PCT Case Study: Ealing

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Introduction

This short case study explores cycle commuting potential in Ealing, Greater London. It uses the Propensity to Cycle Tool (PCT: www.pct.bike) to look at area and route-based potential across Ealing.

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About the PCT

The PCT is a Department for Transport-funded tool that uses information about current trip lengths and hilliness to identify trips that might be most easily switched to cycling. It seeks to help overcome problems associated with planning for cycling in England, where cycling levels are currently low. Tools and models for transport planning have tended to focus on motorised transport, with cycling and walking usually not included or only included as residual modes.

Hence it is difficult for planners to know where to build. Where infrastructure is built at all, locations are often chosen based on ease of implementation, rather than on the likely demand that might be induced by such infrastructure. What planners want to be able to see is not *current cycling*, but *potential cycling*, based on the presence of trips that might plausibly be cycled. However, until recently, tools for estimating potential cycling did not exist[1].

Currently, the tool uses travel to work data from the 2011 Census, which has origins and destinations for almost all commuters in England. The PCT provides a range of scenarios to explore cycling potential at area and route levels. This data is currently at the level of a Middle Layer Super Output Area (MSOA), a unit of population of around 7500 people, with on average 3325 commuters. In time further data and more geographical detail will be used.

Data for the case study was downloaded from the Propensity to Cycle Tool (PCT) as of 1st January 2017. Some of the underlying data may change slightly in future updates to PCT.

The Scenarios

The Propensity to Cycle Tool uses scenarios to identify which areas and routes might see greatest cycling uptake under different scenarios of the future. The tool currently uses Census 2011 Travel to Work data at the level of a Middle Layer Super Output Area (MSOA), a unit of population of around 7200 people, usually at least 5000. The basic concept involves using a statistical model to identify journeys that might be most likely to switch to cycle, based on trip distance and hilliness, established as being substantial barriers to cycling. The tool can then also route cyclists using Cyclestreets.net, which we use to provide estimates of scenario cycling potential along different route sections.

The graphs below show how the likelihood of cycling declines, as distance or hilliness grow:

[1] In London, Transport for London has been working along similar lines, recently using more sophisticated data available in the capital than in England as a whole – but its data and model is not publically available, unlike PCT.

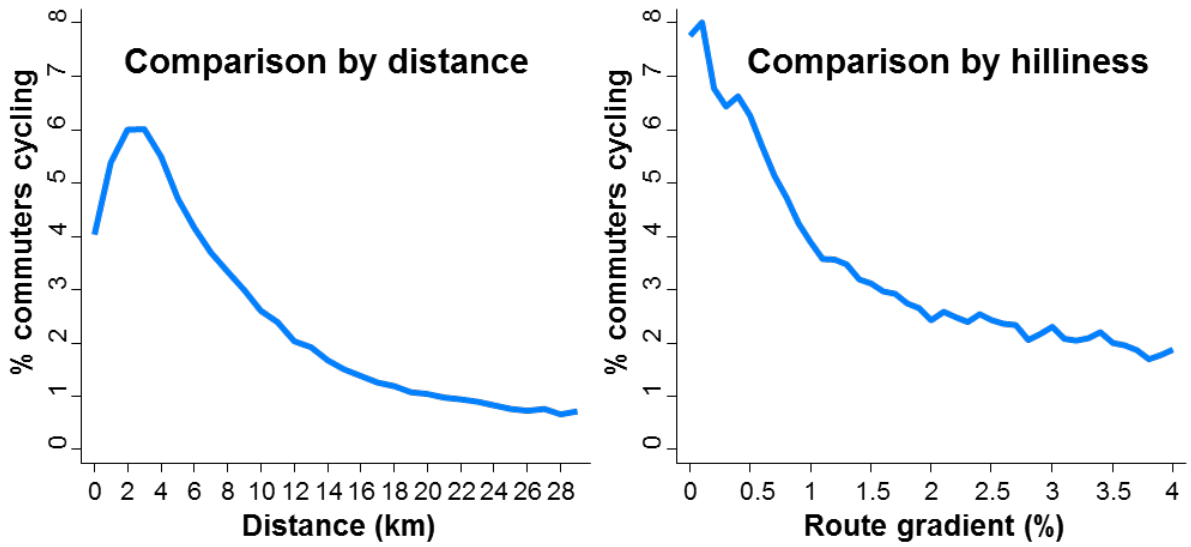


Figure 1: how cycle commuting relates to distance and hilliness (based on Census 2011 Travel to Work data)

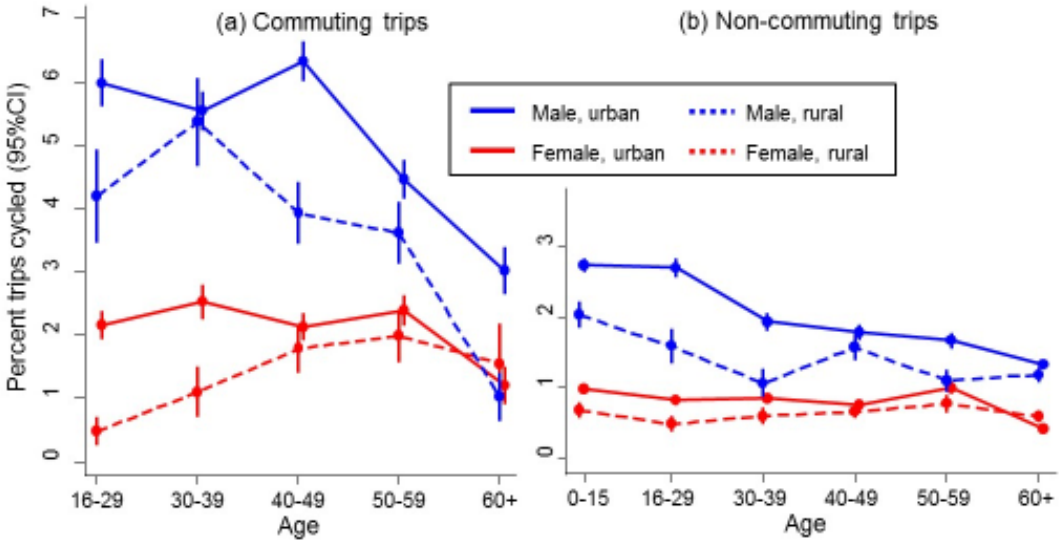
There are four core scenarios:

1. Government Target – the target for cycling in England for 2025, involving a doubling of cycling nationally. At the local level this growth is not uniform, in absolute or relative terms. Areas with many short, flat trips and a below-average current rate of cycling are projected to more than double. Conversely, areas with above-average levels of cycling and many long-distance hilly commuter routes will experience less than a doubling.
2. Gender Equality – women cycle at the same rate as men do now, for each origin-destination pair.
3. Go Dutch – uses the probability that each given trip would be cycled in the Netherlands, based on length and hilliness. In other words, the scenario assumes that England overcomes its infrastructural and cultural barriers to cycling, but hilliness and journey characteristics stay the same.
4. E-bikes – A kind of Go Dutch plus, based on Dutch and Swiss data, assuming that people use e-bikes for longer or hillier journeys as the Dutch and Swiss already do.

For each scenario, we can calculate health and carbon benefits at area and route level. The carbon benefits are based on trips switched from the car, taking into account the length of those trips. Health benefits are calculated using a modified version of the WHO's Health Economic Assessment Tool that uses data about local populations. Switching trips from public transport or car to cycling produces health benefits, while trips switched from walking reduce those benefits (because a mile walked gives you more exercise than a mile cycled). For each origin-destination pair, we assume that people switch to cycling proportionally from modes currently used; hence if most trips are driven, most new cyclists would have been car drivers, for instance.

Cycling and Equality

The PCT currently focuses on distance and hilliness, rather than on demographic predictors of cycling. This is because, while England sees substantial demographic inequalities in cycling take-up, these inequalities are absent or attenuated in other countries.



Source: DfT (2016) National Propensity to Cycle Tool Stage 1 Report, Appendix 8 https://www.gov.uk/government/publications/national-propensity-to-cycle-first-phase-development-study . NTS (England) analysis by Anna Goodman.

