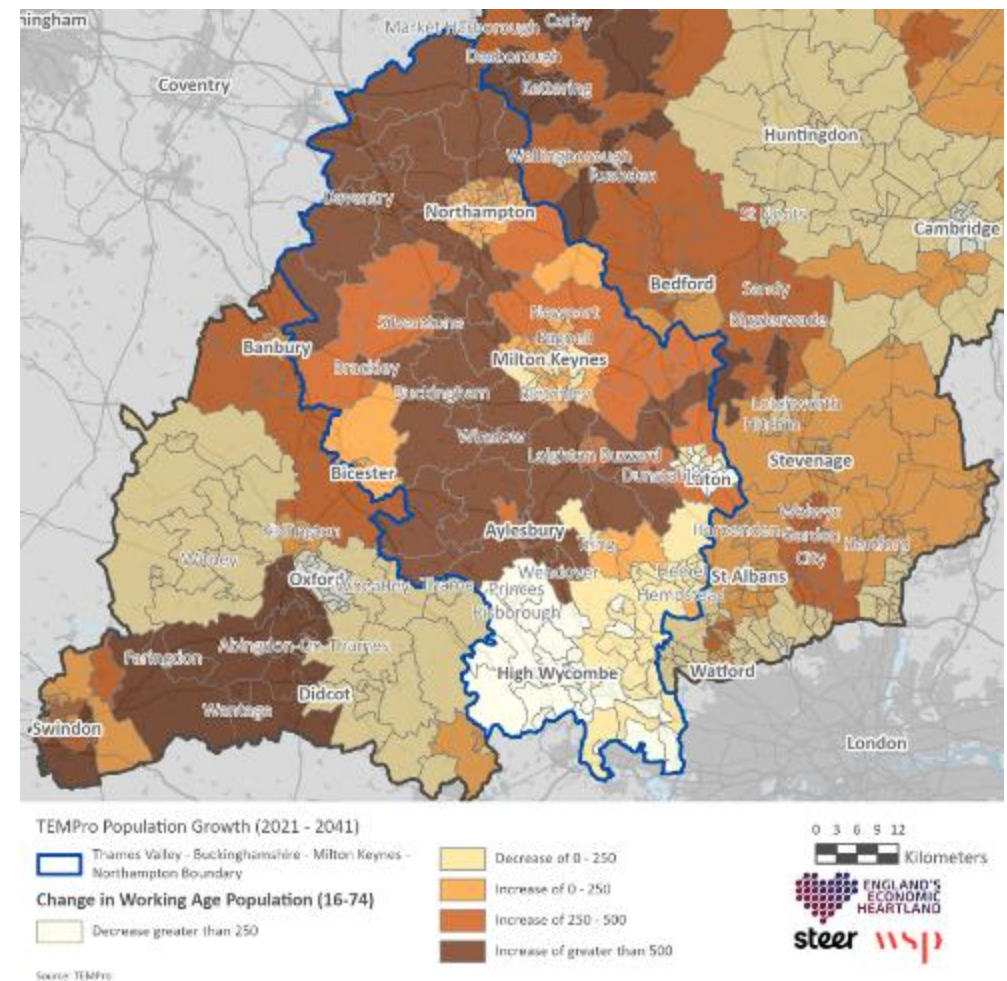
[52] Source: TEMPro Population, ONS, 2021

Transport Improvement Schemes

A number of strategic transport improvement schemes are planned as shown in Figure 42. These include:

- **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.

- **HS2 –** The HS2 route between London and Birmingham is under construction and therefore covered as part of the current context section of this report. Whilst no railways stations are proposed to be provided in the study area, capacity on the West Coast mainline is likely to be alleviated for more local, regional and freight services which will benefit commuters with more regular trains.

- **Aylesbury Link Road projects** – Both the Northern Aylesbury link road and the South East Aylesbury Link Road (SEALR) are planned for road capacity improvements within Aylesbury which will help achieve Aylesbury's future development plans.

- **Luton Airport Expansion –** New terminal improvements proposed alongside the recently implemented Luton DART shuttle service which connects the airport terminal with the mainline railway at Luton Airport Parkway Station in less than four minutes.

- **Western Rail link to Heathrow Airport –** Direct link from the Great Western Main line for Heathrow Airport which would greatly improve the rail connectivity of the largest airport in Britain.

Other schemes include: Northampton Road Schemes, Daventry Parkway Station, A422 Farthinghoe Bypass, A5 Towcester Relief Road, Milton Keynes Bus interchange & DRT.

Rail improvements are a significant area of focus within the study area, with the progress of East-West Rail and HS2, both of which will unlock capacity at local stations along the West Coast Mainline, as well as improving existing east-west severance and support the sustainable growth in Wimslow. Highway capacity improvements are also proposed for the study area. It is notable however that there are no strategic active travel improvements proposed.

Figure 41 Future Transport Schemes[53]
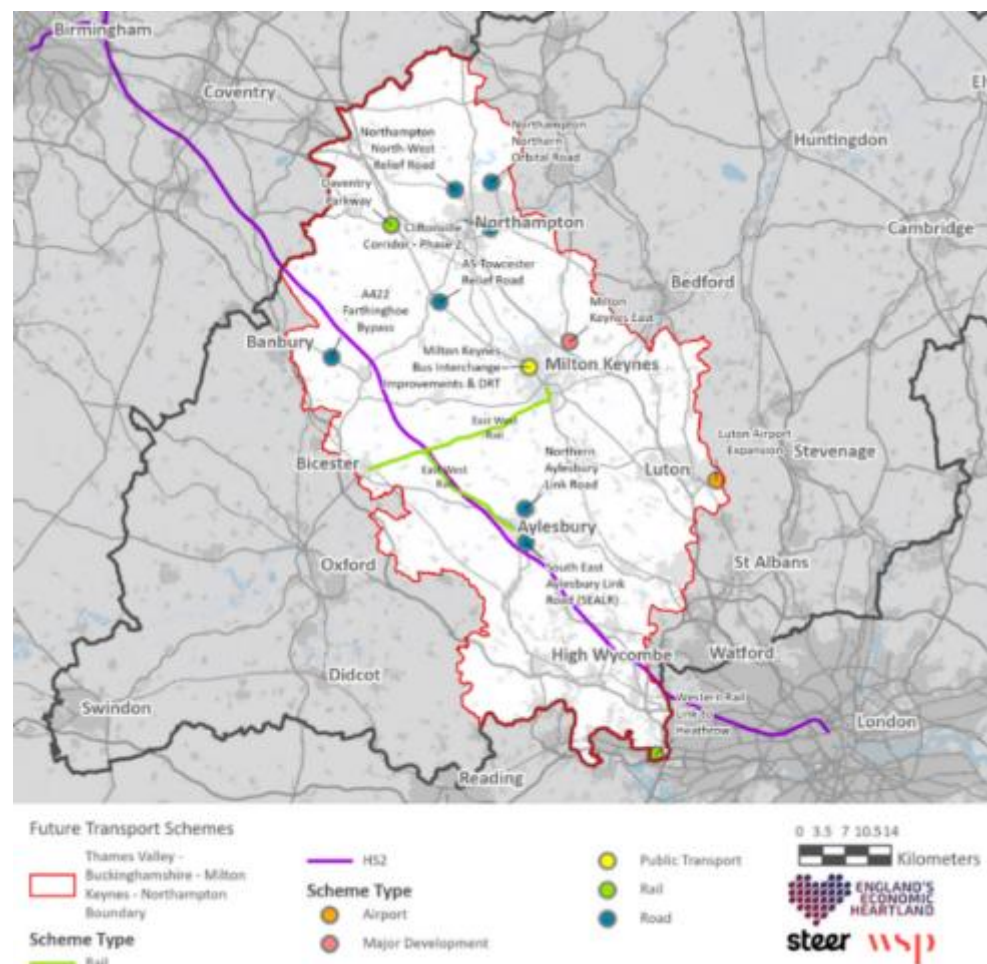
COVID-19 Recovery

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[54]. 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 to 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

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

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

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,[55] 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.

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.[56]
- **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.[57]
- **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.[58]

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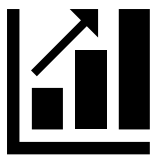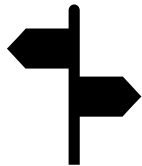
[55] Source Daily domestic transport use by mode - GOV.UK (www.gov.uk)
[56] Lee, J. D., Drysdale, W. S., Finch, D. P., Wilde, S. E., Palmer, P. I. (2020) UK surface NO2 levels dropped by 42% during the COVID19 lockdown: impact on surface O3. Atmospheric Chemistry and Physics Discissions. [Online]. Available at: **https://acp.copernicus.org/preprints/acp-2020-838/acp-2020-838.pdf** [Accessed 1 September 2021].

[57] 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]
[58] 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	**Ensuring new urban extensions are sustainably connected -** Urban extensions can have inherent sustainable travel issues. This is as they locate dwellings on the outskirts of existing settlements, often far away from established centres. This could create car dependency in new developments like the Milton Keynes Urban Expansion, should sustainable travel not be considered from the outset. **Pressure on the transport network from new developments** – Growth in existing rural areas, for example that which is forecast for Silverstone and Buckingham will place pressure on what is currently a limited transport network. Is left unchecked, this is likely to lead to high levels of congestion between these areas and nearby town / city centre destinations as residents attempt to access services and employment.	**Opportunities to plan new developments in a sustainable and accessible way** – 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 planning 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. In Milton Keynes, the urban extension planned should be built into the existing high quality public transport network. **Opportunity to capitalise on changing work patterns to allow commuters to work remotely and reduce the need to commute** – New residential developments have the opportunity to provide high quality broadband infrastructure which would allow greater volumes of people to work remotely and thereby removing the need to commute, whilst simultaneously improving residents access to employment opportunities.
TRANSPORT SCHEMES	**Planned highway based transport interventions continuing to create a transport network focused on car based accessibility** - Some planned interventions within the study area remain as road-based solutions. This includes the Aylesbury Link Road Projects and the Northampton Roads Project. Such interventions offer little focus on reducing car-based commuting. **Limited improvements proposed along key inter-urban corridors** – There are no public transport improvements proposed between Daventry to Northampton, which is a key inter-urban corridor.	**New, high speed rail connections to key national destinations** - HS2 when complete will offer a new, high speed railway link in the study area, which will provide onward connectivity to larger regional destinations including central London in the south and central Birmingham in the north. The main benefit for the EEH region will be released capacity on the WCML, enabling more trains to operate to/from key rail hubs. **East-West rail working towards bridging east west rail severance in the study area** – Proposed rail interventions between Bicester and Milton Keynes will solve an existing issue of severance in the study area, resolving the existing need for lengthy diversions to travel between these two settlements by rail. **Opportunities to improve place making –** New bypass schemes including Aylesbury Link Roads projects, and the Northampton Road Schemes

Future Context: Summary		
Theme	**Issues**	**Opportunities**
		present an opportunity to improve place making along existing local roads, therefore making these local roads more attractive and suitable for walking and cycling. Integrating committed transport infrastructure schemes will result in the best possible outcome in terms of access, opportunity and reducing carbon emissions.

9 Need for intervention

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**
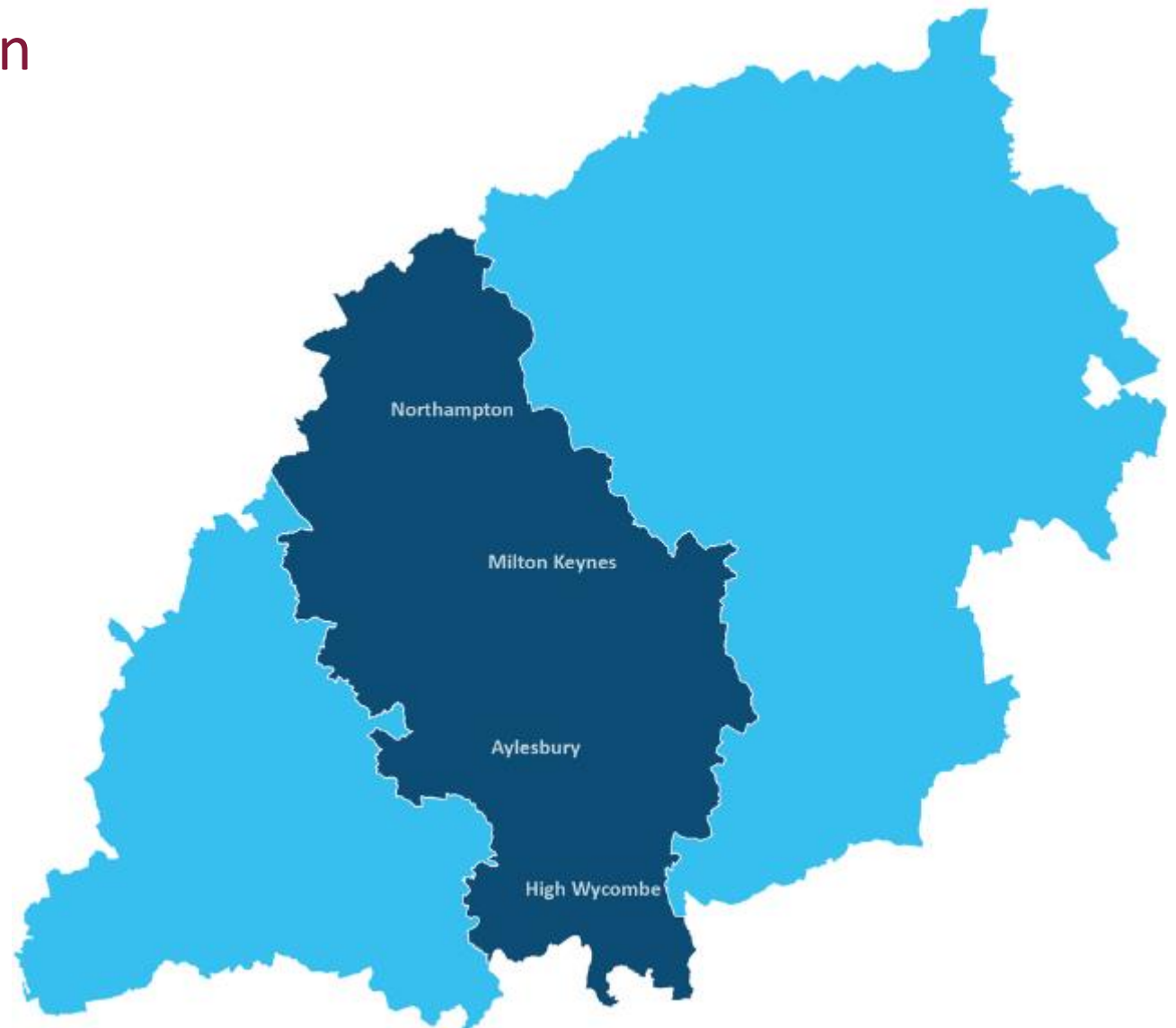
SWOC Analysis

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. In the study area for example, there is a strong presence of the motorsport industry, with the Nissan Technical Centre in Cranfield and Volvo Training and Development Centre in Daventry. This results in a highly skilled workforce in the areas of innovation and technology. The study area also has a number of assets of significance within the film industry. - 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 zero emission vehicles. However, these groups may be more reluctant to user lower cost modes of transport (e.g., local bus services), noting that there is variation in public transport cost and fare affordability could be improved.	- Car availability in the study area is high, particularly in the suburban and rural areas. High car dependency leads to congestion and air quality issues. There is a strong correlation between car availability and car dependency. Car ownership has not changed significantly in the study area in the decade between the 2011 and 2021 census. - Once people have invested in a private vehicle they may be reluctant to use sustainable modes of transport if accessing the vehicle is more convenient. - The planned future transport interventions including the Aylesbury Link Road projects, and the Northampton Roads Project are road orientated and thus will support existing car dependency within the study area. - 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. - Parts of the study area represent households with fuel poverty.
Opportunities	**Challenges**
- East-West Rail, a new railway connection between Bicester and Milton Keynes will provide a solution to existing public transport severance in the study area, and vastly improve opportunities for transfer between the existing north-south orientated railway lines in the area. This is a great opportunity to provide a new rail connection and encourage shifts away from the private car. This will also support sustainable planned growth at Winslow and the surrounding areas. There is also the opportunity to provide complimentary First Mile / Last Mile improvements to Railway	- 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. Whilst EEH is unlikely to be able to influence emissions from the aviation industry, there may be opportunities however to support the decarbonization of surface travel to and from London Luton Airport.

- Stations on the East-West Rail line, to ensure holistic sustainable transport connectivity.
- HS2 when complete will offer a new, high speed railway link through the study area, which is expected to remove significant existing/ future demand for through passenger traffic on the West Coast Main Line by providing a new connection between larger regional destinations including central London in the south and central Birmingham in the north. This will relieve existing pressures on the West Coast Main Line and thus improve local rail travel from local railway stations within the study area. However, it is noted that pricing of future rail services could influence the level of through traffic which is removed.
- The most heavily used road freight link in the study area is the M1. This runs directly 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. To support this, there is the opportunity for the provision of inter-modal freight terminals along existing rail lines which are close to major strategic roads.
- 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 Leighton Buzzard, which currently have no such provision.
- Opportunities for new active travel routes where e-bikes are viable mode for inter-urban journeys, including between Luton and Dunstable, Dunstable and Leighton Buzzard as well as between Milton Keynes and Bletchley.
- Opportunity to improve digital infrastructure in rural parts of the study area including Nash and Great Horwood, which currently have poor digital connectivity. Improving connectivity in these areas will provide the opportunity to residents to make use of 'digital travel' for the access to employment and services remotely.

- 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. In these locations achieving net zero will be dependent upon the uptake of zero emission vehicles. EEH has influence over the uptake of zero emissions vehicles through supporting the role out of EV charge points in the study area.
- 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 onwards to Crewe and Manchester. This is as the study area contains key national road 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.
- Forecast population growth in Silverstone and Buckingham, which are existing rural areas, will be difficult to manage without investment in sustainable transport interventions. This is as existing sustainable transport connections to these areas are very limited.

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

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**
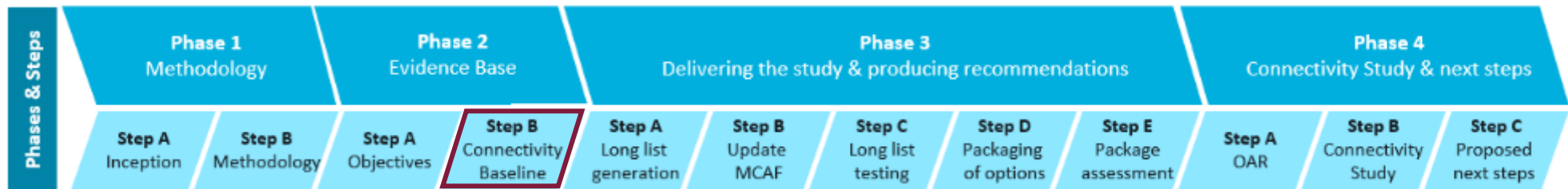
Appendix A – Mosaic Groups

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.

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

Appendix B – Cycle 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

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**
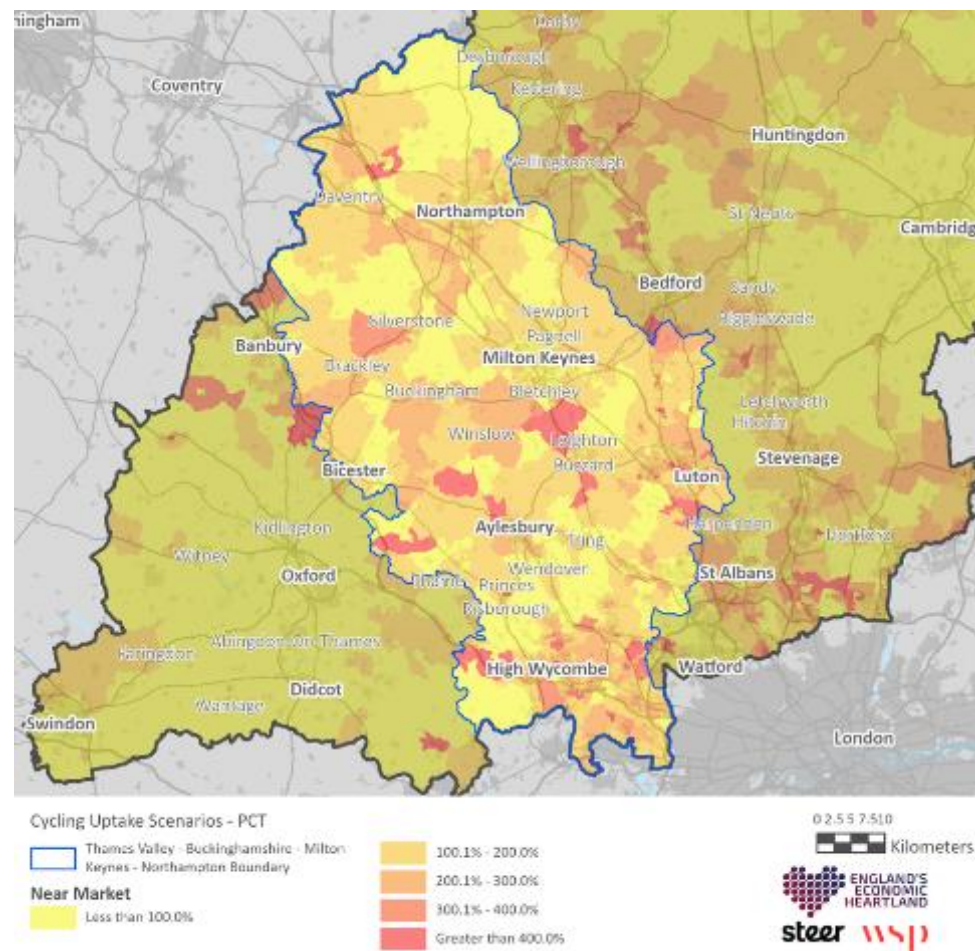
Government Target Scenario

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.
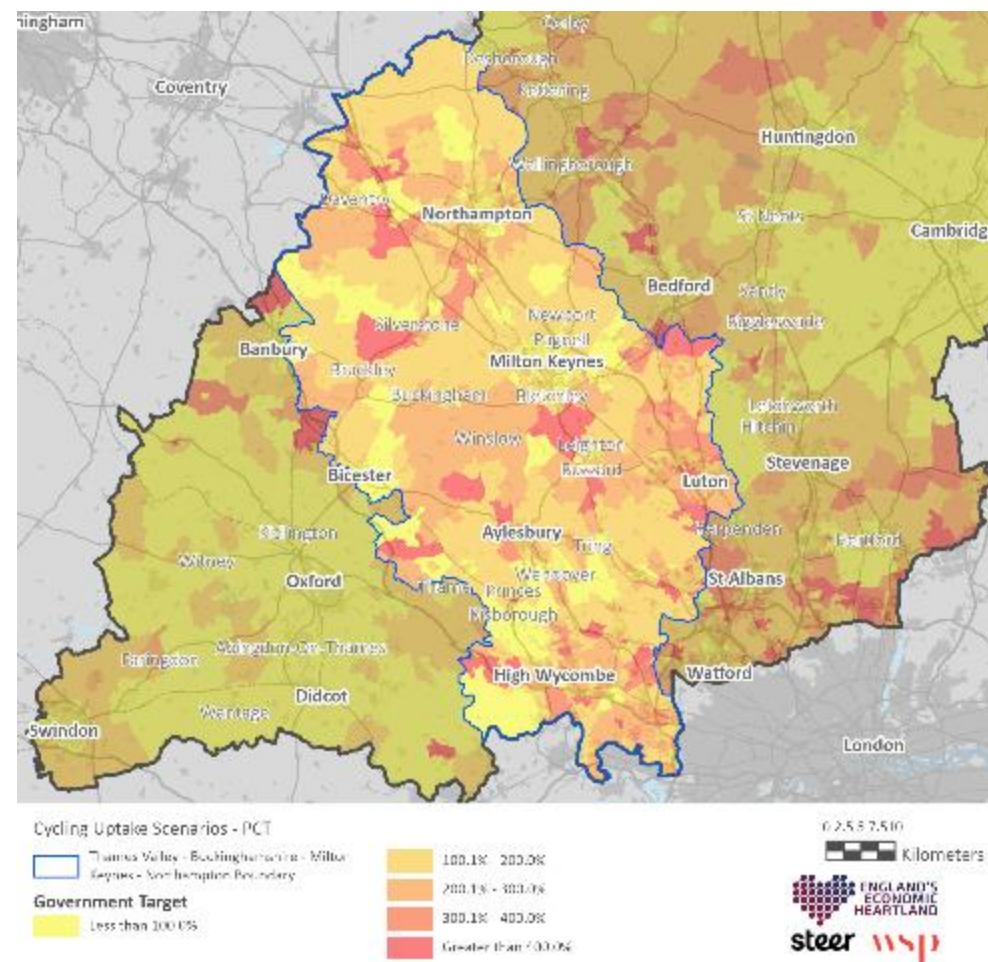
Data Source: Propensity to Cycle Toolkit

