OXFORDSHIRE COUNTY COUNCIL
STRATEGIC ACTIVE TRAVEL NETWORK (SATN)

PROJECT REPORT

MARCH 2024

PJA

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INTRODUCTION

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The Strategic Active Travel Network (SATN) is a long-term plan for a network of walking and cycling routes across Oxfordshire. It aims to enable Oxfordshire County Council (OCC) to prioritise these routes that could make a large contribution to active travel connections and increase chances to secure the resources needed to improve them.

The SATN was designated by OCC as a priority workstream by the Oxfordshire County Council (OCC) Active Travel Programme Board in March 2021 and fits with the objectives of the Council. PJA was supported OCC between August 2022 and February 2024 in the development of the SATN.

SATN is part of a wider set of strategic and policy work aimed at improving the way active travel infrastructure is designed, implemented and maintained. The use of 'Active Travel' in this context includes a wide range of potential user groups including walked, wheeled, cycled and equestrian trips. OCC has adopted a new Local Transport and Connectivity Plan (LTCP) which, along with its supporting strategies, sets out the direction, policies and objectives to be pursued in the following years. The underlying ambition across all of these documents is to enable a radical transformation in travel patterns; specifically, a reduction of trips by cars and other private motorised vehicles and an increase in active travel and use of public transport. The Oxfordshire Cycling Network (OCN), a network of local cycling groups and campaigners, previously developed a proposal for a "Strategic Cycling Network for Oxfordshire" in 2017. This was a major inspiration for the prioritisation of SATN as a strategic project for active travel development in the county.

The role of strategic planning for active travel networks is being increasingly recognised in England by County/Borough/District authorities as they seek to expand network planning beyond urban areas. Crucially, Oxfordshire has emphasised the importance of 'Strategic' in their approach to this project. This has been a critical factor in the development of the SATN network to ensure that any proposals have a strategic contribution.

Active travel networks in Oxfordshire are currently being planned primarily through Local Cycling and Walking Infrastructure Plans (LCWIPs). At present, LCWIPs have been approved in Abingdon, Bicester, Didcot, Kidlington, Oxford and Witney, and other LCWIPs are at different stages of development. SATN will help to combine the LCWIP outputs and identify important strategic routes in more rural locations in the county where LCWIPs are unlikely to be developed. SATN could also be used to supplement other work packages which include scope for improving local active travel infrastructure.

Project Objectives

The objectives for the SATN are:

- To set out an indicative development plan for a comprehensive network of active travel routes linking up all relevant origin and destination locations throughout the county.
- To provide a framework for prioritising routes according to their potential to increase and sustain commuting, leisure and other trips by means of active travel
- To outline indicative infrastructure improvements (ranging from route selection in non-existing parts of the network through to upgrading options on existing established routes) to inform potential future schemes which may be funded through various means
- To support the development of bids for active travel schemes in areas not covered by more detailed infrastructure plans (such as LCWIPs)
- To realise opportunities for active travel improvements in development proposals, local plans, regeneration plans and other infrastructure plans
- To bridge the gap between different strategic and infrastructure plans throughout the county and ensure consistency and coherence in the design of active travel infrastructure.

Methodology

This report provides an overview of the SATN project through its four key methodology components - this is also summarised overleaf in the project logic map. The project has been supported by stakeholder engagement throughout the project, including regular meetings with the project steering group which included elected members, council officers and representatives of key stakeholder groups.

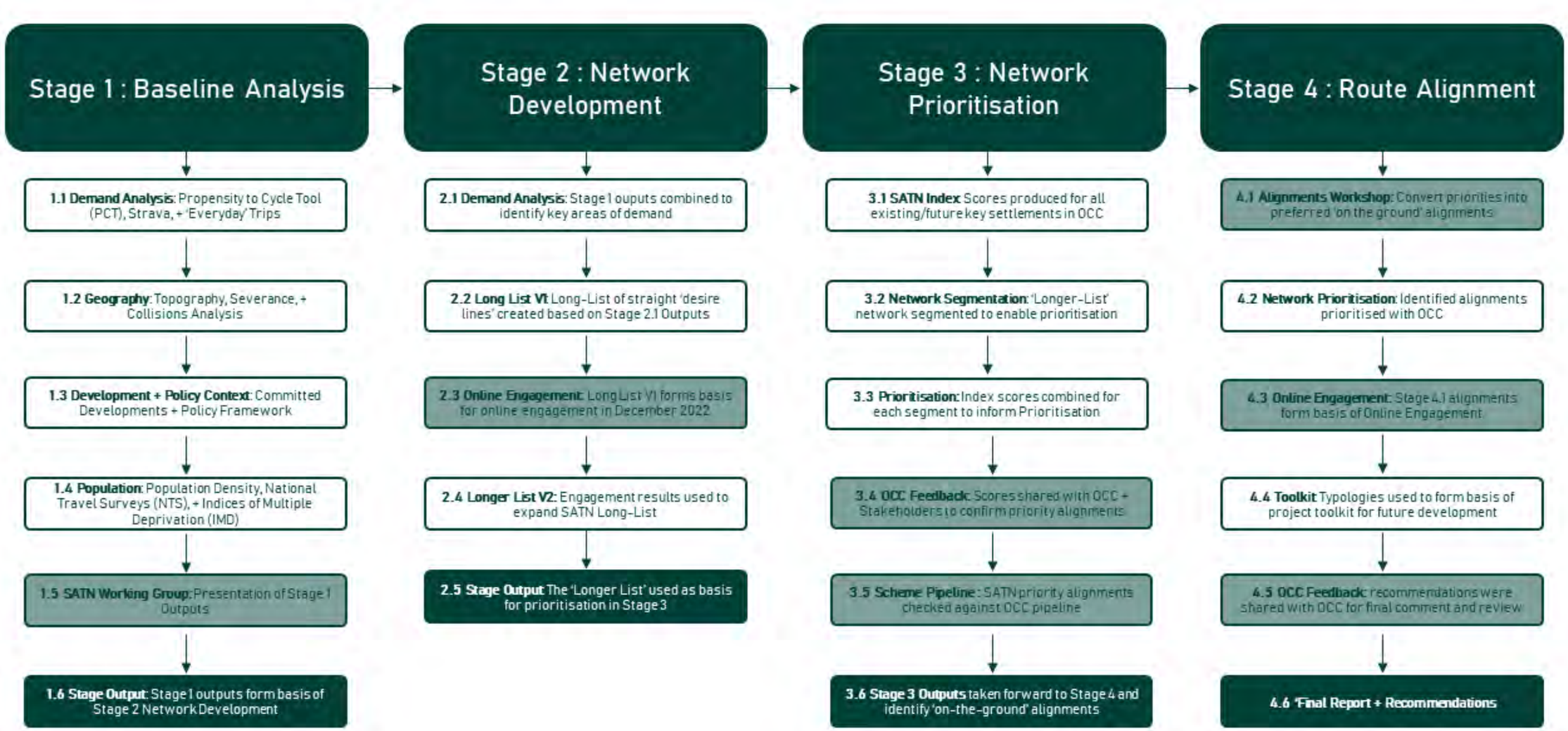
- **1. Baseline Analysis:** Stage One was focussed on better understanding the context for active travel in Oxfordshire to inform the development of SATN. This stage was predominantly desk-based and used various datasets to review existing active travel infrastructure and proposed infrastructure, demand for future increases in active travel, and to review/identify key future developments in the County which will influence future demand.
- **2. Network Development:** The results from Stage 1 were used to identify an initial 'Long-List' of Desire Lines which OCC then used for online engagement during December 2022. The purpose of the engagement was to understand the extent of support for the draft Long List and whether any links/locations had not been considered. The engagement results were incorporated into a revised 'Longer-List' which expanded the network coverage and which included extensions into neighbouring county authorities. The 'Longer-List' was then sub-divided into a series of Route Segments – these segments were defined by key settlements/attractions/boundaries within the study area.
- **3. Network Prioritisation**: SATN is intended to focus on developing a 'Strategic' network for Oxfordshire, and it was important therefore to develop a method for assessing the strategic contribution of locations and routes to the future network.
- The first task in Stage 3 was to develop the 'SATN Index' which was used to calculate a strategic score for all key settlements/locations in OCC and included locations up to 20km beyond the county boundary. As well as generating scores for existing settlements/locations, the index also generated scores for future development sites in OCC such as major committed housing and employment site developments.
- The SATN index scores were used to calculate a combined score for all segments in the SATN straight-line network. The segment scores combined the index scores for all settlements located within a 2km catchment area of the route

segment. To enable direct comparison, these total segment scores were converted into a per km score.

- These scores were reviewed with OCC before identifying the top scoring segments. Upon confirmation of the top scoring segments, PJA/OCC worked together to compare these against OCC's own existing pipeline for active travel projects.

- **4. Route Optioneering**: the remaining priority routes were translated with OCC into 'on the ground' alignments. For a majority of route segments, multiple alignments were identified to provide OCC with more flexibility for route delivery (e.g. on road and off-road alignments).

- The proposed alignments were classified by typologies (on-road, PRoW, Quiet Lane etc.) which helped inform the design development. A design toolkit was developed to summarise the key design recommendations. The toolkit was supplemented by best practice examples to illustrate how the routes could be developed in the future.



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POLICY REVIEW

POLICY REVIEW

This chapter summarises the context for this study with particular focus on the policy framework and major developments proposed in Oxfordshire. In 2022, the County Council launched its local Transport and Connectivity Plan and its Active Travel Strategy which are both critical documents for supporting the long-term delivery of SATN.

NATIONAL POLICY

The **Cycling and Walking Plan for England, 'Gear Change: A bold vision for cycling and walking',** was published in July 2020. The plan sets out the government's shift in transport policy: to prioritise active travel. The plan set out the following vision:

> "Places will be truly walkable. A travel revolution in our streets, towns and communities will have made cycling a mass form of transit. Cycling and walking will be the natural first choice for many journeys with half of all journeys in towns and cities being cycled or walked by 2030."

Figure 2.1 'Gear Change: A bold vision for cycling and walking' front page. Source: DfT, 2020.

Since the introduction of the first Cycling and Walking Investment Strategy (CWISI1) in 2017, cycling rates have significantly increased and active travel has continued to receive great attention in the government agenda. The **second Cycling and Walking Investment Strategy (CSWI2)**, released in July 2022, reflects on the changes in travel patterns brought by the coronavirus (COVID-19) pandemic and sets objectives for the period between 2021 and 2025. Following the impacts of the pandemic, walking activity decreased by 16% from 2019, whereas cycling activity has increased - from 1.0 billion to 1.2 billion stages between 2019 and 2020 (See figures 2.2 and 2.3). Informed by the CSWI1 and the vision set out at Gear Change (2020), the CSWI2 have set the following objectives:

- To increase short journeys by bike and on foot to 46%
- To double cycling from 0.8 billion stages in 2013 to 1.6 billion stages
- To increase walking activity to 300 stages per person per year
- To increase the percentage of children walking to school to 55%.

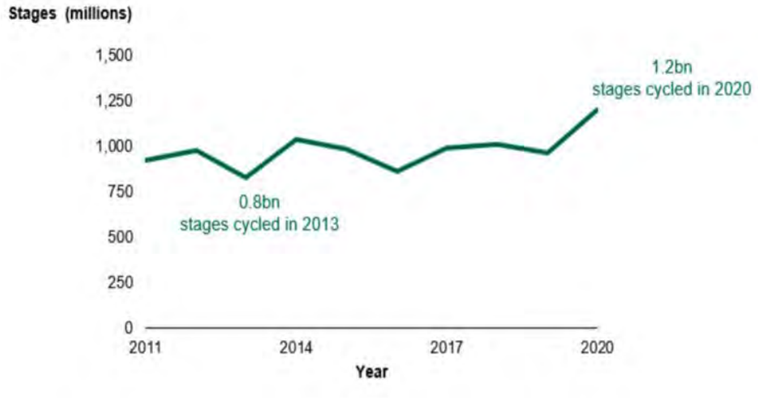

Figure 2.2 Cycling activity between 2011 - 2020 in England. Source: DfT, 2022.

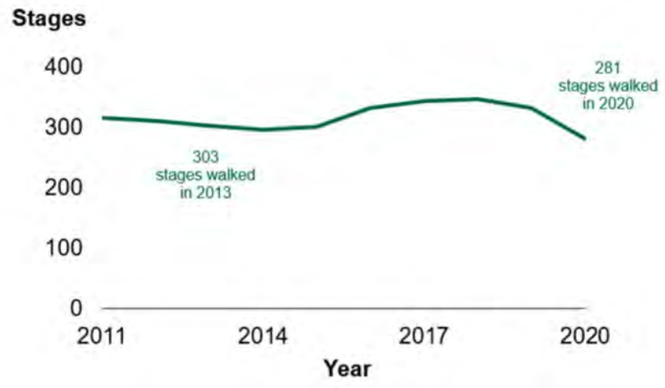

Figure 2.3 Walking activity between 2011 - 200 in England. Source: DfT, 2022.

COUNTY POLICY

The **Local Transport and Connectivity Plan (LTCP)** (Part One Only) was published in July 2022. The plan sets out the county's long-term ambition to achieve a net-zero transport system.

The plan sets out the following vision:

> "It will tackle inequality, be better for health, wellbeing and social inclusivity and have zero road fatalities or life-changing injuries. It will also enhance our natural and historic environment and enable the county to be one of the world's leading innovation economies.
>
> Our plan sets out to achieve this by reducing the need to travel and private car use through making walking, cycling, public and shared transport the natural first choice."

To work towards the delivery of vision, the plan puts forward a set of targets to be achieved by 2030:

- Replace or remove 1 out of every 4 current car trips in Oxfordshire
- Increase the number of cycle trips in Oxfordshire from 600,000 to 1 million cycle trips per week
- Reduce road fatalities or life changing injuries by 50%

To support this, a number of policies are also introduced. The current project emerges from Policy 4, which manifests the need for a county-wide approach to walking and cycling infrastructure as it proposes to:

- Develop a Strategic Active Travel Network (SATN) in order to identify key routes for walking and cycling between destinations across the county and prioritise interventions to existing and new infrastructure.

- Identify and support all opportunities to develop and link up the Strategic Active Travel Network in new developments, rural and major roadworks and road schemes.

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BASELINE ANALYSIS

BASELINE ANALYSIS

Stage 1 of the project was predominantly desk-based, using a combination of open-source mapping, data provided by Oxfordshire CC/District Councils/Oxford City Council, and incorporated feedback from the Working Group. The overarching purpose of stage 1 was to establish a baseline of analysis to help shape and influence the development of the project network. Particular focus was given to understanding existing/future demand and incorporating future developments which are likely to influence how/where people travel in the future.

The key datasets reviewed/developed in Stage 1 included the following:

- **Existing network**: Existing cycle routes and Public Rights of Way (PRoW)
- **Policy Framework + Parallel projects**: Local Plan Allocated Sites, LCWIP extents + Oxfordshire Greenways alignments
- **Demand Analysis**: inc. National Travel Surveys (NTS), Census Mode Share, Strava, Propensity to Cycle Tool + 'Everyday' Trips
- **Geographic + Social Context**: Terrain, Severance, Isochrones, Population Density, Deprivation Levels, Public Transport networks, Collision Data

As well as the above desktop analysis, OCC convened a Project Steering Group who were an essential critical friend and sounding board throughout the project's development This group comprised representatives from a mixture of Council Officers, Elected Members, and Key Stakeholder Groups. In addition, OCC/PJA also engaged with Council Officers from Buckinghamshire Council (BC) to co-ordinate the SATN project with BC's own county-wide LCWIP.

The results from Stage 1 were used to inform the development of the SATN network.

METHOD OF TRAVEL TO WORK (BY DISTANCE)

The pie charts on this page show data obtained from the Office for National Statistics (ONS) in 2022 and highlight the share of method of travel to work by distance across Oxfordshire.

Driving a car or a van is the most preferred method of commuting, regardless of the distance. When travelling less than 5 km, 42% drive a car or a van, 27% walk, 27% walk, 9% use public transport and 6% use a bicycle. When commuting longer distances (up to 10 km), a significantly higher proportion of people travel by car or van (72%) and less people walk (2%) or cycle (5%). In addition, public transport (13%) is used more for 5-10km trips.

A key point to highlight is that while bike commutes represent about 15% of the total share, this number drops by about two thirds when travelling longer distances of up to 10 km. This points to the lack of a suitable active travel network that connects villages and towns located large distances away from centres of employment and public transport.

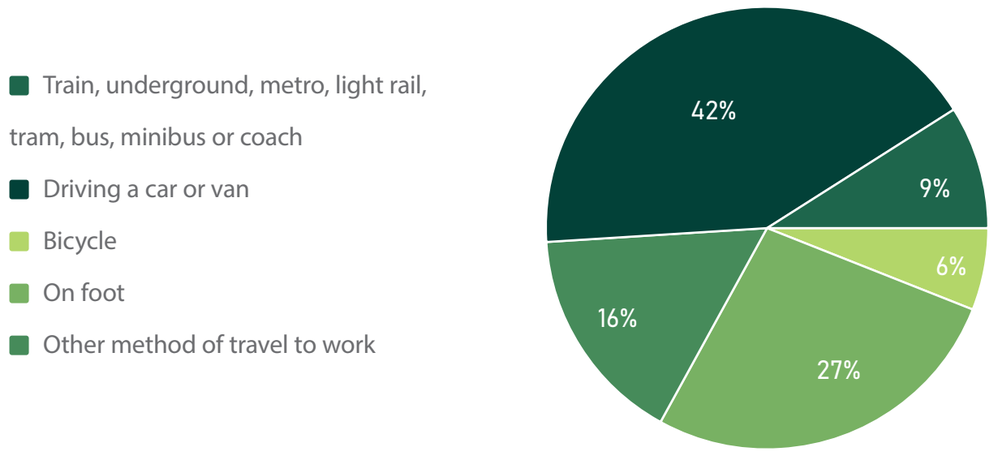


Figure 3.1. Mode of commuting across Oxfordshire (less than 5 km) (Census 2011)

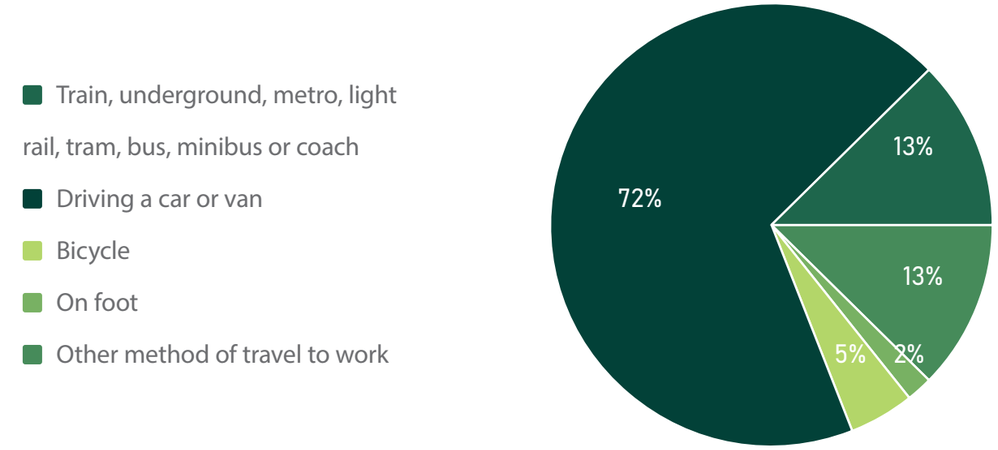


Figure 3.2. Mode of commuting across Oxfordshire (less than 10 km) (Census 2011)

METHOD OF TRAVEL TO WORK (BY AREA)

The data shown on the graphic to the right, also obtained from the ONS in 2022, highlights the percentages of methods of travel to work used in rural and urban areas of Oxfordshire and South East England.

The graphic highlights several key points:

- Similarly to South East England-Rural, in Oxfordshire-Rural, driving a car/van is the main method of travel to work
- Oxfordshire-Urban records higher percentages of both people cycling or walking to work than in the SE England-Urban figures
- Walking to work levels in Oxfordshire-Rural are higher than in the SE England-Rural figures
- Cycling to work levels in Oxfordshire-Rural are comparable to the SE England-Urban figures, and higher than in the SE England-Rural figures.

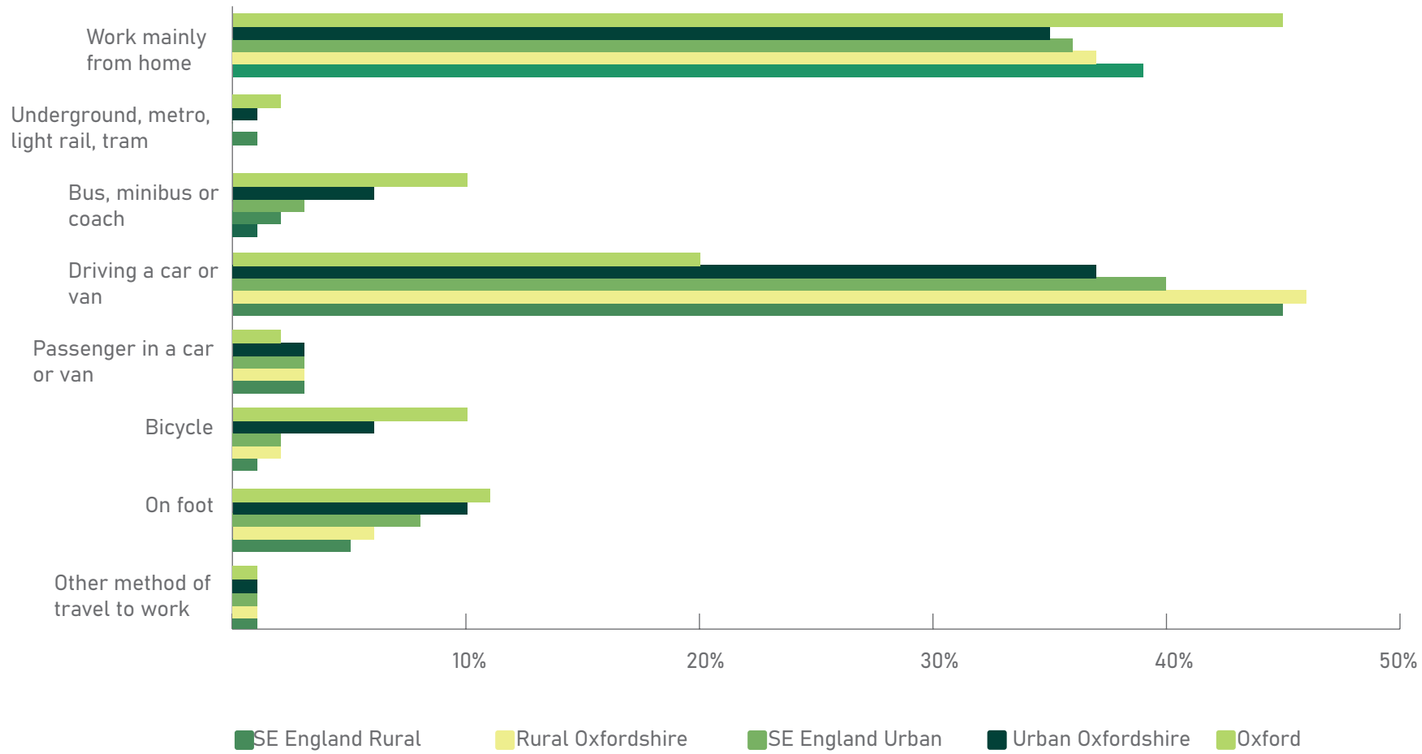
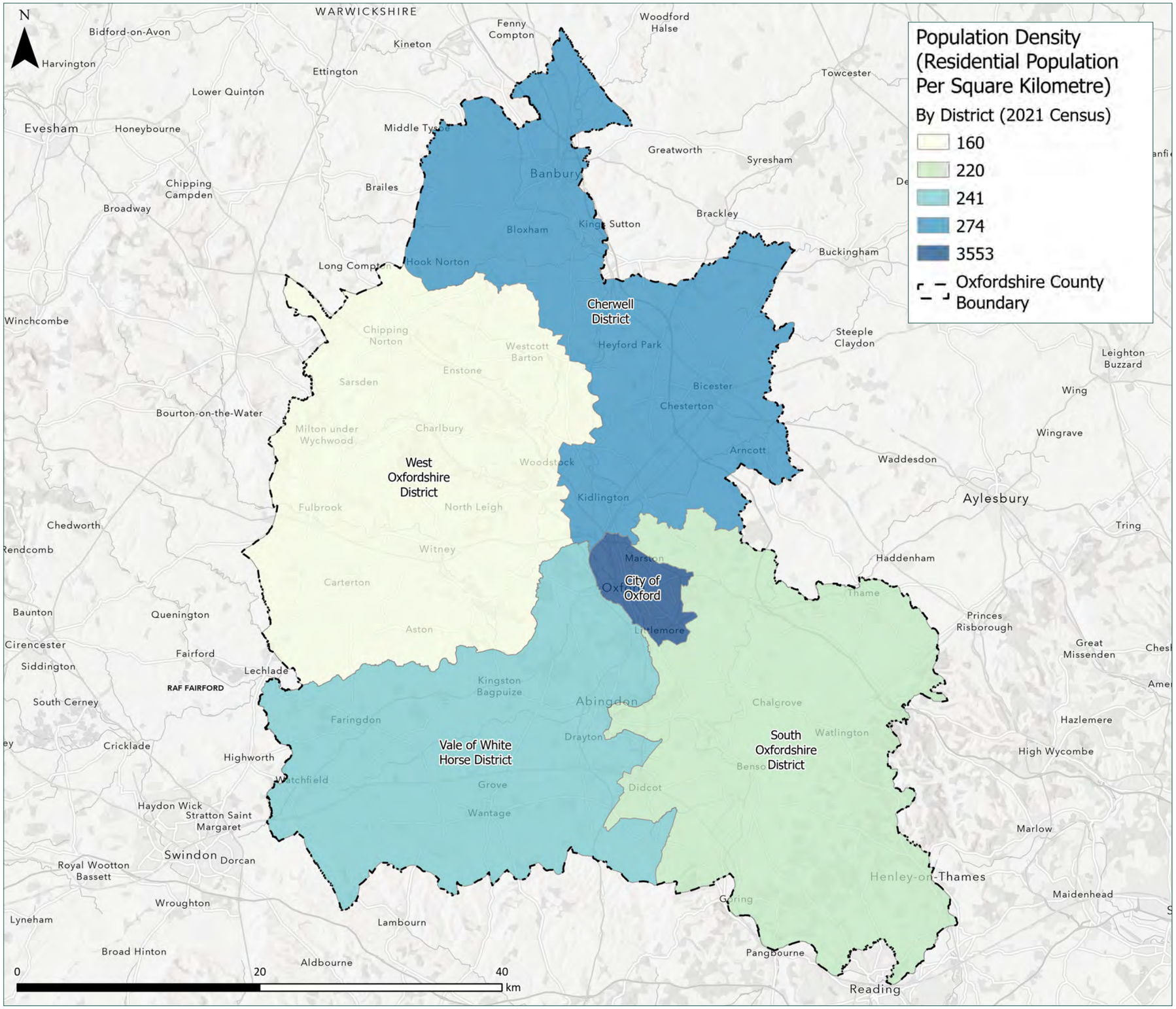


