Department for Transport

Summary and Synthesis of Evidence:
Cycle City Ambition Programme 2013-2018

Lynn Sloman, Sam Dennis, Lisa Hopkinson, Anna Goodman, Kristine Farla, Beth Hiblin and Jay Turner

transport for quality of life

sustrans
JOIN THE MOVEMENT

technopolis [group]

The Department for Transport has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full on the Department's website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard please contact the Department.

Department for Transport
Great Minster House
33 Horseferry Road
London SW1P 4DR
Telephone 0300 330 3000
Website www.gov.uk/dft
General enquiries: https://forms.dft.gov.uk

About this report

The Department for Transport (DfT) commissioned Transport for Quality of Life, Sustrans and Technopolis to evaluate the Cycle City Ambition (CCA) Programme.

This report is the last of eight reports as part of the evaluation. It provides a summary of the findings in the final technical evaluation report (i, below), and in the final analysis of costs of cycling interventions (ii, below), and, where relevant, findings from earlier evaluation reports.

More details of the evaluation are available in the final technical evaluation report, which is available upon request from local.evaluation@dft.gov.uk.

Preferred citation for this report

Sloman L, Dennis S, Hopkinson L, Goodman A, Farla K, Hiblin B and Turner J (2021) Summary and Synthesis of Evidence: Cycle City Ambition Programme 2013-2018

Other evaluation reports about the Cycle City Ambition Programme

(i) Sloman L, Dennis S, Hopkinson L, Goodman A, Farla K, Hiblin B and Turner J (2021) Cycle City Ambition Programme Final Evaluation Report

(ii) Taylor I, Hiblin B and Sloman L (2020) Typical Costs of Cycling Interventions: Final analysis of Cycle City Ambition schemes

(iii) Sloman L, Riley R, Dennis S, Hopkinson L, Goodman A, Farla K and Hiblin B (2019) Cycle City Ambition Programme: Interim Report

(iv) Sloman L, Goodman A, Taylor I, Maia J, Riley R, Dennis S, Farla K, Hopkinson L and Hiblin B (2017) Cycle City Ambition Programme: Baseline and Interim Report

(v) Sloman L, Goodman A, Maia J, Riley R, Dennis S and Farla K (2017) Cycle City Ambition Programme Evaluation Design: Stage 1b / 1c Report

(vi) Taylor I and Hiblin B (2016) Typical Costs of Cycling Interventions: Interim analysis of Cycle City Ambition schemes

(vii) Sustrans (2016) Cycle City Ambition Stage 1a Report

Acknowledgements

Thanks to officers from all the Cycle City Ambition projects, who provided considerable information and help during the course of the evaluation.

Photo credits

All images show cycle infrastructure that was funded as part of the Cycle City Ambition programme

Cover: Broad Quay, North-South Quietway, Bristol © Bristol City Council

Page 7: Castle Park, East-West Quietway, Bristol © Bristol City Council

Page 8: Baldwin Street, East-West Quietway, Bristol © Bristol City Council

Page 11: Huntingdon Road, Cambridge © Cambridgeshire County Council

Page 21: Birmingham canal towpath routes © Birmingham City Council

Page 22: Oxford Road Cycleway, Manchester © Transport for Quality of Life

Page 23: Bond Street, East-West Quietway, Bristol © Bristol City Council

Page 25: © Oxfordshire County Council

Page 34: © Newcastle City Council

Contents

Executive summary

Introduction

1 Through the Cycle City Ambition (CCA) Programme, the Department for Transport provided £191 million in capital grants to eight cities between 2013 and 2018.

2 The evaluation of the CCA Programme focussed on 14 schemes in the eight cities, comprising between a quarter and two-thirds of the DfT grant. The schemes included 'cycle superhighways'; 'mixed strategic cycle routes' that combine quiet roads, paths through green space, lightly-segregated paths and unsegregated cycle lanes; city-centre schemes; improvements to canal towpaths; and a junction treatment.

City-wide trends

3 In all eight cities, city-wide cycling levels increased during the course of the CCA programme. In some cities, this was a continuation of a previous trend. The change in city-wide cycling levels since the start of the CCA programme was between +4% and +79%, with an unweighted mean of 37%, from automatic cycle counts. Cordon and screenline counts, which also provide a measure of city-wide change, showed increases in cycling levels that were mostly in the range +25 to +50%, but with both lower and higher figures in some parts of some cities. Part of this city-wide increase in cycling is attributable to the CCA investment.

4 In the four cities for which mode share data was analysed, cycle mode share increased by between 0.2%-points and 5%-points, sometimes accompanied by a corresponding decrease in car mode share.

5 Despite the evidence that cycling levels are rising, surveys of cycling participation did not show an increase in the proportion of people who cycle. This may partly be because the survey used (the Active People Survey / Active Lives Survey) is not well powered to detect change.

Scheme-level trends

6 Five of the 12 schemes for which robust evidence was available showed increases in cycling levels that are highly likely to be attributable to the CCA investment. Change relative to control sites for these schemes was mostly in the range +14% to +40%, but with one scheme showing an exceptional increase of +158%. Another three schemes showed large increases in cycling (between +42% and +72%) that are likely to be attributable to the CCA investment, but where evidence from control sites, or evidence that the uplift closely coincided with scheme completion, was unavailable. For the other four schemes the evidence is ambiguous or conflicting, but there are indications that cycling volumes increased in some places along the routes.

7 Scheme-level measurements showed that cycling levels may continue to build up for 3-5 years after a scheme is completed.

8 On average, 5% of cyclists surveyed on the new infrastructure would travel by car if the infrastructure they were using was not available, and 11% would travel by other

modes. These figures reflect the incremental effect of individual schemes on mode choice, as opposed to the effect of a whole cycle network, which would be larger.

Profile of cyclists

9 There are marked inequalities in propensity to cycle in the eight cities. At baseline[1], higher levels of cycling were associated with being male, younger and white. During the course of the CCA programme there was some improvement in these inequalities with respect to age and ethnicity, although not with respect to gender, at the programme level.

10 However, surveys of cyclists using CCA infrastructure suggested that demographic profiles may be starting to change and that new cyclists were more likely to be female (42%), and from ethnic minorities (16%), than existing cyclists (33% and 7%, respectively). This suggests that good quality cycling infrastructure may, over time, help to reduce inequalities in cycling participation.

Cyclists' and public perceptions

11 Surveys in five cities (Birmingham, Cambridge, Greater Manchester, Newcastle and West of England) found that there was support amongst both respondents who cycled and the general public for measures to make cycling safer, including reducing traffic levels, reducing traffic speeds, and providing more cycle routes that are physically separated from traffic or built away from roads. Typically more than 70% of both groups considered such measures to be very or fairly important.

12 Somewhat lower proportions of respondents who cycled and the general public (typically under 50%) felt that their city was a good place to ride a bike and had sufficient cycle routes, although these proportions were higher in Cambridge.

13 This suggests that measures being implemented in the CCA cities go 'with the grain' of what cyclists and the public want to happen, but that there is still some way to go.

Effect on physical activity and health

14 Surveys of cyclists using the CCA-funded infrastructure found that more than half (53%) of existing cyclists, and 80% of new cyclists, felt that the new infrastructure had led them to become more physically active. This was particularly beneficial for new cyclists, because they were less likely to meet physical activity guidelines. The CCA infrastructure also improved self-reported physical and mental health for all cyclists, with the benefits again being greater for new cyclists.

Effect on car use and carbon emissions

15 At least 1 million car trips per year are estimated to have switched to cycle trips as a direct result of **CCA-funded infrastructure**. This replaced over 6 million km per year travelled by car, saving nearly 2 kilotonnes of carbon dioxide per year. This is a minimum estimate of the effect of the CCA schemes, because it is based on user surveys which took place before the full build-up of use of the infrastructure had occurred, and because it takes no account of wider effects of the CCA investment.

16 The **city-wide** increase in cycling volumes in the CCA cities since the start of the CCA programme is estimated to have resulted in a reduction in car use of 94 million km per year, with an associated reduction in carbon dioxide emissions of 25 kilotonnes. Part, but not all, of this is attributable to the CCA programme.

[1] Using data from the Active People Survey for 2010/11-2012/13 and 2011 Census data.

1. Key lessons for policy-makers and practitioners

Lessons for policy-makers

1.1 Investment in cycle infrastructure is effective. In an evaluation of 12 significant infrastructure schemes in the CCA cities, eight showed increases in cycling volumes that were likely or highly likely to be attributable to the CCA investment. For the other four schemes the evidence was ambiguous or conflicting, but there were still indications that cycling volumes had increased in some places along the routes.

1.2 It takes time for the full impact of cycle infrastructure to be achieved. Cycling volumes on some new schemes were still increasing 3-5 years after the infrastructure had been completed.

1.3 Increases in cycling are associated with reductions in car use and carbon emissions. Mode share data in some cities shows that as the proportion of trips by bike into city centres has risen, the proportion of trips by car has gone down. Increased cycling in the CCA cities is therefore helping to reduce carbon emissions. Survey data from individual CCA schemes suggests that increased cycling on CCA infrastructure is reducing car travel by about 1 million trips per year in the short term. Medium and long-term impacts of the investment are likely to be larger.

1.4 New cycle infrastructure increases physical activity. Amongst cyclists who were surveyed on new cycle infrastructure, about half of existing cyclists and over three-quarters of new cyclists had become more active as a result of the CCA investment. This was especially beneficial for new cyclists, as they were less likely to already meet physical activity guidelines. Increased cycling did not offset other physical activity (e.g. from walking, sports and recreation).

