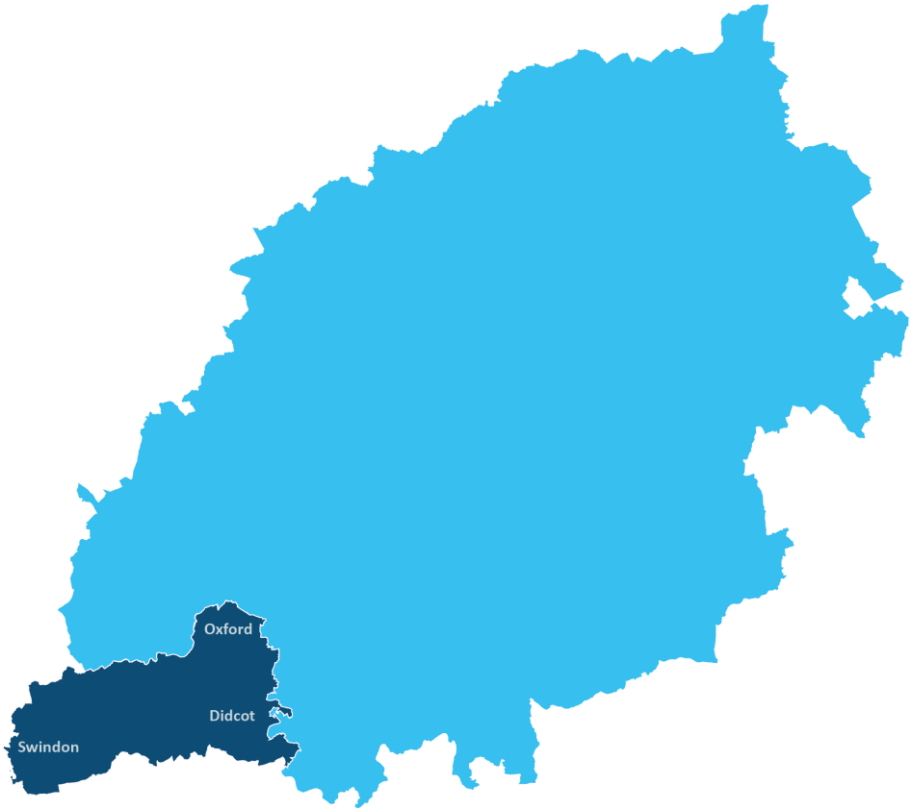
England's Economic Heartland

Swindon-Didcot-Oxford Connectivity Study



Phase 2 Evidence Base Report

Version 3.2

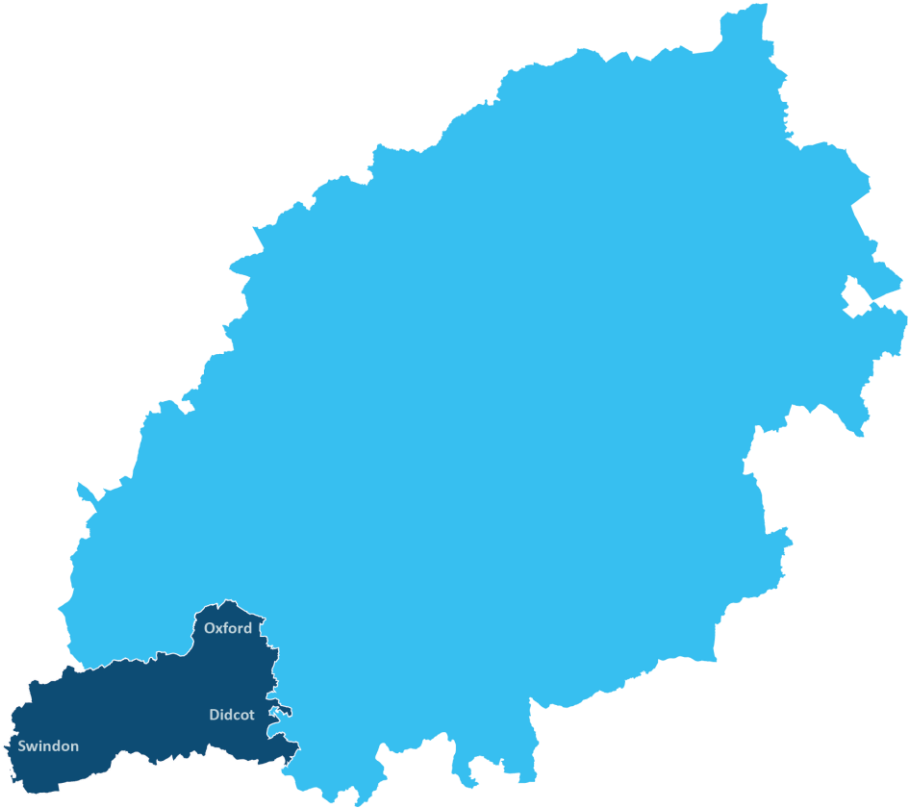
23 September 2022

steer wsp

Contents

Glossary

- **Gross Value Added (GVA):** The measure of the value of goods and services produced in an area, industry or sector of the economy.
- **Dormitory Town:** A place from which many people travel from in order to work in a larger town or city. They can also be known as commuter towns. These towns are primarily residential areas rather than industrial or commercial.
- **Built-up Urban Area (BUA):** A place that is 'irreversibly urban in character', thereby a characteristic of a town or city. This report uses the BUA geographies as defined by the 2011 Census.
- **Employees:** Anyone aged 16 years or over that an organisation directly pays from its payroll(s), in return for carrying out a full-time or part-time job or being on a training scheme. It excludes voluntary workers, self-employed, working owners who are not paid via PAYE.
- **Employment:** Employees (as defined above) plus the number of working owners. The Business Register and Employment Survey includes self-employed workers if they are registered for VAT or Pay-As-You-Earn (PAYE) schemes. Self-employed people not registered, along with HM Forces and Government Supported trainees are excluded.
- **Output Area:** A geographic area that are built from clusters of adjacent unit postcodes in the UK and are the base unit for Census data releases. Output Areas allow for finer resolution of data analysis due to their small size. The average population of 2011 Census Output Areas was 309 people.
- **Lower Layer Super Output Area (LSOAs):** A geographic area built from groups of contiguous Output Areas. These are automatically generated to be as consistent in population size as possible. They typically contain four to six Output Areas. 2011 Census LSOAs had an average population of 1500 people or 650 households.
- **Medium Layer Super Output Area (MSOAs):** A geographic area built from groups of contiguous LSOAs. These are automatically generated to be as consistent in population size as possible. 2011 Census MSOAs had an average population of 7500 residents or 4000 households.
- **Indices of Multiple Deprivation (2019):** Dataset used to classify he relative deprivation of small areas in England (LSOAs). It follows an established methodological framework in broadly defining deprivation to encompass a wide range of an individual's living conditions. The 2019 IoD is based on 39 separate indicators, organised across seven distinct domains of deprivation which are combined and weighted to calculate the Index of Multiple Deprivation 2019.
- **Health & Disability Domain:** A dataset that measures the risk of premature death and the impairment of quality of life through poor physical or mental health. The domain measures morbidity, disability and premature mortality but not aspects of behaviour or environment that may be predictive of future health deprivation. Deciles are calculated by ranking LSOAs from most deprived to least deprived and dividing them into 10 equal groups. These range from the most deprived 10% (Decile 1) of small areas nationally to the least deprived 10% (Decile 10) of small areas nationally.
- **Personal Injury Accidents:** Accidents on public roads (including footways) which become known to the police within 30 days. Damage-only accidents, with no human casualties, and accidents on private roads or car parks are not included in the statistics. PIA data is sourced from the STATS19 database.



Part 1
Introduction

Context & Background

The Ambition

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

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

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

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, and bold decision making that puts people and the environment at its centre. It looks to realise synergies with other policy areas which have a major impact on the way people travel, including spatial planning and the provision of wider infrastructure and services such as digital, utilities, education and health.

The Key Principles

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.

Context & Background

Project Aims

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

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 below.

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

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

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

The study recognises that strategic infrastructure issues (and solutions) extend beyond a single area and adopts a cross-border, strategic approach to assessing connectivity and movement. The study goes beyond more localised approaches to addressing transport issues, like Local Transport 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'.

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

Study Area

The Swindon – Didcot – Oxford connectivity study area, as presented on page 8, extends from Swindon to Oxford. The study area is strategically located to the west of London and is an important contributor to the success of the region, contributing towards 10% of EEH's Gross Value Added in 2018 (£15,570 million of which 19% was from education).

The study area **spans two local authorities** and **includes the primary urban conurbations** of Swindon, Didcot and Oxford.

The study area also **encompasses regional and nationally significant road and rail links,** this includes the M4, A34 and A419 which form part of the Strategic Road Network and are managed by National Highways, as well as the A420 (part of the Major Road Network), A4142 and A419 which are managed by Local Highway Authorities. National and regional rail links in the study area include the Cherwell Valley Line (connecting Oxford, Abingdon On-Thames and Didcot), the Great Western Main Line (connecting Swindon to Didcot) and the Golden Valley Line (connecting Swindon to Stroud and Gloucester). Further detail on the strategic transport routes connecting the study area with wider EEH region is provided on page 9.

There are no international gateways situated within or on the edge of the study area. However, both the A34 and Cherwell Valley line transport significant flows of freight between Southampton and the Midlands. The study area includes Oxford, a city of international, national and regional importance due to its world-class facilities for study and research.

The south of the study area borders the North Wessex Downs AONB and is located just southeast of the Cotswolds AONB. Whilst these are not the focus of this study, the rurality of the study area and surrounding areas may influence future decision-making on the extent of transport interventions in the study area.

Within the study area itself, there are a number of places of strategic importance, including the prestigious Oxford University, as well as Oxford Brookes University and science, technology and innovation centres including: Porton Science Park in Swindon, Harwell Science and Innovation Campus and Didcot Enterprise Centre.

The Swindon – Didcot – Oxford 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:

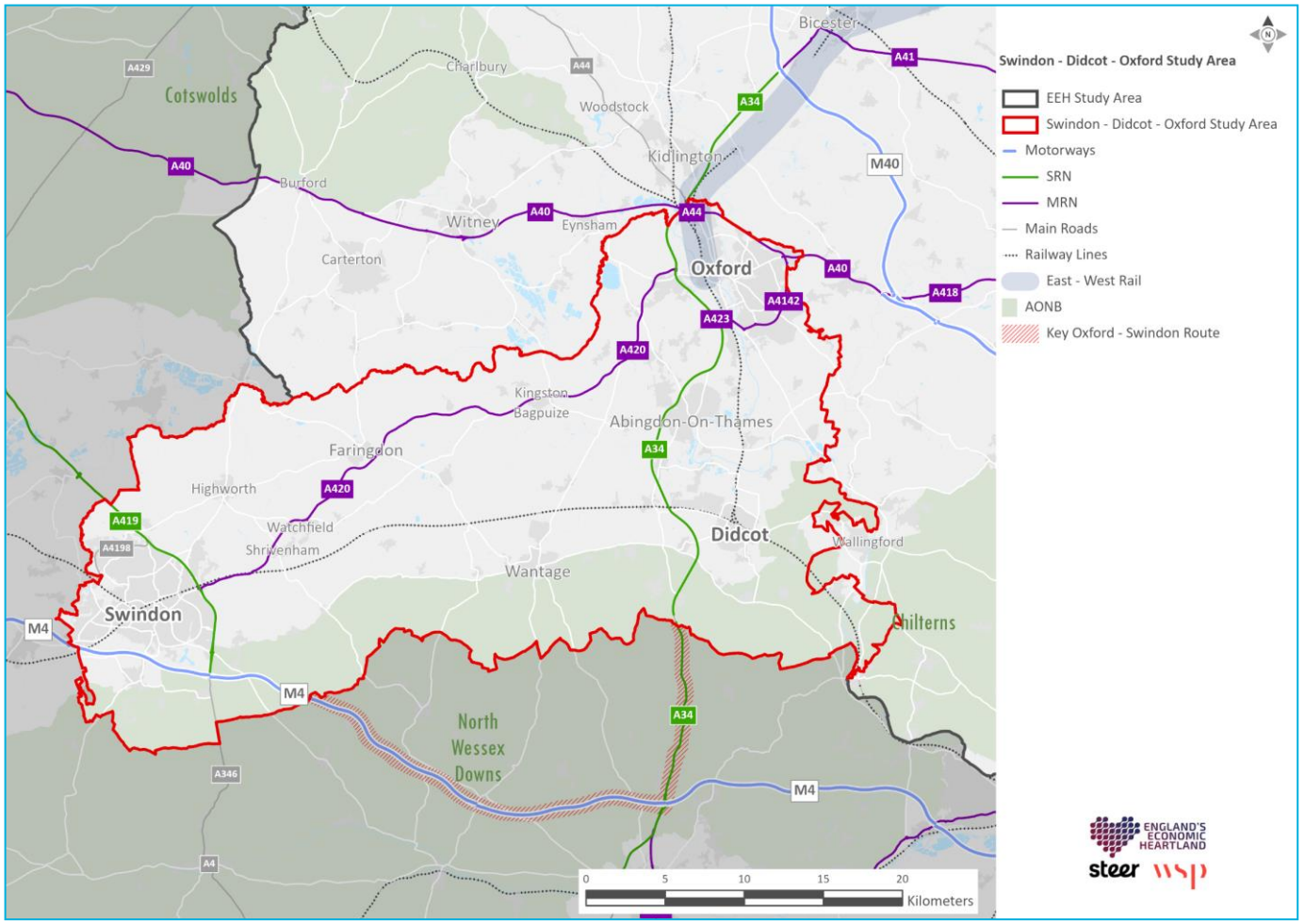
- **Levelling Up:** the study area has varying levels of deprivation, which results in a complex mix of differing needs and challenges. Packages of multi-modal interventions can play a vital role in delivering an affordable and accessible transport network and in turn reducing barriers to employment, education and training, healthcare, social, leisure, physical and cultural activities.
- **Decarbonisation:** EEH are committed to tackling the decarbonisation of the transport system by bringing all greenhouse gas emissions to net zero by 2050, 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 dominated by private vehicles, thereby to achieve this target a substantial behavioural shift in the way existing residents in the study area access jobs, services and amenities is required.
- **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.

Study Area

The plan opposite shows the red line boundary of the core study area – the part of the study area that falls within the EEH region.

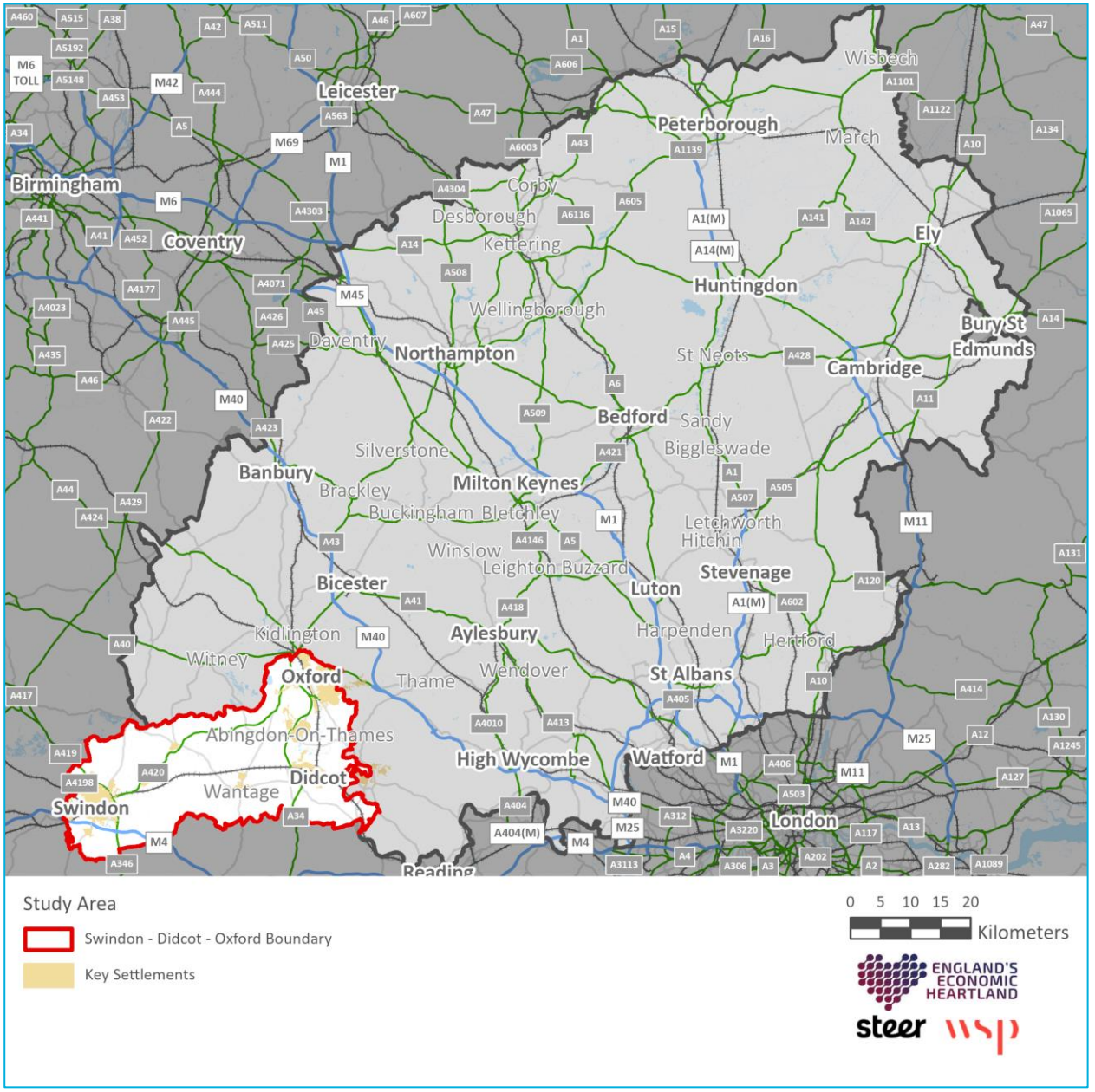
The plan also highlights sections of the M4 and A34 corridors that fall outside the EEH region, but have been included within the study area. These sections of highway have been included due to their interaction with the A420 as they provide an alternative strategic route for people and goods travelling between Oxford and Swindon.

This evidence base report principally focuses on people, place and connectivity within the core study area. However, the potential for the A34 and M4 to support wider movement within the study area as has been considered, particularly in relation to supporting strategic trips between Oxford and Swindon.



Study Area

The plan opposite show the red line boundary of the core study area in the context of the wider EEH region.



Study Area

Significant Road and Rail Links

As discussed on Page 7, the study **encompasses regional and nationally significant road and rail links.**

The strategic transport routes connecting the corridor with the wider EEH region are:

- The **M4**, forms part of the Strategic Road Network and runs in an east-west direction connecting East London with southwest Wales via Reading, Swindon, Bristol and Cardiff and Swansea. Whilst only a small part of the M4 lies within the EEH region, the study considers potential for the A34 and M4 to support wider movement within the core study area, particularly in relation to supporting strategic trips between Oxford and Swindon.
- The **M40** forms part of the Strategic Road Network that links London, Oxford and Birmingham.
- The **A34** forms part of the Strategic Road Network and runs in a north south direction between Southampton and Oxford. It is the main route for HGV traffic travelling between the Midlands and ports along the south coast of England.
- The **A419** is a major route that connects Junction 14 of the M4, east of Swindon, with Whitminster in Gloustershire near the M5 motorway.
- The **A420** is one of the most important links in the study area, providing a major road connection between Oxford in the north east and Swindon in the south west. The route connects with the A34 to the north and A419 to the south.
- The study area is bounded to the north by the **A40**, a major east-west route that connects London and southwest Wales. Because this route does not align with the main movements and flows through the study area, the evidence based has not considered this route in any detail.
- The **A4142** situated to the south east of Oxford forms part of the Oxford Ring Road. It connects the A34 to the south west with the M40 to the north east.
- The **A44** is a major route that connects Oxford with Aberystwyth in west Wales. Because this route does not align with the main movements and flows through the study area, the evidence based has not considered this route in any detail.
- **Great Western Main Line** runs westwards from London Paddington to Bristol Temple Meads. It connects to other main lines such as those from Reading to Penzance and Swindon to Swansea. The line only serves two settlements in the study area, Didcot to the south east and Swindon to the south west.
- **The Cherwell Valley Rail Line** runs between Didcot and Banbury via Oxford. It links the Great Western Main Line and the south to the Chiltern Main Line and the Midlands. The line serves settlements situated in the east of the study area, with stations at Didcot, Culham, Radley, Oxford. The line carries significant volumes of container freight traffic between the Port of Southampton and the Midlands via Basingstoke (on the South West Mainline and Reading – Basingstoke Line), Reading (on the Great Western Mainline), Didcot and Oxford.
- **Chiltern Mainline** runs in a north west 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. Because this route does not align with the main movements and flows through the study area, the evidence based has not considered this route in any detail. However the line does have the potential to support services through to Cowley, should the branch line reopen to passenger services.

Study Area

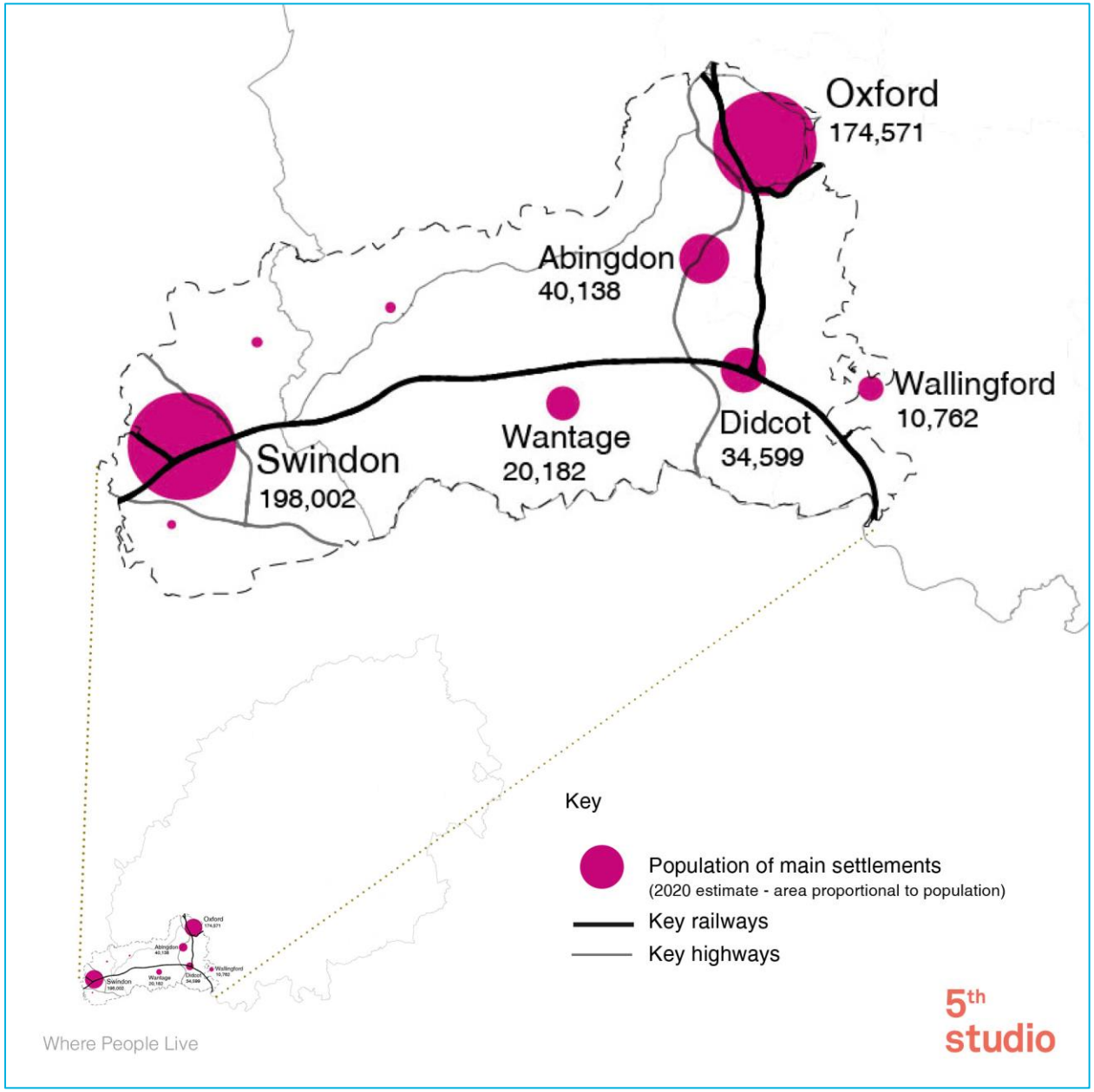
Where People Live

The plan shows the distribution of the residential population across the study area. Settlements with at least 5,000 inhabitants, that together account for around 90% of the total population, are shown as a circle. The area of the circle is proportional to the population represented.

The plan opposite shows that approximately two thirds of the overall study area population live in the large urban settlements of Oxford and Swindon, which, with populations nearing 200,000*, each provide access to a full-range of services within their relatively compact urban areas.

Around 85% of the population live in settlements with populations larger than 10,000 and about 80% in settlements with populations of over 30,000, where most day-to-day needs can be facilitated locally.

Conversely around 15% of the overall population live in smaller settlements or rural locations that are relatively isolated and are therefore likely to be dependent on travel to nearby towns for certain higher-order services, and a broader range of job opportunities.



*Population estimates based on 2011 Census Usual Resident Population at Built-Up Urban Area geography uplifted to 2020. Growth factor based on change in population between 2011 (Census) and 2020 (Mid-Year Population Estimate).

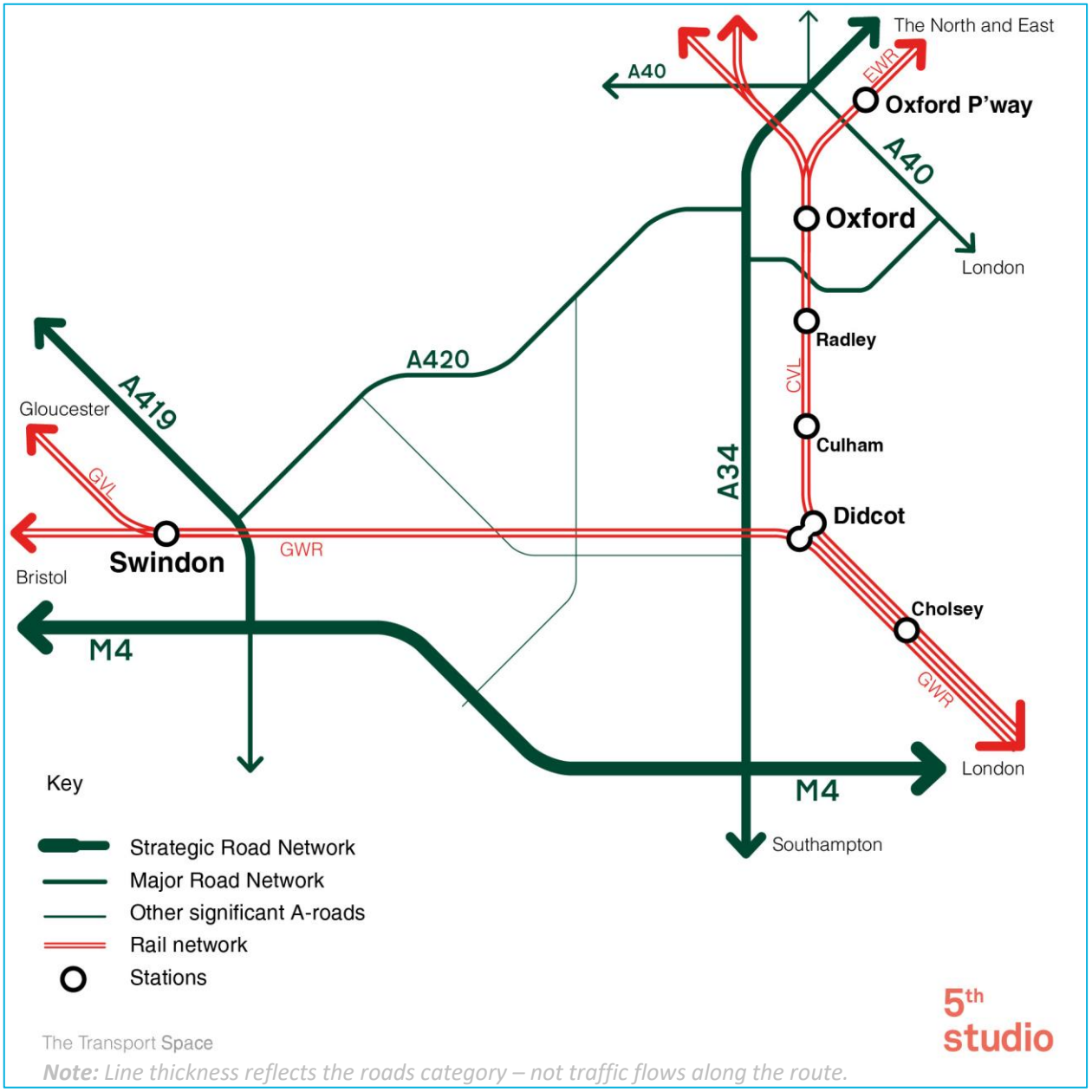
Study Area

The Transport 'Space'

This plan provides a simplified diagram of the strategic passenger rail and main highway networks within the study area. It is intended to give a sense of the psychological 'space' that these movement networks create – a space that will often strongly correlate with the economic geography of a particular region.

The plan shows that while the area has good connections to the strategic highway and national rail networks, a direct linkage between Oxford and Swindon, the two main centres of population and activity, is not, as one might expect, primary. This is particularly the case in terms of rail travel, where there is no direct service between Swindon and Oxford, despite the potential to be only about 30 minutes apart by rail, utilizing existing infrastructure.

The plan also highlights the strength of the north-south corridor running between Oxford and Didcot – with parallel rail and expressway routes (and other public transport initiatives planned) mirroring the identification of the closely linked settlements and employment clusters of this zone as the 'Oxfordshire Knowledge Spine'. In contrast there is a significant gap in rail access between Swindon and Didcot – with no station at all in the intervening 24 miles.



The Transport Space

Note: *Line thickness reflects the roads category – not traffic flows along the route.*

Key Settlements

The study area includes four principal settlements; Oxford, Swindon, Didcot and Abingdon–on-Thames. These play an important economic role within the study area and wider EEH region by having a significant residential population and/or employment offering.

The two largest urban centres in the study area are the city of Oxford in the northeast and the large sized town of Swindon in the southwest. Swindon is the largest of the two settlements with a population of 199,500. This compares to a population of 167,500 in Oxford.

Oxford and Swindon are also the two main employment destinations in the study area with 127,000 and 102,500 employees respectively. Both settlements generate significant levels of in-commuting with workers from surrounding towns and villages.

The study area includes two medium size settlements situated just outside the Oxford Greenbelt, Abingdon-on-Thames and Didcot with populations of 40,000 and 34,500 respectively. Whilst these settlements principally function as dormitory towns with large levels of commuting towards Oxford, Swindon and London they also provide access to a range of everyday services and have a growing employment offering (e.g. Milton Park Science and Technology Park in Didcot and Abingdon Business Park in Abingdon-on-Thames). Both of these settlements are strategic locations for future housing and employment growth.

Key Settlements	Population (2020)	Employment (2020)	Employees (2020)
Oxford	167,485	128,220	127,165
Abingdon-on-Thames	39,889	17,450	17,340
Didcot	34,283	13,345	13,295
Swindon	199,549	102,970	102,465
Study Area	***549,983***	***315,295***	***312,870***
EEH Total	***5,232,018***	***2,676,440***	***2,617,400***
England and Wales Total	***59,719,724***	***27,626,000***	***26,911,000***

Data Sources: ONS 2020 Mid year Population Estimates and ONS Business Register and Employment Survey 2020

The centre of the study area is comprised of smaller rural towns and villages including Faringdon, Grove, Shrivenham and Wantage. Whilst smaller towns such as Wantage and Farringdon do not have the same employment offering as larger settlements in the study area, they do provide surrounding rural community with access to a range of everyday services and facilities.

The main challenge for rural communities is a lack of active and public transport infrastructure connecting residents with employment opportunities and service centres. This results in high levels of car dependency in rural areas, and rural deprivation amongst households / residents without access to a car.

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Policy Context

Overview

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

National Policy

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

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

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

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

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

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

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

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

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

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

Policy Context

National Policy (contd.)

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

Digital

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

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

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

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

Recognising that commercial roll-outs are likely to leave harder-to-reach premises unable to access gigabit services, the government has established the £5 billion Project Gigabit which 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.

Policy Context

Sub-national Policy

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

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

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

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

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

EEH Bus Study, EEH (Ongoing) aims to create a long-term plan to support the role of schedules bus and coach services in the region. EEH are working with local authorities and EEH Bus Operators Association to support the development of BSIPs, identify key strategic intra-regional bus routes and lead options for pan-regional ticketing and integration solutions.

Local Enterprise Partnerships

OxLEP Strategic Economic Plan (2016) - the Oxford Local Enterprise Partnership's (LEP) Strategic Economic Plan (SEP) identifies potential opportunities and prospects of Oxfordshire and manages the county's strong economic growth to ensure sustainability and inclusivity. The LEP has three priority areas driving dynamic economic growth: place-making (provide a quality environment), productivity (delivery and attract skills across sectors) and connectivity (allow people to move freely and connect easily).

Swindon and Wiltshire LEP (SWLEP) Strategic Economic Plan (2016) – this document is an update of its predecessor that was approved by Government in 2014. The SEP builds on work achieved to date as well as the progress towards the delivery of the European Structural and Investment Fund, the Higher Futures Programme and the Swindon and Wiltshire Growth Hub. The SEP identifies five strategic objectives to help achieve their goals which are; skills and talent, transport infrastructure improvements, digital capability, place shaping and business development. Additionally, the SEP identifies priority sectors and growth zones.

Policy Context

Sub-national Policy (continued)

SWLEP Rail Strategy Report (2019) – the Rail Strategy Report for SLWEP hopes to build a vision for the development of the rail network in Swindon and Wiltshire up to 2036 that achieves a rail network that not only has enhanced connectivity to other key regional centres, but one that supports the economy and improves quality of life for its residents and businesses. It also hopes to support the improvement of access to the rail network for businesses and residents and maintain and improve existing links to key regional and national centres.

SWLEP Digital Capabilities Draft Strategy (2018) – the Digital Capabilities Draft Strategy seeks to support a growing, resilient and competitive economy which is at the leading edge of digital technology. It is built around the three key themes of; digital creation, digital adoption and digital foundations and defines digital capabilities as factors that ideally work together to promote technology drive productivity growth. Additionally, the strategy identifies opportunities and challenges as well as key actions that will influence digital capabilities in Swindon and Wiltshire.

Policy Context

Local Policy

The Swindon – Didcot – Oxford study area encompasses two highway authorities (Oxfordshire County Council and Swindon Borough Council) which both have their own Local Transport Plans (LTP). These documents set out their transport objectives, policies and strategies.

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.

Oxfordshire County Council and Swindon Borough Council are both 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 opposite. Noting that draft documents or plans out for consultation are not listed. The exception is the "Oxfordshire Local Transport and Connectivity Plan" which is currently out to consultation.

- *Connecting Oxfordshire Volume 1 Local Transport Plan 2015-2031*
- *Connecting Oxfordshire Volume 2 Local Transport Plan 2015-2031 – Bus Strategy*
- *Connecting Oxfordshire Volume 3 Local Transport Plan 2015-2031 – Rail Strategy*
- *Connecting Oxfordshire Volume 2 Local Transport Plan 2015-2031 – Active Healthy Strategy*
- *Connecting Oxfordshire Volume 2 Local Transport Plan 2015-2031 – Freight Strategy*
- *Oxford Local Walking and Cycling Infrastructure Plan*
- *Oxfordshire Draft Local Transport and Connectivity Plan 2022*
- *Oxfordshire's Strategic Vision for Long-Term Sustainable Development 2021*
- *Oxfordshire's Pathways to a Zero Carbon Oxfordshire*
- *Swindon Local Transport Plan 3: 2011 – 2026*

Identification of Multi-Modal Interventions

This connectivity study will undertake a holistic approach, identifying multi-modal intervention packages that support local infrastructure priorities, whilst helping to achieve local objectives.

It should be noted that not all interventions identified will be taken forward as a part of this study. Some options may be parked for a future study as they better support movement and flows in another area. Alternatively other options may be parked because they are too localised, do not support strategic movement within the study area or do not align with the types of transport infrastructure that a Strategic Transport Body, such as EEH, is expected to promote. In such instances the study will explore whether smaller local interventions can be grouped into a single option.

Report Structure

Part 2 Understanding the Study Area

Using the adopted **people**, **place** and **connectivity** approach, this chapter demonstrates the social and economic diversity of the study area and the challenges and opportunities this creates. It also sets out the key environmental issues, the current travel patterns, behaviours and levels of service provided by the existing transport networks.

This chapter seeks to establish the underlying drivers and the scale of the existing issues, in order to identify the key challenges and the opportunities that multi-modal intervention packages could deliver.

Part 3 Future Context

This chapter 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 identified in Part 2. Without the interventions it will undermine the ability for the study area to deliver the required connectivity outcomes that help achieve EEH's objectives, identified within *Connecting People, Transforming Journeys.*

Part 4 Need for Intervention

This chapter summarises the case for intervention based upon an understanding of the aforementioned policy context, the study area today (Part 2), the scale of the growth challenge (Part 3) and the underlying drivers and causes of the identified issues. It provides a Strengths, Weaknesses, Opportunities and Constraints (SWOC) analysis of the study area before outlining the Critical Success Factors (CSF) that will be used to determine the success of potential intervention packages.

Part 5 Infrastructure Scenarios

This chapter sets out the approach to scenario planning in this study and details the different infrastructure planning scenarios that have been identified as options for addressing the need for intervention. It then outlines how elements of each of these infrastructure planning scenarios have been brought together to develop an optimal scenario to guide long list development.

Part 6 Next Steps

This section sets out the next steps with the study.

Overview

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

This section 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.

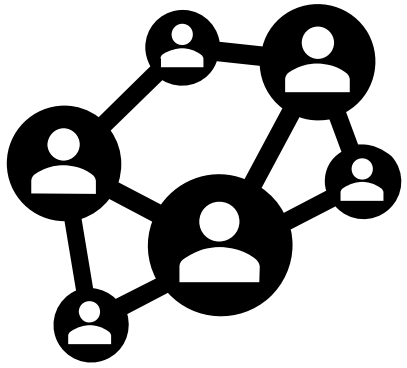
People

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

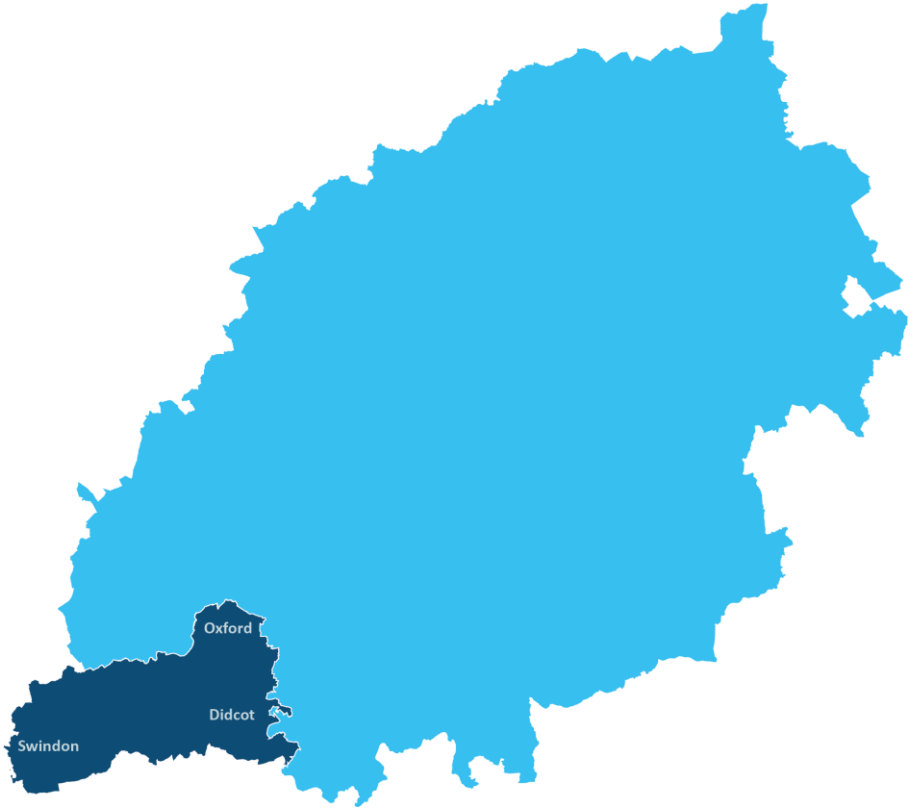
Place

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.

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.



Part 2a

People

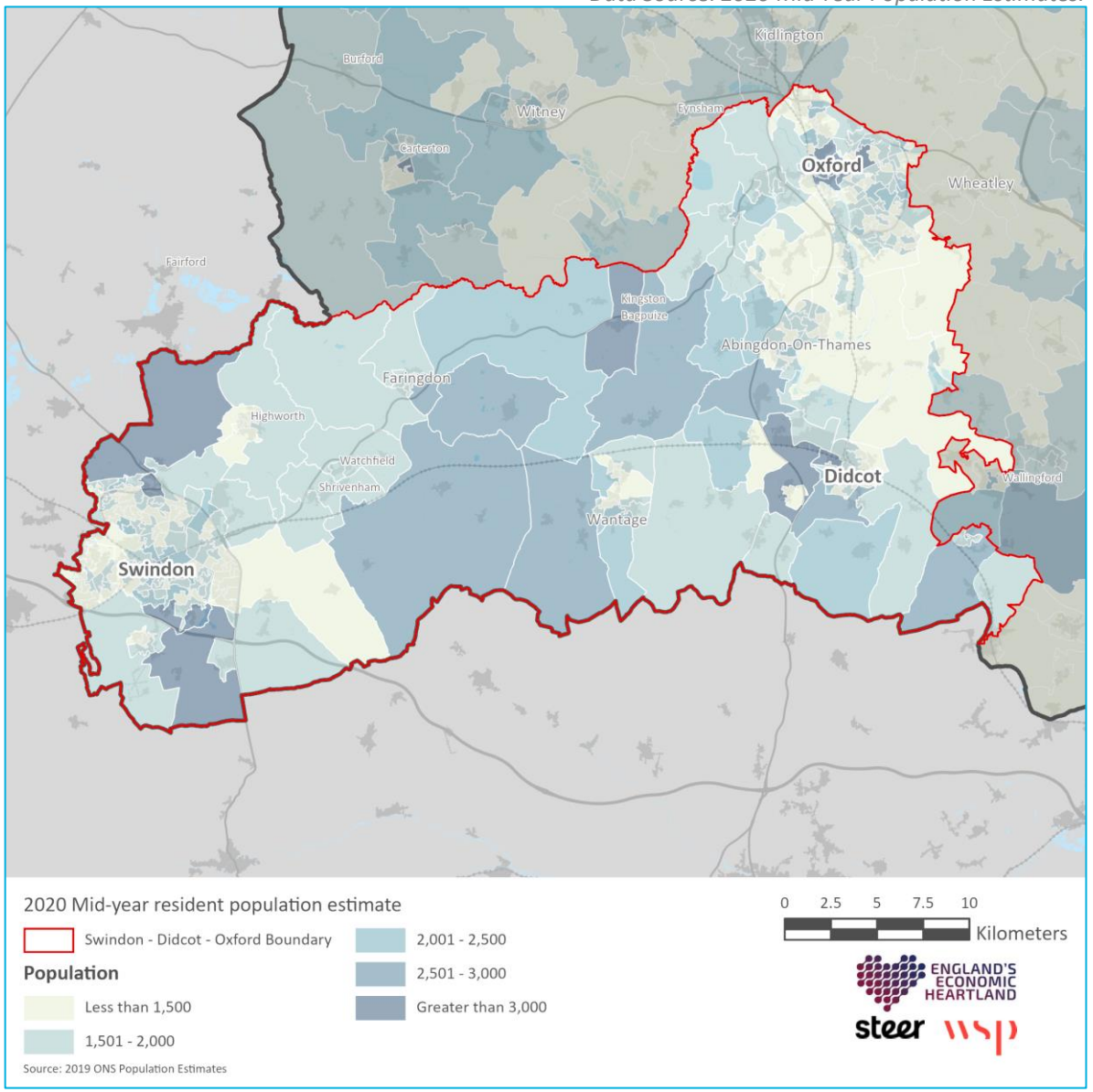
Population

Resident Population

In 2020 the Swindon – Didcot – Oxford study area was home to approximately 550,000 people. The population of the study area is predominantly located in the two major urban centres; Oxford to the northeast and Swindon to the southwest. Swindon is the largest of the two settlements with a population of 199,500. The settlements of Abingdon-on-Thames and Didcot are situated to the south of Oxford. Whilst these principally function as dormitory towns, they also provide access range of everyday services and have a large employment offering. **The centre of the corridor is sparsely populated and comprised of many smaller towns and villages. This results in high levels of car dependency as active travel is often unfeasible and public transport infrastructure is not commercially viable.**

The larger and denser settlements in the study area, such as Oxford, Swindon, Abingdon-on-Thames and Didcot, are likely to play a disproportionate role in supporting the decarbonisation of the transport network. This is because these settlements have a higher density of jobs and amenities meaning that they have the potential to support '20-minute neighbourhoods' – neighbourhoods where people have the ability to meet most of their daily needs within a 20-minute walk from home, with access to safe cycling and local transport options. **The decarbonisation of the transport network in the centre of the corridor is likely to be much more reliant upon the adoption of electric vehicles and new public transport interventions.**

Data Source: 2020 Mid Year Population Estimates.



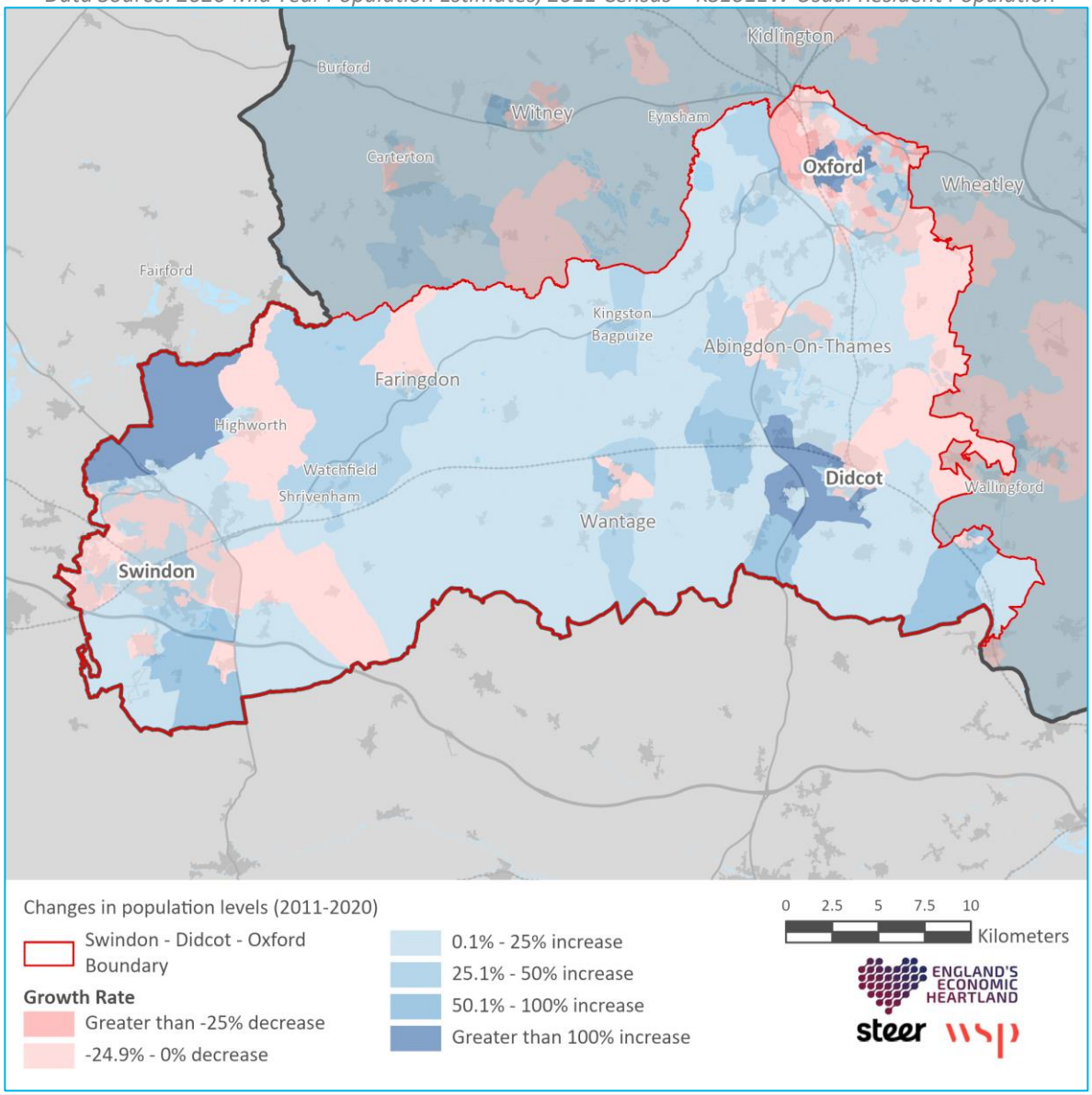
Population

Population Growth (Historic)

The resident population of the study area grew by 7% between 2011 and 2020, from approximately 515,000 in 2011 to approximately 550,000 in 2020. Of the four main settlements, above average growth was recorded in Didcot, with the population growing by 18% between 2011 and 2020. In Swindon the population grew by 7%, in Abingdon-on-Thames the population grew by 4% and in Oxford the population grew by 1%. The largest levels of growth (>100%) were observed to the south and west of Didcot and to the west of Highworth. This is likely to be attributable to new residential developments on the periphery of Didcot and growth within rural communities to the west of Highworth. There was a reduction in the population of some parts of the study area, with the largest reduction observed within and on the periphery of Oxford.

The population of the study area has grown over the last 10 years, particularly on the periphery of medium size urban areas and in smaller, more rural settlements. Growth in these areas presents two challenges. The first is that developments on the edge of urban areas are longer distances from everyday services and amenities and are often less well connected by active and public transport. The second is that developments in smaller settlements and rural hamlets are not well served by sustainable transport connections. To address this innovative forms of mobility, including demand responsive and shared transport, will need to be considered alongside digital and opportunities for mobility hubs to access public transport services.

Data Source: 2020 Mid Year Population Estimates, 2011 Census – KS101EW Usual Resident Population



Community Characteristics

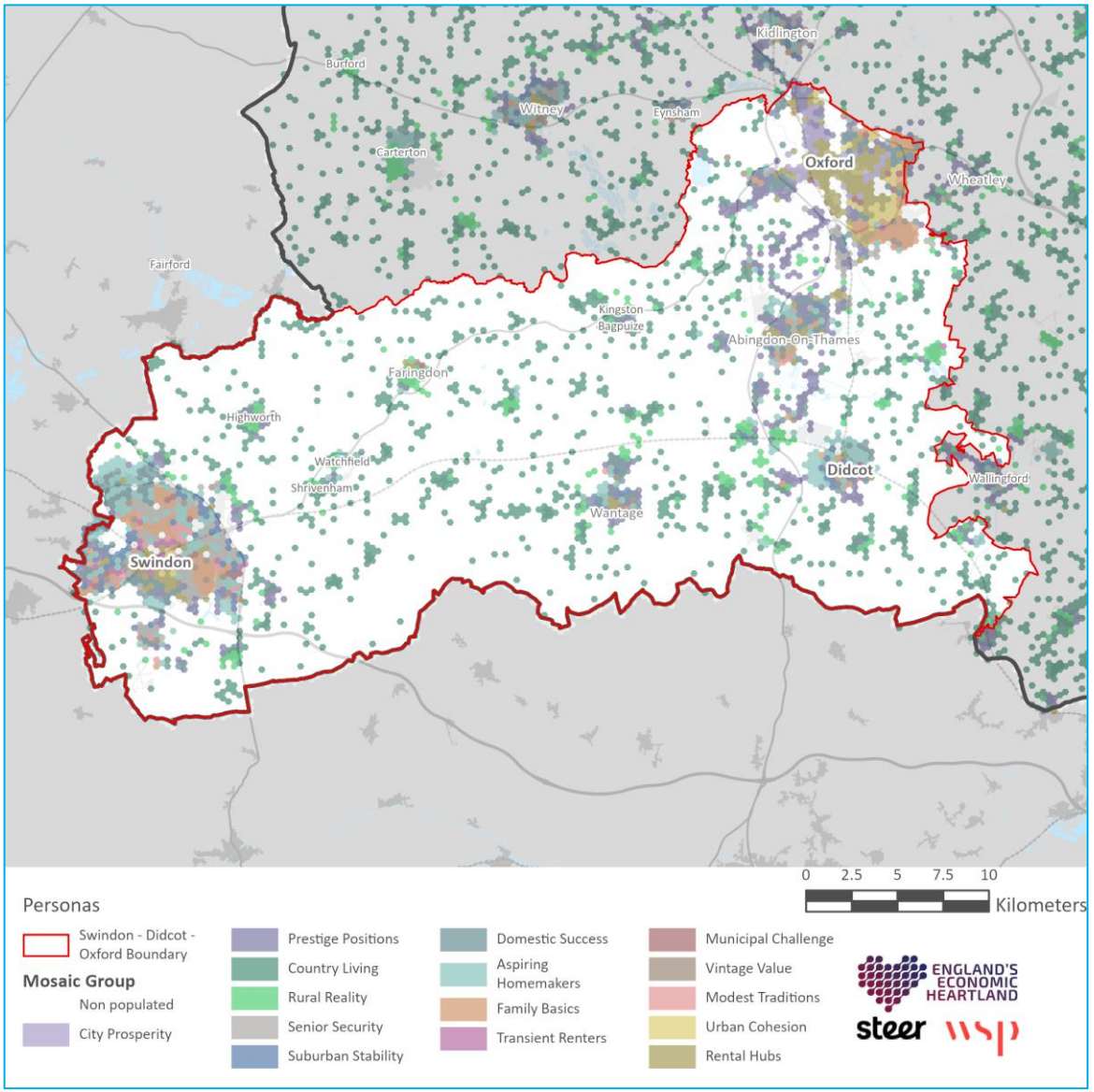
Mosaic Groups

Existing communities can vary significantly in terms of the 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.

- Oxford is characterised by City Prosperity to the north, and Urban Cohesion, Rental Hubs, and Family Basics in the centre and south.
- Abingdon-On-Thames is comprised of a mix of Family Basics, Aspiring Homemakers and Prestige Positions.
- Didcot is comprised of Aspiring Homemakers to the east and west and Prestige Positions to the south.
- Swindon is characterised by Family Basics to the east, whilst the west is a mixture of Country Living, Rental Hubs and Aspiring Homemakers.
- The rural areas are predominantly characterised by Country Living or Rural Reality.

Communities and their respective transport needs vary across the study area. Understanding this community variability can help identify potential and attractive place-based connectivity interventions that support these variable user needs.

Data Source: WSP / EEH First Mile Last Mile Study / Experian Mosaic Data



Community Characteristics

Propensity to Travel (By Mode)

As a part of EEH's First Mile Last Mile Strategy a propensity framework was developed using Experian Mosaic data. Using this framework, key desirable characteristics of mobility were established for each persona group.

For instance, 'Family Basics' place a high value on cost, and as such, are likely to have a higher propensity to take-up lower cost modes. Alternatively, individuals in areas characterised by 'Prestige Positions' and 'City Prosperity' tend to place a higher value on comfort. As such, these groups tend to have a lower propensity to cycle or use bus services.

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

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

The analysis suggests that different communities may have different propensities to take up certain forms of travel. For example, the concentration of Family Basics in eastern Swindon and southern Oxford suggests low-cost active travel solutions could most meet their needs.

	Mode	City Prosperity	Prestige Positions	Country Living	Rural Reality	Senior Security	Suburban Stability	Domestic Success	Aspiring Homemakers	Family Basics	Transient Renters	Municipal Challenge	Vintage Value	Modest Traditions	Urban Cohesion	Rental Hubs
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
On foot	On foot	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Cycling	Cycling (SP & O)	3	4	5	4	4	5	4	5	5	4	4	4	4	4	4
	Cycling (P & O)	2	2	4	2	2	3	3	3	3	3	2	2	2	2	2
	Cycling (SP & S)	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1
	Cycling (P & S)	2	2	3	4	2	2	3	2	2	2	2	2	3	2	2
E-Scooter* (kick-scooter)	E-Scooter (P & O)	2	3	4	4	3	4	3	4	4	3	3	3	2	2	3
	E-Scooter (P & S)	1	2	3	3	1	2	2	1	2	1	2	1	3	1	1
Motorcycle	Motorcycle (PTW - O)	2	1	1	1	1	3	2	3	3	2	2	1	1	2	2
	Motorcycle (PTW - S)	1	1	2	2	1	1	2	1	1	1	1	1	2	1	1
	Motorcycle (PTW - Taxi)	1	1	2	2	1	2	1	1	2	1	2	1	2	1	1
Car	Car (Sole Use)	5	3	1	1	3	3	2	3	3	3	3	3	1	4	3
	Car (Sole Use & S - P2P)	3	3	2	4	4	1	3	2	1	2	4	4	4	3	3
	Car (Sole Use & S - Ride Share)	4	4	4	4	4	4	5	4	4	4	4	4	5	4	4
	Car (S - Car Club)	3	3	2	4	4	2	3	2	2	3	3	4	4	3	2
Traditional & Emerging Taxi	Traditional and Emerging Taxi	4	4	3	3	3	3	4	4	3	4	4	3	3	3	4
Ride-hailing (sole use)	Ride-Hailing (Sole Use)	3	2	1	1	2	2	2	2	2	3	3	2	1	3	3
Ride-hailing (shared use) – shared taxi	Ride Hailing (S - Taxi)	4	4	3	4	4	4	4	4	4	4	4	3	4	4	4
Ride-hailing (shared use) – DDRT	Ride Hailing (S - DDRT)	4	5	4	5	5	4	5	5	4	5	5	5	5	5	5
Traditional Bus	Traditional Bus	1	1	1	1	2	1	1	1	1	1	1	2	1	1	1
Bus Rapid Transit	Bus Rapid Transit	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Light Rail	Light Rail	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

Data Source: WSP

SP – Self Powered
P – Powered
O - Owned
S - Shared
PTW – Powered Two Wheeler
DDRT – Digital / Dynamic Demand Responsive Transport

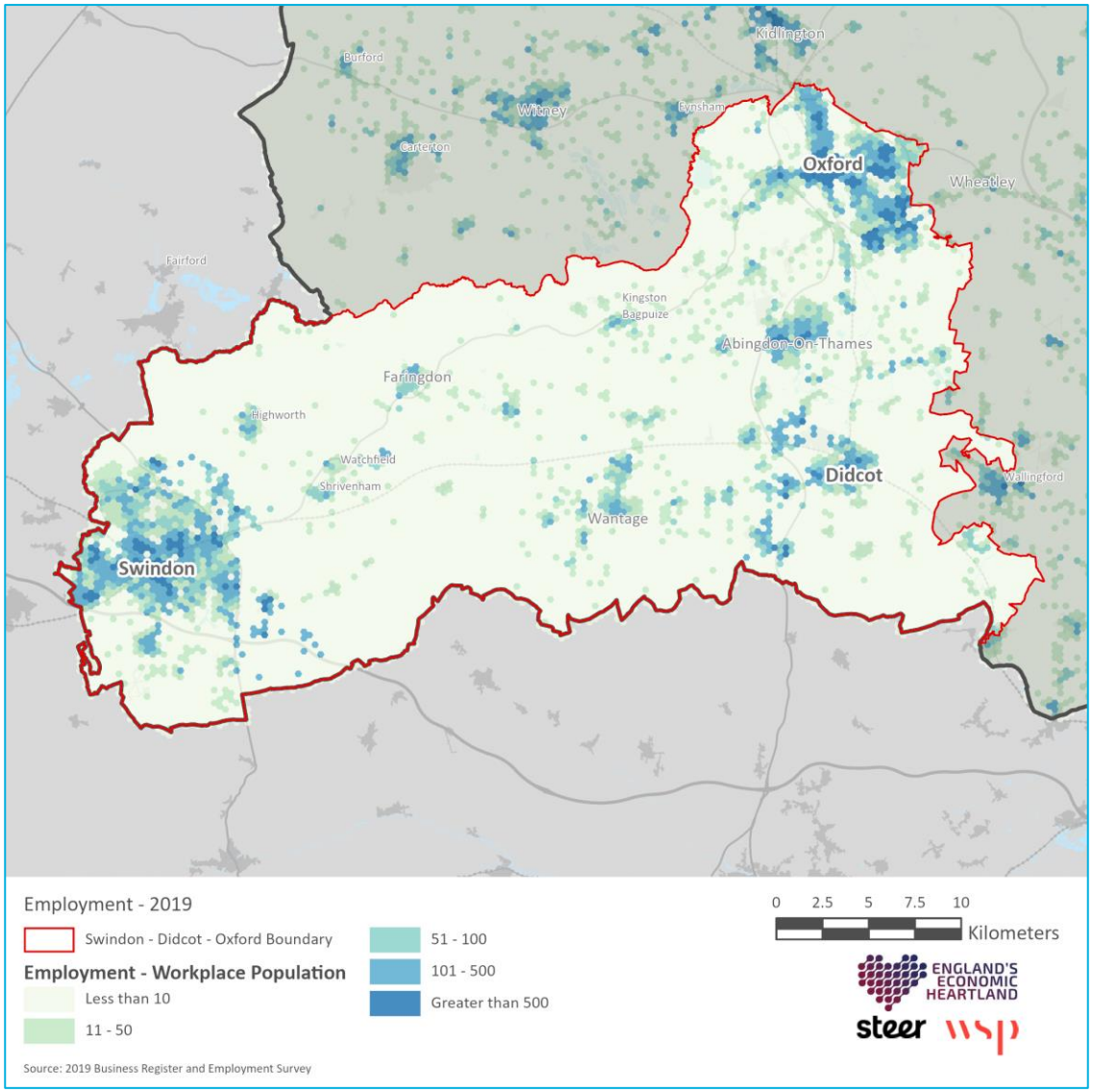
Employment

Data Source: ONS Business Register and Employment Survey 2019

The number of people in employment in the Didcot – Swindon – Oxford study area in 2020 was 315,500. The workplace population is concentrated around Swindon (103,000 people in employment) and Oxford (127,000 people in employment). There are also concentrations of employment in the larger settlements of Abingdon-on-Thames (17,500 people in employment) and Didcot (13,500 people in employment).There are pockets of high employment within more rural areas of the study area (hexcells with more than 500 jobs), including Harwell Science and Innovation Campus. A total of 53,500 people are employed in locations outside of the four Settlements of Strategic Importance (small towns, villages and other rural areas).

Swindon, Oxford and the large rural employment sites such as Harwell Science and Innovation Campus and the Culham Science all have large labour catchment areas. This draws in employees from across the study area resulting in a diverse set of intra-urban and inter-urban movements (as evidenced further on pages 61 and 62). **This results in high levels of car dependency as often active travel is not viable and public transport connections are limited to nearby urban settlements.**

The spatial distribution of jobs across the main towns, villages and rural locations means there is a need for a package of connectivity measures that enables sustainable access within and into the main settlements, but also between the smaller towns and isolated rural employment sites.



2019 Data has been aggregated to a regular tessellated grid of hexagons ("hexcells"). Each hex cell has the same area, allowing the population data within a hex cell to be directly comparable to every other hex cell. Blank areas of the map are characterised by uninhabited hexcells (due to local features, such as a lake, park or field).

