Travel in London

Report 12

MAYOR OF LONDON

TRANSPORT FOR LONDON

EVERY JOURNEY MATTERS

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Travel in London report 12

Overview

Travel in London report 12

Travel in London is TfL's annual publication that summarises trends and developments relating to travel and transport in London. Its principal function is to describe how travel is changing and to provide an interpretative overview of progress towards implementing the Mayor's Transport Strategy, to inform future policy development. It also provides an evidence and analysis base for the general use of stakeholders and policymakers whose responsibilities cover many different aspects of travel and transport in London. This twelfth report covers trends up to 2018 and into 2019.

Publication of Mayor Sadiq Khan's transport strategy last year set out an ambitious programme to improve transport and the wider quality of life of Londoners over the period to 2041, based on an evidence base that reflects trends up to and including 2016.

The strategy established the overarching aim of increasing the mode share for walking, cycling and public transport ('active, efficient and sustainable modes') in London to 80 per cent of all trips by 2041, to enable the city to grow and to address key environmental and health challenges. This and the three related Mayoral priorities below form an overall structure for this report:

- Healthy Streets and healthy people
- A good public transport experience
- Supporting new homes and jobs

Data for the most recent years reviewed in this report is organised around this overarching aim and three themes, starting with the wider transport, economic and societal backdrop. It shows good progress in several areas. It also reveals the emergence of several challenges to achieving the Mayor's aims, demonstrating the importance of implementing the policies and proposals in the strategy to ensure the overall vision of the Mayor can be achieved.

The developing context

Long-term trends

London's economic success has played a key part in the increases we have seen in sustainable travel. More people, jobs and investment has seen Londoners and visitors make increasingly sustainable choices for how they get around, choosing to walk, cycle and use public transport. This has placed significant pressure on our public transport networks, in particular the Underground network. For example, in 2018, over 5 million passengers used the system on a single day for the first time.

Since 2000, London's population growth has led to an increased demand for travel, indeed in the last ten years London's population has grown by over a million people. Over this time, public transport use has grown, often at a more rapid rate than the population. This reflected growth in demand and led to sustained investment in the bus network, followed by Tube improvements, the transformation of the London Overground and innovations such as the Oyster card. Meanwhile, a fall in road traffic reflected increasing constraints on the roads, the impact of the Congestion Charge, greater controls on parking and an overall

change away from the car towards more attractive public transport, walking and cycling.

We are now seeing some potential challenges to these trends. While London's employment remains buoyant, the economic structure of employment is changing rapidly. With continued uncertainty in some parts of the economy, a prolonged squeeze on personal disposable incomes owing to slow wage growth and increasing housing costs and a slowing of the rate of population growth, public transport growth has levelled off. Meanwhile, in some parts of London there have been increases in road traffic. Furthermore, contemporary and future technology-driven trends, including increased flexible working, have potential implications for travel demand patterns that need to be better understood.

All these changes have impacted our progress towards our strategic ambitions.

These trends largely post-date the evidence base for the Mayor's Transport Strategy and some may not be sustained beyond the short term, but they have all had an impact. They serve to intensify the need for the kind of policies outlined in the Mayor's Transport Strategy if transport is to continue to play a key role in London's future economic and social success, whatever the wider international and domestic context.

Against this backdrop, we continue to provide high levels of service and reliability. Large-scale investment is being made, with more planned, in London's streets to make them more attractive for walking and cycling, and the Elizabeth line will soon provide a step change in public transport connectivity to, from and within London.

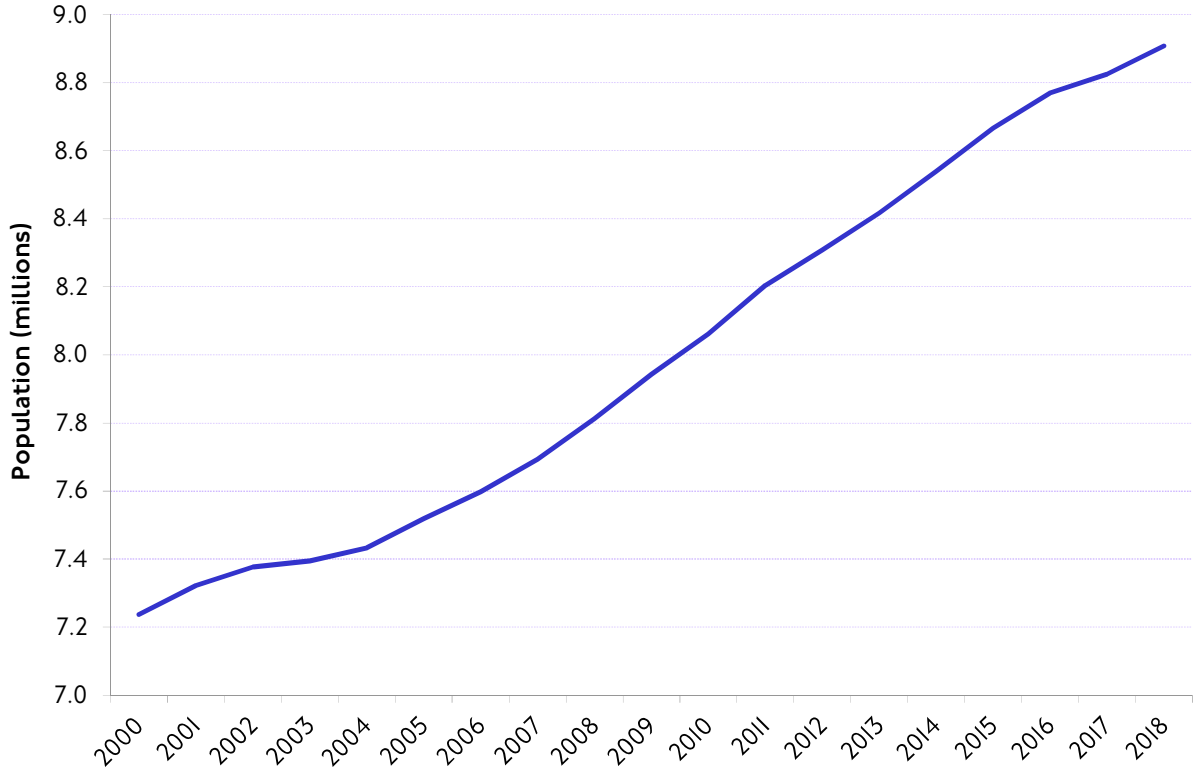
London's population

According to Office for National Statistics (ONS) estimates for 2018, London was still growing, albeit the rate of growth has slowed over more recent years (figure 1). Population growth, which had been up to 1.8 per cent per year over the previous 10 years, fell to an estimated 0.6 per cent in 2017 and was an estimated 0.9 per cent in 2018. While the rate of growth has slowed, the Capital is still the fastest growing region in the UK.

The main driver of the growth in 2018 was an increase in international migration to London, with 6 per cent more migrants moving to London and 17 per cent fewer leaving London compared to 2017 (figure 2).

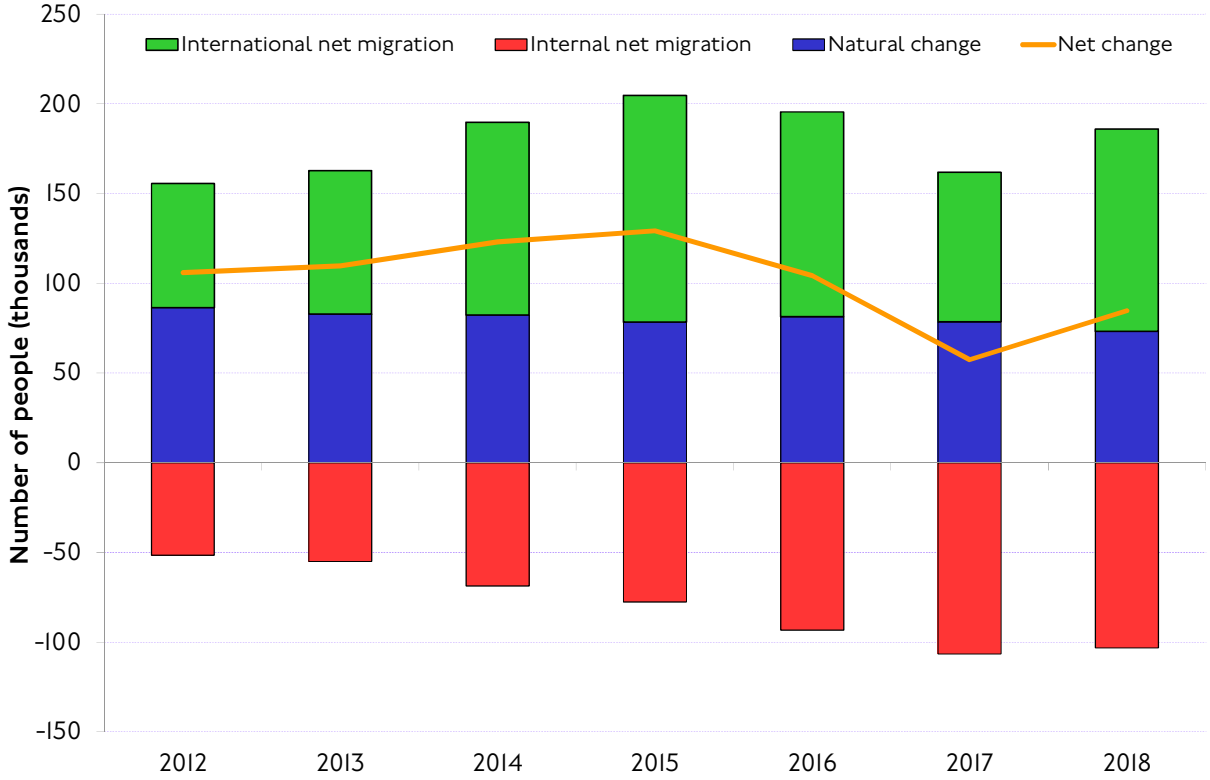
Migration from London to other parts of the UK also declined, by 3 per cent in 2018. However, London is the only region in the UK that has a net outflow of people to other regions of the UK, with around 100,000 more people leaving than arriving in 2018. In the UK as a whole, net migration from the EU fell in 2018, with migration from non-EU countries increasing. More than three times the number of international migrants came from outside the EU than from inside the EU.

Figure 1 Resident population of London, 2000-2018.



Source: Office for National Statistics.

Figure 2 Components of London's population growth, 2012-2018.



Source: Office for National Statistics.

Although the short-term prospects for population growth in London are unclear, most commentators still expect substantial growth in London over the medium to long term, emphasising the need for steady and substantial investment in infrastructure.

London's economy

Since the financial crisis of 2008, economic growth has been slow and many Londoners have felt an unprecedented and prolonged squeeze on their personal disposable incomes. This has been the result of near stagnant real wages and increased living costs, especially housing costs. GDP is growing but growth remains sluggish. UK GDP grew at a modest pace of 1.4 per cent in 2018.

These trends have had a knock-on effect on consumer spending; particularly spending on 'discretionary' activities. Discretionary spending includes travel for shopping and leisure – factors that are thought to partly underlie the recently observed decline in trip rates in London. On the other hand, strong growth in employment has meant that commuting trips and levels of peak demand have remained relatively stable, albeit that there is some evidence that the balance of commuter demand across the days of the week may be changing.

Young Londoners and lower income groups have been disproportionately affected by slow wage growth and high housing costs. Trip rate decline has been particularly pronounced among those aged 17-24 (by 29 per cent between 2007/08 and 2018/19), perhaps connected to the budget pressures particularly faced by this cohort in comparison to previous generations.

Overall travel demand and mode shares

Total travel in London

A daily average of 26.9 million trips was made in London in 2018. This was a 0.1 per cent increase on 2017, which, in turn, was 0.1 per cent lower than 2016. Effectively, total travel demand has been flat for the last three years. Over a longer timescale, overall growth in trips in London has been 2.9 per cent since 2013.

The recent slowdown in the rate of demand growth is, however, unprecedented over the longer term, may not be sustained given improved economic conditions, and is affecting some days of the week and types of travel more than others, particularly demand patterns on the bus network.

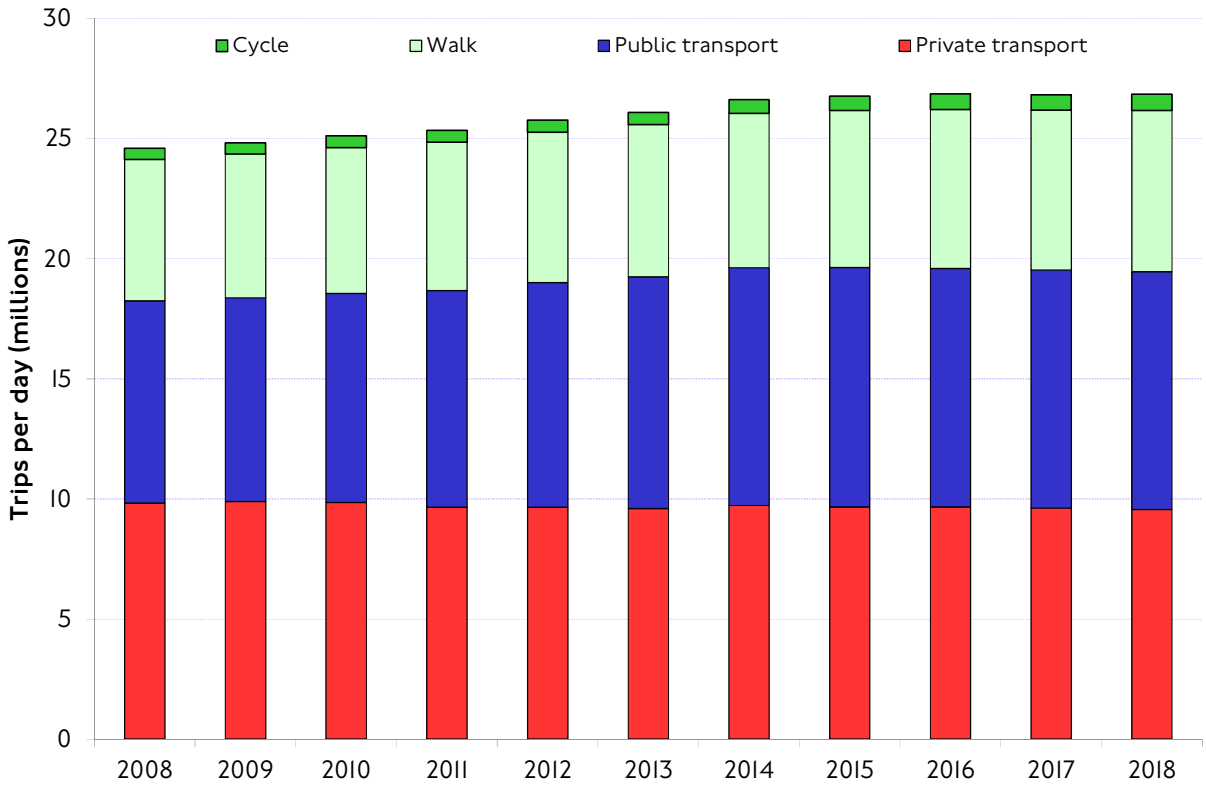
Therefore while there are shifts taking place in terms of the economy, lifestyle and working patterns that are affecting overall travel demand, these are impacting only specific kinds of travel and on certain days. Significant capacity issues on the networks, particularly the rail networks, around peak travel periods are currently, and are likely to remain, a key constraining feature in London for the foreseeable future.

Active, efficient and sustainable modes

The active, efficient and sustainable mode share for travel in 2018 was 63.0 per cent, a 0.3 percentage point increase on 2017 and a 0.4 percentage point increase on 2016. The mode share for private transport was 37.0 per cent in 2018, 0.3 percentage points lower than 2017, and 0.4 percentage points lower than 2016.

Figure 3 shows demand trends on the principal travel modes over the ten year period since 2008. Over this period, total travel demand has grown by 9.1 per cent, and the mode share for active, efficient and sustainable modes has increased from 58.8 to 63.0 per cent. This compares to the Mayor's aim of an 80 per cent share for these modes by 2041. It means that, compared to a case where car travel had increased at the same rate as for all travel, there are 2.9 million fewer car trips per day in London since 2000 than would otherwise have been the case.

Figure 3 Daily average number of trips in Greater London, by main mode, 2008-2018.



Source: Strategic Analysis, TfL City Planning.

Although the pace of change has notably slowed in recent years, the overall trajectory of growing travel demand and a progressive shift towards active, sustainable and efficient modes – familiar over the last two decades – is being maintained.

Travel demand trends on the principal public transport modes

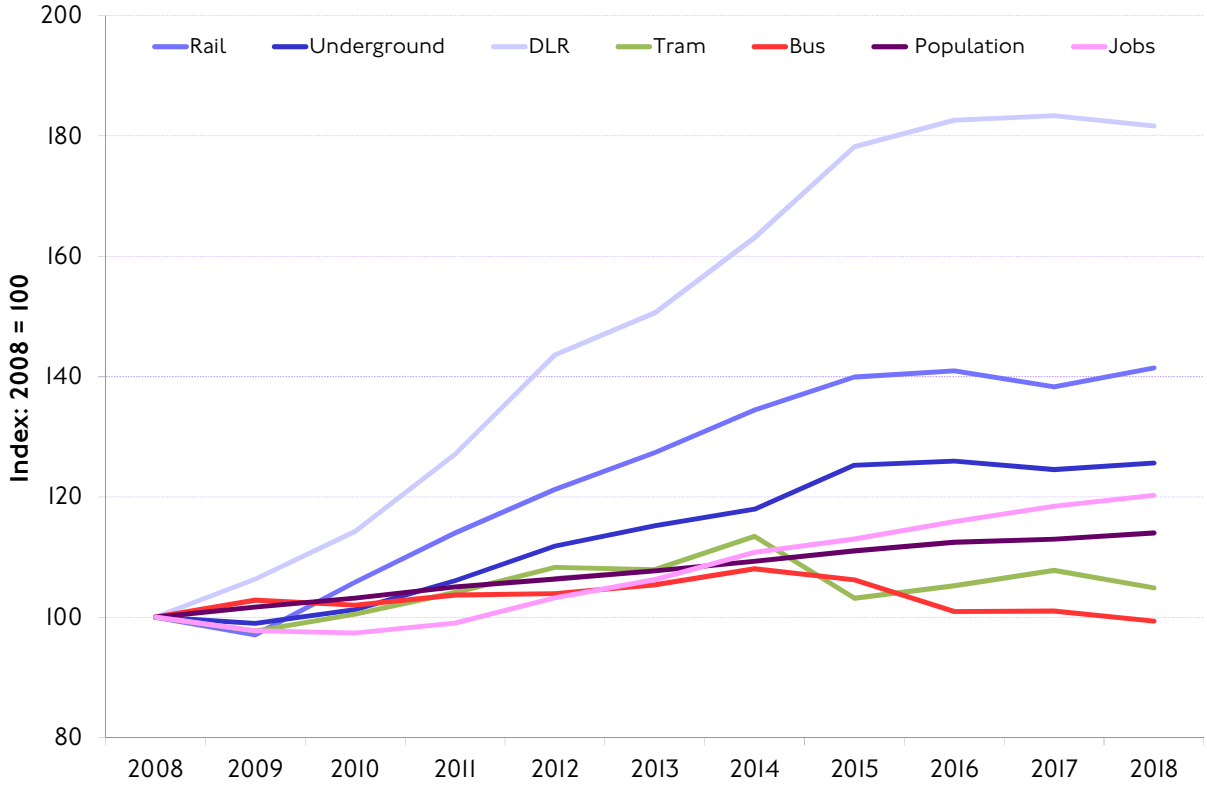
Within this overall trend, however, and as described in detail in the main text, there are differences between the individual travel modes, between different parts of London, and in relation to previously established trends. So, in terms of **journey stages**, in 2018:

- Underground journeys increased by 0.9 per cent in 2018 compared to 2017, thus reversing the decline of 1.1 per cent observed the year before.
- This pattern of return to growth on the Underground was mirrored on National Rail services in London (defined by the Office for Rail and Road as London and South East), which include some TfL-operated services. Journeys on these National Rail services increased by 2.3 per cent with respect to 2017, with demand in 2018 similar to 2016. It is likely that factors such as a recovery from

the prolonged National Rail strikes of 2017, and the completion of the Thameslink upgrade, partly underlie the recent recovery in rail demand.

- Bus journeys saw a decline of 1.7 per cent compared to 2017. This level of reduction is of the same magnitude as that observed in 2015 when bus demand first ceased to grow after several years of continued growth, and it contrasts with the slight increase of 0.1 per cent observed between 2016 and 2017. This trend should be seen in the context of, and contrasts with, growth in London Underground journeys over the same period.

Figure 4 Travel demand trends on key public transport modes, 2008-2018.



Source: Strategic Analysis, TfL City Planning.

In summary (figure 4), over the past 10 years the population has increased by over a million people and:

- Underground patronage has increased by 25.6 per cent;
- National Rail patronage (London and South East and including TfL Rail and London Overground) has increased by 41.5 per cent;
- DLR patronage has increased by 81.7 per cent;
- Bus patronage has decreased by 0.6 per cent overall, with a period of increasing patronage followed by a period of falling patronage.

Travel demand trends on active travel modes

At the London-wide level, the number of walking trips increased, by 0.9 per cent; this increase largely reflecting population growth in 2018.

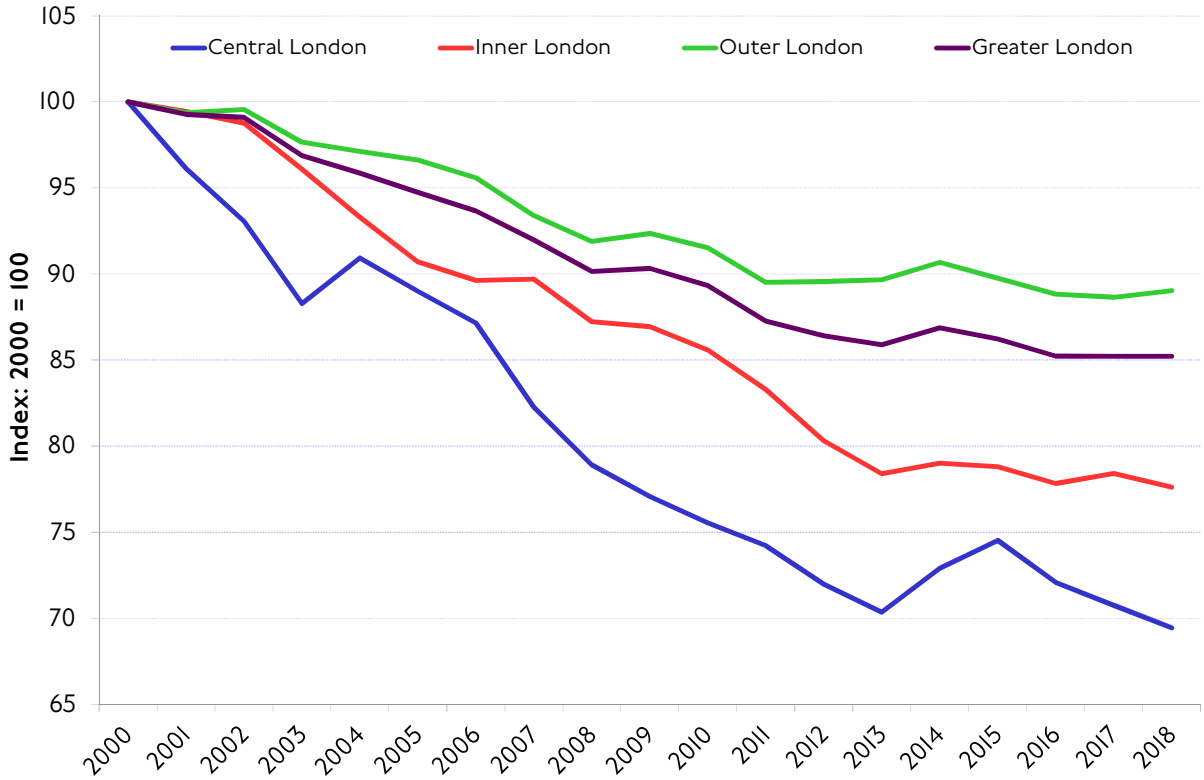
In 2018, cycled kilometres in London saw the highest growth recorded since monitoring began in 2015, increasing by almost 5 per cent from the previous year and exceeding for the first time an average daily volume of 4 million cycle-km. This growth was particularly strong in central London (over 8 per cent) and outer

London (over 6 per cent). Cycling accounted for a trip-based mode share of 2.5 per cent, with 745,000 cycle stages made each day. There have also been positive responses and user feedback to new cycling infrastructure.

Motorised road traffic

Total motorised road traffic London wide remained at the same level in 2018 as in 2017, following minimal growth of 0.1 per cent in 2017. However, this stability was not uniform across London, with traffic in outer London increasing by 0.5 per cent while traffic in inner London declined by 1.1 per cent and there was also a substantial further reduction of 1.6 per cent, according to DfT figures, in traffic in central London. There was no growth in car traffic, with levels the same as in 2016 (figure 5). The number of freight vehicles (HGVs) entering central London in the weekday morning peak fell by 3 per cent with respect to the previous year.

Figure 5 Changes in car traffic levels by London area, 2000-2018.



Source: Department for Transport.

One particular factor affecting traffic levels has been the growth in private hire vehicle (PHV) traffic. Recent data suggests that this could now account for around 15 per cent of car traffic (11 per cent of traffic overall) in Greater London, with a particular focus on central London where these vehicles accounted, in 2018, for over 40 per cent of car traffic at certain times. New material in this report explores the 'market' for PHVs in terms of user behaviour and preferences.

It is too early to give a robust view on the impacts of the removal of the exemption from the Congestion Charge for PHVs on traffic levels and congestion in central London. However, initial indications are that the number of unique PHVs circulating within the Congestion Charge zone has reduced broadly in line with the published expectations, which were a reduction of up to 45 per cent in unique

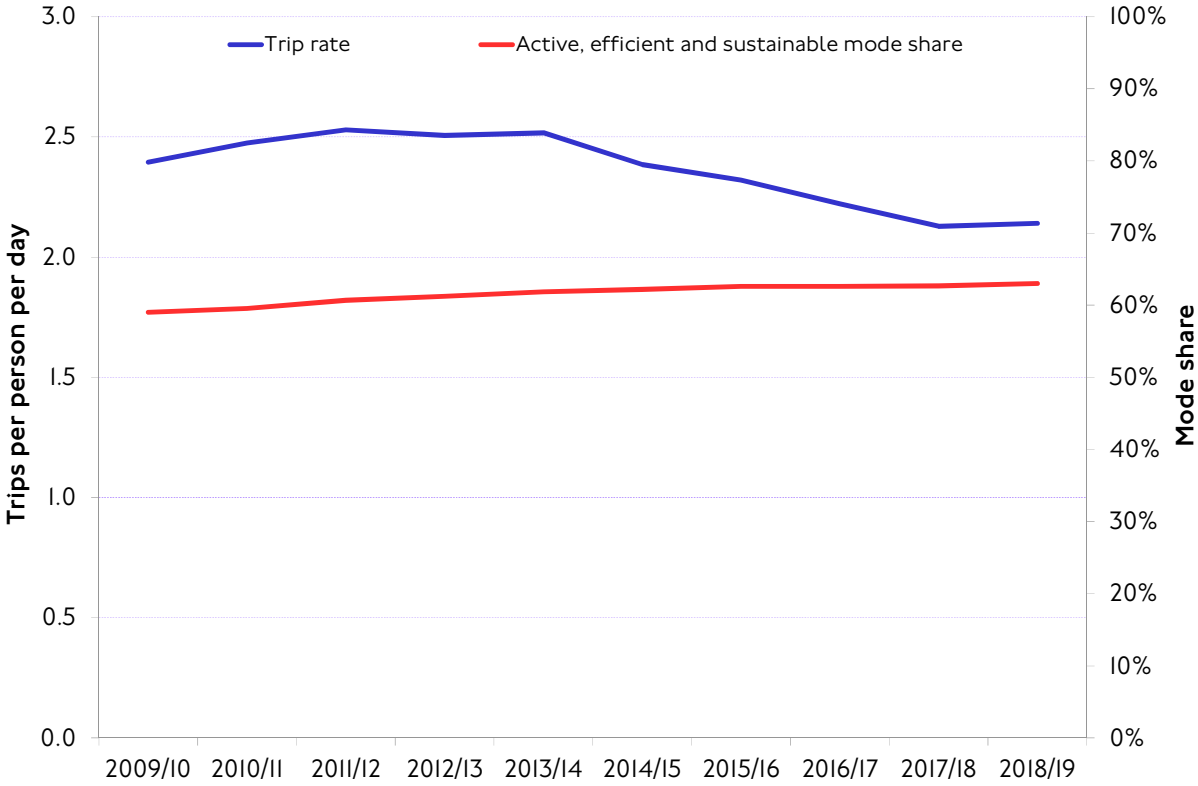
PHVs entering the zone, translating to an average reduction of about 1 per cent in total motorised traffic.

Travel by London residents

Average trip rates by London residents in 2018/19 increased slightly, by 0.6 per cent on the previous year, to stand at an average of 2.14 trips per person per day, following four successive years of decline (figure 6). Falling personal trip rates (the average number of trips made per person per day) have been a key indicator of changing travel patterns over recent years, although it is too early to say whether the recent increase will be sustained.

The active, efficient and sustainable mode share of London residents' (only) travel has also increased from the previous year, to 64.2 per cent. This varies from year to year but in recent years has typically been around 62.5 per cent. The recent increase was driven by a decrease in the car driver and passenger mode share and an increase in walking.

Figure 6 Residents' trip rate and active, efficient and sustainable mode share, 2009/10-2018/19.



Source: Strategic Analysis, TfL City Planning.

It is significant that many of the trends affecting overall travel demand in London have parallels at the national level and appear to be longer established at that scale. Person trip rates at the national scale have declined in recent years, with trip rates in 2018 some 10 per cent lower than the highest recorded, in 1996-98. Road traffic volumes nationally grew by just 0.3 per cent between 2017 and 2018. Bus patronage nationally (outside London) has fallen, although growth on National Rail was 6 per cent in the latest year, following a fall in demand between 2016 and 2017, which partly reflected industrial disputes, timetable changes and large-scale infrastructure works.

Progress towards Mayor's Transport Strategy aims

This backdrop, combined with the short space of time that has elapsed since publication of the transport strategy, are key to the review and evaluation of the data and trends in this report.

Healthy Streets and healthy people

Active travel and physical activity

In 2018/19, the percentage of Londoners who achieved two ten-minute sessions of active travel per day was 31.3 per cent, a slight increase on the previous year. The trend in physical activity has tended to mirror overall travel demand, which also increased slightly in the latest year, although this followed four successive years of decline.

New guidelines on physical activity released in September 2019 by the UK's Chief Medical Officers recommend that adults should be doing at least 150 minutes of physical activity per week (equivalent to our target of 20 minutes per day in periods of ten minutes or more). However, new evidence shows that health benefits are gained from even very short periods of physical activity, and so the guidance no longer states that activity needs to be done in minimum periods of ten minutes. In response, TfL will now measure whether London residents are accumulating a total of 20 minutes of active travel or more per day, in terms of how trips are recorded in our LTDS survey. According to this adjusted measure, 39 per cent of London residents aged 20+ achieved the target in 2018/19, an increase on the value of 37.8 per cent for the previous year using the same methodology. As all walking durations now contribute to achieving the target, multi-stage public transport trips, which frequently include opportunities for walking, will have a major role to play in achieving this aim.

Cycling

In 2018, cycled kilometres increased by almost 5 per cent from the previous year. Cycling journeys, at an average of 745,000 per day in 2018, were 3.3 per cent up on the 2017 value of 721,000.

In central London, the average quarterly growth in cycled kilometres in 2018 with respect to 2017 was 6.2 per cent, also the highest recorded since surveys began in Q4 2013/14, but this should be seen in the context of just 0.1 per cent growth the previous year. The most recent data from January-March and April-June 2019 continue to show signs of sustained long-term growth.

As London's cycle network continues to expand, with 11.5 per cent of Londoners currently living within 400 metres of a high-quality cycle route (up from 9.9 per cent last year), there is emerging evidence that there is stronger growth in cycle volume and improvement in other transport strategy outcomes in areas where investment is made in cycling infrastructure.

On the seven new cycle routes that opened in 2018, there was overall growth in cycling when comparing the first 'after' counts with their respective pre-construction baselines. Although these counts relate to specific routes and locations and are subject to local factors (eg the extent of abstraction from parallel routes), they show that in general, where investment is made, there is at least corresponding local growth in cycling, which also tends to be above the

average level for the area in which they are located (central, inner or outer London).

Other results from these routes show overall user satisfaction with them as well as a positive correlation between the provision of cycling infrastructure and the perception of safety, with emerging evidence suggesting that this correlation may be stronger where the infrastructure is segregated. However, further findings suggest that the demographic profile of people using these new cycle routes is not significantly different to that of the general population of people who cycle in London, and hence further work is necessary to make cycling more representative and accessible to a wider demographic group.

New survey of pedestrian activity in central London

In October 2018, TfL launched a new survey measuring levels of walking, initially in central London. The survey responds to three related requirements to:

- Improve the availability of quantitative data about walking in general, historically poorly served by quantitative surveys.
- Provide, over the longer term, a means of tracking walking trends on a consistent basis for the strategic evaluation of policy outcomes.
- Provide data for diagnostic, appraisal and evaluation stages in relation to schemes intended to improve the pedestrian experience and encourage walking.

Four quarters of data are currently available (up to Q2 2019/20). Initial results show how pedestrian flows vary by street type and across central London. Pedestrian flows are higher on 'high streets' and 'city streets'. Flows tend to be lower on local streets and footpaths. Noticeable also in the trend over the year is the gradual increase of overall flows from the start of the year to the summer period, with flows in Q2 2019/20 (Jul-Sep) 8.9 per cent higher than in Q4 2018/19 (Jan-Mar). However, pedestrian flows were almost as high in Q3 2018/19 (Oct-Dec), presumably reflecting an increase in pedestrian activity for shopping and leisure related to Christmas.

