DANGEROUS JUNCTIONS REPORT

LONDON CYCLING CAMPAIGN

Why are we failing to achieve 'Vision Zero', boost active travel and trigger mode shift?

July 2022

HOW TO USE THIS DOCUMENT

If you're in a rush or just want to read our top level findings, make sure you read the **Policy Recommendations**.

Campaigners
There are lots of important things to learn about throughout the document – start by picking heading sections for areas you don't know much about.

Councillors and officers
As with campaigners, the entire document is worth perusing to check you are up to speed – and worth saving a copy to consult if and when you need to.

But the big priorities are the first part: **Introduction**, **Executive summary**, **Policy Recommendations**, **Examples / Case Studies**, as well as the **How to make safer junctions** section near the end.

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INTRODUCTION

Junctions are where most serious and fatal collisions happen. They are often not only dangerous, but also feel so hostile to those walking, cycling and wheeling they become barriers to active travel in an area and through it[1].

London Cycling Campaign (LCC) has protested at and campaigned around junctions for decades, but following the fatal collision with Dr Marta Krawiec at Holborn in 2021, we launched an ongoing **#DangerousJunctions**[2] campaign – to highlight and tackle not only individual dangerous junctions but also to tackle systemic road danger issues at far too many junctions in London and the ongoing slow pace of action around them.

When junctions are made safe, the payback is huge – they unlock miles of new cycle routes and make walking, cycling and wheeling safer. Right now, fixing junctions is one of the most important things we can do to make cycling in London safer. So why has progress on dangerous junctions been so slow and so ineffective?

When junctions are made safe, the payback is huge

Why have successive Mayors each struggled to deliver more than a handful of genuinely safer, better junctions? In March 2022, LCC convened a high-level summit of expert practitioners on junctions to discuss ways to answer this question and propose ways to improve the pace and quality of delivery of junction remodelling. Practitioners came from transport authorities and consultancies, modelling, design and planning backgrounds.

We asked them what were the systemic barriers to improving junctions and the decisions impacting our safety. We followed it up with a webinar broadening engagement on these questions. This is our full report on the issues around dangerous junctions, and how they can be addressed, based on this investigation.

We also continue to track and campaign around the worst of London's junctions – working with businesses, stakeholders, institutions and indeed anyone who has an interest in people being able to get around London safely and sustainably. This work won't end until notorious junctions, known to be lethally dangerous for years, no longer kill, and people are able to move around our city without fear or significant danger.

“With all the outcomes you’re expected to achieve, you go round and round to the point where you’re not worsening any outcome, but not improving any either. No one hates the scheme, but no one loves it either.”

Dangerous Junctions Summit participant

EXECUTIVE SUMMARY

The pace of fixing our most dangerous junctions is far too slow to meet the Mayor’s ‘Vision Zero’ of no more fatal or serious collisions on London’s roads by 2041. Similarly, those junction designs that do come forward are far too often not of high enough quality to help deliver ‘Vision Zero’.

Given this situation plays out in just about every London borough and has remained across several different Mayors, it’s clear that there are systemic issues impacting junction improvements in London.

The guidance on junctions is in fact increasingly clear – documents such as the DfT’s **Local Transport Note 1/20 (LTN 1/20)**[3] and **Gear Change**[4] guidance, and TfL’s **London Cycling Design Standards**[5] and **Cycle Route Quality Criteria**[6] clearly define minimum standards for safer junction designs and indeed showcase best practice. Yet this guidance is routinely ignored resulting in poor junction redesigns.

The reality, as we heard during our summit, and confirmed by many others, is that all too often road danger reduction gets lost in a mass of competing priorities, with little coherent and consistent direction from above on the balance between saving lives and knock on impacts (e.g. reduced throughput capacity for motor vehicles). As a result, officers tend to deliver what is acceptable – compromise solutions that ultimately fail to reduce danger enough nor ease congestion for public transport enough either. Everyone suffers, no one is happy, buses are delayed and people keep being killed.

That is of course before we even begin to think about the pace and scale of transformation we will need for roads, and junctions, to ensure we hit our climate targets – our current Mayor suggests we’ll need a 27% cut in road km driven by 2030 to achieve them. That means massive changes to our roads to reduce the amenity of motor vehicles and increase that of alternatives. If we cannot even stop killing people at junctions because of competing priorities, we certainly cannot save the planet as well.

We believe however, there are ways forward – they start with clarity from decision-makers, but also openness about the rationale behind each decision. Also, the underlying principles must be clearer and appropriate for the long term – for the lifespan of not just Vision Zero targets and scheme lifetimes, but also to include planned reductions in motor traffic to meet the Mayor’s net zero 2030 goal.

Below are our key Policy Recommendations, arising from the summit we held and conversations with practitioners and experts, on what is needed to ensure our most dangerous junctions are fixed faster, while we keep public transport functioning too.

If we are to decarbonise London’s roads successfully by 2030, we will need a lot of mode shift away from cars, and rapidly too (the Mayor suggests km driven will need to be cut by over a quarter by then). That will require a coherent and safe (feeling) cycle network. Current ‘Vision Zero’ targets are further away – the Mayor’s **Transport Strategy**[7] sets a target of 2041 to eliminate serious and fatal collisions from our roads.
But to reach them, we need to start now.
That makes all of these recommendations urgent. Most of them can and should be implemented by the Mayor, TfL and borough leaders and officers immediately.

POLICY RECOMMENDATIONS

1 — **Politicians**

Put safety first

Politicians must be far clearer on their support for rapid safety gains and brief officers and the public to genuinely prioritise safety, active travel and public transport over private motor vehicles.

2 — **Politicians & officers**

Ensure we design right

Best practice designs should become industry standard and all junction designs in London should match the funding requirements of DfT's LTN 1/20 (ie. a high-quality and safe scheme that avoids the worst objective failures of junction designs – or in detail, featuring a 'Cycling Level of Service' (CLoS) score of over 70, with no 'critical fail' items on the score and a Junction Assessment Tool (JAT) assessment that no turning movement is 'red'), and be subject to a similar walking quality bar.

3 — **Officers**

Use temporary works and trials

Rather than waiting years for modelling and to move 'stats' boxes (broadband, telephone boxes, manhole covers for gas pipes etc.), TfL and other highways authorities must embrace innovative approaches to provide temporary lights and other measures for trial schemes. Using temporary materials, we have seen schemes delivered in weeks that would previously have taken years after a fatality. That has to be standard practice.