Employment

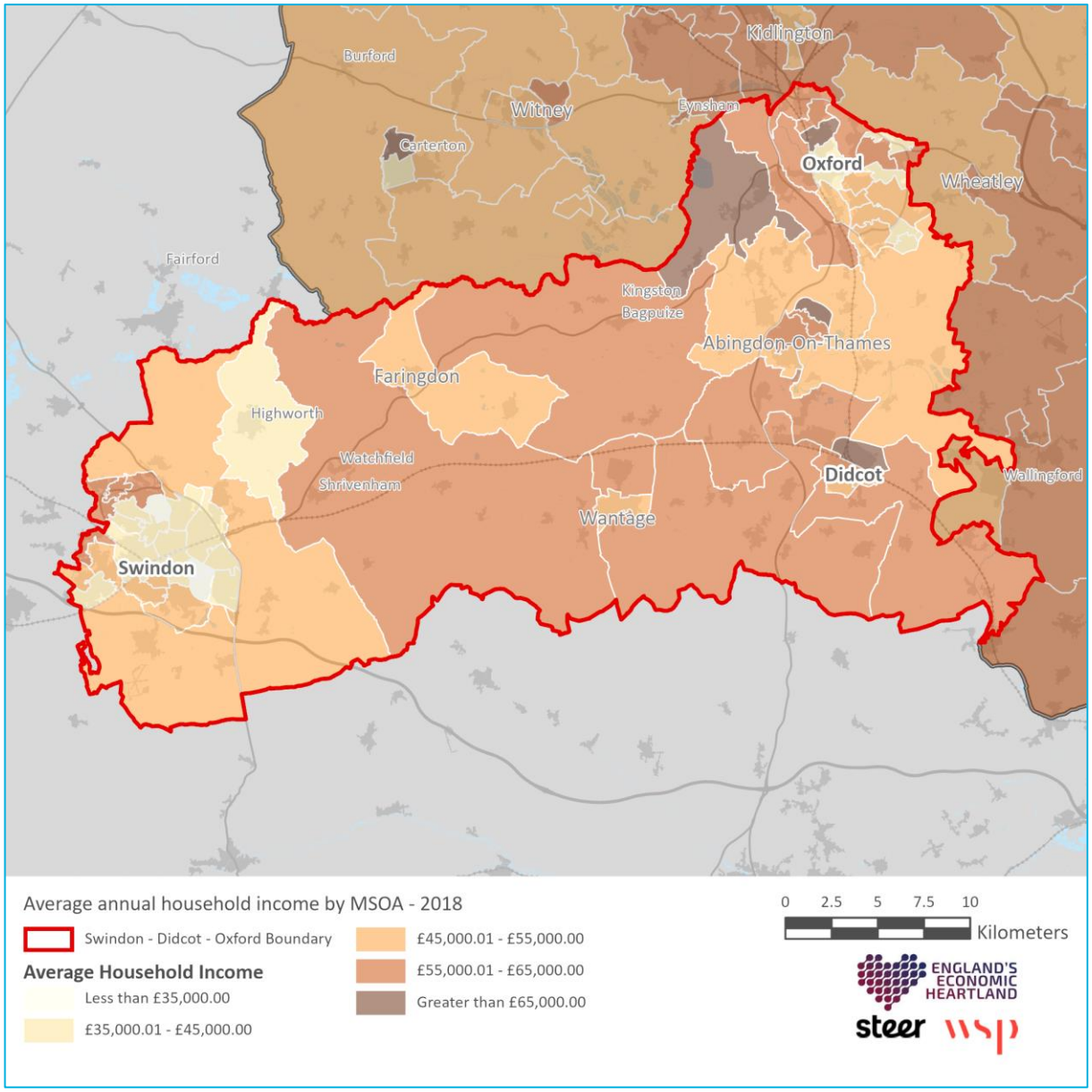
Average Earnings

In 2018 the average household income across all MSOAs the Swindon – Didcot – Oxford study area was £51,000. The plan opposite shows significant variation in household incomes across the study area. Higher average household incomes are generally recorded in rural areas and lower average household incomes are generally recorded in urban areas.

The highest average earnings are recorded in rural villages to the west and north of Oxford and the north of Didcot. The lowest average earnings were recorded in Swindon and south-east Oxford. Low average household earnings were also recorded in and around Highworth to the northeast of Swindon. The difference in average household incomes between Oxford and Swindon is likely to be attributable to the proportion of the population that is economically active. In Swindon, only half of the population is economically active. This compares with 76% of Oxford.

The study area is diverse with a disparity between the north and south of the study area. Improved inter and intra-urban connectivity can play an important role in 'levelling up' the study area by providing improved inclusive and affordable transport links from lower incomes areas to the full range of economic opportunities across the study area. Potential corridors for improvement include: Highworth to Swindon; and Cowley and Headington to Oxford City Centre.

Data Source: Income Estimates for Small areas, England & Wales, Financial year ending 2018



Transport Poverty

Indices of Multiple Deprivation

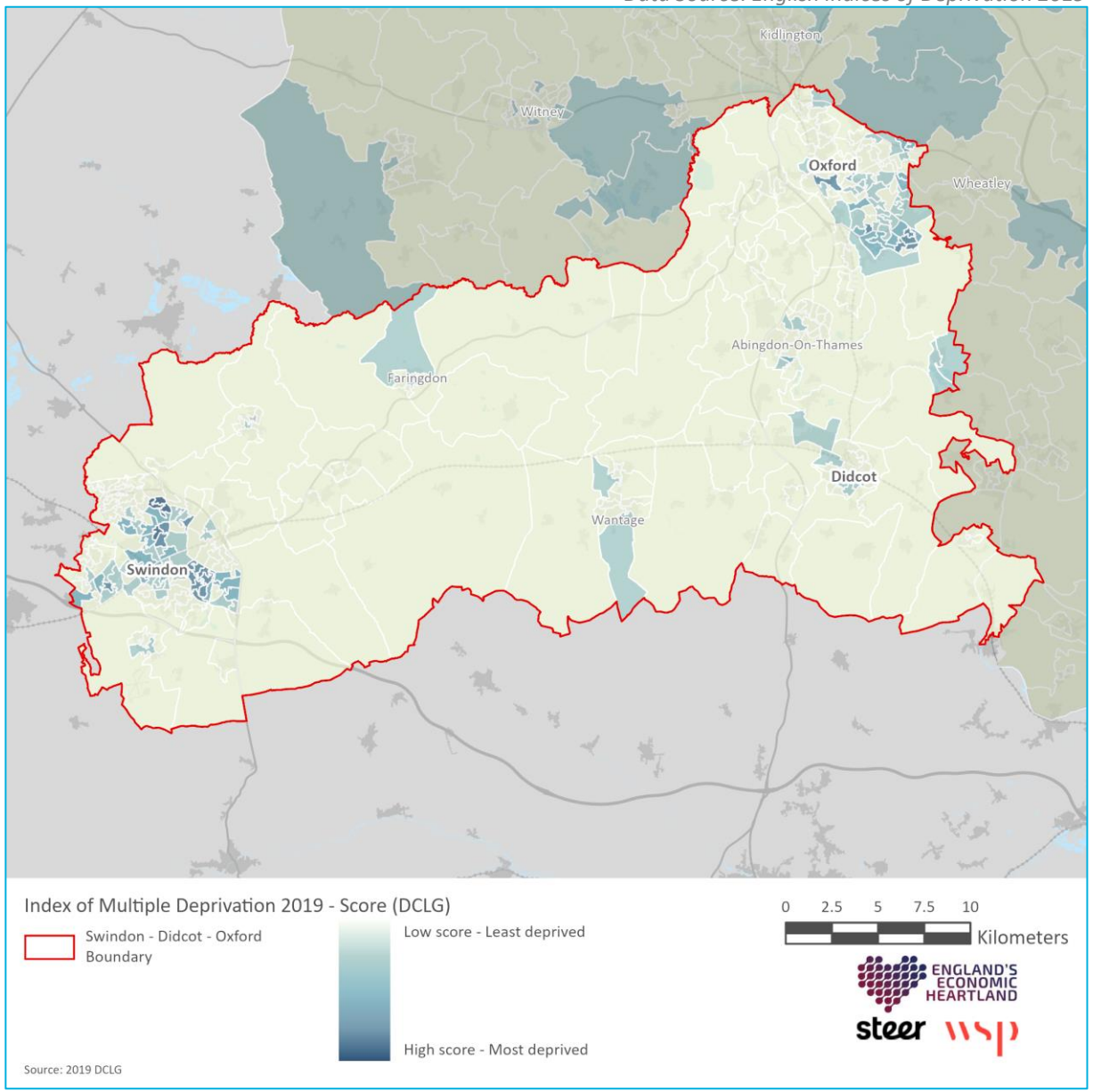
The Indices of Multiple Deprivation (IMD) includes various factors influencing the level of deprivation in an area, including income, employment, education, health, and the living environment. Deciles are calculated by ranking the 32,844 neighbourhoods in England from most deprived to least deprived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

There is a clear urban / rural divide, with rural areas on average having much lower levels of deprivation compared to urban areas. Parts of the corridor experience high levels of deprivation. This includes Swindon and Oxford which both have areas classified as being in the 10% most deprived areas in England .

It is evident that the levels of deprivation vary hugely within the study area, aligning with other socio-economic factors such as average income. In areas of higher deprivation, there is likely to be a higher reliance on public transport and active travel to access jobs and community facilities, with the cost of car ownership disproportionately impacting household budgets.

To support the needs of deprived areas and 'levelling up', residents, workers and visitors need access to high quality active travel and public transport services to provide inclusive and affordable access to local and regional opportunities.

Data Source: English Indices of Deprivation 2019



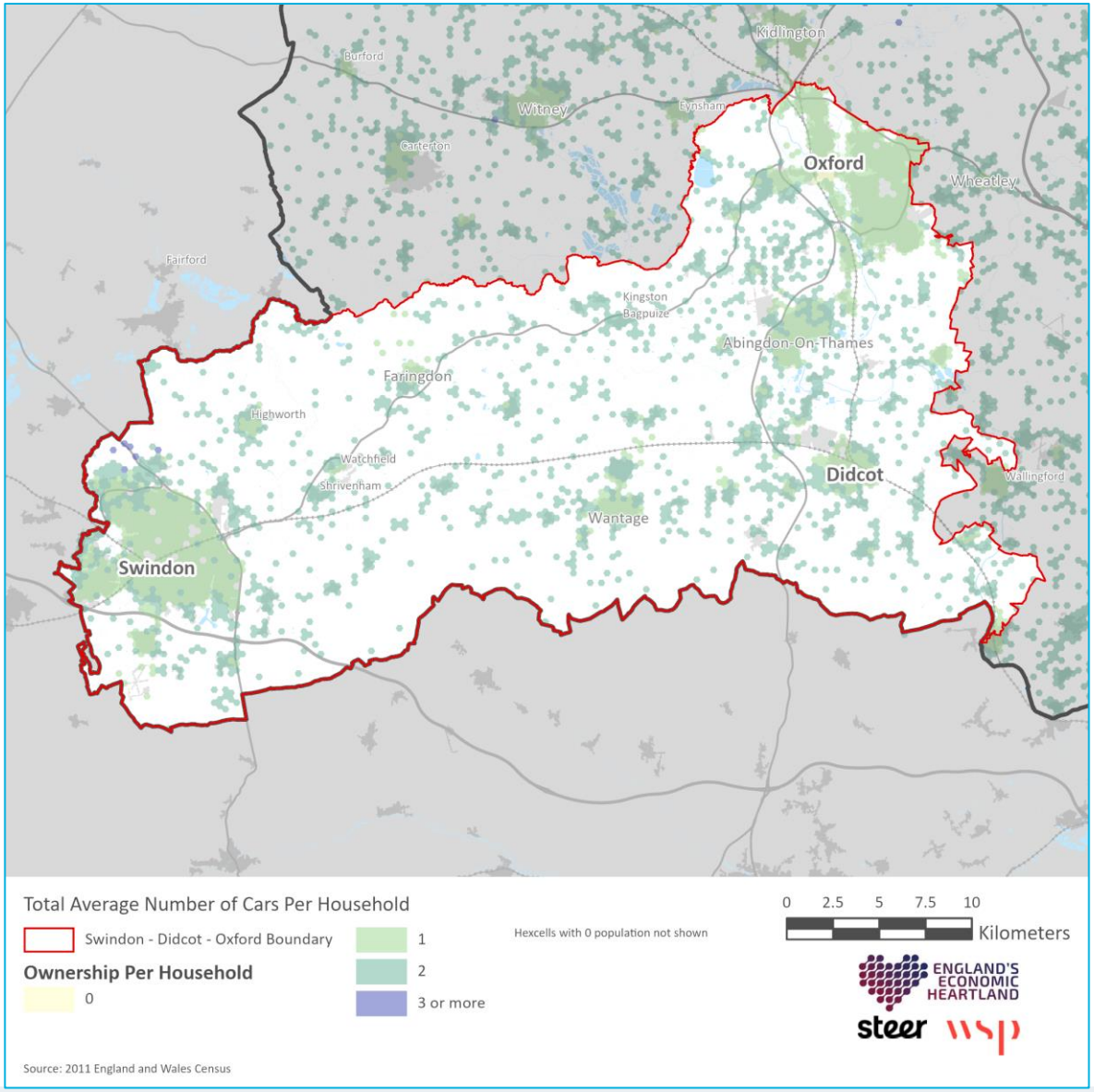
Transport Poverty

Car and Van Availability

Data Source:2011 Census - QS416EW Car or Van Availability

Average car and van availability per household provides an indication of an area's reliance upon the private car for transportation as well its overall economic prosperity. **In 2011 households in the Swindon – Didcot – Oxford study area had access to an average of 1.22 cars or vans.** Average car and van availability per household is generally higher in rural parts of the study area, with average access to 1.57 cars or vans outside of the four largest settlements. Across these four settlements, households had access to an average of 1.14 cars or vans. Of the four Settlements of Strategic Importance, the highest availability of cars and vans per household was recorded in Didcot. On average each household in Didcot has access to 1.41 cars or vans. This is slightly lower than the rural area average. Access to a car or van was lowest in Oxford, average of 0.98 cars or vans per household. This suggests that in Oxford, public and active travel is likely to be preferred mode for a larger proportion of journeys.

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. In order to reduce car usage attractive public transport, shared mobility and active transport options are required. In rural areas of the corridor where these options may not be commercially viable, alternatives such as demand responsive transport, car sharing and car clubs should be explored.



Health & Wellbeing

Health & Disability Decile

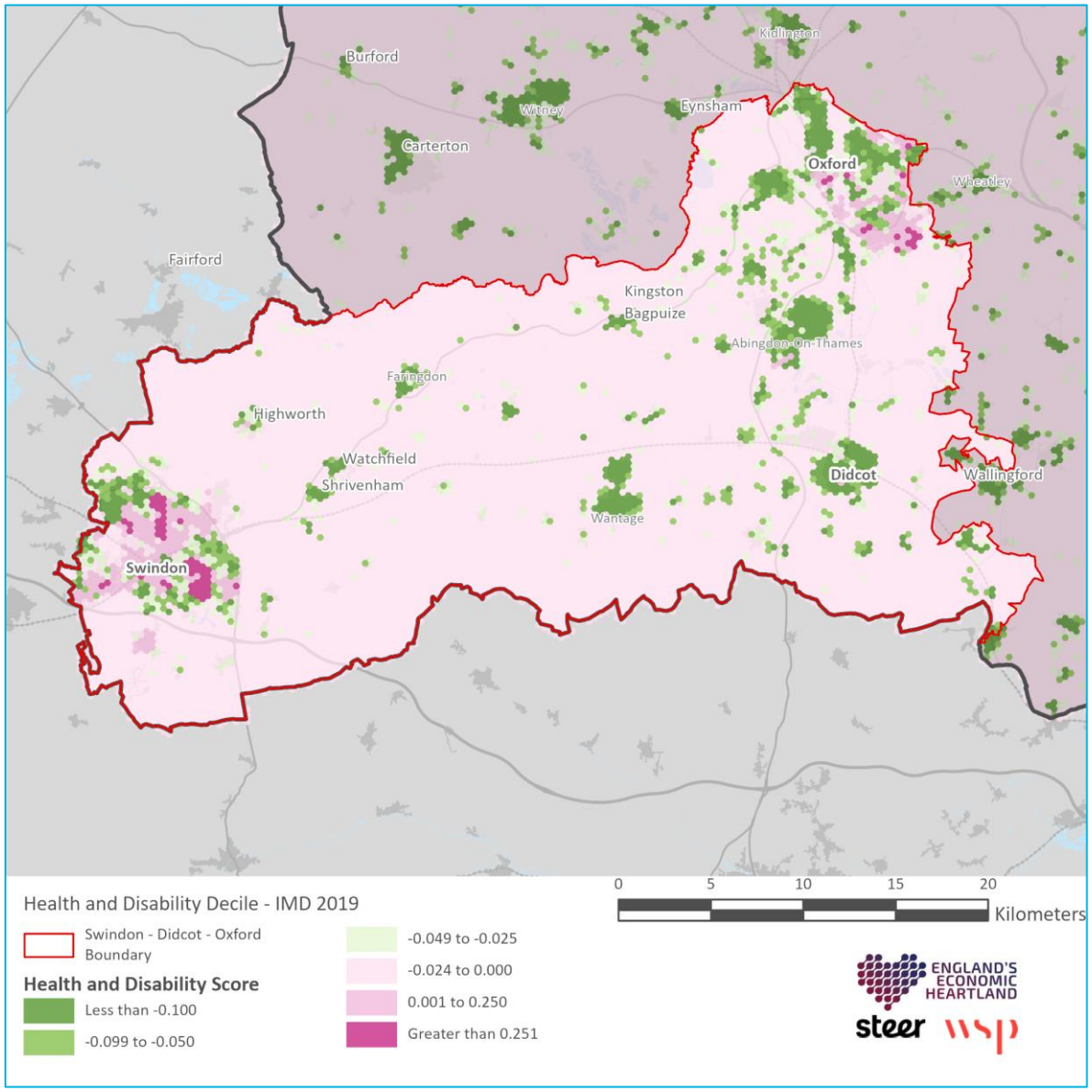
The UK is currently facing a health crisis as a result of growing levels of physical inactivity and poor air quality.

The health and disability decile measures the risk of premature death and the impairment of quality of life through poor physical or mental health. The lowest levels of health and disability deprivation (less than –0.100) were recorded in areas to the north of Oxford, Abingdon-on-Thames, Didcot and north-west Swindon and many rural towns and villages. The highest levels of health and disability deprivation (greater than 0.250) were recorded in south-east Oxford and Swindon.

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 Swindon and south-east Oxford.

To help promote positive health outcomes in areas of high health and disability deprivation (e.g. Swindon and south-east Oxford) 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.

Data Source: English Indices of Deprivation 2019



Health & Wellbeing

Road Safety

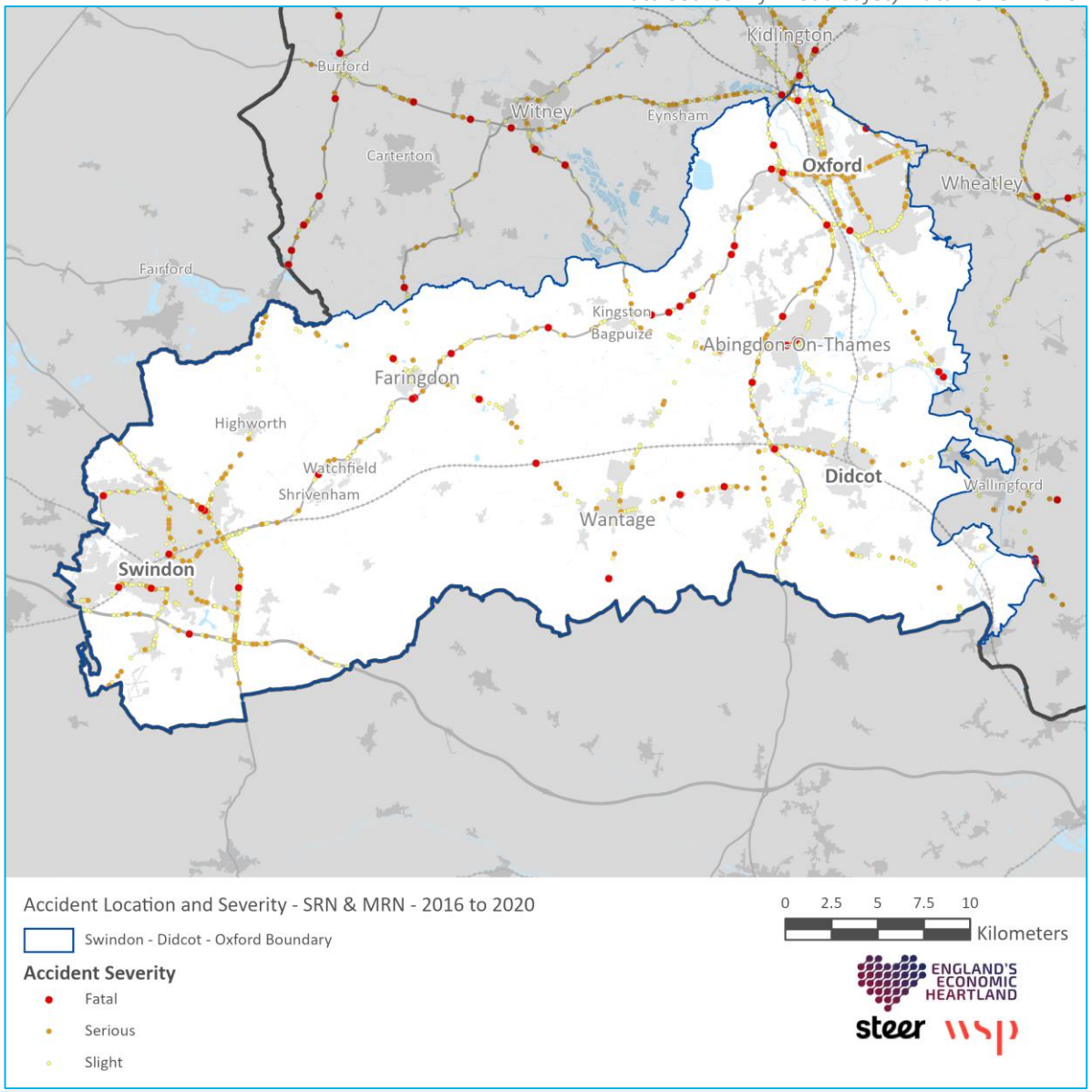
The plan opposite shows the location of personal injury accidents (PIA) recorded on the Strategic Road Network (SRN) and Major Road Network (MRN) between January 2016 and December 2020. Appendix H provides a breakdown of PIAs by mode.

The number of PIAs generally increases around urban areas, with the highest concentration of PIA occurring around settlements such as Oxford, Swindon and Abingdon-on-Thames. A large number of PIAs were recorded along the A420 between Oxford and Faringdon – a rural single carriageway A-road. The high number of PIAs along this route is likely to be attributable to the rural nature of the road, high number of junctions, high speed nature of the road (the road is generally subject to the national speed limit) and absence of street lighting. A high number of fatal severity accidents were recorded on:

- The A420 between Farringdon and Oxford
- The A34 between Abingdon-on-Thames and Didcot

The evidence identifies a number of routes within the study area with high concentrations of fatal and serious severity accidents. To address this, a safe system approach should be adopted. This type of approach recognises that human error is not the singular cause of fatal and serious collisions – instead they result from system failure. A safe system approach considers both driver behaviour and the design of the road system.

Data Source: DfT Road Safety Data 2016 - 2020



Road Safety - HGVs

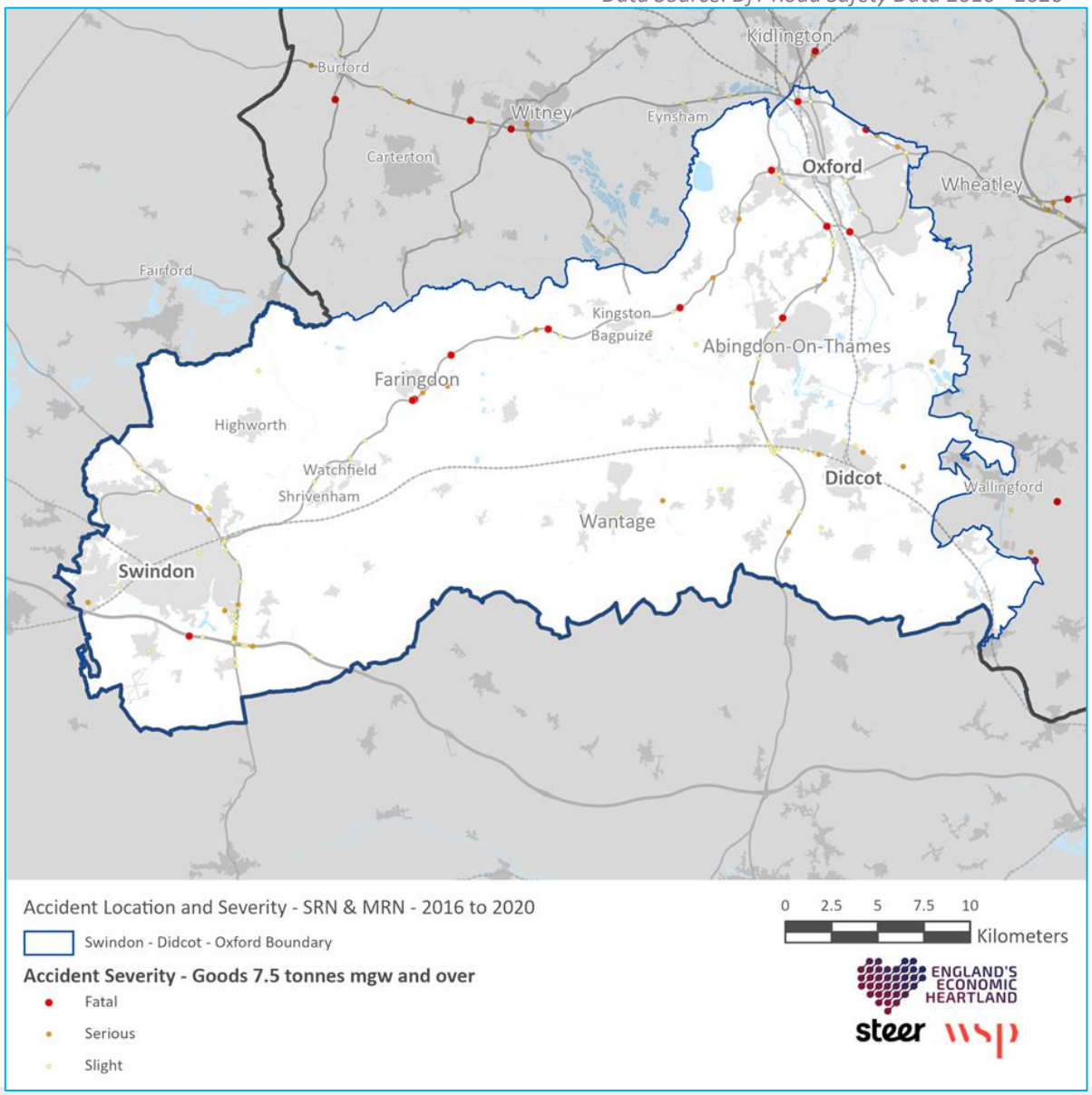
The plan opposite shows the location of personal injury accidents (PIA) recorded on the Strategic Road Network (SRN) and Major Road Network (MRN) between January 2016 and December 2020 that involved HGVs (> 7.5 tonnes).

The plan shows a high number of fatal accidents involving an HGV on the A420 between Swindon and Oxford. The number of PIA s recorded along this link is considerably higher than other A-roads in the study area.

The high number of fatal accidents is likely to be attributable to the design characteristics of the A420, a rural single carriageway A-road which has a large number of side junctions, and the high proportion of HGV traffic that uses this route (discussed further in Section 2c Connectivity).

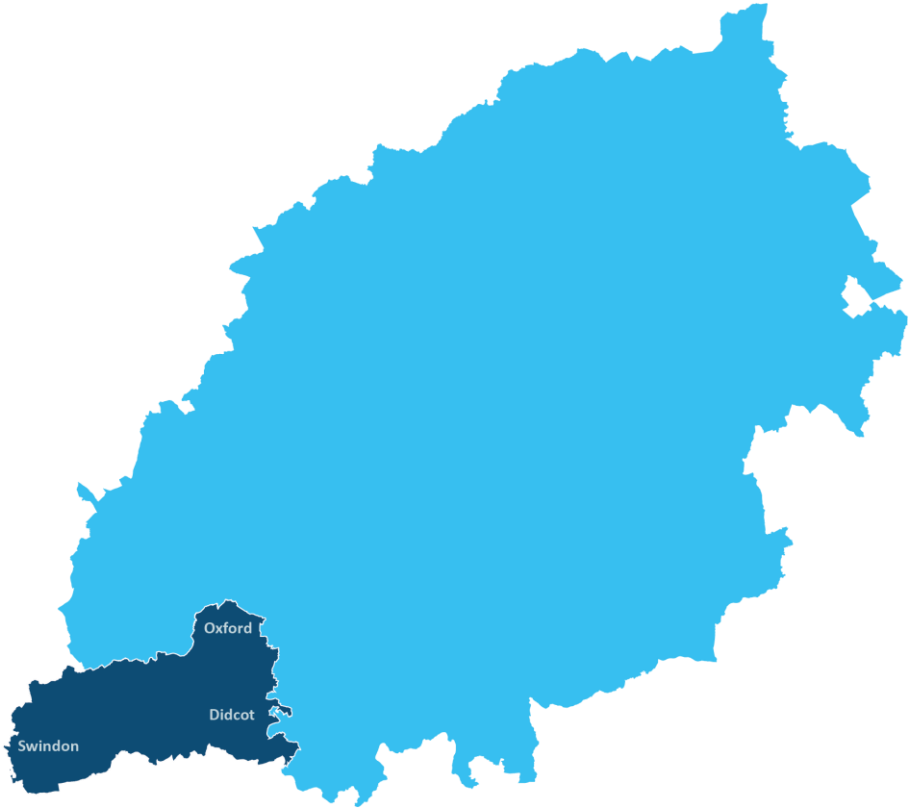
This information will help with the identification of interventions that specifically target a reduction in fatal and serious accidents involving HGVs along the A420. It may be necessary for road safety initiatives to be combined with other HGV demand management measures that directs strategic traffic travelling between Oxford and Swindon by other more appropriate routes (e.g. the A43 and M4).

Data Source: DfT Road Safety Data 2016 - 2020



Summary

Theme	Issues & Opportunities
 POPULATION	**Issues** • **Spatial distribution –** the existing population is predominantly found in the large town of Swindon; Oxford, the study area's only city; and the medium size towns of Abingdon-on-Thames and Didcot. The distribution of the population generates a diverse range of inter-urban and rural-urban movements as residents seek to access employment areas and services within the study area. **Opportunities** • **Population levels –** with a total population of approximately 550,000 people, there is a large residential population that will directly benefit from enhanced connectivity within the study area.
 COMMUNITY	**Issues** • **Social Diversity -** the study area includes a diverse range of personas, each of which can have different propensities to take-up mobility solutions. **Opportunities** • **Inclusive Transport –** there is an opportunity to implement packages of multi-modal transport interventions targeted to specific communities, including low-cost active travel solutions / infrastructure in lower income areas like Swindon and Oxford.
 EMPLOYMENT	**Issues** • **Income disparity –** there is a clear disparity in average earnings between the east and west of the study area. Average earnings of residents living in Swindon are lower than the average earnings of residents living in Didcot, Abingdon-on-Thames and north/west Oxford. Rural areas generally have higher average earnings that urban areas. **Opportunities** • **Inclusive Transport -** improved intra and inter-urban transport links in the study area should provide for better opportunities for lower income groups to access the full range of jobs, education and key services across the study area.
 DEPRIVATION	**Issues** • **Car availability –** car availability in the study area is high, particularly in more rural areas to the north of Swindon. High car dependency leads to congestion, air quality issues and fuel poverty for low income groups in small and medium size settlements such as Wantage and Farringdon who, due to the lack of alternative travel options, are reliant upon the car to access jobs and services. **Opportunities** • **Levelling up –** improved transport connectivity between areas of high and low income can help residents living in lower income areas access employment opportunities and everyday services and facilities.
 HEALTH & WELLBEING	**Issues** • **Deprivation –** the study area has a diverse range of health deprivation, with high levels of health and disability deprivation found in predominantly urban areas of the corridor including both Swindon and Oxford, indicating factors which contribute to national public health issues. **Opportunities** • **Healthy Movement –** intra-urban active travel connectivity, particularly in Swindon and Oxford, may help to address high levels of health and disability deprivation by encouraging the use of walking and cycling for short and medium distance journeys.



Part 2b

Place

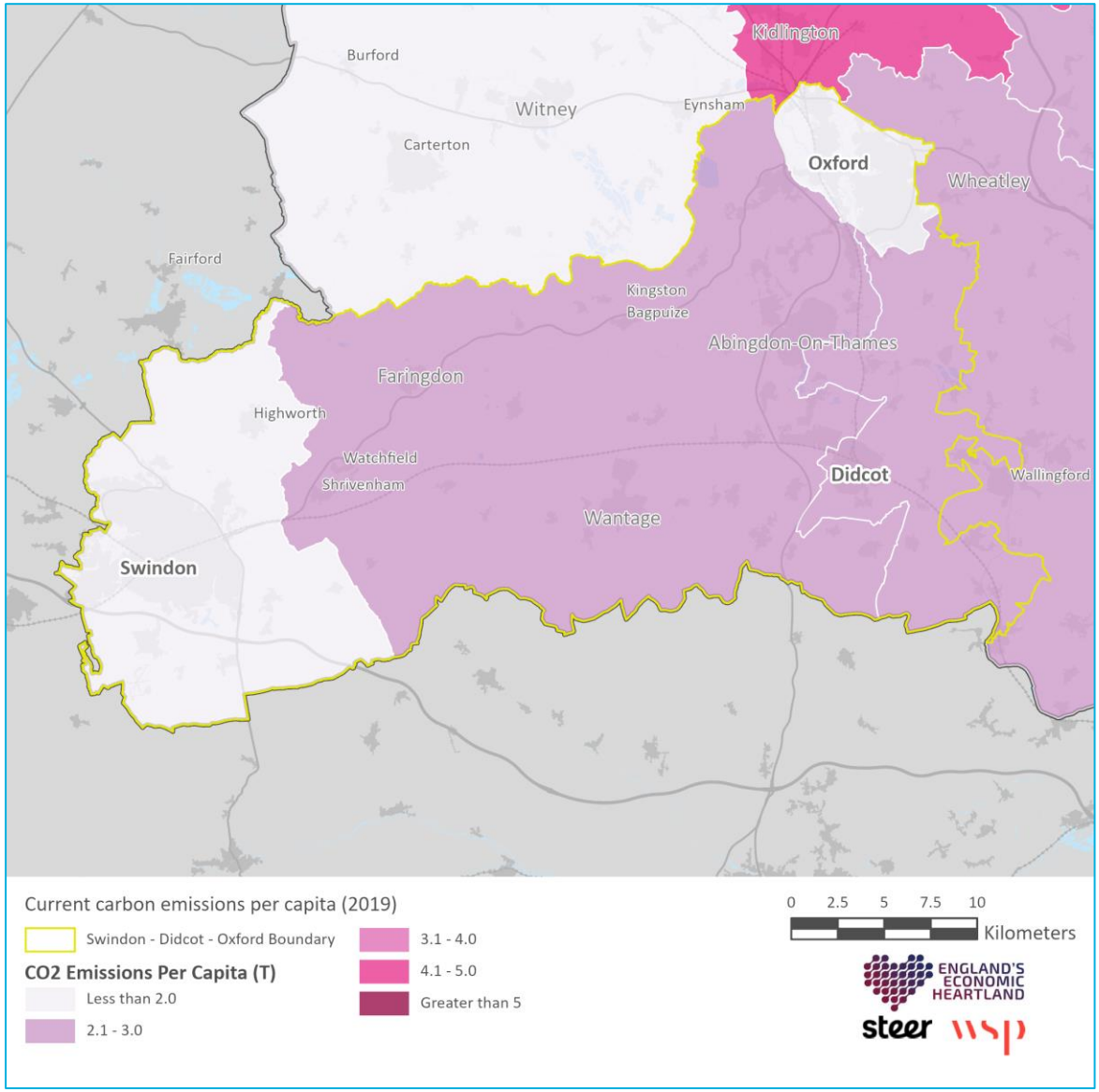
Environment

To address the UK's Greenhouse Gas (GHG) emissions the Government set a legally binding target to reach net zero carbon emissions by 2050, with a reduction of 78% by 2035. **In 2019, the total amount of CO_2 (Carbon Dioxide) emissions from transport[1] by local authorities in the study area was 1,594 kT, equating to 43% of all the CO_2 emissions within the EEH region.**

In 2019 the average transport carbon emission per capita within the study area was 2.09 Tonnes. This compares with an average of 1.86 Tonnes for the UK as a whole and an average of 2.41 Tonnes for the EEH. Areas that recorded above average carbon emissions per capita include South Oxfordshire and Vale of White Horse. It should be noted that these areas do include a high density of Strategic Road Network and associated vehicle trips passing across the study area, contributing to carbon emissions. The urban areas of Oxford and Swindon have lower than average carbon emissions per capita, with Oxford having the lowest (0.85 Tonnes), due mostly to higher active travel.

There is a need to address high transport carbon emissions. This is a substantial challenge outside Oxford and Swindon where the spatial geography is predominately lower density towns and rural villages where emissions per capita will be high. The high streets and market places of smaller settlements (Wantage, Faringdon, Highworth, Wallingford) are dominated by car parking and vehicle movement which negatively impacts them and emphasises the wider benefits of facilitating travel by alternative modes. Interventions must focus on reducing the need to travel, enabling behaviour change to active and sustainable modes of travel and finally switching residual private vehicle trips to alternative fuels.

Data Source: UK Local Authority and Regional Carbon Dioxide Emissions 2019



[1] *Transport refers to the transport system as a whole and includes carbon emissions from diesel railways, road transport (A roads), road transport (minor roads), road transport (motorways) and transport other. It should be noted carbon emissions from international aviation and shipping are not included. However domestic aviation (i.e. flights taking off and landing within the UK) and shipping are included.*

Environment

Flood Risk

Parts of the study area fall into Flood Zone 2 (1 in 1,000 or greater annual probability of flooding) or Flood Zone 3 (1 in 100 or greater annual probability of flooding).

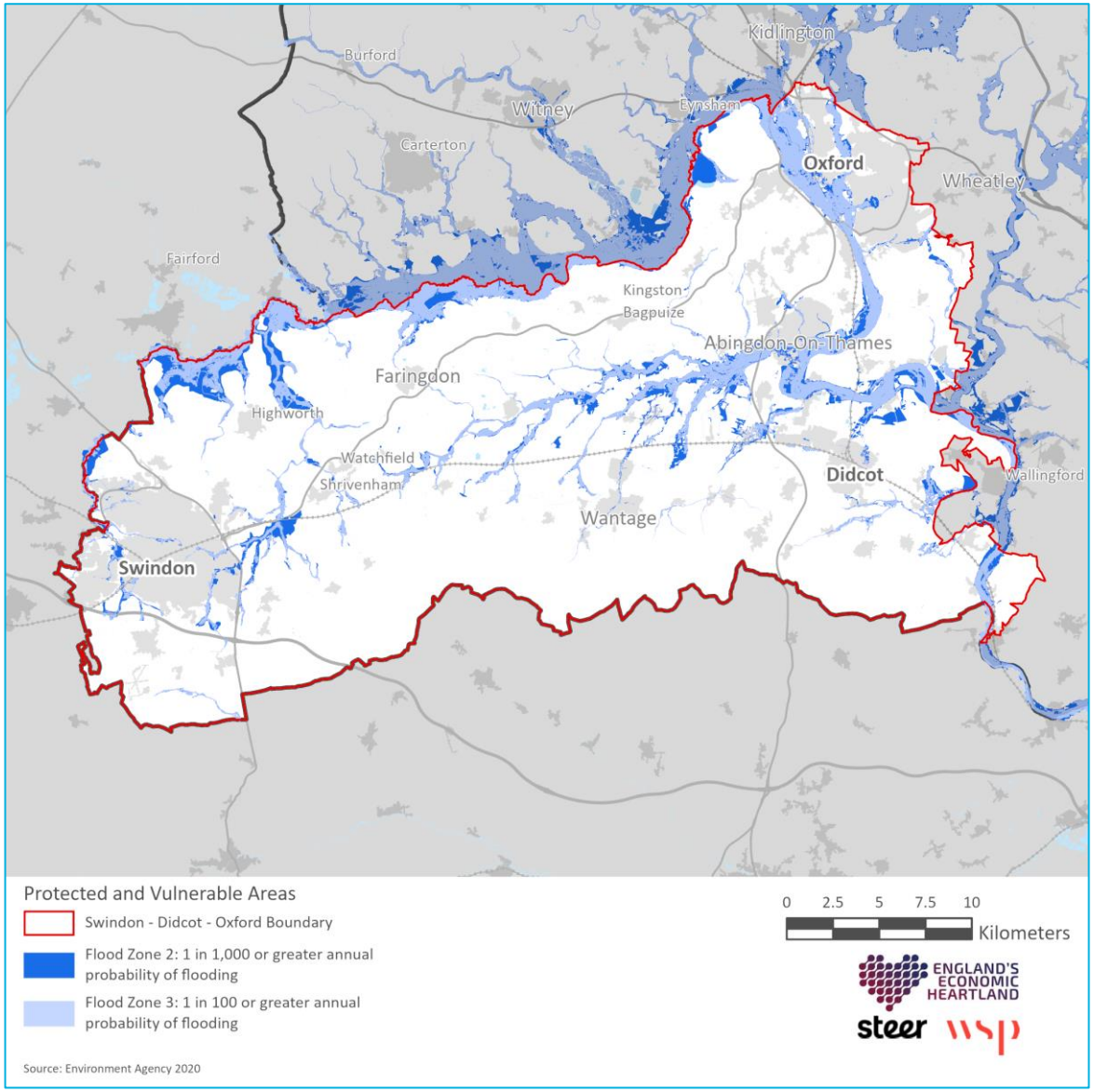
The northern part of the study area, especially the land surrounding Oxford along the River Thames is very susceptible to flooding and is predominantly categorised as a Flood Zone 3.

The River Thames is the main river that runs through the study area. It runs through Abingdon-on-Thames and Oxford, causing most of the West of Oxford to fall within Flood Zone 3.

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

The delivery of large-scale connectivity improvements including the A34 around Oxford may be challenging due the potential for flood risk events. An awareness of the impact of climate change is also needed to ensure interventions are future proofed from severe weather events. Planned infrastructure will also need to work around planned flood defense / mitigation plans.

Data Source: Environmental Agency



Environment

Landscape

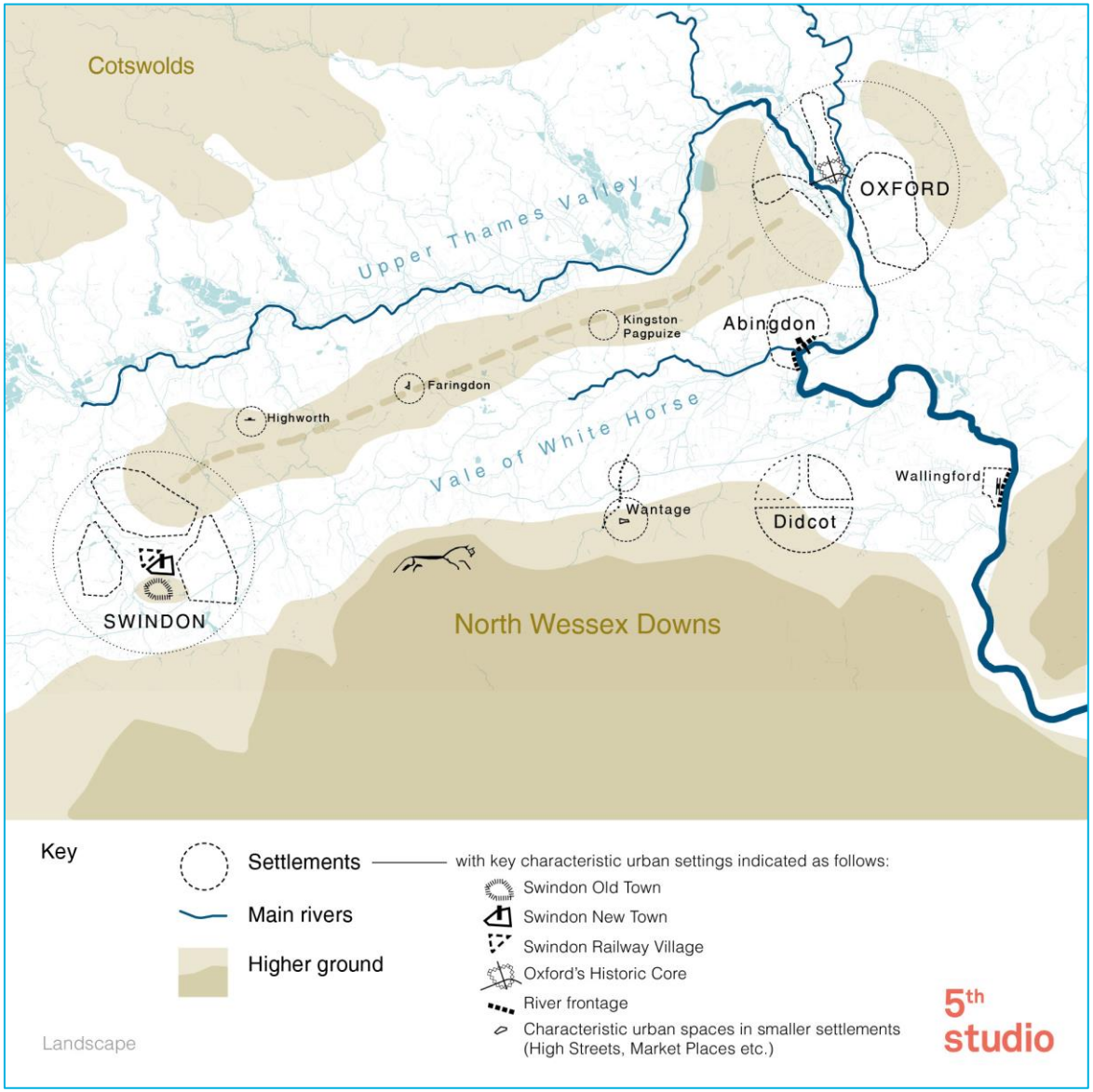
The study area is dominated by the broad clay vale that lies between the Cotswolds to the north and the sparsely populated chalk hills of the Marlborough, Lambourn and Berkshire Downs to the south. Running through the centre of this vale is a ridge, separating the valley of the Thames to the north, from the Vale of White Horse – drained by the River Ock - to the south. The ridge itself accommodates a string of small settlements along a ridgeway route (that has become the A420) between Swindon and Oxford.

At Oxford the continuity of the ridge is interrupted by the Thames where it turns south, flowing towards the Goring Gap, creating the narrow corridor that compresses the city, the floodplain, and key north south road and rail routes between the higher ground to the east and west.

By contrast, Swindon is located at the relatively level landscape at the watershed between the headwaters of the Thames and the Avon. From its nucleus in Old Swindon, atop its hill, the spatial configuration of the town was driven first by the infrastructure of the canals and railway, and later, from the 1950s, by the auto-focused suburban planning of dual carriageway distributor roads and housing estates.

The evidence shows geology to vary across the study area. It is therefore important that geological conditions are considered when identifying and developing new largescale infrastructure.

Data Source: 5th Studio research



Environment

Other protected areas

Heritage

In total, there are 261 Grade I listed buildings and 4,973 listed buildings within the study area. A large proportion of listed buildings are situated in urban areas renown for world heritage such as Oxford.

Ecology

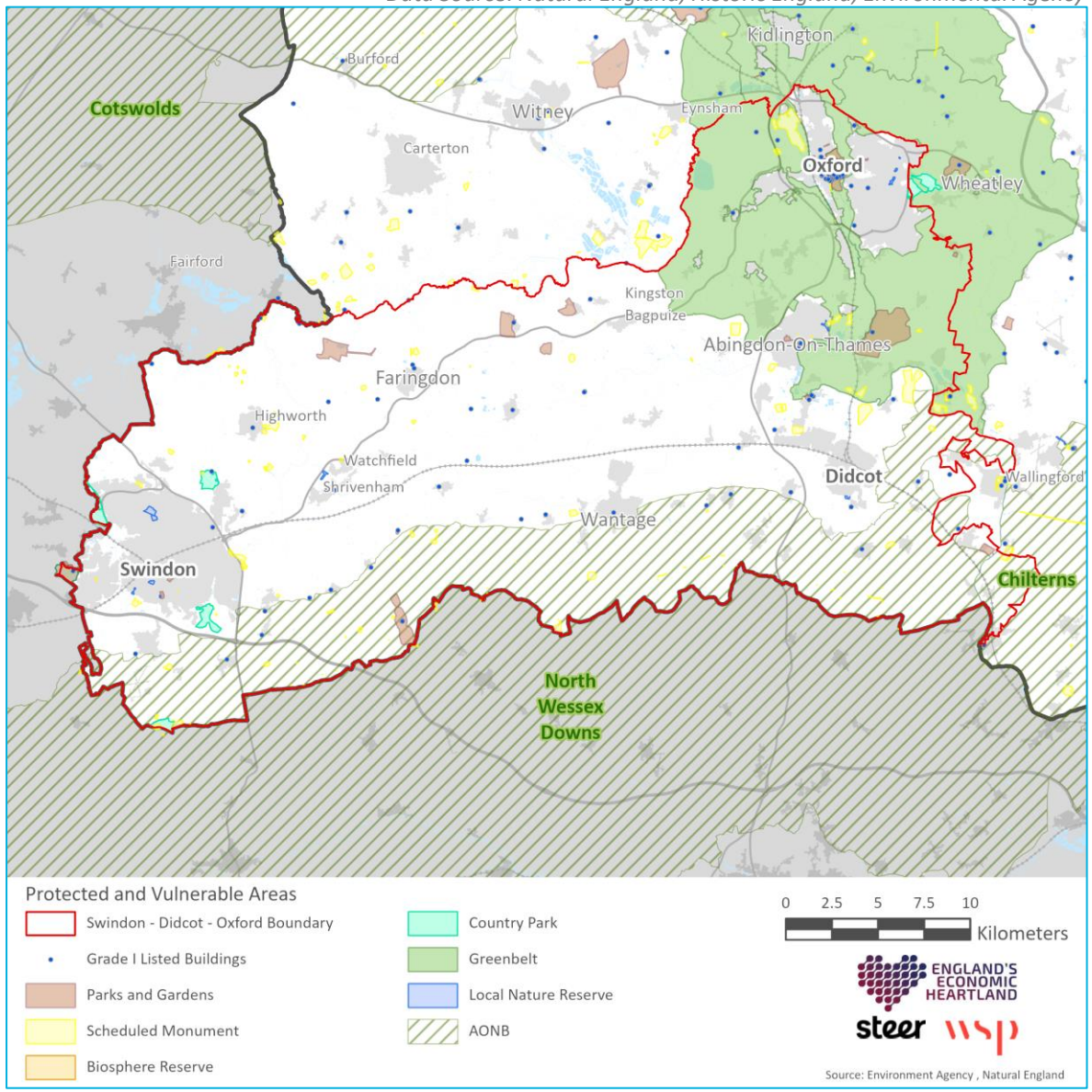
There are several parks and gardens in the study area, including Buscot Park, Culham Park and Christ Church Garden. There are also several country parks on the edge of Swindon.

Green Belt

A large area of Greenbelt surrounds Oxford. This has a substantial influence on the location of planned growth in Oxfordshire, and the resultant connectivity requirements across the Science Vale.

There are numerous protected areas and other heritage and ecological constraints in the study area. As a result, it may be challenging to deliver new large scale transport infrastructure in certain parts of the study area, particularly within the Oxford Greenbelt. It is important that these constraints are taken into consideration at the option identification stage.

Data Source: Natural England, Historic England, Environmental Agency



Environment

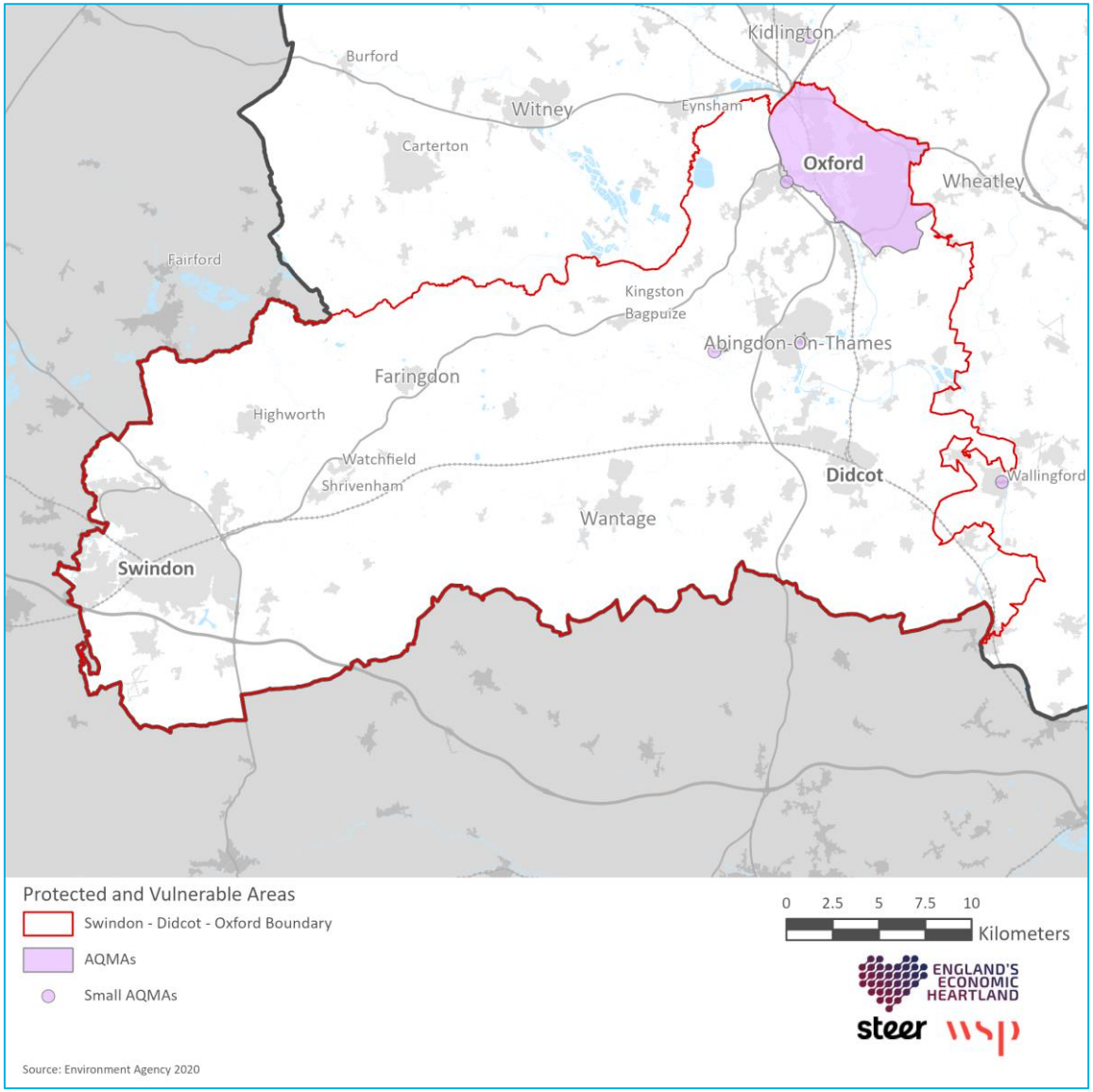
Air Quality

In 2019 total CO^2 emissions in the EEH region stood at 28,827kt, equating to 10% of all emissions in the UK. Additionally, over the last five years CO^2 emissions have fallen at a slower rate than average for the UK – 11% compared to 13% between 2012-2017.

Areas of poor air quality can be identified from the location of Air Quality Management Area (AQMAs), which are typically located where large inter-urban corridors and strategic roads pass through urban areas (for example, West Oxford at Botley Interchange, where the A420 intersects the A34). The largest AQMA in the study area is 'The City of Oxford', established in 2010 due to an excessive annual mean of nitrogen dioxide (NO_2). There are also several small AQMA's in Abingdon-on-Thames, especially in the town centre. The other small AQMA in the study area is located in Marcham.

The establishment of AQMA highlights the severity of air quality issues in the study area. To address this, interventions particularly in existing AQMA areas, must further promote low carbon transport solutions including modal shift to active and sustainable modes, the uptake of alternative fuel vehicles including private vehicles, freight, buses and taxis and the consideration of fiscal measures and zoning to ban polluting vehicles from urban centres.

Data Source: DEFRA AQMAs (2020)



Economy

Housing Affordability

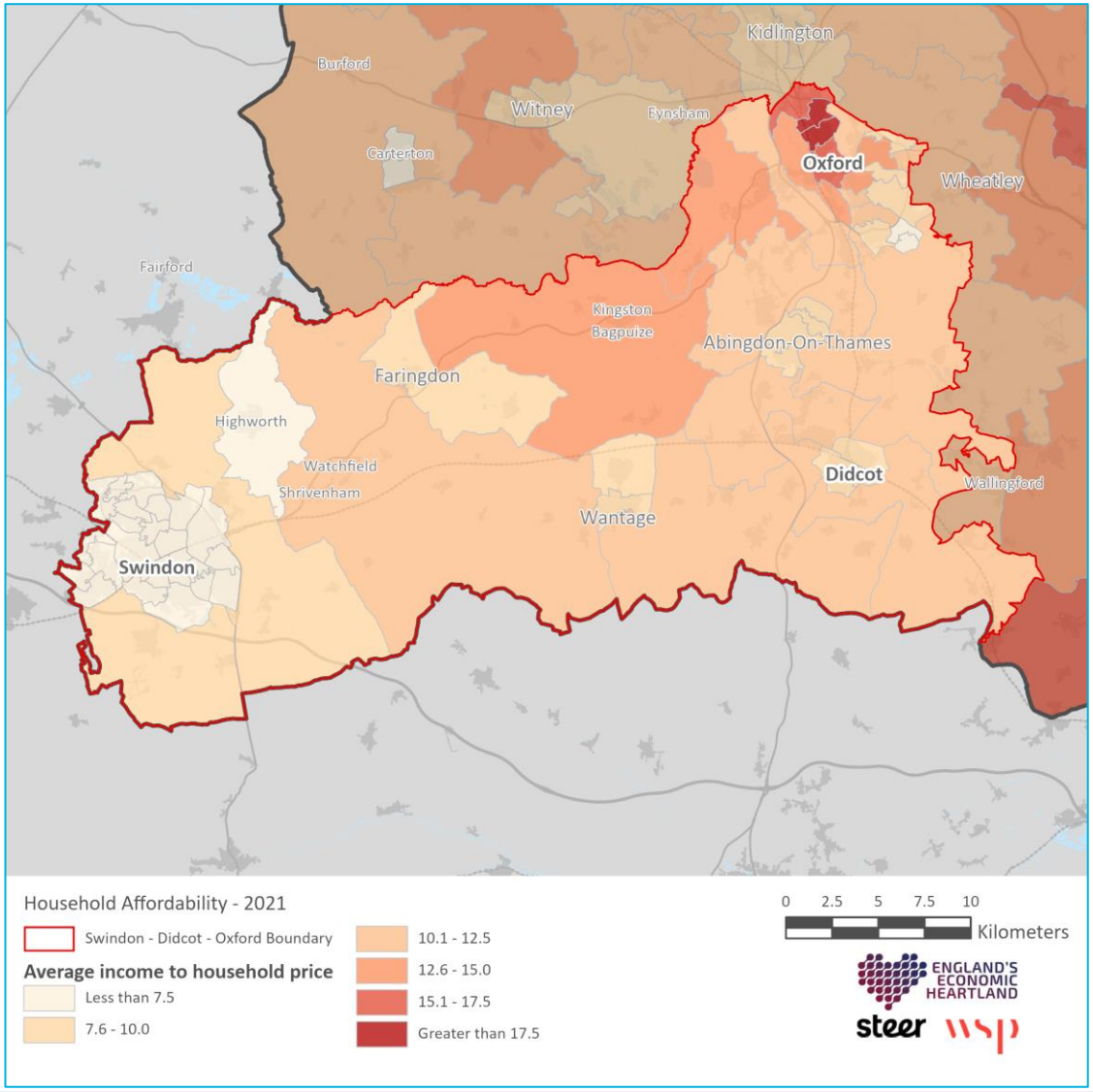
In 2021, the average house price in the Swindon – Didcot – Oxford study area was £375,800, while the national average household income in the financial year ending 2021 was £37,600, resulting in a study area affordability ratio of 10. There is noticeable north-south disparity in the study area, with Oxford and the north of the study area being much less affordable than the south, centre and west of the study area.

Across the city of Oxford as a whole, the average house price in 2021 was £470,000, this represents an affordability ratio of 12.5 (a ratio of the average house price to national average household income). However there is a notable cluster of central areas in Oxford with an affordability ratio of greater than 17.5 (locations where the average house price exceeds £658,000).

In comparison, the southern and western areas of the study area (Swindon and Abingdon-on-Thames) are much more affordable, with several areas recording affordability ratios of less than 7.0. The average house price in Swindon in the financial year ending in April 2021 was £234,600, resulting in an affordability ratio of 6.2.

The absence of affordable housing, particularly in Oxford forces lower income households into more affordable settlements. This can result in longer and more car dependent inter-urban movement patterns. To address this, connectivity between areas of high and low affordability must be improved (the north and south). The location of new affordable housing should also be considered.

Data Source: House Price Statistics for Small areas (HPSSAs) – Dataset 2: Median Price Paid by MSOA (2021)



Economy

Industry Split

The EEH region is the heart of UK's academic and commercial research sector. The region is characterised by a unique combination of scientific and cultural assets, resulting in a highly skilled workforce in the areas of innovation and technology.

The industry split across the study area reflects this, as education and health are the largest employers in the study area, followed by accommodation and food service activities. Education is the industry with the highest proportion of jobs at 18%. This is likely due to the study area having Oxford University and Oxford Brookes University situated within the study area boundary.

Prominent industry hubs within the study area include:

- **The University of Oxford**: One of the world leaders in science and technology.
- **The Didcot Enterprise Centre**
- **Southmead Industrial Park**
- **Oxford Science Park**
- **Porton Science Park**: best known for development of life science technologies.
- **Harwell Campus**: a science and innovation district with more than 66 organisations.

To maximise the economic potential of key industries within the study area, interventions should focus on connecting centres of employment, such as Harwell Campus, with a skilled workforce.

Data Source: Business Register and Employment Survey (2020)

Industry	Study Area		EEH Region		England	
	Number	%	Number	%	Number	%
Transport & Storage	14,990	5%	163,320	6%	1,340,000	5%
Education	52,755	18%	268,020	10%	2,313,000	9%
Public Admin & Defence	7,385	2%	72,960	3%	1,082,000	4%
Agriculture, Forestry & Fishing	265	0%	5,320	0%	173,000	1%
Wholesale	7,430	2%	128,780	5%	1,010,000	9%
Health	39,490	13%	297,495	11%	3,394,000	13%
Financial and Insurance	12,510	4%	65,735	3%	912,000	4%
Manufacturing	17,415	6%	188,760	7%	1,998,000	8%
Retail	23,275	8%	224,795	9%	2,397,000	9%
Arts, Entertainment and Recreation	9,700	3%	105,515	4%	1,080,000	4%
Accommodation and Food Service Activities	17,215	6%	159,195	6%	1,844,000	7%
Motor Trades	5,030	2%	55,710	2%	454,000	2%
Mining, Quarrying & Utilities	3,250	1%	26,150	1%	302,000	1%
Property	4,170	1%	41,205	2%	473,000	2%
Construction	13,330	4%	139,985	5%	1,218,000	5%
Business Admin & Support Services	22,070	7%	282,405	11%	2,304,000	9%
Information and Communications	16,785	6%	129,515	5%	1,195,000	5%
Professional, Scientific and Technical Activities	31,740	11%	263,275	10%	2,318,000	9%
TOTAL	**298,805**	**100%**	**2,618,140**	**100%**	**25,807,000**	**100%**

Economy

Gross Value Added (GVA)

The study area is a significant contributor to the success of the EEH region, contributing towards 10% of the region's Gross Value Added in 2018.

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 2018.

In 2018 the study area had a total GVA of £15,570 million. Of this, 13% was associated with the education sector, a proportion significantly higher than the average for EEH region (6%) - demonstrating the importance of education institutions such as the University of Oxford.

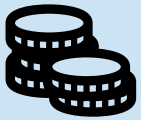
Other sectors that that contributed strongly towards the GVA of the study area included the property sector (13% of GVA in the study area - the same as the average for EEH) and technical activities (12% of the GVA of the study area - higher than the average for EEH). Motor trades and arts, entertainment and recreation had the lowest GVA of all industries in the study area.

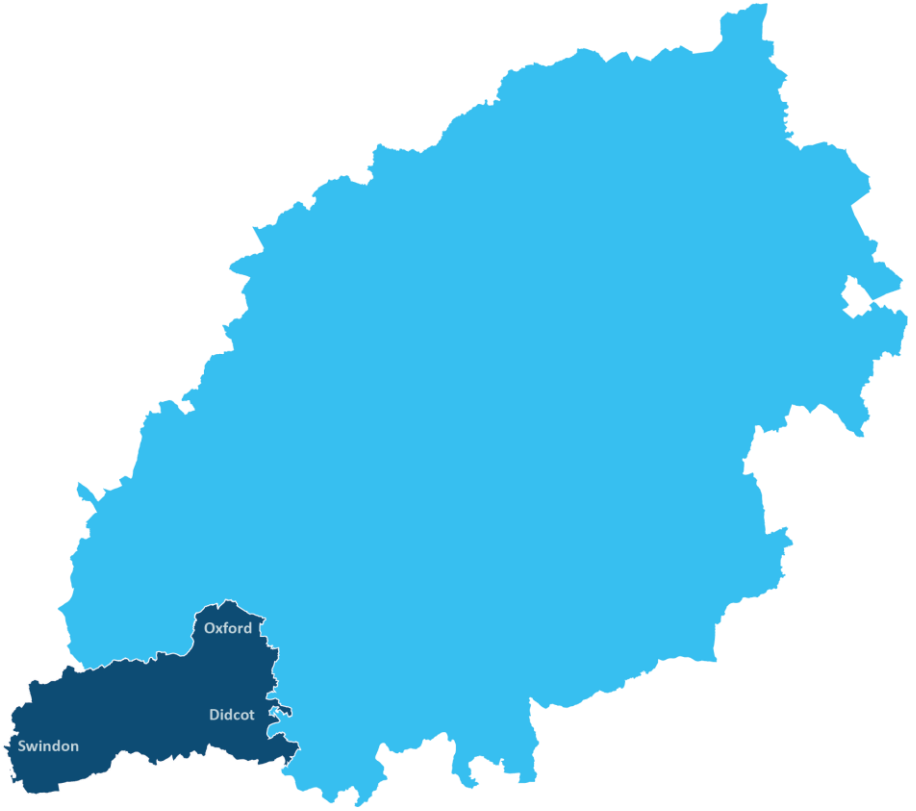
It is important that transport services and infrastructure support the continued growth and expansion of sectors, such as Education, that play a key role in contributing to the success of the EEH region.