Figure 3.3. Method of travel to work by mode (Census, 2011)

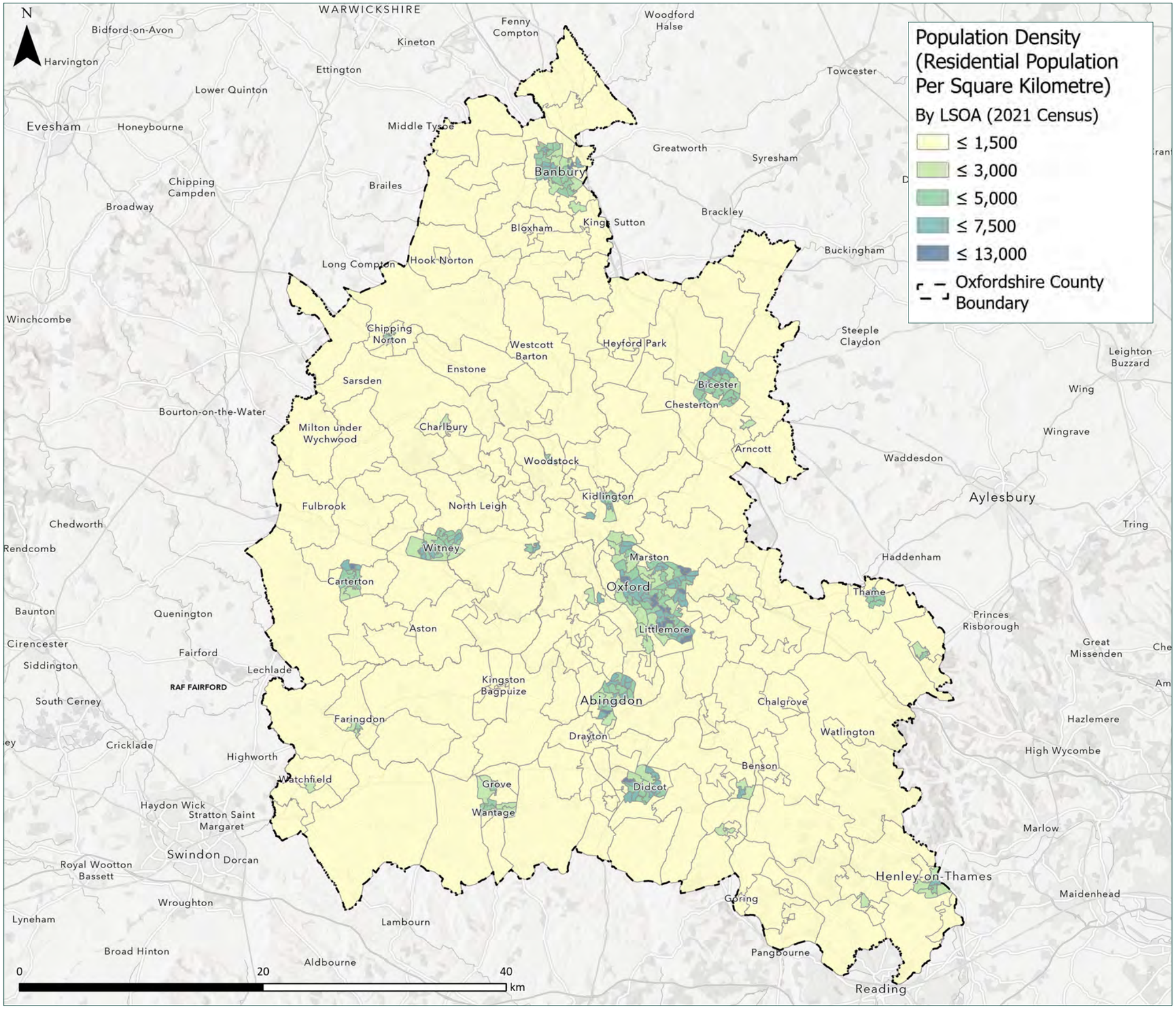
POPULATION DENSITY

Oxford is the smallest and yet the most densely populated district. All other districts occupy significantly wider areas across the county and have much lower population densities. Cherwell is the second most populated district, followed by Vale of White Horse and South Oxfordshire. West Oxfordshire is the least densely populated district.

The stark contrast in population densities reflected in this map may account for the differences in percentages of public transport use, people who walk or cycle and proportions of car-free households across the county, as it will be shown on the maps in the following pages.



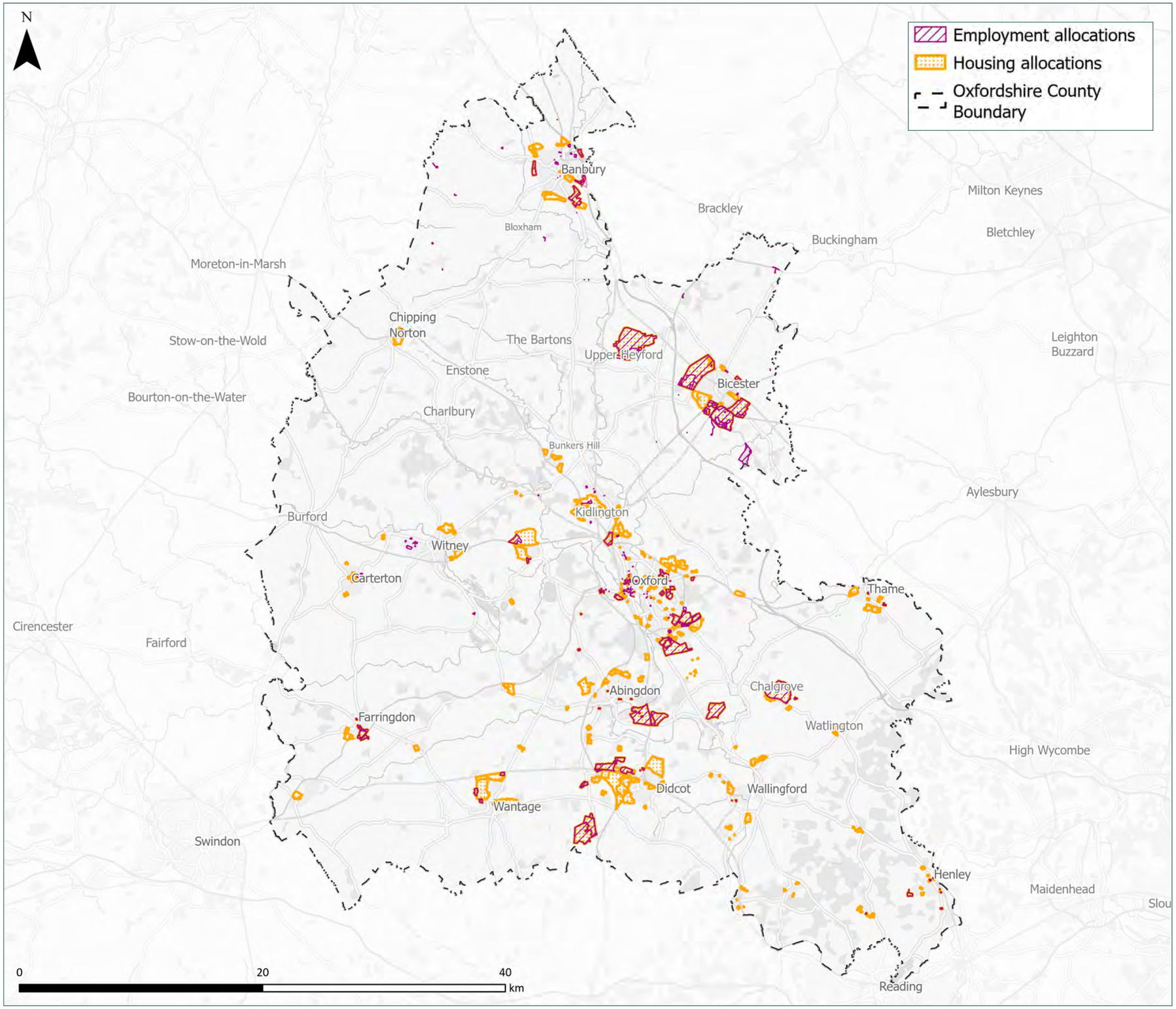
The plan opposite provides a more detailed breakdown of population density in the County using Lower Super Output Areas (LSOA). In doing so, the plan highlights the key population centres within Oxfordshire which will be a key consideration in the development of SATN.



DEVELOPMENT SITES

The plan opposite highlights local plan housing and employment allocations in Oxfordshire, in accordance with adopted local plans from each of the local planning authorities.

The majority of housing and employment allocations are located along the spine formed by Kidlington, Oxford, Abingdon and Didcot. These sites coincide with the most densely populated areas in the county. Another cluster is located near Bicester, the most densely populated town in the district of Cherwell. A few other housing and employment allocations are scattered across the Vale of White Horse, South Oxfordshire and West Oxfordshire.



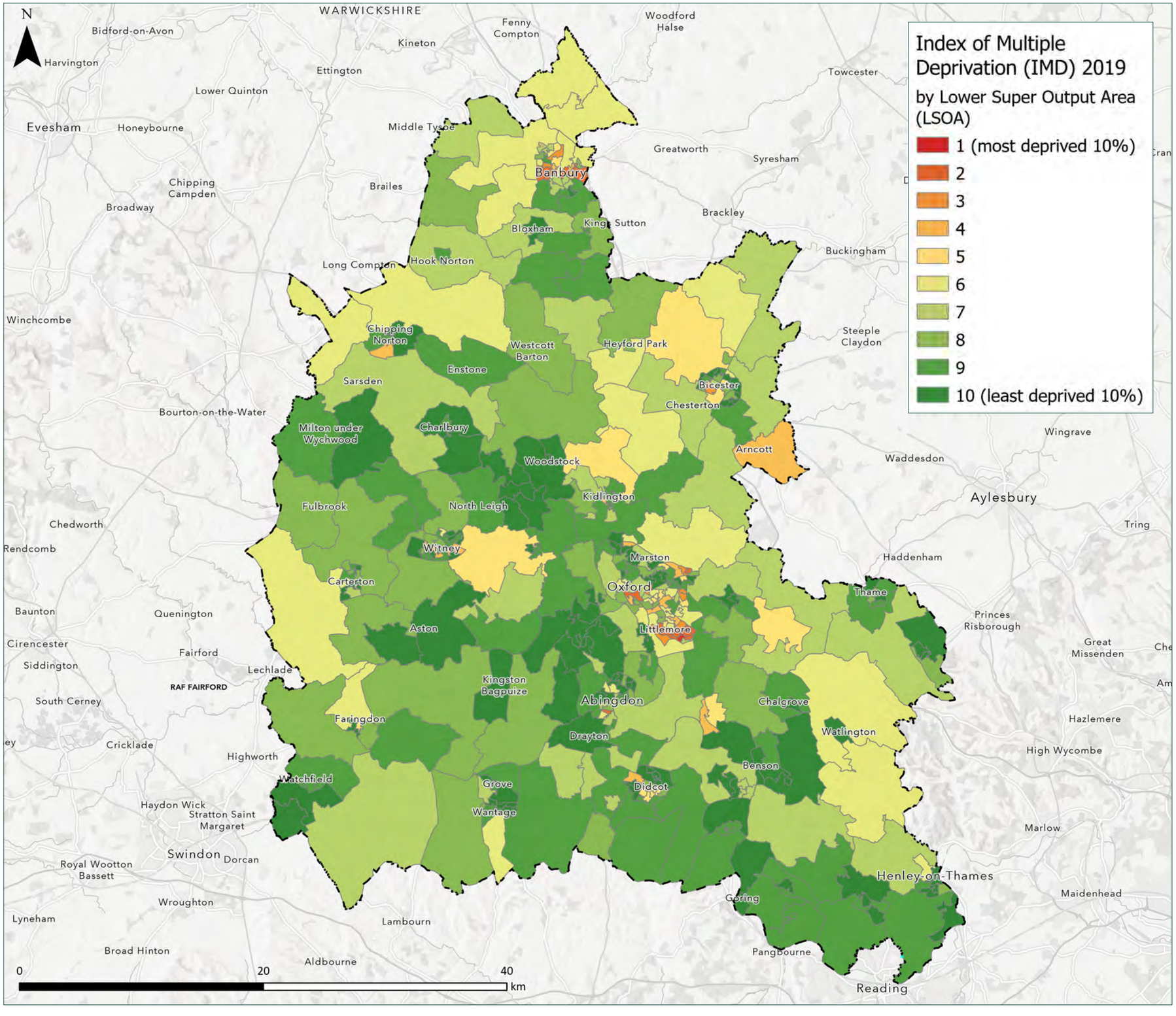
DEPRIVATION

The plan opposite highlights the level of deprivation in Oxfordshire, based on the Index of Multiple Deprivation (IMD) published in 2019.

The index is the official measure of relative deprivation in England, calculated for every Lower-layer Super Output Area (LSOA), or neighbourhood. Seven domains of deprivation have been combined to create the IMD: Income, Employment, Education, Crime, Barriers to Housing and Services and the Living Environment.

Extensive areas across Oxfordshire fall within the highest deciles, meaning they have lower levels of deprivation. Many LSOAs spread across West Oxfordshire, Vale of White and South Oxfordshire fall within the 10th Category (i.e. least deprived 10% category)

In contrast, other areas are amongst the most deprived. These include areas in the southern part of Oxford classed in the 1st/2nd/3rd Categories for most deprived according to the IMD. Other areas with higher levels of deprivation include Upper Arncott to the east, the southern part of Chipping Norton and Witney to the west, Didcot to the south; classed as the 4th Category and 5th Category most deprived LSOAs.

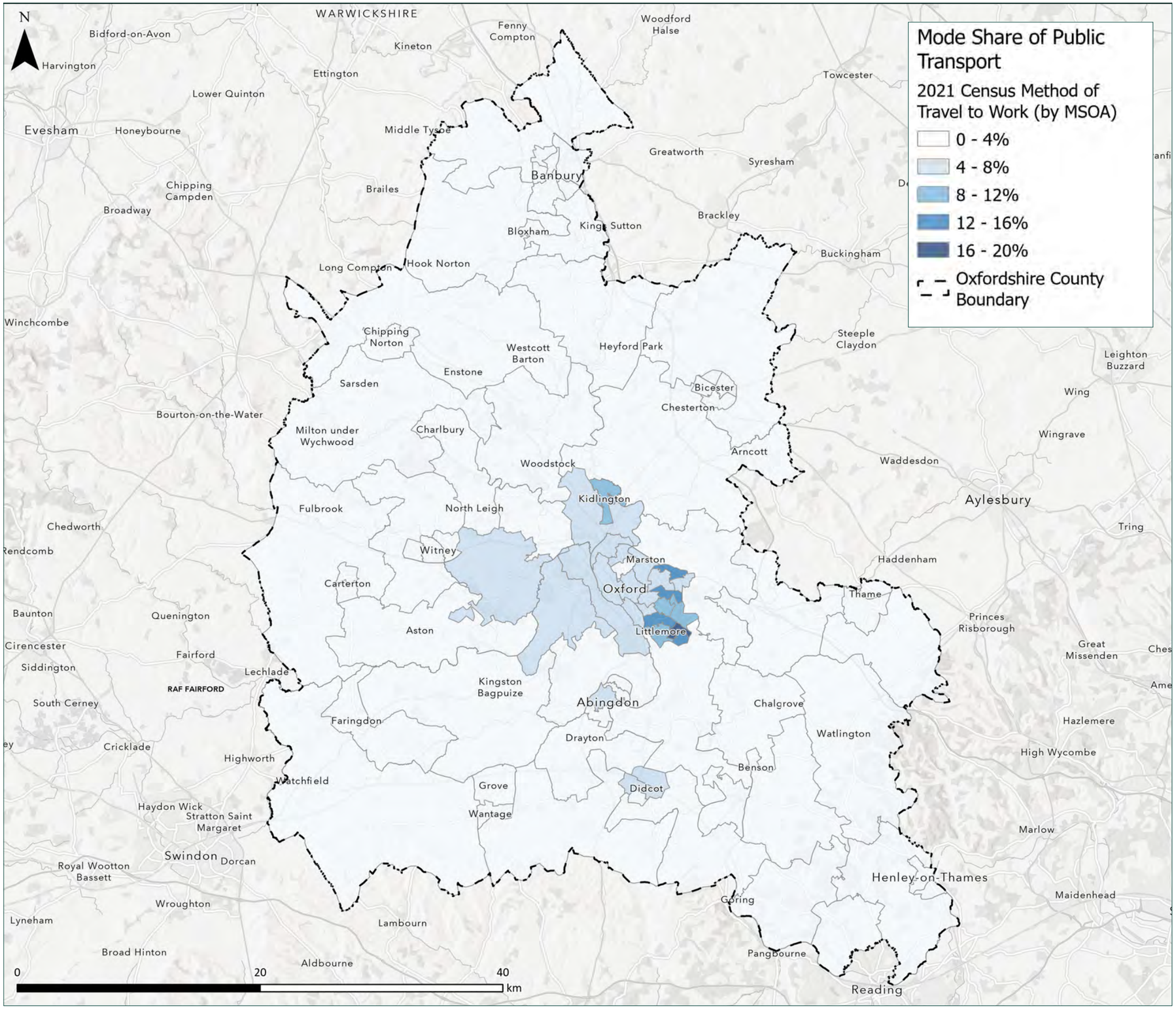


MODE SHARE OF PUBLIC TRANSPORT

The opposite plan summarises 2021 Census Data showing Public Transport as main mode of transport for commuting trips. The majority of areas in Oxfordshire have low percentages of public transport mode share, ranging between 0% - 4%. Compared to the 2011 Census results, there was an overall decrease in public transport usage, the key decreases were in the south and east of the County. This trend of an overall decrease in public transport usage is consistent across England and not unique to Oxfordshire.

Mode share percentages continue increasing with greater proximity to the city Oxford, which presents the highest public transport mode share in the county, ranging between 16% - 20%.

The relatively high percentages of public transport usage in areas around Oxford and south of the county may be explained by the concentration of employment sites along the Kidlington-Oxford-Abingdon-Didcot spine. Other areas across the county concentrating further employment sites and presenting lower percentages of public transport usage may reflect low levels of public transport provision.



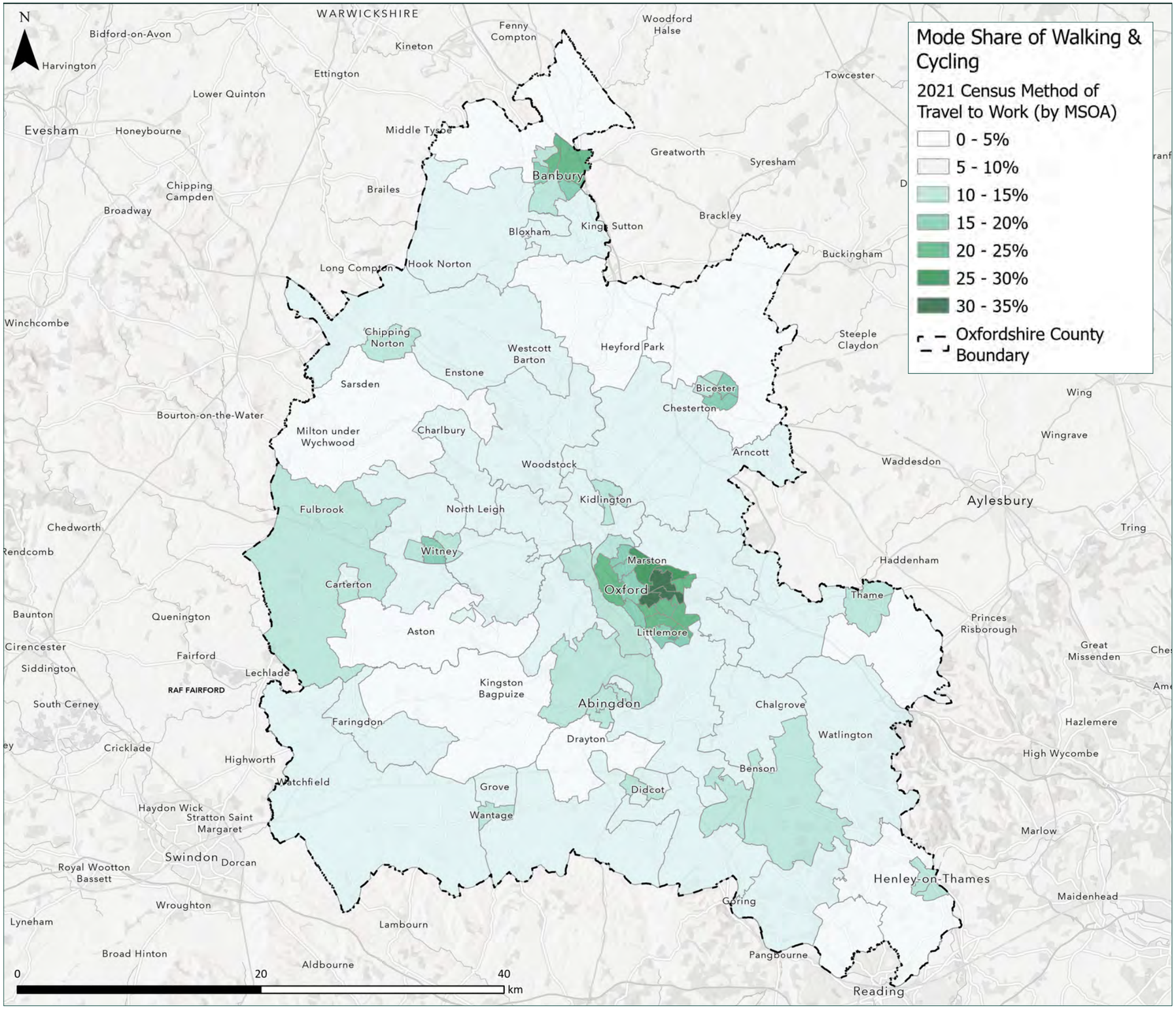
MODE SHARE OF WALKING AND CYCLING

The map opposite illustrates the percentages of walking and cycling mode share for journeys to work by Middle Super Output Area (MSOA) in Oxfordshire, as recorded in the 2021 Census.