Gender Equality Scenario

This map shows the level of change in cycling between the current situation and a scenario where gender disparities are eliminated.
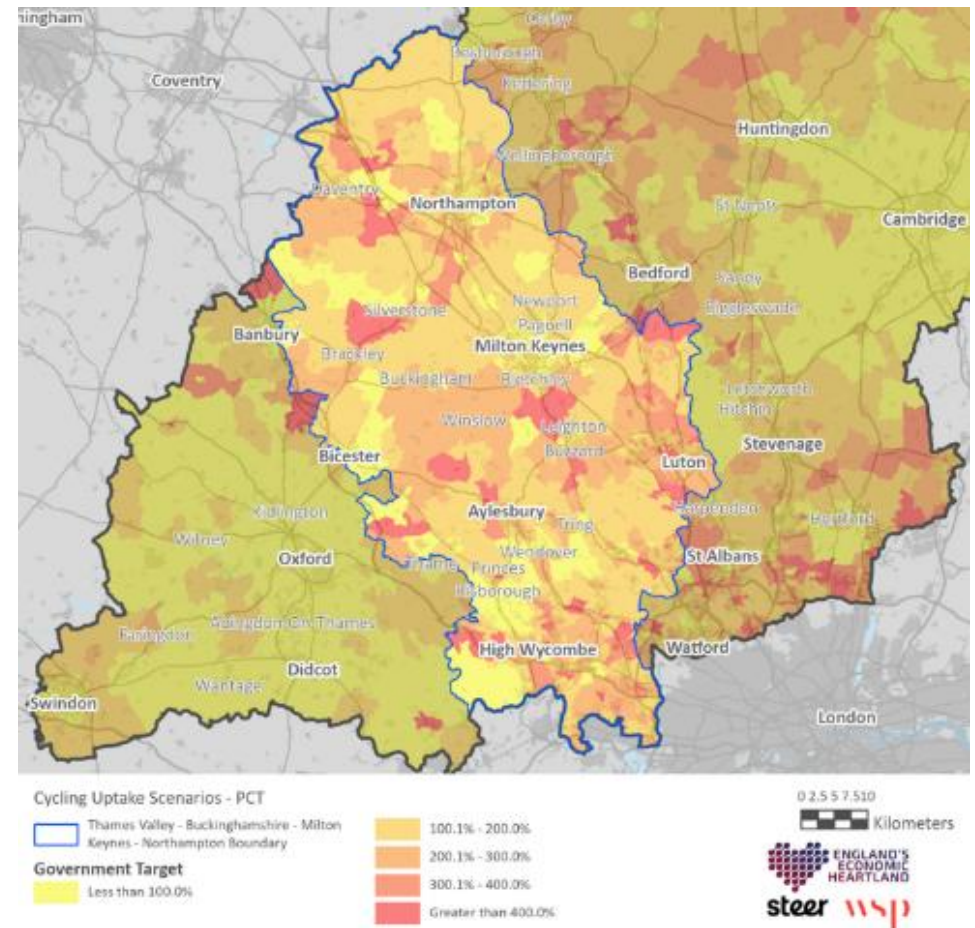
Data Source: Propensity to Cycle Toolkit

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.
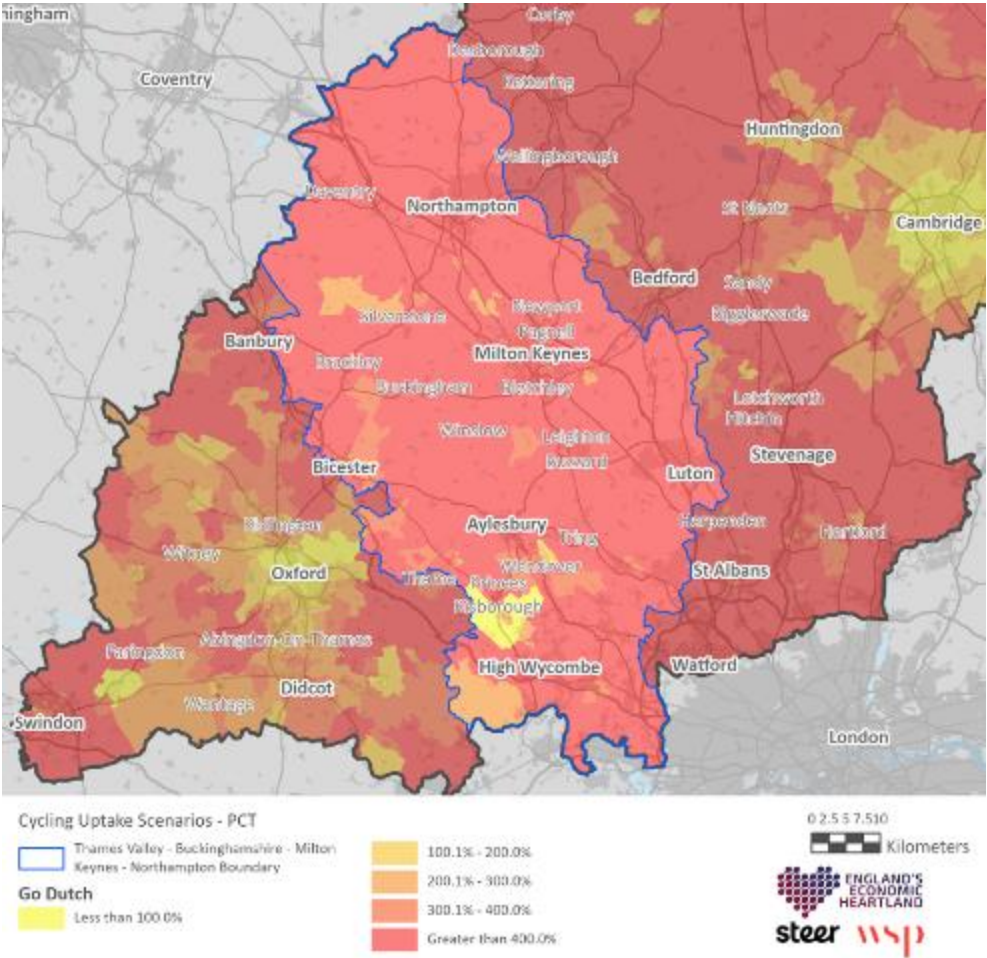
Data Source: Propensity to Cycle Toolkit

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.
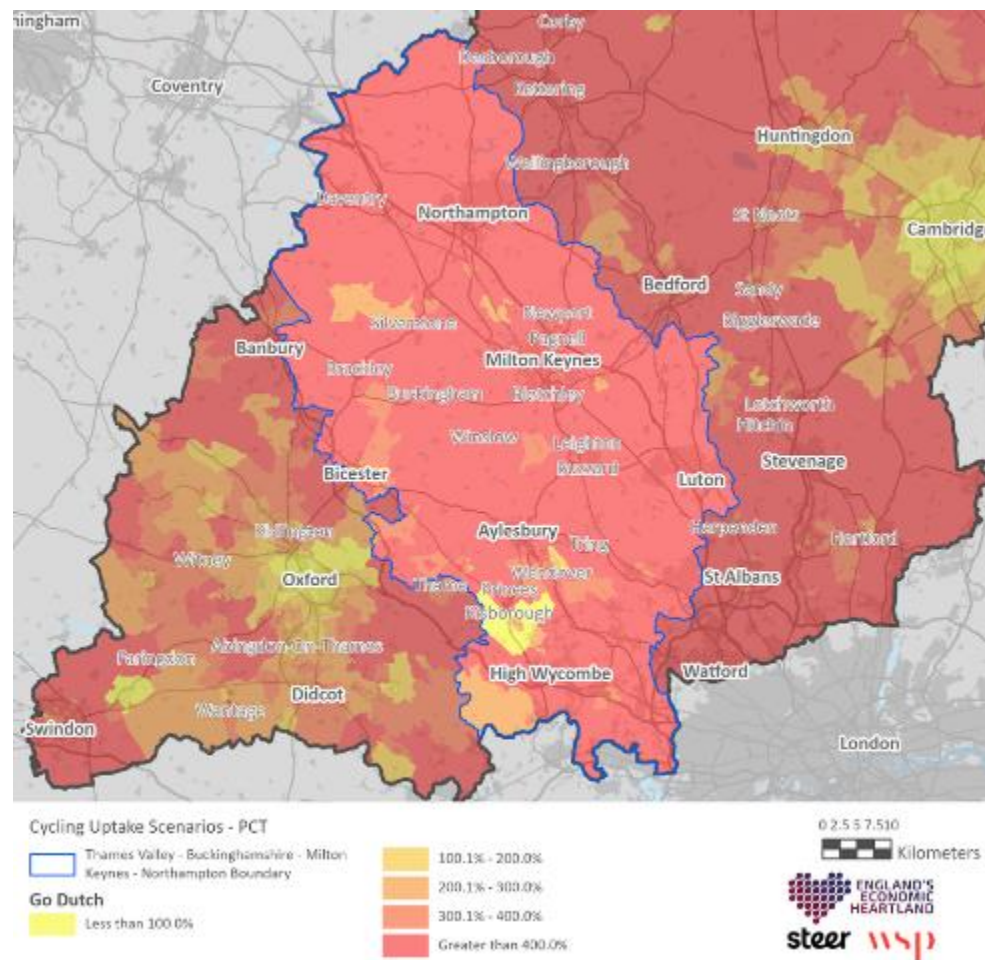
Data Source: Propensity to Cycle Toolkit

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

Appendix C – 60 minute Public Transport and Drive Time Catchments

Aylesbury

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from Aylesbury.
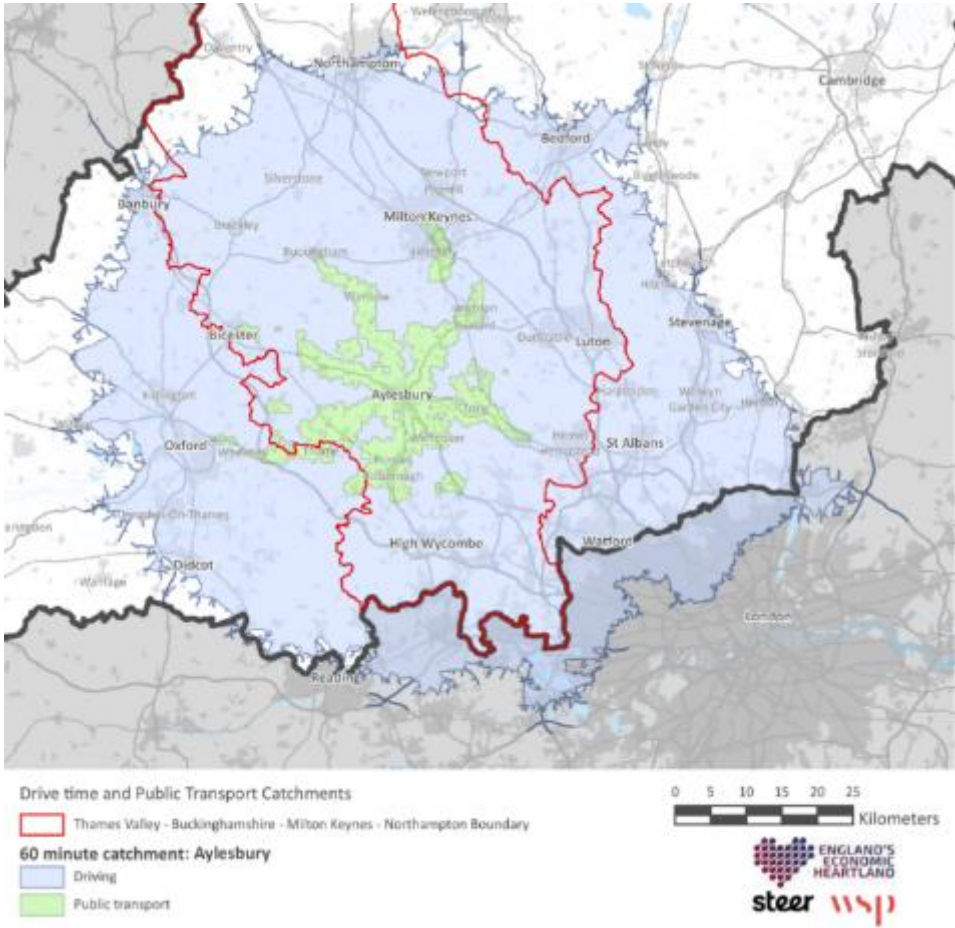
Drive time and Public Transport Catchments

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

60 minute catchment: Aylesbury
☐ Driving
☐ Public transport

0 5 10 15 20 25
Kilometers

ENGLAND'S ECONOMIC HEARTLAND

steer WSP

Bicester

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from Bicester.
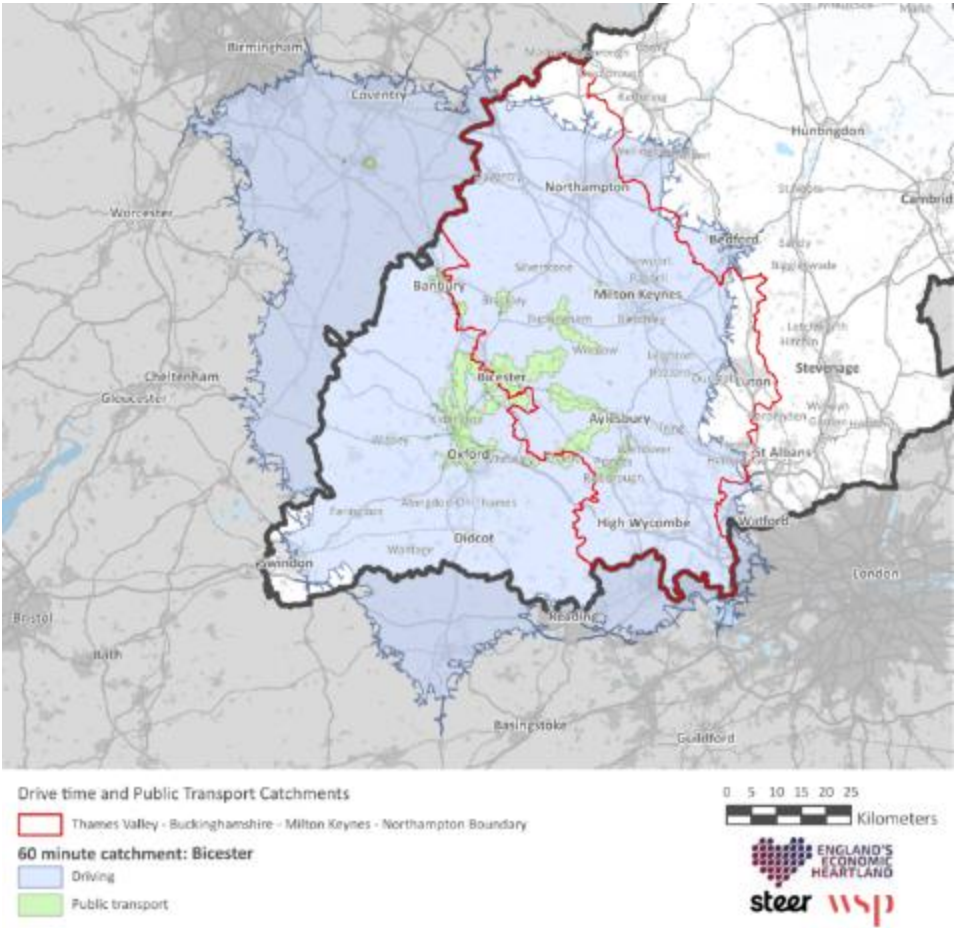
Drive time and Public Transport Catchments

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

60 minute catchment: Bicester
☐ Driving
☐ Public transport

0 5 10 15 20 25
Kilometers

ENGLAND'S ECONOMIC HEARTLAND

steer WSP

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

Bletchley

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from Bletchley.
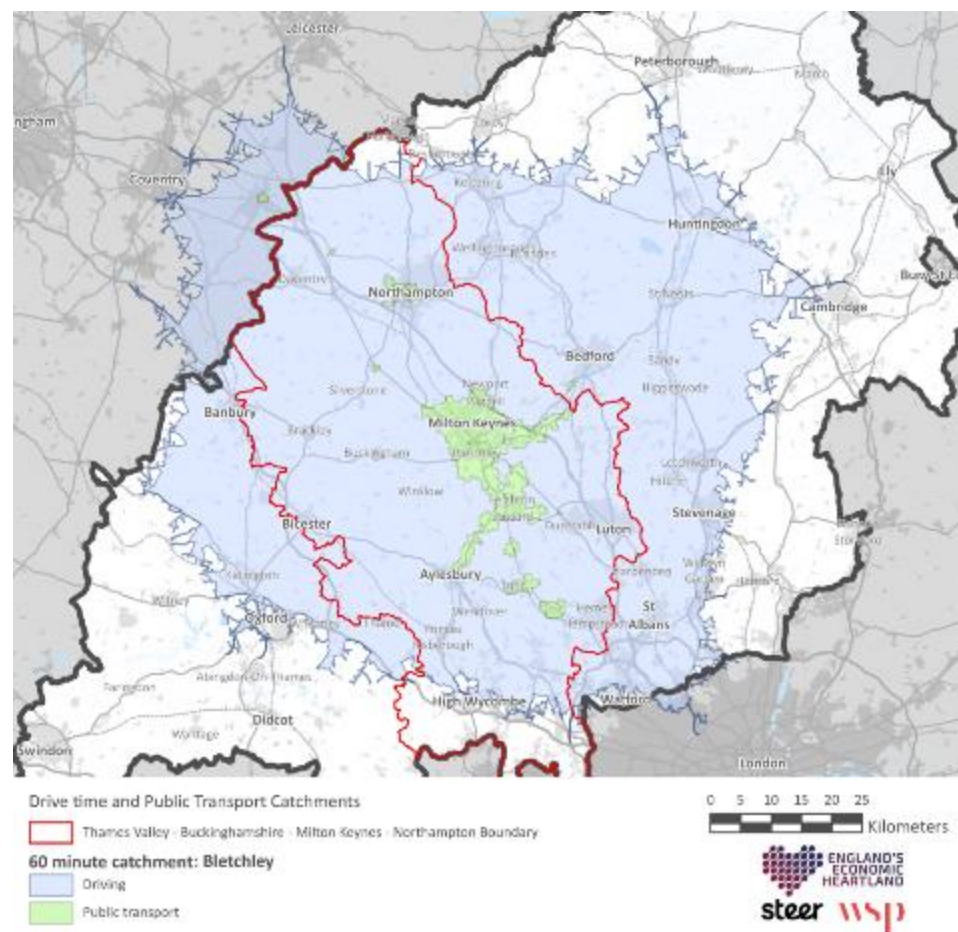
Daventry

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from Daventry.
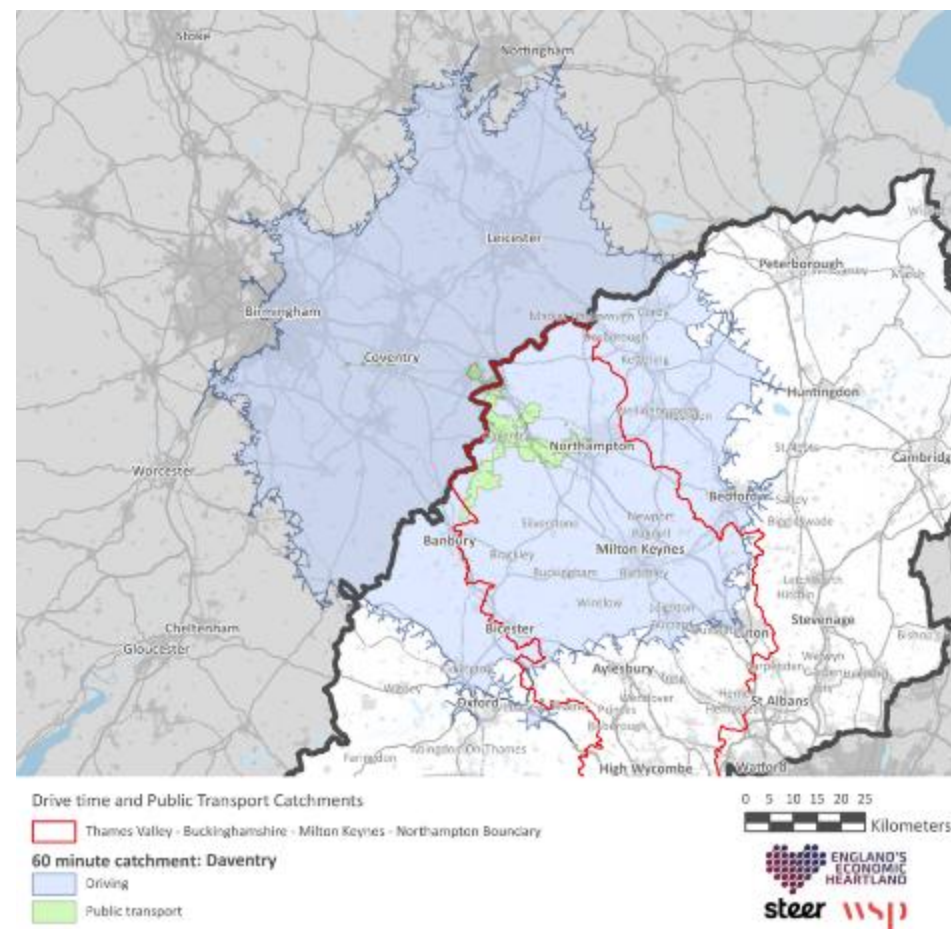
England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

Dunstable

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from Dunstable.
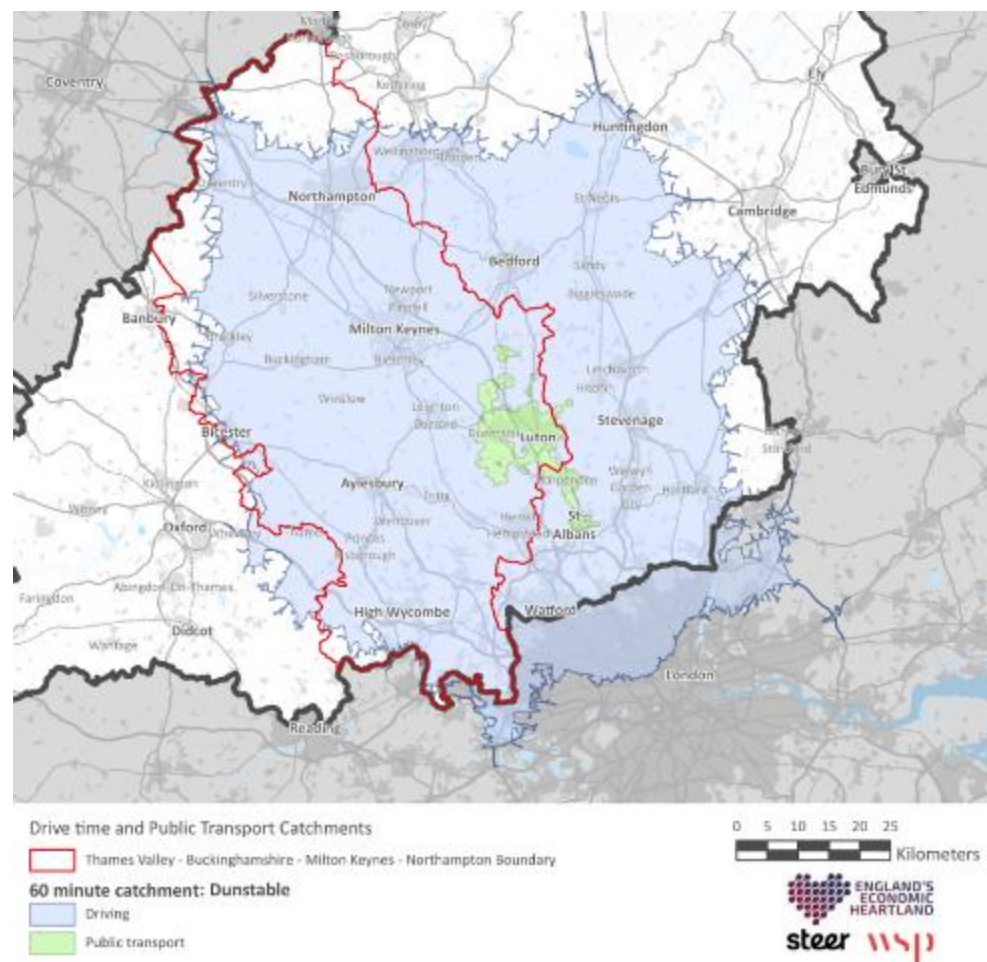
Drive time and Public Transport Catchments