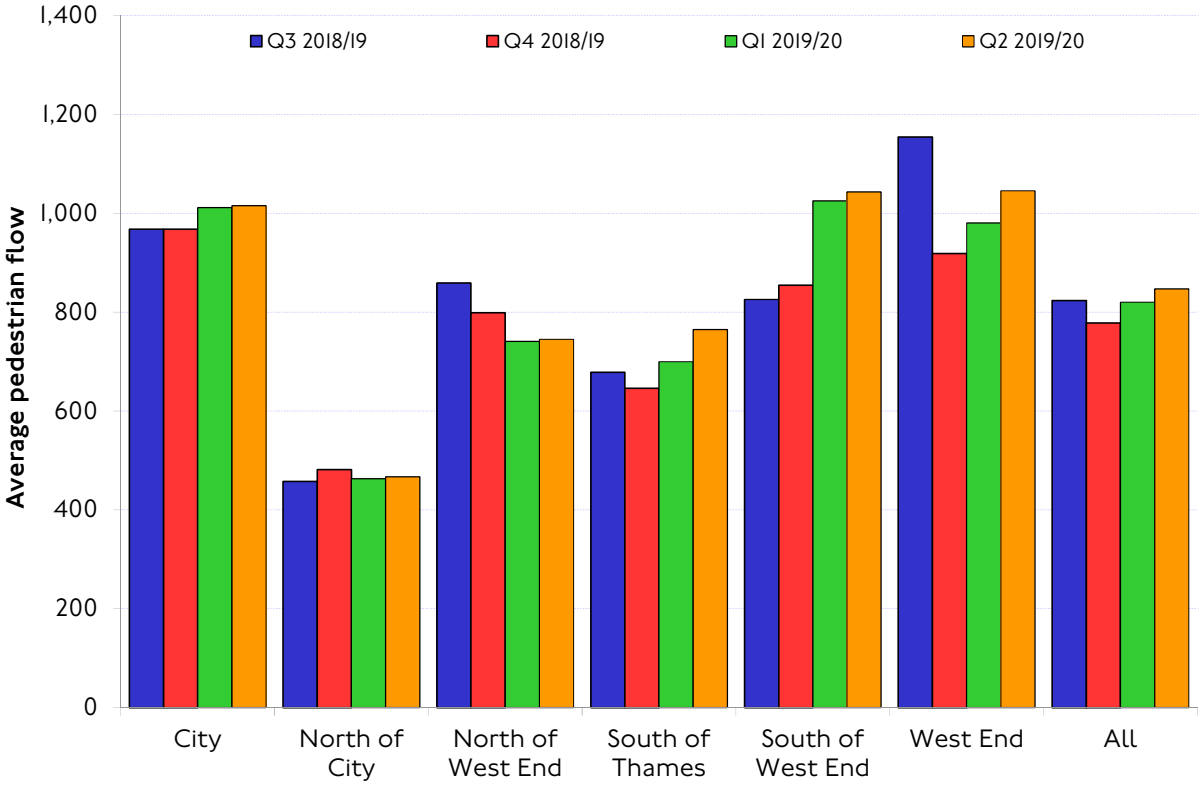
Looking at pedestrian flows by area (figure 7), flows are highest in the West End and the City. Areas of central London that are more residential tend to have lower pedestrian densities, such as south of the Thames and particularly North of the City. Some noticeable trends include high pedestrian flows in the West End in Q3 2018/19, reflecting an increase in shopping and leisure activity in the pre-Christmas period. The biggest seasonal change occurred to the south of the West End, perhaps due to the number of parks in this area, as well as the number of warmer weather events that take place in this part of central London.

New Healthy Streets Mystery Shopper Survey

Last October saw the launch of TfL's new Healthy Streets Mystery Shopper Survey. Now in its second year, the survey is beginning to reveal new insights about our streets. A key output, based on the initial survey sample of locations, is a summary of how London's streets perform against nine of the ten Healthy Streets Indicators. Figure 8 provides the beginnings of a new diagnostic toolkit to guide future policy and investment priorities. The survey also provides a rich new source of detail for the design and appraisal of individual street improvement

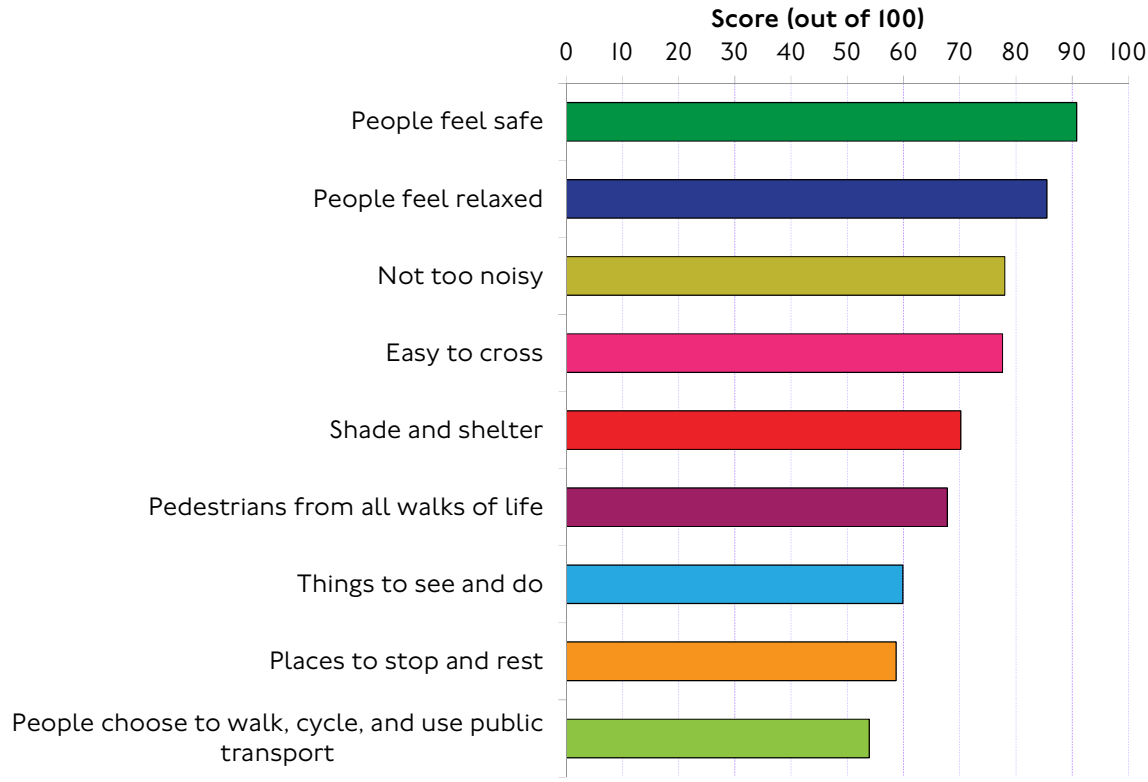
schemes, when used in conjunction with our investment programme, as well as a basis for evaluating outcomes against policy goals.

Figure 7 Pedestrian flows by area, central London, Q3 2018/19-Q2 2019/20.



Source: Strategic Analysis, TfL City Planning.

Figure 8 Cumulative Healthy Streets Indicator scores, Q3 2018/19-Q2 2019/20.



Source: Strategic Analysis, TfL City Planning.

Vision Zero

The Mayor's Transport Strategy sets the aim to eliminate death and serious injury from our transport network by 2041. The Vision Zero action plan sets out a series of targeted interventions which are designed to deliver further reductions in road danger on London's roads and to achieve our Vision Zero road safety targets.

Despite the number of people killed on London's roads falling to the lowest level on record in 2018, this still means that 112 people were killed and 3,953 people were seriously injured. During 2018, people walking, cycling and riding motorcycles made up more than 80 per cent of all people killed on London's roads, with 91 deaths, which is why we will continue to focus efforts on making streets safer for the people most at risk.

The number of people killed while walking fell from 73 to 57, but still made up half of all deaths in road traffic collisions. Despite the number of people killed while motorcycling falling from 31 to 22, they made up 20 per cent of all deaths although accounting for less than one per cent of journeys.

The number of people seriously injured in road traffic collisions increased in 2018 when compared to 2017, from 3,750 to 3,953. There were increases in injuries to car occupants and people cycling. In contrast the number of people seriously injured while walking and motorcycling fell.

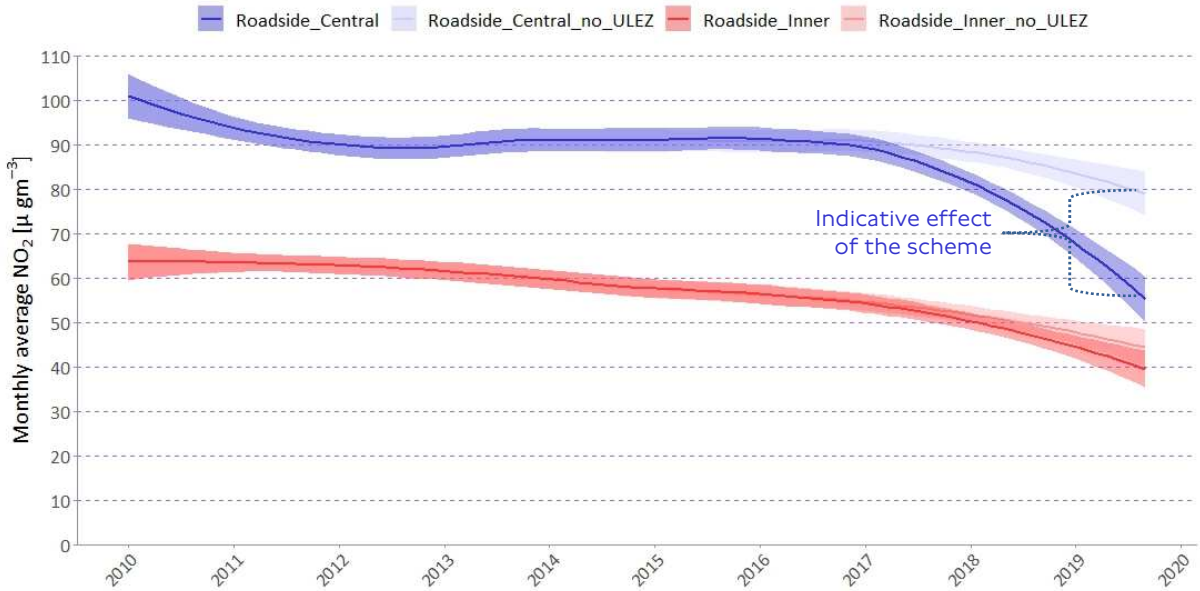
Air quality

On 8 April 2019 the Mayor of London launched the world's first Ultra Low Emission Zone (ULEZ). Six months on, our data indicates that the scheme is having a substantial positive effect. The key highlights are as follows:

- The average vehicle compliance rate with the ULEZ emissions standards was 77 per cent in a 24-hour period (74 per cent in Congestion Charging hours). This is significantly higher than 39 per cent in February 2017 and 61 per cent in March 2019 (during Congestion Charging hours).
- Trend analysis shows that NO_2 (nitrogen dioxide) concentrations at roadside locations in central London are on average 24 micrograms per cubic metre ($\mu g.m^{-3}$) lower (figure 9), equating to a reduction of 29 per cent compared to equivalent conditions where there was no ULEZ.
- Preliminary estimates indicate that NO_x emissions from road transport in the central zone have reduced by 31 per cent (200 tonnes), compared to a scenario where there was no ULEZ.
- This is ahead of schedule to meet the 45 per cent NO_x (nitrogen oxides) emission reduction expected from the scheme in the first year. When compared to 2016 this equates to a 54 per cent reduction, assuming the current compliance rate continues for the remainder of the first year of operation.
- Preliminary estimates indicate that CO_2 (carbon dioxide) emissions from road transport in the central zone have reduced by 4 per cent (9,800 tonnes) compared to a scenario where there was no ULEZ. When compared to 2016 this equates to a 13 per cent reduction, assuming the current compliance rate continues for the remainder of the first year of operation.
- All of the air quality monitoring stations located on ULEZ boundary roads have measured a decrease in NO_2 concentrations since the introduction of the ULEZ.
- Preliminary analysis of traffic flows indicates that the introduction of the ULEZ has contributed to an overall observed reduction in traffic flows in central

London in August and September 2019 of between 2 and 9 per cent when compared to 2018, although further analysis is needed to better understand changes in traffic flows as a result of the ULEZ.

Figure 9 NO_2 concentrations for central and inner London, 2010-2020.



Source: Strategic Analysis, TfL City Planning.

Natural variability in air quality trends, reflecting factors such as the weather, and other things happening at the same time, such as the removal of the Congestion Charge exemption for PHVs, will affect the detailed interpretation of these results and further analysis is required. Nevertheless it is clear that there has been a substantial and positive 'step change' in air quality in central London in the period since the ULEZ was introduced.

Climate change

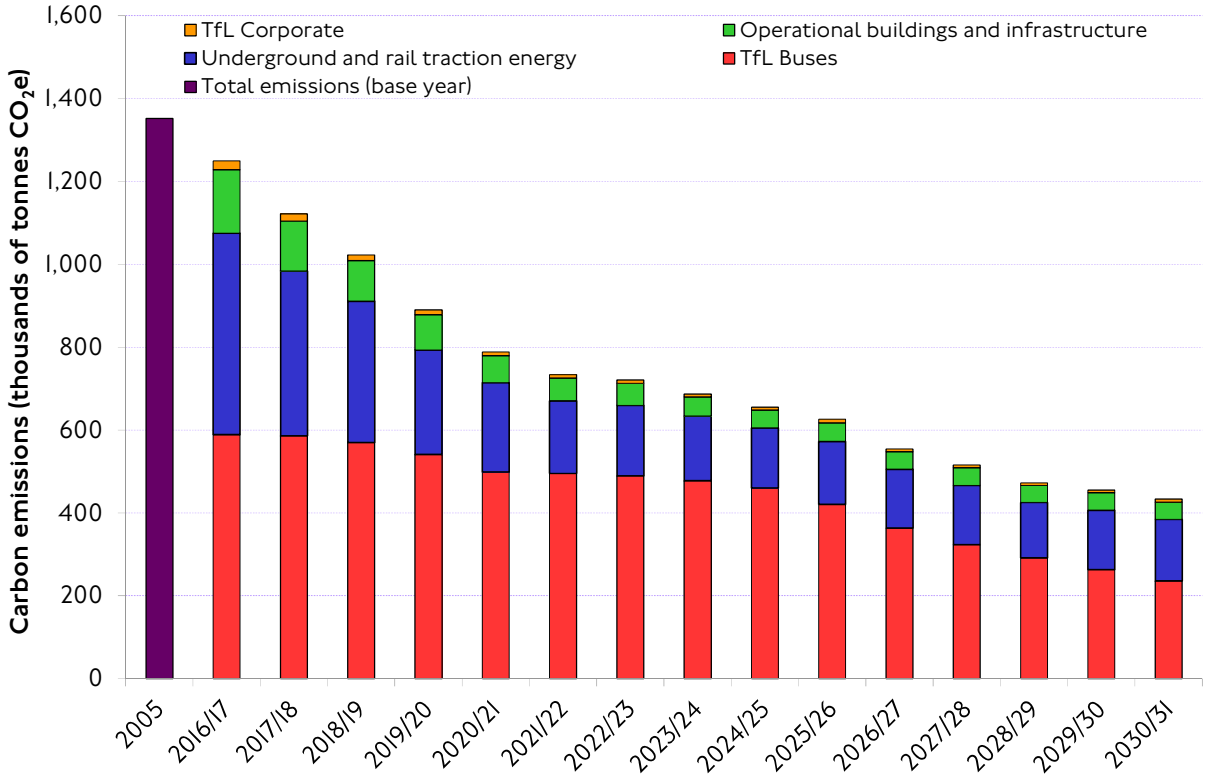
Climate change and the impacts of it present significant challenges. The average temperature between 2009 and 2018 has been on average 0.3 °C warmer than the 1981-2010 average and 0.9 °C warmer than the 1961-1990 average. All of the top ten warmest years in the UK have occurred since 2002. Furthermore, our winters are becoming wetter, with more extreme weather events. Projections indicate, under a business as usual scenario, that summer temperatures could rise by between 3.7 °C and 6.8 °C by the 2070s, and that the sea level rise around the UK's coasts could be up to one metre.

In December 2018, the Mayor produced his 'Climate Action Plan – Zero carbon London: A 1.5°C compatible plan'. It will see London reduce its CO2 equivalent emissions by 60 per cent on 1990 levels by 2030 and by nearly 80 per cent by 2040.

In the London Energy Strategy, the Mayor sets the overall goal for London to reach zero carbon by 2050, and a trajectory for London's emissions to reach this target through a series of five-year carbon budgets. Figure 10 illustrates the forecast TfL-specific contribution to this aim through to 2030/31. Greenhouse gas emissions from TfL's operations have decreased since 2005, as reductions in the carbon intensity of the grid-supplied electricity has offset the expansion of TfL's

rail services. Emissions are forecast to reduce further in the next ten years, driven primarily by the conversion of TfL buses to zero emission.

Figure 10 Trajectory for reductions in attributable CO_2 emissions for transport in London, 2005-2030/31.



Source: Strategic Analysis, TfL City Planning.

A good public transport experience

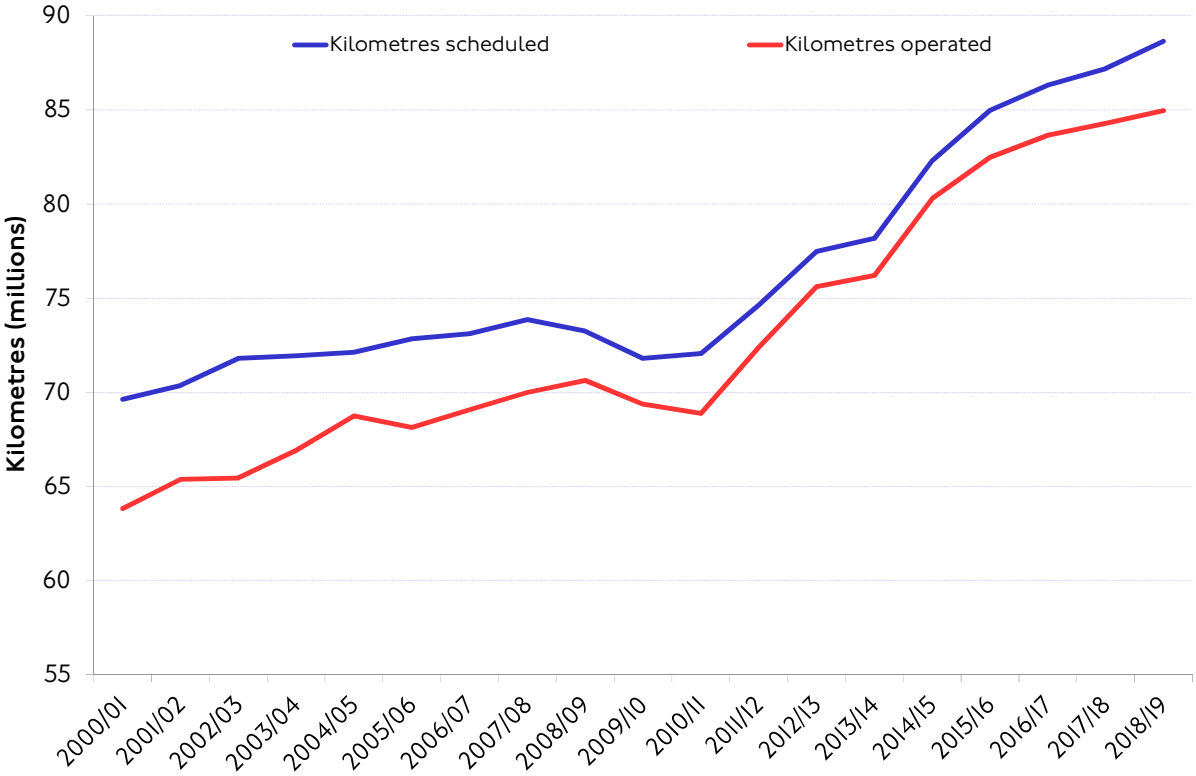
In 2018/19, London's public transport networks operated services equivalent to 114 billion place-kilometres in total, down by 0.3 per cent from 2017/18, but offering an overall capacity 31.3 per cent higher than in 2009/10.

Public transport service supply, operational performance and reliability

In 2018, most indicators of bus performance and reliability showed improvements with respect to the previous year (eg the proportion of scheduled kilometres lost to traffic congestion decreased, from 1.4 per cent in 2017/18 to 1.3 per cent in 2018/19). While scheduled bus kilometres fell for the second year in a row, the proportion of these operated increased very slightly, to 98.1 per cent, making it the highest proportion on record.

On the Underground, scheduled train kilometres in 2018/19 increased by 1.7 per cent from the previous year, reaching the highest level on record. Of those, 95.8 per cent were operated, a slight decrease in performance with respect to the previous year (figure 11).

Figure 11 London Underground train kilometres scheduled and operated, 2000/01-2018/19.



Source: Strategic Analysis, TfL City Planning.

On National Rail services in London, both London Overground and TfL Rail operated highest-ever levels of service in 2018/19, with a large increase in TfL Rail operated kilometres mostly due to the expansion of the network to include services to Heathrow Airport. Operational quality, in terms of the Public Performance Measure, declined by 0.5 percentage points, from 94.4 per cent in 2017/18 to 93.8 per cent in 2018/19 on London Overground but increased by 4 percentage points on TfL Rail. On the wider National Rail network in London there is a mixed picture that varies by operator, some of which show increases and others declines in the Public Performance Measure.

Safety, Care and customer satisfaction

There were 3,968 customer injuries reported during 2018/19 on the London Underground, an increase of 226 (6 per cent) from last year. This was equivalent to 2.87 injuries per million journeys in 2018/19 compared to 2.76 the previous year, an increase of 4 per cent.

On the bus network, 4,889 customers were injured in 2018/19 compared to 5,348 in 2017/18, a reduction of 459 (8.6 per cent). This equates to 2.2 injuries per million passenger journeys, compared with 2.38 in the previous year.

'TfL cares about its customers' is the measure we use to understand whether we are meeting expectations and making Every Journey Matter for our customers. Care measures Londoners' overall perceptions of TfL, and is the best reflection of how we meet expectations during every interaction with us (eg all journeys, interactions with the Contact Centre and communications such as e-mail updates),

not just the last journey. Recent measurements show a slowly increasing trend with, typically, around 50 per cent of people agreeing with the statement.

Physical accessibility to the transport networks

Some Londoners require more time to complete journeys by public transport if they are able to use the step-free network only. In some cases, their journeys may not be possible.

In 2018/19, across all possible public transport journey permutations, trips using only the step-free network (all buses and step-free stations) took, on average, 9 minutes longer than journeys that could be made using the full network – a time differential of 12 per cent and an incremental improvement on the 2017/18 values of 10 minutes and 13 per cent respectively.

TfL collects a broad range of feedback to understand the travel experience of disabled Londoners. 'TfL is making it easier for disabled Londoners to get around' is a measure that reflects awareness and effectiveness of our accessibility programmes. For all people, the level of agreement with this statement has typically been between 50 and 60 per cent, albeit with no evidence of a sustained long-term change. For disabled people the level of agreement has historically been marginally lower.

New homes and jobs

The transport strategy aims to provide for a future where, in 2041, London is expected to have 10.8 million residents, around 30 per cent higher than in 2011, and one million more jobs.

The Greater London Authority sets housing delivery targets for London and the boroughs. Across London there were more than 32,000 housing completions in 2017/18. This is below the adopted London Plan target of 42,000, and is a reduction in housing delivery from the previous year, which saw the highest number of completions recorded.

As one of the Capital's largest landowners, TfL can play a pivotal role in addressing London's housing shortage. Since 2016, our development programme has been gathering pace and we will deliver more than 50 per cent affordable housing across the sites already brought to market. Our long-term development pipeline will start to deliver 10,000 homes and two million square feet of offices, shops and workspace. In 2019, TfL also announced a partnership to progress our Build to Rent programme which will provide more than 3,000 quality rental homes, 40 per cent of which will be affordable.

The location and quality of transport infrastructure has been fundamental to the development of the city. Transport can help shape the location and enable more housing density by improving connectivity and access to jobs and services. For example, the London Docklands has developed into an area of high-density, high-value employment, concentrated in the Isle of Dogs, 3 kilometres east of the City of London. This has been supported by the development of the DLR from 1987 and Jubilee line extension in 1999. In total, rail investment is expected to have unlocked 200,000 jobs around Canary Wharf. New analysis has also found higher rates of delivery of new homes within 800 metres of rail stations in east London.

Given the high level of housing growth required in London, public transport investment is needed to support sustainable, high density population growth in

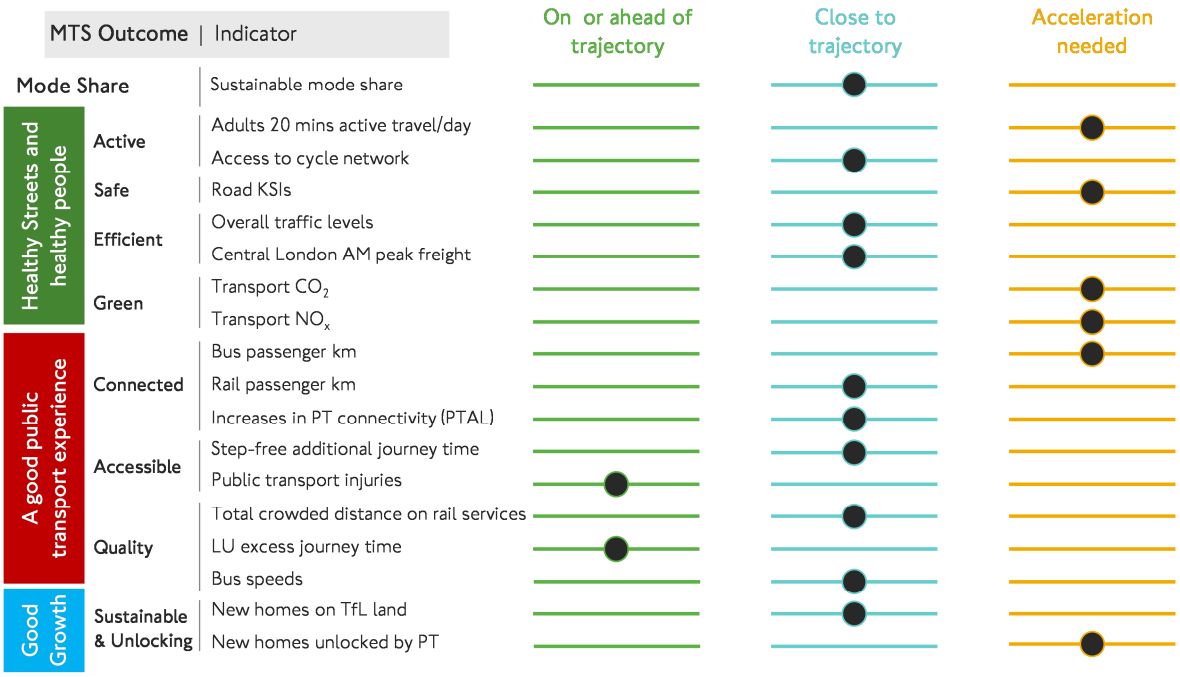
areas that are currently not as well connected. Recognising this, recent bids to government have been successful in securing funding to enable housing development in areas where the current rail infrastructure would be unable to meet increased demand at stations and on trains. This includes the Housing Infrastructure Fund (HIF) for DLR improvements including new trains, depot expansion and a new station to unlock 18,000 new homes. A further HIF for the East London line will see investment to increase train frequency, provide a new rail station, and upgrade a rail and bus station to support 14,000 new homes.

The Mayor's policies aim to focus housing in areas that are well connected by public transport. People living or working in denser areas close to public transport infrastructure make more sustainable travel choices. Higher density housing is being delivered in the more well-connected areas of London. Many developments in well-connected areas are required to be car-free or car-lite, in support of the Mayor's aims of Healthy Streets and increased active, efficient and sustainable mode share. There is more to be done to reduce car dependence in areas that have fewer public transport options.

Summary

The transport strategy identifies clear and challenging aims to improve transport to enhance overall quality of life. It is therefore to be expected that the starting points may not be ideal and that progress will be difficult, and finding the most effective way of working towards the aims is the essential task set for TfL by the Mayor. Figure 12 is a visualisation of the current state of play in relation to the key outcomes sought by the strategy based on the data and trends described in this report. The categorisation is indicative rather than definitive, and should therefore be interpreted as a periodic 'health check' on the progress of our journey from a retrospective viewpoint. Our future business planning is being adjusted to take account of those aspects where particular attention is called for.

Figure 12 Summary of progress towards Mayor's Transport Strategy aims.



Source: Strategic Analysis, TfL City Planning.

Looking forward

New forecasts of future travel demand

TfL has produced new forecasts for travel demand in London, which can be used to inform investment. Our reference case sets out expected conditions for travel in London through to 2041. It assumes a central view of London's economy, funded transport schemes and consideration of the most likely set of other conditions affecting travel demand. It matches the 2018 TfL Business Plan assumptions.

Despite the decline in car travel, the growth that London is expecting will mean the number of cars on the road will increase without intervention. There is strong expected growth in cycling and walking, and rail trips are forecast to increase significantly with the completion of the Thameslink upgrade and the opening of the Elizabeth line. Underground travel is forecast to increase, but not to the same extent, as the planned upgrade to capacity is less than has been delivered historically.

The forecast changes in demand by mode mean that mode shares in London are expected to be different in 2041 than in 2016. With current funded plans, the active, efficient and sustainable mode share is expected to increase from 63 per cent in 2016 to 64 per cent by the end of the Business Plan; to 67 per cent in 2031, and to 68 per cent by 2041. While this is positive, more needs to be done to reach the Mayor's aim of having 80 per cent of travel by active, efficient and sustainable modes by 2041.

We are forecasting a short-term decrease in public transport crowding in the period 2016 to 2021, as committed schemes such as the Elizabeth line come on stream, followed by longer-term increases in crowding as demand continues to grow. A limited pipeline of further committed enhancements will mean that by 2031, without further funding, crowding pressure is forecast to be greater than 2016, with widespread severe crowding by 2041 and beyond.

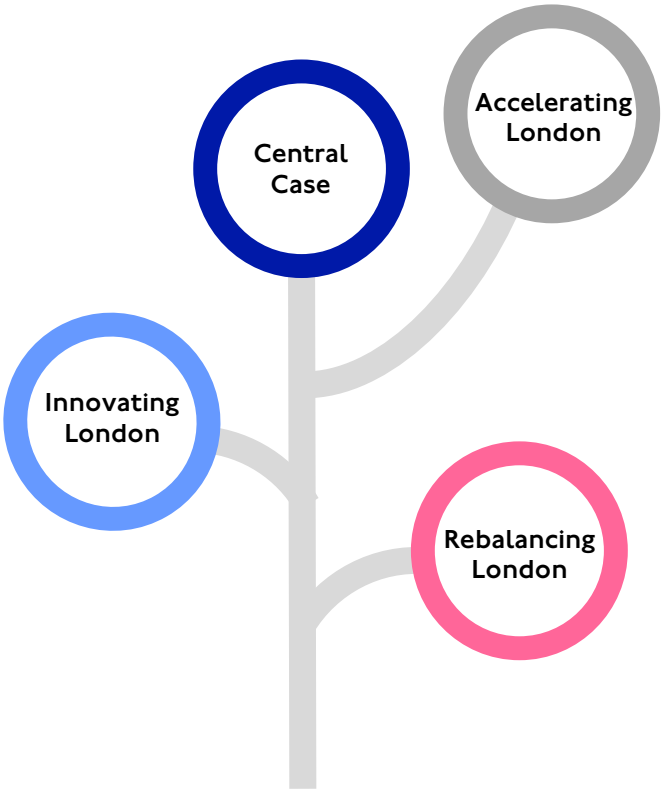
Scenario planning: a way of future-proofing our forecasts and plans

The future, however, is uncertain. One innovation developed by TfL over the past year is our use of scenario planning techniques. Scenarios are illustrative stories about the wider context in which TfL could operate in future, to be used to improve our business planning. They are not formal or definitive forecasts of how future conditions may develop.

Our 'central case' forecast, used for our business planning and outlined above, sets out how we expect London's population, economy and travel patterns to develop. London's population is projected to continue to grow to nearly 11 million people by 2040, with record numbers of homes built in the city. London is also expected to remain at the heart of the UK economy, with more jobs in highly skilled sectors. This central case does not see technology making major changes to where and how people work and travel, with increases in density continuing to drive sustainable travel and demand for public transport. These factors mean that we are forecasting increased crowding and congestion.

To allow us to explore the potential 'envelope of uncertainty' around our core forecasts, three alternative, hypothetical scenarios have been developed (figure 13).

Figure 13 Illustrative scenarios demonstrating divergent possible futures.



Source: Strategic Analysis, TfL City Planning.

- Innovating London is the story of London re-inventing itself as a young, urban innovator, where technology changes how people live and work, but leaves some behind.
- Rebalancing London is the story of a more equal but ageing society with lower economic growth, that focuses on self-sufficiency and liveability as world power moves east.
- Accelerating London is the story of an ever-growing, expanding London which acts as the beating heart of the world financial system, but struggles to deliver a high quality of life for all.

The scenarios do not seek to predict or quantify the wider global, economic, societal and technological trends underlying them, but to pose constructive challenges to future strategic and business decision making. In simple terms, if our proposals can be shown to be robust against most possible futures, we can have greater confidence in them. If this is not the case, then we have the opportunity to make adjustments at this point to improve their future robustness. Whatever future unfolds, it is certain that London will continue to need transport investment to meet the Mayor's aims for the city.

1. Introduction

1.1 TfL's Travel in London reports

Travel in London is TfL's annual publication that examines and summarises trends and developments relating to travel and transport in London. It provides an authoritative source of transport statistics as well as topical evidence-based analysis, and tracks trends and progress in relation to the transport and other related strategies of the Mayor. It also provides an interpretative commentary that looks across the immediate impacts of TfL and its delivery partners, as well as external influences and trends, in shaping the contribution of transport to the daily lives of Londoners and the economic and social vitality of the Capital. As such, it serves as a general resource for those planning and operating transport in London, as well as a more specific 'evidence base' in relation to policy themes and challenges.