As described on the first pages of this chapter, urban areas present higher percentages of walking and cycling as a method of travel to work than rural areas in Oxfordshire. Accordingly, the map shows that, while a significant extent of the county's area records mode shares between 5% – 15%, areas in and around the county's main towns record higher percentages ranging between 15% – 35%. The main concentrations of walking and cycling demand are located around Oxford, Banbury, Abingdon, Witney and Bicester.

Comparing against the 2011 Census Dataset, there was an overall decrease in the mode share of walking and cycling. This trend of an overall decrease in public transport usage is consistent across England and not unique to Oxfordshire

MSOAs with relatively high percentages of walking and cycling may demonstrate proximity to employment sites. Conversely, those areas with lower percentages may reflect longer distances to employment sites, but also poor levels of active travel infrastructure provision.

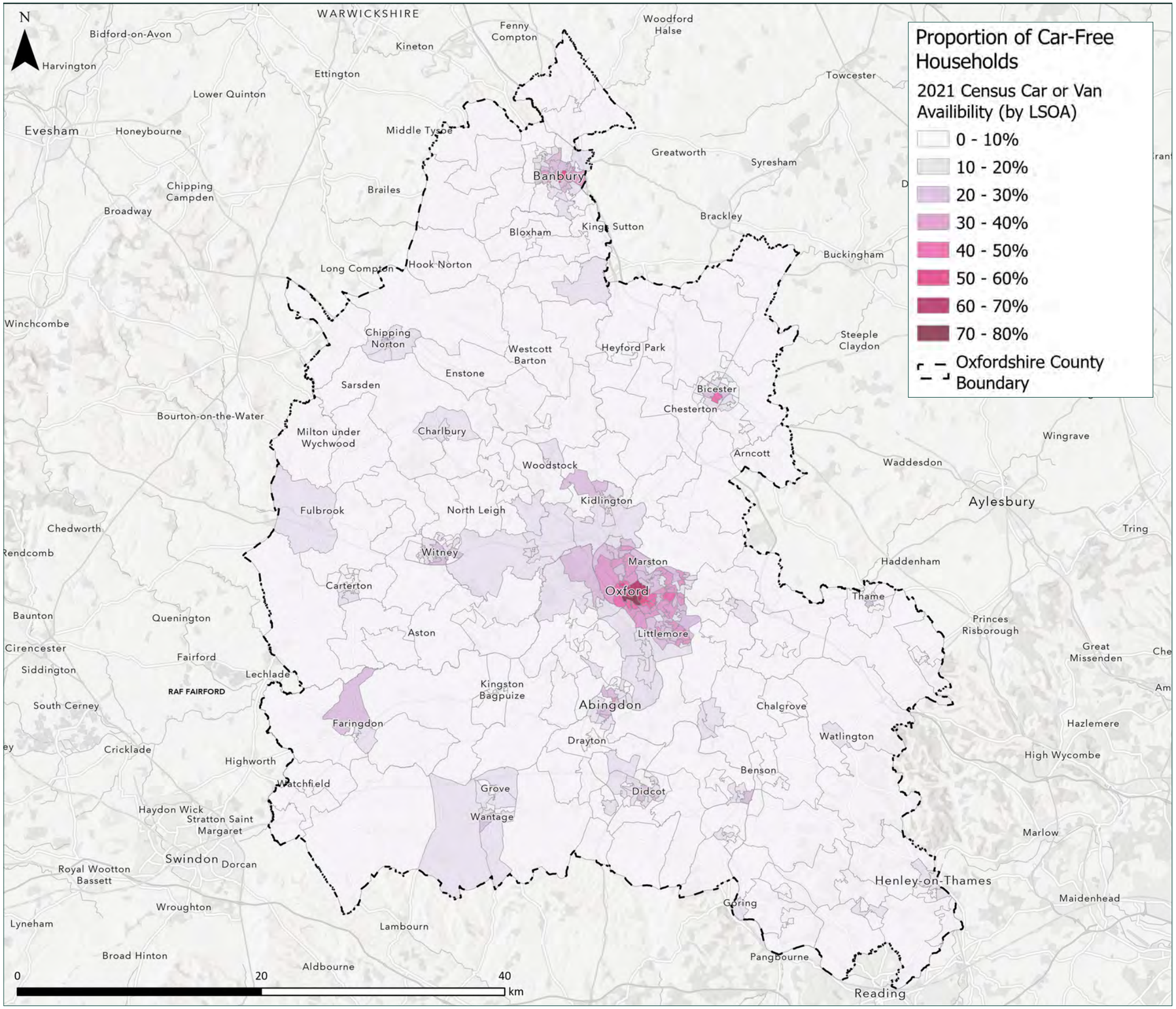


PROPORTION OF CAR-FREE HOUSEHOLDS

The map opposite represents the proportion of car-free households by LSOA across Oxfordshire, as recorded in the 2021 Census.

As shown on the map, areas with a relatively high proportion of car-free households are located around the county's main towns. These mainly concentrate along the Kidlington-Oxford-Abingdon-Didcot spine and around Banbury and Bicester.

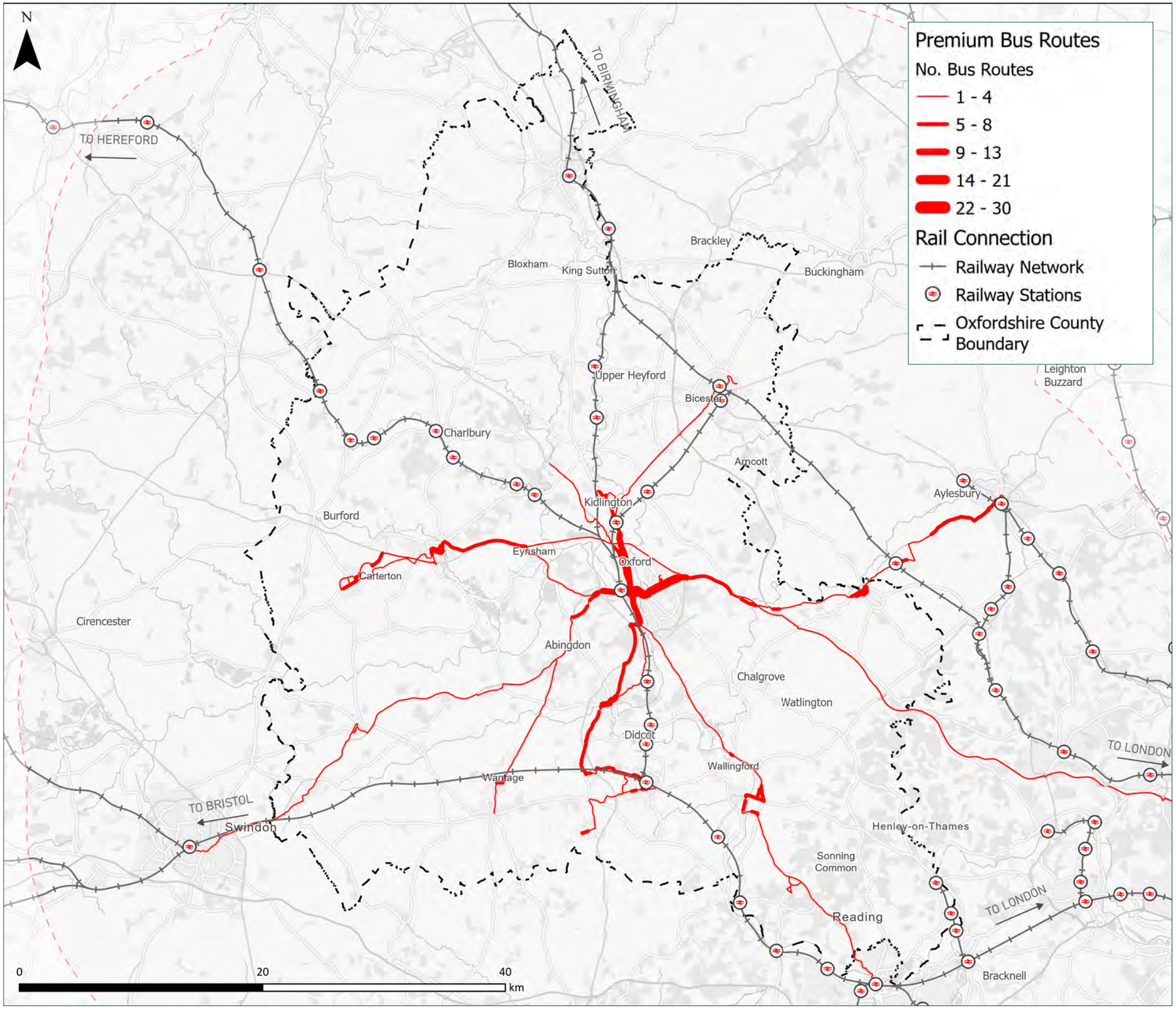
Towns like Chipping Norton, Faringdon, Wantage, Wallingford and Henley present areas with 20% - 30% car-free households, whereas this percentage reaches up to 40% in LSOAs near Bicester, Witney, Abingdon and Didcot and up to 60% in Banbury. Oxford City has the largest concentration of areas with higher percentages of households which do not own a car (between 40% - 60%) and in one area this percentages rises up to 80%.



PUBLIC TRANSPORT NETWORK

Integrating SATN with the 'premium' bus and train networks in Oxfordshire will be a key component of developing an effective active travel network.

The purpose of the plan is to illustrate the extents of the rail network and stations, as well as the County's 'Strategic Bus Route'. Understanding this network will provide additional opportunities in future for development of improved public transport and potential hubs. 'Premium' Bus Routes were identified as inter-urban services with a 'turn-up-and-go' frequency of at least 4 buses per hour during weekday daytime and at least an hourly evening and Sunday service. The plan also includes the Oxford Tube long-distance route.

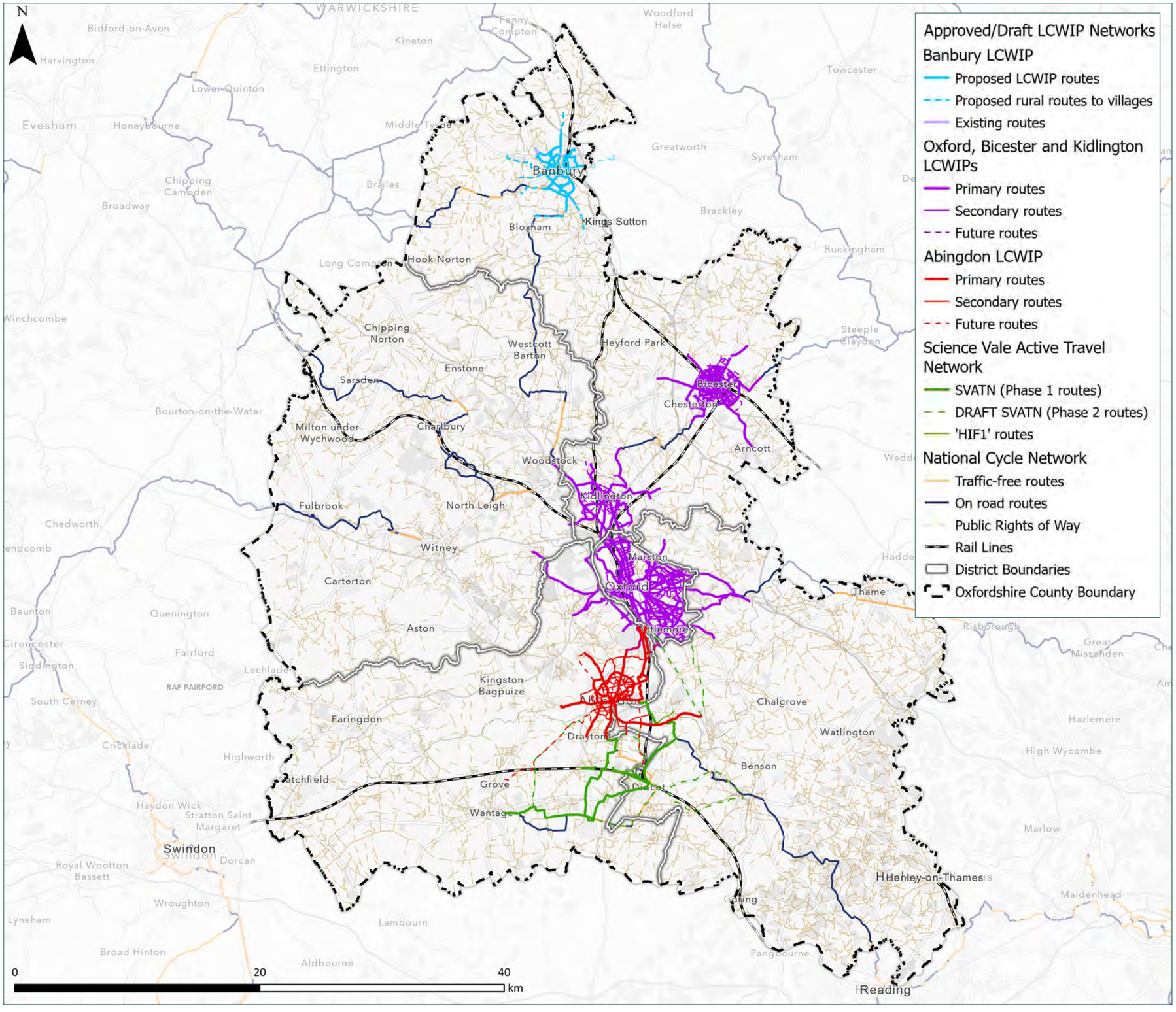


EXISTING NETWORK

A key consideration in the development of the SATN network was the existing and emerging networks that are being developed through other work programmes, namely LCWIPs, OCC's own 'Greenways' programme, PRoW upgrades, and the existing cycle network. The opposite plan outlines the alignments of existing infrastructure and the extents of the anticipated networks through the LCWIP and SATN programmes.

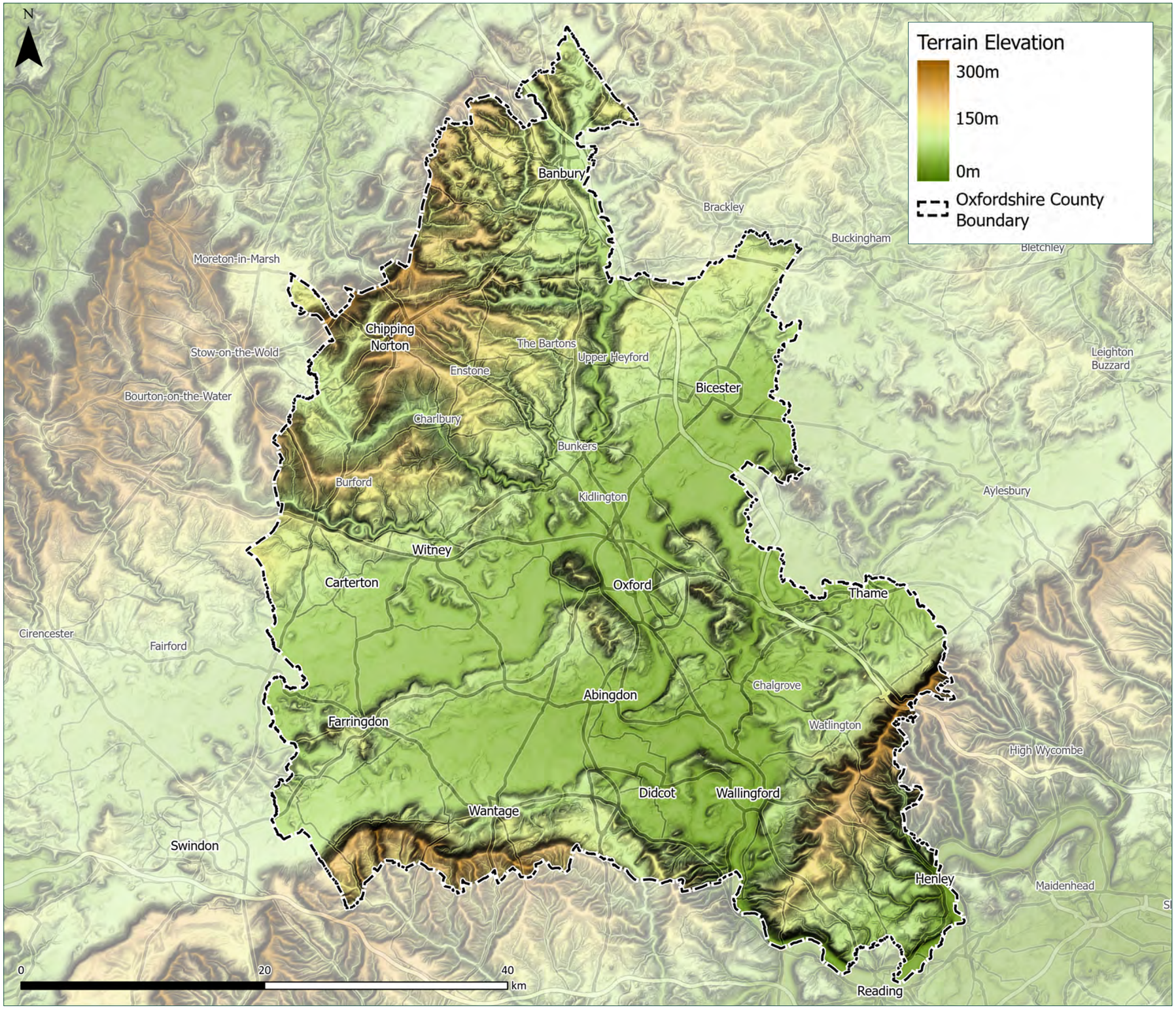
Where practicable, SATN route alignments will adopt/incorporate these existing and proposed routes. This will require a review of the existing infrastructure/proposals to ensure they are consistent with any SATN design proposals.

Note: the Witney and Didcot LCWIPs were approved during the development of this project, and will be added to this map in future updates of the SATN.



TERRAIN ELEVATION

Terrain will be a key consideration in the development of SATN and how the preferred alignments are routed. The plan clearly highlights the importance of the North Wessex Downs, the Chilterns, and the Cotswolds in defining the topography of Oxfordshire. The central area between The Cotswolds and North Wessex Downs is considerably flatter and the location for a majority of the County's key settlements.

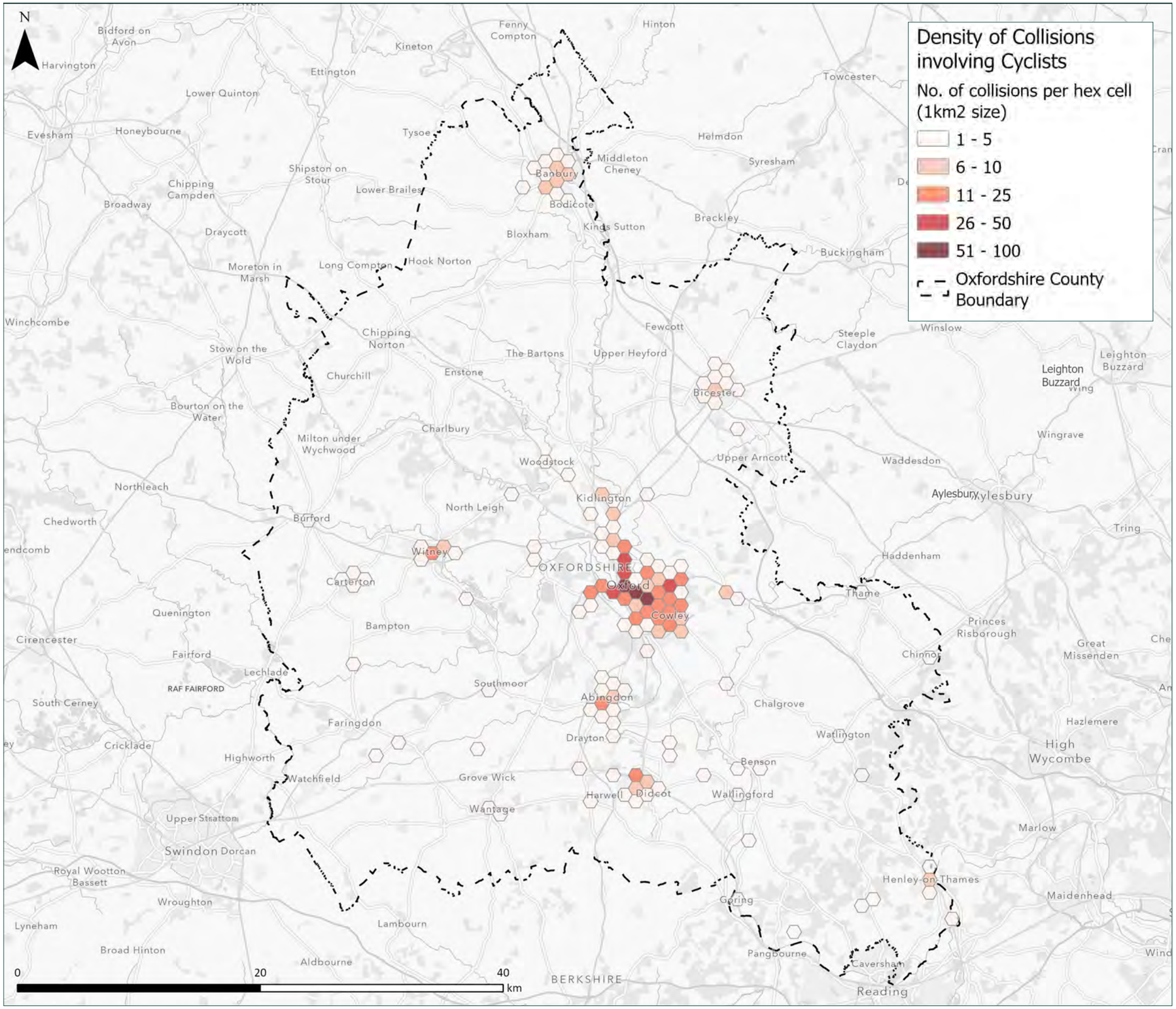


COLLISIONS INVOLVING CYCLISTS

The map on the following page shows the concentration of collisions involving cyclists per km² across Oxfordshire for the period between 2017 to 2021.

Oxford City has the densest occurrence of collisions with a majority of 'hexs' having between 10 to 100 collisions per km² over the five-year period. Other key towns including Abingdon, Didcot, Witney, Banbury and Bicester have a wide range of cyclist collisions, ranging between 2 to 25 collisions per km².

Kidlington, Bicester, Banbury, Henley, Wantage and Didcot record, on average, only 1 collision per year involving cyclists Abingdon and Witney record an annual average of 2.