1.5 Good quality cycle infrastructure can widen 'health equity': that is, it can spread the health benefits of cycling to more people. At the start of the CCA programme, men in the CCA cities were twice as likely to cycle as women; under-55s were nearly three times more likely to cycle than over-55s; and white individuals were 1.6 times more likely to cycle than non-white individuals. During the CCA period, these inequalities decreased for age and ethnicity (although not for gender) at programme level. However, amongst those using new CCA-funded cycle infrastructure, there was strong evidence that the new routes were reducing inequalities with respect to both gender and ethnicity. For example, 43% of new cyclists using new CCA infrastructure were female, compared to only 33% of existing cyclists. This suggests that as cycle facilities improve, they attract a wider range of people.

1.6 There is significant growth potential for cycling in towns and cities. Bristol, Cambridge, Manchester and Newcastle had long-term data which showed sustained growth in cycling over 12-20 years. This suggests that continued investment in cycle facilities can deliver continued growth even once levels of cycling are high (as in Cambridge). There is so far no 'natural limit' to the levels of cycling that may be achieved in English towns and cities. Part of the reason for the sustained growth in these cities is that they have given high priority to cycling over many years, and have been successful in securing funding for it.

1.7 Ambitious cycle infrastructure requires significant investment. The cost of the most effective types of CCA scheme was about £1-3 million per km for cycle superhighways, and £0.2 million per kilometre for traffic-free towpath routes. To build comprehensive networks of cycle routes in towns and cities will require substantial investment over a considerable period of time. This in turn requires local authorities to prepare a pipeline of schemes that are ready to go as soon as funding is available.

1.8 Ambitious cycle infrastructure requires local politicians to make difficult decisions. While some of the successful CCA schemes had not required road space to be reallocated, other schemes had required politicians to make tough decisions to remove car parking or traffic lanes. Where this had been done, the effect was more positive than where compromises had been made. In the long run, infrastructure that is 'right first time' is better value for money.

Lessons for practitioners

1.9 There is strong public support for improving the safety of cycling. A large majority of the general public (69-79% of those surveyed in five CCA cities) believed that the safety of cycling in their city should be improved. Support was even higher amongst people who cycled: 71-85% of people who cycled wanted safer conditions for cycling.

1.10 It is important to make cycle routes that are safe for everyone. While a high proportion of adult cyclists felt that the new cycle infrastructure being built in the CCA cities was safe for them to use (61-89% in surveys in four cities), the proportion who felt that it was safe for children to use was lower (13-78% in surveys in five cities). This highlights the need for new cycle infrastructure to be designed to meet the needs of all potential users, in line with cycle infrastructure design guidelines in Local Transport Note 1/20.

1.11 High quality cycle infrastructure can have a large impact. The cycle infrastructure schemes that delivered the most dramatic increases in cycling were high quality segregated cycle superhighways where cycling felt both safe and pleasant, and high quality traffic-free routes (e.g. along towpaths). This demonstrates it is worth investing in ambitious ‘flagship’ schemes. Cycle superhighways are likely to require reallocation of road space in order to work well.

1.12 Less ambitious schemes and compromised schemes will have less impact. Schemes that had less impact include cycle paths with ‘light segregation’; ‘mixed routes’ (e.g. combining on-road cycle lanes marked by white lines, quiet roads and short sections of segregated cycle track); segregated cycle paths adjacent to inter-urban multi-lane roads with busy traffic; and isolated junction treatments. These schemes may still be worth doing as part of wider investment, or as part of short-term emergency active travel measures in the context of the Covid-19 pandemic, but on their own they are unlikely to be transformational. 'Light' segregation is probably better than no segregation, but less effective than 'full' segregation. As the opportunity arises, it will be desirable to replace 'lightly segregated' cycle infrastructure installed during the pandemic with fully segregated cycleways.

2. Introduction

2.1 The Cycle City Ambition (CCA) programme provided grants to eight cities, or groups of cities, in England: Birmingham; Cambridge; Greater Manchester; Newcastle; Norwich; Oxford; the West of England (Bristol, Bath and North East Somerset, and South Gloucestershire Councils); and West Yorkshire Combined Authority (Leeds, Bradford and neighbouring areas).

2.2 The first phase of funding (£77 million) was awarded in August 2013, and the second phase of funding (£114 million) in March 2015. All eight cities contributed significant additional funding from other sources. The Department for Transport grant was 100% capital.

2.3 The programme ran until March 2018, although some schemes were not completed until after this date.

2.4 The research questions that the evaluation was designed to address were as follows:

- What impact has the CCA investment had upon levels of cycling in the cities and how these have changed over time?
- To what extent do impacts on cycling rates and car use increase or diminish over time?
- What is the profile of those who already cycled in the cities, and those who have taken up cycling since the award of the funding, considering both key demographics and individuals' current levels of physical activity?
- What impacts has the CCA investment had on the perceptions of cyclists and the public in the cities and how has this changed over time?
- What estimates can we generate for the wider impacts of CCA investment on safety, congestion, car kilometres and carbon emissions and overall physical activity[2]?
- What can the CCA programme tell us about the typical costs of cycling interventions and the key factors that can impact on the costs of delivery?
- What lessons can we learn from the implementation of CCA?

2.5 This summary and synthesis of the evaluation evidence brings together the key findings from a final technical evaluation report and a separate report on the costs of different types of CCA scheme. It also includes some findings from earlier evaluation reports.

[2] Analysis of safety data is not included here but is set out in the final technical evaluation report (available at http://www.transportforqualityoflife.com/policyresearch/cyclingandwalking). Analysis of congestion effects did not take place; reasons for this are discussed in the final technical evaluation report.

3. Background city-wide cycling trends

3.1 In all eight CCA cities, city-wide cycling levels measured by automatic cycle counters (ACCs) and manual cordon and screenline counts have increased since the start of the CCA investment programme[3].

3.2 In some of the cities, long-running cordon and screenline counts or ACC data showed that this was a continuation of a trend that pre-dated the CCA programme. For example, cycling levels have been increasing in Bristol since 2000 or earlier; in Cambridge since about 2004; in Manchester since about 2006; and in inner and central Newcastle since about 2008.

3.3 This means that investment in these four cities (and possibly in some of the others) took place in the context of favourable underlying trends, which may have been due to past investment or demographic factors or both.

3.4 Part of the city-wide increase in cycling during the CCA period is attributable to the CCA investment. However, it is also likely to be due in part to previous cycling

[3] Automatic cycle counters (ACCs) use inductive loops (metal detectors) or other technology to record the number of bikes passing a particular point. They collect data continuously, so can measure the total number of cyclists over the course of a year at a single location. Manual counts provide a 'snapshot' of the number of cyclists at a location, typically over a single day but sometimes over several days. If manual counts take place on every road and cycle path entering a city centre they are known as 'cordon' counts; if they take place on every road and cycle path across a natural barrier such as a river they are known as 'screenline' counts.

investment and wider policies that are supportive of cycling. Demographic change may also be playing a role, although over the seven year period that has been evaluated, this will have been limited.

3.5 City-wide changes in cycling volumes during the CCA period are summarised in Table 1. ACC data shows increases in city-wide cycling volumes over seven years that range from +4% to +79%, with an unweighted mean of 37%.

3.6 Cordon and screenline counts show changes during this period between -6% and +73% at different locations in each city, but with most figures between 25% and 50%.

3.7 In individual cities, results from ACC data and cordon / screenline counts show broadly similar trends.

Table 1: 'City-wide' change in cycling volumes in CCA cities, as measured by ACCs and manual cordon and screenline counts

City	ACC data (baseline-final)	Manual cordon and screenline counts
Birmingham	+38% (2012-2019)	No data
Cambridge	+51% (2012-2019)	+32% (2012-2019) River Cam Screenline +49% (2012-2019) radial cordon
Greater Manchester	+40% (2012-2019)	+41% (2012-2019) cordons at 5 district centres* +62% (2012-2019) Manchester cordon
Newcastle	+4% (2012-2019)	+73% (2013-2019) central cordon +15% (2013-2019) inner cordon -6% (2013-2019) outer cordon
Norwich	+45% (2012-2019)	+31% (2013-2018) inner cordon +46% (2013-2018) outer cordon
Oxford	+15% (2012-2019)	stable (2012-2018) inner cordon +20% (2012-2019) outer cordon
West of England (Bristol)	+79% (2011-2019)	No data
West Yorkshire (Leeds)	+26% (2012-2019)	+27% (2012-2019) Leeds cordon; peak period +26% (2012-2019) Leeds cordon; inter-peak period

* Manchester, Salford, Stockport, Tameside, Trafford

3.8 In four cities, there is data from cordons and screenlines which suggests that alongside the absolute increases in cycling volume, cycling mode share is also increasing:

- In Cambridge, cycling mode share increased from 24% to 29% between 2012 and 2019 on a screenline across the River Cam, and from 5% to 7% in the same period across an outer cordon around the city. In both cases, car mode share fell by a similar amount.
- In Greater Manchester, cycling mode share increased from 5% to 8% between 2012 and 2019 at a cordon around Manchester city centre (with car mode share falling by a similar amount), and from 3.3% to 4.6% in the same period at a cordon around Eccles in Salford (with car mode share not changing).

- In Norwich, cycling mode share increased from 6% to 8% between 2012 and 2018[4] at an inner cordon around the city (with car mode share falling by a similar amount).
- In Leeds (West Yorkshire), cycling mode share at a cordon around the city is much lower, at 1.3% in 2012 and 1.5% in 2019. Car mode share fell during this period, but due to increases in bus mode share.

