Foreword by Cllr Yvonne Constance

Oxfordshire County Council is tackling the challenges of Climate Change, housing growth, air pollution and the growing public health crisis of physical inactivity by a range of innovative transport measures. Encouraging and increasing walking and cycling is core to our approach to transport solutions and will feature highly in our new Local Transport and Connectivity Plan.

This will build on the Oxford Transport Strategy within our current Local Transport Plan which has the ambition that Oxford will become a world class cycling city with an outstanding public realm for walking. The Council is embarking on a range of innovative measures to achieve this transformational change in travel behaviour. In particular, we are consulting on ”Connecting Oxford” which proposes to introduce traffic control points in the city centre and a work place levy charge for businesses in the south east arc.

As part of this process, we recognise the importance of the Local Cycling and Walking Infrastructure Plan (LCWIP). Oxford is already famous for its high levels of cycling and has one of the highest levels of walking in the UK, but we know we can and need to do more. The importance of Oxford LCWIP is that it:

- Sets out the evidence of how we can achieve a very challenging but realistic 50% increase in cycling in the City
- Lays out a comprehensive cycle network to focus expenditure for best value
- Identifies a list of infrastructure improvements for both walking and cycling based on best practice and our Cycle and Walking Design Guides
- Summarises the evidence for supportive measures, such as Low Traffic Neighbourhoods and controlled parking zones
- And provides cost estimates for these schemes we can use in future bids and in planning decisions

We have worked with many stakeholders in preparing this document. Cyclox and OxPA, representing Oxford cyclists and pedestrians, have willingly given their time to undertake audits and review the LCWIP. We will continue to work together with Oxford City Council, the University, other stakeholders and internally with public health, planning and transport officers to implement the LCWIP. We do not underestimate the challenges, but ultimately the benefits will be felt by all the citizens of Oxford in better health, cleaner air and better journeys.

Cllr Yvonne Constance
Cabinet Member for Environment (including Transport)

Oxford LCWIP v192001

Table of Contents

List of additional LCWIP documents

Document	Name
1	Cycle Network map
2	Quiet Cycle Network map
3	2019 Cycle Flow map
4	2031 Cycle Flow map
5	2019 OXCRAM rating Quick Cyclists
6	2019 OXCRAM rating Quiet Cyclists
7	2031 OXCRAM Quick Cyclists
8	2031 OXCRAM Quick Cyclists
9	Oxford LCWIP costings and prioritisation
10	**Cycle Route Schemes** OCR 1-24, 26 OCR B Inner Ring OCR C Ring Road

Route OCR 25 has not been included because there is a scheme programmed for implementation.

Executive Summary

Oxford Local Cycling and Walking Infrastructure Plan (LCWIP) sets out a series of measures and programmes to achieve a transformational change in the levels of cycling and the attractiveness of walking in Oxford. Walking and cycling have many benefits for society and the individual, which include health, decongestion, safety, air quality and climate change mitigation. The LCWIP supports existing Oxfordshire County Council policies for Oxford to become "a world class cycling city" with an "outstanding public realm for walking and cycling", as well as supporting climate change targets. Additionally, the LCWIP policies and programmes support housing and jobs growth in Oxfordshire.

The **cycling** section identifies 2 targets to increase both commuter cycling and all cycling trips in Oxford by 50% by 2031. This equates to an increase in commuter cycling from 25% to 38% of all commuter trips and from 300,000 to 450,000 all cycle trips a week in Oxford. To achieve these targets, there need to be 25,000 new cyclists, including 9000 everyday cyclists and 8000 weekly cyclists in Oxford by 2031. There will be a need to concentrate on promoting utility cycling trips, as well as widening the journey purpose for cycling beyond commuter journeys.

Modal share analysis of commuter trips for the 3 main employment areas – the City Centre, Headington and Cowley, as well as other smaller employment areas in Oxford – shows how there are around 20,000 existing commuter car trips which could realistically be made by cycle. However, there are geographic challenges to achieving this modal change. Many cyclists will need to come from the outskirts of Oxford and nearby villages. Many of these are relatively far for cycling and some of them involve steep hills. For other trips, the bus is currently a viable alternative to cycling. There are also additional socio-economic and cultural barriers in that some of the outlying wards have high levels of deprivation and lower levels of cycling.

The next section focuses on the outcome of meeting the cycling targets. Increasing cycling trips could facilitate an increase of 2000 people (from 19,000 to 21,000) entering the city centre over the 2 peak hours, when there is most demand on road space. City Centre counts have recorded a 25% increase in cycling over the last 10 years during the 2 morning peak hours. This represents a solid base to increase cycling but also indicates that further measures will be needed to meet the targets of a 50% increase in cycling over the next 10 years.

Research is inconclusive on how to increase cycling levels. However, there are 5 broad factors which may be important in promoting cycling – a town-wide cycle network, a cycle friendly public realm, traffic restraint, a cultural norm of cycling and Council commitment. On this basis, the LCWIP sets out 8 pillars fundamental to achieving a step change in cycling and walking in Oxford in terms of infrastructure. The 5 most relevant to cycling are; Pillar 1) a comprehensive cycle network, P2) low traffic neighbourhoods P3) city centre control points P4) workplace levy charge and P5) traffic speed enforcement.

Pillar 1 - Oxford Cycle Network was developed in close consultation with many stakeholder groups. In addition, an internet survey "the Oxfordshire Cycle Survey 2019" (OCS19) was conducted to understand the problems and priorities of all cyclists. With 2559 responses from Oxford, OCS19 identified 2 cycling cohorts – cyclists who opted for direct routes and those opting for slower routes away from traffic. On this evidence, a dual network of 'Quick' and 'Quiet' routes was considered the best way forward. Cyclist responses in the OCS19 were also used to create the Oxfordshire Cycle Route Assessment Matrix (OxCRAM) as a way of evaluating the existing cycle network and improvement proposals.

The benefits of the other LCWIP pillars are also examined. The example of Waltham Forest shows how low traffic neighbourhoods (P2) encourage both walking and cycling journeys.

Evidence from Groningen in the Netherland shows how city centre control points (P3) were crucial in promoting cycling. The Workplace Levy Charge (P4) will act as an incentive for drivers to change behaviour and help fund new cycling improvements. A DfT review of cycle safety found that speed reduction (P5) was the single most important factor in promoting cycle safety.

The next section sets out the design details of the Oxford Cycle Network along with supporting measures to improve the ease and attractiveness of cycling. These include achieving added value in maintenance schemes, removing barriers on cycle paths, converting one-way streets to 2-way for cyclists, assessing crossings of the ring road, providing cycle parking at both origins (home) and destinations, signing the network and how to design 'cycle streets'.

The next section looks at cyclist safety, calculating the reported casualty rate for each of the Oxford cycle routes. It compares the overall casualty rate with data from 2005 survey of Oxford cyclists which shows that around 90% of cyclist casualties are unreported. The final cycling section summarises the key design standards applied when assessing and improving the Oxford Cycle Network.

The next section focuses on data relevant to **walking** trips in Oxford. Oxford is in the top 10 local authorities in terms of the percentage of people walking at least weekly. This is mainly because of its high levels of utility walking with 35% of adults making a walk trip at least 5 times a week. New 2019 data commissioned for the LCWIP shows that over the day, there are nearly 24,000 walk trips (15% of all trips) into/out of Oxford city centre. Walking into the city centre, like cycling, has very distinct morning peaks. Inside the city centre, most walking trips (80%) involve trips to the city centre by bus, car and cycle. There are around 30,000 walk trips a day in both Cornmarket and Queen Street. Work, shopping and education are the main journey purposes.

Pedestrian audits were undertaken in co-operation with OxPA (Oxford Pedestrian Association) of the city centre and the 4 main district shopping centres. These audits identified a list of city centre public realm improvements (LCWIP Pillar 6). Improvement proposals were also identified for the 4 local shopping centres – Cowley Centre, Headington, Cowley Road and Summertown. The next section sets out walking design policies, including (LCWIP Pillar 7) design policies for the extension of controlled parking zones (CPZs) to ensure that they enhance walking by removing obstructive parking from footways. It also promotes 'Quality Pedestrian Corridors' along the main roads, improved road crossings and measures to improve pedestrian priority across side roads.

The final section sets out a summary of the proposed walking and cycling schemes and their costings. The OXCRAM assessment of the cycle network shows that many routes are currently of poor cyclability. The LCWIP schemes will potentially raise around half of all routes to an acceptable level of cyclability. The potential cycle flow increase from 22,000 to 40,000 cyclists on the network has been calculated on the basis of these improvements and the LCWIP pillars. The OCS19 data has been used to show which routes have the highest number of comments. Route improvements have been prioritised in terms of their impact on:

- Providing viable cycling and walking routes for new housing
- their contribution to increasing cycling targets OC1 and OC2
- the scale of OxCRAM improvement for existing cyclists
- Meeting cyclists' priorities as shown by the OCS19 comments
- Casualty reduction impact

The attached Excel values the schemes. The total cost of LCWIP schemes as submitted is just under £300 million.

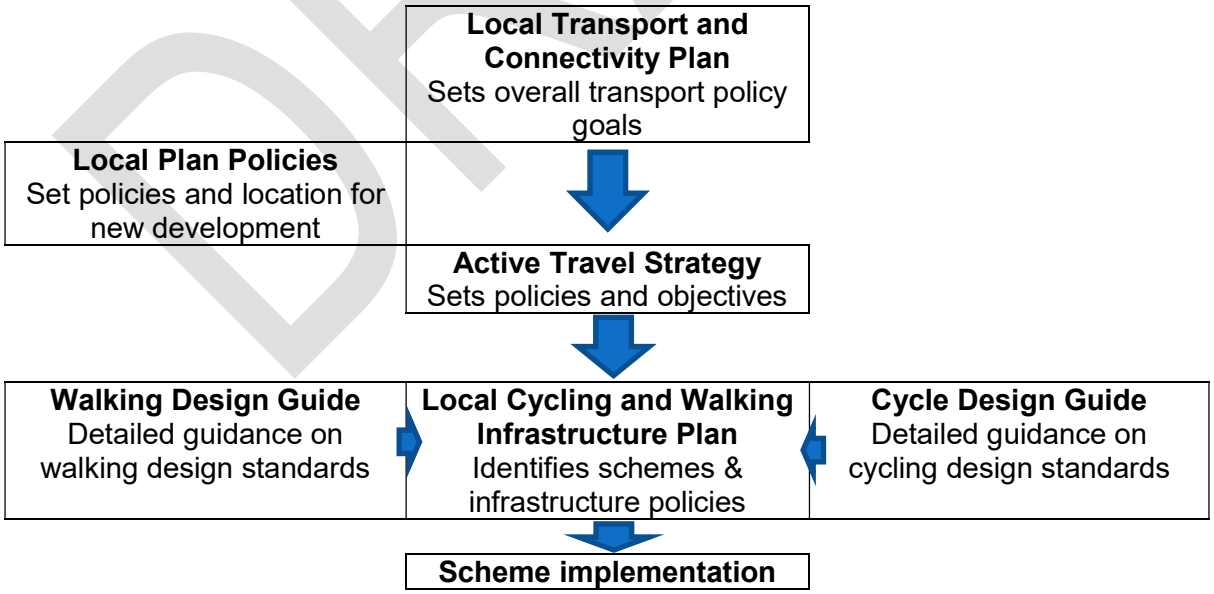
1 Introduction

Oxford Local Cycling and Walking Infrastructure Plan (LCWIP) sets out a series of measures and programmes to achieve a transformational change in levels of cycling and the attractiveness of walking in Oxford. Walking is already normal behaviour in Oxford for many journey purposes, used not only in conjunction with other modes such as bus, car and bicycle especially in the city centre, but also for the whole journey from home to many everyday destinations. In fact, Oxford could be famous for its walking levels. Oxford is among the top 10 local authorities with the highest levels of walking once a week in England, along with Cambridge, Exeter and several central London authorities. For cycling the situation is more ambivalent. Oxford is already internationally famous for its high levels of cycling – the 2nd highest authority in UK after Cambridge, but cycling conditions, provision and routes are often very poor. The evidence from other European cities shows that cycling levels could still be substantially higher. The LCWIP builds on Oxford's current high levels of cycling and even higher levels of walking to create an environment where cycling and walking will become the norm for travel within Oxford.

2 Purpose and Layout

The Oxford LCWIP is a public document which sets out Oxfordshire County Council policy and practice related to cycling and walking infrastructure in Oxford. The LCWIP supports both the existing Local Transport Plan 4 "Active Travel Strategy" policies and the emerging Local Transport and Connectivity Plan and Oxford Local Plan. It also builds on previous reports, in particular the Gilligan Report[i] on cycling in Oxford and the Phil Jones report on Oxford public realm[ii]. It sets out the infrastructure measures that are needed to achieve a modal change to walking and cycling in support of the policies in those documents.

The LCWIP sets out practical measures, such as a cycle network and route improvements, but also includes wider measures, such as low traffic neighbourhoods, which are essential to achieving that modal change. Additionally, it includes policies where further work is needed, such as reviewing the current walking and cycling design guides, which will be needed if the Council is to achieve an increase in cycling and walking in a timely and cost-effective way. The chart below shows where the LCWIP sits in terms of policy and practice.



The LCWIP will set out a programme of measures to improve cycling and walking in support of LTP and LP policies. The LCWIP will be embedded within the transport and planning policies and be used as a material consideration in planning applications for new developments.

2.1.1 Layout

The document first sets out the current policy background. The next section focuses on cycling. The issues facing cyclists and cycling are more pressing and the additional transport and health benefits potentially higher, because there is a greater potential for modal change from the car to cycle. The third section focuses on walking, in particular access to and within the city centre and 4 local shopping centres. Walking is a short distance mode so the priority is improving local routes to the main destinations. The final section pulls together a summary of schemes and costs and calculates a route prioritisation system.

3 Benefits

The benefits of walking and cycling are solidly backed up by a wealth of research, policy and practice. They *give* real life benefits and *prevent* real life costs for the individual, the community and nationally. Many of the benefits have immediate or longer term monetary savings. Others are more difficult to measure, but still just as real e.g. quality of life benefits. In summary they are:

- Urban decongestion benefits – as very space efficient modes, they permit highly efficient urban movement within a city.
- Journey time benefits – typically cycling journeys in urban areas, particularly during the day, are quicker than going by car or bus
- Health benefits – regular walking and cycling keep you fit and healthy, helping prevent a wide range of causes of death, disability and ill health
- Air quality and Climate Change benefits – they emit no air pollutants nor climate change gases. Their use can have a big impact, particularly when they replace car use and car ownership
- safety benefits – walking and cycling are the safest of all modes in terms of road injuries to other road users. They also have relatively low injury rates compared to many other healthy activities
- Urban realm benefits – walking and cycling are very quiet and together they fit easily in with a pleasant environment in town centres and residential neighbourhoods.

The TfL has set out a succinct summary of the benefits – see http://content.tfl.gov.uk/walking-cycling-economic-benefits-summary-pack.pdf.

4 Policy Background

The LCWIP supports existing OCC (Oxfordshire County Council) policies. The measures within the LCWIP set out an ambitious programme of actions to transform these policies into reality.

- The Active and Healthy Strategy 2015-2031 (Volume 4 of LTP Connecting Oxfordshire) sets out the Council's ambitions for active travel in Oxford – "the ambition is for a fully joined-up and coherent and safe network of higher quality routes throughout the city that are continuous and direct, enabling cyclists to travel more quickly across the city"
- The Oxford Transport Strategy (Volume 8 of LTP) has the objective that "by 2035 Oxford will be a world-class cycling city that will be accessible to everyone, regardless of age, background or cycling experience" and that "by 2035 walking in the city will be a pleasant, comfortable experience, with an outstanding public realm in the city centre and district centres".
- Oxfordshire 2050 sets out the ambition that "by 2031 Oxford will be a world-class cycling city that will be accessible to everyone, regardless of age, background or cycling experience".
- OCC full Council motion of 6th November 2018 "shares the Government's Cycling and Walking Investment Strategy ambition to double cycling by 2025" and enjoins the

Cabinet Member for Environment to "apply LCWIPs to agree a prioritised and costed Strategic Active Travel Network"

- OCC motion of 2nd April 2019 "acknowledges a Climate Emergency and call for action". This supports the UK parliament declaration of a climate emergency on 1st May 2019.

5 Climate Change Emergency

The United Nations says we could have just 11 years left to limit a climate change catastrophe. The UK Government has a legally binding target to deliver the net zero target by 2050. Currently transport is the second largest contributor to carbon emissions, making up around 20% of all emissions[iii]. Carbon emissions from all transport need to fall to zero to meet 2050 Government carbon targets. The Science and Technology Committee has highlighted that even replacing the current car fleet with electric cars will be insufficient to meet 2050 zero carbon target, and concludes that "in the long-term, widespread personal vehicle ownership does not appear to be compatible with significant decarbonisation" and recommends encouraging and supporting increased levels of walking and cycling[iv].

.

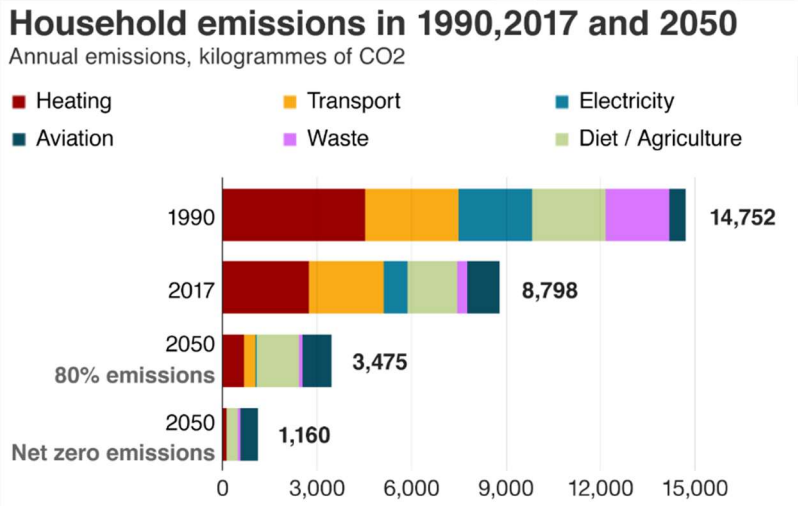


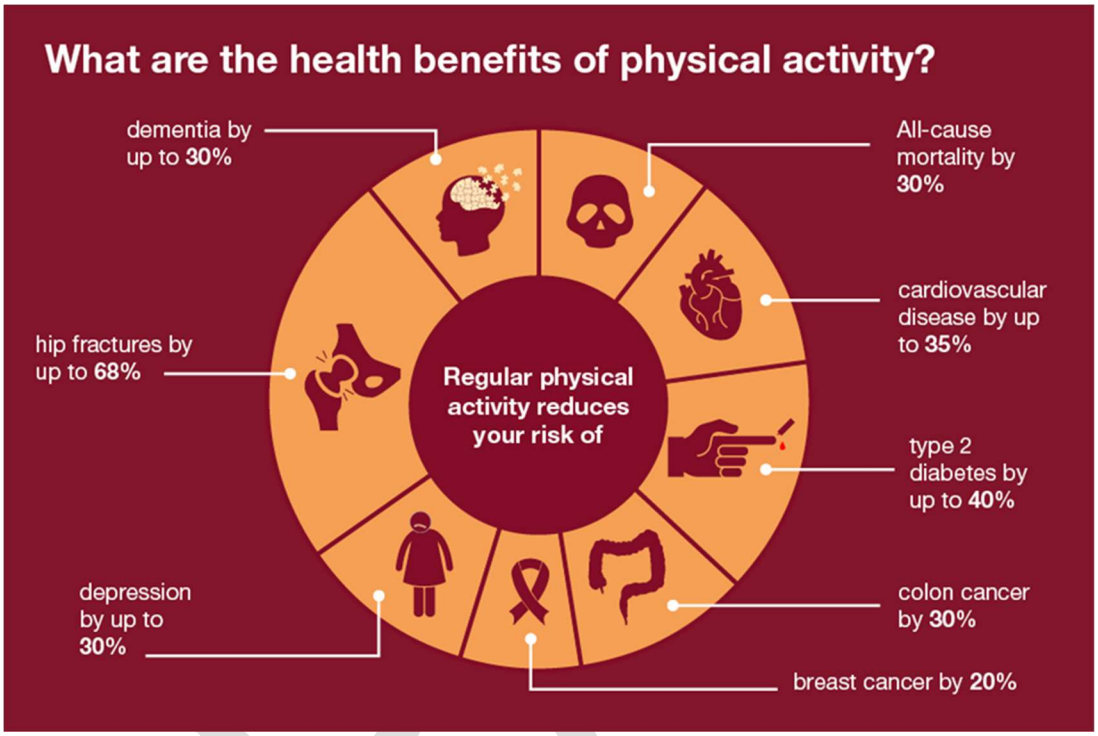
Figure 1: Data source: Climate Change Committee/BEIS 2019

Currently carbon emissions in UK are around 7 tonnes per person per year. To achieve 2050 carbon targets, emissions must fall to 2 tonnes per person per year. The bicycle in combination with walking for short journeys and public transport (bus or train) for longer journeys provides a realistic way of achieving this goal. A study by ECF[v] found that a normal bike has emissions of 21 g/CO2e (=grammes of CO2 equivalent per kilometre travelled) and e-bikes just fractionally more at 22 g/CO2e, whereas for cars it was 271 g/km per person. One of the biggest impacts that an individual can therefore have in reducing carbon is to cut back on car journeys. Not owning a car and living 'car free' could have an even greater impact because it additionally saves on the carbon impact of building the car[vi].

6 Health Benefits

The health benefits of walking and cycling are very well established in public health research. As one of the easiest and most acceptable forms of physical activity that can be built into everyday life, Public Health England[vii] suggest creating environments that encourage walking and cycling are "more cost-effective than other initiatives that promote exercise, sport and active leisure pursuits". Nationally, a recent cohort study (2017) of 264,337 UK Biobank participants suggested that cycling to work is associated with a 40% reduced risk of premature death, 45% lower risk of developing cancer and a 46% lower risk of heart disease, compared to a non-active commute[viii]. According to Public Health England's review of available evidence, people who walk and cycle as part of their daily routine:

- have improved metabolic health and are at reduced risk of premature death. Moreover, the health benefits far outweigh potential risks from road traffic accidents and factors, such as air pollution.
- reduce their risk of developing over 20 common health conditions, including cardiovascular disease, respiratory disease, some cancers, and Type II diabetes
- are more likely to have good mental health and well-being with immediate benefits including improved sleep quality and longer-term benefits including reduced risk of dementia.



Source: PHE 2019 physical-activity-applying-all-our-health

6.1.1 Health impacts in Oxford

Across Oxfordshire in 2017, 'low physical activity' resulted in an estimated 124 deaths or 2.24% of all premature deaths[ix]. The number of people registered with Oxford GPs with common conditions for which cycling and walking are known to have a positive impact are: hypertension (18,000), depression (15,000), diabetes (7000), cancer (4500), chronic kidney disease (3600), coronary heart disease (3,200), atrial fibrillation (2500), stroke (2300), heart failure (1100) and dementia (1000). Additionally, cycling and walking can effectively replace car journeys and thereby prevent roadside air pollution. PHE's (2014) estimates of local mortality burdens associated with particulate air pollution suggest PM 2.5 is attributable for 55 deaths per annum in Oxford with an average loss of 12 years per attributable death[x]. Recent modelling by Kings College London (2019) to personalise the health impacts of air pollution, estimates that roadside air pollution in Oxford stunts lung growth in children by 14.1% and living near busy roads within the city increases the risk of hospitalisation from stroke by 7.4%[xi].

7 Housing and Job Growth

Oxfordshire is undergoing a substantial growth in housing and employment. This affects both Oxford City (as in the plan below) and surrounding areas of Oxfordshire from which people commute to or shop in Oxford. By 2031, LTP4 predicts (that Oxford will have 26,000 additional trips, including 13,000 more commuter trips and 2500 more HGV trips. In terms of Oxford city centre, there is a predicted 40% increase in bus trips, additional 9 million tourist

trips per year, an increase from 5 to 16 million trips to the expanded Westgate Shopping centre and a 70% increase in rail trips from Oxford train station from 4.9 to 8.3 million journeys per year. The implications of this projected housing and jobs growth is recognised in the Local Transport Plan. To cope with the future population and journey growth, the modal share of 'space efficient modes' – bus, cycling and walking – need to be increased at the expense of the 'space *inefficient*' mode of car use (see photo below).

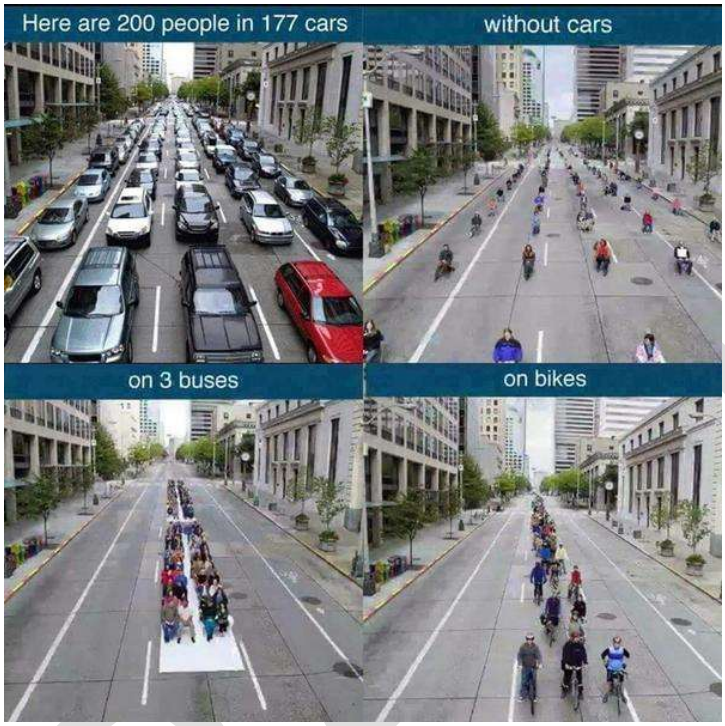


Figure 2: Comparison of road space used by different modes

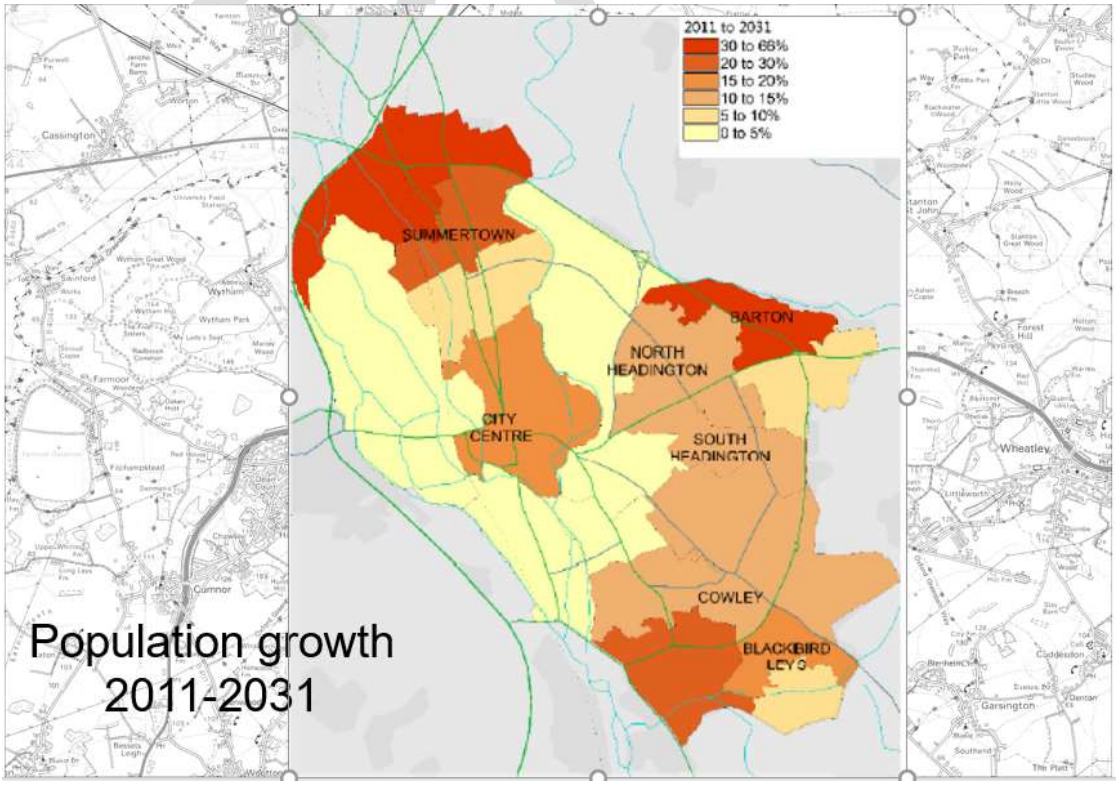


Figure 3: Source Oxford Transport Strategy: Projected percentage increase in ward populations

8 Cycling

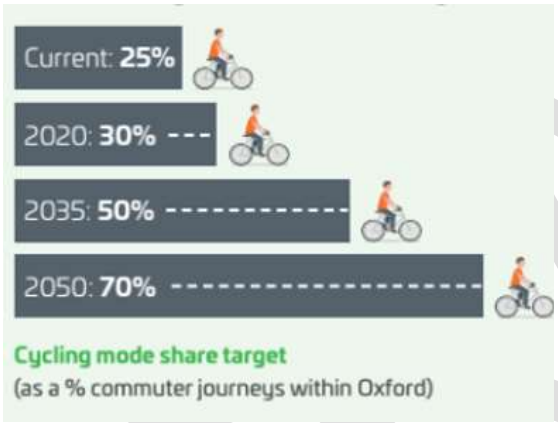
8.1.1 Commuter trips target

OCC policy document "Oxfordshire 2050" sets out ambitious targets to increase the percentage of journeys to work by bicycle *within* Oxford from the baseline of 25% in *2011* to 50% by *2035* and 70% by 2050. Travel within Oxford means workers both living and working in Oxford City. In 2011, there were 42,000 daily journeys to work by Oxford City residents to a workplace within Oxford city, with a modal share of 25% by bicycle, 26% on foot, 25% as car driver, 3% as car passenger and 20% by bus. Projections for all mode share are set out in the charts below for 2031 and 2050 in line with the Oxfordshire 2050 targets.

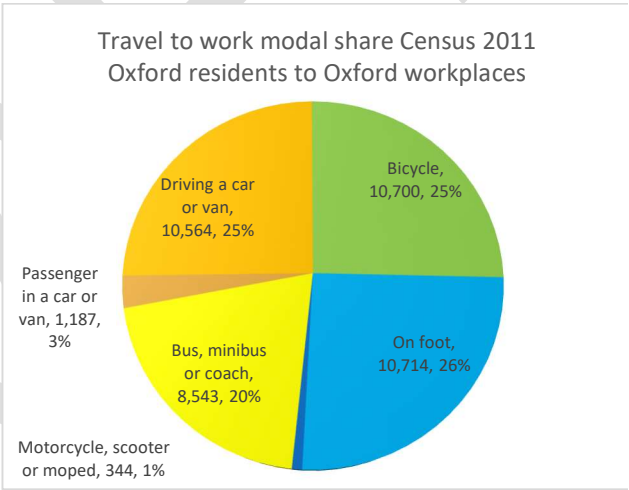
The modal share projections are based on the existing modal shares of Cambridge and Groningen in Netherlands, which already have city commuter cycling levels near to the proposed Oxfordshire 2050 targets for Oxford.

> Achieving the 2031 target will put Oxford cycling levels near that of commuter cycling in Cambridge (43%). Achieving the 2050 targets will put Oxford cycling at similar levels to cycling in Groningen (60%)

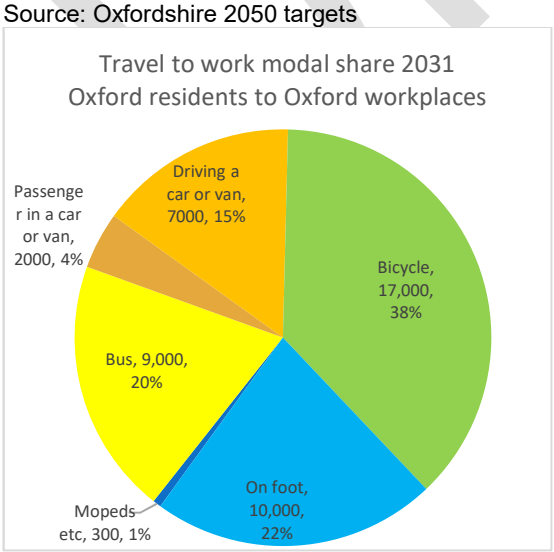
Policy OC1: OCC will plan for 38% of all Oxford to Oxford work journeys to be by bicycle by 2031 (representing a 50% increase from 11,000 to 17,000 commuter cycle journeys a day compared to 2011)



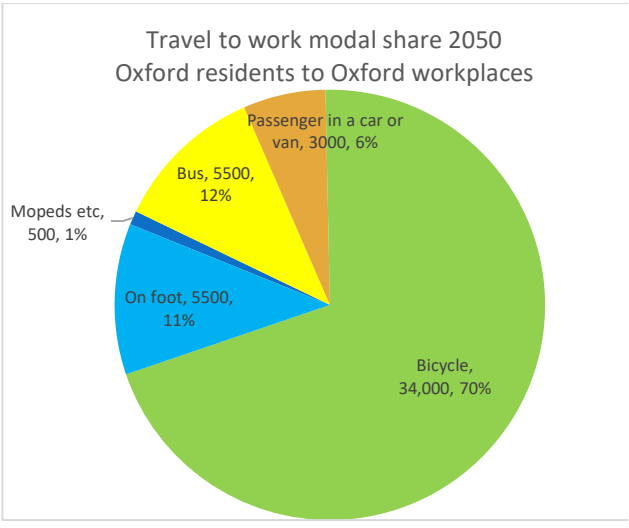
Commuter Cycling mode share target
Source: Oxfordshire 2050 targets



Commuter travel within Oxford in 2011
Source 2011 Census



2031 Commuter travel within Oxford
OC1 target in line with Oxfordshire 2050 targets



2050 Commuter travel within Oxford
Projection based on Oxfordshire 2050 targets

8.1.2 All cycle trips target

To support the Oxfordshire 2050 targets, the LCWIP sets out an additional target for *all* cycle trips (not just commuter trips) – to increase the number of all cycle journeys in Oxford by 50% as measured by the Active Lives Survey (ALS).

The most accurate data on all cycle trips is collected in the annual Active Lives Survey (ALS). ALS is a postal to web survey of all adults over the age of 16. Addresses are selected at random to ensure a representative sample of people are invited to take part. ALS collects data annually on a rolling basis from 500 residents in each district. The data used in this report is averaged over 2 years (2015-17) to smooth out annual fluctuations. It shows that there are around 140,000 cyclists in Oxfordshire (a cyclist equals someone cycling at least monthly) of which 53,000 (37% of Oxfordshire cyclists) live in Oxford.

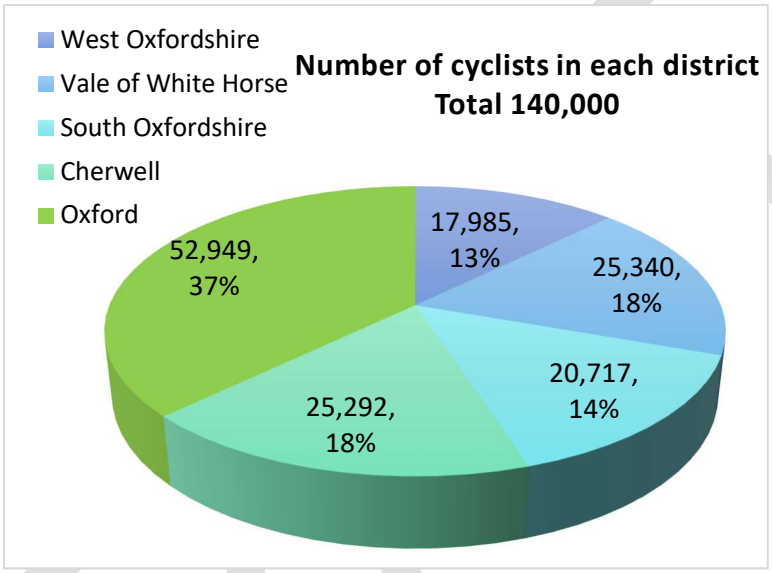


Figure 4 Source: Active Lives Survey average 2015-7 data

ALS data permits a calculation of the number of cycle journeys in each district (calculated by the number of cyclists multiplied by their frequency of cycling). On this basis, there are around 600,000 cycle journeys per week in Oxfordshire, of which just over 300,000 (51%) take place in Oxford.