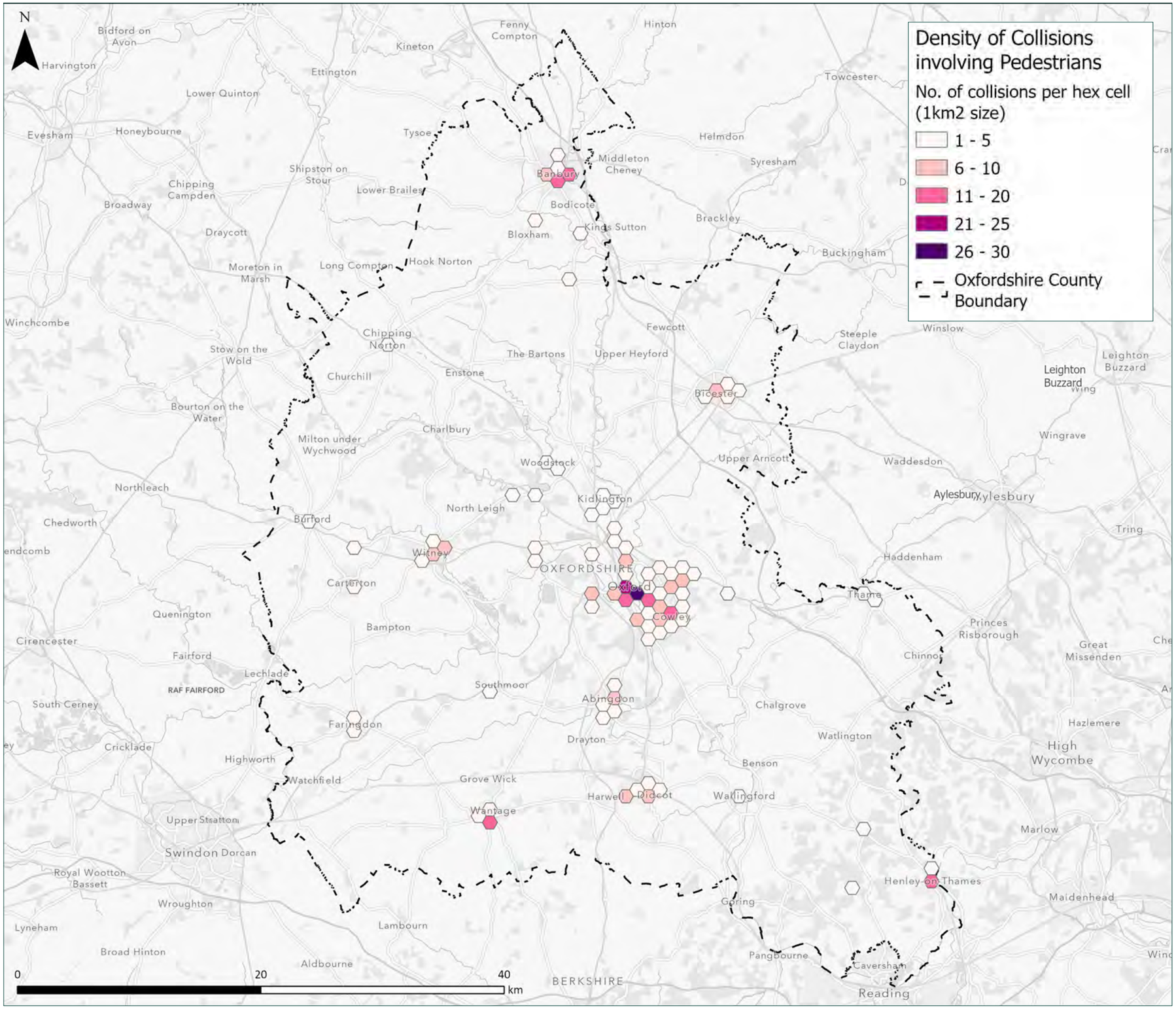


COLLISIONS INVOLVING PEDESTRIANS

The map opposite shows the concentration of collisions involving pedestrians per km² across Oxfordshire for the period between 2017 and 2021.

The highest density of collisions involving pedestrians is recorded in Oxford (between 26 and 30 collisions per km²). Banbury, Wantage and Henley-on-Thames also have areas with high density of collisions (up to 20 per km²). Other main towns like Bicester, Abingdon, Didcot and Witney have lower densities of up to 10 collisions per km².

On average, most major towns across Oxfordshire recorded 1 collision involving pedestrians per year. These towns include Witney, Bicester, Abingdon, Didcot, Wantage and Kidlington. Banbury and Oxford recorded up to 2 and Henley up to 3 collisions per year.

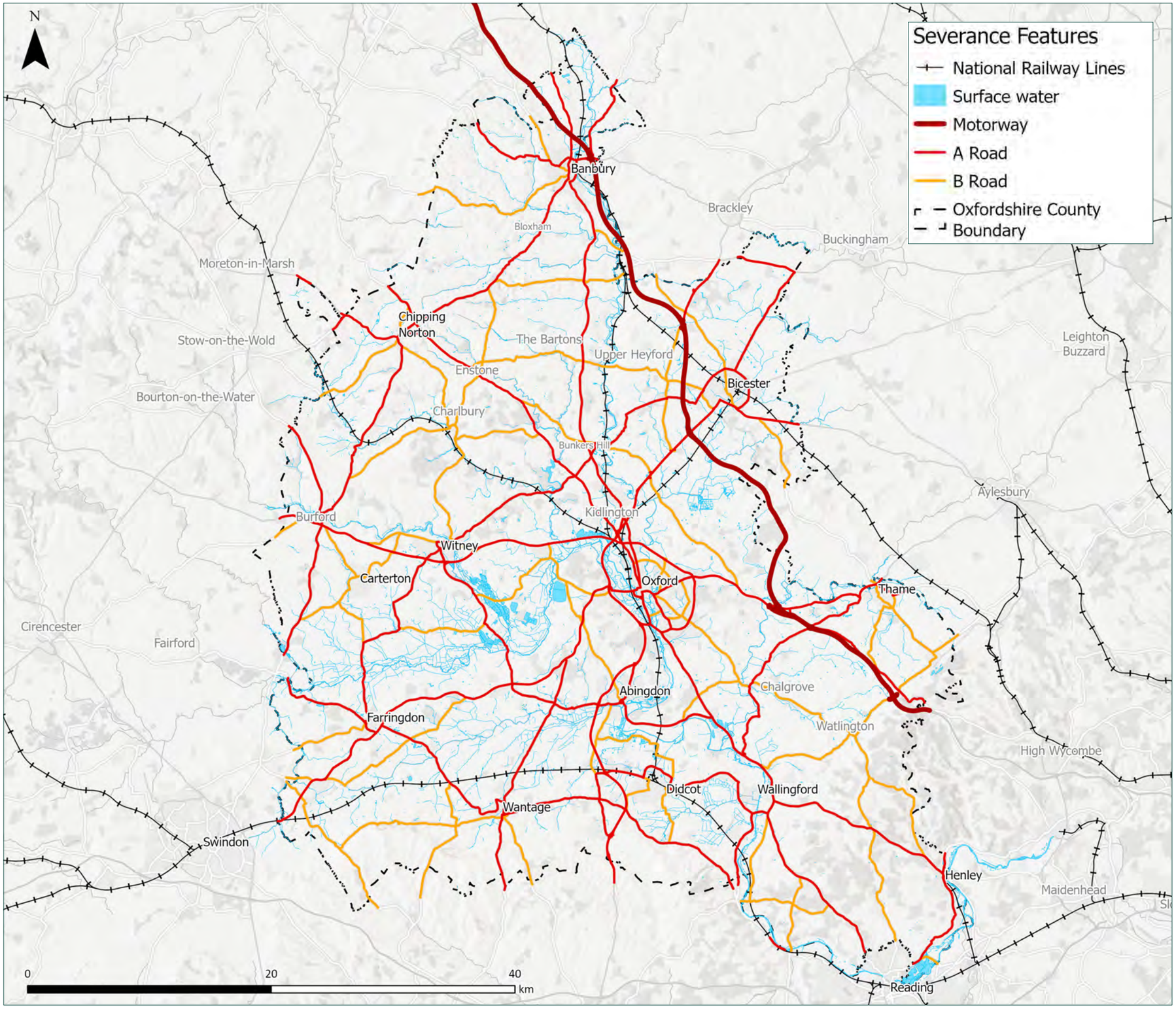


SEVERANCE

Understanding the impact of severance is critical for contextualising how walked, wheeled and cycled trips are currently made through the County, particularly in relation to key features like main roads, rivers, railway lines and other geographical features including acute topography.

The plan was developed to highlight the key 'Severance' features in the County: 'Severance' typically refers to barriers to movement, and we typically consider these as either 'hard' or 'soft' features. 'Hard' severance features tends to refer to features which are fixed and generally harder (although not impossible) to overcome through design (e.g. rivers and railways), whilst 'Soft' severance is more likely to refer to a feature which is easier to overcome/relocate (e.g. minor roads or relocating existing crossing points).

The plan highlights several key severance features including; the M40, River Thames, and railway lines. The extent to which these features act as barriers to movement is very site specific however the purpose of this plan is to identify these features and consider them later in the project when developing 'on the ground' route alignments.

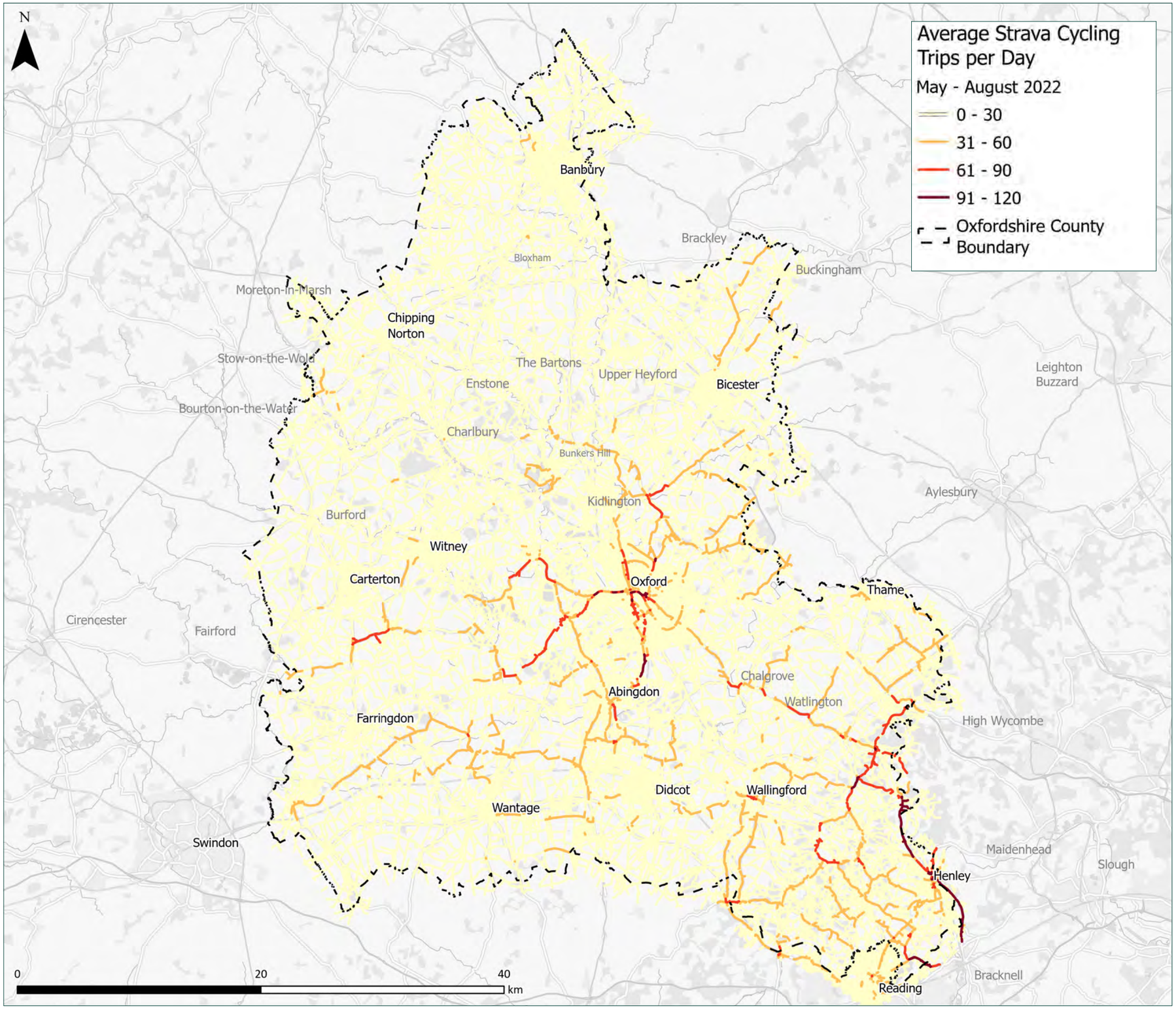


LEISURE TRIPS

Data from Strava (a digital service for tracking physical exercise)was used to provide information on trips 'on bike'. The data, extracted from the Strava Metro website, is gathered from users recording cycling trips on their Strava app. It consists predominantly of leisure and recreational trips, however it also includes commuter trips which generally account for c.5-10% of entries The Strava data was used as one source of 'demand' alongside the PCT and 'Everyday' Trip analysis.

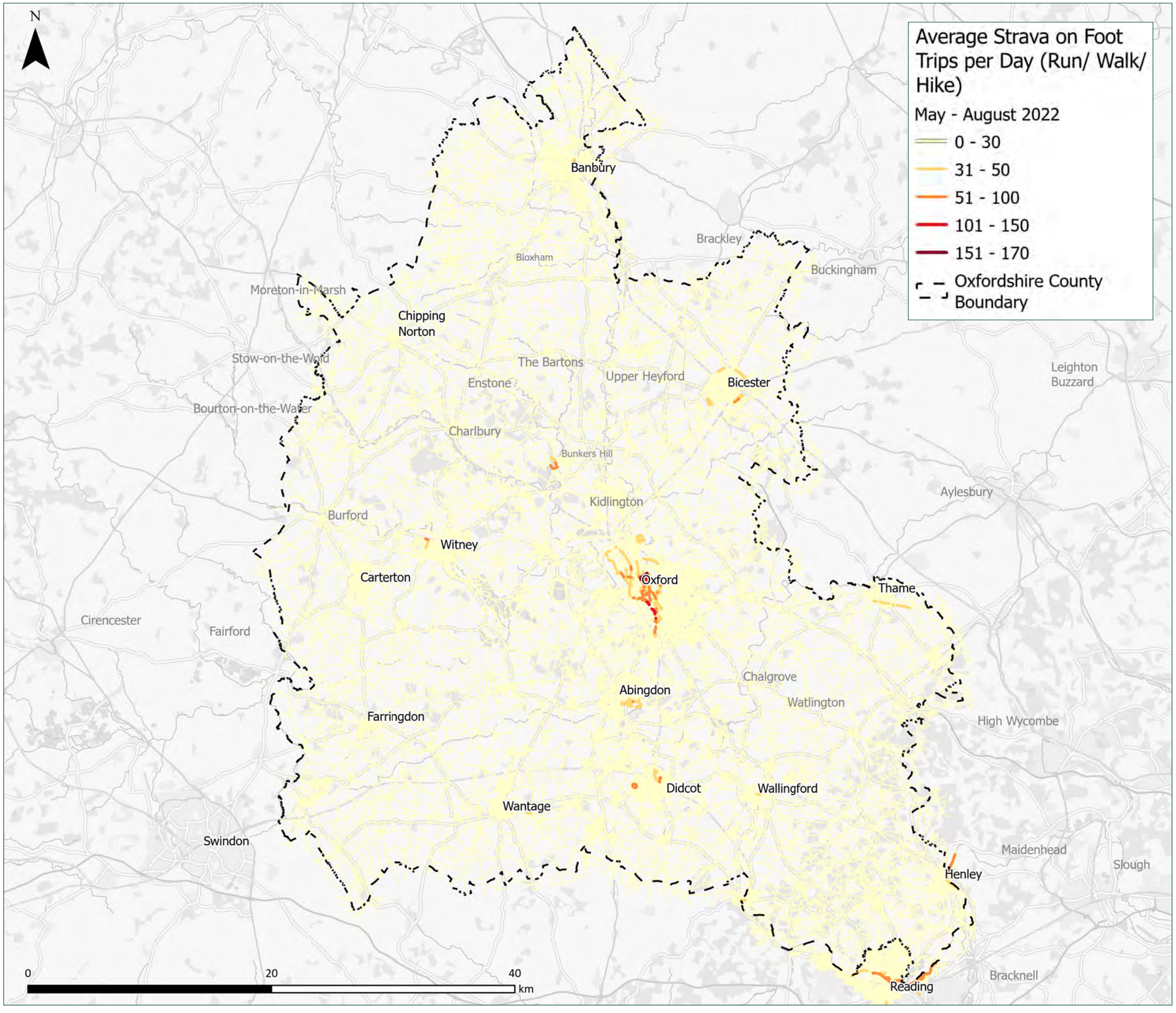
The data shown on the map opposite represents the period between May and August 2022. It highlights several alignments where daily trip volumes are high.

Areas in the central and southern parts of Oxfordshire record the highest number of Strava cycle trips per day. As predicted by the mode share of cycling and walking plan, areas within Oxford City and to the west of this show a significant concentration of cycling trips per day. In addition, areas around Henley, Watlington and Stonor are also popular among cyclists who use the Strava app to record leisure cycling trips.



Data from Strava (a digital service for tracking physical exercise) was also used to provide information on trips 'on foot'. The plan opposite, similarly, shows the period between May and August 2022 and highlights several alignments with the highest number of daily trips on foot.

Unlike trips on bike per day, on foot trips recorded on Strava are concentrated in urban areas, particularly around Oxford. Other areas include Bicester, Abingdon, Didcot and Reading.



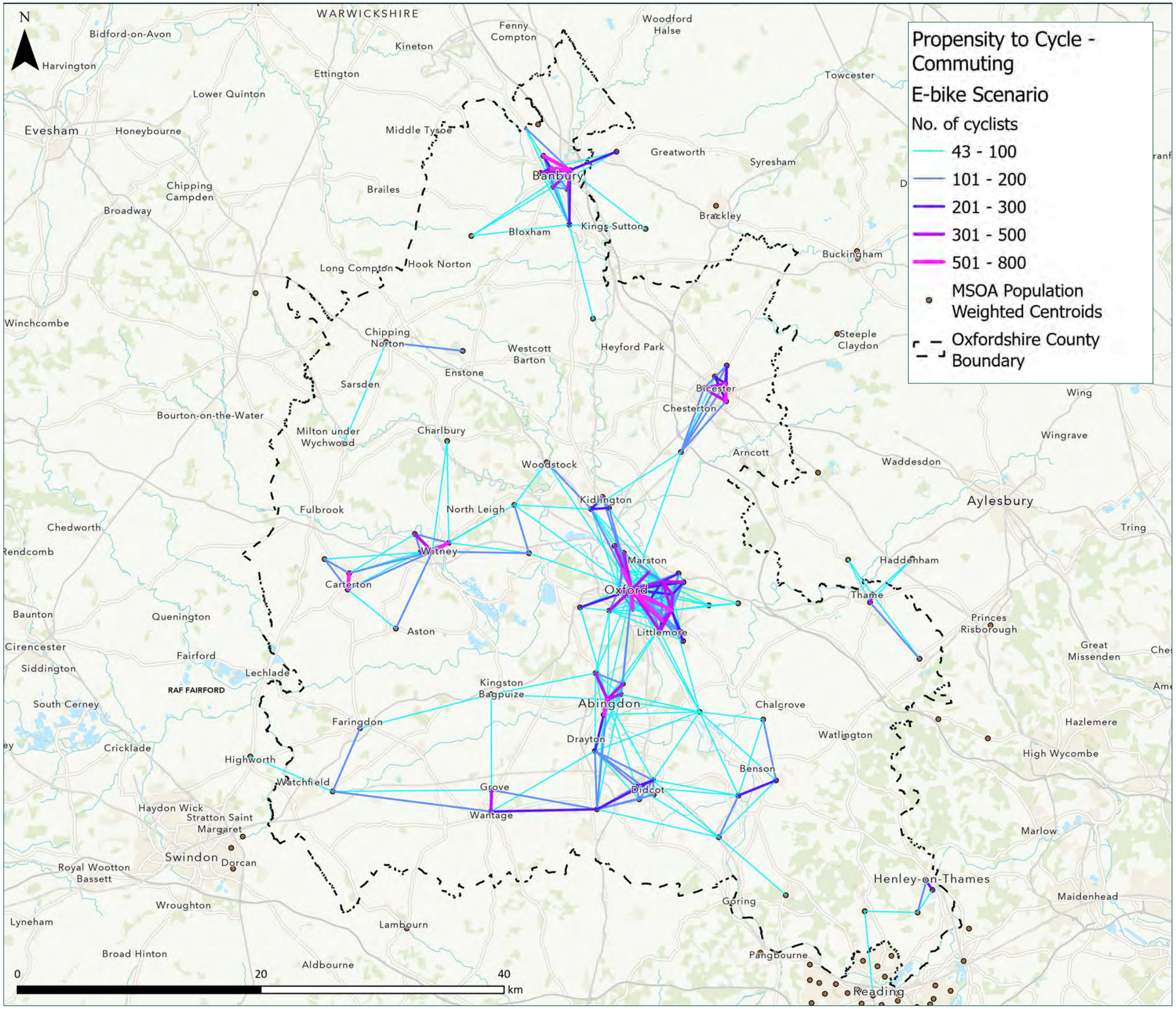
PROPENSITY TO CYCLE TOOL (PCT)

The Propensity to Cycle Tool (PCT) is a nationwide model that identifies where increases in the rates of cycling can be expected through the provision of better infrastructure, as well as considering the impact of gradient and cycling propensity. The analysis uses Census 2011 travel to work data and school travel data, and looks at trip distances to see where there may be scope for more short journeys to be undertaken by cycling.

The PCT has been used to identify the top 300 straight desire pairings between residences (within Oxfordshire) and workplaces. In this case, the E-bike Scenario is used to capture the routes with ultimate potential for cycling to work trips if appropriate infrastructure was provided. The E-bike scenario assumes 22% of commuting trips by bicycle and improved access to e-bikes. This provides a more ambitious and longer-term outlook for cycling flows which is advantageous in network planning as it ensures that the planned cycle network will provide for assumed future advances in the county's cycle network.

The results shown on the plan opposite suggest that the highest future commuting demand would be concentrated in and around the county's major towns, including Banbury, Bicester, Witney, Oxford, Abingdon and Didcot. Additionally, inter-urban links have also been identified using the PCT desire lines: including Charlton-on-Otmoor - Bicester, Kidlington - Oxford, area between Abingdon-Wantage-Didcot, Rowstock/Harwell, Faringdon - Shrivenham and Carterton - Witney.

It is important to note that the PCT tool still sources 2011 Census Data and therefore is not based on the most recent 2021 outputs.



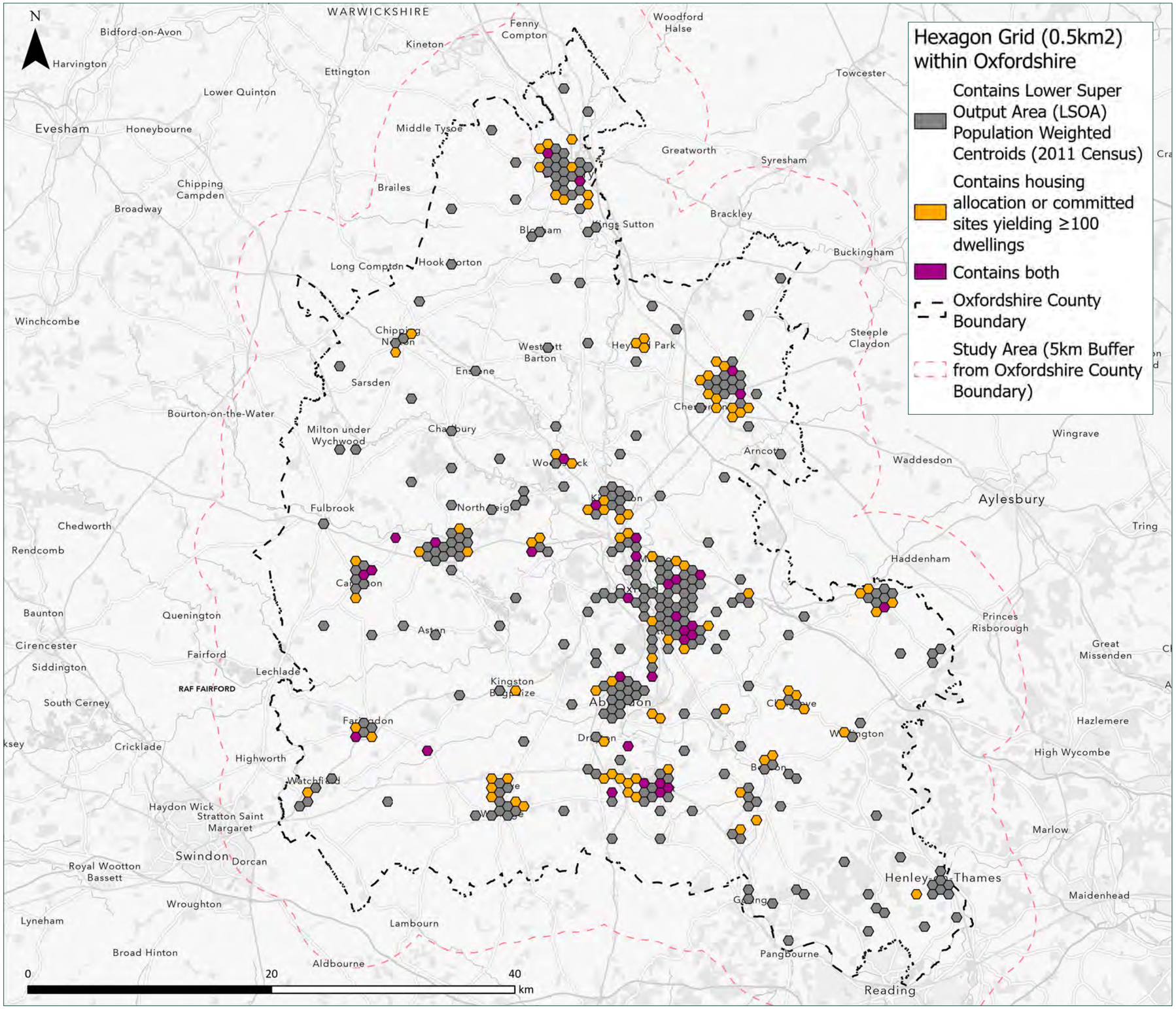
‘EVERYDAY’ TRIPS ANALYSIS

The PCT outputs provided indicative cycling networks based on commuting and school trips, whilst the Strava data is generally focussed on trips for recreation and/or exercise. The purpose of the Desire Line Clustering therefore was to provide an additional layer of analysis that focussed on ‘Everyday’ cycling trips which would include: leisure and recreation, trips to local centres and amenity trips. Combining the ‘Everyday’ trips, Strava and PCT outputs provided a comprehensive demand model for developing the SATN network.