1.2 Travel in London report 12

This twelfth edition of Travel in London provides a comprehensive and updated overview of key travel and related trends and their causes, to inform the on-going development, implementation and monitoring of the transport and other strategies of the Mayor of London.

Sadiq Khan published his transport strategy in March 2018 (see: www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf). This drew on a wide range of evidential material, summarised in accompanying documents and in previous Travel in London reports. It has a central aim of an 80 per cent mode share for active, efficient and sustainable modes by 2041, and three themes:

- Healthy Streets and healthy people
- A good public transport experience
- New homes and jobs

The content of this report is therefore broadly organised around this overall aim and three themes. Travel in London reports will be the primary means of tracking progress towards the strategy aims through their role of bringing together available evidence from across the various monitoring and analysis programmes that are in place.

Travel in London Report 10, published in December 2017, set out a 'baseline' set of conditions relevant to the future monitoring of the transport strategy, largely based on data from 2016 and before, and described several new monitoring initiatives under development to help TfL better assess conditions in relation to Mayoral transport priorities. Travel in London report 11 updated this evidence base, broadly reflecting conditions that applied at the time the final strategy was published, or shortly thereafter during 2018. This report updates the picture for the latest year, including commentary on progress against key strategy aims, external factors that have affected them, and data from new surveys that will further inform how the strategy is taken forward.

1.3 About Transport for London (TfL)

Part of the Greater London Authority family led by Mayor of London Sadiq Khan, we are the integrated transport authority responsible for delivering the Mayor's aims for transport. We have a key role in shaping what life is like in London, helping to realise the Mayor's vision for a 'City for All Londoners'. We are committed to creating a fairer, greener, healthier and more prosperous city. The Mayor's Transport Strategy sets an aim for 80 per cent of all trips to be made on foot, by cycle or using public transport by 2041. To make this a reality, we prioritise health, safety and the quality of people's experience in everything we do.

We manage the city's red route strategic roads and, through collaboration with the London boroughs, can help shape the character of all London's streets. These are the places where Londoners travel, work, shop and socialise. Making them places for people to walk, cycle and spend time will reduce car dependency and improve air quality, revitalise town centres, boost business and connect communities.

We run most of London's public transport services, including the London Underground, London Buses, the Docklands Light Railway, London Overground, TfL Rail, London Trams, London River Services, London Dial-a-Ride, Victoria Coach Station, Santander Cycles and the Emirates Air Line. The quality and accessibility of these services is fundamental to Londoners' quality of life. By improving and expanding public transport, we can make people's lives easier and increase the appeal of sustainable travel over private car use.

We are moving ahead with many of London's most significant infrastructure projects, using transport to unlock growth. We are working with partners on major projects like Crossrail 2 and the Bakerloo line extension to deliver the new homes and jobs London and the UK need. We are in the final phases of completing the Elizabeth line which, when it opens, will add 10 per cent to London's rail capacity.

Supporting the delivery of high-density, mixed-use developments that are planned around active and sustainable travel will ensure that London's growth is good growth. We also use our own land to provide thousands of new affordable homes and our own supply chain creates tens of thousands of jobs and apprenticeships across the country.

We are committed to being an employer that is fully representative of the community we serve, where everyone can realise their potential. Our aim is to be a fully inclusive employer, valuing and celebrating the diversity of our workforce to improve services for all Londoners.

We are constantly working to improve the city for everyone. This means freezing TfL fares so everyone can afford to use public transport, using data and technology to make services intuitive and easy to use, and doing all we can to make streets and transport services accessible to all. We reinvest every penny of our income to continually improve transport networks for the people who use them every day. None of this would be possible without the support of boroughs, communities and other partners who we work with to improve our services. We all need to pull together to deliver the Mayor's Transport Strategy; by doing so we can create a better city as London grows.

1.4 Further information

For queries on the contents of this report, please contact TILEnquiries@tfl.gov.uk.

Section 1: Overall travel demand and mode shares

2. Overall trends in travel demand and mode shares

2.1 Introduction

This section looks at overall travel demand trends in London, in terms of the overall number of trips made and the mode shares for the different forms of transport.

- **Chapter 2** focuses on 'top level' annual measures of travel and mode share, in Greater London by all people including residents and visitors, considered in their recent historic context and in terms of the aims set out in the Mayor's Transport Strategy.
- **Chapter 3** reviews recent trends in the two principal drivers underlying travel demand in London – London's population and economy.
- **Chapter 4** reviews recent data from TfL's London Travel Demand Survey (LTDS), which provides a detailed data source on the travel behaviour of London residents, this year focusing on trends in trip rates, the factors affecting car ownership and parking, and travel patterns at night.

The evidence from chapters 2, 3 and 4 is that there has been a recent slowing of the hitherto well-established trend of growing overall travel demand in London, primarily reflecting slowing population growth and economic factors. Furthermore, while positive progress towards the Mayor's aim of an 80 per cent share for active, efficient and sustainable modes by 2041 continues to be made, the rate of change over more recent years has been slower than typical of the preceding ten years. These trends are of obvious importance for understanding progress towards the transport strategy aims and for the formulation of future transport policy more generally.

2.2 Historic and changing trends in total travel in London

The amount of travel in London has grown substantially over the last two decades or so, over the earlier part of the current decade at a notably faster rate than previously expected, albeit historically matched by a consistent shift in mode share away from the private car towards walking, cycling and public transport.

In the period 2000 to 2016, total travel demand in London grew by 18.6 per cent, largely reflecting population growth, and at the same time there was a 10.6 percentage point shift in mode share towards active, efficient and sustainable modes, broadly reflecting investment in these modes. These long established demand trends formed part of the evidence base for the Mayor's Transport Strategy.

At the same time London's population was forecast to continue to grow strongly into the future, and policies contained in the transport strategy have the broad aim of effectively accommodating and providing for London's further expected growth in an efficient and sustainable way and continuing and accelerating the positive mode share trends.

Over the last three years however, confirmed by most recent data for 2018, the rate of growth in both population and travel in London has slowed. Because of the way that this has played out between the different modes, progress towards

active, efficient and sustainable modes has also slowed from historic levels, increasing the effort required to meet the Mayor's aim of an 80 per cent share for active, efficient and sustainable modes by 2041.

On the latest available evidence however London is still growing, and longer-term projections forecast relatively strong population and economic growth over the medium to long term.

2.3 Total travel in London

In 2018:

- Some 26.9 million trips were made on an annual average day (7-day week) in London in 2018, a 0.1 per cent increase on 2017, but this occurred in the context of a 0.1 per cent fall in 2016. The total number of trips across all modes in London has therefore been effectively static for the past three years, despite ongoing population growth, indicating a corresponding per capita decline in average trip rates.
- The average number of trips in 2018 was, however, 18.5 per cent higher than in 2000, an average growth rate of 0.9 per cent per year. Over this period, London's population grew by 23.1 per cent, an average growth of 1.2 per cent per year.
- Furthermore, the recent trends in overall travel demand are affecting the different travel modes, different types of trips and different time periods in different ways. Evidence is pointing to greater changes in leisure and other 'discretionary' trips, with a continued robustness in commuting demand – alongside current and expected future capacity constraints affecting the Underground in particular – which will act as an impediment to London's growth and quality of life.
- As in more recent years, and alongside subdued growth in overall demand, there was relatively little change in mode share, with public transport mode share in 2018 remaining at 36 per cent, the same as in 2013.
- On an average day (7-day week) in 2018, the share for active, efficient and sustainable modes (walking, cycling and public transport) was 63.0 per cent, an increase of 0.3 percentage points on 2017. The Mayor's aim of 80 per cent of trips in London being made by active, efficient and sustainable modes in 2041 requires, on average, a yearly 0.7 percentage point shift towards public transport, walking and cycling. It is recognised that this is an idealised trajectory and that progress may vary from year to year.

2.4 Trips in London

Essential background and terminology

This section updates consolidated estimates of total travel in London on an average day. A **trip** is defined as a one-way movement from an origin to a destination to achieve a specific purpose, for example, to go from home to work. Each trip may involve travel by one or more individual modes of transport. These component parts of trips are referred to as **journey stages**. Key concepts relating to trips, journey stages and main mode of travel were explained in detail in Travel in London report 5, including the assignment of a main mode to each trip based on the journey stage by which the longest distance is travelled (as part of a whole individual trip).

The Mayor's Transport Strategy vision of an increase in active, efficient and sustainable mode share to 80 per cent by 2041 is based on **trips**, which are explored in detail in this section, with trip-based mode shares discussed in sections 2.6 and 2.7.

Total number of trips

Over the period since 2000, total trips in London have increased by 18.5 per cent overall, with particularly notable increases of 78.0 per cent in rail trips and 54.1 per cent in bus trips, with cycle trips (as main mode) increasing by 144.4 per cent.

The number of trips made in London in 2018 averaged 26.9 million per day, an increase of 0.1 per cent over the previous year (table 2.1). This reflects the slowing down of travel demand growth in London in recent years, with an increase in trips of just 0.8 per cent since 2014 compared with an estimated population increase of 4.3 per cent over the same period.

This comparison illustrates an important trend – observed across several different indicators and indeed in other cities elsewhere – of a slowing in the rate of demand for travel (in terms of the 'trip rate' for both residents and visitors); an important factor bearing on recent demand trends for many individual modes.

Table 2.1 Estimated daily average number of trips (millions) in Greater London by main mode of travel, seven-day week, 2000-2018.

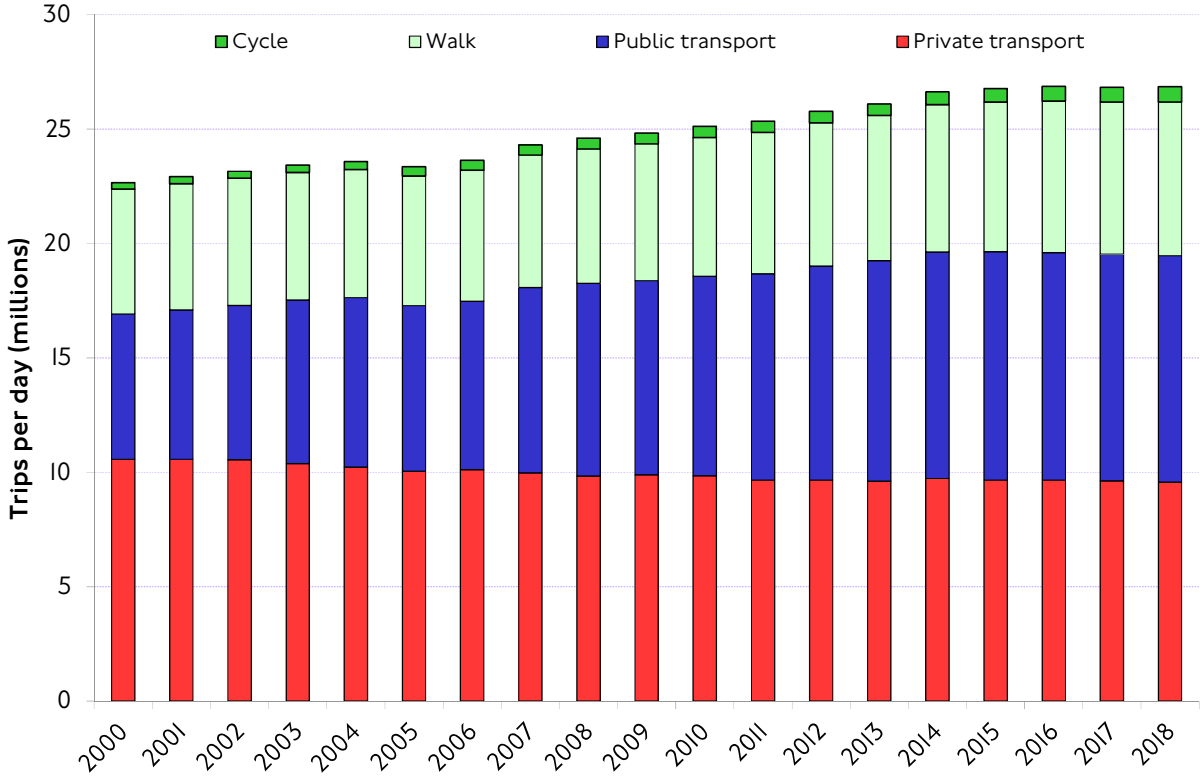
Year	Rail[1]	Under-ground /DLR	Bus (incl. tram)	Taxi/ PHV[2]	Car driver	Car passen-ger	Motor cycle	Cycle	Walk	All
(2000)	(1.7)	(2.0)	(2.4)	(0.3)	(6.8)	(3.6)	(0.2)	(0.3)	(5.5)	(22.7)
2009	2.1	2.2	3.9	0.3	6.2	3.5	0.2	0.5	6.0	24.8
2010	2.3	2.1	4.0	0.3	6.1	3.6	0.2	0.5	6.1	25.1
2011	2.4	2.2	4.1	0.3	5.9	3.6	0.2	0.5	6.2	25.3
2012	2.6	2.4	4.1	0.3	5.9	3.6	0.2	0.5	6.3	25.8
2013	2.7	2.5	4.1	0.3	5.8	3.6	0.2	0.5	6.3	26.1
2014	2.8	2.6	4.1	0.3	5.9	3.7	0.2	0.6	6.4	26.6
2015	3.0	2.8	3.8	0.3	5.9	3.6	0.2	0.6	6.5	26.8
2016	3.0	2.8	3.7	0.4	5.8	3.6	0.2	0.6	6.6	26.9
2017	2.9	2.8	3.8	0.4	5.8	3.7	0.2	0.6	6.6	26.8
2018	3.0	2.8	3.7	0.4	5.8	3.6	0.2	0.7	6.7	26.9
Percentage change										
2000 to 2018	*78.0*	*43.9*	*54.1*	*23.6*	*-15.4*	*1.2*	*0.1*	*144.4*	*23.1*	*18.5*
2009 to 2018	*41.0*	*30.7*	*-5.1*	*29.7*	*-6.7*	*2.7*	*-4.3*	*43.8*	*12.2*	*8.1*
2017 to 2018	*1.2*	*0.5*	*-1.0*	*-6.8*	*-0.3*	*-1.0*	*-0.9*	*4.0*	*0.9*	*0.1*

Source: Strategic Analysis, TfL City Planning.
Notes: Trips are complete one-way movements from one place to another. Trips may include use of several modes of transport and hence be made up of more than one journey stage. They are classified by the mode that is typically used for the longest distance within the trip. Round trips are counted as two trips, an outward and an inward leg.
1: Includes London Overground.
2: Private hire vehicle.

Included in these totals are all trips with an origin, a destination, or both, in Greater London by London residents and by non-residents, including commuters and day visitors from outside London as well as overnight visitors and tourists.

The London resident population in 2018 was 8.9 million, estimated to be 0.9 per cent higher than in 2017 and 23.1 per cent higher than in 2000. The larger 'daytime population' of Greater London, including non-resident visitors, was estimated at 10.1 million in 2018, 0.7 per cent higher than the previous year.

Figure 2.1 Estimated daily average number of trips, by main mode, seven-day week, 2000-2018.



Source: Strategic Analysis, TfL City Planning.

Over the most recent year there was an increase in National Rail trips of 1.2 per cent, with Underground trips increasing by 0.5 per cent. There was a decline of 1.0 per cent in bus trips, which are down by 10.2 per cent from the high in 2014. Car driver trips decreased by 0.3 per cent.

2.5 Journey stages in London

Total number of journey stages

Table 2.2 shows the trend for total travel volumes and mode shares at the journey stage level. Notable from the table is the 18-year trend, showing a 24.1 per cent increase in total journey stages from 2000, with National Rail stages up by 85.7 per cent over the same period. Also notable is the 66.7 per cent increase in bus stages since 2000, despite a fall in bus patronage in more recent years.

Daily journey stages in London in 2018 were 31.4 million, slightly down from 31.5 million in 2017 and 0.7 per cent lower than the recent high reached in 2015.

Annual average journey stages increased on rail-based modes, with increases in 2018 of 0.9 per cent on London Underground and 2.3 per cent on National Rail compared with the previous year. Bus journey stages decreased by 1.7 per cent, and are now 8.0 per cent below the 2014 high.

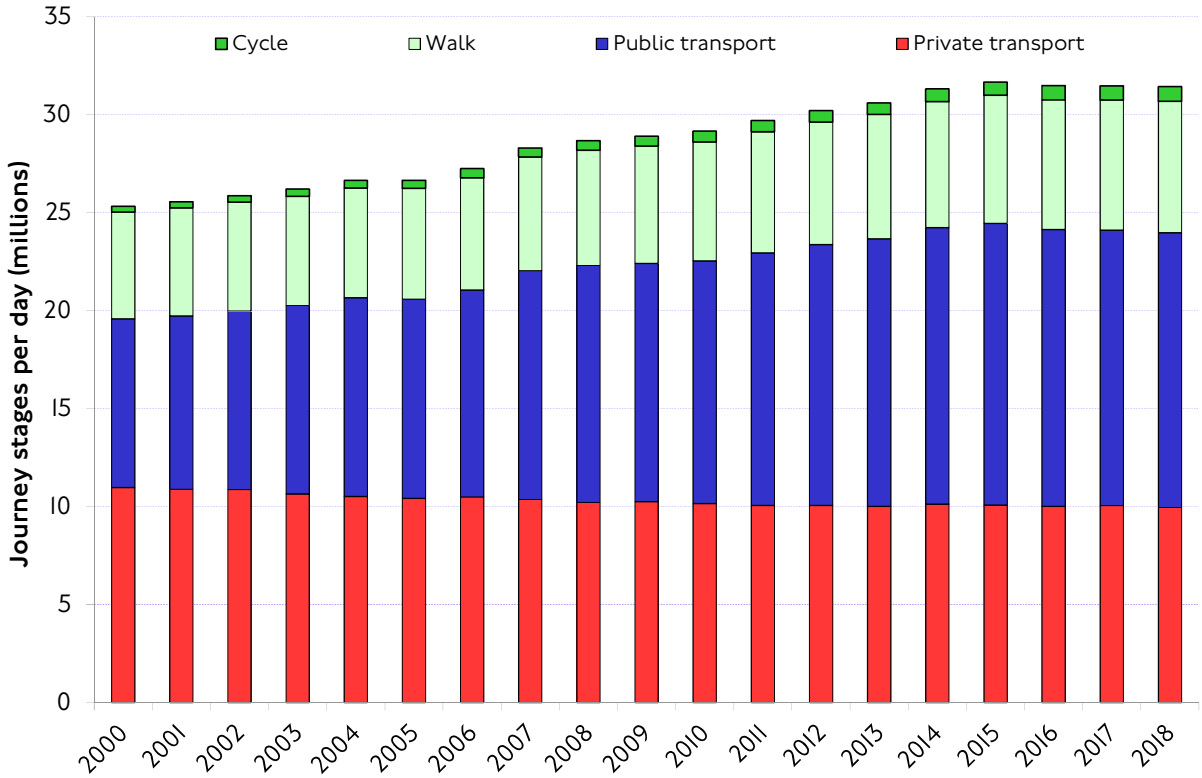
Car driver stages showed no change in 2018 for the third year in a row, although car driver trips decreased slightly. Walk stages increased in 2018 by 0.9 per cent, while cycle stages increased by 3.3 per cent, in line with the growth observed in terms of cycling volume (cycle-kilometres) described in more detail in Chapter 6 of this report.

Table 2.2 Estimated daily average number of journey stages (millions) in Greater London by mode, seven-day week, 2000-2018.

Year	Rail[1]	Under-ground	DLR	Bus (incl. tram)	Taxi /PHV[2]	Car driver	Car passen-ger	Motor cycle	Cycle	Walk	All
(2000)	(1.8)	(2.6)	(0.1)	(3.7)	(0.4)	(7.0)	(3.8)	(0.2)	(0.3)	(5.5)	(25.3)
2009	2.3	2.9	0.2	6.3	0.4	6.3	3.7	0.2	0.5	6.0	28.9
2010	2.5	3.0	0.2	6.3	0.3	6.3	3.7	0.2	0.5	6.1	29.2
2011	2.7	3.2	0.2	6.4	0.4	6.1	3.8	0.2	0.6	6.2	29.7
2012	2.9	3.3	0.3	6.4	0.4	6.0	3.8	0.2	0.6	6.3	30.2
2013	3.1	3.4	0.3	6.5	0.4	6.0	3.8	0.2	0.6	6.3	30.6
2014	3.2	3.5	0.3	6.7	0.4	6.1	3.9	0.2	0.6	6.4	31.3
2015	3.4	3.7	0.3	6.5	0.4	6.0	3.9	0.2	0.7	6.5	31.7
2016	3.4	3.7	0.3	6.2	0.4	6.0	3.8	0.2	0.7	6.6	31.5
2017	3.3	3.7	0.3	6.2	0.5	6.0	3.9	0.2	0.7	6.6	31.5
2018	3.4	3.7	0.3	6.1	0.4	6.0	3.8	0.2	0.7	6.7	31.4
Percentage change											
2000 to 2018	*85.7*	*41.8*	*227.9*	*66.7*	*16.2*	*-14.8*	*0.4*	*-0.5*	*160.0*	*23.1*	*24.1*
2009 to 2018	*45.7*	*26.9*	*70.8*	*-3.2*	*21.5*	*-5.6*	*1.8*	*-4.9*	*45.0*	*12.2*	*8.7*
2017 to 2018	*2.3*	*0.9*	*-0.9*	*-1.7*	*-5.8*	*0.0*	*-2.5*	*-0.9*	*3.3*	*0.9*	*-0.1*

Source: Strategic Analysis, TfL City Planning.
Notes: A journey stage is a part of a trip made by a single mode of transport. Each rail interchange between train operating companies is a new journey stage. Bus journey stages are counted by starting a new stage each time a new bus is boarded. Underground journey stages are counted by station entries; interchanges within stations are ignored. Walks are counted only when they form complete trips (ie walking all the way), not when they are part of trips using other modes of transport.
1: Includes London Overground.
2: Private hire vehicles.

Figure 2.2 Estimated daily average number of journey stages, seven-day week, 2000-2018.



Source: Strategic Analysis, TfL City Planning.

2.6 Mode shares in London

Introduction

Mode shares reflect the choices that people make for travel in London, given the connectivity provided by the transport networks. The Mayor's aim for 2041 is for 80 per cent of trips in London to be made by active, efficient and sustainable modes (walking, cycling and public transport). This section looks at historic trends in mode share and recent changes to this. Section 2.7 focuses specifically on active, efficient and sustainable modes.

Trip-based mode shares

Public transport accounted for 35.5 per cent of trips in 2018, up from 26.8 per cent in 2000. Over the most recent year, the private transport mode share decreased, down by 0.3 percentage points compared with 2017. Cycle and walk mode shares both increased in 2018, to 2.5 per cent and 25.0 per cent respectively.

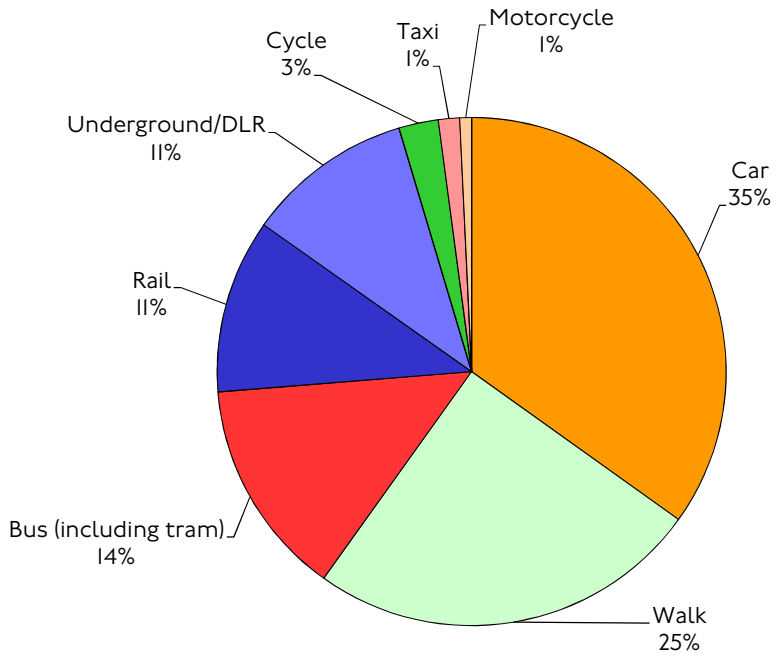
Over the longer term, the decrease of 11.8 percentage points between 2000 and 2018 in the private transport mode share in terms of journey stages is equivalent to a decrease of 11.0 percentage points in terms of trips. Similarly, the public transport mode share, which increased by 10.7 percentage points in terms of journey stages, increased by 8.8 percentage points in terms of trips since 2000 (note that public transport trips typically involve more than one stage). This is equivalent to 2.9 million fewer car trips per day in London compared to 2000, if the mode shares had stayed the same.

Table 2.3 Trip-based mode shares by type of transport, 2000-2018.

Year	Public transport	Private transport	Cycle	Walk
(2000)	(27%)	(48%)	(1.2%)	(24%)
2009	33%	41%	1.9%	24%
2010	33%	40%	2.0%	24%
2011	34%	39%	1.9%	24%
2012	35%	39%	1.9%	24%
2013	36%	38%	1.9%	24%
2014	36%	38%	2.1%	24%
2015	36%	37%	2.2%	24%
2016	36%	37%	2.4%	25%
2017	35%	37%	2.4%	25%
2018	36%	37%	2.5%	25%

Source: Strategic Analysis, TfL City Planning.
Note: Trips are classified by the mode that is typically used for the longest distance within the trip.

Figure 2.3 Mode shares of daily trips in London, 2018.



Source: Strategic Analysis, TfL City Planning.

Journey stage-based mode shares

In 2018, 43.3 per cent of journey stages in London were made by public transport, compared with 33.0 per cent by private transport. This reflects the historic position of a well-established trend of a net shift away from private motorised transport to the public transport modes in London. Since 2000 the public transport mode share has increased by 10.7 percentage points. In the latest year, the public transport mode share increased by a further 0.1 percentage point while the private transport mode share decreased by 0.4 percentage points. Cycling and

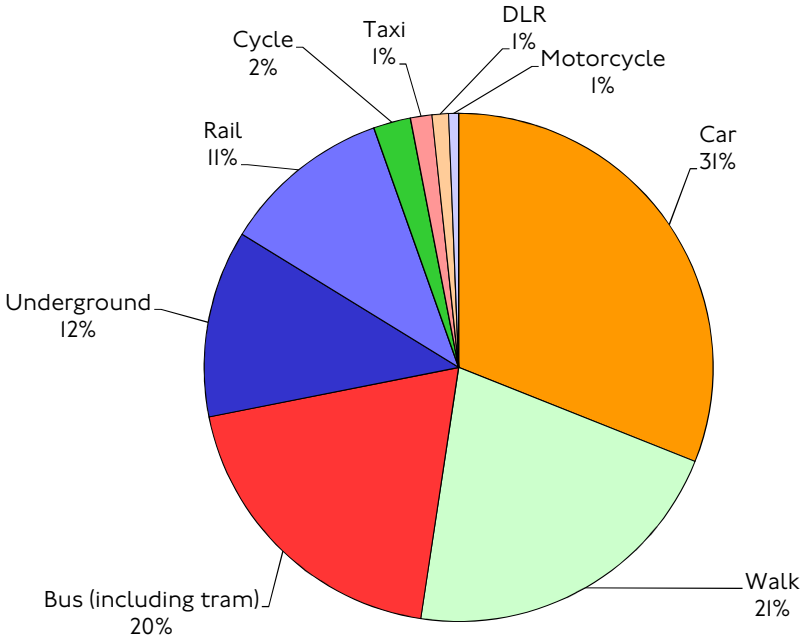
walking mode shares at the journey stage level increased slightly, with cycle mode share up to 2.4 per cent.

Table 2.4 Journey stage-based mode shares by type of transport, 2000-2018.

Year	Public transport	Private transport	Cycle	Walk
(2000)	(33%)	(45%)	(1.1%)	(22%)
2009	41%	37%	1.8%	21%
2010	41%	36%	1.9%	21%
2011	42%	35%	1.9%	21%
2012	43%	35%	1.9%	21%
2013	43%	34%	1.9%	21%
2014	44%	34%	2.1%	21%
2015	44%	33%	2.1%	21%
2016	43%	33%	2.3%	21%
2017	43%	33%	2.3%	21%
2018	43%	33%	2.4%	21%

Source: Strategic Analysis, TfL City Planning.
Note: Mode shares are calculated from the consistent series for journey stages given in table 2.2. Totals may not add up to 100 per cent due to rounding. Walks are counted only when they form complete trips (ie walking all the way), not when they are part of trips using other modes of transport.

Figure 2.4 Mode shares of daily journey stages in London, 2018.



Source: Strategic Analysis, TfL City Planning.
Note: Walks are counted only when they form complete trips (ie walking all the way), not when they are part of trips using other modes of transport.

Trends in journey stages by mode

Figure 2.5 shows trends in demand on selected travel modes since 2000. Public transport use has grown strongly over this period, with demand for all the public

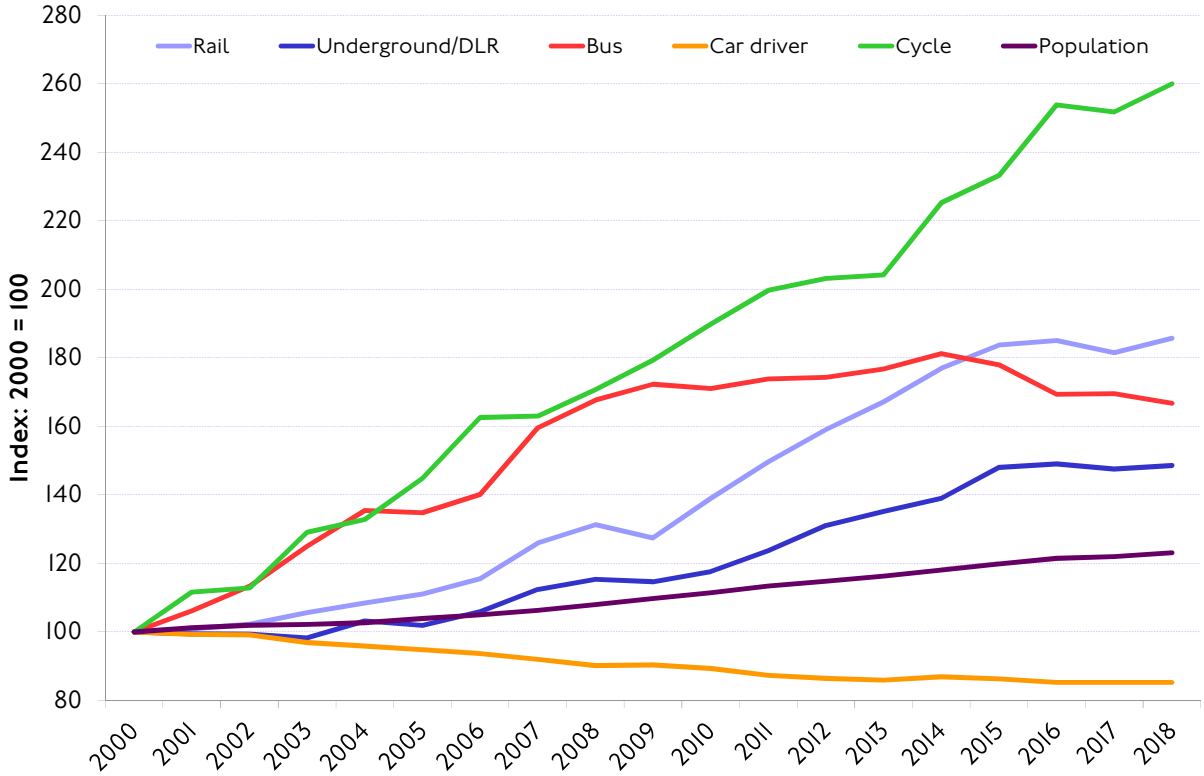
transport modes growing faster than population, reflecting changing mode shares, and accompanied by substantial investment in improved public transport. Initially, growth was strongest on the bus network, with a 35.4 per cent increase in bus journey stages between 2001 and 2004. Following slower growth of 8.1 per cent between 2008 and 2014, bus stages have decreased over the last four years, although they still remain 67 per cent higher than in 2000.

Growth in National Rail use (including London Overground) was initially slower than bus use until 2009. Since 2009, National Rail journey stages have increased by 45.7 per cent, partly helped by the opening of TfL's Overground network, with National Rail stages now 85.7 per cent higher than in 2000. However, growth in National Rail patronage has started to slow in the last two years, with a net growth of just 1.1 per cent since 2015.

In contrast, Underground passenger growth closely followed population growth between 2000 and 2006, although use started to grow at a faster rate in more recent years, reflecting completion of upgrades to several lines, which added extra capacity to the network. Again, however, the rate of growth has slowed since 2015, with net growth of just 0.3 per cent over the last three years.

Car driver stages in 2018 were 14.8 per cent below the 2000 level. Growth has been highest in cycle journey stages, which have grown by 160.0 per cent since 2000, albeit starting from a relatively small base.

Figure 2.5 Growth in journey stages on selected modes, 2000-2018.



Source: Strategic Analysis, TfL City Planning.