3.9 Despite the evidence that cycling levels in the cities are rising, surveys of cycling participation did not show an increase in the proportion of people who cycle. Between three baseline years (2010/11 - 2012/13) and three 'follow-up' years (2015/16 - 2017/18), the proportion of survey respondents who had cycled in the previous four weeks went down, both in absolute terms and relative to four comparison groups (a "matched" comparison group, a "national" comparison group, an "unfunded" comparison group and London). The same outcome was seen for another measure of cycling participation, the average number of cycling days per adult in the previous four weeks.

3.10 This finding should be treated with caution for two reasons. First, the surveys used to measure cycling participation (Active People Survey, APS, until 2015/16; and Active Lives Survey, ALS, from 2015/16, with one overlap year) used different sampling methods and asked slightly different questions, and the results in the year when both surveys were undertaken showed that they were not directly comparable. Despite efforts to reweight the data, this increases the uncertainty about the findings.

3.11 Second, the surveys are not well-powered to detect change, so it is only possible to analyse them at the level of the whole CCA programme, not for individual cities, and certainly not for areas within cities. This means that increases in cycling in more successful cities, or areas within cities, may be 'diluted' by data from less successful cities, or areas within cities.

3.12 It is nevertheless possible that both the ACC and manual count data (showing **cycling levels going up**), and the cycling survey data (showing **the number of people who cycle going down**), are correct. This could happen because the geographical distribution of APS/ALS survey respondents is random, whereas ACCs may be in locations with better cycle facilities, and counts at cordons and screenlines may also be in places that are more conducive to cycling, such as inner urban areas.

3.13 Thus there may have been increases in cycling participation in some areas where cycling facilities are improving (detected by ACCs and cordon / screenline counts), but offset by falls in cycling participation in other areas, such as more car-dependent outer urban areas, where cycle facilities may be less good and not improving as much.

3.14 Once results of the 2021 Census become available, it will be possible to examine change in cycling participation (for cycling to work) between 2011 and 2021 at a finer grained level, and to investigate whether this did indeed vary by location within the cities.

[4] Data given for 2018 because 2019 counts were affected by heavy rain.

4. Overview of CCA schemes

4.1 The CCA programme provided £191 million in capital grants to the eight CCA areas between 2013 and 2018. Table 2 summarises how the grants received by the CCA cities were used. Schemes that were a focus of the evaluation are underlined.

Table 2: How the CCA investment was used

City	DfT grant	How the grant was used
Birmingham	£39 million	• 7km segregated cycle track along two A-road corridors into the city + cycle parking along routes • Resurfaced and improved canal towpaths (46km of total 52km in the city[5]) • Improved 24km of cycle routes across green space • Signed 11 routes along quieter roads • Implemented 20mph limits across 41km of roads • Distributed over 7,000 bikes in disadvantaged neighbourhoods • Grants to 62 workplaces and 69 schools for cycle parking, cycle lockers etc.
Cambridge	£10 million	• 3 sections of segregated cycle paths along main radial routes into city centre (4km) • 2 fully segregated paths along rural main roads between Cambridge and villages • Pedestrian / cycle bridge over River Cam as part of major north-south cycle route, the Chisholm Trail • Signage of 20mph limits on nearly all roads that are not A- or B-roads (212km)
Greater Manchester	£42 million	• Wilmslow Road / Oxford Road Cycleway: 7km segregated cycle superhighway • 3 other segregated or lightly segregated cycle routes (5km), including the Broughton Cycleway • 3 canal towpath routes (16km) • 2 quietways (11km)

[5] The remaining 6km of canal towpaths in the city already had a hard surface.

City	DfT grant	How the grant was used
		• Improvements to cycle access and parking at 15 'cycle and ride' stations; 2 new cycle centres with parking, lockers, showers and bike repair • Grants to 97 workplaces and 21 schools for cycle parking, cycle lockers etc.
Newcastle	£16 million	• Gosforth Corridor: improvements to 5km route from city centre to Gosforth, including quiet roads, fully-segregated track and light segregation • John Dobson Street: 0.4km segregated cycle track in city centre connecting to Gosforth Corridor • Shared space schemes in 3 local shopping areas • Mixed strategic cycle routes from city east to North Tyneside employment area (7km); and from city to west Newcastle suburbs (3km)
Norwich	£12 million	• Upgrades to 3 pre-existing mixed strategic routes, the Pink Pedalway and Blue and Yellow Pedalways (40km) including on-road cycle lanes and segregated track • Contraflow cycle route in city centre • 20mph zones across 128km of roads
Oxford	£4 million	• Remodelled The Plain roundabout on main approach route to city centre from the east • Widened and resurfaced riverside route (4km)
West of England	£27 million	• Filwood Greenway: mixed strategic route (5km) including segregated cycle track and paths through green space • North-South and East-West segregated cycleways in city centre (3km) • Remodelled ring-road junction including direct crossing of six traffic lanes for cyclists • New 100m pedestrian / cycle bridge cantilevered off viaduct carrying 4-lane ring road • Signage of 20mph limits on 246km of residential roads
West Yorkshire	£40 million	• Leeds - Bradford Cycle Superhighway (23km), fully segregated for 80% of the route; 20mph zones in 14km of adjacent streets • Resurfaced canal towpath / riverside routes (38km) • New pedestrian/cycle bridge between York railway station and city centre • Grants to 99 workplaces for cycle parking, cycle lockers etc.

5. Typical costs of different types of cycling investment

5.1 Analysis of the schemes funded by the CCA grants provides some benchmarks for typical costs of a variety of types of scheme, summarised in Table 3.

Table 3: Typical cost of different types of scheme funded through CCA

Scheme Type	Range of costs	
Cycle Superhighway	£1-3m/km	two-way physically segregated
Mixed Strategic Cycle Route	£0.2-0.9m/km	
Inter-urban main road cycleway	£0.5-1m/km	
Resurfaced cycle route	£0.1-0.2m/km £0.4m/km	canal or riverside routes of 10km or more canal or riverside routes of <5km
Cycle bridge	£4-5m £0.1-0.5m	new bridges upgrades of existing bridges
20 mph zone	£10-14k/km £2-3k/km	including traffic calming measures without any traffic calming measures
Remodelled major junction	£1.5-1.6m £0.2m	cycling-specific schemes cycling piggybacking on traffic measures
Cycle crossing at major road	£0.1-0.4m £0.9m	at-grade crossing of major road at-grade crossing replacing pedestrian subway
Area-wide workplace cycle facilities	£0.4-0.7m £4-8k	4-year programme cost cost per workplace grant
Area-wide school and college cycle facilities	£0.5-2.2m £7-70k £75k	4-year programme cost (ambitious programme) cost per school (on-site facilities) cost per school (off-site infrastructure)
Large-scale cycle parking	£2.5m £0.1-0.7m	for a very large bike park for 3,000 bikes for secure bike parks for 10s - 100+ bikes, including changing rooms / showers at the largest
Large-scale provision of cycles	£2.5m £360	4-year programme cost cost per bike provided (with associated kit)
Comprehensive cycle route signage	£44-92k £12k	cost per route cost per km
Automatic cycle counters	£4-5k £12k	cost per monitoring site totem display units

6. Scheme-level cycling volumes

6.1 At the start of the CCA evaluation, 14 schemes (between one and three in each city) were identified for detailed assessment. The selected schemes represented between a quarter and two-thirds of the Department for Transport grant in each city.

6.2 The schemes selected for detailed assessment included:

- Cycle Superhighways: segregated cycle tracks along main radial corridors (4)
- Mixed Strategic Cycle Routes: routes that combined quiet roads, paths through green space, lightly-segregated paths and unsegregated cycle lanes (5)
- City-centre schemes (3)
- Improvements to a network of canal towpaths (1)
- A junction treatment (1).

6.3 For each scheme, the evaluation aimed to identify one or more control sites: places that were similar to the investment location but that would not receive any improvements in cycling facilities. These control sites were selected at the beginning of the programme. Change in cycling levels at the investment location was then compared with change in cycling levels at the control sites.

6.4 Where possible, time-series data from ACCs was also used to investigate whether there was an 'up-tick' in cycling volumes at the investment location coinciding with the timing of the investment.

6.5 Table 4 summarises the results from the scheme-level evaluations in each city. Boxes on pages 21-23 illustrate some of the outcomes of the CCA investment, for three schemes in different cities.

6.6 For scheme locations where a change in cycling volumes was observed, consideration was given as to whether that change could be attributed to the investment. Judgement about the likelihood that increases in cycling were attributable to CCA investment was based on three considerations: whether the change in cycling levels exceeded the change at control sites; whether its timing was clearly associated with the date of completion of works; and whether its magnitude was sufficiently large that it was highly improbable that it could have been due to chance.

6.7 Evidence from ACC data was given more weight than evidence from pre- and post-scheme manual counts, as the latter can be affected by weather conditions on the days when the count takes place. However, it is worth noting that ACC data mainly reflects increases in cycling once a scheme is complete, and may therefore underestimate the total change.

6.8 For the 12 schemes with suitable evidence, five showed an increase in cycling volumes that was highly likely to be attributable to the CCA investment. Increases relative to control sites were mostly in the range of +14% to +40% but with one scheme (canal towpaths in Birmingham) showing an exceptional increase of +158%.