4 — **Politicians & officers**

Consult using evidence first, not hearsay

Highways authorities must urgently bring out into the open discussions on, and representations from, institutional stakeholders across the board, and ensure such representations are considered alongside data and evidence. If stakeholders, including LCC, want to support or oppose a scheme, we should all do it in public and on the basis of cited evidence and considering all factors.

5 — **Officers**

Data should be public

As well as not allowing stakeholders to lobby against (or for) schemes in secret, the data underpinning complex decisions should be publicly available, including options and alternatives considered, economic impact cases, Equalities Impact Assessments (EqIAs), and modelled traffic impacts.

6 — **OFFICERS**

Plan for all junctions, not one at a time

Highways authorities must take a more holistic approach to transport – planning for a long-term change to the network and considering individual local changes, such as at a junction, in that context. If proposed changes to an individual junction slows down buses through that junction, but the changes will save lives, and trigger mode shift away from cars in the longer term; if the overall changes mean that the bus network as a whole works better over time as people ditch their cars, currently such changes would never happen. Short-term and localised issues triumph over long term and regional ones over and over again.

7 — **Politicians & officers**

Computer modelling is to improve, not veto

Computer modelling of junctions should only be done where really needed, and never as a default veto to schemes. If a scheme design shows unacceptable impacts to private motor traffic and / or buses in modelling, use modelling to mitigate the impacts. Modelling designs for junctions now should also take into account a future modelled state of motor traffic based on longer term policy goals for decarbonisation and road danger reduction.

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Officers

Use bus gates to speed up schemes

The rollout of ‘bus gates’ has provided a way forward to enable people cycling and people on public transport to both get benefits, including safety. We need to be clear that asking those cycling to share space on busy bus routes will not broaden cycling’s appeal, but it should be possible for every single London borough to develop and deliver multiple bus gate schemes with TfL in the next 4 years. Similarly, running bus lanes right up to junction mouths provides more amenity to public transport and safety gains for cycling but, again, is not a long-term solution for also increasing cycling rates.

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Politicians

An independent design review panel

Active Travel England, TfL or another body should convene a regional, or ideally national, junction design review panel aimed at independently assessing junction designs put forward by highways authorities. That could be convened at national level this year.

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GOVERNMENT

Funding is vital

The current government’s approach to funding transport in London is markedly out of step with every other major city in advanced economies and is clearly having a major negative impact on the ability for TfL and boroughs to deliver major schemes such as junction redesigns. This is impacting not just the Mayor’s ‘Vision Zero’ plans but also action on reducing climate emissions, both of which are rapidly growing in urgency for action.

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POLITICIANS & OFFICERS

Stop planning for more cars

The DfT economic case for highways schemes and TfL case for action on ‘Healthy Streets’ are both out of date and only partially used. We urgently need reform of economic case-making and pathway planning to coherently plan for a zero carbon future; to place roadbuilding and road capacity in the context of climate, road danger and health policy goals; rather than build cases on assumptions motor traffic will grow, is economically viable to grow or at least won’t significantly reduce.

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POLITICIANS

Demand management to cut cars

Private motor traffic demand must be decisively and rapidly brought down, using demand management tools such as smart road-user charging to free up roadspace, e.g. for protected cycle tracks and bus lanes, and therefore make safety gains. In London, the Mayor is consulting in July 2022 on expanding the inner London ULEZ scheme to all of Greater London for rollout in 2023, with a clear intention to start the process of consolidating all London’s charging schemes into a single, smarter and fairer road-user charging after the next Mayoral election in 2024.

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GOVERNMENT

Innovation needed

Regulatory changes from the government and DfT could rapidly deliver safety gains, speedier rollout of upgrades and indeed reduce the cost of schemes. Such changes could even ensure easier rollout of lots more schemes by making more schemes neutral or even positive for congestion levels.

Most notably urgent for consideration are the introduction of zebra crossing markings at side roads, enabling rapid rollout of clear priority for those walking and cycling at side road junctions; and ‘yield at turn’ legalisation simplifies junction designs (by allowing drivers to turn left across a green person signal cautiously). This is allowed in much of the world and means the lights’ phasings are simpler, and people walking and cycling get much more green time.

Beyond that, enabling ‘all green’ or ‘scramble’ junctions (which give a green signal to those walking and cycling simultaneously on all arms, enabling those walking and cycling to go in any direction any way they want, as is used widely in Holland) would likely help also but is less urgent than the other two items listed here.

It should be possible to bring regulatory changes on zebra markings at side roads within a year, and begin yield at turn changes within this national election cycle.

THE PROBLEMS WITH JUNCTIONS

Safety versus congestion

Photo: @RantyHighwayman

Junctions are where road users cross paths: the intersection of roads. But this self-evident point hides a complexity that we can only begin to untangle in this report. As motor traffic volumes and speeds have increased over the decades, we have found ever more complex ways of controlling the interactions between road users as they cross paths; and we have learnt more and more what the impacts of such control, or lack thereof, are.

On one hand, separating different classes of road user – crudely, small, slow, light and squishy from large, fast, heavy and hard – is increasingly important from a safety perspective. When cars turn across those walking or cycling, particularly at speed, people are injured or die. And the more motor vehicles we have, and the faster they go, the more this is a problem.

On the other hand, the more control you put on motor traffic and more vulnerable road users, the less efficient the system is for journey times, the more congestion there is, and the longer the wait for pedestrians and cyclists for the 'green' time.

The Government's ongoing revisions to its Network Management Duty Guidance and other documents is the end result of rising congestion and traffic volumes and a growing need to control and signalise traffic flows. Enshrined in this guidance is a duty to ensure the "expeditious movement of traffic" because of the costs to the economy from congestion, and the perceived inconvenience to drivers. These have to be balanced by politicians and officers with due regard to the safety of residents and, increasingly, the need for 'mode shift' away from motor vehicles to meet multiple sensible policy objectives. Most of the time the simple truth is that safety and mode shift lose out to 'easing' traffic flow.

Barriers to walking, cycling and community

Often not even counted in the tally of benefits and costs are the wider impacts to community that the worst roads and particularly the worst junctions cause. We know that heavily trafficked roads are where the worst air quality is, but also that on main roads people are far less likely to know neighbours and children are far less likely to play out, explore and learn independence. Big dual carriageway roads can sever entire communities from each other.