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

60 minute catchment: Dunstable
☐ Driving
☐ Public transport

0 5 10 15 20 25 Kilometers

ENGLAND'S ECONOMIC HEARTLAND

steer WSP

Hemel Hempstead

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from Hemel Hempstead.
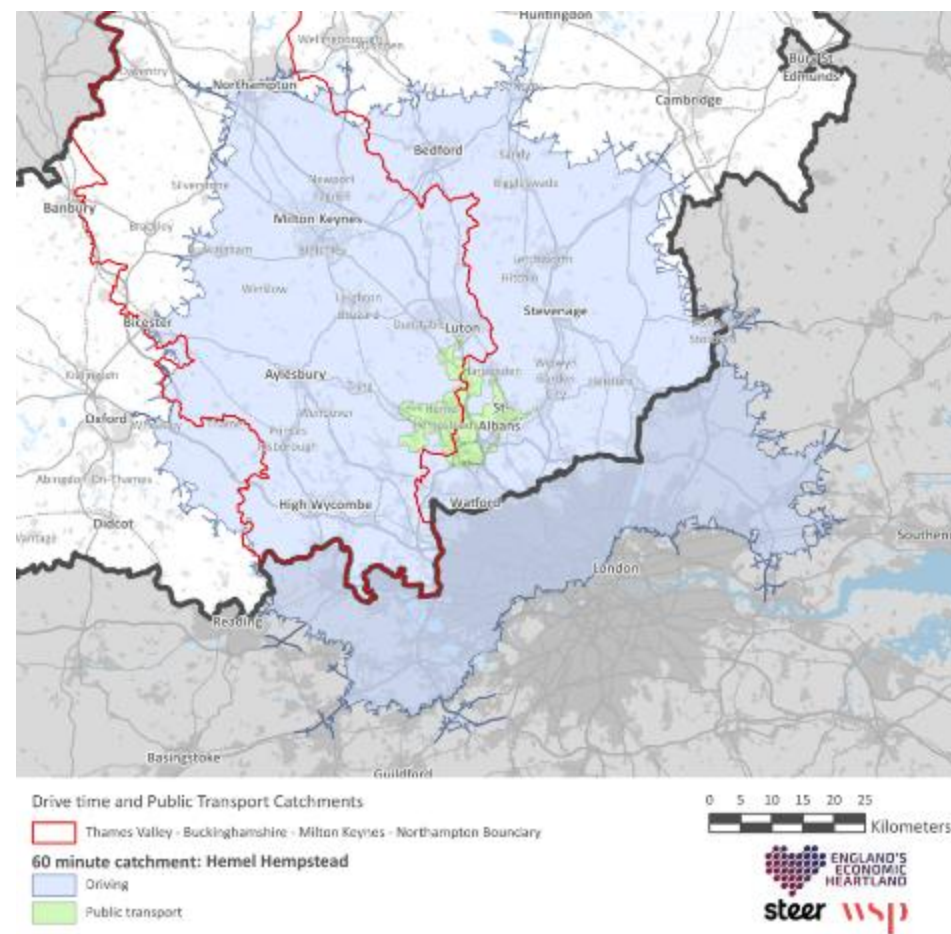
Drive time and Public Transport Catchments

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

60 minute catchment: Hemel Hempstead
☐ Driving
☐ Public transport

0 5 10 15 20 25 Kilometers

ENGLAND'S ECONOMIC HEARTLAND

steer WSP

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

High Wycombe

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from High Wycombe.
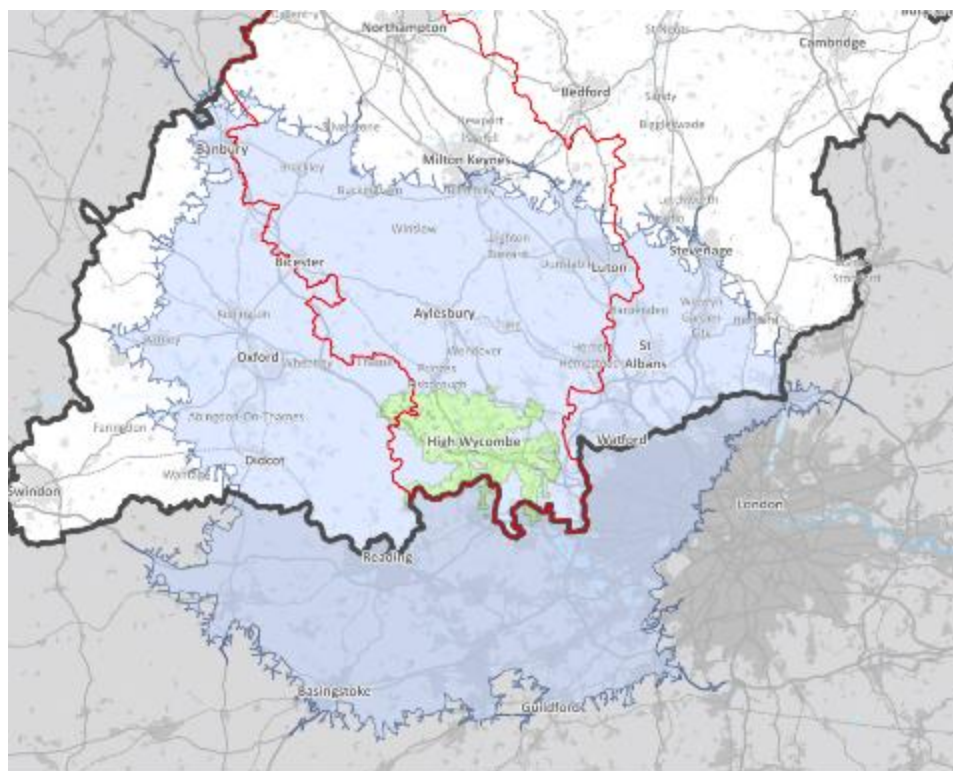
Drive time and Public Transport Catchments

Thames Valley · Buckinghamshire · Milton Keynes · Northampton Boundary

60 minute catchment: High Wycombe
Driving
Public transport

0 5 10 15 20 25 Kilometers

Leighton Buzzard

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from Leighton Buzzard.
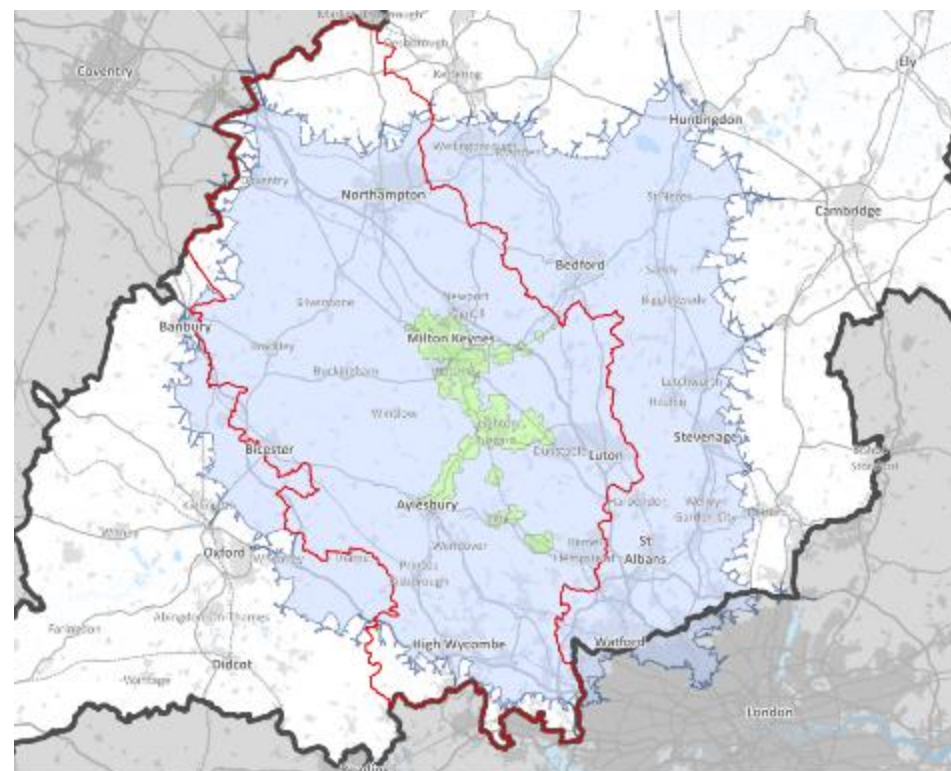
Drive time and Public Transport Catchments

Thames Valley · Buckinghamshire · Milton Keynes · Northampton Boundary

60 minute catchment: Leighton Buzzard
Driving
Public transport

0 5 10 15 20 25 Kilometers

Luton

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from Luton.
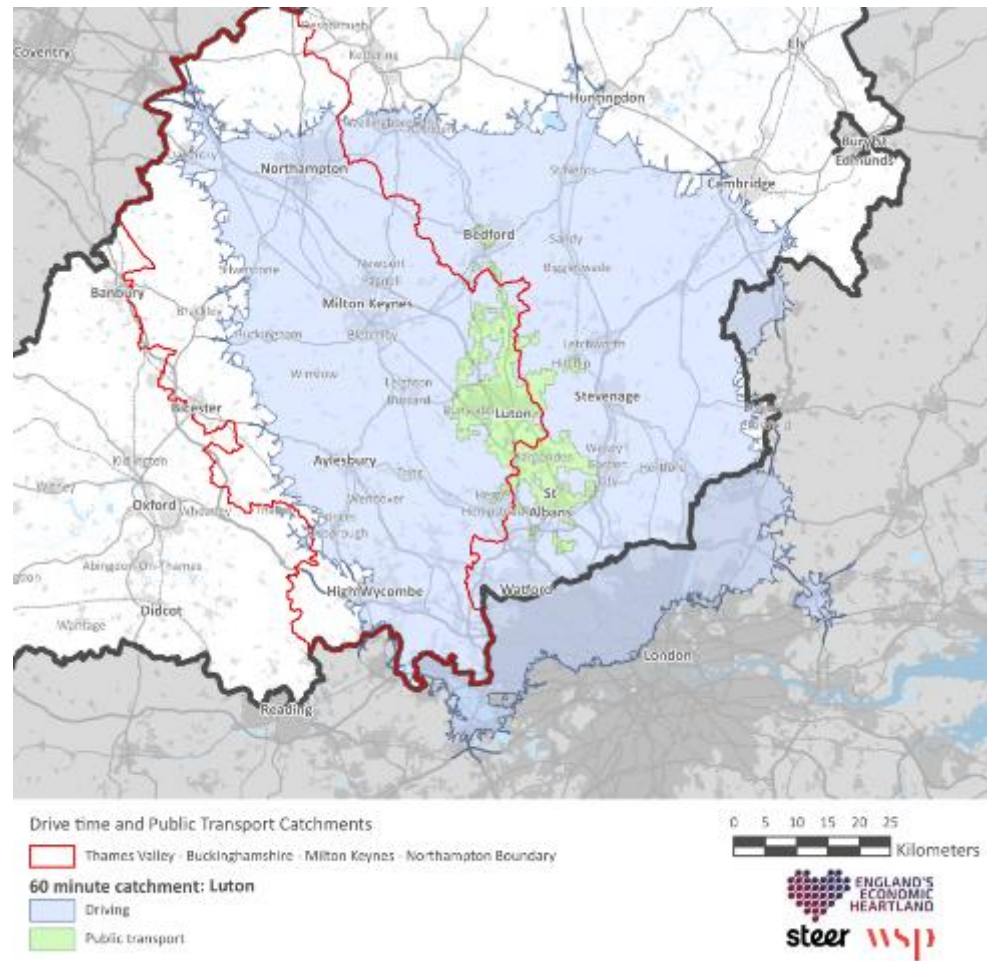
Milton Keynes

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from Milton Keynes.
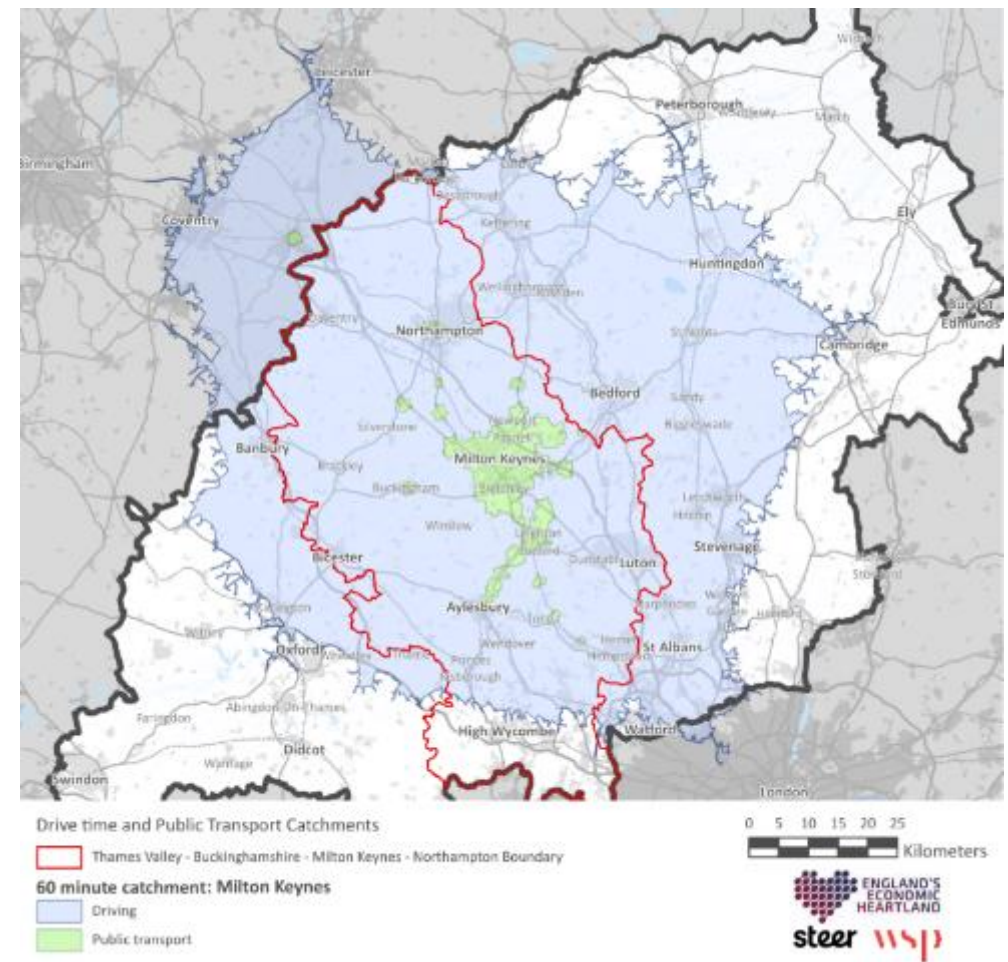
England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

Northampton

The plan opposite highlights the difference between how local residents can travel by public transport and private car for 60 minute journeys from Northampton.

Drive time and Public Transport Catchments

[red outline] Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

60 minute catchment: Northampton

[blue] Driving

[green] Public transport

0 5 10 15 20 25 Kilometers
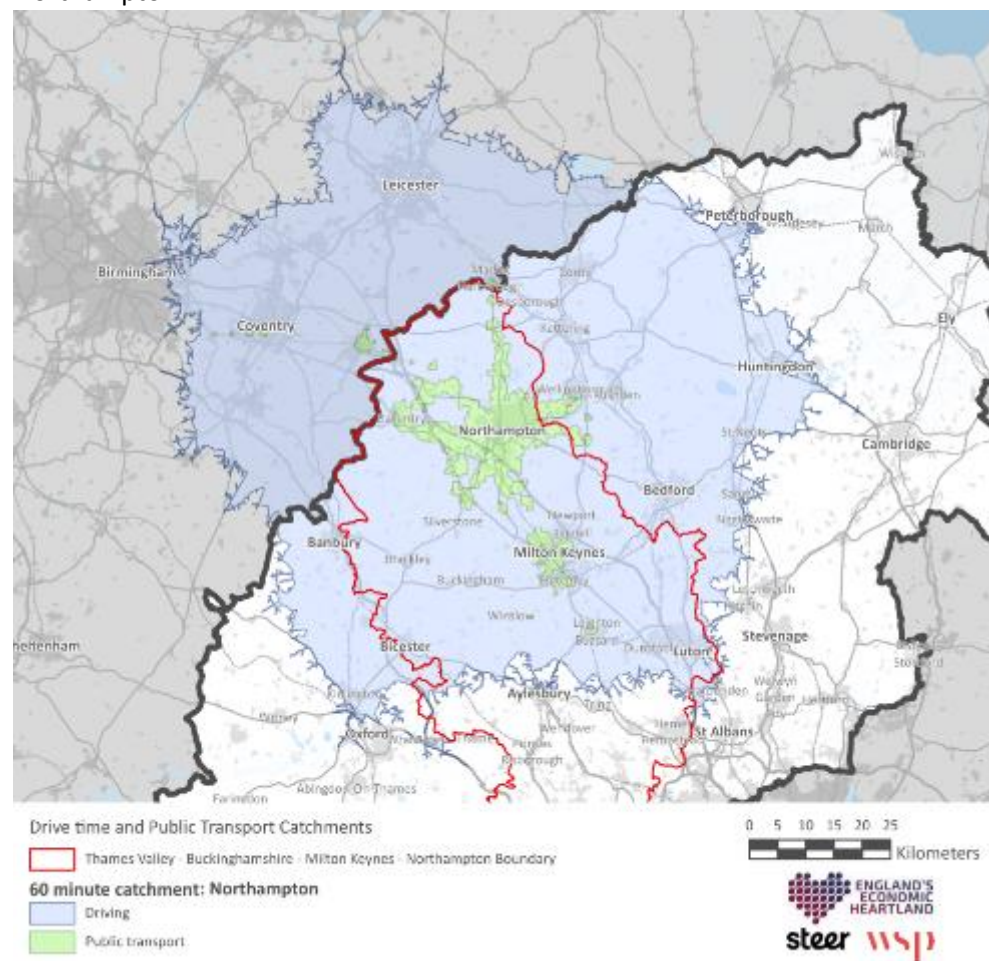
Appendix D – 25 minute E-Bike Catchments

Aylesbury

The plan opposite identifies the distance from the centre of Aylesbury that a resident can travel to within 25 minutes using an electric bike.
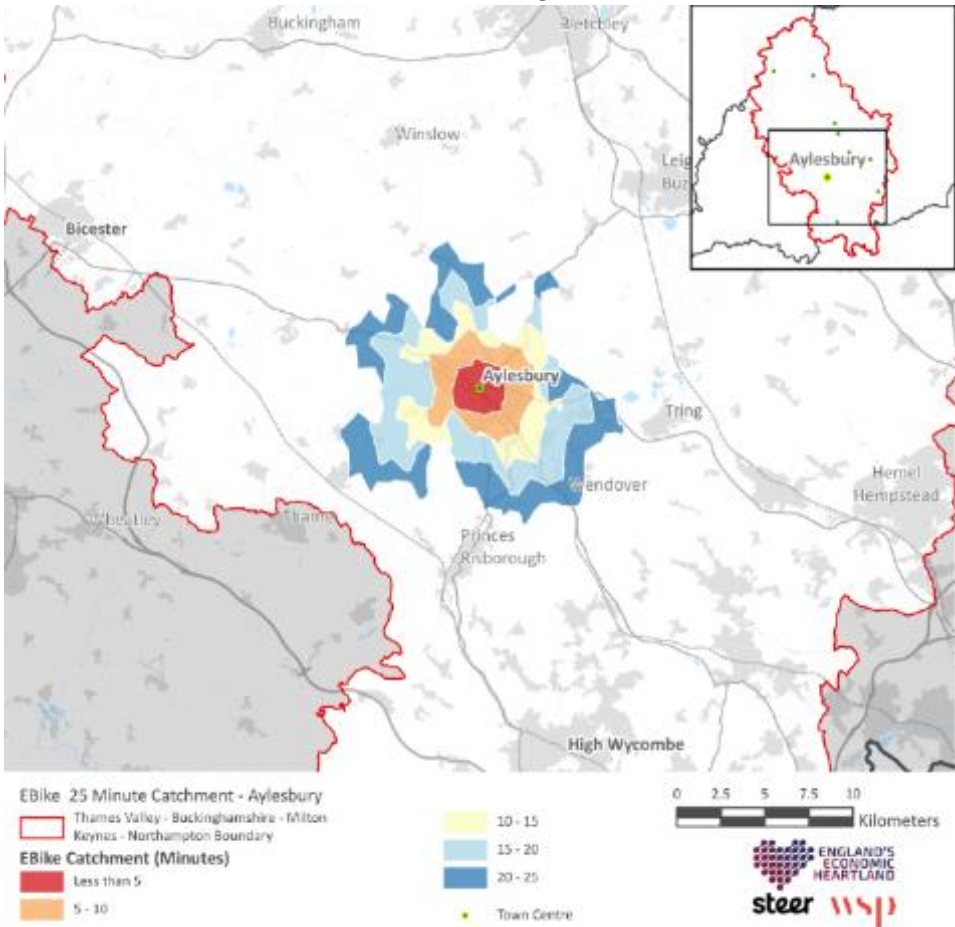
Bicester

The plan opposite identifies the distance from the centre of Bicester that a resident can travel to within 25 minutes using an electric bike.
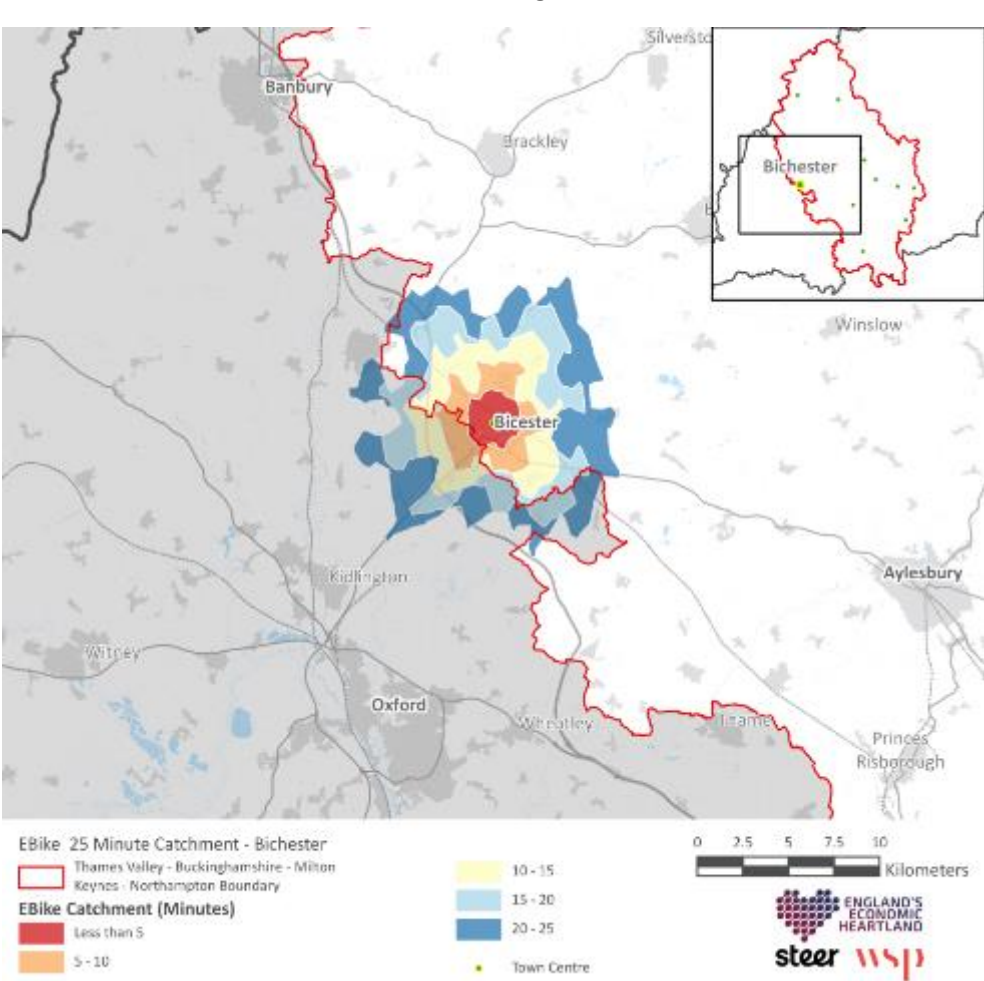
Bletchley

The plan opposite identifies the distance from the centre of Bletchley that a resident can travel to within 25 minutes using an electric bike.