6.9 Three schemes showed substantial increases in cycling volumes (in the range +42% to +72%) that were likely to be attributable to the investment, but where evidence from control sites or evidence that the uplift was closely associated with the timing of scheme completion was unavailable.

6.10 Four schemes showed less positive results. Of these, three schemes showed conflicting evidence from different data sources or at different locations along the route, and one scheme showed a small increase in cycling that was slightly less than the increase at a control site.

6.11 Of these four schemes, two were on major roads. It is possible that even with a degree of light segregation, these were still not attractive routes to cycle on. The other two were good quality schemes on roads that are relatively attractive to cycle on. The reason for increases in cycling on these roads being slightly less than increases in cycling at the control site is not clear.

Table 4: Evidence from scheme-level evaluations

City, scheme and scheme completion date	Evidence	Absolute change	Change vs control sites	Increase attributable to CCA investment?
Birmingham **Upgraded canal towpaths** **2014-15**	Between 2012 and 2019, ACC data show cycling volumes on the towpaths increased substantially (+181%), whereas a group of control sites increased by a smaller amount (+23%). The timing of the uptick in cycling volumes on the four canal towpaths coincides with the different completion dates of each set of towpath works, strengthening the conclusion that the uplift in cycling volumes is attributable to the schemes.	Large positive	+158%	Highly likely
Cambridge **Huntingdon Road** **2016-17**	Between 2016 and 2019, ACC data show a small increase in cycling volumes on Huntingdon Road (+3%), but a slightly larger increase at a control site (+7%). Manual counts at two sites on feeder routes (~0.5km from the scheme) show an increase in cycling volumes between 2015 and 2019 (+10%), whereas counts at control sites slightly decreased (-2%).	Small positive	Neutral	Not known
Cambridge Hills Road 2016	Between 2017 and 2019, ACC data show a small increase in cycling volumes on Hills Road (+3%), but a slightly larger increase at a control site (+6%).	Small positive	-3%	Not known
Greater Manchester **Wilmslow Road / Oxford Road Cycleway** **2016-17**	Between 2017 and 2019, ACC data at a location 2km from the city centre shows cycling volumes on the cycleway increased (+34%), whereas a group of control sites showed a small drop (-2%). The 2017 data was collected after the scheme was completed, so does not capture short-term effects and probably under-estimates total uplift. ACC data at a location 3.5km from the city centre shows a pre/post change in cycle volumes of +70% between 2015/16 and 2019/20. The group of control sites shows no change in this period.	Large positive	+36-70%	Highly likely

City, scheme and scheme completion date	Evidence	Absolute change	Change vs control sites	Increase attributable to CCA investment?
	Pre- and post-scheme manual counts at multiple locations along the cycleway suggest cycling volumes may have nearly doubled or tripled at sites within 4km of the city centre (increases between +85% and +176%), but suggest smaller increases (+42%) further away from the city centre.			
Greater Manchester **Broughton Cycleway** **2016**	Between 2016 and 2019, ACC data at two sites on the cycleway show cycling volumes fell or slightly increased (-14% and +4%). The 2016 data was collected after the scheme was completed. A group of control sites showed a small drop (-1%). Pre- and post-scheme manual counts at three locations along the cycleway suggest cycling volumes increased (+13-27%).	Neutral	Negative	-
Newcastle **Gosforth Corridor** **2016-2017**	Between 2016 and 2019, ACC data at a site on the corridor near the city centre show cycling volumes increased (+6%); two control sites showed drops (-8% and -12%). Between 2017 and 2019, ACC data at a site further from the city centre show cycling volumes fell (-10%); a control site showed an increase (+8%).	Neutral	Neutral	-
Newcastle **John Dobson Street** **2015-16**	Between 2015 and 2019, manual counts show a large increase in cycling volumes (+72%).	Large positive	Not known	Likely
Norwich **Pink Pedalway** **2013-15**	Between 2014 and 2019, ACC data at four sites on the pedalway show cycling volumes increased (+36%); three control sites showed a smaller increase (+22%).	Positive	+14%	Highly likely
Oxford **The Plain roundabout** **2015**	Between 2014 and 2018, manual count data adjacent to The Plain show cycling volumes increased (+25%); five control sites showed a small drop (-3%). ACC data at a site on a feeder route (1km from The Plain) shows an uptick in cycling volumes that coincides with the completion of the works, strengthening the conclusion that the uplift in cycling volumes is attributable to the scheme.	Positive	+28%	Highly likely

City, scheme and scheme completion date	Evidence	Absolute change	Change vs control sites	Increase attributable to CCA investment?
Bristol (West of England) **Filwood Greenway** **2018**	Between 2017 and 2019, manual counts at two sites on the greenway where improvements had been made showed increases in estimated annual cycling volumes (+42% and +63%). A third site on the greenway where no improvements were made showed a smaller increase (+16%).	Positive	Not known	Likely
Bristol (West of England) **East-West Quietway** **2014 -2018**	Between 2015 and 2019, ACC data at one site on the quietway showed cycling volumes increased (+58%). There were no suitable control sites, but this increase was larger than the increase in cycling volumes for the city as a whole over the same period (+18%).	Positive	+40%	Likely
West Yorkshire **Leeds-Bradford Cycle Superhighway** **2016**	Between 2017 and 2019, ACC data at eight sites on the cycle superhighway showed an overall increase in cycle volumes (+18%). A group of eight control sites showed a small increase (+3%). Increases in cycling were larger at sites near Leeds city centre; moderate at sites near Bradford city centre; and smaller at sites that are further from either city centre.	Positive	+15%	Highly likely

Note: For columns showing absolute change and change relative to control sites, "neutral" is used when some measures of change in cycling levels are positive and others are negative. In the column showing whether increases in cycling are attributable to the CCA investment, schemes are marked as "-" when there was not an absolute increase; and as "not known" when there was an absolute increase but it is not possible to say it was attributable to CCA investment because it was less than the increase at a control location. Results for one scheme, the Bristol North-South Quietway, are not shown because of uncertainty over the reliability of baseline data, and results for another scheme, Cambridge Trumpington Road, are not shown because post-intervention data was not collected due to Covid-19.

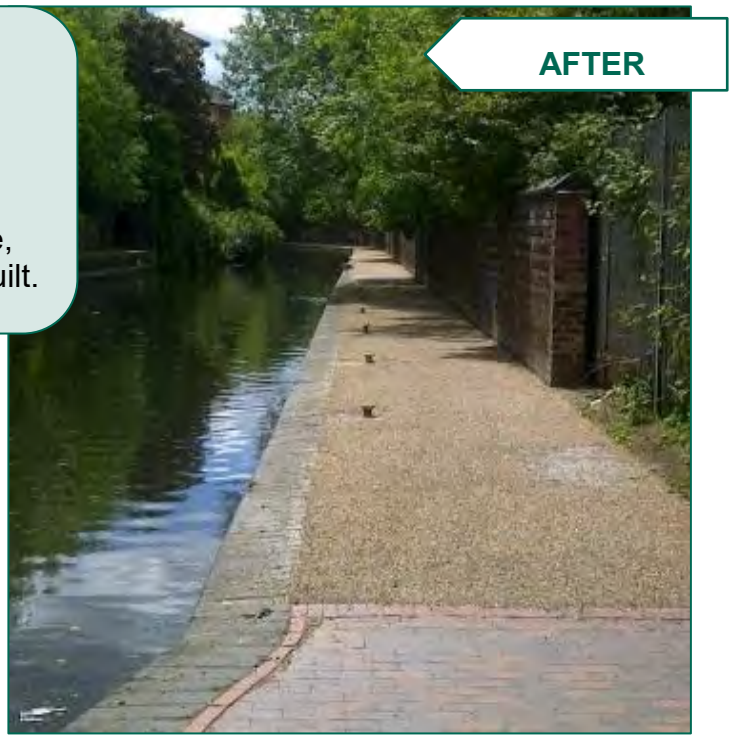
6.12 There is evidence that cycling levels at scheme locations continued to grow for some time after new cycling infrastructure was completed. In Birmingham, cycling on the canal towpath routes continued to grow for 5 years after they were improved[6]. In Greater Manchester, cycling volumes on the Wilmslow Road / Oxford Road Cycleway lasted for 3 years after completion of the first phase of improvements, and then levelled off. In Bristol, cycling volumes on the East-West Quietway continued to grow for 4 years after the first phase of improvements. This suggests that it is important when assessing the effectiveness of cycling investment to collect data for at least 5 years after a scheme is completed, in order to see the full build-up of effects.

6.13 It is not possible to say from the scheme-level ACC and manual count data what proportion of the increase in cycling is due to new cycle trips, as opposed to route-switching. However, some evidence on this is available from surveys of users of the new routes, summarised in section 10.

[6] Leeds City Council also noted that following interventions on the Leeds-Liverpool Canal, usage continued to grow for many years.