Figure 2: current cycling by age and gender, England

Around three-quarters of cycling in England is by men, but in the Netherlands women cycle slightly more than men. In England, non-white people are around half as likely to cycle as white people, yet in the USA cycle commuting rates were higher in 2009 among non-white people and immigrants, and cycling has been growing faster among these groups over recent years than among white people. Some inequalities are reduced or do not exist even within higher-cycling cities in England; for example in Cambridge, women and men cycle commute at approximately the same rate and cycle commuting only declines slightly at older ages (whereas it declines sharply in England as a whole).

Therefore, the inequalities that currently exist in England by gender, age, disability, income and ethnicity may not remain the same as cycling grows. This does not of course imply that such inequalities will be easy to change: but rather that this is possible and should be considered in planning. Many groups currently under-represented in cycling also have relatively poor access to other forms of mobility (e.g. the car) and hence potentially have much to gain from access to cycling.

Scenario Cycling Levels in Ealing and London

Cycle commuting levels are lower in Ealing than in Greater London, at 3.2% compared to 4.3%. Under the Government Target scenario – which allocates a doubling in cycling across the country based on trip distance and hilliness – this gap is maintained, although commuter cycling rates in Ealing rise similarly to all-London rates, reaching 4.8%. This lower potential relative to Inner London is characteristic of Outer London boroughs, partly because the PCT does not capture the potential for cycling to stations.

In the more ambitious Go Dutch and Ebike scenarios, however, cycle commuting potential in Ealing is very similar to potential across Greater London: for Go Dutch, 20.4% vs. 20.9%, and for Ebikes, 27.3% vs. 28.2%. In other words, were Ealing commuters to cycle to work (all the way) at the same rate as Dutch commuters, one in five would do so, and with mass access to ebikes we might expect more than one in four to ride all the way to work. In numbers, this would mean more than 30,000 or

40,000 Ealing residents cycle commuting, compared to under 5,000 now (using Census home and work locations and commuter numbers).

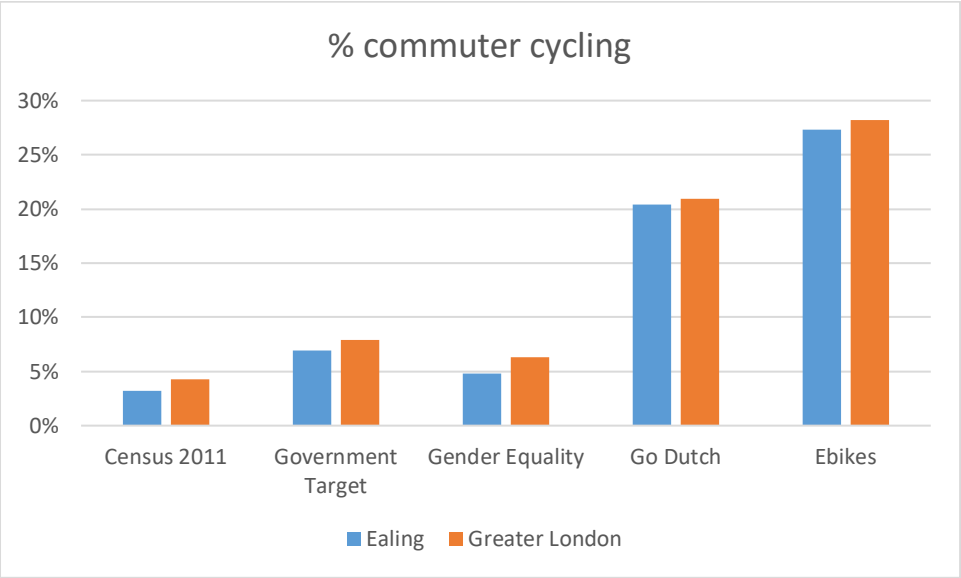


Figure 3: commuter cycling now and under all scenarios, Ealing and Greater London

What might this mean for car trips? Clearly in Ealing, compared to England as a whole, relatively fewer cycle trips will come from the car because people are more multi-modal to begin with. However, there is substantial potential to cut car trips through cycling: the two more ambitious scenarios show 10-14,000 fewer commuter car trips originating in Ealing, with Government Target cutting around 2,000 car trips.

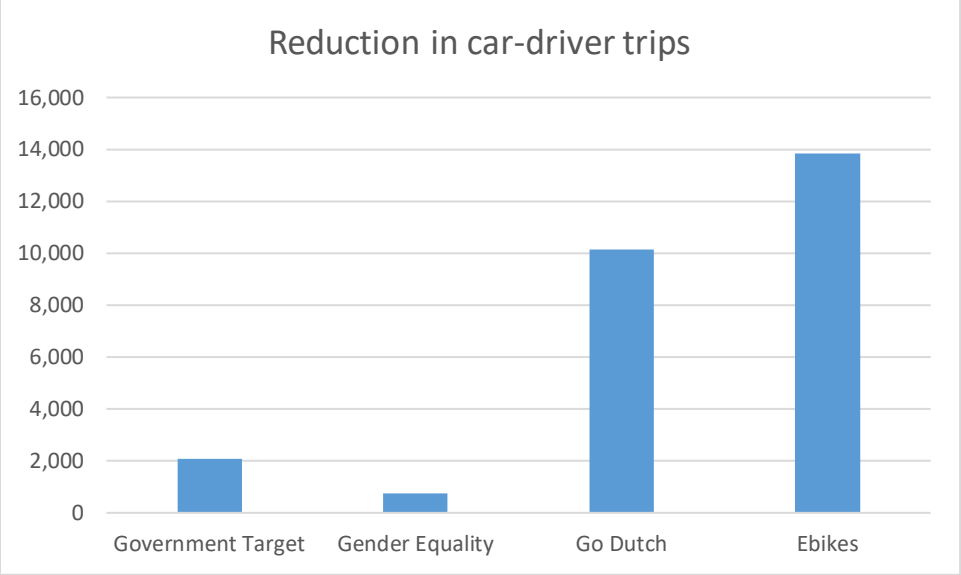


Figure 4: Reduction in car-driver trips, Ealing, all scenarios

Finally, the health and carbon reduction benefits to be gained in Ealing under each scenario are illustrated below:

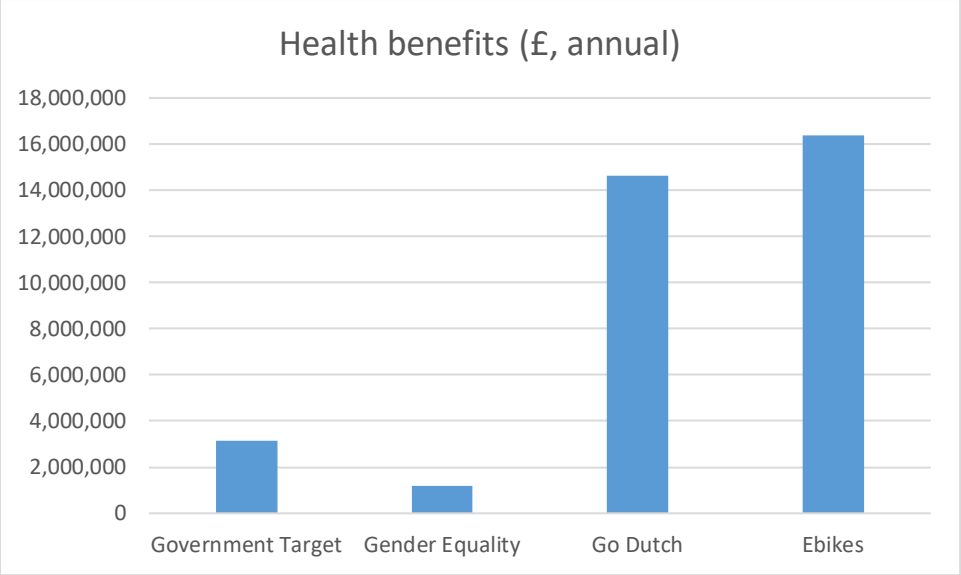


Figure 5: Health benefits, Ealing, all scenarios

Substantial health benefits can be gained with the two most ambitious scenarios. The increase for the Ebike compared to the Go Dutch scenario is less than the concomitant increase in mode share because the Ebike scenario assumes a large switch from conventional to e-bikes.