Data Source: Office for National Statistics Regional gross value added (balanced) by industry: local authorities by NUTS1 region (2019)

Industry	Study Area		EEH Region		England	
	GVA (£ million)	%	GVA (£ million)	%	GVA (£ million)	%
Transport & Storage	417	3%	6,738	4%	66,260	4%
Education	1,985	13%	10,195	6%	97,787	6%
Public Admin & Defence	631	4%	5,444	3%	74,278	5%
Agriculture, mining, electricity, gas, water and waste	432	3%	5,067	3%	10,748	1%
Wholesale	608	4%	7,811	5%	62,652	4%
Human health and social work activities	1,281	8%	10,538	7%	117,629	7%
Financial and Insurance	230	1%	7,418	5%	148,201	9%
Manufacturing	1,727	11%	16,020	10%	160,570	10%
Retail	603	4%	8,154	5%	82,304	5%
Arts, Entertainment and Recreation	271	2%	2,943	2%	27,767	2%
Accommodation and Food Service Activities	495	3%	3,648	2%	48,623	3%
Motor Trades	223	1%	6,507	4%	28,106	2%
Property	2,072	13%	20,929	13%	230,776	14%
Construction	850	5%	12,171	8%	107,881	7%
Business Admin & Support Services	716	5%	10,158	6%	88,612	6%
Information and Communications	1,179	8%	10,453	7%	112,868	7%
Professional, Scientific and Technical Activities	1,852	12%	13,472	9%	131,581	8%
TOTAL	**15,570**	**100%**	**157,666**	**100%**	**1,596,643**	**100%**

Summary

Theme	Issues & Opportunities
 ECONOMY	**Issues** • **Workforce** – a significant proportion of the study area's jobs are focused in the two main settlements of Oxford and Swindon. Combined, 77% of the study area's workplace population work in these settlements. The study area also includes a number of relatively isolated employment campuses, such as Harwell Campus in the southeast of the corridor. The challenge for employment areas situated outside major urban settlements is how to improve, promote and encourage sustainable travel. • **Inequality** – there is a clear north/south divide within the study area in terms of housing affordability, with Oxford being significantly less affordable than Swindon. For many people working in Oxford housing will be unaffordable, prompting them to live in other more affordable settlements within the corridor. This has the potential to result in longer, car based, inter-urban commuting journeys. • **Opportunities** • **Transport** – the level of high-tech industries within the study area, along with having one of the world's leading science and technology universities in Oxford and Porton and Oxford Science Parks, suggests the study area could be at the forefront for innovative technological transportation solutions. • **Connectivity** – improved transport connectivity along the A420 corridor, particularly by non-car modes, will help improve access to employment opportunities from more affordable locations such as Swindon. Improved inter and intra-urban connectivity could also support more deprived communities by providing better access to job opportunities and everyday services and facilities, helping to 'level-up' the study area.
 ENVIRONMENT	**Issues** • **Air quality** – the largest AQMAs in the study area is in Oxford, with a number of smaller AQMAs set up in and around Abingdon-on-Thames, including one to the west of the A34 – indicating the severity of existing air quality issues in the corridor. CO2 emissions will be harder to reduce in the small towns and rural communities across the study area. • **Flood risk** – numerous locations in the study area are in Flood Zones 2 and 3, notably the west of Oxford and south of Abingdon-on-Thames due to their proximity to the River Thames. These areas are at high risk of flooding which may make the delivery of new infrastructure more challenging. • **Heritage protection** – there are a total of 261 grade I listed buildings in the study area, particularly in Oxford and rural areas in the centre of the study area. There are also a large number of scheduled monuments distributed throughout the corridor. Protected buildings and assets may make the delivery of new infrastructure more challenging. • **Greenbelt** – a large area of Greenbelt surrounds Oxford. This has a substantial influence on the location of planned growth in Oxfordshire. This may result in more medium and long-distance commuting journeys and restrict opportunities to undertake journeys by active travel modes. It may also make the delivery of new infrastructure more challenging. **Opportunities** • **Active travel** – with the Greenbelt surrounding Oxford influencing the spatial distribution of new housing and employment growth in the Science Vale, there are opportunities to link these new settlements via attractive mass transit system and cycling 'greenways'. • **Decarbonisation** – 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. Across the study area there are opportunities to explore the rollout of EV chargepoints.



Part 2c

Connectivity

Networks – Digital Connectivity

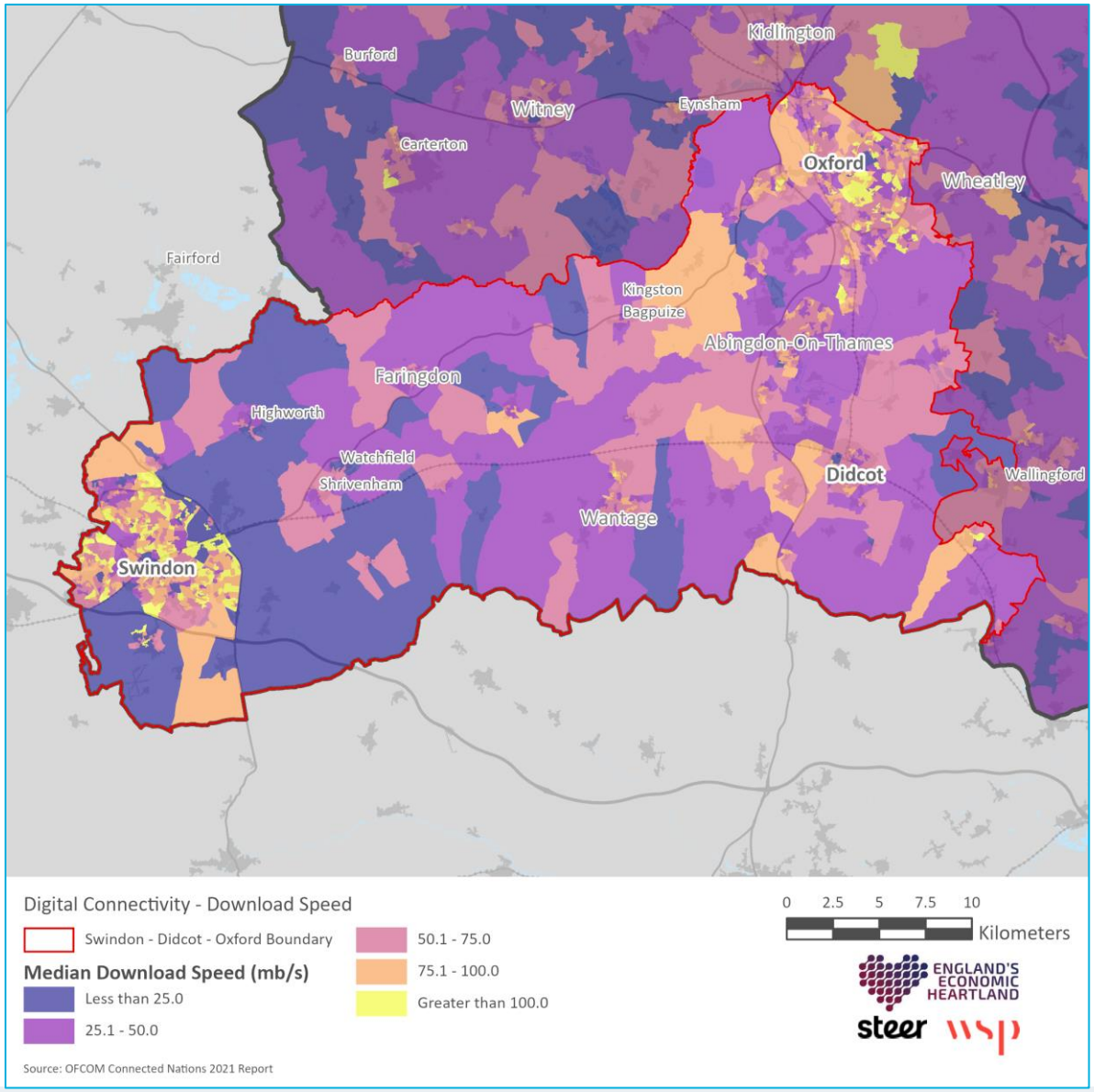
Average Download Speeds

The plan opposite shows the average download speed of LSOAs in the study area. It generally demonstrates an urban / rural split with the highest average download speeds recorded in urban areas (>100 mb/s), notably Oxford and Swindon, and the slowest average download speeds recorded in rural areas to east of Swindon (<25 mb/s). However average download speeds vary significantly in urban areas, with a number of LSOAs in both Swindon and Oxford recording average download speeds of less than 25 mb/s. Further detail on digital connectivity in the study area is provided in **Appendix I**.

EEH's Working From Home Propensity & Capacity Release report (dated July 2021) estimates that if those who used to commute by car and who (as a result of the COVID-19 pandemic) started to work from home were 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.

Improved digital connectivity, particularly in rural areas east of Swindon where the lowest average download speeds are observed, will help facilitate the adoption of agile and hybrid working practices, and in turn, reduce the need to travel. If workers living in rural areas, who usually commute via car, have the capacity to continue hybrid working, there is likely to be a substantial reduction in the number of trips undertaken by car, in turn reduced peak hour traffic.

Data Source: OFCOM Connected Nations 2021 Report Performance Data



Networks – Active Modes

Active Travel Network

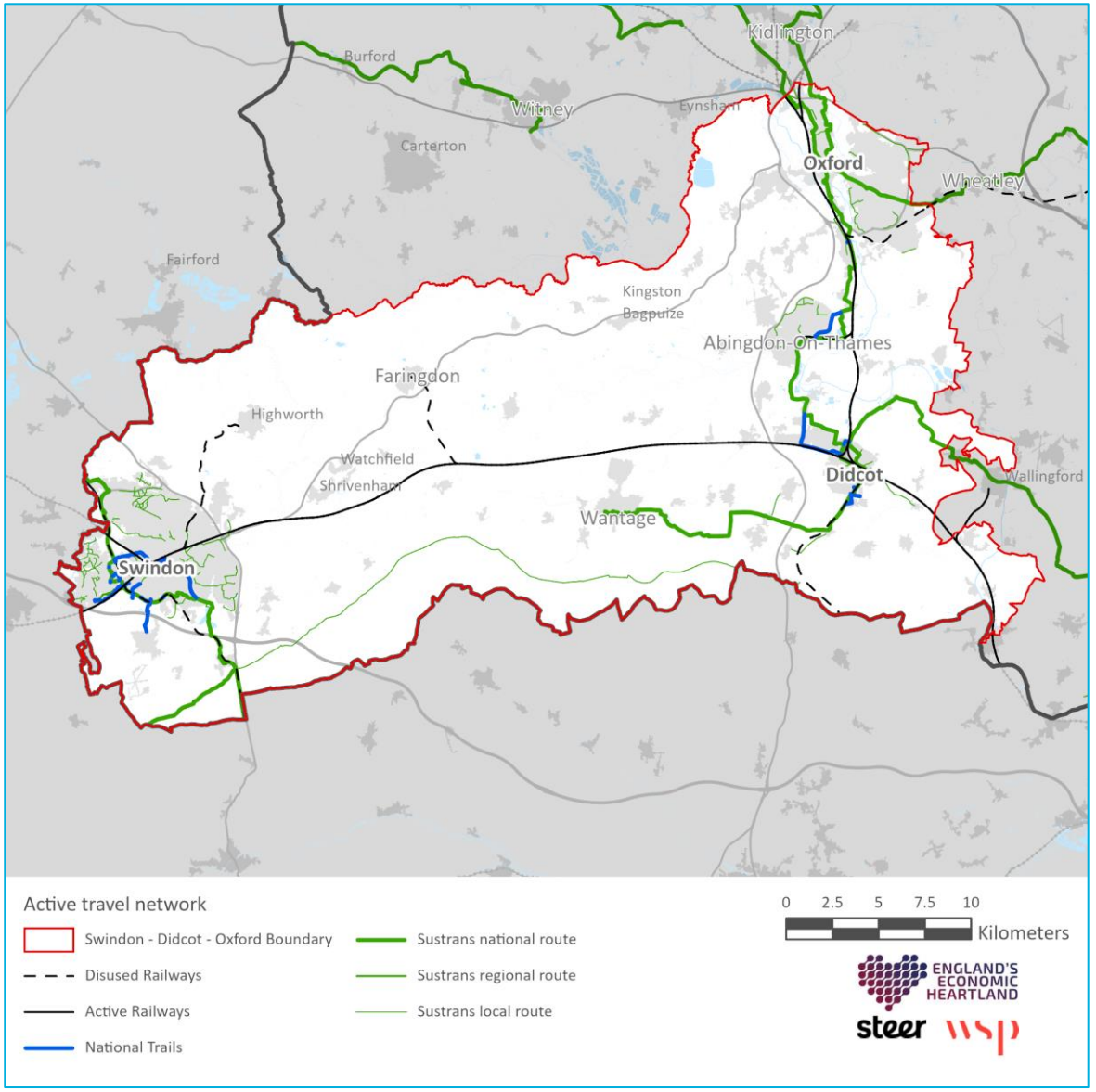
The distribution of active travel infrastructure throughout the study area varies. The plan shows the Sustrans National Cycle Routes and nature trails that route through the study area. These routes provide strategic connectivity between settlements on foot and cycle. The routes comprise of a mix of on-carriageway, segregated and shared-use sections. To improve the active travel network, there are opportunities to convert disused rail lines (Highworth and Faringdon) into active travel routes.

The evidence indicates that there is a lack of strategic active travel infrastructure between Oxford and Swindon. No Sustrans National Cycle Network (NCN) routes connect between the east and west of the study area, this makes active travel difficult for certain interurban movements including between communities along the A420 corridor.

Active Travel connections between Oxford, Abingdon-on-Thames and Didcot exist with Route 5 connecting the urban areas. Route 544 also connects Wantage to the rest of the NCN. **However, many rural areas throughout the study area lack active travel routes for inter-settlement travel.**

It is important that active travel networks provide high quality local connections between residential and employment areas and into rail stations to help facilitate longer-distance sustainable movements. Active travel connectivity between Oxford and Swindon and their surrounding local communities including Highworth, Shrivenham and Botley could increase active travel into the key settlements.

Data Source: SUSTRANS (2022)



Networks – Active Modes

Micro-mobility

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

The shared mobility schemes operating across the study area are listed below:

Oxford:

- Shared Standard Bicycle Scheme offered by Donkey Republic.
- Shared E-Scooter Scheme offered by Voi.

Didcot & Abingdon-on-Thames:

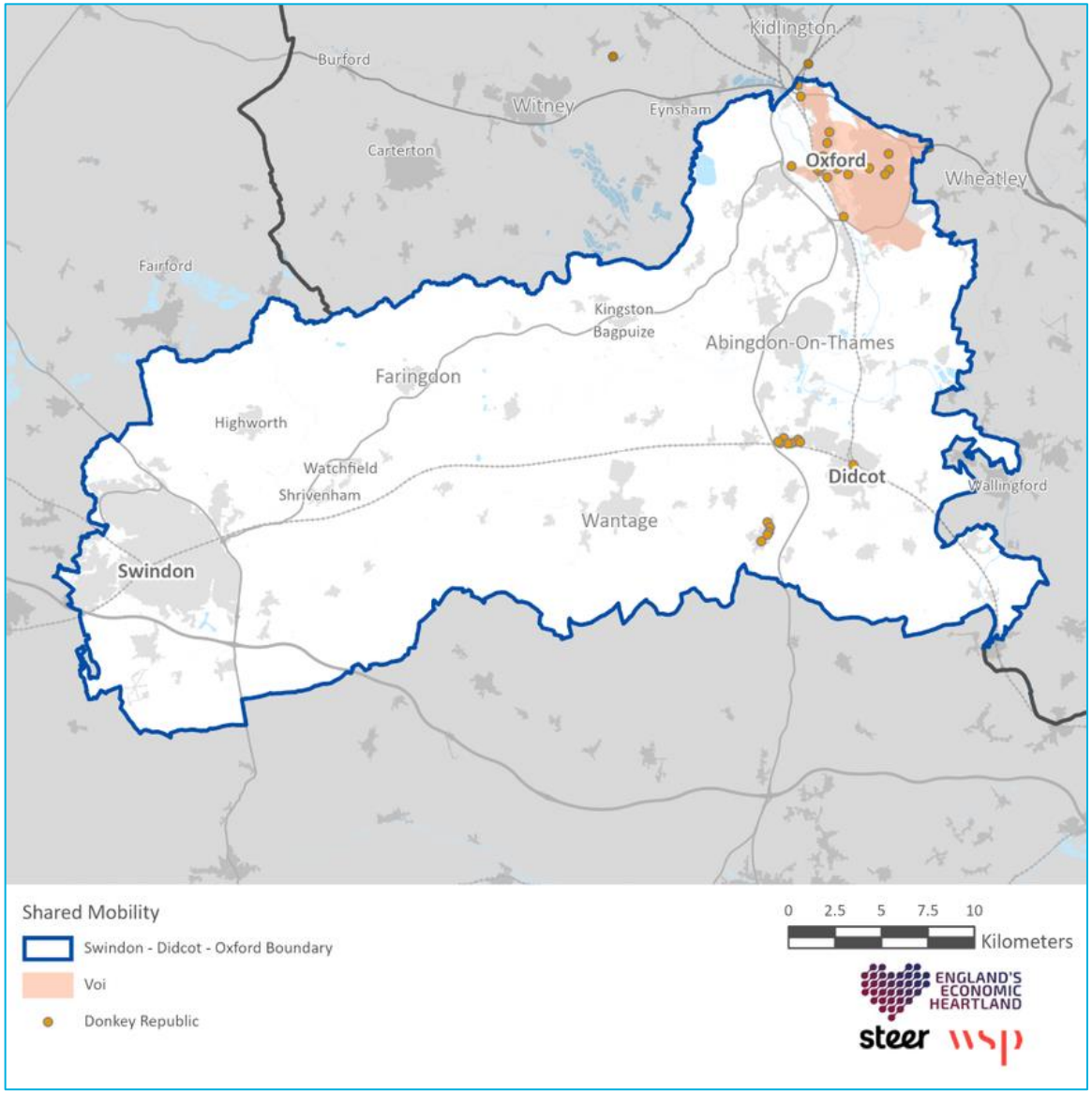
- A shared bicycle scheme run by Donkey Republic operates at Milton Park and Harwell Campus.

Swindon:

- Despite being larger than Oxford, there are no shared micro-mobility schemes established in Swindon.

Micro-mobility solutions can form the first / last mile of a longer journeys undertaken by public transport, thereby supporting a holistic transport network. They can also help to replace short and medium length journeys that would otherwise be undertaken by car. Micro-mobility schemes are more viable in urban areas where there is a critical density that ensures commercial viability. The study should consider shared micro-mobility schemes in Swindon and Abingdon (and surrounding settlements) where there are opportunities to provide access last mile access to a wide range of opportunities and existing rail stations.

Data Source: Voi, Donkey Republic, BikeSharingWorldMap (2022)



Cycling Propensity

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

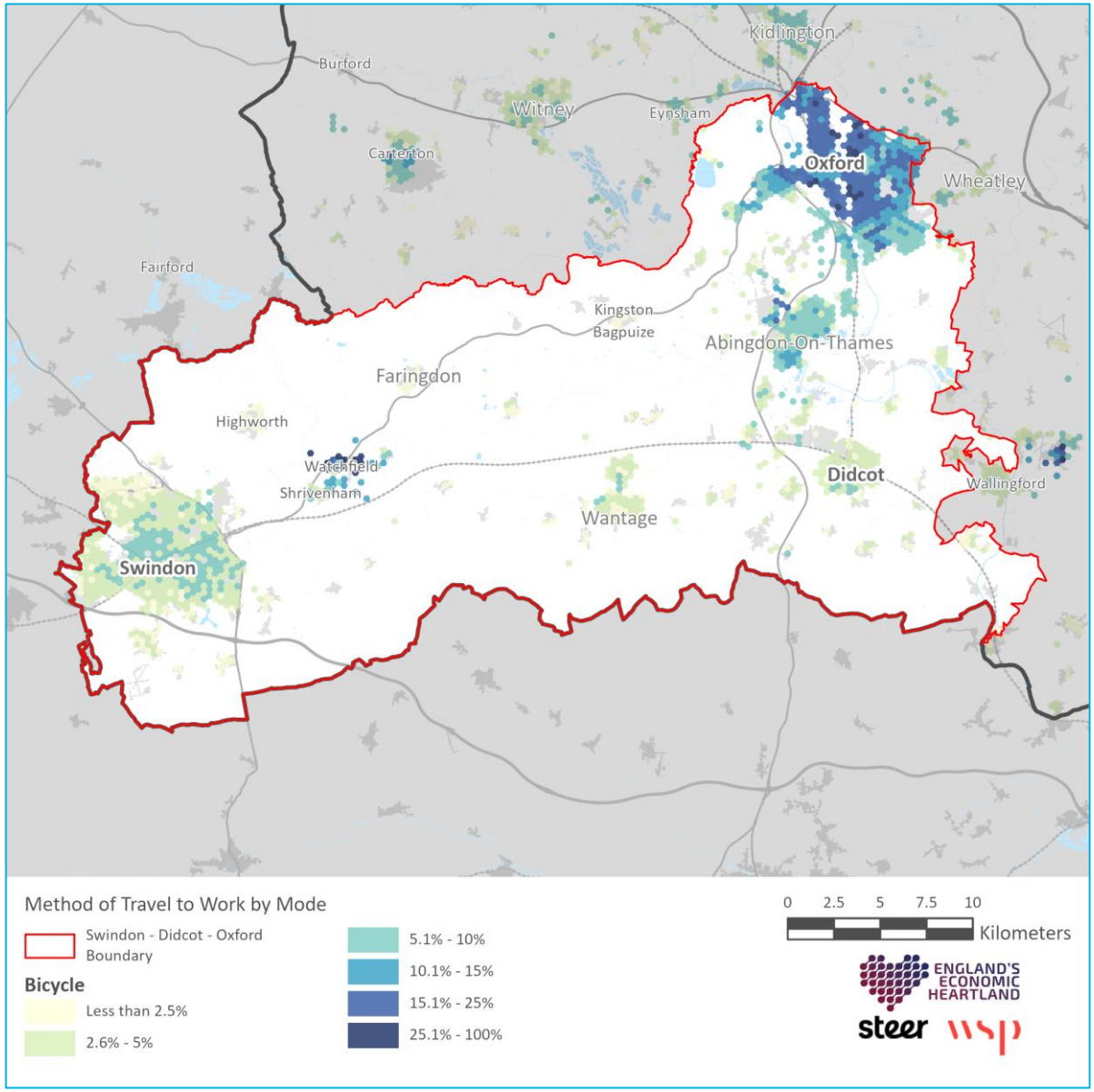
The plan shows percentage of all forecasted journeys to work (JTW) undertaken by bicycle (as per the 2011 Census). This provides an insight into the existing levels of cycling within the study area.

The Cycling Propensity Toolkit (CPT) has considered the cycling JTW mode share in a number of future scenarios where the population acquires a different propensity to travel. This suggests that if the population of the study area acquired the same propensity to cycle as that of the Dutch population, the JTW cycle mode share would increase to >10% in all areas across the study area. The largest increases in cycling take place in Swindon and Didcot, with many of the rural areas expected to increase in uptake as well. The outputs of this analysis is attached in Appendix B. It should be noted that whilst the CPT focuses on commuting journeys, similar propensities are likely to be observed for other journey purposes.

A high propensity to cycle requires high quality cycling infrastructure to support these commuting trips. High quality LTN 01/20 compliant active travel infrastructure must be provided to encourage increased uptake for commuting and other journey purposes.

Cycling to work is much lower in Swindon, compared to Oxford, despite being a comparable population, and also low in Didcot, Wantage and Faringdon. This suggests there are substantial opportunities to increase cycling within these medium and smaller settlements.

Data Source: 2011 Census: Method of Travel to Work



Catchments (E-Bikes)

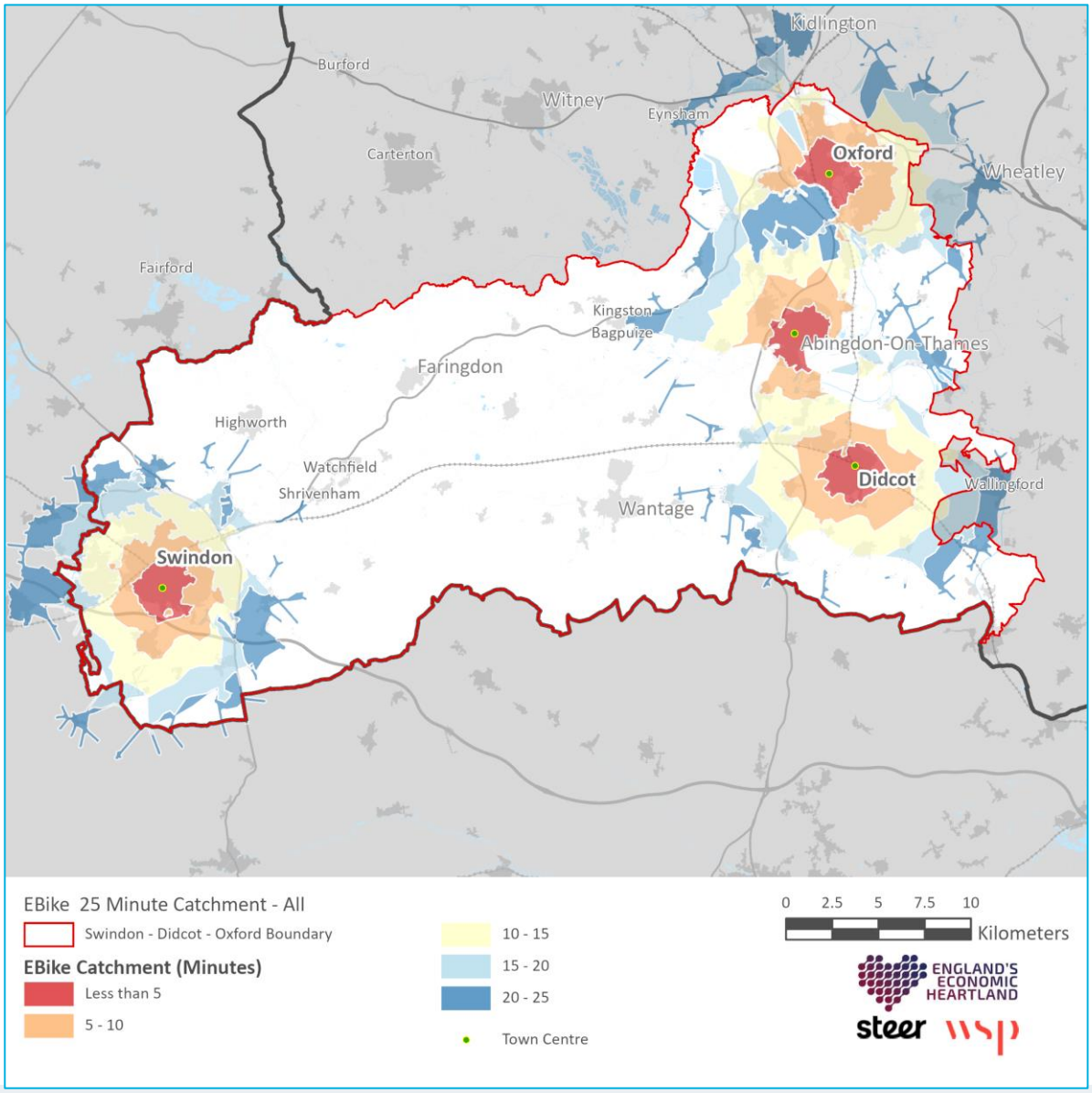
E-bikes are electrically assisted pedal bicycles which can travel up to 25km/h. This makes them an attractive option for commuting compared to pedal bikes. E-bikes offer an excellent option for local and inter-settlement movements. In contrast E-scooters can offer local intra-settlement movement.

The plan opposite shows the potential for E-bikes to support within urban areas, whilst also providing opportunities for inter-urban travel, particularly between larger towns / cities and the villages / towns on their periphery. Separate catchments by settlement can be seen in **Appendix C**. Notable opportunities for inter-urban E-bike travel can be seen between:

- Oxford and Abingdon-on-Thames
- Abingdon-on-Thames and Didcot
- Swindon and Highworth
- Swindon and Shrivenham

The increased travel distances that E-bikes facilitate means that they have the potential replace short to medium distance car journeys within the corridor. There is significant potential to increase cycling participation within Highworth, Shrivenham, Wantage and the Science Vale, if attractive, safe and segregated infrastructure is provided. Cycling participation could also be increased between settlements along the A420 corridor, Oxford and Swindon if improved cycling infrastructure is provided. To ensure cost is not a barrier to uptake low cost or subsidised E-bike schemes should be considered.

Source: Open Route Services (2022)



Networks – Public Transport

Rail Network

The rail network within the study area provides passenger and freight connectivity to locations within and beyond the study area. The main rail lines within the study area are:

- **Cherwell Valley Line –** connecting Oxford, Abingdon-on-Thames and Didcot.
- **Great Western Main Line –** Connecting Swindon to Didcot
- **Golden Valley Line –** Connecting Swindon to Stroud and Gloucester.

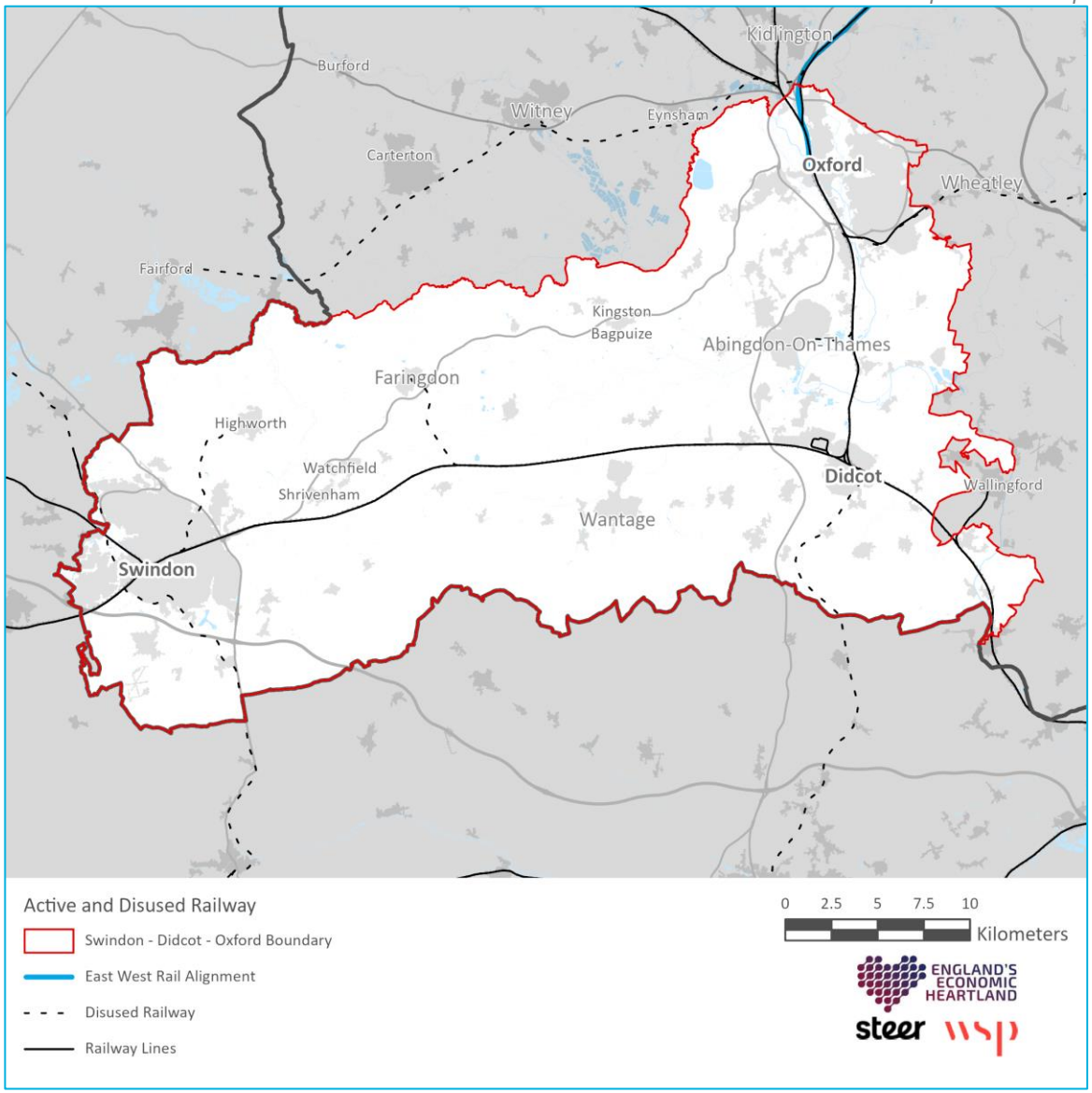
Several Heritage Rail lines / disused branch lines exist in the study area, these are:

- **Swindon & Cricklade Rail line –** Connecting Northwest Swindon to Cricklade.
- **Henley Branch Line –** Connecting Henley to the Great Western Mainline (outside the study area)
- **Cholsey & Wallingford Railway –** Connecting Wallingford to the Great Western Mainline
- **Chinnor & Princes Risborough Rail line –** Connecting Chinnor to Princes Risborough (outside the study area)

Currently no rail freight interchanges exist or are planned in the study area.

There is huge opportunity to increase local rail travel within the study area. Building on the existing assets, there are opportunities for new stations on the Great Western Main Line, new direct services between Swindon and Oxford, improving access to existing stations to better serve their local communities and increasing rail freight opportunities.

Data Source: Open Street Map

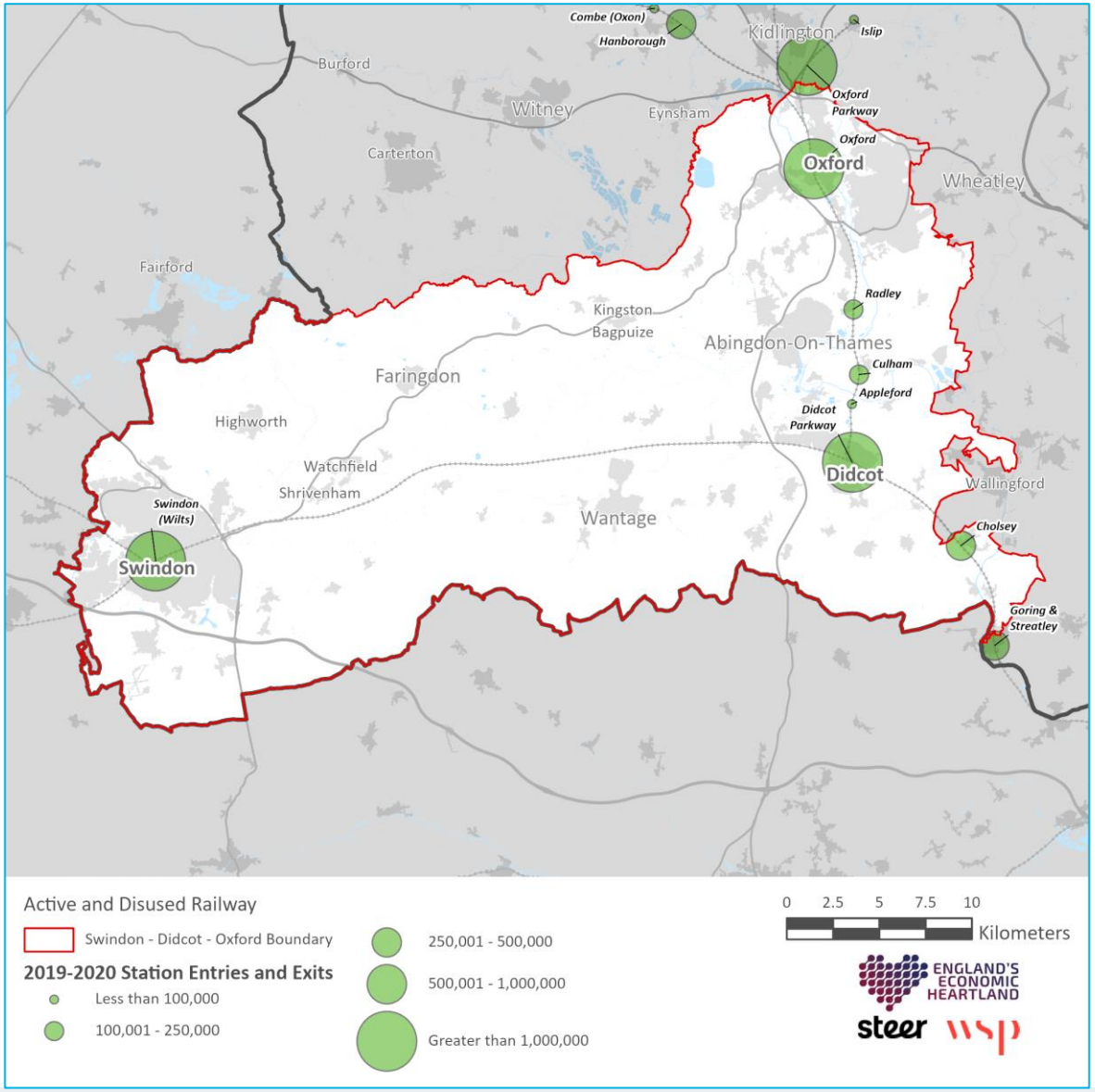


Networks – Public Transport

Rail Station Usage

Over 17,500,000 rail station entries and exits took place in the 2019-20 financial year. Oxford is the most used station in the study area, with a total of 8.7 million entries and exits recorded in the 2019-20 financial year. This represents 50% of all passenger entries and exits in the study area. The Covid-19 pandemic led to an 82% reduction in station entries and exits in the 2020-21 financial year. The least used stations in the study area are Appleford, Cholsey, Culham, and Radley. These stations represent 3% of all entries and exits in 2019-20. Appleford was the least used station, recording 7,232 entries and exits. Improved public transport and active travel connectivity between Radley railway station and centre of Abingdon-on-Thames may help improve rail usage in the study area. Connectivity to rail stations in the centre of the study area is poor, with no intermediate stations on the Great Western Mainline between Didcot and Swindon and no direct rail services between Swindon and Oxford. **There are substantial opportunities in the study area to increase rail use by maximising the benefit of the existing assets to the local communities. Delivery of new rail stations along the Great Western Mainline between Didcot and Swindon would enable residents in Wantage and Grove to access services into Swindon and Didcot. Direct services between Swindon and Oxford could reduce car-based travel demand along the A420. New parkway stations to the east and west of Swindon could help support planned developments and improve access to the rail network from communities along the A420.**

Data Source: Office For Rail and Road (ORR) (2020)



Networks – Public Transport

Bus Network

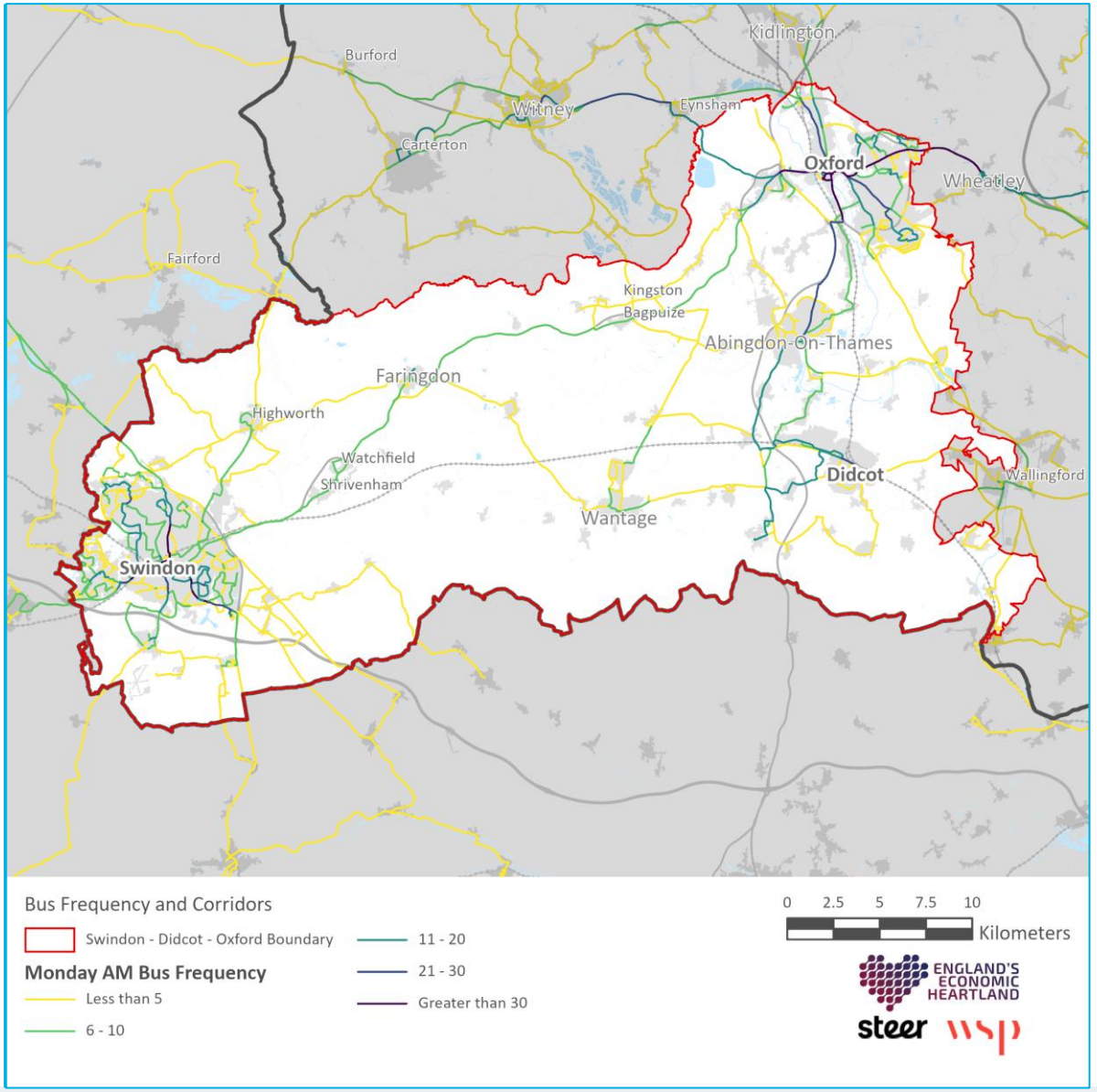
Buses services provide a more sustainable alternative to the private car for short and medium length journeys.

The plan shows the frequency of local bus services (two-way total) on links between the key settlements during the morning peak hour (0700 to 0859) on a Monday in 2022. It should be noted coach services are not included.

High frequency local bus services serve the major settlements in the study area (notably Oxford, Didcot and Swindon). There are two distinct inter-urban bus corridors: A north-south bus corridor between Oxford and Chilton via Didcot and Harwell Campus (with two buses per hour), and an east-west bus corridor between Oxford and Swindon via Shrivenham, Faringdon and Kingston Bagpuize (with three buses per hour). Several smaller settlements within the corridor lack access to high frequency bus services, with Wantage and Stanford in the Vale served by less than five buses during the morning peak. Smaller villages to the west of Wantage are not served by any buses at all.

There are opportunities to enhance existing services. Within the main settlements of Oxford and Swindon, bus priority measures and a new/expanded Park and Ride will reduce congestion on the main radial routes. There are opportunities for more attractive 'express' inter-urban service between Swindon and Oxford along the A420 corridor and Demand Responsive and shared transport services to support the rural communities. The evidence also shows the opportunity for mass rapid transit opportunities in the Science Vale area.

Data Source: Basemap Bus Route Lines (Q1 2022)



Networks – Public Transport

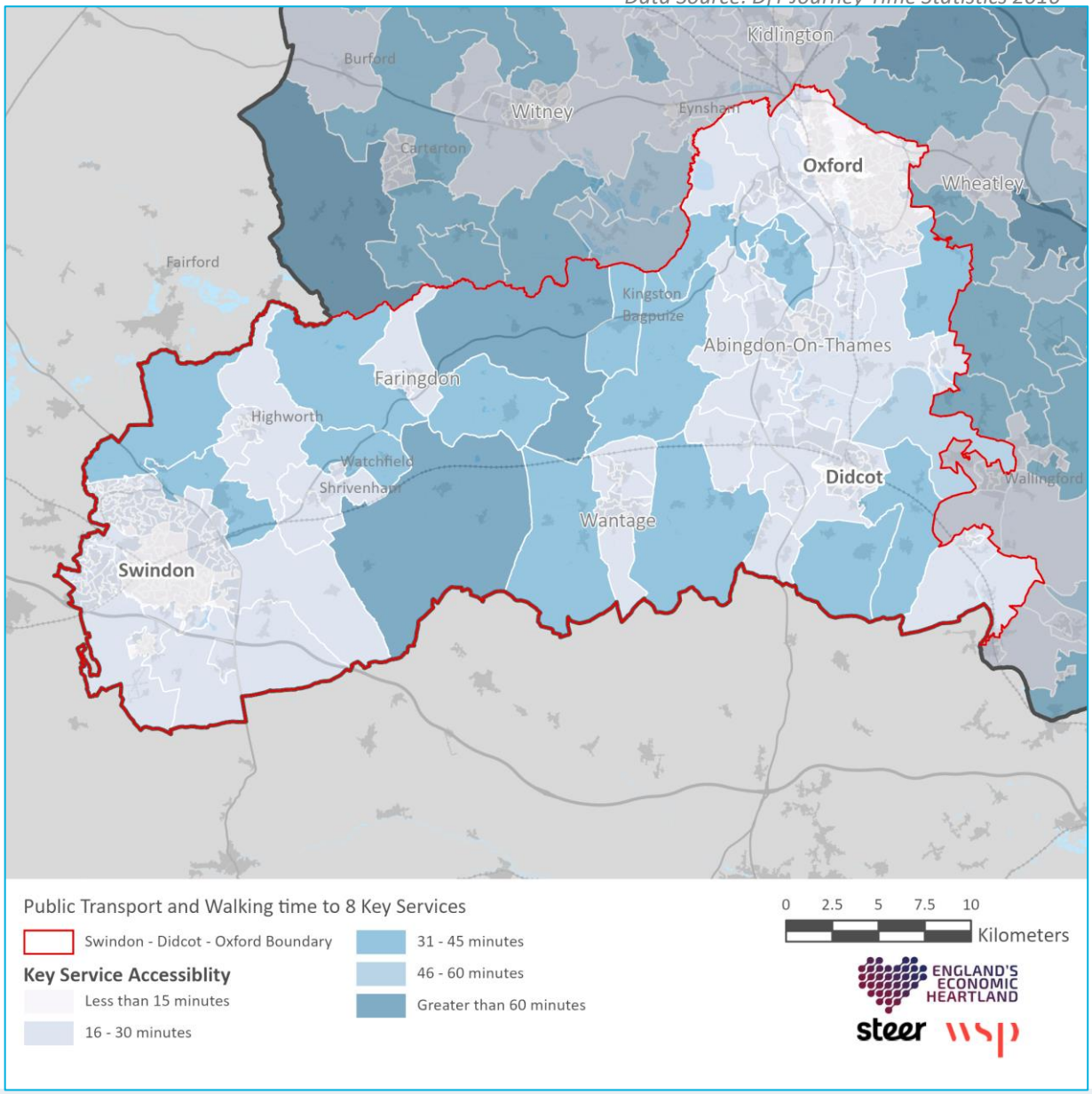
Access to Services

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

The plan opposite shows the minimum average accessibility by walking and public transport to eight key services and facilities: Medium sized employment centres; Primary Schools; Secondary schools; Further education colleges; GPs; Hospitals; supermarkets; and Town centres. The distribution shows a clear rural / urban divide. There is also a difference between larger and medium size towns and cities, with Oxford and Swindon having better accessibility than Didcot and Abingdon-on-Thames. There are 'transport deserts' in the centre of the study area where small rural communities risk being cut off from key services if they do not have access to a car.

Improvements to public transport services, particularly to settlements on the periphery of larger urban areas, will help improve inclusive access to everyday amenities and services. However, for any substantial mode shift to occur public transport journey times must be competitive with private car. To achieve this express bus services should be considered along with the introduction of bus priority measures. In smaller villages, high frequency bus services may not be viable. In these locations alternative bus-based arrangements should be considered, e.g., Demand Responsive Transport.

Data Source: DfT Journey Time Statistics 2016



Networks – Road

Catchment

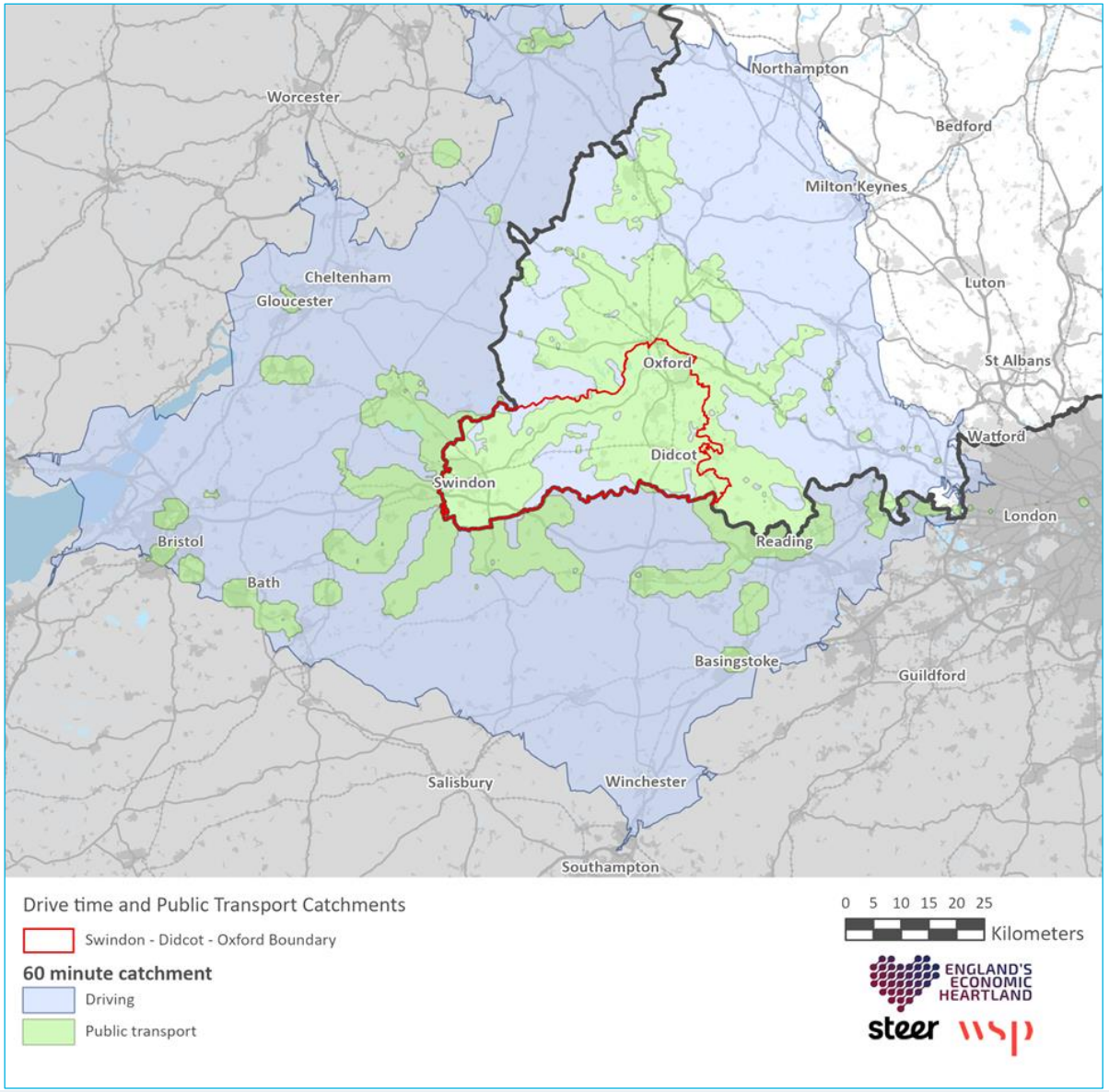
For public transport to be a realistic alternative to private car travel it must provide a similar level of accessibility. The plan opposite shows the combined 60-minute AM peak public transport and car driver catchments for travel towards four strategic centres: Oxford, Abingdon-on-Thames, Didcot and Swindon. Separate catchments for each centre are provided in **Appendix B**.

The whole study area, and a significant area beyond, can access one or more of the strategic settlements within a 60-minute drive. Similarly, 99% of the population can access one or more of these settlements within a 60-minute journey via public transport. This can be seen in the table below. Accessibility of strategic settlements from rural areas by public transport is constrained.

	Study Area	60 minutes by Public Transport Catchment	
		Absolute	%
Area	991 km^2	812 km^2	82%
Population	640,000	635,500	99%
Employment	321,500	319,500	99%

The evidence shows there is a public transport 'desert' in the centre of the study area where a number of villages and hamlets do not have access to public transport. There are opportunities the address this with demand responsive, shared or community led transport interventions.

Data Source: TRACC / ESRI Speed Profile Data (2019)



Networks – Road (AM Peak)

Network Overview

To understand the performance of the local and strategic road network through the study area and identify existing pinch points, the percentage change in speed between the AM / PM peak hour and free flow conditions (85th percentile) has been reviewed.

AM Peak Network Speeds

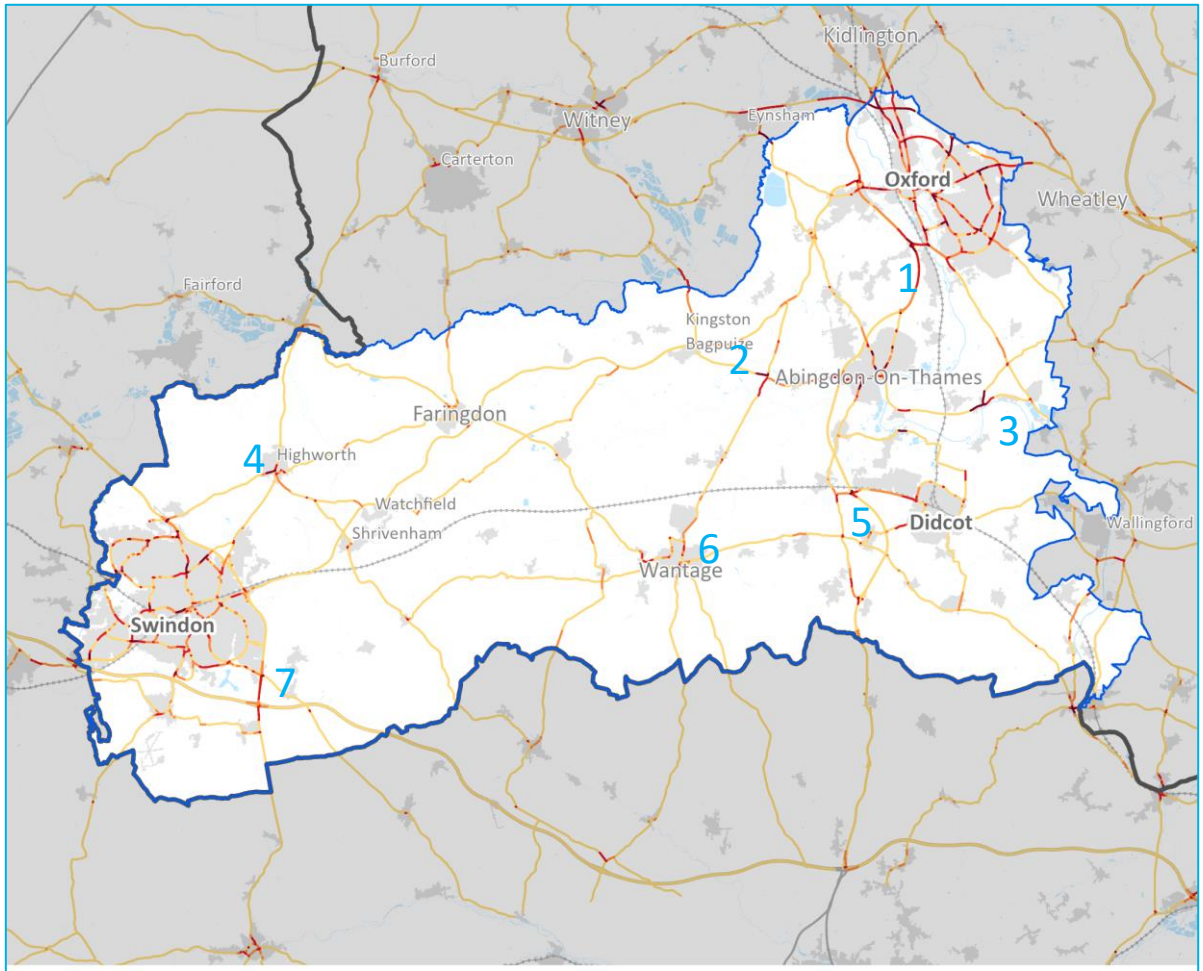
Compared to free flow conditions, AM peak hour (08:00 to 09:00) speeds are generally more than 50% slower in urban areas and between 0% and 25% slower in rural areas. Oxford experiences some of the worst congestion in the AM peak, followed closely by Swindon, with traffic flows more than 75% slower on a number of routes.

Notable pinch points include:

1. A34 south of Oxford
2. A338 / A415 Frillford Junction
3. A415 / B4015 Clifton Hampden
4. B4019 in Highworth
5. Milton Interchange at Didcot
6. Several Junctions within Wantage
7. A419 Southeast of Swindon

The evidence shows relatively high levels of congestion on the main radial routes into Oxford, Didcot and Swindon. The root causes of the congestion needs to be targeted, with interventions that encourage modal shift to support the urgent need to decarbonise the transport system.

Data Source: TrafficMaster (2021)



Networks – Road (PM Peak)

PM Peak Network Speeds

Compared to free flow conditions, PM peak hour (17:00 to 18:00) speeds are generally more than 50% slower in urban areas and between 0% and 25% slower in rural areas and is relatively similar to conditions in the AM peak.

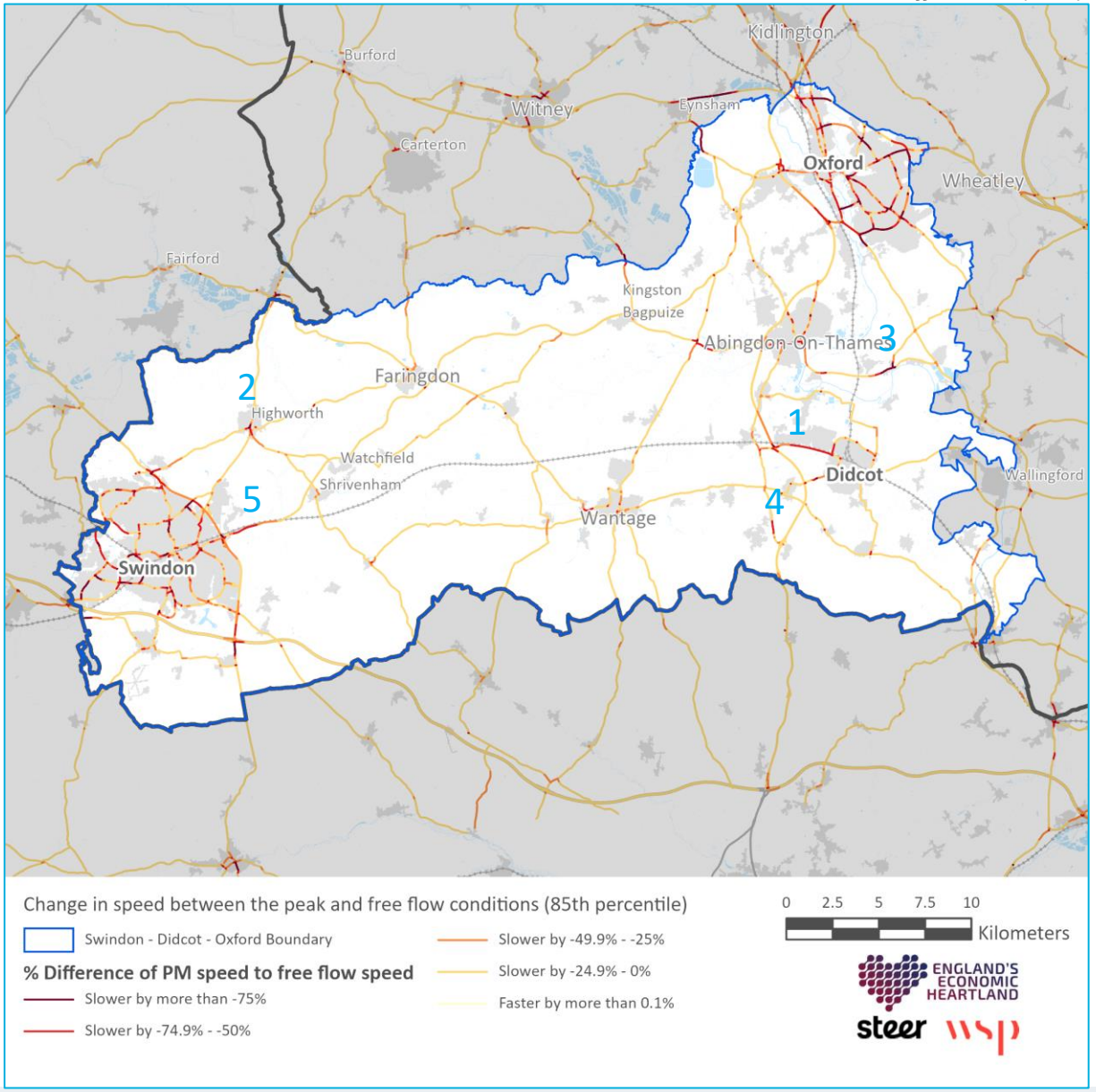
The worst congestion is experienced in the key settlements notably Oxford and Swindon. Outside of urban areas the local highway network performs relatively well with speeds generally 0% to 25% slower than free flow conditions.

Notable pinch points include:

1. Milton Interchange at Didcot
2. B4019 at Highworth
3. A415 / B4015 Clifton Hampden Junction
4. A34 Chilton / Harwell Interchange
5. A420 East of Swindon

Several highway improvement schemes have been identified to alleviate congestion such as the A34 junction improvement scheme, M4 Junction 15 & 16 improvement scheme, Moonrakers Junction improvement and the construction of the Wantage Link road. It is important that any targeted highway improvements support improved active travel and public transport journeys, particularly within Swindon and Oxford, where there are the greatest opportunities for sustainable travel.

Data Source: TrafficMaster (2021)



Networks – Road

Freight Movements

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

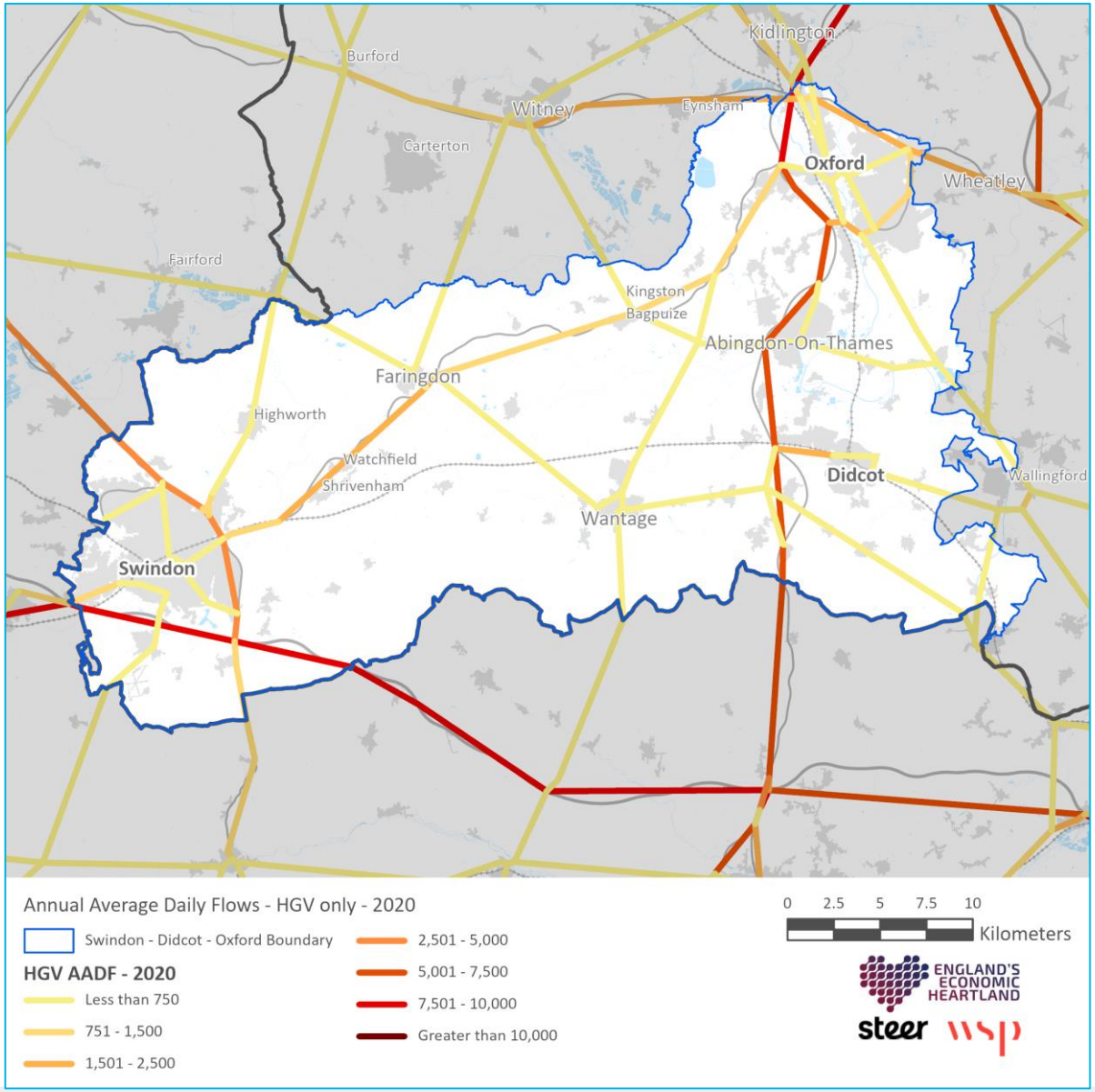
The plan opposite shows annual average HGV flows on motorways and A-roads in the study area. The plan shows the highest flows to be on the M4 to the southeast of Swindon with maximum flows reaching an average of 9,500 movements per day.