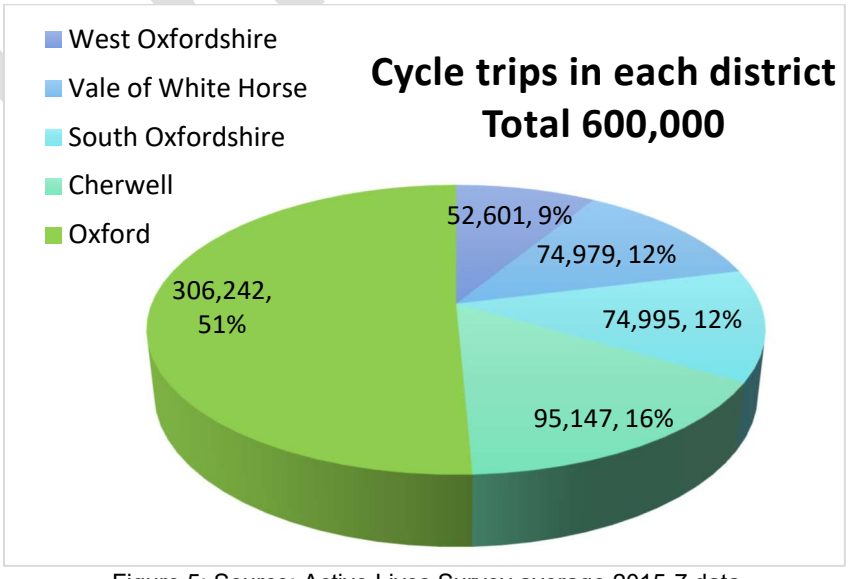


Figure 5: Source: Active Lives Survey average 2015-7 data

Policy OC2: OCC will plan for a 50% increase in all cycle journeys within Oxford for all purposes by 2031 (representing an increase from 300,000 to 450,000 in cycle journeys a week by Oxford residents)

Policy OC3: OCC will plan Oxford's cycle and road network in line with OC1 & OC2 targets. This will mean for instance factoring in the increase of cycling in the allocation or road and junction space, when modelling traffic for road improvements, designing widths of cycle paths and calculations of cycle parking numbers at cycling destinations.

9 Assessing the challenges of meeting the cycling targets

The LCWIP cycling targets are challenging but necessary to cater for Oxford's housing growth, as well as other Oxfordshire County Council policies on health, climate change, public realm and air quality. This section looks at the implications of increasing cycling by 50% in line with OC1 and OC2 targets. Understanding current cycle usage, for instance through market segmentation, allows resources to be focused on where they will have most impact.

9.1.1 Most cycle trips are by frequent cyclists

How many people will need to cycle to meet OC targets? The 2 charts below use ALS data to compare:

1. the number and percentage of all *adults* who cycle in Oxford by their cycling frequency (first chart) and
2. the total number and percentage of all cycling *trips* per week by how frequently people cycle (2nd chart).

Chart X shows that around 60% of all Oxford adults (75,000 people) don't cycle, whereas 40% (50,000) cycle (at least monthly), of which group 23,000 (18%) cycle 'at least 5 times a week' and 11,000 (9%) cycle '3-4 times a week'. Chart Y shows that those adults cycling 'at least 5 times a week' make 76% of all Oxford cycle trips. Adding those cycling '3-4 times a week' (27% of all adults in total) accounts for 91% of all cycle trips in Oxford.

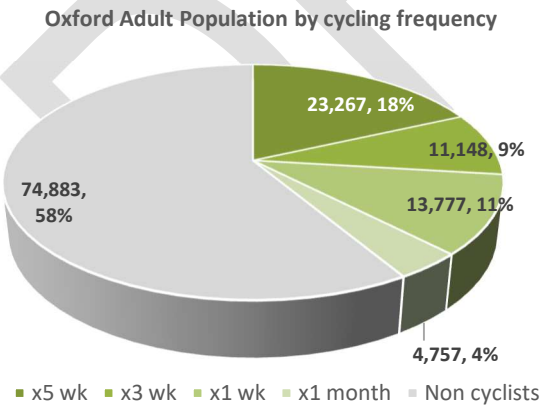


Chart X: Oxford adult population by frequency of cycling
(Data source: ALS 2015-7)

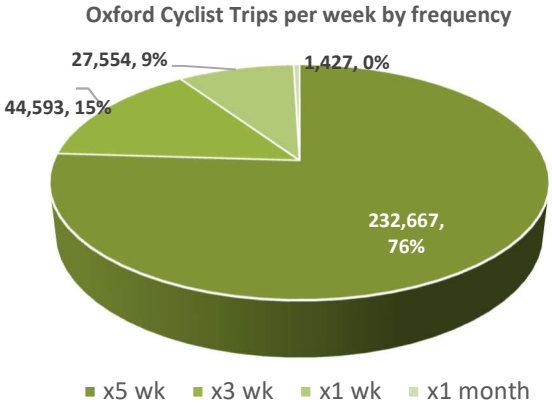


Chart Y: Oxford cycle trips per week by frequency of cycling
(Data source: ALS 2015-7)

The next 2 charts show the same data, but as a projection for 2031, in line with the target of a 50% increase in all cycling trips by 2031 (policy OC2) – around 450,000 cycling trips per week compared to 300,000 cycling trips in 2015-7 (chart Y). To achieve this target (chart X) requires approximately 9% more Oxford adults (9000 adults) cycling 'at least 5 times a week'

and 6% more Oxford adults (8000) cycling once a week, along with the number of *non*-cyclists falling from 75,000 (58%) to 51,000 (40%). This would put Oxford at the same level as Cambridge where 60% of the adult population cycle at least monthly.

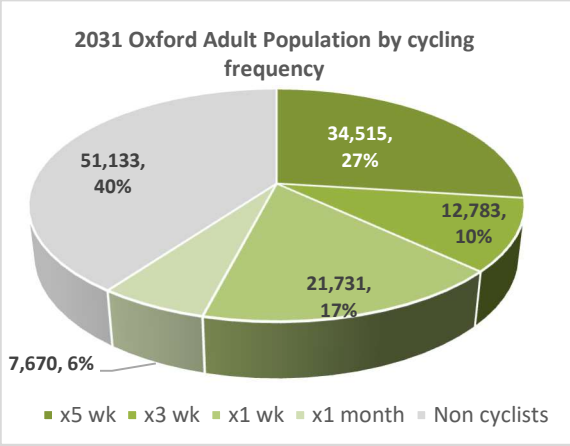


Chart X: Oxford adult population by frequency of cycling (2031 target)
(Projection based on ALS 2015-7)

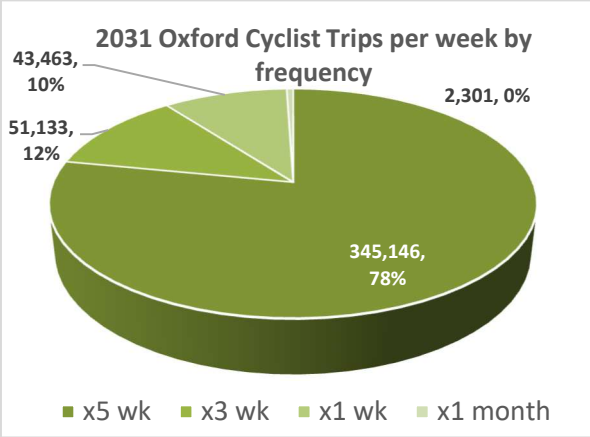
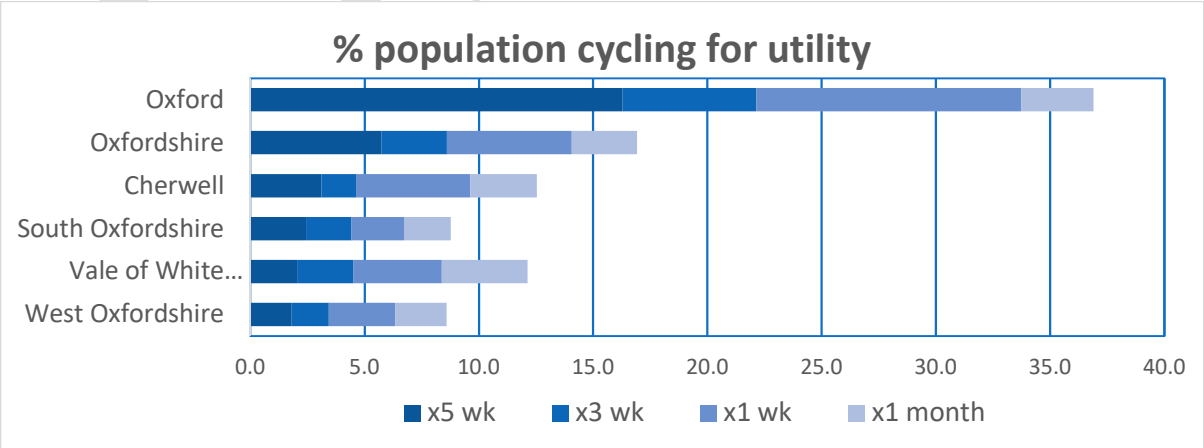


Chart Y: Oxford cycle trips per week by frequency of cycling (2031 target)
(Projection based on ALS 2015-7)

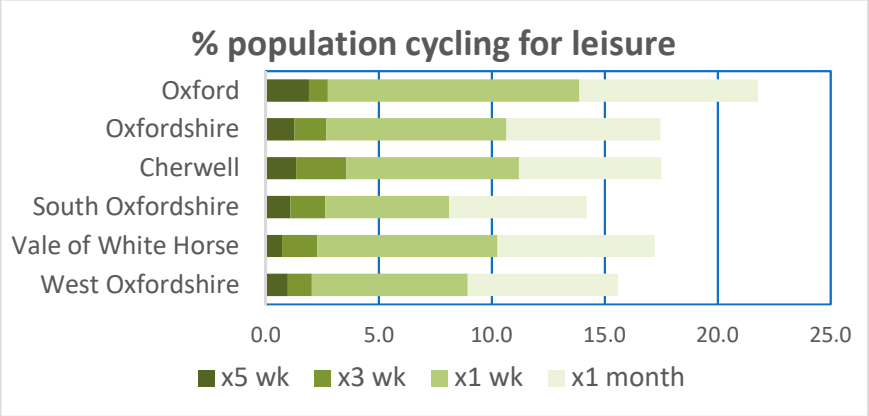
This demonstrates the importance of everyday cyclists in increasing cycling levels. It also demonstrates the scale of challenge. In other words, to meet the OC2 target, there needs to be around 25,000 new cyclists, including 9000 everyday cyclists and 8000 weekly cyclists.

9.1.2 Utility vs leisure cycling in Oxford

Oxford has a higher percentage of cycle journeys (51%) than cyclists (37%) as a percentage of all cycle journeys and cyclists in Oxfordshire. This is because cyclists in Oxford cycle more frequently than in other districts. The main reason is the much higher percentage of all adults in Oxford (15%) cycling 'more than 5 times a week' for **utility** purposes ("cycling for travel") compared to the other districts where only around 2-3% of adults cycle for utility purposes 'more than 5 times a week'. Cycling for **leisure** ("cycling for recreation, health, competition or training") is common in all districts but very few (around 1-2% of adults) cycle 'more than 5 times a week' for leisure in each district, including Oxford. This underlines the importance of concentrating on everyday utility journeys to increase overall levels of cycling. In terms of trips per week, there are 200,000 cycle leisure trips in Oxfordshire (60,000 or 30% in Oxford) and 440,000 utility trips in Oxfordshire (270,000 or 60% in Oxford).



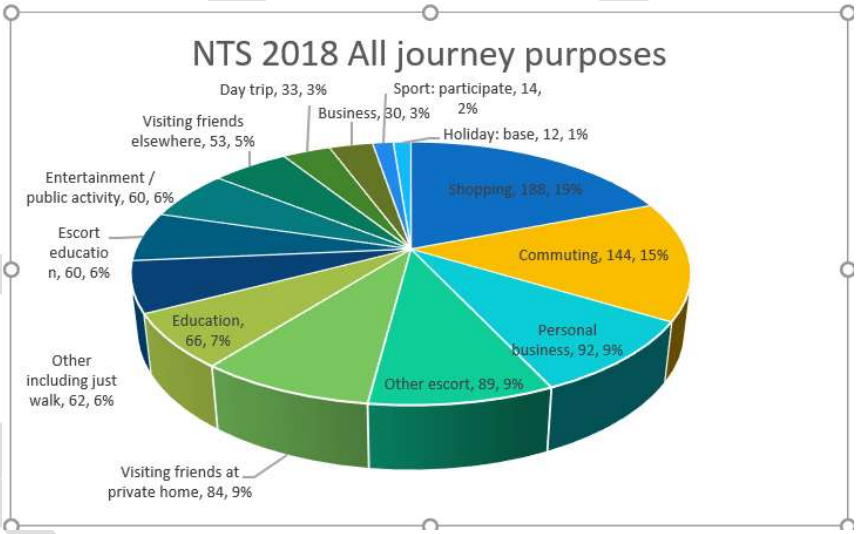
Source: Active Lives Survey average 2015-7 data



Source: Active Lives Survey average 2015-7 data

Policy OC4: To achieve OC2 targets of 50% increase in cycling by 2031, cycle infrastructure improvements will be prioritised on utility routes likely to attract everyday cyclists.

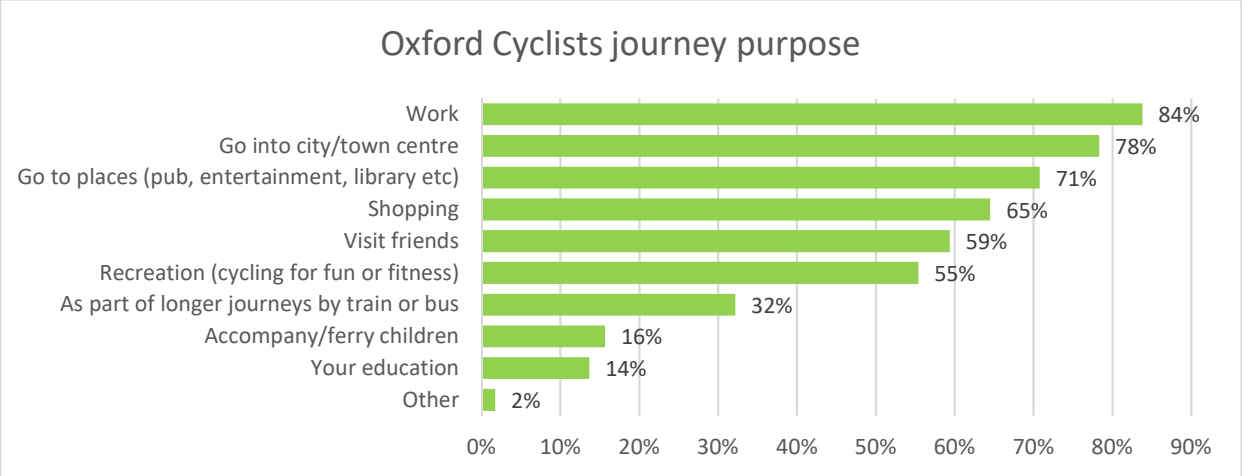
9.1.3 Widening journey purpose



Increasing cycling will also depend on cycling taking a larger share of different journey purposes. National Travel Survey in England shows that commuting represents just 15% of all trips, compared to shopping (18%), personal business (9%) (= purposeful trips such as to banks, doctors etc); visiting friends at home (9%) and elsewhere (5%), entertainment (6%), education (7%) and escort education (6%). On average, individuals make just under 1000 trips a year.

The breakdown of journey purpose for cycling in Oxford is not known but can be estimated. ALS data shows that the only 18% of Oxford cycle trips are for leisure whilst combining Census and ALS data suggests that around 65% (42,000 of 65,000 daily cycle trips) of adult cycle trips are for commuting in Oxford, which leaves around 17% for other journey purposes. Therefore, commuter journeys are much more important to cycling (65%) than for all journey modes (15% NTS data). Normalising cycling is likely to involve increasing cycling for other purposes.

An additional data source is the Oxfordshire Cycle Survey 2019 which gives an indication of the percentage of Oxford adult *cyclists* who cycle for different purposes. The list shows that adults in Oxford are already cycling for many different purposes but the survey did not collect information on the frequency of those different trips so it cannot be converted to cycle trip numbers.

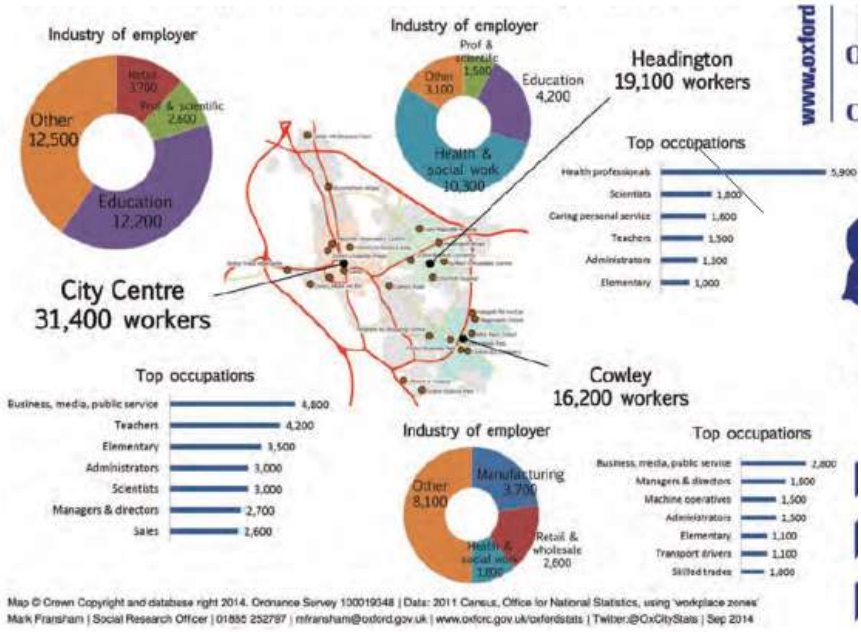


Percentage of all Oxford cyclists making cycle journeys for each purpose
Source Oxfordshire Cycle Survey 2019

10 Travel to Work

The data above shows that cycling to work is the main journey purpose for cycling in Oxford. However, there are opportunities to further increase levels of cycling to work, particularly to workplaces outside the city centre. There are 3 main employment areas in Oxford together employing around 58% of all workers in Oxford:

- City Centre - around 30,000 workers (education, retail and other)
- Headington - around 19,000 workers (health and science)
- Cowley - around 16,000 workers (manufacturing, science and retail).



The charts below show the potential for encouraging cycling to each of the 3 main employment areas of Oxford. Using Census 2011 information for each employment area, the *home location* of workers has been identified and classified into 5 groups, depending on whether they live *within* or *outside* reasonable cycling distance:

1. Oxford City – easy (< 3km/1.5 miles) and medium (3km – 5km/1.5-3 miles) cycling distance

2. ‘Oxon near’ – villages and one town (Abingdon) within medium and long (5-8 km/3-5 miles) cycling distance
3. London – potentially cycleable for multimodal travel (train and cycle)
4. ‘Oxon far’ – the rest of Oxfordshire which is beyond typical cycling distance (> 8km/5 miles)
5. ROSE (Rest of SE England) and ROEW (Rest of England and Wales) – beyond cycling distance

For each workplace, 3 pie charts have been created. The first pie chart (left) shows where the workers originated (home location). The second pie chart (Near < 5 miles) shows the *mode of travel* for workers living within cycleable distance (either in Oxford or near Oxford - groups 1 and 2) or from London (group 3) (for multi-modal travel). The third smaller pie chart (Far > 5 miles) shows the *mode of travel* for workers living beyond cycling distance (groups 4 and 5). The Far > 5 miles graph is included only to give some idea of the overall sustainability of the employment centre in terms of percentage using car travel.

It should be noted that Census only asks about the longest section of the work journey. Therefore, it is always possible that those who state “car” may use Park and Ride to finish their journey. This is most likely to apply to the city centre.

10.1.1 City Centre

Around 31% of all Oxford employment is in the city centre. Travel to the city centre is already relatively sustainable. Chart X shows 70% of Oxford City Centre workers live within cycling distance, either in Oxford (52%) or near Oxford (18%). Chart Y (within cycling distance) shows that currently only 17% (3000) of this group come by car (and it is likely some of these use park and ride) with 27% (5000) arriving by cycle and 19% (3500) on foot.

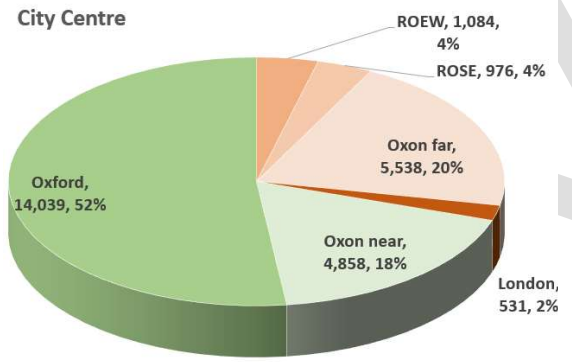


Chart X: Origins of workers who work in Oxford City Centre
Data source: 2011 Census

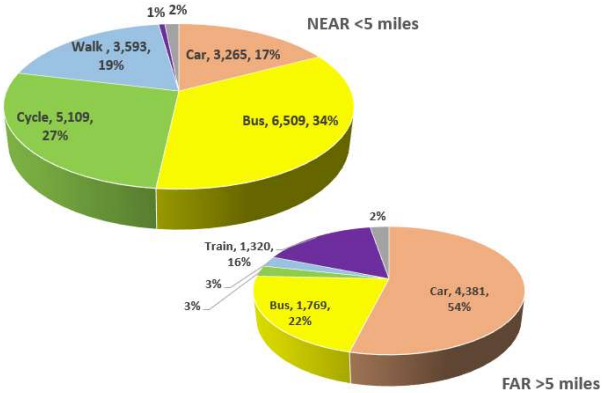


Chart Y Near: mode of travel for those living within cycling distance
Chart Z Far: mode of travel for those living beyond cycling distance
Data source: 2011 Census

10.1.2 Headington

Headington is far less sustainable. The percentage of workers living within cycling distance (65%), either in Oxford (49%) or near Oxford (16%), is not much different from that of the city centre employment area (70%). However, chart Y shows that travel is much more car based than the city centre. Nearly 3000 (38%) arrive by car and only 1300 (17%) arrive by bicycle. However, the percentage of those living within cycling distance who arrive on foot (24%) is higher than for the city centre (19%).

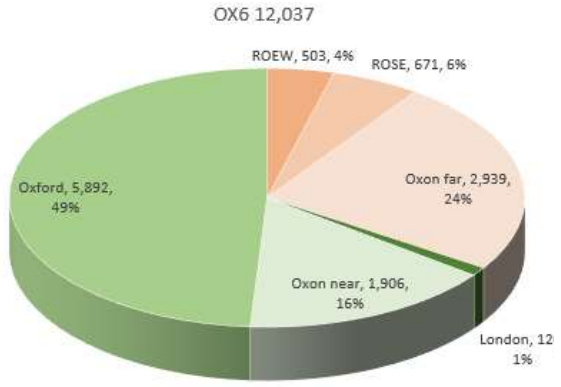
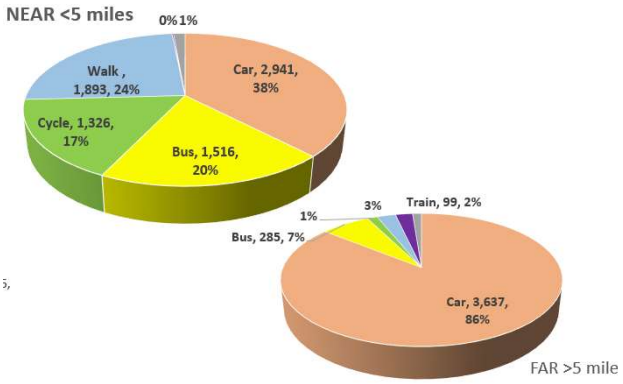


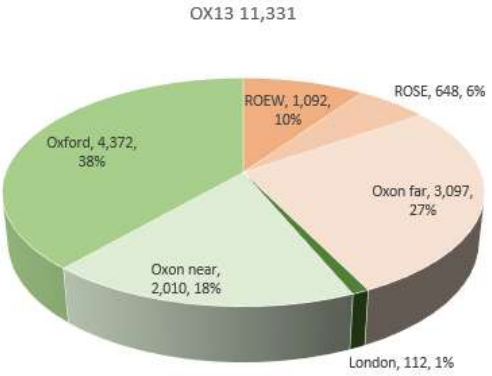
Chart X: Origin of workers who work in Headington
Data source: 2011 Census

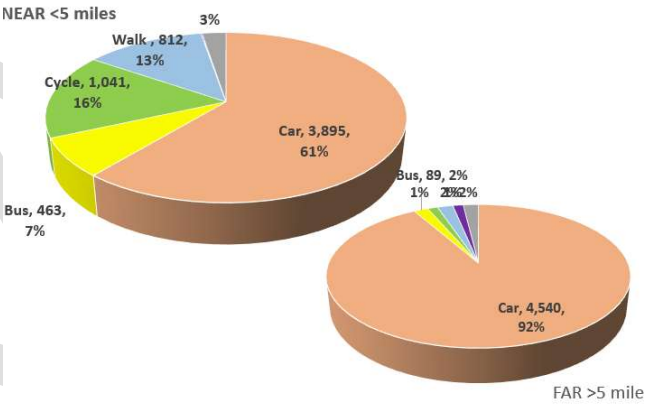


Charts Y&Z: Mode of travel to Headington
Data source: 2011 Census

10.1.3 Cowley

Cowley is even less sustainable than Headington. In terms of where the workers live, 66% of workers come from Oxford or near Oxford, which is the same as Headington. Chart Y however, shows that 62% (3900) of this group arrive by car, with just 1000 (16%) arriving by bicycle and just 13% on foot.

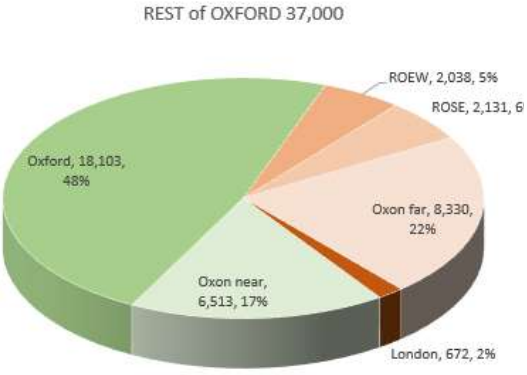


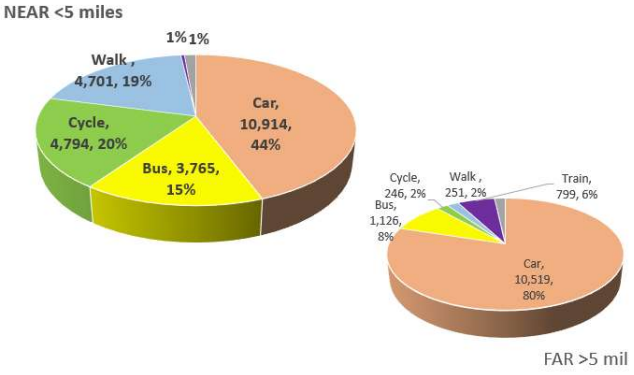


Data source: 2011 Census

10.1.4 Rest of Oxford

There are 37,000 jobs (43% of total) spread out across the rest of Oxford. Overall 65% of the workers live within cycling distance (the same as for Headington and Cowley), with 48% (18,000) of workers from Oxford and 17% (6,500) from near Oxford. Chart Y shows that 44% (10,000) of these arrive by car and only 20% (4700) arrive by bicycle.





Data source: 2011 Census

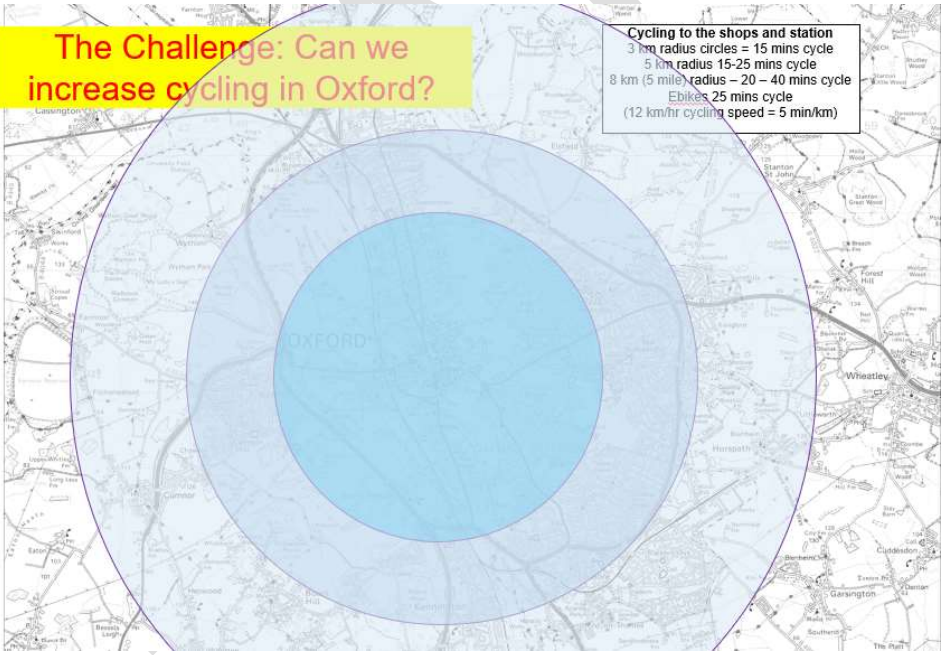
In summary, there is little difference in the location of workers living within cycling distance to each of the employment locations (65% to 70% of all workers) but substantial differences in the percentage who arrive by car (17%, 38%, 48% and 62%) and by bicycle (27%, 20%, 17% and 16%). Altogether, there are around 10,000 car journeys to the 3 major workplaces and another 10,000 car journeys to other Oxford workplaces from home locations within cycling distance – around 20,000 in total, with a split of 11,000 from Oxford and 9,000 from near Oxford. Policy OC 1 sets a 2031 target of 7000 more commuter cycle journeys. This could therefore be achieved if 35% of workers living within cycling distance changed from car to cycle.

11 Geographic challenges

Achieving Oxford cycling targets will approximately match cycling levels in Cambridge, but the challenge is greater as Cambridge is flatter and more compact than Oxford. This section sets out the main geographic challenges.

11.1.1 Distance and hilliness

The map below shows a plan of Oxford with 3 circles focused on the city centre. The inner circle represents a short and easy cycle riding distance (<3 km – 1.5 miles); the next circle out represents a medium cycling distance (<5 km – 3.5 miles) and the outer circle a long riding distance (<8 km – 5 miles). Much of Oxford lies in the medium cycling distance band and nearly all the adjoining villages and adjoining town of Abingdon lie in, or even outside, the long cycling distance band.



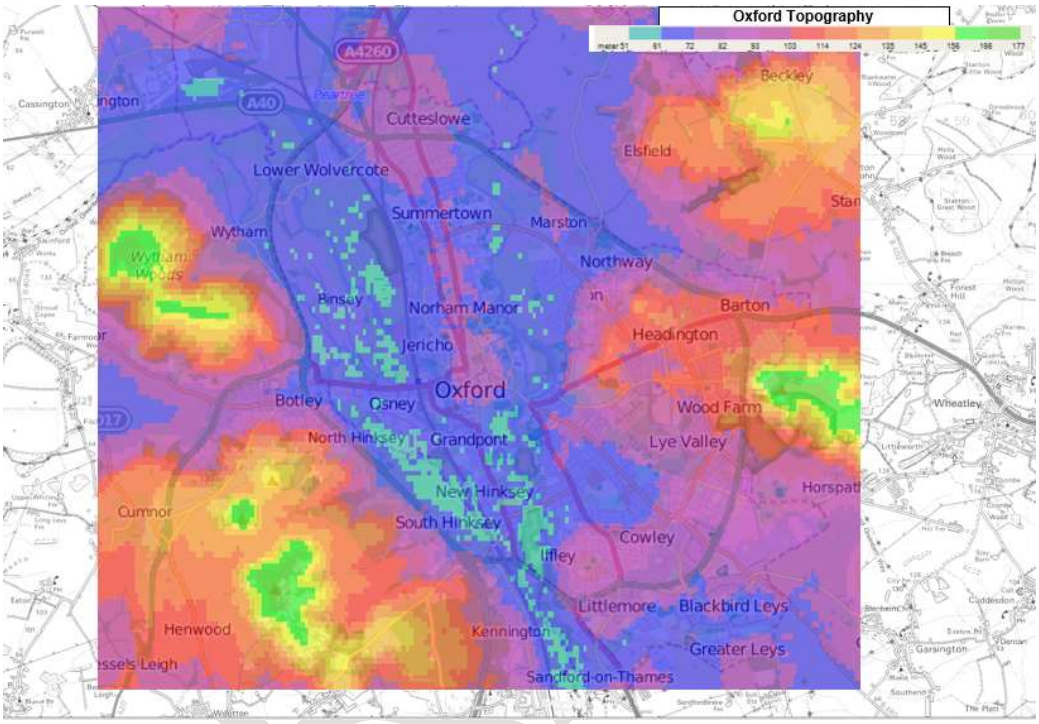
Oxford plan showing 3 distance bands centred on Oxford City Centre

11.1.2 Hilliness

Additionally, Oxford is surrounded by high hills on both its east and west hinterlands. In particular, this affects large areas of SE Oxford – Headington, Barton, Cowley, Blackbird Leys, Rose Hill, Littlemore and Greater Leys. The policy implication of distance and hilliness is that there will need to be a substantial increase in e-bikes to meet OC1 and OC2 targets so that new cyclists can comfortably cope with the distance and hilliness. Additionally, extra protection. such as wide cycle lanes will be needed for cyclists on the uphill sections because of the greater speed differential between cyclists and cars. Equally, designs will need to take account the faster downhill speed of cyclists by for instance ensuring greater

freedom of sideways movement (so that cyclists can safely avoid hazards) and measures to help conserve momentum (such as removing obstacles or junctions on the down slope and the flat stretch beyond the bottom of the hill where cyclists gradually lose their kinetic energy).

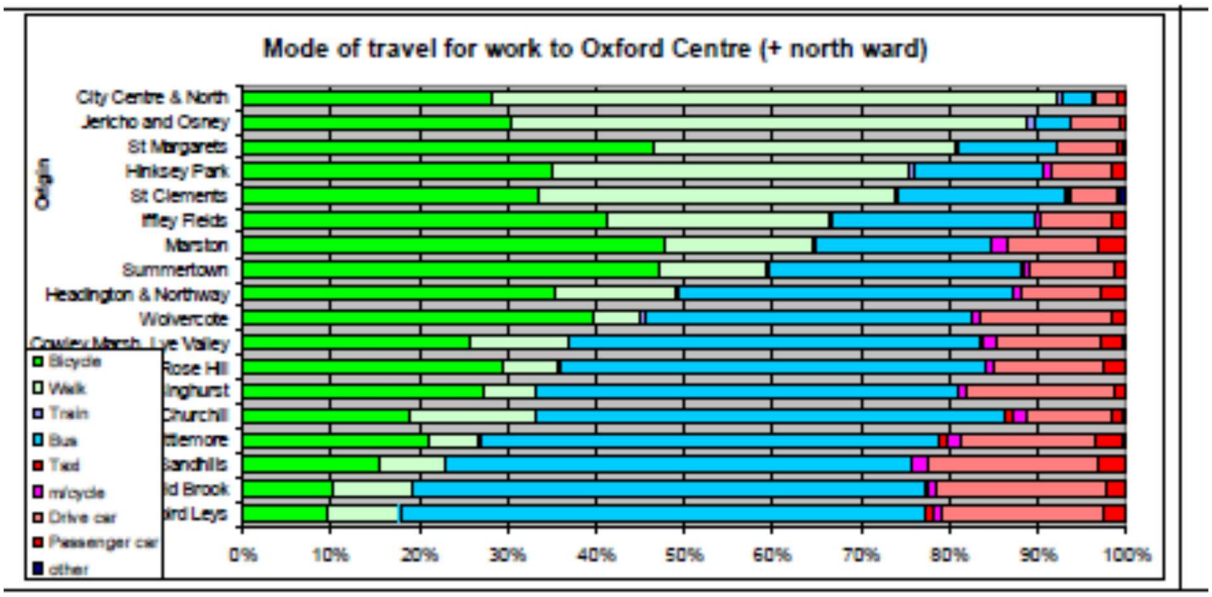
Policy OC5: OCC will promote the use of e-bikes, particularly to residents of Oxford's hillier outskirts and outlying villages. Radial cycle routes, particularly long distance routes into Oxford, will be designed for ebike maximum speeds (15 mph). Cycle infrastructure design for hills will factor in the slower uphill speeds of cyclists and the faster downhill speeds of cyclists and the advantage to cyclists of using this downhill kinetic energy to travel further.