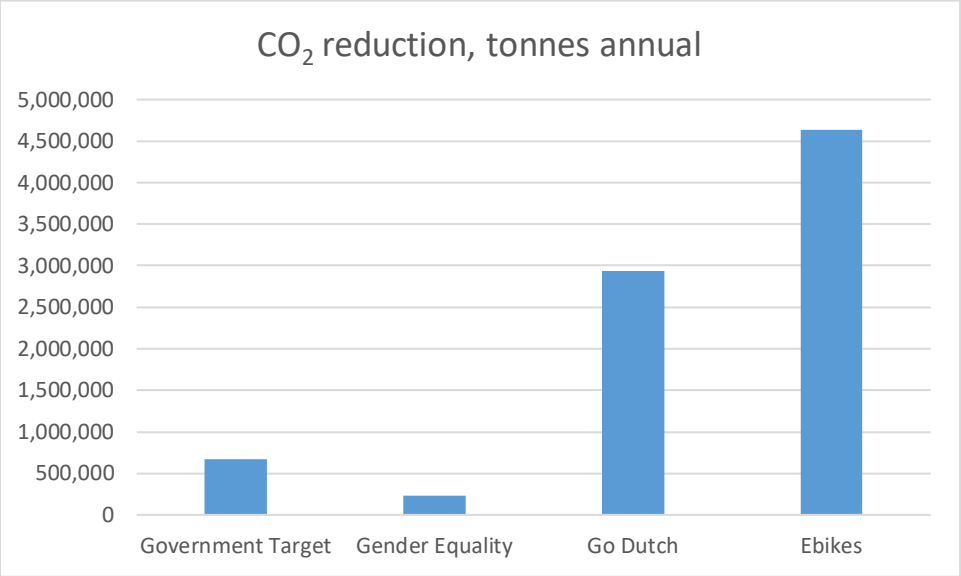


Figure 6: CO2 reduction, Ealing, all scenarios

By contrast, the additional carbon reduction benefits in the Ebikes scenario compared to Go Dutch is very substantial (>50%) because so many additionally cycled trips were previously longer car-driver trips.

About how trips are routed

The PCT uses the Cyclestreets.net routing algorithm. This is used by individual cyclists for journey planning, but it can also be used to route a series of trips. Cyclestreets provides both 'fast' and 'quieter' routes, and comparing these (in terms of distance and hilliness) can help provide information about the quality of a network. Analysis conducted for the PCT project has illustrated how propensity to cycle declines as distance and hilliness rise. As we know that cyclists will

preferentially choose quieter routes, this implies that where such routes are longer and/or hillier than busier alternatives, cycling demand will be suppressed.

Analysis conducted for this report

The analysis conducted for this report uses the .csv and .geojson downloads available from pct.bike, downloaded into free QGIS software and into Microsoft Excel.

Commuter Cycling Potential in Ealing: area level data and co-benefits

The following images explore the cycling potential in Ealing at MSOA level, highlighting those MSOAs with particularly high potential and with particularly high co-benefits. The area data includes all commuters, unlike the route data where not all commuters can be included (due to within-zone flows, exclusion criteria for longer trips, and the exclusion of cross-regional flows into or outside of the Greater London boundary).

The figure below illustrates current commuter cycling rates across the borough, mostly these are under 5% but in the East of the borough seven MSOAs have between 5 and 10% commuter mode share for cycling.

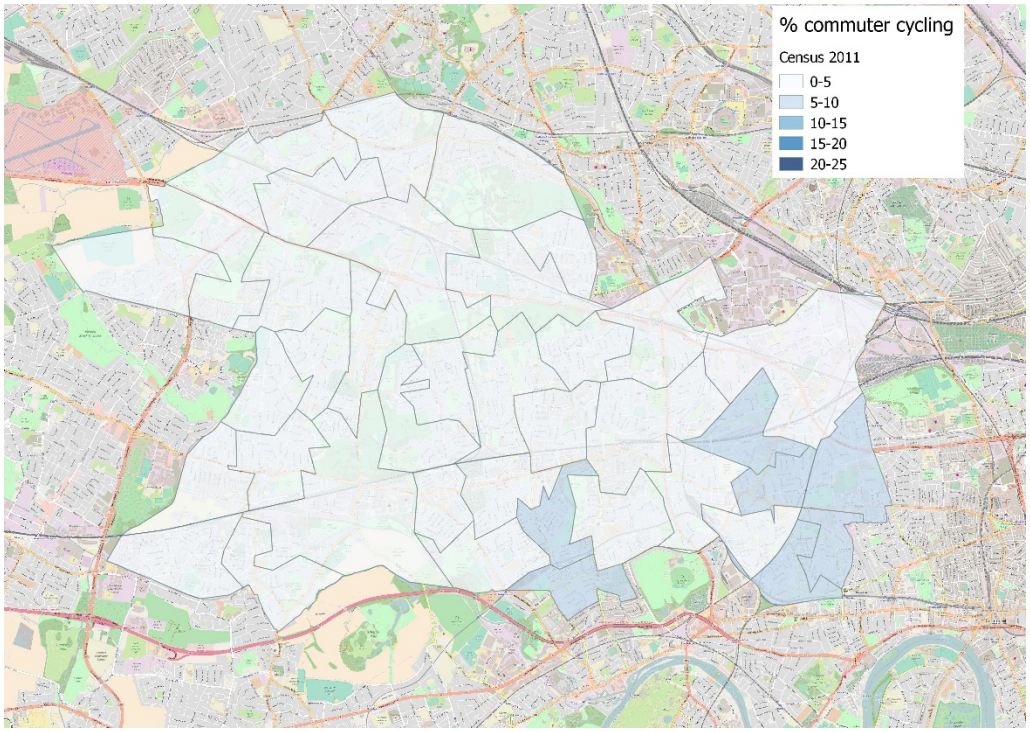


Figure 7: Census 2011 cycle commuting, Ealing

Below we see the Gender Equality scenario. This illustrates the impact of women cycling at the same rates as men currently do, for all the various commute origin-destination pairs. Achieving gender equality based on current cycling rates has most impact in the East of the borough where cycling levels are already higher, but skewed towards male commuters. Under Gender Equality one MSOA, to the far East of the borough, would have cycle commuting rates >10%.

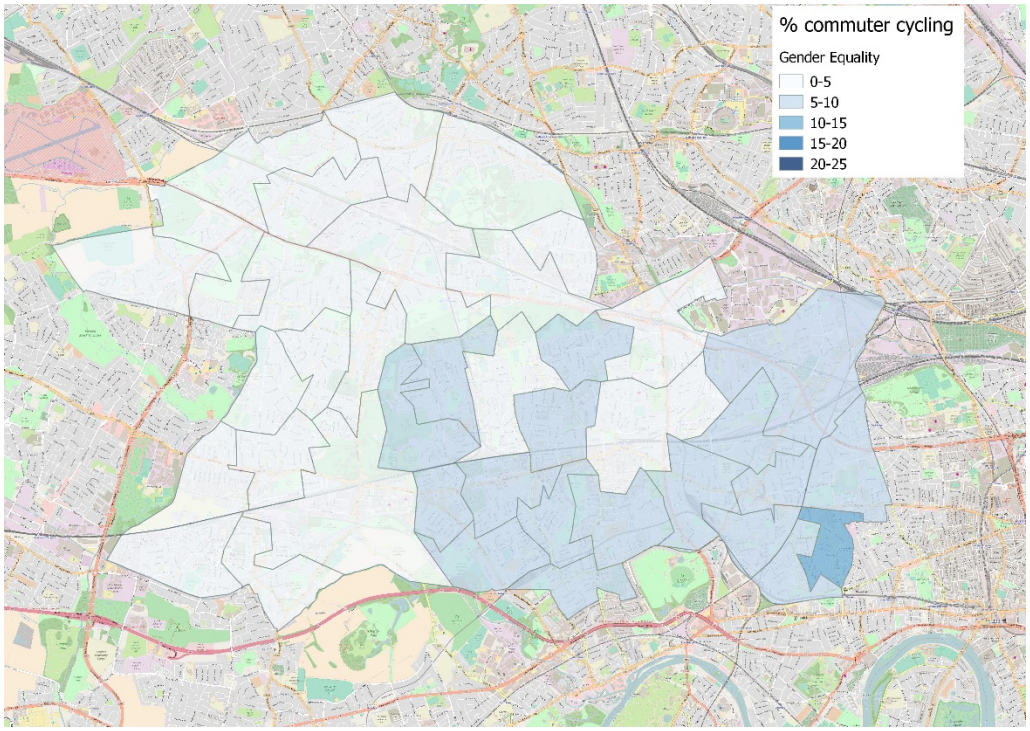


Figure 8: Gender Equality scenario, Ealing

By contrast the Government Target results are more homogenous across the borough, highlighting similarities in trip distance and hilliness across the MSOAs. Here most MSOAs see cycling to work rates between 5 and 10% with four MSOAs to the far East of the borough having 10-15%.