Similarly, the worst junctions – either those so arduous to cross from one side to the other for those walking or cycling, or those so dangerous everyone avoids them – also sever communities, deny children freedom and impose heavy burdens of pollution at them. Go to such junctions in outer London and it is simply visible how communities are severed by complex crossings, and the few people visible on the streets will be trying to get off them as quickly as possible.

Hostile junctions alongside massive main roads are also a particular barrier to children's independent mobility, to women's safety, to disabled people's mobility – with complex crossings, underpasses and bridges all particularly points of severance. Such issues are why for instance, 95% of primary children in 1970 were able to get to school by themselves, but now only 2% do[8].

Such points of severance don't just divide communities, they represent the key barriers to more people walking and cycling in the area. Often, fixing one bad junction can unlock miles of cycling route and comfortable walking.

Collisions at junctions

Photo: Jorge Martínez López

The ‘worst’ junctions cause a huge burden in terms of road danger. Fifty percent of London’s road collisions happen at just 5% of junctions[9]. While campaigners are right to point out that on the whole, cycling is safer than it is often perceived to be, these critical junctions are far too dangerous, objectively and subjectively.

This danger is even commonly baked in to junction design. Nine out of 14 cycling deaths in London in 2013 were caused by left hooks[10] where a motor vehicle turning left ran over a cyclist. This position can be exacerbated by the most common ‘treatment’ for cycle users in the last twenty years which has been a short approach cycle lane on the left leading into an Advance Stop Line (ASL) box. This lane and box matches blind spots to the side and in front of older HGVs.

The risk that cyclists will not be seen becomes dangerous when different modes of transport move through space together. Drivers not seeing cyclists in cycle lanes isn’t dangerous when they’re not using the same space at the same time. Separation in time or space for movements has become the benchmark and is now used on numerous junctions in varying degrees, precisely to design out these risks. It’s relatively easy to separate movements at junctions – and different cities and countries globally are demonstrating successful approaches, including in London and the UK. But delivering such designs here seems very difficult to achieve at pace. And as a result, too many people are being hit, injured and killed at dangerous junctions across our capital. There were over 25,000 collisions in 2019, resulting in 125 people being killed and 3,780 seriously injured[11]: well over 70 percent of these fatalities and serious injuries were at junctions[12].

Where collisions happen

Photo: @RantyHighwayman

According to government analysis of cycling risks, the most common junction layouts for collisions are T or staggered junctions; then roundabouts; then crossroads. And the most common “contributory factors” for such collisions are that the driver or cyclist failed to look, failed to judge the other person’s path or speed, or that the cyclist entered the road from the pavement or they performed a “poor turn or manoeuvre”. In two separate studies of collisions in the UK, driver error was highlighted as the sole or majority cause of collisions with those cycling compared to cyclist error.

In other words, complex locations with movements crossing each other without clear control are obviously the riskiest ones. Again though, the international evidence is that these issues are relatively easily to control and thus road danger can be reduced or removed almost entirely.

“If you genuinely are protecting buses above all else then follow through the logic: everything that isn’t buses, walking, cycling, freight – that’s your slack in the system.”

Dangerous Junctions Summit participant

Bad design elements

TURNING RISK

The biggest issue for junction designs in the UK, as highlighted already, is the lack of control or clarity of priority for those walking or cycling ahead, while motor vehicles are turning left across them. These types of dangers are often experienced by pedestrians where there is no 'green person' signal on roads with high volumes of motor traffic and / or fast turns or difficult to anticipate ones – all too common still across London. For cyclists, the classic 'left hook' risk is arriving at traffic lights showing green signal, riding ahead, and then being "hooked" by a motor vehicle turning left directly across them. Even with side roads this can become very dangerous with "MGIF" (Must Get In Front) drivers pulling turns at speeds, particularly where sides roads are inappropriately designed, i.e. speed has taken design priority over control.

London and the UK also have a plethora of complex, large and fast junctions where, for the foreseeable future, cyclists and pedestrians will not have fully separated movements. As well as high-speed roundabouts, with and without signals, we often can see the spectacle of cyclists forced into crossing multiple lanes of fast-moving motor traffic, with drivers often simultaneously jockeying to change lanes themselves – just to go ahead or turn right.

Speed and aggression are the two watchwords here, combined with volume. If a junction arm is hardly ever turned into, then it matters little how badly it's designed – the odds are that those walking and cycling through the junction won't encounter a conflicting motor vehicle movement. But pile on more motor vehicles and design becomes rapidly critical. The following physical design features exacerbate or fail to tackle turning risk:

• Wide turning radii

Photo: @RantyHighwayman

Side roads or junction arms that are designed for motor traffic to turn into at speed, with wide lanes and a shallow curve to turn in or out, create serious danger to those crossing by foot or cycle – by design. In London, all too often, "Swept Path Analysis" is used to ensure that bin lorries or even HGVs can turn in and out as easily as possible – however, ensuring the turn radii is big enough for a comfortable turn by a bin lorry, also ensures a fast turn is possible for a car, with all the risk of tragedy that comes with it.

• Wide lanes

The wider the carriageway or the lane drivers are in, the faster they go, broadly. In TfL's London Cycling Design Standards and DfT's LTN 1/20 design guidance, lane widths between 3.2m (the minimum acceptable width for lanes that are used by buses and lorries) and 4m are specifically highlighted for danger – because this range of width sees close passes of those cycling inside the lane and speed. At junction approaches, wider lanes or lack of clarity of lane markings can encourage drivers of larger vehicles to 'swing wide' – moving right slightly to aid a faster turn left for instance. Such manoeuvres are particularly dangerous for those cycling ahead.

• Sightlines

One of the simplest and most powerful safety measures with junctions can just be to ensure everyone can see each other clearly. Ensuring good visibility of pedestrians and cyclists, particularly as drivers make a turn is vital. Lower walls and hedges, building lines set back from corners, less clutter at junctions can all help make everyone more visible.