High HGV flows are also recorded on the A34 between Didcot, Abingdon On-Thames and Oxford, with a maximum average daily HGV flow of 7,500. The A34 is a strategic freight route from the Solent Ports to the Midlands and the North. It is the busiest non-motorway HGV route in the UK, which is closely mirrored by one of the busiest passenger rail lines (Cherwell Valley Line). It also accommodates inter-urban movements between Oxford, Abingdon and Didcot and local movements around Oxford.

High HGV flows are also observed on the A419, a key freight route that connects, via the M5, the M4 and the Midlands.

There are opportunities to reduce and decarbonise freight movements through the study area. Joint working with Network Rail, National Highways, local and freight operator stakeholders will be required to increase rail network and interchange capacity and availability.

Data Source: UK Government - GB Road Traffic Counts (2020)



Networks – Road

Freight Movements

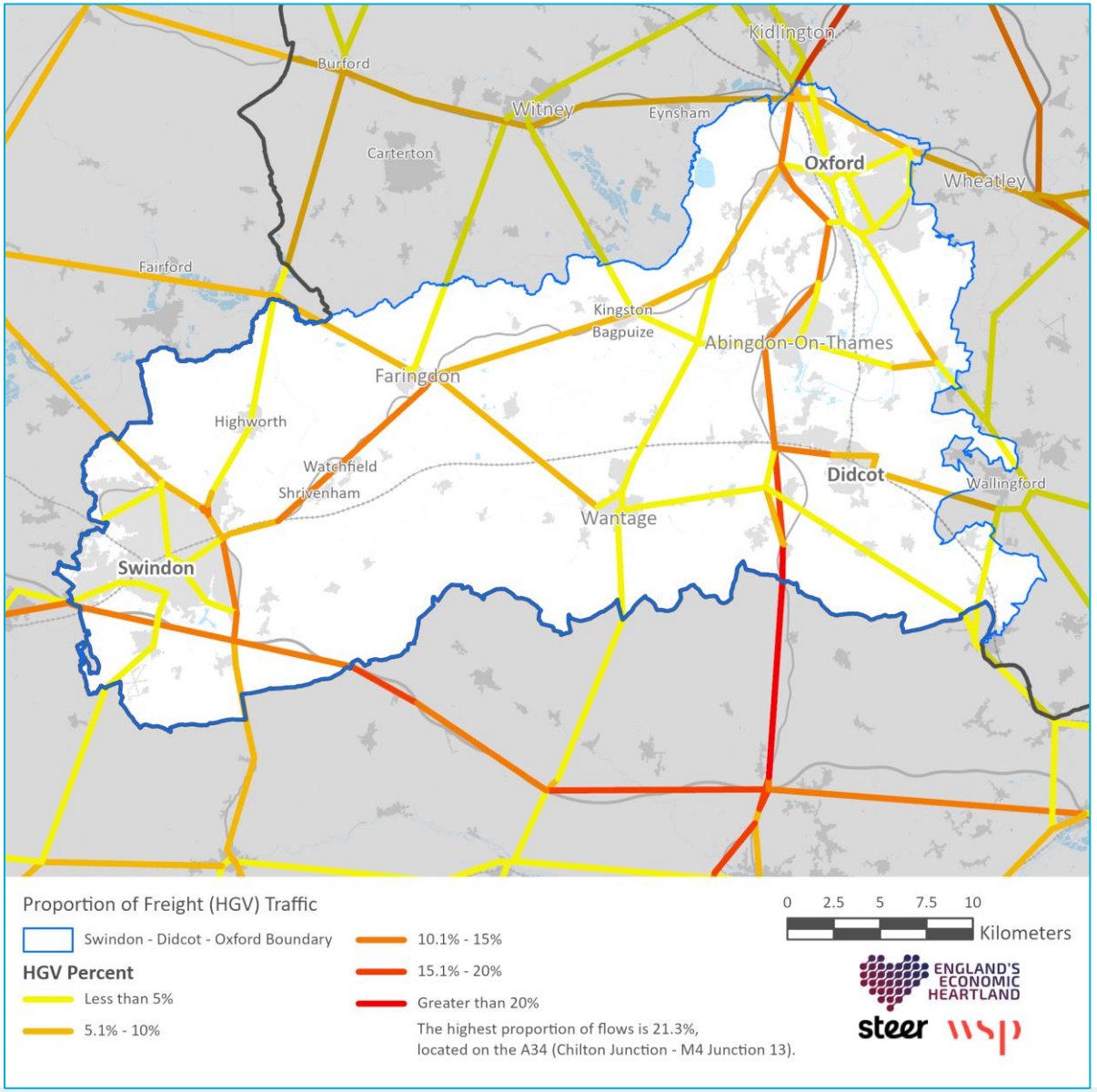
The plan opposite shows the proportion of freight traffic on major routes in the study area.

The plan shows the major east west / north south routes in the study area to have the highest percentage of HGVs traffic. This includes the M4 south of Swindon and A34 to the west of Oxford and Didcot. On these routes HGVs generally comprise between 10% and 20% of all traffic.

A relatively high proportion of HGVs also route along the A420 – a single carriageway A-road that runs between Oxford and Swindon. On this route, HGVs comprised 10% to 15% of all HGV traffic – which is higher than other single carriageway A-Roads in the study area. The flows are highest between Swindon and Faringdon, with freight movements on the A420 having accounting for a number of fatal accidents.

The evidence shows a relatively high proportion of HGV movements routing east-west on the A420, a single carriageway A-road. This route also accommodates local movements and provides an important regional connection between Swindon and Oxford. There are opportunities to consider the function of the A420 and whether HGV demand management measures are needed to direct these trips to the M4/A34 alternative route. For local HGV movements, opportunities for these trips to be consolidated and use sustainable first mile /last mile logistics networks can be considered.

Data Source: UK Government - GB Road Traffic Counts (2021)



Electric Vehicle Charge Points

Electric vehicles (EV) are a key component in reaching a net zero study area by 2050.

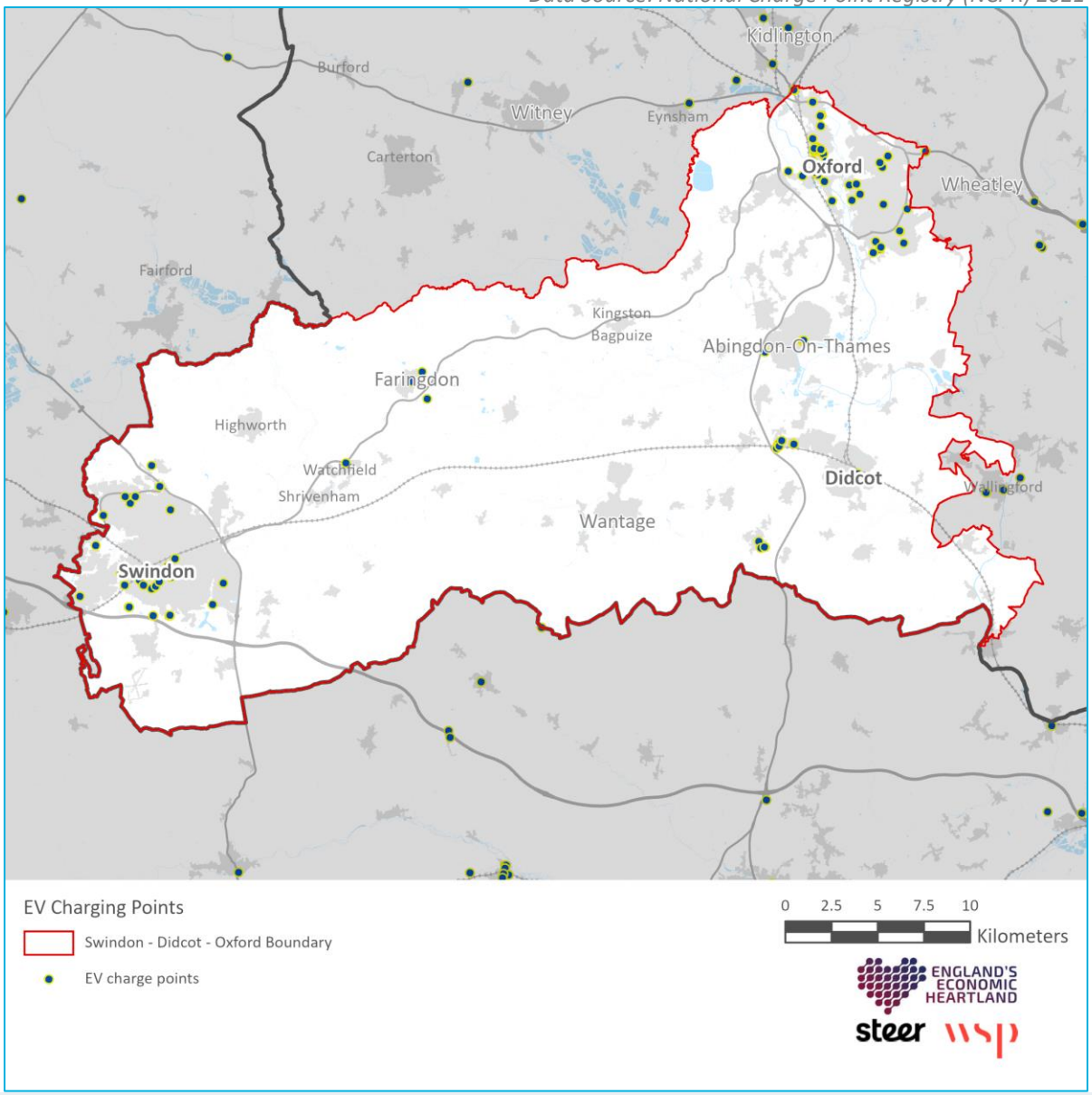
The plan opposite shows the distribution of non-residential Electric Vehicle Charge Points (EVCP) within the study area. Approximately **142 non-residential EVCPs** exist within the study area.

The distribution of EVCP points shows a clear urban / rural divide. The largest number of EVCP can be seen in both Oxford and Swindon (73%). Several EVCP can be found in Faringdon as well as some outside Didcot. A small cluster of EVCP can be found at the Harwell Campus.

There is a distinct lack of EVCP in rural parts of the study area with no EVCP in Grove or Wantage, creating a potential barrier for uptake of zero emission vehicles in smaller settlements. Kingston Bagpuize is also notable for a lack of EVCP. Accessible charging stations along the major road network is also inconsistent with the A420, A346, M4 and A34 lacking charging infrastructure outside major urban areas.

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

Data Source: National Charge Point Registry (NCPR) 2021



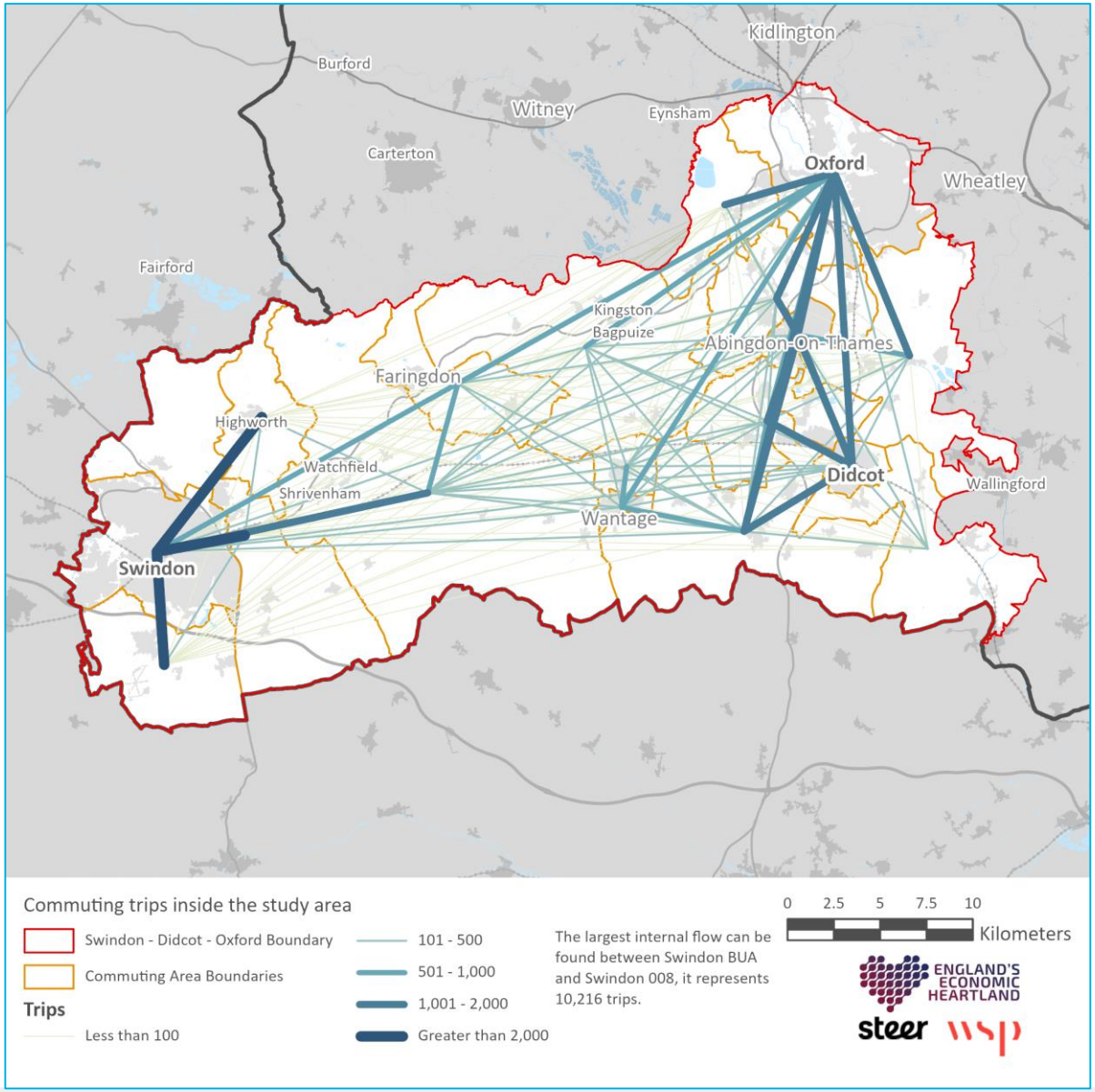
Travel Patterns & Behavior

Journey to Work Origin – Destination Flows

Data Source: 2011 Census – WU03EW Location of Usual Residence and Place of Work by Method of travel to work

The plan shows historic commuter movements between the major settlements and rural areas. In 2011 the total number of commuter movements within the study area was approximately 152,000 (origin and destination within the study area). Of these, 68% involved commuting within the four main urban settlements and 6% involve commuting between these centres. Looking at commuter movements within and between the four largest urban areas, the highest number of commuter trips was internally within Swindon (50,500 commuting trips). This represented 45% of all movements between the four main settlements. The largest number of commuter trips between settlements was between Oxford and Abingdon-on-Thames (1,000 commuter trips). In total 85% of all commuting trips took place between Oxford, Didcot and Abingdon On-Thames.

There are a large number of commuter movements between rural areas and the four main urban areas, with high flows observed between Highworth and Swindon, Oxford and Harwell Science and Innovation Campus and Didcot and Harwell Science and Innovation Campus. **The evidence shows two main travel to work catchments comprising Oxford-Abingdon-Didcot in the north and Swindon-Wroughton-Highworth in the south, with a complex pattern of small flows within the central study area. The travel patterns suggest the potential for a mass rapid transit system in the Science Vale area, substantial opportunities for modal shift within and around Swindon and enhanced inter-urban connectivity along the A420 corridor and from Wantage.**



Travel Patterns & Behaviour

Origin-Destination Matrix

Data Source: 2011 Census – WU03EW Location of Usual Residence and Place of Work by Method of travel to work

Settlements of Strategic Importance (From / To)	Abingdon-on-Thames	Didcot	Oxford	Swindon	Rural Areas	London	Study Area Total	EEH Region	EEH Excluding Study Area	England & Wales Excluding EEH and London
Abingdon-on-Thames	4,902	371	3,931	91	3,264	433	12,559	14,149	1,590	825
Didcot	779	2,948	1,490	70	3,474	391	8,761	10,532	1,771	1,185
Oxford	1,160	286	45,380	184	2,790	2,143	49,800	56,989	7,189	2,828
Swindon	157	78	593	50,451	13,135	1,234	64,414	65,607	1,193	16,099
Rural Areas	2,931	1,321	7,038	4,944						
London	194	62	2,938	930						
Study Area Total	9929	5004	58,432	55,740						
EEH Region	12,040	5838	84,464	56,401						
EEH Excluding Study Area	2,111	834	26,032	661						
England & Wales Excluding EEH and London	981	498	5,217	16,764						

The origin-destination matrix show the number of workers travelling between the fours Settlements of Strategic Importance and other geographical areas in the study area and UK by all modes of travel.

- Rural Area: This area includes all MSOAs inside the study area, excluding the MSOAs that comprise the four Settlements of Strategic Importance.
- England and Wales: This area includes all data from England and Wales, excluding the EEH region.

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

Travel Patterns & Behaviour

Mode Share by Settlements

The table opposite shows the journey to work mode share of the four main settlements in the study area.

The main mode of transport used by people travelling to work in the study area is car, with 57% of all commuting movements being made as a car driver. Public transport makes up 12% of all commuter movements within the study area and active travel makes up 20%. Only 6% of residents living in the study area worked from home (noting that this is pre-Covid-19).

The settlement with the highest journey to work public transport mode share is Oxford (20%). Oxford also had the highest journey to work active travel mode share (36%). These mode shares are more than double that of the three main urban areas. Further detail on travel patterns and behaviour in the study area is provided in **Appendix E**.

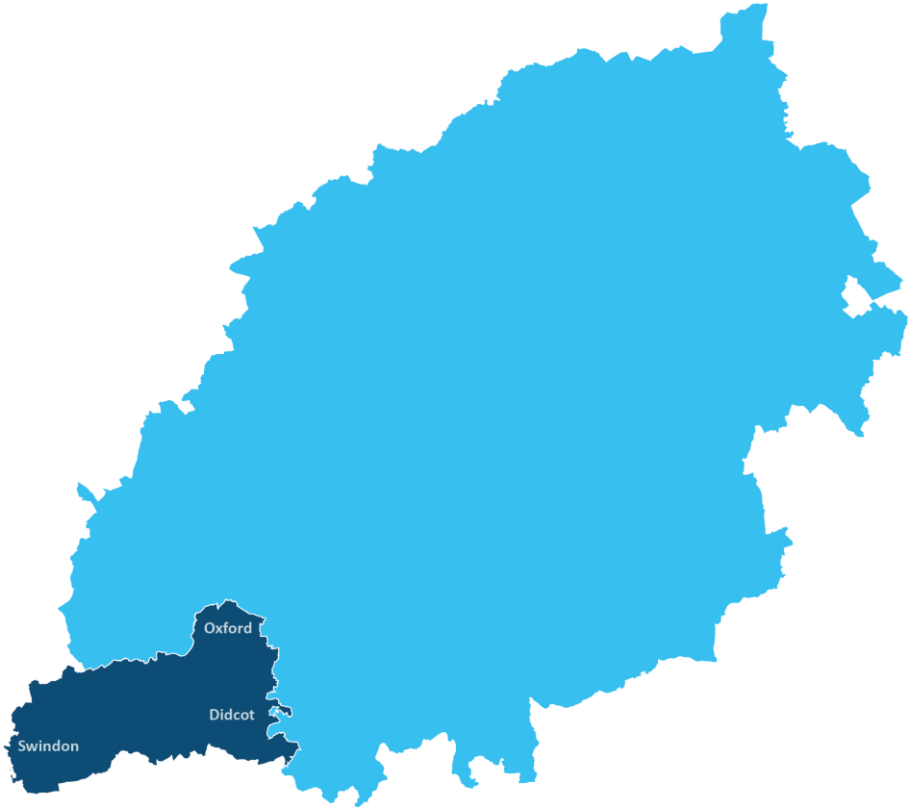
The evidence shows the journey to work mode share varies significantly across the study area. Oxford has the highest levels of sustainable travel supported by a dense residential population, P&R sites, good bus network and two rail stations. The evidence suggests there are substantial opportunities for modal shift in Swindon a settlement of similar population size to Oxford.

Data Source: 2011 Census – QS701EW Method of travel to Work

	Car / Van (Driver)	Car / Van (Pass.)	Bus	Train	Cycling	Walking	Work From Home
Abingdon-on-Thames	11,027 62%	824 5%	1,474 8%	295 2%	1,525 9%	1,660 9%	870 5%
Didcot	9,092 65%	722 4%	544 4%	995 7%	645 5%	1,498 11%	488 3%
Oxford	26,175 36%	2,405 3%	12,074 17%	1,897 3%	12,849 18%	13,019 18%	4,603 6%
Swindon	60,822 64%	6,114 6%	8,690 9%	1,284 1%	4,375 5%	9,792 10%	3,570 4%
Study Area Total	**147,516** 57%	**12,771** 5%	**25,226** 10%	**6,163** 2%	**21,870** 8%	**31,633** 12%	**14,420** 6%
EEH Total	**1,433,810** 62%	**111,900** 5%	**97,426** 4%	**117,264** 5%	**82,195** 4%	**204,767** 9%	**257,013** 11%
England and Wales Total	**15,264,527** 61%	**1,347,280** 5%	**1,949,442** 8%	**1,371,025** 5%	**762,334** 3%	**2,846,588** 11%	**1,422,708** 6%

Summary

Theme	Issues & Opportunities
 **ROADS**	**Issues** • **Congestion –** high car dependency for inter-urban, intra –urban and rural-urban movements leads to congestion on key radial routes in Swindon and Oxford and at pinch point junctions on the main routes including the A34 south of Oxford, B4019 at Highworth and A420 East of Swindon. • **HGVs –** HGV movements on the A34 and A420 conflict with a mix of local inter-urban and regional movements. **Opportunities** • **Connectivity –** in the main Swindon and Oxford travel to work catchments interventions should focus on modal shift to public transport and active travel. • **Freight –** capacity improvements along the Cherwell Valley Line and construction of new multi-modal freight interchanges will help support the transportation of freight by rail.
 **PUBLIC TRANSPORT**	**Issues** • **Bus –** Bus use varies significantly between urban and rural parts of the study area. Wantage and Stanford in the Vale are served by less than five buses per hour (2-way) in the AM peak. This compares with Oxford and Swindon which have routes served by more than 30 buses per hour. • **Rail –** Local community access to the Great Western Main Line is restricted to Swindon and Didcot, with no direct rail services from Swindon to Oxford. **Opportunities** • **Bus –**new mass rapid transit systems in the Science Vale, enhanced express inter-urban services on the A420, P&R and bus priority measures in Swindon and demand responsive or community-led transport in the rural areas of the study area. • **Rail –** additional stations on the Great Western Main Line, including to east or west of Swindon and at Wantage; enhanced rail access; and increased rail capacity on the Cherwell Line. • **Mobility hubs –** urban, rural and A420 Mobility hubs combining appropriate rail, bus demand responsive, shared transport, freight and local services tailored to the needs of local residents. Location options include the A420, Swindon and Wantage.
 **ACTIVE MODES**	**Issues** • **Catchments –** With the exception of Oxford, cycling levels are generally low across the study area, including within the largest settlement of Swindon. **Opportunities** • **New Infrastructure –** new high quality, attractive and segregated infrastructure can help support modal shift to cycling within Swindon, Abingdon-on-Thames and Didcot and between Swindon/Oxford and their surrounding settlements. • **E-bikes / Shared mobility –** the roll out of shared mobility schemes e-scooters and E-bikes in Swindon, Abingdon-on-Thames and Didcot to support modal shift from car the micro-mobility modes.
 **TRAVEL PATTERNS & BEHAVIOUR**	**Issues** • **Car –** the majority of commuting trips within the study area are made by private car travel, with limited car sharing. Car use is particularly high in Swindon. • **Distance –** There are high levels of inter-urban commuting between the Settlements of Strategic Importance, notably between Oxford, Abingdon-on-Thames and Didcot. Residents living in the smaller communities along the A420 corridor are heavily dependent on the car to access jobs and community services. **Opportunities** • **Future Developments –** targeted rural mobility interventions including mobility hubs, shared and demand responsive transport, combined with improved rail and inter-urban bus access. Modal shift to active modes, particularly within Swindon.



Part 2d

Stakeholder Engagement

Stakeholder Engagement – Steering Group

Steering Group

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

Strategic Trip Attractors

- Panatonni – potential logistics site
- Amazon Symmetry Park
- Highworth housing developments
- Planned development around Kidlington
- New development south of Oxford
- Milton Park – wide catchment area
- Didcot Growth Accelerator Enterprise Zone
- Housing developments along the A420, Shrivenham, Faringdon and Kingston Bagpuize
- Swindon Eastern villages (8,000 homes)
- Dalton Barracks/Shippon residential development
- Science Vale
- Development in Wichelstowe (4,000 homes)
- Harwell Campus – wide catchment including Swindon
- Planned growth around Didcot and Abingdon-on-Thames

General Issues

- Rural areas are not well-connected
- Political differences between Swindon and Oxfordshire
- Covid-19 has resulted in a modal shift from public transport to car
- Lack of employment in Wantage/Faringdon and central study area leads to much out commuting
- Not all business growth areas well served by sustainable transport e.g. Harwell Campus
- National Highways policy not aligned with EEH Transport Strategy Ambition.

General Opportunities

- A40 corridor scheme includes a new P&R, bus lanes (Witney to Oxford), cycleway from P&R to Oxford – good case study for improvements.
- Mobility Hub trial at Milton Gate
- Mobility Hubs on the A420 and Rural Mobility Hubs along corridors
- National Road User Charging
- Re-prioritise road space wherever possible
- Develop high speed and 5G networks
- Alternatives to business car use – lease of e-car and cycles
- Integrated ticketing and timetabling between bus and rail
- Behaviour change programme – including targeting employers
- Hydrogen – opportunities across the study area – Swindon and Wiltshire LEP support
- Park & Ride – multi-purpose sites providing 'Park & Charge' and overnight Freight Parking

Bus Issues

- Public transport connections from Wantage/Grove generally not good, except to Oxford
- Lack of bus links to Didcot Parkway station – 'virtual branch lines'
- Lack of funding for New Park and Ride policy
- Swindon to Oxford bus frequency reduced to 3 buses per hour
- Bus connections to Oxford Hospital improving, but bus journey times substantially longer than car.
- Bus journey times substantially longer compared to car journeys

Bus Opportunities

- LTP4 identifies opportunity for a P&R at Cumnor. Opportunity to review new P&R locations.
- Provide a series of Mobility Hubs along the A420 to link into S6 Strategic Bus route
- Marcham Interchange – land reserved for P&R
- A420 is a key bus corridor – 4 buses per hour
- Bus priority – A34 Lane Lodge Hill to Hinksey Hill – Vale of White Horse Local Plan
- Bus priority on A420 and A34 and on key routes
- Proposals for new Newbury Bus Link via A34 in Oxfordshire BSIP
- Real time information
- Better bus interchange between routes
- Swindon Bus Rapid Transit
- Oxford Mass Transit
- Pump Prime bus services as employment centres expand
- Encourage public, private and bus operators to work together on innovative solutions e.g., DRT

Stakeholder Engagement

Rail Issues

- Rail line capacity between Didcot and Oxford to accommodate freight and passenger movements
- Cost of accessing rail – rail fares

Rail Opportunities

- Direct services between Oxford and Swindon
- Links to EWR from Swindon
- New station at Grove
- High Speed Rail
- Swindon Parkway station

Active Travel Issues

- Lack of active infrastructure on the A420, A338, A415 and A417
- Lack of National Cycle Network routes

Active Travel Opportunities

- Strategic public rights of way network/greenways
- Oxford-Swindon cycle route and longer distance cycle routes
- Delivery of Oxford, Abingdon-on-Thames and Didcot LCWIPS
- LCWIP for Wantage/Grove
- Improved wayfinding information
- Science Vale Cycle Network
- Extension of Walking and Cycling routes out of Oxford to nearby towns/villages
- Reduce active travel severance caused by major routes – A420, A34
- HIF 1 Schemes include active travel infrastructure

Private Vehicle Issues

- A419 Birdlip bypass increasing vehicle flows from the Midlands to Ports via A417-A419-M4-A34
- Acorn railway bridge pinch point on the A420
- A420 White Hart junction
- High flows on A420 including HGV movements impact quality of life for rural communities adjacent to the route, including crossing the road to access the frequent bus service.
- Lack of resilience on A34 – incidents cause major delay and knock-on impacts on wider road network.
- Congestion – western approach to Oxford A420/Botley Road/Seacourt P&R
- A415 corridor including the Frilford junction.
- Building more roads will not achieve the EEH Transport Strategy objectives.
- High dependence on car in the central study area

Private Vehicle Opportunities

- Safeguard land for north facing slips at the A34/Milton Park Interchange
- Parking demand management – parking standard revies for new developments
- Improved EV charging infrastructure
- Different strategies for local and through traffic
- Lift sharing and car clubs – contribute towards net zero and provide connectivity

Freight Issues

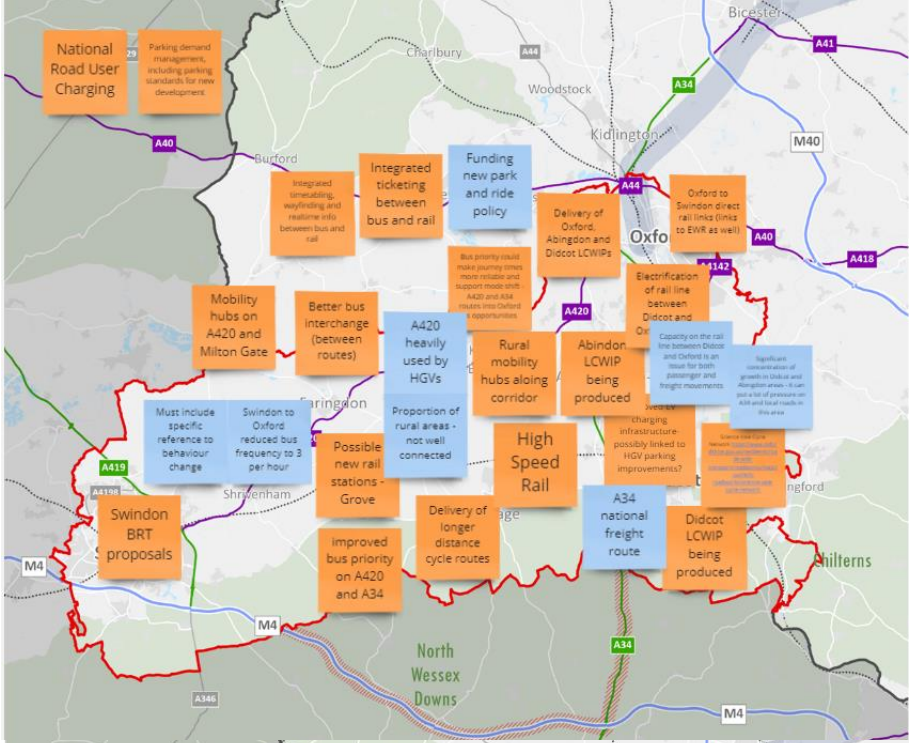
- A420 heavily used by HGV's
- Lack of freight facilities for drivers (wellbeing/staffing) including A34
- Lack of lorry parking facilities on the A34/M4
- A34 is a national freight route
- Managing the increased demand for moving freight and goods including increased HGV movements
- Lots of distribution/logistics companies in Didcot leads to high HGV flows
- Solent to Midlands freight movements

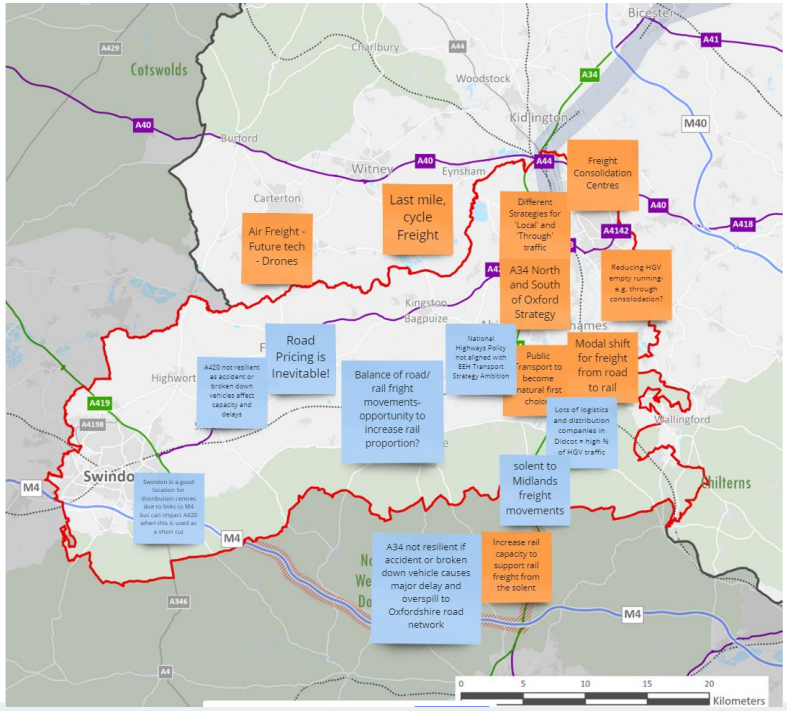
Stakeholder Engagement

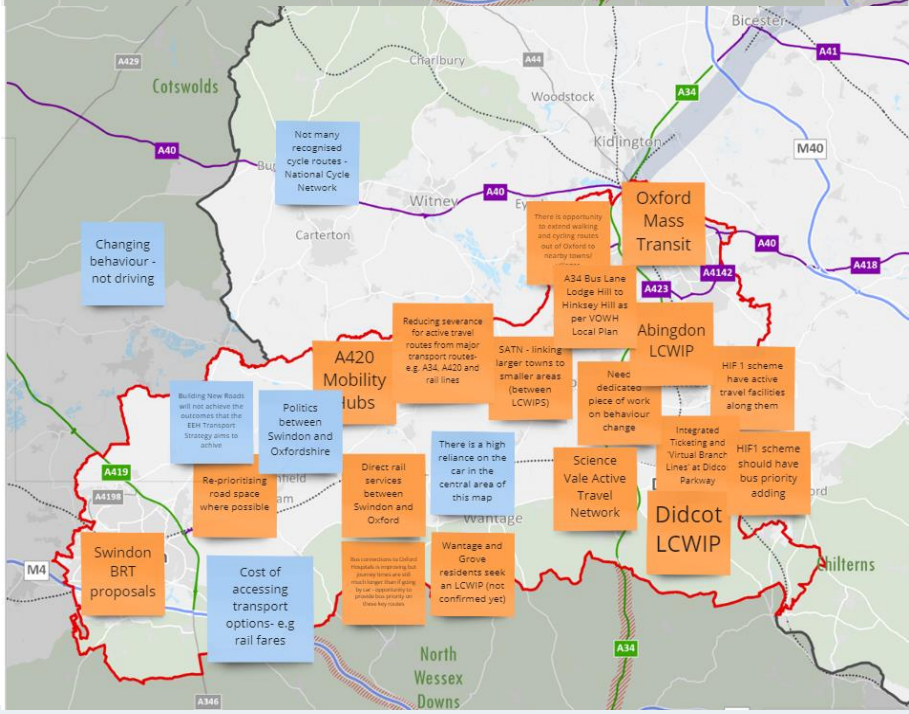
Freight Opportunities

- Consider the local/strategic balance of HGV movements on the A420 and A34/M4
- Reduce freight movements, reduce empty running
- Air Freight – Drones
- Last mile cycle freight
- Freight Consolidation Centres
- Reducing HGV empty running
- Modal shift from road to rail
- Increase rail freight capacity from Solent
- Swindon good location for distribution centres due to M4 but can impact A420

Data Source: Steering Group Miroboard







Stakeholder Engagement

Stakeholder Group

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

General Issues and Opportunities

- Need to consider non-commuting journeys
- Range of heritage assets across the region
- Oxford LEZ Implementation
- Climate change resilience of proposed infrastructure measures
- TfSE SW Study/ Western Gateway M4/GWML covers area to the south – need to work together
- Mobility Hub concepts for better interchange between bus and rail
- OxCam Local Natural Capital Plan (LNCP) evidence base provides useful baseline data
- Local mobility interchanges Kingston Bagpuize, Southmoor West, Coxwell Road, Faringdon, Highworth Road Shrivenham
- Great Western Park Didcot – 7,000 new homes
- Access to Harwell Campus

Bus Issues

- Little to no bus priority
- End-to-end bus services on A420 – but slow journey times
- Lack of express bus services - route through the villages

Bus Opportunities

- Longer distance A420, A34/M4 vehicle trips to shift to bus or rail
- More direct express bus services
- Bus priority measures, intermodal interchanges and formal P&R sites on the A420 for the S6 bus service
- Make bus services more accessible, convenient by extending peripheral links, better waiting facilities
- A420 S6 service patronage has grown rapidly

Rail Issues

- Oxford Station capacity constraints
- Twin track between Didcot and Kennington
- Lack of electrification
- Single entrance to Didcot Parkway station
- Catering for both freight and passenger services on the Didcot-Culham line
- No direct Bristol-Swindon-Oxford rail service.

Rail Opportunities

- EWR opportunity for direct link from Southampton to Golden Triangle – logistics sites at MK
- Extend EWR to Swindon/Didcot and beyond to Bristol/Bath
- Direct rail link Swindon to Oxford
- Intermediate stations at Grove & Shrivenham – improve connectivity with Oxford, Swindon, Reading, London
- Improve links to Crossrail

Active Travel Issues

- Lack of segregated infrastructure on inter-urban and rural roads – A420 a barrier to cycling

Active Travel Opportunities

- Improve walk/cycle connectivity with bus stops – along the A420
- Strategic cycle routes between towns

Stakeholder Engagement

Private Vehicle Issues

- Poor road safety record on the A420 – lack of resilience when accidents occur – narrow/circuitous diversion routes (including for buses)
- A420 Junction congestion including A420/A415 and A417/A4130 impacting bus reliability
- A420 functions as both a local and strategic route – conflict in movement requirements
- Strategic function due the M4-A34 travel distances
- Villages suffer from traffic impacts
- Congestion issues Coxwell Road and Park Road Faringdon
- A34 not fit for purpose

Private Vehicle Opportunities

- Expansion/role-out of the EV charging network
- A420 – need for further dualling
- A420 – 40mph average speed cameras except for buses

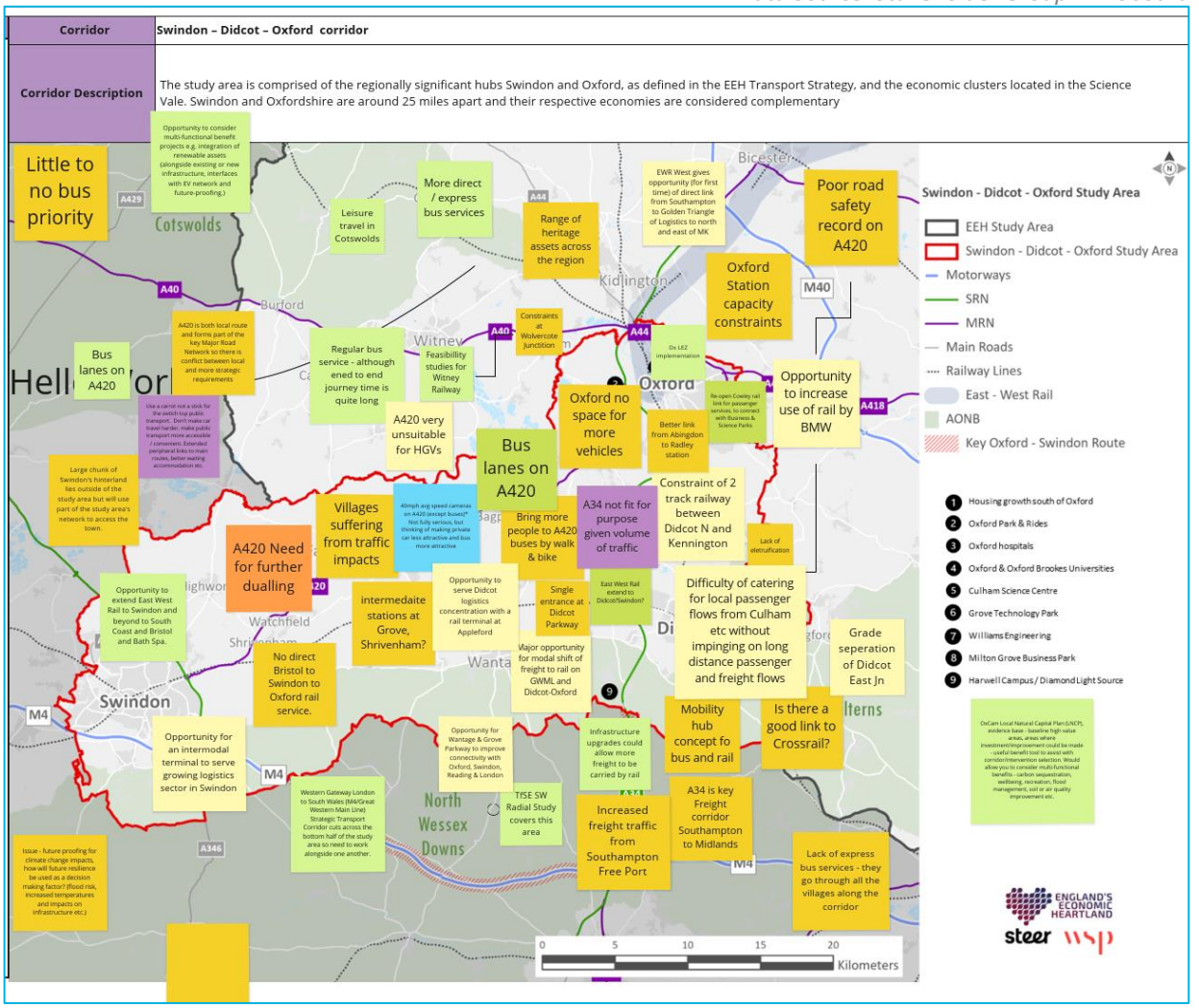
Freight Issues

- A420 unsuitable for HGV movements
- Increased freight traffic from Southampton Free Port
- A34 Key Freight corridor Southampton to the Midlands

Freight Opportunities

- Rail Freight Terminal at Appleford
- Intermodal Freight Terminal to serve Swindon
- Modal shift freight to rail on Great Western main ine and Didcot-Oxford

Data Source: Stakeholder Group Miroboard



Stakeholder Engagement – Local Members

Local Member Engagement

A Local Member Workshop and local authority engagement sessions have been held on the study to gain insight into the issues and opportunities in the study area. A summary of the key findings from these engagement sessions are provided below.

General Issues and Opportunities

- Need to ensure no all the interventions are focused on access into Oxford, the Market Towns need better connectivity
- Too many movements require access into Oxford and then back-out
- Consider the RTPI Avoid/Shift/Improve approach to identifying the interventions.
- Need to consider better spatial planning – 15-minute neighbourhoods.
- Redevelopment of the Honda site – additional movements on the network
- Opportunities for Transport Hubs/P&R near the villages along the A420
- Liveability/wellbeing not seen as a transport priority in place shaping decisions.
- Health inequalities - high levels of deprivation in Blackbird Leys, Littlemore, Rose Hill, Northfield Brook and Barton.
- Integrated ticketing and MaaS.
- Use land value uplift to deliver transport improvements – Cowley Line
- Opportunity for rewilding and living lanes.
- Oxford – sectorisation like Ghent

Bus Issues

- Lack of bus/public transport connectivity between the market towns
- Some villages have no buses to connect to Wantage which is the main service town.
- Lack of direct bus routes between Oxford and the Science Vale (Culham, Harwell, Milton Park etc).

Bus Opportunities

- Improve bus connectivity between the market towns and villages
- Park and Ride for Abingdon-on-Thames at Radley
- Reopen the Cowley Line
- Mass Transit between centres
- Buses between Wantage and Faringdon should be enhanced to improve connectivity
- Wantage to Cumnor and onto Oxford
- Improve bus journey times Swindon to Oxford

Rail Issues

- Lack of direct services from Oxford to Swindon/Bristol
- Lack of good quality cycle infrastructure to Oxford Parkway Station – South towards Oxford and North to Kidlington.
- Passenger and rail freight capacity on the Didcot-Oxford line.

Rail Opportunities

- New rail station at Grove and Milton Park
- Need to make more of existing rail infrastructure – Swindon-Grove-Milton Park-Didcot-Oxford
- Science Vale Very Light Rail System – linking the main employment sites (Harwell, Milton Park, Didcot, Appleford, Culham, Abingdon On-Thames and Berinsfield).
- LRT for Oxford
- 4-track, electrification and increased line speed of the Didcot to Oxford line.

Active Travel Issues

- Lack of active travel connectivity between the market towns
- Lack of safe active travel infrastructure on routes into Oxford

Active Travel Opportunities

- Improve walk/cycle connectivity between the market towns and villages, and inter-rural-urban cycle network.
- Improve the provision of safe active travel infrastructure into Oxford from the surrounding settlements

Private Vehicle Issues

- A420, congestion and safety key concern, including rat-running through villages.
- Use of the A420 as a through route for freight traffic an issue, should be using the SRN.

Stakeholder Engagement

Private Vehicle Issues (Continued)

- A420, high traffic flows means the road is difficult to cross safely.
- A420 Pinch Points – A419, Watchfield, Faringdon and Appleton.
- A420 – growth causing increased use, with accidents resulting in substantial issues.
- Congestion at the A34/A420 Botley roundabout
- A34 around Oxford functions as both a local and strategic route – conflicting functions with poor active travel provision and environment for local residents.
- A34 elevated around Oxford, lack of resilience to accidents, cannot re-route traffic through Oxford
- Need to reduce private car journeys
- Building new highway capacity will result in induced demand and new car journeys

Private Vehicle Opportunities

- A420 – should be downgraded to a local road, freight movements directed to use the M4-A34
- Reclaim town centres from through traffic and car parking for community (markets/play space) and public realm space improvements.
- Birdlip bypass – missing dualled link on the A419/A417 but concerns will attract freight movements from M5-A417 and A419-M4

Freight Issues

- Not enough freight being moved by rail, particularly from Southampton to the Midlands (A34).
- Narrow country roads not appropriate for accommodating HGV movements
- HGV movements through Shrivenham and surrounding villages.

Freight Opportunities

- Increase the number of freight movements by rail – Rail freight interchange at Milton Park
- Consolidation centres on the edge of settlements so HGV's do not need to travel into the market owns, villages and Oxford city.
- Utilise new technologies for delivery services, E-cargo bikes, water-transport.

Data Source: Member Workshop Miroboard

Call for Evidence

A Call for Evidence was held in March 2022 for the connectivity study area. The call for evidence was made public on the EEH website and promoted amongst stakeholders with an interest in the study but not involved in either the steering or stakeholder groups.

This opportunity allowed external organisations to provide inputs on:

- The key themes within the study area;
- The key movements in the area;
- The key connectivity opportunities and challenges; and
- The key interventions the study should consider.

A total of 21 people or organisations responded to the call of evidence, with a summary of the responses to these questions provided below. A full, more detailed, list of interventions identified by respondents as a part of the call for evidence will be included in the long list of options.

Question 1: Key Themes

The most common identified themes were:

- Decarbonisation / net zero
- Accessibility by and use of non-car modes
- Environmental protection and enhancement

Other Key themes included:

Sustainable Travel

- Maximising the use of the existing rail network for commuting and freight
- Sustainable connectivity between home and work
- Increasing levels of active travel and improved bus connectivity
- Bus journeys times and costs (Wantage to Oxford)
- Interchange between rail and bus

Digital

- Need for high-speed digital infrastructure

Private Car Travel

- Road congestion including the A420, A34, A338 (Wantage), A417
- Car dependency in rural areas and high levels of car use in Oxford

Environmental, Health and Wellbeing

- Infrastructure that is resilient to climate change
- Consider health, wellbeing and nature

Political

- Lack of joined-up approach between Local Authorities – needs better co-ordination

Question 2: Key Movements/Trip Attractors

- The most common identified movements and trip attractors were:
- Long distance through movements (A34, A420) and inter-urban travel demands
- Local trips to / from and within the main towns
- Direct rail service between Oxford-Didcot-Swindon
- Specific identified movements included:

Local Movements

- To and from the main settlements of Oxford, Swindon and Didcot
- Limited commuting into Swindon
- Movements from rural communities to key service centres
- Swindon to Shrivenham (by bicycle)

Inter-Urban Movements

- Inter-urban movements including Swindon-Oxford, Wantage-Abingdon-on-Thames -Oxford, Didcot-Abingdon-on-Thames -Oxford, Swindon-Shrivenham-Wantage-Didcot, Didcot-Oxford
- Commuting eastwards from Swindon (due to lower house prices)

Employment Sites

- To and from the Harwell Campus

Through and Longer-Distance Movements

- A34 route freight route to southern ports and commuting
- To and from London –commuting and rail freight
- Oxford to London
- Rail freight movements through Didcot between London and Southampton to the West Midlands and North-West as well as from the west, South Wales.

Call for Evidence (continued)

Specific identified trip attractors included:

- Abingdon-on-Thames
- Wantage poor retail centre compared to Faringdon
- Major employers in Wantage, Grove, Honda Site in Swindon,
- Oxford Science Park
- Growing logistics hub in Swindon increasing freight movements
- Science/tech Centres including Oxford, Harwell Campus Milton Park, Didcot
- Oxford main destination for Hospitals and larger retail shopping centre

Question 3: Key Connectivity Opportunities and Challenges

The most common identified opportunities were:

- A rail station at Grove – Mobility Hub/Bus Interchange for Wantage/Grove and surrounding villages
- Decarbonise transport by utilising new technologies increasing sustainable and active transport
- Freight Consolidation Hubs (Rail, Bicester, Aynho Junction Chiltern Line, Theale, Swindon)
- Direct rail services Oxford-Didcot-Swindon
- East West Rail – including extension west
- People and environment-centric decision-making.

The most common identified challenges were:

- Congestion on the A420 – lack of active travel and safe crossings
- Climate change and environmental impacts
- Poor non-car connectivity to major employment sites
- Lack of rail capacity and accessibility
- New developments will place increased pressure on the congested road network

Specific identified issues include:

Sustainable Travel

- Electrification of the rail network
- No safe cycle route between Swindon and Shrivenham and lack of national cycle network routes/commuting east of Swindon
- Affordability of rail improvements
- Poor active travel infrastructure, Wantage and Grove
- Connectivity gaps Wantage to Abingdon-on-Thames and Abingdon-on-Thames to Oxford

Private Car Travel

- Swindon rail station difficult to access
- Congestion on road network serving Grove and Wantage

Environmental, Health and Wellbeing

- Loss of local retail facilities

Freight and Logistics

- Increased HGV traffic to logistic sites in Swindon

Specific identified opportunities include:

Active Travel

- Restoration of Wilts & Berks Canal for walk/cycle connectivity Swindon-Shrivenham-Wantage-Grove-Abingdon-on-Thames
- Improved place-based streetscape design
- Inter-urban cycle routes

Public Transport

- Increased rail frequency between Bicester/Begbroke and Didcot
- Better rail connectivity between east Swindon (8,000 new homes) and west Oxfordshire (vicinity of A420/A419 Interchange)
- LRT System Linking Oxford, Witney, Woodstock, Abingdon-on-Thames, Wantage/Grove, Faringdon, Harwell Science Park
- Interchange Hubs – Bus, DRT, Rail
- Non-car connectivity to the Harwell Campus
- Non-car connectivity to key employers in Wantage and Grove (Williams)
- Reopening the Cowley branch line
- More platforms at Oxford Station – bottleneck
- Oxford to Swindon rail line, Interchange Hubs between modes with integrated ticketing
- Improved trains – double decker carriages with improved facilities for bicycles, prams and mobility aids

Call for Evidence (continued)

Road Network
- Improve the A420 Swindon to Oxford as the alternative route via M4/A34 increases carbon footprint

Freight and Logistics
- East West Rail releasing capacity on the West Coast Main line for more freight trains and freight access from the East
- Increase rail freight

Digital
- Improvements in digital connectivity

Spatial Planning
- Improvement in work opportunities/services in rural communities to reduce the need to travel

Environmental, Health and Wellbeing
- Improving the environment as part of new transport links
- Improving access the green space/natural environment to improve health and wellbeing
- Improving air quality

Question 4: Interventions

The most common identified intervention themes were:

- Public transport – particularly rail based and maximising use of existing assets
- Active travel – new cycle routes including inter-urban routes
- Freight travel
- Electric vehicle charging points

The most common identified location specific interventions were:

Rail
- New rail station at Grove
- Four-tracking to increase rail capacity through Oxford
- East West Rail – including Freight capacity and extension to Ox-Did-Swi-Bristol
- Rail Freight Hubs/Consolidation Centres
- Direct rail services between Oxford-Didcot-Swindon
- Reopening Cowley Branch Line
- Electrification of the rail network
- Increased frequency of train passenger services through central Oxfordshire

Active Travel Infrastructure
- New and improved cycle routes

Vehicle Infrastructure
- Improving the A420 route
- Electric Vehicle charging locations

- Specific identified opportunities include:

Public and Shared Transport
- DRT for Didcot and surrounding villages including Harwell and Didcot Parkway
- Electric Car Club vehicles at key employment sites and settlements
- Rapid inter-urban bus services – A420
- Improved bus services to the John Radcliff Hospital
- Reinstated Village bus services

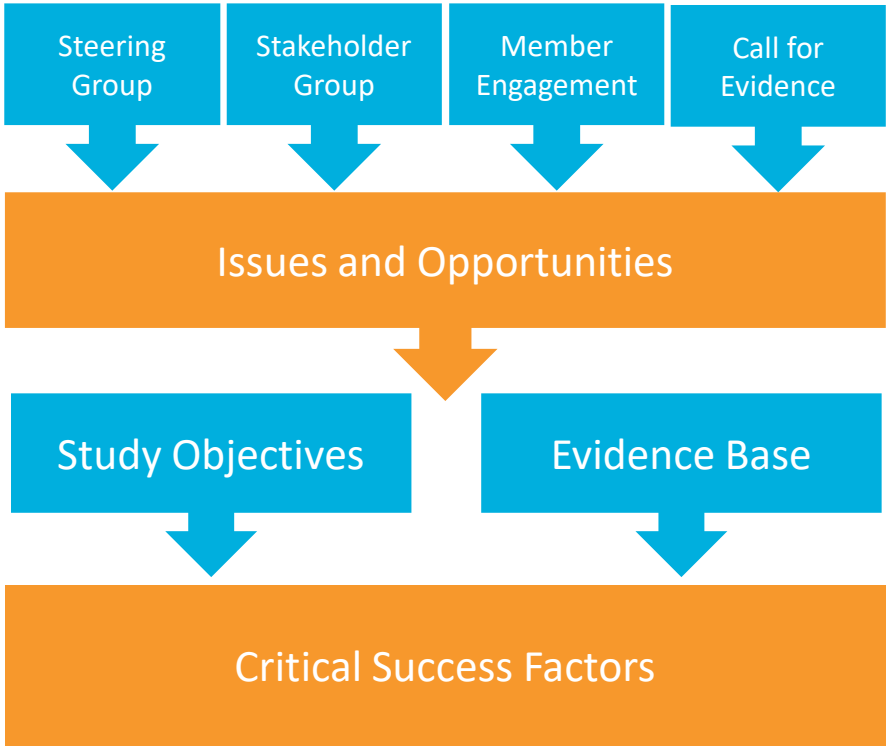
Rail
- Improve cycle facilities on trains
- Oxford city metro/suburban rail network
- Rail station on the east side of Swindon
- Rail station/Transport Hubs along the Oxford-Swindon line
- New Begbroke Rail Station

Active Travel Infrastructure
- Direct cycle route between Swindon and Shrivenham

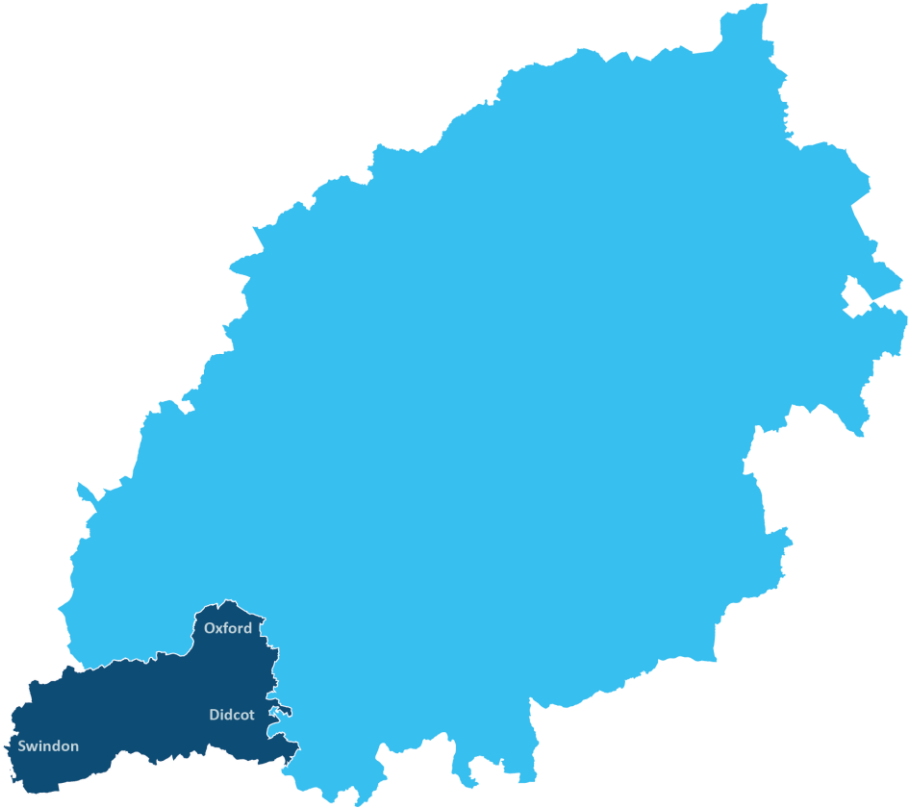
Freight and Logistics
- Discourage HGV/Freight use from the A420 and use the M4/A34
- Rail Freight Interchange at the old Honda site Swindon to minimise HGV movements for future logistics use

Summary

The feedback received from the Steering Group, Stakeholder and Member workshops and Call for Evidence 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 (Part 4 Need for Intervention).



EEH Principle	Issues Summary	Opportunities Summary
Achieving Net Zero	• High car dependency particularly in rural areas • Lack of bus priority and connectivity between all settlements • High HGV movements on the A420/A34 • Competing rail passenger/freight demands • Car-dependent employment sites	• New Park and Ride sites • BRT/LRT/Mass Transit Oxford and Swindon • Bus priority on key routes • Implementing LCWIPS • Direct rail services Oxford-Swindon and new stations • Strategic cycle routes • Behaviour change programme • Better settlement connectivity
Sustainable and active travel	• Poor quality infrastructure including connectivity and segregation – particularly along key corridors • High flows resulting in community severance • Lack of good quality infrastructure extending into the main settlements	• Implementing LCWIPS and additional LCWIPS • Increased bus frequencies to key trip attractors • Behaviour change programmes • Additional Park and Rides • New parkway and settlement stations – Grove/Swindon • Corridor and rural mobility hubs
Connecting people and businesses to opportunities	• Pinch point road congestion • Strategic movements on the A420 • Bus priority on key corridors • Rural public transport connectivity • Access to key economic assets – e.g. Science Vale • Lack of direct rail services	• Strategic Housing Sites • Increased employment across the study area • Improved digital access • Mass Rapid Transit and Express Services • Science Vale connectivity • Mobility Hubs • Park and Ride sites • Bus priority measures
Efficient Movement of People and Goods	• Rail freight – competition between passengers and freight • Increasing numbers of HGV's (A420) and LGV's including home deliveries	• Increase rail freight • Freight consolidation centres • Reduce empty HGV movements • Supporting EV take-up



Part 2e

Summary

Overview

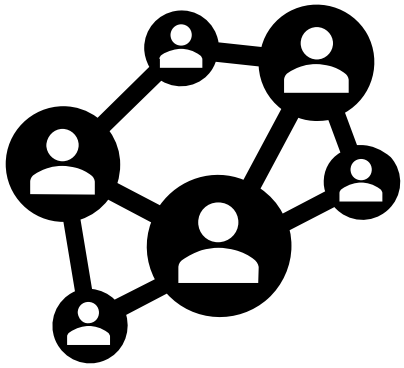
People

- The evidence provided in this section shows that the study area is socially diverse with concentrations of low-income groups in Swindon and Oxford.
- Low-income groups are more dependent on low-cost travel options (walking, cycling and public transport) to access jobs, education and community facilities and more likely to experience fuel poverty.
- Targeted interventions in Oxford and Swindon, that improve access to public transport and high-quality cycling infrastructure can transform the ability of these low-income groups to access jobs, educations and essential services.
- Residents in the smaller villages/hamlets and the isolated employment sites (Harwell) have limited access to public transport and active travel infrastructure. Improved digital and innovative rural transport interventions will be needed to improve access and decarbonise transport connectivity.

Place

- The study area is polycentric with two main settlements a range of smaller towns and villages and hamlets in the central study area.
- There are two main travel to work catchments centered on Swindon and Oxford-Abingdon-Didcot.
- The central study area comprises a number of small towns located along the A420 corridor and Wantage/Grove to the South which are reliant on Oxford and Swindon for higher level services and access to a wider range of job opportunities.
- Place-based transport interventions are needed to enable the high number of internal movements in Swindon/Oxford and inter-urban movements to transition away from car dependency to more sustainable modes of travel.

Connectivity



- Poor local access to the Great Western Main Line and localised passenger and freight capacity challenges on the Cherwell Valley Line.
- High car dependency for inter-urban movements combined with HGV movements on the A34 and A420 result in a conflicting mix of local, inter-urban and long-distance journeys.
- Opportunities include mass rapid transit in the Science Vale, new/expanded P&Rs in Oxford and Swindon;
- Improved rail access to the Great Western Main line, including new stations and direct services between Swindon and Oxford;
- Enhanced active travel infrastructure in Swindon, Abingdon and Didcot and links to settlements within cycling distance of Oxford and Swindon.
- The A420 is an important east-west corridor which would benefit from multi-modal interventions.