To identify the Origins, the county area was divided into an hexagon grid using 0.5 km² hexagons. All hexagons containing LSOA Population Weighted Centroids, as well as Housing Allocations or Committed Development Sites (anticipating to include >100 dwellings) were included as Origins. A majority of the identified Origins are located at existing key settlements or within close proximity to these, whilst there are also some more isolated development sites/ populations distributed across the County.

The plan is based upon three categories:

- LSOAs containing >100 dwellings based on 2011 Census Outputs
- LSOAs containing allocated/ committed sites of >100 dwellings
- LSOAs containing both existing/allocated/ committed sites of >100 dwellings

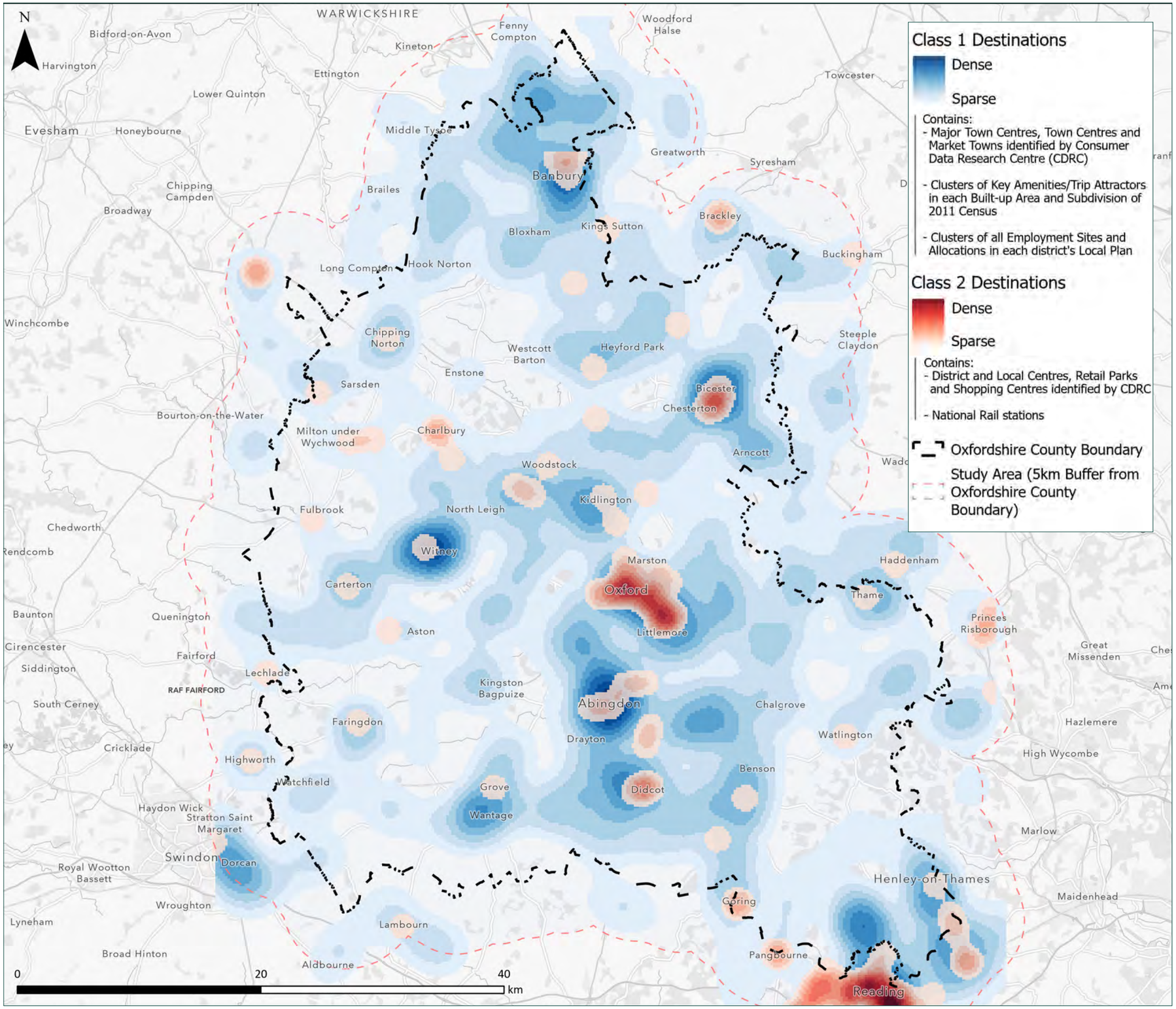


Having identified the Origins, Destinations were identified following the categories below:

- Class 1: Town, Village and Local Centres; Railway Stations; Future/allocated key Employment Sites

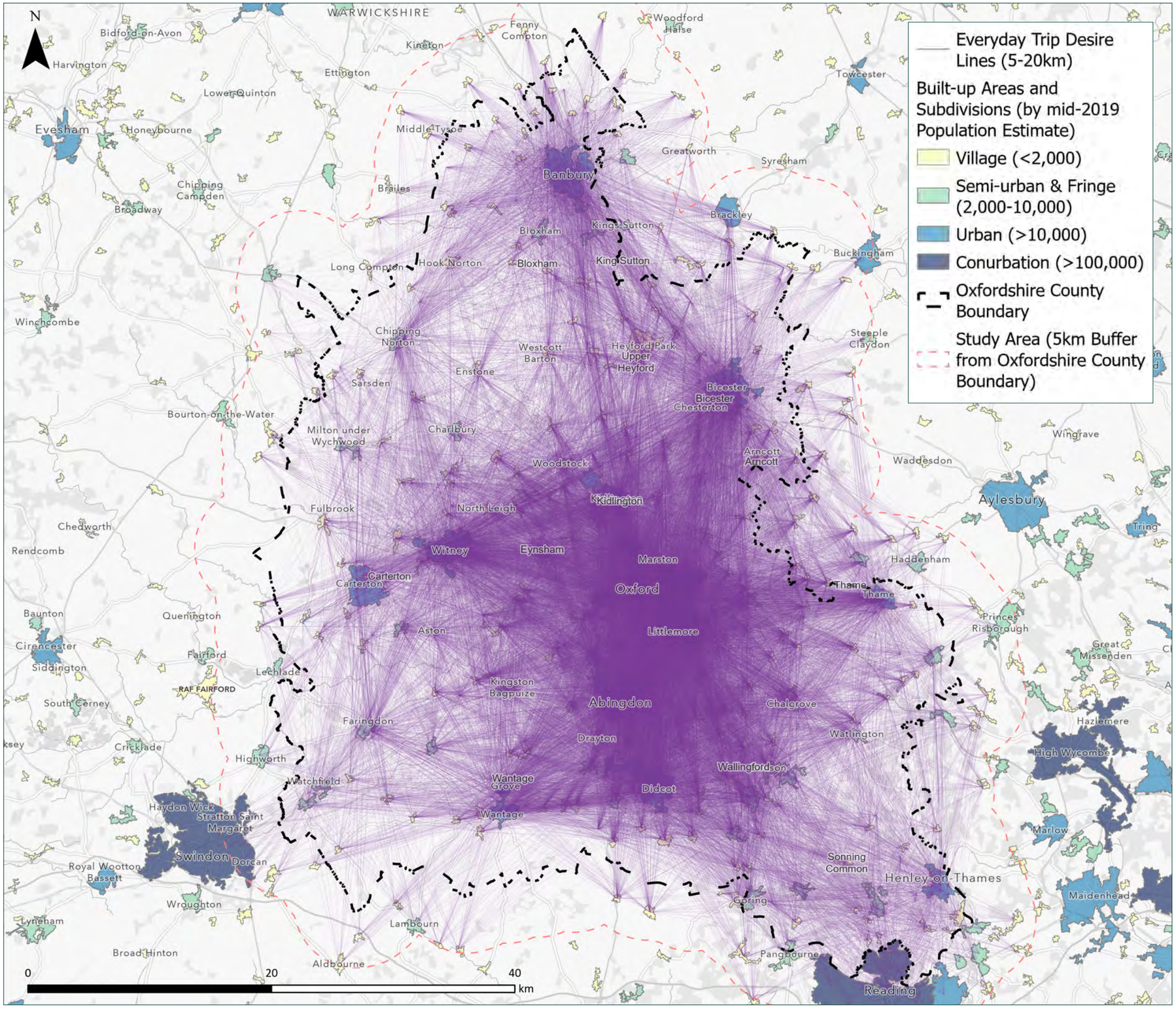
- Class 2: Existing and Proposed Schools, Hospitals, Supermarkets, Leisure Centres and Libraries, Bus Stops etc.

The plan opposite presents a heat map of the combined locations of both Destination Classifications. The results suggest that Oxford, Banbury, Bicester, Didcot. Abingdon and Reading are the key locations within the study area which have high concentrations of both classifications.



To determine the key desire lines for Oxfordshire's SATN, the spatial relationship between Origin and Destinations was analysed. 'Everyday' Origin-Destination desire lines were created from each origin centroid to its nearest Class 2 destination, and then also to all Class 1 destinations in the study area. This was based on the assumption that the Class 1 destinations would generate a higher number of trips and that they are also likely to have a larger catchment area of trips from across the study area, compared to Class 2 destinations which would generate more locally based trips.

The plan provides the combined outputs of all desire lines being paired using the above methodology. This initial analysis identified c. 17k OD pairs and subsequently refined overleaf.

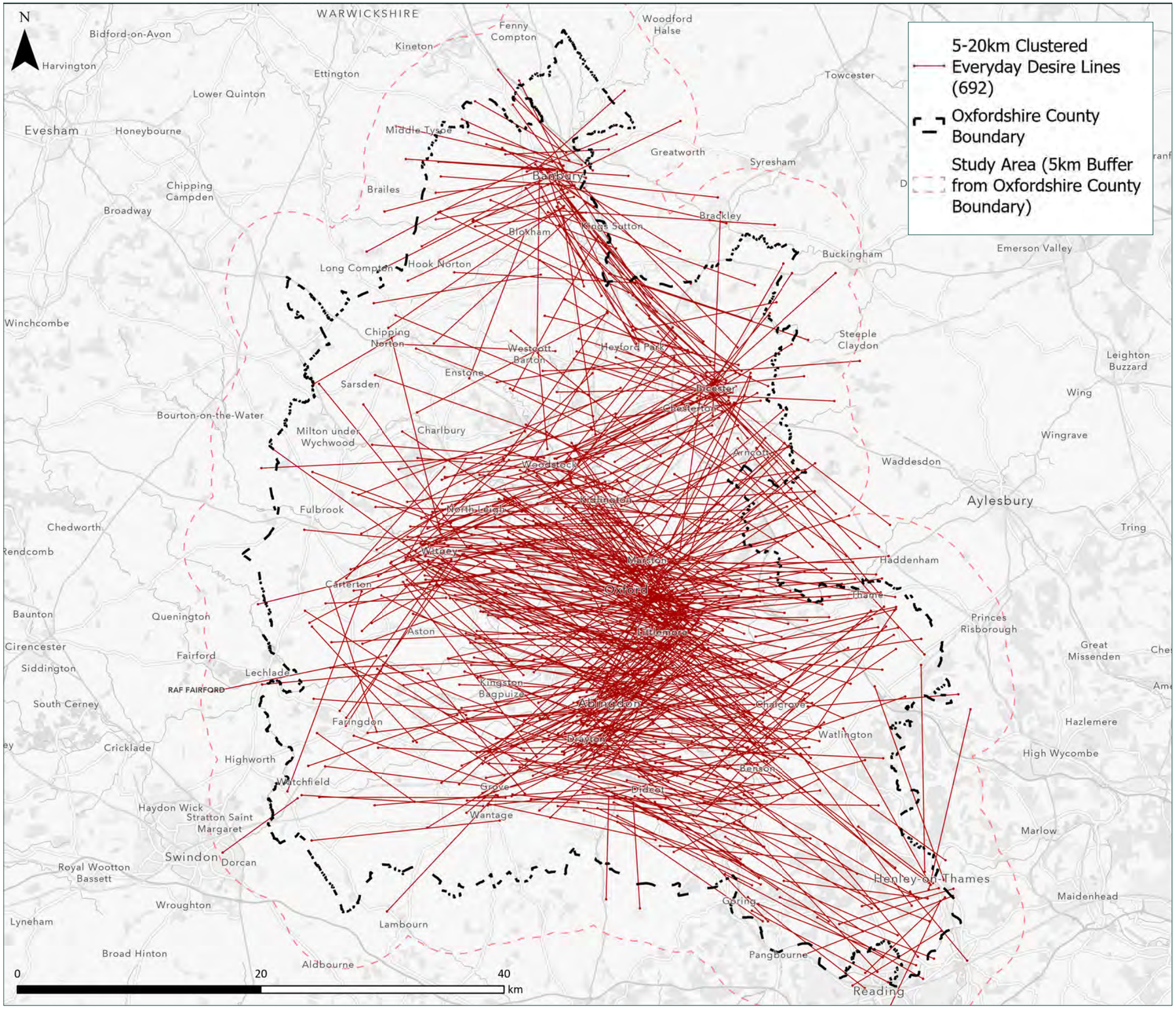


Having identified all available desire lines into the 'Long-List', a "Density Based" clustering analysis was used to cluster the above desire lines into a more refined plan which identified the top desire line clusters. Clusters of desire lines were identified using the Clustering tool in ArcGIS, which identifies clusters of point features within surrounding noise based on their spatial distribution. Once each cluster had been identified, the clusters of points were matched with the corresponding groups of desire lines and the linear directional mean of each group was identified. The cluster groups were then ranked based on the number of desire lines in each cluster. Given the thousands of OD pairs generated, we removed the below desire lines types:

- **Intra-Settlement** – any OD pairs which took place entirely within a settlement was removed on the basis that it would not contribute to the strategic network

- **Trips between 5km - 20km** – To reflect the 'strategic' nature of SATN, OD pairs were only identified if they were between 5km and 20km in length.

Using the above filters reduced the number of OD pairs from c.17k to <1k pairs which was used as the 'short-list'. The short-list was used in conjunction with the Strava and PCT outputs to identify an initial Demand Heatmap to form the basis of Stage 2.

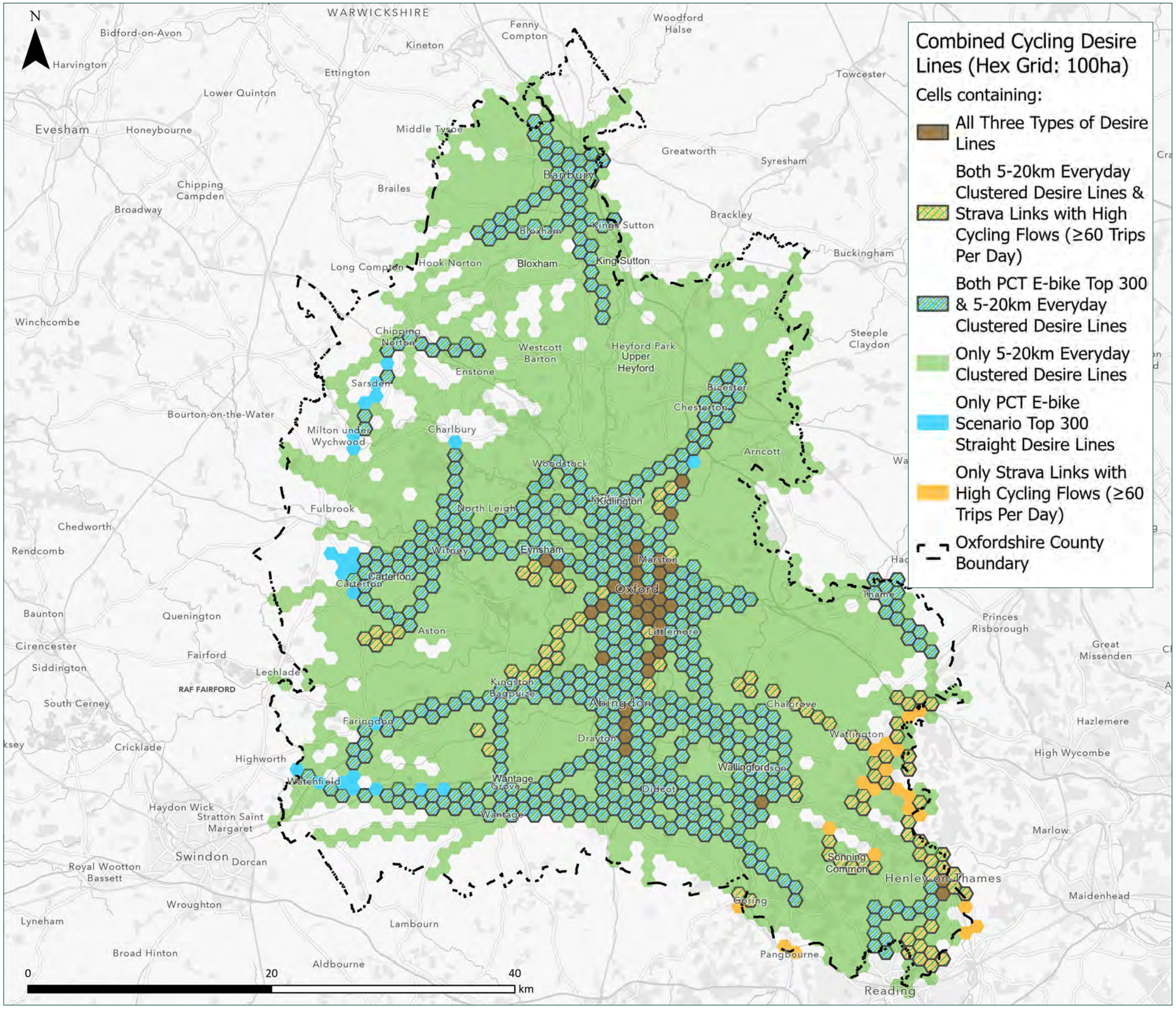


COMBINED DEMAND ANALYSIS

The outputs from the Strava/ PCT/ Everyday Trips analysis were combined to produce the opposite plan which provides a single overview of the combined demand identified by the three datasets. Given the limitations of the individual datasets, this approach provides a more balanced overview of the three datasets which considers commuting, recreational and utility trips.

The plan identifies those areas where there is overlap between the demand datasets and therefore the areas with highest levels of demand are anticipated - outlined in black with brown hatch. The plan suggests that a majority of demand is concentrated in the southern half of the County and particularly along the central spine from Kidlington – Oxford – Abingdon – Didcot.

The plan was used to provide the basis for developing the SATN network and relating it back to areas of anticipated highest demand for cycling in OCC.



4
NETWORK DEVELOPMENT

NETWORK DEVELOPMENT PROCESS

The outputs from Stage 1 were used to draft the proposed SATN 'straight-line' desire network. The initial network is based on a series of 'straight desire lines' connecting key settlements and destinations in the County. These desire lines reflect the outcomes from Stage 1 and also incorporate feedback from officers and stakeholders.

The confirmed straight desire line network has been taken forward into Stage 3 for prioritisation and to enable the identification of initial 'on the ground' alignments. This chapter outlines the methodology for the refinement of the SATN network through the below stages:

1. Straight Desire Line Network - Long List V1

2. Long List + Engagement Feedback - Longer List V1

3. Refined Long List V2

4. SATN – Draft Network Segments

5. SATN – Draft Sub-Segments

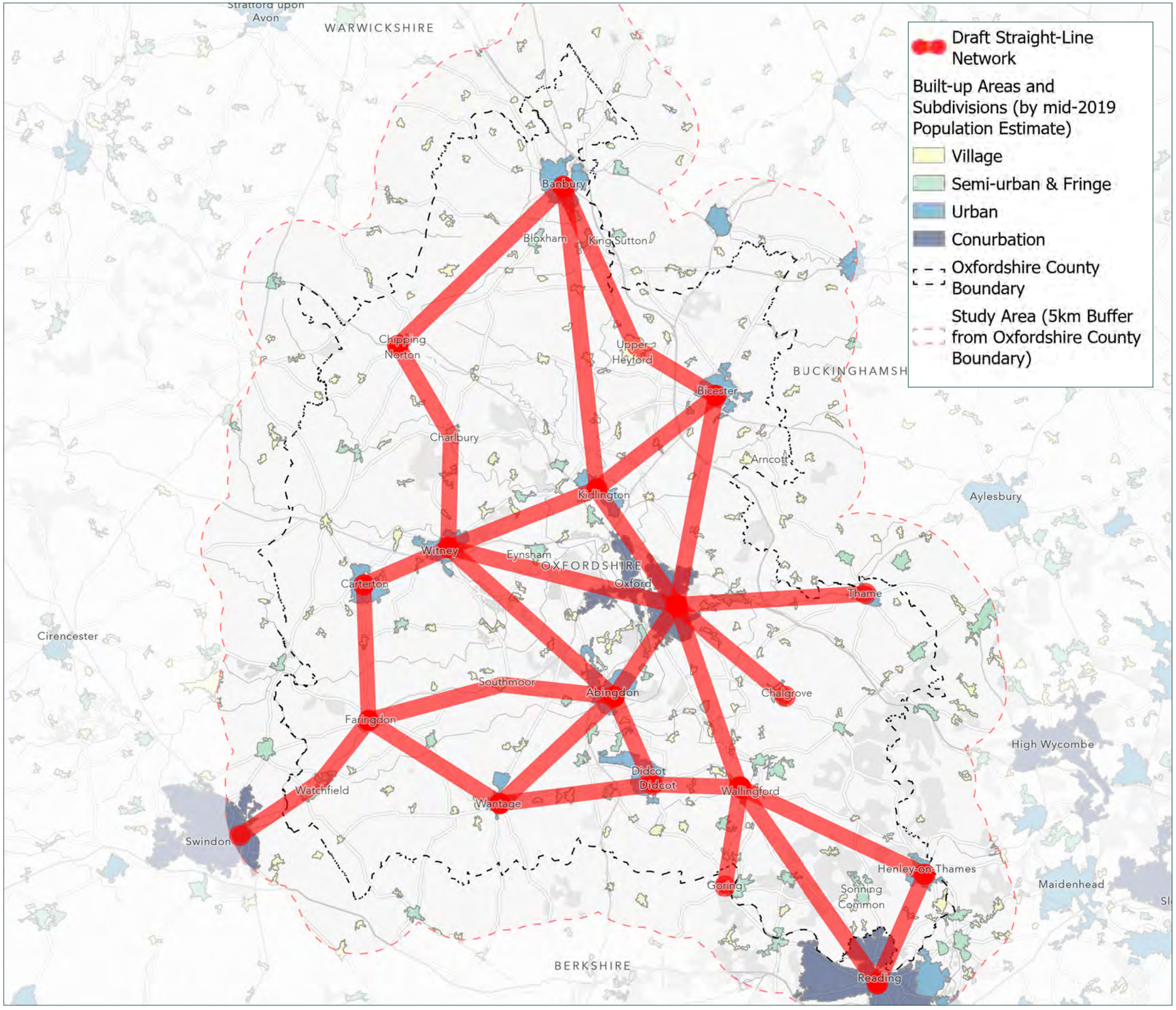
This approach focussed on the 'strategic' contribution of the desire lines to the long-term development of the SATN network, whilst also providing flexibility in terms of where desire-lines are applied on the ground. The design development and specific route alignments using more detailed 'on the ground' is described in Stage 4.