EBike 25 Minute Catchment - Bletchley
- Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

EBike Catchment (Minutes)
- Less than 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- Town Centre
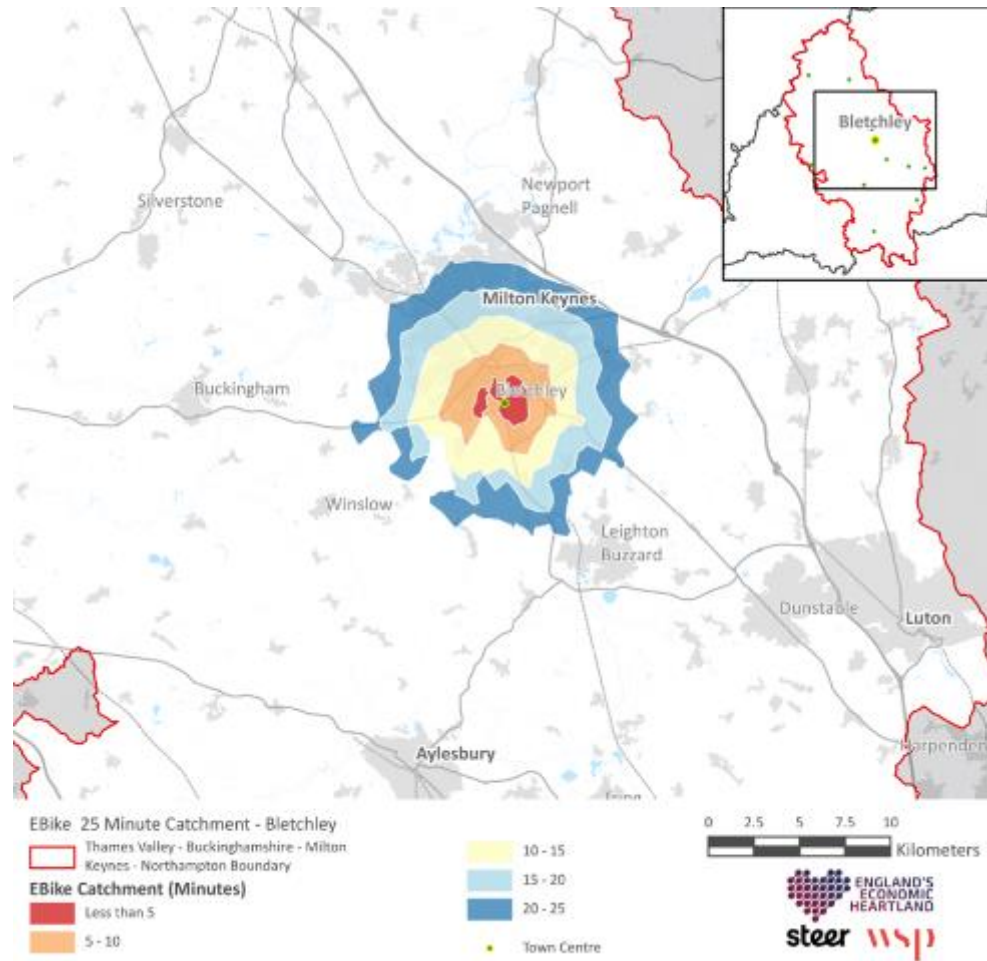
Daventry

The plan opposite identifies the distance from the centre of Daventry that a resident can travel to within 25 minutes using an electric bike.

EBike 25 Minute Catchment - Daventry
- Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

EBike Catchment (Minutes)
- Less than 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- Town Centre
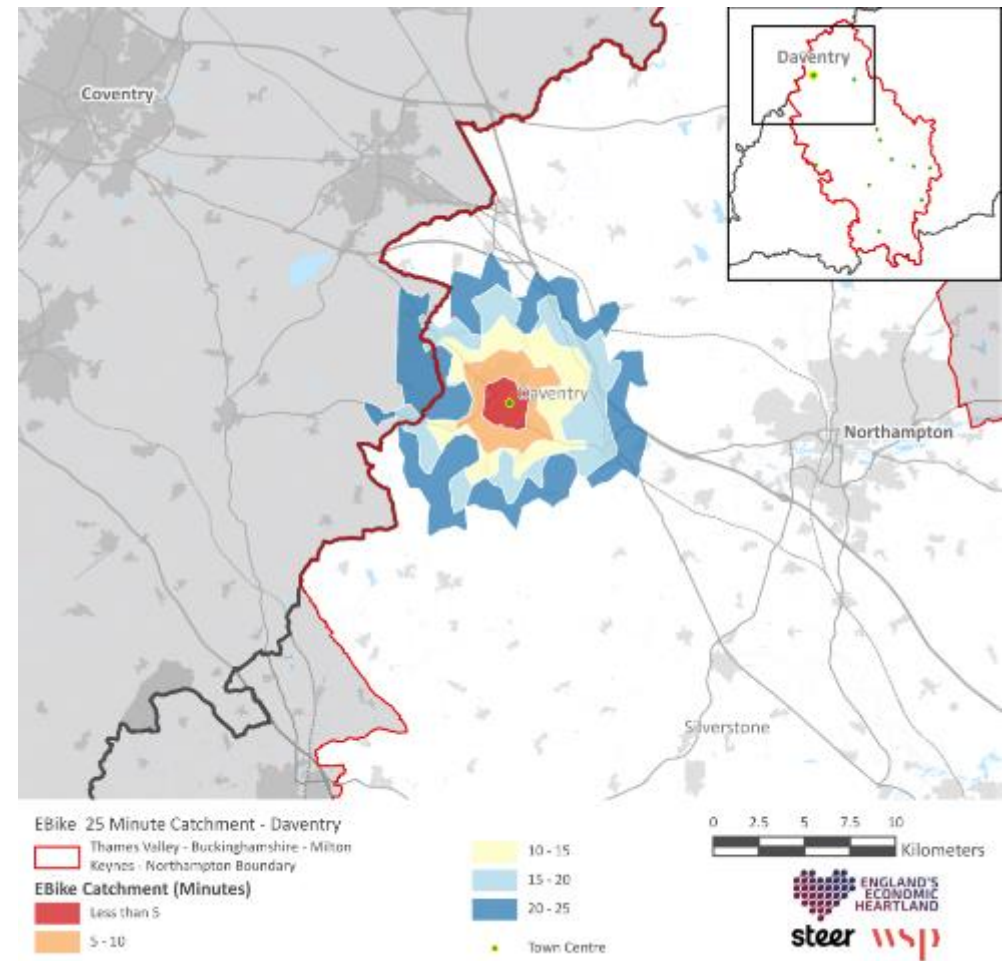
Dunstable

The plan opposite identifies the distance from the centre of Dunstable that a resident can travel to within 25 minutes using an electric bike.

EBike 25 Minute Catchment - Dunstable

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

EBike Catchment (Minutes)

- Less than 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25

• Town Centre

0 2.5 5 7.5 10 Kilometers
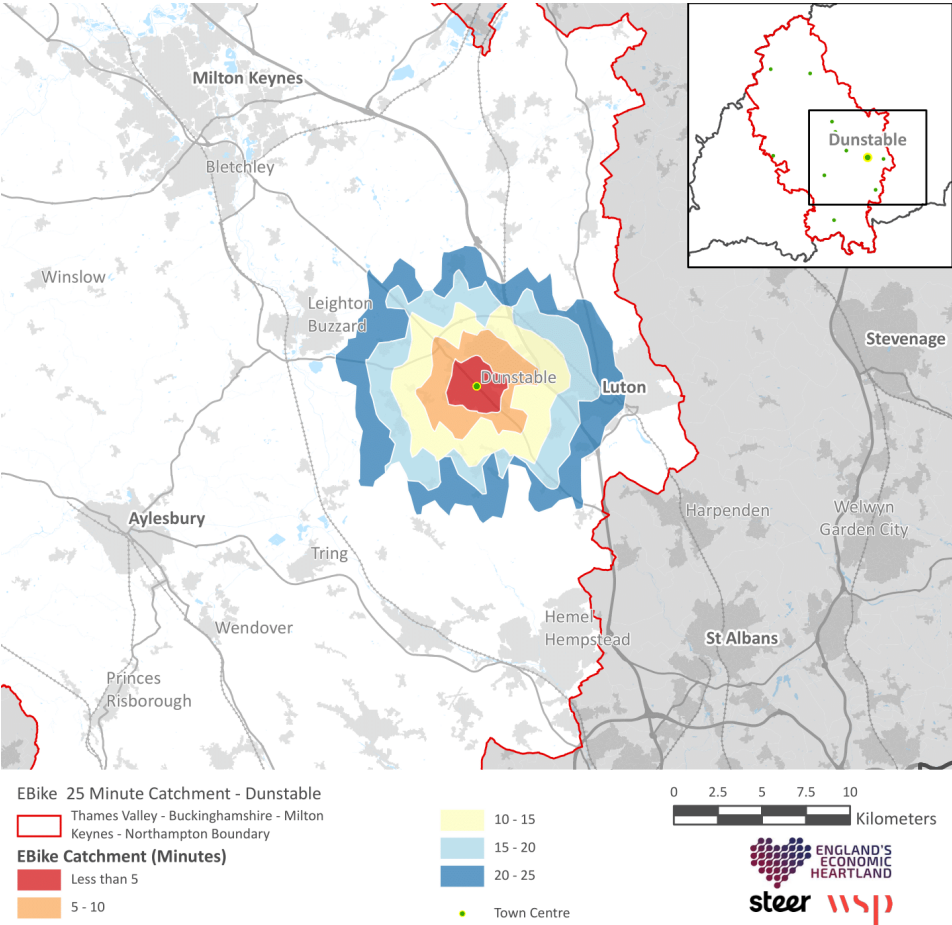
Hemel Hempstead

The plan opposite identifies the distance from the centre of Hemel Hempstead that a resident can travel to within 25 minutes using an electric bike.

EBike 25 Minute Catchment - Hemel Hempstead

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

EBike Catchment (Minutes)

- Less than 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25

• Town Centre

0 2.5 5 7.5 10 Kilometers

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**
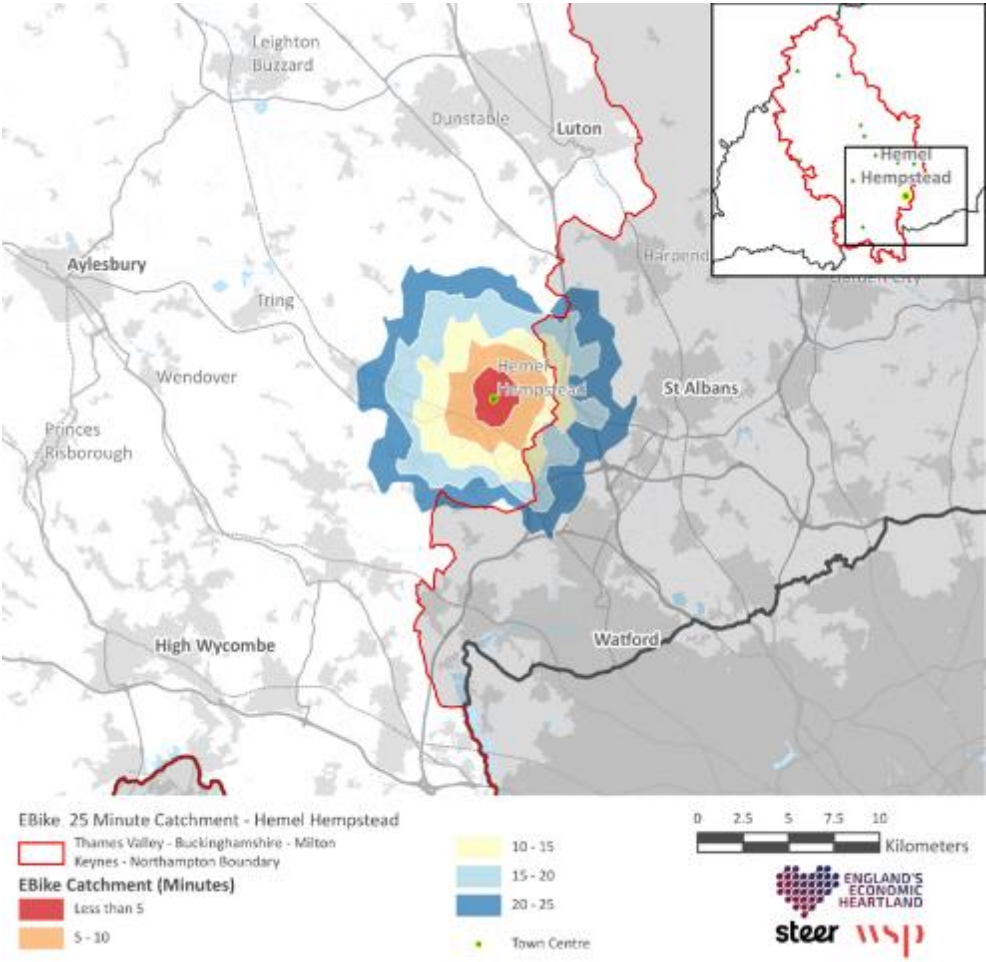
High Wycombe

The plan opposite identifies the distance from the centre of High Wycombe that a resident can travel to within 25 minutes using an electric bike.

EBike 25 Minute Catchment - High Wycombe

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

EBike Catchment (Minutes)

Less than 5
5 - 10
10 - 15
15 - 20
20 - 25

Town Centre

0   2.5   5   7.5   10 Kilometers
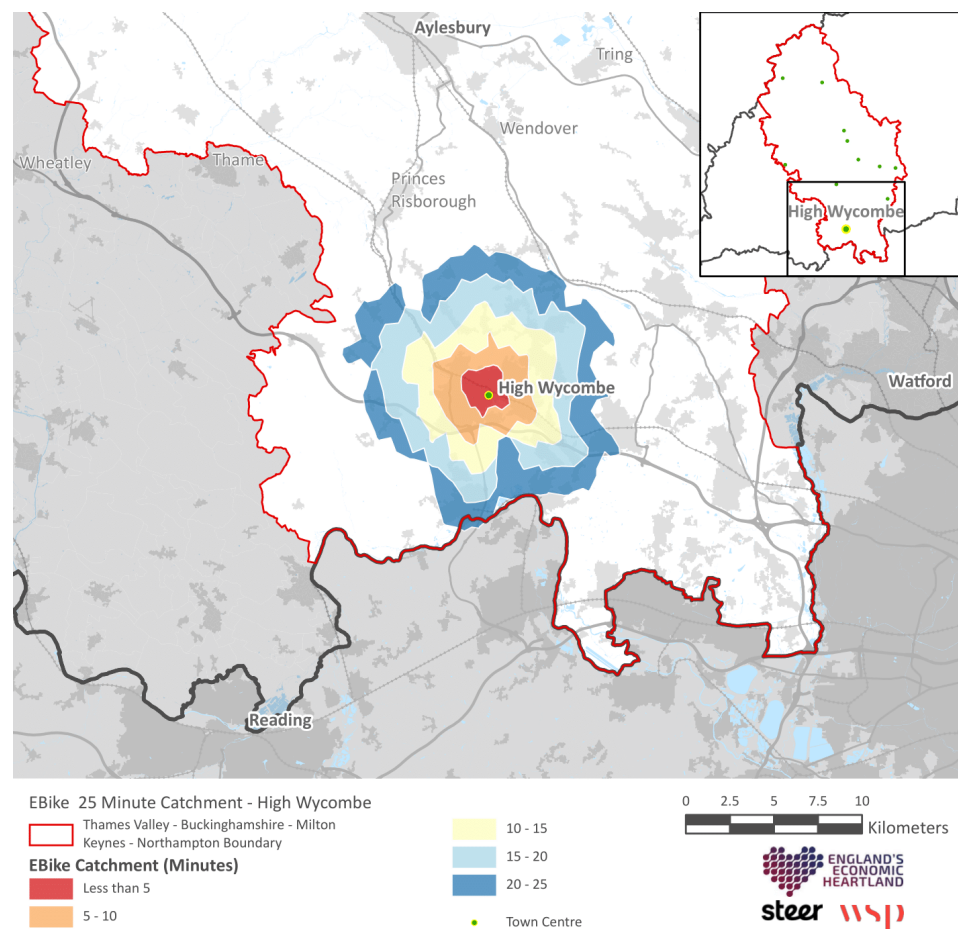
Leighton Buzzard

The plan opposite identifies the distance from the centre of Leighton Buzzard that a resident can travel to within 25 minutes using an electric bike.

EBike 25 Minute Catchment - Leighton Buzzard

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

EBike Catchment (Minutes)

Less than 5
5 - 10
10 - 15
15 - 20
20 - 25

Town Centre

0   2.5   5   7.5   10 Kilometers

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**
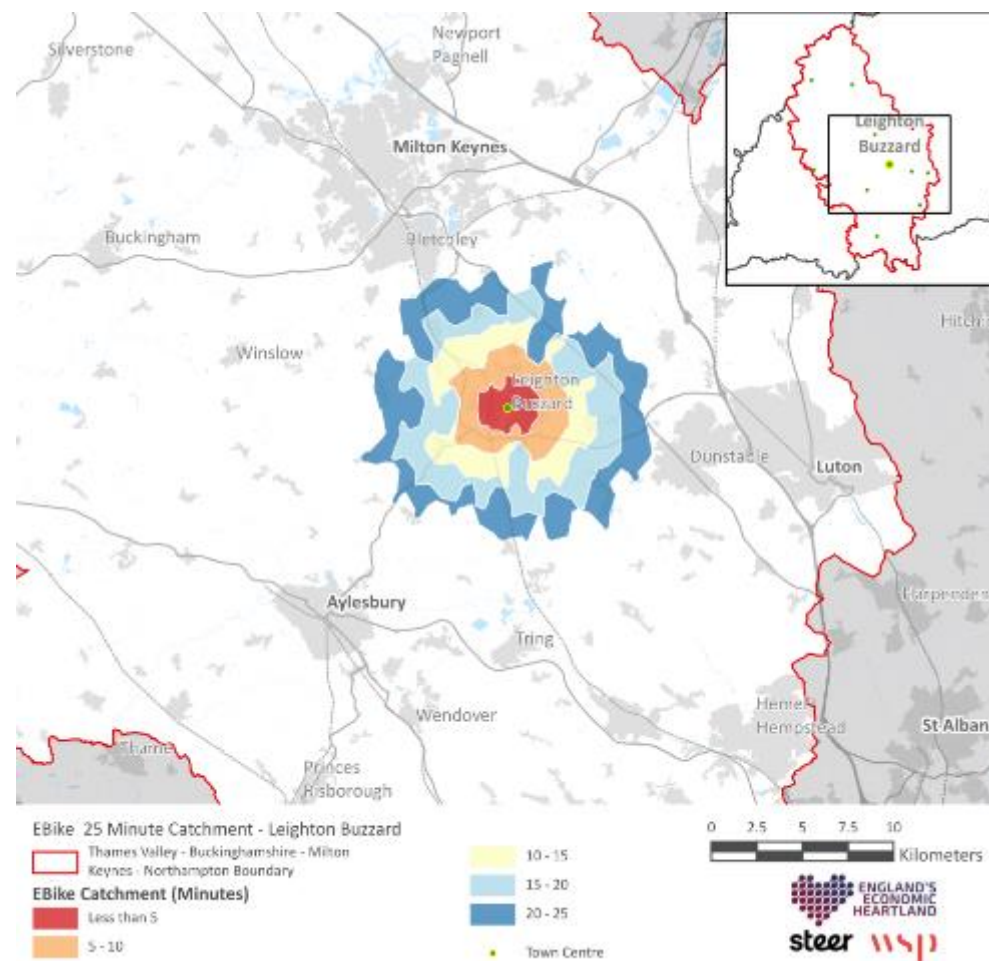
Luton

The plan opposite identifies the distance from the centre of Luton that a resident can travel to within 25 minutes using an electric bike.

EBike 25 Minute Catchment - Luton

- Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

EBike Catchment (Minutes)
- Less than 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- Town Centre
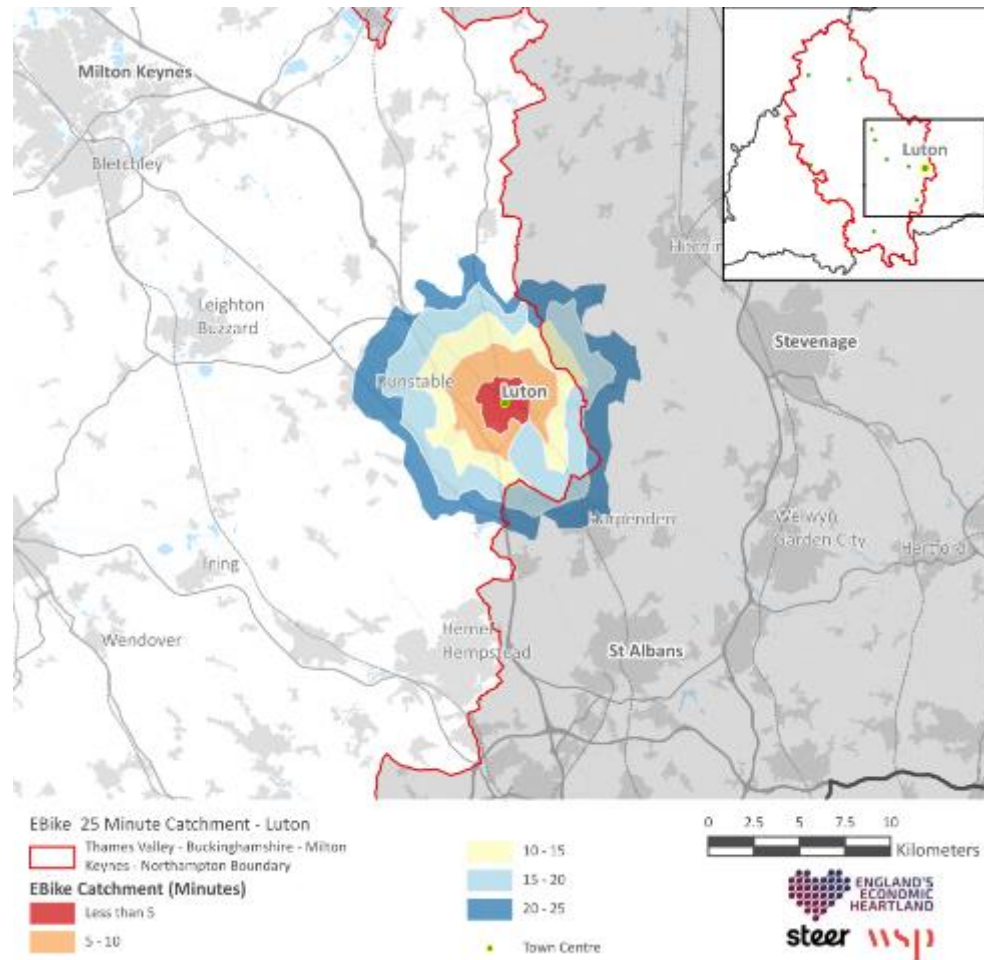
Milton Keynes

The plan opposite identifies the distance from the centre of Milton Keynes that a resident can travel to within 25 minutes using an electric bike.

EBike 25 Minute Catchment - Milton Keynes

- Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

EBike Catchment (Minutes)
- Less than 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- Town Centre

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**
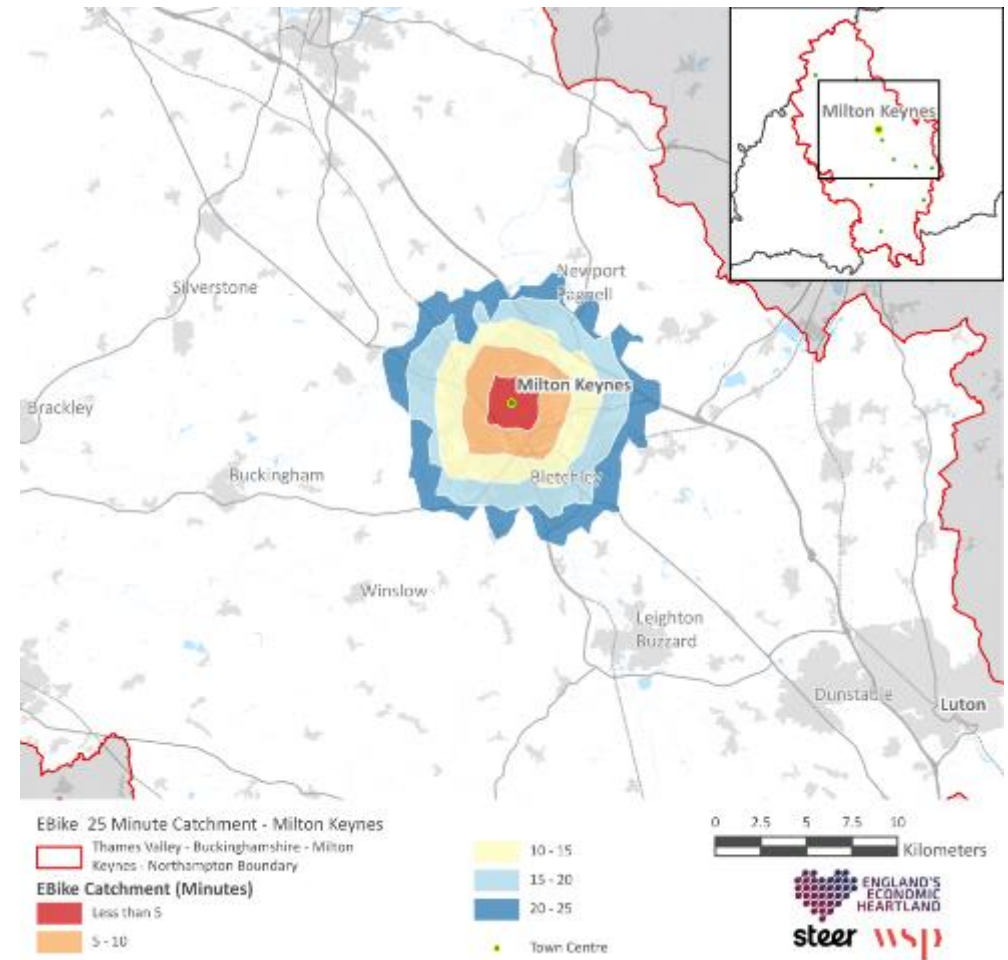
Northampton

The plan opposite identifies the distance from the centre of Northampton that a resident can travel to within 25 minutes using an electric bike.