2.7 Active, efficient, sustainable mode shares

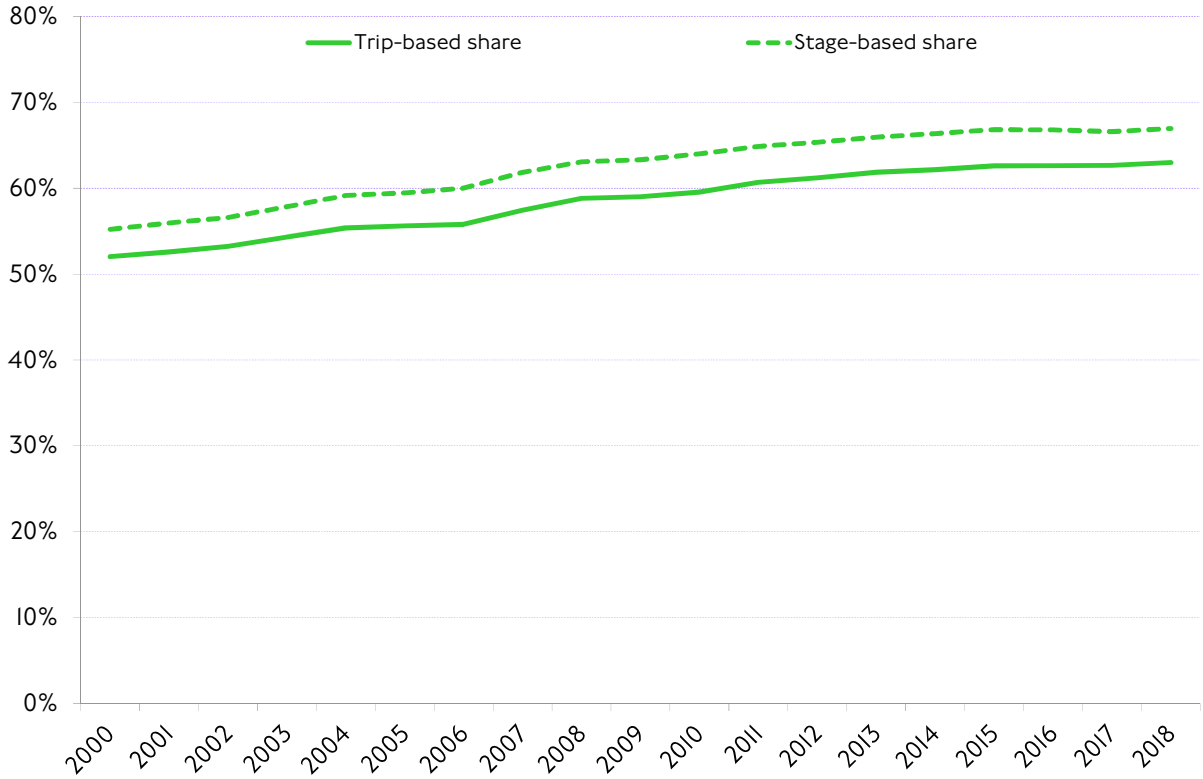
Active, efficient and sustainable modes are defined in the Mayor's Transport Strategy as walking, cycling and public transport. For this purpose, public transport

does not include trips by licensed taxi and private hire. The active, efficient and sustainable mode share is calculated in terms of all trips, by all people (including residents and visitors) travelling in London, on an annual average day. To be included, trips must have at least one 'end' in the Greater London area. Trips are assigned to a 'main mode' according to the stage of the trip on which the longest distance was undertaken (an established convention).

Figure 2.6 shows the historic trend, with data up to 2018. There has been a continuous year-on-year increase in the active, efficient and sustainable mode share since 2000, averaging 0.6 percentage points per year. In 2017, the active, efficient and sustainable mode share increased marginally, by 0.1 percentage point to 62.7 per cent. Growth was stronger in 2018, with an increase of 0.3 percentage points to 63.0 per cent.

Although progress over recent years has therefore been at a slower rate than previously, positive progress towards the Mayor's aim continues to be made.

Figure 2.6 Proportion of all trips and journey stages in London made by active, efficient and sustainable modes, 2000-2018.



Source: Strategic Analysis, TfL City Planning.

Table 2.5 Percentage of trips and journey stages in London made by active, efficient and sustainable modes, 2009-2018.

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Trips	59.0%	59.6%	60.7%	61.2%	61.9%	62.2%	62.6%	62.6%	62.7%	63.0%
Journey stages	63.3%	64.0%	64.9%	65.4%	66.0%	66.4%	66.8%	66.8%	66.6%	67.0%

Source: Strategic Analysis, TfL City Planning.

Long-term trend: journey stage-based mode share

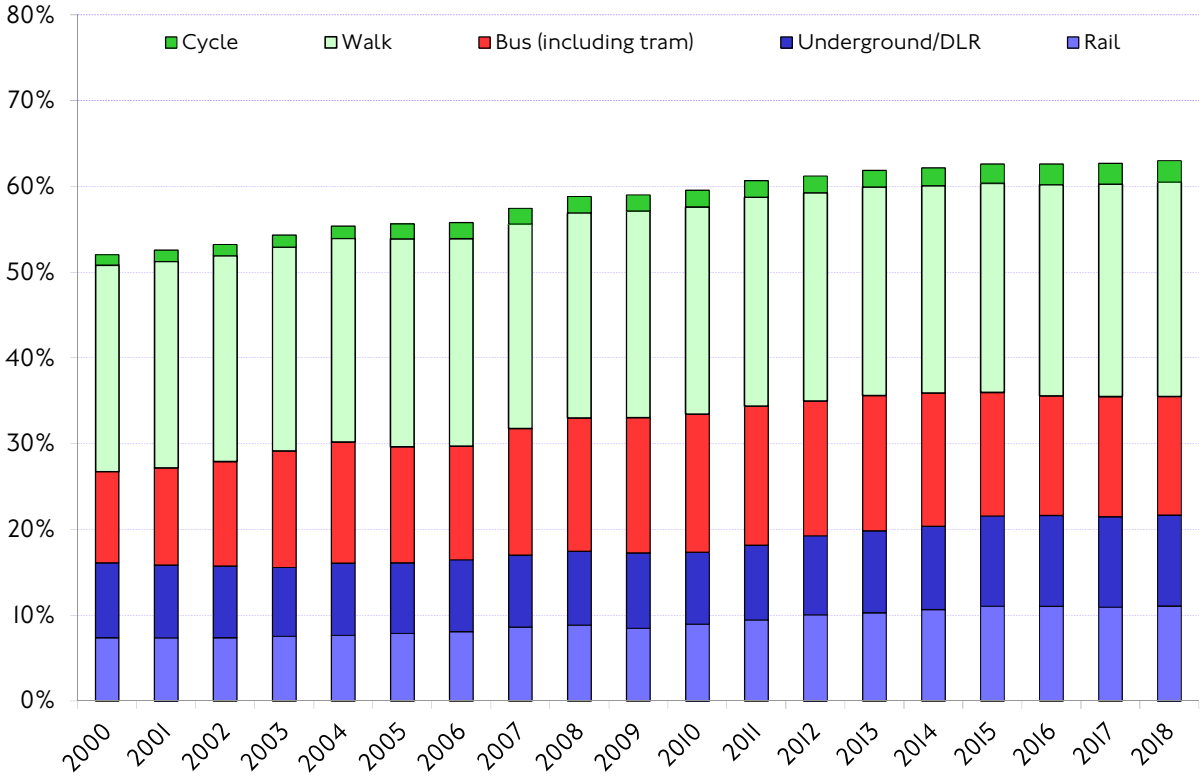
The trend in the active, efficient and sustainable mode share of journey stages has broadly reflected that for trips, with a continuous year-on-year increase up to 2015, followed by a decline of 0.2 percentage points in 2017. In 2018, the active, efficient and sustainable mode share of journey stages increased by 0.4 percentage points to 67.0 per cent. The stage-based measure of active, efficient and sustainable mode share is higher than the trip-based measure, as public transport trips are more likely to be made up of multiple journey stages.

Components of active, efficient and sustainable modes

Figure 2.7 shows the breakdown between active, efficient and sustainable modes at the trip level since 2000. The proportion of trips made by sustainable public transport modes (excluding taxi/PHV) has increased over the period, from 27 per cent in 2000 to 36 per cent in 2018. The cycle mode share has doubled over the period, albeit from a much smaller base, from 1.2 per cent in 2000 to 2.5 per cent in 2018. The mode share of walking trips has remained relatively stable, this reflecting a growth broadly in line with increasing population, although this increased to 25 per cent in 2018.

Overall, the active, efficient and sustainable mode share at the trip level has increased from 52.0 per cent in 2000 to 63.0 per cent in 2018.

Figure 2.7 Trip-based mode shares for active, efficient and sustainable modes, 2000-2018.



Source: Strategic Analysis, TfL City Planning

3. London's population and economy

3.1 Introduction

Chapter 2 reviewed overall travel demand trends in London in terms of 'outcomes' – the number of trips made by all people in London, whether residents or visitors, alongside overall mode shares for travel. This chapter reviews trends in London's population and economy – two of the principal drivers underlying travel demand and where recent developments are thought to be particularly significant in explaining the trends described in Chapter 2. Travel demand trends over most of the last two decades have reflected London's population growth and economy, both of which have seen a slowdown in growth over recent years.

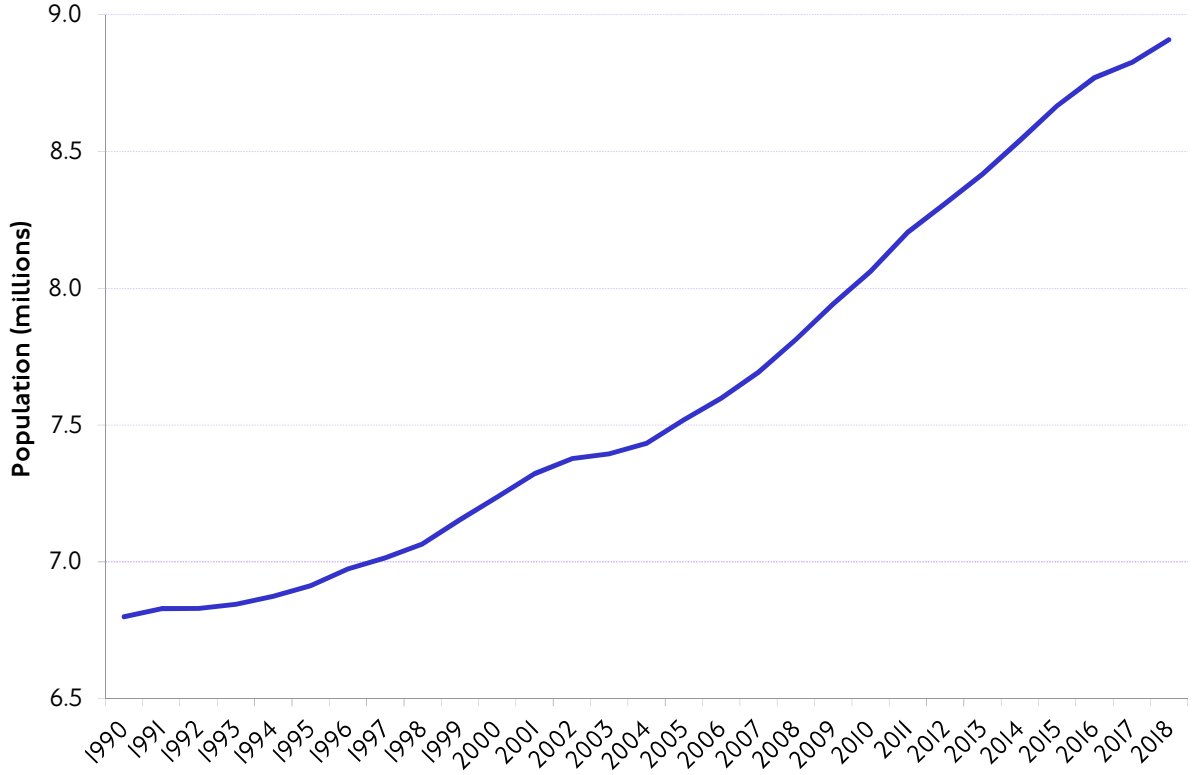
3.2 London's population

Long-term trend in London's resident population

Following a period of decline between 1939 and the late 1980s, London's population grew rapidly – by over 1.3 million people in the two decades up to 2011. More recently, the rate of growth in London's population has slowed, with particularly slow growth in 2017, and recovering slightly in 2018, increasing by 0.9 per cent on 2017 (figure 3.1). Although based on the best available data, it should be noted that there is considerable uncertainty attached to estimates of population, especially in the latter half of the inter-Census cycle.

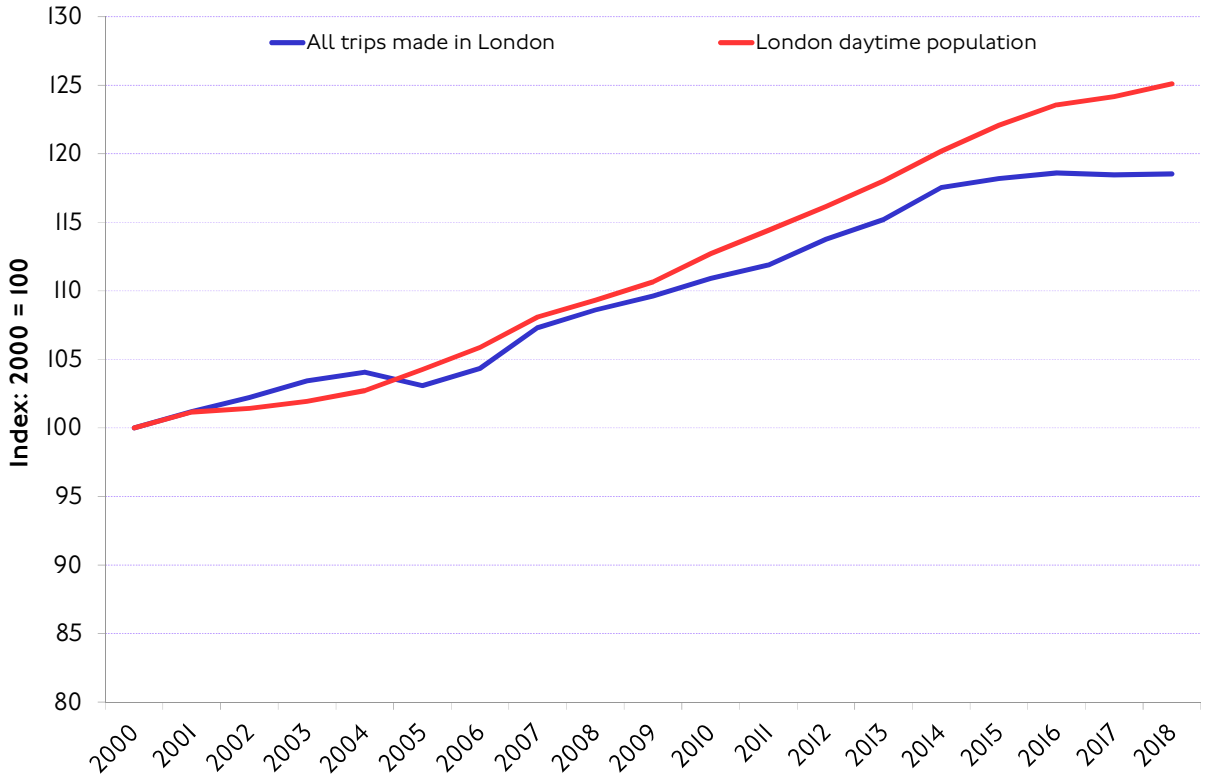
Historically, London's population has been a good predictor of travel demand, in that the rate of growth in London's population has broadly mirrored the rate of growth in the number of trips made in London, implying a relatively constant 'trip rate' – the average number of trips made per person per day. This has remained at 2.7 trips per person per day since 2015, down slightly on the average of 2.8 in the previous decade. Visitors to London who are resident in other areas comprise a second group of travellers in London, whether 'day visitors', such as longer-distance commuters, or those staying in temporary accommodation (eg tourists). Together, these residents and visitors make up London's 'daytime' population, and it is this larger 'daytime' population to which the relatively constant trip rate observation applies.

Figure 3.1 Long-term trend in London's resident population, 1990-2018.



Source: Office for National Statistics.

Figure 3.2 Trend in the number of trips made in London and London's estimated daytime population, 2000-2018.



Source: Strategic Analysis, TfL City Planning.

More recently, however, the trends in London's estimated 'daytime' population and total travel demand in London have been diverging (figure 3.2), with travel demand tending to grow at a slightly slower rate than population. This is an important observation, for it suggests that the nature of the relationship between the number of people in London, and the total travel demand, could be changing, albeit relatively slowly, over time.

Short-term trend in London's resident population

Between 2011 and 2015, London's population is estimated to have increased by around 1.4 per cent per year, with growth in net international migration particularly driving the increase in population between 2013 and 2015 (table 3.1). Between mid-2015 and mid-2016, however, the increase in population is estimated to have been slightly less, at around 1.2 per cent, corresponding to a decline in net international migration. Growth in 2017 was estimated at just 0.6 per cent, so although, on the basis of that evidence, the population was in 2017 still growing, it was at a markedly slower rate than typical of recent years. In 2018, growth increased to 0.9 per cent, although this was still below the recent trend.

Most notably, there is evidence of a slowdown in the growth of London's working age population, with evidence, reviewed below, suggesting that housing costs are now acting as a particularly significant barrier to in-migration to London.

Table 3.1 Components of change in London's resident population, 2012-2018.

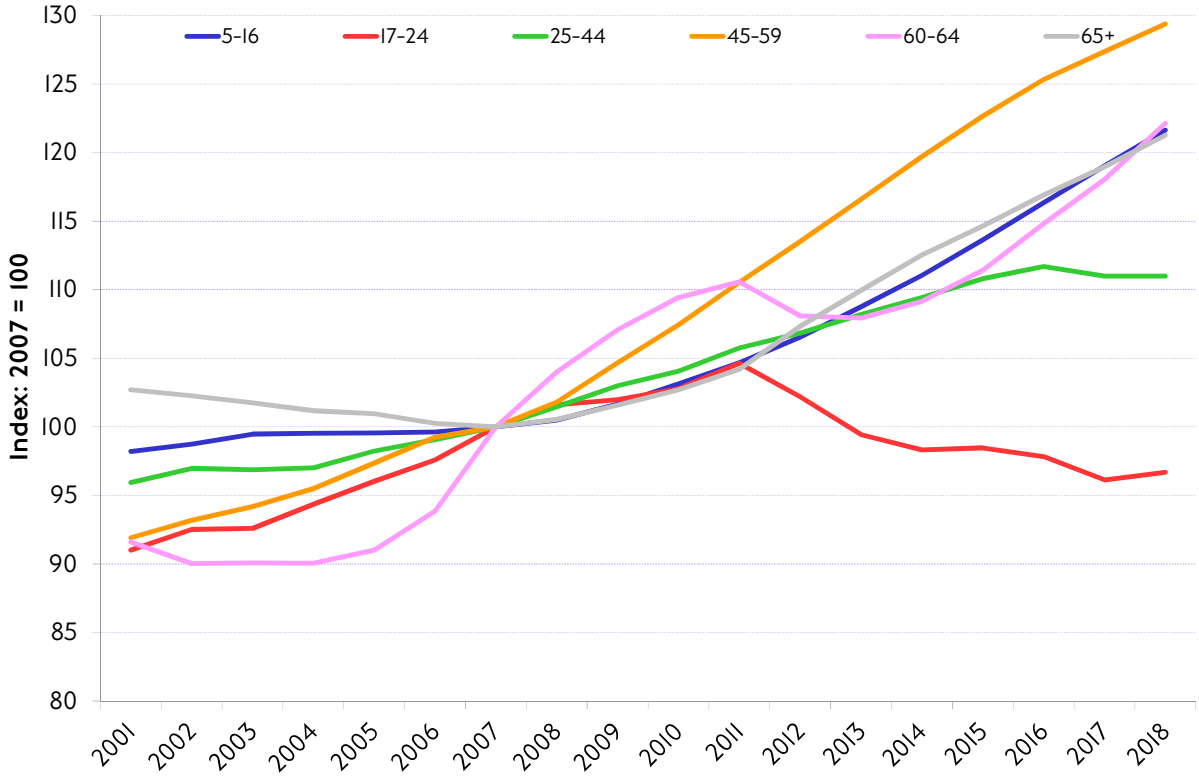
Year	2012	2013	2014	2015	2016	2017	2018
Population (millions)	8.31	8.42	8.54	8.67	8.77	8.83	8.91
Natural change (thousands)	86.5	82.9	82.4	78.4	81.3	78.5	73.1
Internal net migration (thousands)	-51.7	-55.0	-68.6	-77.5	-93.3	-106.6	-103.2
International net migration (thousands)	69.2	79.7	107.4	126.4	114.2	83.5	112.8

Source: Office for National Statistics.

Estimates of population change by age in London

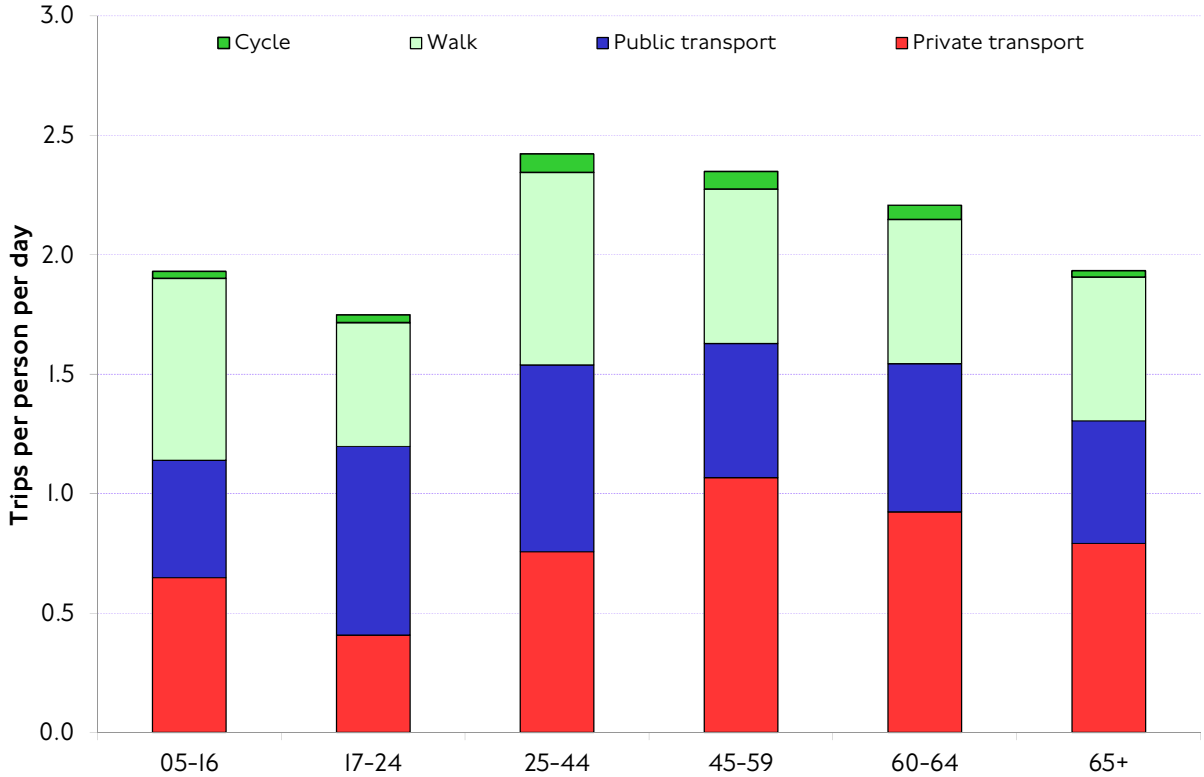
The rate of population change varies by age group in London. Over the past few years, the highest rate of growth has been among those aged 45-59, with increases typically of around 2.5 per cent per year, although this rate of growth has slowed over the last two years. The population of 5-16-year olds and over 65s have also seen steady growth of around 2 per cent per year in recent years, the latter possibly reflecting birth rate fluctuations following the Second World War. The number of residents aged 25-44 has increased by just 0.2 per cent since 2015. This age group makes up more than a third of London's population, and make the highest number of trips per person on an average day.

Figure 3.3 Trend in London population by age, 2001-2018.



Source: Office for National Statistics.

Figure 3.4 Trip rates by main mode and age, London residents, LTDS 2018/19.



Source: Strategic Analysis, TfL City Planning.

The latest population estimates show that there has been no growth in recent years among 17-24-year olds and a more recent flattening of growth among the 25-

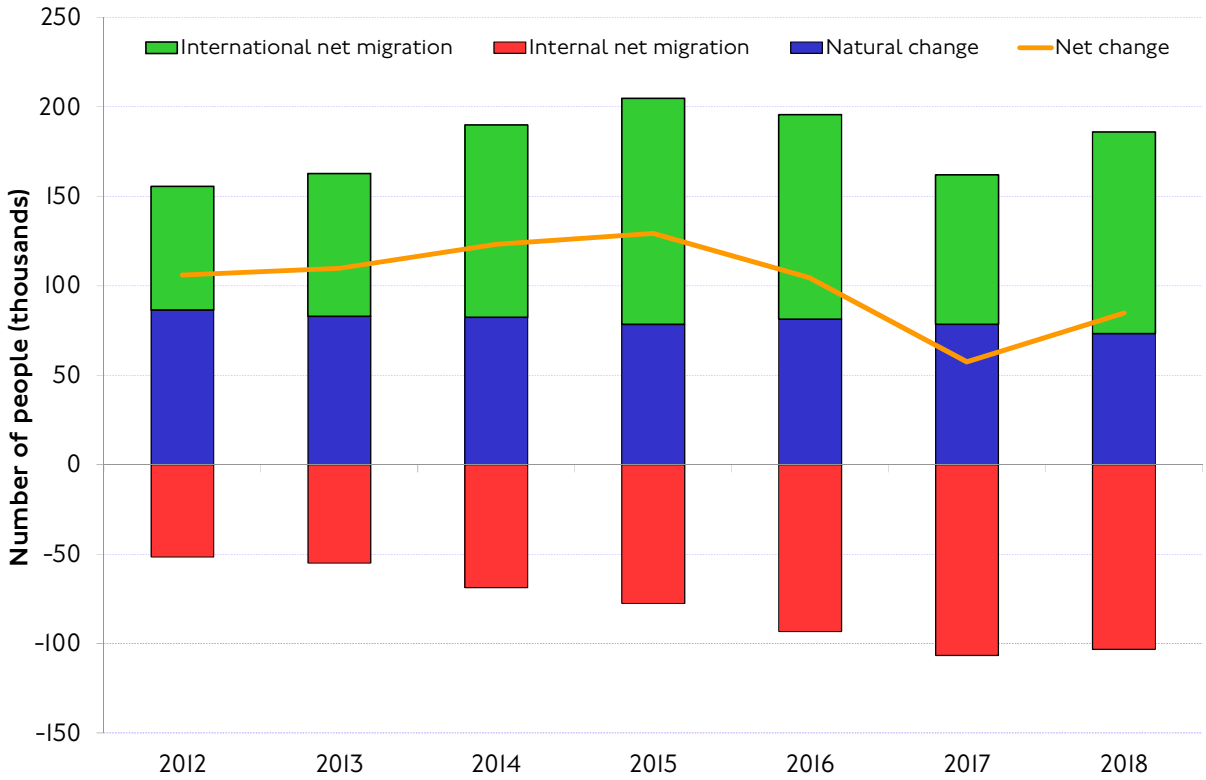
44-year-old age group. This lower rate of growth means that this age group now makes up a smaller proportion of London's population. Given the higher frequency of travel and use of public transport among this age group (shown in figure 3.4) this is likely to have had a disproportionate effect on recent public transport patronage trends and trip rates.

Components of change

Figure 3.5 shows the trend in the components affecting London's population over the last few years. Between 2015 and 2017, the factors driving the slower growth in London's population were the increases in domestic and international emigration, coupled with a decline in international immigration, with net migration in 2017 falling below zero.

In 2018, international net migration increased by 35 per cent, with international in-migration up by 6 per cent and out-migration falling by 17 per cent compared to 2017. The volume of international migration to London in 2018 was still higher than every year except 2015 and 2016. Domestic out-migration decreased, with a domestic net migration figure showing an outflow of 103,000 people over the year.

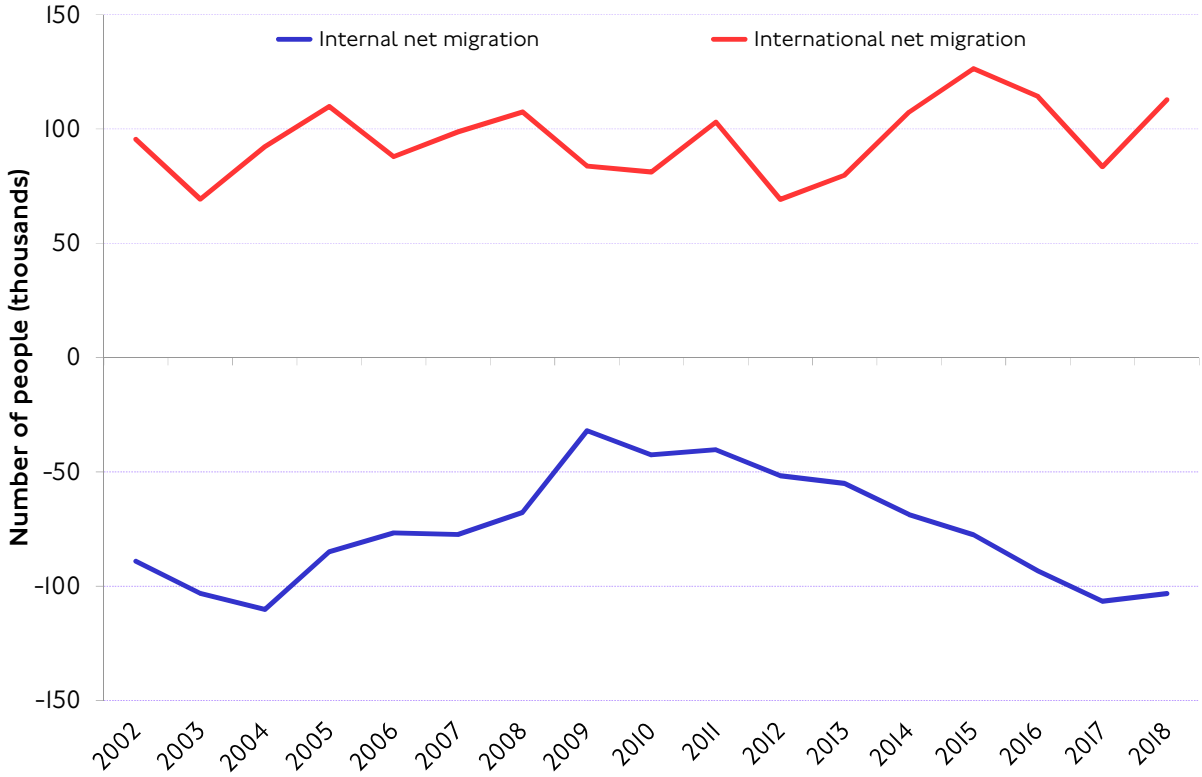
Figure 3.5 Trends in natural and migratory change in London population, 2012-2018.



Source: Office for National Statistics.

Figure 3.6 shows that more people leave London for the rest of the UK than move the other way, with this internal outflow increasing from 2009 onwards to around 100,000 people per year in 2017 and 2018. In contrast, international migration to London from outside the UK is a net inflow, which in 2018 added more than 100,000 people to London's population.

Figure 3.6 Change in migration in London, 2002-2018.



Source: Office for National Statistics.

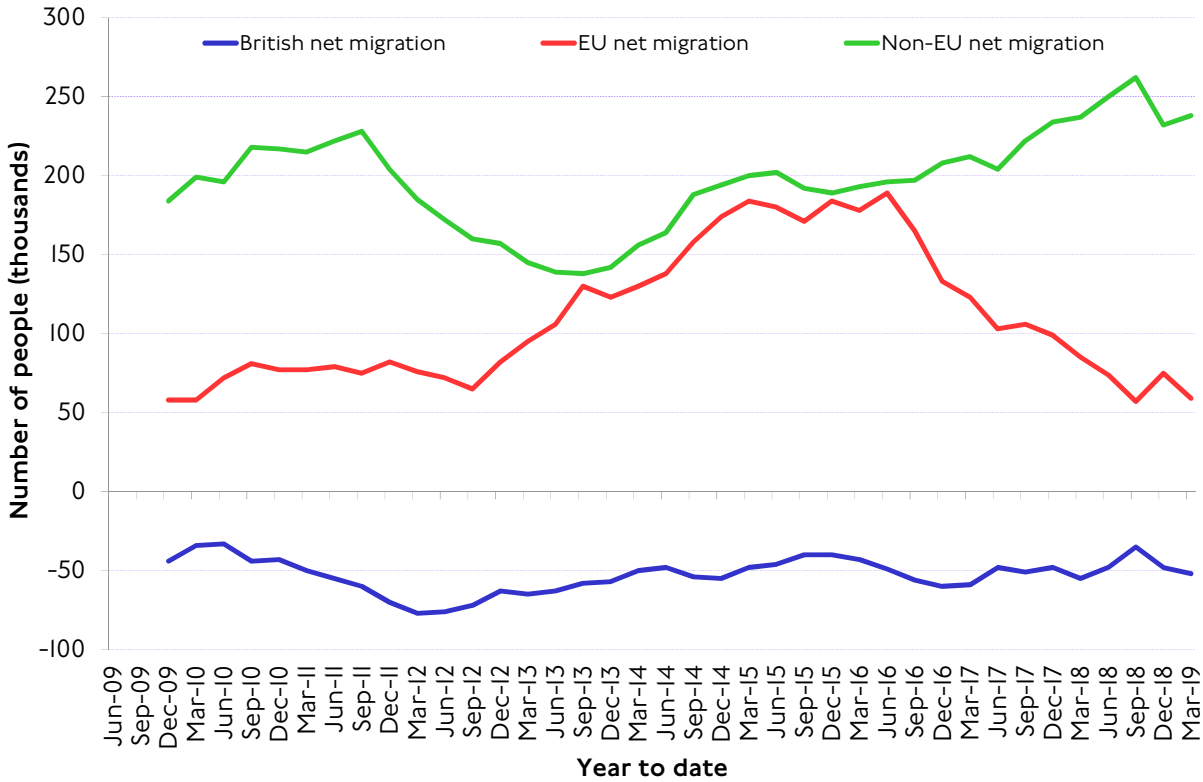
Migration (UK level)

The latest Office for National Statistics (ONS) figures on migration, not included in figure 3.6, indicate that net migration to the UK as a whole decreased slightly in the year ending March 2019, with net migration estimated at 245,000. European Union (EU) net migration was at its lowest level since 2010 but continues to add to the UK population, with around 60,000 more EU citizens coming to the UK than leaving.