DRAFT NETWORK - 'LONG LIST V1'

Based on the outcomes from Stage 1 and feedback received from officers/stakeholders, an initial 'long-list' of straight desire lines was developed. These desire lines were identified based on several factors, including number of desire line clusters, proximity to public transport, contribution to a Strategic Network and alignment with existing cycle routes.

For the purposes of the SATN network, all desire lines were located within Oxfordshire and all desire lines were book-ended by settlements. This was based on an assumption that all proposed SATN routes should be integrated to a strategic focal point e.g. town/village centre or existing local cycle network, rather than ending nowhere.

This initial network was used to inform the public engagement in December 2022.

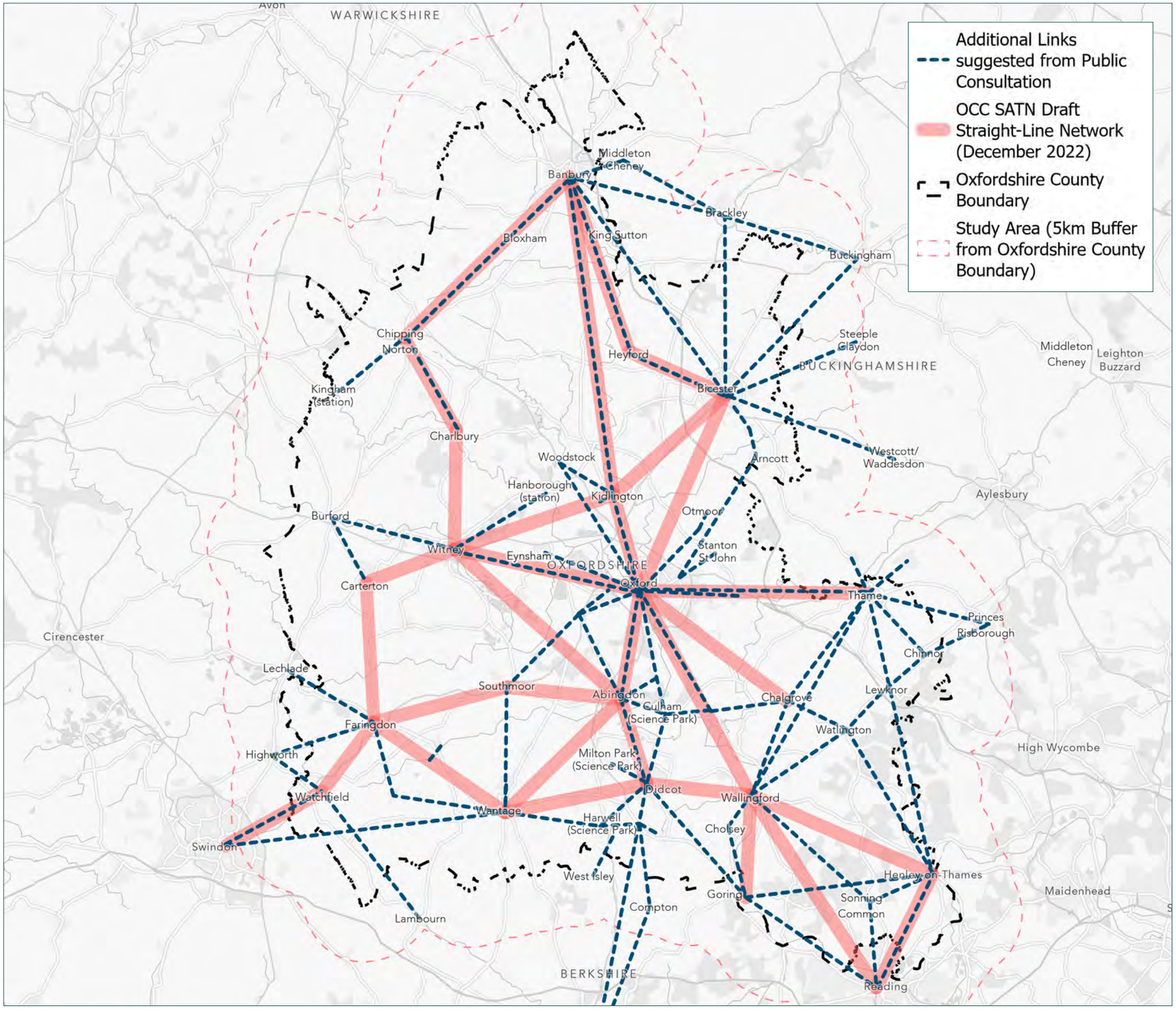


DRAFT NETWORK - 'LONGER LIST V1'

Online feedback was collected by OCC using their 'Lets Talk' platform during December 2022 on the emerging SATN Long-List V1. Participants were asked to review the straight-line network and provide any recommendations/comments based on their own knowledge and experience of walking/cycling in Oxfordshire.

The results from the engagement were combined into the opposite plan. The dashed blue lines represent additional alignments from the engagement that were identified/ comments were made on initial SATN network proposals. The opposite plan suggests that a majority of the additional recommended routes, particularly those in the South and East, tended to be focussed away from the key areas of 'demand' identified in Stage 1 and also reached beyond the OCC boundary in several instances.

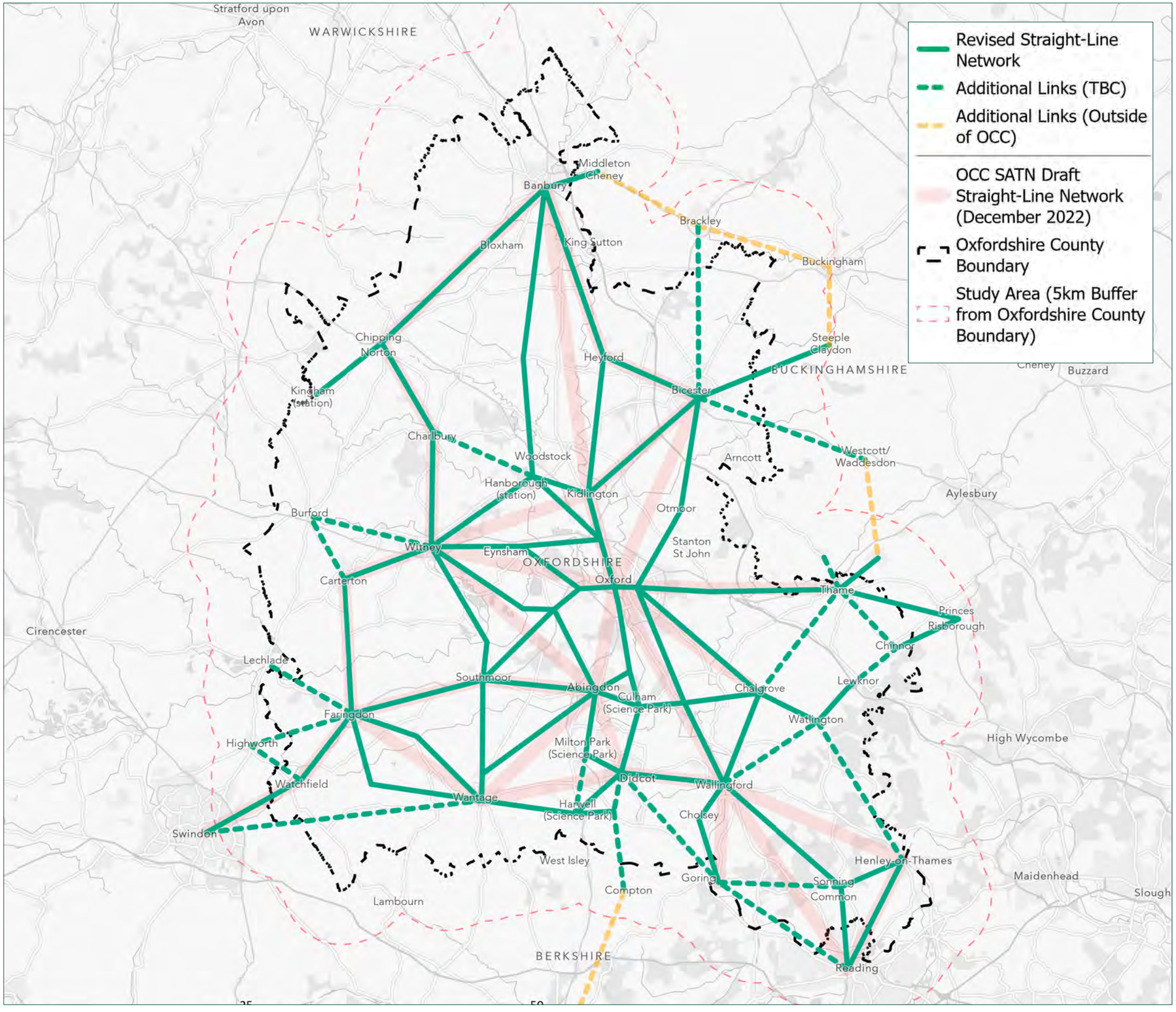
In addition to comments on the specific network, the engagement also collected more general feedback on responses to the SATN network. Of the 46 responses, 35 were made online and 11 via email. 63% of responses 'strongly supported' the draft SATN network, 34% 'supported' the network, and 3% 'neither supported/opposed'.



DRAFT NETWORK – 'LONG LIST V2'

The combined outputs from the Longer List were then refined/adapted into the opposite plan. This plan grouped the Long List V2 alignments into three categories:

- 'Revised Straight-Line network' – The previous straight-line network was adapted to reflect comments from the engagement, and also to add further integration with main settlements
- 'Additional Links (TBC)' – These were a collection of additional segments which were subject to review with OCC
- 'Additional Links (Outside of OCC)' – These links in yellow were identified during engagement however are routed outside of OCC.



DRAFT NETWORK - SEGMENTS

To help develop the SATN network, the Long List V2 was converted into two key outputs: a Segments plan and a Sub-Segments plan. The intention was these two plans would be used to help inform the prioritisation scoring and develop specific route alignments further in Stage 3 of the project. This network comprises of 46 segments.

Initially, the Long List V2 was converted into a draft network of segments which were identified using the below approaches:

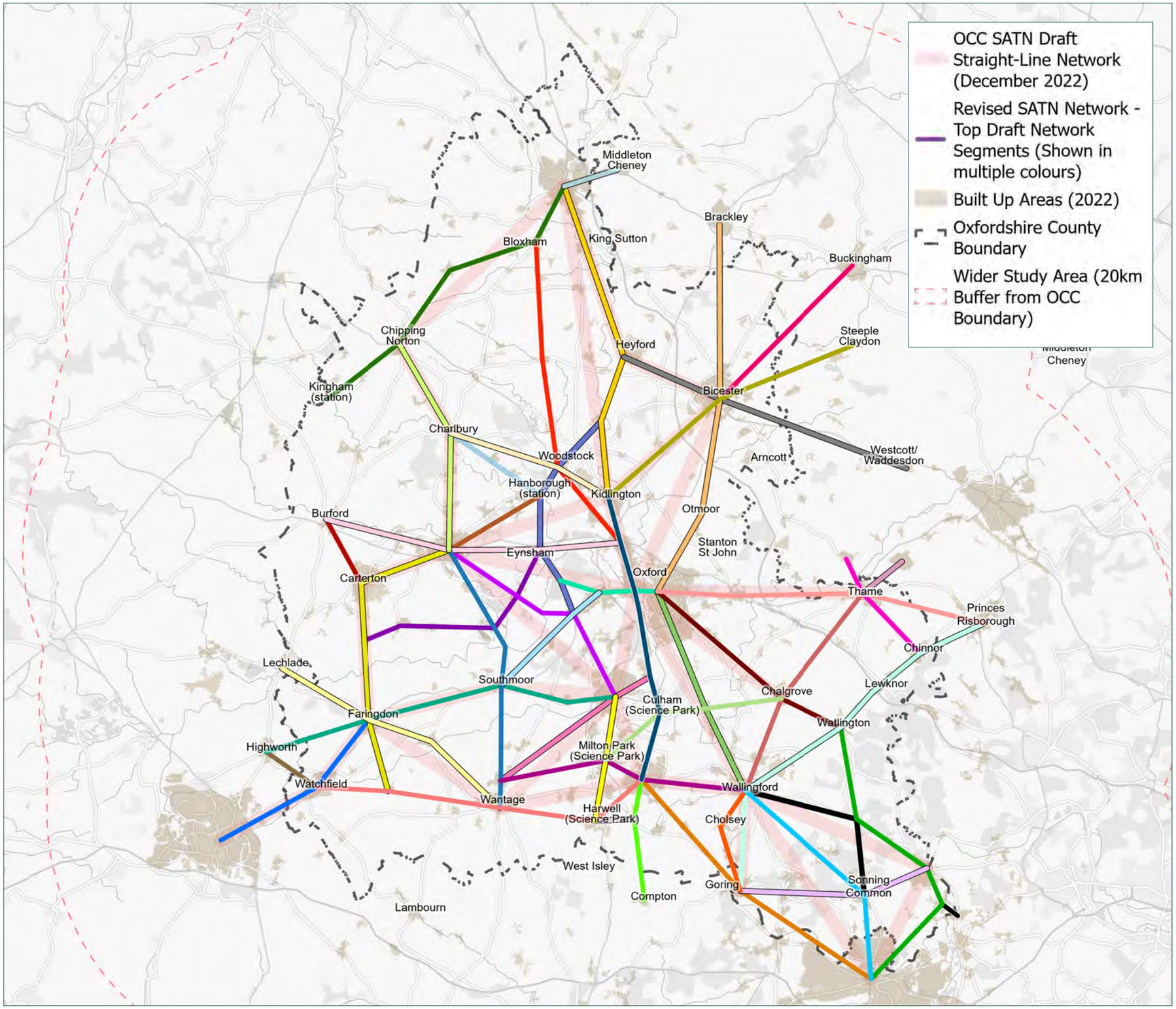
- A majority of the segments were identified by book-ending straight-lines with settlements e.g. Banbury – Kidlington

- In some instances, segments were extended to include nearby settlements/destinations e.g. Banbury - Chipping Norton was extended to include Kingham Station

- In some instances around denser areas of the network e.g. south of Oxford, the division of segments was more iterative with the aim of creating more consistent segment lengths

- The network was developed to reflect comments for extending the network beyond the OCC boundary to include key settlements in neighbouring counties

This plan was shared with the Project Steering Group to confirm that this conversion of the Long List V2 into the Segments plan was logical and intuitive for the local context.

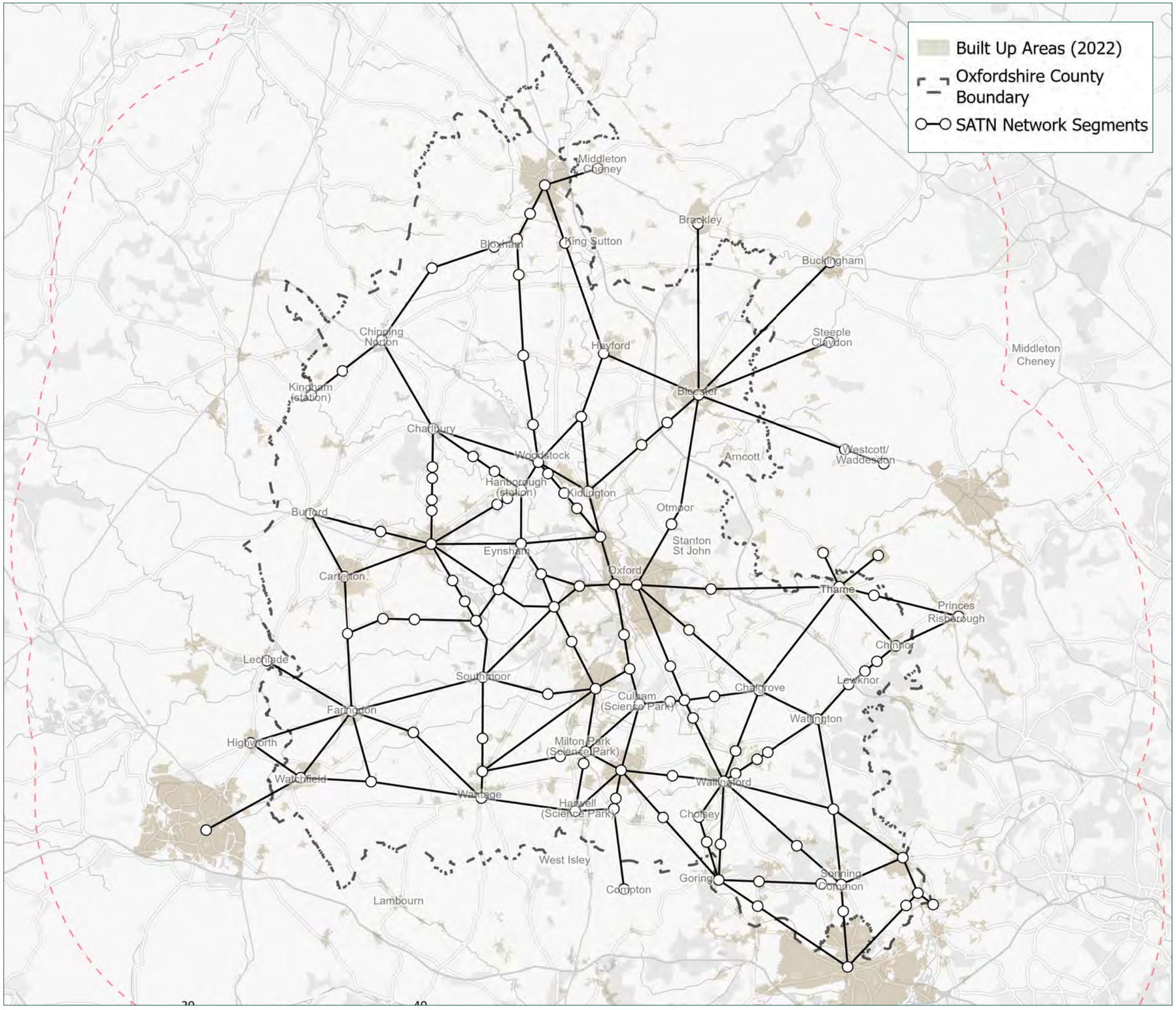


DRAFT NETWORK - SUB-SEGMENTS

The Segment plan from the previous page was further divided into the opposite Sub-Segment plan based on where Segments junctioned with settlements. This significantly increased the number of segments in the network and therefore enabled more detailed analysis during the Prioritisation stage.

For example, the previous Segment of Banbury - Kidlington was divided into Sub-Segments of: Banbury-King Sutton, King Sutton - Heyford, Heyford - Kirtlington, and Kirtlington - Kidlington.

This Sub-Segment network comprises of 176 Sub-Segments.



5 NETWORK PRIORITISATION

PRIORITISATION PROCESS

Stage 3 focussed on prioritising the straight-line segments developed in Stage 2 to enable the identification of a prioritised network which could be applied to 'on the ground' alignments.

The prioritisation was focussed on capturing the strategic contribution of individual segments to the overall Strategic Active Travel Network. Defining 'Strategic' and how this translated into the prioritisation of the SATN network was a key discussion point during the development of Stage 3 and producing the results. Stage 3 comprised of the following key components:

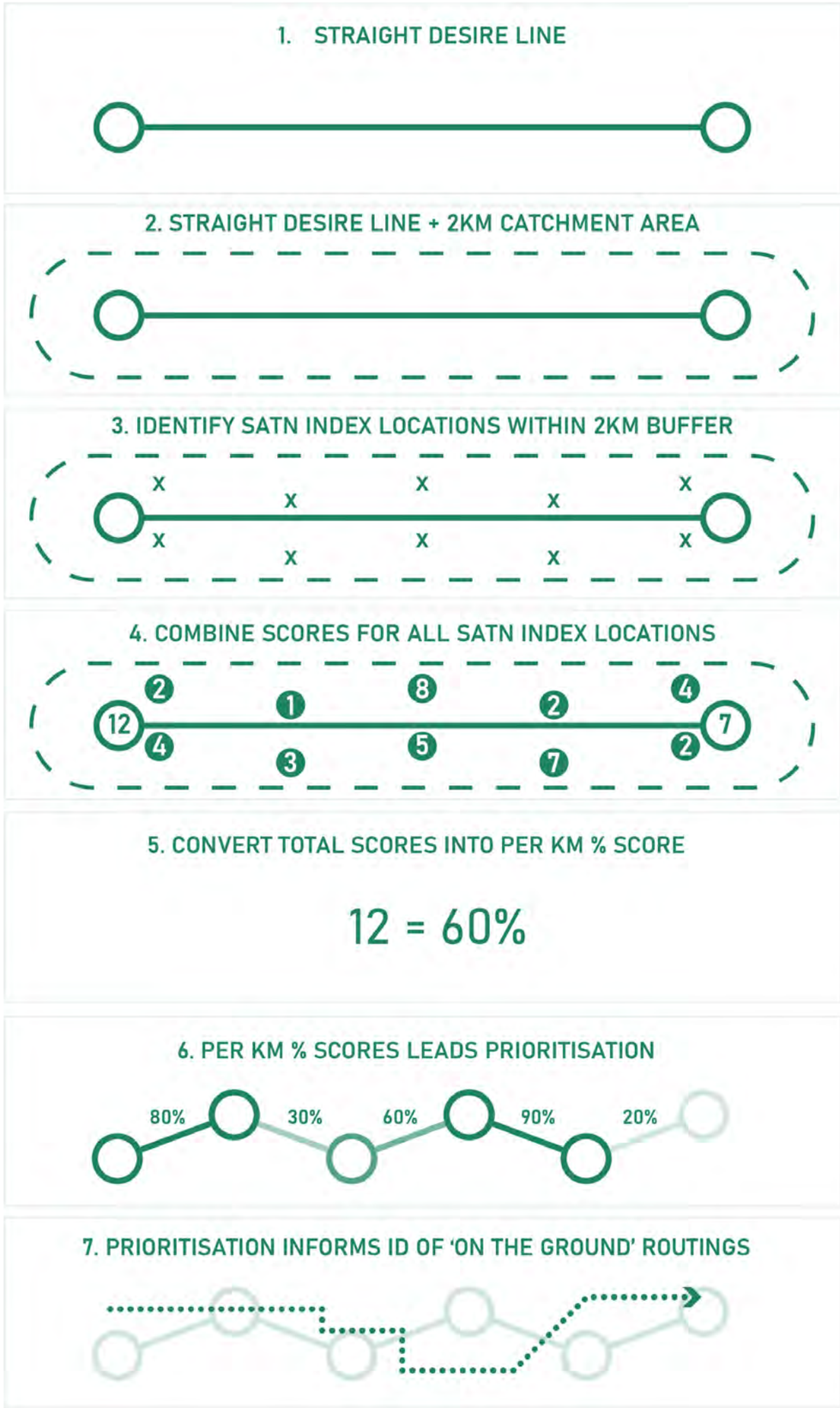
- **Prioritisation Approach**– Given the innovative nature and scale of the project, it was critical to develop a methodology which would satisfy OCC requirements for the long-term justification of its strategic network. The method was therefore developed in close collaboration between PJA and OCC throughout.

- **'SATN Index'** – to capture the 'strategic' potential of each segment, an index for each settlement within OCC and also within neighbouring counties (a 20km offset from the OCC border was used).

- **Scoring**: The prioritisation scores were calculated by creating a 2km offset from all segments and sub-segments in the SATN network. The scores for the respective settlements/destinations within those catchment areas were then combined to generate a total score (which was also converted into a per km result to enable easier comparison).