• Lack of signals

Photo: alistairhall.co.uk

At far too many junctions in London, pedestrians are left to hope that a vehicle won't turn, with no clarity as to priority at junctions that have signals for motor vehicles but no signalised pedestrian crossings. At others, pedestrians and those cycling are often held for minutes at a red signal or asked to cross to narrow 'refuge' islands, or cross multiple lights across 'staggered' crossings, each stagger introducing more delays. Around 85% of pedestrians cross within 30 seconds of arriving at a signalised crossing[13]. Failing to provide a signal for them or providing one that takes far longer to go green means most pedestrians end up jogging across the crossing, while drivers have a green signal. Indeed, at many junctions, green time for pedestrians is shaved down in order to give more time to driving to ease congestion – resulting in those who move slower for whatever reason, either needing to be very quick off the mark, or face down traffic as they finish crossing. Similarly, giving those cycling a green signal at the same time as those driving, or no signal at all, sets up those cycling for the same inevitable conflicts.

• Lack of calming measures

For many locations, signals to separate in time or physical kerb protection to separate flows in space are not possible or suitable. Side roads, for instance, should not need signals. Instead, these are locations where traffic calming measures are useful, as are measures to indicate 'priority' for more vulnerable road users. Raised tables at junction mouths, alongside tighter kerb radii, and street furniture such as bollards or post boxes, can significantly reduce the turning speed of cars.

LARGER VEHICLES

Larger vehicles pose a particular problem of lethality. HGVs were involved in 14% fatal collisions on London's roads in 2020, despite only being 3% of traffic[14].

All larger vehicles can be offputting and intimidating to cycle near as well – one of the reasons why LCC and many other organisations do not consider bus lanes shared with higher volumes of double decker buses to be an appropriate, long term solution for inclusive cycle routes.

CAPACITY AND STAKEHOLDER RESPONSES

In theory, for major schemes, TfL has three economic impact assessments it performs – although these are rarely talked about or made public. These are on the basis of the economic cost of increased congestion; the cost of loss of life; and the cost to health.

The health impact of a scheme, calculated using the WHO's **HEAT tool**[15], is a relatively recent addition by TfL and is not used universally across the rest of the country. In progressive schemes, the economic cost from adding delays to motor traffic, (for instance by increasing green time for pedestrians or separating cycle movements from turning car movements and so reducing overall motor traffic green time) is offset roughly by the savings made by reducing the number of life-altering or fatal collisions (using standard methodologies to put a price on these). Adding in health benefits generally tips the assessment of progressive major schemes in their favour. The cost economically of pollution, and inactivity is huge and, when priced in as health savings to the public purse, usually decisively favours motor vehicle restraint.

However, most schemes aren't assessed in this manner – or if they are, that assessment isn't really resulting in the approval of more and better schemes. More, it is clear that savings to the public purse in health terms do not cut much mustard in terms of potential losses in bus ridership when TfL Bus journey times are impacted by schemes. Health savings don't go to TfL coffers, but NHS ones.

TfL Buses and TfL senior staff have repeatedly made plain that any delay to a specific TfL bus route reduces ridership along that route. Given the parlous funding situation for TfL, that dichotomy is more keenly felt than ever. The argument is often articulated as 70 bus passengers being more important to not delay than a few cyclists. But what isn't articulated is the more pertinent decision – who matters more, 70 bus passengers delayed one minute, or 1 person dead, a family ruined, friends devastated.

Ultimately, this is a false dichotomy: the truth of this matter is that if the Mayor, TfL and London are serious about responding to the climate crisis appropriately, to achieving 'Vision Zero' on road danger, to addressing our crises of pollution and inactivity, then we must find a way to enable both buses and cycles to be the main ways Londoners make road journeys (alongside walking).

That likely means either accepting that, on some routes and in some locations, TfL Buses will run slower; or it means being far more restrictive on private motor traffic than before. It is the private cars and private hire and taxi journeys that can most easily be removed from the system to free up green time for buses and those cycling and walking. But that requires boldness at junctions that London has not seen much of thus far.

Schemes blocked because of bus delays will need to be replaced by holistic planning and that must be based carefully on evidence, data and best practice. The same approach is also needed for the many stakeholders that get a say, it seems, in junction and other highways schemes.

Landowners, property developers, local boroughs, health trusts, emergency services consultation respondees, utility companies, security services, large organisations such as Crossrail, HS2, The Royal Parks, Secured By Design etc. all appear to be able to lobby TfL behind closed doors and off the record – and achieve changes to schemes that often do not appear to be well evidenced.

This can be seen in leaked consultation responses made by emergency services respondents during the Covid / Streetspace period – where 'concerns' trumped actual data; similarly see the rapid rollout of security barriers on London's bridges. Not only did these take away roadspace in a way that LCC had been told was impossible for years, but LCC was then told it was impossible to move the barriers (to create protected space for cycling) due to structural weaknesses on the bridges (and despite them going in almost overnight). Yet, quietly a year later, the barriers were moved out on most bridges. Again and again, stakeholders with power working behind the scenes appear able to force key decisions on road safety without reference to data and evidence and in secret. This practice must be abolished – all stakeholder lobbying should be scrutinised for its evidence base and should be out in the open.

HOW WE GET GOOD JUNCTIONS

Why doing good junctions isn't easy

The greatest risk to people walking and cycling at junctions are conflicting movements – a pedestrian stepping out when a car comes through or a cyclist going one way while a vehicle goes another. The answer to this problem is seemingly simple – to 'separate in time or space' – but doing that does appear to be far more difficult in practice for most highway authorities.

What separating in time or space means is using physical protection or signals to ensure that those cycling and walking are not in the same space at the same time as motor vehicles. The most obvious examples of this approach are: signalised pedestrian crossings – pedestrians wait while motor vehicles pass through, then drivers wait while pedestrians cross; and 'hold the left' signals where motor vehicles turning left are held, while cyclists go ahead, then cyclists are held as motor vehicles turn left.

The challenge is that enabling people to walk or cycle through a junction safely, giving them the separation in time and space they require, means giving time and space to those who are slower moving. Every second taken from motor vehicles will reduce the number of motor vehicles that can get through the junction in one cycle of the signals, and increase congestion at the junction and beyond as a result. Highway engineers and planners model junctions closely because they are the places where motor traffic is slowed down and bottlenecked most. Indeed, in London, large schemes are often assessed economically on three areas – the impact of the scheme on loss of life, on increased congestion and latterly on health impacts.