Following previous reductions in the number of EU citizens coming to the UK looking for work, fewer EU citizens are now coming to the UK with a definite job offer. This could be because of uncertainty surrounding the vote to leave the EU.

However, non-EU net migration has increased, and is now at similar levels to 2011, with most of the increase reflecting migration from Asia (figure 3.7). Of relevance is the acknowledged high degree of uncertainty with these estimates – in most cases greater than the indicated change – which adds to the difficulty of estimating population trends over the relatively short term in between decennial Censuses.

Figure 3.7 Net UK migration by citizenship (year to date shown), 2009-2019.



Source: Office for National Statistics.
Note: 2018 and 2019 data are provisional.

Leisure visitors: domestic day visitors in London

In 2018, there were an estimated 319 million domestic day visitors to London, a decline of 2 per cent on the previous year (table 3.2). This is the second successive year that the number of domestic visits has declined, and is thought to reflect a combination of factors, primarily the high costs associated with leisure visits in the context of recent pressures on disposable incomes. Significant disruption to the rail network is also thought to have contributed to the decline. Despite this, London had the greatest share of day visits for tourism and leisure among the English regions and the UK's top ten most visited attractions in 2018 were all in London.

Table 3.2 Leisure visitors to London (domestic), 2011-2018.

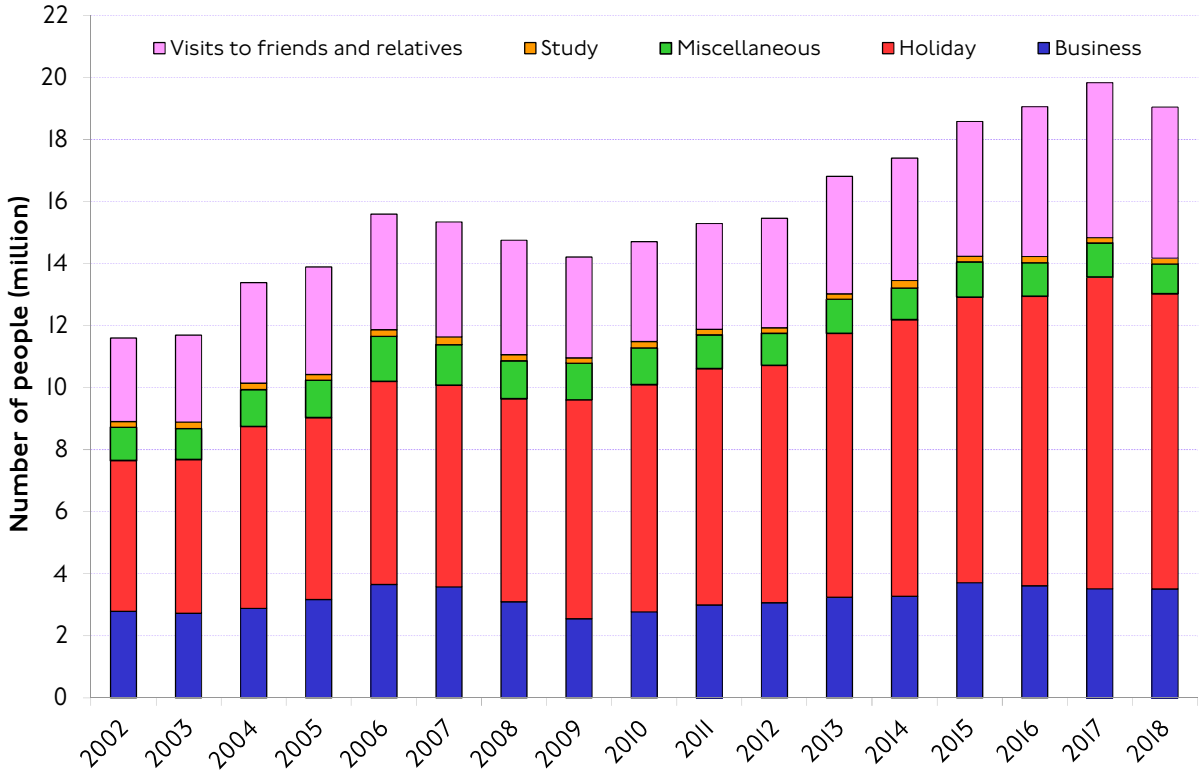
Year	Number of day visitors (millions)	Change
2011	314	-
2012	362	15%
2013	301	-17%
2014	315	5%
2015	322	2%
2016	337	5%
2017	327	-3%
2018	319	-2%

Source: Great Britain Day Visits Survey.

International visitors to London

The number of international visitors to London had increased each year since 2009, with a 4.0 per cent increase between 2016 and 2017 and an aggregate increase of 40 per cent over the period (figure 3.8). However, in 2018 international visitor numbers declined for the first time since 2009, down by 3.9 per cent. Half of all international visits to London were for holidays.

Figure 3.8 Trend in number of international visits to London, 2002-2018.



Source: International Passenger Survey.

The number of visits to London for business and study remained similar to 2017. The uncertainty over Britain's departure from the European Union had previously led to a decline in the number of business visits, and may also have affected international students' decisions about whether to study in London or not. However, this latest data suggests that this decline may have stabilised, with holiday visits still higher than in any other year except 2017, and the value of Sterling remaining comparatively weak.

Summary assessment

To summarise key points from this section:

- London's population grew in 2018, at a higher rate than in 2017, but still below previous levels of growth. This slower growth is a significant factor underlying recent travel demand trends; although London has also been the fastest-growing region of the UK.
- EU-departure related uncertainty and all-time-high housing costs contributing to a squeeze on disposable incomes (see also section 3.3 below) are thought to be particularly significant factors deterring EU citizens and younger people

from migrating to London, potentially affecting short-term public transport patronage trends.

- The number of domestic day visitors to London and the number of international visitors to London decreased, by 2 and 4 per cent respectively in 2018 compared to 2017. This was mostly driven by a decrease in leisure visits, although the number of international holiday visitors remained higher than any other year except 2017, and the value of Sterling remains comparatively weak.
- In addition, as shown by the evidence in section 4.2 of this report, resident Londoners are, on average, making fewer trips per person per day – a slow but progressive trend over the last decade.

The short-term picture is therefore one of population growth that is slower than in recent years, contributing to trends in travel demand. Over the long term, however, London's population is still projected to grow strongly and therefore these recent developments do not invalidate the assumptions in the Mayor's Transport Strategy or the measures required to meet the strategy outcomes over the much longer time period to 2041.

3.3 London's economy

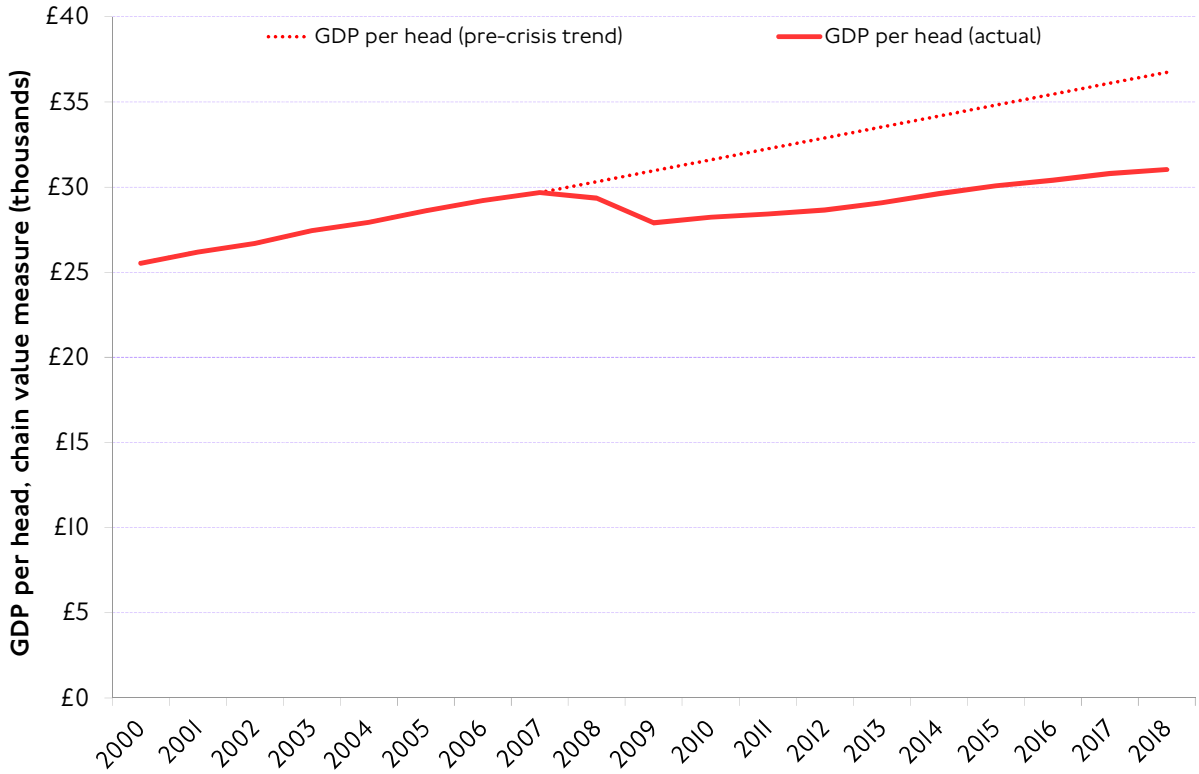
Alongside and linked to population change, London's economy is a key driver of overall travel demand. While evidence of declining travel demand in terms of per-person trip rates pre-dates the global financial crisis, the reduction in per-person shopping and leisure travel has accelerated since 2008 amid slow wage growth and high housing costs. Meanwhile, the UK's future relationship with the EU, and the longer-term economic implications of the vote to leave the EU, remain uncertain. Economic uncertainty has implications for the population trends explored above, but also on the discretionary spending of London households, with effects on their demand for travel.

London's economic growth

Since the financial crisis of 2008, economic growth has been slow and many Londoners have felt an unprecedented and prolonged squeeze on their personal disposable incomes. This has been the result of near stagnant real wages and increased living costs, especially housing costs, with many households also being affected by reductions to welfare payments.

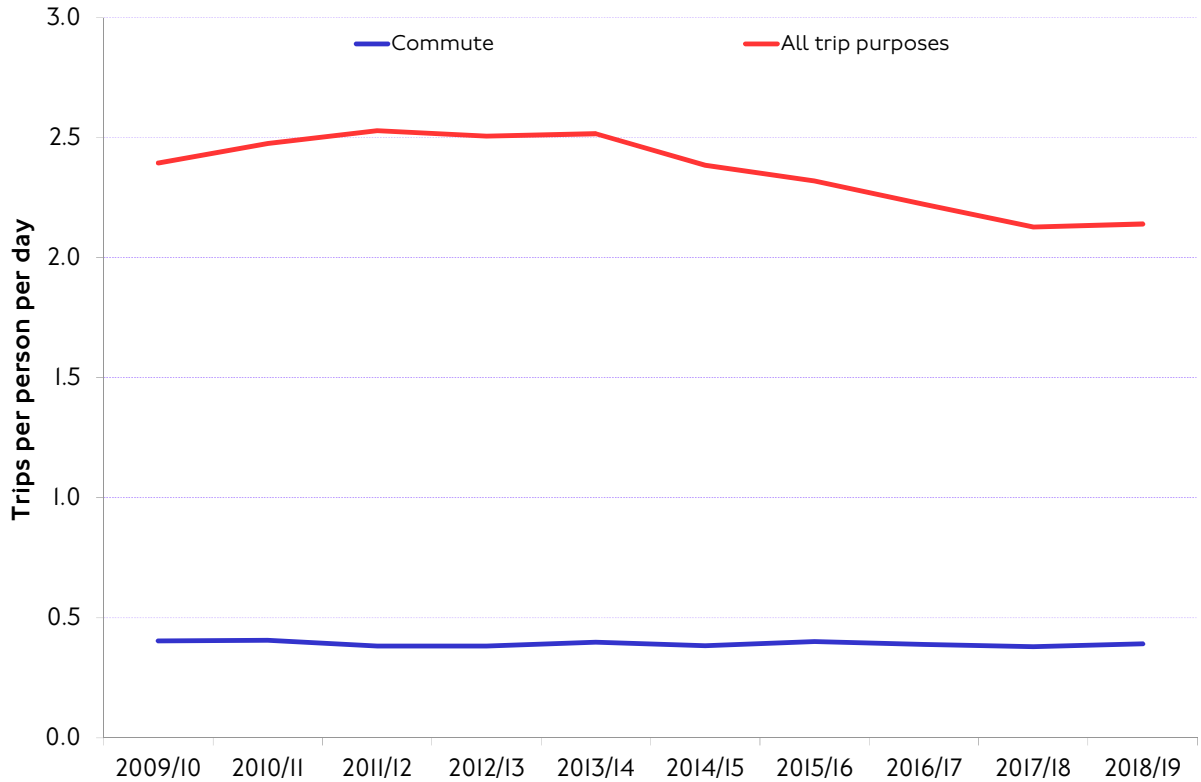
The UK's GDP grew at a modest pace of 1.4 per cent in 2018 and growth per capita remains lower than the pre-crisis rate. This sluggish rate of productivity growth has meant that GDP per head is more than £5,000 lower than it would have been had pre-crisis trends continued (figure 3.9).

Figure 3.9 UK real GDP per head, 2000-2018.



Source: Office for National Statistics.

Figure 3.10 Change in commuting trip rate, London residents, 2009/10-2018/19.



Source: Strategic Analysis, TfL City Planning.

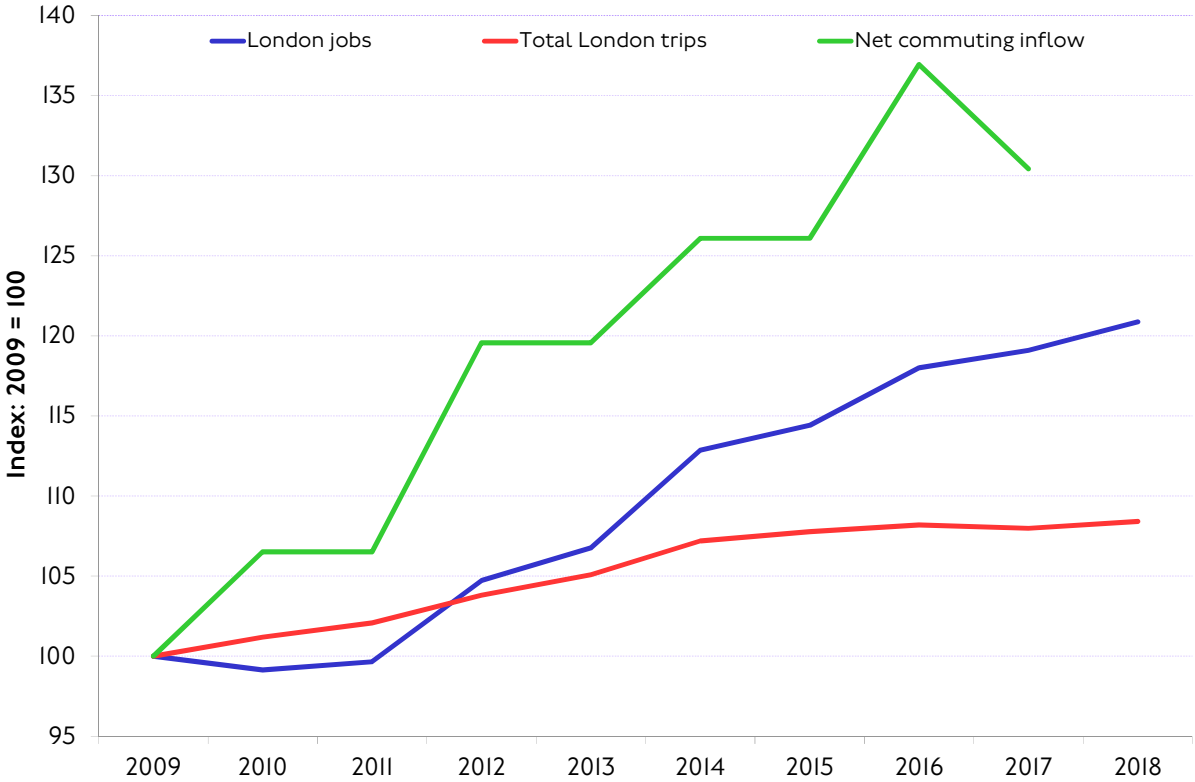
Employment trends

London's labour market remains largely stable, with strong year-on-year jobs growth and a historically low unemployment rate. This has led to a relatively stable commute trip rate relative to other trip purposes (figure 3.10).

Figure 3.11 shows that while the number of jobs in London has risen by 22 per cent since 2009, the number of trips during this time has risen by just eight per cent.

In addition, the net commuting inflow into London has grown faster than the number of jobs. This means that an increasing proportion of workers in London live outside of London's boundaries. This has an effect on overall travel, as London workers who live outside the Capital are likely to make a smaller proportion of their non-commute trips within London.

Figure 3.11 Workforce jobs and total trips growth, 2009-2018.



Source: Office for National Statistics and TfL City Planning.

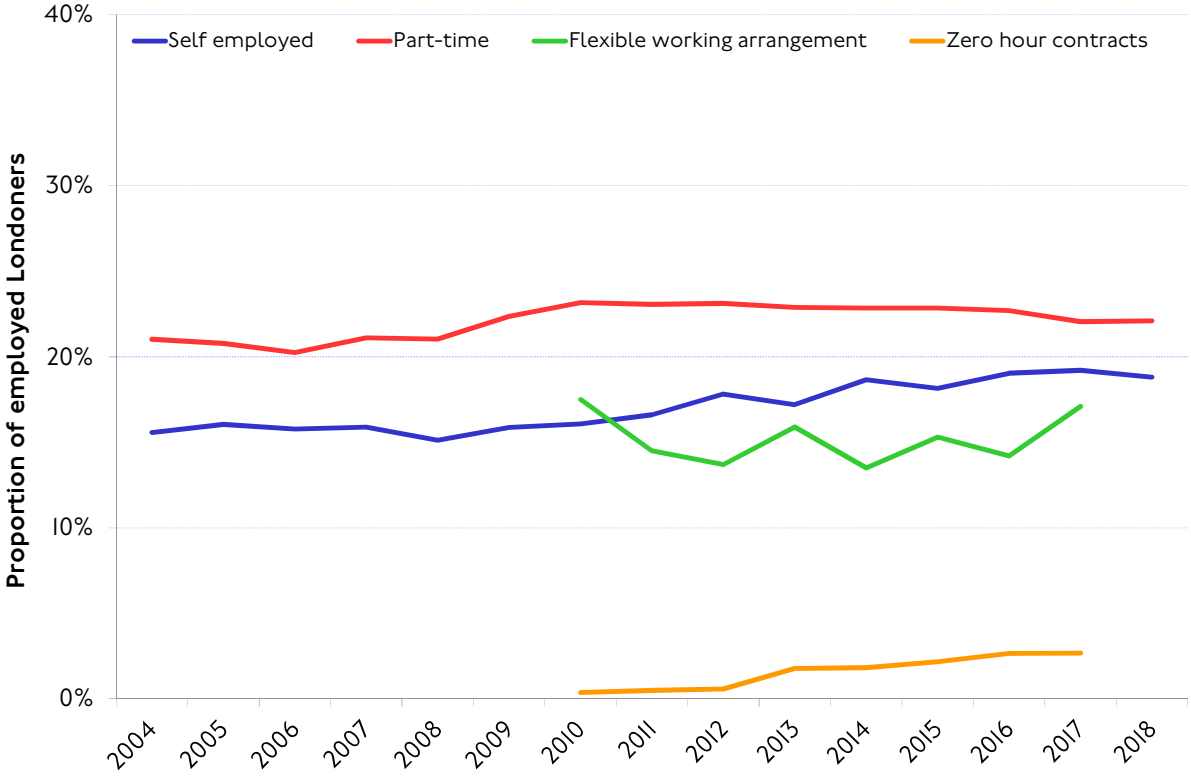
Nature of work and trip making

Following the 2008 financial crisis there were increases in self-employment, part-time employment and 'zero hours contracts'. The proportion of workers working part-time has fallen slightly since it peaked in 2009/10 (figure 3.12). Self-employment has been growing, and now represents 19 per cent of employed Londoners. Meanwhile, there has been a dramatic increase in zero-hour contract employment.

Data suggests that there has been little growth in formal flexible working arrangements in recent years. But it is possible that remote working, facilitated by the availability of personal computing and digital connectivity, along with pressures to reduce the cost of office accommodation in central London, is also affecting the timing and location of travel in London for both commuting and other trips.

The long-term decline in average working hours has also stalled since the financial crisis. Resolution Foundation analysis of Labour Market Statistics show that nationally, we now work an hour a week longer than we would have done had the post-1980s trend of declining hours continued. This potentially leaves Londoners with less time for leisure activities and non-work trips.

Figure 3.12 Proportion of London workers by employment type, 2004-2018.



Source: Office for National Statistics.

Real wages

After a decade of poor growth since the global financial crisis of 2008, headline data shows that 2019 has so far seen strong growth in real earnings.

The Annual Survey of Hours and Earnings shows that typical weekly pay grew by 3.3 per cent in London in the year to April 2019, compared to 2.9 per cent nationally. Pay growth was stronger at the bottom of the pay distribution than at a top, as increases to the minimum wage pushed up hourly pay for the lowest earners, reducing pay inequality.

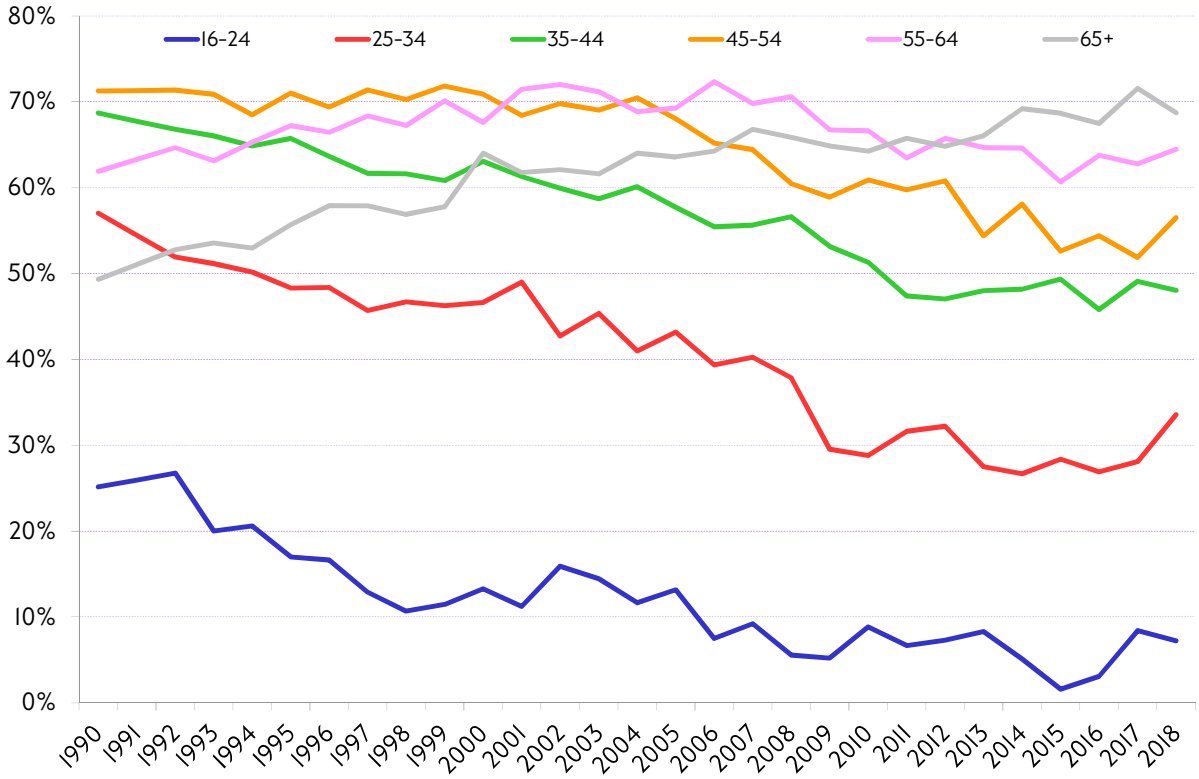
However, in real terms median weekly earnings are still 2.9 per cent (£18) below their peak in 2008. In addition, 36 per cent of full-time employees experienced a real-terms pay decrease or pay freeze in 2019. This means that many Londoners continue to feel a significant squeeze on their personal disposable incomes. This has an effect on consumer spending, particularly on 'discretionary' activities, such as shopping and leisure. This could have contributed to the falling trip rates seen across most income and age groups, but particularly among young Londoners who have felt the biggest squeeze in their disposable incomes. Transport costs make up 11 per cent of household spending in London albeit that this has been relatively constant in recent years.

Housing costs

In recent years, London has seen unprecedented growth in house prices. This has benefitted home owners, but left a large number of young and low income Londoners reliant on an expensive and insecure private rented sector. Comparing rents against earnings, the average renter in London spent 37 per cent of their household income on housing in 2016/17, up from 30 per cent in 2010/11.

Figure 3.13 shows significant declines in home ownership among Londoners in their 20s and 30s. While 58 per cent of those aged 25-34 owned their home in 1990, today this has fallen to just 33 per cent. Connected to this, GLA analysis of the Labour Force Survey shows that 23 per cent of Londoners aged 20-34 now live with their parents, up from 17 per cent in 2000.

Figure 3.13 Proportion of home ownership by age group of household head, 1990-2018.



Source: Greater London Authority.

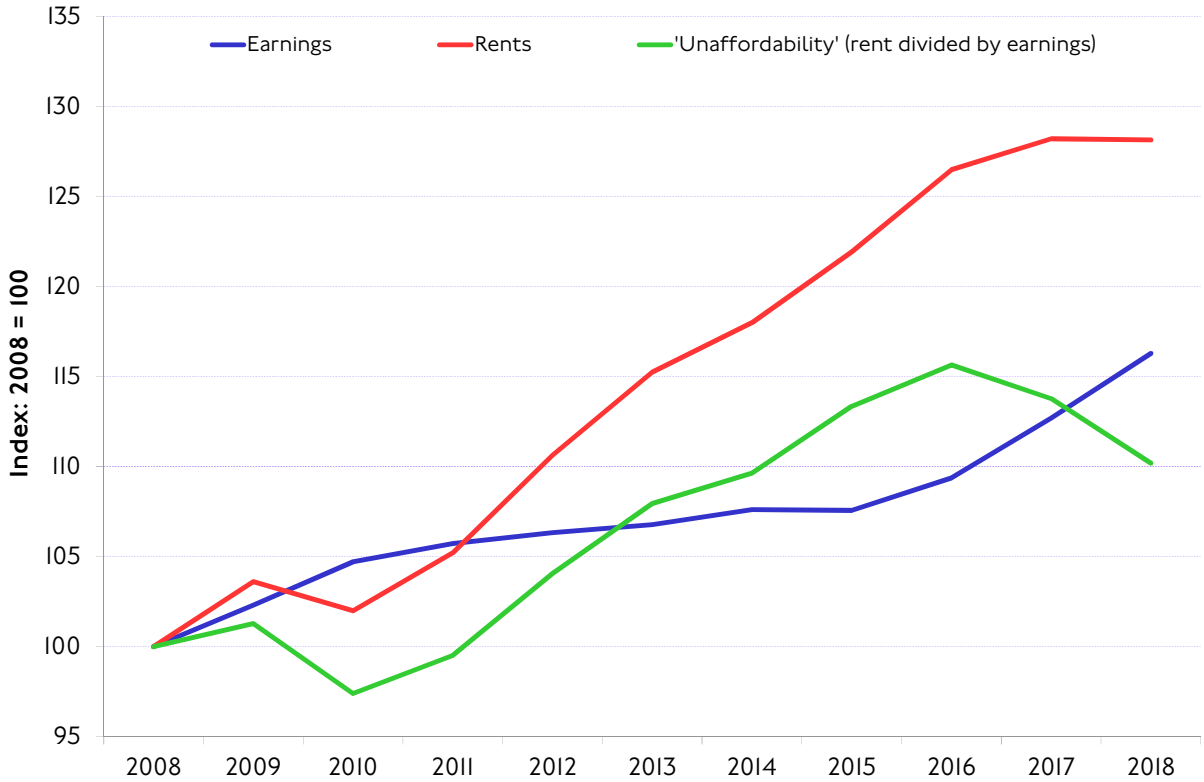
Traditionally, young adults have moved to London when they enter the labour market. Dense areas of inner London with good public transport connections have proved particularly popular among young professionals.

But it is thought that London's high rents and known difficulties getting onto the property ladder are dissuading young adults from moving to the Capital and causing those who do choose to come to London to live further from the centre or to live with parents for longer. This could be contributing to changes in the travel behaviour of young adults, as travel behaviours are conditioned in part by residential location, and the distances between home, employment, social and leisure activities.

There are early signs that house prices are falling. In August 2019, the average house price in London was £472,753, down 1.4 per cent on the previous year. Flats and maisonettes have seen a bigger year-on-year decline of 2.8 per cent.

Figure 3.14 shows that average private rents increased by 29 per cent between 2010 and 2018 in London. Meanwhile average wages rose just 13 per cent over the same period, making housing more unaffordable. In the last couple of years, earnings have been rising at a slightly faster rate than rents in London, causing a second consecutive year of improvements to affordability. Despite this, rents are still much less affordable than they were at the start of the decade.

Figure 3.14 Index of cumulative change in private rents, earnings and implied affordability in London, 2008-2018.



Source: Greater London Authority.

As a result, there is evidence that regional house prices are beginning to converge, although a large gap remains between housing costs in London and the rest of the UK. It is likely that lower income households will continue to feel 'priced out of London', a trend that is contributing to population changes and squeezed incomes, with implications for travel behaviour.

Summary assessment

To summarise key points from this section:

- Since the financial crisis of 2008, GDP and wage growth has been slow and many Londoners have felt a prolonged squeeze on their incomes. This has been exacerbated by high housing costs in London.
- These trends have had a knock-on effect on consumer spending; particularly spending on 'discretionary' activities including travel for shopping and leisure.

Commute trip rates have remained relatively stable, fuelled by a high employment rate.

- There are early signs that London house prices may be stalling and a tight labour market is finally contributing to wage growth. These two factors could begin to reverse the squeeze on Londoners' disposable incomes.
- But real wages remain below those seen before the financial crisis and housing costs remain high relative to earnings. There is evidence that the cost of housing in London, relative to the rest of the UK, might be contributing to a flattening of population growth among young adults in London, and an increase in commuting from outside London.
- The future of the UK's relationship with the EU remains the most pressing and uncertain issue facing London's economy, with potentially important short-term repercussions for both the total population level and per-person travel demand in London. Again, however, the consensus of longer-term forecasts is for continued strong economic growth in London.

3.4 Further consideration of the factors underlying travel demand trends

The factors underlying the recent travel demand trends across specific modes are reviewed throughout this report. Chapter 14 of this report looks in more detail at how travel demand in London has evolved over a longer timescale, including a review of the factors historically leading to the demand and mode share trends that have been observed. This chapter also considers our latest forecasts for travel demand in London to 2041, in the context of projections of London's future population and economic growth. It also describes how we are using scenario planning techniques to help ensure that our future forecasts and plans are as robust as they can be to future uncertainty.

4. Travel by London residents

4.1 Introduction

This chapter looks in more detail at the travel demand and travel behaviour trends and mode shares of London residents specifically, using data from the London Travel Demand Survey (LTDS). LTDS is a continuous household survey of the London area and has been running since 2005/06 with an annual sample size of around 8,000 households. It captures information on households, people, trips and vehicles and therefore allows for detailed analysis of trip making and its relationship to socio-demographic factors over time.

Although residents account for the majority of all travel in London, it is also likely to be the case that the travel patterns of non-residents are materially different from those of residents. Consequently, estimates of total travel and mode shares from this source will differ from those described in Chapter 2 of this report. Nevertheless, LTDS provides a unique window on to the travel trends of Londoners and, through capturing a wealth of associated socio-demographic and travel behavioural data, allows connections to be made between overall travel trends and the factors that are affecting them.

4.2 Travel by London residents: trip rates

Overall per-person trip rates by London residents

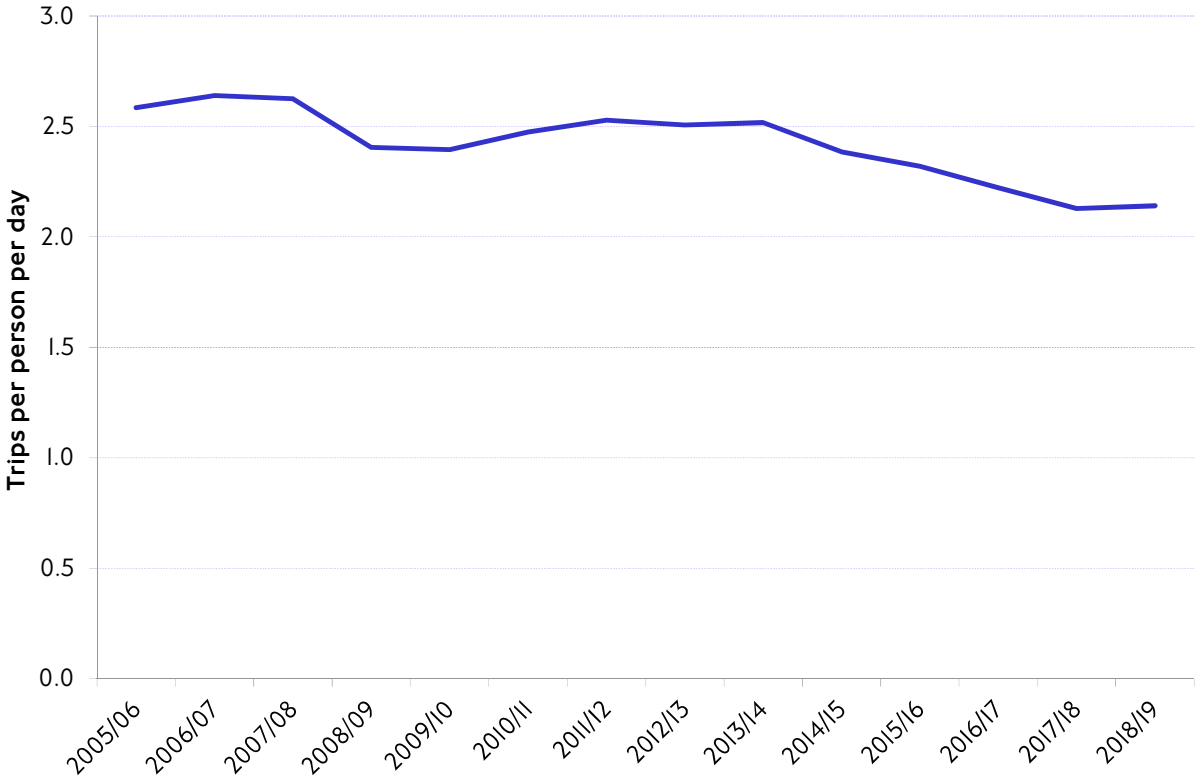
Trip rates are a basic indicator of travel – relating to the number of trips (or journey stages) undertaken on an average day – by Londoners in general or by more specific groups of people. LTDS has tracked a pattern of generally falling trip rates over the decade-long lifetime of the survey, a trend that is mirrored at the national scale (figure 4.1).