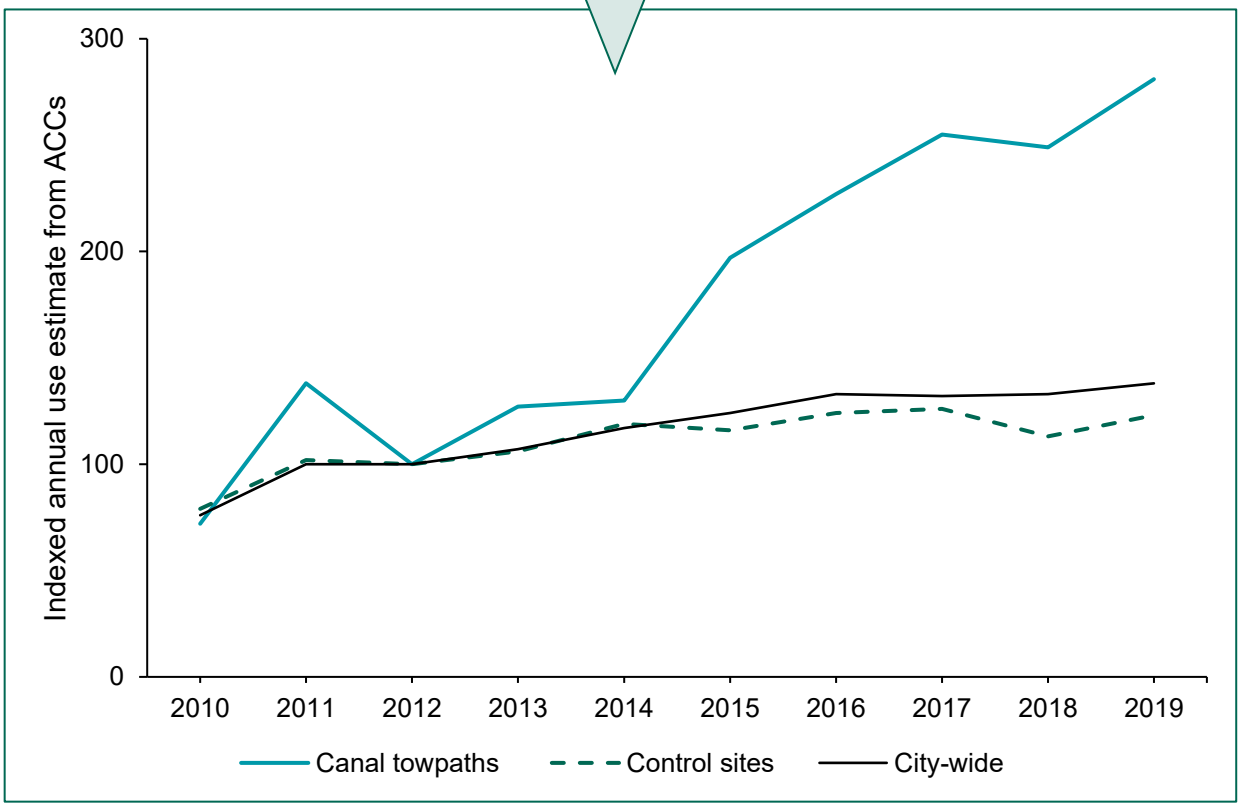
1. Birmingham: canal towpath improvements

46km of canal towpaths were upgraded with all-weather bonded surfaces. Paths were widened to 2.5m where there was space. Information totems were installed in the city centre, and two access ramps were built.



BEFORE

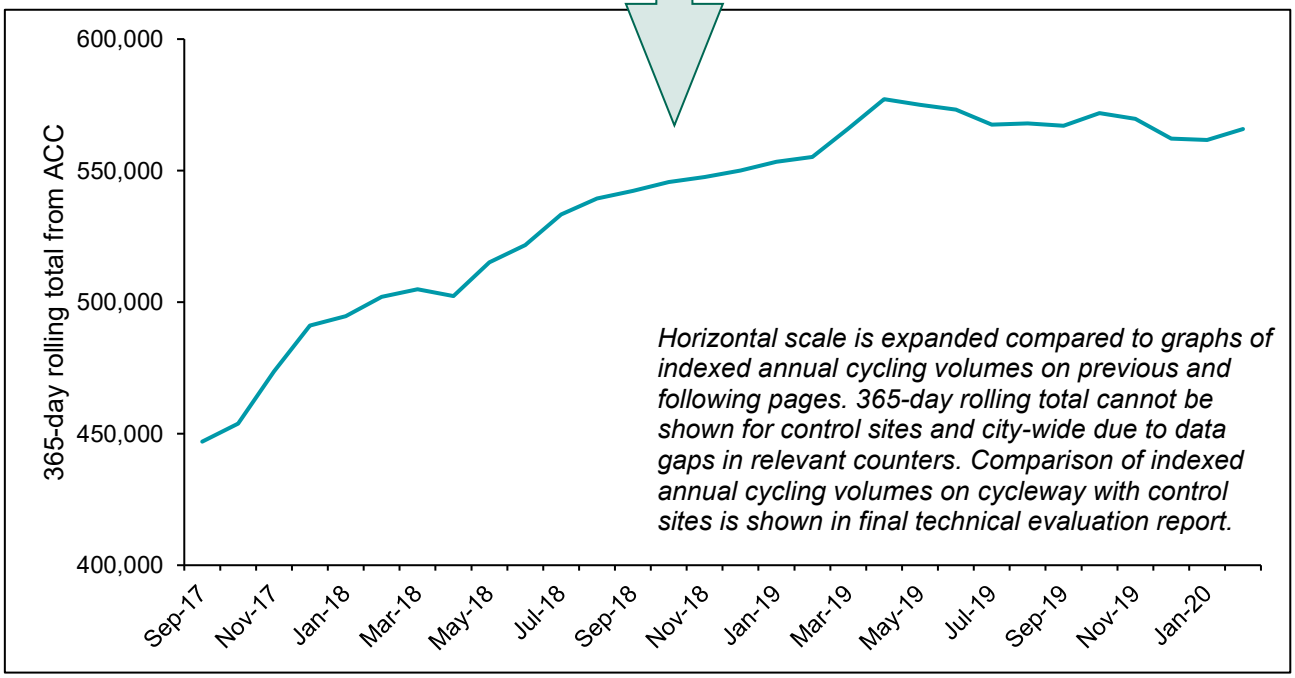
Indexed annual cycling volumes *(2012=100)*
Cycling trends on the canal towpaths in the period before the works took place (2010-2014) were close to trends at a set of control sites and city-wide. After the towpaths were improved, there was a large increase in cycling, exceeding the control and city-wide trends. This trend has continued for at least five years.



2: Manchester: Wilmslow Road / Oxford Road Cycleway

This cycleway runs south from Manchester city centre for 7km, past the University of Manchester, Manchester Metropolitan University and the Royal Northern College of Music. Most of the cycleway (70%) is physically segregated from traffic.

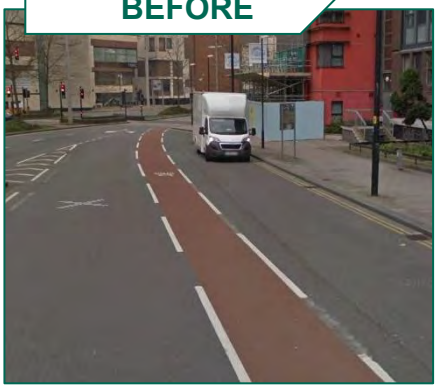
Number of cyclists in previous rolling 12-month period
The first section of the Cycleway (three-quarters of the whole route) was completed in April 2016 and the second section one year later. In the year to September 2017, there were 450,000 cycle trips on the Cycleway travelling south near the location shown in the picture above. By April 2019, the number of people travelling south along the Cycleway here had grown to 580,000 per year. At that point, growth levelled off. It took three years for the full build-up of the effect of the Cycleway to be seen.



3: Bristol: East-West Quietway

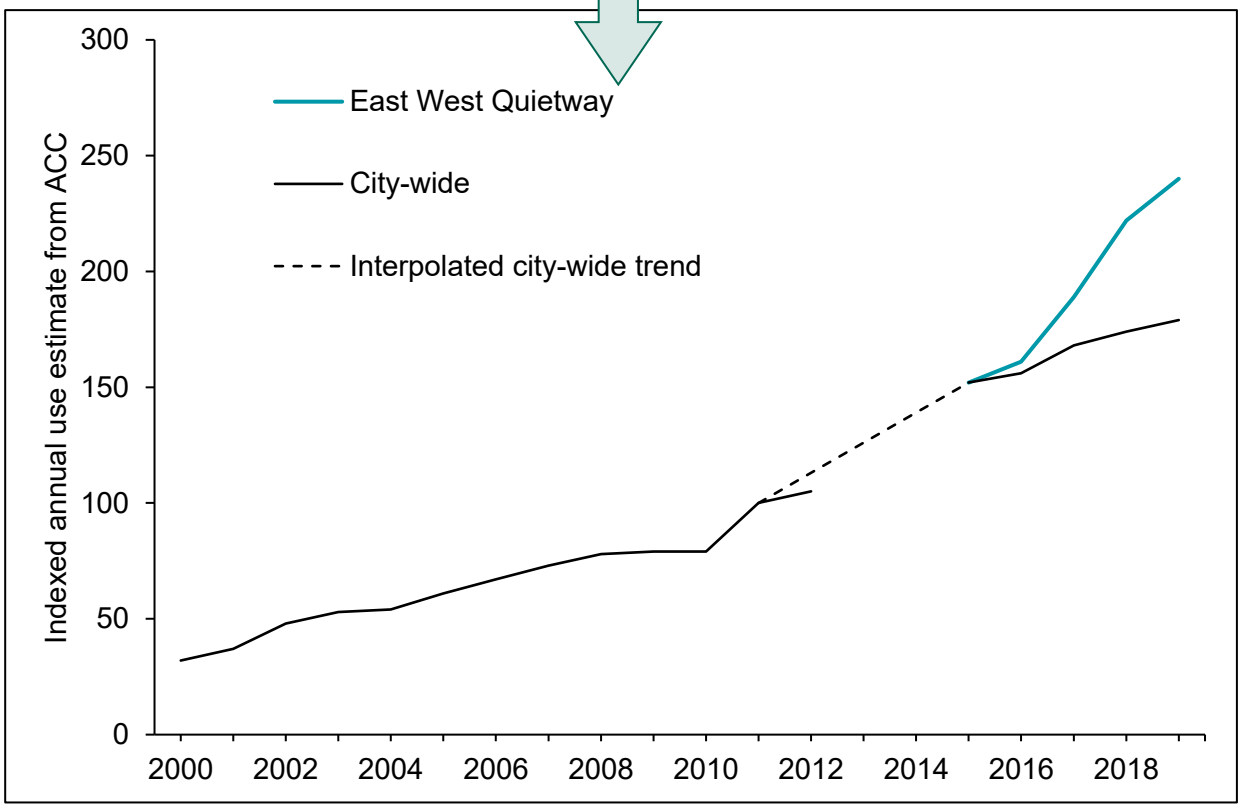
The East-West Quietway provides a link from Bristol city centre to the popular Bristol-Bath Railway Path. It was completed in stages between 2014 and 2018.