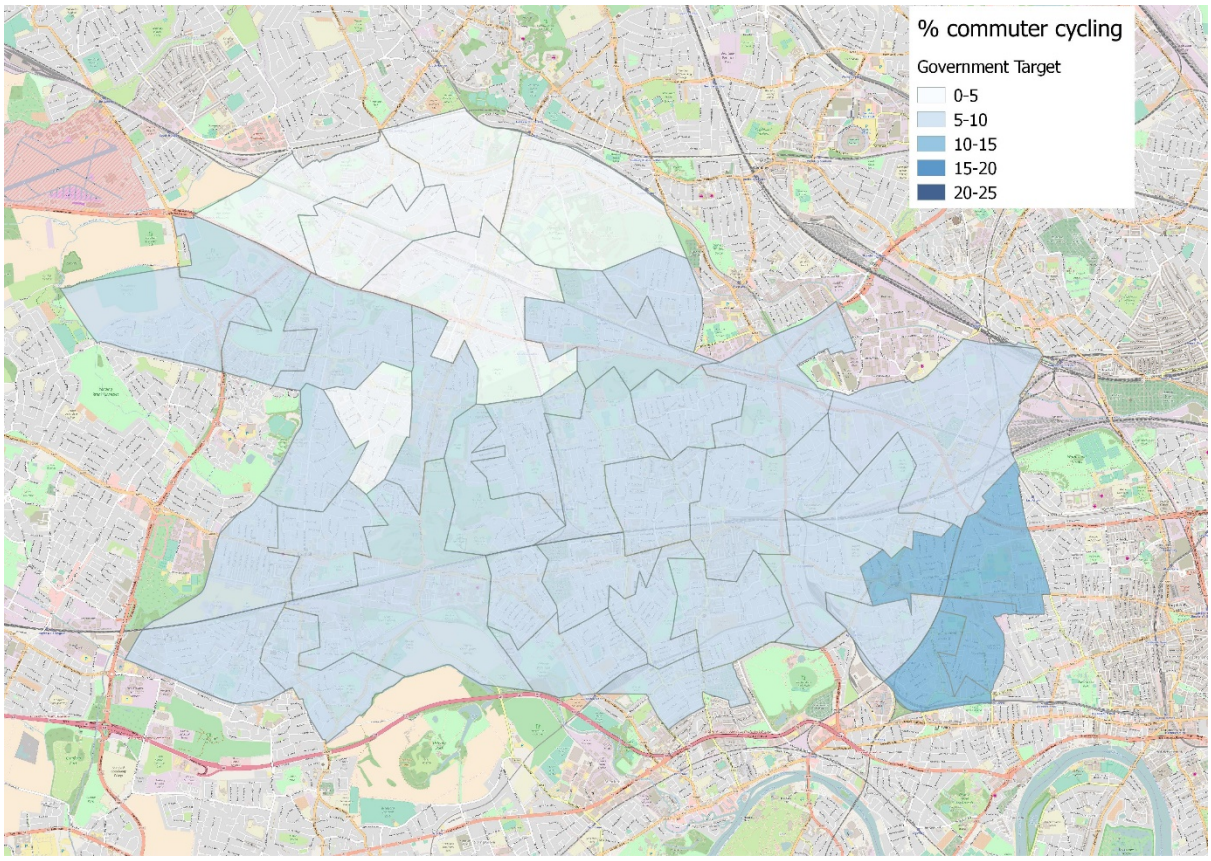


Figure 9: Government Target scenario, Ealing

Go Dutch presents a different picture. With the exception of one MSOA, half of the areas see 15-20% cycling to work rates, and the other half 20% or more.

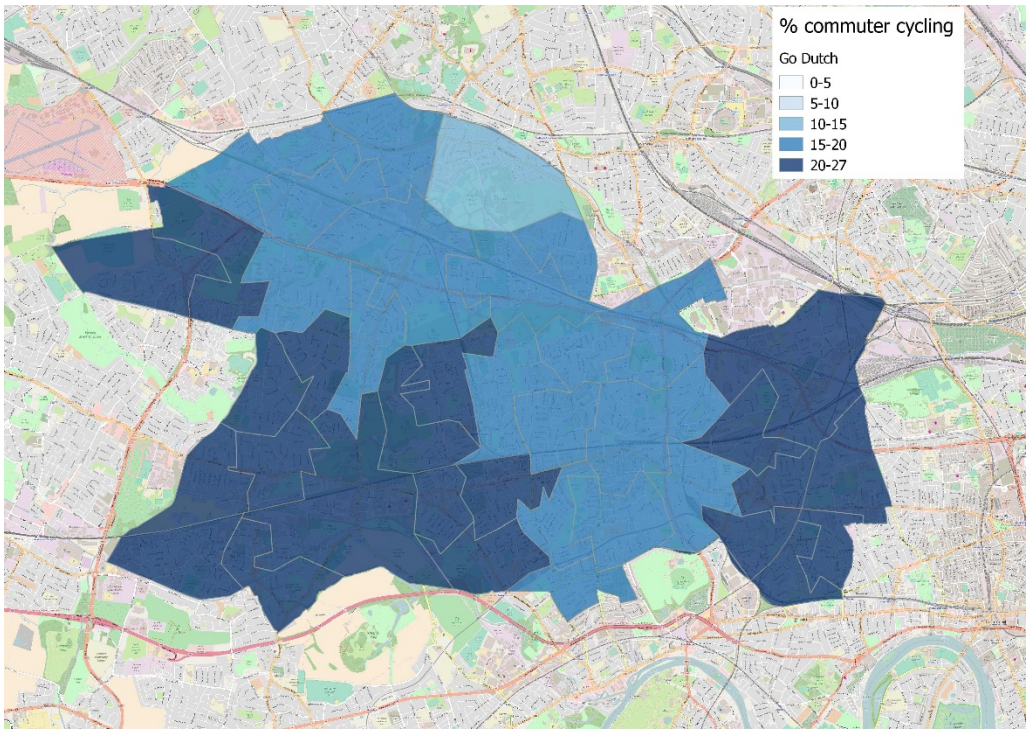


Figure 10: Go Dutch scenario, Ealing

The highest cycling potential under Go Dutch are the group of MSOAs at the East end of the borough, followed by those towards the West. The Ebike scenario levels up potential, with all MSOAs now having 20%+. However, the extremely high levels of cycling (>30%) are still found towards the East or West, with the centre and North seeing relatively lower levels, albeit still high.

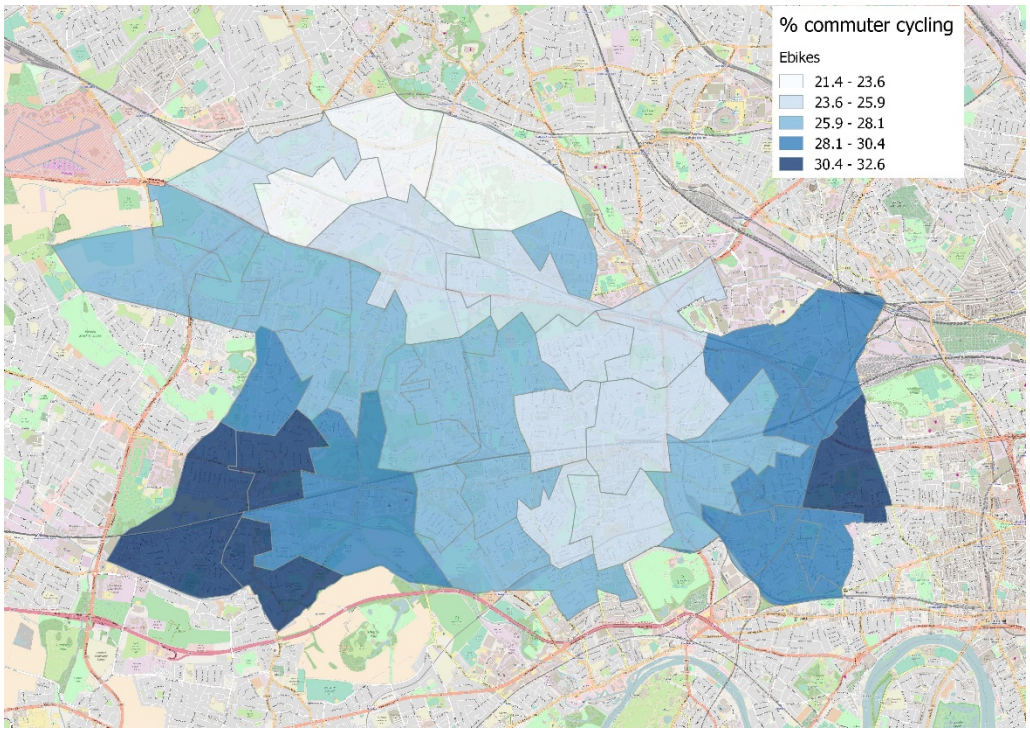


Figure 11: Ebikes scenario, Ealing

A couple of other graphs highlight two benefits of achieving the Go Dutch scenario. The West of the borough has particularly high health benefits. However there are MSOAs with high health benefits further East, and all see more than around £150,000 health economic benefits per year.