EBike 25 Minute Catchment - Northampton

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

EBike Catchment (Minutes)

- Less than 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- Town Centre

0   2.5   5   7.5   10   Kilometers
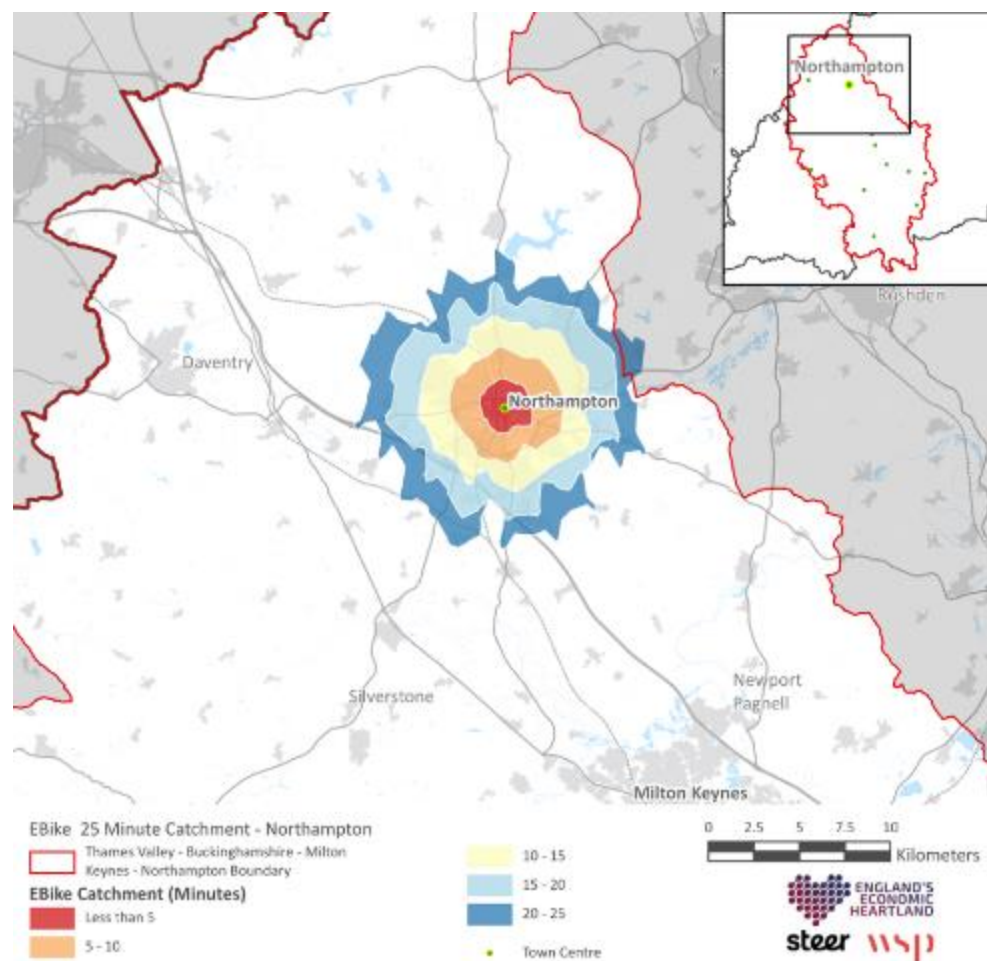
Appendix E – Travel Patterns and Behaviour

Car/Van Driver

Most commuting trips within the study area were undertaken as a car / Van driver. The 2011 Census recorded that 556,376 people commuted to work in the study area, equating for 67% of the study area. Car/Van driver based commuting appears to favour Rural areas, with the Northern areas of the study area showing the highest levels of car dominance.

Dunstable has been highlighted as a settlement with the highest car dominance with a 74% car modal share. This is contrast to Luton (located adjacent to Dunstable) which has the lowest car driver mode share of 60%.

The Dominance of car driving within the study area highlights a key challenge as many single occupancy car trips is inherently unsustainable and a shift to sustainable modes can help create a more efficient and safer transport system for all.

Method of Travel to Work by Mode

- Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary
- Car or Van Driver
  - Less than 55%
  - 55.1% - 60%
  - 60.1% - 65%
  - 65.1% - 70%
  - Greater than 70.0%

0 3 6 9 12 Kilometers
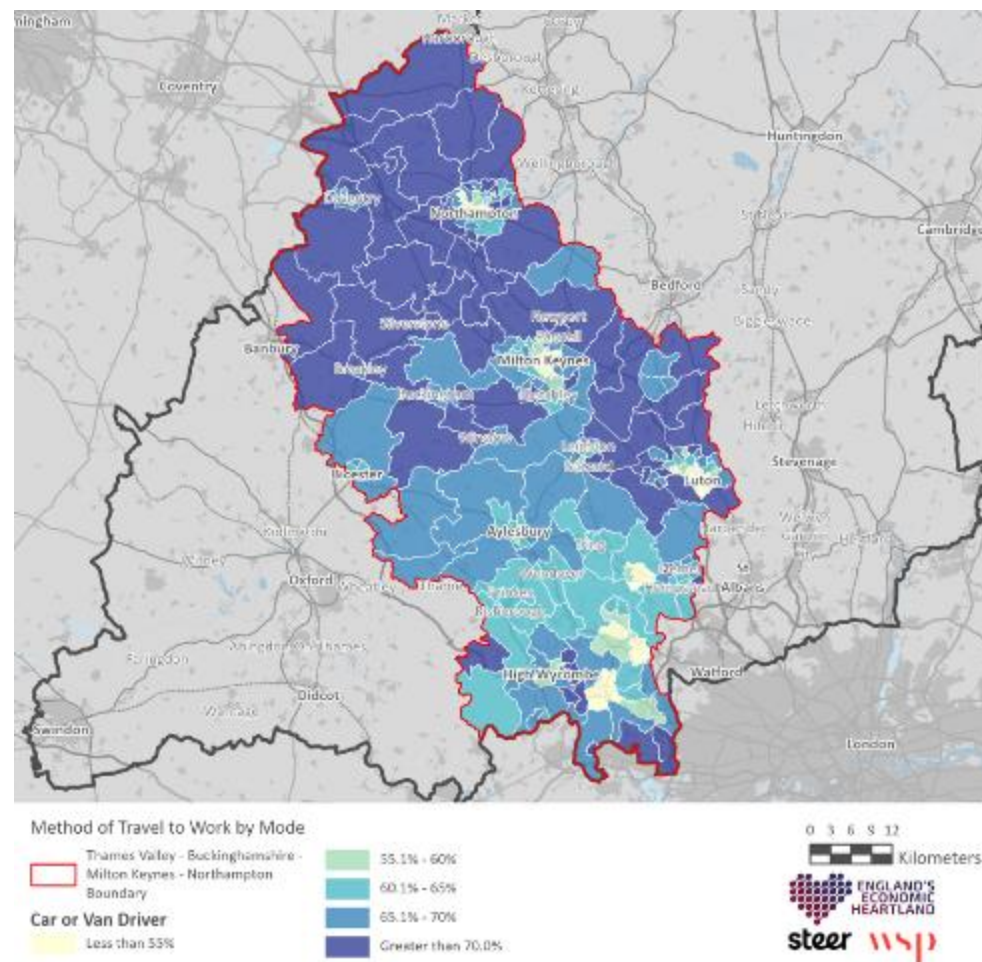
Car Passenger

The number of commuters in the study area who travel as a passenger in a car or van was 47,490 equating to a total of 6% of the corridor population.

The settlement with the highest amount of car / van passenger modal share is Luton with 9%, whereas the lowest is 4% in Leighton Buzzard (as opposed to a driver share of 66%).

In settlements with high car/van driver mode shares, the level of passenger usage should also be higher as that indicates the use of car sharing as a form of commuting, promoting a more sustainable option through removing the dominance of single occupancy road vehicles. However, it should be noted that more sustainable modes should be considered such as buses, trains and active travel.

Method of Travel to Work by Mode

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Car Passenger

Less than 2.5%

2.6% - 5%

5.1% - 7.5%

7.6% - 10%

Greater than 10.0%

0 3 6 9 12 Kilometers
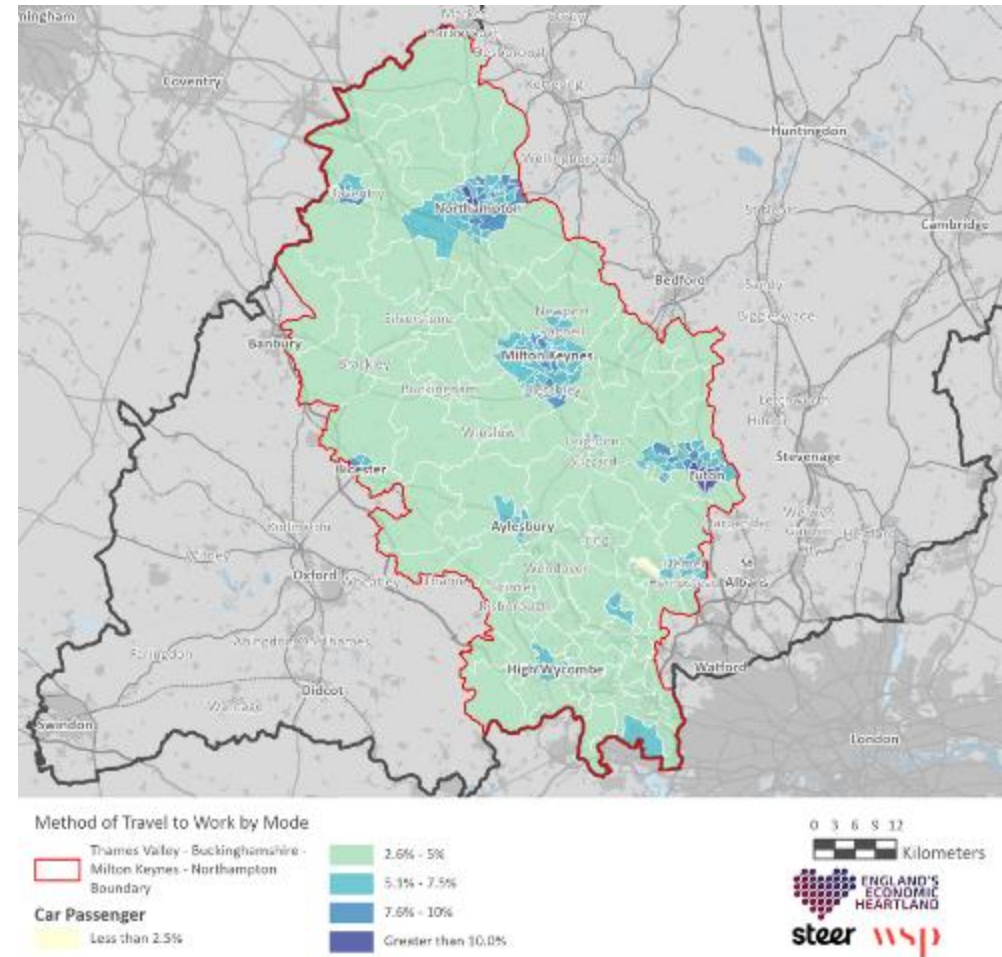
Bus, Minibus and Coach

The total amount of commuting using bus, minibus and coach services within the study area was 34,851. This equates to 4% of the total corridor study area.

Bus services commuting is generally highest in the key settlements as population densities allow for more appropriate bus services to be available to local residents. The highest settlement modal shares can be seen in both Luton and Bletchley with 8%. Settlements with the lowest usage are Daventry and Leighton Buzzard with 1% and 2% respectively.

The use of bus services has seen notable challenges with ridership continuing to fall within the UK. Covid has had a substantial impact on the both the public perceptions and ridership of local bus services. Bus priority and more frequent services are needed to help increase the opportunity for bus to replace notable car dominated commuting patterns. The use of DRT can also help promote bus services to the rural areas which appear to lack effective services.

Method of Travel to Work by Mode

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Bus

Less than 2.5%

2.6% - 5%

5.1% - 7.5%

7.6% - 10%

Greater than 10.0%

0 3 6 9 12 Kilometers
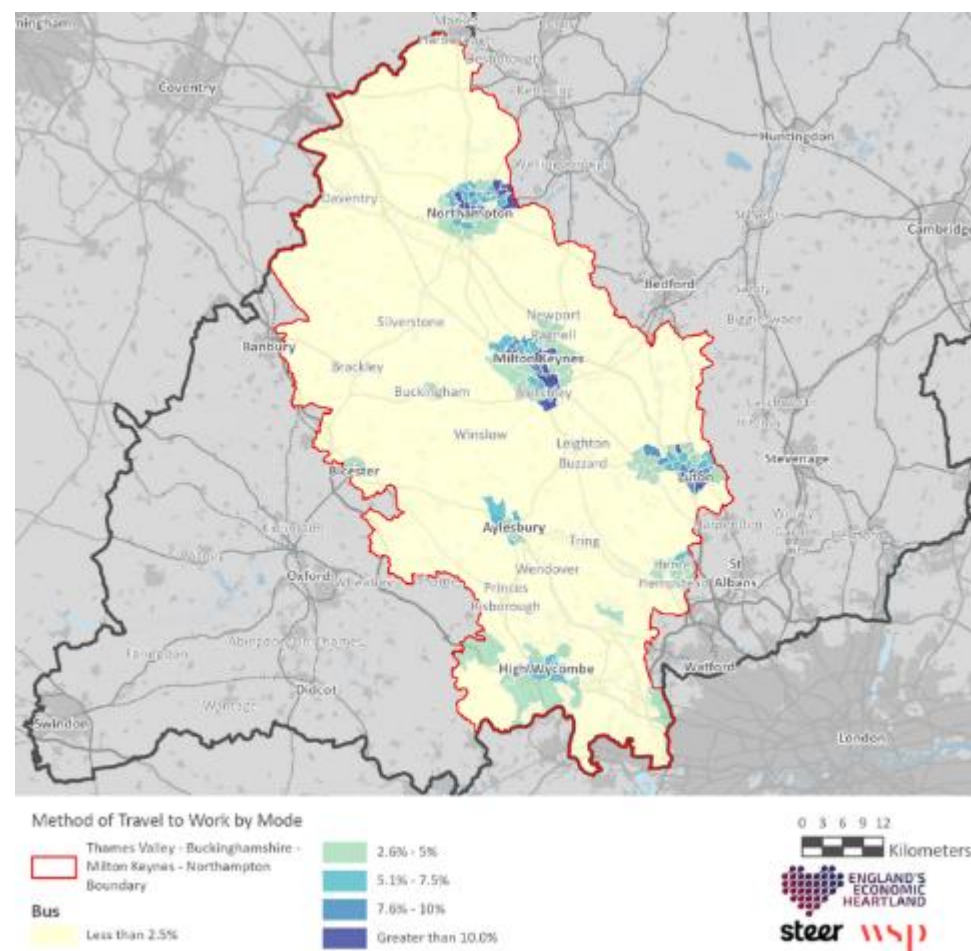
Train

The total amount of commuting using rail services in the study area is 42,095. This equates to a total of 5% of the study area. The highest floes of rail commuting can be seen mostly in the lower half of the study area, with notable levels of rail movements take place surrounding Princes Risborough, Tring, Berkhamstead and Flitwick.

Rail transport seems to be relatively popular in Rural areas as it makes up at least 10% in some rural areas (such as Flitwick and Chalfont St. Giles). This is likely due to high quality services being available for access into London and other key destinations, allowing rural communities to be connected to employment opportunities.

The settlement with the highest level of rail commuting is Leighton Buzzard, with 9% of total commuting. Leighton Buzzard has frequent services to both London and Milton Keynes, making rail an effective option for commuting. The lowest level of rail usage can be seen in Daventry with only 1%, likely resulting from the distinct lack of effective rail station available nearby. Northampton also indicates significantly low rail usage, with only 2% rail commuting, indicating that rail connectivity to local settlements could see improvement.

Improvements to Rail can help to connect different settlements up with a high quality and frequent public transport option. New rail lines and stations should become available for areas lacking access (such as surrounding Silverstone, Buckingham and Daventry).

Method of Travel to Work by Mode

- Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary
- Train
- Less than 2.5%
- 2.6% - 5%
- 5.1% - 7.5%
- 7.6% - 10%
- Greater than 10.0%
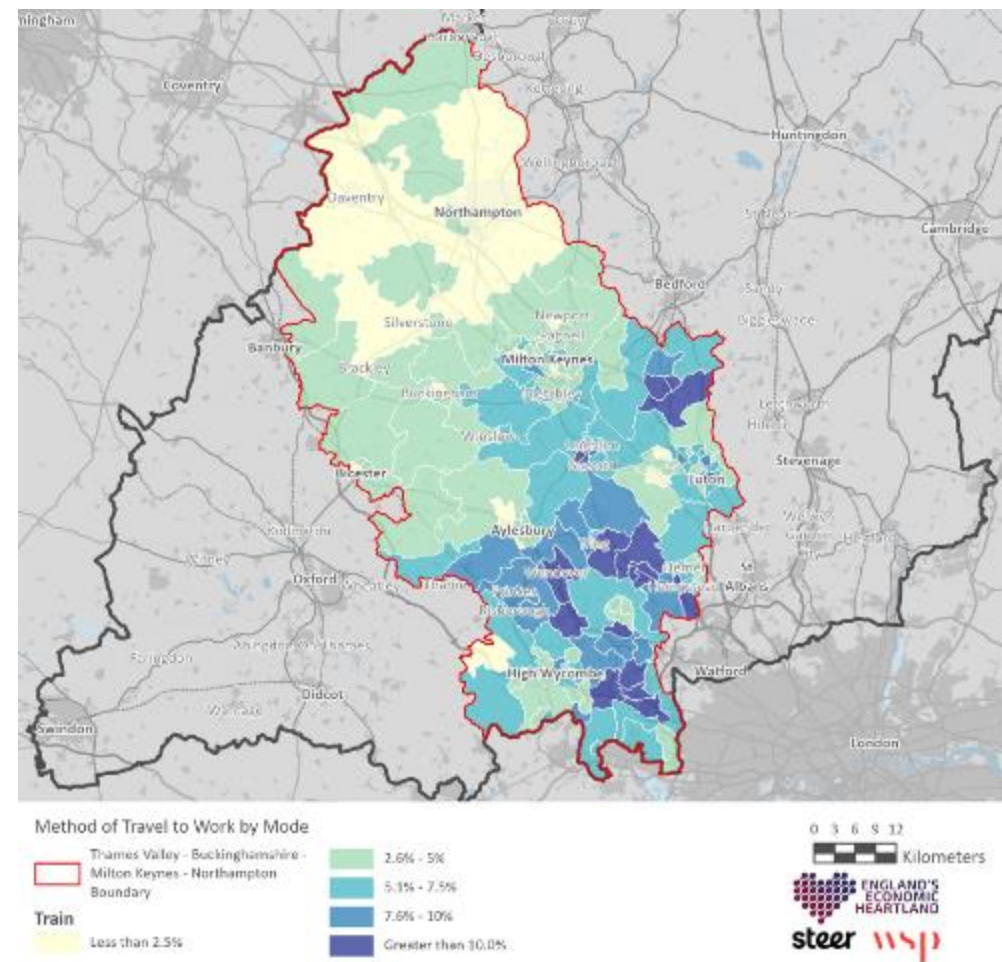
Cycling

The total amount of cycling within the study area is 15,041. This equates to a total of 2% of the study area. Cycling remains near inexistent int most rural areas, with less than 2.5% shares. Most Urban areas also seem limited amounts of less than 5%.

The Settlement with the highest level of cycling modal share can be seen in Bicester with 4% and the lowest settlement modal share can be seen in Dunstable, Hemel Hempstead, High Wycombe and Luton with each settlement having 1% cycle modal share.

Cycle modal share is limited within the corridor, despite it being a relatively accessible and sustainable travel mode. Introducing LTN 1/20 cycle infrastructure and new micromobility services can help to make cycling more attractive to unconfident cyclists and promote cycle usage.

Method of Travel to Work by Mode

- Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary
- Cycle
  - Less than 2.5%
  - 2.6% - 5%
  - 5.1% - 7.5%
  - 7.6% - 10%
  - Greater than 10.0%

0 3 6 9 12 Kilometers
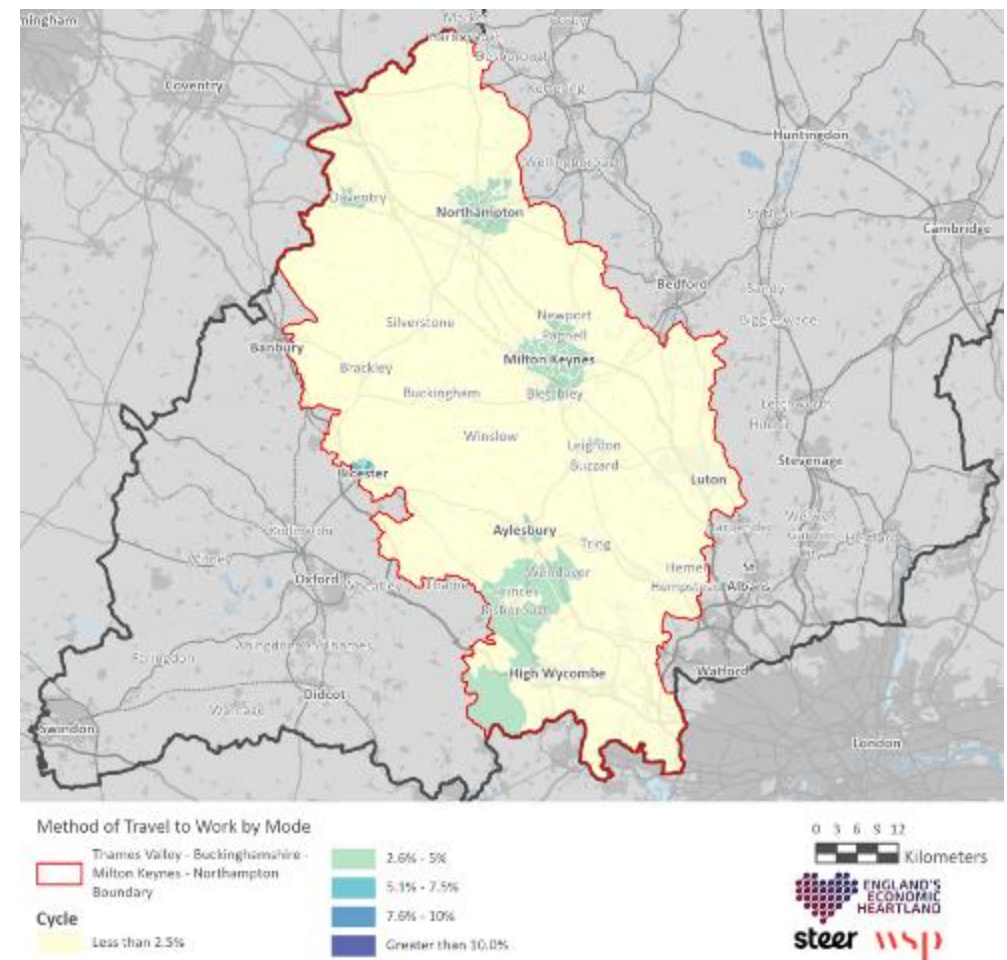
Walking

The total amount of commuting that has taken place on foot within the study area is 79,403. This equates to a total of 9% of the entire study area.

The Settlement with the highest amount of walking modal share is seen in Aylesbury, with a total of 15%. The lowest modal shares can be seen in Bletchley and Milton Keynes with 8% each.

Walking is a notably attractive form of transportation, making up the majority of active travel movements. However, there is potential for implementing more LTN 1/20 level infrastructure to help make walking a more attractive alternative for car movements.