Sub area profiles

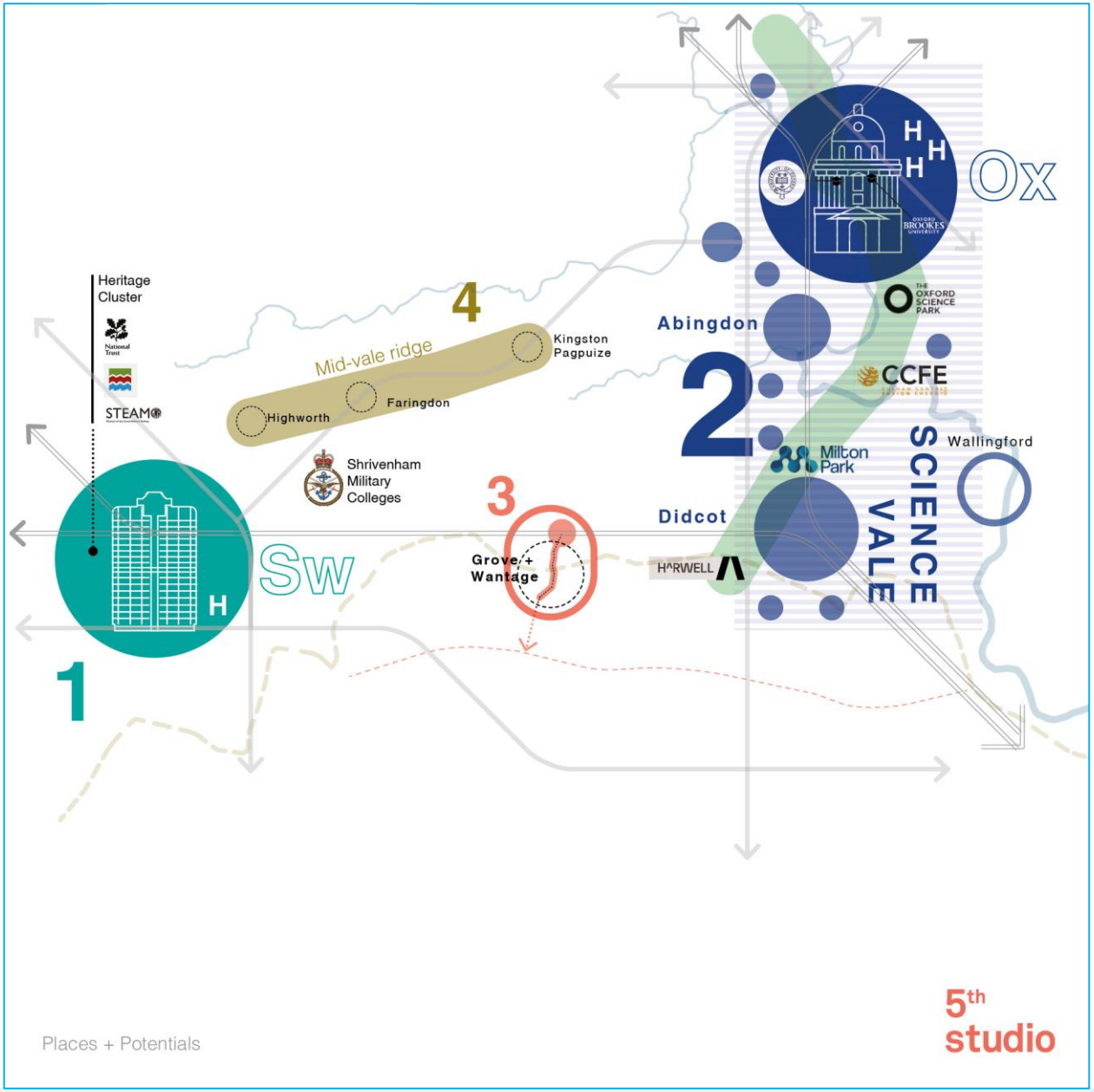
Combining observations from the previous analysis has helped us to identify four sub-areas, each with their own place quality, challenges and opportunities.

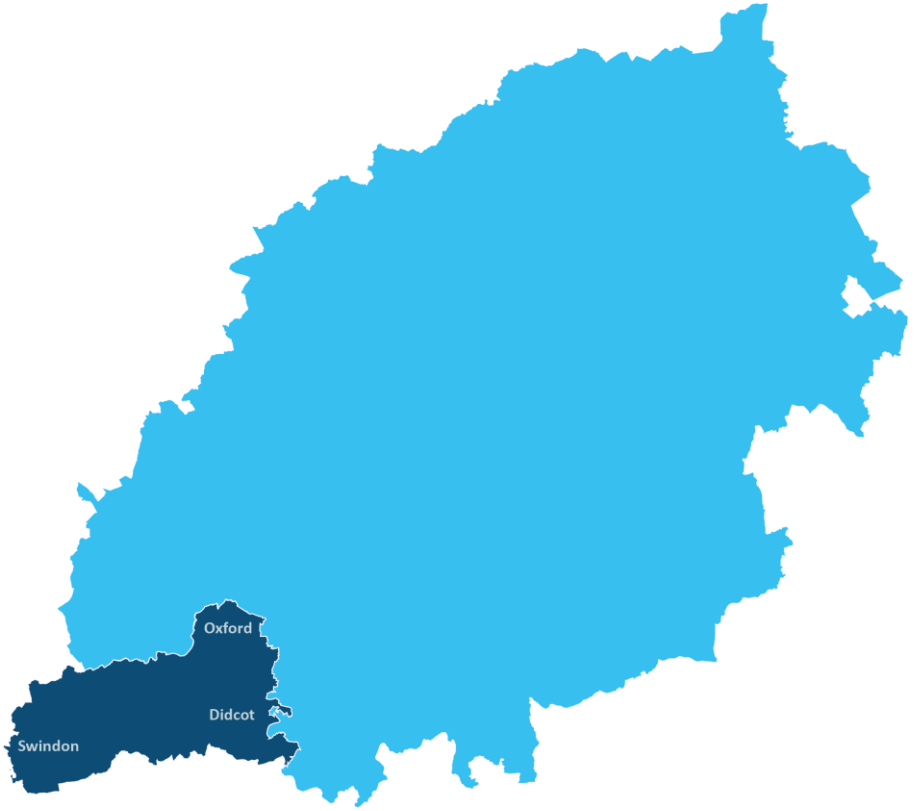
1 Swindon - A highly self-contained large town with a strong sense of place related to its historic hilltop core, town centre and rail quarter. Alongside ensuring planned growth is well integrated in movement terms there are opportunities – given the loose grain, extensive areas of landscaping, and scope for road reallocation - to retrofit and improve the car-oriented suburban areas to better support active and public transport.

2 Greater Oxford – A network of out-of-town, employment locations and settlements - ranging from constrained, historic Oxford, to major growth points like Didcot - arrayed along the A34/rail corridor, where improvements in active and public transport would further strengthen the integration of this important economic cluster.

3 Grove and Wantage - Relatively isolated settlements, where a new station could serve the existing population, and as a focal point for the rural hinterland, and also potentially act as a gateway point to the Downs for visitors.

4 Ridgetop towns – These compact rural towns may, having generally already been bypassed, benefit from measures to green and calm streets to better support walking and cycling locally, alongside route improvements to speed up public transport services linking to Oxford and Swindon.





Part 3

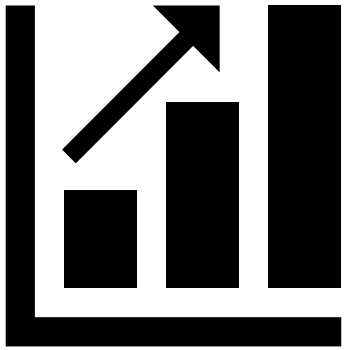
Future Context

Overview

Background

This chapter will set out the scale of the growth challenge and provide an understanding of the committed transport improvements schemes within the study area. It will also demonstrate 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. Housing and economic growth within the study area should be provided in a sustainable and equitable way.

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 recent Covid-19 Pandemic, has required a fundamental shift in how society and business operate on a day to day basis. The pandemic has 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 will be short lived, such a significant transformation in everyday life will undoubtedly lead to some longstanding transport behaviours and patterns.

Future Growth Sites

Residential Sites

In the Swindon – Didcot – Oxford study area a total of 179 residential developments are expected to be constructed between 2022 and 2031. This is forecast to result in an additional 66,853 dwellings in the study area.

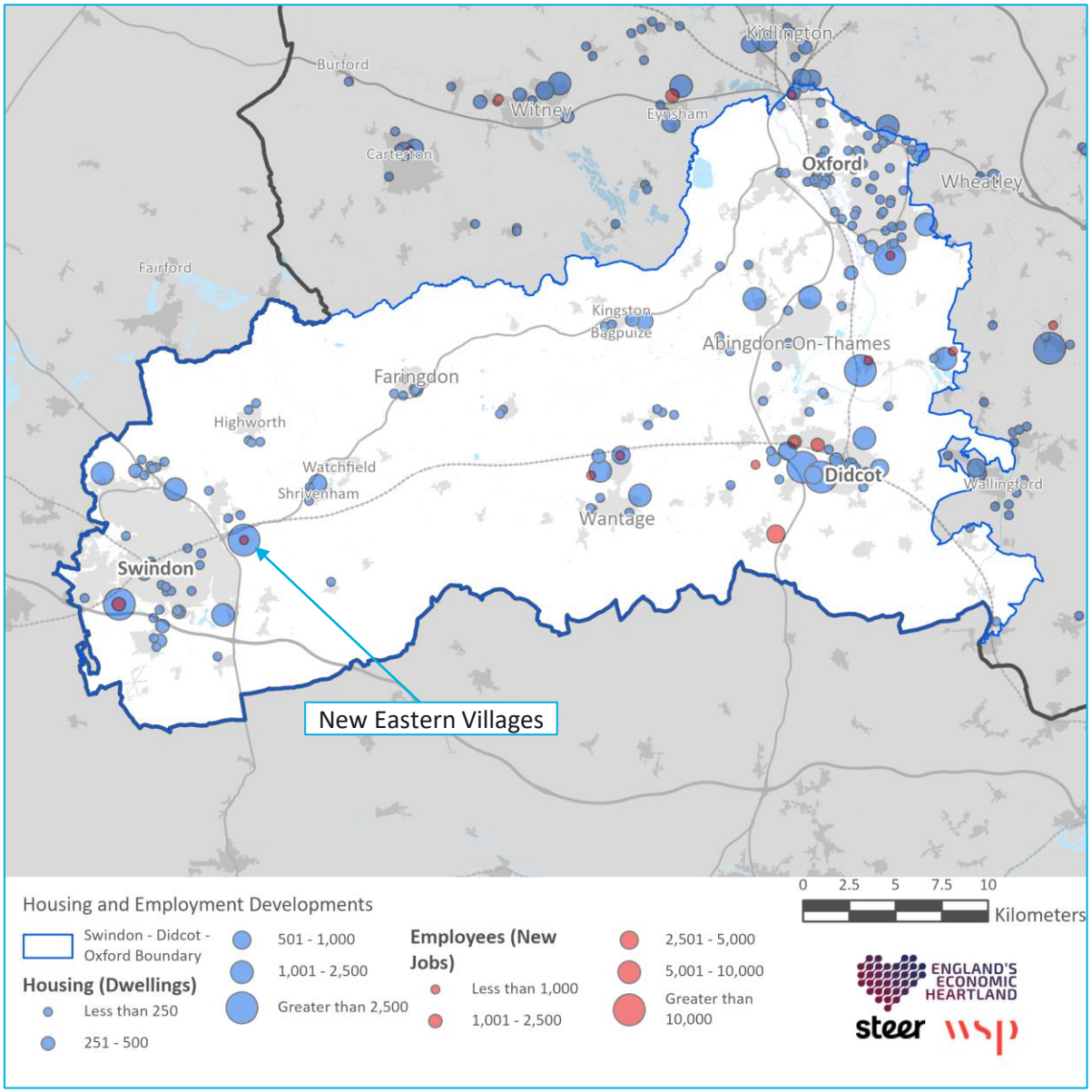
The largest housing developments are situated surrounding four Settlements of Strategic Importance. The largest development is the "New Eastern Villages development" the East of Swindon. This will provide an additional 9,000 dwellings in the study area.

Employment Sites

There are 13 employment growth sites in the study area, totalling 115 hectares and equating to roughly 11,337 jobs. The largest employment growth sites are situated within and surrounding Didcot, including Harwell Campus and Milton Park. Other large employment growth sites include Wichelstowe in Swindon.

The largest growth sites are located on the periphery of Swindon, Oxford, Wantage and Didcot. Urban extensions face transport sustainability challenges unless high quality public transport and active travel connections to key destinations are provided from the outset. Planned growth in smaller settlements along the A420 and Wantage will be more challenging to deliver sustainably due to limited existing opportunities to travel by non-car modes.

Data Source: EEH Databank



Population

TEMPro Forecasts

The planned increases in population will result in additional intra-urban and inter-urban travel demands that will put further pressure on the existing transport networks.

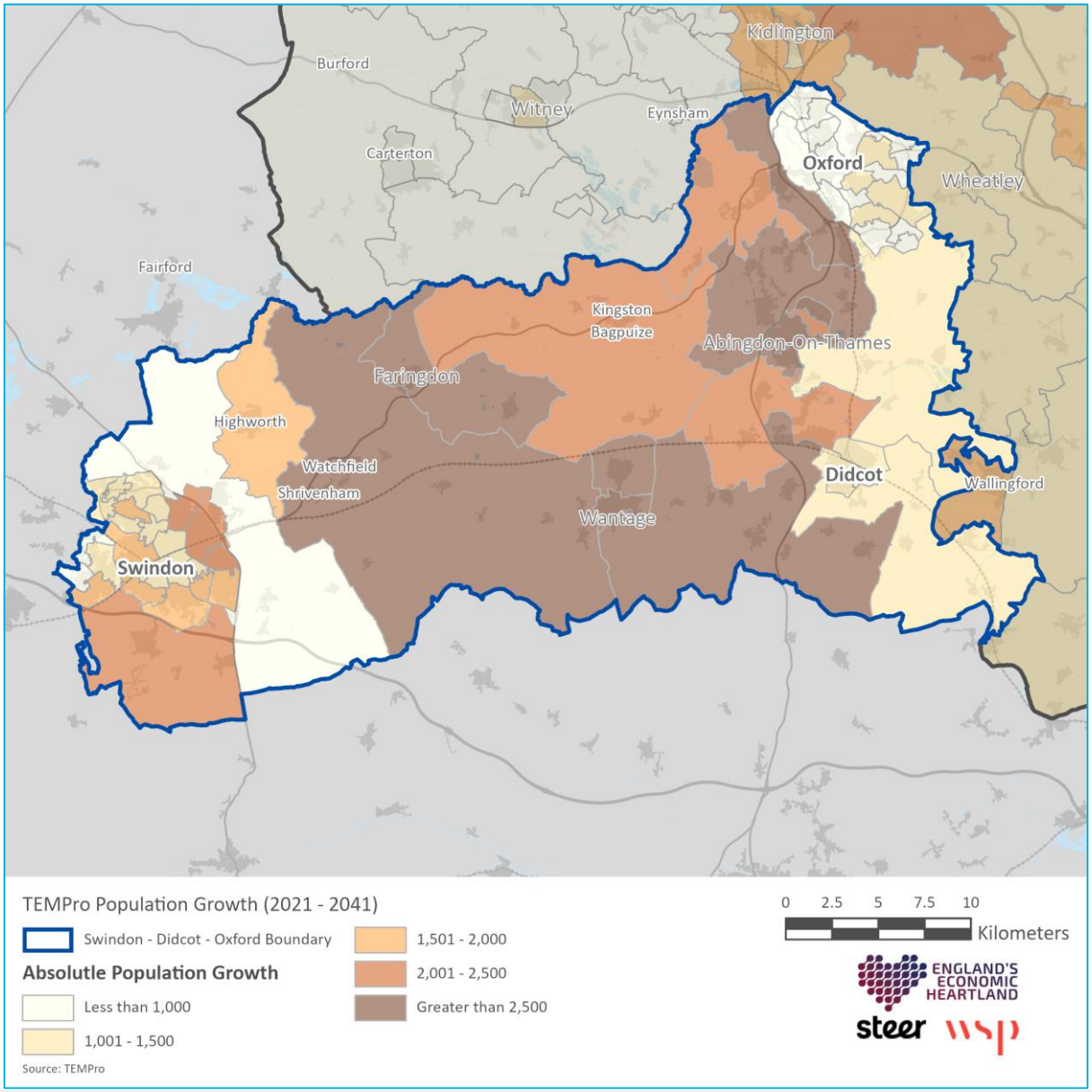
The MSOAs which are expected to experience the largest population growth within the study area are mostly situated within the study area's rural centre. Areas surrounding Shrivenham, Grove, Wantage and Faringdon are forecasted to experience a population increase of more than 2,500.

Substantial development is also forecast to the south of Swindon and west of Oxford, particularly surrounding Abingdon-on-Thames.

The MSOA immediately to the east of Swindon is forecast to experience low levels of population growth, despite the New Eastern Villages development being situated in this area. Central Oxford is also forecast to experience low levels of population growth.

Without mitigation, population growth in the centre of the study area will increase demand for car travel and increase congestion on the local highway network. To address this, improved sustainable transport connectivity along the A420 corridor and between Wantage and the Science Vale will be needed.

Data Source: TEMPro, 2019 Mid year Population Estimates



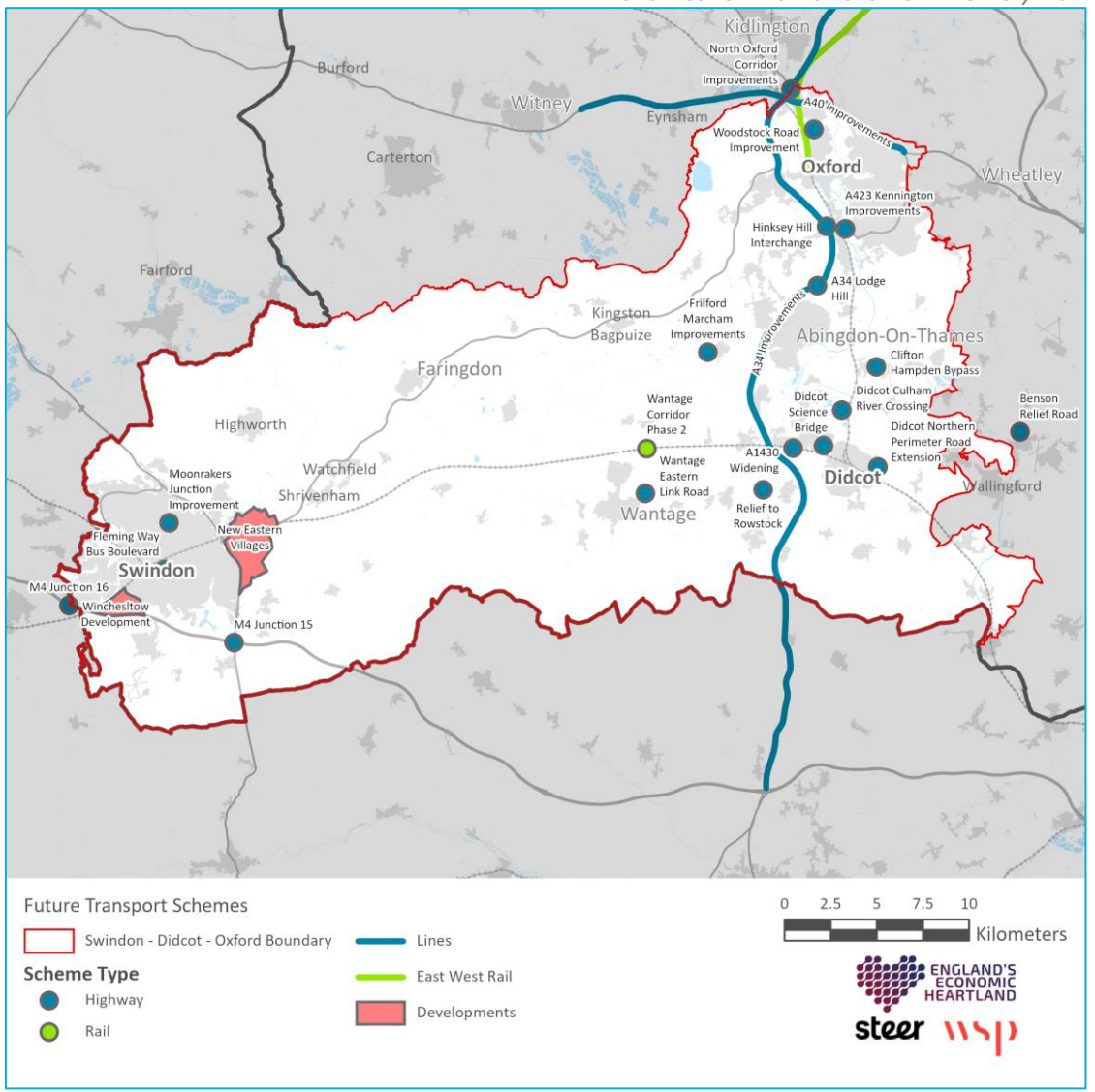
Transport Improvement Schemes

A number of strategic transport improvement schemes are planned in the study area. These includes:

- **New Eastern Villages Transport Improvements:** New residential developments to the east of Swindon will deliver a range of transport improvements, including to the A420.
- **A34 Improvement Project:** National Highways are exploring opportunities to reduce congestion on the A34 between the M4 and M40. Their immediate focus is to explore the interaction between the A34 and other local roads.
- **Wantage Corridor Phase 2:** This study is exploring rail connectivity improvements in Grove and Wantage, including the feasibility of opening a new station along the Great Western Mainline.
- **M4 Improvements:** National Highways are making improvements to junctions 15 and 16.
- **Science Vale Cycle Network:** 8 routes that will provide greater connectivity between key employment centres at Harwell Campus, Milton Park and Culham Science Centre and the key urban centres of Didcot, Abingdon and Wantage within the Science Vale area.
- **Other Schemes include:** East West Rail Connection, Clifton Hampden Bypass, Rowstock Relief Road, A420 Roundabout at Shrivenham, Land East of Kingston Bagpuize and Proposed A420/Coxwell Road Function Improvements.

Most transport improvement schemes in the study area are highway focused. Future transport improvements schemes must prioritise active travel and public transport to reduce congestion and deliver improved decarbonised transport connectivity.

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



Covid-19 Recovery

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

National Response

In combating the spread of Covid-19, the UK government has taken a number of significant actions that have placed restrictions on individuals, areas and the wider economy. Whilst these restrictions have caused very significant disruption to people's lives, they have also resulted in changes of behaviour in the current, emerging position from the pandemic. If continued, these could help to resolve some transport-related issues.

Examples of measures taken by organisations include:

- Investing in IT systems to support remote working
- Expansion of capacity of home delivery services
- Contactless payment preference
- Bus services reduced in medium to long term
- Reduced local services due to closing down

Attitudes to Public Transport

Due to the increased physical interaction required by public transport, there has been reluctance to return to bus and rail use. Transport Focus's latest research from March 2022 found:

- 87% of train passengers feel safe in relation to Covid-19; however only 68% of non-rail passengers would feel safe if they had to make a rail journey.
- 82% of bus passengers feel safe in relation to Covid-19; however only 63% of non-bus passengers would feel safe if they had to make a rail journey.

The safety concerns expressed by non-rail and non-bus users is likely to be a significant barrier to encouraging mode shift and encouraging greater use of public transport. 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.

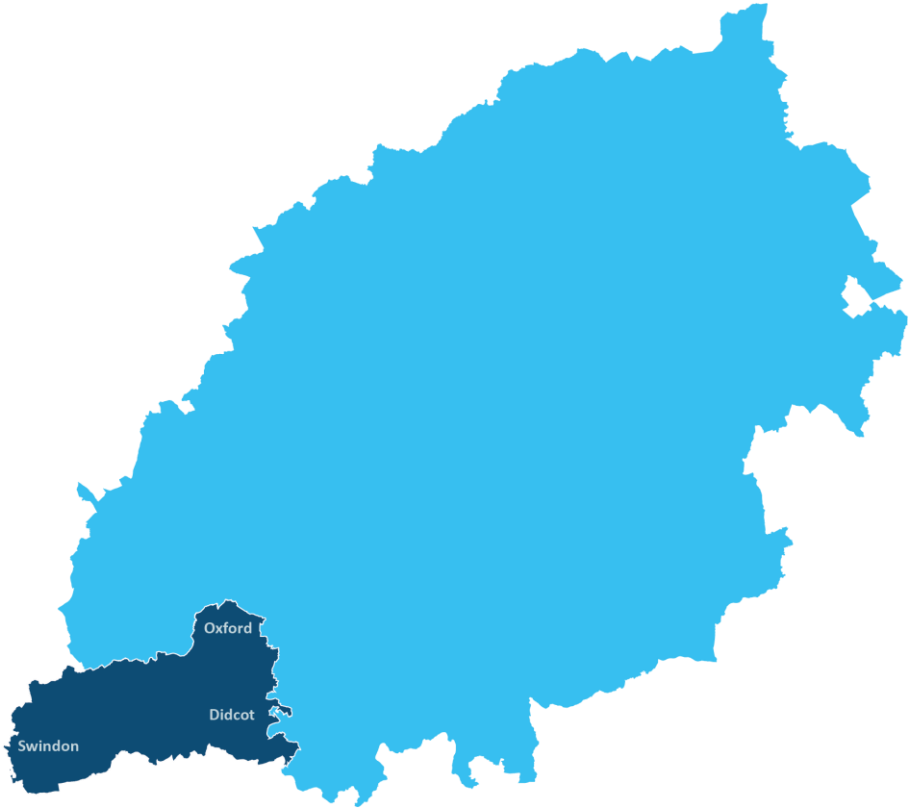
Several large companies have established policies outlining WFH patterns that can be allowed for employees in the future. British Airways, BP, and Nationwide have outlined that WFH will become an accepted practice for at least a few days a week. As more organisations embrace the use of WFH, total commuting 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.[1]
- **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.[2]

[1] 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 Chemestry and Physics Discissions. [Online]. Available at: https://acp.copernicus.org/preprints/acp-2020-838/acp-2020-838.pdf [Accessed 1 September 2021].
[2] 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]

Summary

Theme	Issues & Opportunities
FUTURE GROWTH	**Issues** • **Growth –** substantial levels of housing and employment growth are planned within the study area. This will result in substantial increases in population, jobs and travel demand. There is a risk that the substantial growth planned in urban extensions will become car-dependent if a mix of land-uses and public transport and active travel access is not provided to key destinations from the outset. Without sustainable connectivity interventions, growth planned in Wantage and along the A420 will be car-dependent due to the need to access Swindon and the Science Vale. It is unlikely that new developments will be able to deliver significant and widescale improvements to transportation infrastructure on their own. • **Covid-19** – bus and rail patronage is still below pre-Covid-19 levels. Lower levels of demand for existing bus and rail services threatens the commercial viability of existing services. Traditional commuter travel patterns are changing with an increasing proportion of people adopting hybrid working arrangements and only commuting a few days a week. **Opportunities** • **Sustainable Urban Extensions –** 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 masterplanning 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. • **Hybrid working –** operators should explore the introduction of flexible monthly / season ticketing arrangements that support hybrid working arrangements. • **A420 Corridor –** multi-modal interventions along the A420 corridor to enable future residents in the planned developments to access Swindon and Oxford by attractive public transport. • **Wantage/Grove –** new rail station to transform the opportunity to travel locally by public transport into Didcot, Oxford and Swindon.
TRANSPORT SCHEMES	**Issues** • **Highway Schemes –** A substantial number of planned transport improvements schemes are focused on highway capacity improvements including improvements on the A34, M4 Junctions 15 and 16 and Wantage Corridor Phase 2. Designing for increased private vehicle capacity will continue to support car-dependent travel behaviours within the main settlements and for cross study area movements. **Opportunities** • **Oxford and Swindon –** internal travel within Oxford and Swindon make up a large proportion of travel demand within the study area. There is huge potential for modal shift within Swindon due the high level of internalised trips. Improved active travel infrastructure, demand management, and bus priority will support the decarbonisation of the local transport network. • **Science Vale–** substantial levels of growth are planned for the Science Vale. Mass transit opportunities, improved rail access and active travel inter-urban connections could transform the way people travel between Didcot, Abingdon and Oxford. • **A420 –** HGV demand management alongside multi-modal opportunities to improve connectivity into Swindon and Oxford. • **Rail –** new stations on the Great Western Main Line and direct services between Swindon and Oxford to support planned developments and reduce car dependency.



Part 4

Need for Intervention

SWOC Analysis

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

Strengths

- The study area is home to approximately 550,000 people, which is forecast to grow, resulting in a substantial 'addressable market' that will directly benefit from enhanced intra-urban and inter-urban connectivity.
- The EEH region is the heart of the UK's academic and commercial research sector, having a unique combination of scientific and cultural assets, resulting in a highly skilled workforce in the areas of innovation and technology.
- There is existing active travel infrastructure in the study area, such as the Sustrans National Cycle Route and nature trails, which provide strategic connectivity between settlements. There are also a large number of local routes that provide interurban connectivity. High quality active travel networks will help encourage a sustainable modal shift in the study area.
- Oxford has achieved high levels of active travel and bus usage within the city.
- Cherwell Valley Line and the Great Western Main Line provide key transport assets, providing strategic north-south and east-west rail connectivity.
- The A43 and Cherwell Valley Line are key in connecting the international ports along the south coast of England with the midlands.

Weaknesses

- High car usage in the study area results in many junctions experiencing congestion, including junctions on the A4 and M34 as well as radial routes in Oxford and Swindon.
- The Greenbelt around Oxford may impact the deliverability of new transport infrastructure interventions.
- There is limited bus access outside major urban areas. Inter-urban bus services often operate on a low frequency and have journey times not competitive with travel by private car.
- CO_2 emissions have fallen at a slower rate than the average for the UK, with the city of Oxford having the largest AQMA in the study area.
- There is an urban / rural divide in the distribution of ECVP points across the study area and an inconsistency in provision along the major road network.
- Rail connectivity in the centre of the study area and between the northeast and southwest of the study area is poor. There is currently no direct rail connection between Swindon and Oxford and no intermediate rail stations along the Great Western Mainline between Didcot and Swindon.
- The function of the A420 results in conflict between local and through traffic as the route provides connectivity to several small towns and villages in the centre of the study area but is also the alternative route to the A34 /M4. This results in high flows of HGVs and is likely to contribute to existing road safety issues.

Opportunities

- New public transport and active travel interventions focused within the Swindon and Science Vale travel to work catchments.
- Multi-modal improvements to east-west (Swindon and Oxford) connectivity to support planned growth and enable inclusive access to the full range of opportunities in the study area.
- Mass rapid transit opportunities in the Science Vale, combined with improved rail access and inter-urban active travel connectivity.
- Improved local access (new stations) and direct services from Swindon to Oxford to support development in Swindon, Wantage/Grove, Didcot, Abingdon and Oxford.
- Targeted rural mobility interventions including Mobility Hubs, shared and demand responsive transport, combined with improved rail and inter-urban bus access.
- New express inter-urban public transport interventions along the A420 between Oxford and Swindon that provides journey times comparable to travel by private car.

Challenges

- 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 that rely on Swindon, Oxford and the medium sized service centers to access jobs and services. In these locations achieving net zero will be dependent upon the uptake of zero emission vehicles.
- Substantial levels of housing and employment growth are planned on the urban fringe and in the smaller settlements along the A420 and Wantage/Grove. These locations have high propensity for car-dependent travel patterns to become engrained unless attractive sustainable transport alternatives are provided.
- Conflicting demands on the main road and rail corridors, A34 and A420 accommodating longer-distance freight movements, inter-urban movements and local movements. Rail network accommodating high demand for freight and passenger movements.

Objectives

Key Principle 1:	Key Principle 2:	Key Principle 3:	Key Principle 4:
Achieving net zero no later than 2050, with ambition to reach this by 2040.	Improving quality of life and wellbeing through a safe and inclusive transport system which emphasises sustainable and active travel.	Supporting the regional economy by connecting people and business to markets and opportunities.	Efficient, safe movement of people and goods through the region and to international gateways.
Objectives			
1a – Promote and enable the use of sustainable and active travel modes **1b –** Use technology to reduce the need to travel and enable more sustainable travel (e-vehicles, shared mobility etc) and efficient use of networks to reduce carbon impacts of transport **1c** – Reduce the carbon impact of transport investment and minimise the embodied carbon in scheme construction and future maintenance	**2a –** Create a transport network within the study area that provides comprehensive and sustainable access to education, health, leisure and retail destinations, is affordable and accessible for all and socially inclusive **2b –** Minimise road danger and perception of danger for all users **2c** – Minimise the impact of transport-related air and noise pollution on local communities	**3a –** Improve sustainable connectivity to key economic areas (including major town and city centres, Enterprise Zones, Science Parks, Research and Technology Zones) to better connect workforce to high value opportunities and reduce inequality **3b –** Ensure new developments have good access to a sustainable transport network and are accessible for all	**4a –** Enable efficient, safe and sustainable movement of people and goods through the study area and to key international gateways, ensuring impacts on local communities from freight traffic are minimised **4b –** Facilitate sustainable first mile/last mile connectivity for people and goods in both urban and rural areas

Critical Success Factors

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

They have been developed to provide:

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

The Critical Success Factors are drawn from:

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

The Critical Success Factors are focused around the **four themes** listed opposite.

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

Global Issues

- *Improved digital infrastructure reduces the need to travel*
- *The carbon emissions of transport are reduced to zero by 2050*
- *Improved transport connectivity enables sustainable and high-quality development growth, helping to address inequalities and accessibility issues*
- *The benefits of new technologies that enable improved connectivity are accessible to everybody*

Public Transport and Shared Mobility

- *A high-quality, sustainable, integrated and accessible transport network connects the study area's* Settlements of Strategic Importance *and strategic economic assets.*
- *Rural communities are well connected to key opportunities by the public transport network*

Freight

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

Active Travel

- *Active travel mode share of journeys within and to / from our towns and cities increases*

Critical Success Factors: Global Issues

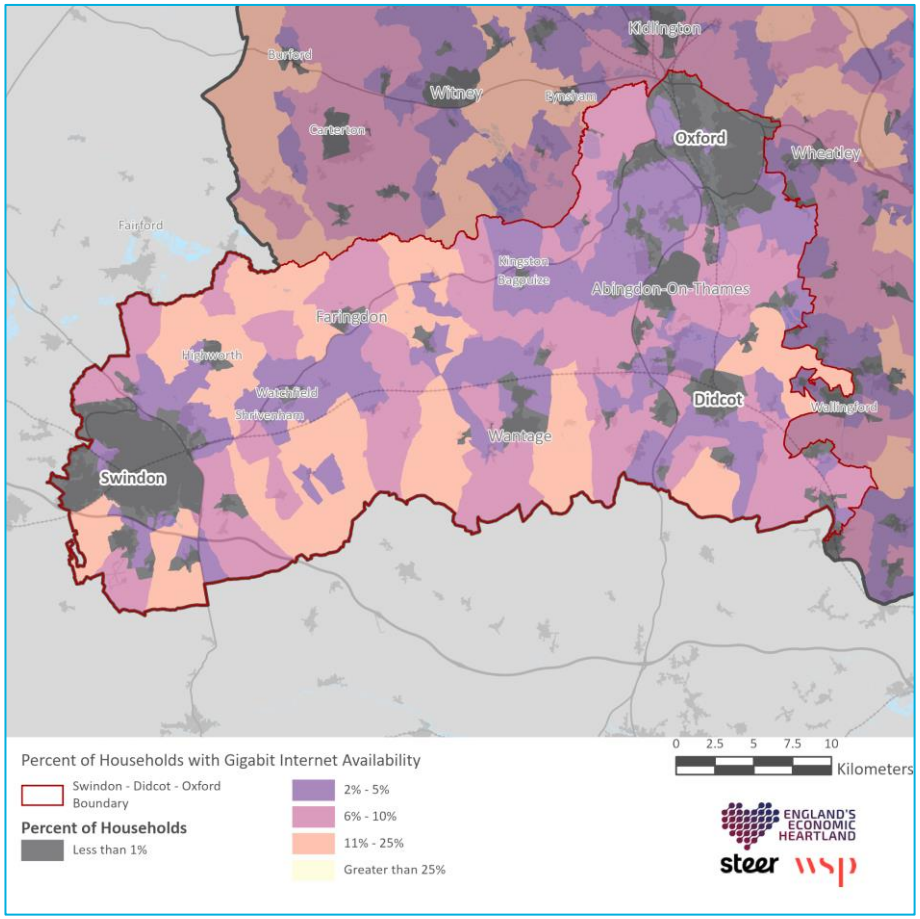
1 Improved digital infrastructure reduces the need to travel

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

The evidence demonstrates that gigabit provision across the study area is not uniform. The lowest availability of gigabit internet availability is within urban areas, notably Oxford, Swindon, Abington and Didcot where less than 1% of households have access. The highest availability of gigabit connectivity is in rural areas where 11% to 25% of households have access to gigabit connectivity. This is likely to be associated with government targeted investment in rural areas where the commercial rollout of gigabit connectivity is never likely to be feasible.

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.

Data Source: OFCOM Connected Nations 2021 report



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

Critical Success Factors: Global Issues

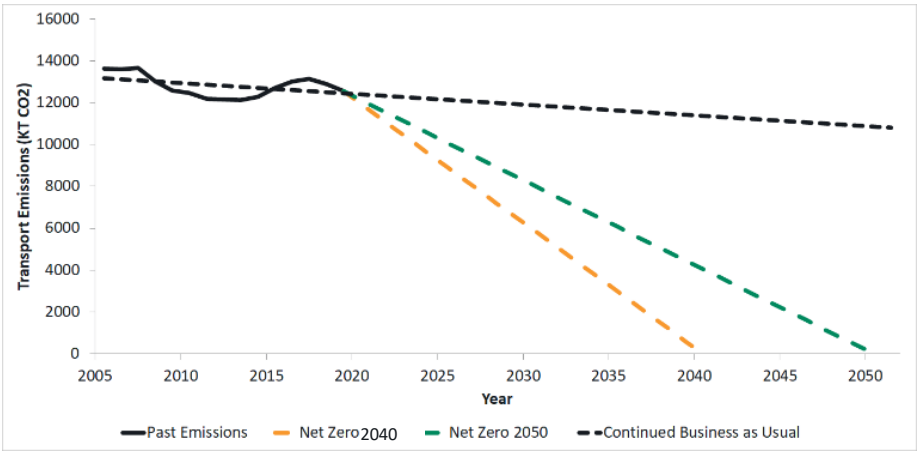
2 The carbon emissions of transport are reduced to zero by 2050

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.

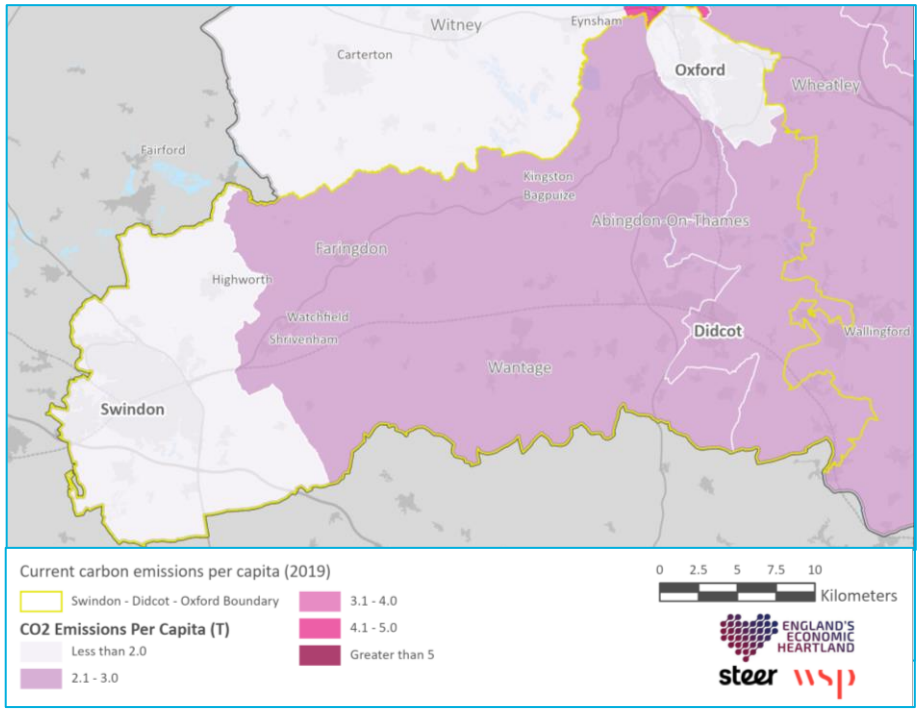
The graph shows the trajectories required to achieve decarbonisation from transport by 2040 and 2050 and the extent these deviate from the "Business as Usual" situation. The trajectory shown indicates that, at the current rate, EEH will not reach its net-zero carbon target.

The evidence indicates that Carbon Emissions per capita vary in each local authority across the study area. The average transport Carbon Emissions per capita within the study area was 2.08 Tonnes. The highest carbon emissions per capita were recorded in rural local authorities, notably South Oxfordshire and Vale of White Horse. Vehicular traffic is responsible for most transport carbon emissions within the study area, with minor roads, major A roads and motorways accounting for 92% of all transport emissions.

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.



Data Source: UK Local Authority and Regional Carbon Dioxide Emissions 2019



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?**

Critical Success Factors: Global Issues

3 Improved transport connectivity enables sustainable and high-quality development growth, helping to address inequalities and accessibility issues

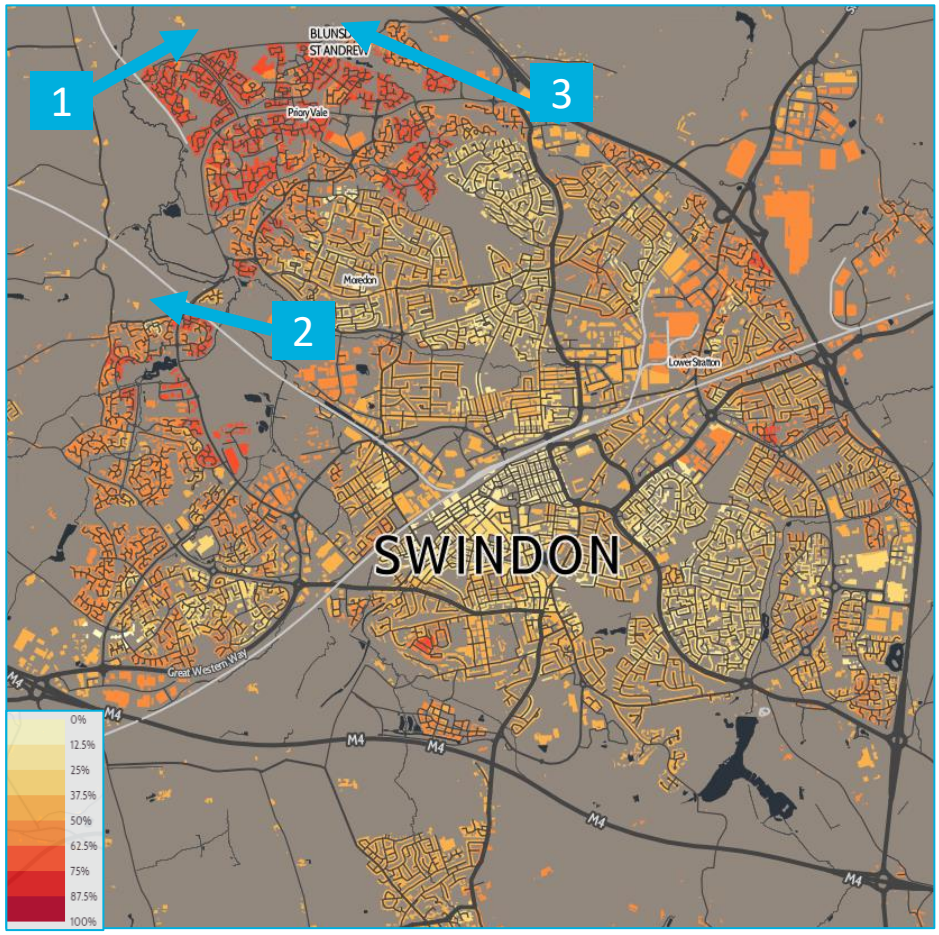
A key factor influencing the use of the private car is the accessibility of everyday services and amenities. If everyday services and amenities are easily accessible on foot or by a fast and frequent public transport, sustainable travel patterns can be promoted.

The map illustrates connectivity issues at a settlement level. The proportion of residents who drive to work is generally higher on the periphery of urban settlements – the location of many new larger residential developments. For example: Tadpole Garden Village (1), Ridgeway Farm (2) and Abbey Farm (3).

There is significant housing growth forecast on the periphery of the of the large and medium-size settlements in the study area, particularly where existing access to key services and amenities via active and sustainable modes is more limited. This is likely to result in residents, visitors and workers of these developments relying heavily on private vehicles.

The evidence shows high levels of multiple car ownership per household and clear rural / urban divide on access to services / amenities by sustainable and active travel.

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



Plan showing % of all residents aged 16-74 who drive to work by car or van
Source: Datashine.org.uk *Census data (c) Crown Copyright Office of National Statistics. Contains Ordnance Survey data (c) Crown copyright & database right 2014-5.*

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?**

Critical Success Factors: Global Issues

4 The benefits of new technologies that enable improved connectivity are accessible to everybody

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

The low volume of EV charging points, particularly outside of larger urban areas, in the study area could potentially limit the uptake of EVs – particularly in rural areas. Across all four local authorities in the study area, the number of public EVCPs ranges from 21 to 66 per 100,000 of the population, with significantly fewer charging points located in rural areas. This compares to a UK maximum of 391 public EVCPs per 100,000 of the population in Westminster.

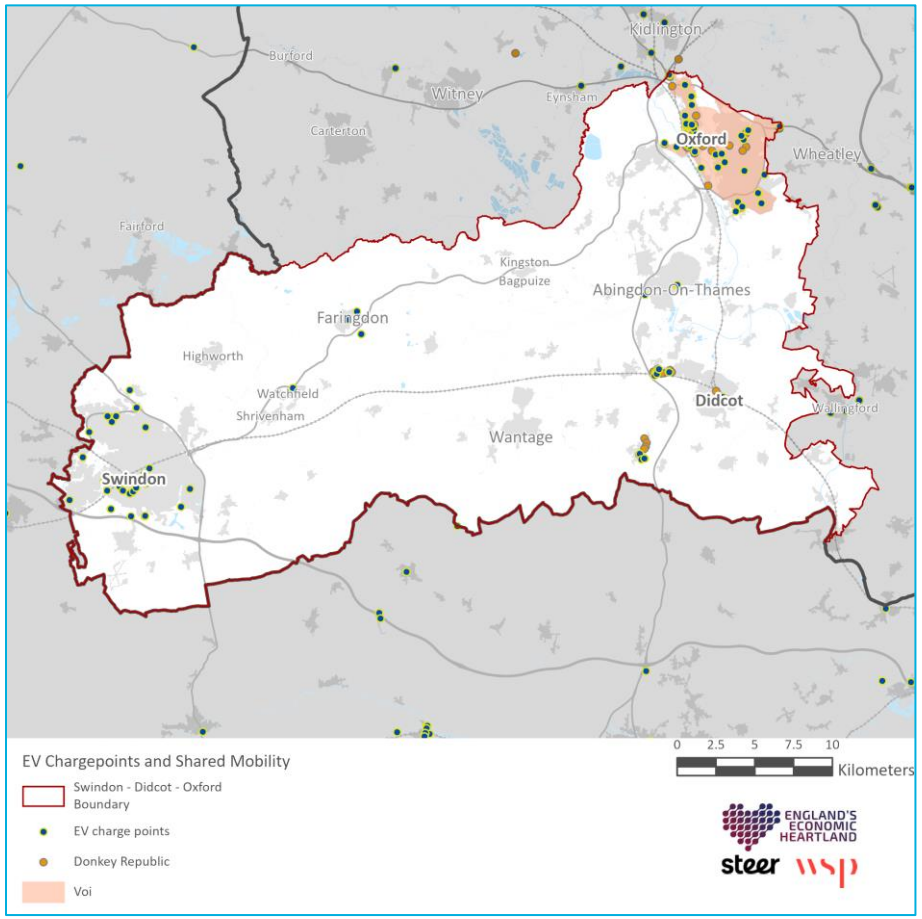
However, as part of the Park and Charge programme, EV charging hubs are set to be installed in 20 car parks throughout Oxfordshire, featuring between 10 and 16 charge points. To further this, the UK's largest EV charging hub is being installed in Redbridge Park and Ride in Oxford.

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

Shared micro-mobility schemes (including E-bikes) can also help facilitate longer distance journeys by public transport, by providing an attractive first mile / last mile travel option. Whilst these modes could be adopted across the study area, they are more viable in urban areas where there is a higher density of potential users.

Interventions should seek to create networks of high-quality infrastructure supporting short and medium distance trips that can be travelled by shared micro-mobility schemes. In addition, EVCP should be rolled out in low coverage rural areas, particularly where shared mobility and public transport is not a viable option.

Source: National Charge Point Registry (NCPR) (2021)



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

Critical Success Factors: Freight

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

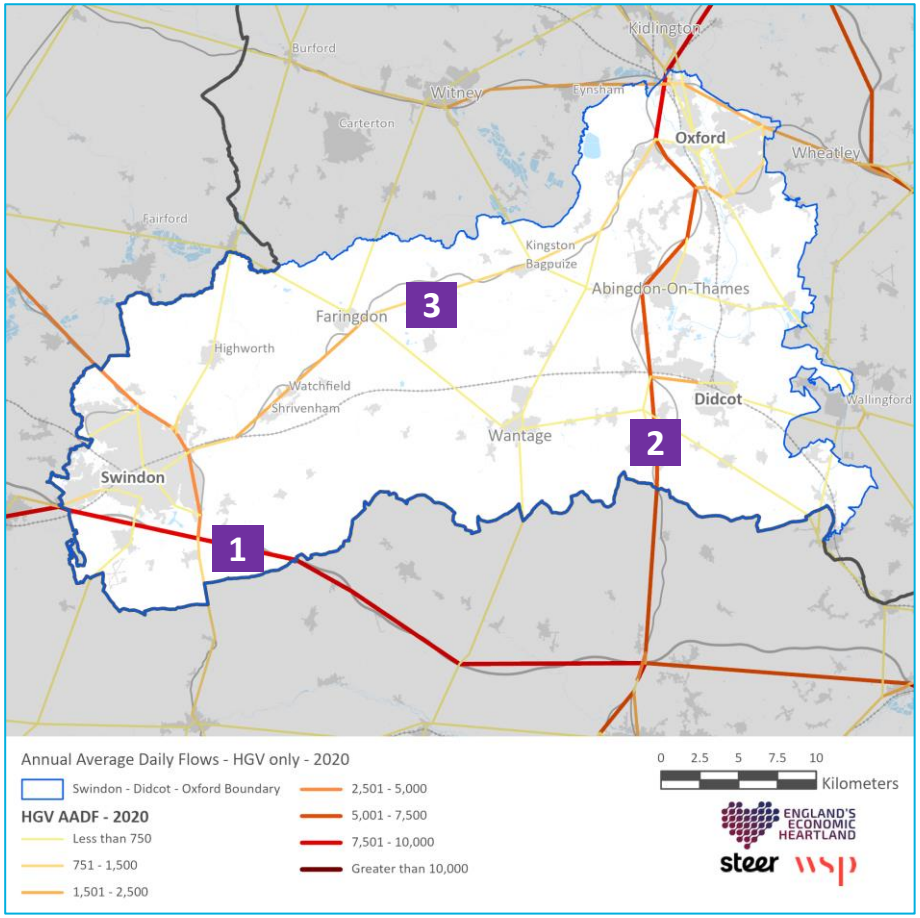
Road haulage is essential to growth and success of businesses across the study area, with key industries such as automobile and logistics/modern manufacturing present here. The two main freight routes in the study area are the M4 to the southwest (1) and the A34 to the east (2). The M4 connects London with Reading, Swindon, Bristol, Newport, Cardiff, and Swansea. The A34 connects ports along the south coast (via the A3) with Oxford.

Despite the M4 and A34 providing strategic connectivity between Swindon and Oxford (via Junction 13 of the M4) it is not the most direct route. The most direct route is via (3) the A420, a single carriageway A-road, that connects rural towns and villages along the southern edge of the Cotswolds. The volume of HGV traffic using this route is high (average of 2,501 to 5,000 HGVs per day) and whilst a proportion will be serving settlements along the A420, a significant proportion is likely to be through traffic routing between Oxford and Swindon.

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

Interventions should also explore opportunities for non road-based freight options (multi-modal rail-road freight terminals) and the use of consolidation centres to reduce traffic volumes and promote decarbonisation. Zero emission HGV fleets should also be considered alongside increases in rail freight movements, for further decarbonisation.

Data Source: UK Government - GB Road Traffic Counts (2020)



Challenge – The map shows heavy volumes of goods transport along single carriageway A-roads, routes less suited to high volumes of HGV traffic. **How can we ensure goods are transferred efficiently within and through the study area in a way that supports our four principles?**

Critical Success Factors: Active Travel

6 Active travel mode share of journeys within and to / from our towns and cities increases

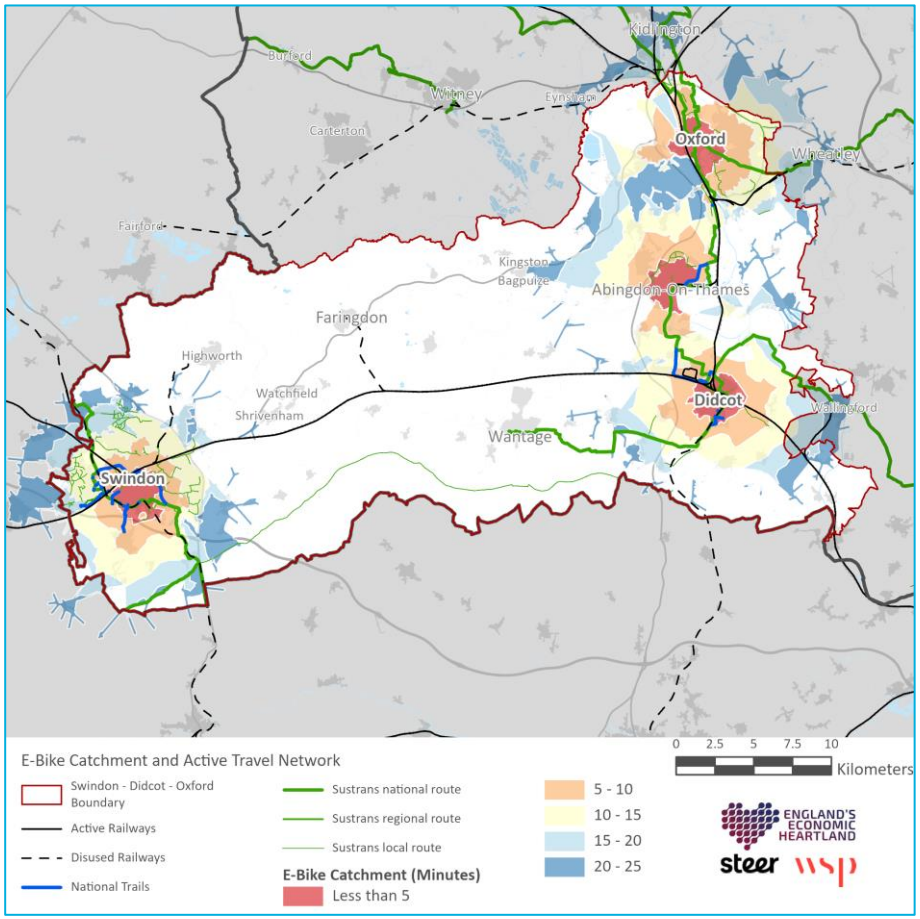
The distribution of active travel infrastructure varies throughout the study area. National cycle routes provide connections between some of the built-up areas in the study area, however some key gaps are present, particularly on the periphery of Settlements of Strategic Importance.

The map shows potential 25-minute E-bike catchments from the centre of Swindon, Didcot, Abington and Oxford. These show the entirety of each settlement to be accessible within a 25-minute journey by E-bike. The plan also show smaller settlements on the periphery of Oxford, Swindon, Didcot and Abington to also be accessible within 25 minutes journey by E-bike.

E-bikes have the potential to significantly increase the active travel mode share, particularly within settlements where there is a high number of internal commuting trips (notably Oxford and Swindon). E-bikes can also help increase the active mode share of workers commuting from settlements on the periphery of Settlements of Strategic Importance. However due to the rural nature of the study area and distance between Settlements of Strategic Importance, opportunities for a significant volumes of inter-urban active travel trips is limited (e.g. between Oxford and Abingdon-on-Thames).

To maximise the uptake of active travel modes, high quality, attractive infrastructure is needed and could be delivered through LCWIPs. There is however is a risk that lower income households, unable to afford an E-bike, may be excluded or disadvantaged by the emergence of new forms of mobility, unless shared mobility grows.

Data Source: SUSTRANS (2022)



Challenge – The plan above shows that E-bikes could be a viable mode of transport for people living and working in large towns and cities in the study area. **How can we take advantage of the opportunities presented by new forms of mobility and what can be done to ensure affordable options?**

Critical Success Factors: Public Transport

7 A high-quality, sustainable, integrated an accessible transport network connects the study area Settlements of Strategic Importance and strategic economic assets

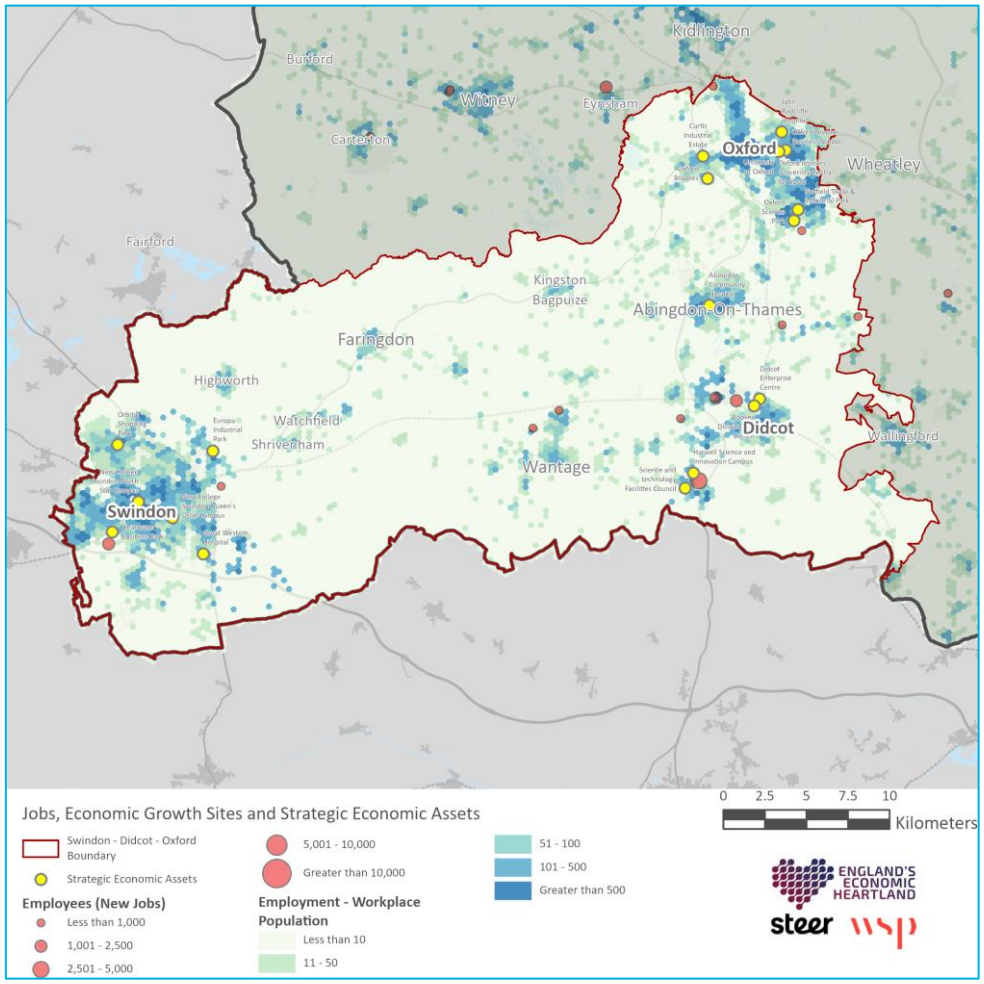
Currently, jobs within the study area are predominantly located in the urban centres (Swindon, Didcot, Oxford and Abingdon-on-Thames), with clusters within mid-sized towns and pockets within more rural areas around strategic economic assets (business and science parks).

Large employment developments are proposed within and surrounding Didcot, Swindon, Oxford, Harwell and Abingdon-on-Thames. As such to support long-term economic growth, a high-quality, sustainable, integrated and accessible transport network will need to be provided. Interventions should focus upon connectivity between settlements / employment sites where there is a high theoretical demand. The interventions should seek to take up opportunities to improve existing road-based connections (for example, road space allocation to bus-based transit). This could include:

- Introduction of express bus services and delivery of bus priority measures along the A420 corridor to take public transport a real alternative to travelling by private car
- Improvements to east-west rail connectivity through the introduction of new direct rail services between Oxford and Swindon
- Delivery of new rail stations along the Great Western Mainline that serve new residential developments in Wantage and Grove.

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

Data Source: ONS Business Register and Employment Survey 2019 & EEH Databank



Challenge – The existing transport network does not incentivise the use of public transport to access Settlements of Strategic Importance and strategic economic assets. **How can we ensure high quality connections are provided that meet sustainability needs, whilst also being affordable and economically viable?**

Critical Success Factors: Public Transport

8 Rural communities are well connected to key opportunities by the public transport network

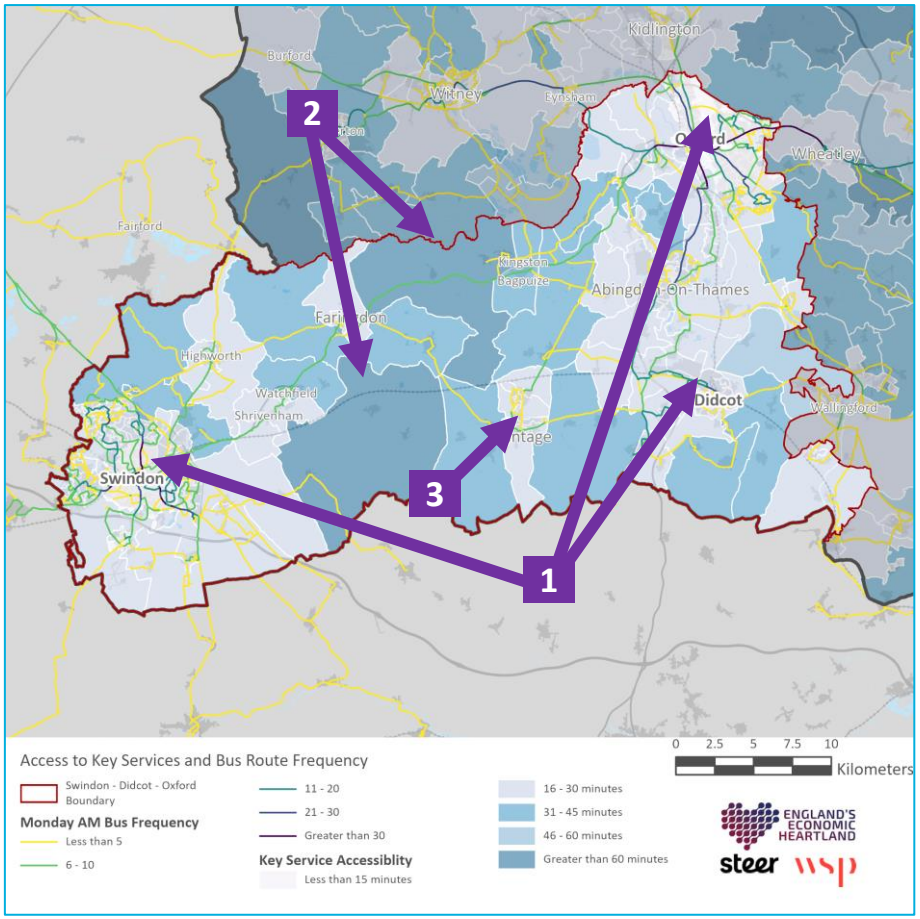
There is a clear urban / rural split in the accessibility of key services by public transport, with the evidence demonstrating a correlation between public transport routes and accessibility to services / amenities. The map opposite shows public transport and walking time to eight key services, overlaid with bus routes of at least two bus service per hour (in any direction). This shows:

- Urban areas generally have good access to key services (travel time of 15 mins or less by foot and / or public transport) and are served by high frequency bus routes (1).
- Rural areas (particularly villages within the centre of the study area to the east of Faringdon and west of Wantage) have much poorer access to key services, coinciding with poorer bus provision (2).
- Some semi-rural areas have good levels of access to key services despite lower bus service provision indicating good local service availability (3).

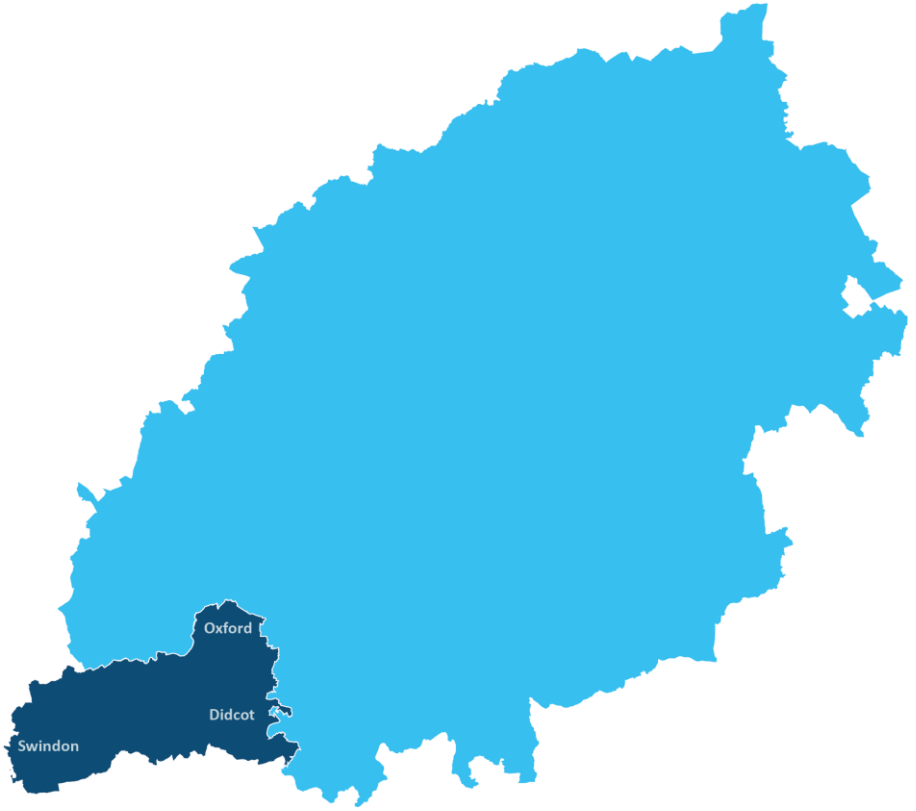
To ensure rural communities are connected to key opportunities, interventions should focus upon providing high-quality, high-frequency public transport links between key services and amenities and those areas within the study area that are least connected. The delivery of new public transport services could be supported through the creation of a network of rural mobility hubs that help to facilitate multi-modal journeys in rural areas. In areas where it is not commercially viable for traditional public transport services to operate, other initiatives such as DRT should be explored.