Oxford topographical map showing low lying areas (lime green and blue) and hills (mauve to orange to green)

11.1.3 Viable alternatives to cycling

The next chart shows the breakdown of mode of travel to work to Oxford City Centre from each MSOA (= Council Ward) within Oxford, ordered in distance from the city centre. For the central wards, nearly all commuter journeys are on foot (60%) and by cycle (30%). As one moves away from the centre, walking quickly declines and cycling peaks around 3 km from the centre at 45% of work journeys to the centre by cycle and 10% on foot. As one moves yet further away, cycling declines to 10% of journeys from the furthest wards and is increasingly replaced by the bus (60% at the furthest wards). Car use does not much exceed 20% of journeys from any Oxford ward. The implication of this is that there is not a large potential to change behaviour within Oxford to the city centre to meet the OC1 and OC2 targets. Cycling needs to be encouraged both for purposes other than work to the city centre (e.g. shopping) and to work locations outside the city centre.



Commuter journeys to Oxford city centre from City wards, ordered by distance from the city centre. Data source: Census 2011 MSOA data (Middle Super Output Areas)

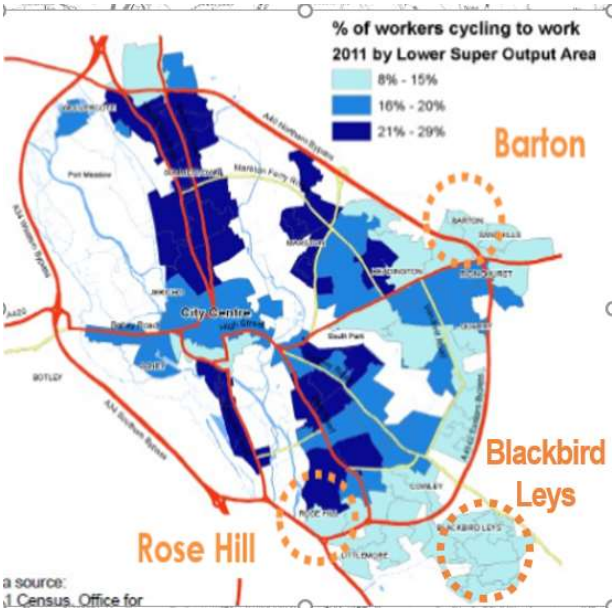
Oxford's frequent and fast bus service focused on the city centre thus offers a viable alternative to cycling to the city centre for residents living on the outskirts of Oxford. However, it should be noted that around 8% of bus journeys to the city centre are under 1 km and 47% between 1 km and 5 km[xii]. For many of these bus trips, cycling would be faster than even Oxford's frequent bus service. With city centre congestion in part caused by the high concentration of buses and bus stops, there are decongestion and health benefits of transferring some of these bus journeys to cycling.

Policy OC6: Whilst Oxford city centre will remain the main focus for cycle routes, OCC will also prioritise cycle routes to workplaces and shopping centres outside the city centre. OCC will seek to ensure that adequate and convenient cycle parking is available at these locations.

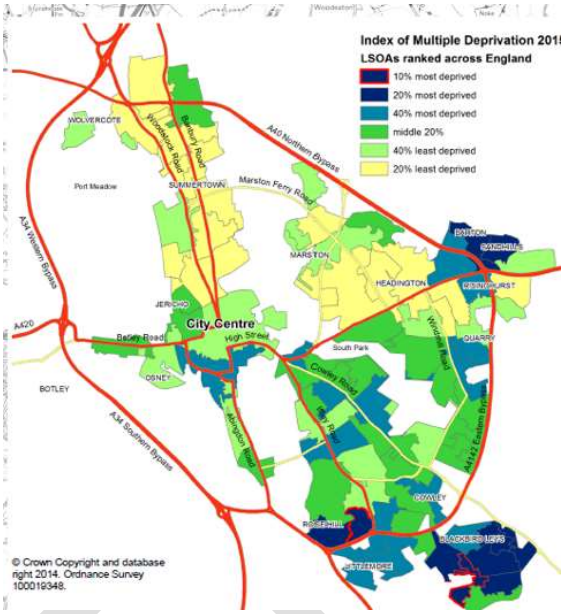
11.1.4 Social norms and social deprivation

The next maps of Oxford cycling show how there is a considerable overlap between areas of social deprivation and low levels of cycling to work. The 3 areas in Oxford classified as nationally the 20% most deprived areas – Barton, Rose Hill and Blackbird Leys – also have some of the lowest levels of cycling to work. There are probably several self-reinforcing reasons for this – distance, hilliness and competing bus services, as well as generally poor cycle route provision. But there are also likely to be cultural and normative influences as well[xiii]. Improving cycle access to and from these areas will help improve accessibility and health outcomes and meet wider public health and well-being policies. Sport England research suggests that active travel has disproportionate health benefits to more disadvantaged and marginalised groups.[xiv]

Policy OC7: In co-operation with Public Health, measures will be undertaken to prioritise and encourage cycling in deprived wards of Oxford, both in terms of infrastructure and promotion



Percentage cycling to work by LSOA
Source Census 2011 Lower Super Output Areas



LSOA areas of multiple deprivation 2015
Source X

11.1.5 Widening the market for cycling in Oxford

In summary, the implications of this section in terms of increasing cycling are that there will be a need to:

- increase cycling to locations other than the city centre, such as locations where public transport is less convenient and frequent
- encourage ebikes and ensure cycle routes encourage long distance cycling to extend the catchment area of Oxford to its outlying neighbourhoods, nearby villages and the town of Abingdon
- widen further the journey purpose of cycling beyond travel to work
- Ensure that the cycling network is promoted and attractive to all Oxford residents including in deprived wards.

12 Oxford City Centre – the impact of increasing cycling

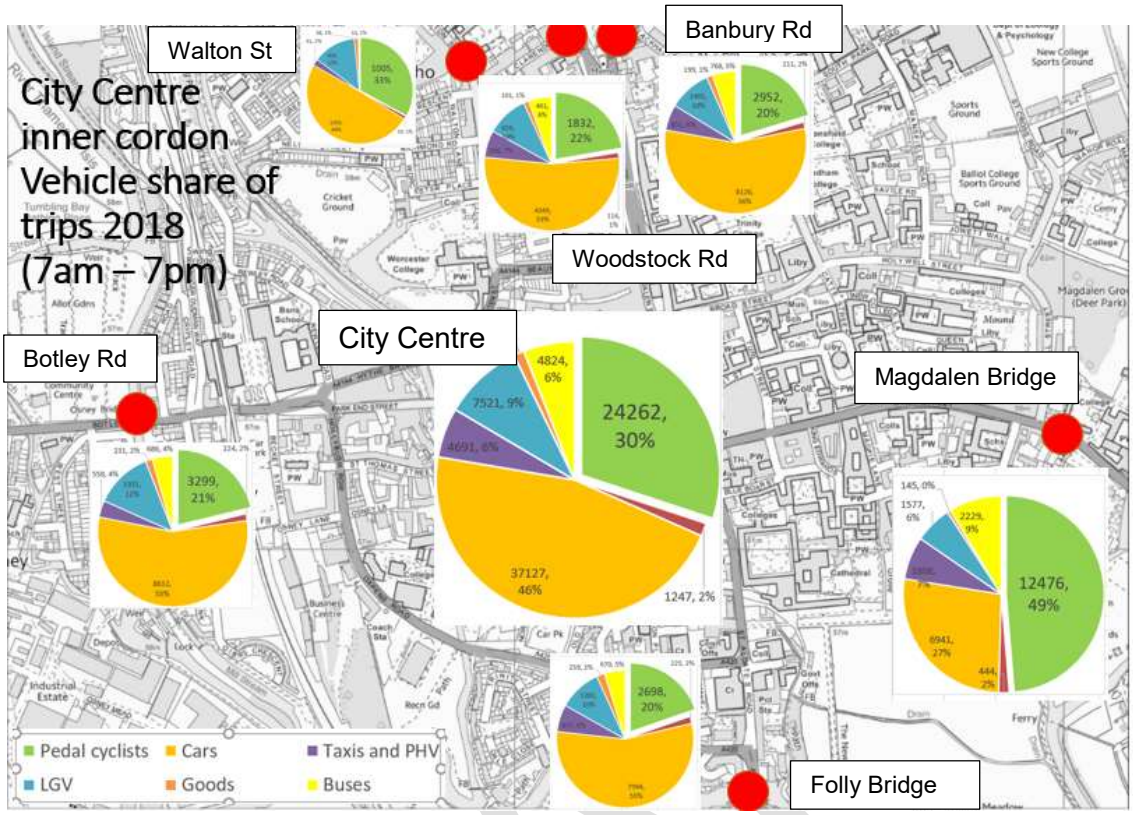
Oxford City Centre Road is the focus of employment, shopping, entertainment, culture, social exchange, tourism and education. It serves as a centre not just for Oxford residents but for a much wider catchment area of Oxfordshire and beyond. The expansion of Westgate Centre in 2016 has reinforced the central role of Oxford City Centre.

This section shows how cycling can help increase the number of people entering the city centre within the limits of the existing road infrastructure, thereby encouraging more economic vitality and a better public realm. Space is most at a premium in the city centre, especially at the peak morning and evening hours. There are no opportunities to increase city centre road space, even if wished for. The University occupies much of the central area. The centre has a street layout established in Saxon times and little changed since the 18th century (New Road) except for Oxpens (20th century).

12.1.1 Current journeys to the city centre

Every year, the Council undertakes a *vehicle* count at the inner cordon. The plan below shows the 12 hour 2-way vehicle data for 2018 for 1) all trips from/to the city centre (central chart) and 2) at each of the 6 cordon points (red dots) with charts sized in relation to their total vehicle flows. Cycle flows are in green. Over 12 hours, there were in total over 24,000 cycling trips, which made up 30% of all vehicles. Crossing Magdalen Bridge, which is the gateway to East Oxford and Headington, there were over 12,000 cycling trips which

represented 49% of all vehicles. Cycling represented around 20% of all vehicles at the other cordon points.



Vehicular modal share of journeys into and out of Oxford City Centre
Source: OCC 2018 inner cordon surveys (excludes pedestrians)

12.1.2 Encouraging more sustainable journeys

Using the inner cordon *vehicle* cordon data, it is possible both to calculate the number of *people* and the occupation of *road carriageway space* by each mode. This is particularly important for inbound morning peak hours when there is most demand on road space. Note: pedestrians and footways are excluded in this data analysis.

Chart X shows that currently around 19,000 people enter the city centre over the 2 morning peak hours (excluding pedestrians), with around 41% arriving by bus, 27% by car and 23% by cycle. An unknown number of these travel through, rather than stay in the city centre (calculated around 30% of car users but probably much lower for other modes).

Chart Y shows the allocation of road space by mode in passenger car units (PCUs) over the 2 morning peak hours. PCU is a standard for road space use based on cars being rated as 1 PCU and calculated for other vehicles e.g. cyclists are rated as 0.2 PCU. This shows there is around 8000 PCUs use of road space, which probably represents the approximate maximum road space capacity into the centre. Despite only accounting for 27% of mode share, cars occupy around 52% of road space in Oxford. In comparison, buses occupy 17% and cyclists 11% of road space. Together buses and cycles occupy 28% of road space but transport around 68% of people.

> In the morning peak hours, cars occupy 52% of road space but only transport 27% of people.
>
> Cyclists occupy just 11% of road space but transport 23% of people.

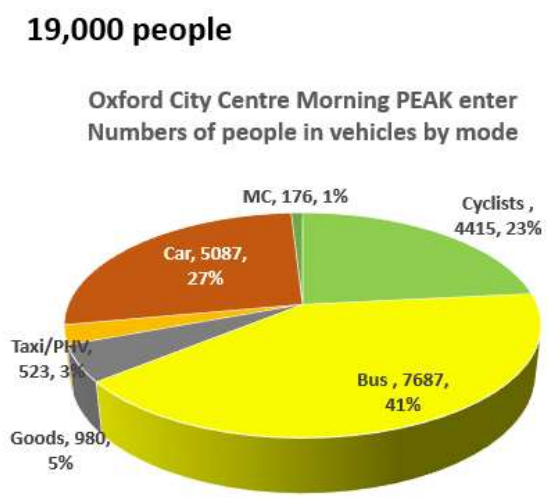


Chart X: People entering Oxford City Centre by mode (7.30am-9.30am)
Source: Inner Cordon Survey average 2012-17 (excludes pedestrians). Calculated using bus occupancy and typical car occupancy rates.

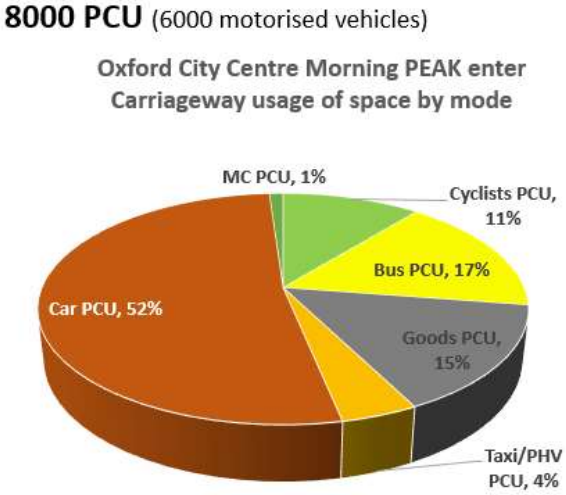
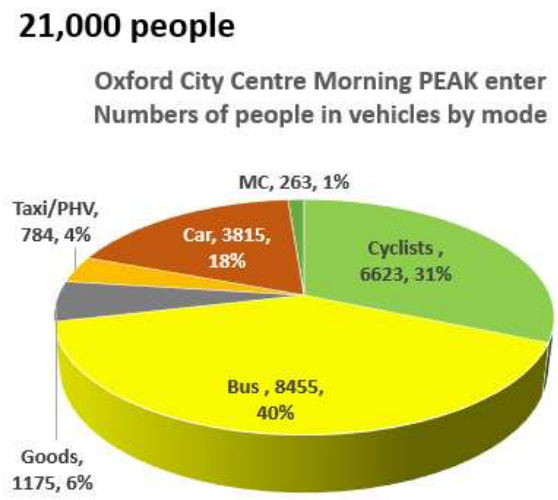
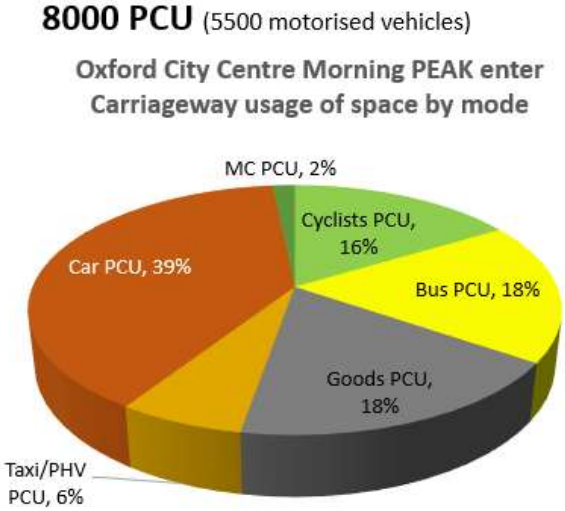


Chart Y: Carriageway space used by each mode (7.30am-9.30am)
Source: Inner Cordon Survey average 2012-17. Calculated using standard vehicle PCU rates.

The next charts show the potential impact of achieving a 50% increase in cycling by 2031 in line with OC policies 1 and 2, whilst keeping within the road space use of 8000 PCUs over the 2 peak hours. This suggests that increasing cycling trips could facilitate a total increase of 2000 people (from 19,000 to 21,000) entering the city centre over the 2 peak hours. This would be achieved by a 50% increase in cycling, 10% increase in bus passengers, 50% increase in taxis/PHVs along with a 25% decrease in car occupants. It should be noted that cars still occupy 39% of road space whilst transporting only 18% of people. Bus and cycling would transport 71% of people, whilst using only 32% of road space. The total number of motorised vehicles reduces from 6000 to 5500.



People entering Oxford City Centre 2031
Source: Projection 2031 (excludes pedestrians).



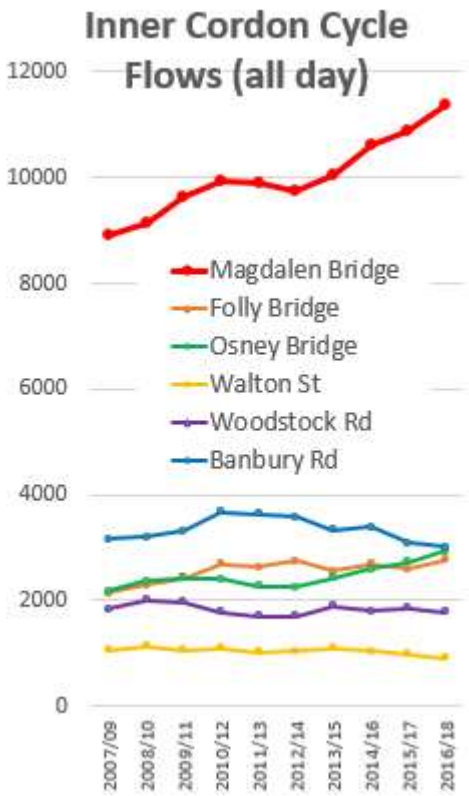
Carriageway space used by each mode 2031
Source: Projection 2031 (excludes pedestrians).

Policy OC8: The design of City Centre streets and access roads will take into account a more equitable allocation of road space in comparison with flows of people, in line with achieving OC1 and OC2 targets.

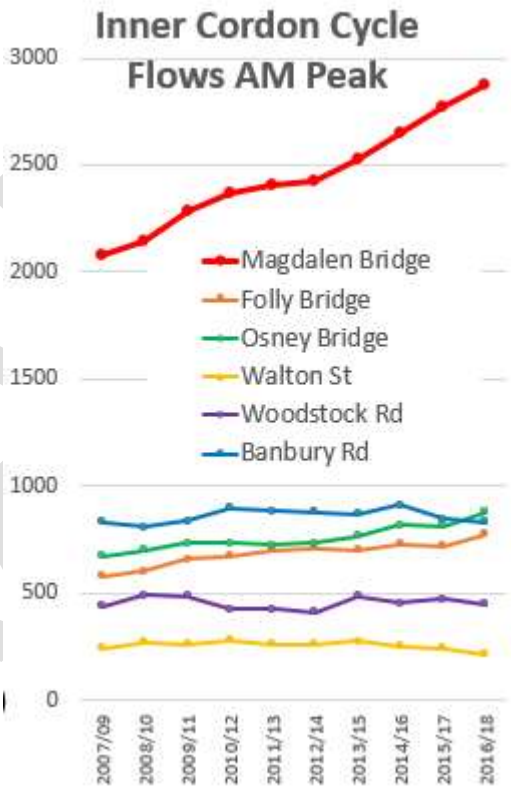
12.1.3 Current cycle counts – building on success

Over the last 10 years, cycling in Oxford has had a generally positive outcome. The charts below show the trend patterns for the inner cordon over 10 years from 2007/9 to 2016/18 (each point averaged over 3 years). In summary, the inner cordon data shows that over the last 10 years:

- All day (12 hours) cycling increased from 19,200 to 22,800 cycles (+18%)
- AM peak cycling (2 hours) increased from 4800 to 6000 cycles (+25%)
- Magdalen Bridge increased by 28% all day and 38% AM peak
- Folly Bridge increased by 29% all day and 35% AM peak
- Osney Bridge increased by 35% all day and 31% AM peak
- In contrast, cycling from the north decreased all day by 2% for Woodstock Road, 5% for Banbury Road and 15% for Walton Street.



All day cycle flows (7am – 7pm)
Source: Oxford inner cordon

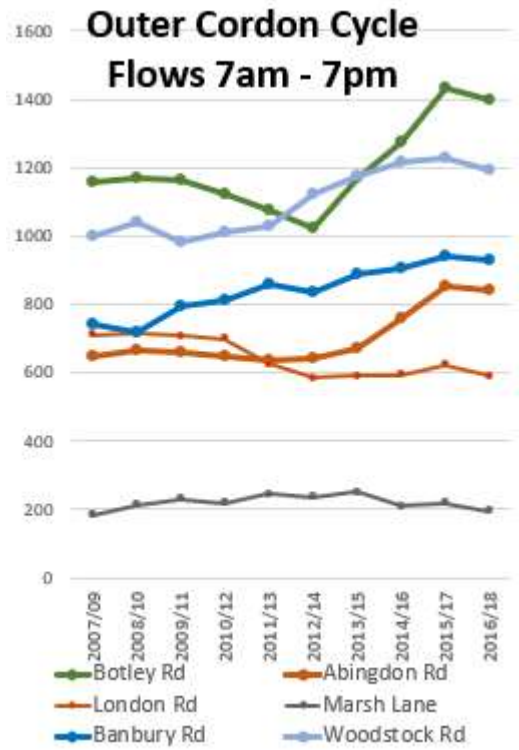


AM Peak (7.30-9.30) cycle flows
Source: Oxford inner cordon

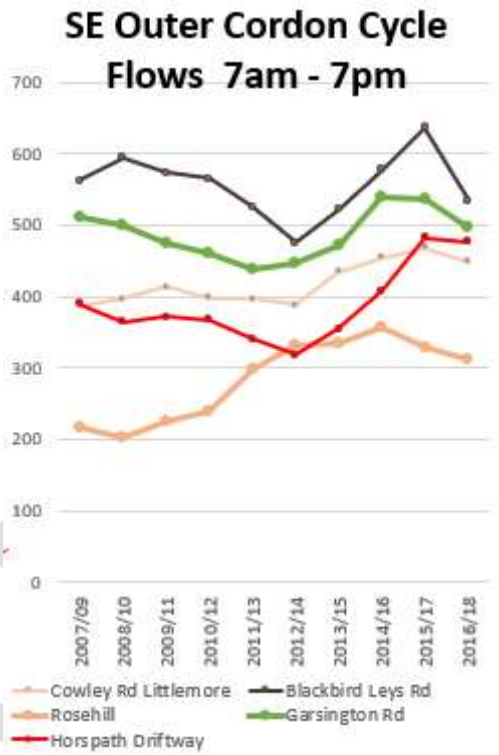
Cycling at the outer cordon has also been relatively positive. Outer cordon points are located just inside the ring road. The charts below show the trend patterns for the outer cordon (averaged over 3 years) from 2007/9 to 2016/18. For visual clarity, the outer cordon points entering the SE quadrant have been grouped in the second graph. In summary, the outer cordon data shows that over last 10 years:

- All day cycling increased from 6,500 to 7,400 cycles (+14%)
- AM peak cycling increased from 1800 to 2300 cycles (+25%)
- Cycling levels were up at 8 of 11 cordon points, with the highest percentage increases in
    - Rosehill (+45%), Abingdon Rd (+30%), Banbury Rd (+25%), Horspath Driftway (+22%), Botley Rd (+21%) and Woodstock Rd (+19%)
- The only substantial decrease was in London Road (-17%)

Thus cycling levels have increased at both the inner (18%) and outer cordon (15%). This forms a good basis to meeting the OC1 and OC2 targets, but also highlights the scale of the challenge of meeting a 50% increase over a similar period.



All day cycle flows (7am – 7pm)
Source: outer cordon surveys



All day cycle flows (7am – 7pm)
Source: outer cordon surveys

13 How to increase cycling levels

LCWIP targets OC1 and OC2 set challenging targets to increase commuter and general cycling by 50% in Oxford. Research on how to increase cycling is vast but there is little conclusive evidence how it can be achieved in all situations. Much of the research evidence relates to individual successful locations, but it is typically difficult to understand the many underlying factors that may contribute to success or whether these can be translated to another town. For instance, increasing cycling where around 25% of trips are by cycle as in Oxford may be very different from towns with 2-3% levels of cycling. There are many opinions, some passionately held, but in reality there is no magic bullet nor magic formula to achieve an increase in cycling.

Nevertheless, a review of the evidence, in particular Dutch and UK evidence, suggests 5 broad factors (F1-F5) which may be important in promoting cycling:

F1. An identifiable, visible and comprehensive town-wide **cycle network**
F2. A high density **urban realm** with accessible destinations which permit and encourage short journeys
F3. **Traffic restraint** such as congestion, restricted road capacity or the cost of parking or driving, which gives comparative *advantage* to cycling
F4. A **cultural norm** or attitudes among the population which support and promote cycling
F5. **Council commitment** at all levels to increase cycling as a priority

Oxford is fortunate in having a relatively positive history for each of these 5 factors. Oxford already has a nascent cycle network, created over the last 50 years. The urban realm is relatively dense, in particular around the city centre, though on the other hand, some of the

1980s peripheral developments such as business parks and superstores are fairly inaccessible for cycling. Oxford has had a balanced transport strategy for 50 years, with minimal road widening and relatively high central car parking charges. Most visibly, the existing high cycling flows create a cultural norm of cycling. Council commitment to cycling has varied over the years. The LCWIP and LTCP represent a new commitment of Council support and interest.

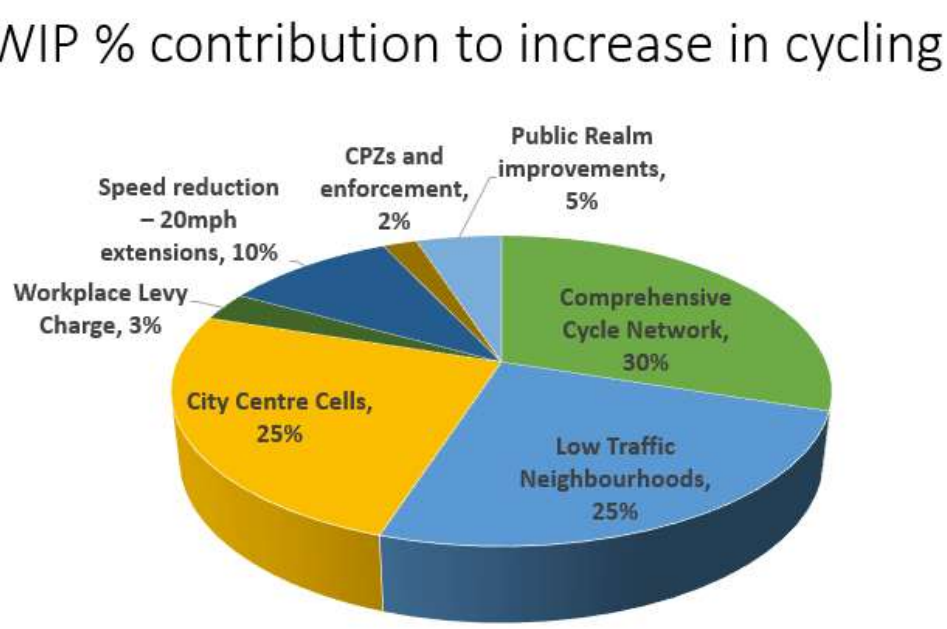
A long history of encouraging cycling: Oxford built its first cycle track in 1937 (Marston Road cycle track). In 1969, the Marston Ferry Road cycle track was built. The South and North Oxford cycle routes were added in 1981 and 1982. Barracks Lane cycle track was added in 1986 and Willow Walk cycle track in 1990. From 1978 cycle lanes were also added to many of the main roads. Cycling levels have remained high throughout this time. In 1982 around 22,000 cyclists crossed the inner cordon compared to 24,000 in 2018 with levels never dropping much below 20,000 cyclists.

14 Oxford LCWIP+ 8 pillars of change

The LCWIP sets out a step change in cycling levels. Compared with the 18% increase at the inner cordon and 14% increase at the outer cordon over the previous 10 years, it is proposing a 50% increase in cycling by 2031 over 12 years. To achieve this, the LCWIP sets out 8 pillars (or priority infrastructure measures) fundamental to achieving this step change in cycling levels and improvements in walking. The image of pillars is used because they work together rather than separately to support the increase in cycling.

8 Pillars	**Main features**
1 Oxford Cycle Network	Core comprehensive 'dual network' of cycle routes focused on the city centre along with orbital and connecting cycle routes
2 Low Traffic Neighbourhoods	Neighbourhood areas, where rat runs are blocked combined with public realm improvements (as in Waltham Forest)
3 City Centre Traffic Control Points	Connecting Oxford: 3 central filters preventing cars crossing the city centre
4 Work Place Levy Charge	Connecting Oxford: Eastern arc combined with traffic restrictions
5 Average Speed Cameras and 20 mph	Speed control on main road radials
6 Controlled Parking Zones and enforcement	Extension of CPZs across whole of Oxford
7 Public Realm Improvements	City Centre and local shopping centre improvements
8 Schools	Routes to schools – to be assessed

All 8 pillars will be important in changing behaviour and creating an environment where cycling and walking become the natural choices. The chart below gives an estimate of the impact each pillar has on increasing cycling in Oxford in line with OC1 and OC2 targets. For example, the completion of Oxford cycle network should achieve 30% of the OC2 target to increase by cycling by 50%. However, it is important to note that the pillars need to be implemented together to support the increase. Pillars 1 to 5 primarily support cycling and pillars 6 to 7 primarily support walking.



14.1.1 Schools and children

Pillar 8 Schools and encouraging children to cycle and walk is also fundamental to the future of cycling and walking in Oxford. This will be a future piece of work delivered in co-operation with schools, Public Health and Education and other stakeholders. Enabling more cycling and walking to school would significantly increase the proportion of children meeting the Chief Medical Officers physical activity guidelines - 79% of children in Oxfordshire currently do not meet these guidelines. We already have an excellent example of what can be achieved. Good infrastructure and soft measures have helped promote and enable cycling at Cherwell (Secondary) School which has the highest rate of traveling to school by bike in the UK[xv]. Altogether 58% of children regularly travel to school by bike with 15% arriving by bus and 15% on foot and just 11% by car.

Policy OC9: The Council will undertake a full assessment of travel to school in Oxford and improve walking and cycling routes to schools in co-operation with schools, Education and Public Health.

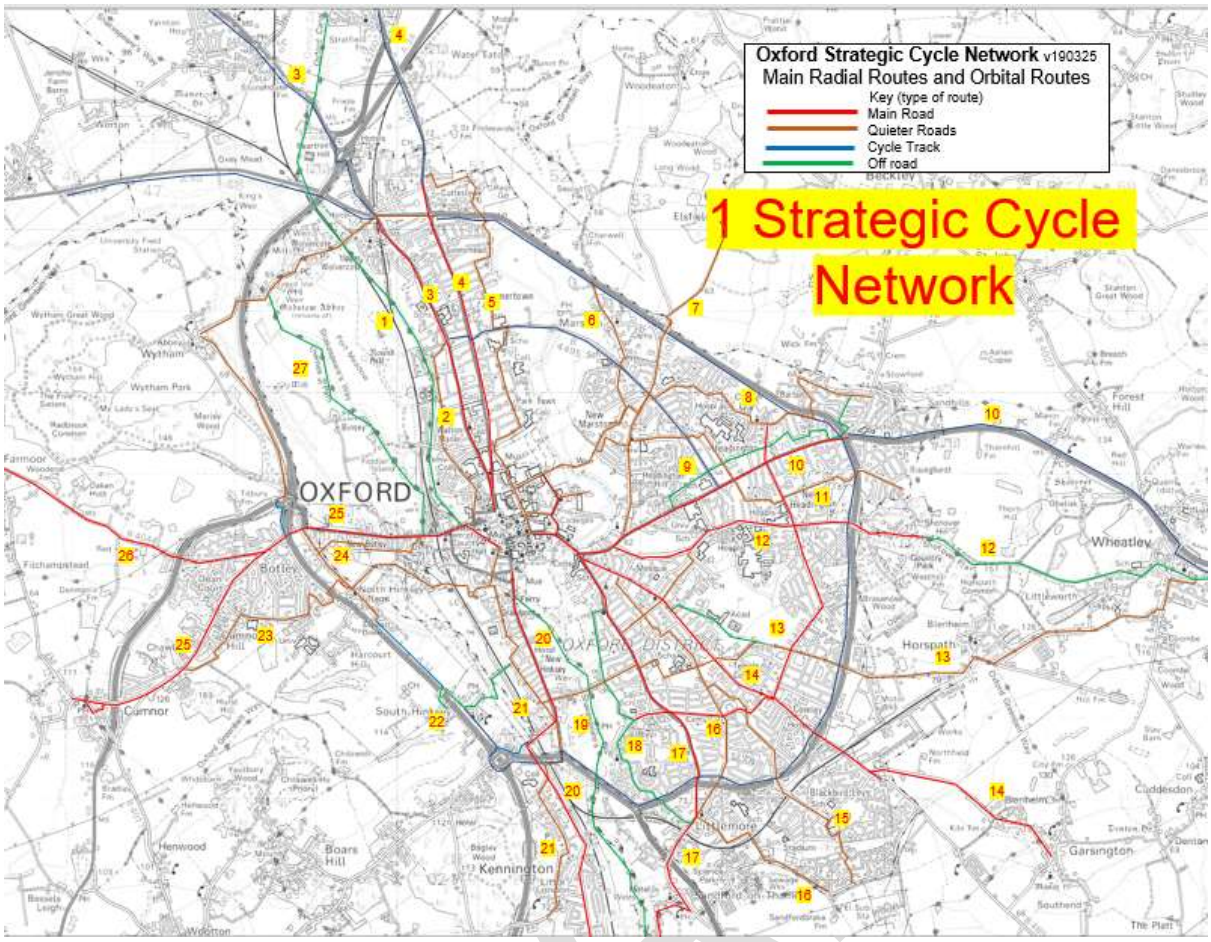
The next chart looks in more detail how each pillar fits in with Council policy and contributes to an increase in cycling with reference to the 5 broad factors F1-F5 in section 12.

8 Pillars	**Policy and Impacts on cycling (and walking)**
P1 Oxford Cycle Network (OCN)	The main LCWIP policy. A comprehensive dual cycle network of Quiet and Quick routes will provide for 2 cohorts of cyclists identified in the Oxfordshire Cycle Survey 2019, encouraging both less confident cyclists who are reluctant to share with cars and more confident cyclists who prioritise directness and speed (F1).
P2 Low Traffic Neighbourhoods (LTN)	LCWIP policy to be included in LTCP 5. LTNs are fundamental in promoting cycling and walking because they remove rat runs (F3) and thereby lead to less traffic and slower traffic speeds (F3) in residential areas, providing opportunities for people to cycle in safety and comfort to the nearest cycle routes (F1), as well as opportunities for parklets and improved local public realm for pedestrians, residents and cyclists (F2). In several cases, the LTNs will potentially remove nearly all the traffic from some of the core radial Quiet cycle routes (F1).