Method of Travel to Work by Mode

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Walk
- Less than 2.5%
- 2.6% - 5%
- 5.1% - 7.5%
- 7.6% - 10%
- Greater than 10.0%

0 3 6 9 12 Kilometers
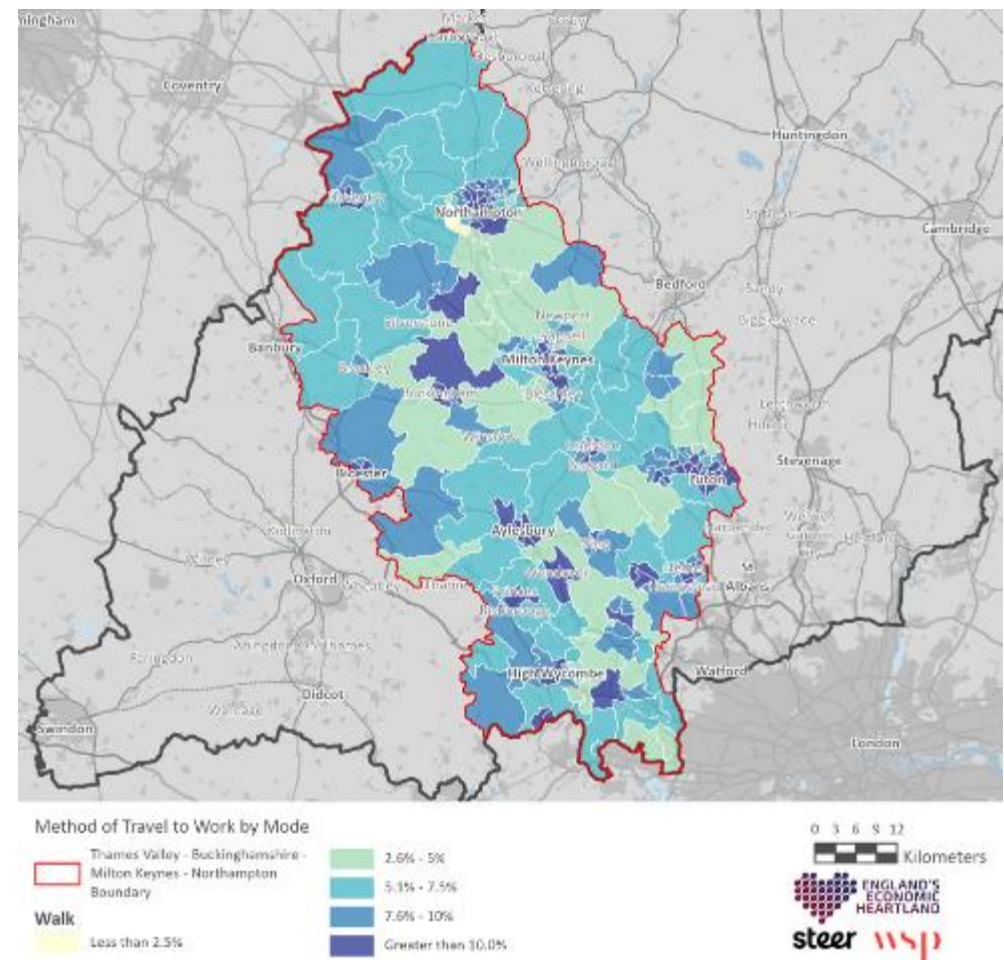
Work From Home

As of 2011, the total amount of people who worked from home was 53,195. This equates to 6% of the study area. The distribution of Working from home was mostly found in Rural areas, where many locations found outside of key settlements exceed 10%.

The settlements with the highest Working from Home patterns can be seen in Hemel Hempstead, High Wycombe, Leighton Buzzard and Milton Keynes with 5%. The Lowest settlement modal share can be seen in Luton with 3%.

Now that Hybrid working is becoming more popular from the impact of the Covid-19 pandemic, it is likely that Working from home is likely to increase in Urban and rural areas. Supplying effective amounts of digital connectivity can help to promote this shift to more flexible ways of working.

Method of Travel to Work by Mode

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Work from Home

Less than 2.5%

2.6% - 5%

5.1% - 7.5%

7.6% - 10%

Greater than 10.0%

0 3 6 9 12 Kilometers
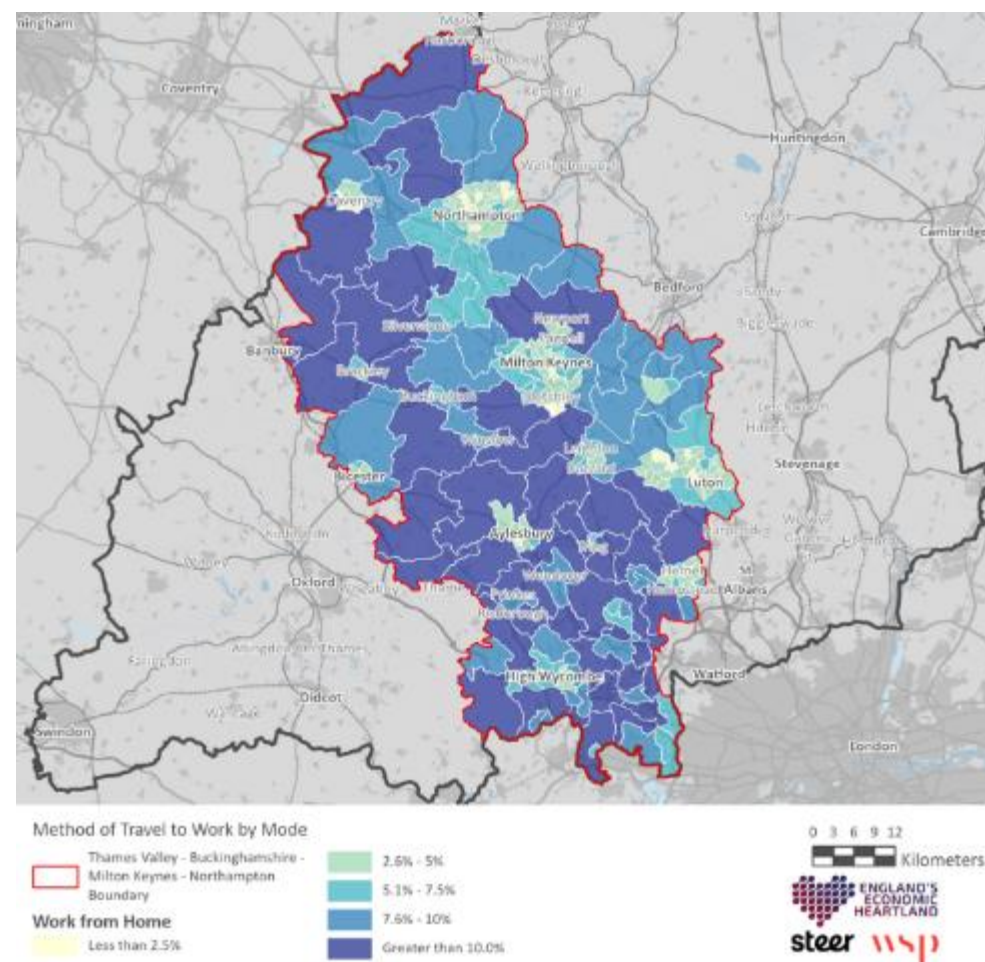
Distance Travelled to Work

The distance travelled to work can indicate what existing journey are creating from existing connectivity in the transport system. Journey distances appear to be the highest within Rural areas such as surrounding Winslow, Silverstone and Brackley with more than 20Km on average travelled.

The lowest distances can be seen throughout the key settlements such as Milton Keynes, Luton and Northampton.

The high journey distances indicates that many Rural areas likely lack adequate transport options and result in high journey lengths. Improvements to sustainable travel connectivity can help reduce the total journey times found within the study area.

Average Distance Travelled to Work

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary	10.1 - 15.0
Distance travelled to work (km)	15.1 - 20.0
Less than 10.0	20.1 - 25.0
	Greater than 25.0

0 2.5 5 7.5 10 Kilometers
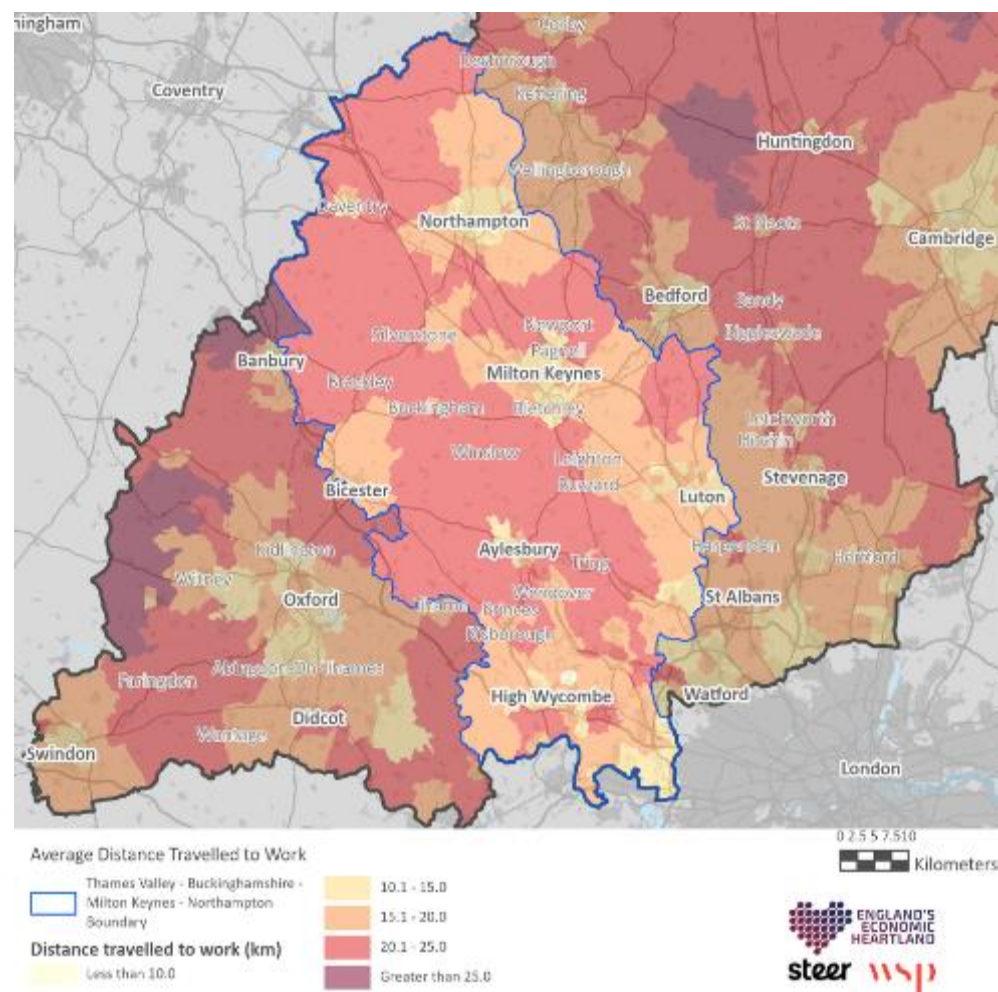
Mode of travel OD Matrices

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	Bicester	Bletchley	Daventry	Dunstable	Hemel Hempstead	High Wycombe	Leighton Buzzard	Luton	Milton Keynes	Northampton	Rural Area (corridor ex. Major urban settlements)	London	Corridor total	EEH	EEH exc. corridor	England and Wales exc. EEH
Aylesbury	7481	221	106	1	55	350	924	148	168	574	45	6531	933	####	18182	1578	922
Bicester	195	2585	30	5	4	12	71	8	15	147	46	1546	164	4664	9318	4654	544
Bletchley	142	22	2574	6	64	61	18	155	185	5370	170	1008	227	9775	10381	606	339
Daventry	2	12	21	3089	5	4	3	2	9	148	918	1588	71	5801	6300	499	1375
Dunstable	93	8	130	5	1958	470	22	389	3187	524	50	1538	626	8374	10234	1860	304
Hemel Hempstead	189	5	42	2	126	8799	102	87	583	183	30	3454	2545	####	20696	7094	905
High Wycombe	400	23	12	1	19	86	8074	4	47	66	16	7063	2720	####	16981	1170	3523
Leighton Buzzard	500	14	484	6	439	500	53	2746	860	1828	72	1826	417	9328	10506	1178	339
Luton	114	10	231	15	2254	1372	61	399	23263	1332	170	2994	2773	####	41204	8989	1354
Milton Keynes	503	127	5560	50	264	228	84	525	1016	29542	1172	5509	1118	####	47731	3151	1771
Northampton	52	57	378	717	48	67	19	43	262	2784	38670	6623	603	####	56589	6869	3042
Rural Area (corridor ex. Major urban settlements)	7606	1914	2520	1934	1866	3898	8911	1607	6858	15654	11124						
London	300	56	62	18	228	1476	1272	70	1556	703	355						
Corridor total	17277	4998	12088	5831	7102	15847	18342	6113	36453	58152	52483						
EEH	18248	7213	13049	6257	8181	20828	19674	6560	44991	65260	66068						
EEH exc. Corridor	971	2215	961	426	1079	4981	1332	447	8538	7108	13585						
England and Wales exc. EEH & London	682	432	398	2474	423	1718	3432	220	4967	4080	5966						

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Car / Van Passenger

Major Urban Settlements	Aylesbury	Bicester	Bletchley	Daventry	Dunstable	Hemel Hempstead	High Wycombe	Leighton Buzzard	Luton	Milton Keynes	Northampton	Rural Area (corridor ex. Major urban settlements)	London	Corridor total	EEH	EEH exc. corridor	England and Wales exc. EEH
Aylesbury	951	11	4	0	0	18	54	11	3	33	2	579	46	1666	1721	55	33
Bicester	5	398	0	0	0	2	3	0	0	7	0	181	12	596	944	348	19
Bletchley	2	0	386	0	3	2	0	13	12	683	14	77	19	1192	1223	31	19
Daventry	0	1	0	420	0	0	0	0	0	6	58	211	6	696	735	39	66
Dunstable	1	0	9	0	186	21	0	23	324	24	1	130	32	719	817	98	15
Hemel Hempstead	5	0	0	0	3	1234	5	6	15	1	6	288	112	1563	1912	349	28
High Wycombe	23	1	0	0	0	2	1121	0	1	2	3	591	105	1744	1794	50	172
Leighton Buzzard	18	0	26	0	24	26	4	326	57	124	0	97	14	702	745	43	15
Luton	18	2	38	3	244	361	3	58	3627	195	12	568	229	5129	6395	1266	177
Milton Keynes	20	2	623	1	12	9	1	35	55	3893	55	403	63	5109	5269	160	75
Northampton	3	4	25	62	1	3	3	0	10	167	5276	664	47	6218	6764	546	205
Rural Area (corridor ex. Major urban settlements)	462	173	142	130	154	222	597	120	423	935	657						
London	15	6	4	0	9	61	51	6	67	26	19						
Corridor total	1508	592	1253	616	627	1900	1791	592	4527	6070	6084						
EEH	1537	734	1318	661	658	2115	1819	605	4860	6508	6997						
EEH exc. Corridor	29	142	65	45	31	215	28	13	333	438	913						
England and Wales exc. EEH & London	29	23	17	187	11	66	138	10	560	151	416						

Bus Minibus Coach

Major Urban Settlements	Aylesbury	Bicester	Bletchley	Daventry	Dunstable	Hemel Hempstead	High Wycombe	Leighton Buzzard	Luton	Milton Keynes	Northampton	Rural Area (corridor ex. Major urban settlements)	London	Corridor total	EEH	EEH exc. corridor	England and Wales exc. EEH
Aylesbury	890	7	5	0	1	11	63	8	9	28	0	423	28	1445	1487	42	18
Bicester	2	84	0	0	0	0	1	0	0	7	0	35	7	129	685	556	5
Bletchley	6	2	374	0	1	0	2	7	9	830	2	53	21	1286	1326	40	31
Daventry	0	0	0	61	0	0	0	0	0	0	37	39	1	137	145	8	9
Dunstable	2	0	2	0	99	8	1	32	380	21	1	27	72	573	614	41	18
Hemel Hempstead	9	0	0	0	0	815	3	1	16	1	1	136	253	982	1418	436	20
High Wycombe	45	0	2	0	1	3	1303	0	0	1	0	669	106	2024	2073	49	150
Leighton Buzzard	31	0	10	0	26	0	0	65	53	48	2	16	34	251	258	7	5
Luton	7	0	14	1	370	120	2	53	4171	158	4	243	260	5143	5751	608	136
Milton Keynes	21	13	587	0	8	1	6	12	41	3423	27	270	127	4409	4557	148	126
Northampton	1	3	4	41	0	0	1	2	4	53	5860	361	72	6330	6594	264	184
Rural Area (corridor ex. Major urban settlements)	376	68	55	62	122	144	567	36	311	538	366						
London	22	6	9	5	9	120	70	4	197	84	105						
Corridor total	1390	177	1053	165	628	1102	1949	216	4994	5108	6300						
EEH	1418	348	1071	178	641	1347	1969	223	5223	5283	6755						
EEH exc. Corridor	28	171	18	13	13	245	20	7	229	175	455						
England and Wales exc. EEH & London	32	15	18	55	9	46	127	4	552	172	338						

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Train

Major Urban Settlements	Aylesbury	Bicester	Bletchley	Daventry	Dunstable	Hemel Hempstead	High Wycombe	Leighton Buzzard	Luton	Milton Keynes	Northampton	Rural Area (corridor ex. Major urban settlements)	London	Corridor total	EEH	EEH exc. corridor	England and Wales exc. EEH
Aylesbury	39	9	3	0	0	3	44	0	2	5	1	114	870	220	249	29	31
Bicester	9	12	0	0	0	0	20	0	0	0	0	25	260	66	208	142	31
Bletchley	2	0	31	0	0	3	0	9	3	60	14	14	446	136	193	57	31
Daventry	0	1	2	5	0	1	0	0	0	2	4	2	42	17	19	2	25
Dunstable	1	0	0	0	7	3	0	2	4	5	0	9	275	31	57	26	10
Hemel Hempstead	3	0	2	0	0	79	1	2	6	25	4	42	1903	164	355	191	44
High Wycombe	25	7	1	0	0	0	51	0	0	1	1	128	1471	214	233	19	80
Leighton Buzzard	3	0	39	0	4	18	1	34	14	138	10	34	1207	295	403	108	43
Luton	2	0	2	0	14	18	1	7	593	24	2	76	3231	739	1414	675	109
Milton Keynes	5	0	50	1	1	11	1	23	10	215	56	46	2858	419	576	157	174
Northampton	2	0	14	2	0	5	1	2	5	192	131	32	927	386	434	48	214
Rural Area (corridor ex. Major urban settlements)	103	22	17	4	8	62	170	13	231	145	57						
London	72	22	33	3	11	160	199	10	483	402	158						
Corridor total	194	51	161	12	34	203	290	92	868	812	280						
EEH	213	128	200	16	47	307	313	97	1359	977	343						
EEH exc. Corridor	19	77	39	4	13	104	23	5	491	165	63						
England and Wales exc. EEH & London	23	29	32	9	2	119	52	9	291	435	208						

Cycling

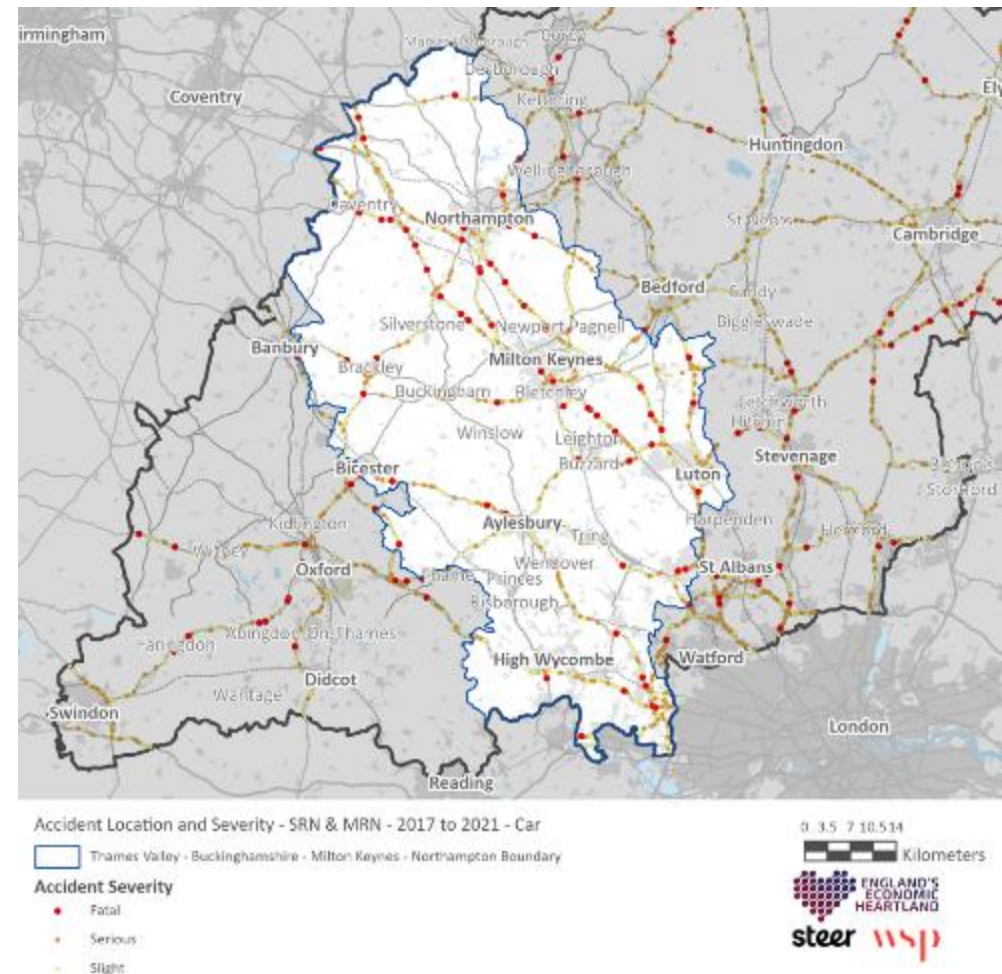| Major Urban Settlements	Aylesbury	Bicester	Bletchley	Daventry	Dunstable	Hemel Hempstead	High Wycombe	Leighton Buzzard	Luton	Milton Keynes	Northampton	Rural Area (corridor ex. Major urban settlements)	London	Corridor total	EEH	EEH exc. corridor	England and Wales exc. EEH
Aylesbury	632	2	1	0	1	6	5	3	0	3	0	133	9	786	792	6	19
Bicester	1	576	0	0	0	0	0	0	0	0	0	64	4	641	734	93	7
Bletchley	4	0	229	0	0	1	0	2	1	238	2	10	5	487	494	7	3
Daventry	0	0	0	242	0	0	0	0	0	0	5	26	0	273	278	5	9
Dunstable	0	0	0	0	94	1	0	9	95	1	0	23	6	223	230	7	5
Hemel Hempstead	1	0	0	0	2	313	1	0	2	1	0	62	24	382	454	72	10
High Wycombe	0	0	0	0	0	0	274	0	0	1	0	97	13	372	379	7	15
Leighton Buzzard	6	0	0	0	6	4	2	283	11	9	0	24	2	345	355	10	5
Luton	1	0	1	0	85	8	0	3	921	2	0	43	11	1064	1120	56	16
Milton Keynes	7	5	315	0	1	0	0	5	10	2071	12	108	19	2534	2562	28	23
Northampton	0	2	1	6	0	0	0	0	1	6	2340	139	14	2495	2565	70	29
Rural Area (corridor ex. Major urban settlements)	141	47	17	22	38	40	91	31	71	267	114						
London	1	1	0	0	0	12	6	1	10	15	7						
Corridor total	793	632	564	270	227	373	373	336	1112	2599	2473						
EEH	795	677	577	273	231	429	379	342	1192	2646	2602						
EEH exc. Corridor	2	45	13	3	4	56	6	6	80	47	129						
England and Wales exc. EEH & London	10	5	9	21	5	20	37	1	90	41	84						

Walking

Major Urban Settlements	Aylesbury	Bicester	Bletchley	Daventry	Dunstable	Hemel Hempstead	High Wycombe	Leighton Buzzard	Luton	Milton Keynes	Northampton	Rural Area (corridor ex. Major urban settlements)	London	Corridor total	EEH	EEH exc. corridor	England and Wales exc. EEH
Aylesbury	4354	9	9	0	1	4	17	2	3	24	0	340	43	4763	4791	28	70
Bicester	6	1529	0	0	0	0	2	0	1	0	0	86	6	1624	1771	147	26
Bletchley	3	0	1003	0	1	1	0	3	3	331	1	22	7	1368	1391	23	33
Daventry	0	0	0	1494	0	0	0	0	0	2	28	87	1	1611	1642	31	47
Dunstable	1	0	0	0	1267	6	1	39	332	13	1	118	10	1778	1824	46	28
Hemel Hempstead	1	0	1	0	3	3634	1	2	4	0	0	174	29	3820	3975	155	66
High Wycombe	13	3	3	1	0	9	3860	0	4	1	1	311	59	4206	4232	26	106
Leighton Buzzard	7	0	9	0	12	19	2	1749	37	19	3	63	13	1920	1964	44	14
Luton	5	0	1	1	161	26	6	20	10289	22	9	136	106	10676	10889	213	151
Milton Keynes	11	1	276	1	3	4	2	3	23	5503	11	149	74	5987	6063	76	104
Northampton	5	6	4	14	1	1	5	0	8	34	9886	273	60	10237	10446	209	184
Rural Area (corridor ex. Major urban settlements)	325	53	21	52	143	147	265	65	139	248	165						
London	13	4	4	2	1	36	25	2	48	25	33						
Corridor total	4731	1601	1327	1563	1592	3851	4161	1883	10843	6197	10105						
EEH	4746	1711	1353	1591	1613	3927	4187	1915	10984	6321	10413						
EEH exc. Corridor	15	110	26	28	21	76	26	32	141	124	308						
England and Wales exc. EEH & London	62	24	19	43	22	69	117	14	409	182	237						

Appendix H – Accident data by Mode

Car

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a car along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Car

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Accident Severity
- Fatal
- Serious
- Slight

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Bus / Coach

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a bus or coach along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Bus / Coach

▢ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Accident Severity
- ● Fatal
- ● Serious
- ● Slight

0 3.5 7 10.5 14 Kilometers

Goods Vehicle 3.5t – 7.5t

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a Goods vehicle weighing between 3.5 tonnes and 7.5 tonnes along the major road network (MRN) and strategic road network (SRN).