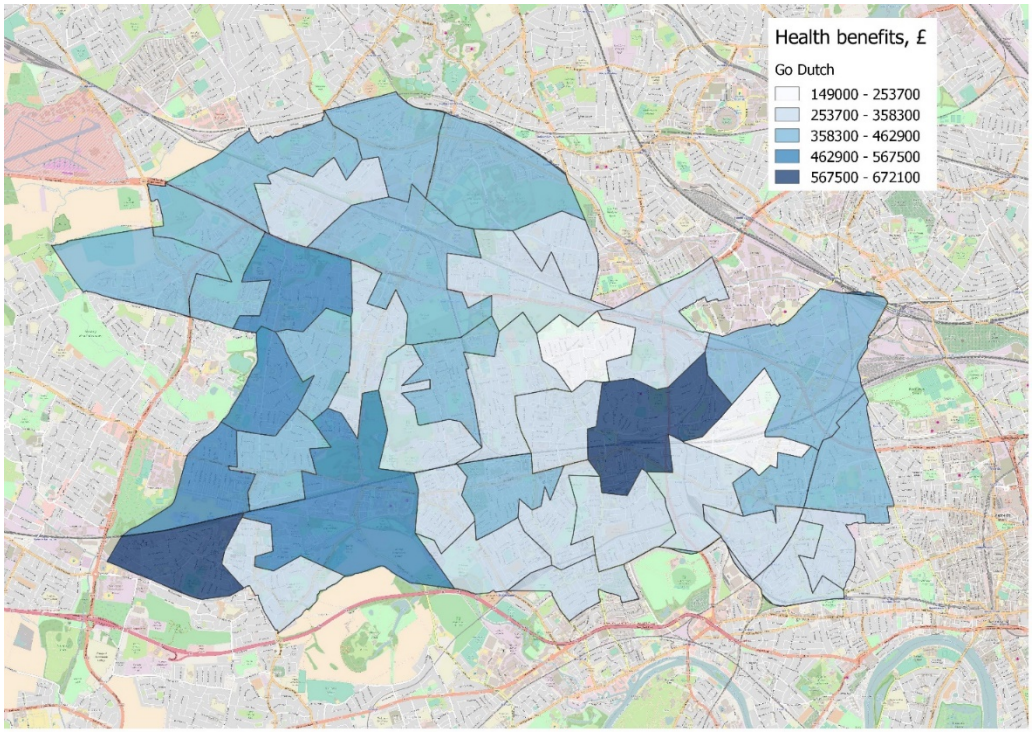


Figure 12: Health benefits, Ealing

The picture for carbon reduction is different, however. The greatest benefits here are to be realised in the West of the borough, where car dependency is highest.

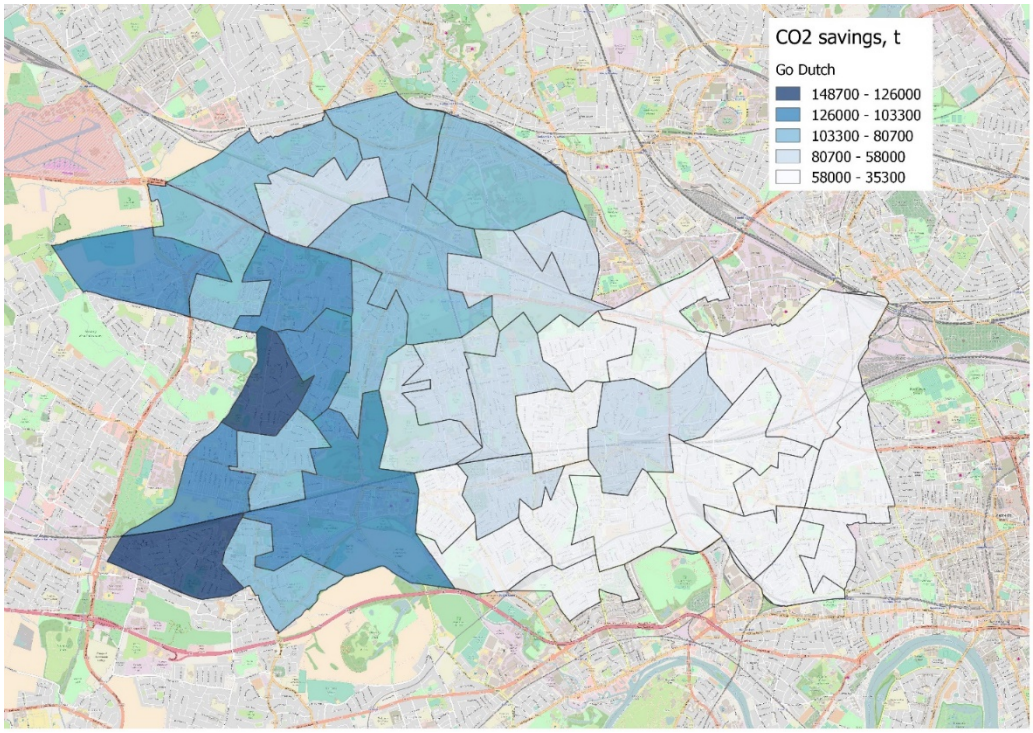


Figure 13: CO2 savings, Ealing

Commuter Cycling at Route Level

Desire Lines

The image below shows all desire lines running through Ealing that we have captured in the MSOA-level PCT. As explained in the methods section of the Manual (C), this does not include all commuters, due to the exclusion of longer trips, within-zone trips, and cross-regional flows.

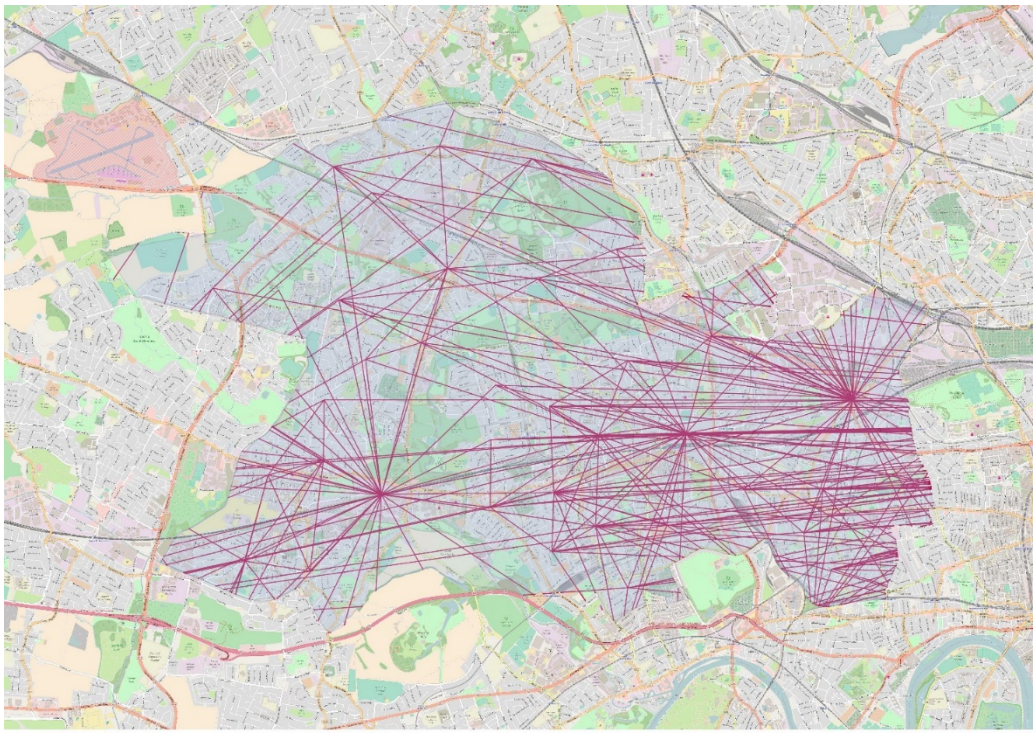


Figure 14: Desire Lines: Ealing

Next we see cycling desire lines based on the 2011 Census; no OD (origin-destination) pair currently has more than 33 cycle commuters, and most have only a handful (<8).