After rising from 2.40 trips per person per day in 2008/09 to 2.52 in 2013/14, trip rates for London residents have fallen by an average of 4.1 per cent per year for the last four years, this reduction primarily affecting 'discretionary' trips, for example trips for shopping and leisure.

In the most recent year (2018/19), however, the number of trips per day made by an average London resident increased slightly, to 2.14, up by 0.6 per cent on 2017/18. It is too early to say if this indicates the start of a longer-term stabilisation or an increase in trip rates.

Resident trip rates are notably lower than the average for all travellers in London (2.67 in 2018) but this difference is to be expected, given that the large majority of non-resident day visitors are already (by definition) in the course of making at least one trip on the day in question to get to or from London.

Figure 4.1 Trend in per-person trip rate per day (annual average) by London residents, LTDS 2005/06-2018/19.

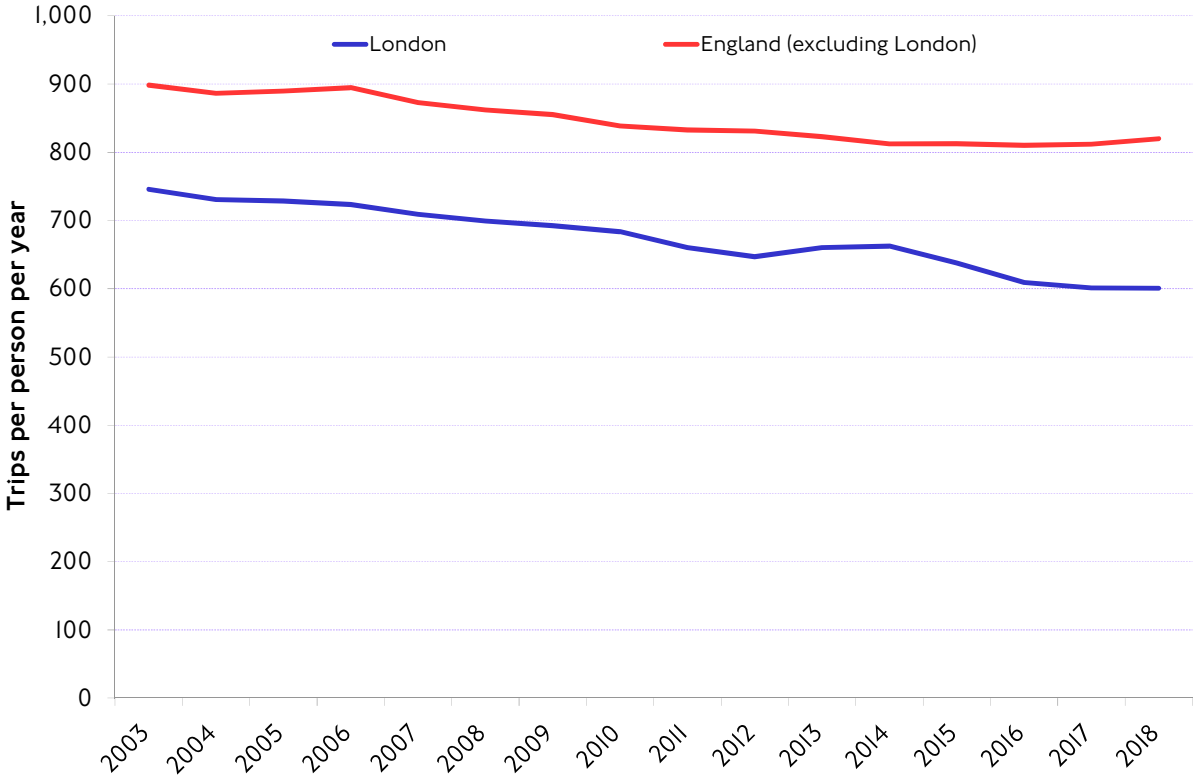


Source: Strategic Analysis, TfL City Planning.

Parallels at the national scale

The trends in trip rates seen among London residents have parallels at the national scale. The National Travel Survey (GB, latterly England only) shows these trends to have been well established. Although emerging results from the National Travel Survey for 2018 suggest a small increase in per-capita travel in England (excluding London) of 1 per cent, the trip rate remained 9 per cent lower than in 2003. The London component of this survey shows almost no change in London trip rates on 2017, broadly mirroring the trend reported in LTDS (figure 4.2). It should be noted that there was a change to the way the National Travel Survey collected data on short walks from 2016 onwards, so walks of less than a mile are excluded from the trend to ensure comparability over time.

Figure 4.2 Trips per person per year (excluding walks of less than a mile), National Travel Survey, 2003-2018.



Source: Department for Transport.

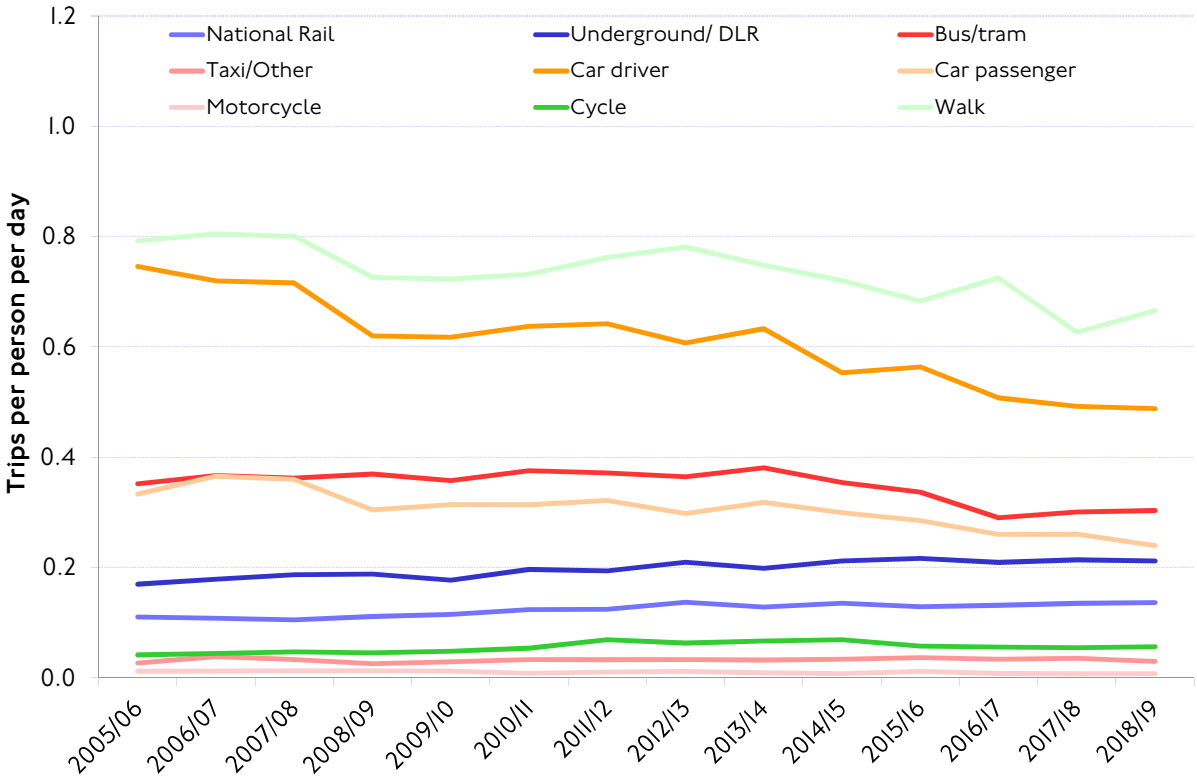
Trip rates by mode

Over the long-term period of the LTDS survey, the most notable trends are the decline in car driver trip rates and the fluctuations in walking trip rates since 2005/06. Car driver trip rates have declined by 35 per cent since the start of the survey in 2005/06 and by 23 per cent since 2013/14 alone. This change needs also to be seen in the context of changes to the overall composition of road traffic, as described further in Chapter 9 of this report.

The trend in walk trip rate over the period mirrors the overall trip rate, declining by 16 per cent since 2005/06 (compared to a 17 per cent decline in the total trip rate). National Rail and Underground trip rates have shown steadier growth over the period, increasing by 24 per cent and 25 per cent respectively since 2005/06.

In the most recent year, there has been a small increase in trip rates by National Rail and bus (up 1 per cent respectively), although Underground trip rates fell by 1 per cent. Car driver and passenger trip rates have both decreased since 2017/18 and walking and cycling trip rates have both increased (figure 4.3).

Figure 4.3 Trend in per-person trip rate per day (annual average), by mode, London residents, 2005/06-2018/19.



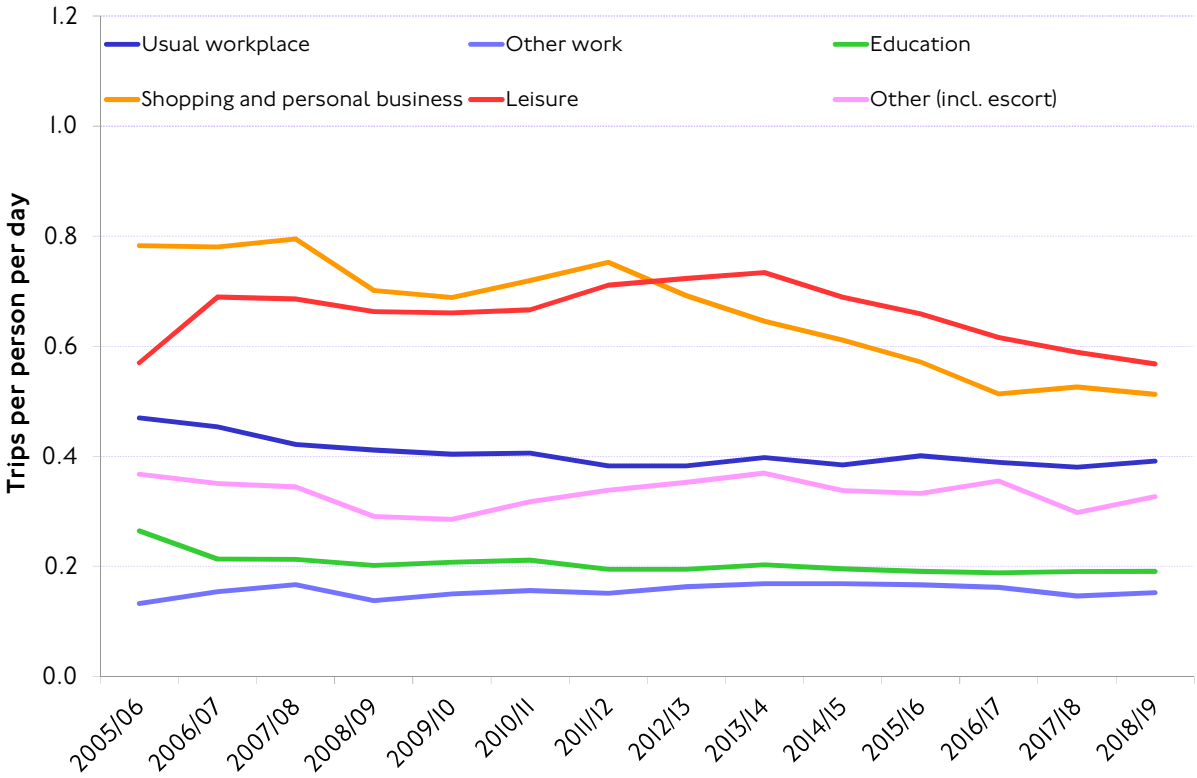
Source: Strategic Analysis, TfL City Planning.

Trip rates by journey purpose

By journey purpose, the average number of trips London residents make per day for education and travel in the course of work (not commuting) has changed very little over the time period. In contrast, there have been substantial declines in the average number of trips made for shopping and leisure purposes since 2011/12 and 2013/14 respectively. The number of trips made for shopping and personal business has declined by 32 per cent since 2011/12 and leisure trips are also down by 23 per cent since 2013/14. Commuting trips have seen a gradual decline over the period, down by 17 per cent overall since 2005/06 (figure 4.4).

The reasons for these changes in travel by purpose are explored in more detail in Chapter 4 of Travel in London report 11. It should however be noted that the declines in per-person trip rates took place in the context of a growing population, which had the effect of partially masking their effect on overall travel demand. Furthermore, it may be the case that changes to personal travel over the course of a single day ('trip chains'), such as increased working at 'non-usual' workplaces, or evening leisure activity after work, affect the journey purpose assignment used in LTDS (for example, commuting is defined, strictly, as a trip between 'home' and 'usual workplace').

Figure 4.4 Trend in per-person trip rate per day (annual average), by journey purpose, London residents, 2005/06-2018/19.

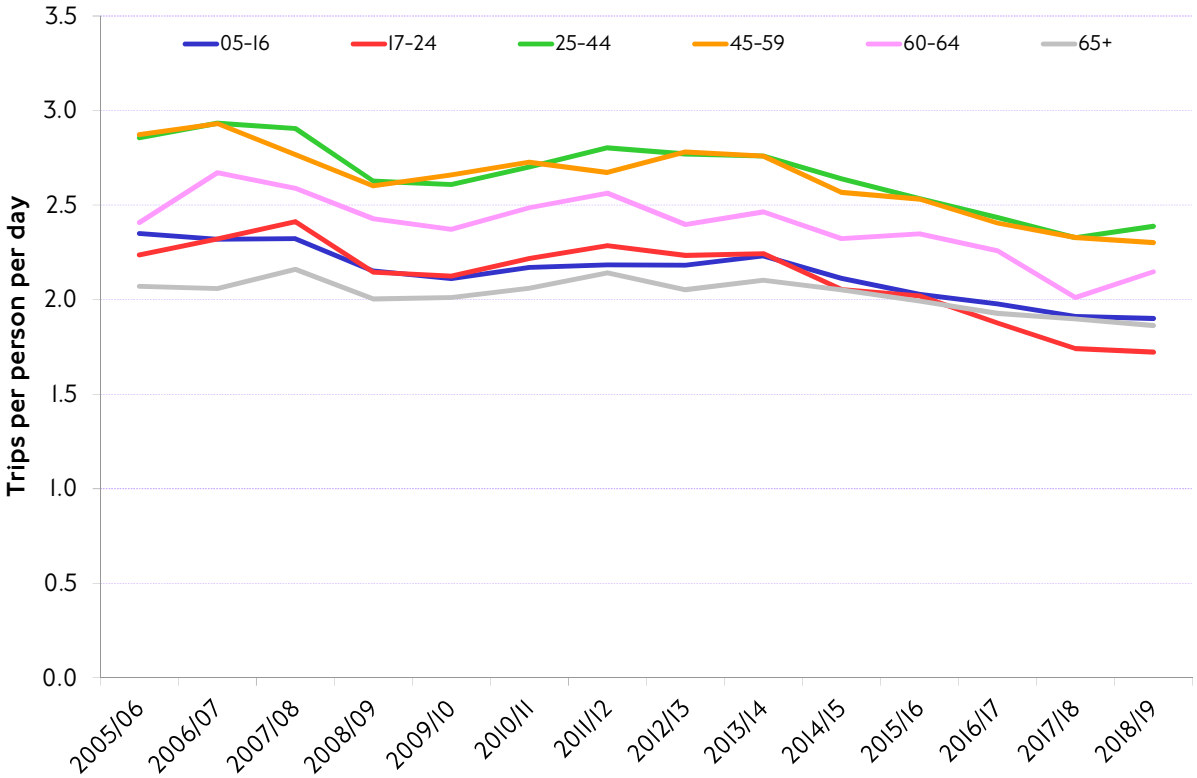


Source: Strategic Analysis, TfL City Planning.

Trip rates by age

London residents aged 25-44 and 45-59 make the highest number of trips per day. The decline in trip rates that has occurred over recent years is evident across all age groups, although the largest proportional decline in trip rates is seen among 17-24 year olds (a decline of 23 per cent since 2013/14 compared to an average of 15 per cent across all people). Since 2017/18, trip rates among 25-44 year olds and 60-64 year olds have increased slightly, whereas there were small declines across all other age groups (figure 4.5).

Figure 4.5 Trend in per-person trip rate per day (annual average), by age, London residents, 2005/06-2018/19.

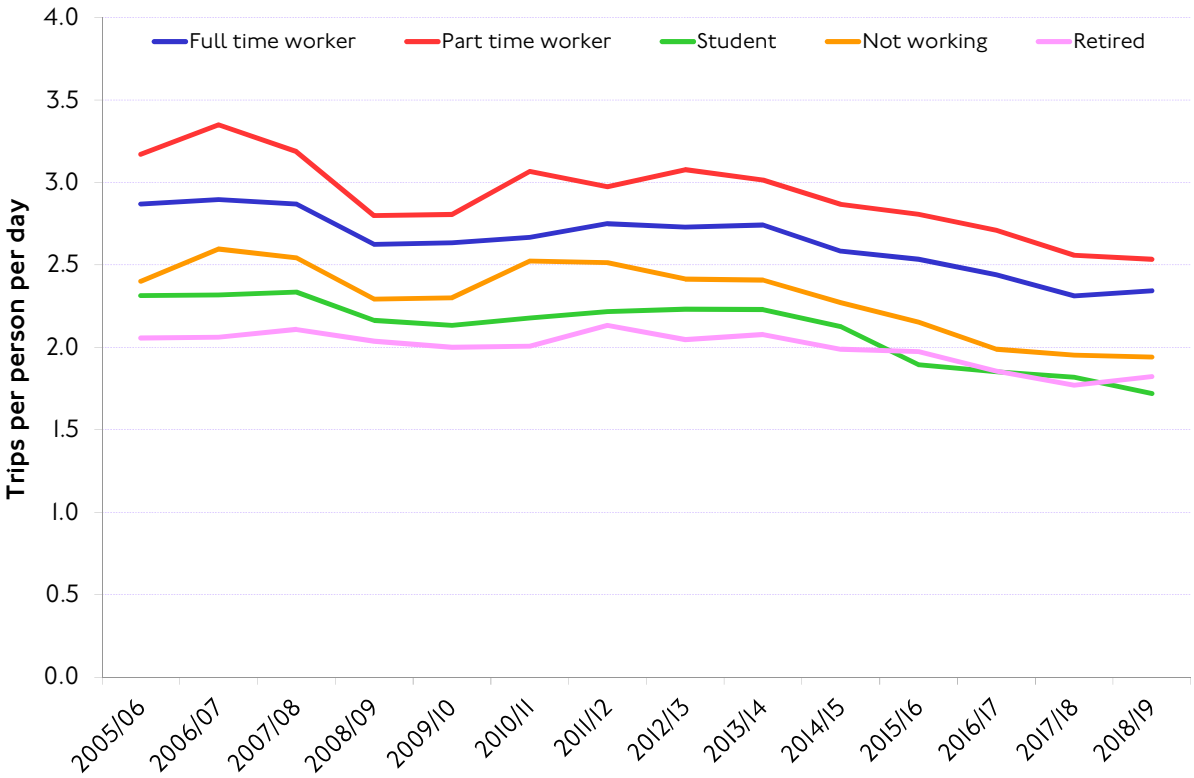


Source: Strategic Analysis, TfL City Planning.

Trip rates by working status

London residents who are in employment make the highest number of trips per day – those in part-time employment make around 2.5 trips per day and those in full-time employment make about 2.3 trips per day. London residents who are in education, retired or not working make fewer trips on average. The decline in trip rates that has occurred over the last four years is again evident across all working status groups, but students and London residents who are not working have seen greater declines in their trip rates since 2013/14 than the average London resident (figure 4.6).

Figure 4.6 Trend in per-person trip rate per day (annual average), by working status, London residents, 2005/06-2018/19.



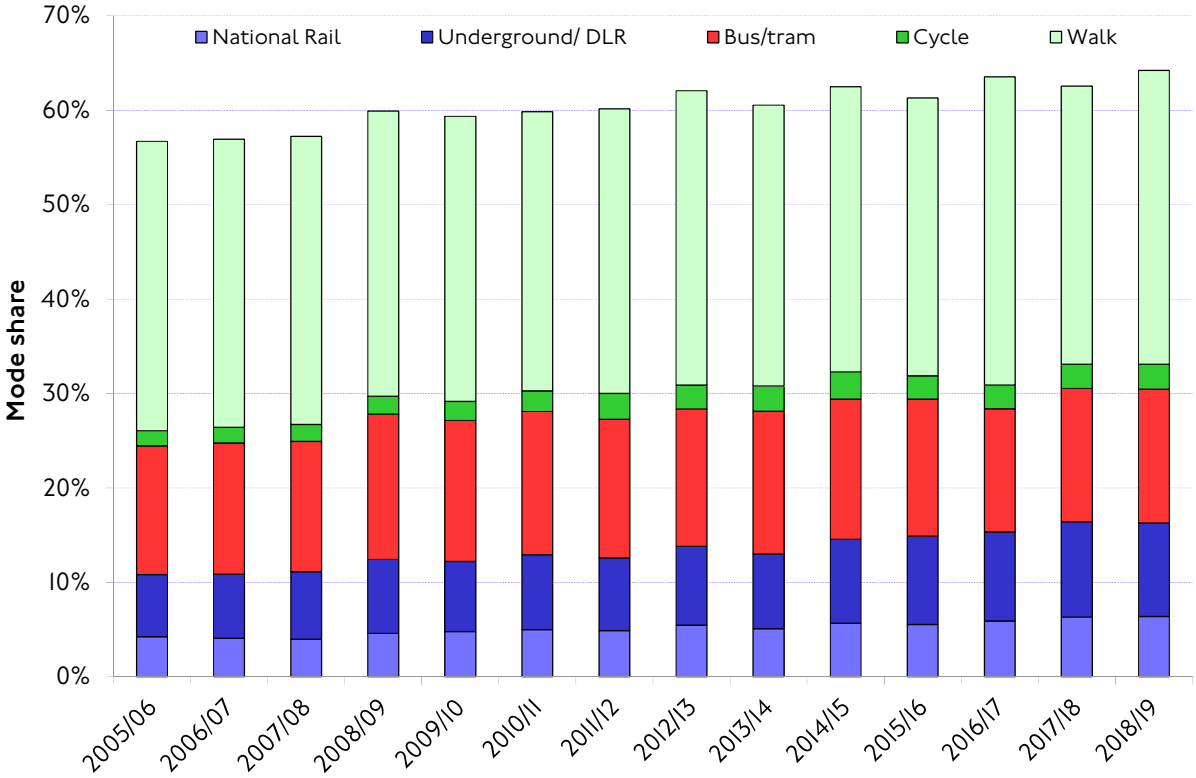
Source: Strategic Analysis, TfL City Planning.

4.3 Travel by London residents: active, efficient and sustainable mode shares

LTDS tells us about the mode share of London residents only, which is not the same as the Mayor's aim, which relates to all travel in London. The way in which the two indicators are measured also differs – and so while the trends shown by LTDS are useful for assessing general progress, and reflect the majority of people travelling in London, the specific numbers and proportions will not relate directly to those calculated every year (and published in Chapter 2 of this report), which relate specifically to the Mayor's aim.

Figure 4.7 shows that the proportion of trips by London residents that are made by active, efficient and sustainable modes has fluctuated over the last few years at around 60 per cent. In the latest year, there has been a 1.7 percentage point increase in the active, efficient and sustainable mode share, which is the result of an increase in the walking mode share. The share of trips by other modes changed very little in the last year.

Figure 4.7 Active, efficient and sustainable mode share for trips by London residents, 2005/06-2018/19.



Source: Strategic Analysis, TfL City Planning.

Spatial variation in active, efficient and sustainable mode share

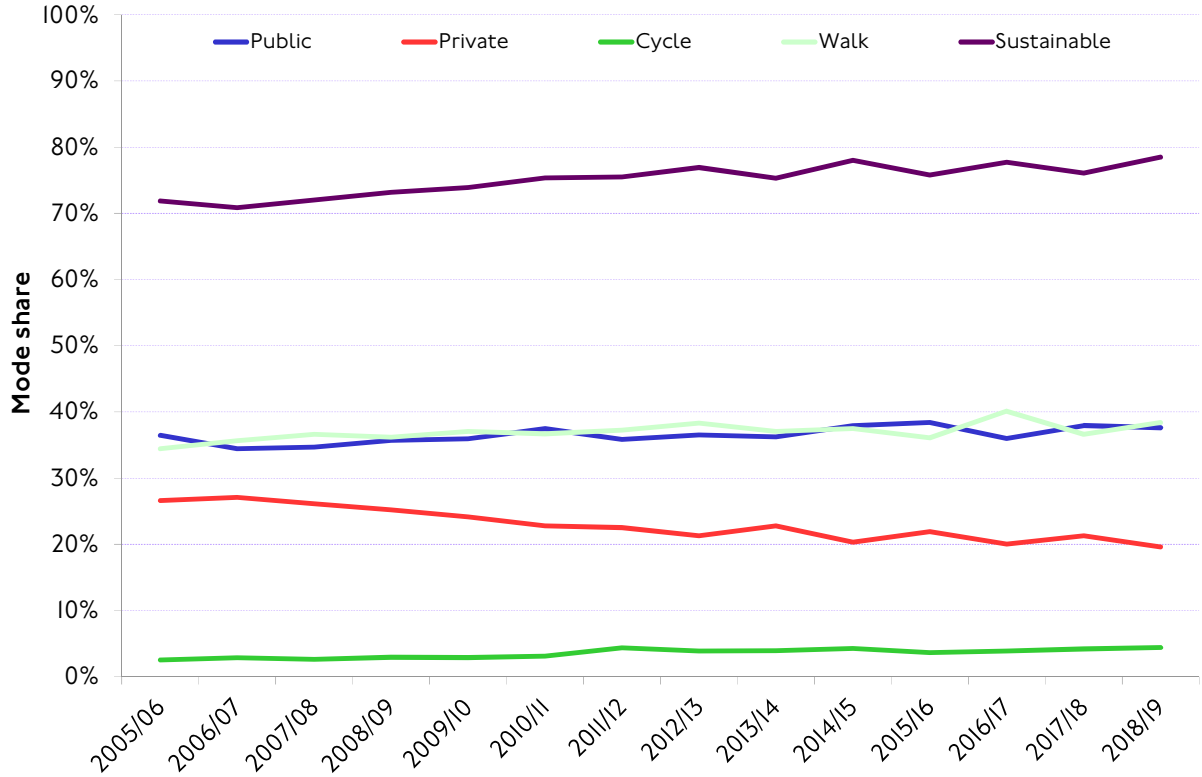
Mode shares vary geographically. Typically, the highest active, efficient and sustainable mode shares characterise trips involving central and inner London. This analysis is based on area of residence, although trips may be made in other areas, so long as one end of the trip is within the GLA area.

Inner London (including central London)

Among inner and central London residents, public transport mode shares have remained broadly constant at around 35 to 38 per cent, with a small decrease in the latest year. Despite small fluctuations in recent years, there has been a sustained decline in the private transport mode share over the period, falling from 27 per cent in 2005/06 to 20 per cent in 2018/19 (figure 4.8). Cycle mode share increased, from 2.5 per cent in 2005/06 to 4.4 per cent in 2018/19, with a 0.2 percentage point increase in the latest year. The walk mode share has also fluctuated in recent years but has increased from 34.4 per cent in 2005/06 to 38.4 per cent in 2018/19, with a small increase in the latest year.

Some 71.9 per cent of trips by central and inner London residents were made by active, efficient and sustainable modes in 2005/06, increasing to 78.5 per cent of trips in 2018/19.

Figure 4.8 Mode share of trips by inner London residents, 2005/06–2018/19.

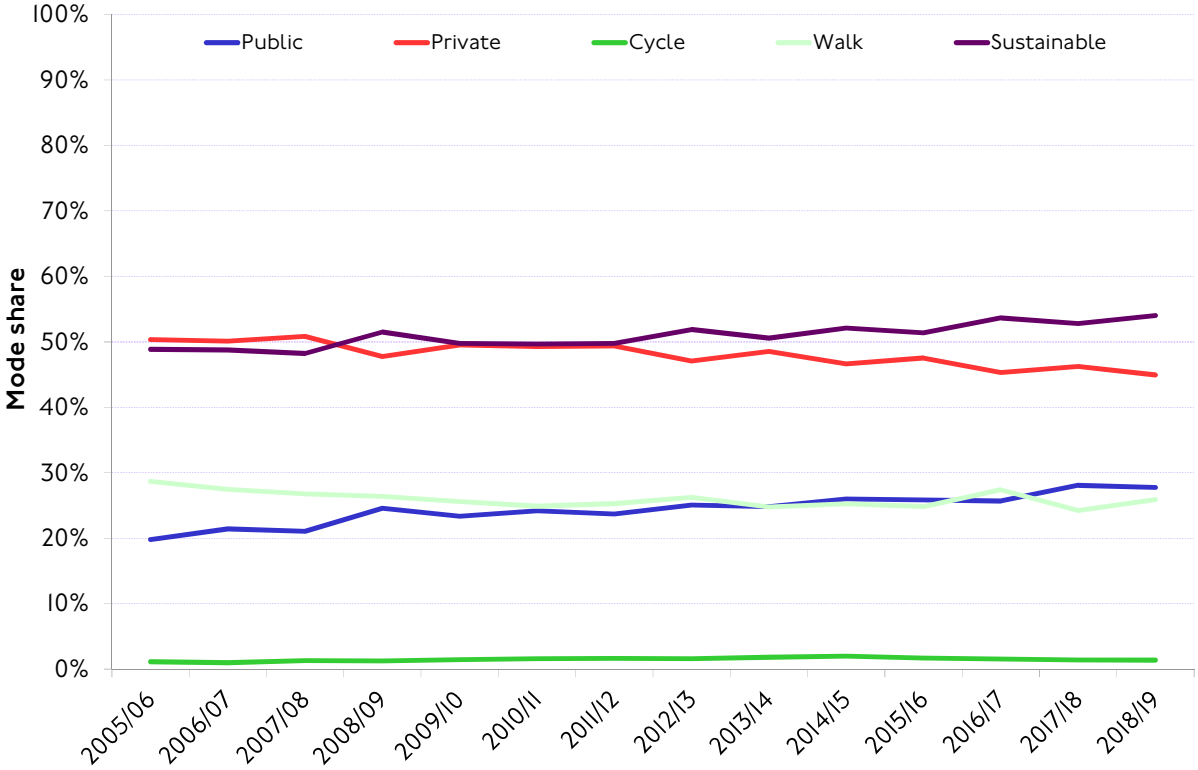


Source: Strategic Analysis, TfL City Planning.

Outer London

In outer London, where public transport coverage is less comprehensive, the trends have been different, with private transport mode share falling at a slower rate, from 50.4 per cent in 2005/06 to 45 per cent in 2018/19 (figure 4.9). Public transport mode share increased from 19.8 per cent to 27.8 per cent over the same period, despite a slight fall in the latest year. The cycling mode share among outer London residents is much lower than among inner London residents and has increased at a slower rate, from 1.1 per cent in 2005/06 to 1.4 per cent in 2018/19. The walk mode share has decreased over the period from 28.7 per cent in 2005/06 to 25.9 per cent in 2017/18. In 2005/06, less than half (48.9 per cent) of trips by outer London residents were made by active, efficient and sustainable modes, and in 2018/19 this had increased to 54 per cent of trips, with a 1.2 percentage point increase in the latest year.

Figure 4.9 Mode share of trips by outer London residents, 2005/06–2018/19.



Source: Strategic Analysis, TfL City Planning.

Borough-level patterns

Figure 4.10 shows the trip-based active, efficient and sustainable mode share by borough of residence. This figure includes all trips undertaken by residents of each borough, irrespective of where the trips take place (although one end of the trip must be in the GLA area to be included). There are many reasons underlying these patterns but the considerable variation highlights both challenges and opportunities in respect of achieving the active, efficient and sustainable mode share aim.

In general, inner London residents have a higher share of trips made by active, efficient and sustainable modes, and this is to be expected given the denser land use and more comprehensive public transport network. Residents of the City of London have the highest overall active, efficient and sustainable mode share (93 per cent), but the smaller number of households in the City of London compared to other London boroughs should be recognised.