P3 City Centre Control points	County Council policy (Connecting Oxford) currently under consultation. OCC propose 3 central filters preventing cars crossing city centre, but permitting cyclists, buses and taxis. It is predicted that these will lead up to a 30% to 40% decrease in traffic along many of the radial routes into Oxford (F3), thereby allowing better cycle provision (F1) along the main roads and potential for city centre public realm improvements (F2).
P4 Work Place Levy Charge (WPL)	County Council policy (Connecting Oxford) currently under consultation. OCC propose WPL charge for Eastern arc businesses (F3) combined with traffic restrictions on the main B4495 orbital road (F3), which will permit better cycle provision along this core orbital (F1). The charge will also help fund new cycle routes and cycle parking (F1) and provide an incentive for modal change from the car (F3).
P5 Average Speed Cameras and 20 mph extensions	LCWIP proposal. Oxford already has 20 mph limits on all residential roads (F3). Better speed control on the main road radials will both manage traffic (F3) and create more attractive cycle routes (F1).
P6 CPZs and enforcement	County Council policy is to extend CPZs across the whole of Oxford. CPZs manage residential parking with enforcement, preventing random commuter, particularly pavement parking which is a deterrent to walking. Cycle lanes and entries can also be enforced (F1). **See walking section**
P7 Public Realm Improvements	LTCP 5 proposed policy: Public realm improvement in the City Centre and local shopping centres will mainly benefit pedestrians but can also provide more space for cycling (F1) and manage traffic (F3). **See walking section**.
P8 Schools	Routes to schools are essential for the next generation of cyclists. **This area will be assessed in the future.**

15 Pillar 1 Oxford Cycle Network

The main element of the LCWIP proposals is the identification and creation of a comprehensive cycle network. Cycleway improvements have been applied to Oxford over many years, but the LCWIP is the first time that there has been a systematic review of the network and the identification of a comprehensive cycle network. The full cycle network is shown in the accompanying file “Oxford Cycle Map”.



15.1.1 How was the cycle network identified?

The cycle network was identified using several data sources and through initial engagement with cycle groups to agree on the network and subsequent consultation with a wide range of stakeholders, typically via presentations combined with Q&A sessions. The box sets out the groups which were involved in the engagement and consultation process. In addition, an internet survey was undertaken of all cyclists.

15.1.2 Oxfordshire Cycle Survey 2019

To ensure that the LCWIP was based on as wide a participation as possible, a survey of cyclists was undertaken - the Oxfordshire Cycle Survey 2019 (OCS19).

The Oxfordshire Cycle Survey 2019 (OCS 2019) was an internet-based survey hosted on Oxfordshire County Council's consultation website for 2 months from 6th June 2019 to 8th August 2019

Oxford LCWIP Consultation
Cyclox (Main Oxford cycling organisation)
OXPA (Oxford Pedestrians Association)
Civic Trust
Oxford Friends of the Earth
COHSAT (Coalition of Healthy Streets and Active Travel)
Oxford University
Oxford Brookes University
Oxford City Council Cycle Forum
Pedal and Post
Oxon Active and Healthy Travel Steering Group
County and City Council members via drop in session
All cyclists via Oxfordshire Cycle Survey 2019

The consultation webpage invited all cyclists living in Oxfordshire to take part, but particularly those living in the 3 LCWIP towns of Oxford, Didcot and Bicester. Various methods were used to boost sample response, including emailing the survey link to members of Cyclox,

Civic Trust and OxPA (Oxford Pedestrians Association), using twitter and paid adverts on Facebook, press releases, and putting up posters at Oxford, Didcot and Bicester train stations. Over the 2 months, there were 3754 responses, comprising 2559 (68% of total responses) from Oxford City, 436 (12%) from Didcot, 213 (6%) from Bicester and 546 (15%) from the rest of Oxfordshire. There were also around 7000 comments or issues mapped to specific locations on the network

The Oxfordshire survey was intended primarily to understand

- Cyclists' problems in terms of location and type of problem
- Cyclists' route choice and preferences in terms of road types and paths
- Factors (gender, age, cyclist experience) that affect cyclists' route choice and preferences

The underlying purpose of the survey was to ensure that the LCWIP was based on evidence, in particular to make sure that

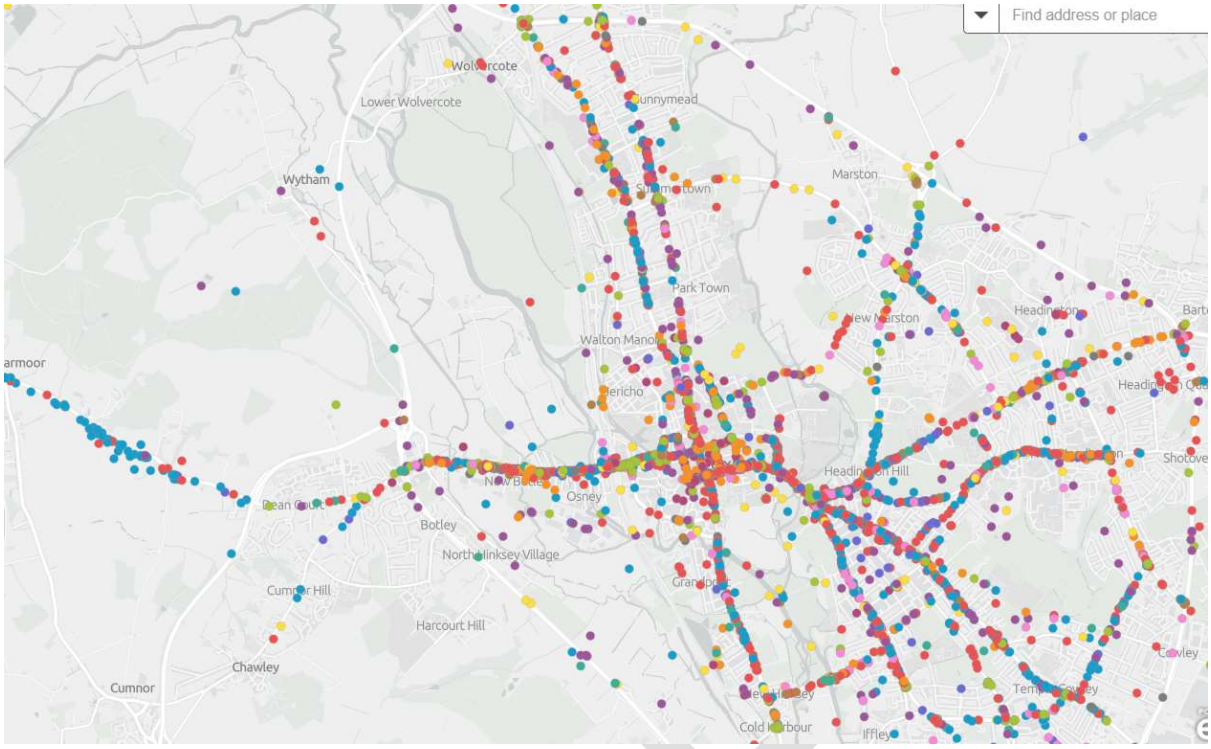
- The LCWIP identified cyclists' problems as cyclists themselves experienced them
- Proposed improvements would meet cyclists' route choice preferences
- Disagreements about infrastructure designs could be resolved on the basis of evidence rather than just individual perception

Analysis of the data in the survey has permitted:

1. A detailed assessment of existing cycle routes based on the detailed locational comments
2. An understanding of cyclists' priorities and preferences in terms of route choices, which have been incorporated in proposed cycle infrastructure improvements
3. The creation of the Oxfordshire Cycle Route Assessment Matrix (OxCRAM) to assess existing cycle routes in line with cyclists' assessment of cycle routes

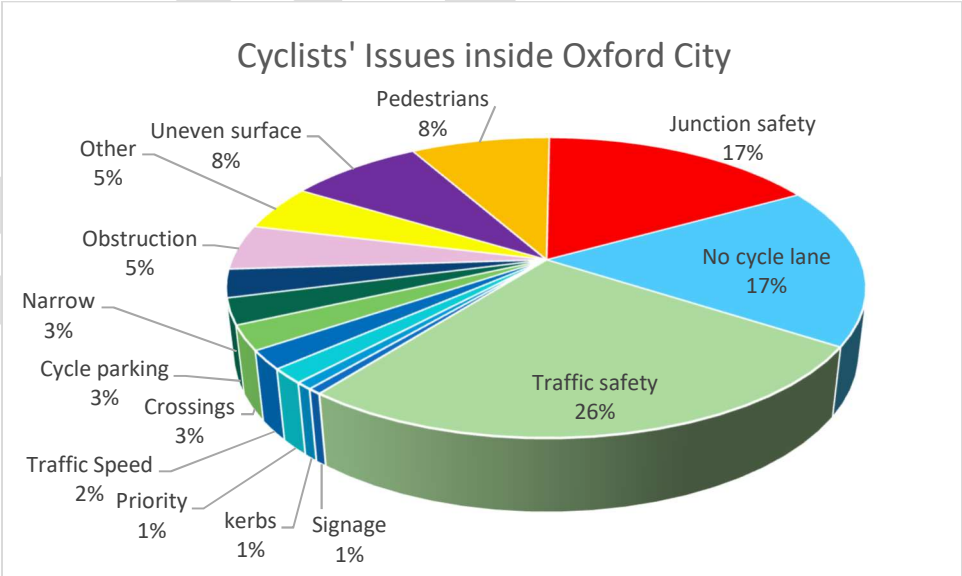
15.1.3 Detailed comments

The map below captures all the locational comments from the OCS19 for a section of Oxford. Altogether there were 4648 issues located within Oxford City Boundary. The comments are particularly focused on the main roads where cyclists evidently experience most conflicts. These comments have been assessed in the evaluation of cycle improvements in the LCWIP.



Oxford Plan showing location of detailed comments about cyclists' problems
Source: Oxfordshire Cycle Survey 2019

The colour of the dots represents the main issues. The chart below shows Oxford City issues grouped in order of importance using the same colour coding. Issues relating to safety account for over 60% of issues, in particular issues relating to traffic safety (26%), narrow or no cycle lane (17%) and junction safety (17%).

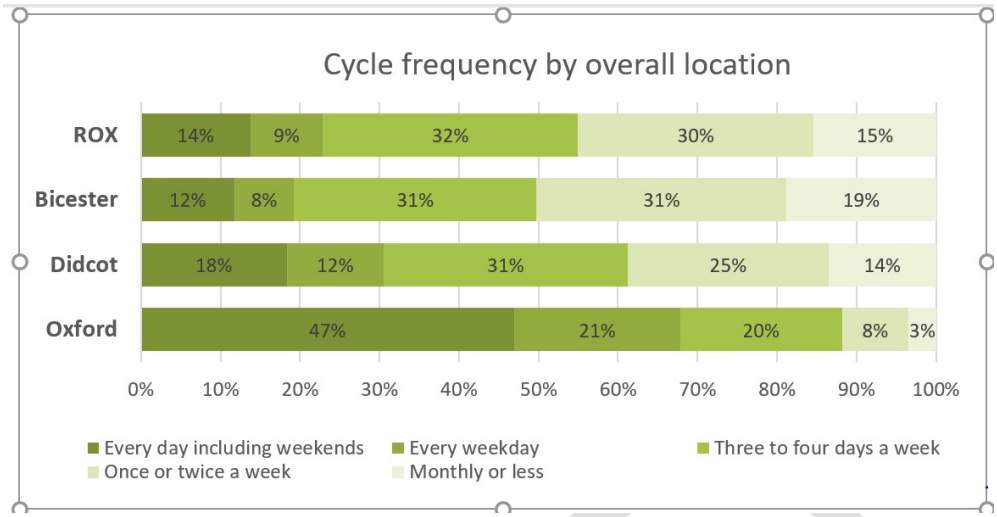


Source: Oxfordshire Cycle Survey 2019

15.1.4 Infrastructure preferences and priorities

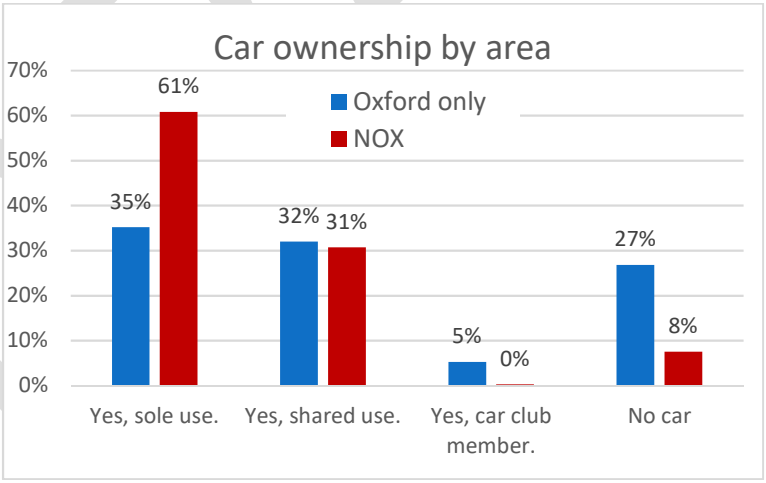
The OCS19 asked questions about infrastructure preferences and priorities. The survey showed was that there were many distinct differences in the responses of Oxford cyclists compared to cyclists in towns outside Oxford. What underlies these differences is that cycling has become almost normal behaviour in Oxford. The normality of cycling in Oxford was shown in various ways. Oxford cyclists were much more likely to be very frequent cyclists with 47% of respondents using their cycle 'every day including weekends' and 68%

at least ‘every day’ (see chart). The gender ratio was also much nearer equality with 51% male and 46% female (3% other or preferred not to say).



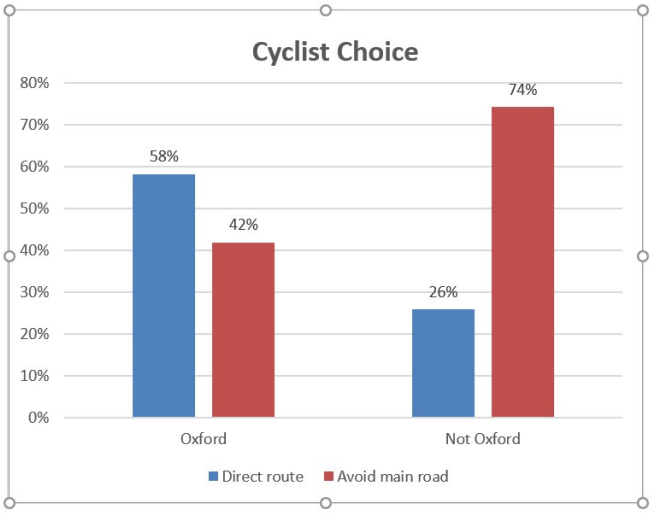
Percentage of cyclists by different frequency of cycling for Oxford, Bicester and Didcot (LCWIP towns) and the rest of Oxfordshire.
Data Source: OCS19

Another key difference was that Oxford cyclists had much lower levels of car ownership – 35% with ‘sole use of a car’ in Oxford compared to 61% outside Oxford. This effect was then multiplied, because lower car ownership was combined with less car use even for those with cars. Only 28% of cyclists with ‘sole use of a car’ in Oxford chose ‘car’ as their main mode compared to 51% of cyclists with ‘sole use of a car’ outside Oxford. This demonstrates how even those with a car will choose to cycle if the culture is right. Put succinctly, cycling replaces car trips.



Access to a car – Oxford compared to the rest of Oxfordshire
Data Source: OCS19 (NOX = Not Oxford)

Another key difference was that 50% of *Oxford* cyclists chose ‘quickest time’ as one of their 3 main reasons for cycling, which was the choice of just 15% of cyclists *outside Oxford*. Cumulatively, it was Oxford cyclists’ 2nd main reason for cycling, whereas it was the 5th choice of cyclists outside Oxford. This was also reflected in their infrastructure choice, with 58% of Oxford cyclists preferring ‘direct routes sharing with traffic’ rather than (42%) ‘a longer or slower route avoiding a main road’. In contrast, 74% of cyclists in other towns preferred slower routes with just 26% choosing direct routes.



Oxford and Rest of Oxfordshire cyclists' route choice
Data Source: OCS19

15.1.5 Detailed Infrastructure Choices

As a follow-up to the question on direct and slower routes, the survey asked detailed questions about infrastructure choices. For each road type, cyclists could choose 4 options, whether they 1) 'like', 2) 'don't mind', 3) 'use if I have to' (= tolerate) or 4) 'avoid' cycling on that type of infrastructure. The charts below show the choices for *Oxford* cyclists *only*. Chart X shows the infrastructure choices of Oxford cyclists who chose a 'direct route sharing with traffic' (58% of respondents). Chart Y shows the infrastructure choices of Oxford cyclists who chose a 'slower route avoiding a main road' (42% of respondents).

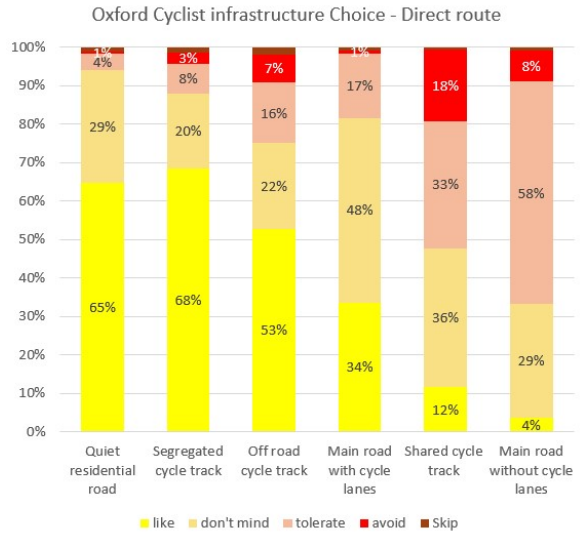


Chart X: Oxford Cyclists choice – Direct route cyclists
Data Source: OCS19

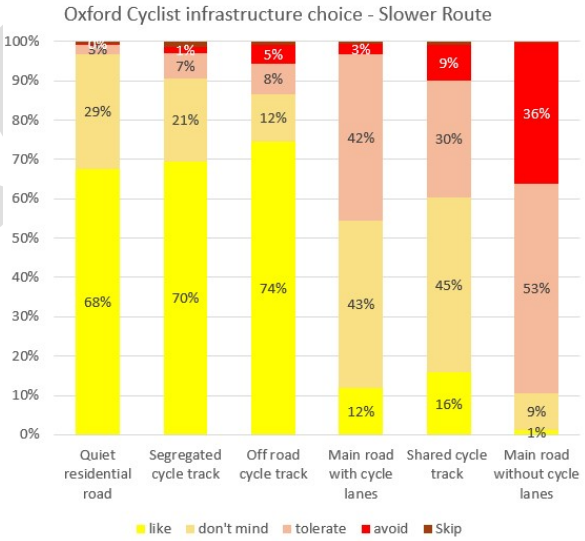


Chart Y: Oxford Cyclists choice – Slower route cyclists
Data Source: OCS19

The charts for the 2 types of cyclists are both similar for some infrastructure types but with key important differences for other infrastructure types. To interpret the answers, options 1) 'like' and 2) 'don't mind' are regarded as *positive* whilst options 3 'tolerate' and 4 'avoid' are *negative*. Positive means they encourage cycling and negative means they discourage cycling. Options 1, 2 and 3 combined show what infrastructure cyclists are 'willing to use' (rather than option 4 where they 'avoid' the infrastructure). The chart below shows the order of preference and the percentages of cyclists in each group who are *positive* (like + don't mind) about each type of facility for the 2 categories of cyclists.

Preference	Direct Route sharing with traffic	Slower route avoiding main road
1st	Quiet residential road (94%)	Quiet residential road (97%)
2nd	Segregated cycle track (88%)	Segregated cycle track (91%)
3rd	Main road with cycle lanes (82%)	Off road cycle track (86%)
4th	Off road cycle track (75%)	Shared cycle track (61%)
5th	Shared cycle track (48%)	Main road with cycle lanes (55%)
6th	Main road without cycle lanes (33%)	Main road without cycle lanes (8%)

Definitely Positive Fairly positive Fairly negative Definitely Negative

Whereas both groups are very positive about 'quiet residential roads' and 'segregated cycle tracks', the other categories diverge. The key differences are summarised below.

- **main roads with cycle lanes**: direct route cyclists are definitely positive; slower route cyclists are only fairly positive.
- **shared cycle tracks**: slower route cyclists are fairly positive; direct route cyclists are fairly negative (18% avoiding them).
- **main roads without cycle lanes:** direct route cyclists are fairly negative but still willing to use them (with only 8% avoiding them); slower route cyclists are definitely negative with 36% avoiding them.

These infrastructure choice differences make sense if interpreted in line with direct cyclists' choice to prioritise infrastructure that has minimum delays even at the expense of sharing with traffic. For instance, off road cycle tracks and especially shared cycle tracks by sides of roads have variable quality in directness, pedestrian induced delay, side road delay and diversion, whereas main roads are typically laid out direct and with minimal signal or junction delay. On the other hand for cyclists prioritising comfort, off road cycle tracks and shared cycle tracks parallel to roads are traffic free, even if they are slower. These differences underpin the idea of a dual network of Quick and Quiet routes with cycle infrastructure catering for the different preferences of the 2 types of cyclists.

15.2 Why not a single network which meets both groups' choices?

OCS19 indicates that for a single network to be attractive to both types of cyclist, all routes must use exclusively quiet residential roads, off road paths and segregated cycle tracks alongside main roads. The challenge lies in building segregated cycle tracks, which meet the needs of direct cyclists. Some of the design challenges would be that cyclists are not delayed at side road junctions, interrupted at drive ways and bus stops, there was adequate width to overtake other slower cyclists and cyclists would not be obstructed by pedestrians and other street clutter. This requires a minimum cycleway design width of 3 metres 2-way for cyclists, whilst still allowing adequate widths for pedestrians (also minimum 3 m) as well as other traffic and buses. Most of Oxford's main road network is not that wide. The conclusion is that inevitably design compromises must be made. A dual network ensures that the compromises are aligned with the priorities of the cyclist category and provides each category with a comprehensive choice of routes that suits their priorities.

15.2.1 Other categories – gender, frequency of cycling and age

The OCS19 data was also analysed according to various other categories which research has shown affect cyclists' choice. It was found that gender, cycle frequency and age all had an impact on cyclist infrastructure choice in terms of the percentages choosing between direct routes and slower routes. Females, a lower frequency of cycling (e.g. monthly and less) and older cyclists were all more likely to choose slower routes than males, younger cyclists and more frequent cyclists. However, Oxford cyclists of all those categories were much more likely to choose more direct routes than cyclists outside Oxford. Secondly for all groups, there were cyclists who chose direct routes and those who chose slower routes. This categorisation between direct and slower cyclists by itself was sufficient to capture the

full range of cyclist infrastructure choice. In other words, there was no need (for instance) specifically to cater for women cyclists because the categorisation of direct and slower cyclists captured the full range of female cyclists' infrastructure choice.

Policy OC10: OCC will seek to establish a comprehensive dual cycle network, catering for both 'direct route' cyclists (Quick Routes) and cyclists choosing routes away from traffic (Quiet Routes).

Policy OC11: As far as possible, the core Quick Route cycle network will consist of cycle infrastructure identified as positive in OCS19 by 'direct route' cyclists. Routes will be improved as far as possible to ensure ease of cycle 'flow', including a cyclist design speed of 20 mph (minimum 15 mph) and measures to remove delays, diversions and the need to stop.

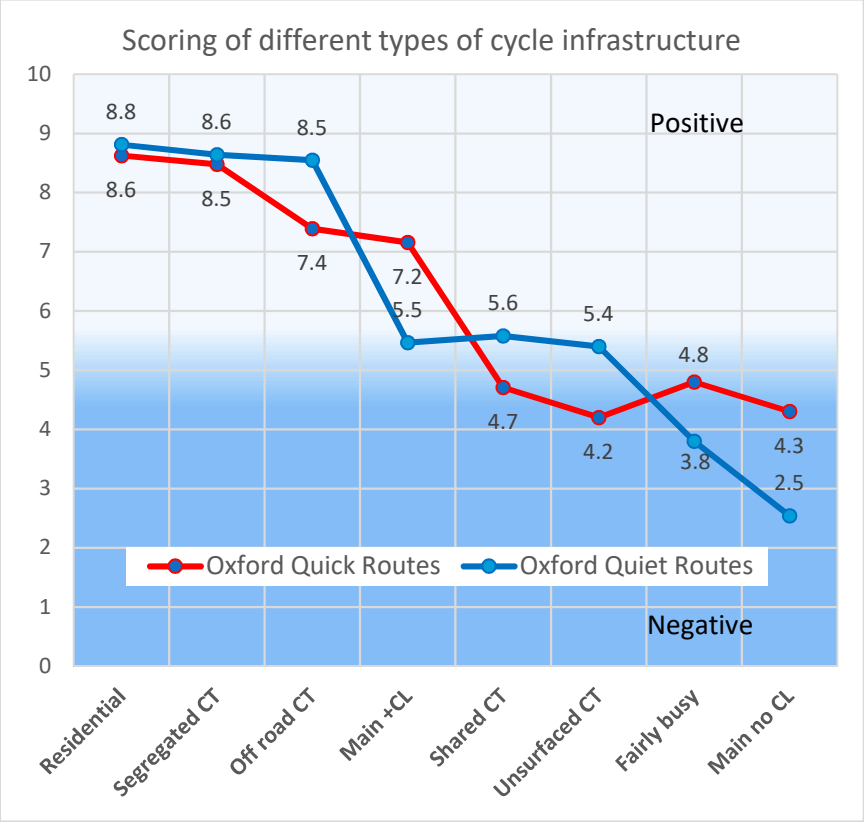
Policy OC12: As far as possible, the core Quiet Route cycle network will consist of cycle infrastructure identified as positive in OCS19 by 'slower route' cyclists. Routes will be improved as far as possible to increase cyclist comfort, including minimising and simplifying interactions with motorised traffic. Where 'fairly positive' infrastructure must be used, extra attention will be paid to improve the experience, such as wider shared cycle tracks or light segregation cycle lanes.

15.2.2 Oxfordshire Cycle Route Assessment Matrix (OxCRAM)

The OCS19 data has also been used to create the Oxfordshire Cycle Route Assessment Matrix (OxCRAM) for the current cycle network. The advantage of OxCRAM is that it is based on what Oxford cyclists said in the OCS19, so it has validity and relevance to current cyclists. OxCRAM has been created by assigning to each cyclist route choice a score of +3 for 'like', +1 for 'don't mind', -1 for 'use it if I have to' and -3 for 'avoid'. The percentages have been converted into a numerical scale which ranges from 0 (worst) to 10 (best). A score of 8-10 is highly positive, 6-8 positive, 5-6 is slightly positive and 4-5 slightly negative, 2-3 negative and 0-2 highly negative

Because there is distinct difference between the choices of 'direct route' cyclists and 'slower route' cyclists, a separate score has been calculated for 'Quick Routes' for direct route cyclists and 'Quiet Routes' for slower route cyclists, based on the choices of those 2 cohorts. The inventory types have been expanded to include 'fairly busy roads' and 'unsurfaced (as opposed to tarmacked) off road cycle tracks'. OxCRAM scoring will be applied to assess the existing cycle network to create a base scoring for each infrastructure type. This base score will then be adjusted up or down to take into account individual locational issues such as lighting, road and path widths, surface conditions, traffic volumes, traffic speed and continuity. The main gap in the OxCRAM scoring is that we do not have data on cyclists' attitudes to bus lanes. A review of Oxford cycle network using the OxCRAM scoring is set out in sections 25.1.2 and 25.1.3.

Policy OC13: OCC will audit the cycle network to measure its attractiveness, using the OxCRAM scale for Quick and Quiet Routes. OCC will prioritise routes based on cycle flows and the OxCRAM rating, particularly where the scale falls below 5. This scale can be used as a basis of audit and review for future schemes.



OxCRAM scoring for different infrastructure, by Quick and Quiet routes
Key: CT = cycle track; CL = cycle lane (on-road)

15.2.3 The near market of potential cyclists

The OCS19 and OxCRAM inevitably rely on the views of existing cyclists, because it is impossible for non-cyclists to assess a type of infrastructure without experience of that infrastructure. There is an argument that potential cyclists may differ in their views, particularly in terms of what incentivises them to take up cycling. The OCS19 analysed cyclists' perceptions of cycle infrastructure in terms of years of cycling but found no significant difference between those cycling for 'less than 5 years', 'all their adult life' and 'all their life including childhood'. This suggests that new cyclists may only differ in underlying categories, such as attitude, gender, age or frequency cycling rather than how recently they took up cycling.

A second counter argument against using OCS19 and OxCRAM could be that some new infrastructure types, e.g. a new off-road cycle track, might incentivise non-cyclists to take up cycling, independent of existing cyclists' perceptions of that infrastructure. There is some research which indicates individual large interventions, such as new bridges or the Cambridge guided busway, can have an impact on increasing cycling levels by themselves.[xvi] Typically these will make cycling considerably more convenient by removing detours or barriers, such as having to cross or use main high speed derestricted roads unsuitable for cycling. The Marston cycle track or cycle bridge to Cutteslowe may be examples of this impact. However, for smaller interventions, such as improving an existing route by creating an off-road path, there is very little evidence of such an impact. Typically, the evidence suggests measured increases on new infrastructure are more due to route substitution by existing cyclists than new cyclists[xvii]. It is therefore considered that creating and improving a town-wide cycle network on the basis of OCS19 evidence is more effective than cherry picking individual routes for improvement.

15.2.4 Updating the cycle network

The Council is currently working with a company See Sense, marketing smart rear bicycle lights at discount rates. These work with smart phones to track the journeys of cyclists, as well as collecting other information such as cyclist speed. The Council will be able to use this data along with personal data to refine the cycle network and help identify routes taken by different cyclist cohorts and for instance, locations or times of the day when cyclists are delayed. This data should become available in 2020.

16 Evidence for impact for the other pillars

16.1 P2 Low Traffic Neighbourhoods

Low Traffic Neighbourhoods (LTNs) are the other main focus of the LCWIP for which funding is sought. LTNs are residential areas where through traffic ("rat runs") is prevented by targeted road closures to motorised traffic, whist still always allowing access for walking and cycling and where appropriate also for buses (a concept called "filtered permeability"). Put simply, for motorised traffic the catchphrase is "to not through". The purpose is to create more pedestrian and cycle friendly streets and a better liveable environment for residents. Waltham Forest in north London is the most prominent and systematic example of this approach in England.

The LTNs in Waltham Forest resulted in an increase in cycling and walking comfort and participation:

- A safety analysis of 11 key junctions (using London Cycling Design Standards methodology) found that safety had improved at all junctions, with 4 moving into the (green) safest category and 4 moving from the (red) unsafest to the (amber) medium safe category.
- Automatic Cycle Counters at 11 locations showed a 20% increase in cycling from 837 to 1005 cyclists per day.
- An independent academic survey (Aldred 2018) found that residents in the area were 24% more likely to have cycled in the follow-up survey compared to those living in other London outer areas, which represents an additional 41 minutes extra walking or cycling per week
- Kings College London research of Waltham Forest's Low Traffic Neighbourhoods suggests that a 7% reduction in NO2 and PM emissions between 8am and 9am is enough to increase children's life expectancy by up to six weeks[xviii]

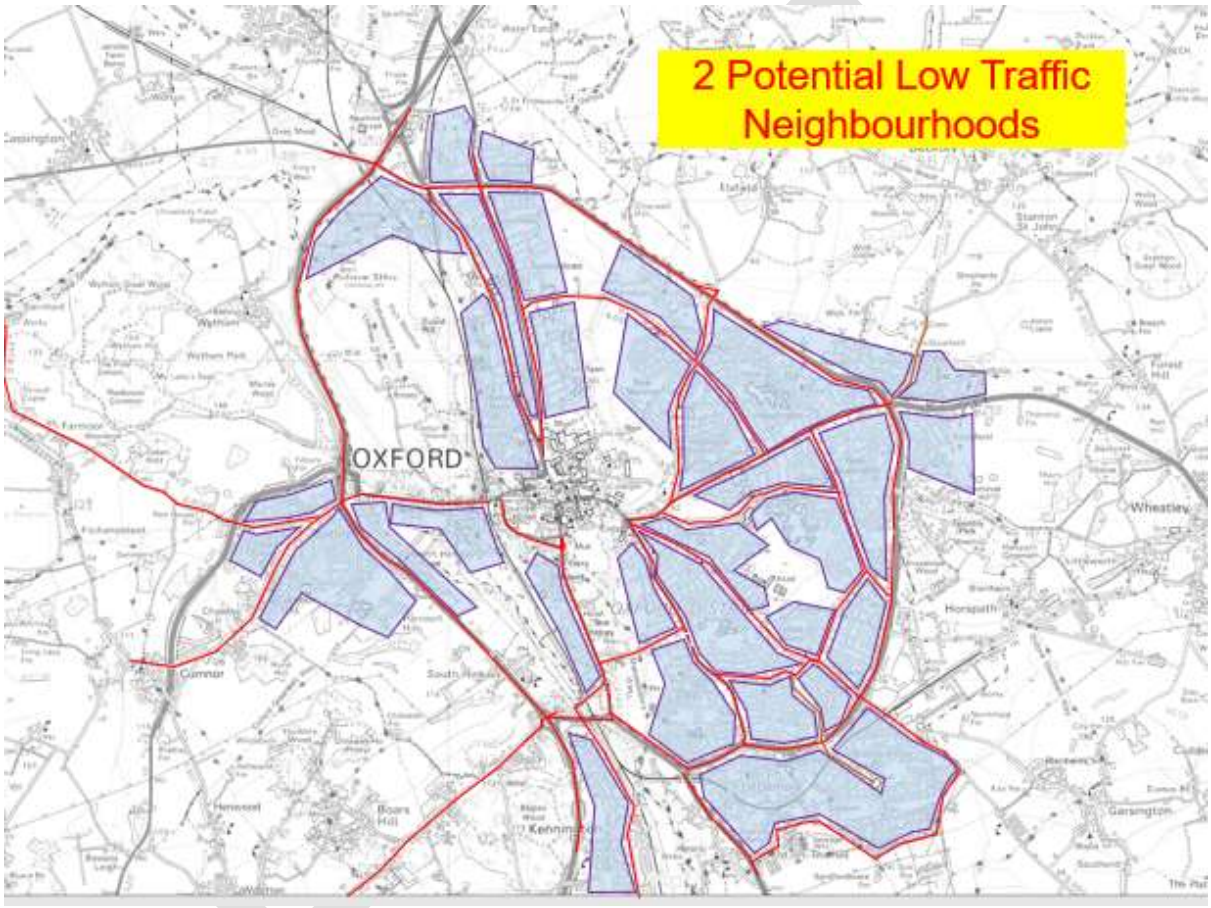
Oxford already has several areas which work as LTNs e.g. Rewley Park. In several locations, OCC has in the past introduced traffic filters to prevent rat running, as in the photos below.

Traffic filter in Bainton Road prevents this road becoming a main radial route into Oxford for motorised traffic and thereby creates an attractive radial route for cyclists

Traffic filter in Freelands Road prevents cars rat running through this residential area to avoid traffic lights

What is proposed is a more systematic approach to implementing LTNs, going beyond just closing rat runs, looking for opportunities to change travel behaviour and improve the local public realm. LTNs could also radically improve the attractiveness of some of the radial and connecting routes, by removing all but local traffic and permitting the introduction of 'cycle streets'.

The plan below gives an indication of where potential LTNs could be sited in Oxford and the strategic road system (in red). It is recognised that creating LTNs requires considerable consultation and engagement to ensure local support.



Policy OC14: OCC will support the implementation of Low Traffic Neighbourhoods in Oxford as a way of improving local public realm and improving conditions for walking and cycling.

16.2 P3 City Centre Control Points and P4 Work Place Levy

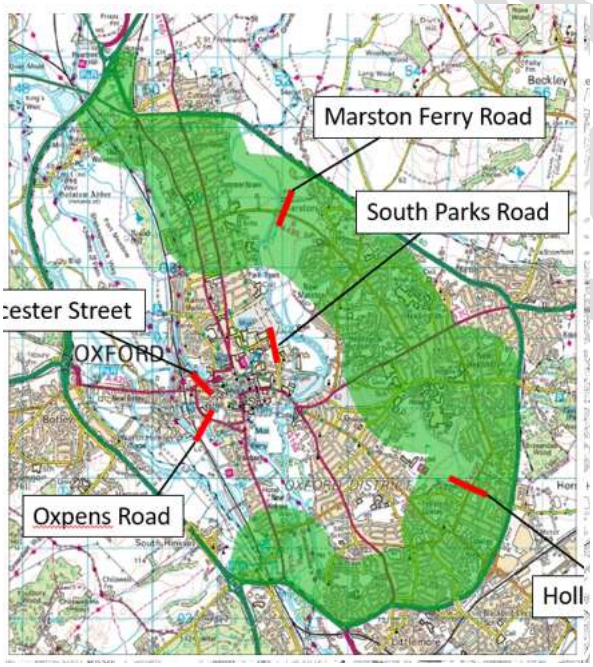
The County Council and Oxford City Council are proposing a number of city centre control points. These city centre measures will be combined with the introduction of a Work Place Levy covering the north to eastern arc, supported by additional control points on the orbital road (B4495). The draft measures are set out in the plan below. These measures were first established in policy in the Local Transport Plan 4 'Connecting Oxford'. The Council is currently consulting on the proposals and a decision will be made in December 2019 whether to develop the proposals to feasibility stage. Issues such as the timing and location of restrictions will follow from the consultation and subsequent work.