BEFORE



AFTER

Indexed annual cycling volumes *(2015=100)*
Numbers of cyclists have increased much faster on the East-West Quietway than for the city as a whole. Between 2015 and 2019, cycling levels on the route rose by 58%, compared to an 18% increase during the same period for the city as a whole.



7. Profile of cyclists

Propensity to cycle amongst different demographic groups

7.1 Before the start of the CCA programme, there were marked inequalities in cycling participation in the CCA cities. Higher levels of cycling were associated with being male, younger, white, more educated and more affluent. These inequalities were smaller in cities where there was more cycling -- for example, in Cambridge and Oxford, men and women were almost equally likely to cycle.

7.2 During the course of the CCA programme, APS/ALS data shows there was some improvement in some of these inequalities. Comparing data for a baseline period of 2010/11-2012/13 and a follow-up period of 2015/16-2017/18:

- The propensity of the under-55s to cycle was 2.9 times greater than that of the over-55s at baseline, while at follow-up it was only 2.1 times greater
- The propensity of white people to cycle was 1.6 times greater than that of black / minority ethnic (BME) people at baseline, while at follow-up it was only 1.3 times greater.

Both these changes were statistically significant.

7.3 The APS/ALS data shows no change in the inequality in cycling participation between men and women. The propensity of men to cycle was 2.2 times greater than that of women at baseline, and 2.1 times greater at follow-up, but this difference is not statistically significant.

7.4 These findings should be treated with caution, because of the change in survey methodology between APS and ALS. Full details and graphs are included in the technical evaluation report.

7.5 Data on change in cycling participation according to education level and income is not yet available, as the baseline evidence comes from analysis of the 2011 Census. Once results of the 2021 Census are available, it will be possible to examine whether there has been a change in cycling participation (for cycling to work) according to level of education and income. The Census data will also provide a cross-check of the trends from APS/ALS with respect to gender, age and ethnicity.

Demographics of 'new' and 'existing' cyclists

7.6 All eight cities carried out user surveys of cyclists at CCA scheme locations. Route User Intercept Surveys in six cities included questions that provide evidence on the demographic profile of ‘new’ versus ‘existing’ cyclists.

7.7 In surveys carried out at scheme locations after the schemes were complete, the proportion of survey respondents who said that they were 'new' or 'starting' cyclists

was around 8%. At programme level, there were clear differences in the demographic profile of these new cyclists, compared to existing cyclists:

- The percentage of new/starting cyclists that were female was around 42%, compared to 33% for existing cyclists[7].
- The percentage of new/starting cyclists that were BME was around 16%, double that of existing cyclists at 7%[8].
- However, perhaps unsurprisingly, new cyclists were *less* likely to be over 65: only 3% of new/starting cyclists were over 65, compared with around 5% for existing cyclists.

7.8 These differences between new and existing cyclists with respect to gender, ethnicity and age are all statistically significant. They point towards a conclusion that the improvements in cycle infrastructure in the cities are attracting a wider range of people (specifically, women and BME people) to take up cycling, which may, over time, go some way to reducing current inequalities in cycling participation.

[7] 95% confidence interval for percentage of *new/starting* cyclists that were female is 37-47%; 95% confidence interval for percentage of *existing* cyclists that were female is 32-35%.
[8] 95% confidence interval for percentage of *new/starting cyclists* that were BME is 11-23%; 95% confidence interval for percentage of *existing* cyclists that were BME is 6-8%.

8. Cyclists' and public perceptions

Perceptions of safety and convenience of cycling in CCA cities

8.1 In five cities (Birmingham, Cambridge, Greater Manchester, Newcastle and West of England), evidence about perceptions of cycling was available from the Sustrans Bike Life survey.

8.2 The 2019 wave of the survey collected data on attitudes to various measures to make cycling safer, amongst both cyclists and the general population. Some findings are that:

- 80-84% of cyclists who were surveyed, and 76-83% of the general population, said that it was very / fairly important to **reduce levels of traffic** on the road
- 71-81% of cyclists who were surveyed, and 68-76% of the general population, said that it was very / fairly important to **reduce the speed of traffic** on the roads
- 91-95% of cyclists who were surveyed, and 84-91% of the general population, said that it was very/fairly important to **improve routes and facilities** for safe cycling
- 87-92% of cyclists who were surveyed, and 76-85% of the general population, said that more **physically distanced cycle tracks alongside roads** would be very/fairly useful in starting to cycle or cycling more
- 86-92% of cyclists who were surveyed, and 75-85% of the general population, said that more **traffic-free routes away from roads** would be very/fairly useful in starting to cycle or cycling more.

8.3 The Bike Life survey in 2019 also asked about perceptions of the convenience of cycling, and conditions for cycling, in the CCA cities. Some findings are that:

- Excluding Cambridge, 38-59% of cyclists who were surveyed, and 37-52% of the general population, felt that **their city was very / quite good as a place to ride a bike**. In Cambridge, perceptions were more positive, with 80% of cyclists and 76% of the general population feeling that the city was very/quite good as a place to ride a bike
- Again excluding Cambridge, 31-51% of cyclists who were surveyed, and 28-46% of the general population, felt that the **amount of cycle routes in their city** was very / quite good. In Cambridge, perceptions were somewhat more positive, with 59% of cyclists and 57% of the general population feeling that the amount of cycle routes in the city was very/quite good.

8.4 The overall sense of the findings from the Bike Life survey is thus of strong support (mostly >70% of both cyclists and the general population) for reducing traffic volumes, reducing speeds, and building more cycle routes; with somewhat lower proportions of people (mostly <50%, except in Cambridge) feeling that their city is a good place to ride a bike and has sufficient cycle routes. This points towards a

conclusion that the measures being implemented in the CCA cities go 'with the grain' of what cyclists and the public want to happen, but that there is still some way to go.

Perceptions of safety of CCA routes

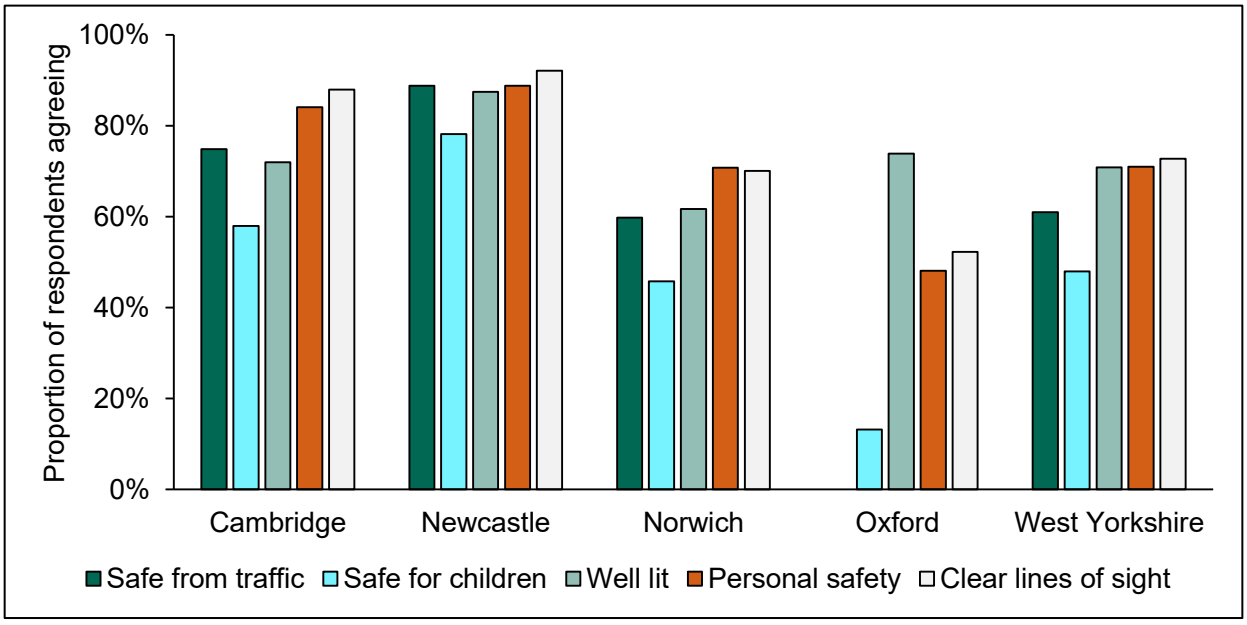
8.5 Route User Intercept Surveys provide evidence about perceptions of CCA-funded cycle routes specifically (as opposed to perceptions of conditions for cycling in the city as a whole). Five cities (Cambridge, Newcastle, Norwich, Oxford and West Yorkshire) asked cyclists about their perceptions of the new cycle routes. Results are shown in Figure 1.