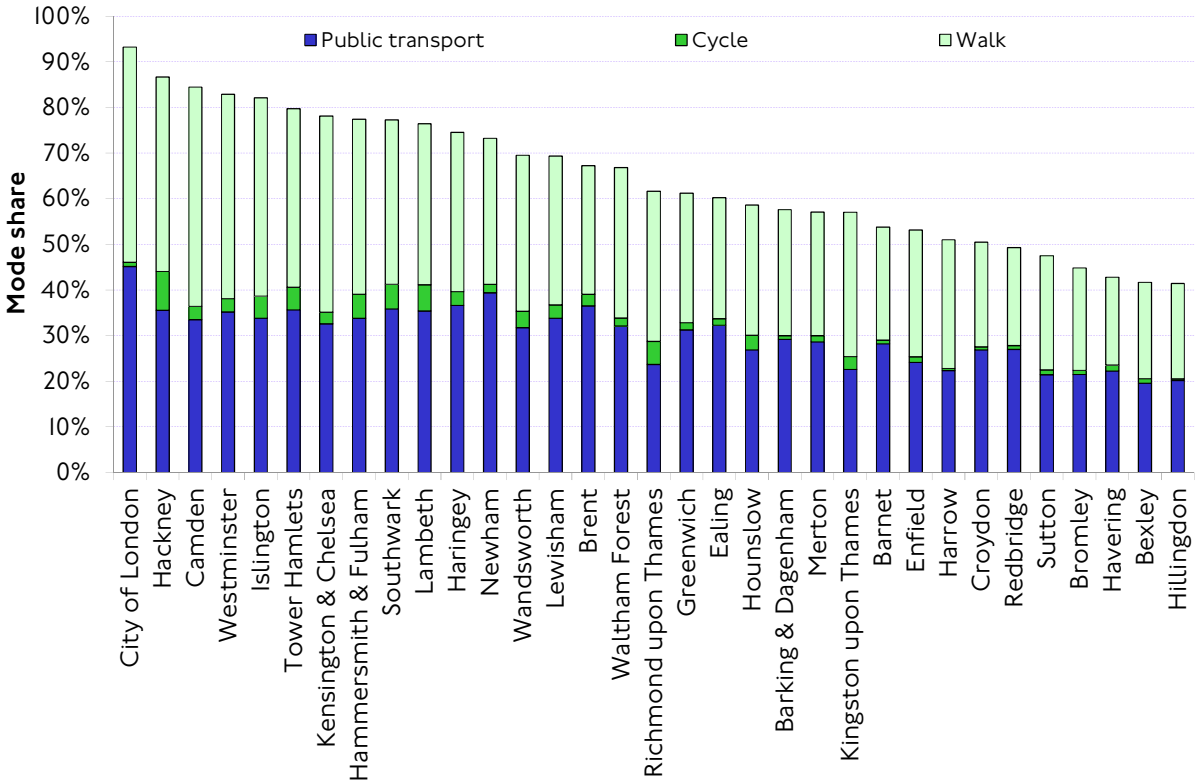
Hackney has the second highest active, efficient and sustainable mode share (87 per cent), in part due to the high cycle mode share of 8.5 per cent. Residents of the City of London, Camden and the City of Westminster have notably high walk mode shares, whereas residents of the City of London, Haringey and Newham have the highest public transport mode shares.

Outer London residents have lower overall active, efficient and sustainable mode shares. Residents of Brent have the highest active, efficient and sustainable mode share (67 per cent) of all of the outer London boroughs, due to a higher than average public transport mode share of 37 per cent. Residents of Waltham Forest also have a higher than average active, efficient and sustainable mode share for

outer London, with the highest outer London walk mode share of 33 per cent, along with Richmond upon Thames. Richmond upon Thames residents also have the highest outer London cycle mode share of 5 per cent. Residents of Bexley and Hillingdon have the lowest active, efficient and sustainable mode share of 42 per cent and 41 per cent respectively, followed by Havering (43 per cent) and Bromley (45 per cent).

Particularly notable from the figure is the variation in the proportion of the mode share accounted for by cycling and (in particular) walking. Public transport mode shares are relatively more consistent between boroughs.

Figure 4.10 Trip-based mode share for active, efficient and sustainable modes, by borough of residence, LTDS 3 year average, 2016/17-2018/19.



Source: Strategic Analysis, TfL City Planning.

4.4 Focus on: car ownership in London

Introduction

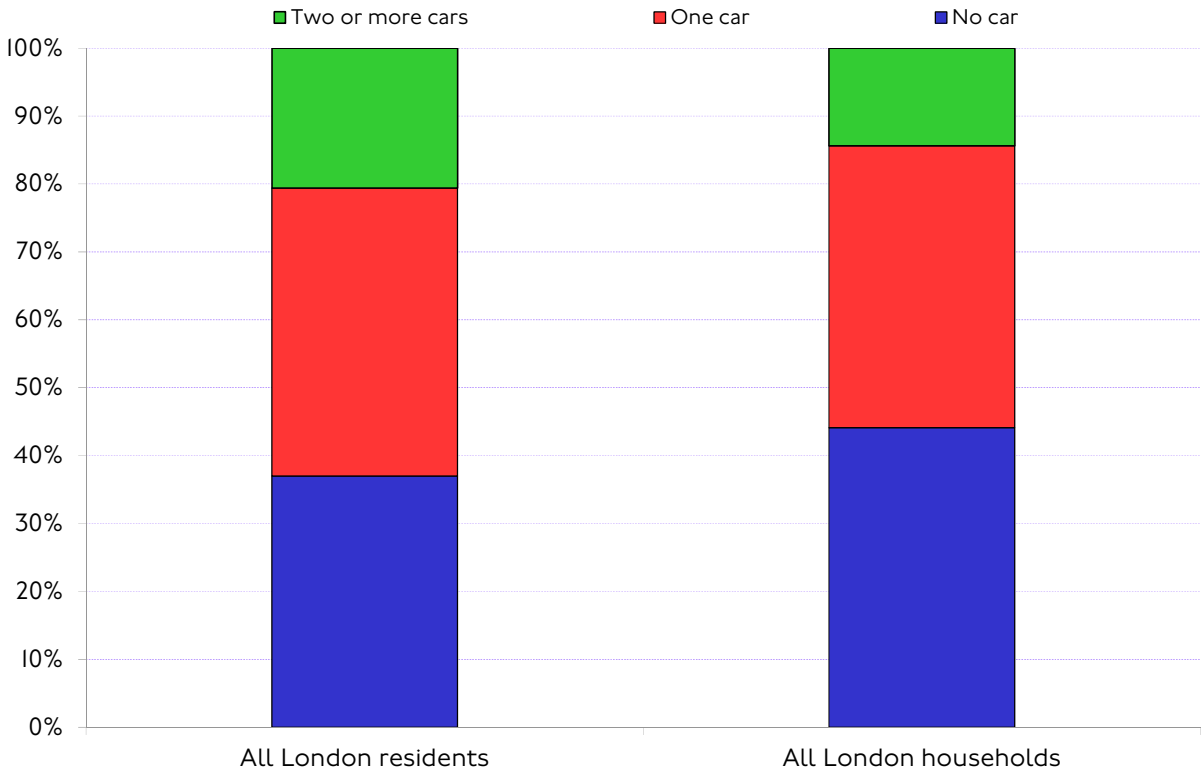
This section considers patterns of car ownership in London and some of the implications of this. Car ownership has a clear relationship with travel patterns, with people who have access to a car making very different travel decisions to those who do not. While most of the impact of cars is due to their movement, their storage also affects street environments across London. Levels of car ownership in the future will therefore have a bearing on sustainable transport outcomes, both directly and through decisions about how road space is allocated. Understanding the role of car ownership and what determines it will therefore be important to securing lower congestion, emissions and better health in years to come.

Proportion of residents and households that have access to one or more cars

In 2017, there were nearly 2.7 million cars licensed in London. While the number of vehicles licensed in London has increased by 10 per cent compared to 2000, this is considerably slower than the growth in vehicle numbers across the UK of 28 per cent, reflecting wider travel trends in the Capital.

This number equates to around 0.76 vehicles per household; however, access to these vehicles is not evenly spread. Figure 4.11 shows that only 56 per cent of London households in London have access to a car (or other vehicle), while a quarter of these households own multiple vehicles (14 per cent of all households).

Figure 4.11 Residents and households access to cars in London, LTDS 2016/17.



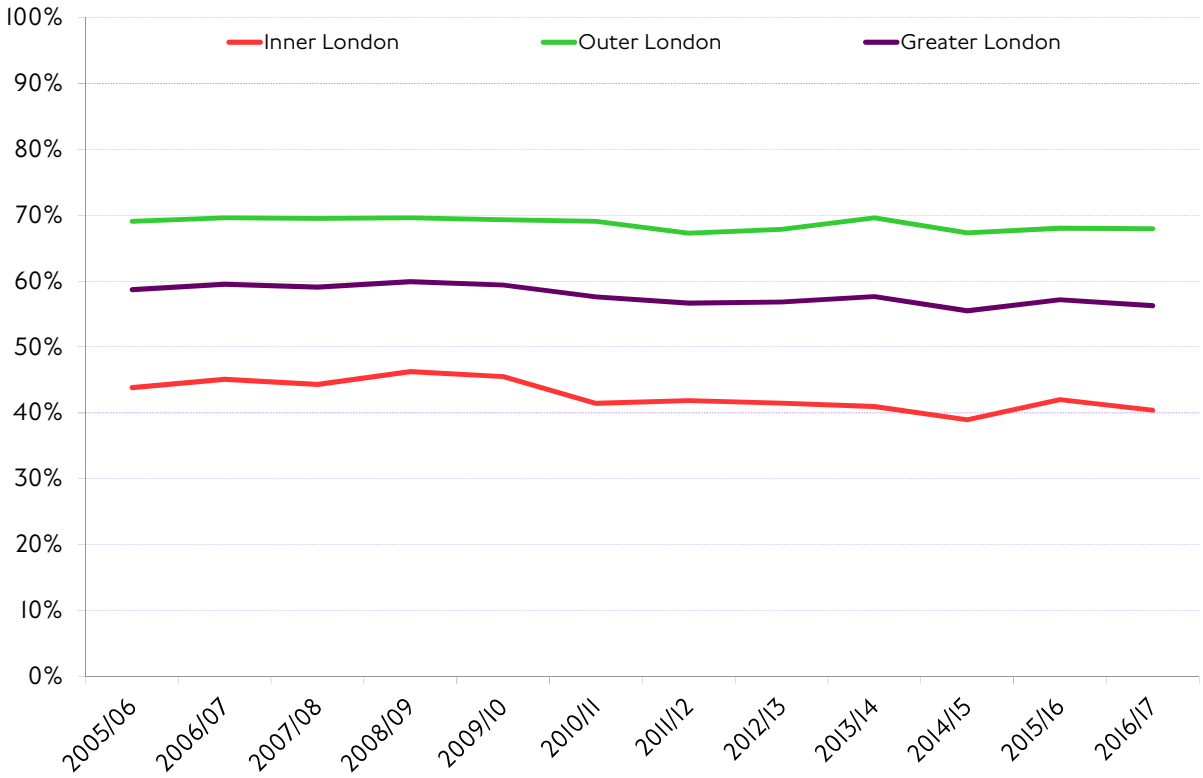
Source: Strategic Analysis, TfL City Planning.

Car ownership varies considerably between different parts of London, only 40 per cent of inner London households have a car, compared to 68 per cent of outer London households. Access to a car among London households was relatively stable over the previous decade. However, figure 4.12 shows that there has been a decline in the rate of ownership since the early 2010s.

Relationship between car ownership and active, efficient and sustainable mode share

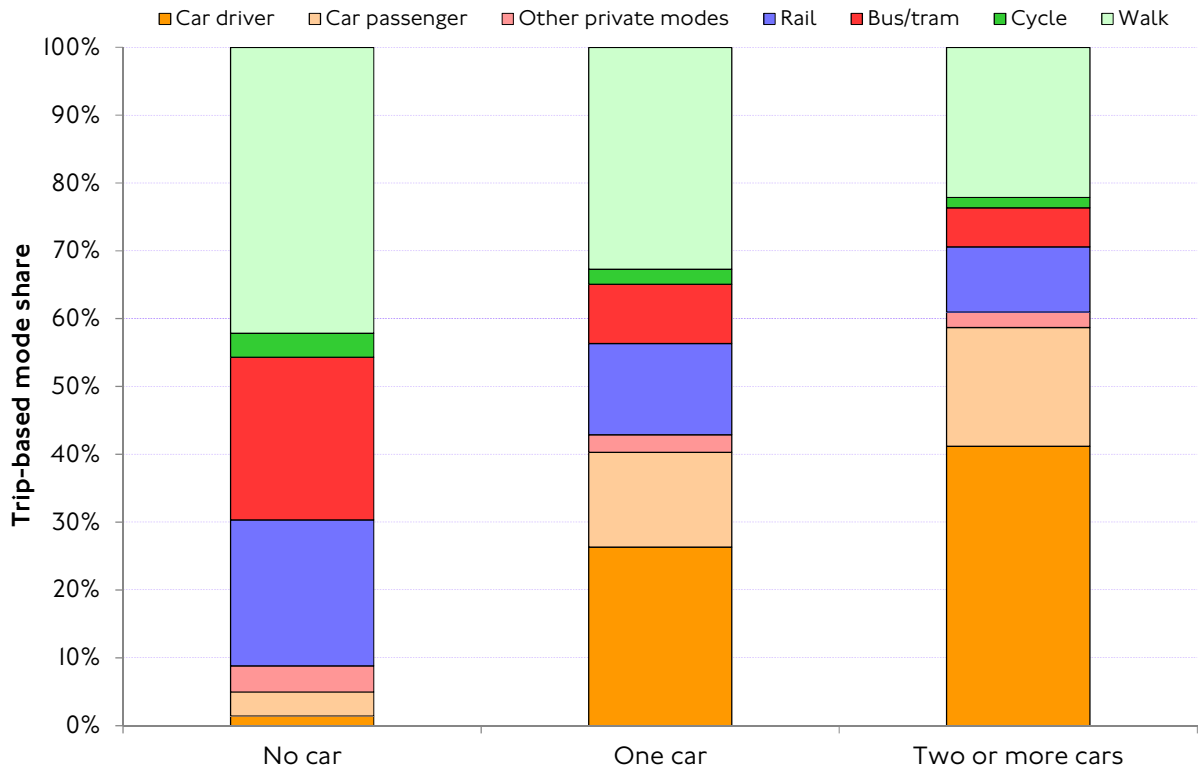
Figure 4.13 shows that households with access to cars have very different travel patterns to those that do not have access to a car. Car ownership is strongly correlated with a higher proportion of trips made by car and, consequently, lower levels of active travel and public transport usage (which in turn limits opportunities for physical activity through daily travel). People in car-owning households are less likely to use the bus in particular, while multiple car ownership is associated with even higher levels of car use, particularly car driver trips (potentially implying lower average car-occupancy in these households).

Figure 4.12 Proportion of households with access to at least one car, by area, 2005/06-2016/17.



Source: Strategic Analysis, TfL City Planning.

Figure 4.13 Trip-based mode share by household car access, LTDS 2016/17.

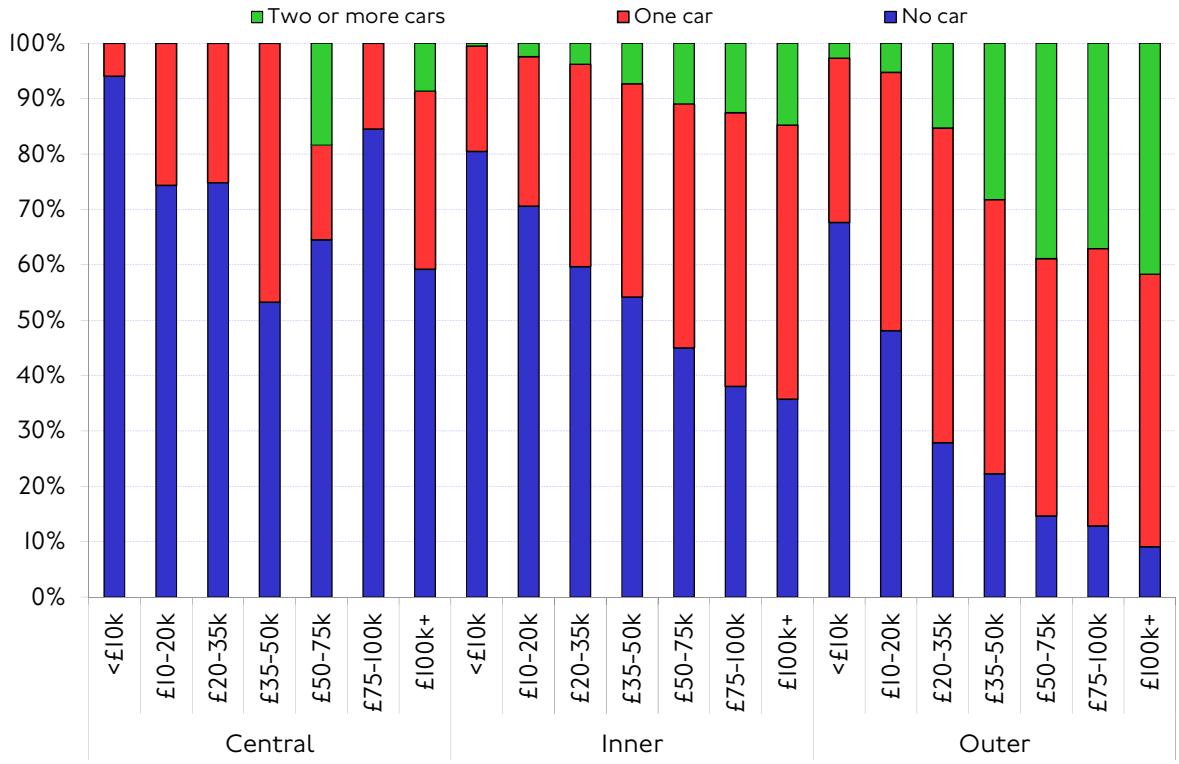


Source: Strategic Analysis, TfL City Planning.

Car ownership and household income

Figure 4.14 shows that income is a strong predictor of car ownership in inner and outer London, with car ownership generally increasing as household income increases. Households with higher incomes are also more likely to own two cars. The correlation between household income and car ownership is less strong in central London, where for example, more than half of households in the highest income bracket (more than £100,000 per year) do not have access to a car.

Figure 4.14 Proportion of households with access to a car, by annual household income and location, LTDS 2016/17.

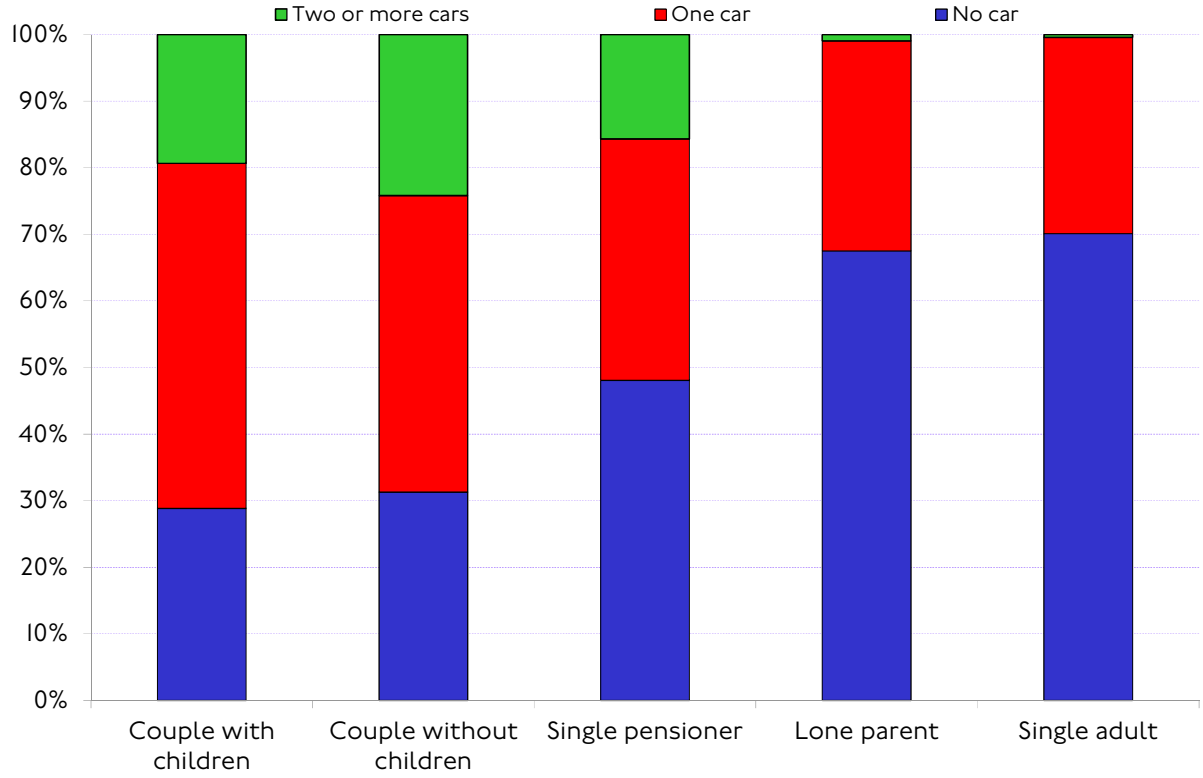


Source: Strategic Analysis, TfL City Planning.

Car ownership and household structure

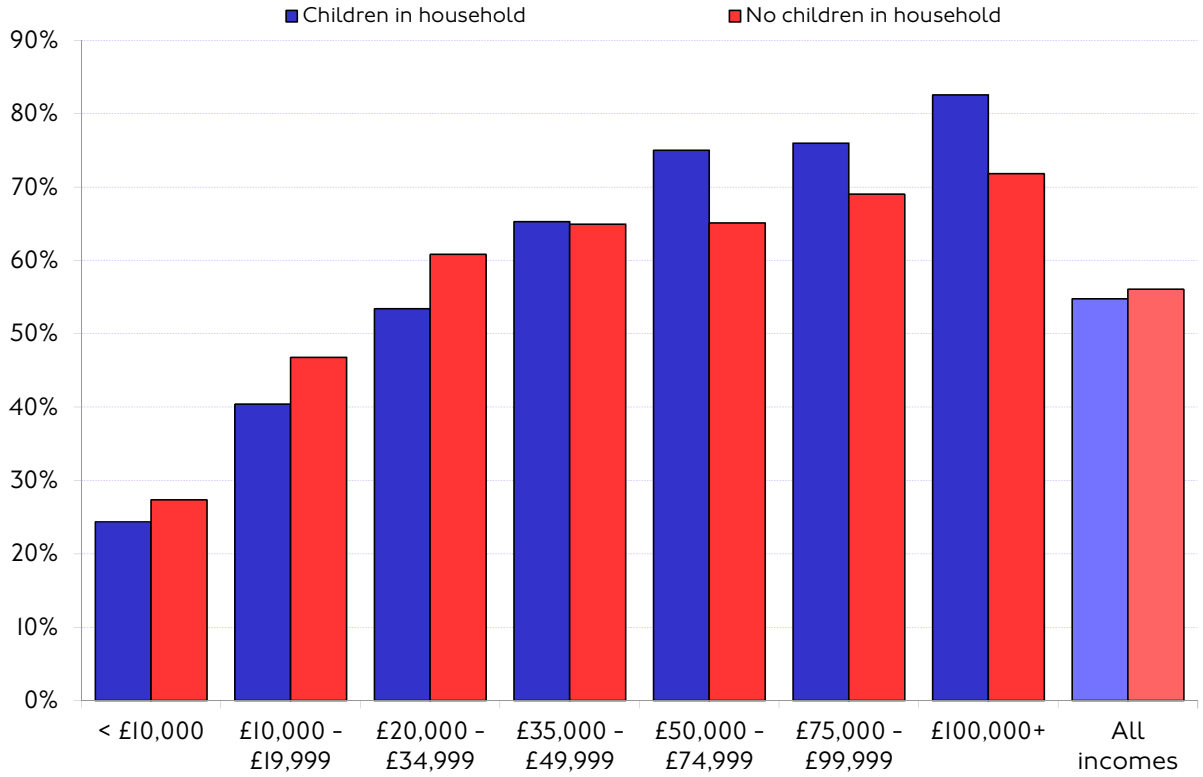
Household structure is another predictor of car ownership, particularly among couples compared to single adults (figure 4.15). However, the presence of children in a household appears to have little effect on car ownership once the number of adults in the household has been taken into account. Most couples – possibly in part due to having two potential earners – have access to a car, with 71 per cent of couples with children owning at least one, compared to 69 per cent of couples without children. Similarly, most one-adult households do not own a car, with only 33 per cent of lone parents and 30 per cent of single adult households owning a car. Single pensioners are more likely to own a car than other single adults, but less likely than couples. Households with children and an income of less than £50,000 have similar or lower rates of car access to those without children. Above this income, households with children are slightly more likely to own at least one car, although households without children and with incomes higher than £50,000 are more likely to own a car than those with children and with incomes less than £50,000 (figure 4.16).

Figure 4.15 Proportion of households with access to a car, by household structure, LTDS 2016/17.



Source: Strategic Analysis, TfL City Planning.

Figure 4.16 Proportion of households with access to a car, by household income and structure, LTDS 2016/17.

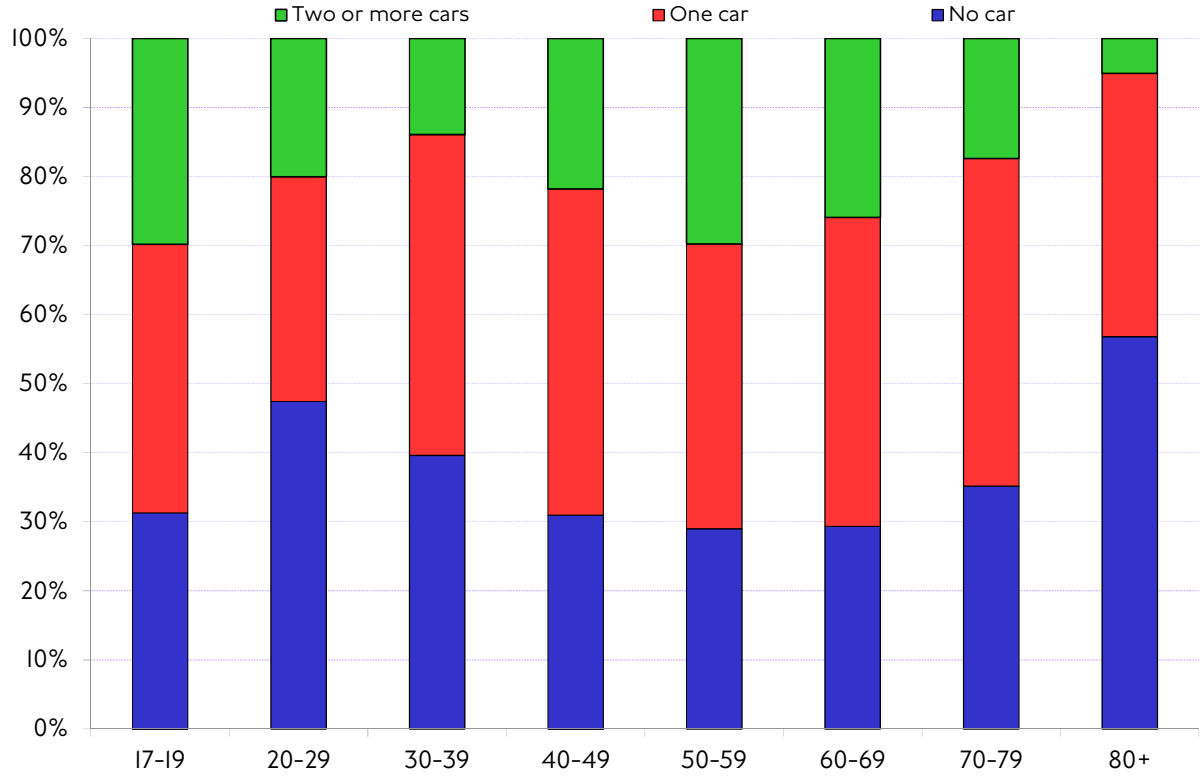


Source: Strategic Analysis, TfL City Planning.

Car ownership and age

Figure 4.17 shows that, between the ages of 20 and 70, car ownership is higher among older age groups. Levels of car ownership are highest among 50-59 year olds, while the lowest levels are seen among London residents aged 20-29. Above age 70, car ownership starts to decline considerably, perhaps caused by a declining ability to drive or retirement reducing the need to. Most Londoners aged 17-19 live in a household with a car, which is likely to reflect the fact they are more likely to live with parents who own a car than 20-29 year olds.

Figure 4.17 Proportion of households with access to a car, by age, LTDS 2016/17.



Source: Strategic Analysis, TfL City Planning.

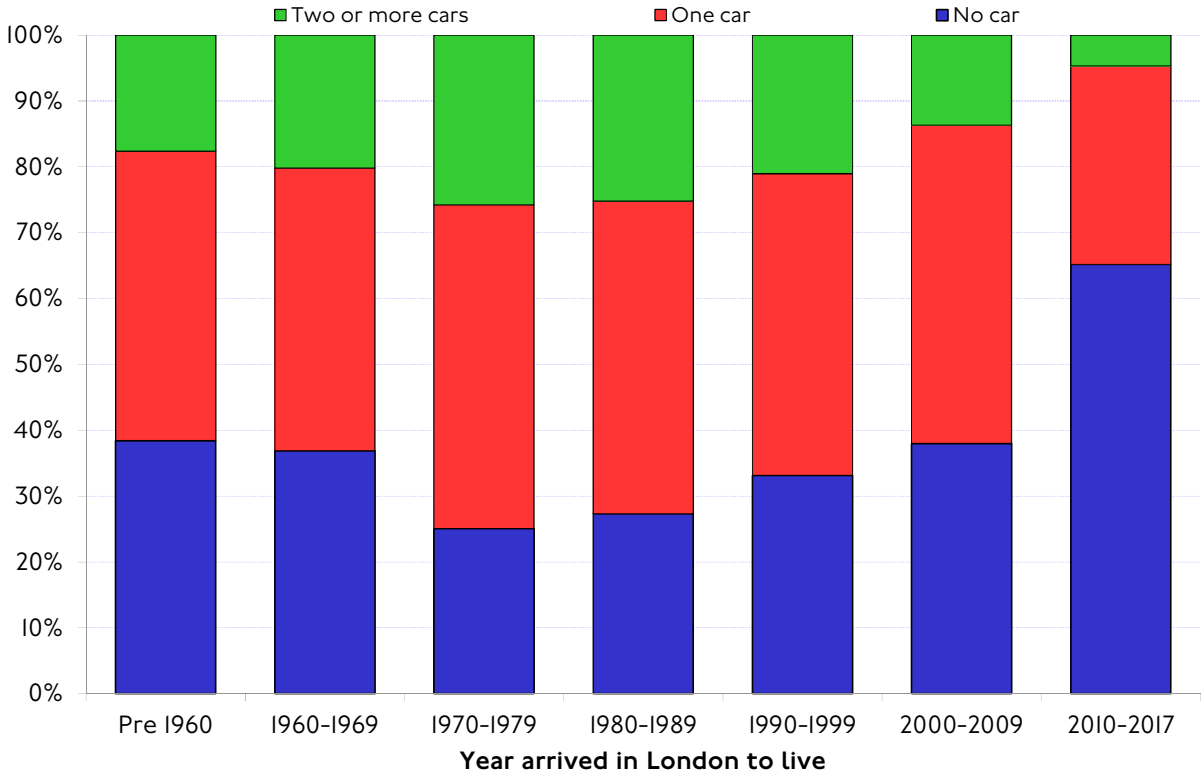
Car ownership and year arrived in London

Car ownership rates vary little between people who arrived in London in each of the decades before 2010, although they tend to be lower in more recent years after 1970. However, since 2010, there is a significant difference, with people who moved to London in the last ten years considerably less likely to own a car than those who have lived in the city for longer. Almost two thirds of Londoners who have arrived since 2010 do not have access to a car, compared to less than 40 per cent of people who arrived in any of the preceding decades.

This is likely to be explained by a range of factors, rather than any single reason. While younger people are less likely to have a car, the post-2010 group are significantly less likely to own a car than any single age group. Similarly, other factors like country of origin cannot fully explain this trend. While people born outside the UK are less likely own a car (46 per cent) than those born in London (29 per cent) or elsewhere in the UK (36 per cent), this is still significantly lower than the post-2010 group. It is possible that changes to the transport system, housing market and economy prior to 2010 may have influenced the decisions of those

arriving in London (for instance improved public transport, more parking controls or the location or nature of housing and employment).

Figure 4.18 Proportion of households with access to a car, by year of arrival in London for London residents born outside of London, LTDS 2016/17.



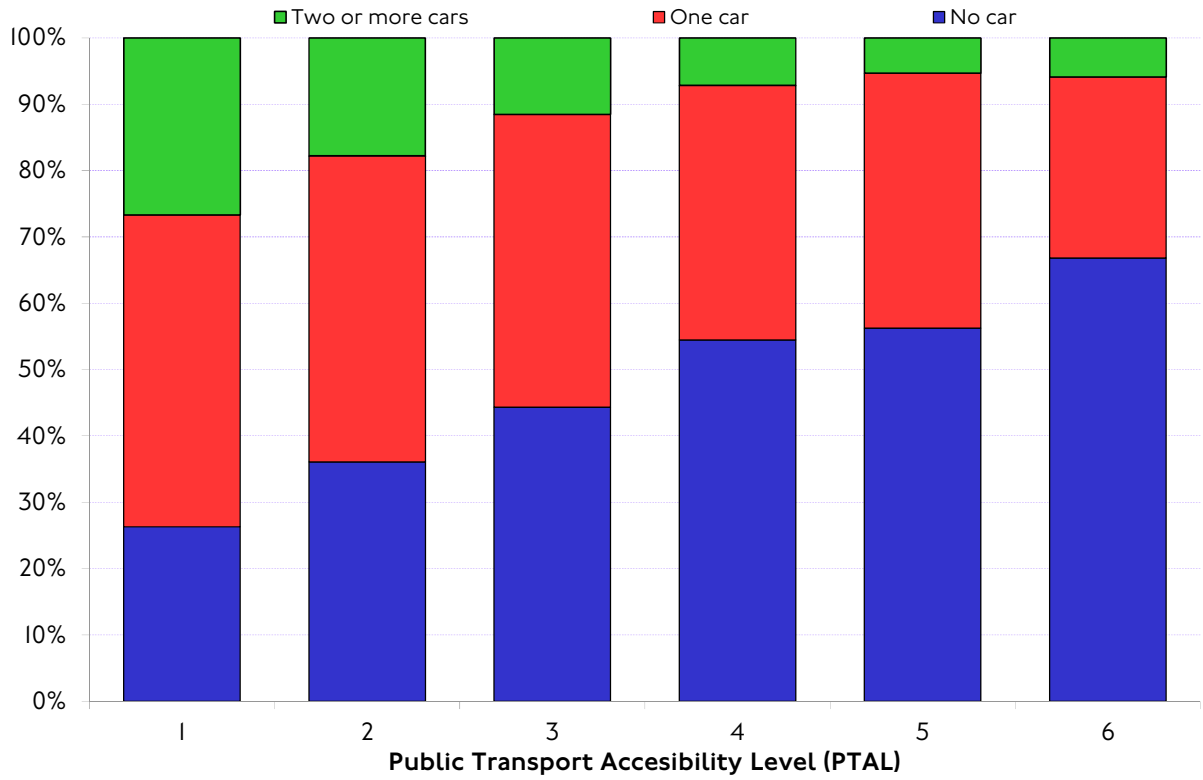
Source: Strategic Analysis, TfL City Planning.