- **Prioritisation + Priority Routes**: The prioritisation scores were produced for both the longer segments and also shorter sub-segments. This dual approach supported the identification of the top scoring routes for further development and ensured that the prioritisation considered the highest scoring sections of network.

- **'On the Ground Alignments'**: the results from the prioritisation were used to identify 'on the ground' alignments for further design development in Stage 4 of the project. The identification of these alignments was closely co-ordinated with OCC to check against the County's exiting pipeline of measures.



SETTLEMENT INDEX

The index included a score for all identified settlements based on: existing/proposed settlement population, train stations, strategic bus routes, key attraction sites, and existing/ proposed key employment sites - summarised in opposite table.

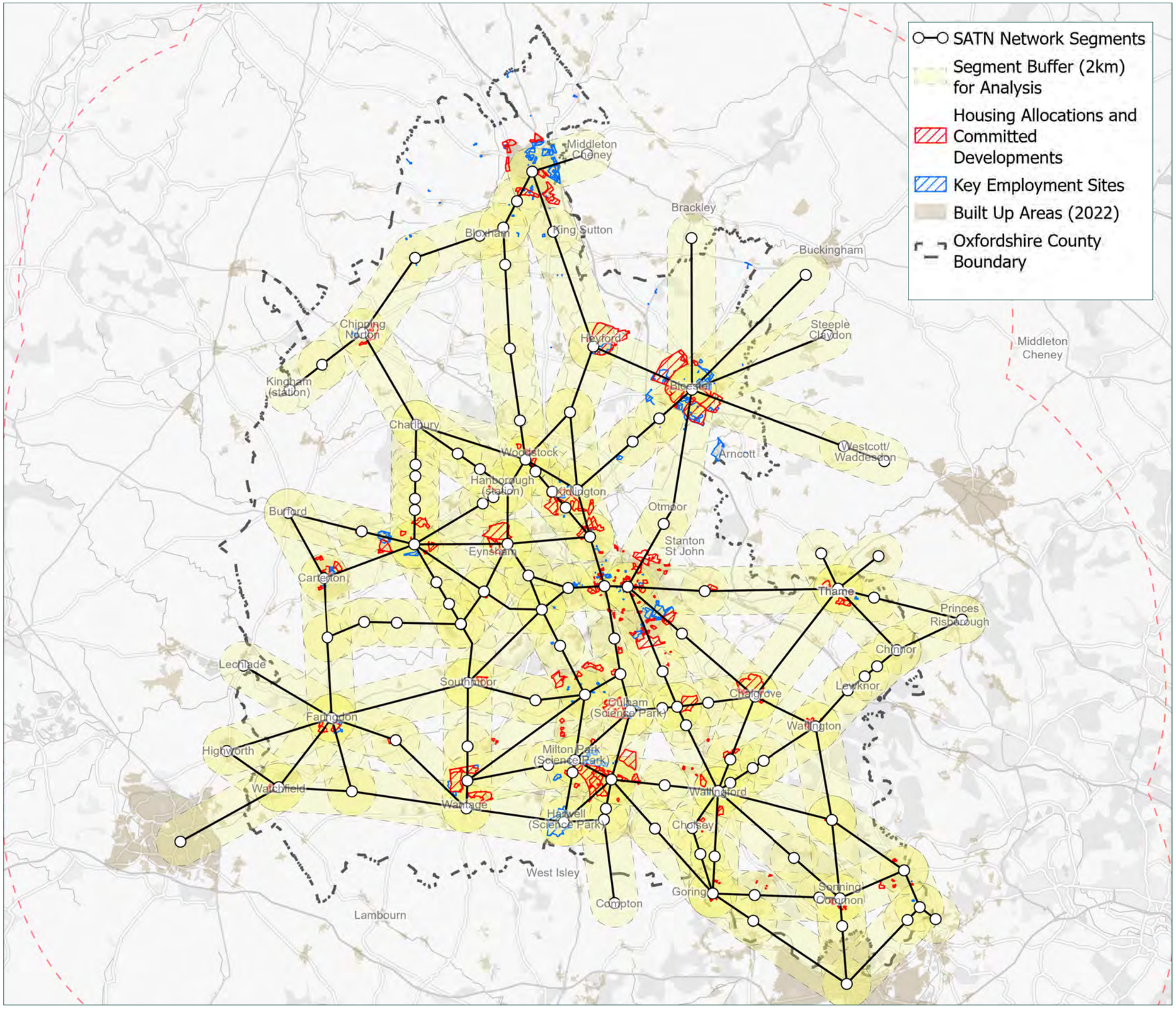
The Index identified standalone sites which fell outside of any already identified settlements. The intention of the Index was to provide a comparable score for each settlements which was then converted into a percentage score/ per km based on the maximum Index score. Settlements are identified based on the built-up area boundaries produced by the Office National Statistics in 2022.

Scoring Metric	Data Source	Scoring Method/Criteria
Existing and Future Residential Population	The existing population numbers were collated from the 2019 mid-year population estimates by built-up areas obtained from ONS, and the number of usual residents (TS001) from Census 2021. The future population numbers were estimated from the 'housing allocations and committed developments' dataset provided by OCC, assuming 2.4 people per new dwelling. The existing population is added with the future population estimates to form a combined total.	Each settlement was scored according to its combined total population based on the following scores + designations: 1. ≤500 2. 500 < x ≤ 1,000 3. 1,000 < x ≤ 2,000 4. 2,000 < x ≤ 5,000 5. 5,000 < x ≤ 10,000 6. 10,000 < x ≤ 20,000 7. 20,000 < x ≤ 75,000 8. 75,000 < x
Workplace Population	ONS 'Census 2011 - Workplace population (WP101EW)'	Same as above
No. of Housing Allocations + Committed Developments	Provided by OCC	Count of sites within 1km buffer of the settlement boundary
No. of Employment Sites or Allocations	Provided by OCC	Count of sites within 1km buffer of settlement boundary
No. of Key Attractors or Trip Generators	Schools, Sport fields, Play Space and Leisure Centres, (from Ordnance Survey Open Data),Hospitals, GP Practices, Clinics, Pharmacies & Dentists (from NHS), Tourist Attractions (from Open Street Map)	Count of sites within settlement boundary
No. of Train Stations	Ordnance Survey Open Data	Each train station within the settlement boundary was scored according to its most recent DfT Station Category: 1. Category F 2. Category E 3. Category D 4. Category C 5. Category b 6. Category A The score for each train school was then added up to each settlement's total.
No. of Strategic Bus Routes	Provided by OCC	Count of bus routes that pass through the built-up area boundary

SEGMENT - CATCHMENT AREAS

The strategic scores were calculated by combining the individual Index scores for all sites/settlements that were within a 2km catchment area of each sub-segment (as shown opposite). These total scores were then converted into per km scores to allow comparison between the scores which varied significantly in length.

The opposite plan illustrates the catchment areas for all segments that formed the basis of the scoring. The plan also illustrates all key settlements/destinations/development sites which were identified in the SATN index and formed the basis of the SATN scoring.



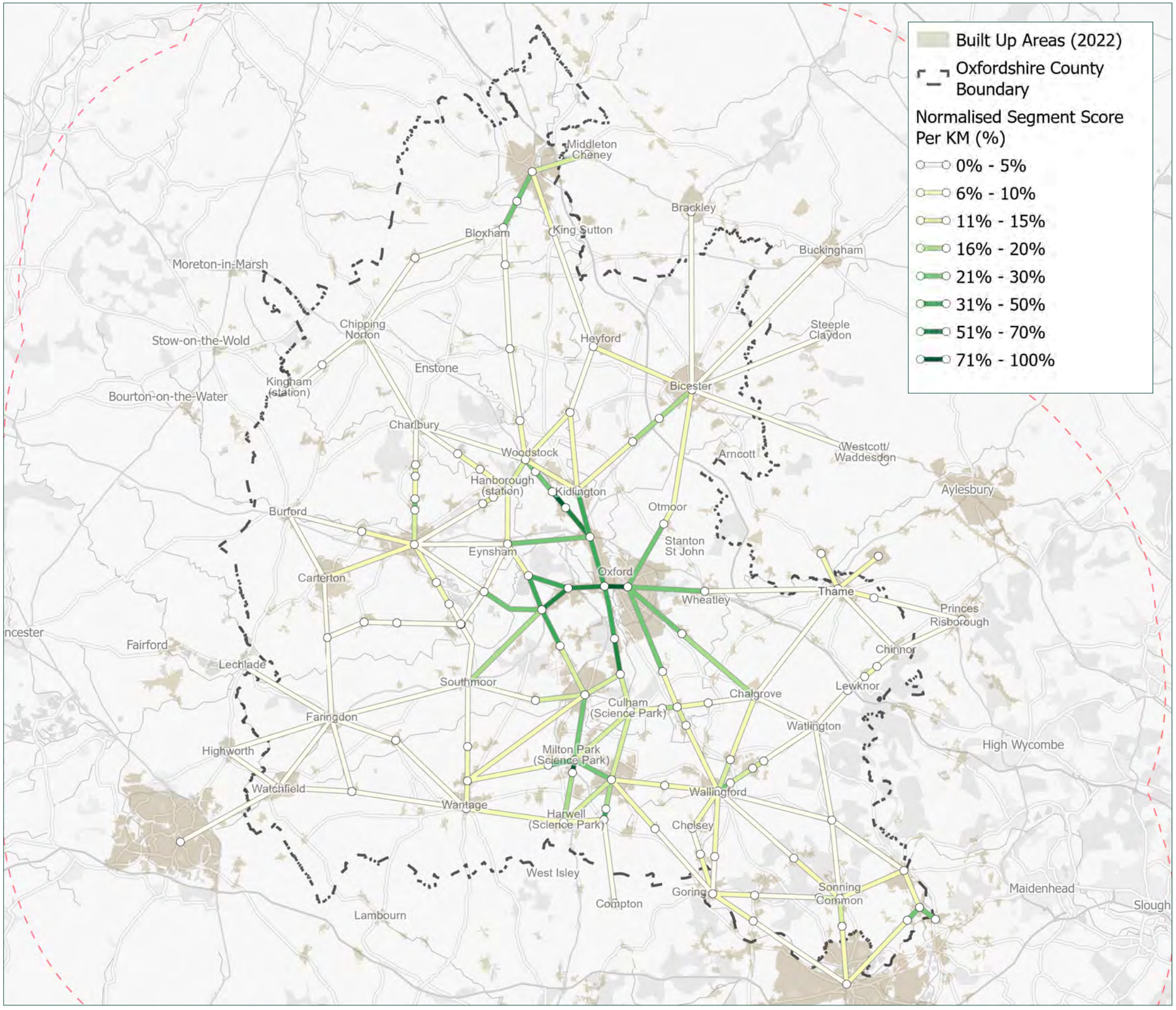
PRIORITISATION OF SUB-SEGMENTS

The combined segment scores were converted into a 'per km' score and then a percentage score to enable comparison between the segment scores.

For the purposes of illustration, the opposite plan only presents the sub-segment scores based on the straight desire line (rather than the full catchment area).

These results provide a more detailed output which clearly identifies shorter sections with the highest strategic score.

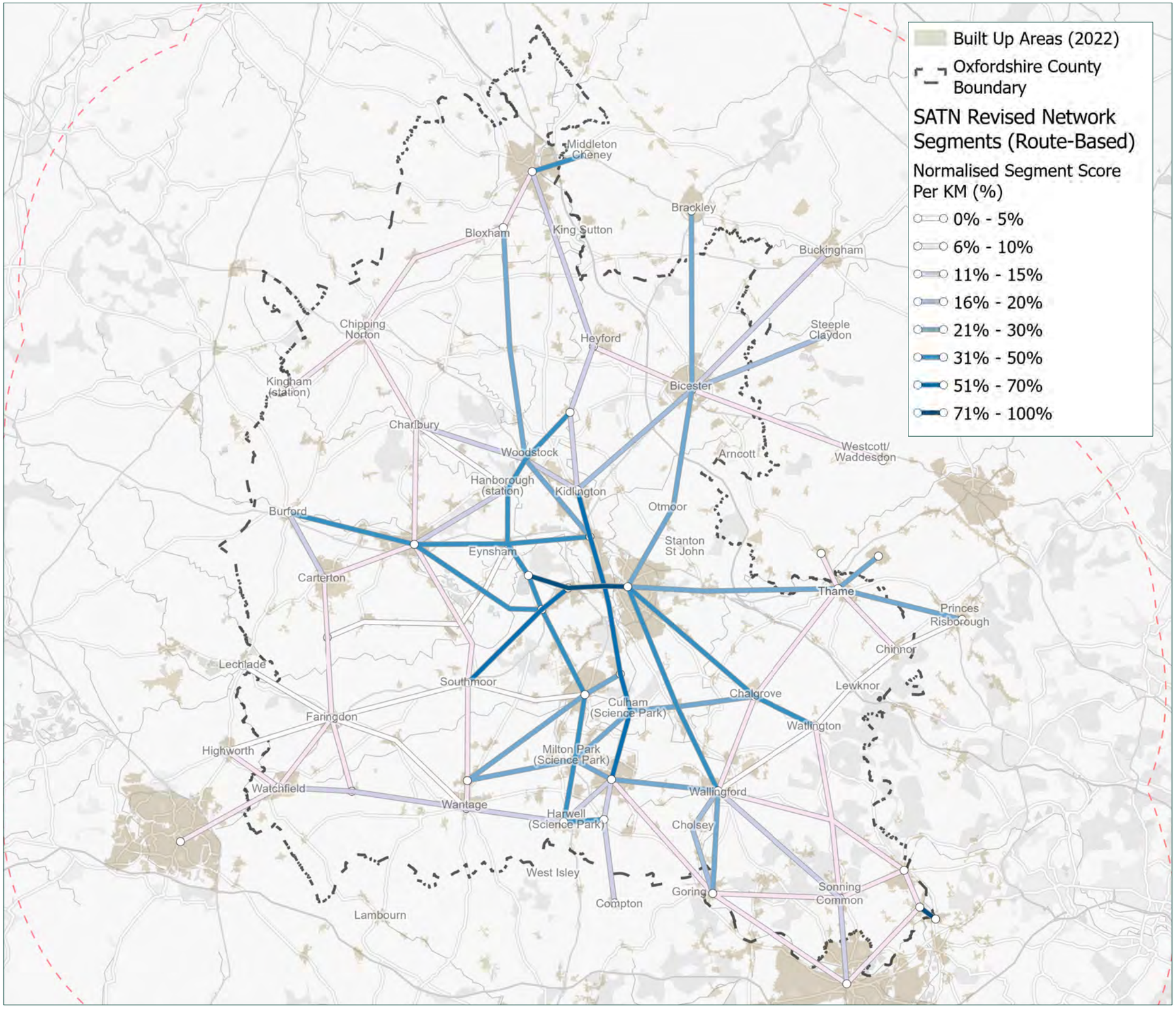
The plan suggests that the segments with the highest scores are concentrated in the centre of the County running north-south between Banbury to Chalgrove/Harwell/Wallingford. The plan also highlights some important east-west routes between Southmoor/Carterton/Witney, via Oxford, to Otmoor/Chalgrove/Wheatley.



PRIORITISATION OF SEGMENTS

Based on discussions with OCC, it was felt that the Sub-Segments results provided a more accurate and useful output for identifying the top priority alignments for SATN's development. However, the results from this stage were concentrated in the centre of the County and therefore did not necessarily provide longer distance strategic routes.

To help develop a network of longer 'strategic' alignments, Prioritisation scores were also generated for the Segments plan (shown opposite). Whilst it was recognised that the segments were generated based on fairly academic origins and destinations - this approach helped to illustrate the average performance of the longer distance segments.



SATN NETWORK: PRIORITISED LINKS

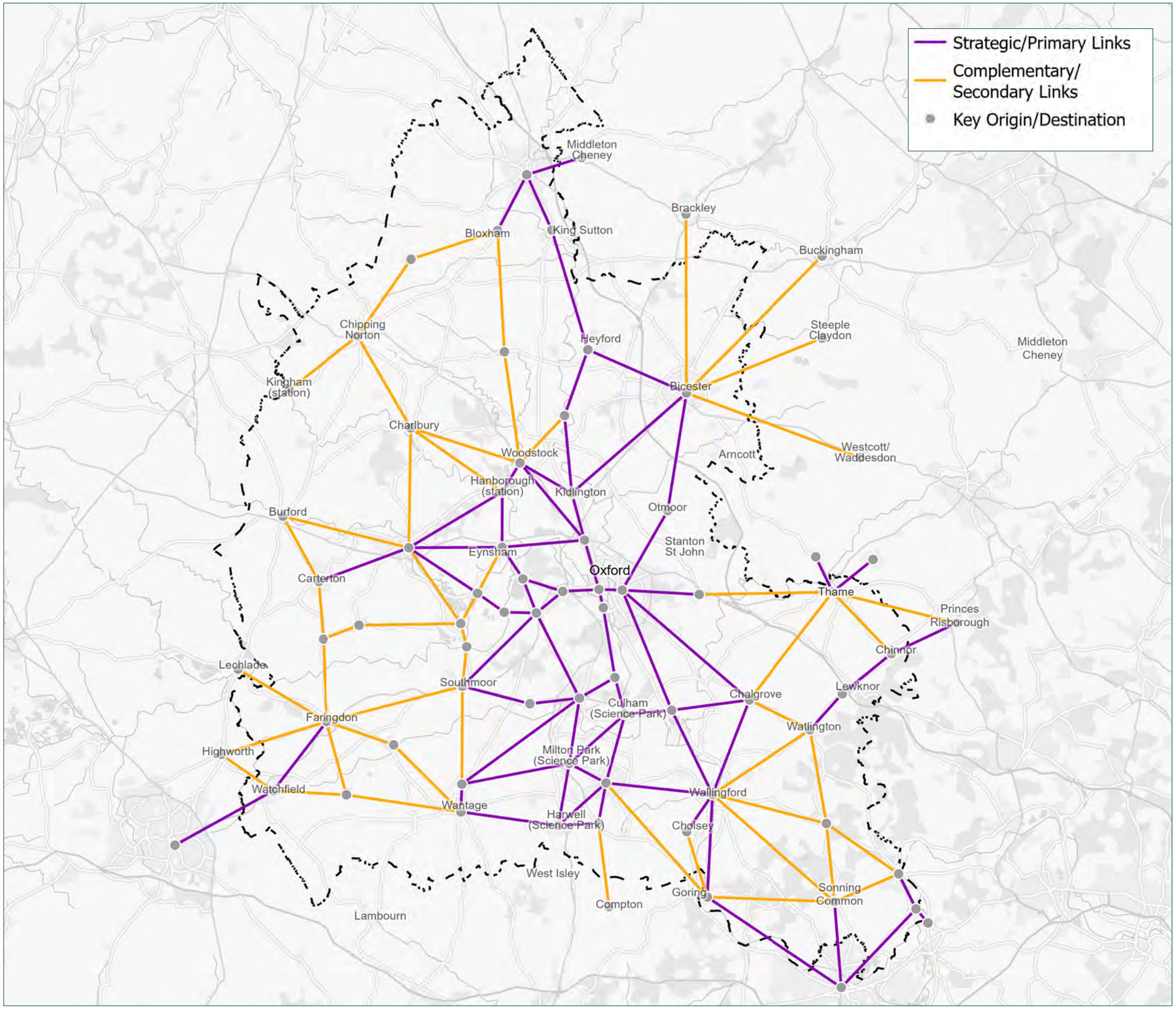
The Prioritisation results were used to identify a series of 'top priority' links. Comparing the performance of shorter and longer segments ensured that the 'top priority' links directly responded to the Prioritisation results and therefore created route extents that had the most 'strategic' potential.

The intention of the results is that all segments which have been identified and scored in the prioritisation process each have 'Strategic' value and therefore merit further investigation. The identification of these routes as 'secondary/ complementary' does not preclude further design development of the routes nor should it constrain the timescales for delivery. The intention is similar to the Prioritisation process in the LCWIP where the aim ultimately is that all identified measures are delivered.

The draft results were used at a design workshop with OCC officers which confirmed Segments for translating into 'on the ground' alignments. The opposite plan translates the results from the workshop into two categories:

- Strategic/Primary links - these segments are a combination of links to be developed further by SATN and also links which OCC are already developing designs/have alignments for. A majority of OCC's pipeline schemes are contained in LCWIPs, Developer Funded Routes or through other work packages e.g. NCN upgrade

- Complementary/Secondary Links - the second category identifies remaining links within the network which are recommended for further development outside of the SATN.

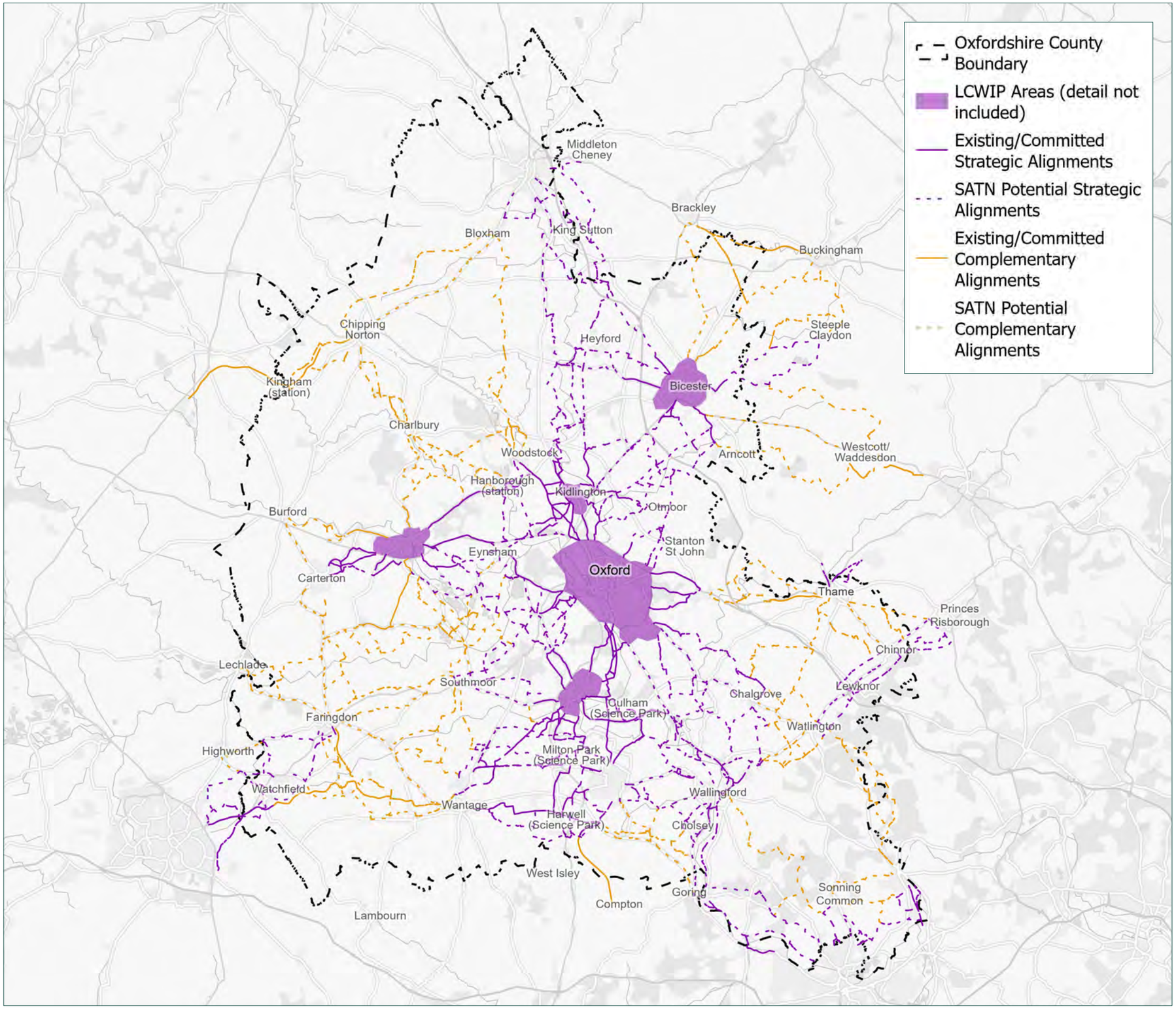


SATN NETWORK: POTENTIAL ALIGNMENTS

Having categorised the Prioritisation results, OCC/PJA hosted a joint workshop to translate the 'straight lines' network into potential 'on the ground' alignments (shown opposite). Local knowledge and previous project experience from OCC and Stakeholders was essential in scoping these alignments. Currently, the proposed alignments are focussed on links between the study area's main settlements. The expectation is that complementary strategies within these settlements i.e. LCWIPs will then connect onwards to the local centres.