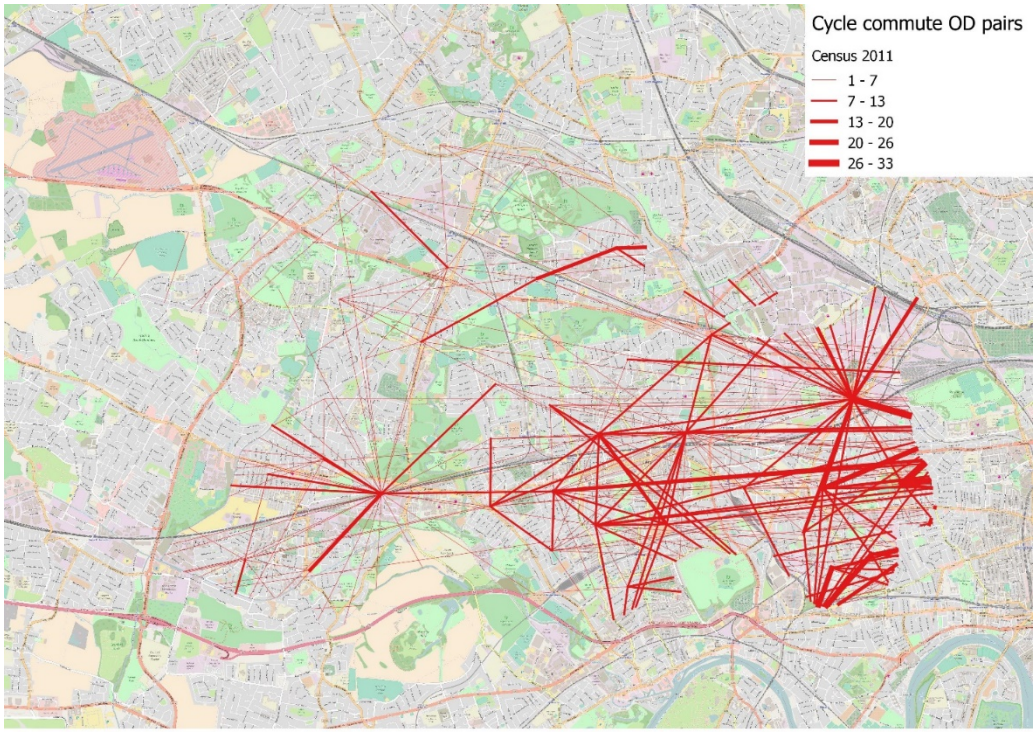


Figure 15: Cycle commute OD pairs, Census 2011

Next we see the Government Target scenario, where we see a more even geographical split – many more lines in the South-West of the borough start to reach higher levels (>22 cycle commuters), and many more lines with over 10 cycle commuters.

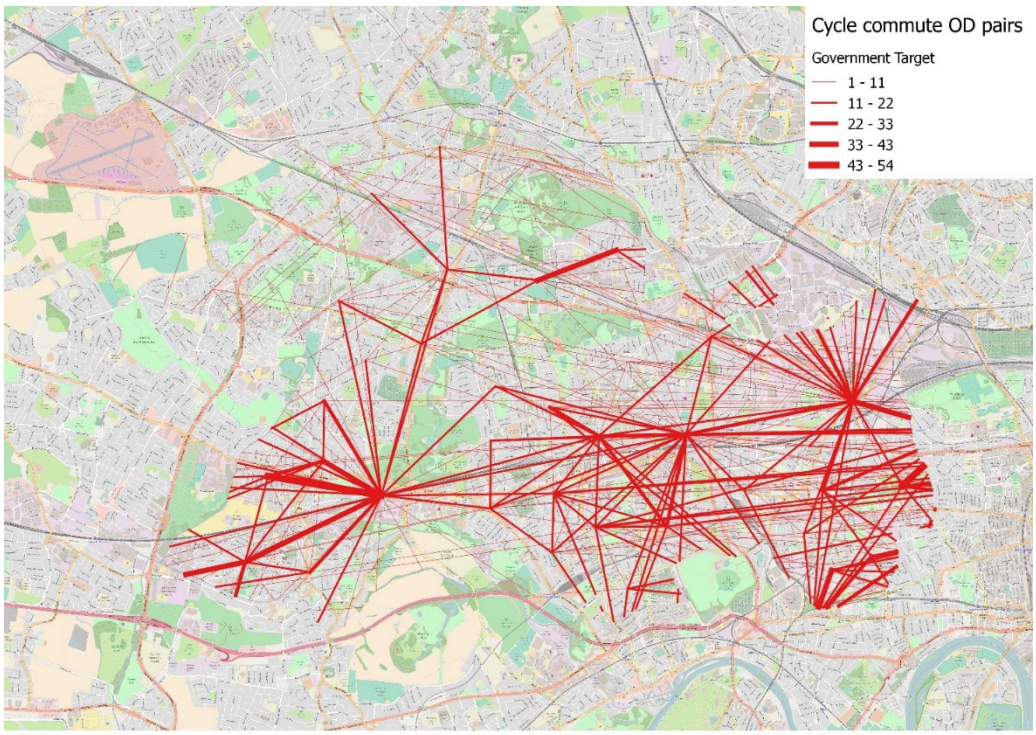


Figure 16: Cycle commute OD pairs, Government Target scenario

The Go Dutch scenario clearly marks a step-change, with cycle commuting still concentrated in the South and Centre of the borough (particularly now, the South-West) but with many lines seeing 80 or more cycle commuters.

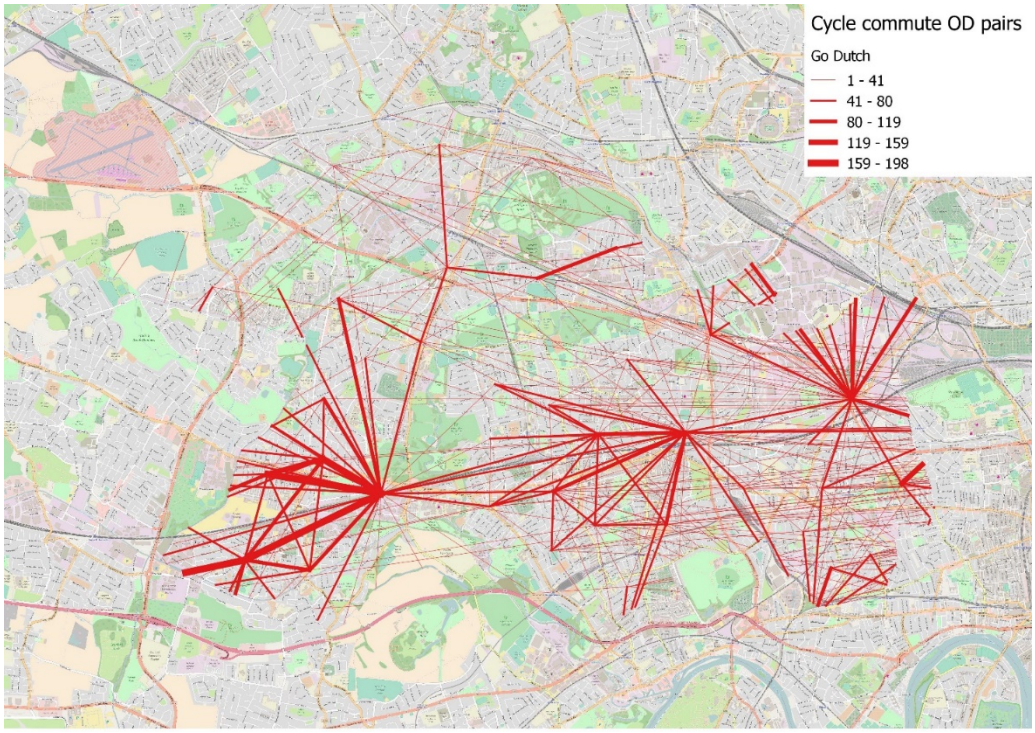


Figure 17: Cycle commute OD pairs, Go Dutch scenario

The 'Dutch multiplier' image highlights spatial shift with Go Dutch (to a lesser extent, Government Target). Lines with more than ten times as many cyclists are concentrated in the South-West.