Vehicles within this weight range include pickup trucks, Tipper Trucks, Luton Box Vans and Fridge Vans.

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Goods Vehicle 3.5t to 7.5t

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary
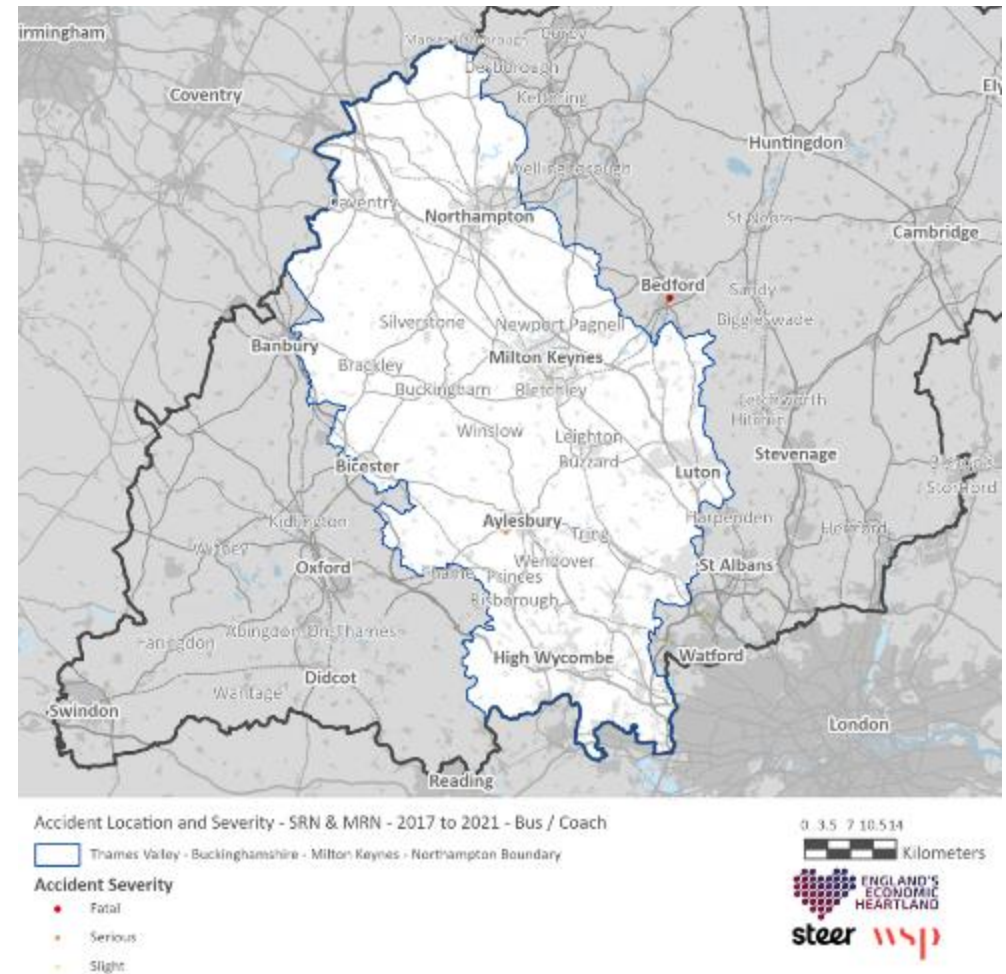
Accident Severity
- Fatal
- Serious
- Slight

Goods Vehicle 7.5t and Over

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a Goods vehicle weighing 7.5 tonnes or more along the major road network (MRN) and strategic road network (SRN).

Vehicles within this weight range include larger Trucks and HGVs.
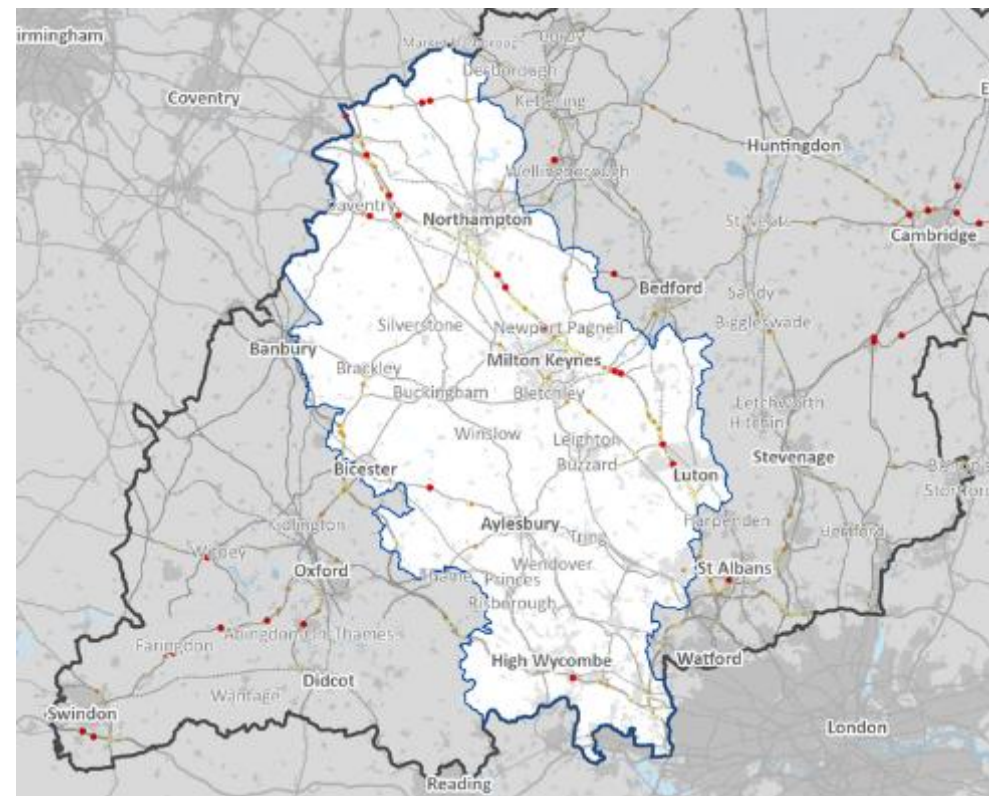
Accident Location and Severity - SRN & MRN - 2017 to 2021 - Goods Vehicle 7.5t and over

0 3.5 7 10.5 14 Kilometers

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary
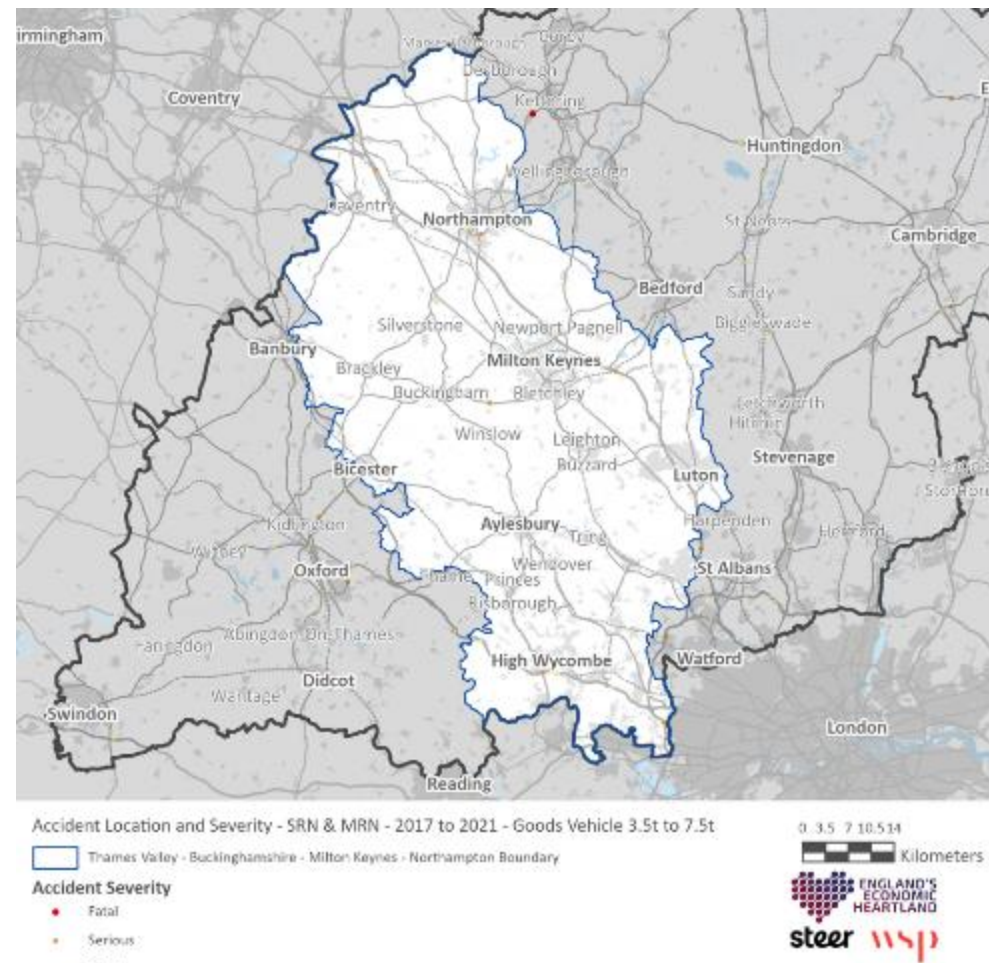
Accident Severity
- Fatal
- Serious
- Slight

Minibus

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a Minibus along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Minibus

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Accident Severity

- Fatal
- Serious
- Slight

Motorcycle (50cc or Less)

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a Motorcycle with a 50cc engine or less along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Motorcycle 50cc or less

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Accident Severity
- Fatal
- Serious
- Slight

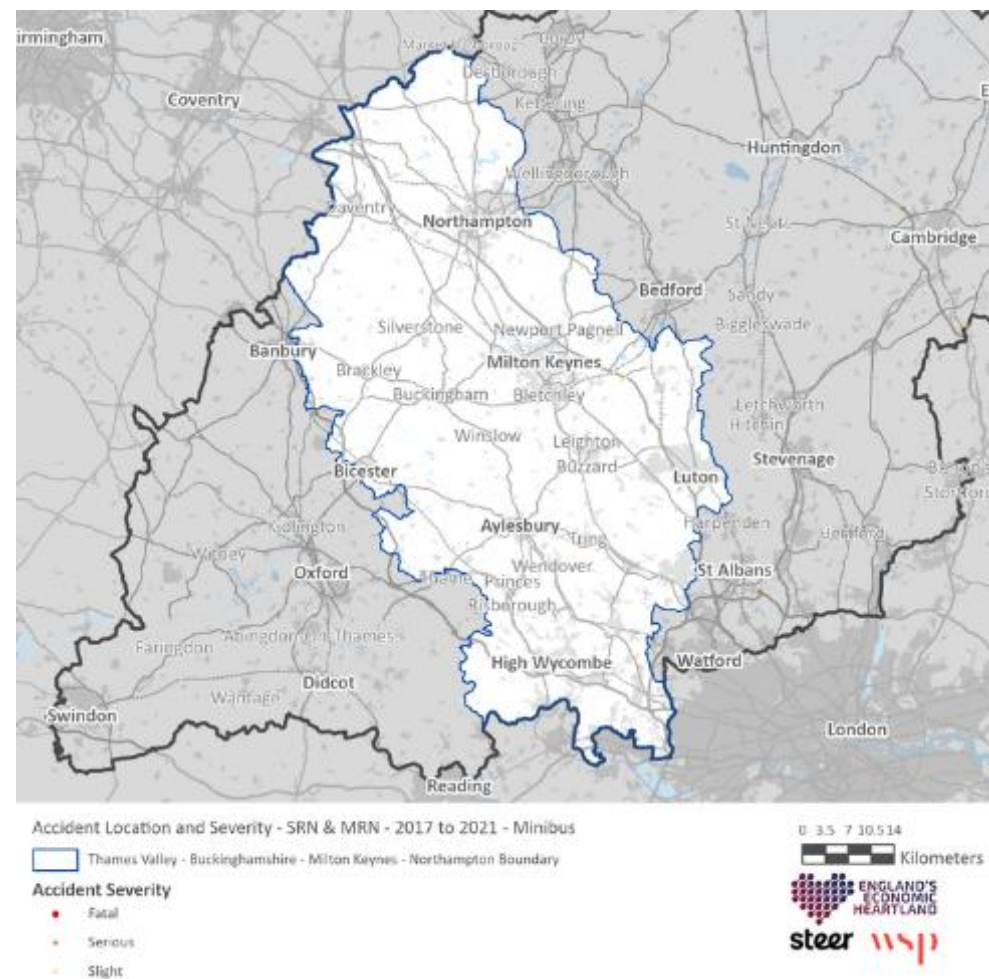## Motorcycle (50cc – 125cc)

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a Motorcycle with a 50 - 125cc engine or less along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Motorcycle 125cc or less

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Accident Severity
- ● Fatal
- ● Serious
- ● Slight

Motorcycle (125 – 500cc)
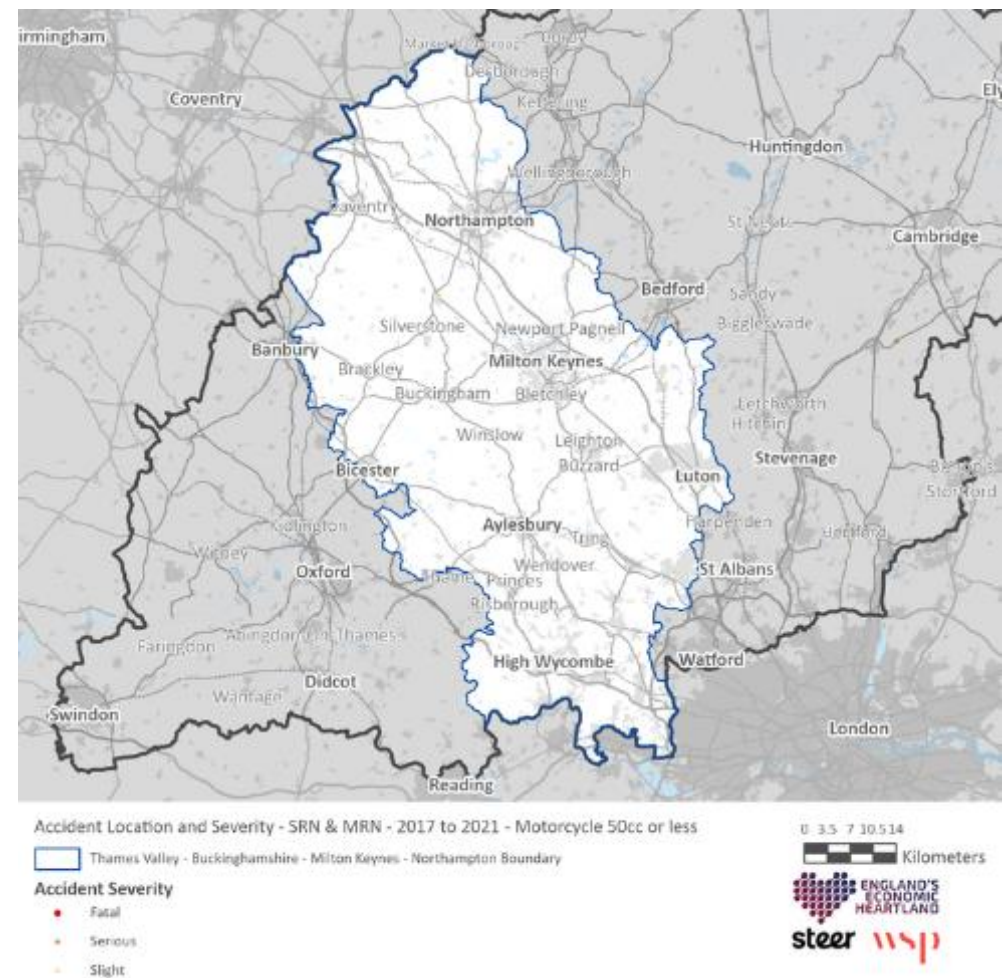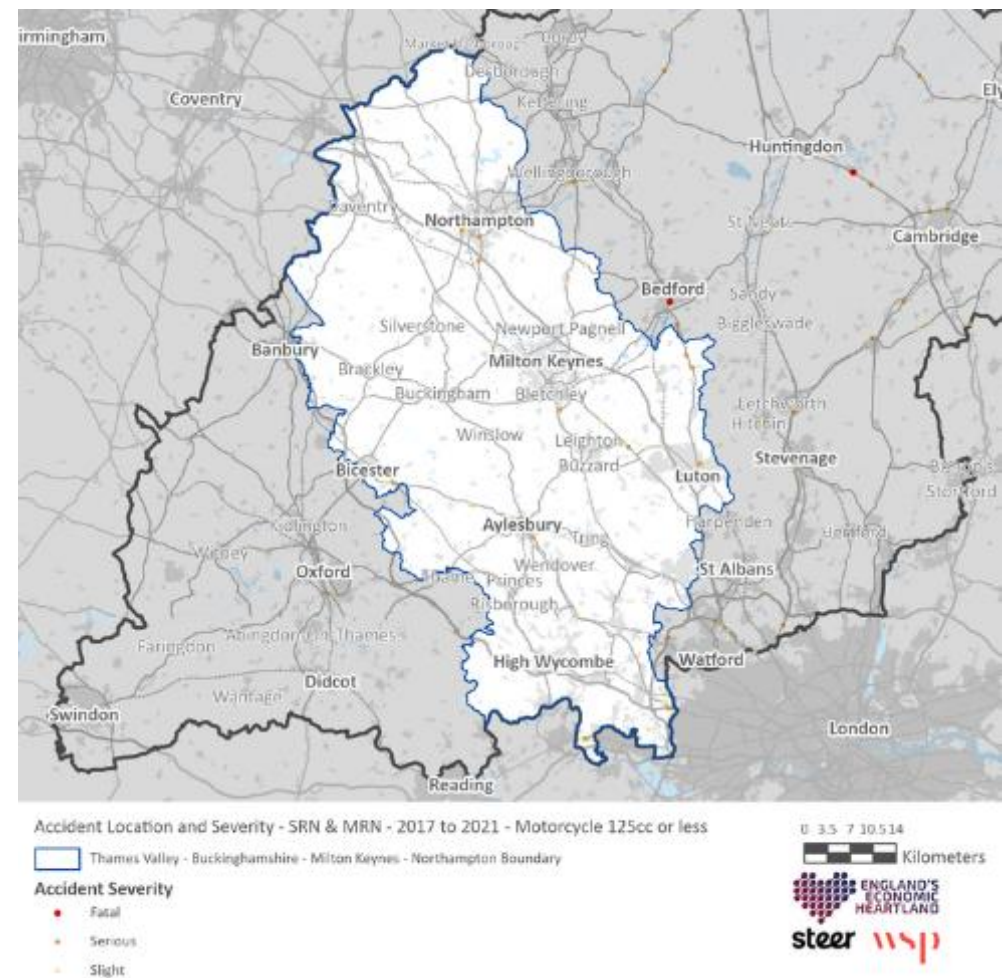
The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a Motorcycle with a 125cc – 500cc engine along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Motorcycle 125cc - 500cc

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Accident Severity
- ● Fatal
- ● Serious
- ● Slight

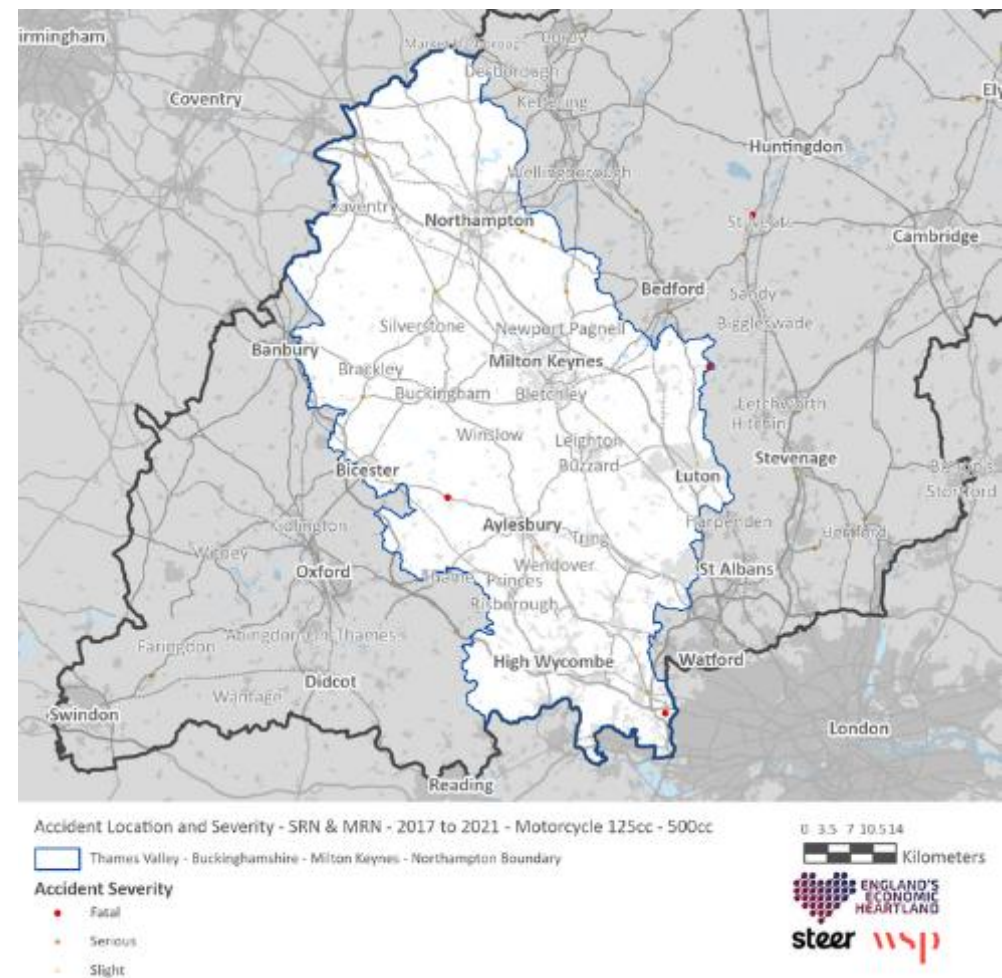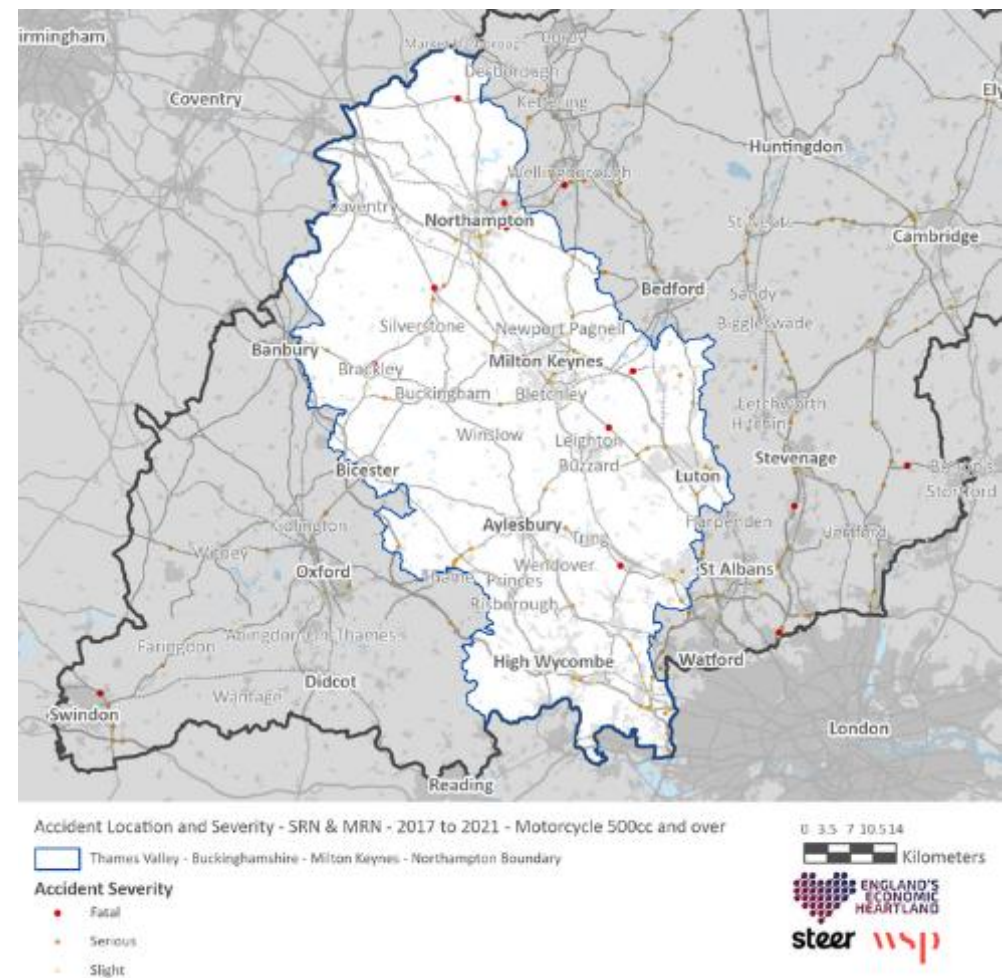England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