The identification of 'on the ground' alignments considered a wide range of design options/ scenarios, and includes the identification of multiple alignments (where applicable). This initial network was taken to public consultation in July-August 2023. The feedback from the consultation was subsequently incorporated into a revised network which is shown opposite. 148 responses were received during this period. Key groups which responded to the consultation, included: Oxford City Council, South Oxfordshire District Council, Vale of White Horse District Council, West Oxfordshire District Council, Buckinghamshire Council, Wiltshire Swindon & Oxfordshire Canal Partnership, Culham Bicycle User Group, Cyclox, British Horse Society, Oxfordshire Cycling Network, Sustrans, and Bike Safe.

It is worth noting at this stage that the initial identified alignments are not definitive, and these alignments will be subject to further feasibility work, design development and engagement by OCC in the future. This will also include detailed co-ordination with complementary workstreams including LCWIPs, Sustrans' 'Paths for Everyone' Strategy, and development with neighbouring counties. This draft network comprises a wide range of route typologies (i.e. on-carriageway, low-traffic, traffic free, PROW etc.) and also route lengths (ranging from 5-20 miles).



6
DESIGN TOOLKIT

DESIGN TOOLKIT

The SATN network provides an extensive range of potential 'on the ground' route alignments for future delivery. It is worth repeating that the initial identified alignments are not definitive, and these alignments will be subject to further design development and engagement by OCC in the future. To provide maximum flexibility in the future development of the SATN network, multiple 'on the ground' alignments have been developed for the majority of the original 'straight desire lines'. The intention is that this approach will provide OCC with more flexibility in the future delivery incase a preferred route alignment transpires as being undeliverable. Routes may be considered 'undeliverable' for a multitude of reasons (e.g. land ownership, costs, design constraints etc) however these reasons will only become clear upon further design work.

This chapter therefore provides a Design Toolkit for the future implementation of the SATN network. It is not intended to be a prescriptive range of examples, and instead should be used to illustrate potential design approaches for the identified route alignments.

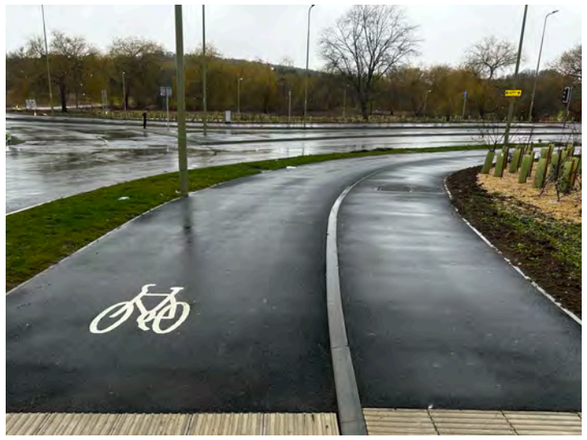
The draft SATN network comprises a range of route typologies including on-carriageway, low-traffic, traffic free, PROW etc. The included examples in the toolkit have been selected to reflect the range of typologies. Where relevant, local examples have been sourced from Oxfordshire and neighbouring authorities. Including local examples was an important point in highlighting that there are existing routes within Oxfordshire and nearby (e.g. the Waddesdon Greenway in Buckinghamshire) which provide high-quality inter-urban active travel infrastructure.

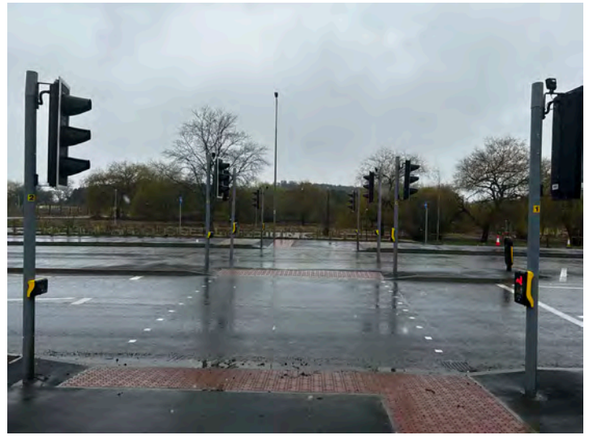
The Toolkit is structured around an assumed interchange of design scales and typologies which will be used in the development of the SATN network: Linear Interventions, Area-Based Interventions, and Spot and Operational Interventions. The expectation is that most routes will require a combination of designs from the different scales e.g. a route may use a 'linear' treatment for a majority of its length however then require bespoke treatments within small settlements along the route. As well as selecting more typical 'active travel' infrastructure, the toolkit also includes good practice examples of street design improvements, such as village centre improvement schemes. Designing site specific and sensitive designs will be critical in these locations in respecting the bucolic setting of the SATN network.

LINEAR

AREA-BASED

SPOT + OPERATIONAL



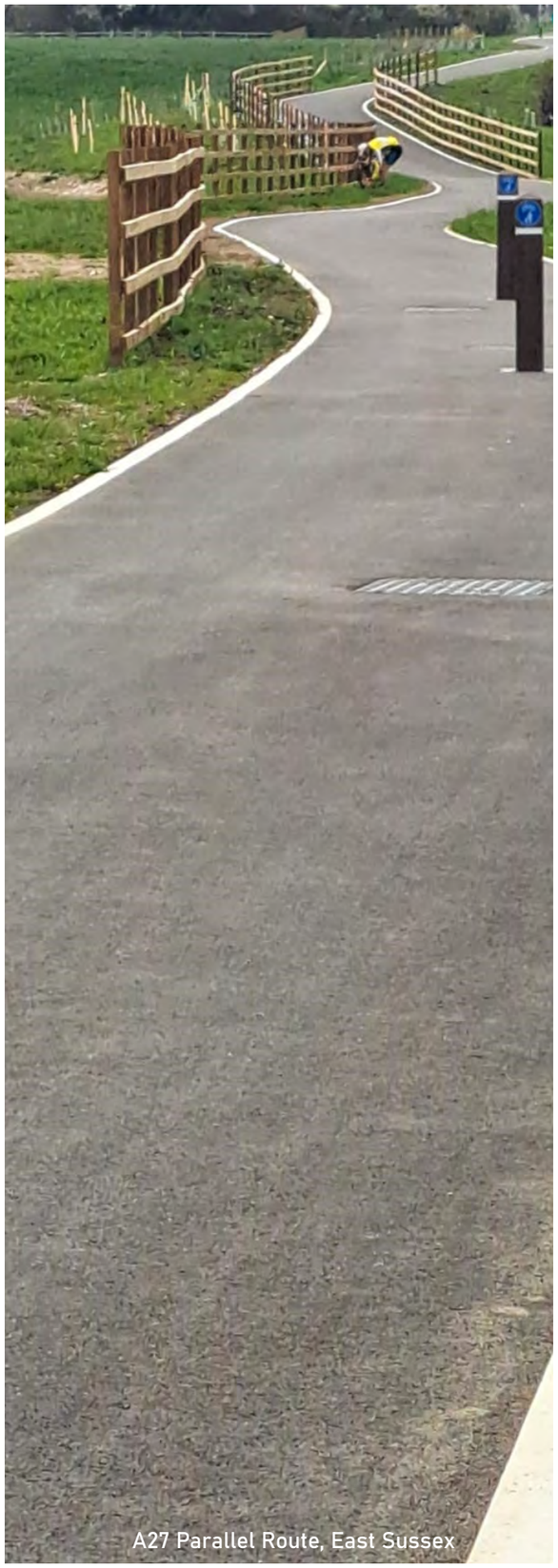


LINEAR INTERVENTIONS

Linear measures will represent a majority of the SATN network in terms of design mileage. The toolkit provides a range of design options for these locations, including;

- On- carriageway,
  - Protected Uni/Bi-Directional Facilities
  - Speed Limit Reduction
  - Cycle Streets
- Off-carriageway,
  - 'Greenways'
  - Shared use paths,
  - Canal Towpaths,
  - Disused Railways,
  - Farm Tracks
  - PRoW
  - Behind the hedge/fence schemes

The application of linear treatments will be influenced by multiple factors however the location of the alignments will likely be the key determinant of the type of infrastructure that is introduced. The examples opposite illustrate a range of predominantly off-carriageway treatments - these have been included on the assumption that traffic volumes/speeds will either be sufficiently high to require separate cycle facilities, or will be located away from a road alignment altogether.

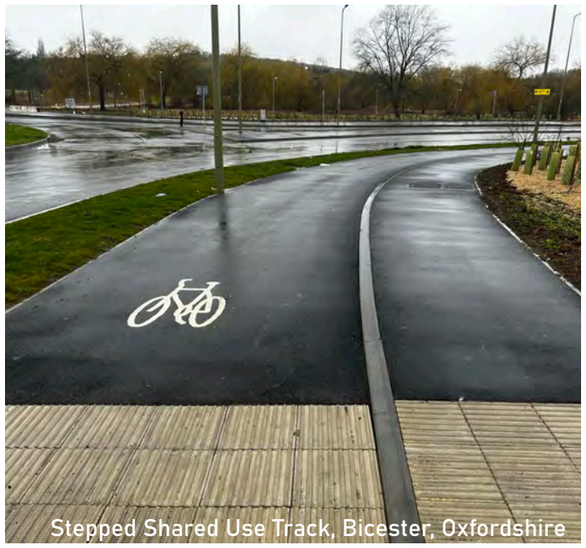


A27 Parallel Route, East Sussex

Egrets Way, East Sussex

Green Circle Bridleway, East Sussex

A21 Parallel Cycle Route, Kent

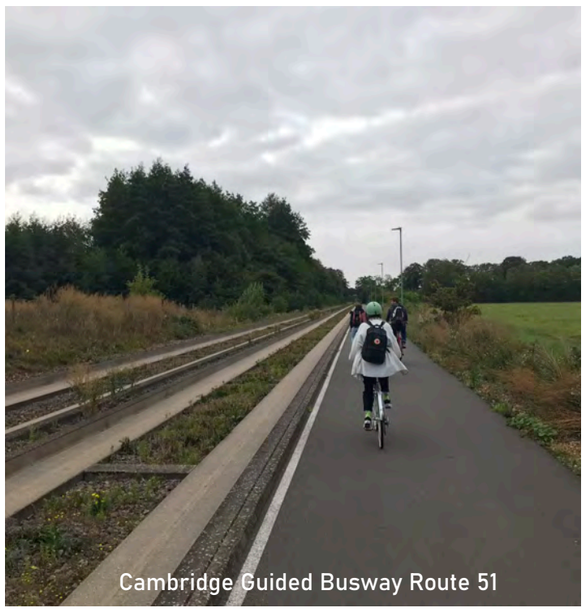


Stepped Shared Use Track, Bicester, Oxfordshire

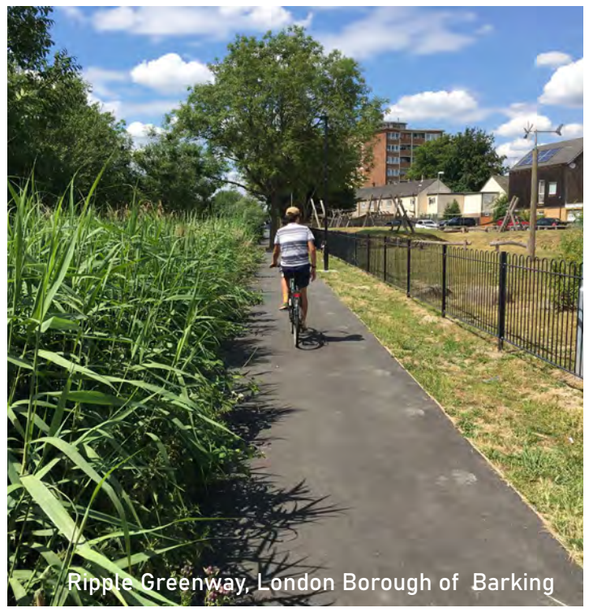
The Phoenix Trail, Thame, Oxfordshire

Waddesdon Greenway, Buckinghamshire

NCN 5, link between the Oxford Canal and the A44, Oxfordshire



Cambridge Guided Busway Route 51



Ripple Greenway, London Borough of Barking

AREA BASED INTERVENTIONS

Whilst much of the SATN network is concentrated on providing linear routes for walking, wheeled and cycled trips, there are many locations in Oxfordshire which would benefit from more holistic street design changes to reduce the impact of vehicular traffic. There are also more discreet elements of street design and placemaking that could be incorporated on the minor roads within the network that would help calm traffic and generally make conditions more comfortable for on street cycling.

Reducing the scope for conflict between cyclists and vehicular traffic is a critical consideration in the development of a comfortable network, particularly on narrow rural lanes where there is limited design scope for providing protected facilities. The 'Quiet Lane' approach is based upon the assumption of low volumes of vehicular traffic and can be further reinforced with modal filters to remove through traffic. This approach also has synergies with the Low Traffic Neighbourhood (LTN) approach which has been implemented in Oxford in recent years.

These measures therefore are generally more targeted measures for smaller locations – predominantly smaller settlements within the county. These include:

- Area-wide speed limit reductions, such as 'Quiet Lanes'
- Traffic calming
- Local centre streetscape improvements

Faversham High Street, Kent

Bucklebury Greenway, West Berkshire

West Meon, Hampshire

20mph Town-Wide Limit, Goring, Oxfordshire

Centre Line Removal, West Meon, Hampshire

Narrowed Carriageway, Pattingham

Traffic Calming, West Meon, Hampshire

Rural Modal Filter, Baldon, Oxfordshire

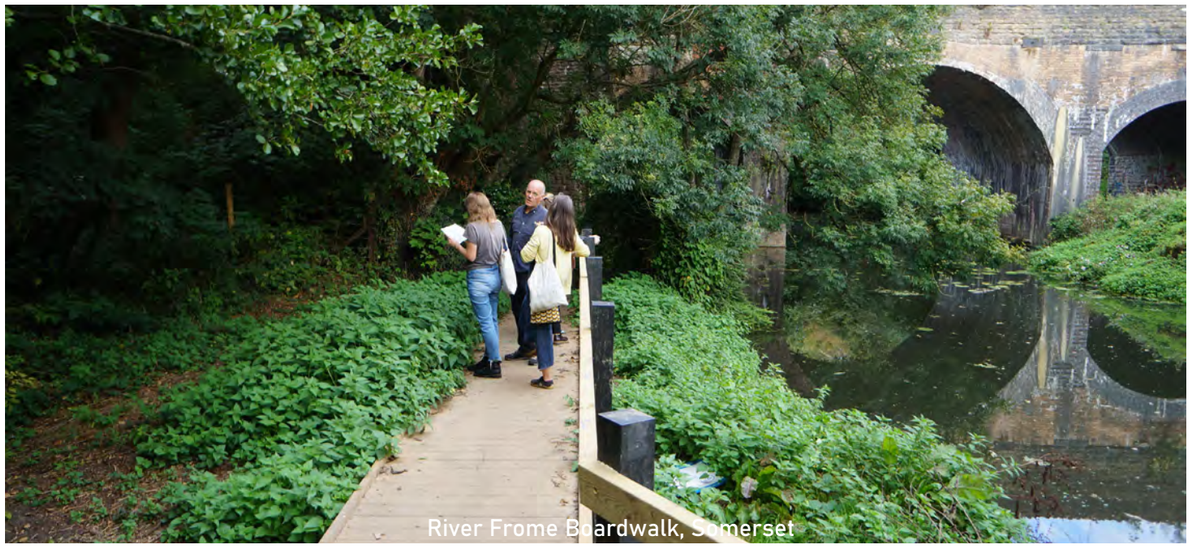
Narrowed junction, Buriton, Hampshire

SPOT + OPERATIONAL INTERVENTIONS

‘Spot and Operational’ measures are focussed on more acute interventions that will be required to support design development. The examples include a combination of essential considerations, such as crossing/junction facilities, down to complementary measures, such as secure cycle parking and wayfinding.

We have also included operational considerations including drainage, fencing, access controls, bollards, embankments, and structural reinforcement.

Canal Cycle Parking, London Borough of Islington



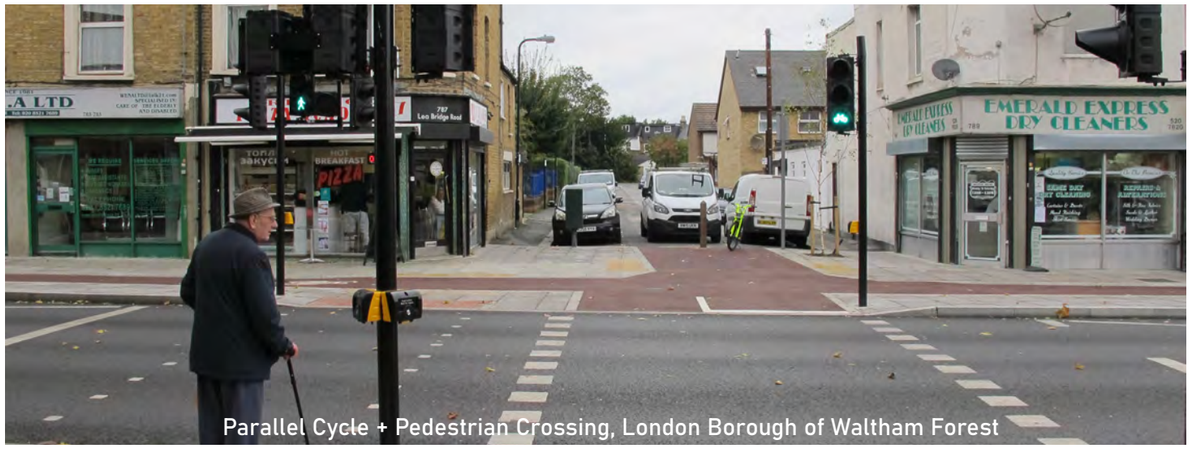
River Frome Boardwalk, Somerset

Village SIgnage, Thorpeness, Suffolk

Tightened Junction Radii, Buriton, Hampshire

Straight-Ahead Toucan Crossing, Bicester, Oxfordshire

Felixstowe Railway Cycle Crossing, Kent



Parallel Cycle + Pedestrian Crossing, London Borough of Waltham Forest

Salford Greenway Artwork, Manchester

Implied Crossing, Bungay, Suffolk

RHS Bridgewater Signage

7
NEXT STEPS

NEXT STEPS

This chapter outlines the recommended next steps for the project and how this aligns with the work completed already for SATN. The opposite flow chart has been developed to illustrate the scope of the works completed in SATN through this project, and how this relates to the recommended progress of the network.

In addition to developing design recommendations for SATN, there are some additional recommendations which would support SATN's development:

1. Develop a **single online resource/plan** which plots all proposed cycle routes inc. LCWIPs and SATN, as well as existing facilities such as NCN. The network should be developed in a GIS compatible format.

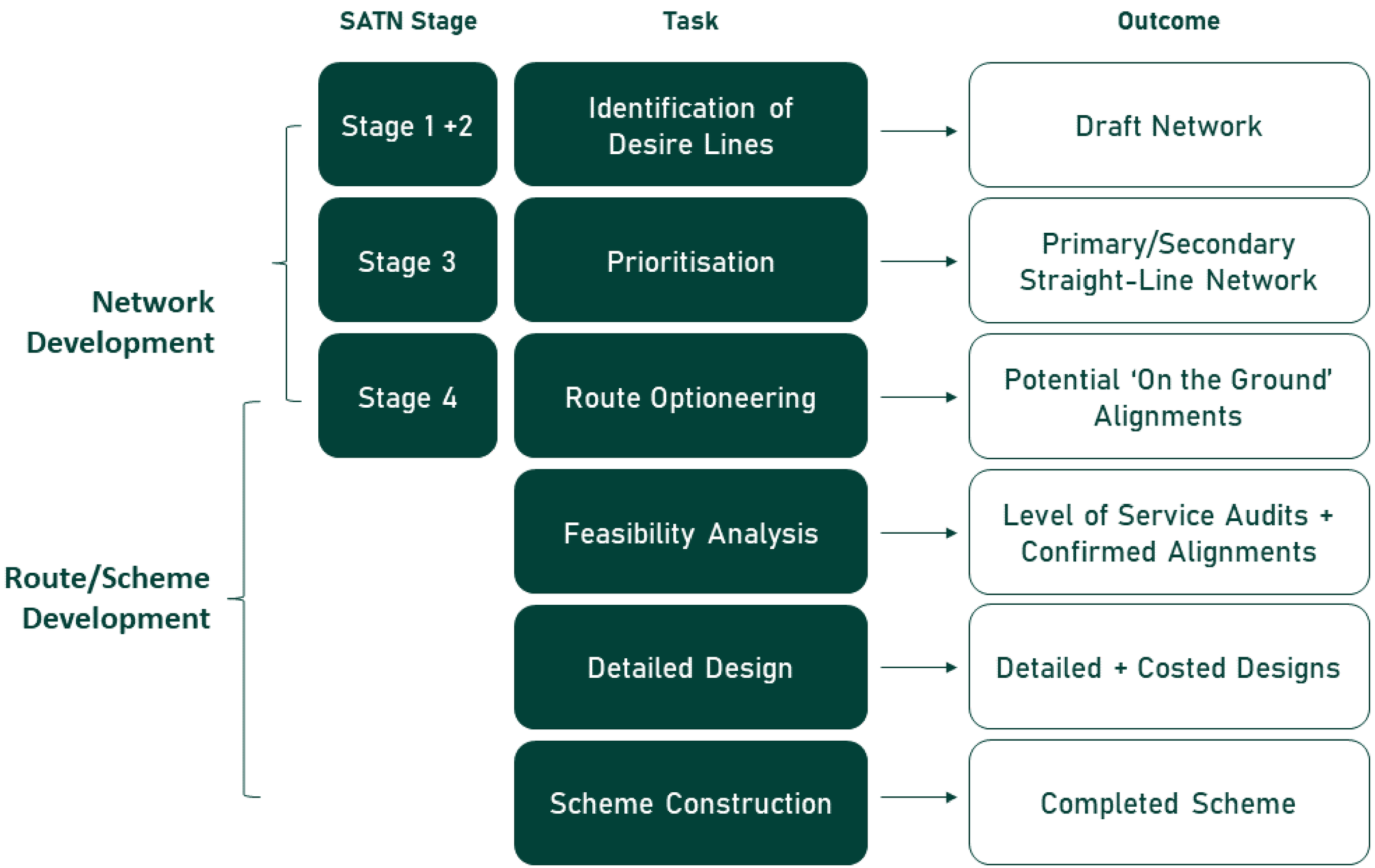
2. Detailed **'level of service' auditing** of the Strategic/Priority routes recommended from SATN to inform design development. Recommendation that site audits align with LTN 1/20 auditing tools however also been mindful of LCWIP's RST and WRAT tools - particularly where LCWIP and SATN routes converge. It's also recommended that OCC consider creation of a freely available online toolkit which could be used by officers and stakeholders to support the future side auditing of SATN route alignments.

3. **Further Design Development and Engagement** - this would expand on the above site auditing stage and confirm preferred alignments and develop detailed design proposals and include stakeholder and landowner engagement, as well as more detailed site surveys.

4. **Wider County Engagement**: SATN draft network identifies several cross-county alignments which will need careful co-ordination to ensure their successful delivery. The SATN project included feedback from some neighbouring County Authorities, however this exercise should be expanded to a more structured and consistent approach.

5. **OCC to consider adopting SATN as an LCWIP** to ensure it has the same material impact on future planning decisions as the County's other LCWIPs.

6. Create a '**SATN Oversight Group**' to maintain the momentum of the project and support the management of the above recommendations/actions. The group could include a combination of County and District officers with 'active travel', highways, transport planning and development planning responsibilities, as well as key stakeholder representatives.


SATN Stage
Task
Outcome
Network Development
Route/Scheme Development
Stage 1 +2
Identification of Desire Lines
Draft Network
Stage 3
Prioritisation
Primary/Secondary Straight-Line Network
Stage 4
Route Optioneering
Potential 'On the Ground' Alignments
Feasibility Analysis
Level of Service Audits + Confirmed Alignments
Detailed Design
Detailed + Costed Designs
Scheme Construction
Completed Scheme

PJA

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