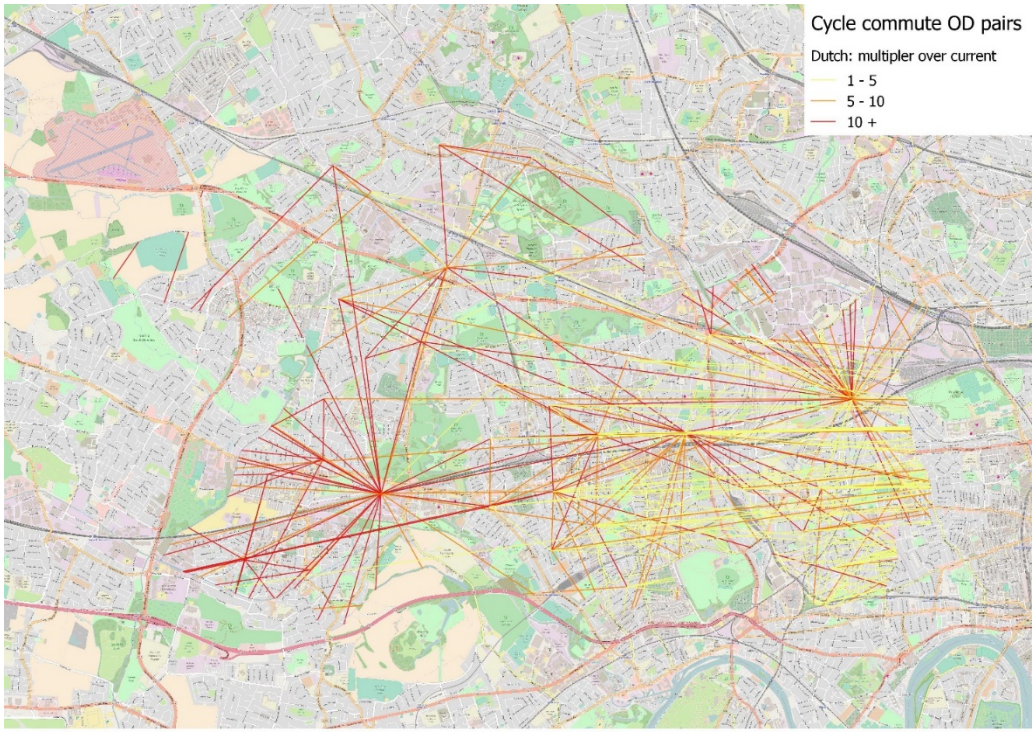


Figure 18: Dutch multiplier, OD pairs

Finally in this section we present the Ebike scenario; here cycling levels rise again but the concentration of cycling in the South, Central and in particular South-West of the borough is again pronounced.

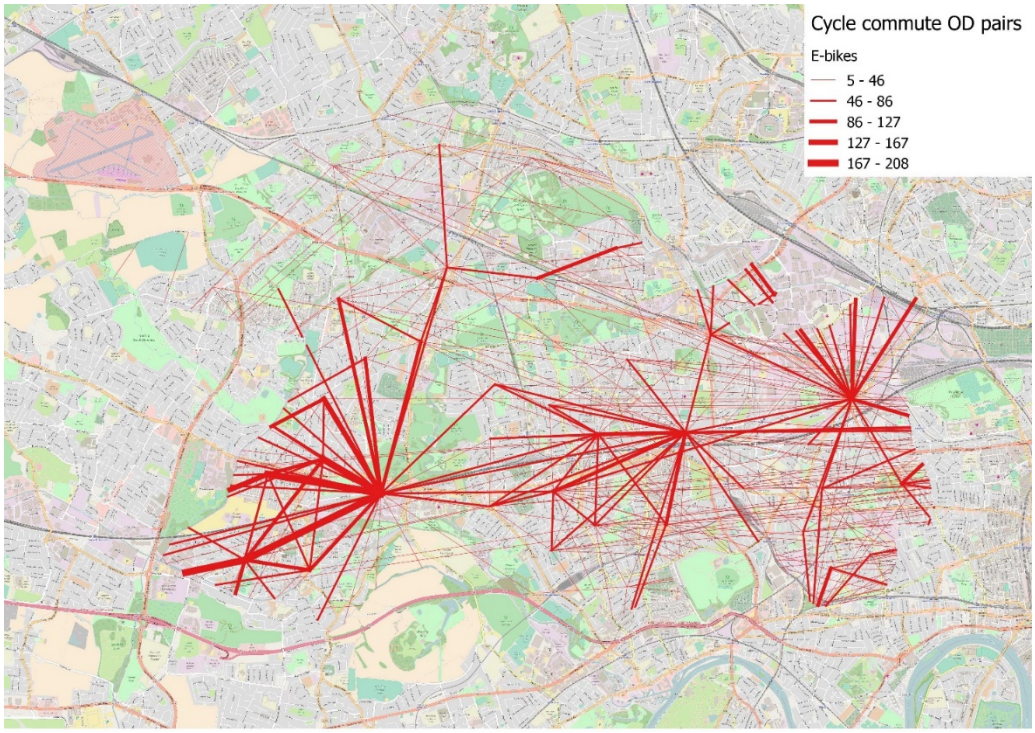


Figure 19: OD pairs, Ebike scenario

Route Network

Now we use the PCT's Route Network data to examine how these OD pairs might map on to the route network in Ealing. First we present the Route Network based on Census data; i.e. where people might be cycling, if they took the fastest legally cycleable routes. Few sections of the route network see over 50 commuter cyclists, and those are concentrated to the East of the borough.

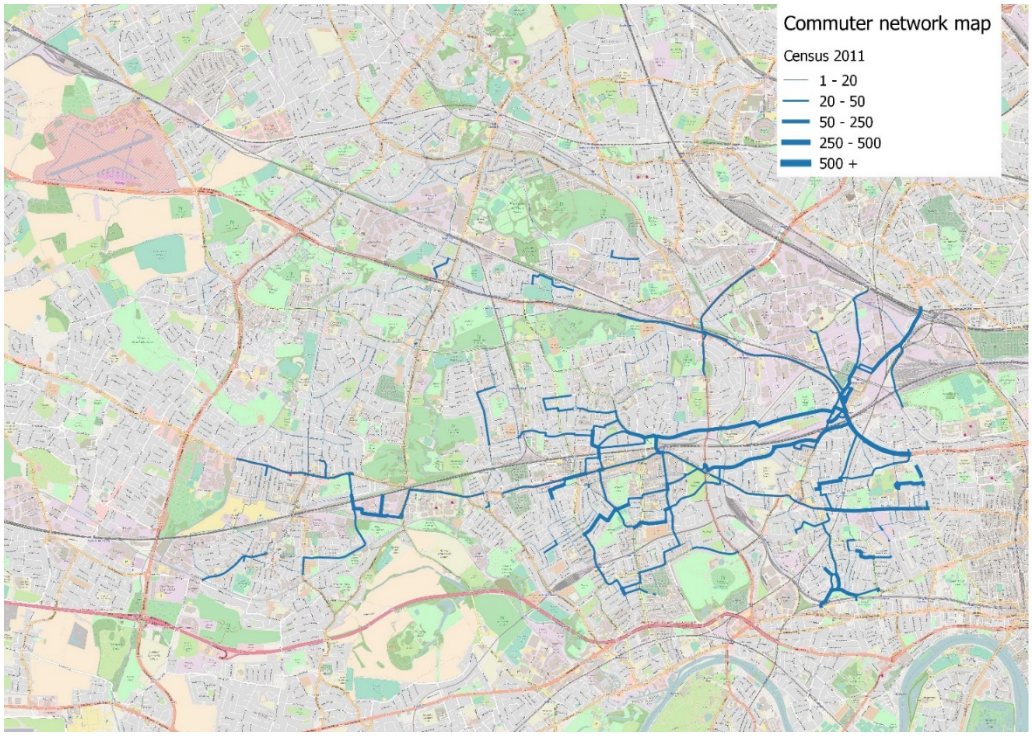


Figure 20: Route Network, Census 2011

Secondly, we present the Route Network for the Government Target scenario, where the higher-cycling sections are much more spread across the borough, although with lower numbers to the North.