Market towns, such as Faringdon, play an important role in providing access to a wide range of everyday services and activities. Improvements to rural public transport will not only improve the accessibility of market towns by sustainable transport, but also provide the opportunity for sustainable multi-modal journeys where local bus services connect with express bus / coach services or rail stations (e.g. in Oxford or Swindon).

Data Source: BaseMap and DfT Journey Time Statistics (2019)



Challenge – Evidence indicates areas of the study area where access to services is limited**. How can we ensure our rural communities are well connected in a sustainable way, whilst offering good service frequencies and journey times?**



Part 5

Infrastructure Scenarios

Overview

Scenario Planning

Scenario planning is increasingly viewed as good practice in long-range planning given how uncertain the future is so.

As part of the programme of Connectivity Studies we have two approaches

- Alternative Futures – at an England's Economic Heartland level (reported in Appendix F); and
- Infrastructure Scenarios – at a Connectivity Study level

Both will help inform the options we identify and shortlist as part of each Connectivity Study, as well as testing the resilience of our shortlists.

We want consistency of approach between Connectivity Studies so that when the Investment Pipeline is developed from the sum of the Connectivity Studies' shortlists, we can demonstrate to stakeholders that the shortlists have undergone the same fair and robust process of validation.

Infrastructure and mobility scenarios

Infrastructure scenarios represent different voices and approaches to infrastructure planning all of which could contribute to realizing England's Economic Heartland's Transport Strategy and addressing the objectives and Critical Success Factors of the Connectivity Study. However, on their own, none of the infrastructure scenarios can fully achieve these goals.

They have been developed to present plausible and realistic scenarios from which the most appropriate components with the highest positive impact can be drawn to develop an optimal infrastructure scenario which will then guide option development.

Four infrastructure scenarios have been developed all of which are made up of a range of component interventions and supporting elements.

Four infrastructure / mobility scenarios

Over the next four slides the infrastructure scenarios are presented in more detail in summary they are:

- **Digital and demand management**: Focused on interventions which reduce the need to travel or manage its demand for people and goods.
- **Sustainable First Mile Last Mile:** Focused on interventions which support low carbon journeys, particularly over shorter distances, for people and goods as part of a single trip or as part of a First Mile-Last Mile leg of a longer journey.
- **Rail & Mass Rapid Transit:** Focused on interventions which deliver fast, frequency, reliable, high-capacity transit options which connect people and goods where they need to travel.
- **Highway:** Focused on interventions which improve highway efficiency between key origins and destinations for people and goods.

Digital and Demand Management

Infrastructure impact

In this infrastructure scenario, improved digital infrastructure reduces the need for individuals to travel for many activities. This includes increased home or local-working, and reduced commuting, the resurgence of home delivery for many goods, and the ability for many services to be provided remotely.

The reduction of the need to travel and the advent of 'mobility as a service' (MAAS) also reduced the need for some individuals to own a car.

Demand Management measures will reduce the amount of vehicular traffic within an urban area, thereby reducing congestion, and its negative impacts on the places it affects including noise, pollution and severance.

Demand management can support the reallocation of road space to other uses, including improved walking and cycling facilities, segregated or prioritised public transport, all of which have the potential to help transform currently abrasive, car-dominated environments, into pleasant places to be.

Impact on place

Improved digital infrastructure results in the reduced need for many people to travel outside of their immediate neighbourhood for many day-to-day activities. This implies a greater focus on the local area as a setting for certain activities so local shared workspaces, libraries, community facilities, places for eating and socialising, and streets that support more inhabitation are all potential responses to this at a place level.

As fewer car parking spaces are required, a substantial amount of space could be released for other uses, whether that be cycle parking, greenspace or better residential or commercial development within a given site.

Similarly, demand management measures such as Workplace Parking Levies, may also free up space currently used for parking. This would enable these spaces to be transformed into a more attractive environments (e.g. communal workspaces). It may facilitate densification of these existing – effectively brownfield - places, by helping reduce the need for new development on greenfield sites / outside urban areas. However, the loss of parking could lead to a reduction in people visiting town centers and economic decline if not planned properly.

Summary

Core elements

- Urban Demand Management
- Integration of land use and transport planning
- Increased digital connectivity
- Delivery of Mobility as a Service
- Increase digital connectivity – connected vehicles

Supporting elements

- Increased adoption of shared mobility solutions.
- Bikeshare scheme across the study area.
- Demand responsive transport.
- Road space reallocation to public transport.
- Road space reallocation to active modes.

Pros

- Reduces carbon emissions.
- Improved air quality.
- More efficient use of road space.

Cons

- Limitation on the scale of impact
- Possible equity issues (access to new tech, impact of low emission zones)
- Potential economic decline of town / city centres

Sustainable First Mile Last Mile

Infrastructure impact

This scenario involves prioritisation of first mile last mile intra-urban movement within each settlement whilst also linking key population centres by improving inter-urban movement by low-carbon transport form of transport. This allows end-to-end journeys utilising public transport to be a realistic choice across the area.

In residential areas, simple and low-cost interventions to restrict through-traffic and create low-traffic neighbourhoods can radically improve the street environment for local communities as well as supporting walking and cycling for a broader group of the population.

Demand responsive transport, coupled with access to real time information can bring public transport closer to many people's homes, particularly in low density suburbs and rural areas, and may lead to the removal of many fixed bus stops or shelters in some locations, and the creation of hubs, linked to a broader range of activities, in others.

New, high-quality inter-urban bus routes would better connect people to employment, vital services and leisure opportunities. The potential for road space reallocation for bus and active travel modes will also be considered.

Impact on place

This scenario presents a great opportunity from a 'place' perspective. General vehicular traffic is an inefficient use of limited road space within towns, compared to the capacity that active travel and public transport can achieve within the same space, so the reallocation of space to these modes has the potential to both increase capacity and release more space other purposes. Reduced space for vehicles can lead to safer streets, and lower impact from noise and air pollution.

High-quality inter-urban bus connectivity presents opportunities for 'transit-oriented development.' Subject to other planning considerations and environmental constraints, settlements can grow around the catchment of intermediate stations or stops strung along the new high-capacity public transport routes. The parallel active travel routes (as per the Cambridgeshire guided busway) further increase the development potential.

Conversely there are challenges in creating new routes through the countryside given the potential impact on the landscape from the infrastructure itself, and any associated development – although new landscape interventions, biodiversity net-gain and the repurposing of existing routes can all mitigate against this.

Summary

Core elements

- Alternative bus operating models & bus service improvements
- Adoption of shared mobility solutions
- Sustainable urban goods transport
- Segregated active travel network
- Strategic mobility hubs across the study area
- Demand responsive transport

Supporting elements

- Urban Demand Management
- Integration of land use and transport planning
- Support delivery of Mobility as a Service
- Road space reallocation to public transport/active modes
- Improved highway safety

Pros

- Reduced carbon emissions
- Improves health
- Improves air quality
- Inclusive interventions

Cons

- Measures less effective on longer journeys
- Requires demand management measures to 'lock in' benefits
- Financial challenges for local bus services.

Rail & Mass Rapid Transit

Infrastructure impact

This scenario suggests a focus on creating a grid of fast and frequent rail and/or Mass Rapid Transit (MRT) connections across the area, through improvements on existing lines, new lines connecting major settlements and intra-urban MRT in major settlements.

Rail-based MRT network in major settlements would provide high capacity, fast, reliable, frequent public transport services for the study area's major settlements, better connecting people to key opportunities and reducing car dependence. New rail lines connecting major settlements would provide fast, direct, low carbon alternatives to road-based options, e.g. direct services from Swindon to Oxford. Potential for new stations may be limited by the national/regional nature of the network, but there may be opportunities to support a new station west/east of Swindon to support sustainable development along that southern part of the study area.

However, any potential constraints may be mitigated through capacity increases as a result of HS2 or other capacity upgrades. Service improvement on existing rail lines would make rail more attractive. Improved integration of rail with other modes would support mode shift for longer journeys within the study area from road based to rail reducing congestion and emissions.

Impact on place

From a 'place' perspective, a focus on development of a rail and MRT network may support creation of a more singular regional place identity which would support economic agglomeration effects that government hopes will boost growth and productivity in the area.

A key aspect of this scenario from a place perspective is the role and potential of stations. Many of the area's existing stations are poorly connected to their wider urban setting, are surrounded by vacant or low-density development, with low intensity of use, or areas with regeneration potential. Stations should be secured as concentrated places in their own right – with the needs of interchange and onward travel integrated within a strong and site-specific approach. The environs of station should reflect the needs and characteristics of the community as well as making them as attractive for use as possible.

One challenge with the creation of any new cross-country routes, and the development that might be associated with them, would be the effect on the existing places that they pass through - in terms of visual impact, noise, and so forth.

Summary

Core elements

- New rail lines connecting major settlements
- Increase capacity on existing rail lines
- Service improvement on existing rail lines
- New stations to serve development
- Improved integration with other modes

Supporting elements

- Support delivery of Mobility as a Service
- Bus service improvements in major settlements
- Bus based MRT between major settlements
- Inter-urban segregated active travel network
- Region-wide smart and integrated ticketing
- Road space reallocation for active modes

Pros

- High capacity, low emission, fast, reliable alternatives to road-based travel
- Opportunity for transit orientated development

Cons

- Requires sufficient demand
- Funding questions and public attitudes to public transport post-Covid
- Possible impact on existing 'place'

Highway

Infrastructure impact

This scenario focusses on highway interventions which seek to ensure road space meets the needs of the study area in the most efficient way, provides for accessibility requirements and supports sustainable growth. Inter-urban journey times are already relatively good, particularly when compared to the available alternatives thus further justifiable upgrades would likely be focused on specific pinch points or where safety is of concern.

Given the constraints around further capacity increases, this scenario assumes the reallocation of road space for walking, cycling (including E-bikes) and public transport alternatives to the private car, to provide greater choice and address congestion issues. Segregated active travel routes, combined with Low Traffic Neighbourhoods (LTNs) would also support freight delivery by sustainable modes such as cargo bike operated from strategically located depots linked to the main road and/or rail networks.

Interventions which provide the enabling conditions for alternative fueled and automated vehicles, which are also part of the scenario.

Impact on place

Highway influences 'place' at a range of levels – from the main inter-urban roads, to the highways in urban areas to local access roads. Capacity reallocation of road space on main inter-urban roads has huge potential to create a positive improvement from a 'place' perspective.

To aid placemaking, where access roads are considered, it may be appropriate to think of ampacity these as lower speed urban high streets with associated facilities, including segregated walking and cycling routes, rather than as high-speed 'distributor roads'. In residential areas, the creation of low traffic neighbourhoods (LTNs) would support walking and cycling and allow greater occupation of residential streets for play and socialising.

Small scale 'pinch point' interventions on main inter-urban roads coupled with incremental changes to the charging and digital technology are unlikely have a significant effect on the overall place quality of the study area. However, they may offer opportunities for localised place improvements.

This scenario is also probably most pertinent to smaller settlements – such as Bicester or Brackley – where there are less constraints on peripheral growth.

Summary

Core elements

- Enabling access to development
- Improved safety package
- Freight connectivity
- Developing enabling conditions for new modes and vehicle automation
- Road space reallocation to public transport, active modes, freight
- Alternative fuel vehicles infrastructure

Supporting elements

- Increase digital connectivity – connected vehicles

Pros

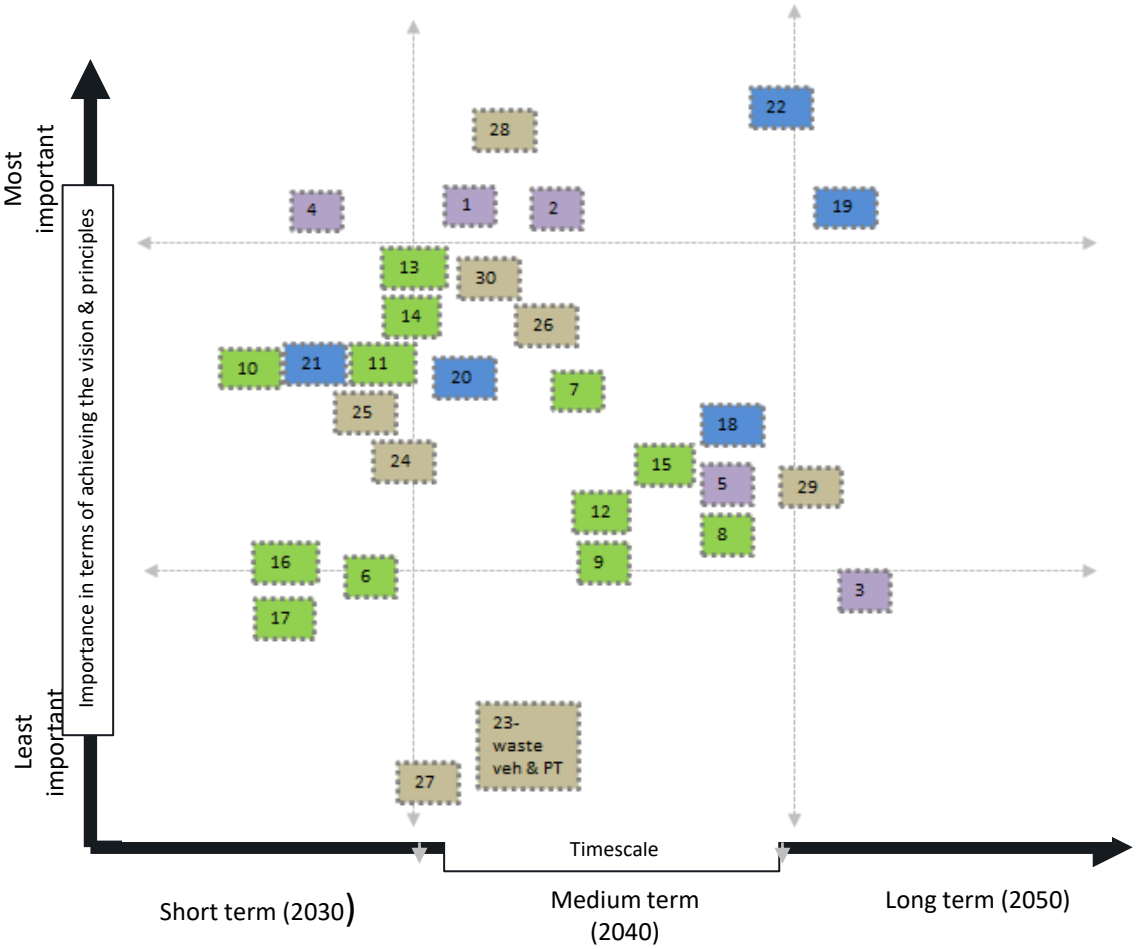
- Supports flexible movement
- Builds on existing road-based infrastructure
- Potential separation of freight and people

Cons

- Dependent on significant development to achieve significant carbon reduction
- Continued congestion impacts on the economy
- Continued social exclusion and health impacts

"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."

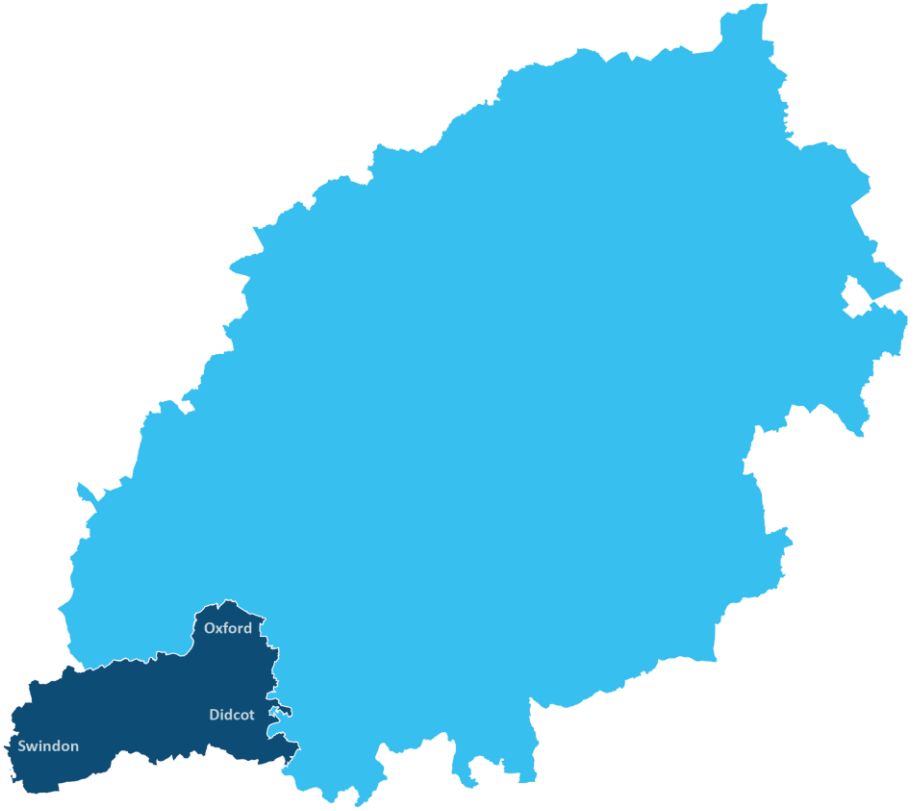
1 Urban Demand Management (e.g. Low Emission Zones, Workplace Parking L 1	2. Integration of land use and transport planning (e.g. Transit Orienta Development) 2	3. Increase digital connectivity – connected vehicles 3	4. Increase digital connectivity – Broadband. 4
5. Support delivery of Mobility as a Service. 5	6. Alternative bus operating models (e.g. Franchising, Enhanc Partnership) 6	7. Focus infrastructure investment on deprived communities 7	8. Region-wide smart and integrated ticketing 8
9. Bus-based MRT (bus priority & segregation) between major settlements 9	10. Increase adoption of shared mobility solutions e.g. bike share. 10	11. First Mile/Last Mile – sustainable urban goods transport. 11	12. Bus service improvements (freq. and operating hrs) in major settlements. 12
13. Intra-urban segregated active travel network 13	14. Inter-urban segregated active travel network. 14	15. Network of multi-modal mobility hub across the corridor 15	16. Demand responsive transport. 16
17. Bus service improvements (freq. and operating hrs) in rural settlements 17	18. Station improvements to improve rail/P/activ travel integration 18	19. New rail lines connecting major settlements 19	20. Intervention to increase capacity on existing rail lines 20
21. Service improvement on existing rail lines 21	22. New stations to serve development areas. 22	23. Highway – Enabling access to development 23	24. Highway - Road space reallocation (public transport) 24
25. Highway - Road space reallocation (active modes) 25	26. Highway - Road space reallocation (Freight) 26	27. Highway- Improved inter-urban private car journey times. 27	28. Accelerate uptake of alternative fuel vehicles through infrastruct 28
29. Enabling conditions for new modes and vehicle automatio 29	30. Highway – Improved safety package 30		



Infrastructure Scenarios

Following stakeholder assessment, outcomes of the process were sense checked to develop a suite of packages as set out below. Those interventions which were classed as low priority by the group were sifted out.

	Packages					
	Demand management	**New use for reallocated road space**	**Supporting rail to do what it does best**	**Support mode shift to active and sustainable modes**	**Sustainable and efficient freight solution**	**Plans to accommodate sustainable development and a decarbonised fleet**
	Components					
Short term (2025-30)	• 4. Increased digital connectivity - broadband	• 13. Intra-urban segregated active travel network • 24. Road space reallocation (Public Transport) • 25. Road space reallocation (Active Modes) • 26. Road space reallocation (freight)	• 20. Interventions to increase capacity on existing rail lines. • 21. Service improvement on existing rail lines.	• 8. Region wide smart and integrated ticketing • 10. Increase adoption of shared mobility solutions. • 13/14. Intra and inter-urban segregated active travel network • 16. Demand responsive transport • 30. Highway – Improved safety package. • 32. Bus service improvements	• 11.First/last mile sustainable urban goods transport	• 7. Focus infrastructure investment on deprived communities • 23. Highway – Enabling access to development (waste vehicles and public transport)
Medium term (2030-40)	• 5. Support delivery of Mobility as a Service • 29. Enabling conditions for new modes and vehicle automation	• 9. Bus Based MRT (Bus priority and segregation between settlements)	• 18. Station improvements to improve rail/bus/active travel integration.	• 15. Network of multi-modal mobility hubs.		• 2. Integrate land use and transport planning. • 28. Accelerate uptake of alternative fuel vehicles through infrastructure.
Long term (2040-50)			• 19. New rail lines connecting major settlements • 22. New stations to serve development areas			



Part 6

Next Steps

Next Steps

This report provides a summary of the work undertaken in the second of the four phases underpinning the Swindon – Didcot – Oxford Connectivity Study. The graphic below shows the phases and steps that are being delivered for this study.

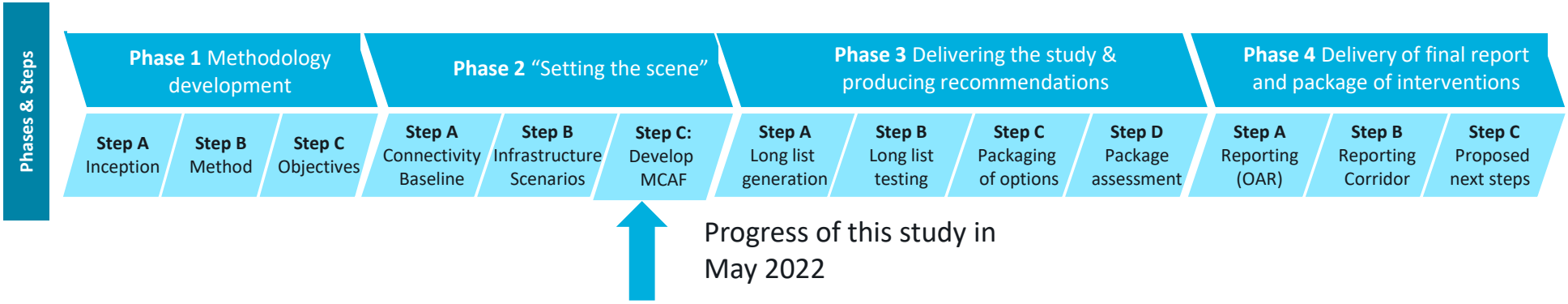
This report presents the connectivity baseline providing a common understanding of the current and future context, demonstrates a need for intervention in the area, and defines objectives for the Swindon – Didcot – Oxford Connectivity Study. It also shows the identification of alternative infrastructure scenarios and the development of an optimal scenario.

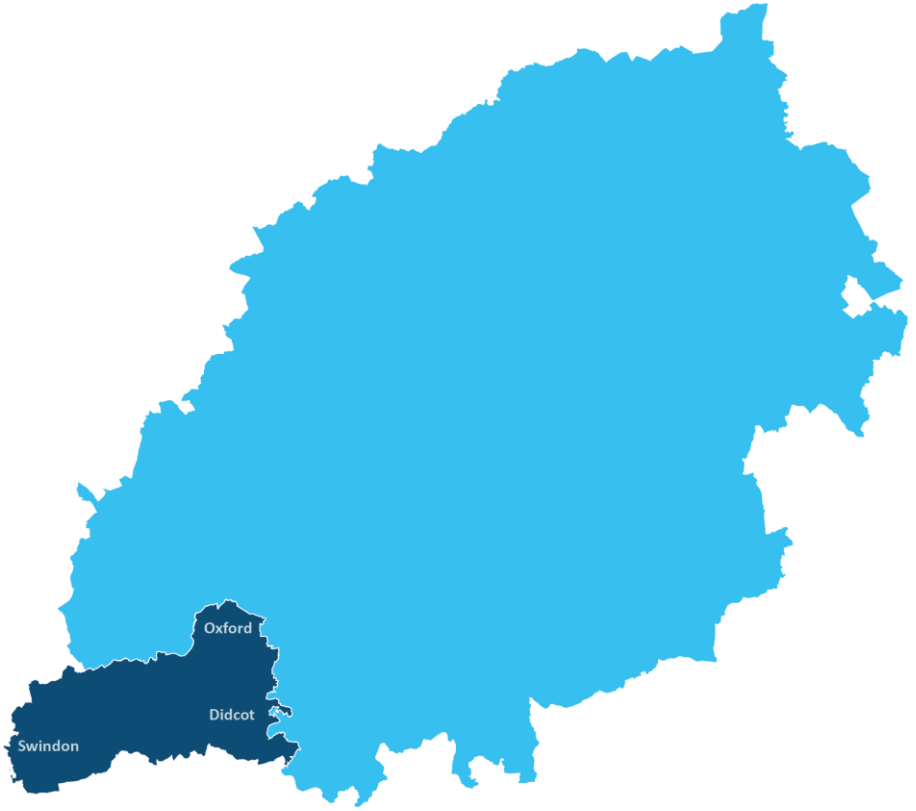
The next Phase for this study is **Phase 3**. The purpose of this phase is to generate a long list of options in response to the need for intervention and guided by the detail of the optimal scenario identified in Phase 2, describe them in a consistent way, and assess them informed by the evidence base, against the criteria included in the Multi Criteria Assessment Framework (MCAF) tool, also developed as part of **Phase 2**.

The optimal scenario and subsequently the package of options will be modelled in the England's Economic Heartland Economy and Land Use Model to support quantification of impact .

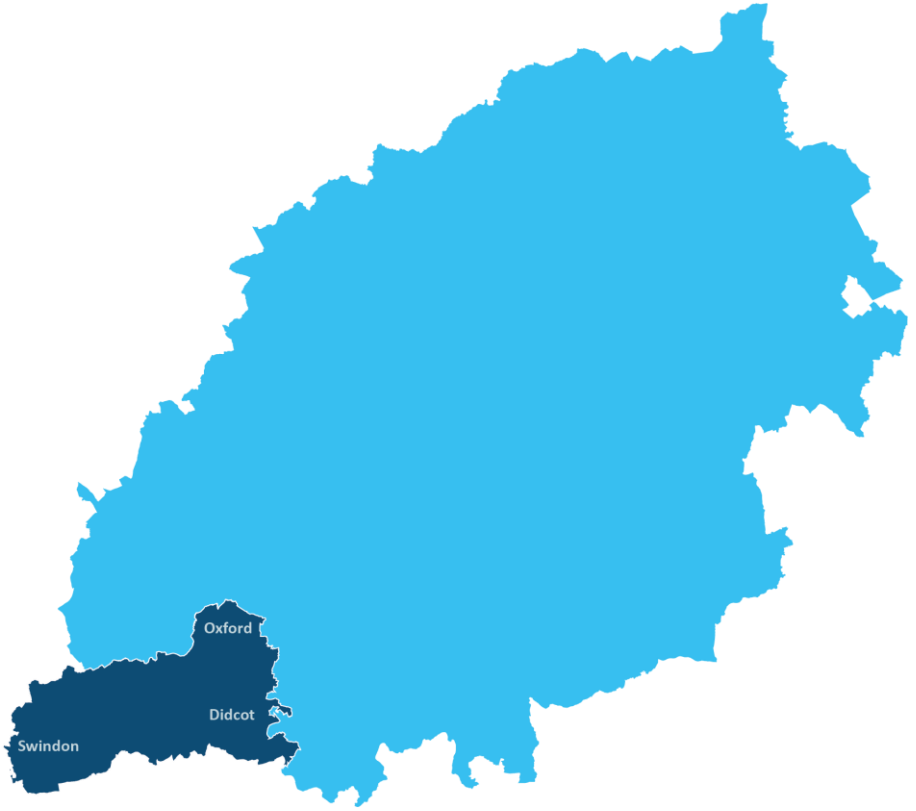
This phase will include significant engagement with stakeholders and be reported in October 2022.

The purpose of **Phase 4** will be is to produce outputs to make the case (to government and others) for investment in the England's Economic Heartland infrastructure networks. This will mobilised in November 2022 and the report produced by the end of January 2023.





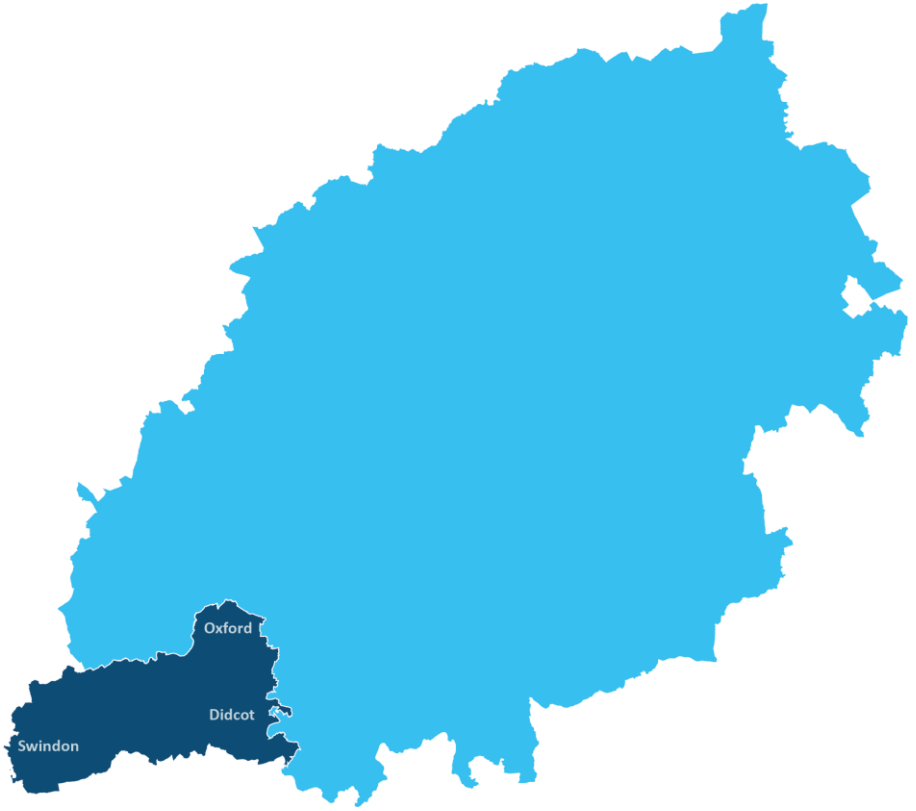
Part 7
Appendices



Appendix A – Mosaic Groups

Mosaic Groups

Mosaic Group	Characteristics Description
City Prosperity	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	Living in a high value detached homes, being employed in managerial or senior positions and supporting students/older children.
Country Living	Well-off owners in rural locations enjoying the benefits of country life. High car ownership and high levels of internet use.
Domestic Success	Thriving families who are busy bringing up children and following careers. They are likely to have children and own new technology.
Suburban Stability	Living in a suburban mid-range home, which they've lived in for several years with older children.
Aspiring Homemakers	Younger households, in full time employment, settling down in housing priced within their means, which may be in the suburbs.
Urban Cohesion	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	Householders living in inexpensive homes in village communities or outlying houses. Experience slower internet speeds.
Transient Renters	Single people privately renting low cost homes, often in terraced housing, for the short term.
Modest Traditions	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	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	Elderly and those 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 limited resources who have to budget to make ends meet. Likely to have children, limited resources. squeezed budgets.
Municipal Tenants	Mature residents living in affordable suburban housing.
Vintage Value	People living alone, in small homes or flats, on low income and need of support.

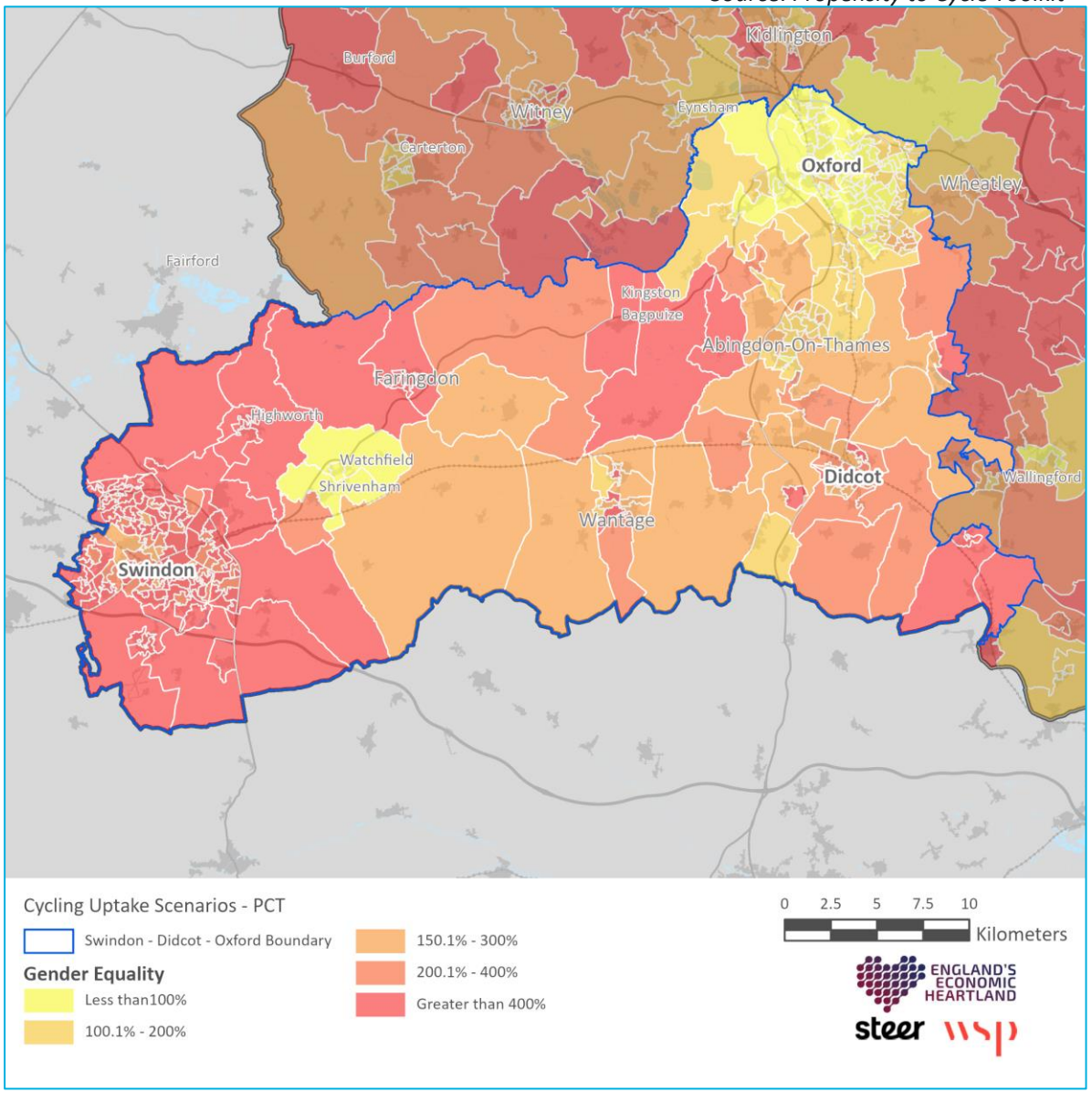


Appendix B – Cycling uptake scenarios

Cycling Propensity – Gender Equality

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

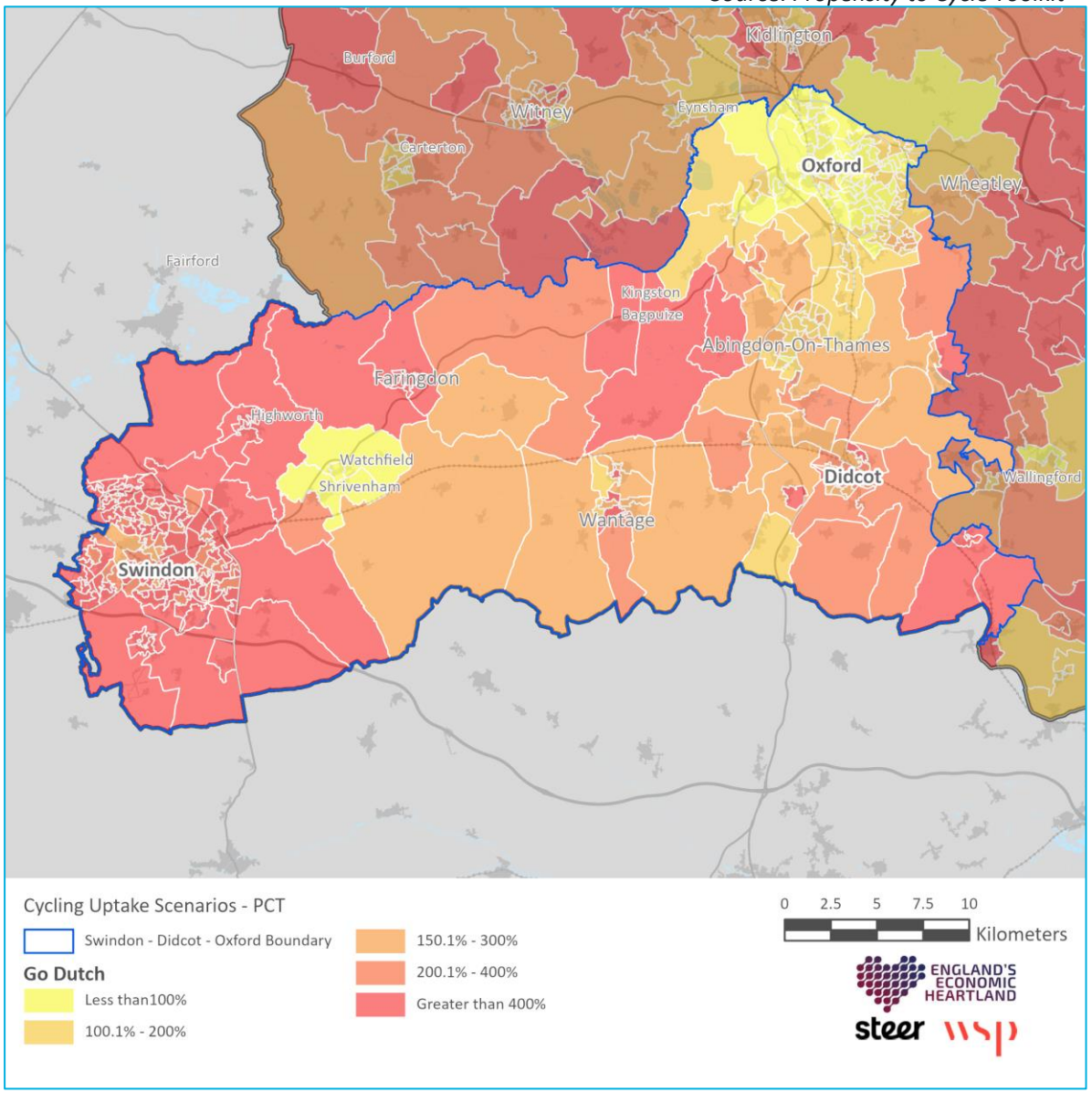
Source: Propensity to Cycle Toolkit



Cycling Propensity – Go Dutch

This plan 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.

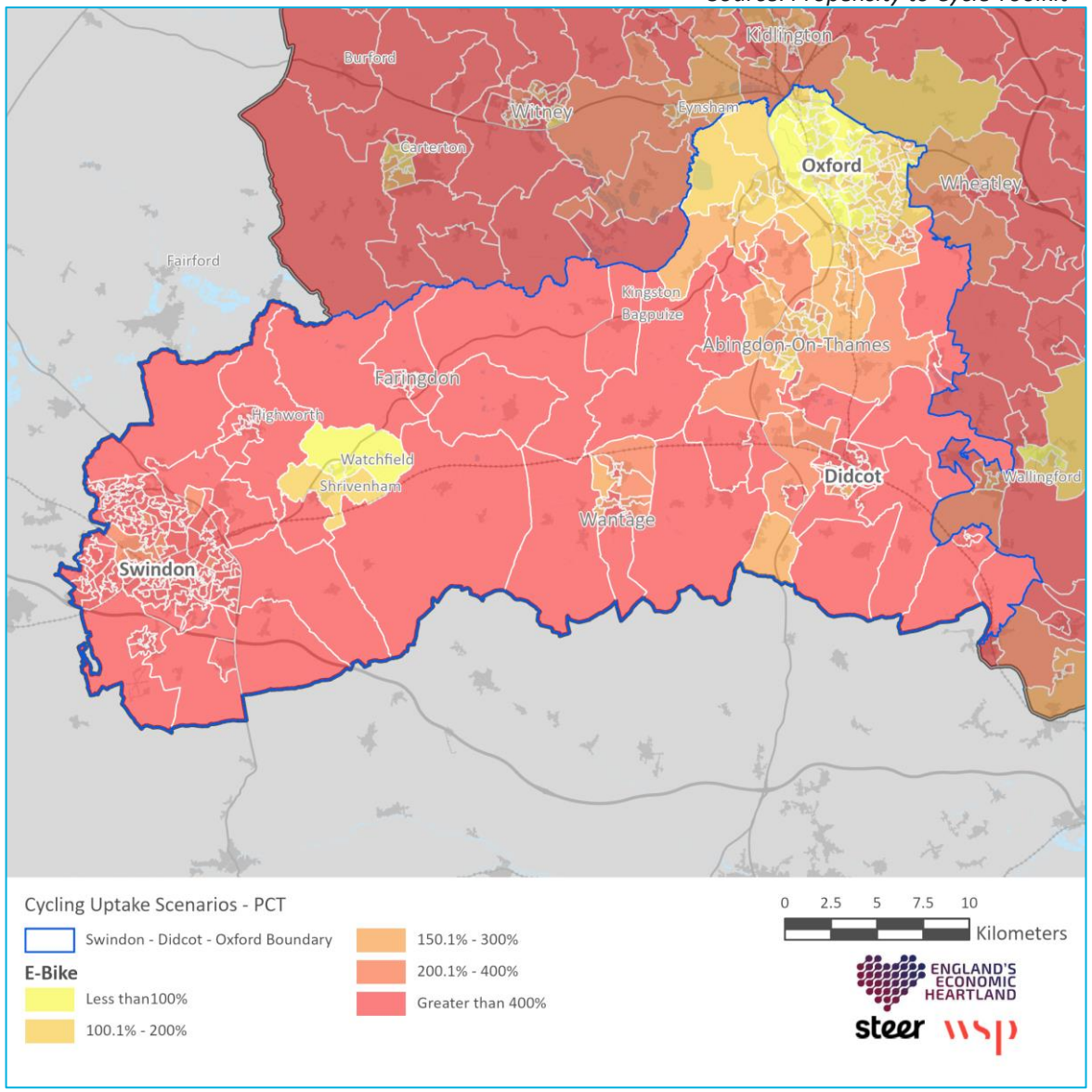
Source: Propensity to Cycle Toolkit



Cycling Propensity – E-Bike

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

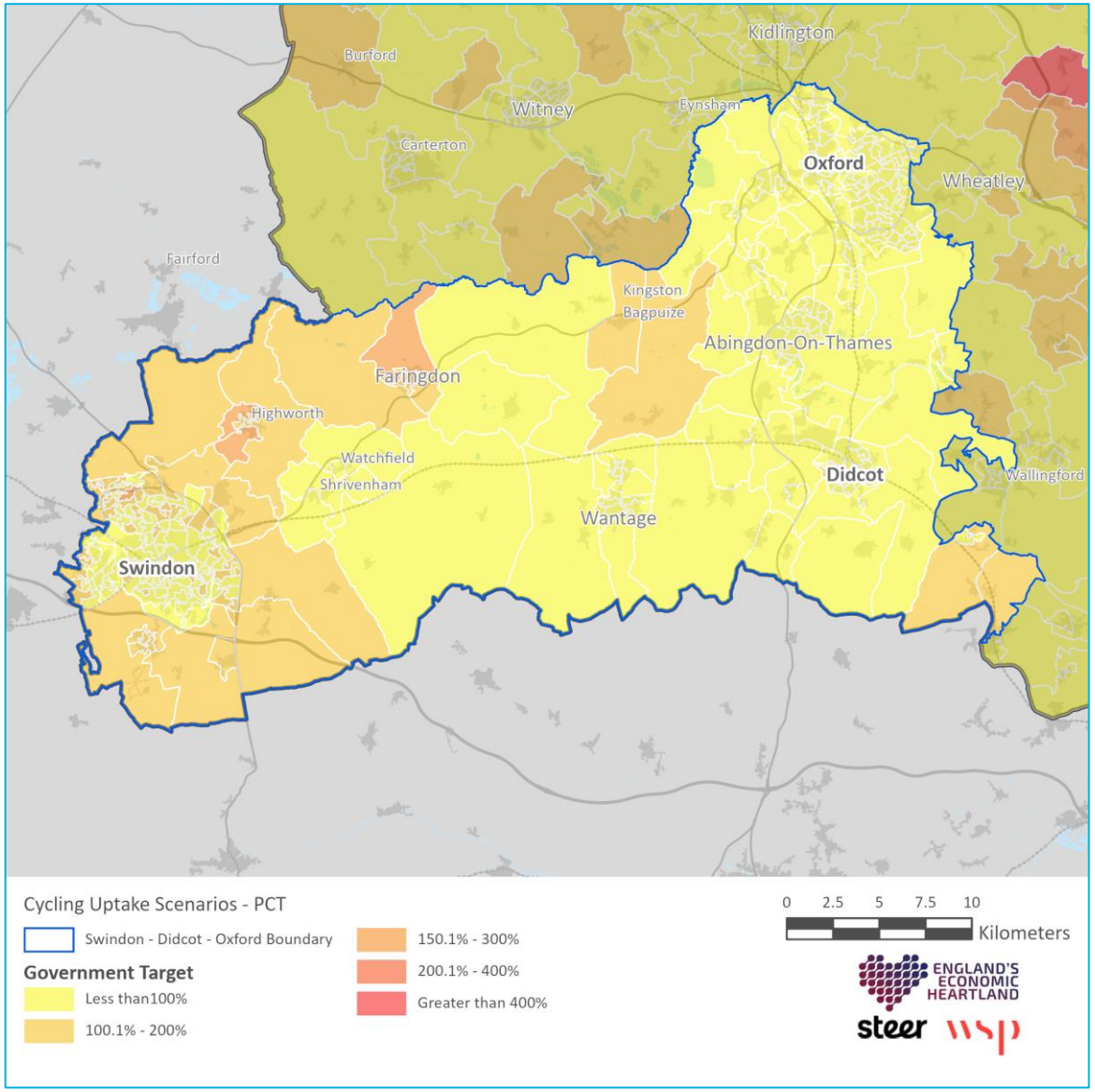
Source: Propensity to Cycle Toolkit



Cycling Propensity – Government Target

This plan 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.

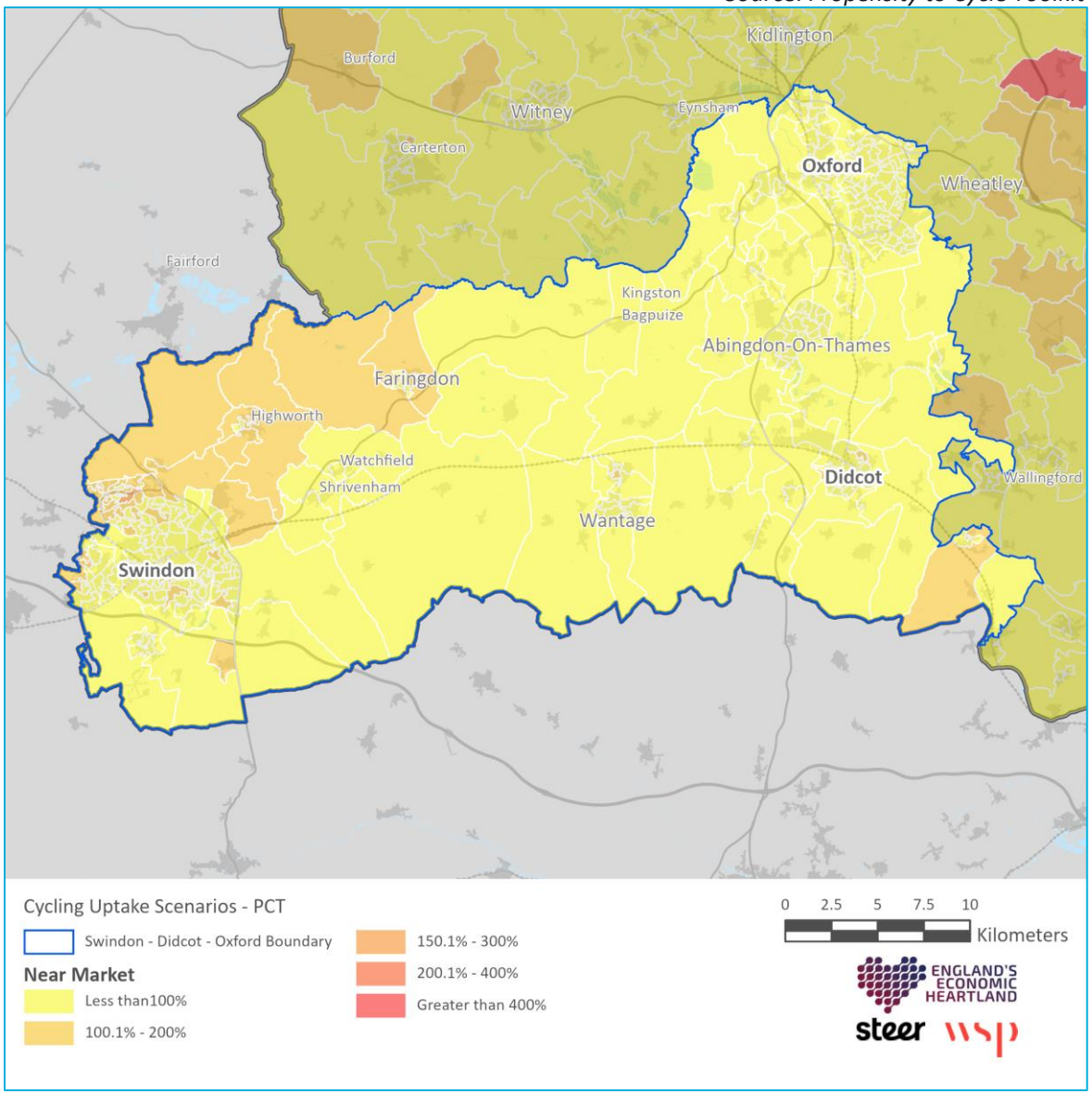
Source: Propensity to Cycle Toolkit

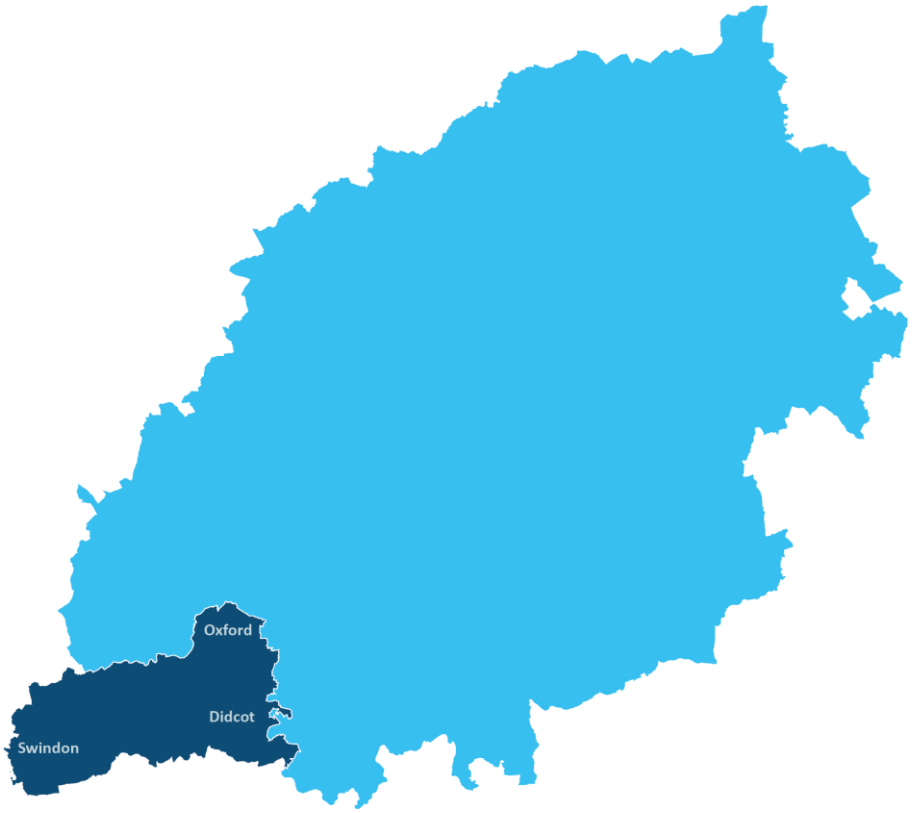


Cycling Propensity – Near Market

This plan 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.

Source: Propensity to Cycle Toolkit

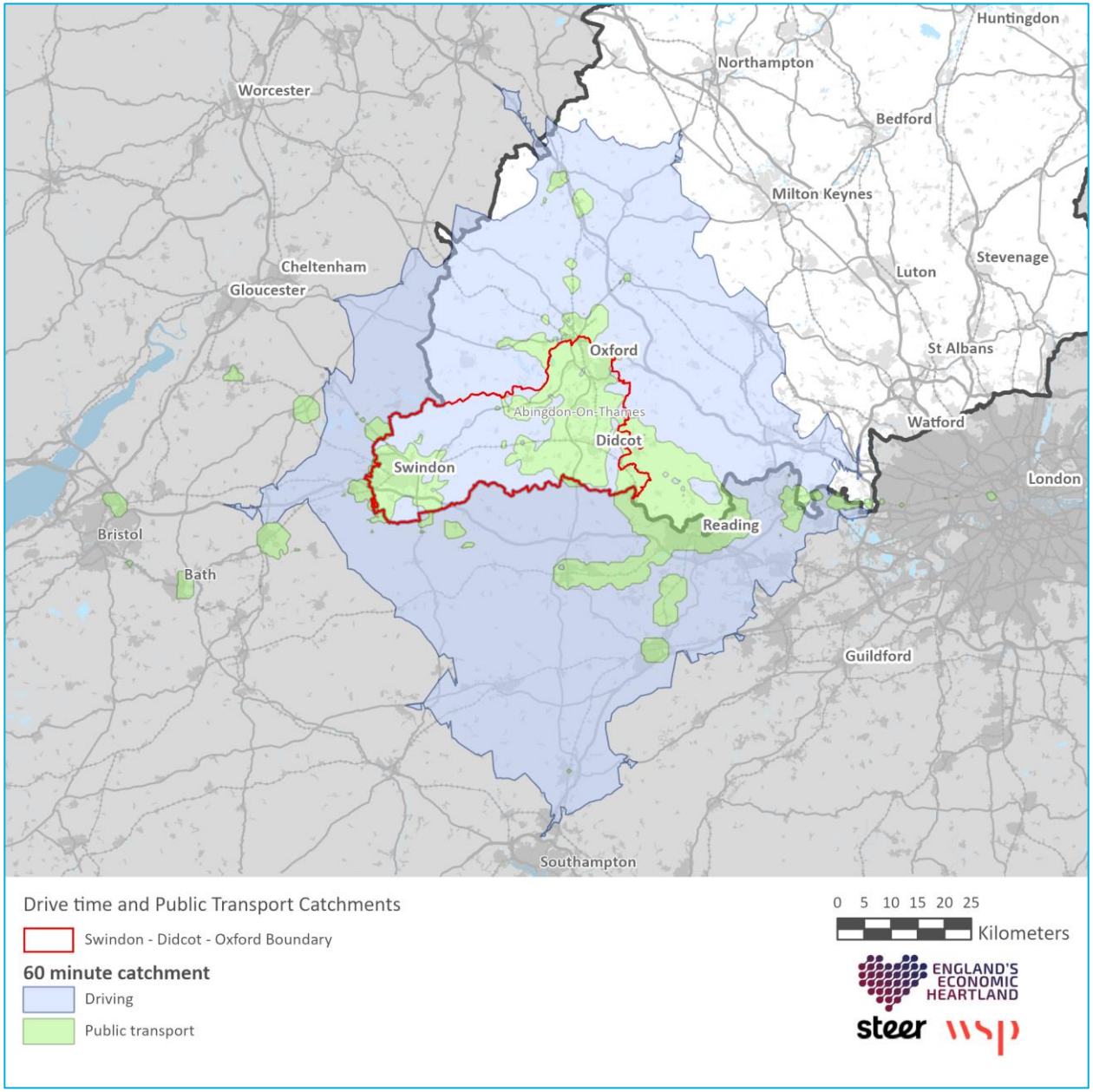




Appendix C – Drive Time and PT Catchments

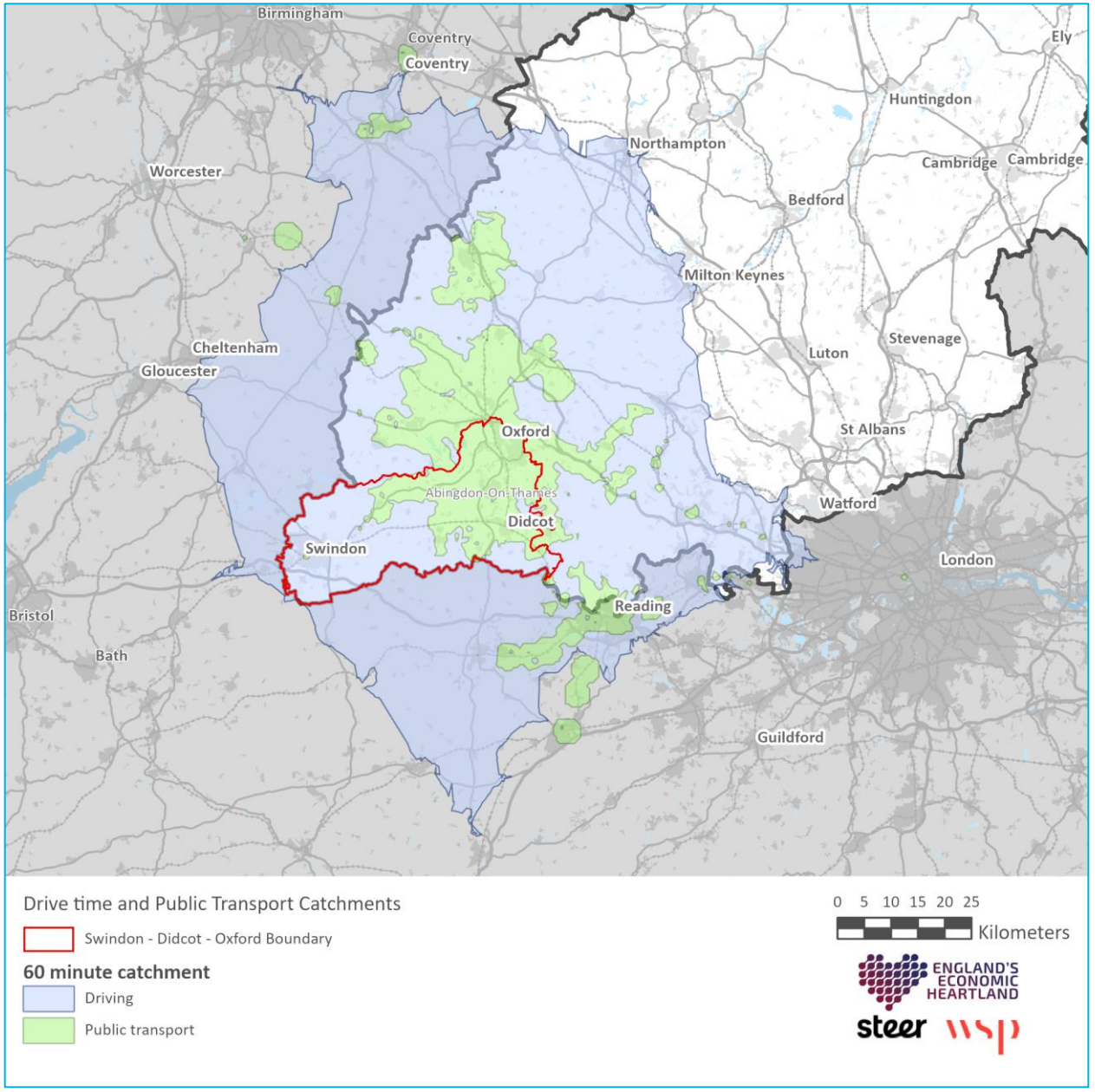
60 Minute Drivetime / PT Catchment – Didcot

Source: TRACC / ESRI Speed Profile Data



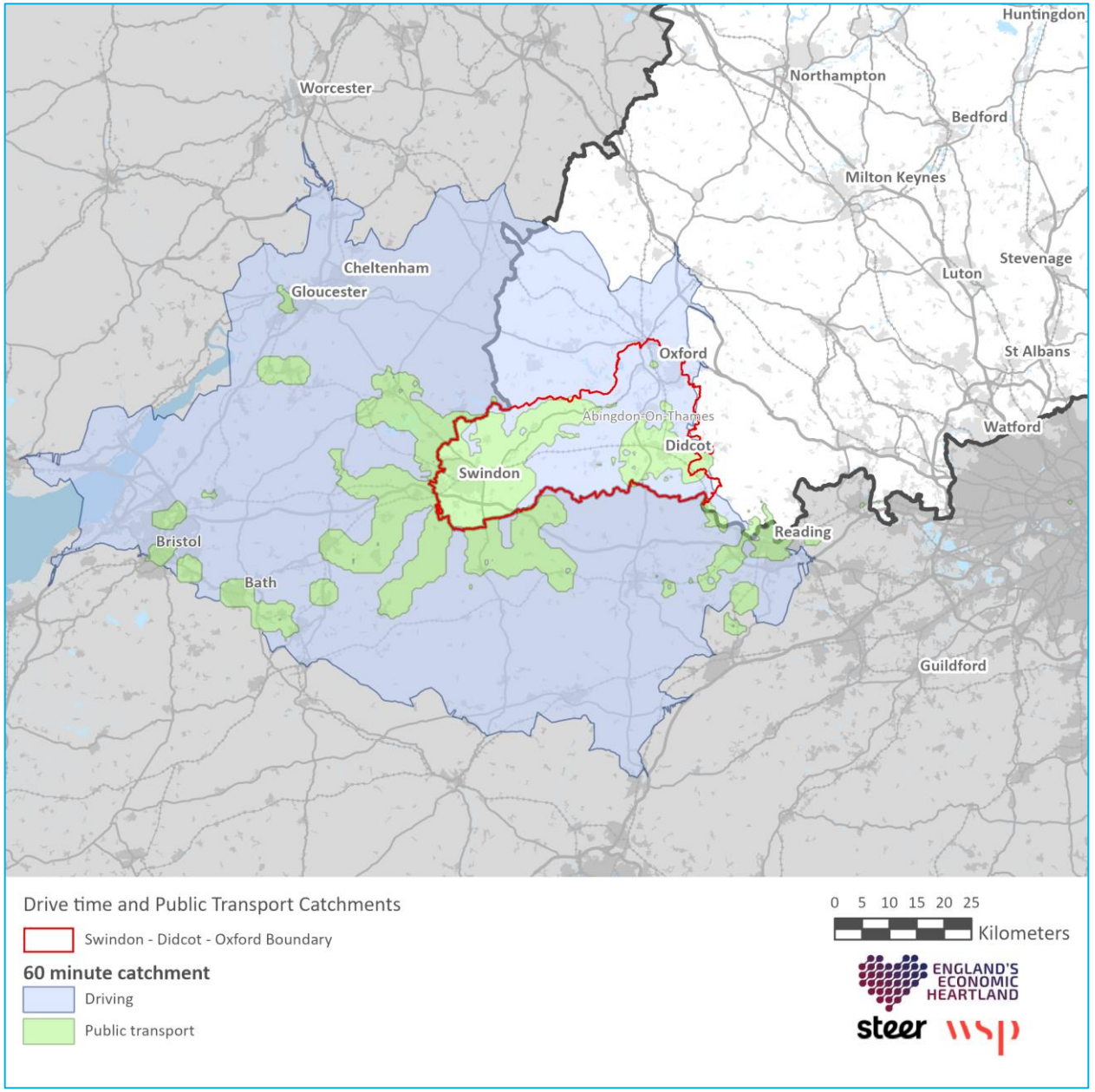
60 Minute Drivetime / PT Catchment – Oxford