The second plan below on the right shows the assumed level of change in traffic levels along the main radial and orbital roads of Oxford. It is assumed that there will be approximately a 10% to 25% reduction in traffic along the South Eastern arc and a 35% to 40% reduction in traffic along the north, west and south radial routes.

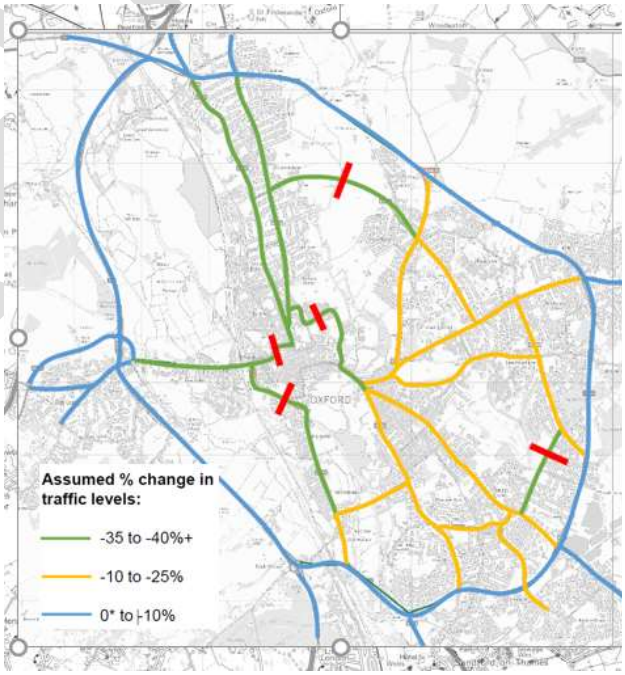
The importance of these proposals for the Oxford LCWIP are twofold:

- The traffic reduction impact of the proposals is essential to the OC1 and OC2 targets of increasing cycling by 50% by 2031. It is calculated that they will contribute over 25% of the increase in cycling.
- The LCWIP designs for the Oxford Cycle Network have been predicated on these levels of traffic reduction. Reductions in traffic of around 10% to 40% permit designs which can be very different from an assumption of existing traffic flows, including for instance removing bus lanes to allow wider cycle lanes rather than providing off road cycle tracks.

The timetable for the Connecting Oxford proposals envisage implementation at some point in 2021. Even though the Connecting Oxford proposals have not been agreed, it is considered appropriate to take account of them in setting out the LCWIP proposals. The proposals are already established in the County Council LTP 4 policies and increasing walking and cycling rates to support healthier communities is a corporate Oxon CC objective. Additionally, the LCWIP is set out over a 10 year period. It is assumed that during that 10 year period, measures will be undertaken to support national Climate Change targets and cycling and walking targets.



Connecting Oxfordshire proposals showing proposed traffic control points and area of Work Place Levy.

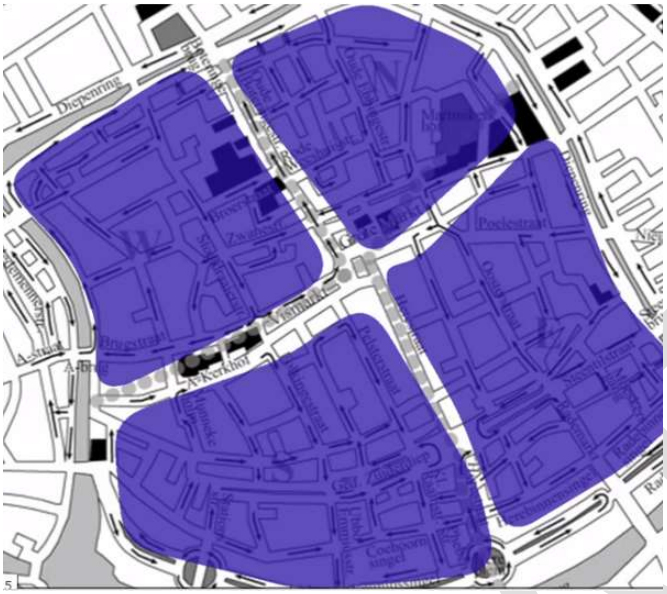


Connecting Oxfordshire proposals showing assumed level of impact on traffic levels of traffic control points.

16.2.1 European evidence - city centre traffic control points

Groningen in the Netherlands introduced traffic control points in 1977 around its city centre. Groningen is a useful comparison because of its similarities to Oxford. It is a compact university city of a similar size (177,000 inhabitants) with around 36,000 students. Its historic centre is also similarly sized to Oxford – around 1km square. This allows us to forecast some likely outcomes for traffic and cycling as a result of Oxford's city centre closures.

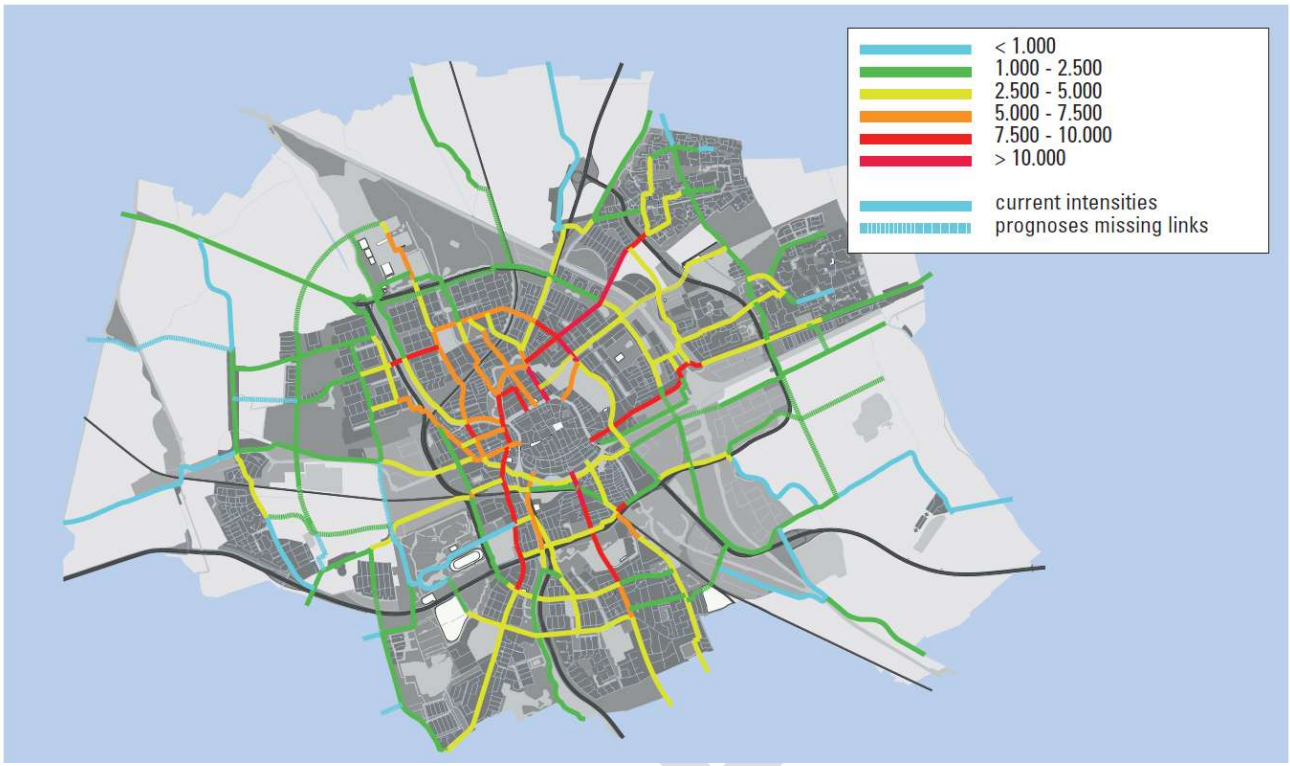
Groningen is now the Dutch city with the highest bicycle share in the Netherlands – 37% of all trips by its inhabitants[xix] (including pedestrian trips) or around 60% by cycle excluding pedestrian trips[xx]. It achieved this step change in cycling by first introducing city centre controls which prevented car travel across the city centre. The control points created 4 city centre cells. It was only possible to cross from cell to cell by bicycle, bus and on foot and not by car. This gave cycling a big advantage in time and convenience over car use in the centre, as shown below.



Groningen city centre traffic cells
Source: https://vimeo.com/76207227

Groningen comparative travel times
Source: https://vimeo.com/76207227

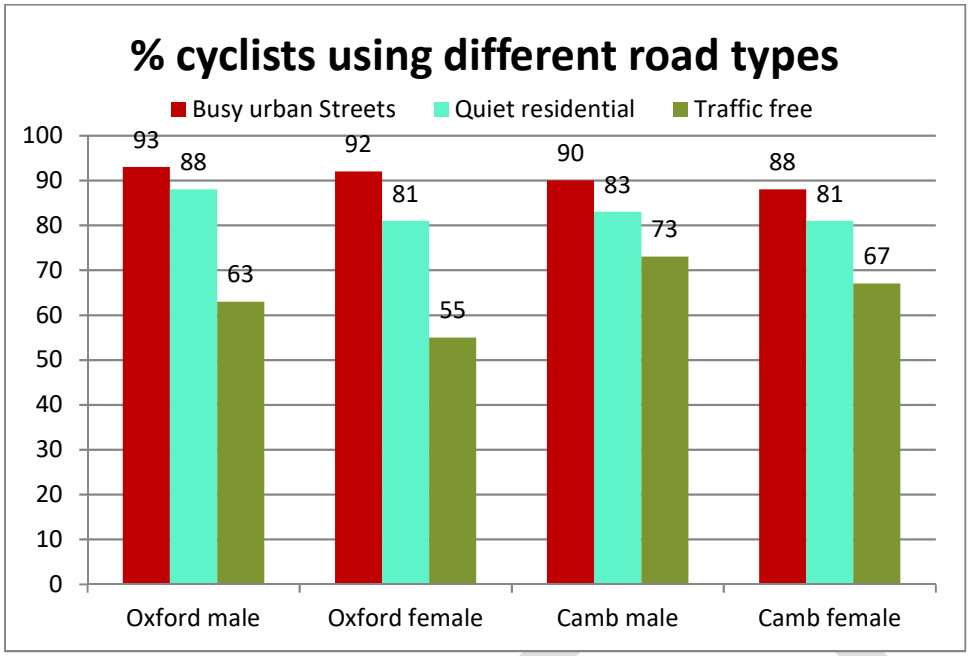
Groningen Council built on the subsequent increase in cycling to expand its cycle network. Around 225,000 people commute to/from the city. Now there are around 150,000 cycle journeys a day, compared to around 50,000 in Oxford. The plan below shows the daily cycle flows on the main roads and paths leading to Groningen city centre. Several routes carry the same flows as Magdalen Bridge in Oxford (over 10,000 cyclists per day). The train station also has around 10,000 cycle parking spaces (compared to just over 1000 at Oxford train station). Groningen demonstrates how cycling can take on the role that the car plays in most other cities. The big difference in travel patterns compared to Oxford is that Groningen has minimal bus use.



Map of Groningen showing 24 hour cycle flows on roads and paths
Source: Fietsberaad "Continuous and integral: The cycling policies of Groningen and other European cycling cities"

16.3 P5 Speed reduction on the main radial routes

Oxford's main road network makes up the core of Oxford's cycling network. Ten of the 27 core radial cycle routes are along main roads with substantial car traffic and bus flows. Every day, around 24,000 cyclists enter Oxford city centre on main roads shared with traffic. Cycling numbers outside the city centre are not so precise, but at 2 km distance from the centre, data indicates that there are around 10,000 cyclists on main roads and at the ring road (3-4 km distance) there are around 6000 cyclists on main roads. With around 50,000 cycle journeys a day (ALS data), this indicates that at least half of cyclist journeys are on main roads in part. The OXCAM 2005 survey of 2338 cyclists in Oxford found that over 90% of all Oxford cyclists, both male and female, responded that they generally used 'busy urban streets' when cycling (see chart). With only minimal changes since 2005, it is likely that these figures still apply in 2019.



Source: OXCAM survey 2005

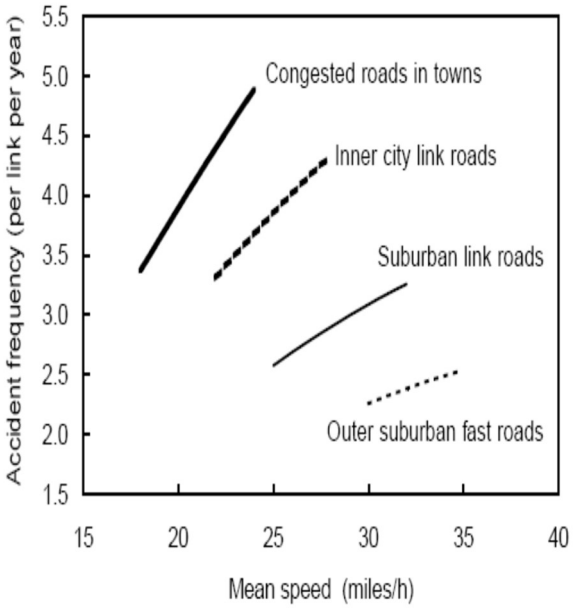
Whereas all residential roads in Oxford City have been designated as 20mph limits, most of the main roads in Oxford remain as 30mph limits. What is more, there is little speed enforcement in the urban area.

Where cyclists share the carriageway on the urban roads in Oxford, even if, as in many cases, there are cycle lanes or cycle tracks, cyclists inevitably need to interact with drivers to a greater or lesser extent on these main roads. For instance, many cyclists will need to cross the main road to go or leave home at some point. Equally drivers will be turning into and out of side roads.

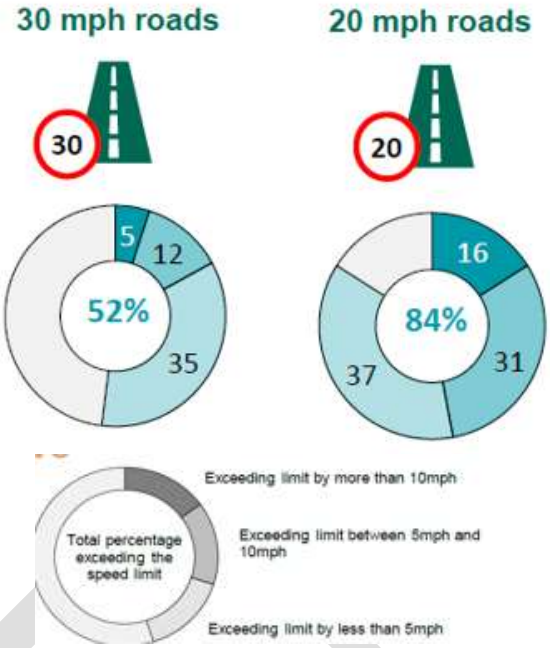
Speed and excess speed can both intimidate and deter cyclists and expose cyclists to heightened levels of hazards. The benefits of lower speeds are also felt by pedestrians and children walking. The DfT undertook a detailed review of the role of infrastructure in relation to the safety of cyclists and their interactions with other road users. The main conclusion of the review was:

"Of all interventions to increase cycle safety, the greatest benefits come from reducing motor vehicle speeds. Interventions that achieve this are also likely to result in casualty reductions for all classes of road user. This may be achieved by a variety of methods, including physical traffic calming; urban design that changes the appearance and pedestrian use of a street; and, possibly, the wider use of 20 mph speed limits[xxi]"

Average speed cameras (ASC) record vehicle speeds over a stretch of road and have excellent compliance in contrast to spot cameras, which measure speed just at one point. In Bedford Borough, they have been widely used to enforce speeds through villages. However, there is potentially an even greater safety benefit if applied to busy main urban roads where speed is a potential problem (see chart). National data shows that around 52% of cars exceed the 30 mph speed limit and 84% the 20 mph speed limit (see chart). ASCs can be used for different speed limits and distances as short as 0.5 miles. Installation costs are around £100K per mile. An advantage of ASCs is that they are effective without traffic calming which is advantage when catering for buses on main roads.



Accident frequency by vehicular mean speed. A steeper gradient means that there are more benefits in reducing speed.



Percentage of cars exceeding speed limits of 30 and 20 mph by <5mph, 5<10mph and over 10 mph

Policy OC15: The Council will review speed limits along the main roads in Oxford city to see if 20 mph is more appropriate, particularly where cyclists share the carriageway or cycle lanes are narrow or large numbers of cyclists or pedestrians need to cross the carriageway.

Policy OC16: The Council will investigate the use of Average Speed Cameras, to see if these can be used effectively and economically to improve pedestrian and cyclist safety along urban main roads

17 Oxford Cycle Network

The accompanying files show the Oxford Cycle Network. This consists of 27 core radial routes (OCR 1-27) and 2 main orbital routes – B449 (OX B) from North Oxford to South Oxford and the ring road cycle track (OX C) which circles the whole of Oxford, along with the connecting cycle routes – in North Oxford OXN 1-13 and in East Oxford OXE 1-15. Additionally, there is the A40 cycle track. In total that makes 70 cycle routes. Together these routes make up the Oxford Cycle Network. The attached file shows the Quietways cycle network. This gives an indication of gaps in the Quiet route network where cyclists will need to use the Quickways network.

Radials: The core network radial network consists of 27 routes

- 8 Quick Routes along main roads (shown in red)
- 11 Quiet Routes mostly along roads (shown in brown - some fairly busy with traffic)
- 8 Quiet Routes along mostly cycle paths (shown in green)

Cycling conditions along these core radials vary enormously and are often poor. Facilities along the main roads are often disjointed and inadequate. Cycle infrastructure along the fairly busy roads is often invisible. Many of the cycle paths are poorly surfaced and too narrow.

Rings: The central ring (OX B) is mostly along busy roads but varies enormously in quality. It includes a high-quality cycle path over one section. The outer ring (OX C) is mostly a cycle

path parallel to Oxford's ring road, generally of reasonable quality but in need of maintenance and with some gaps.

Connectors: The topography of both North Oxford and East Oxford create the need for additional cycle routes that connect from one urban edge to the other urban edge. Many of these routes are along residential roads so are generally OK, but in some cases they are used as rat runs and consideration is needed where they cross the main radials.

City centre routes present different challenges. The main north-south (CN1) and east-west (CE1) cycle routes pass through the pedestrianised city centre and both are blocked between 10am and 6pm every day. Alternative city centre routes are of variable quality and directness.

17.1.1 How have LCWIP cycle improvements been assessed?

The procedure for assessing cycle route improvements has been thorough, within the time and resources available. All the radial and main orbital routes have been assessed. Work continues in auditing the connecting and city centre routes. The following information has been collected and used where possible for each route and route section:

- The routes have been cycled and audited. This includes taking photos of every section, making on the spot measurements and observing cyclist behaviour
- Cyclist casualty data over the last 5 years for each route has been collated and analysed to identify the typology of casualties and possible causes. A casualty rate per 1000 metres and per 1000 cycle journeys has been calculated where possible to identify any peaks or problems
- Cyclist comments/issues in the Oxfordshire Cycle Survey 2019 have been analysed to understand what cyclists perceive as the issues
- Wherever possible a cycle flow rate for each route has been calculated, using either cordon figures, one-off counts, Smart Camera Detection System, Census or PCT (Propensity to Cycling) data.
- The quality of the route has been assessed using the OxCRAM tool
- Data on traffic congestion and potential traffic reduction post-Connecting Oxford have been used as a base case
- The needs of cyclists crossing at Connecting Routes have been identified
- Cycling design standards and best practice examples have been applied to the designs.

Because of the complexity of this data and the length of reviews, the cycle route audits and improvement schemes have been kept as supporting documents and not included in the main LCWIP document.

17.2 Cycle Network – added value and quick wins

In addition to the assessment of each route, there are a number of more general policies and programmes that support the LCWIP and will be needed to achieve the LCWIP cycling targets.

17.2.1 Road improvements and maintenance

Road improvements (resurfacing) present a low-cost opportunity to make significant improvements to cycle routes, particularly those which are reliant on just line marking and especially on main roads where traffic management is a substantial element of scheme cost. Additionally, road maintenance is an important element in ensuring that road or path surfaces on the cycle network are smooth, well drained and attractive to cycling. Many of Oxford's main roads are in very poor condition, especially hazardous to cyclists, in part due to the extra stresses caused by stopping and starting buses.

Policy OC17: OCC will set up a maintenance regime for the Oxford Cycle Network to ensure that the cycle route surfaces are smooth, well-drained and safe, which takes into account the extra vulnerability of cyclists to potholes and rough and deformed surfaces. This will include following up re-instatement works.

Policy OC18: OCC will liaise internally and with cycling stakeholders to make sure that future maintenance schemes that affect the Oxford Cycle Network are adequately assessed in time to identify potential added value improvements.

17.2.2 Removing barriers on cycle paths

Poorly designed barriers on cycle paths can create impassable barriers for legitimate cyclists, particularly delivery cycles and disabled cyclists using tricycles or adapted cycles, as well as unnecessary delay where cyclists have to slow down or even dismount. Additionally, barriers can present hazards where they have insufficient visibility, either through a lack of external lighting or lack of retroflective bands. In general bollards are preferred.

Policy OC19: OCC will with the assistance of Cyclox and cycle delivery companies, review all barriers on cycle paths, both those on the Oxford Cycle Network and local access cycle routes, to ensure that they are convenient and accessible for cycling, taking account of the needs of disabled cyclists and cycle delivery companies.

17.2.3 One-way streets

Many one-way streets have been introduced over the years to manage car flows. For cyclists these will typically create unnecessary detours and diversions.

Policy OC20: OCC will with the assistance of Cyclox review all one-way streets in Oxford, both those on the Oxford Cycle Network and local access cycle roads, to see if they can be safely and economically changed to 2-way for cycling.

17.2.4 Oxford Ring Road

Oxford ring road often presents a considerable physical and psychological barrier to cyclists living in the many neighbourhoods beyond the ring road. To encourage more cycling and meet OC1 and OC2 targets it is essential that it easy for cyclists to cross the ring road without fear or excessive delay. Designs should take into account both the needs of Quick and Quiet route cyclists.

Policy OC21: OCC will undertake a review of all cyclist crossings of the ring road, including road junctions, to ensure that cyclists can easily cross the ring road without excessive delay, detour or danger, taking into account the needs of both Quick and Quiet route cyclists.

17.2.5 Cycle Parking

Secure cycle parking is essential to increasing cycling at both origin (home) and destination.

Policy OC22: OCC with the assistance of Cyclox or Oxford City Council will undertake regular assessments of the city centre, local shopping centres and public destinations to assess whether there is the need and opportunities for more cycle parking. Cycle parking needs to accord with best practice in both design and location.

Policy OC23: OCC with work with Oxford City Council and other districts to ensure that there are comprehensive cycle parking conditions and advice in planning guidance to ensure all new developments include sufficient, secure and convenient cycle parking.

Policy OC24: OCC will work internally and with Oxford City Council to encourage retrofitting of secure and convenient cycle parking in existing developments, such as schools, shops, workplaces, places of entertainment, pubs, church and local halls etc. One method may be funding Park that Bike to supply free bike stands.

17.2.6 Numbering and Wayfinding Signage

All cycle routes on the cycle network have been numbered. This has been done to emphasise the connectivity of the routes from end to end, even though paths and roads may change on the way (in the same way the B4495 follows different roads but together they create an inner ring road for Oxford). Numbering is also important in asset management and route assessment and identification. The next stage is to turn route numbering into wayfinding signage.

Wayfinding (directional) signage has several functions of

- Helping cyclists find their way along a cycle route, particularly new cyclists along Quiet routes
- Helping cyclists interpret cycle maps or apps on the ground
- Encouraging residents to identify routes and thereby use cycle routes
- Reassuring cyclists of the destination and time needed to reach the destination
- Legitimising cyclists' use of the road both to cyclists and to motorists
- Altering driver behaviour to recognise cyclists' use of roads
- Increasing safety and comfort by guiding cyclists through junctions

'Quietway Wayfinding User Testing' by TfL gives advice on important elements of wayfinding signing. Wayfinding signage should include both surface and vertical signage. On-carriageway markings are crucial for night time navigation.

> "if there were no signs, you wouldn't use the routes, you wouldn't remember – you'd feel apprehensive"

Surfaces signage should include

- a cycle logo,
- the route number and
- arrows where there is a change of direction or direction is unclear

Vertical signage should be on the same side of the road as direction and include

- Cycle logo (30 mm size recommended)
- the route number within a coloured patch,
- next and final destination
- Time in minutes to get there (at key intervals)
- Arrows to indicate direction

Policy OC25: OCC will sign the Oxford cycle network, in particular the core radial and orbital routes, using both surface and vertical signage.

17.2.7 Cycle Streets

Cycle Streets (also known as Bicycle Boulevards in USA) originate in Netherlands (Fietstraat) and Germany (Fahrradstrasse). A cycle street is

- On a main cycle route with high cycling flows
- Remains open to local motorised traffic, but
- Cyclists have priority over motorised traffic

Cycle priority means that cyclists can ride 2 abreast and cars have no right to overtake or pass cyclists using the Cycle Street. Cyclists should behave as if they are cycling on a bicycle path and motorised vehicles should also have the feeling that they are on a bicycle

path and should therefore anticipate cyclists' behaviour as though on a bicycle path. Although it has legal backing in the Netherlands, cyclist priority is primarily created by street design and filtering to prevent long lengths of road. Dutch cycle streets typically have around 1000 to 3000 cyclists per day, compared to 100 to 4000 motorised vehicles per day, with a ratio of cyclists vs motorised vehicles varying from under 1:1 to 10:1.

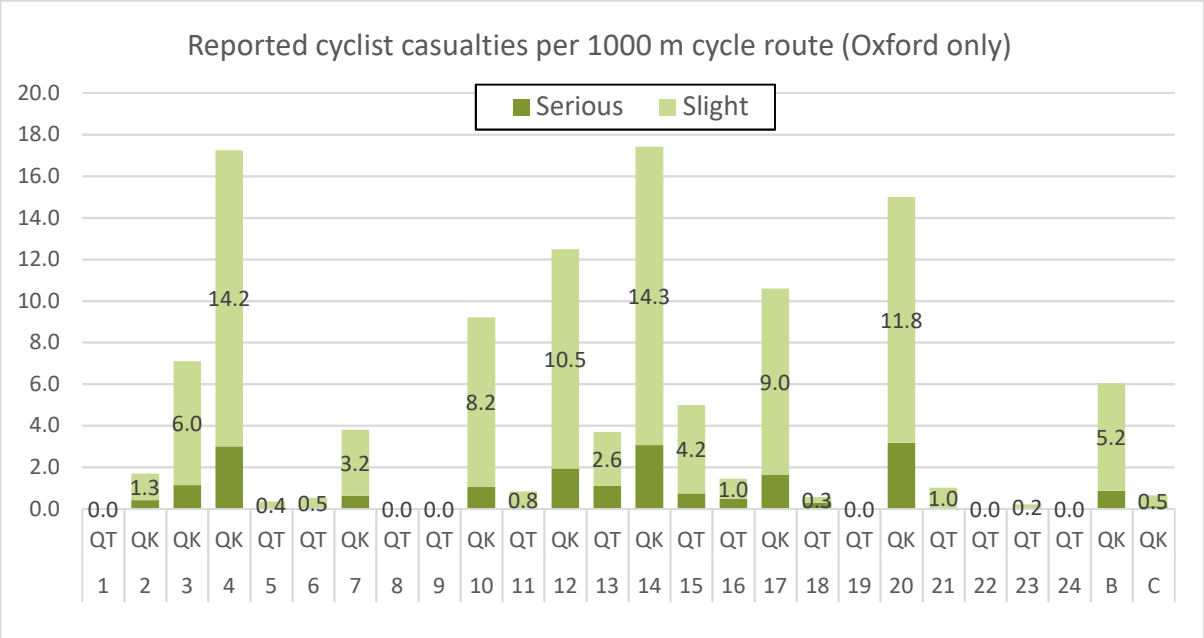
Policy OC26: OCC will trial cycle streets in line with Dutch guidance on core cycle radials where the opportunity arises.

18 Data on Safety

Many cyclists are concerned about their safety whilst cycling. Surveys of non-cyclists typically find that this is the most expressed barrier to cycling. "Cycling is dangerous" is an often-expressed view by both cyclists and non-cyclists. In many ways, danger or safety can mean different things. When cyclists talk about feelings of danger, they typically mean feelings of vulnerability and even intimidation from drivers and motorised vehicles, due to such issues as close passing or being hooted at. These are common feelings among cyclists. On the other hand, there is the Police casualty data which identifies reported casualties and is what transport planner and road engineers think of as safety and danger. As part of preparing the LCWIP, every reported cyclist casualty in STATS 19 over the last 5 years was examined.

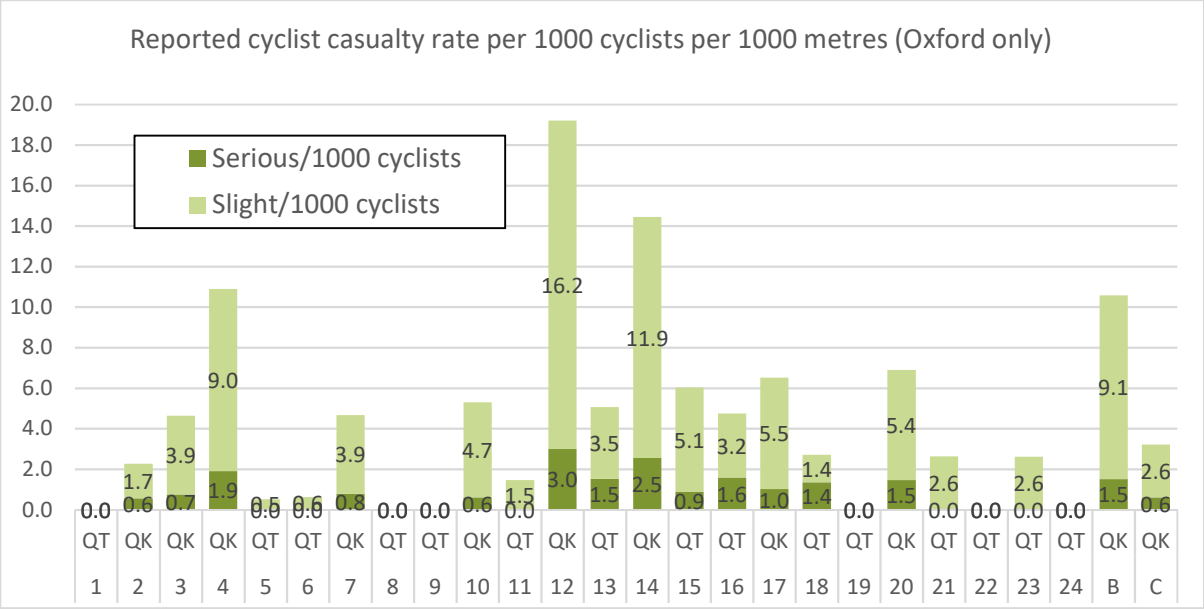
This section gives an overview of this data. For the core Oxford cycle network, there were 80 serious and 397 slight cyclist casualties over the last 5 years. These have been assigned to individual cycle routes.

The chart below shows the casualty rate per 1000 metres of cycle route. As is to be expected, as the Police only collect road safety data and not data from cycle paths as well as the much higher number of cyclists and motorised vehicles on main roads, the Quick Cycle Route have significantly higher cyclist casualty rates than the Quiet Cycle Routes. Routes 4 (Banbury Road) and 14 (Cowley Road) have the highest rates with very similar cyclist casualty rates per 1000 m. This data gives a good picture of the number of cyclist casualties for each route.



Cyclist casualties per 1000 m of cycle route.
Source: Police STATS 19 data from 2014-2019

However, there is a bias in terms of assessing cyclist safety on the basis of casualties per 1000 m when viewed from an individual cyclist view, because the Quick Routes have higher flows of cyclists and motorised vehicles so will almost inevitably have higher casualty rates from greater exposure. The next chart assesses the cycle casualty rate per 1000 cyclists per 1000 metres. This gives a comparable rate that an individual cyclist will face on each route. This shows the risk faced by individual cyclists more clearly and alters the perspective of which are the most hazardous routes. The Quick routes generally still have the highest cyclist casualty rates, though Quiet routes 13 (Barracks Lane), 15 (Blackbird Leys) and 16 (Littlemore) have casualty rates roughly equivalent to Quick routes 3, 7 and 10. OCR 12 is the most hazardous, with OCR 14 next, followed by OCR 4 (Banbury Rd) and OCR B (inner ring). The overall risk of the whole cycle network is 4.5 for any cyclist casualty and 0.8 for serious casualties and 3.7 for slight casualties.



18.1.1 Putting casualty rates into perspective

These numbers are for comparison between routes. What do they mean for an individual cyclist? These figures represent the casualty rates per 1000 cyclist journeys per 1000 metres per day over 5 years. Assuming 300 journeys a year, that means 300 x 5 x 1000 = 1,500,000 cycle journeys. The figures could therefore be multiplied by 2/3 to get a casualty rate per million cycle journeys per 1000 metres or seen as the casualty rate per million cycle journeys of a typical length of 1.5 km. By this scale, a casualty rate of 1 per million, for an individual cyclist making 2 cycle journeys a day of 1.5 km length means that the cyclist would have to cycle for 2000 years before being involved in a reported cyclist casualty.

A commuter cyclist making 2 cycle journeys a day in Oxford is only 2% likely to have a **reported** slight cycle accident in 10 years.

A commuter cyclist would need to cycle 2000 years before they were likely to have a **reported** serious cycle accident.

18.1.2 Is STATS 19 data a valid criterion of real risk?

STATS 19 suggests that cycling in Oxford is a very low risk activity. Even on the cycle route with the highest reported cyclist casualty rate (OCR 12 with 20 casualties per million cycle journeys per 1.5 km), a cyclist who makes a 1.5 km cycle journey twice a day for their entire life (50 years) is only 50% likely to have a slight cyclist casualty (average risk is one casualty ever 100 years). Slight road casualties are generally really slight (minor cuts, abrasions or

bruising) which do not result in broken bones or hospital visits. In other words, they are the kind of injury that you expect at times doing nearly any physical or sporting activity.

However, Police data miss 2 aspects of cyclist safety. First, Police only collect data on public highways. Cycle tracks are excluded. Secondly they depend on the casualty being reported so have a bias towards serious collisions involving motorised vehicles and cyclists. We have some idea of the real risk of being involved in a cycle accident from the OXCAM survey undertaken in 2005. This asked respondents to say whether they had had a cycle accident in the last year.