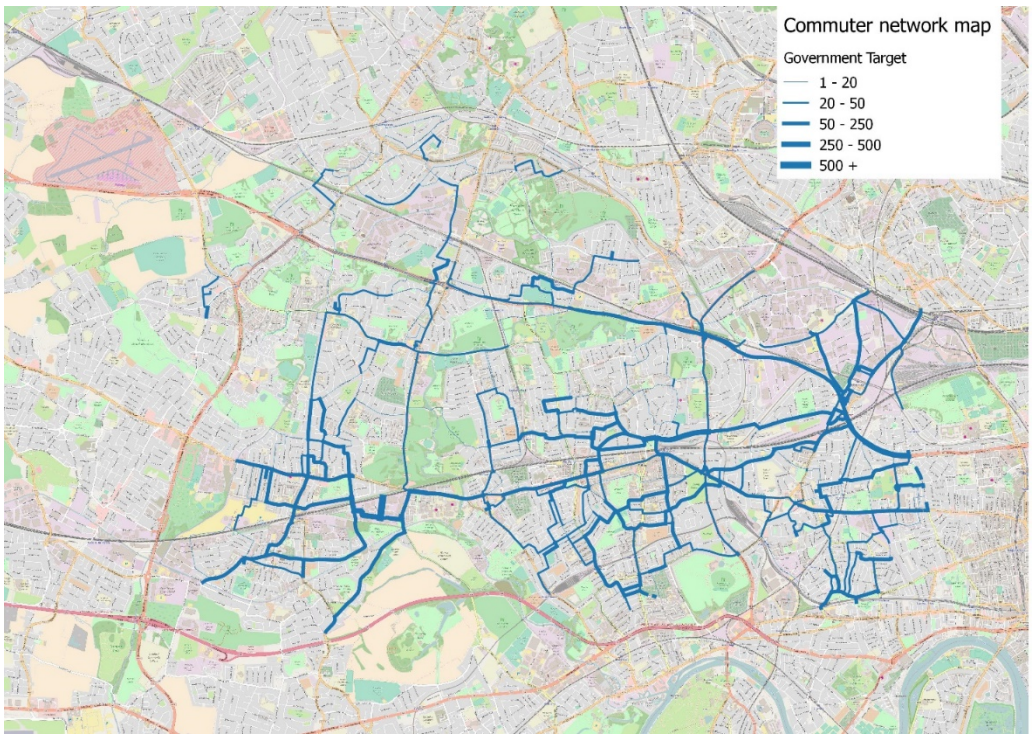


Figure 21: Route Network, Government Target scenario

The next image is Go Dutch: a number of route sections have >250 (including in the North) and even >500 (particularly in the South) commuter cyclists.

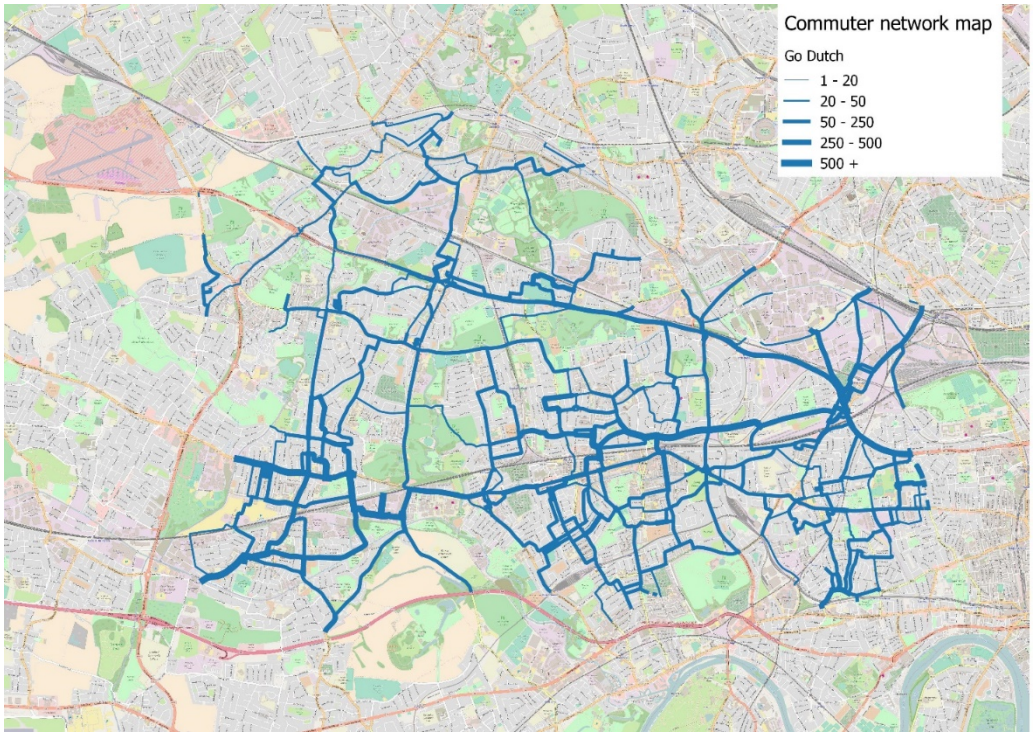


Figure 22: Route Network, Go Dutch scenario

Finally the Ebikes scenario illustrates even higher takeup, with more route sections falling into the 500+ categories.

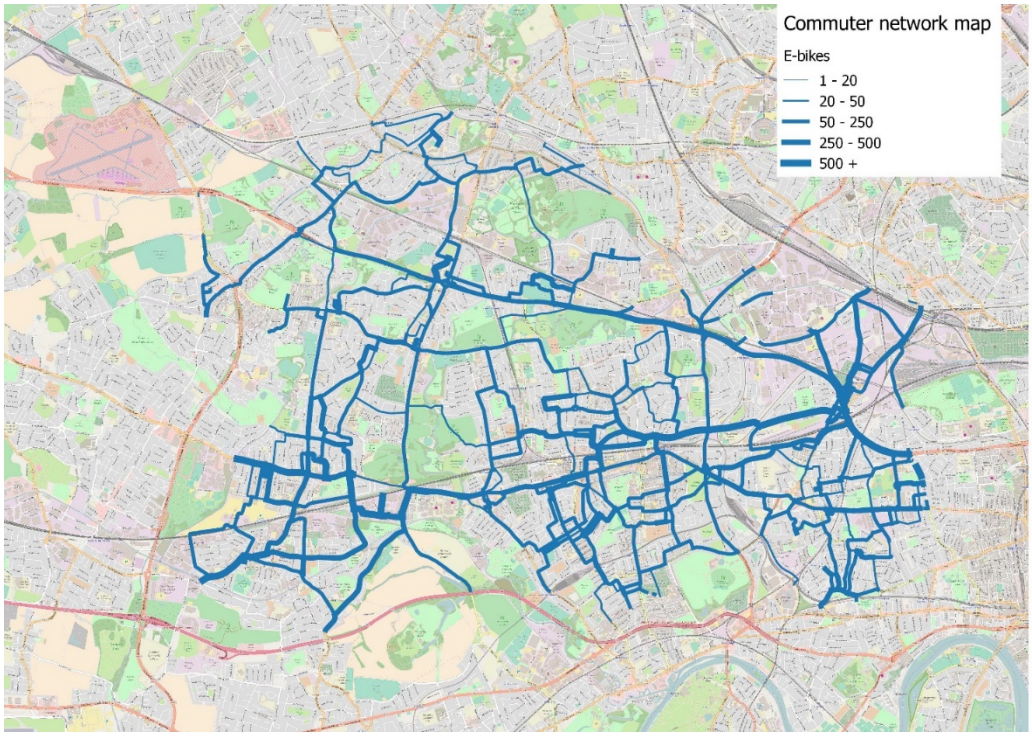


Figure 23: Route Network, Ebike scenario