The economic costs of avoiding serious and fatal collisions at a specific junction are often out-weighed by the economic costs that come with increased congestion for any solution that reduces such collisions. But this isn't just about fatalities vs lost minutes for workers, it's also about impacts to bus journeys, freight, and other important traffic. Somewhere in the mix, the actual lives being lost are ignored. As ever by vetoing junction changes, and putting cash or buses above safety, the end result is ossifying London's currently hostile, dangerous streets and missing the opportunity to reduce overall traffic levels.

It doesn't have to be that way, however. London is increasingly learning how to deliver safer junctions, as are other areas in the UK.

Elements of UK safer junctions

SIGNALS

• Early Release
Early release junctions give a green signal to people cycling who are already waiting in a box at the front of the lights before general traffic, normally of 5 seconds. This is enough time for those cycling to generally get ahead of the turning motor vehicles from behind them.

However, in many London locations Early Release is so short it's often routine to see cyclists facing right turning oncoming drivers before they're halfway across the junction, and motorcycle and moped riders, with a total lack of enforcement of the lights, often start moving on the Early Release green too.

Of course, the Early Release becomes entirely meaningless the moment the general traffic light goes green – so if you arrive at the junction during a green cycle, it's no benefit to you. This makes the approach particularly useful for roads where those cycling nearly always arrive to a red light. However, for such arms of junctions, a 'Cycle Gate' (below) is surely better?

Either way, Early Release signals are not inclusive designs and routes featuring them notably skew towards fitter, more assertive cyclists.

• Cycle Gates
Cycle Gates improve on Early Release by adding lights on a separate cycle track on the approach to the box at the front of the lights. If you're in the box when the light goes green there, you get the Early Release. But as the motor traffic light goes green, the cycle track light before the box goes red – holding those cycling until motor traffic has a red light again to remove conflict.

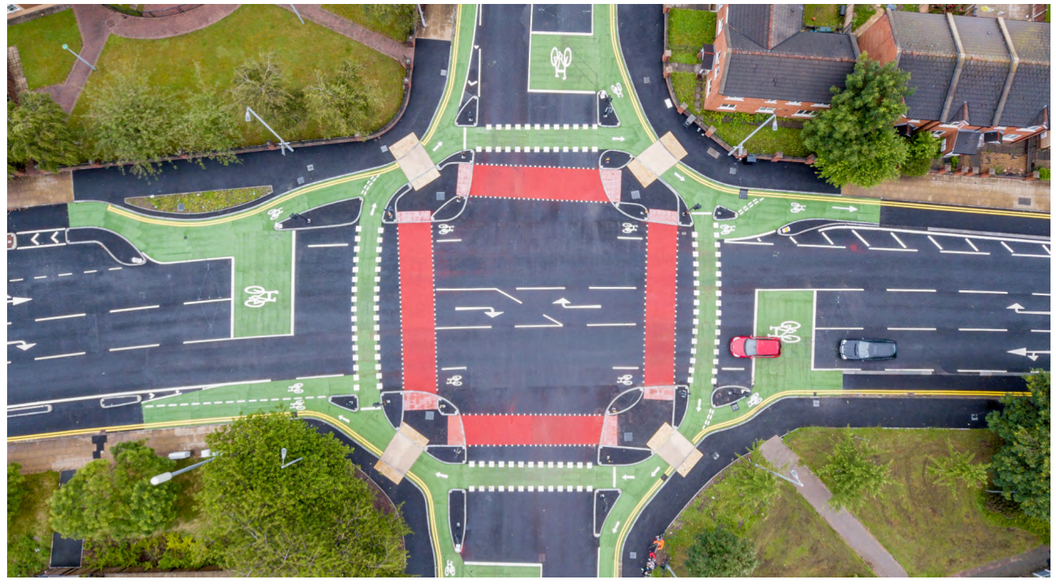
The problem, fairly obviously, is while Cycle Gates provide full separation in time for those cycling and driving, it does so at a cost – arrive at a green light for driving and you're held at a red for cycling. The temptation for faster, assertive cyclists is to either join general motor traffic on green, negating the safety benefit, or 'jump' the cycle red light. Less green time for cycling means greater likelihood of 'non-compliance' with the cycle track and signal.

• Hold the left
These junctions are designed so that the cycle track runs up to the junction mouth and there are separate lights for motor traffic turning left from those driving ahead. Those cycling get a green light at the same time as motor traffic going ahead, while any drivers turning left are held on a red. This means cycling is safer, but it makes all sorts of movements complex – for instance, either left-turns for cyclists are banned or they go with ahead cyclists, and therefore pedestrians crossing the side road are held for longer on a red; right-turning cyclists have to do so in two stages. These junctions, due to needing more signals and traffic islands, mean far more red time for just about everyone and need far more space.

• Green person authority
TfL has begun rolling out 'Green person authority' signals on its network slowly. Over several years, 20 have been installed so far. These pedestrian crossings – either standalone or part of a junction – are green for pedestrians constantly until a motor vehicle approaches the crossing. Then after a few seconds, they go briefly green for motor traffic. The time balance and priority shifts dramatically away from private motor vehicles and pedestrians are far less likely to wait anywhere near, let alone over, 30 seconds.

The question again is why, considering these appear to be working well all over the world, including in London, TfL is so slow at rolling out more of these signals – to as many junctions as possible as quickly as possible.

• Bus lanes to the junction
Often bus lanes are stopped before the junction being replaced by left turn lanes. One quick win for safety and active travel would be to scrap lots of dedicated turn lanes, ban turns where possible, and run bus lanes right up to junction mouths where feasible. Doing this would hold space for buses and cycling and reduce the risk of turns across those cycling. But it wouldn't be an inclusive design for cycling.



• Circulating Cycle Stage
Circulating Cycle Stage (CCS) junctions are the new kids on the UK block. In one sense these junction types are very simple: all those walking and cycling are held while motor traffic goes, then all motor traffic is held from all directions, and then those walking and cycling go. This design has so far been applied mostly to crossroads in the UK. And those cycling generally circulate clockwise around the junction (if turning) – hence the name of the scheme type.

These are about as close as the UK can currently get to 'scramble' or 'all green' junctions found in the Netherlands – where during the pedestrian / cycle phase, those walking and cycling can go and turn in just about any direction informally.

In these designs, as well as the signal phasing protecting those walking and cycling, cycle tracks and pedestrian pockets at the junction itself ensure that there is physical kerbed protection all the way round the junction.