Motorcycle (500cc or more)

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a Motorcycle with an engine larger than 500cc or more along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Motorcycle 500cc and over

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Accident Severity
- Fatal
- Serious
- Slight

0 3.5 7 10.5 14
Kilometers

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**

Other Vehicle

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a vehicle identified as any of the main vehicle categories or more along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Other Vehicle

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary
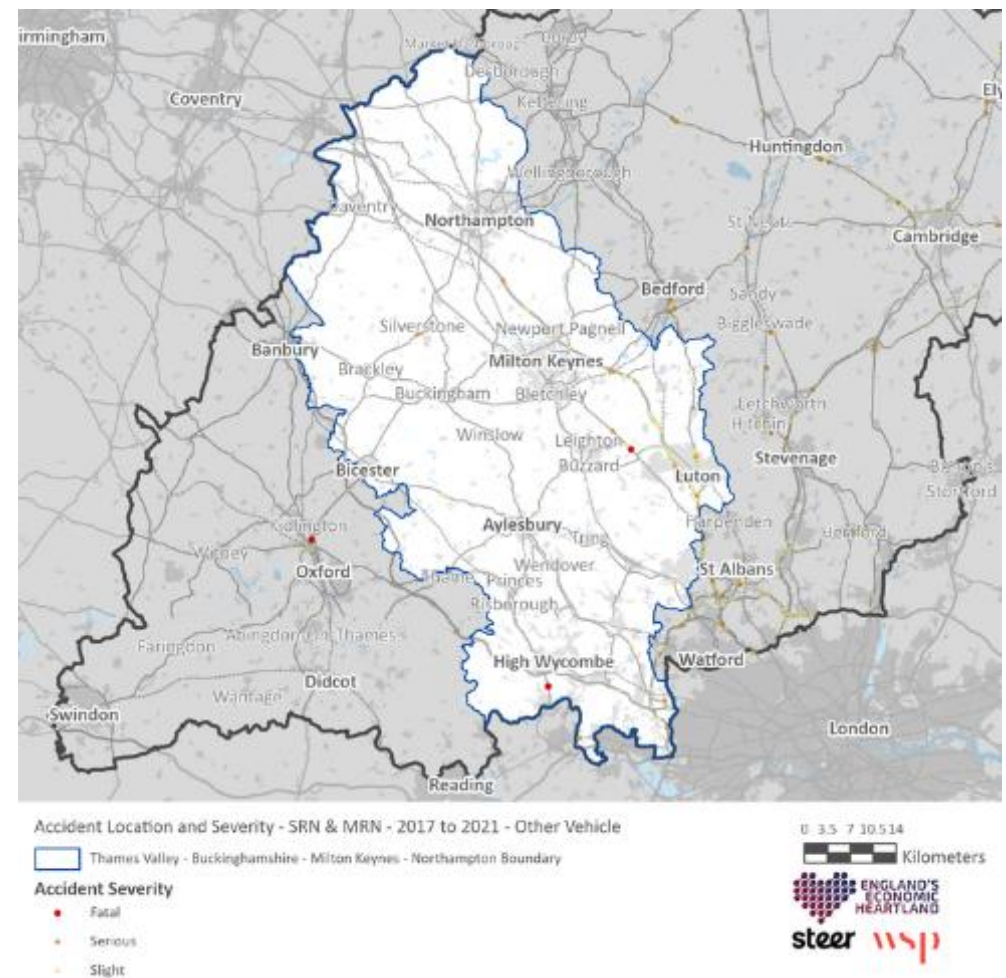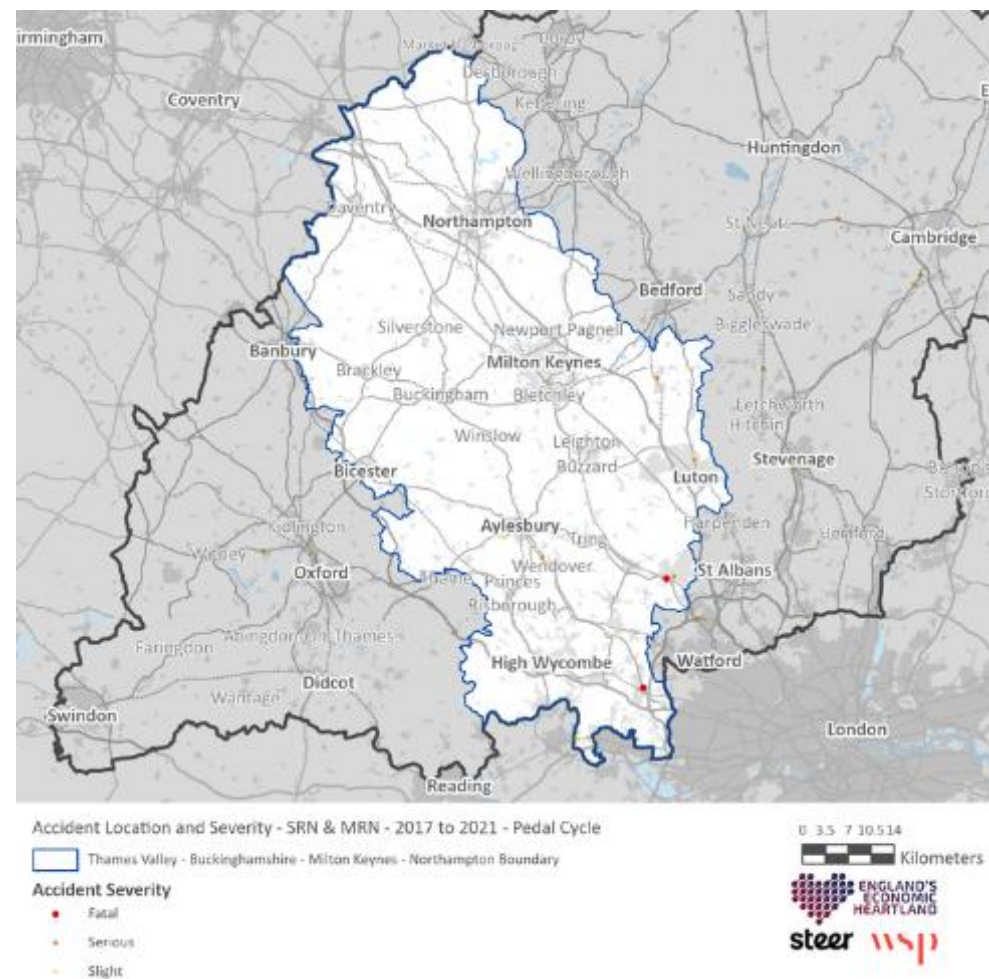
Accident Severity
- Fatal
- Serious
- Slight

Pedal Cycle

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a pedal bicycle along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Pedal Cycle

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

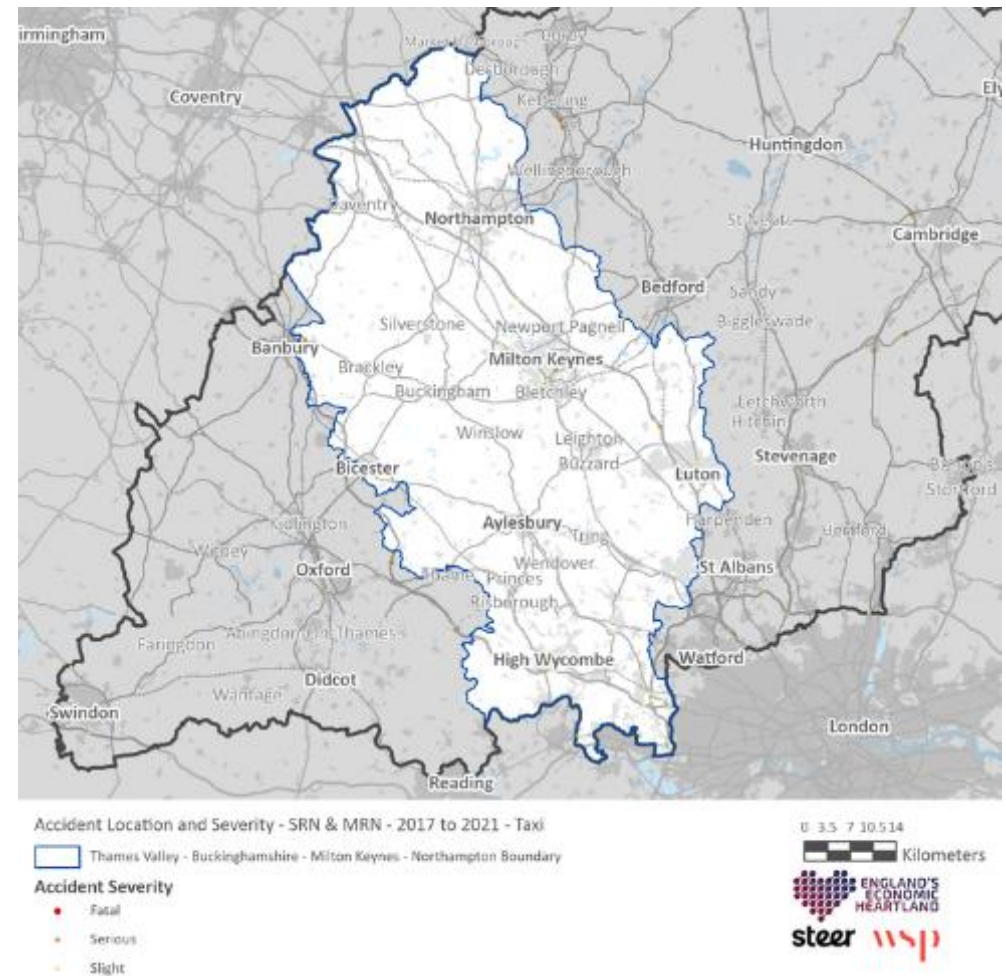**Accident Severity**
- ● Fatal
- ● Serious
- ● Slight

0 3.5 7 10.514 Kilometers

Taxi

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a taxi along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Taxi

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Accident Severity
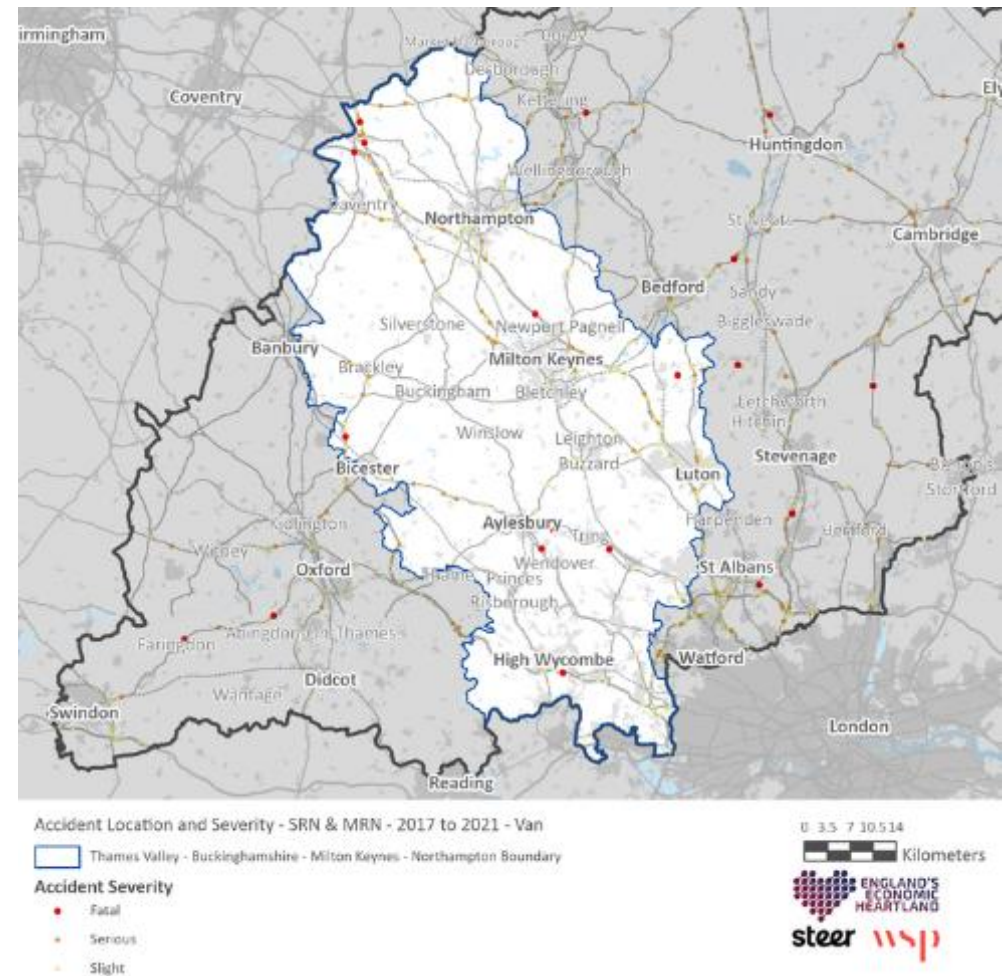- • Fatal
- • Serious
- • Slight

0 3.5 7 10.514 Kilometers

Van

The plan opposite highlights the location where Slight, Serious and Fatal accidents took place involving a van along the major road network (MRN) and strategic road network (SRN).

Accident Location and Severity - SRN & MRN - 2017 to 2021 - Van

☐ Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Accident Severity
- • Fatal
- • Serious
- • Slight

0 3.5 7 10.514 Kilometers
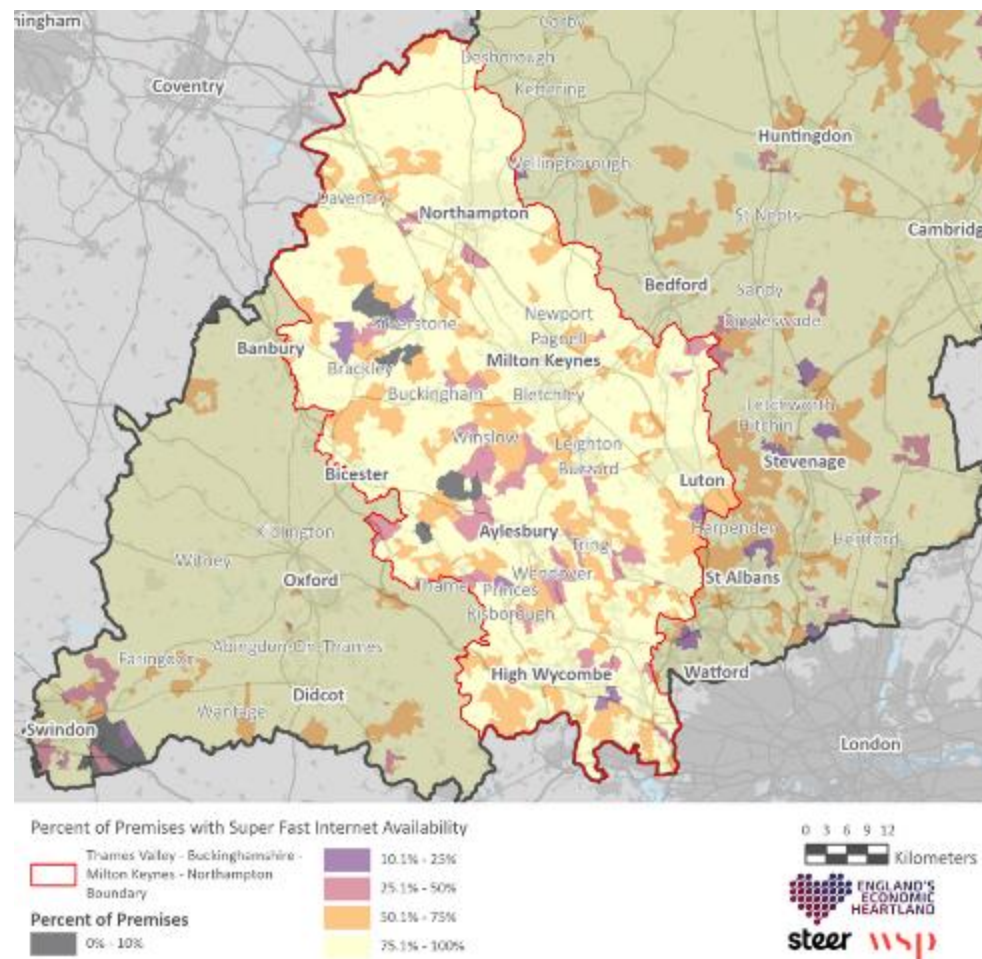
Appendix I – Broadband speed availability

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 Silverstone, Winslow, Brackley and Wendover.

Superfast broadband coverage is lowest in rural areas to the West of the study area, with Silverstone and Winslow both showing areas with less than 10% superfast internet coverage.

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

England's Economic Heartland **Thames Valley - Northamptonshire Connectivity Study**
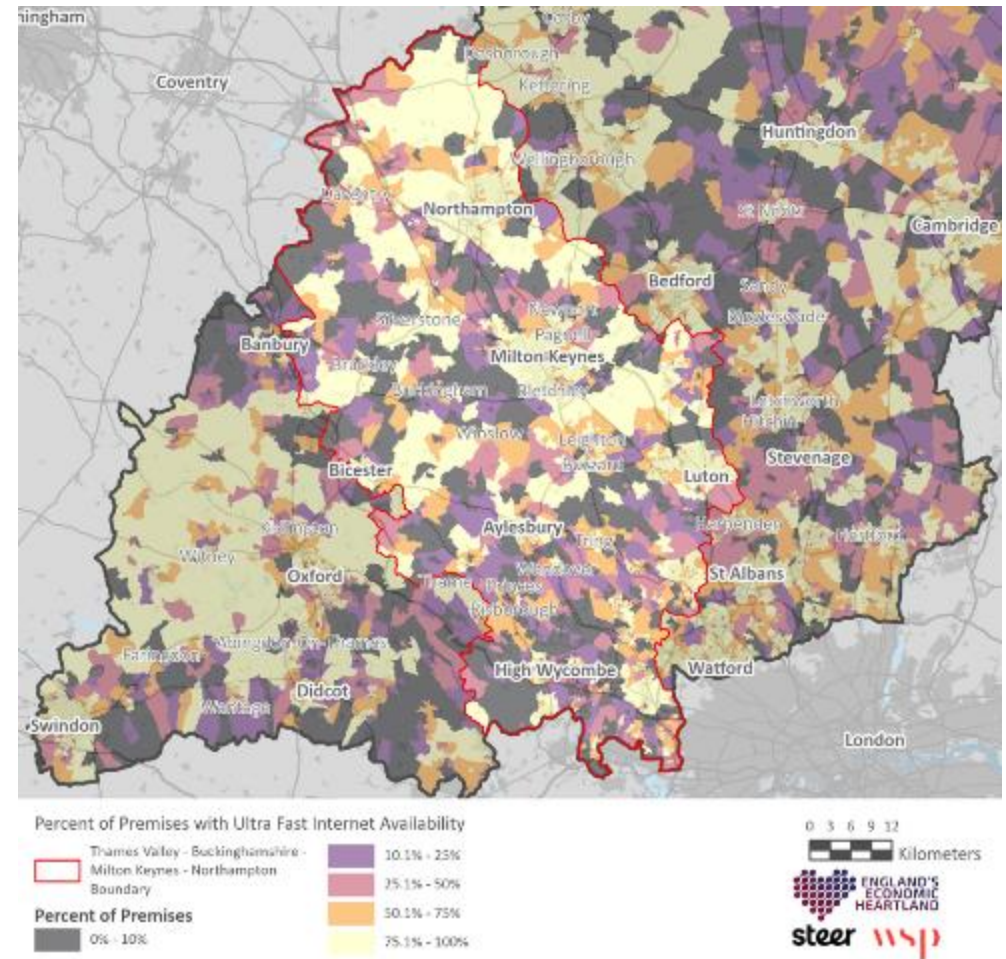
Ultrafast Broadband Availability

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). An 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 major urban Centres such as Milton Keynes, Northampton 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 Buckingham, Silverstone and High Wycombe. Rural areas found outside of the main urban centres also have reduced availabilities, with Luton suburban areas and north of Milton Keynes 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.

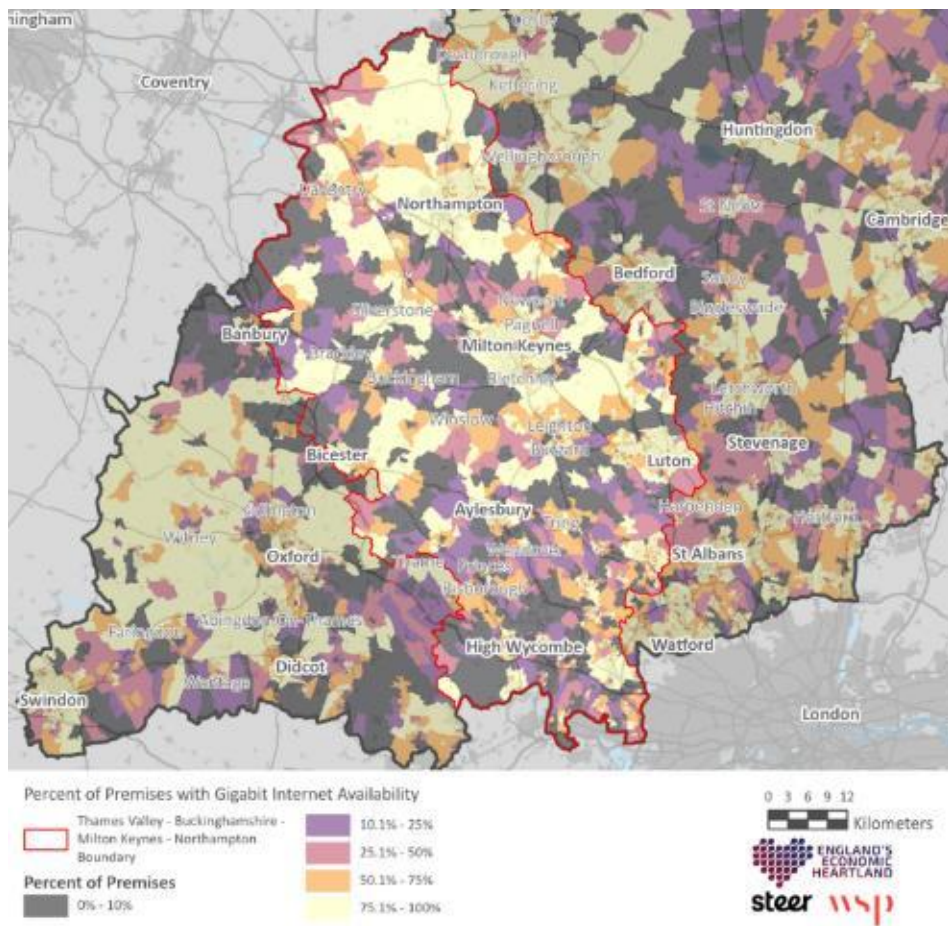Data Source: OFCOM Connected Nations 2023 Report Performance Data

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 in between the main urban settlements of Luton, Milton Keynes and Northampton. North of Northampton also highlights a large area of Gigabit availability within a rural context.

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.

Percent of Premises with Gigabit Internet Availability

Thames Valley - Buckinghamshire - Milton Keynes - Northampton Boundary

Percent of Premises
- 0% - 10%
- 10.1% - 25%
- 25.1% - 50%
- 50.1% - 75%
- 75.1% - 100%

0 3 6 9 12 Kilometers

Data Source: OFCOM Connected Nations 2023 Report Performance Data

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 estimates 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
Housing Affordability	House Price statistics for Small areas (HPSSAs), Dataset 2Median Price paid by MSOA (2018)
Industry Split	Business Register and Employment Survey (2020)

Evidence Type	Source
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