8.6 A majority of respondents agreed that the CCA-funded routes were safe from traffic (61-89%, excluding Oxford where this question was not asked).

8.7 A majority also agreed that the routes were well-lit (62-88%), had clear lines of sight (52-92%) and were safe in terms of personal safety (48-89%).

8.8 There was more variation in the proportion of respondents who agreed that the routes were safe for children (13-78%), with the Oxford survey, related to a scheme on a busy road, showing the lowest level of agreement. Reasons for this may be that, in general, parents know that their child might not be quite as steady on a bike as an adult, might not be seen by drivers (because of their smaller size), and might not be able to 'read' the road quite as well.

Figure 1: Cyclists' perceptions of the safety of CCA cycle routes



Note: base sizes and further details provided in final technical evaluation report, Appendix F.

8.9 In another question, surveys in two cities (Norwich and West of England) asked how safe cyclists felt on the specific CCA route they were using. A high proportion (70-89% in different waves of the surveys) felt very safe or fairly safe. Around 80% of cyclists in West of England agreed that the new route had improved the safety of their trip.

9. Effect of CCA investment on physical activity and health

Effect of cycling on overall levels of physical activity

9.1 From a public health perspective, a key question about policies to encourage cycling is whether they increase overall levels of physical activity, or whether people who take up cycling compensate by doing less of other forms of physical activity, such as walking or sports.

9.2 The evaluation investigated this question for people living in the CCA cities. APS data was used to estimate average weekly physical activity energy expenditure by each survey respondent in the CCA cities, from cycling, walking, and all other sports and recreational activities.

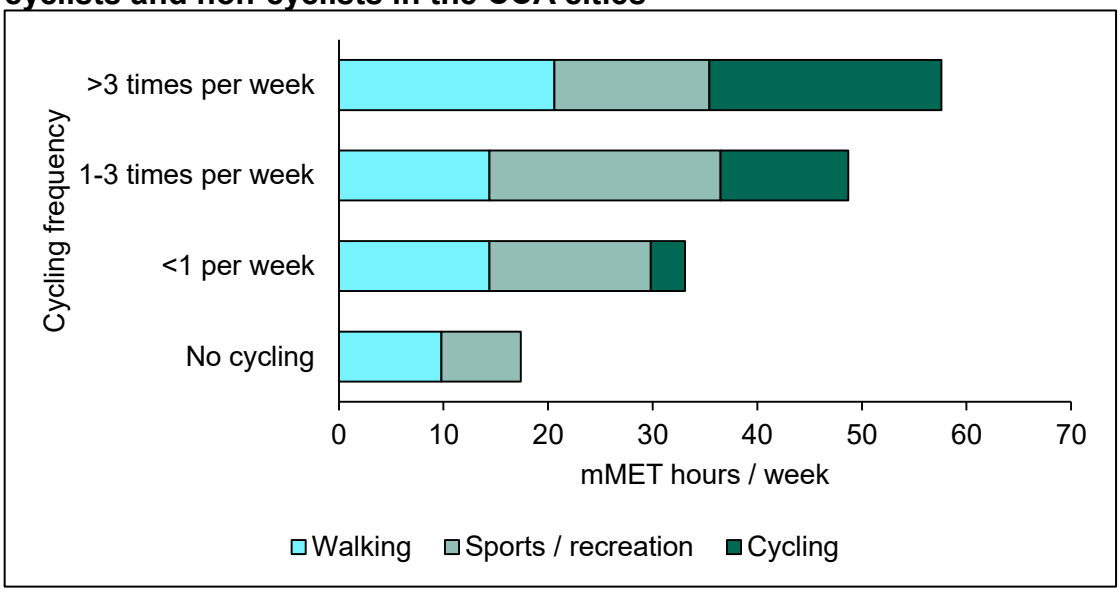
9.3 There was no indication that individuals who cycled more compensated by walking less or spending less time doing other sports and recreational activities. When simply comparing those doing *any* cycling versus those doing *none*, cyclists actually reported considerably more physical activity from walking, sports and recreation. This comparison should be interpreted with caution, however, as it is likely to be substantially confounded by demographic and health characteristics – e.g. the fact that cyclists are on average younger and less likely to have a physical disability than non-cyclists.

9.4 More convincingly, levels of walking, sports and recreation were similar *among cyclists* regardless of how much cycling was done (Figure 2). This suggests that physical activity from cycling does not displace physical activity in other domains, which is in line with previous evidence that an increase in active travel translates into a corresponding increase in total physical activity energy expenditure[9].

9.5 Across all eight cities, the proportion of individuals who met World Health Organisation physical activity guidelines (150 minutes of moderate intensity activity per week) was much higher amongst cyclists than for non-cyclists. Just under half (49%) of non-cyclists met the guidelines, as compared to 73% of those who cycled once a week or less; 92% of those who cycled 1-3 times a week; and 98% of those who cycled more than 3 times a week.

[9] Sahlqvist S. et al. (2013) *Change in active travel and changes in recreational and total physical activity in adults: longitudinal findings from the iConnect study* International Journal of Behavioral Nutrition and Physical Activity 10(1) p28

Figure 2: Amount of physical activity from different activity domains amongst cyclists and non-cyclists in the CCA cities



MET or 'Metabolic Equivalent Task' is a measure of energy expenditure, with a value of one corresponding to resting. Marginal MET hours (mMET hours) are a measure of additional energy expenditure above resting.

Physical activity and health of new and existing cyclists

9.6 Route User Intercept Surveys in five cities asked whether the presence of the cycle route had helped increase the amount of physical activity that users regularly took.

9.7 In four of these cities (Greater Manchester, Newcastle, Norwich and West Yorkshire), between 52% and 67% of cyclists reported that the presence of the route they were using had helped them increase the amount of physical activity that they regularly took. In Oxford, the proportion was lower (21%), probably reflecting the more modest nature of the scheme at The Plain roundabout, although the large number of cyclists using this junction mean that the absolute number who have increased their physical activity as a result of the scheme is significant.

9.8 The surveys in Greater Manchester, Norwich and West Yorkshire distinguished between new and existing cyclists. They showed that the impact of the new infrastructure on physical activity was much larger for new cyclists than for existing cyclists. Combining the three cities, 80% of new cyclists said the CCA infrastructure had increased their physical activity levels (95% confidence interval of 75-85%), compared to 53% of existing cyclists (95% confidence interval of 51-55%).

9.9 The effect of the CCA schemes in increasing activity levels amongst new cyclists is important because responses to a question on physical activity in the previous week, asked in Greater Manchester and Birmingham, showed that new cyclists were less physically active. For these two cities combined, only 48% of new / starting cyclists had done 30 minutes or more of physical activity on at least five days in the previous week, compared to around 62% of existing cyclists.

9.10 Surveys in three cities (Cambridge, Norwich and West Yorkshire) asked about the effect of the new infrastructure on physical health, mood and well-being. Again, there was evidence that the benefits were more strongly felt by new cyclists. For the three cities combined, 81% of new cyclists and 69% of existing cyclists said the scheme improved their physical health; 74% of new cyclists and 66% of existing cyclists said

the scheme improved their mood; and 81% of new cyclists and 74% of existing cyclists said the scheme improved their wellbeing.

9.11 Taken together, these findings suggest that the CCA infrastructure helped increase physical activity amongst all types of cyclist, but this was particularly marked for new cyclists. Because new cyclists tended to be less active, the health benefit to them of this increase in activity was greater. Finally, the CCA infrastructure improved self-reported physical and mental health for all cyclists, with the benefits again being greater for new cyclists.

10. Effect of CCA investment on car use

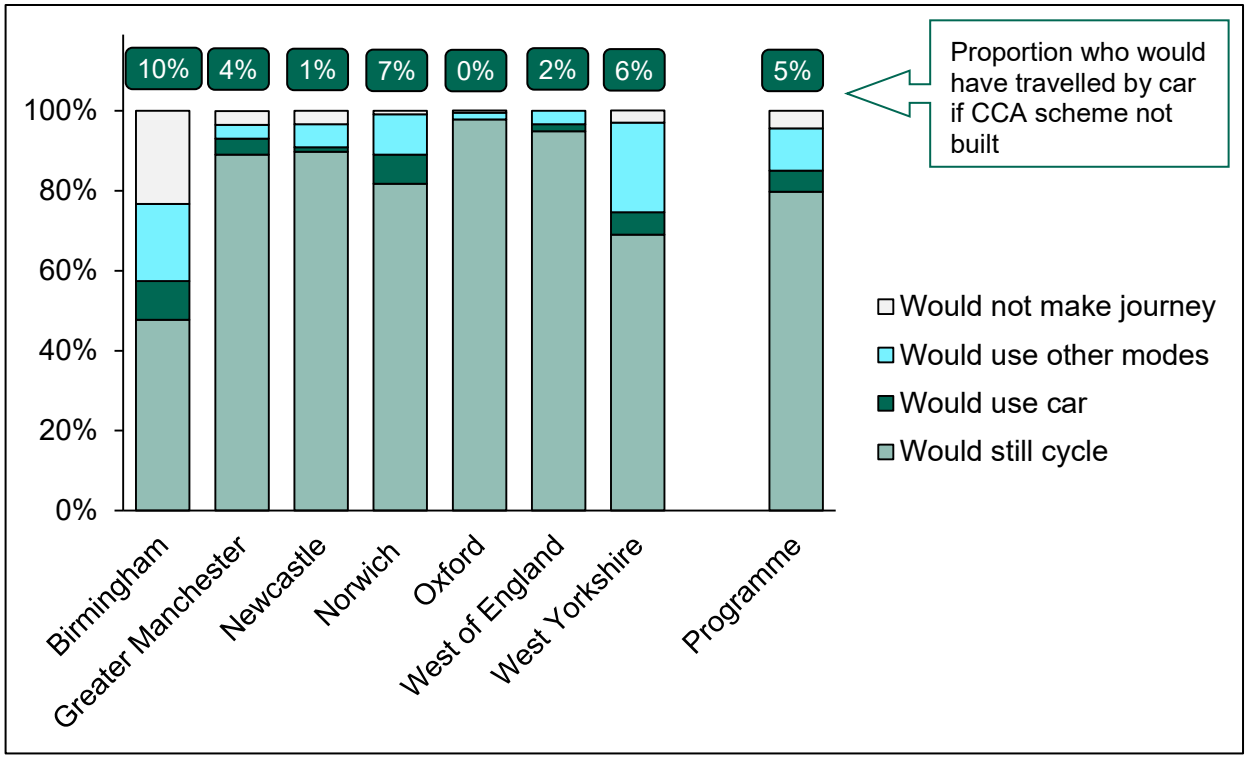
10.1 The effect of CCA-funded cycle schemes in encouraging mode switch from car to cycle can be estimated from results of Route User Intercept Surveys in seven cities[10].