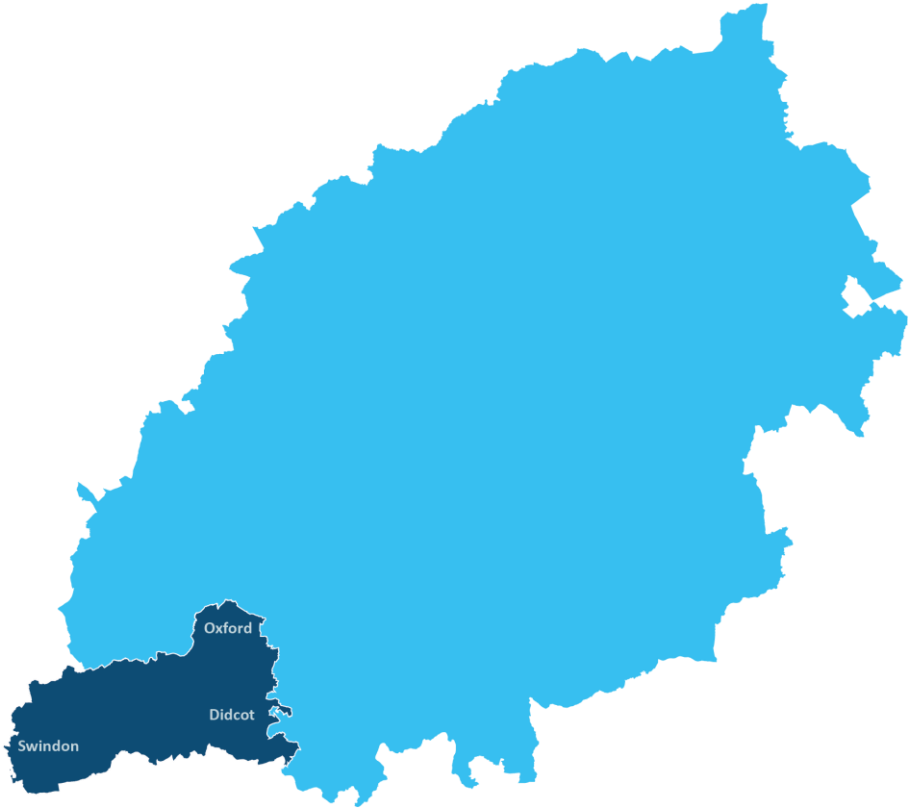
Source: TRACC / ESRI Speed Profile Data



60 Minute Drivetime / PT Catchment – Swindon

Source: TRACC / ESRI Speed Profile Data

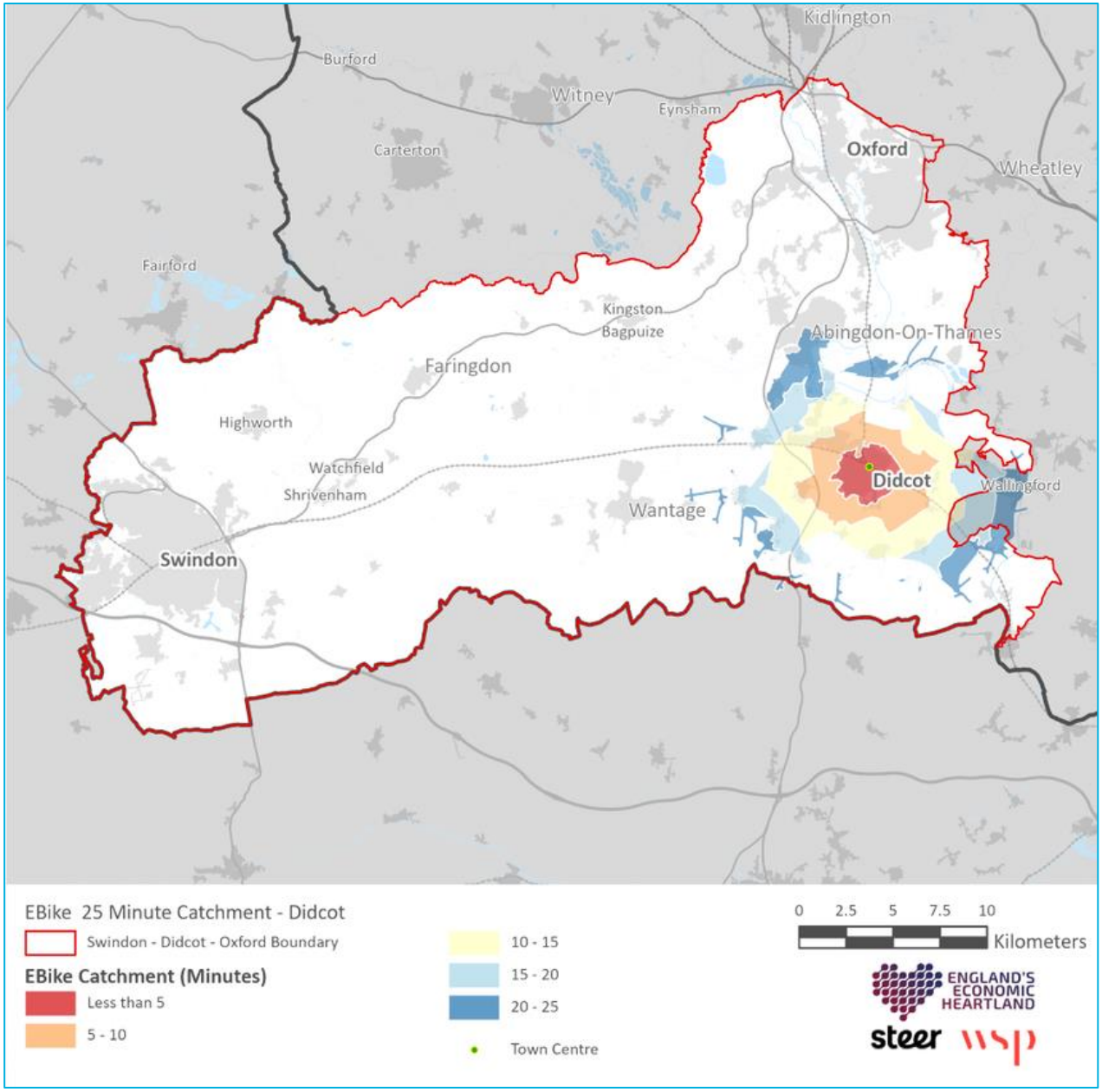




Appendix D – E-bike Catchments

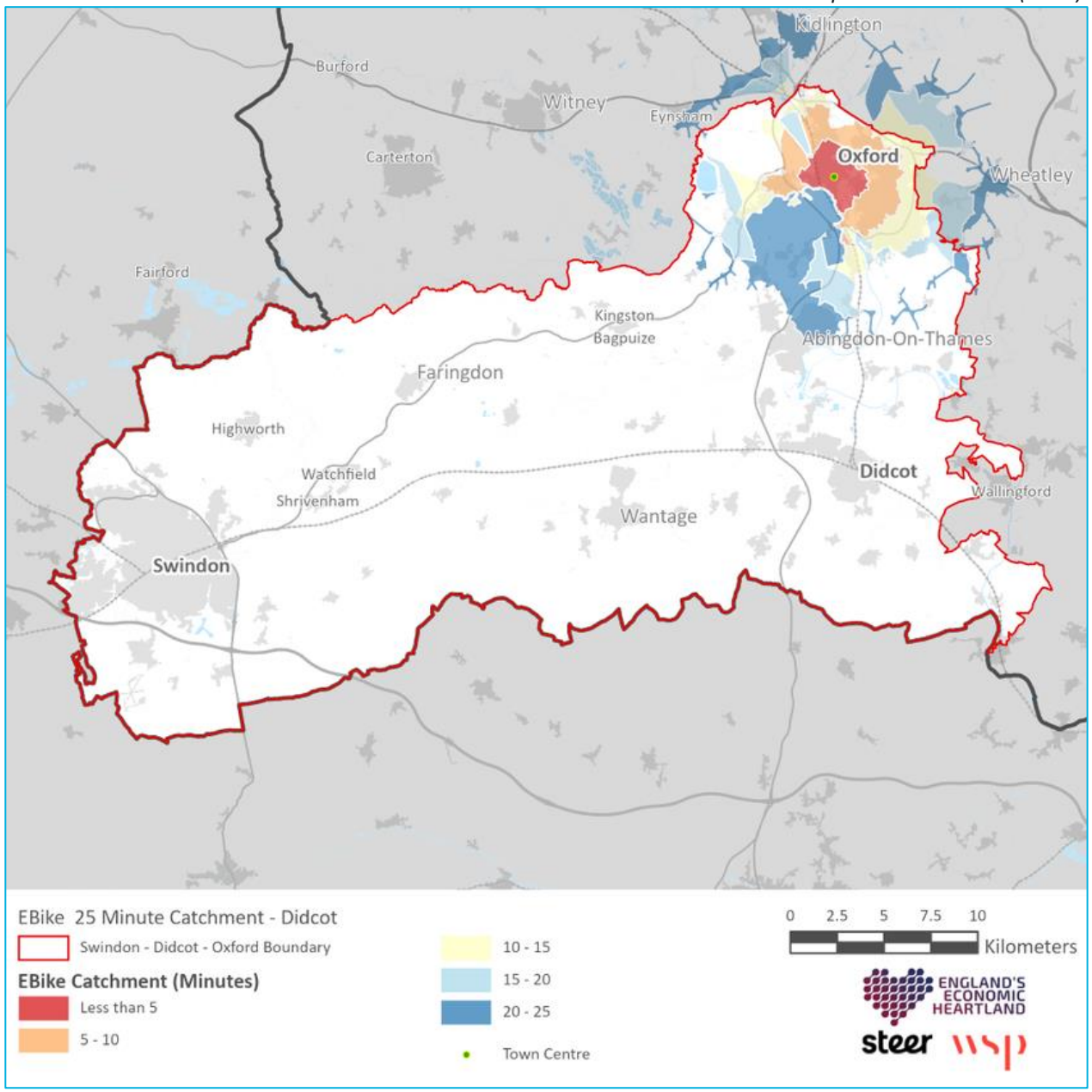
E-Bike 25 Minute Catchment – Didcot

Source: Open Route Services (2022)



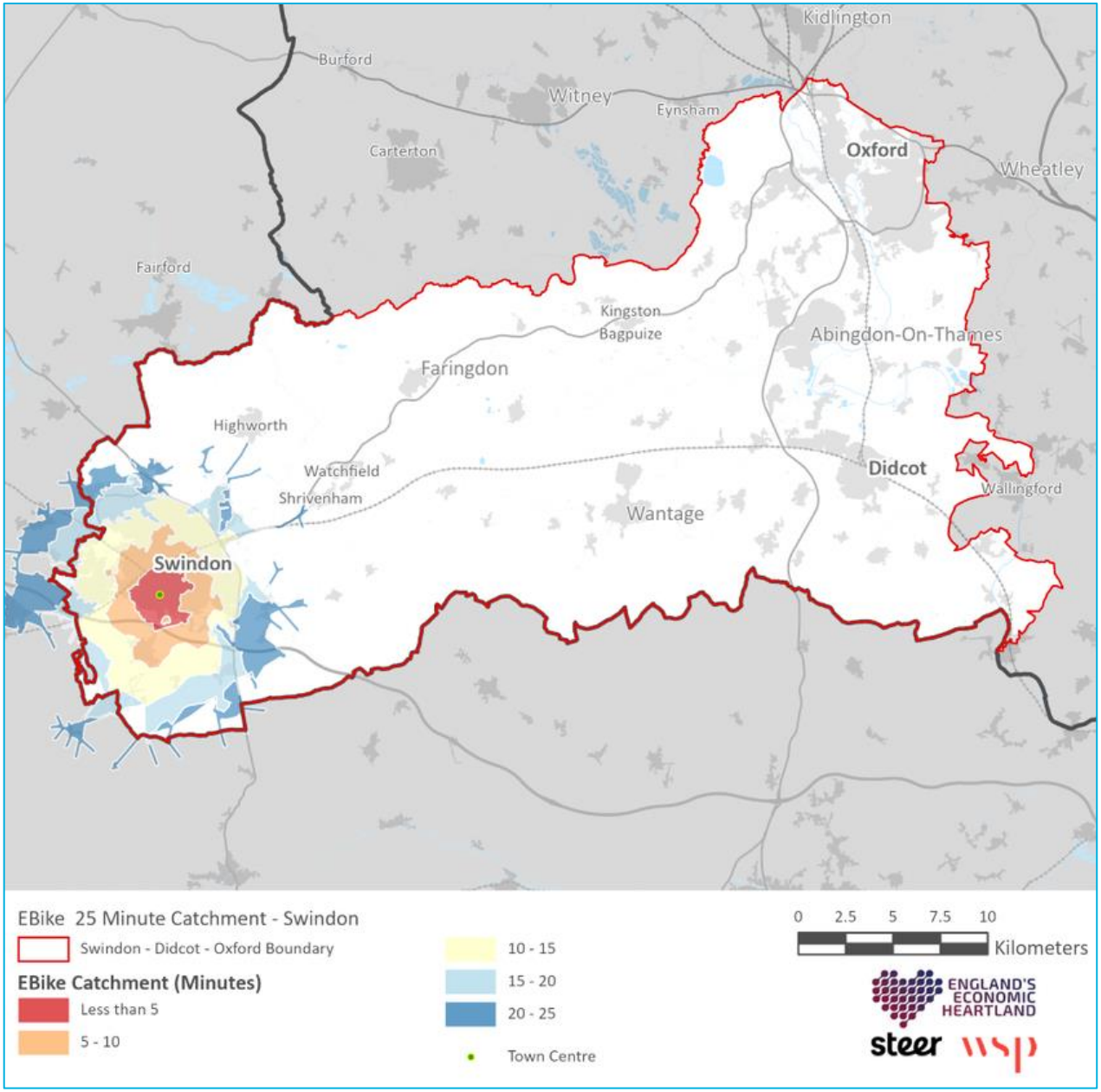
E-Bike 25 Minute Catchment – Oxford

Source: Open Route Services (2022)



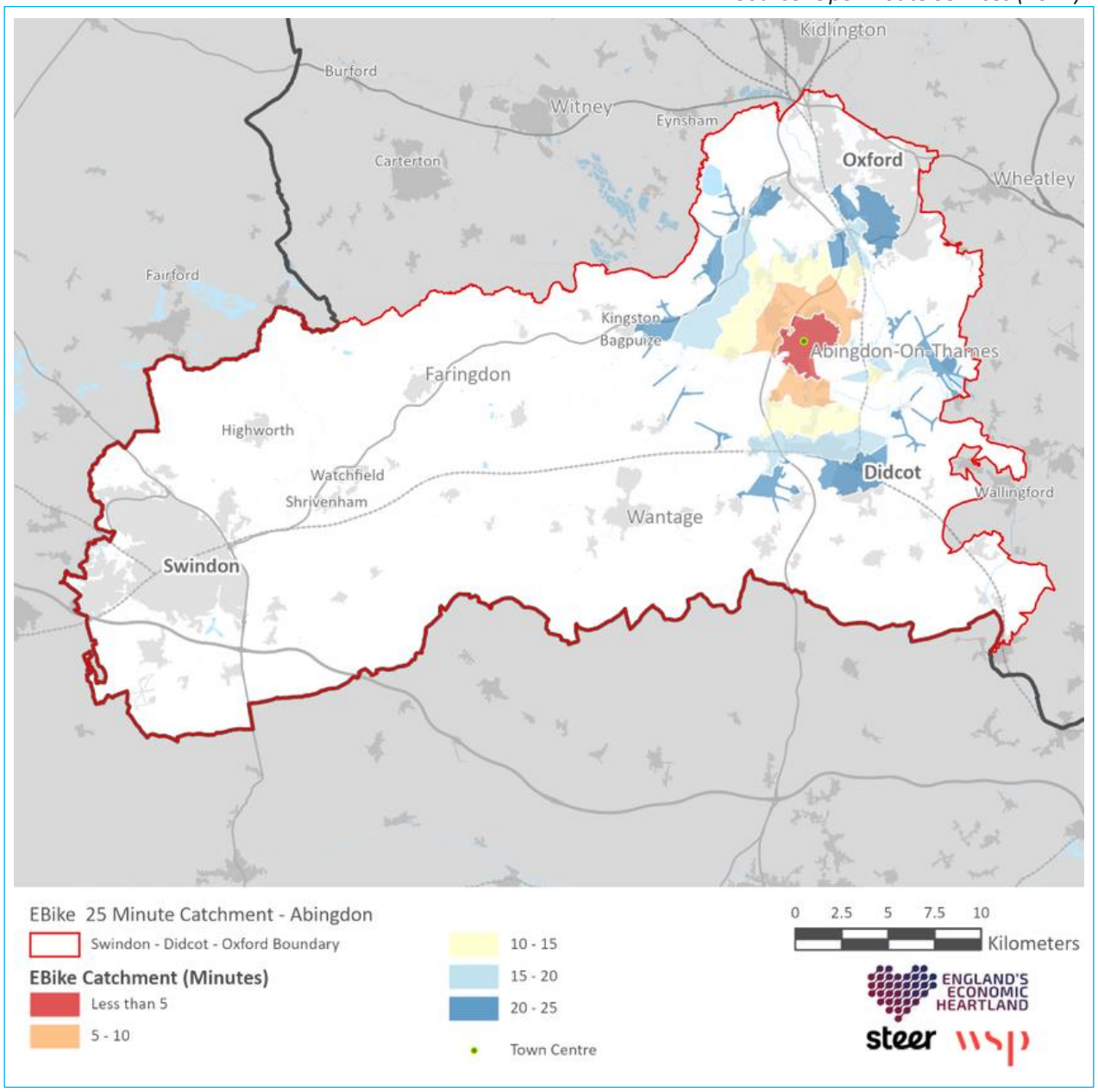
E-Bike 25 Minute Catchment – Swindon

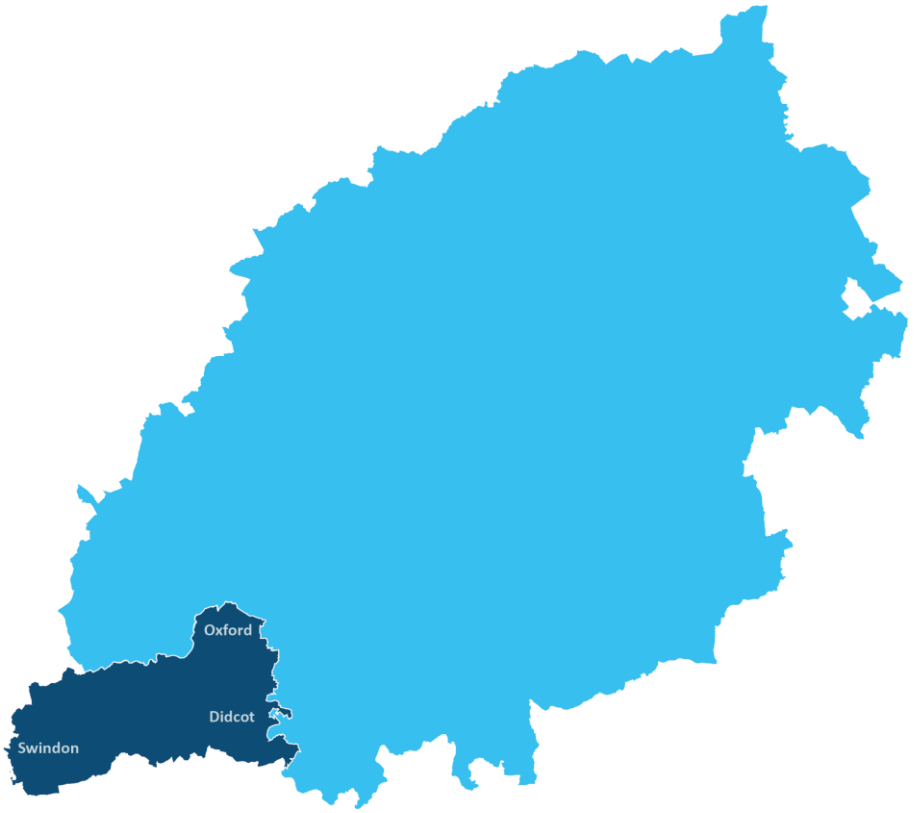
Source: Open Route Services (2022)



E-Bike 25 Minute Catchment – Abingdon-on-Thames

Source: Open Route Services (2022)





Appendix E – Travel Patterns and Behaviour

Travel Patterns & Behaviour

Car Driver

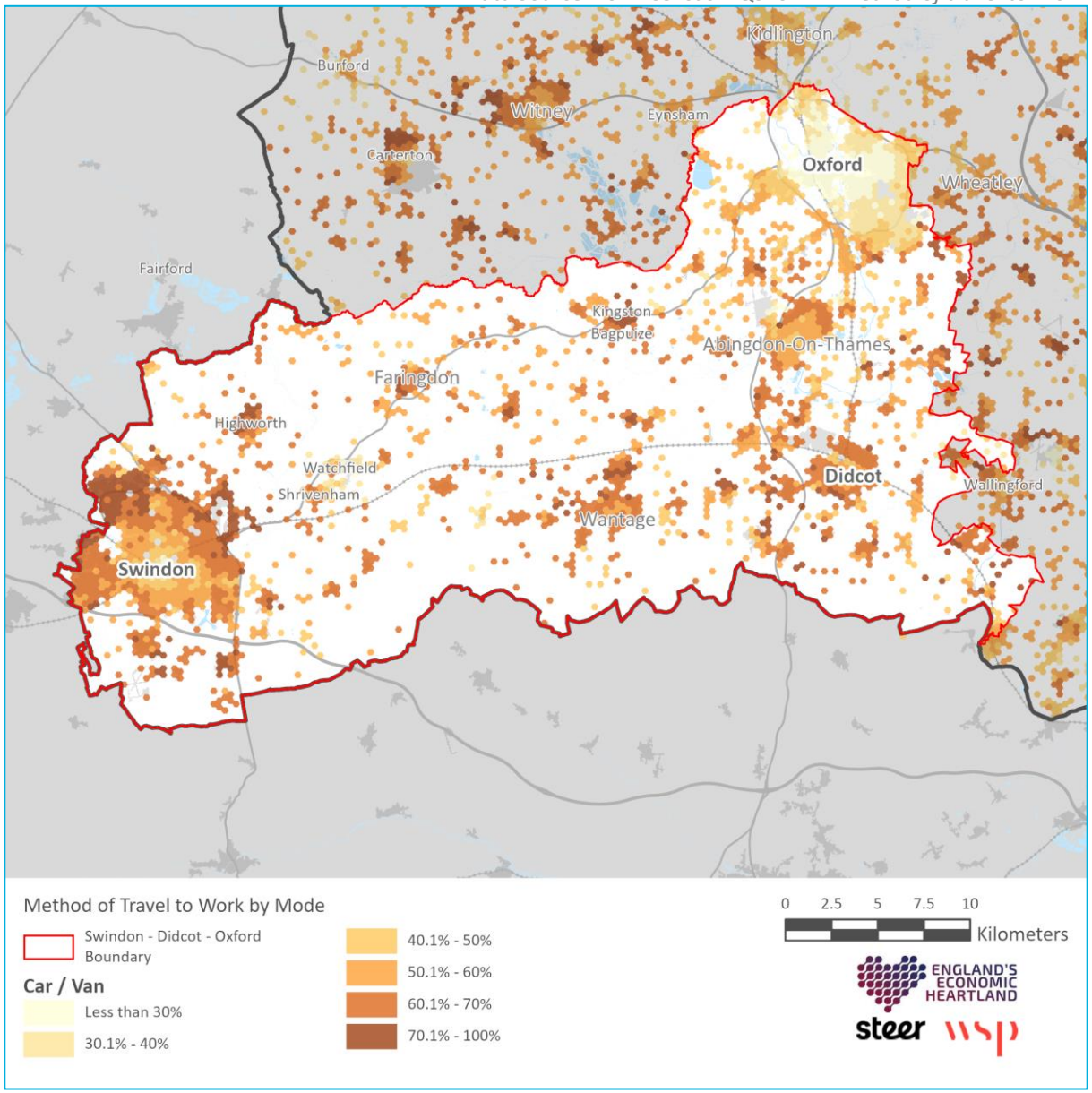
Most commuting trips within the Swindon – Didcot – Oxford study area were undertaken as a car driver. The 2011 Census recorded 139,000 commuter trips by car. This represented 37% of all commuter trips within the study area.

The plan opposite shows the journey to work car and van driver mode share in the study area. The plan shows the highest journey to work car and van driver mode share to be in suburban and rural areas, particularly in the north and northeast of Swindon and towns and villages in the centre of the study area, where modal share exceeds 70%.

The lowest car driver modal share is in Oxford city centre, where the car and van driver mode share is less than 30%. This is likely to be attributable to the city's density, availability of employment opportunities, and active travel behaviours of residents living and working in the city, notably the very high cycling mode share.

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

Data Source: 2011 Census – QS701EW Method of travel to Work



Travel Patterns & Behaviour

Car Passengers

The 2011 Census recorded 12,000 commuter trips as a car passenger within the Swindon – Didcot – Oxford study area. This represents 3% of all movements.

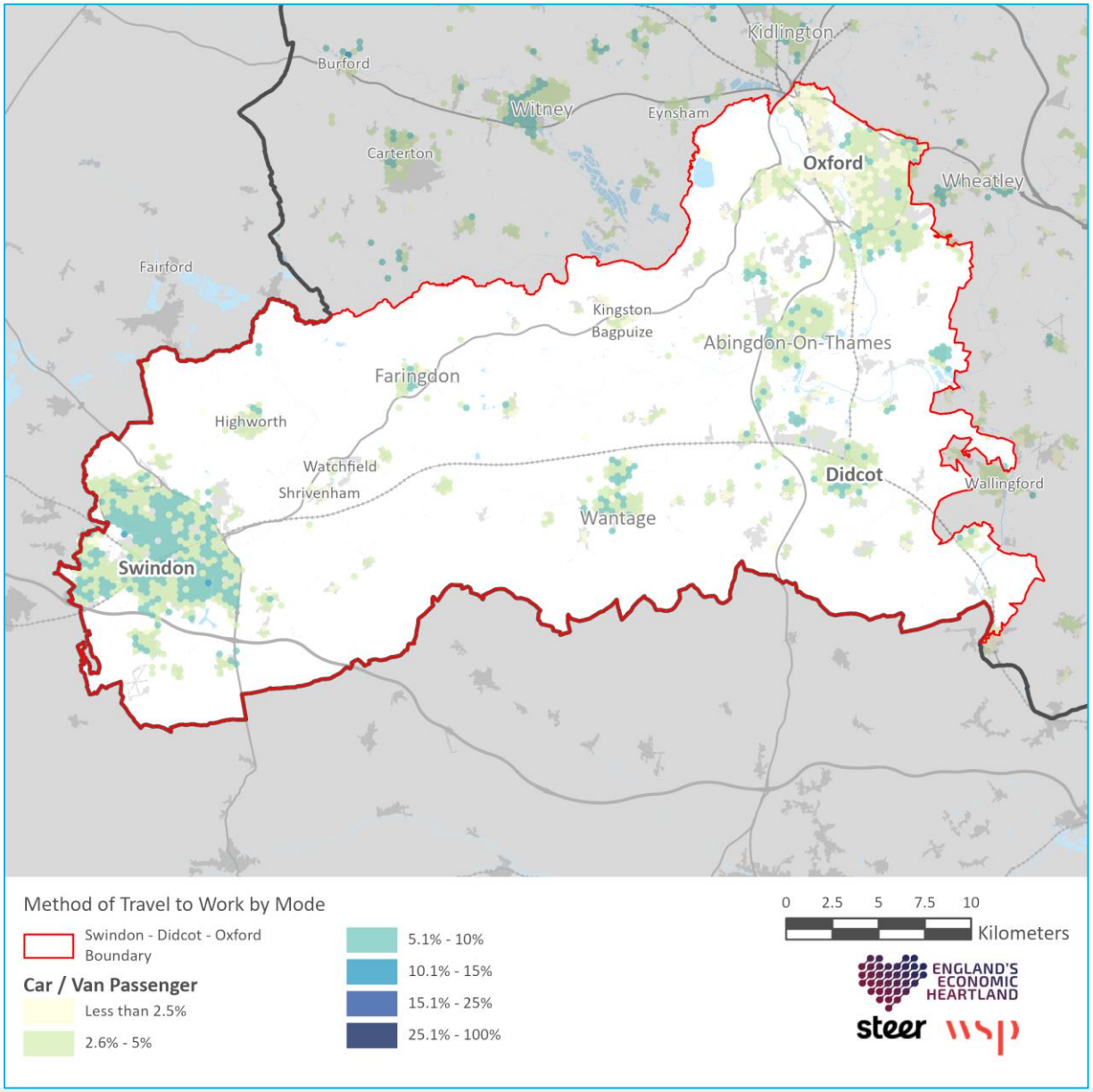
The car passenger journey to work mode share was highest in large and medium size urban areas. This included Swindon, Didcot, Oxford, Wantage, Abingdon-On-Thames and Faringdon.

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

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

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

Data Source: 2011 Census – QS701EW Method of travel to Work



Travel Patterns & Behaviour

Bus, Minibus and Coach

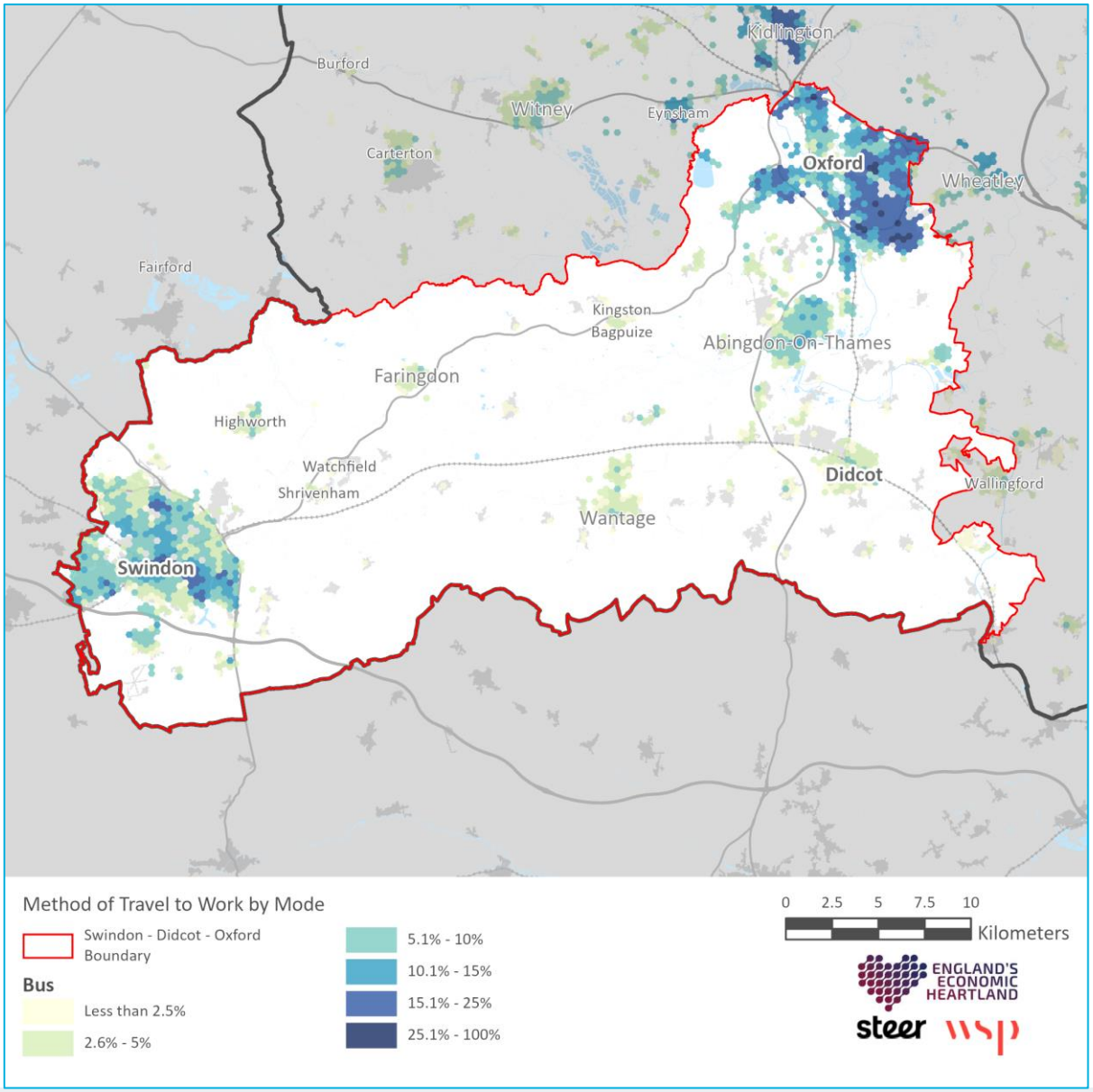
Bus usage makes up most of the the public transportation movements in the Swindon – Didcot – Oxford study area.

The 2011 Census recorded 25,000 commuter movements by bus. This represented 7% of all commuter movements in the study area and 79% of all public transport commuter movements.

There is a clear urban / rural divide, with the highest bus usage recorded in Oxford, Swindon and Abingdon-On-Thames. Overall, 69% of bus commuting trips originated from one of the four Settlements of Strategic Importance(Oxford, Didcot, Abingdon-On-Thames and Swindon).

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

Data Source: 2011 Census – QS701EW Method of travel to Work



Travel Patterns & Behaviour

Train

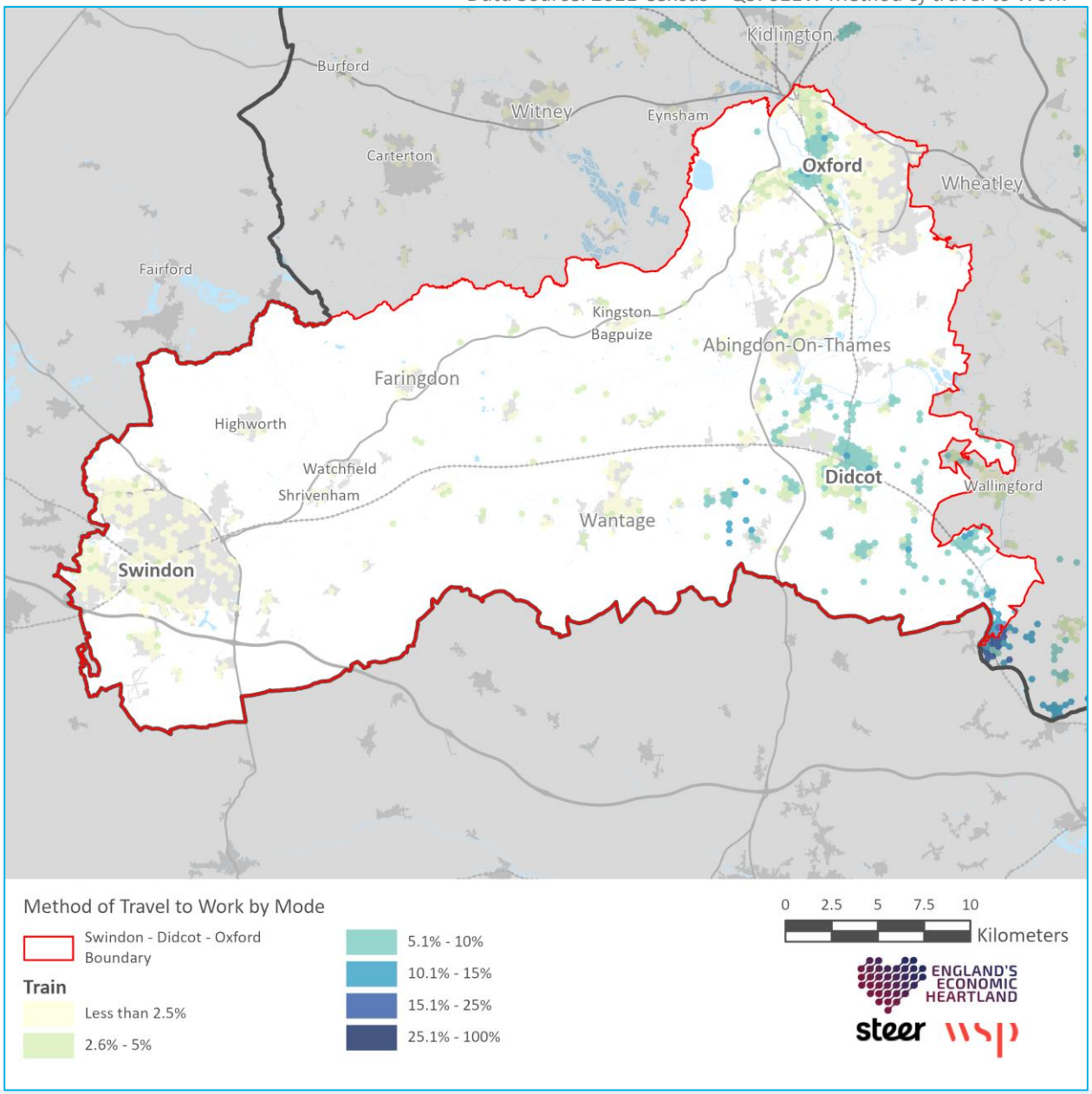
The 2011 Census recorded 5,500 commuter trips by train within the Swindon – Didcot – Oxford study area. This represented 1% of all commuter movements. Travel by train accounts for 18% of all public transport movements within the study area.

The rail journey to work mode share is highest in settlement with good rail connectivity, notably Didcot and Oxford.

Low rail use in centre and west of the study area is likely to be associated with poor inter-urban rail connectivity. For example, there is no direct rail connection between Swindon and Oxford.

Interventions should explore opportunities to improve inter-urban rail connectivity within the study area, particularly between Swindon and Didcot.

Data Source: 2011 Census – QS701EW Method of travel to Work



Travel Patterns & Behaviour

Cycling

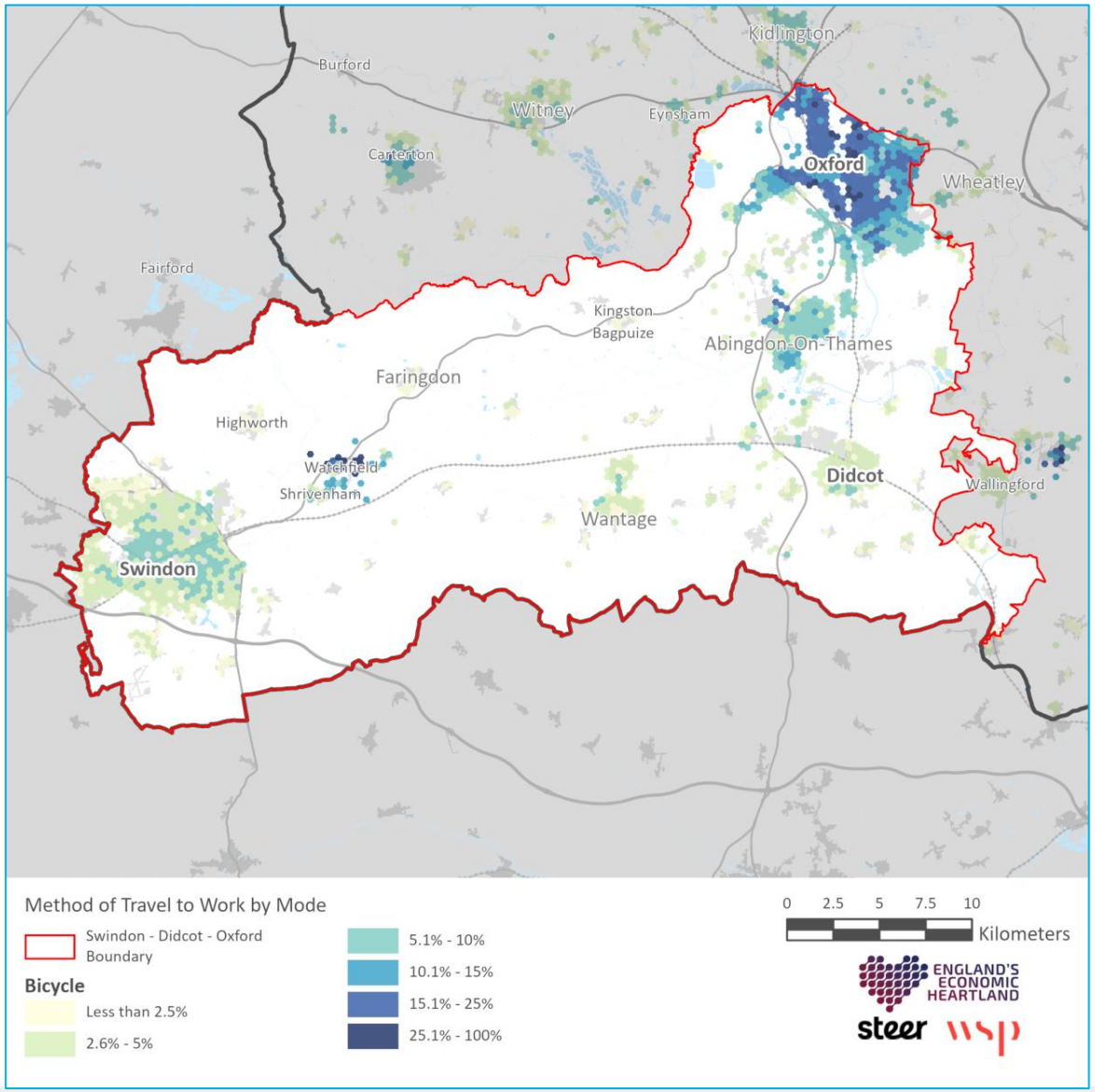
The 2011 Census recorded 21,500 cycling commuter movements within the Swindon – Didcot – Oxford study area. This represented 41% of all active travel commuter trips.

Oxford has the highest journey to work cycling mode of the four Settlements of Strategic Importance. In total 41% of all cycling commuter movements were undertaken from one of the four Settlements of Strategic Importance.

The cycling to work mode share is generally low in rural areas. This is likely to be attributable to the distances between rural settlements and large urban areas as well as the lack of active travel infrastructure. The exceptions are Watchfeild and Shrivenham where a high cycling to work mode share was recorded.

Oxford has received active travel funding from the DfT, which will be invested in upgrading cycling infrastructure. These interventions have the potential to increase cycle uptake in these areas.

Data Source: 2011 Census – QS701EW Method of travel to Work



Travel Patterns & Behaviour

Walking

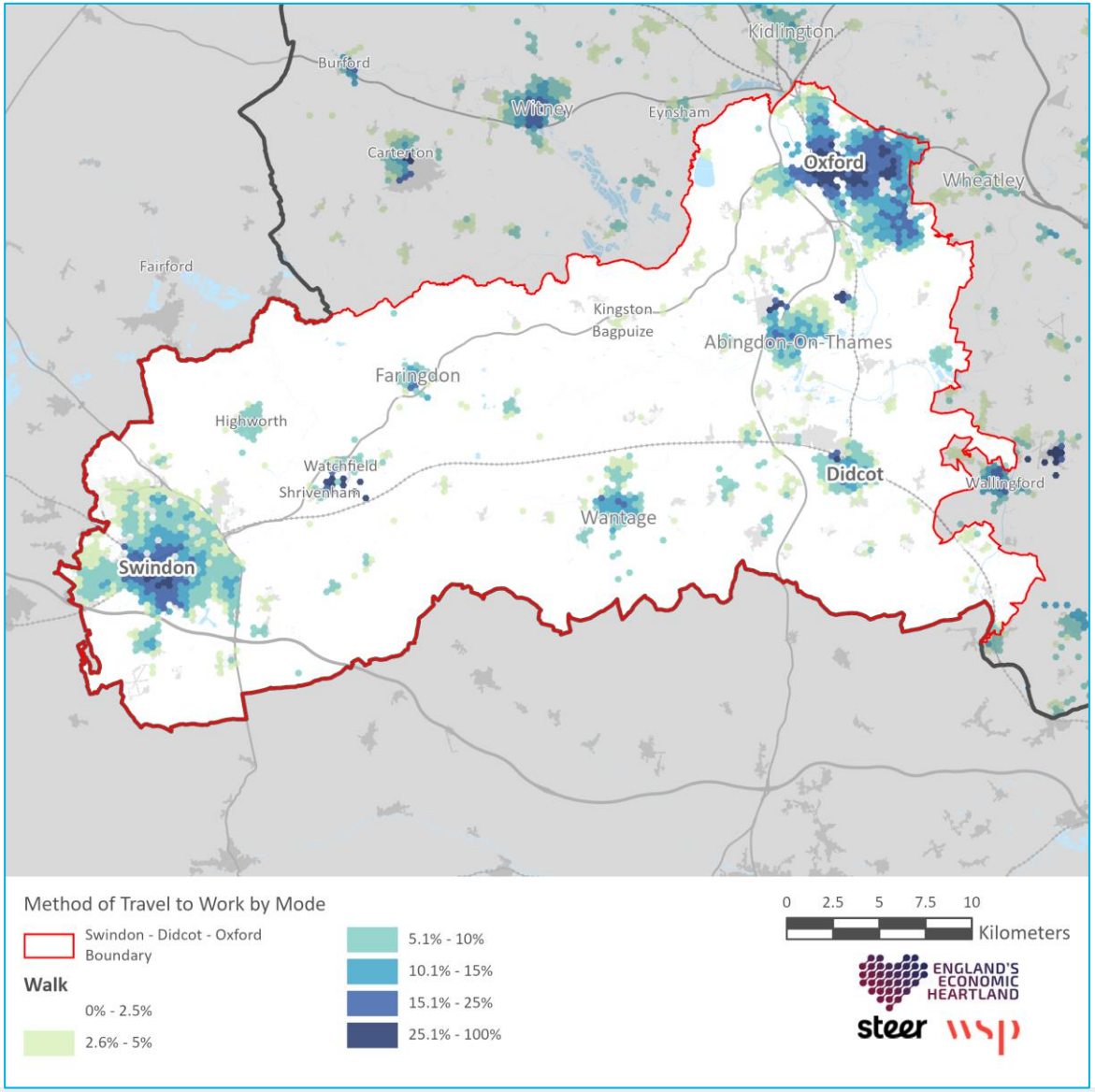
The 2011 census recorded 31,000 commuting movements on foot within the Swindon – Didcot – Oxford study area. This represented 8% of all movements within the study area.

Pedestrian movements within the study area make up 59% of all journeys by active travel. The highest journey to work walking mode share was within urban areas. In total 52% of all journeys to work on foot were from one of the four Settlements of Strategic Importance.

The evidence shows that commuter trips on foot are more common in urban areas. In rural areas the lower journey to work walking mode share is likely to be attributable to longer commuting distances.

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

Data Source: 2011 Census – QS701EW Method of travel to Work



Travel Patterns & Behaviour

Work From Home

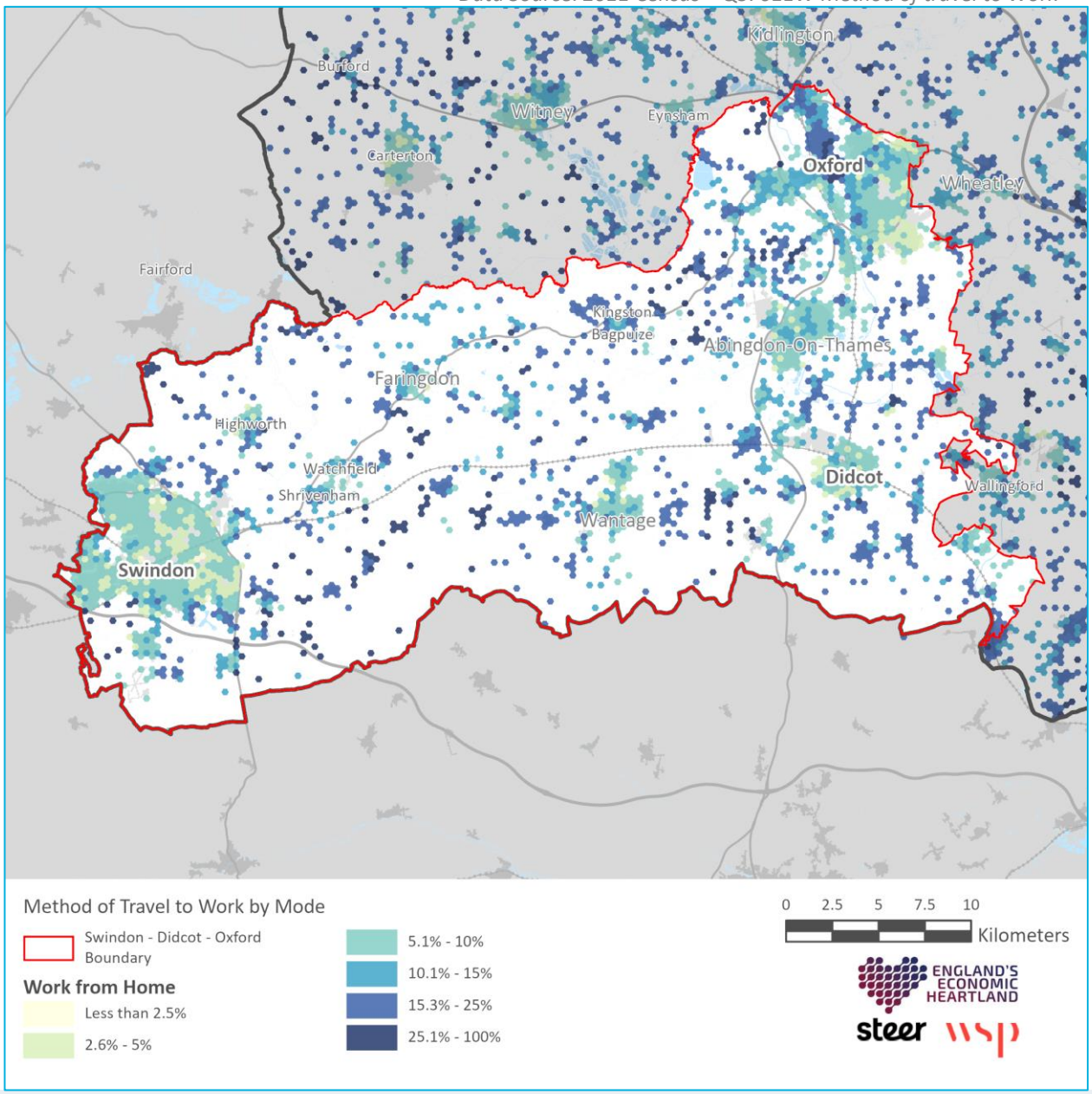
One of the most significant changes to transport patterns as a result of Covid-19 is the increase in working from home (WfH). It is difficult to predict the longer-term impacts on travel patterns, however it is likely that hybrid working will remain a common workplace arrangement.

The pre Covid-19 patterns of WFH behaviours show that 13,000 people worked from home. This represented less than 5% of all commuter journeys within the Swindon – Didcot – Oxford study area.

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

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

Data Source: 2011 Census – QS701EW Method of travel to Work



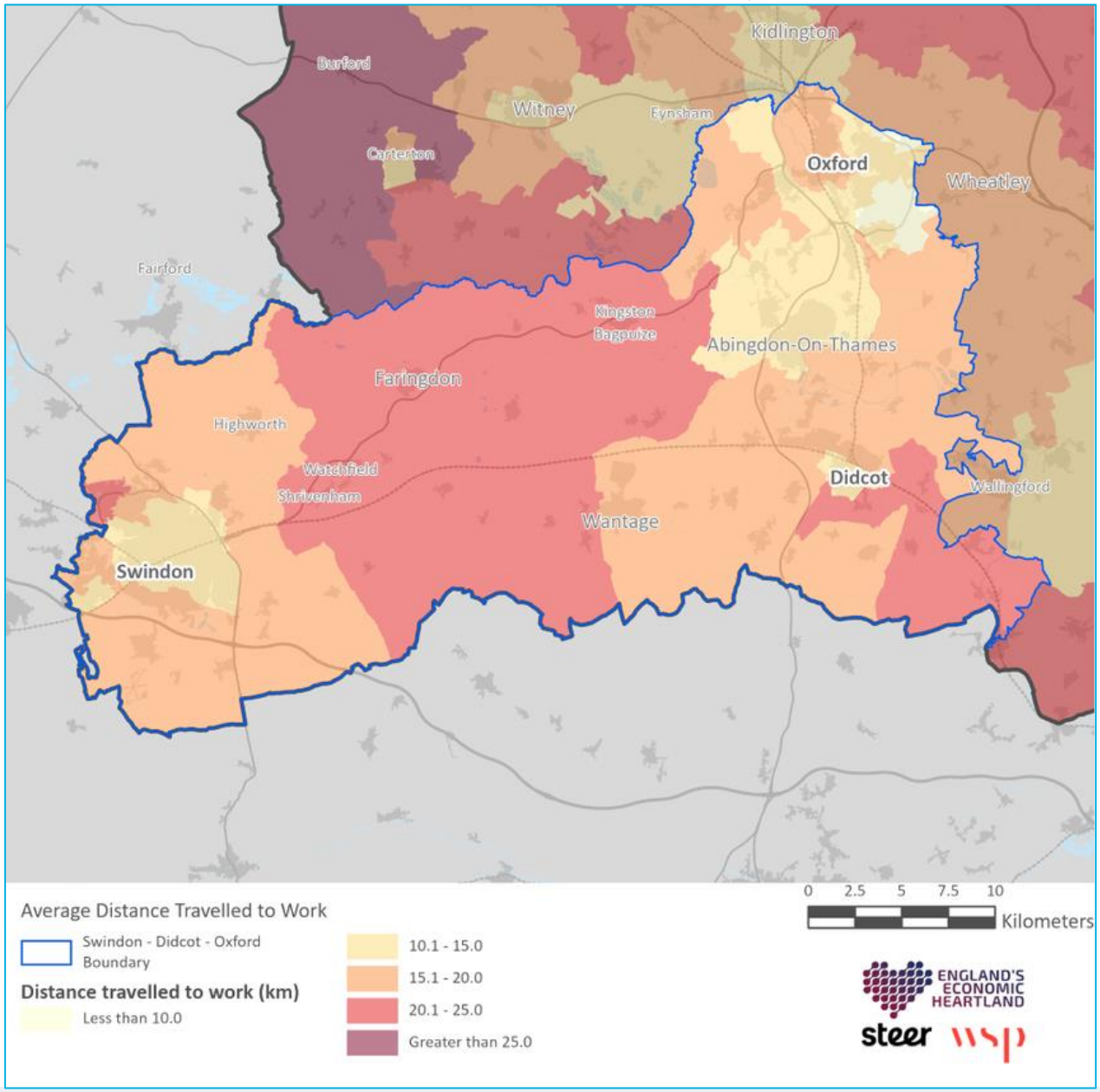
Distance Travelled to Work

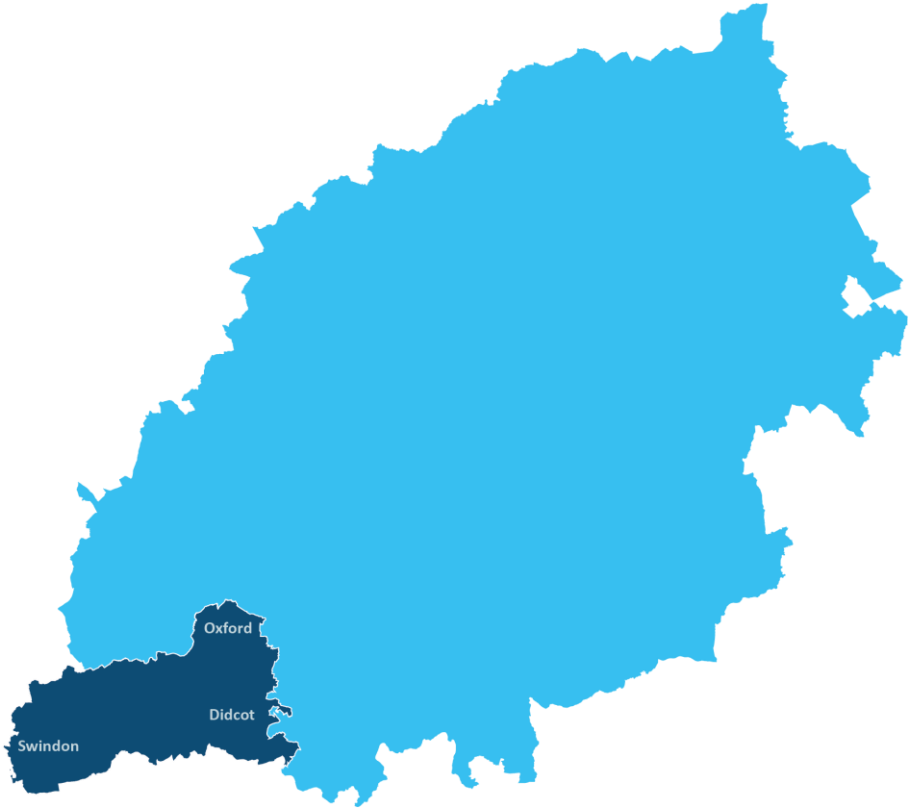
The average distance travelled to work in the Swindon – Didcot – Oxford study area was 15.1 to 20.0 km.

There is a clear urban / rural divide with residents living in rural areas travelling further to reach their place of work than residents living in urban areas. The shortest average distance travelled to work was recorded in Swindon, Didcot and Abingdon-On-Thames. This is likely to be associated with the high number of employment opportunities near these settlements.

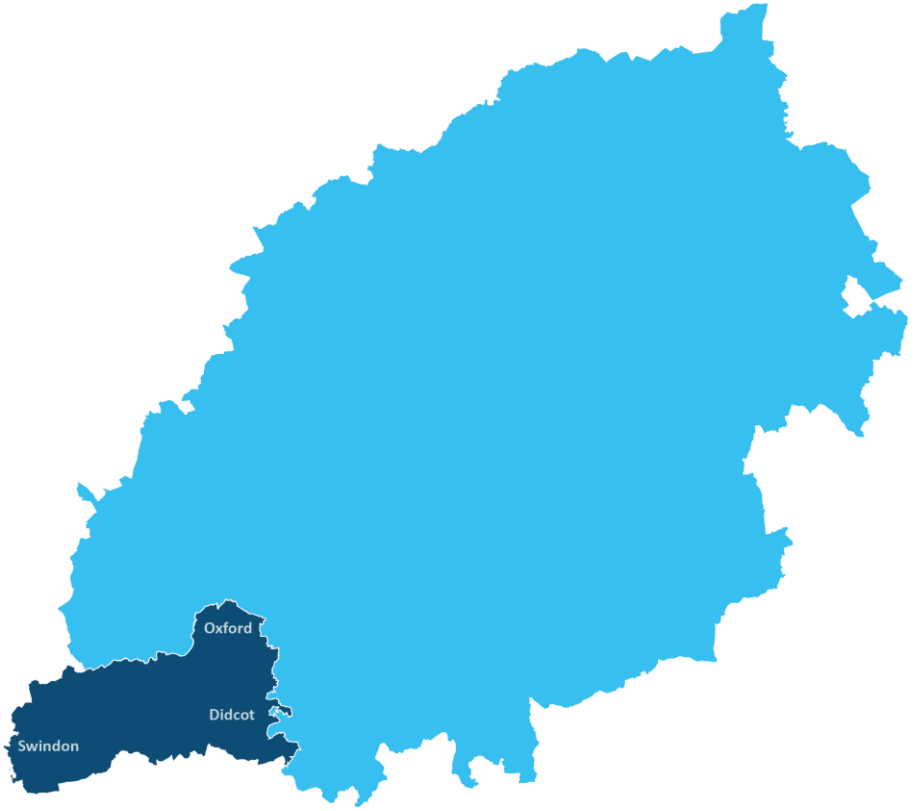
Active travel interventions should target areas where active travel is a feasible option for people travelling to work. This means that interventions should focus on the areas to the east and west of the study area.

Data Source: 2011 Census – QS702EW Distance travelled to Work





Appendix F – Alternative Futures



Appendix G – O-D Matrix

O-D Matrix – Car Driver

Major Urban Settlements	Abingdon-on-Thames	Didcot	Oxford	Swindon	Rural Areas	London	Study Area Total	EEH Region	EEH Excluding Study Area	England and Wales Excluding EEH and London
Abingdon-on-Thames	2160	294	2477	77	2471	135	7479	8868	1389	672
Didcot	657	1240	1040	35	2554	88	5526	6992	1466	826
Oxford	851	208	11825	130	2036	457	15050	20273	5223	1706
Swindon	147	58	472	28806	9101	535	38584	39596	1012	12636
Rural Areas	2295	1056	5057	3895						
London	56	15	459	195						
Study Area Total	6110	2856	20871	32943						
EEH Region	7976	3502	39191	33518						
EEH Excluding Study Area	1866	646	18320	575						
England and Wales Excluding EEH and London	845	392	3541	13456						

The origin-destination matrix show the number of workers travelling between the fours Settlements of Strategic Importance and other geographical areas in the study area and UK as a car driver.

- Rural Area: This area includes all MSOAs inside the study area, excluding the four Settlements of Strategic Importance.
- England and Wales: This area includes all data from England and Wales.

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

O-D Matrix – Bus

Major Urban Settlements	Abingdon-on-Thames	Didcot	Oxford	Swindon	Rural Areas	London	Corridor Total	EEH Region	EEH Excluding Corridor	England and Wales Excluding EEH and London
Abingdon-on-Thames	125	26	959	1	176	57	1287	1352	65	15
Didcot	48	26	38	0	337	10	449	499	50	7
Oxford	158	16	9182	12	214	606	9582	10421	839	187
Swindon	1	0	53	5785	1482	79	7321	7361	40	894
Rural Areas	193	50	861	432						
London	11	0	401	54						
Corridor Total	525	118	11093	6230						
EEH Region	572	151	15181	6241						
EEH Excluding Corridor	47	33	4088	11						
England and Wales Excluding EEH and London	26	3	187	701						

The origin-destination matrix show the number of workers travelling between the fours Settlements of Strategic Importance and other geographical areas in the study area and UK by bus.

- Rural Area: This area includes all MSOAs inside the study area, excluding the four Settlements of Strategic Importance .
- England and Wales: This area includes all data from England and Wales.

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

O-D Matrix – Train

Major Urban Settlements	Abingdon-on-Thames	Didcot	Oxford	Swindon	Rural Areas	London	Corridor Total	EEH Region	EEH Excluding Corridor	England and Wales Excluding EEH and London
Abingdon-on-Thames	9	1	26	8	5	205	49	53	4	77
Didcot	5	21	289	34	26	265	375	404	29	257
Oxford	4	19	126	21	127	786	297	397	100	472
Swindon	1	12	14	79	35	456	141	160	19	530
Rural Areas	8	17	107	35						
London	15	11	317	127						
Corridor Total	27	70	562	177						
EEH Region	37	85	1412	212						
EEH Excluding Corridor	10	15	850	35						
England and Wales Excluding EEH and London	24	40	855	1336						

The origin-destination matrix show the number of workers travelling between the fours Settlements of Strategic Importance and other geographical areas in the study area and UK by Train.

- Rural Area: This area includes all MSOAs inside the study area, excluding the four Settlements of Strategic Importance.
- England and Wales: This area includes all data from England and Wales.

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

O-D Matrix – Car Passenger

Major Urban Settlements	Abingdon-on-Thames	Didcot	Oxford	Swindon	Rural Areas	London	Corridor Total	EEH Region	EEH Excluding Corridor	England and Wales Excluding EEH and London
Abingdon-on-Thames	259	22	153	3	183	1	620	686	66	37
Didcot	33	161	67	1	241	4	503	591	88	24
Oxford	53	22	1288	7	194	32	1564	1887	323	137
Swindon	6	6	34	3393	1065	25	4504	4545	41	706
Rural Areas	169	70	285	261						
London	2	1	26	5						
Corridor Total	520	281	1827	3665						
EEH Region	588	326	2916	3677						
EEH Excluding Corridor	68	45	1089	12						
England and Wales Excluding EEH and London	23	29	112	913						

The origin-destination matrix show the number of workers travelling between the fours Settlements of Strategic Importance and other geographical areas in the study area and UK as a car passenger.

- Rural Area: This area includes all MSOAs inside the study area, excluding the four Settlements of Strategic Importance.
- England and Wales: This area includes all data from England and Wales.

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

O-D Matrix – Bicycle

Major Urban Settlements	Abingdon-on-Thames	Didcot	Oxford	Swindon	Rural Areas	London	Corridor Total	EEH Region	EEH Excluding Corridor	England and Wales Excluding EEH and London
Abingdon-on-Thames	924	16	204	1	299	2	1444	1471	27	7
Didcot	18	327	15	0	193	9	553	598	45	15
Oxford	58	5	11333	7	107	64	11510	11868	358	103
Swindon	1	0	8	3208	705	22	3922	3934	12	305
Rural Areas	131	50	430	113						
London	0	0	52	6						
Corridor Total	1132	398	11990	3329						
EEH Region	1167	410	12894	3333						
EEH Excluding Corridor	35	12	904	4						
England and Wales Excluding EEH and London	7	4	122	146						

The origin-destination matrix show the number of workers travelling between the fours Settlements of Strategic Importance and other geographical areas in the study area and UK by bicycle.

- Rural Area: This area includes all MSOAs inside the study area, excluding the four Settlements of Strategic Importance.
- England and Wales: This area includes all data from England and Wales.