CCS junctions have thus far been installed in Waltham Forest's mini-Holland areas (initially on Lea Bridge Road at the Argall Way / Orient Way junction, but now also at Blackhorse Road and Bell Corner junctions), and also in Manchester with their "CYCLOPS" designs.

The key difference between the Waltham Forest and Manchester designs is that with CYCLOPS designs, pedestrians stand closer to the junction mouth – this gives several pros and cons. On the pros, the pedestrian signal timings can be shorter because crossing distances are slightly shorter, this can make these junction designs easier to get approved – as more time for motor vehicles means less congestion hit. Also, the curved cycle turns achieved by putting cycle crossings further from the junction mean smoother turning movements. The negative is that these junction designs take up a bit more room as designed so far.

Both types of CCS hold cyclists and those walking while any traffic goes – and that can mean long waits for those cycling. But in return, you can make right turns, even u-turns cycling in one go. And retaining time for general motor traffic means they're easier to get approved with less 'hit' on traffic to get past highways modellers and engineers.

PHYSICAL PROTECTION

Photo: alistairhall.co.uk

• Semi-protected measures
'Wands', 'wand-orcas', 'Orcas' etc. are an affordable form of temporary physical cycle track demarcation. They do not offer the levels of protection and the emotional sense of safety full kerb cycle tracks do, as there are regular gaps between protection, and often the protection can be driven through or over without damaging a vehicle. As a result they're also far more rapidly damaged and need more maintenance. But they do perform far better than paint-only schemes, and are ideal for trialling a route. Ultimately though, wands are not as inclusive a form of cycle track protection as kerbs as they feel far more easily encroached upon and less protecting, and the rollout during Covid of 'Streetspace' temporary schemes using mostly wands shows not only how limited the lifespan of this approach is both in terms of the regular maintenance required to keep wand protected tracks working, but also in terms of how inclusive they are. Wand protected tracks delivered during Covid were done so for value for money reasons – but the budgetary and other constraints TfL and others faced meant junctions were nearly always left untreated, and that further reduced the safety and comfort of these schemes.

• Kerbs
Bolt-down rubber or stone kerbs are used for 'fully protected' cycle tracks to deter drivers very successfully from entering cycle tracks. They are more costly in general than semi-protected measures, and often the cost is added to by the need to relocate drains, metal covers for subsurface utilities etc. as the roadspace is properly reallocated. Again however, kerbs aren't generally used through the middle of junctions – for that, signals are what is needed to deliver protected and separate space.

• Verges
Designing green space or car parking spaces between people walking and cycling and the carriage can further bolster the protection and amenity offered to those walking and cycling – traffic is further away and so too pollution, noise and fast-moving vehicles.

CONTROLLING DRIVER BEHAVIOUR

Photo: John Dales Urban Movement

Photo: alistairhall.co.uk

• Raised tables, continuous footways, tracks
By raising the carriageway to footway level at junction mouths and continuing pavement treatments and cycle tracks across the junction, you reinforce priority for walking and cycling. However this has to be designed carefully and visually impaired people have raised concerns over those designs without tactile paving being difficult to detect by cane, guide dog etc.

• Tightened turns
The simple reverse of widely splayed kerb radii that enable faster turns by motor vehicles is tightened turns and indeed narrowed entry / exit widths. Tightening radii available to turn in / out of junctions, including using street furniture, bollards at the junction mouth, slows and calms turns. Reducing the width (even to the extent drivers turning in and out can't pass each other easily) shortens crossing distance for those walking and cycling and further calms traffic.

• Banned turns
One of the simplest and cheapest approaches available. By banning motor vehicles from making a left turn, for instance, you can all but remove the risk of 'left hook' collisions. Obviously banning turns needs care as to where motor traffic displaces to and the impacts on the network.

• 'Bus gates', one ways, modal filters and reducing traffic and turning movements
'Bus gates' are largely camera-based "modal filters" – gates through which buses and other exempted motor vehicles (Dial-A-Ride and emergency services vehicles for instance, commonly) can pass without a fine, as can those walking and cycling, but general motor traffic cannot. Bus gates in London have now been implemented in several locations.

Examples / Case Studies

Lea Bridge Road / Argall Way / Orient Way

The first Circulating Cycle Stage (CCS) junction installed in the UK was the Lea Bridge Road / Argall Way / Orient Way junction, done as part of the huge “Mini-Holland” programme reinvention of Lea Bridge Road from borough boundary to borough boundary. Lea Bridge Road in Waltham Forest runs from near the border of the borough of Redbridge to over the Hackney border. And the entire Waltham Forest section (4km of it) saw a total transformation from building line to building line.

As part of that, several major junctions were entirely redesigned, as well as the Argall / Orient CCS junction. The scheme replaced the hated Whipps Cross roundabout with a staggered, signalised T-junction; the Markhouse Road and Bakers Arms junctions were replaced with staggered CCS-style junctions and then there was Argall / Orient.

The junction design took over a year to get through approval stages because of concerns around impacts on motor traffic. And the end result increasingly sees dozens of cyclists bunching in the morning heading westbound into Hackney and the City, such is the high level of cycling delivered.

Bank Junction

Two things arguably swung the approval of huge, phased changes at the iconic Bank Junction in the City. The first was the idea of City grandees being able to sip their lattes right outside the Bank of England in a new European-style piazza. The second was the presentation of what a ‘do nothing’ option at Bank would mean, following protests around fatal collisions there.

Bank, notorious for its lack of safety for those walking and cycling, was (argued City’s officers), set to get even less safe. As Crossrail passed nearby, Bank Junction was set to see increased numbers of people surfacing into the junction at peak hours. Those people were already so numerous they were overwhelming narrow pavements, crossing against red person signals and crowded off crossings. That combined with complex traffic movements, meant the prediction was for such frequent collisions it would even impact average bus journey times over the day. Doing nothing, in other words, was a recipe for disaster.

As a result, the City made the exceedingly bold and brave choice to close the junction to all but buses and those cycling and walking from 7am to 7pm weekdays. Other motor traffic (including taxis) can approach the junction via its seven arms, but not drive through it. The result has been a dramatic shift at the junction and on its approaches – allowing people to walk on widened pavements calmly, and city workers to enjoy the central square for lunch in peace without incredibly high volumes of passing traffic.

Cambridge Fendon Road Roundabout

In Holland, roundabouts are designed generally radically differently from the UK. There are two types of roundabouts generally built – neither one makes a habit of expecting those cycling to ‘take the lane’ or those walking to scurry across the road without any support.