The survey found that (for Oxford and Cambridge combined) around 33% of cyclists had had an accident (which is defined as coming off your cycle whether or not there is any injury) in the last year. The data has been used to calculate the frequency of self-reported accidents in Oxford (using ALS data on the number of Oxford cyclists – 50,000). The data suggests for each year in Oxford that there are approximately:

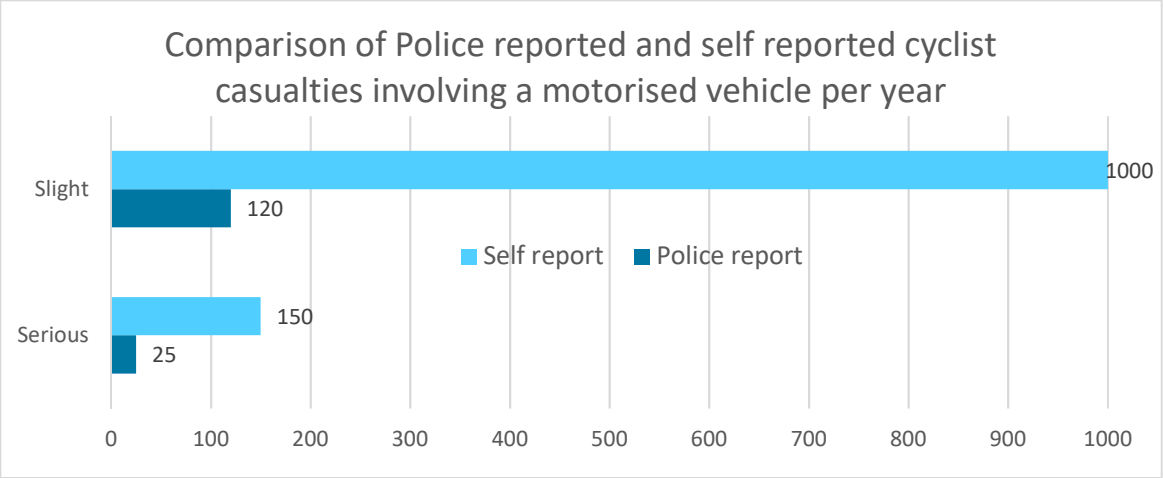
- 17,000 incidents of cyclists coming off their bikes
  - 2200 [13%] in collision with a motorised vehicle
- 12,000 (73%) result in no injury
  - 1000 [8%] in collision with a motorised vehicle
- 4,000 (22%) result in a slight injury
  - 1000 [28%] in collision with a motorised vehicle
- 800 (5%) result in a serious injury
  - 160 [20%] in collision with a motorised vehicle

Note the numbers in () represent the percentage of total accidents and the numbers in [] the percentages that involved motorised vehicles of casualties of that type

A commuter cyclist making 2 cycle journeys a day in Oxford is perhaps 20% likely to have a cycle accident involving a motorised vehicle which results in a slight injury in 10 years

A commuter cyclist would need to cycle 500 years before they were likely to have a serious cycle accident

From this, it is possible to roughly compare the number of Police reported casualties with the number of self-reported cyclist casualties resulting in an injury involving a motorised vehicle on the highway, which is the kind of casualty that should be reported to the Police. This suggests that only 12% of slight and 15% of serious cyclist casualties involving a motorised vehicle are reported to the Police. Very roughly then, it suggests that the risk factors above should be multiplied by 10 for slight injuries and 5 times for serious injuries. This still represents a low injury rate.

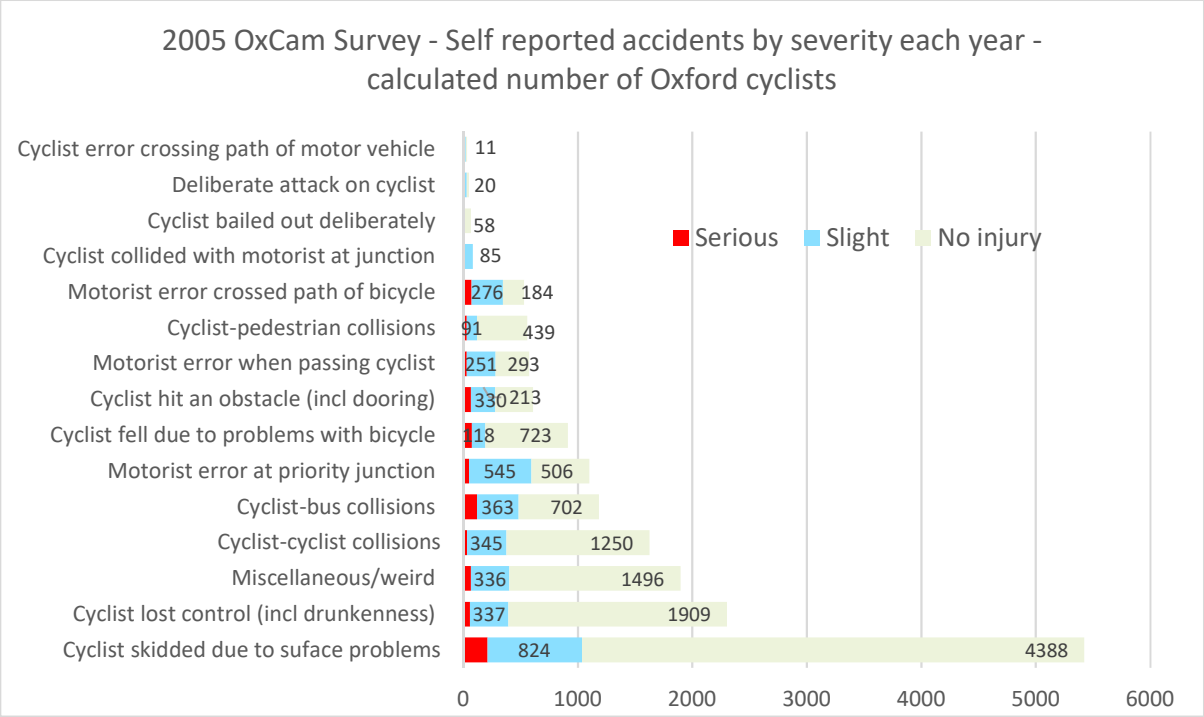


Source: OXCAM 2005 survey of Oxford and Cambridge cyclists. Police STATS 19 data.

18.1.3 Understanding the nature of cyclist casualties

The chart below shows the nature and seriousness of the *self-reported* accidents from the OXCAM 2005 survey, with calculated numbers of Oxford cyclists involved. By far the most common was skidding due to surface problems (32% of total) followed by the cyclist losing control (14%). Cyclist – cyclist incidents are the next (10%) followed by cyclist – bus collisions (9%). Cyclists falling because of bicycle problems (6%) and cyclist hitting an object (3%) make up another 9%. Adding all cyclist – motorist accidents equals 13% of total. Cyclist – pedestrian incidents make up another 3%.

In terms of infrastructure, this emphasises the importance of ensuring that cycle paths and road carriageways have very good quality surfaces and are regularly maintained. The high number of cyclist-cyclist casualties emphasises the importance of adequate width paths.



Calculated annual number of accidents by type in Oxford
Source OXCAM 2005 Survey

19 Cycle Design Standards

This section summarises the design standards applied to the Oxford Cycle Network. OCC produced and adopted its own “Oxfordshire Cycling Design Standards” (OCDS) in Summer 2017. These underpin the proposed designs. However, these are now in need of an update for 4 reasons. There have been changes in national standards. Some OCDS standards do not accord with best practice. The standards do not acknowledge new infrastructure such as Cycle Streets. In some cases, the standards are not being applied due to lack of clarity.

Policy OC27: OCC will undertake a review of the “Oxfordshire Cycling Design Standards” to ensure that the standards are clear, concise and applicable. The standards will be reviewed in the light of new national guidance, new research evidence and new cycle infrastructure options, such as Cycle Streets. The standards will also incorporate the findings of the Oxfordshire Cycle Survey 2019, LCWIP guidance and the Oxford Cycle Route Assessment Matrix, in particular the difference between Quick and Quiet cycle routes.

19.1.1 LCWIP Quick Guide to cycle route infrastructure options

The table below sets out the basic minimum design standards applied to the main infrastructure options based on OxCRAM. Where minimum design standards cannot be met, creative solutions will be applied in line with the type of route (Quick or Quiet).

Cycle infrastructure	Quiet Routes	Quick Routes
Residential roads	Cyclists use all carriageway Combine with LTNs to remove rat-running traffic 20 mph – introduce traffic calming where speeds are exceeded Use surface cycle logos to identify cycle route Core radial routes – design as Cycle Streets	
Off road cycle tracks both types below	Lighting Smooth machine laid tarmac surface Change barriers to bollards Smooth transitions	
1) Segregated off road cycle tracks	Minimum widths – cycle 3 m and footway 2 m wide Segregated by kerb or verge or median strip Design speed 20 mph	
2) Shared off road cycle tracks	Minimum width 3.5 metres Design speed 15 mph	Unsuitable unless on low pedestrian flow paths: Change to segregated
Medium busy roads	Use Cycle lanes or residential roads criteria	Use Cycle lanes or residential roads criteria
Main roads	AS BELOW	AS BELOW
On carriageway (free flow) sharing with traffic	Unsuitable: Change to cycle lane or cycle track	Change to 20 mph (or 30 mph with average speed cameras) Use surface cycle logos to identify cycle route
Bus lanes	Unsuitable? - More evidence needed	Use “Bus and Cycle” surface signage
Shopping and high pedestrian volume streets	20 mph limit On carriageway Shared space schemes or traffic calming to slow vehicles and encourage pedestrians crossing Use large surface cycle logos to identify cycle routes	
Cycle lanes	Minimum 2.0 m width >10,000 cycles per day Minimum 1.8 m width >1000 cycles per day Minimum 1.5 m width < 1000 cycles per day (Quiet add light segregation – wands or ziclas, outside lane widths)	
Cycle track (2 way) both types below	Smooth machine laid tarmac surface Smooth transitions Priority over all side road junctions	
1) Segregated cycle track (2 way)	Design speed <20 mph Minimum widths – cycle 3 m and footway 2 m wide Segregated by kerb or verge or median strip	
2) Shared cycle track (2 way)	Minimum width 3.5 metres Design speed <15 mph	Unsuitable: Change to segregated or cycle lane on carriageway
Segregated cycle track or stepped cycle track 1 way	Minimum 1.8 m width <1000 cycles per day and 2.0 m width >1000 cycles per day with footway minimum 2 m wide Design speed <20 mph Smooth machine laid tarmac surface and smooth transitions Priority over all side road junctions at carriageway level	

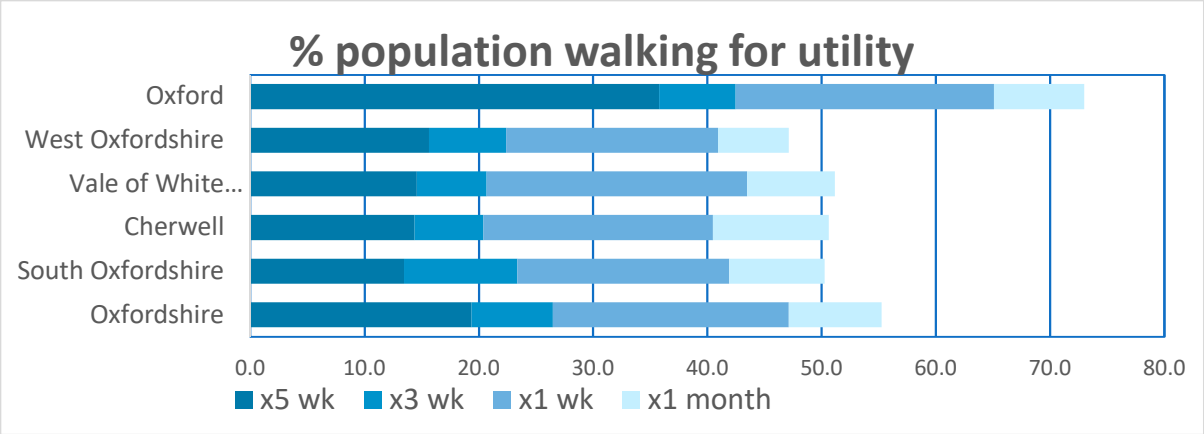
20 Walking

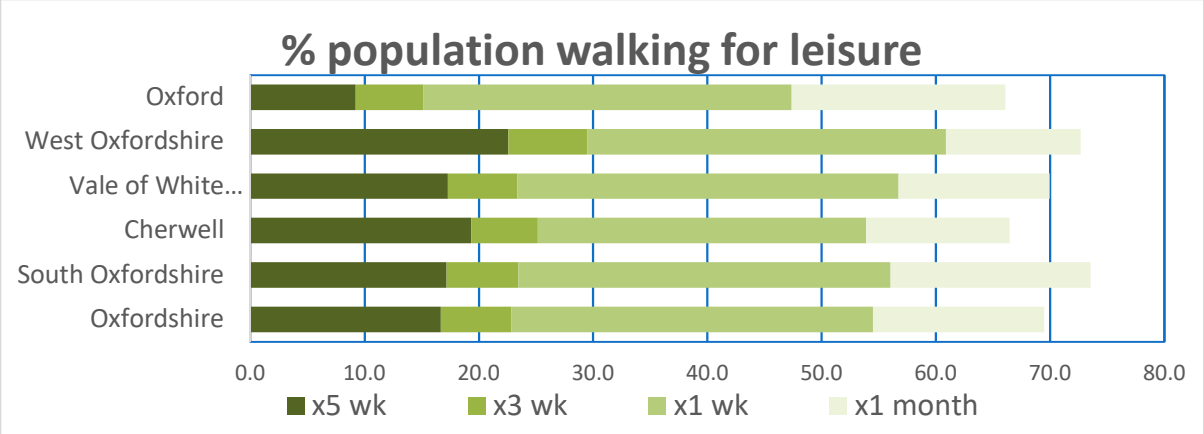
Oxford already has nationally high levels of walking, equivalent to the best central London authorities. The LCWIP priority is to improve conditions for the majority of Oxford population who already make walking trips with the objective that public realm is enhanced and the current high levels of walking are at least maintained. There will be additional health and transport benefits if this encourages more walking, particularly in the most deprived wards in Oxford. Whilst overall walking rates are high, pockets of inactivity exist. Getting people who are currently physically inactive walking for utility purposes would be transformational for health and wellbeing/air quality outcomes. Whilst the LCWIP does not include specific targets for increasing overall walking levels, the LCWIP will support measures to provide appropriate infrastructure for those with mobility issues, children and older people to walk more.

20.1 Data on walking trips

20.1.1 Oxford compared to other districts

Oxford is in the top 10 local authorities in terms of percentage of people walking at least weekly. Compared to other Oxfordshire districts, Oxford has high levels of **utility** walking. Measured by the percentage of the population making at least '5 times a week' trips on foot, 35% of adults do so in Oxford compared to around 15% in other Oxfordshire authorities. In contrast, Oxford has lower levels of its population making leisure trips on foot '5 times a week' (9% compared to 17% in other Oxfordshire districts). The high levels of utility walking account for Oxford's high overall percentage of walking trips.





Data source ALS 2017/8

20.1.2 Frequency of walking in Oxford and number of walking trips

Around 87% of Oxford adult population walk at least monthly. 44% of adults walk 'at least 5 times a week' and this group make over 80% of trips. Altogether, that translates to around 700,000 walking trips per week or 100,000 trips per day. Census data shows that there are around 20,000 (20% of all trips) commuter walk trips a day (i.e. 10,000 residents making 2 way trips) and ALS shows that 25,000 trips are for leisure (25% of all trips), so there must be around 55,000 trips for utility purposes other than work journeys (55% of the 100,000 trips per day).

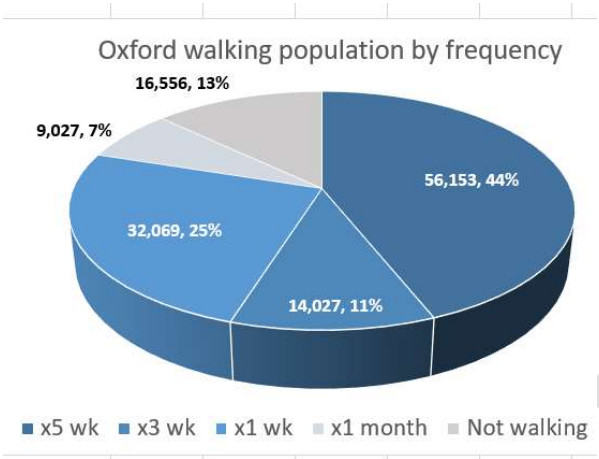


Chart X: Oxford adult population by frequency of walking
(Data source: ALS 2017-8)

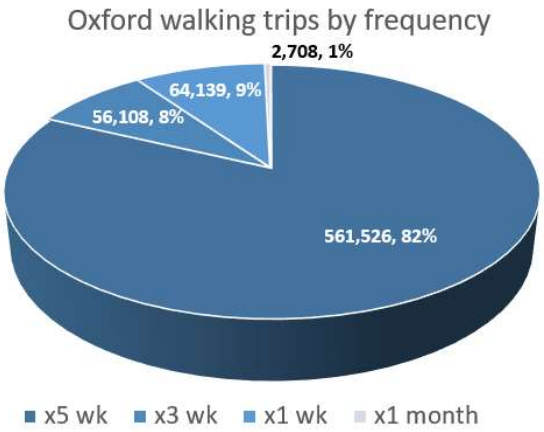
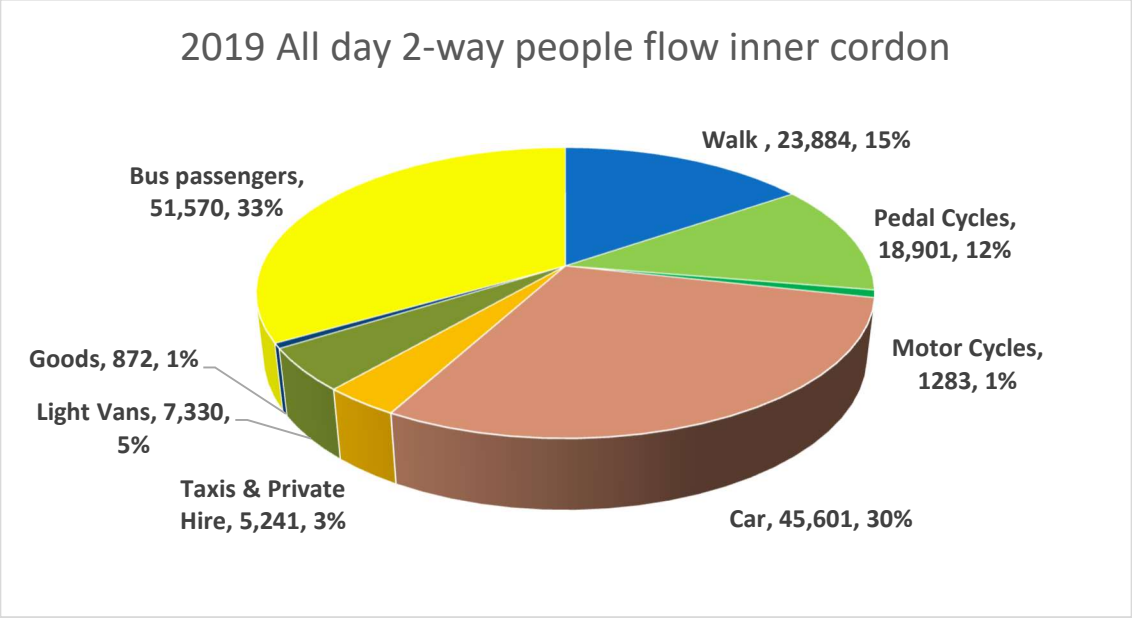


Chart Y: Oxford adult population by frequency of walking
(Data source: ALS 2017-8)

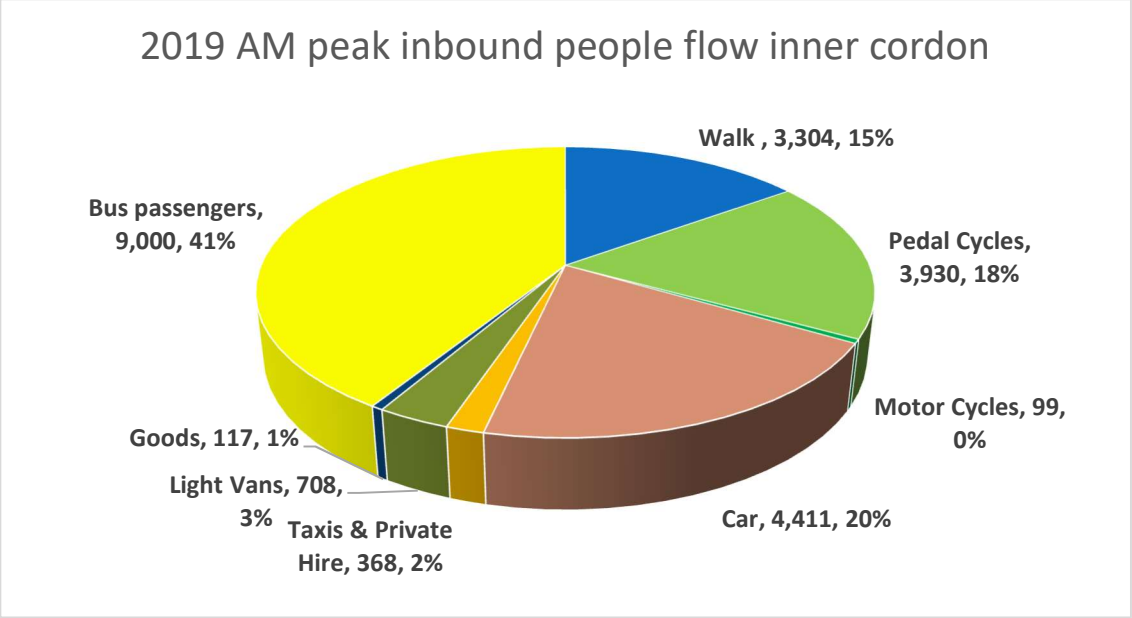
20.1.3 Oxford trips to/from the city centre

Walking shares with cycling the advantage of being a very space efficient mode and therefore contributes to supporting the growth in housing and jobs and the economic vitality of the city centre. However, it was difficult to measure the contribution of walking because walking trip have not previously been collected in most traffic surveys. In 2019 for the first time, pedestrian counts were undertaken at the inner cordon. These showed that over 12 hours (7am – 7pm) there were around 13,000 pedestrians entering and nearly 11,000 pedestrians leaving the city at the cordon points (23,800 in total). The chart below shows the 12 hour 2-way 7am – 7pm flows and modal share for all people trips to and from Oxford city centre including pedestrians. Pedestrians made up 15% of the 150,000 people entering and leaving the city centre.



Source: Inner Cordon 2019 – people numbers calculated from vehicle occupancy rates

The next chart shows the number of people entering the city centre during the peak 2 morning hours when road space is most at a premium. There were just over 3000 pedestrians, making up 15% of 22,000 people entering the city centre.

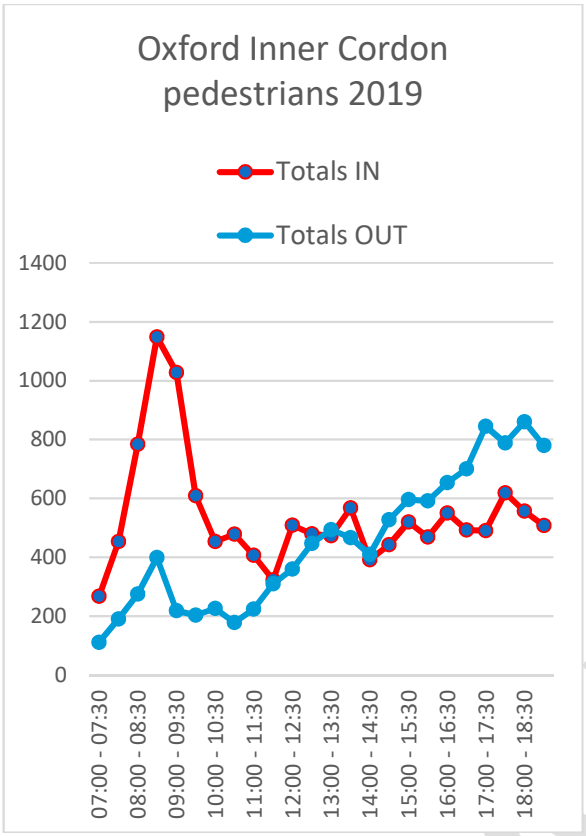


Source: Inner Cordon 2019 – people numbers calculated from vehicle occupancy rates

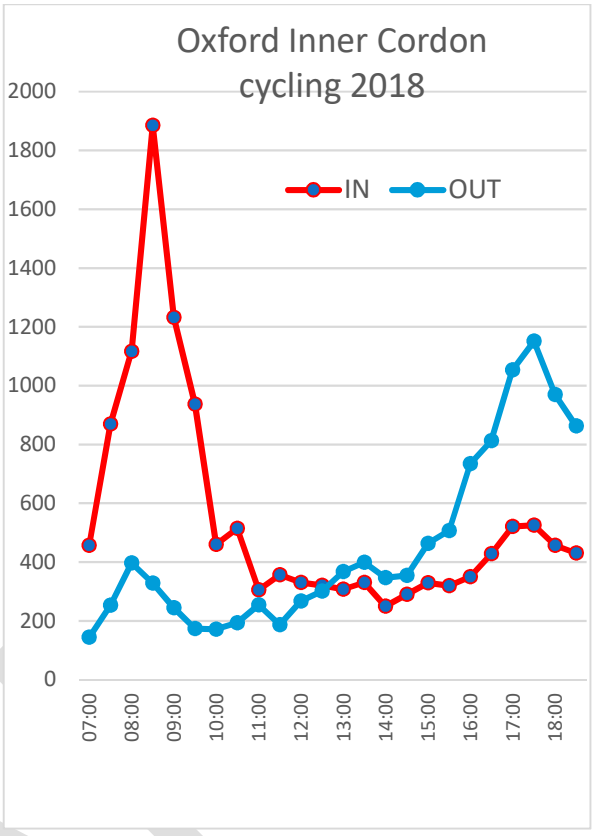
Magdalen Bridge was by far the busiest walking route into Oxford. Pedestrian flows at each of the cordon points were in order of numbers (12 hour 2-way pedestrian flows): Magdalen Bridge 8000, Folly Bridge 4600, Osney Bridge 4000, Banbury Road 2500, Woodstock Road 1800, Pipe Bridge (OCR 21) 1500, Walton Street 800, and Willow Walk 350.

20.1.4 City Centre flow patterns over 12 hours

The next chart compares pedestrian and cycle flows across the day at the inner cordon. Cycling has a much higher morning inbound peak, but daytime levels are lower than for walking. Outbound levels for walking and cycling are similar but cycling has a more pronounced evening peak. This exemplifies how cycling is predominantly a commuter mode whereas walking is used for a wider range of purposes.



Half hour flows into and out of Oxford City Centre – walking
Source Oxford Inner Cordon

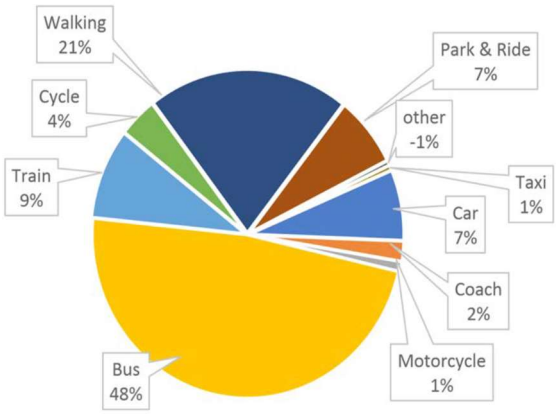


Half hour flows into and out of Oxford City Centre - Cycling
Source Oxford Inner Cordon

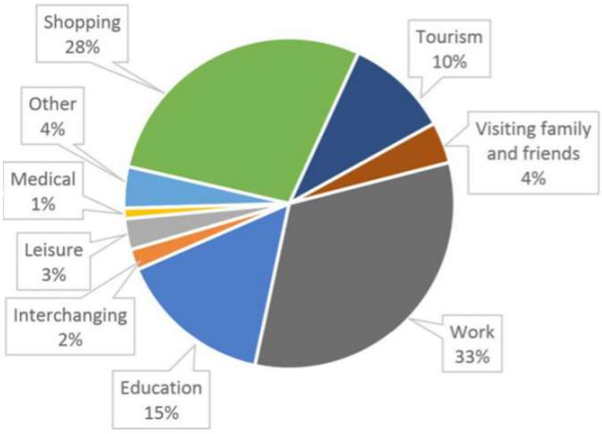
20.1.5 Trips within Oxford City Centre

Many walking trips in the city centre are combined with access by other means, such as the car, cycle or bus. Walking data at the inner cordon on the other hand probably captures people walking all the way from their homes as all the city public car parks and bus stops are located inside the cordon. The Phil Jones report[xxii] undertook city centre pedestrian surveys. The chart below shows that 21% walked all the way, whilst the other 79% arrived by another mode before walking in the city centre. The data should be taken as broadly indicative rather than precise as the specific locations selected mean that cycling and car use are likely to be under-represented.

The survey also asked about journey purpose. The 3 main purposes why people were walking in the city centre accounting for 76% of all journeys were work (33%), shopping (28%) and education (15%). The next highest was tourism (10%) – a reminder of Oxford's international reputation as a destination.



What mode people walking in the city centre used to get there.
Source Phil Jones Report



What purpose people walking in the city centre were there for.
Source Phil Jones Report

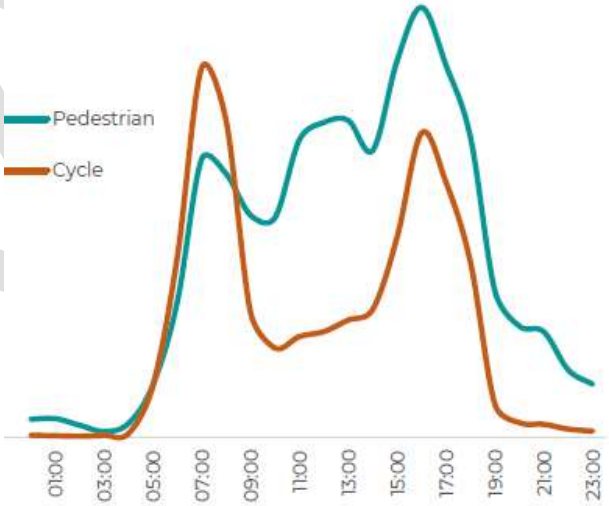
20.1.6 Pedestrian and Cycle Flows in the City Centre

City Centre Surveys show that both Cornmarket and Queen Street have over 30,000 pedestrians from 7am to 7pm with the flows concentrated in those 12 hours. As a comparison, Oxford main pedestrian street flows are twice the town centre flows in Bedford (15,000) with a roughly equal urban population, which demonstrates the retail strength of Oxford city centre, but also highlights the challenge of getting people in and out of the city efficiently. New Inn Hall Street has few shops on it, so the 12,000 pedestrian flows show its importance in terms of city centre connectivity.

Street		
Red Zone		
Cornmarket	32,856	1,099
Queen Street	31,127	1,538
Ship Street	2,023	417
New Inn Hall Street	12,305	1,407

Two-way pedestrian and cycle flows 7am to 7pm

Source 2019 ZEZ surveys



Typical daily profile of pedestrian and cycle flows in Oxford city centre

Source 2019 ZEZ surveys (walking and cycling on different scales)

21 Pedestrian Audits

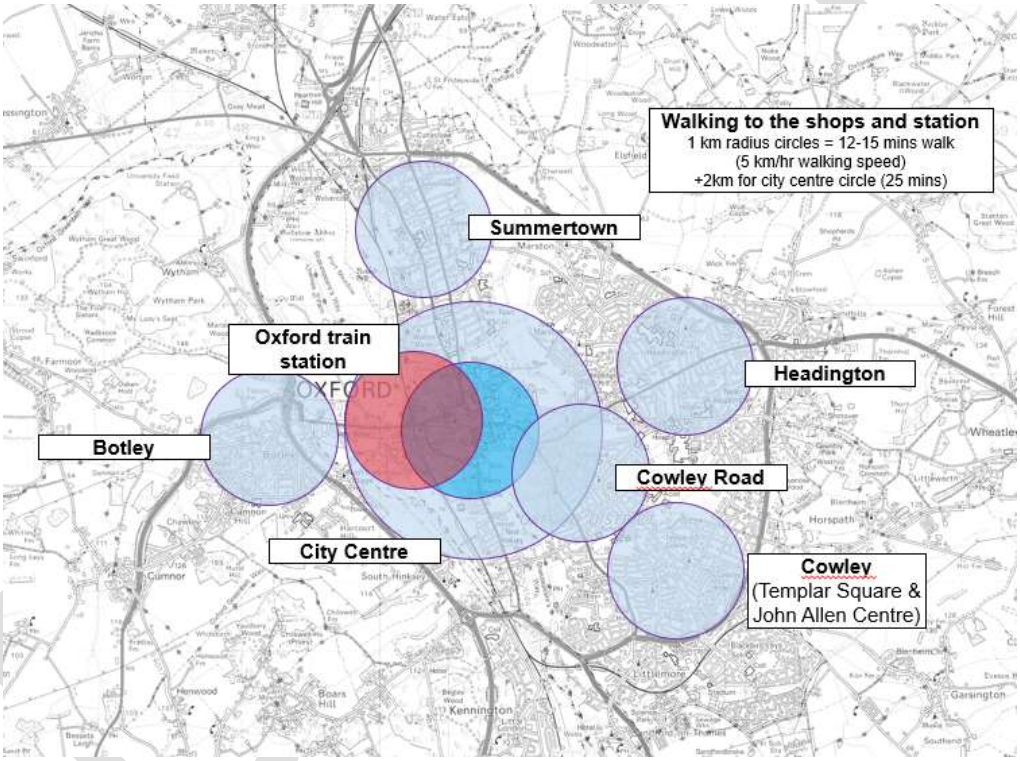
Pedestrian street audits of existing pedestrian conditions were undertaken for the LCWIP. All footways in Oxford are important for pedestrian movement. However, within the limitation of time, audits were focused on areas with higher concentrations of pedestrians. Walking is mostly a short distance mode. The LCWIP therefore concentrated on auditing walking routes to and from the city centre (within a 2 km radius circle) and to and from the local shopping centres and the train station (within 1 km radius circles). The plan below shows the areas of

the audits. For each area, only the high use routes were audited. Another shopping centre in Botley (Elms Parade) was not audited as it is currently being redeveloped. It should also be noted that there are also many other destinations that could have been audited, for example, smaller shopping streets, such as Walton Street, and arcades and work places.

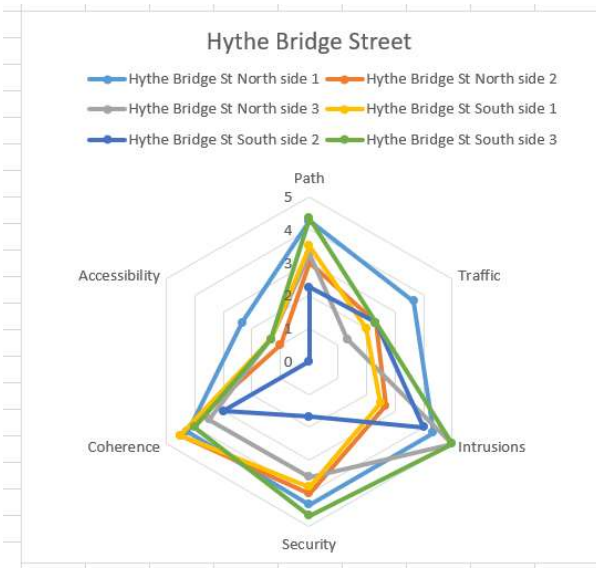
Policy OW1: OCC will devise a Place Shaping Audit system to assess the quality of streets for audit and review in liaison with Public Health.

Policy OW2: OCC will undertake a survey of pedestrians to better understand pedestrian problems, priorities and preferences, in a similar manner to the Oxfordshire Cycle Survey.

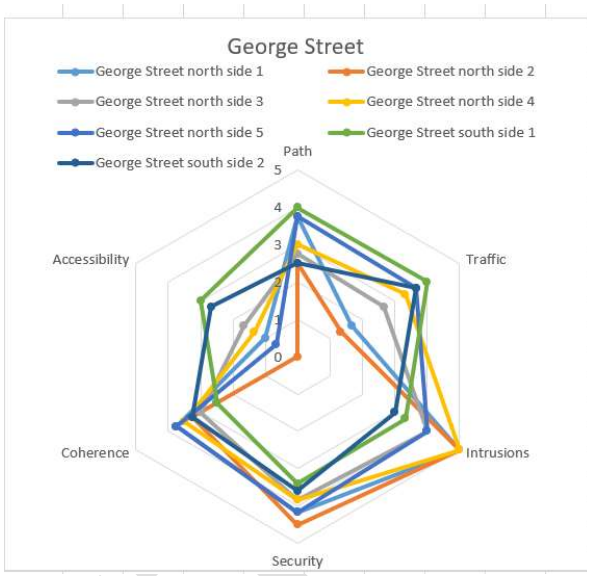
Policy OW3: OCC will review city centre streets in terms of Equality Analysis (EA) guidance, such as Inclusive Mobility guidance, particularly the need to provide smooth connected surfacing for wheelchair users and people with visual problems and seating for the elderly or disabled.