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

O-D Matrix – Foot

Major Urban Settlements	Abingdon On-Thames	Didcot	Oxford	Swindon	Rural Areas	London	Corridor Total	EEH Region	EEH Excluding Corridor	England and Wales Excluding EEH and London
Abingdon On-Thames	1360	4	35	1	74	2	1474	1494	20	20
Didcot	12	1141	17	0	72	9	1242	1314	72	35
Oxford	27	10	10997	6	71	64	11111	11353	242	219
Swindon	0	1	2	8248	419	22	8670	8712	42	562
Rural Areas	78	47	155	113						
London	0	0	52	6						
Corridor Total	1477	1203	11206	8368						
EEH Region	1538	1266	11548	8385						
EEH Excluding Corridor	61	63	342	17						
England and Wales Excluding EEH and London	36	28	314	274						

The origin-destination matrix show the number of workers travelling between the fours Settlements of Strategic Importance and other geographical areas in the study area and UK on foot.

- Rural Area: This area includes all MSOAs inside the study area, excluding the four Settlements of Strategic Importance.
- England and Wales: This area includes all data from England and Wales.

The darker colours in the matrix represent the highest flows.

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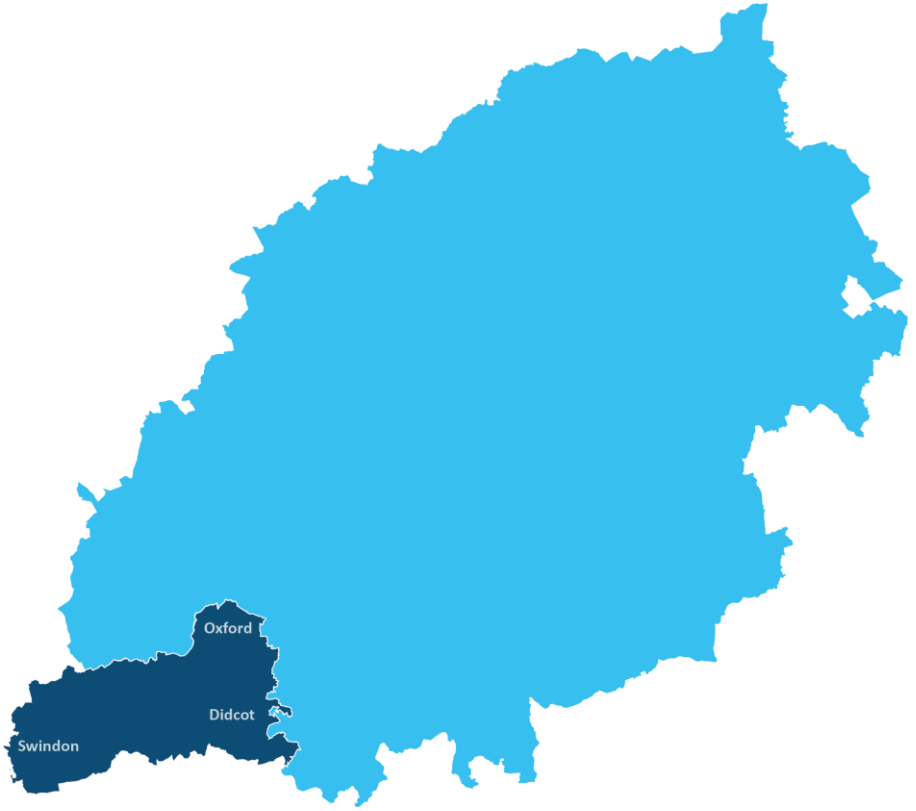
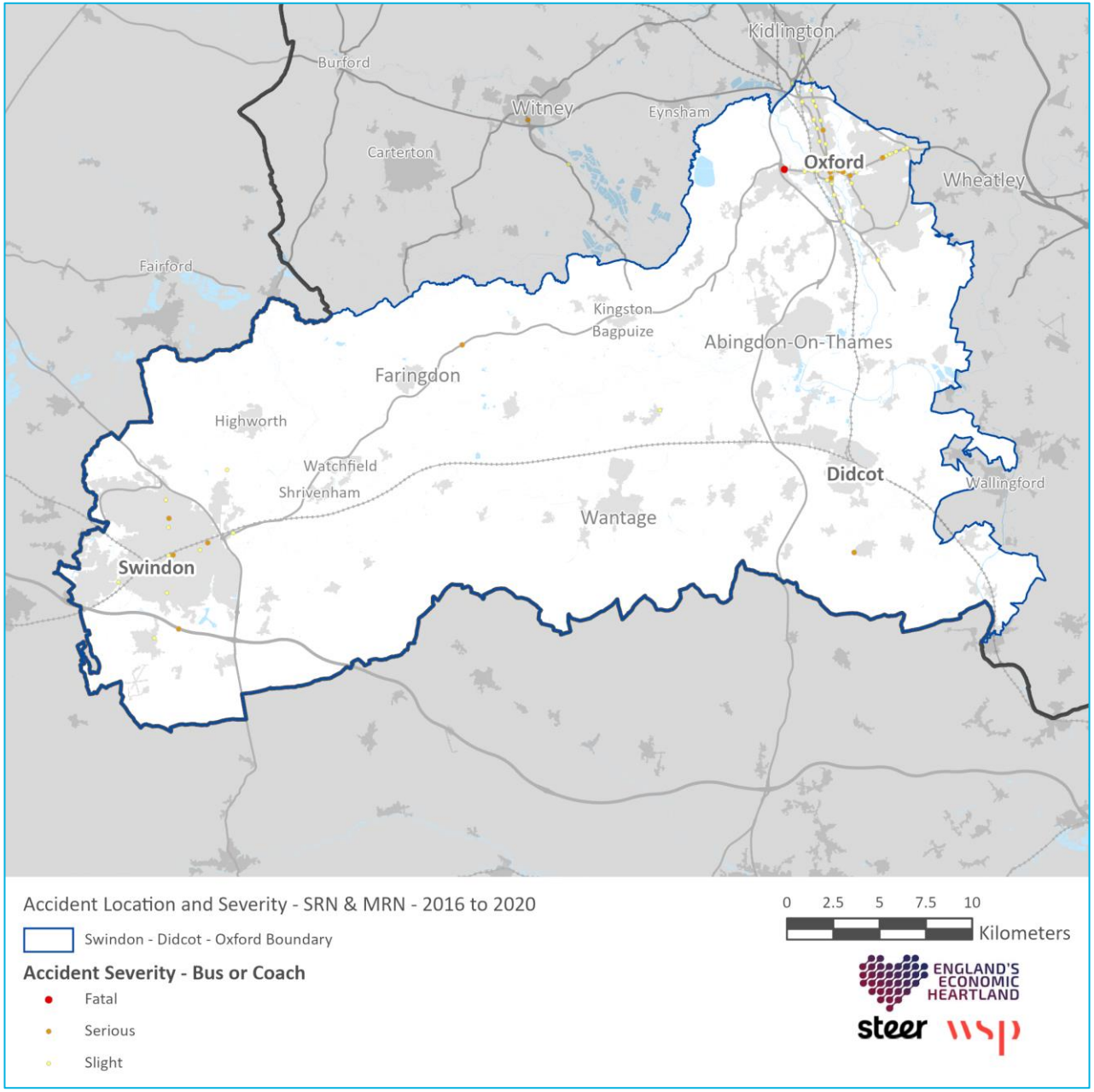
- Pink highlights the highest flows between the Settlements of Strategic Importance and England & Wales excluding EEH and London



Appendix H – Vehicle Accident Data

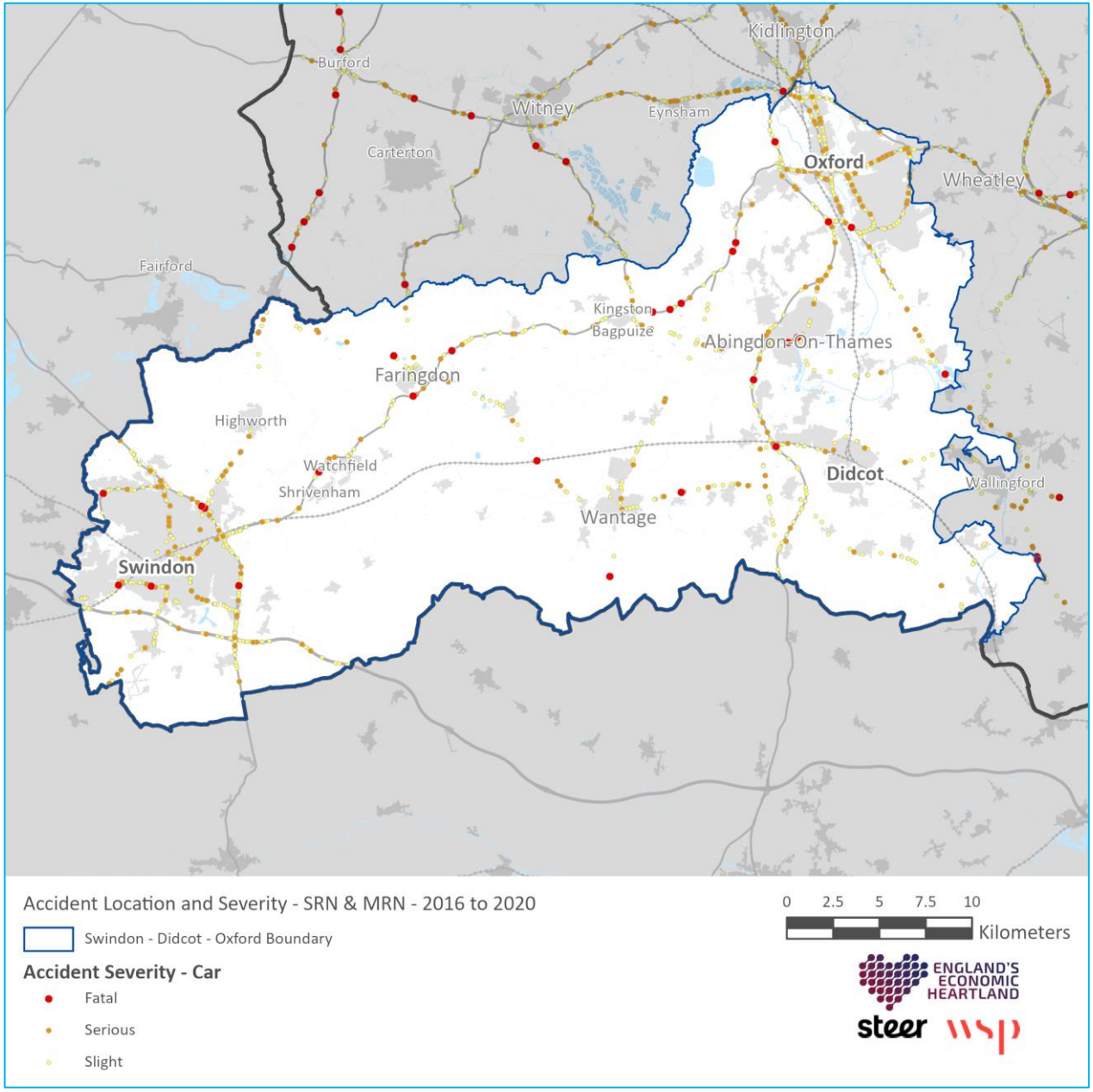
Accident Data – Bus or Coach

Source: DfT Road Safety Data 2016 to 2020



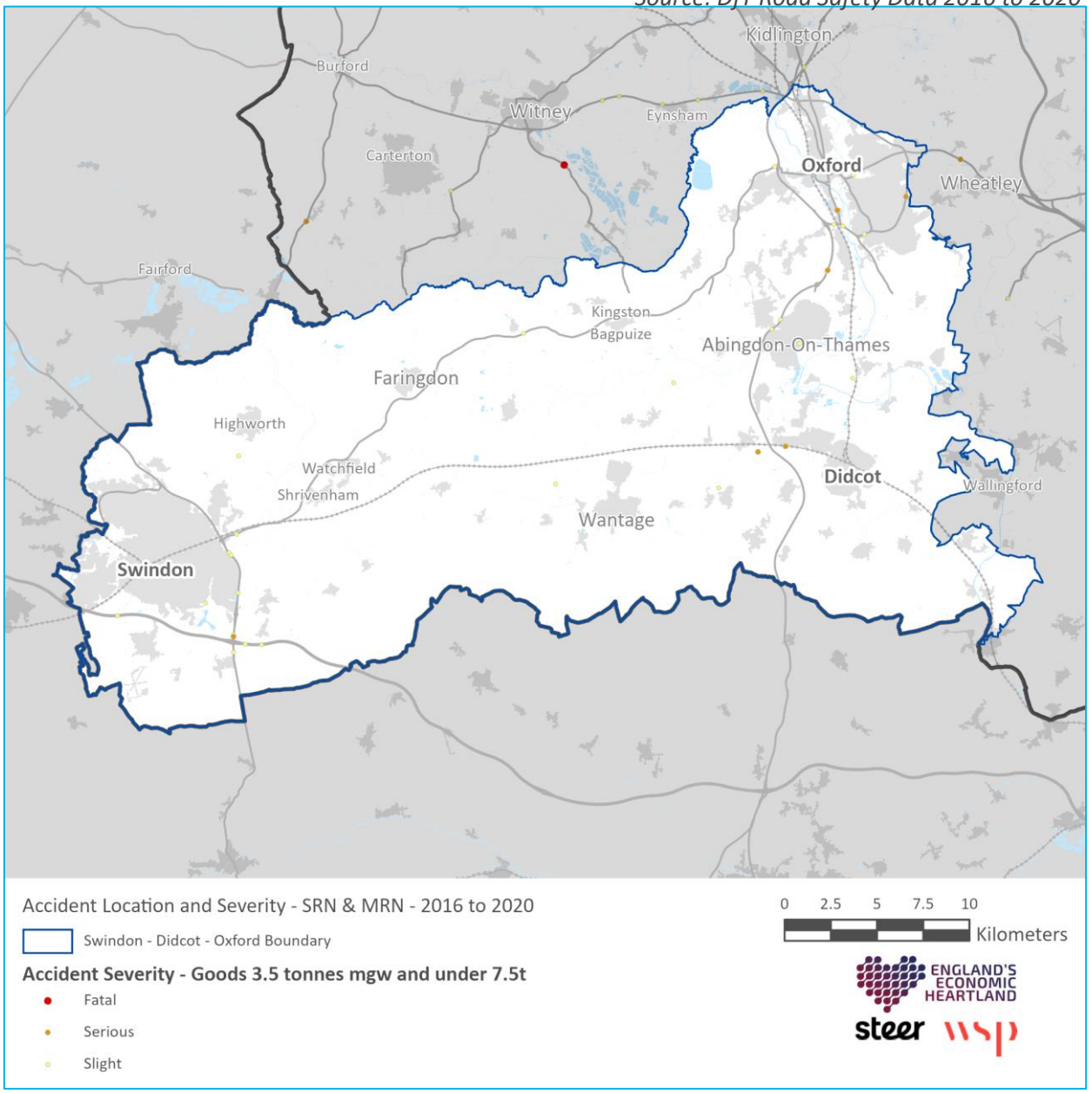
Accident Data – Car

Source: DfT Road Safety Data 2016 to 2020



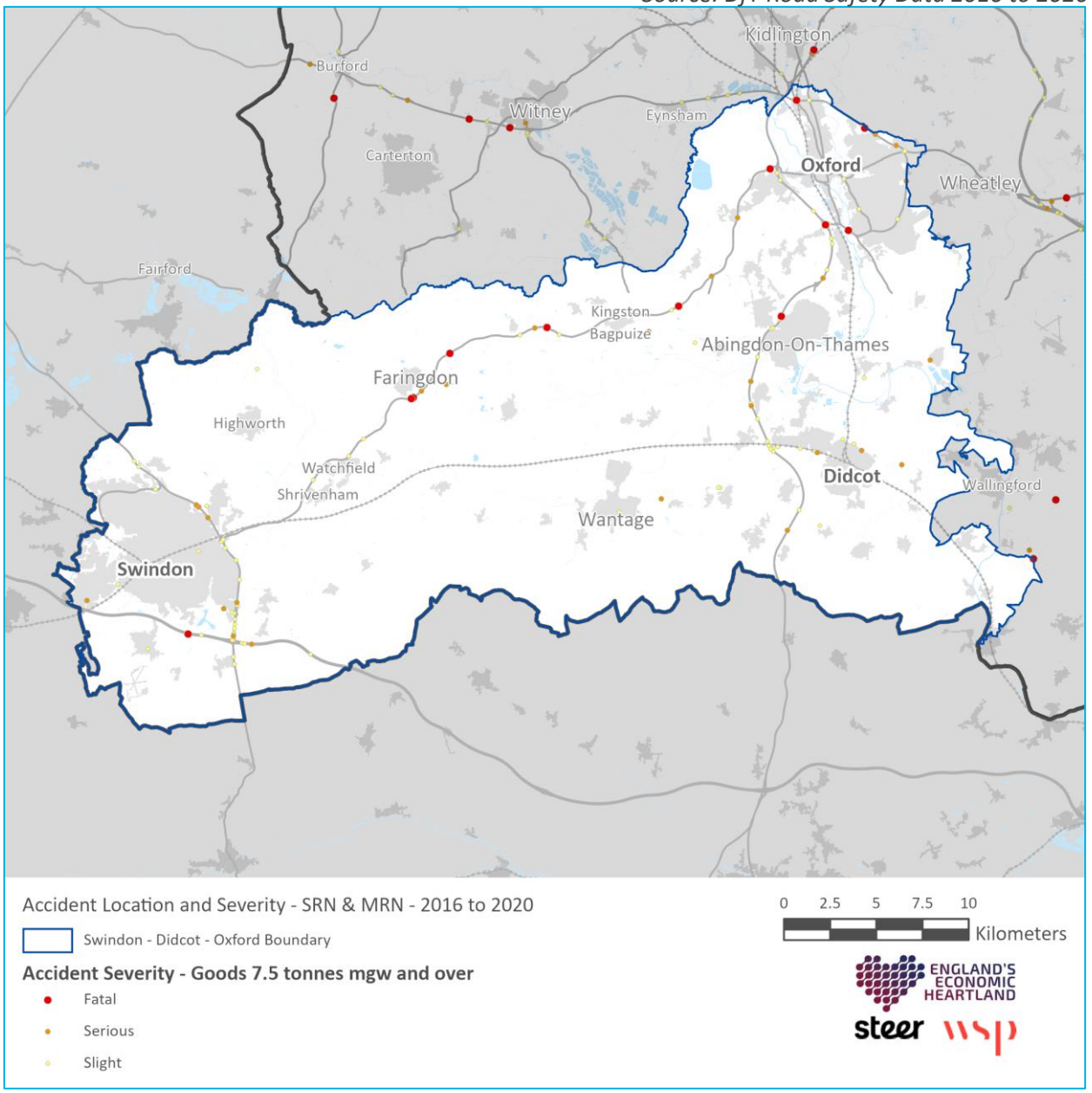
Accident Data – Goods 3.5t to 7.5t

Source: DfT Road Safety Data 2016 to 2020



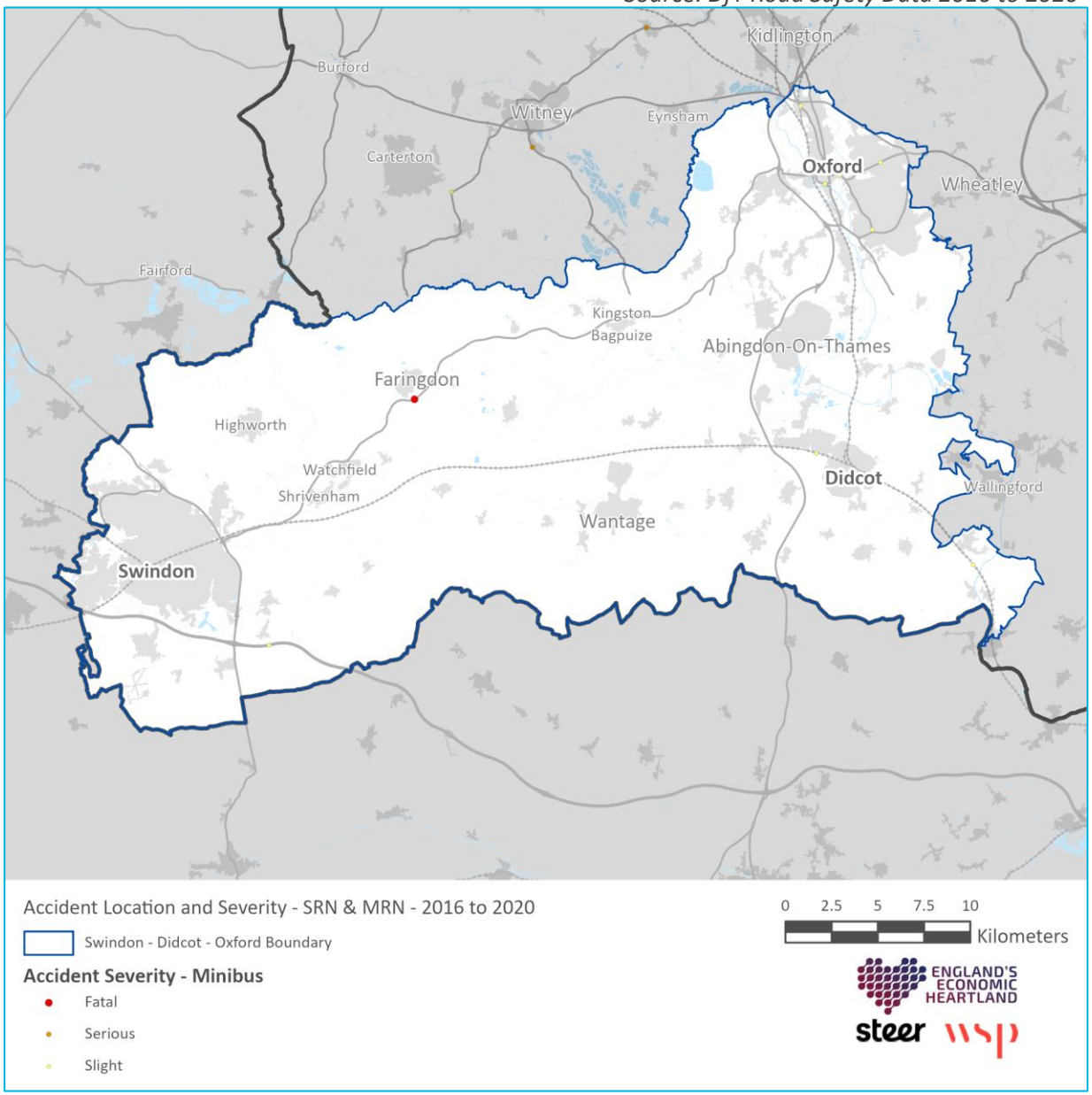
Accident Data – Goods 7.5t and over

Source: DfT Road Safety Data 2016 to 2020



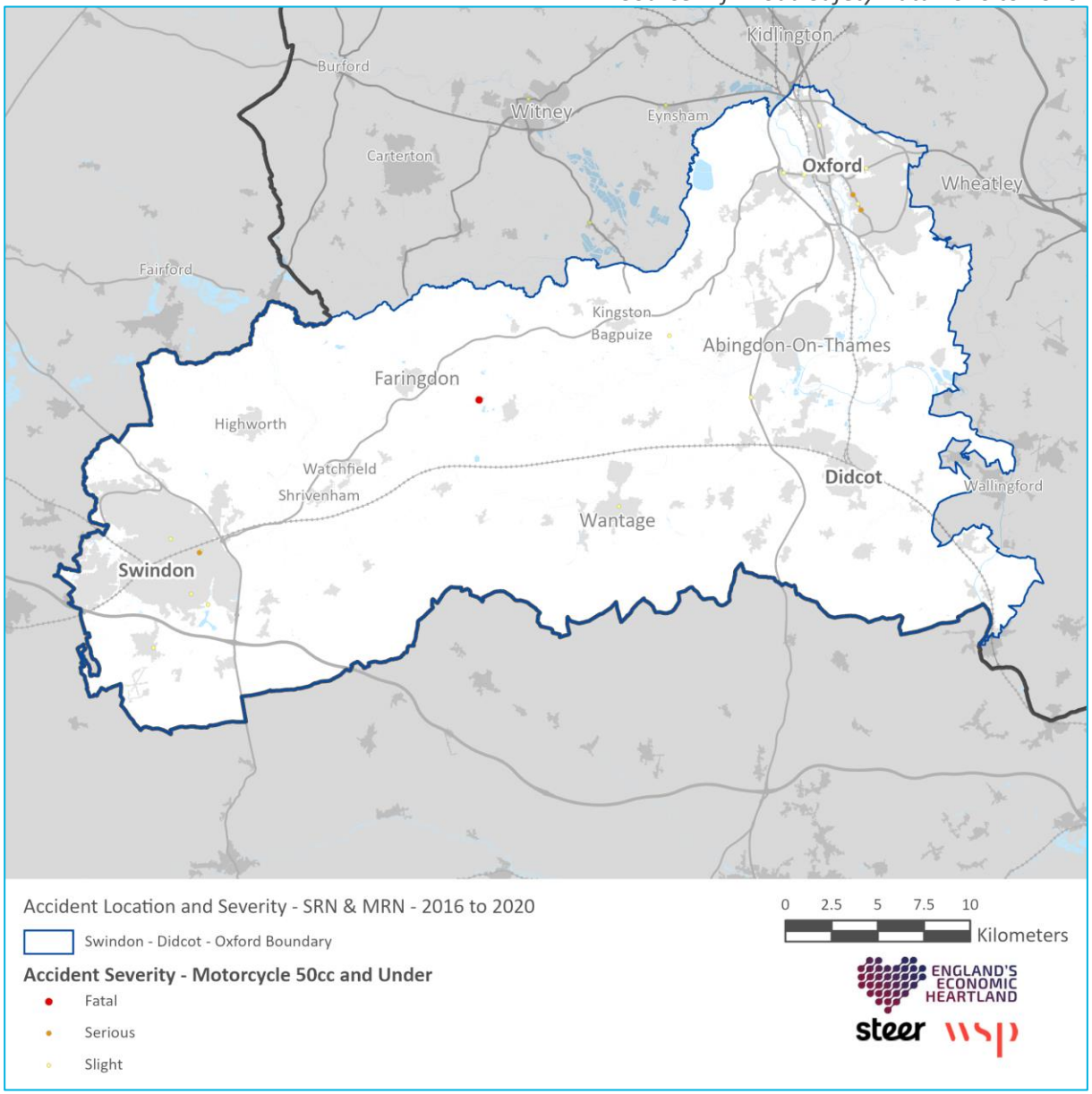
Accident Data – Minibus

Source: DfT Road Safety Data 2016 to 2020



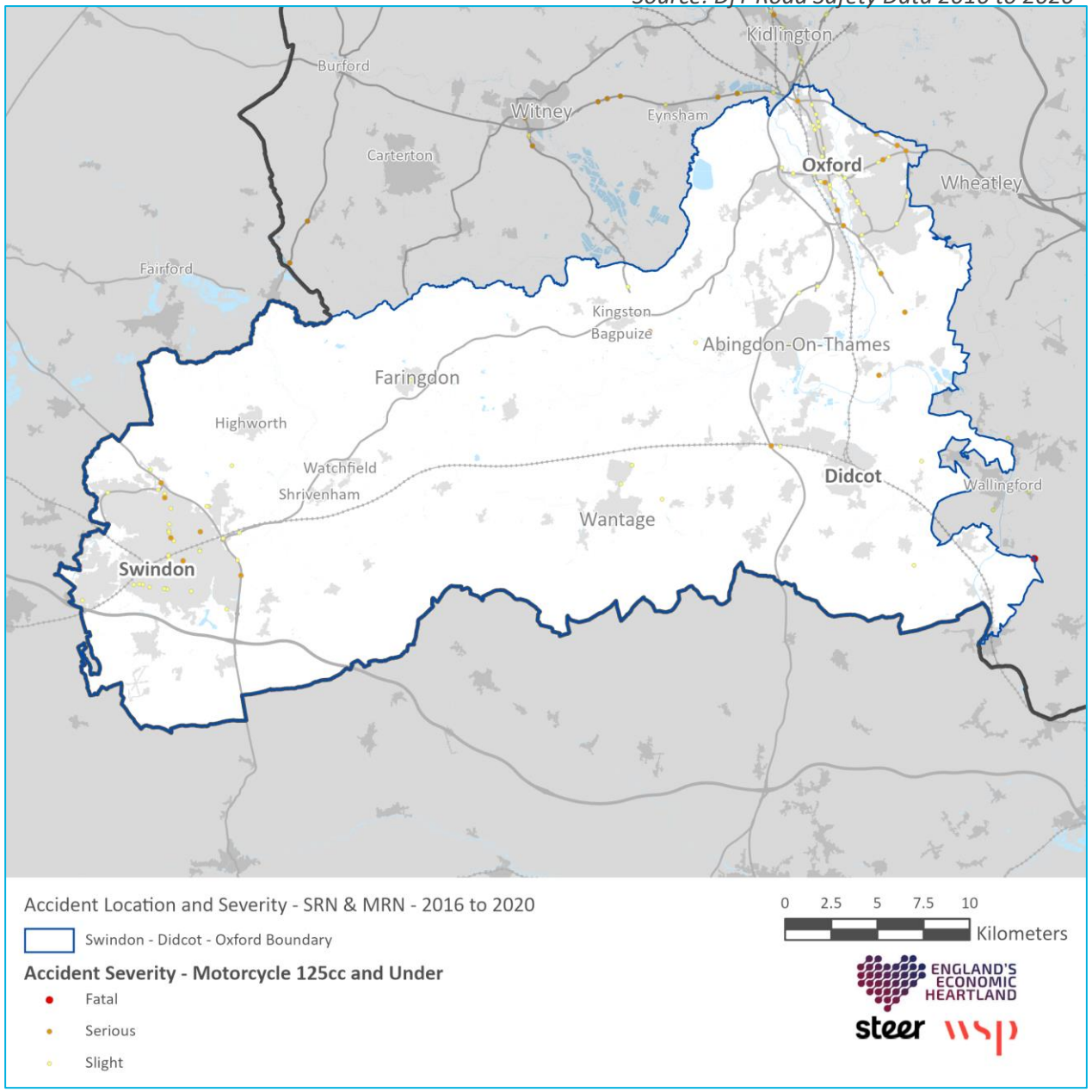
Accident Data – Motorcycle 50cc and under

Source: DfT Road Safety Data 2016 to 2020



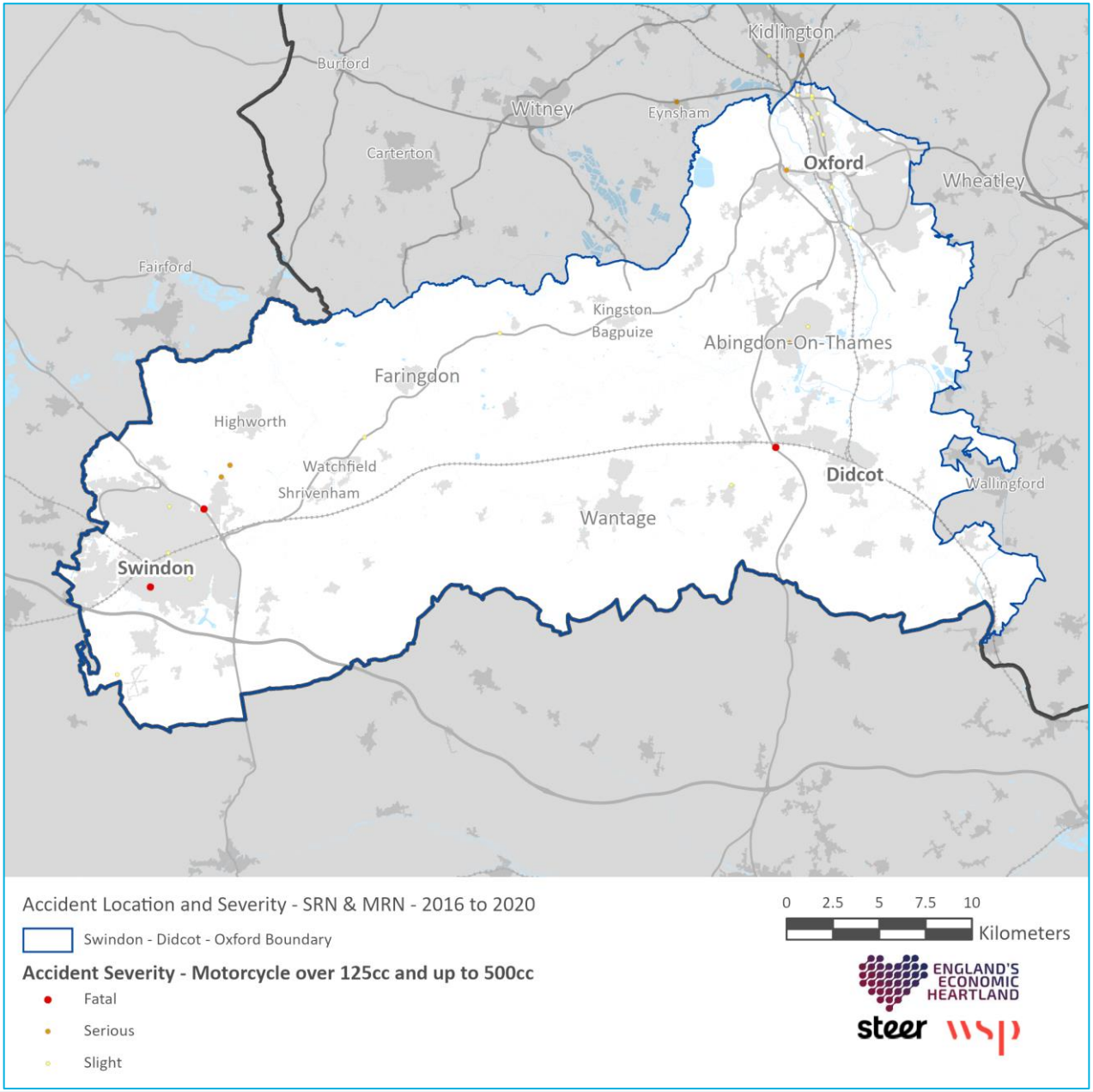
Accident Data – Motorcycle 125cc and under

Source: DfT Road Safety Data 2016 to 2020



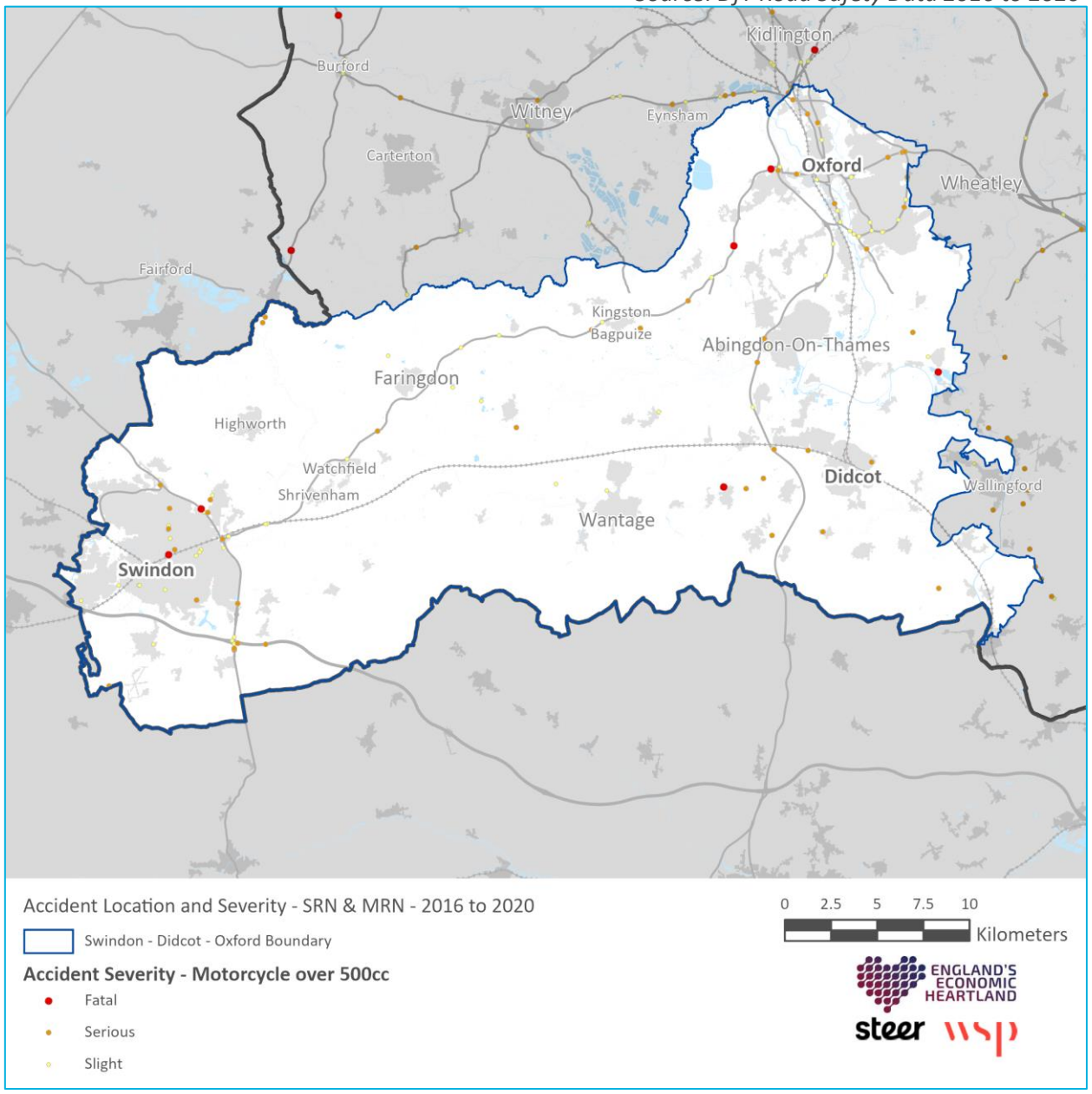
Accident Data – Motorcycle over 125cc and up to 500cc

Source: DfT Road Safety Data 2016 to 2020



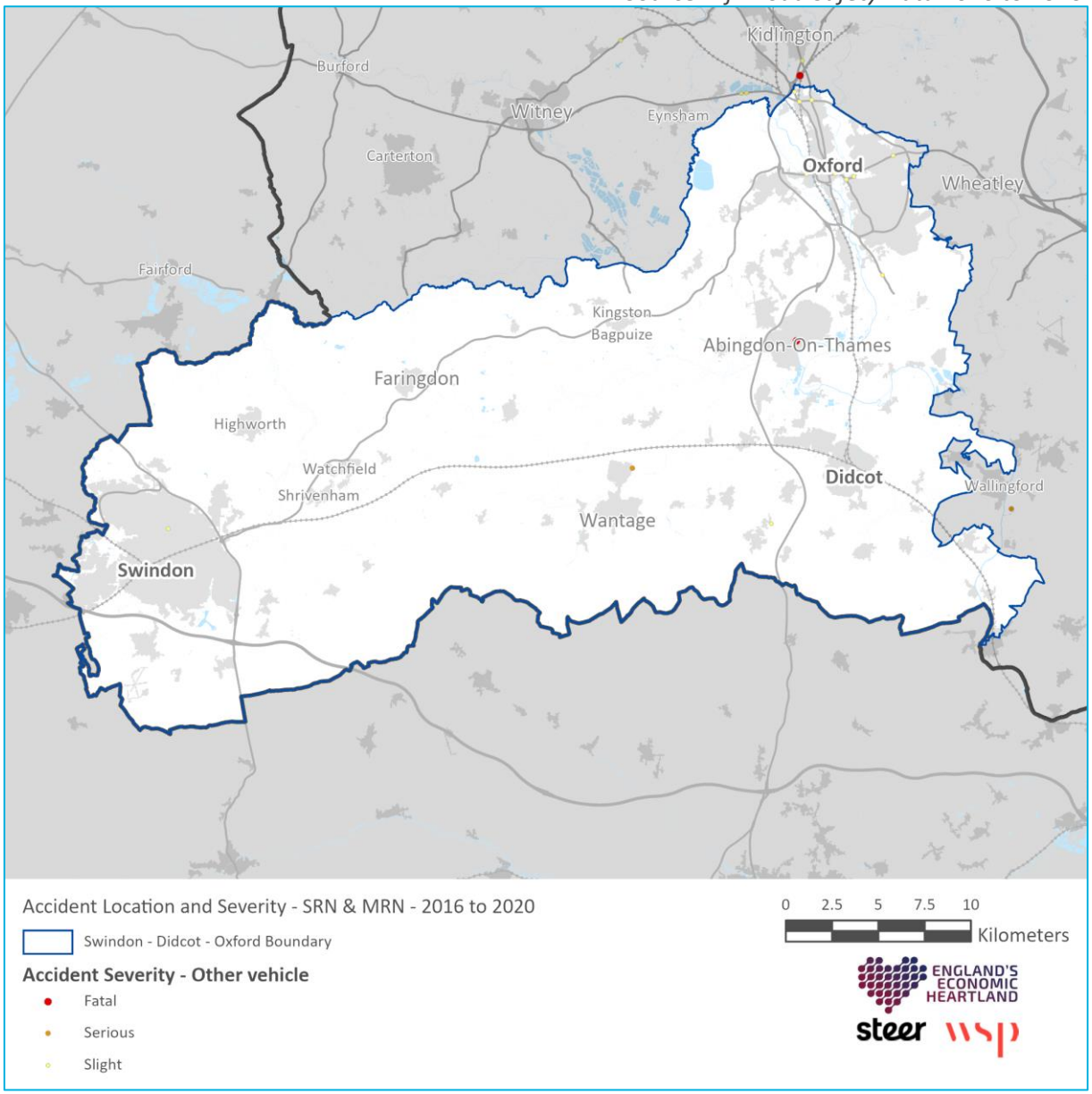
Accident Data – Motorcycle over 500cc

Source: DfT Road Safety Data 2016 to 2020



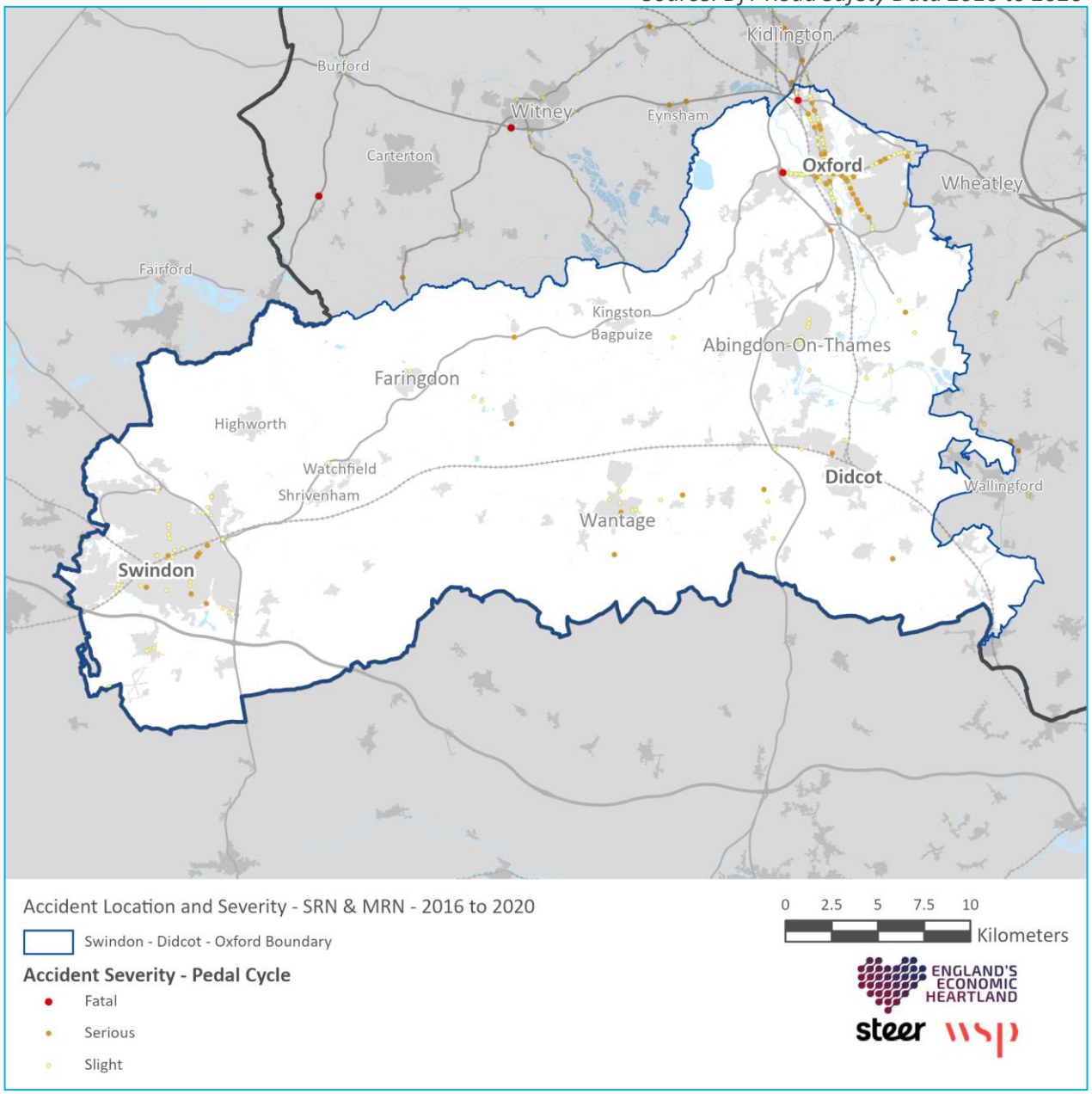
Accident Data – Other vehicle

Source: DfT Road Safety Data 2016 to 2020



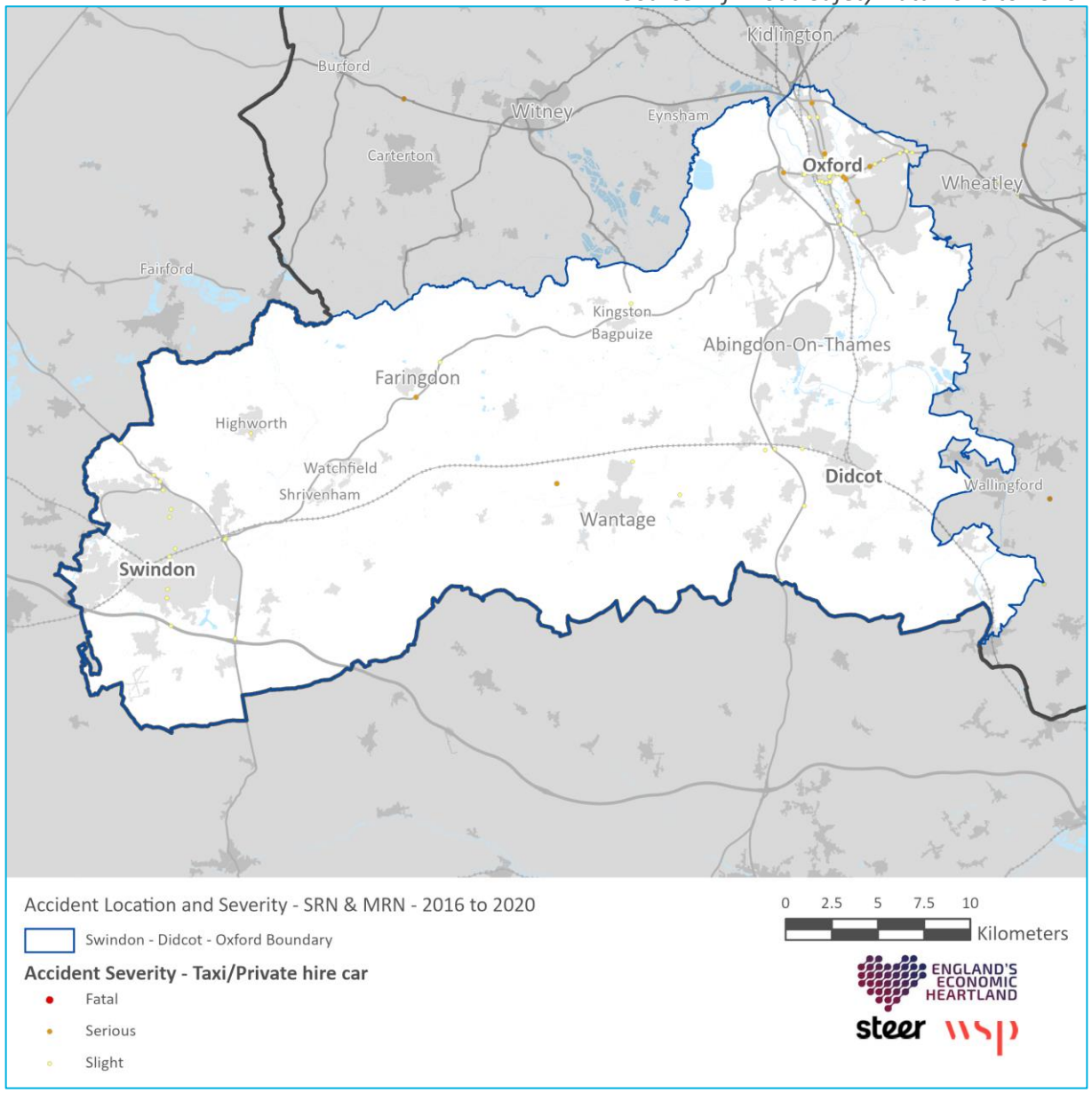
Accident Data – Pedal cycle

Source: DfT Road Safety Data 2016 to 2020



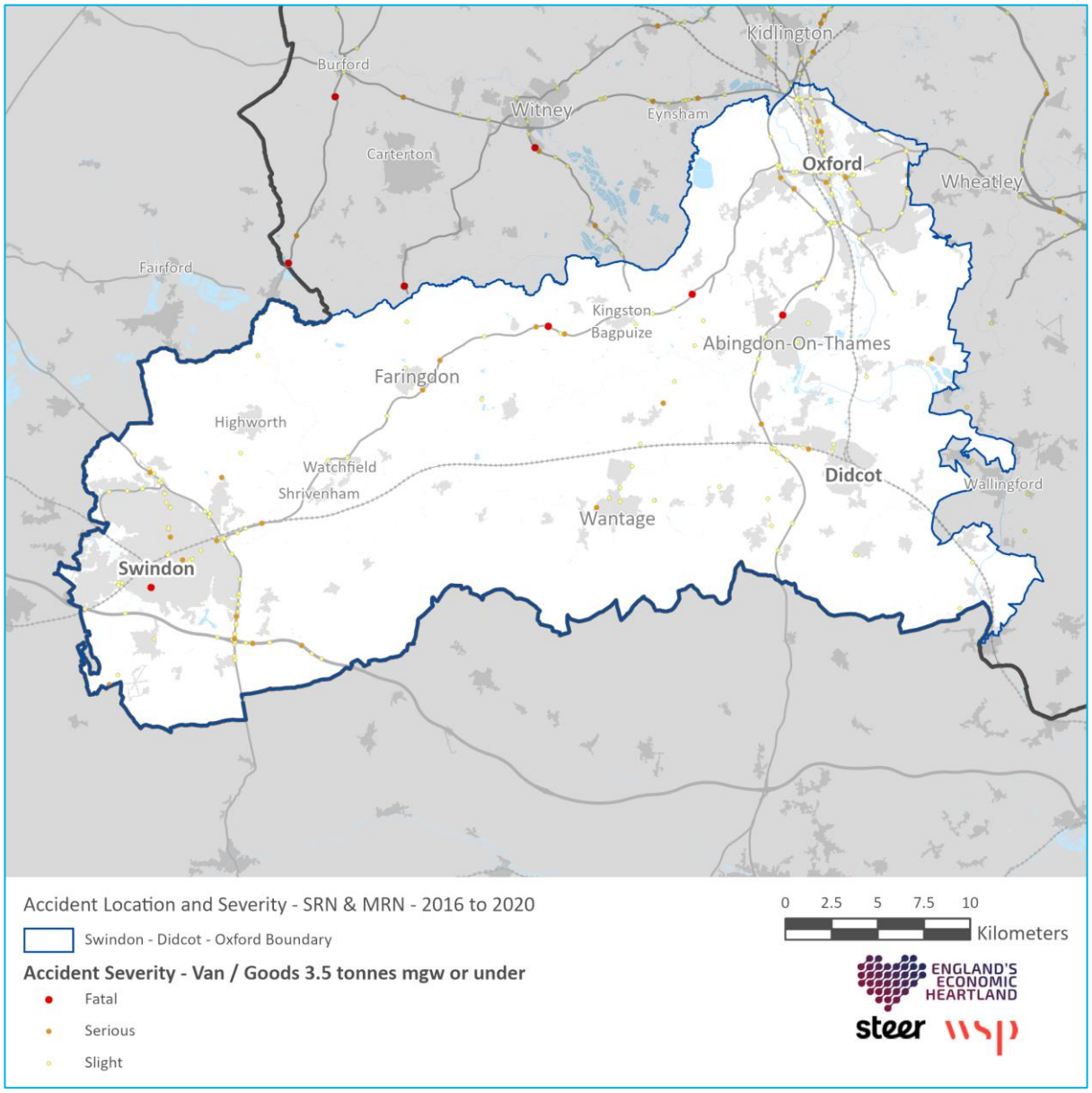
Accident Data – Taxi / Private Hire Car

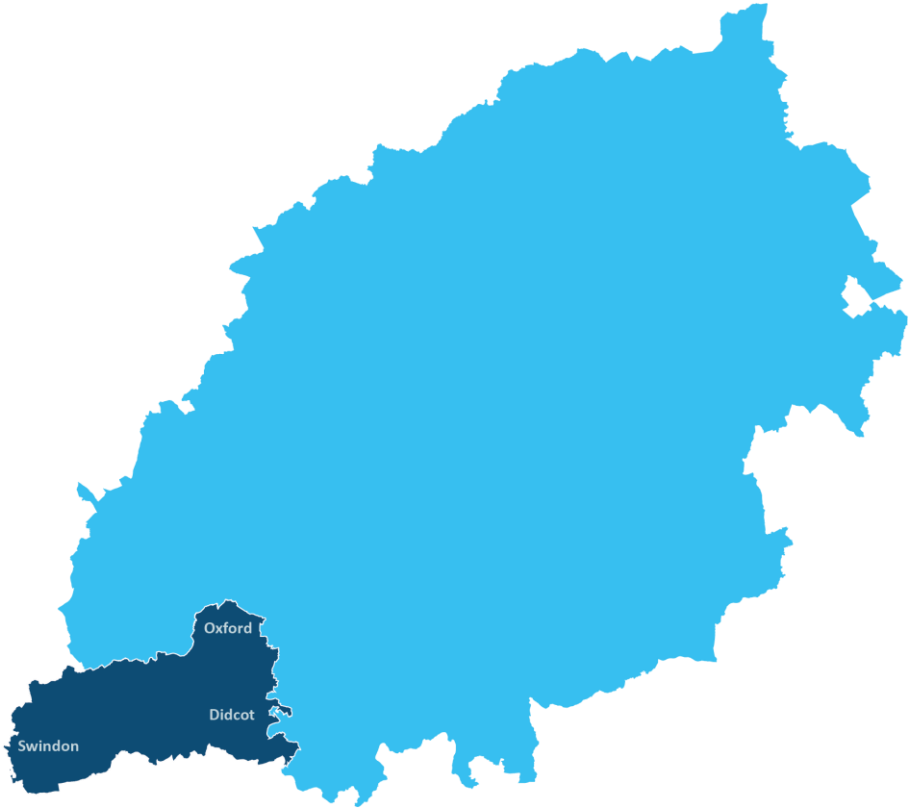
Source: DfT Road Safety Data 2016 to 2020



Accident Data – Van (Goods)

Source: DfT Road Safety Data 2016 to 2020





Appendix I – Digital Connectivity

Networks – Digital Connectivity

Superfast Broadband Availability

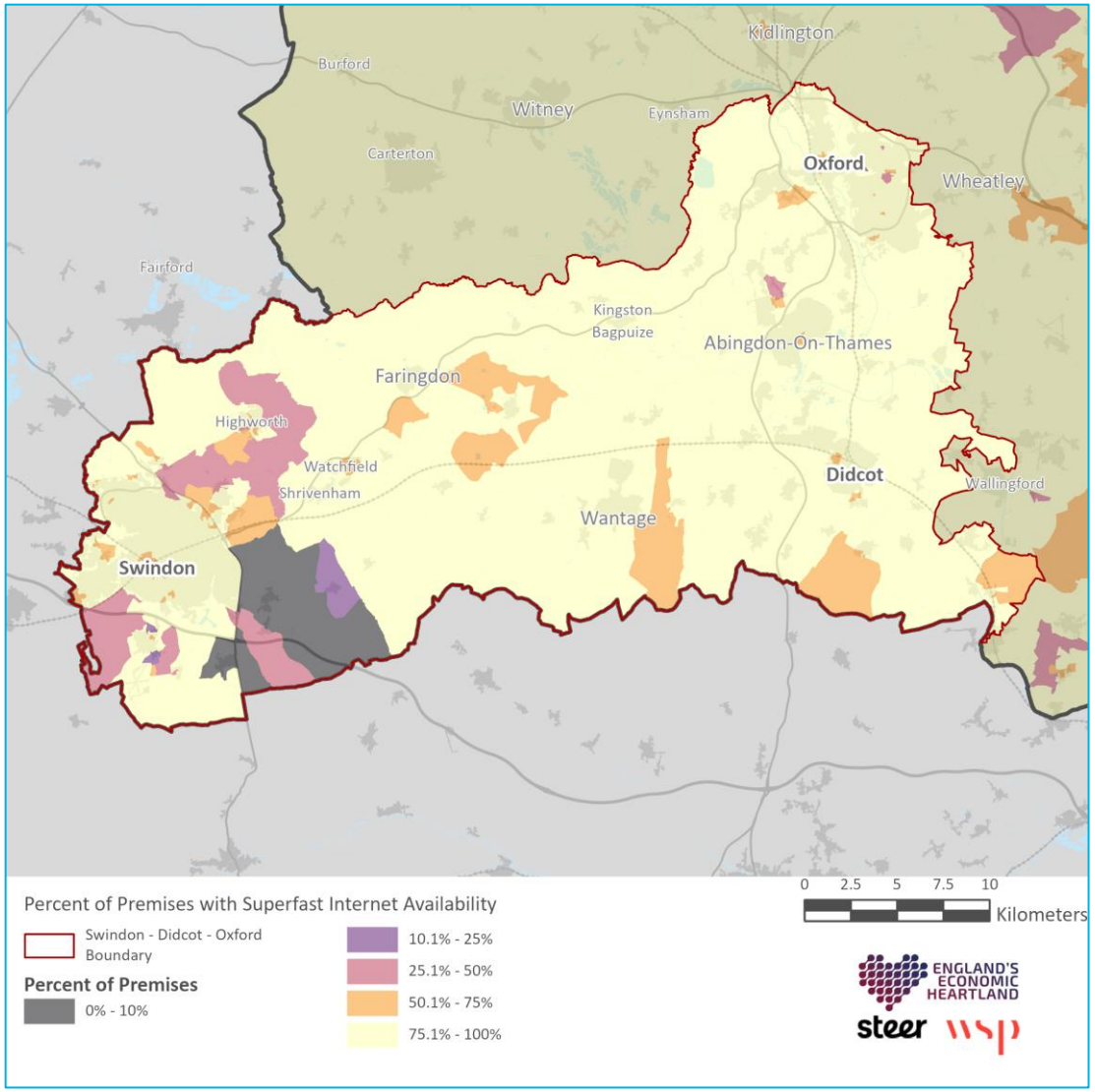
The plan opposite shows the percentage of premises in the study area, by Census Output Area, that have **superfast coverage** from fixed broadband (proportion of premises that currently receive this speed). A superfast broadband connection can provide download speeds of at least 30 megabits per second.

The plan shows that in most areas between 75% and 100% of premises have superfast broadband. The main exception is rural areas around Swindon, Didcot, Oxford, Abingdon-on-Thames and Kingstone Bagpuize.

Superfast broadband coverage is lowest in rural areas to the southeast of Swindon, in particular the settlement of Wanborough and the area between Bishopstone and Bourton. In these locations 0% to 10% of premises have superfast broadband.

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 Update: Spring 2022



Networks – Digital Connectivity

Ultrafast Broadband Availability

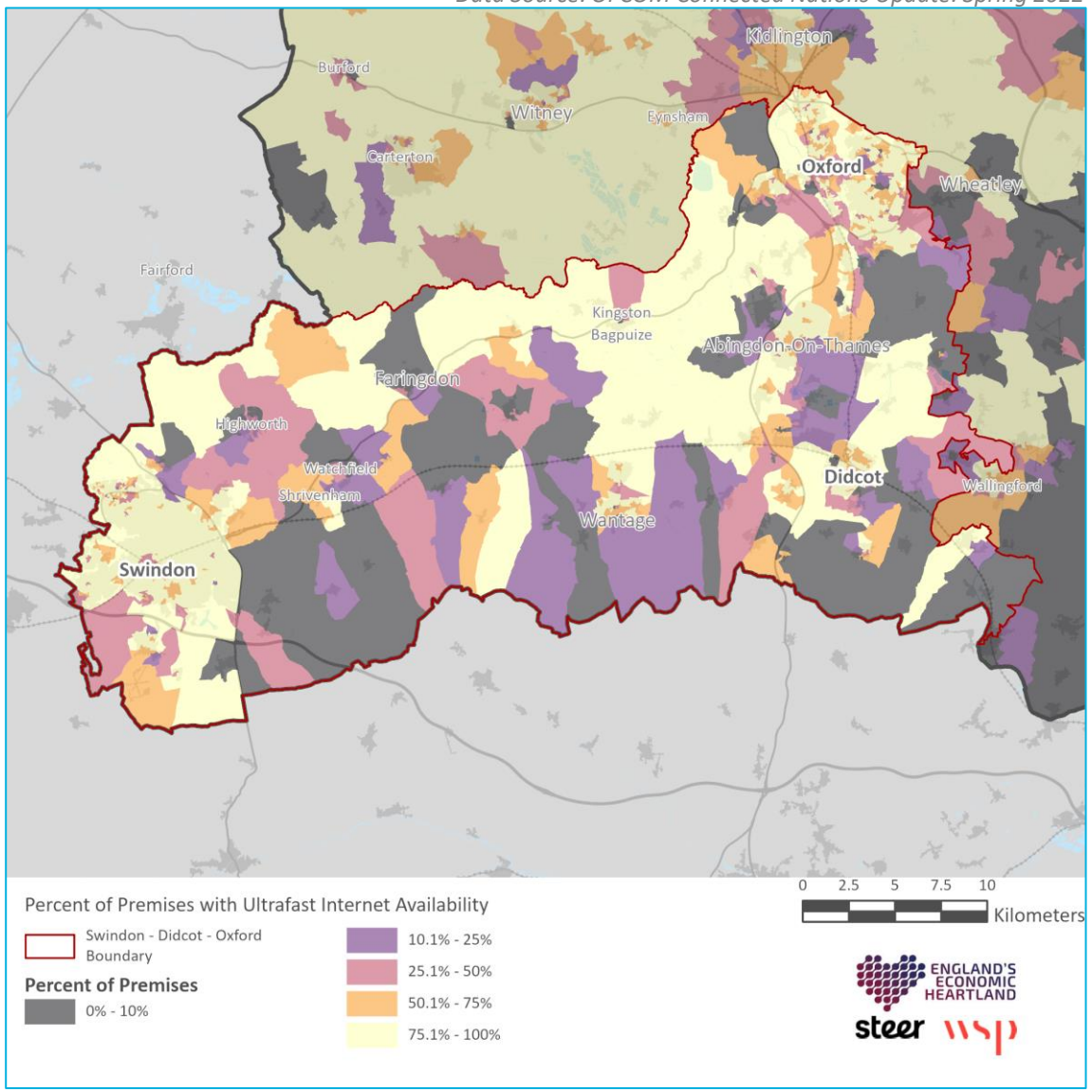
The plan opposite shows the percentage of premises in the study area, by Census Output Area, that have **ultrafast coverage** from fixed broadband (proportion of premises that currently receive this speed). A ultrafast broadband connection can provide download speeds of at least 300 megabits per second.

The plan opposite generally shows a rural / urban divide, with higher coverage in Swindon, Didcot and Oxford and a lower coverage in rural areas. However, there are a few exceptions with 75% to 100% of premises receiving ultrafast broadband in rural areas to the south of Kingston Bagpuize, northeast of Didcot and northwest of Highworth.

Ultrafast broadband coverage is highest in Swindon. In most areas of the town 75% to 100% of premises are receive ultrafast internet. Superfast broadband coverage is lowest is in rural areas to the south of the study area, notably areas to the south of Wantage, south of Shrivenham, south of Didcot and northeast of Abingdon-on-Thames. In these areas is less than 25% of premises have ultrafast broadband.

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 Update: Spring 2022



Networks – Digital Connectivity

Gigabit Broadband Availability

The plan opposite shows the percentage of premises in the study area, by Census Output 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 to the south of Kingston Bagpuize, including the settlement of Garford, northeast of Didcot, west of Wantage, southwest of Faringdon and north and south of Swindon.

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.

Oxfordshire County Council's Digital Infrastructure team has also secured funding to install full fibre broadband infrastructure to a range of public service sites in Oxfordshire under the 'Gigahubs' initiative and intend to connect public service site including schools, GP practice's, libraries, community centres and fire stations with gigabit capable broadband. Additionally, digital connectivity in the EEH region will improved through five Regional Supplier procurement lots as part of Project Gigabit.

Data Source: OFCOM Connected Nations Update: Spring 2022