Where traffic volumes and speeds are high, ‘turbo’ roundabouts are used to maximise throughput of motor traffic – for these, underpasses, overpasses, bridges and incredible ‘Hovenring’ style designs are there to ‘grade’ separate those cycling and walking with high quality direct alternatives.

For low levels of motor traffic, roundabouts feature zebra crossings and cycle tracks parallel to them that ring the roundabout. Design details are key here – and the biggest one is tight turn radii for motor vehicles entering and exiting the roundabout to ensure slow speeds. On top of that the Dutch use clear road markings to reinforce priority for those walking and cycling.

The Fendon Road roundabout in Cambridge is the first UK roundabout to attempt a Dutch-style approach. It opened in July 2020 at a roundabout notorious for its dangers to those cycling and has proven highly successful. Others are now planned by other UK authorities.

WHY ARE GOOD JUNCTIONS SO HARD TO DELIVER?

The wrong priorities and the right ones

There are three central reasons why good junctions seem so hard to come by. Nearly all of them come down to political fear of backlash.

1. MODELLED IMPACTS TO BUS JOURNEY TIMES
There is a direct linear relationship between bus journey times and their journey time reliability, and passenger numbers, and therefore TfL revenue from buses, bus route viability and bus network coherence is critically dependent on passenger numbers, for those who need buses most. Plus, Londoners on low incomes depend heavily on buses.

It's understandable then, that TfL Buses are concerned with impacts to their network. However, if the Mayor's Transport Strategy and approaches to both climate crisis and 'Vision Zero' road danger reduction are to mean anything, TfL, London and indeed other areas need to square a circle and find a way to enable those walking and cycling to get through junctions without a constant effective veto from TfL Buses.

For Vision Zero to have meaning, we need to eliminate all serious and fatal collisions, including those involving buses. Buses in London do kill and severely injure those walking and cycling (and indeed those inside buses). But more than that, TfL's reaction to any localised impacts to buses from a scheme is currently often to block that scheme. As a result, we are stuck with a slower pace of mode shift away from private motor traffic and towards active travel in the medium to longer term. One junction, then another, then another weakened or vetoed, leads to a retention of the status quo – where private motor traffic, not buses, win most.

Photo: flickr.com_photos_sarflondonunc

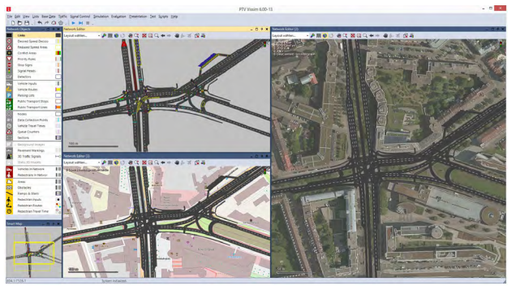


Photo: PTV Vissim

Top: Queuing buses
Bottom: Traffic modelling

"If you assume the traffic you have today is the traffic tomorrow and traffic continues to maybe even grow, then you can't give any space away."

Dangerous Junctions Summit participant

2. MODELLED IMPACTS ON PRIVATE MOTOR TRAFFIC
Right behind buses, TfL's Network Assurance approach and politicians' reaction to it is again to see modelled increases in congestion beyond a minimal amount to be reason to weaken or not move forward a scheme if congestion time is modelled to increase beyond a specified threshold.

TfL's modelling is of undeniable quality – and nearly always fairly accurate. This is not an argument that TfL are often 'wrong' to suggest scheme X is modelled to deliver an impact of Y minutes, but more that their conclusions, and even more, the conclusions of others – politicians particularly – from such modelling, often lead to poor outcomes.

Most importantly, TfL models junctions for now, and for worst case scenarios. Junctions are major schemes that once in are expected to stay in for decades. Junction designs should be predicated on modelling for a future based on the Mayor's Transport Strategy trajectory, and considered holistically as part of a network that needs to move away from private motor traffic.

Indeed, modelling in the UK is often based, in terms of assumptions on long-term traffic changes, on DfT WebTAG figures that have repeatedly failed to be accurate, often overestimating long term motor traffic volumes, and more, making an assumption motor traffic volumes will continue to grow despite a climate crisis. If DfT's long-term base model for motor traffic is right, in other words, then we're doomed. We need to stop modelling for what we think might happen – and more for what we need and want to happen.

Trialling changes also shows us generally that often we don't need to model – traffic in a huge city does adapt, and localised congestion is not automatically a reason to not do a scheme if we want to overall create mode shift, safe routes for walking and cycling etc.

3. FAILURE TO PRIORITISE APPROPRIATELY AND COHERENTLY
All too often we see junction designs where everything comes before safety. We have heard of junctions that are notorious, lethal, and known to be so for decades, where construction vehicle parking has been the reason why progress has stalled. In other locations, counter-terrorism concerns have delayed progress. In others, low level bus journey impacts are enough. In others, hard as it may be to believe, concerns about (honestly) chauffeur driven access for rich clients and stakeholders have stopped progress in its tracks. Simply put, if private motor traffic, tipper truck parking or chauffeur driven limos are more important to London than people's lives, families ruined, then our leaders and key stakeholders should at least be honest about that.

The alternative is to have a set of policies, strategies, clear goals for the future and stick to them – implement them boldly, coherently and with care. If we want a 'Vision Zero' of no more road deaths in London, then we need to put road safety first, not last. When we held our summit, we heard from those involved in modelling, planning and designing schemes, over and over again, that they end up being asked to prioritise 20 things at once, to balance the impossible. The same people also said that modelling as an approach is increasingly targeted at trying to improve schemes for everyone, rather than offer a veto – that it is politicians that need to understand that great schemes will almost always involve some impacts to some stakeholders. And that road safety has to come much higher up the food chain.

In the industrial design of bicycles, there is a famous phrase: "cheap, light, strong: pick two". In other words, it is entirely feasible to design a cheap and light bicycle, but it is unlikely to be strong; similarly, light and strong bikes don't come cheap. Road safety and junction designs perhaps then need a similar phrase: "safe, cars, buses, pick two". Ultimately, if we want to enable bus journeys to be reliable and rapid, if we want to reduce private motor traffic and we want to enable more walking and cycling, it's pretty clear which of the three has to give: private motor traffic.