10.2 A high proportion of respondents (48% - 98%) said that if the CCA scheme had not been built, they would still have cycled (Figure 3). This is consistent with the finding from section 5 that most of the users of the CCA infrastructure were 'existing' cyclists.

10.3 The proportion of respondents who said that if the CCA scheme had not been built, they would have travelled by car ranged from 0% to 10% (with an average of 5%). The proportion who said that they would have used other modes ranged from 2% to 22% (with an average of 11%).

10.4 In most cities, only a small proportion (0% - 6%) said that in the absence of the CCA scheme they would not have travelled. The exception was Birmingham, where a much higher proportion (23%) would not have travelled. This may reflect the nature of the Birmingham schemes where surveys took place: canal routes, shared use routes and green routes, where discretionary travel for leisure is likely to account for a higher proportion of trips.

Figure 3: How respondents would have travelled if the CCA scheme had not been built



Note: base sizes and further details provided in final technical evaluation report, Appendix E.

[10] This question was not asked in the Cambridge survey.

10.5 On the face of it, the figures for the proportion of cyclists who would otherwise have travelled by car seem low. However, these figures reflect the incremental or marginal effect on mode choice of a single scheme, as opposed to the effect of a whole cycle network on mode choice, which would be expected to be substantially larger. They are consistent with international evidence, where surveys of individual schemes yield similar results[11].

10.6 For each city, the proportion of cyclists that would have used a car was combined with annual numbers of cyclists at the survey location to derive an estimate of the number of car trips avoided. Across all schemes surveyed, an estimated 346,000 car trips per year (95% confidence interval of 295,000 - 404,000) were avoided. Route User Intercept Surveys were only undertaken at some CCA schemes, representing about 30% of overall investment. Assuming that the schemes without a survey had a similar impact to those with a survey, **an estimated 1 million car trips per year are being replaced by cycle trips**, as a direct result of CCA investment in the eight cities.

10.7 This is likely to be a minimum estimate, because some Route User Intercept Surveys took place fairly soon after schemes had been completed, and probably before the full build-up of effects had occurred (which, as noted above, may take 3-5 years).

[11] For example Brey et al. (2017) *Is the widespread use of urban land for cycling promotion policies cost effective? A Cost-Benefit Analysis of the case of Seville* Land Use Policy 63, 130-139, reports that only 5% of users of the Seville public bike hire scheme, and 8% of other cyclists in Seville, would make their journeys by car if they did not use a cycle. Similar results are also reported in van Goeverden K and Godefrooij T (2011) *The Dutch Reference Study: cases of interventions in bicycle infrastructure reviewed in the framework of Bikeability*

11. Impacts of cycling on carbon dioxide emissions

11.1 Three calculations were made of the impact of cycling investment on emissions of carbon dioxide:

- First, the effect on car driver mileage, and hence carbon dioxide and pollutants, of *all cycling in the CCA cities* was estimated. This answers the question *'how much extra car traffic would there be if nobody cycled?'* and gives an indication of the long-term consequence of all pro-cycling transport and land use policies and investment in each city, over many decades
- Second, the effect of the *change in cycling volumes in the CCA cities* since the start of the CCA programme was estimated. The resulting estimate is not all attributable to the CCA investment, since some of the increase in cycling during the CCA period may be due to cycling investment and pro-cycling transport policies before the start of the CCA programme. It may be seen as an estimate of medium-term effects (say, over the last decade)
- Third, the effect of the *change in cycling volumes on the CCA-funded routes* was estimated. This is wholly attributable to the CCA investment. However, it does not allow for build-up of effects over time, and nor does it allow for possible 'network-level' or 'social norm' effects, and so it should be seen as a minimum estimate of the short-term effect of the CCA investment.

Impact of all cycling in CCA cities

11.2 Across all the CCA cities, an estimated 880 million km per year was travelled by cycle at baseline. If this travel by cycle had instead been made by other modes, modelling suggests that car mileage would have been greater by an estimated 229 – 361 million km per year (with the range dependent on assumptions about the proportion of cycle trips that would have otherwise been made by car). This would have resulted in additional annual emissions of **61-102 kTCO2, equivalent to around 2-4% of CO2 emissions from traffic on minor roads in the CCA cities**.

Impact of the increase in cycling in CCA cities

11.3 The increase in cycling since the start of the CCA programme is estimated to be 363 million km per year. This estimate is based on city-wide change in cycling from ACC data, applied to baseline levels of cycling from APS survey data. It should be treated with caution, because the increases in cycling suggested by ACC data are more positive than those suggested by the APS/ALS survey data.

11.4 Only some of this increase in cycling is attributable to the CCA programme itself. It is likely that other investment, shortly before the start of the CCA programme or

concurrent with it, will also have contributed to the observed change, and population growth and demographic changes may also have played a role. This increase in cycling is estimated to have resulted in a reduction in car use of 94 million km per year, with an associated reduction in emissions of **25 kTCO2 per year, equivalent to 1% of CO2 emissions from traffic on minor roads in the CCA cities**

Impact of the increase in cycling on CCA-funded infrastructure

11.5 The increase in cycling on CCA-funded infrastructure is estimated to have replaced over 6 million km per year travelled by car. All of this reduction in car use is directly attributable to the CCA programme, and it should be considered a minimum estimate of the reduction in car use as a result of the programme. This is because the estimate is based on user surveys which took place soon after schemes were competed, before the full build-up of use was likely to have occurred, and because it takes no account of possible 'network-level' effects (people taking up cycling because of a specific improvement, such as a canal towpath scheme, but then starting to cycle more often for other trips) and 'social norm' effects (people seeing others cycling, and therefore being more likely to consider cycling themselves, even if not on the new infrastructure). The reduction in car mileage has led to a reduction in emissions of **1.7kTCO2 per year, equivalent to 0.07% of CO2 emissions from traffic on minor roads in the CCA cities**.

12. Conclusions

12.1 The eight cities that received funding via Cycle City Ambition all achieved increases in cycling over the course of the programme. Analysis of individual CCA schemes provides evidence that some of the city-wide increase in cycling is attributable to the CCA investment, and that improvements in cycle infrastructure made cycling appealing to a wider range of people, including more women and more people from BME communities.

12.2 Surveys of people using the CCA schemes also provide evidence that they encouraged more people to be active, leading to benefits for physical and mental health.

12.3 Despite the evidence that cycling levels went up, surveys of cycling participation did not show an increase at programme level in the proportion of people who cycle. This may partly be because the survey used (the Active People Survey / Active Lives Survey) is not well powered to detect change. Analysis of 2021 Census data, and comparison with 2011 Census data, may provide a better understanding of the extent to which the new cycle schemes encouraged people in different parts of the CCA cities to take up cycling.

12.4 The intention of the CCA programme was to fund 'ambitious' cycling schemes, and some of the schemes were ground-breaking. Evidence on the size of the uplift in cycling on the new infrastructure suggests that the more ambitious and attractive schemes -- typically, those most closely aligned with recent Government guidance in Gear Change[12] -- had bigger impacts. Taken together, the schemes funded by CCA are estimated to have replaced over 6 million km per year travelled by car, with associated carbon savings.

12.5 These schemes required substantial resources. Analysis of typical costs suggests that budgets of £1-3 million per kilometre are needed for two-way physically segregated cycle superhighways. New cycle and pedestrian bridges to fill key gaps in the cycle network can cost £4-5 million. This means that in order to build comprehensive, Dutch-style cycle networks, towns and cities need to make significant investment over extended time periods.

12.6 Other analysis undertaken by the Department suggests that investment in cycling infrastructure can provide very high value for money, due to its wider health and social benefits as well as its effects on carbon emissions and air quality. In the context of the Government's target to double cycling and the Transport Decarbonisation Plan, the types of schemes implemented in the CCA cities provide a blueprint for the type of investment that is needed across the UK.

[12] Department for Transport (2020) *Gear Change: a bold vision for cycling and walking*