OCC worked with OxPA (Oxford Pedestrian Association) to undertake the pedestrian audits. Initially, a detailed survey of the quality of the pedestrian environment was undertaken using a detailed 6 point assessment on a scale from 0 worst to 5 best. Four city centre streets were audited. Examples of the findings for Hythe Bridge Street and George Street are shown below. Whilst these gave a high level of information, insufficient resources meant that a simpler “pedestrian fault” audit was designed and undertaken, identifying just the problems that could be relatively easily rectified by the Council. The findings of the pedestrian fault surveys are set out in the following sections first for Oxford City Centre then for each local shopping area.



City Centre Audit – Hythe Bridge Street



City Centre Audit – George Street

22 LCWIP Pillar 6: Public Realm in the City Centre

The OxPA city centre audits build on previous work by Phil Jones Associates. The Phil Jones report published in 2018 focused on improving the public realm of Oxford city centre to achieve more walking and cycling. The report concluded

"A key observation for the study area is that there is inadequate pedestrian circulation space along many streets due to high footfalls, particularly on summer weekends when there are high visitor numbers as well as people coming into the city centre from the rest of Oxford and the surrounding towns. These high footfalls conflict with other users, in particular people waiting at bus stops, due to limited amount of footway space available"

The study identified various issues:

- The experience of the public realm did not befit Oxford's status as globally renowned place for learning and international tourism
- The lack of public space where people can simply enjoy the experience, in particular the lack of seating
- The excess of street signs and road marking detracting the quality of public space
- pedestrian congestion, caused by too narrow footways and excessive footfall on some streets, was a major problem

The study proposed various improvements, including

- Broad Street has the potential to be one of the UK's great streets and public spaces
- Improvements to the public realm of Carfax and St Giles
- Reallocation of carriageway space to pedestrians and removing parking in Beaumont St and St Giles
- Pedestrian priority in George Street, Hythe Bridge Street and Park End Street

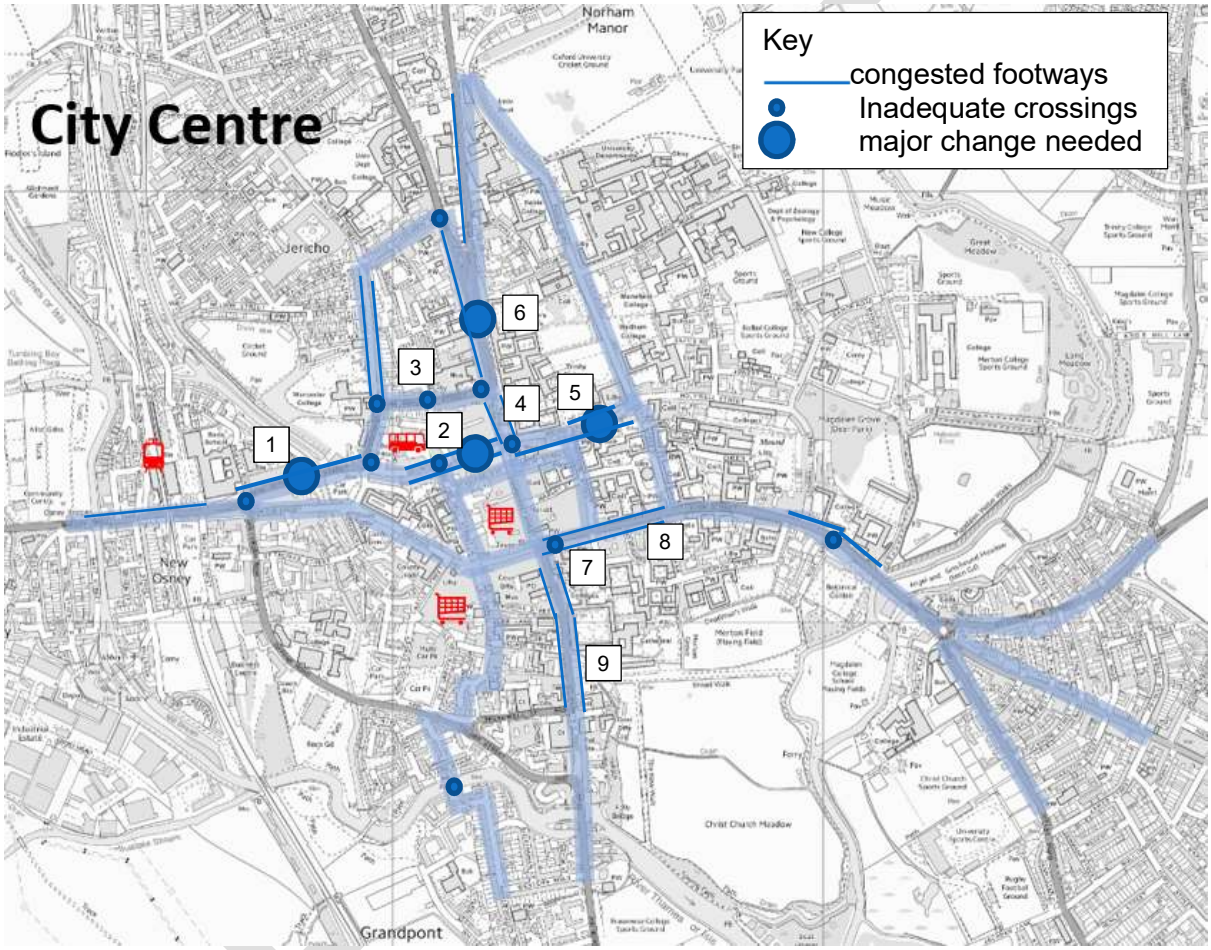
As the study highlighted, one the main challenges to achieving public realm improvements is maintaining Oxford's frequent bus services, mostly due to the congestion impact of buses stopping at bus stops combined with the impact of people queuing at bus stops blocking footways.

OXPA also examined the state of walking in Oxford in their report "A More Walkable Oxford". Their conclusions reflect those of the Phil Jones Report.

"The people of Oxford and the city's visitors deserve a better street environment. The current, mostly unpleasant, experience of being on foot (or wheelchair) in Oxford reflects a lack of focus which leads to well-intentioned policies remaining unfulfilled". ("A More Walkable Oxford" – OxPA 2017).

The Connecting Oxford City Centre control points will bring transformative changes to traffic movements with the City Centre. This will potentially impact on opportunities to make transformative improvements in Oxford City Centre public realm.

The plan below shows the main routes audited and summarises the findings of the city centre pedestrian fault audit, in terms of narrow congested footways, inadequate or congested crossings and highlights the opportunities (post Connecting Oxford) to implement major public realm improvements.



Oxford City Centre: main pedestrian problems (numbers refer to text below)
Source: 2019 OXPA and OCC audits

22.1.1 Major issues

1: **Hythe Bridge Street** is the gateway from Oxford train station to the city centre. Currently conditions for pedestrians are extremely poor, with the north footway overcrowded particularly considering the large number of pedestrians pulling trolley cases. A short sample survey suggested that around 10,000 pedestrians use the footways over a day. Footway widths are narrow. There are near continuous eastbound traffic queues during the day. This is also a principal cycle street and cyclists are forced to filter alongside pedestrians. With large groups of pedestrians meeting continuous flows of pedestrians in the opposite direction, many have to step into the carriageway to pass each other. The Pelican crossing at the east end is frequently blocked by large groups of pedestrians waiting to cross.

2: **George Street** is a continuation of Hythe Bridge Street. Conditions are equally poor for pedestrians but in a different way. George Street footways are narrow and cluttered with street furniture. Food establishments and shops create frequent clusters of pedestrians waiting and crossing. The road is principally reserved for buses, taxis, loading vehicles and bicycles, but traffic blockages often occur. There is a major crossing flow from New Inn Hall Street to Gloucester Green where markets are held on many days, but without any kind of crossing provision, pedestrians are at risk from buses, taxis and commercial vehicles. The traffic lights at the east end create pedestrian congestion.

3: **Beaumont Street** suffers from pedestrian congestion at the 2 signals at either end, with pedestrians often spilling over into the carriageway. Additionally, there is no priority crossing for pedestrians or cyclists in the central route from St John Street to Gloucester Street

4: **Magdalen Street West** suffers from extreme pedestrian congestion. With 2 supermarkets and many bus stops, the west footway is one of the busiest and most constrained footways in Oxford.

22.1.2 Potential improvements

With a proposed traffic control point in Worcester Street, Connecting Oxford presents a unique opportunity to alter bus circulation and remove general traffic to transform the public realm and pedestrian and cycle experience in this area.

Policy OW4: As part of Connecting Oxford traffic control points, OCC will assess the opportunity to transform the pedestrian and cyclist experience from the train station to the city centre.

This should include assessing whether:

- Hythe Bridge Street could become a vehicle restricted area (VRA) with cycles and pedestrians only east of Upper Fisher Row and access and delivery vehicles only west of that point (excluding emergency access for fire engines), with the introduction of high quality level surfacing over the whole carriageway.
- George Street could become a pedestrian and cycle only street east of Gloucester Street and a vehicle restricted area west of that, with all coaches accessing the coach station from Park End Street and Worcester Street only.
- Beaumont Street could become a bus only street (with access) leading to Worcester Street and Park End Street, allowing widening of the footways especially in front of the Ashmolean.
- Magdalen Street East and West could become VRAs with suitable all carriageway surfacing and access for cycles and pedestrians only.

Great Squares

5: **Broad Street** is already partially pedestrianised but pedestrian congestion on the south west footway is severe, along with the problem of turning bus movements. In the light of its outstanding architectural quality and the dearth of public space in Oxford, it is recommended that all public parking is removed and the square repaved with access only to pedestrians, cyclists and commercial vehicle access.

6: **St Giles** is the other jewel of Oxford, but currently the space is devoted almost entirely to parking and traffic movements. In contrast to the wide expanse of carriageway and parking, footways are narrow. Pedestrian congestion along the west side is often severe.

Policy OW5: As part of Connecting Oxford traffic control points, OCC will assess the opportunity of creating high quality public realm designs with priority to pedestrians and cyclists for both St Giles and Broad Street, including the removal of parking.

Carfax (7)**, High Street** (8) and **St Aldates** (9) were the other main problem areas for pedestrians with extreme congestion particularly along St Aldates west side due to bus stop queues and High Street north side due to high flows. The Phil Jones report concentrated on finding a solution for these streets, but the solutions were only achieved at the expense of unacceptable changes to bus circulation and a deterioration of other urban spaces. In the interim until the impact of the city centre control points is assessed, it is considered that limited improvements are only possible.

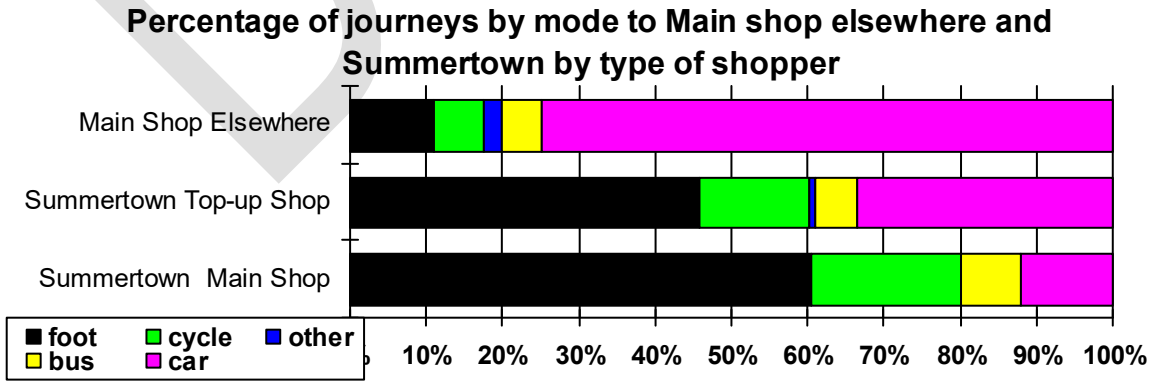
Policy OW6: OCC should keep the corridor High Street to St Aldates under review to see whether there are opportunities to improve the pedestrian and cyclist experience post Connecting Oxford measures.

23 Oxford local shopping centre trips

Oxford has 4 local or district shopping centres – Cowley Road, Cowley Centre (Templar Square + John Allen Centre), Headington and Summertown. Together the 4 shopping centres previously accounted for around the same retail space as the city centre (before the Westgate centre was expanded). There is also a 5th shopping centre within the Oxford LCWIP area – Elm's Parade in Botley, outside Oxford City but within the LCWIP area, which is currently being redeveloped so has not been audited or assessed. There are no recent local shopping surveys but historical surveys from the 1960s to 1990s indicate that about 60% to 70% of shoppers live within a mile of each centre and they are substantially reliant on walking with around 25% to 60% of shoppers arriving on foot (depending on the centre).

A detailed survey of Summertown shoppers in 1998[xxiii] found that

- 50% of shoppers arrived on foot (16% by cycle, 6% by bus and 26% by car)
- 30% of shoppers set out within 0.25 mile, 50% within 0.5 mile and 70% within a mile (origin was typically either their home or their workplace)
- 30% of shoppers shopped daily and 60% at least 2-3 times a week
- Shoppers on foot spent £11.60 per trip compared to cyclists £12.70 and car occupants £25.00. But because shoppers on foot visited more frequently, it was calculated that shoppers on foot contributed 40% of total shopping expenditure compared to 40% by car occupants (with 15% by cyclists).
- Around 30% of shoppers did their main shop in Summertown, but both 'top up' and 'main' shoppers mostly arrived on foot when shopping in Summertown, whereas most went by car when shopping at their main shop elsewhere – see chart.
- Around 5,000 residents living within a mile used the shopping centre at least weekly



Source: P Lingwood 1998 MSc "Walking to the Shops"

These surveys reinforce the importance of the local shopping areas in terms of reducing longer car journeys and providing local services for those without a car. Retail has evolved over the last 20 years and journey patterns may have changed, but it is certain that the local shopping areas are still important generators of travel.

Policy OW7: OCC in co-operation with Oxford City Council will undertake updated shopping access surveys of the local centres to assess their retail health, modes of access and public realm improvements.

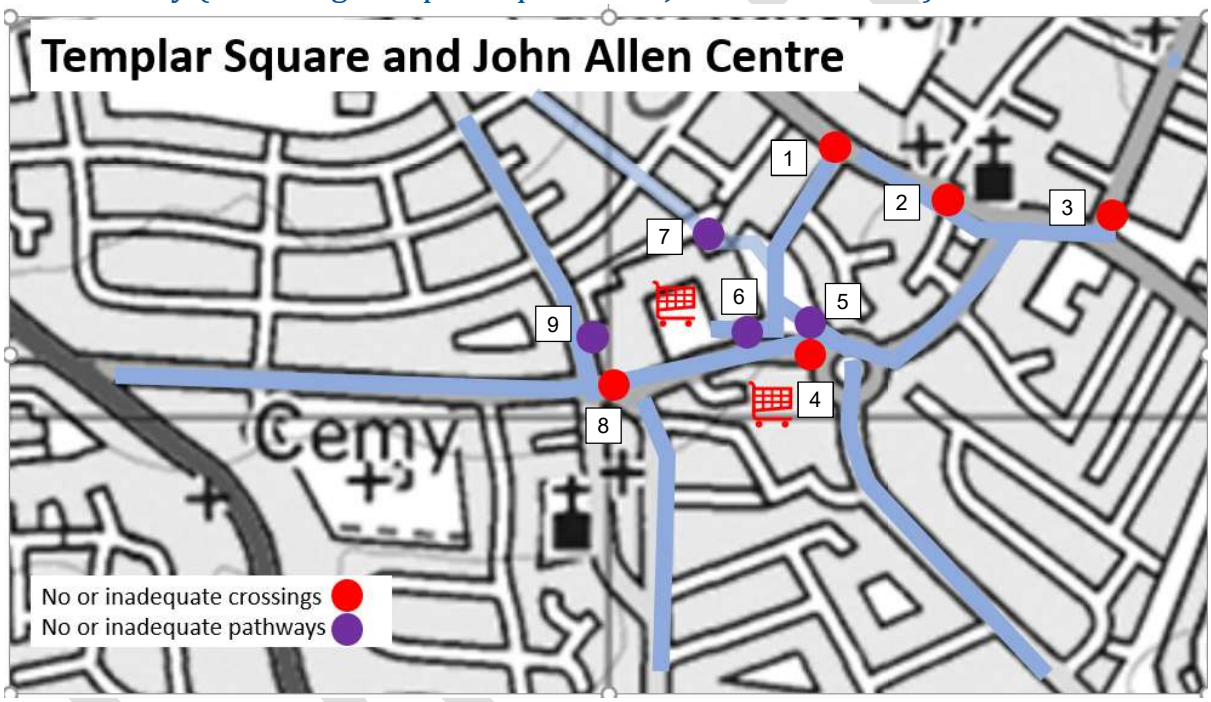
Policy OW8: OCC will seek to improve access to the local shopping centres on foot and by cycle as funding opportunities arise.

Policy OW9: OCC will also seek to improve access to smaller shopping streets and arcades on foot and by cycle as funding opportunities arise

23.1 Shopping Survey findings

The findings and recommendations from pedestrian fault survey of the 4 shopping centres undertaken by OxPA in autumn 2019 are set out below.

23.2 Cowley (including Templar Square and John Allen Centre)



Generally, the walking environment is poor around Cowley Centre. Both the Cowley Centre and John Allen Centre have been designed primarily for the car with little thought for pedestrians and walking desire lines. Many footways and pathways are in poor condition with puddles and ponding after rain and traffic queues are intrusive including the smell of fumes. In spite of this air of neglect, there are very high pedestrian flows, particularly crossing from Templar Square to John Allen Centre. The main issues on routes to and from the centre were

1. No crossing on Oxford Road leading to Cleveland Road or signage to say it connects to the path leading to the centre – needs Zebra
2. No crossing on Oxford Road from busy bus stop leading to Temple Road – needs Zebra
3. No crossing on desire line of Holloway at signalised junction – junction needs redesign as roundabout with Zebra
4. No crossing of Between Towns Road to Barns Road – roundabout needs redesign and Zebra
5. Rough inadequate path with EA impossible step from Between Towns Road – needs smooth transition

6. Path entry to John Allen Centre is very busy with pedestrians but narrow and EA unfriendly – needs redesign and widening
7. Path exit onto Maidcroft Road narrow and EA unfriendly – needs widening
8. Signalised junction at John Allen Centre entry – no crossing of Crowell Road. Green pedestrian phase crossing Between Towns Road conflicts with right turning traffic.
9. No EA friendly path entry from Rymers Lane with obvious foot-worn path showing pedestrian desire line

23.3 Headington

Headington shopping centre has been upgraded with improved footways and footway extensions across side roads. A bit further away Headley Way footway has also been renovated and improved as part of an off road cycle scheme. Some issues are:

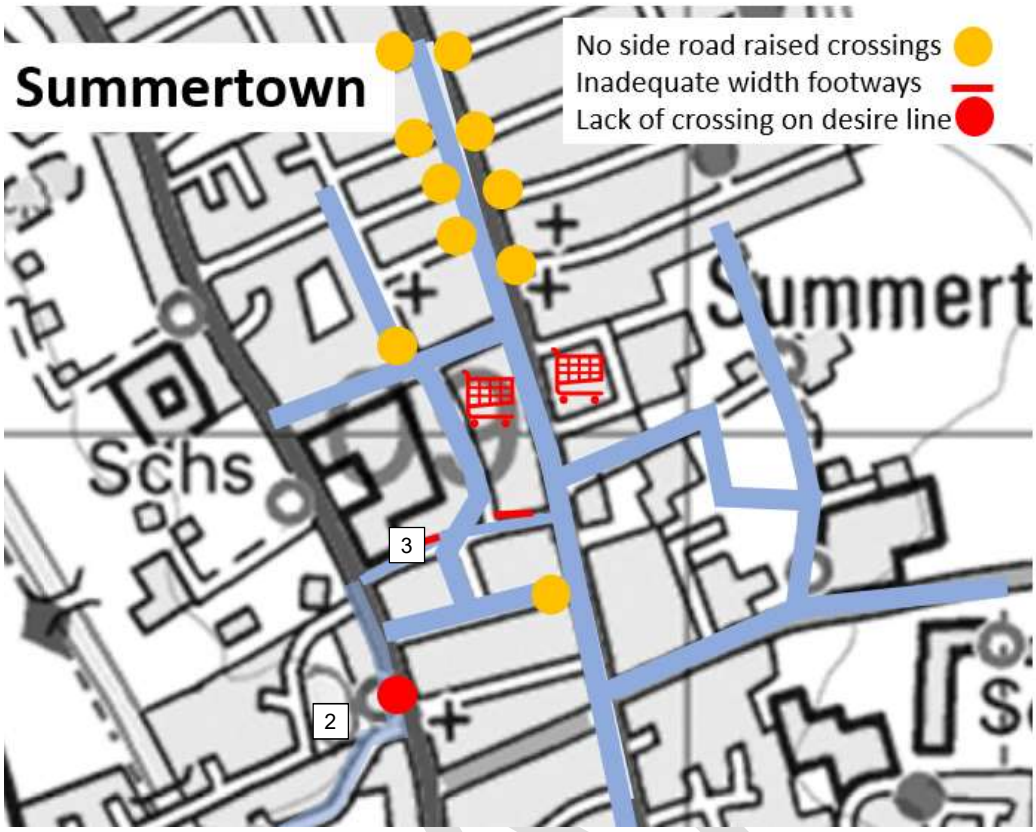
1. Junction of London Road and Windmill Road – long pedestrian delays at signalised junction with minimal pedestrian crossing times.
2. London Road puffin crossing – unnecessary long pedestrian wait times
3. Windmill Road some wide bellmouths and no footway extensions
4. Old Road east of Lime Walk: footway is nearly entirely covered with cycle track with very little space for pedestrians

23.4 Cowley Road

Cowley Road footways were improved as part of a DfT Mixed Priority Demonstration project. The long shopping road has a lively ambience with high pedestrian flows along its whole length. Footways are normally in good condition with raised footway extensions at many side road crossings. There is a very high frequency bus service and the road has some of the highest cycle flows in Oxford. Crossing the road is relatively easy to do with the frequent Zebras and signalised crossings. However, the road currently suffers from severe traffic congestion and concomitant problems with air pollution in the evening peak hours which detracts from the pedestrian experience. Some issues are:

1. Lack of side road footway extensions: Circus Street, Temple Street, Jeune St (off desire line), Marston Road, James Street and Chapel Street
2. Narrow footways: Widen (or in some cases, change loading bay to footway level and design as dual use – loading at certain times, pedestrian footway at the others
3. Outside Tescos – intense congestion and high pedestrian use. Consider installing traffic control point

23.5 Summertown



Summertown has also been upgraded with wide footways and new surfacing. Generally the pedestrian experience is pleasant. Some issues are:

1. Lack of raised footway extensions at side roads in Beechcroft Road, Middleway, Londsdale Road, Roger Street, Portland Road, Grove Street, Hamilton Road, Hobson Road, Victoria Road and Summerhill Road
2. Crossing in Woodstock Road is not on desire line from Bainton Road
3. Narrow footways with steep crossfalls in Oakthorpe Road

24 Pedestrian design policies

There are many principles of pedestrian design which need to be applied throughout Oxford to achieve a change in pedestrian priority and comfort.

Policy OW10: OCC will review and update Oxfordshire Walking Design Guide to ensure it includes the latest guidance and research.

24.1 LCWIP Pillar 7 Controlled Parking Zones

Controlled Parking Zones (CPZs) form one of the pillars of the LCWIP because they have the potential to substantially improve pedestrian comfort and therefore the attractiveness of walking. Parking on the footway is a very significant deterrent to walking, especially to parents with children and older or disabled pedestrians.

24.1.1 Footways (pavements)

Footways form the backbone of the pedestrian network. Most streets of Oxford have adequate width footways on both sides of the road. However, this network is increasingly threatened by the spread of parking on the pavement. The House of Commons Transport Committee issued a report on pavement parking in September 2019. Pavement parking adversely affects vulnerable protected groups, including those with visual impairments, those using mobility aids, those in wheelchairs, those needing the help of carer or parents with

pushchairs or walking with children. Additionally. there are costs to the authority in terms of damage to kerbs and flagstones, creating trip hazards. The report concluded:

> "Pavement parking affects everyone who uses the pavement. Pavement parking puts pedestrians in danger when they are forced to move into the road to get around a vehicle or where there are trip hazards due to damage to the pavement. People with mobility or visual impairments, as well as those who care for others, are disproportionately affected"[xxiv]

It highlighted the problem of enforcement. Whereas most parking offences are decriminalised, pavement parking remains a criminal matter for the Police to enforce. Councils are permitted to introduce Traffic Regulation Orders to ban pavement parking in certain areas under the Road Traffic Regulations Act 1984 but this needs consultation.

In the absence of an easy way of preventing pavement parking, the solution could be included within the extension of CPZs which mark out parking bays and double yellow lines which are enforceable by Council parking attendants. It is already Council policy to extend CPZs throughout the area of Oxford City.

Policy OW11: In line with OCC policy to extend CPZs throughout Oxford, OCC will introduce residential and visitor parking bays combined with double yellow lines to mark out car parking locations. The road markings in CPZs will be designed to:

- Prevent pavement parking
- Ensure that junctions are free from parked cars to ensure safe and comfortable crossings for pedestrians
- Protect entries and exits where cycle or footpaths join roads
- Provide gaps in parking and footway build outs where practicable in locations where pedestrians are likely to need to cross (such as opposite a road or path)
- Provide on street cycle parking bays where there is a need

Policy OW12: Parking bays will not be marked out on footways. This will only be considered if a full assessment of parking provision and need has been assessed, including the use of nearby streets, shows that public support can only be achieved by so doing and adequate width footways are retained in line with EA guidance (2 metres width absolute minimum)

Policy OW13: Footway widths will not be narrowed below 2 metres. Where there is an application for a driveway entry it will be refused if a clear level width of minimum 1.8 metres width cannot be retained for the footway.

24.1.2 Quality Pedestrian Corridors (QPCs)

Quality Pedestrian Corridors (QPRs) represents an approach to important corridors for pedestrian movement. In QPRs, pedestrians are provided a smooth obstacle-free continuous footway. QPRs are designed to give all pedestrians a high degree of comfort and particularly disabled or visually impaired pedestrians the reassurance that they can be used without obstacles. This means among other design issues:

- Ensuring a minimum clear width path (2 metres <1000 pedestrians a day and 3 metres >1000 pedestrians a day) where all obstacles (such as street lights, bus shelters or traffic poles) are relocated outside the clear width either to the inside or outside edge.
- The surface can be flagstones or tarmac but should have no upstands and no areas of ponding. Additionally. the crossfall should be constant at around 3% and driveway entries and dropped kerbs should be outside the clear width path.
- Priority over side roads should be installed at all side roads with extended footway raised extensions, using so-called Copenhagen crossings. These will mirror the

footway surface on either side so giving pedestrians a sense of continuity and priority without the need for tactile paving. At busier junctions where it is thought more highlighting is needed, different coloured surfacing could be used. Ramp gradients leading onto the footway extension will be designed to slow down vehicles.

- Wherever possible side road junctions will be stopped up as part of Low Traffic Neighbourhood programme measures to minimise side road conflicts.

Policy OW14: OCC will assess the feasibility of Quality Pedestrian Corridors for all main radials within 2 km of the city centre and 1 km of local shopping areas, as well as main pedestrian corridors in the city centre

24.1.3 Crossings

Another key element in the pedestrian network are opportunities to cross main roads. Generally, Oxford is quite well supplied with crossings of main roads, but there remain gaps particularly away from the city centre. What is the best option for a crossing? Toucans, Puffins and Pelicans give the most surety but can create extra queuing and time delay to both pedestrians and vehicles. Zebras allow pedestrians to cross without delay and fit in better with public realm improvements. Courtesy crossings can be used successfully in shared space schemes and areas of high quality public realm.

Policy OW15: Crossings

a) **OCC will consider the crossing needs of pedestrians on main roads to minimise delay or diversion and to satisfy existing or potential flows. The crossings will be designed as far as possible on desire lines to avoid diversion and delay**
b) **The need for community cohesion and people to cross the street to talk to their neighbours will be considered on both main and residential roads**
c) **Zebra crossings will be the default option where there is a need for a pedestrian crossing in urban areas along main roads, unless other considerations take priority**
d) **OCC will review the timings of existing free-standing signalised crossings to revert to immediate green for pedestrians after 20 second delays**
e) **OCC will install pedestrian phases on all arms of signalised junctions where there is a pedestrian demand**
f) **OCC will install Zebra crossings on all arms of urban roundabouts where there is a pedestrian demand**
g) **OCC will review all bus stops on main roads to ensure there is a nearby convenient crossing**

24.1.4 Side roads

Another gap in the pedestrian network are side roads where pedestrians, in practice if not legally, lose their priority and security in relation to traffic. The Highway Code states that pedestrians have priority once they start to cross [Highway Code rule 170]. However, the design of many junctions put pedestrians at risk and unable to command this legal priority. There are many design solutions to reinforce pedestrian priority at side roads.

Policy OW16 Side Road Crossings:
Wherever possible and funding is available, OCC will

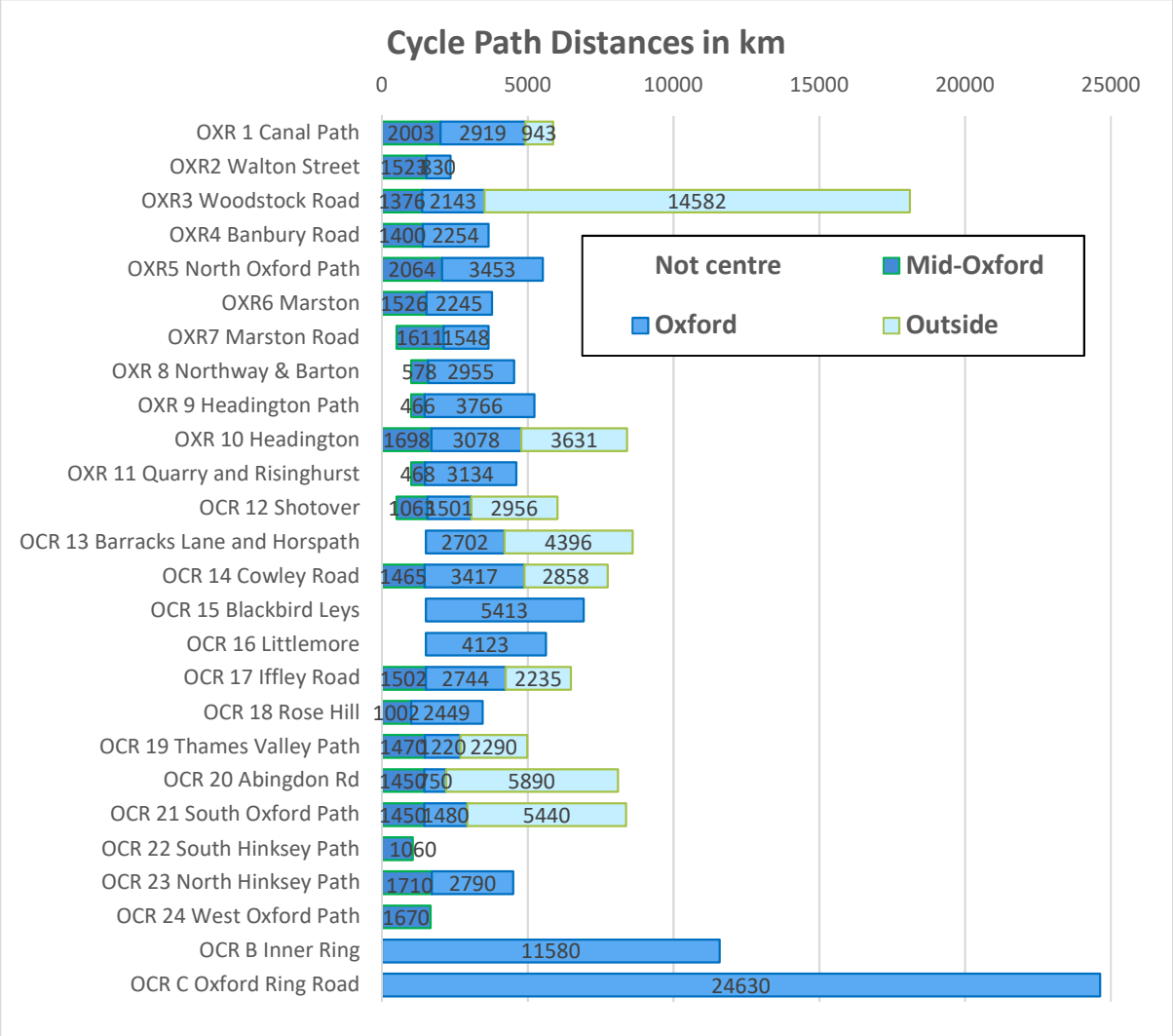
a) **Extend footways across side road entries so there is a raised crossing**
b) **Set back the Give Way lines to give priority to the pedestrian crossing**
c) **Narrow kerb radii to the minimum possible whilst maintaining access for appropriate vehicles**
d) **Introduce “Copenhagen” style crossings particularly along main roads and along Quality Pedestrian Corridors**

25 Oxford Cycle Network scheme costs and benefits.

This section looks at the actual scheme problems and benefits.

25.1.1 Length of cycle network

The total length of the primary cycle network is 167 kms or 104 miles. The chart below shows the network length of each route, divided into whether the route is within 1.5 km of the city centre (approximately within the inner ring – not all routes start in the centre), within Oxford's boundaries (approximately within the ring road) or outside Oxford boundaries. The Ring cycle path is the longest route (25 km) but this is typically used in sections rather than as one route. The longest radial is Woodstock Road (18 km) leading to the small town of Woodstock. The main focus of the LCWIP is for journeys in Oxford. Altogether, 17% of the cycle network is within 1.5 km of the city centre, 56% over the rest of Oxford and 27% outside Oxford.



Length of Oxford cycle routes (km)

25.1.2 OXCRAM Assessments

The cycle network was assessed using the OXCRAM rating in its current state and 2031 LCWIP outcome, from the point of view of 1) Quick and 2) Quiet route cyclists. Note that all routes (both Quick and Quiet routes) were assessed on both ratings to see whether Quick cyclists would use the Quiet cycle network and whether Quiet cyclists would use the Quick network.

The OXCRAM ratings give a good indication of whether the cycle infrastructure will encourage or deter new cyclists according to their underlying attitudes (Quick or Quiet preferences which encapsulate other factors such as gender, age and cycle frequency). The ratings in the table below apply to both cycle cohorts, though the same infrastructure is likely to have a different rating for the 2 cohorts.