HOW TO MAKE SAFER JUNCTIONS

So you're a politician, officer or campaigner who wants better, safer junctions in your area? Here's how to get them.

1. Get the political will to make change

We don't see coherent action on climate, road danger, or active travel without politicians who are willing to listen, but also lead.

2. Prioritise

Use technical tools like the DfT's PCT.bike or TfL's Strategic Cycling Analysis combined with collision mapping, and other datasets to identify which junctions are a priority for action, and which will be likely to attract funding from TfL or government.

3. Get good design guidance & best practice examples

Read this report, read the DfT's LTN 1/20 guidance, set a quality bar based on that document's Junction Assessment Tool (JAT) and funding bar.

4. Get data

Particularly on high priority desire lines for walking and cycling, vulnerable road user and motor vehicle flows and turning movements. Good data not only helps build a case for funding but also guides design.

5. Lead and listen

Have early discussions with officers, key stakeholders, residents, emergency services and more interested parties laying out the need for change and identifying issues that change might cause as well as the support base for change. See LCC's How To Talk To People About The Future Of Their Streets[16] report for more on this.

6. Be clear about priorities

Obviously, a junction design that sees entire swathes of your city grind to a halt isn't a sensible design. But if you really want safe junctions, that means being clear with yourself and others about Vision Zero being a priority. Do not allow schemes to move forward that overly compromise that approach. Be prepared to compromise other areas (private motor traffic capacity, for instance) and be prepared to push back to those who will try and push the scheme back towards the status quo – it's a climate crisis and people are being killed on our roads far too often, remember.

7. Trial if possible, get data always

If you can, use temporary materials and measures to enable teams to tweak and improve designs in situ more easily. And collect data so that you can establish that something has worked and replicate it more easily next time.

WHAT LCC WILL DO NEXT

1. BUILD SYSTEMIC CHANGE
This report has laid out some of the key issues holding back faster and bolder progress on junctions, and made recommendations for addressing them. We will now work to remove barriers in line with those recommendations, from London-wide to local level and work with other organisations to press for national recommendations to be implemented rapidly also.

2. REACT TO ONGOING SERIOUS COLLISIONS
We are moving to be able to more rapidly and appropriately respond to serious and fatal collisions as they happen in London. We cannot protest at every single fatal collision in London – nor will doing so necessarily be a good use of our resources, but we will continue to protest at some, as well as using other means to ensure change comes rapidly wherever there are serious collisions happening. And we aim to track all such collisions to follow up with highways authorities and keep pushing for action in all such locations.

3. HIGHLIGHT THE WORST JUNCTIONS
We are developing data tracking and mapping methods in order to more coherently and clearly identify and highlight those junctions most needing of priority action. We aim to be able to identify junctions with clusters of serious or fatal collisions, whether to pedestrians or those cycling, across London and provide interactive mapping of such junctions.

4. FOCUS ON KEY LOCATIONS
Our campaigning work will also provide specific focuses to key junctions that we believe must and can most urgently be acted on. Holborn is obviously an ongoing key focus for our campaign, not just because it is so infamous and has killed so frequently but also because both TfL and Camden Council have repeatedly committed to more action at this tangle of one-way streets and junctions. Indeed, change is already visible at Holborn – it just should not have taken recent fatal collisions to achieve that. As well as Holborn, we are also initially looking at the King's Cross one-way system of junctions. These are lethal and have long been earmarked for action, most recently in discussions around cycle tracks installed during Covid as temporary measures along Euston Road. And the removal of those tracks only underlines the urgent need for 'Vision Zero' compliant junctions at junctions along this corridor, including King's Cross. We have been working with new design and visualisation software **BetaStreets**[17], which we also used during our **#ClimateSafeStreets**[18] campaign in 2022, to visualise what a safer King's Cross might look like. Here's a photograph of King's Cross today, and one of the BetaStreets visualisations of how it could look in the future.

Top: King's Cross (Euston Road) as it is now.
Bottom: A BetaStreets visualisation of what a safer King's Cross could look like in the future.

CONCLUSIONS

The systemic issues impacting 'Vision Zero' and the reduction of road danger are not primarily due to lack of technical design expertise, the unique layout or make-up of British roads and laws, or the nature of British driving. They are primarily political in nature.

While we continue to design and deliver Highways schemes in a manner designed to expedite motor traffic, or 'fight' congestion, we are designing in an unacceptably high level of road danger into our roads. And that stands in increasingly stark contrast with other countries and cities.

In London specifically, concerns about short-term impacts on the bus network and every other stakeholder getting a voice before the victims of road danger leads over and over again to road danger reduction being of a lower priority than other issues – such as keeping a bus network moving, albeit at an ever-slowing pace as we fail to tackle the elephant in the room: too many cars. If we are serious about Vision Zero and a net zero emissions road system, it is time for that to shift.

Fortunately there are actually ways forward – best practice examples available here in London, offering cheaper, quicker ways to avoid the delays – if only politicians can find the bravery to do what's needed: be clear with us all about what the priorities are and stick to them.

"It was an emergency during Covid, but there is another emergency. We can't lose that speed and those innovative approaches."

Dangerous Junctions Summit participant

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About the London Cycling Campaign

LCC was born out of the environmental movement in 1978. With 20,000 members and supporters is one of the largest urban cycling campaigns in the world.

We mobilise public pressure for action by politicians to create a greener, healthier, more inclusive and happier capital, by making London's streets safe enough for everyone to cycle for their everyday journeys.

We've been instrumental in changing the policies of past and present London Mayors to adopt a high quality, Dutch style approach to cycling infrastructure and traffic restraint; and our volunteer groups, of which we have one in nearly every borough, have won better provision for cycling by many councils.

Plus, this approach to cycling has now been taken up by central government and is being rolled out across the country.

And as well as campaigning, we run grassroots projects to help people take up cycling (or cycle more), and to diversify those cycling, working collaboratively with councils and businesses and community groups.

Our work, especially over the last decade, has seen a big rise in safer cycling infrastructure. But we need to achieve even greater and faster success, especially as London is rightly aiming to be a net zero carbon city by 2030. We will continue to grow our capabilities and impact until cycling is the natural choice for all Londoners for their everyday journeys.

To find out about how you can work with or support LCC, please email **info@lcc.org.uk**.

Design: We Made This wemadethis.co.uk

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