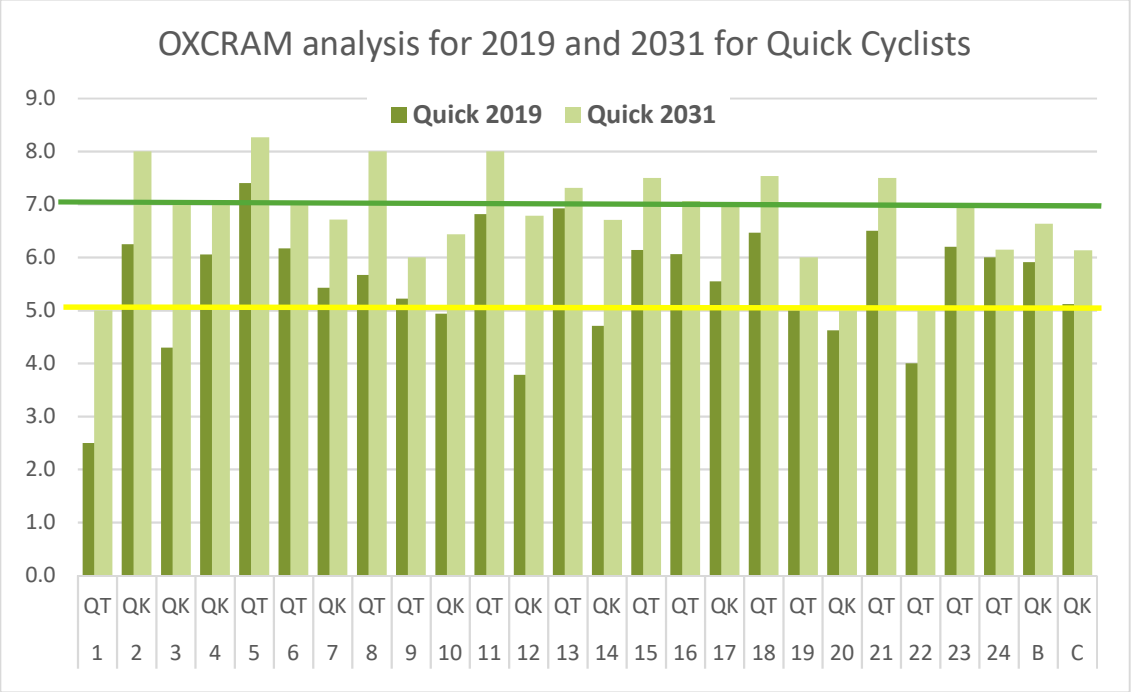
The table below summarises the likely outcome of infrastructure at different ratings. The 'Willing' column shows the percentage of cyclists who will be willing to use cycle infrastructure at that rating (calculated from 'like' + 'don't mind' + 'tolerate' responses). The 'Happy' column shows the percentage of cyclists will be happy to use infrastructure at that rating (calculated from 'enjoy' + 'don't mind' responses). The 2031 goal is to ensure that the cycle network is rated at 7+, with no section falling below 5. A rating of 7 means that very few cyclists will be deterred (5%) from using it and most cyclists (80%) will be happy to use it. A rating of 5 means that only 20% of cyclists deterred from using it and around 50% will be happy to use it.

OXCRAM rating	% cyclists Willing	% cyclists Happy
8+	99	95
7	95	80
6	90	60
5	80	50
4	70	30
3	60	20
2-	50	10

25.1.3 OXCRAM rating of Oxford Cycle Network

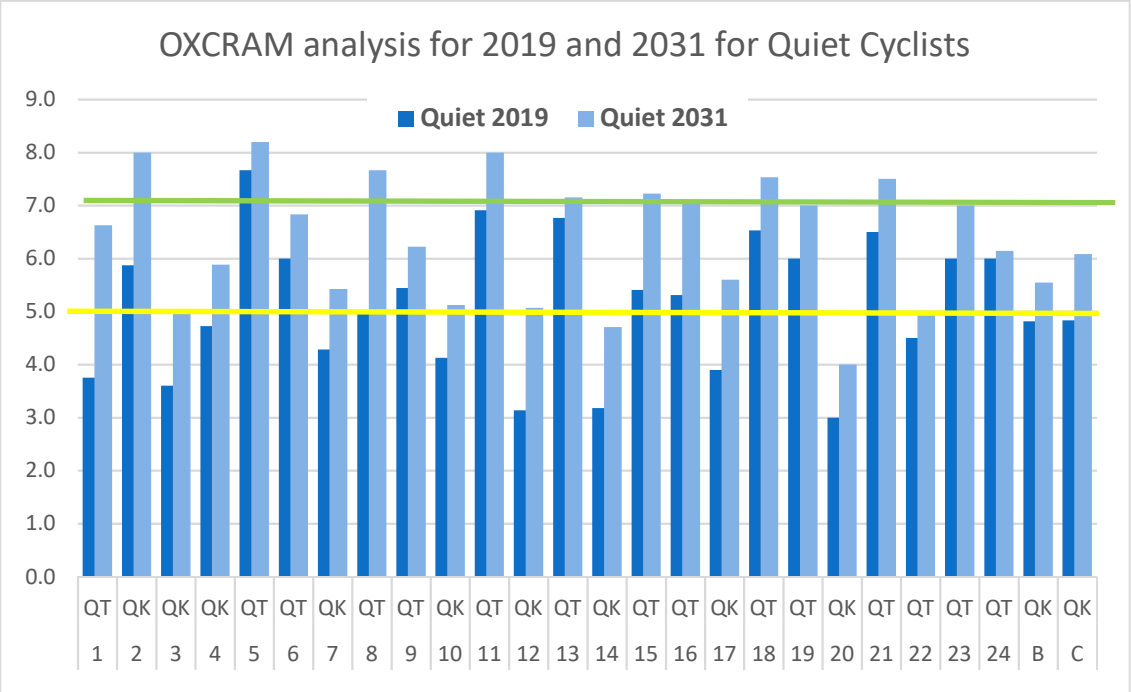
The OXCRAM ratings of the cycle network are set out in the attached maps 5 to 6 – Cycle Network Cyclability. Note that the maps are inputted in and produced from the Council's GIS system and have *not* been completely updated and currently exclude routes 23 to 27.

For Quick route cyclists the overall rating of the entire cycle network (giving equal weight to each and averaged over the whole route) was 5.5 in 2019. The completion of the LCWIP programme will result in an overall rating of 6.8 in 2031, an increase of 1.3. The average rating for the Quick cycle routes only (which most Quick cyclists will use most of the time) similarly increases from 5.3 in 2019 to 6.7 in 2031 with the LCWIP programme. An increase of 1.3 may not sound much, but this means that the number of cycle routes rated 7+ by Quick cyclists increases from 1 to 14. Additionally, all the routes reach the minimum standard of 5.0. Note in the charts below, Quick routes are denoted by QK and Quiet routes by QT.



OXCRAM assessment for Quick cyclists of cycle routes – current 2019 and predicted 2031

For Quiet route cyclists the overall rating of the entire cycle network (giving equal weight to each route) was 5.1 in 2019. The completion of the LCWIP programme will result in an overall rating of 6.4 in 2031, an increase of 1.3. The average rating for Quiet cycle routes (which most Quiet cyclists will use most of the time) increases from 5.5 in 2019 to 6.8 in 2031 with the LCWIP programme. What this means is that the number of cycle routes rated 7+ by Quiet cyclists increases from 1 to 11. It is mostly the main roads (Quickways) which are rated below 7 for Quiet route cyclists, but generally there is an alternative Quietway option. The accompanying document 1 “Cycle Network Quiet Map” highlights the gaps in the Quietway network.



OXCRAM assessment for Quiet cyclists of cycle routes – current 2019 and predicted 2031

25.1.4 Calculating the increase in cycling

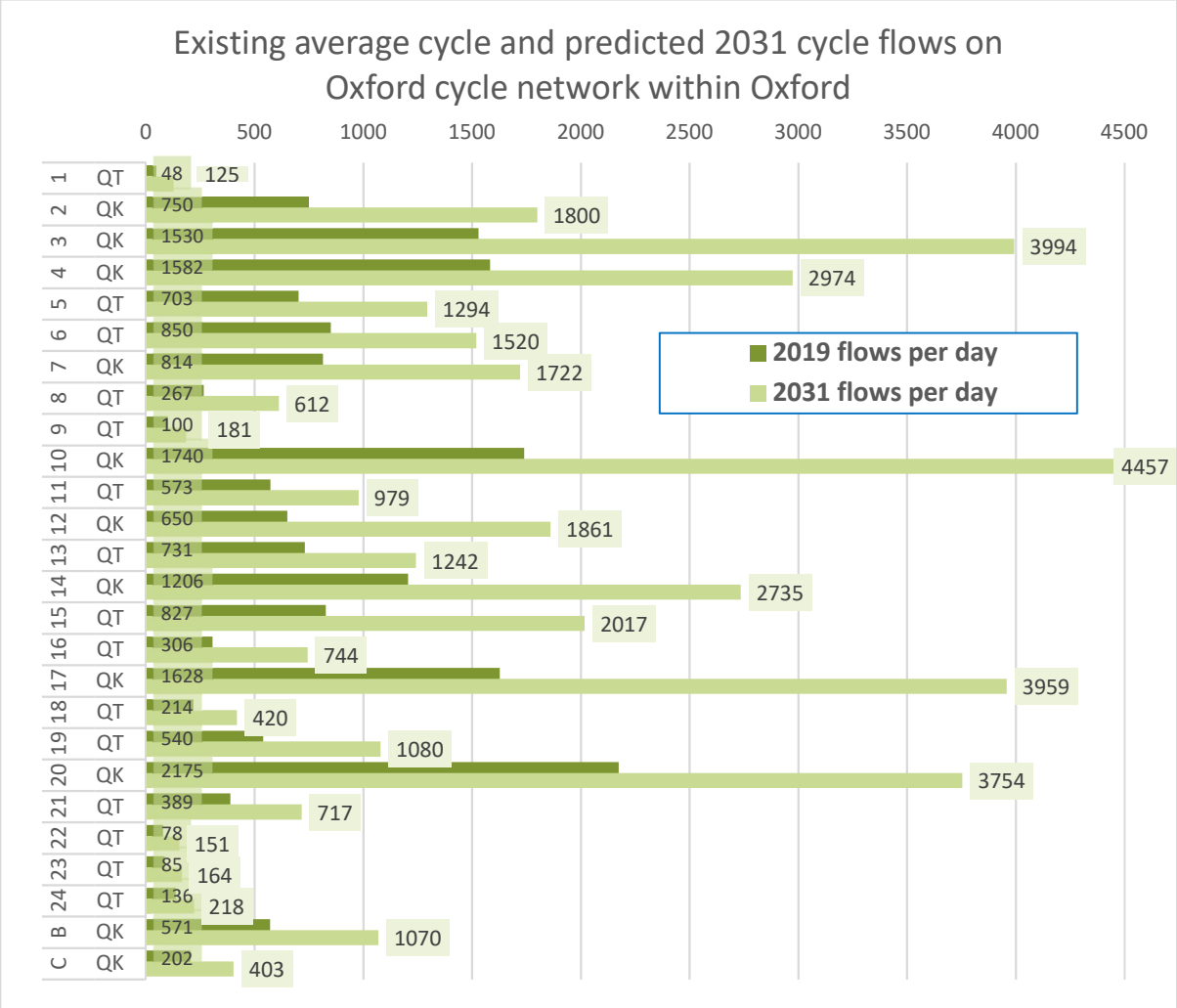
The cycle flows of the cycle network are set out in the accompanying maps 3 and 4 – Cycle Network Total Flows.

For each cycle route, survey data has been used to assign a daily cycle flow over its length, estimating the flow patterns for each section. For many routes we have fairly good data from the inner or outer cordon figures, cycle counters or one-off surveys. For others, we have used the Smart Camera Survey Detection systems. For the few remaining routes with no survey data, we have extrapolated from the propensity to cycling tool or by deduction from other routes. Everyday there are around 19,000 cycle journeys on the Oxford cycle network averaged over the routes in Oxford. This is plausible and fits in with other data like the Active Lives Survey. These flows have been calculated as 11,000 Quick and 8000 Quiet cycle journeys, in keeping with the OCS19 survey findings.

To calculate the benefits of the LCWIP, an overall 50% increase in cycling has been assumed on the basis of the other LCWIP pillars (in particular, pillar 2 low traffic neighbourhoods and pillar 3 connecting Oxford proposals). The 50% increase has been assigned to each cycle route. Where the route will be significantly improved, a greater increase has been separately factored in as a bonus in terms of the scale of improvement for Quick or Quiet cyclists, with the increases assigned to Quick and Quiet cyclists depending on the improvement. On this basis, it is calculated that the whole LCWIP programme (cycle network improvements combined with the other pillars) will deliver 40,000 cycle journeys on the network in 2031 (an increase of around 22,000 cycle journeys). These flows break down into 24,000 Quick and 16,000 Quiet cycle journeys, which represents an increase of 14,000 Quick cycle journey and 8000 Quiet cycle journeys.

A doubling of cycle journeys on the cycle network exceeds the OC1 and OC2 50% increase targets but it is thought appropriate as cyclists are likely to transfer from non-cycle network routes so the cyclist increase on the cycle network is likely to be higher than for Oxford as a whole.

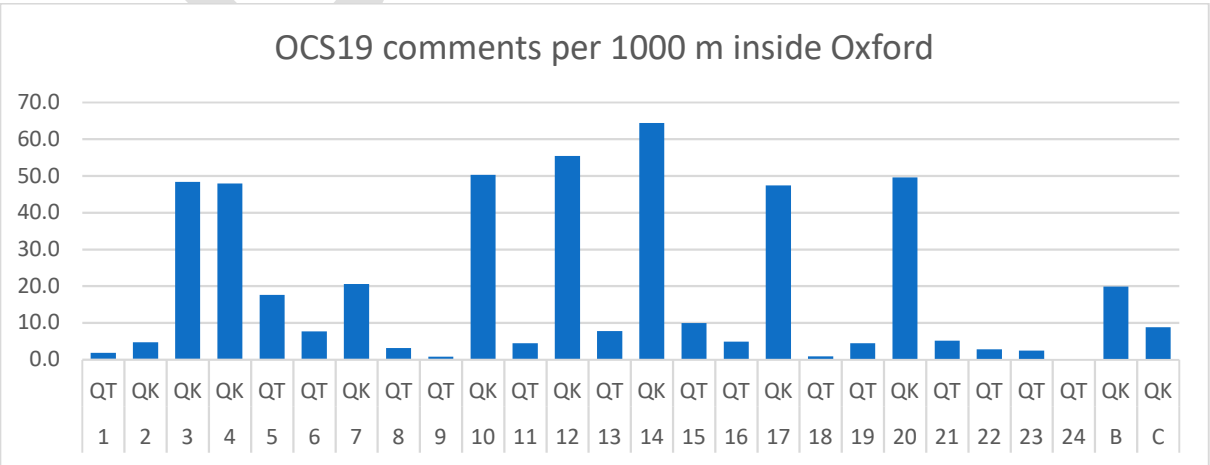
The chart below shows the average cycle journey flow for 2019 and predicted flow for 2031, based on the Oxford sections of the routes. Note that cycle flows are the average for Oxford city, excluding routes outside Oxford where cycle flows are typically much lower. On the other hand, cycle flows also increase nearer the city centre. To understand how cycle flows change over each cycle route, it is easier to look at the attached cycle flow maps.



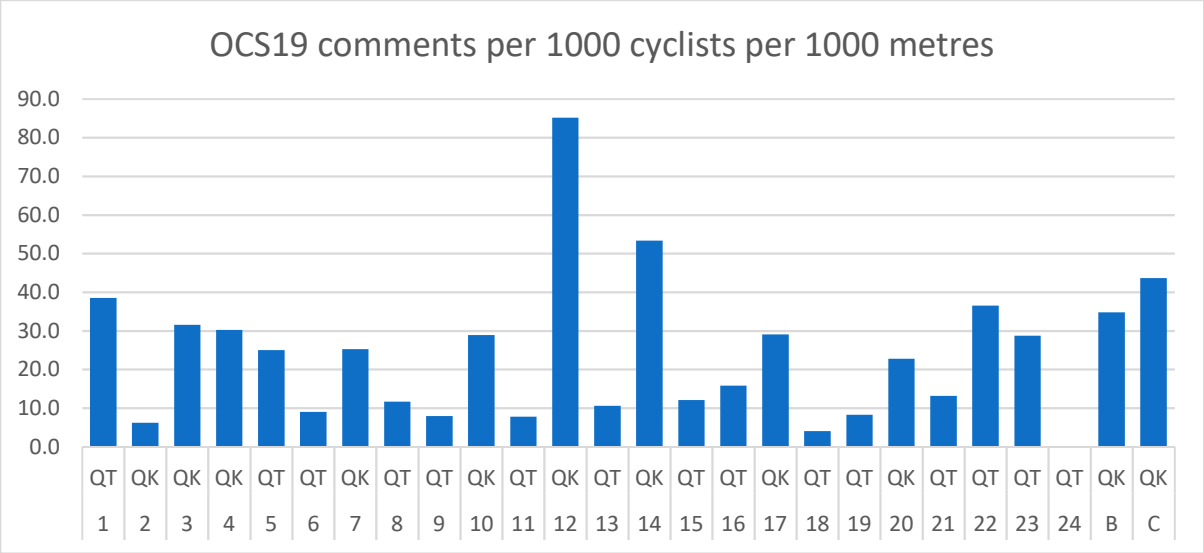
Oxford cycle network – average cycle flows in Oxford for 2019 and predicted flows for 2031

25.1.5 Scale of problems with existing cycle network

The OCS19 comments have been used extensively in assessing the problems on the cycle network. This section gives an overview of cyclists' views of the problems on the network, by examining the number of comments for each route. OCS19 comments give a good idea of whether cyclists perceive the route as cyclable or problematical. The first chart shows comments per 1000 metres of Oxford cycle route (excluding routes outside Oxford). The main Quick routes (QK) engender by far the most comments.



In terms of evaluating the overall benefit of improvements, using comments per 1000 m is a good scale. However, there is a bias in just using 1000 metres of cycle network as the scale of assessing the scale of problems for individual cyclists, as the Quick cycle routes serve a lot more cyclists. The next chart shows OCS19 comments scaled by the average number of cycle journeys over each 1000 metres. This identifies OCR 12 (Old Road) as the worst route in cyclists' eyes, followed by OCR 14 (Cowley Road). The Quick Routes (QK) generally still engender the most negative comments, but there are 2 exceptions: Quiet route OCR 1 (the Canal) probably because of its very poor surface quality and OCR 22 (South Hinksey) – a little used path with a lot of problems, but for those living in that village, the only viable path to Oxford. It is also worth noting the success of the 'Low Traffic Neighbourhood' road closure of Walton Street (OCR 2) which is the only Quick Route with fewer issues than most Quiet Routes.



OCS19 comments per 1000 cyclists per 1000 metres of cycle route

25.1.6 LCWIP Cycling Schemes

The attached PDF documents (OCR 1 – 24, OCR 26, OCR B, OCR C) outline the main measures proposed for each of the cycle routes. For each route, there is a short introduction giving the flavour of the route. The route is divided into sections, with a plan of the route from the city centre outwards. Each new plan includes a short summary of the main features of the route over that section. The main schemes are identified and numbered on the plans. In the table below each plan, there is a short explanation of the schemes. Note the route plans also show where other cycle routes cross the main route, by blue lines and the route name.

Throughout the plans, the symbol has been used to denote a raised footway extension across the side road for the benefit of pedestrians to create Quality Pedestrian corridors (policy OW16). These also have the benefit of minimising collisions with both pedestrians and cyclists where cars turn out or turn in side roads which are a main cause of cyclist casualties. The symbol has been used to denote a priority cycle crossing of a side road. The symbol has been used for a major scheme such as a junction change or new bridge. The symbol has been used where there were 3 or more cyclist casualties in the last 5 years at the same location (typically a junction) which highlights a cyclist accident black spot.

25.1.7 Scheme prioritisation

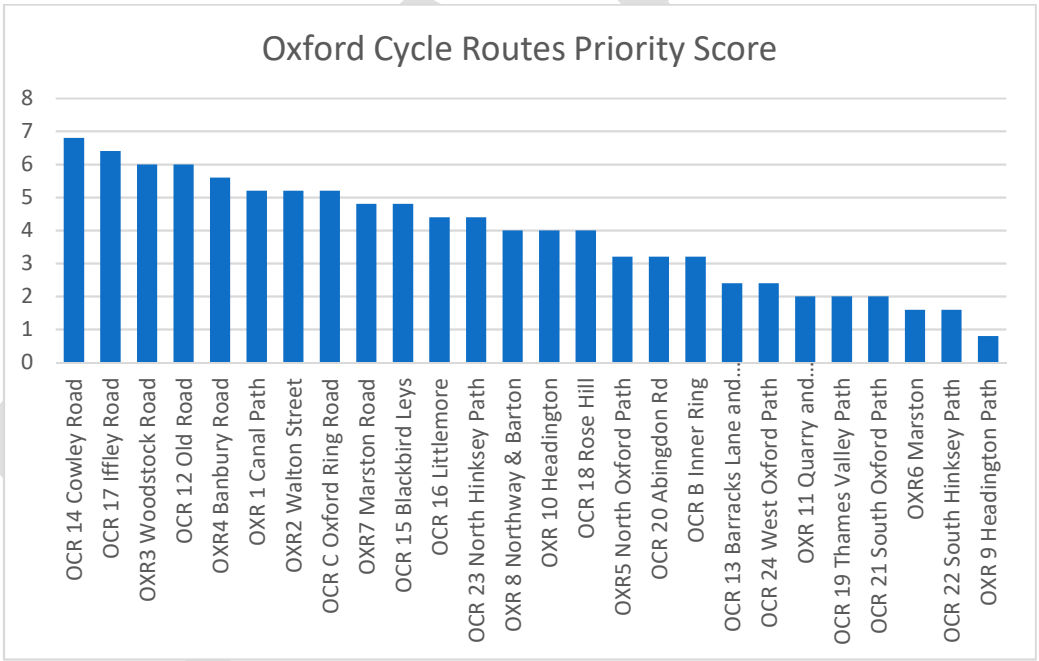
The attached Excel document (Oxford LCWIP Costings and Prioritisation) sets out in the first tab the main summary data for each route. This data sets out:

- Length of route for each section for central Oxford up to 1.5 km, outer Oxford, outside Oxford

For the Oxford section of the route:

- OXCRAM rating for 2019 for the Quickways and Quietways
- OXCRAM rating for 2031 for the Quickways and Quietways
- Oxfordshire Cycle Survey 2019 comments factored by 1) comments per 1000 metres and 2) comments per 1000 cyclists per 1000 metres.
- Cyclist casualty data 1) per 1000 metres and 2) per 1000 cyclists per 1000 metres
- Average cycle flows for 2019 and 2031, divided by Quick route and Quiet route cycle journeys.
- Prioritisation of routes by 5 factors
    - Whether there is substantial new housing feeding into the cycle route
    - The calculated increase in cycling journeys by 2031
    - The degree the route has improved (OXCRAM rating)
    - The number of cyclist comments in the OCS19 (per 1000 cyclists)
    - The potential reduction in cyclist casualties (per 1000 metres).

This prioritisation gives a reasonable first estimate of the importance of the route to the improving the Oxford cycle network, combining different factors: its contribution to permitting new development, its overall increase in cycling, its increase in cyclability, its degree of deterrence as shown by cyclists' comments and its contribution to a reduction in cycle casualties. The chart below shows the ratings (converted 0 lowest priority to 10 highest priority).



Oxford Cycle Route prioritisation (0 lowest – 10 highest)

25.1.8 LCWIP costings

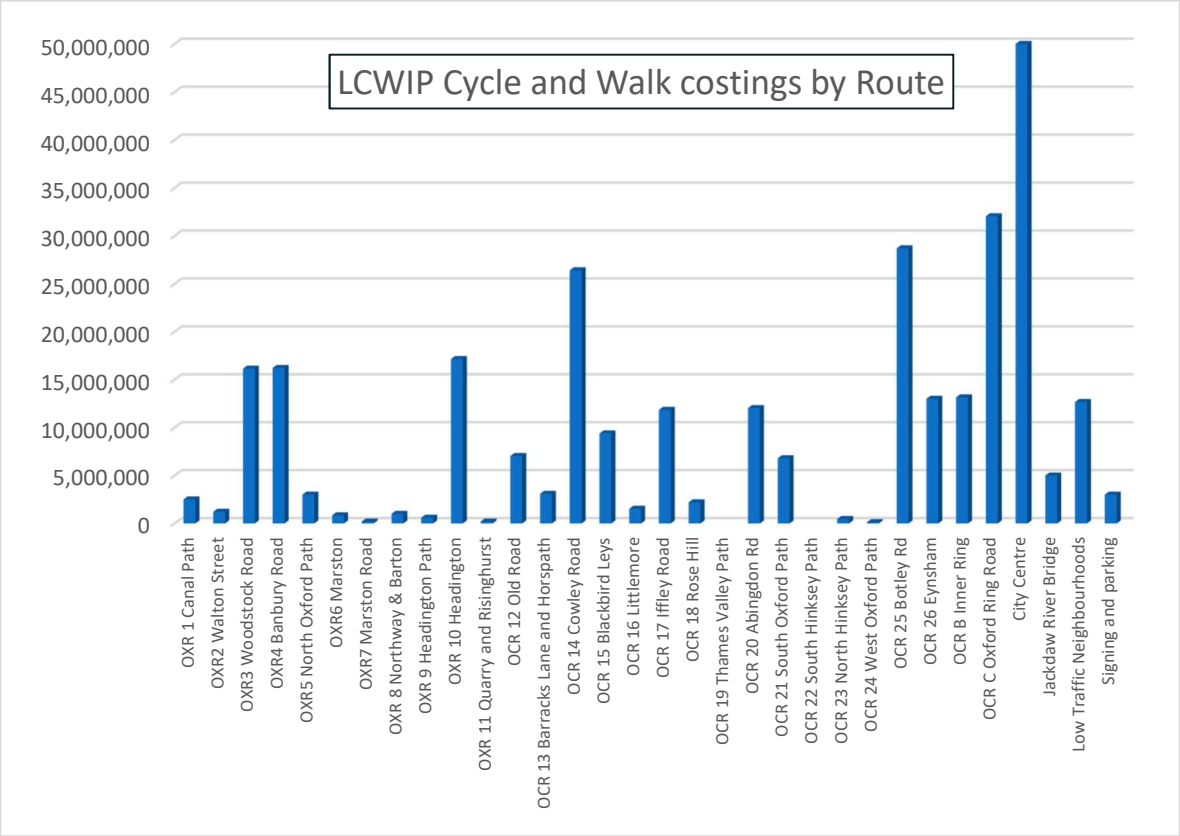
The second tab in the attached Excel summarises the costings of the LCWIP. The grand total is just under £300 million.

The costings are listed by the cycle route number (column B). Column A lists schemes added to the list since its last iteration. Column C identifies the major schemes identified in LCWIP 26 Overview of schemes. Column D identifies whether there will be substantial improvements to walking in the schemes. It is worth noting that schemes with substantial walking benefits account for £135 million. Columns E and F give an indication of proposed construction year. Column G lists the scheme name. Column H gives some additional data

on the scheme. Column I lists the costings. Column J comments on the deliverability in some cases. Column K notes how the costings were calculated.

The costs have been assessed by the infrastructure delivery team from various different sources. In some cases, detailed costings have been undertaken. In others, standard pro-rata costs have been applied. In others, a more general estimate has been used on the basis of experience. Generally, we believe the costs are reliable first estimates before moving to more detailed design.

The chart below summarises the costings for each cycle route (including walking schemes on that route). The information is set out in tab “LCWIP costs by Route”.



25.1.9 Last word

Oxford LCWIP has taken around 12 months to prepare. It has involved extensive engagement with many stakeholders and the creation and publicising of an internet survey to really understand cyclists’ problems and the willingness of 2600 Oxford cyclists to respond with issues on the network. This has been supplemented by a cycle audit of every route and by an assessment of many data sources, in particular a detailed analysis of every cyclist casualty in Oxford over the last 5 years. OxPA have willingly contributed their own time to walk and audit the main pedestrian routes. Within the Council, Public Health and Oxford Localities team have all contributed their time to its completion. Senior management have committed their support and the resources to get it completed.

In January 2020, we will be taking the final report to another round of consultation externally with all the main stakeholders and internally with all the teams who will be involved in turning this report into reality. In Spring, the report will be included in a wider public consultation as part of the Local Transport and Connectivity Plan which will embed the LCWIP as a key component of Oxfordshire’s ambitions to transform Oxford. There is still a lot of work to do, but we believe that Oxford LCWIP will be a launchpad to really making Oxford an exemplar cycling and walking city.

26 Overview of LCWIP cycle schemes

The detail of the cycle schemes is set out in the attached annexes for each route. This section gives an overview of the concept behind each scheme.

OCR		Centre	Oxford	All	Main Issue	Oxford	Major schemes	Outside Oxford
1	QT	66	48	37	Poor quality narrow towpath	Widen and improve surface and connections	1) Cycle Bridge over canal to provide link from train station to OCR 6-9	Quiet alternative to OCR3
2	QK	833	750		Radial route –traffic volume	LTN cells to reduce traffic. Cycle Street design.	2)Walton Street shared space Cycle Street	
3	QK	1700	1530	932	Main road without cycle lanes or with substandard track	Provide continuous cycle lanes both sides with speed control. Provide for connecting route crossings.	3) Norham Manor shared space; 4) A40 roundabout safety 5) Peartree Rbt safety	Improve quality of cycle track. Extend to Kidlington
4	QK	2300	1582		Main road with bus or cycle lanes. 5 cycle accident blackspots.	Widen cycle lanes. Provide for connecting route crossings.	6) Parks Rd junction 7) Marston Ferry Rd junction 8) Kidlington Rbt	Improve cycle track. Review Kidlington.
5	QT	1133	703		Narrow paths and lack of lighting	Improve cycle path widths, lighting and connectivity		
6	QT	1567	850		Alternative route to Plain Rbt.	Improve roads with LTN cells		
7	QK	940	814		Main roads lacking cycle lanes	Add and widen cycle lanes. Improve link to bypass	9) St Clements junction 10) Cherwell Drive junction	
8	QT	400	267		Good quiet road route	LTN cells to reduce traffic. Cycle Street design.	11) Crossing of B4495	
9	QT	100	100		Potential route along existing paths	Linkages to create new route		
10	QK	2857	1740	1384	Main road with mix of cycle lanes and cycle tracks. St Clements narrow street with shopping and conflicts. 4 cycle accident blackspots	Add and widen cycle lanes.	12) St Clements shared space scheme 13) Windmill Rd junction 14) Barton subway	Widen and resurface cycle track
11	QT	1600	573		Good quiet road route	LTN cells to reduce traffic. Cycle Street design.		
12	QK	1300	650	723	Busy narrow road. Main link to hospital.	Add uphill cycle lanes. Remove on street car parking. Reduce morning queues	15) Slade Junction	New surfaced cycle path
13	QT		270	76	Cycle path and roads – poor surface	Resurface route to high quality. LTN cells to reduce side road conflicts and traffic	16) Horspath Rd link to Pony Rd industrial estate	Average speed cameras
14	QK	2057	1206	1050	Busy shopping street with very high cycle flows. Was Mixed Priority Demonstration Project: Severe traffic queues. 12 cycle accident black spots.	Review design to make a cycle street. A mixture of solutions. Extend 20 mph limit (average speed cameras). Realign and remove car parking. Introduce LTNs in side streets to reduce traffic rat runs and turning accidents	17) Marsh Lane junction 18) Between Towns Rd junction 19) Hollow Way junction 20) Garsington Rd Rbt	Average speed cameras
15	QT		827		This route is currently in 2 poorly connected halves: 1) Quiet road, marred by rat running. 2) Busy road: Cycle lanes marked by car parking. 2 cycle accident black spots	1) LTN to prevent rat running. 2) Light segregation on cycle lanes.	21) New cycle path up slope to link Barns Rd to quiet road. 22)Barns Rd Rbt 23) Knights Rd junction 24) BBL shopping shared space scheme	

OCR		Centre	Oxford	All	Main Issue	Oxford	Major schemes	Outside Oxford
16	QT		306		Potential good quiet road route marred by rat running	LTN to prevent rat running.		
17	QK	3114	1628	1430	Main road with high cycling flows but intermittent cycle lanes and lots of car parking. 4 cycle accident black spots.	Cycle lanes over whole route. Remove car parking to side streets (a political challenge!)	25) Donnington Bridge Rd junction 26) Iffley Turn junction 27) Southern Bypass Rbt 28) Village enhancement scheme	Resurface quiet road
18	QT	363	214		Quiet route following path then residential roads. Bridge over bypass narrow and not cycleable	Mostly minor improvements	29) Upgrade cycle bridge over bypass	
19	QT	700	540	429	River path OK but no lighting.	Add solar lighting entire length	30) Potential bridge over River Thames to link to East Oxford via Jackdaw Lane	Widen and surface cycle path and add solar lighting
20	QK	2680	2175	1427	Main road busy with cyclists, but narrow and very narrow cycle lanes. Severe traffic queues. 3 cycle accident black spots.	Extend 20 mph. Average speed cameras.	31) Weirs Lane junction 32) Old Abingdon Rd junction	Average speed camera
21	QT	333	389	385	Quiet road alternative to OCR 20. Poor bridge connection to Oxford.	Cycle Street, LTN, resurface road	33) New cycle bridge over Thames	Slip road high speed traffic – new cycle path
22	QT	78			Path to Village over railway – inconvenient bridge. Narrow path	Potential improvements linked to OFA (Oxford Flood Alleviation) project		
23	QT	100	85		1) Industrial road, 2) path, 3) residential roads	Section 1 dependent on new development. Widen path. LTNs and traffic calming		
24	QT	136			Path then car park roads through retail park	Widen path		
25	QK				Wide busy road with heavy traffic	Botley Road scheme in preparation – not considered in LCWIP		Rural high speed road
26	QK				Route along busy narrow rural road to nearby small town and major development	.		Narrow busy road to nearby town New parallel cycle track
27	QT				Recreational path in Port Meadow by river - unsurfaced	Surface and widen path		
B	QK		571		Mixture of roads creating inner ring. Busy narrow roads some with no cycle lanes. 6 cycle accident black spots.	Mixture of solutions. Route will have bus gates under Connecting Oxford proposals.	34) Between Towns Road – redesign to make tree lined boulevard	
C	QK		202		Mostly cycle path but also on road sections. Cycle path poor surface. On road sections speed. 1 cycle accident black spot. There is a major gap in the route.	Resurface and widen paths. Add lighting.	35) South Hinksey Rbt – as part of bigger scheme. There is no viable cycle connection across this junction.	

References

[i] NIC's 'Running out of Road Report' https://www.nic.org.uk/publications/running-out-of-road-investing-in-cycling-in-cambridge-milton-keynes-and-oxford/
[ii] Oxford City Centre Movement and Public Realm Strategy Final Report Phil Jones Associates and ITP
[iii] Climate Change Committee/BEIS 2019
[iv] https://publications.parliament.uk/pa/cm201719/cmselect/cmsctech/1454/145403.htm
[v] http://www.ecf.com/wp-content/uploads/ECF_CO2_WEB.pdf
[vi] Study reported at https://www.theguardian.com/environment/2017/jul/12/want-to-fight-climate-change-have-fewer-children
[vii] https://fingertips.phe.org.uk/search/walking#page/6/gid/1/pat/6/par/E12000008/ati/201/are/E07000178/iid/93439/age/164/sex/4
[viii] Source: University of Glasgow 2017 - https://www.gla.ac.uk/news/archiveofnews/2017/may/headline_522765_en.html .
[ix] Source: Global Burden of Disease Study 2017 Results. Seattle, United States: Institute for Health Metrics and Evaluation, 2018. Available from http://ghdx.healthdata.org/gbd-results-tool.
[x] Source https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/332854/PHE_CRCE_010.pdf
[xi] Source: https://www.kcl.ac.uk/news/living-near-a-busy-road-can-stunt-childrens-lung-growth
[xii] Oxford City Centre Movement and Public Realm Strategy Final Report Phil Jones Associates and ITP
[xiii] Effectiveness and equity impacts of town-wide cycling initiatives in England: A longitudinal, controlled natural experimental study.
[xiv] https://www.sportengland.org/media/13943/active-travel-full-report-evidence-review.pdf
[xv] https://www.cherwell.oxon.sch.uk/446/transport
[xvi] https://www.cedar.iph.cam.ac.uk/high-quality-traffic-free-routes-encourage-more-walking-and-cycling/ https://www.cedar.iph.cam.ac.uk/cambridgehshire-guided-busway-encouraging-people-to-be-more-active-on-the-commute/
[xvii] https://www.sciencedirect.com/science/article/pii/S0966692318306689 Does new bicycle infrastructure result in new or rerouted cyclists?
[xviii] https://walthamforest.gov.uk/content/independent-studies-find-people-waltham-forest-are-living-longer-and-getting-more-exercise
[xix] Fietsberaad (2006) Continuous and Integral: the cycling policies of Groningen and other European cycling cities.
[xx] City of Groningen (2015) Groningen Cycling Strategy 2015-2025
[xxi] TRL Report PPR 580
[xxii] Oxford City Centre Movement and Public Realm Strategy Final Report Phil Jones Associates and ITP
[xxiii] Patrick Lingwood MSc dissertation 1998 “Walking to the Shops”
[xxiv] House of Commons 2019 Transport Committee Pavement Parking 13th Report of Session 2017-9