Car ownership and access to public transport

Public Transport Access Level (PTAL) is a measure that assesses connectivity (level of access) to the transport network, combining walk time to stops/stations on the public transport network with the level of service provided there. Figure 4.19 shows the relationship between car ownership and PTAL, with considerably lower levels of car ownership at higher PTAL, reflecting the better alternatives to car use in these locations.

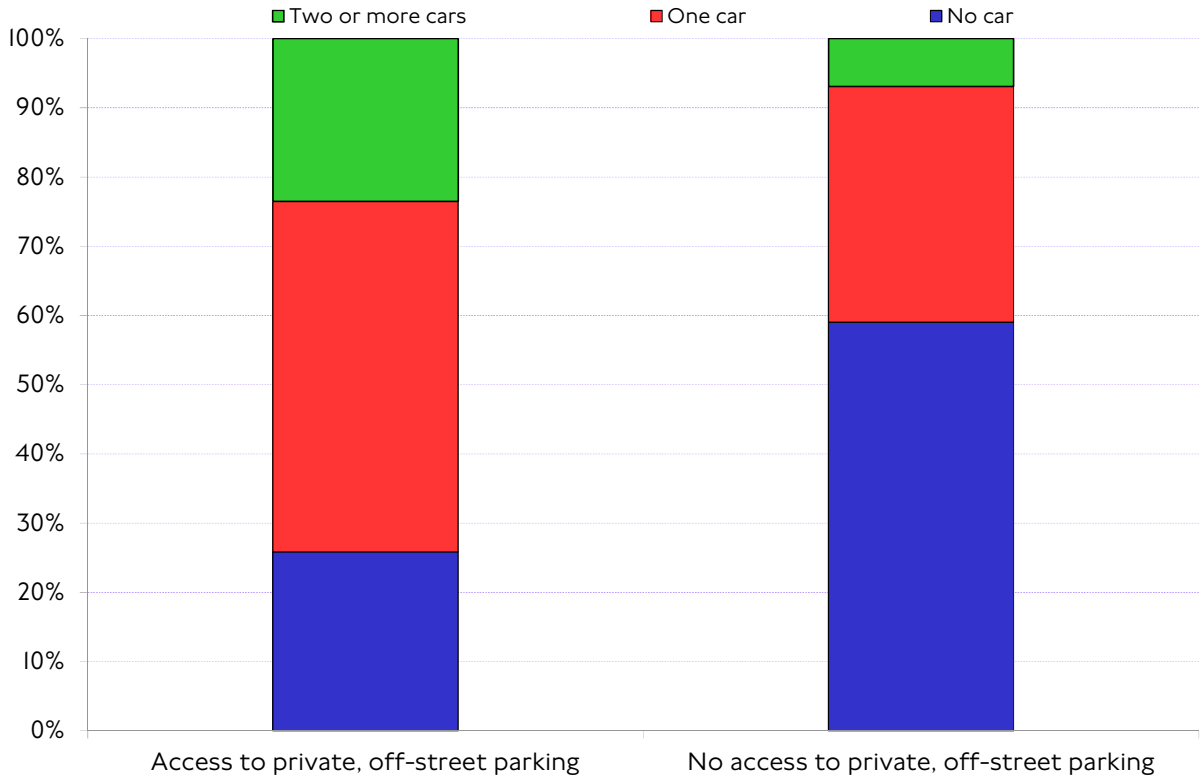
A similar relationship exists with population density, with lower levels of car ownership at higher densities. This may be in part due to its correlation with public transport access: development around transport hubs tends to be denser and denser development helps justify and pay for transport improvements. Areas with higher population densities can also support more local services that are accessible on foot, reducing the need for a car.

Figure 4.19 Proportion of households owning cars, by PTAL, LTDS 2016/17.



Source: Strategic Analysis, TfL City Planning.

Figure 4.20 Proportion of households owning cars, by access to parking, LTDS 2016/17.



Source: Strategic Analysis, TfL City Planning.

Car ownership and access to parking

Access to off-street parking is a strong predictor of car ownership, and particularly multiple-car ownership. Figure 4.20 shows that households without access to off-street parking are more than twice as likely not to own a car compared to households with off-street parking. However, there is also likely to be an element of 'self-selection' here, as those who require a car for work or other reasons will disproportionately choose locations where such parking is available.

More in depth analysis allows for other factors such as household structure and income to be taken into account. In 2017, TfL analysis explored the relationship between household parking and car availability. It found that the availability of off-street parking increases the probability that a household owns a car by 23 per cent overall, and in central London by 32 per cent.

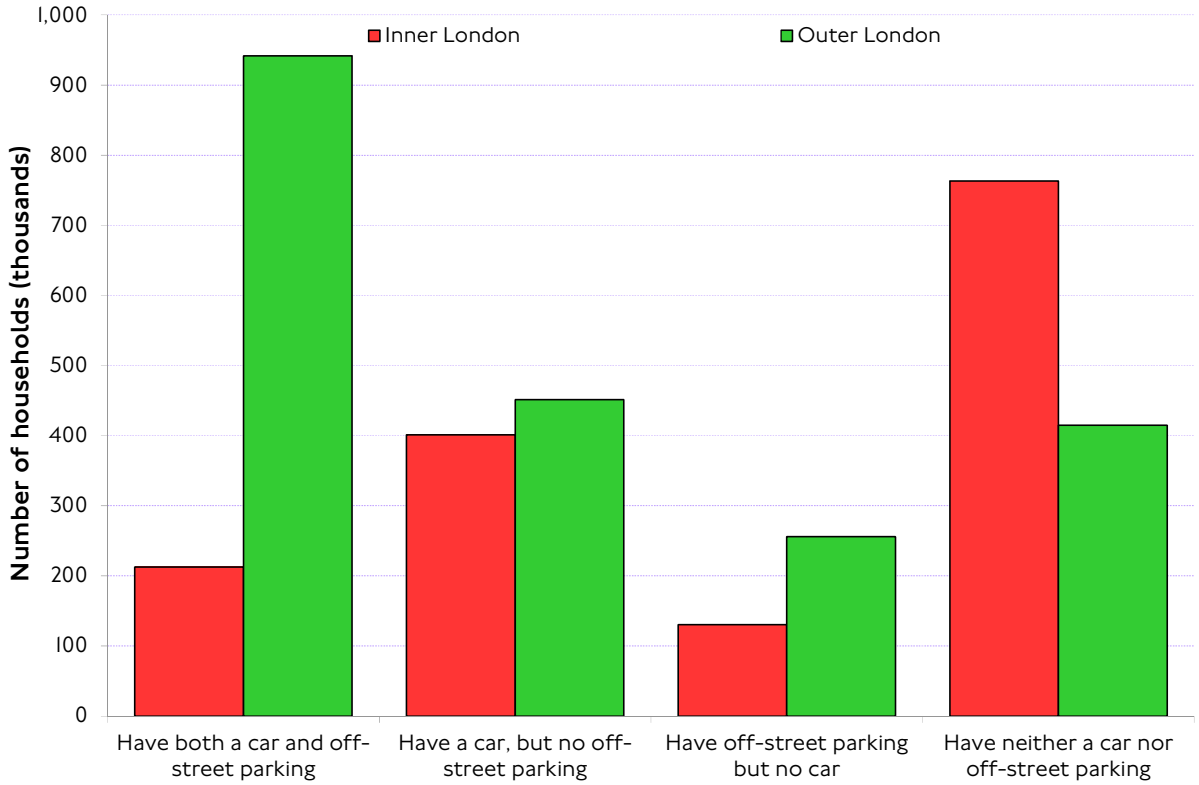
Parking

Car ownership not only reduces the use of sustainable modes, but the space taken up by cars parked on London's streets is significant. A large majority of London households have access to parking at their address: 76 per cent either have a car (parked on or off-street) or do not have a car but have access to off-street parking (while more households without a car could potentially park one on-street).

Figure 4.21 shows the distribution of these households by access to a car and access to off-street parking across both inner and outer London. Levels of off-street parking in particular are lower in inner London (although so is, to a lesser degree, car ownership). The two largest groups represent very different sets of circumstances: over 940,000 outer London households have at least one car and access to off-street parking, while over 760,000 inner London households have neither.

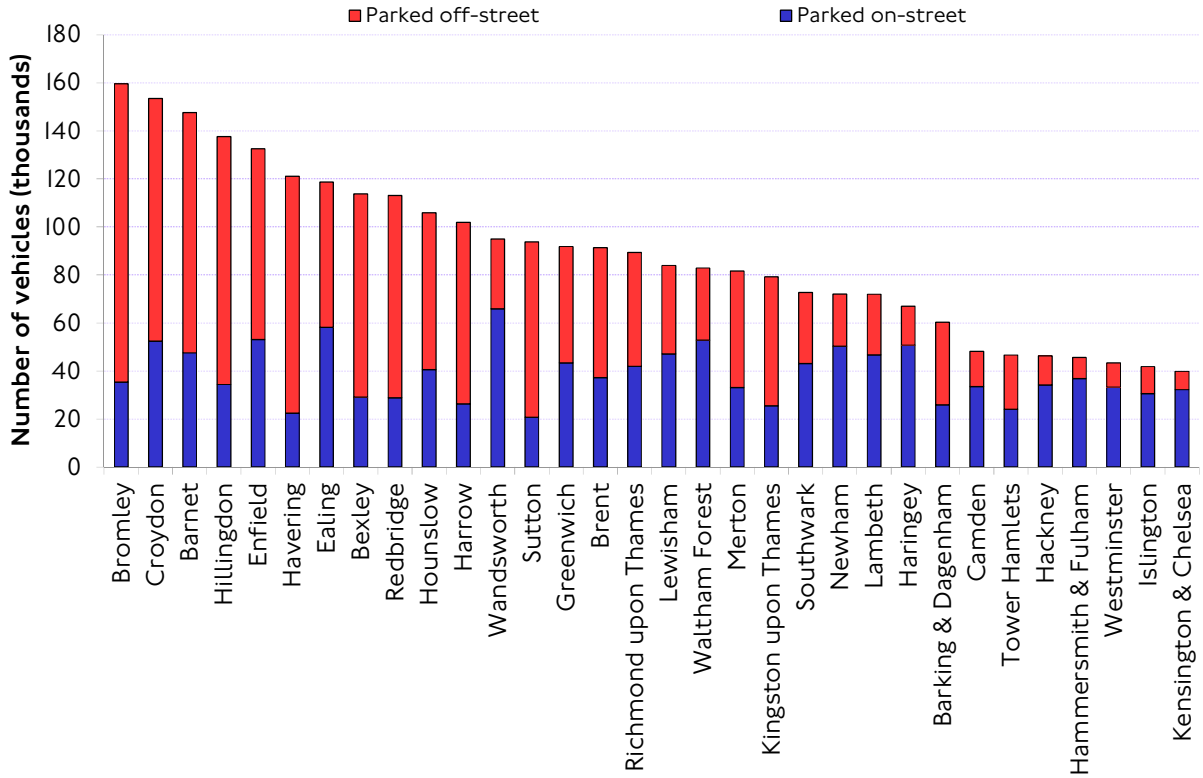
Figure 4.22 shows the number of cars parked by residents in each borough, split by those parked off-street and those parked on-street. Those with the most vehicles parked on their streets are not necessarily the boroughs with the greatest numbers of vehicles overall. For example, Wandsworth has the most vehicles parked on its streets despite there being 11 boroughs with more vehicles in total. In total, over 1.2 million vehicles are parked on London's streets, taking up an estimated 14 square kilometres of space, an area equivalent to ten times the size of Hyde Park.

Figure 4.21 Number of households by car access and parking category, LTDS 2016/17.



Source: Strategic Analysis, TfL City Planning.

Figure 4.22 Number of vehicles by borough and parking category, LTDS 2016/17.

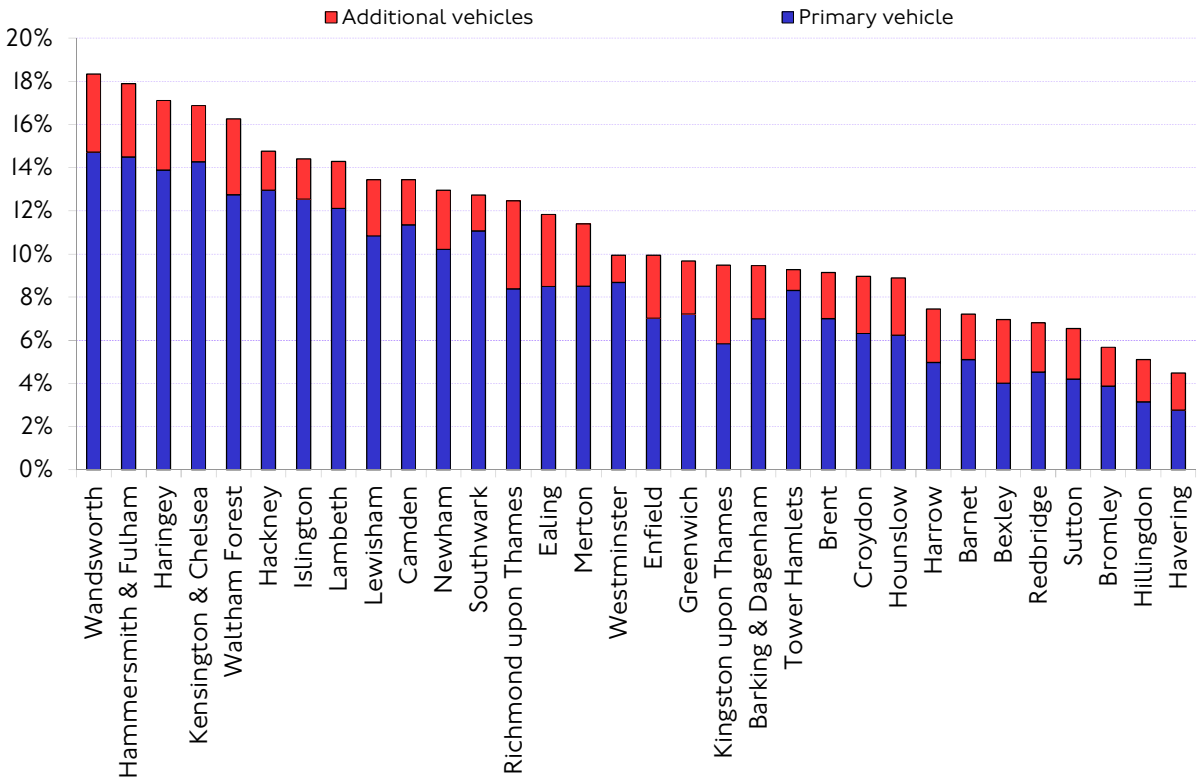


Source: Strategic Analysis, TfL City Planning.

The amount of road space taken up by cars parked on-street varies considerably by borough, with greater proportions in smaller boroughs and those with more cars parked on-street. Figure 4.23 shows that the proportions are generally higher in inner London, reaching as high as 18 per cent of available road space in the boroughs of Wandsworth and Hammersmith & Fulham. However, certain outer London boroughs also have higher proportions, with over 16 and 12 per cent of road space in Waltham Forest and Richmond upon Thames used for vehicles parked on-street respectively. On average, around 14 per cent of road space in inner London boroughs is used for on-street parking, compared to 8 per cent in outer London.

Most of the cars parked on London's streets are the only or primary car used by a household. However, in some boroughs a significant proportion are additional vehicles, which, as described above, are more likely to be associated with higher incomes and lower travel by active modes. In some boroughs, these vehicles represent a significant proportion of those parked on street (over 40 per cent in Bexley) and tend to represent a higher proportion in outer London, where multiple car ownership is more common.

Figure 4.23 Proportion of road space taken up by vehicles parked on-street, LTDS 2016/17.



Source: TfL City Planning analysis of OS MasterMap Highways Network (2019).

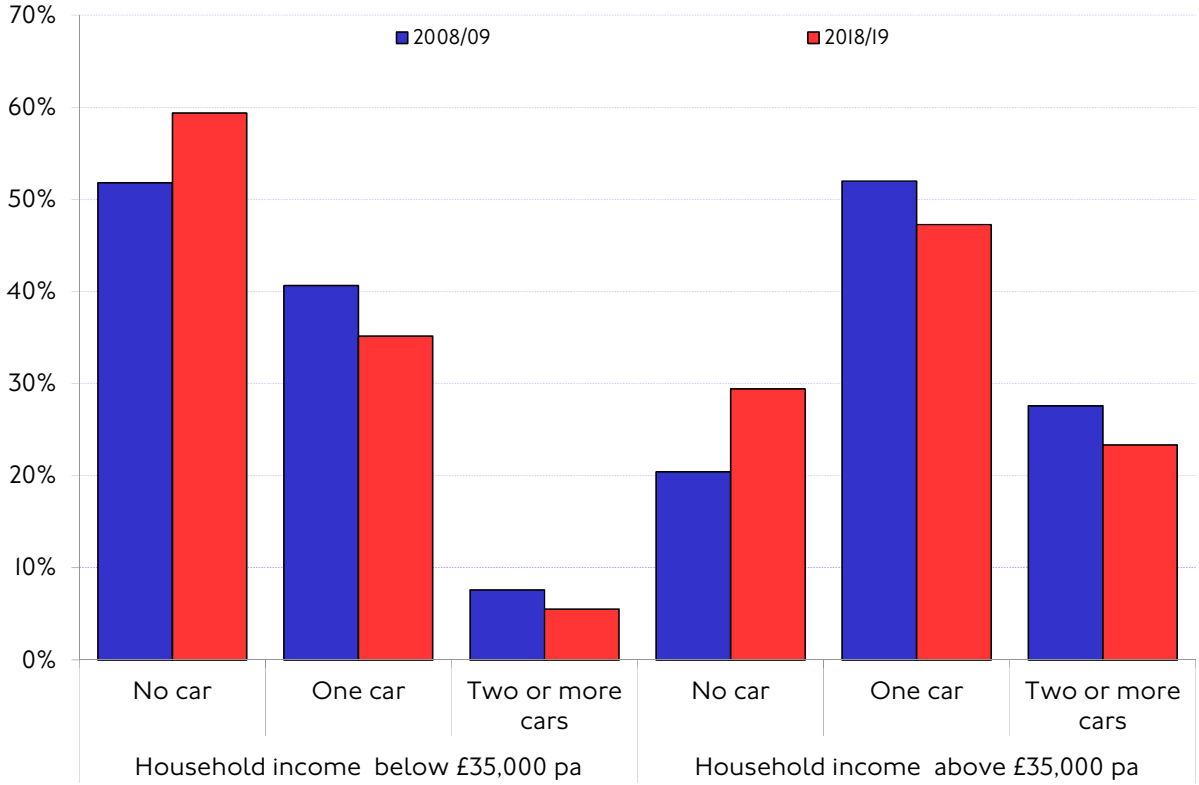
Overall, 1.2 million vehicles are parked on London's streets, of which around a quarter are not the primary vehicle of the household. In most inner London boroughs over 50 per cent of vehicles are parked on-street, with the proportion exceeding 80 per cent in both the Royal Borough of Kensington & Chelsea and Hammersmith & Fulham.

How has car ownership changed over time?

The previous charts have shown a snapshot of car ownership in London, however it is also of interest to explore how car ownership has changed over time. The following graphs show two different aspects of car ownership and change over a period of ten years, from 2008/09 to 2018/19.

Figure 4.24 shows how household car ownership by household income has changed in the last ten years. The data shows that households with an annual income of more than £35,000 are much more likely to own at least one car compared to households with an annual income of less than £35,000. However, between 2008/09 and 2018/19, the proportion of households with no car has increased for both income groups.

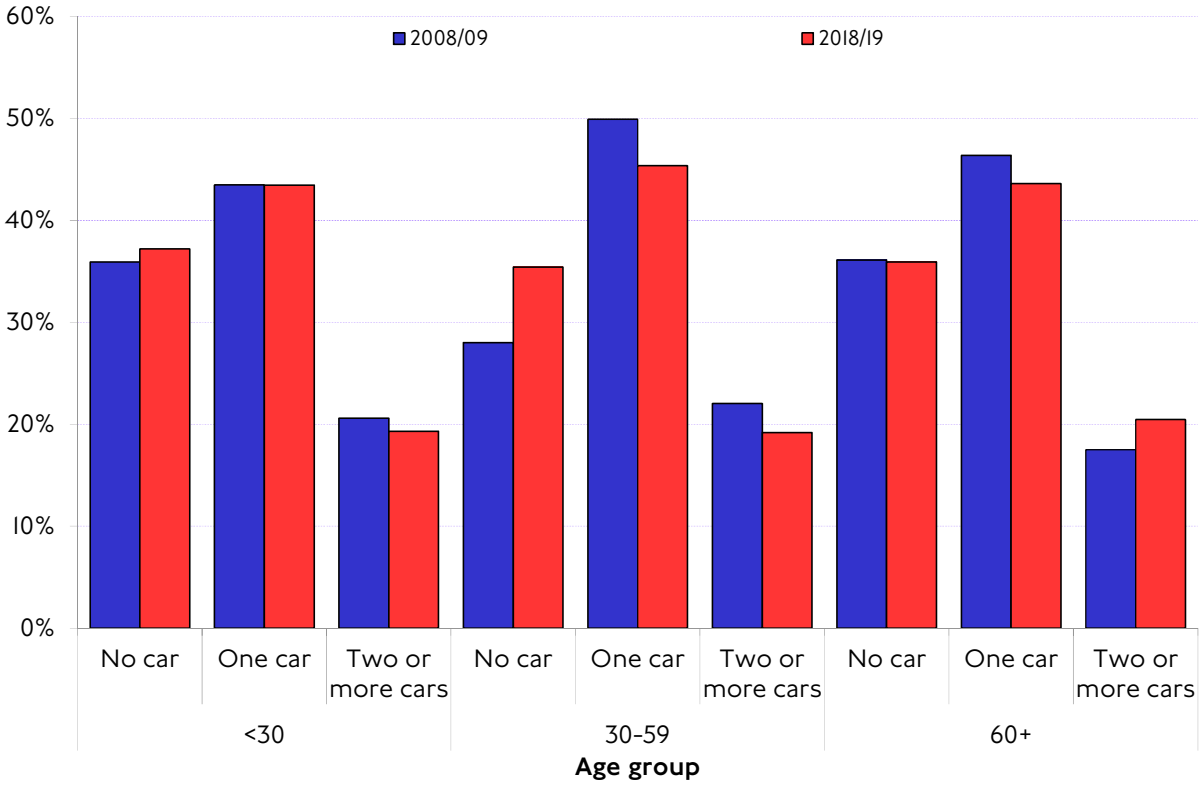
Figure 4.24 Proportion of households by car ownership and household income, LTDS 2008/09-2018/19.



Source: Strategic Analysis, TfL City Planning.

Figure 4.25 shows household car ownership varies by residents' age. The data shows that residents aged between 30 and 59 are most likely to live in a household with a car, with 35 per cent living in households with no car in 2018/19, an increase of 7 percentage points since 2008/09 where the figure was 28 per cent. The percentage of under 30s who live in households without a car has also increased between 2008/09 and 2018/19, from 36 to 37 per cent, however the proportion of residents aged over 60 who live in a household with at least one car has decreased very slightly, by 0.2 per cent.

Figure 4.25 Proportion of households by car ownership and age, LTDS 2008/09-2018/19.



Source: Strategic Analysis, TfL City Planning.

4.5 Travel in London at night

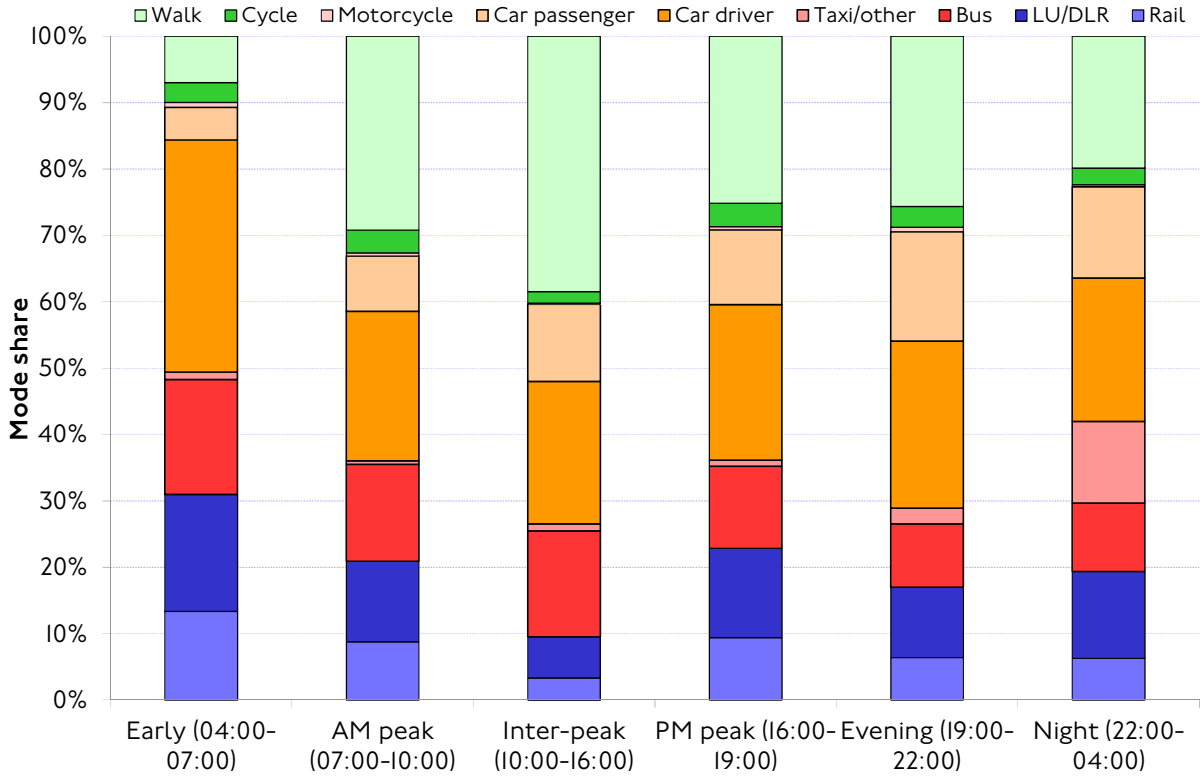
London's night-time economy is a key driver of economic and cultural regeneration and a magnet for domestic and international visitors. Recent research shows that the night-time economy contributes billions to London's annual GDP and supports 1.6 million jobs. Transport plays a key role in ensuring both London residents and visitors to London can access the night-time economy, with the opening of the Night Tube in 2016 and the Night Overground in 2017 significantly expanding the public transport offering during the night.

This section uses data from LTDS to examine how travel in London at night by London residents differs from that during the day. Night-time travel is defined as trips starting between 22:00 and 03:59 the next day.

Night-time mode shares for residents

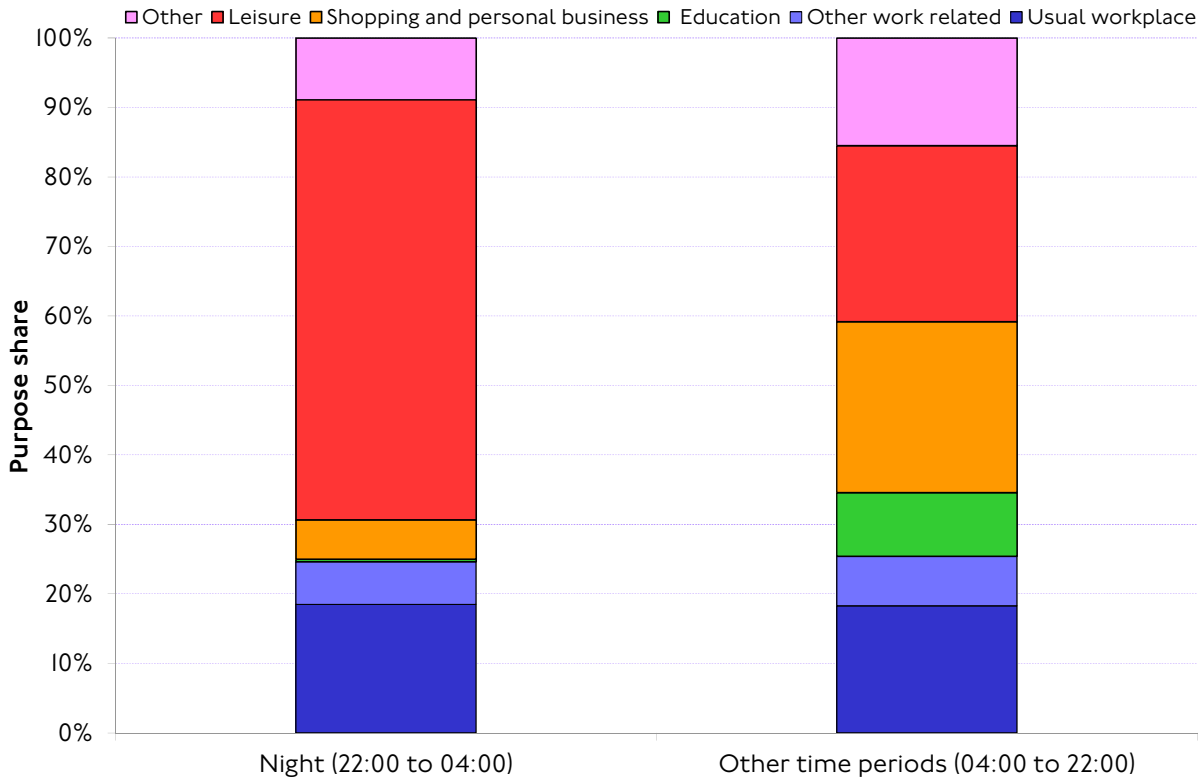
The modes people use at night differ from those they use in the day (figure 4.26). Walking makes up 20 per cent of all trips at night, compared with 32 per cent during the day, while Underground trips increase in proportion from 10 per cent to 13 per cent. The proportion of car trips at night is similar to during the day, although there is an increase in car passenger trips. Taxi (including licensed private hire) mode share increases significantly at night, from 1 per cent to 12 per cent – higher than the bus mode share for this time, which is 10 per cent.

Figure 4.26 Comparative mode share of trips, by time period, LTDS 2018/19.



Source: Strategic Analysis, TfL City Planning.

Figure 4.27 Purpose share of trips at night, LTDS 2018/19.



Source: Strategic Analysis, TfL City Planning.

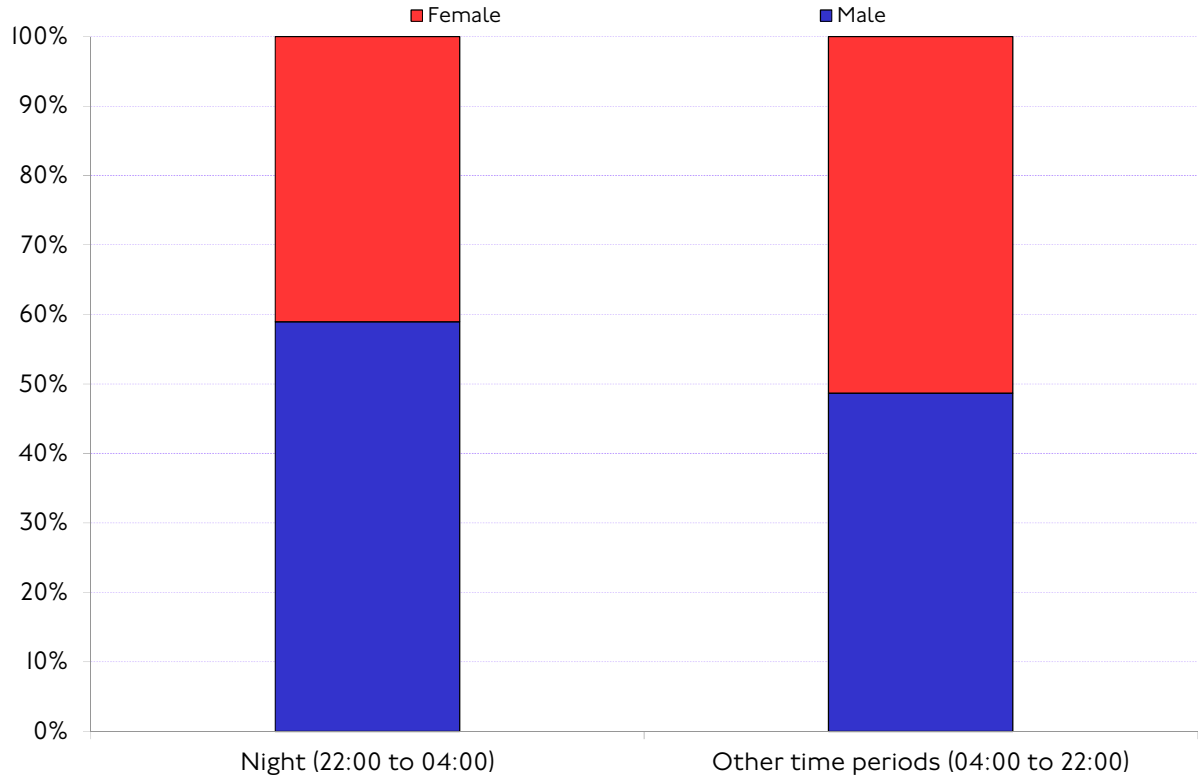
Night-time journey purpose for residents

The reasons people travel at night differ from during the day (figure 4.27). The majority of trips made at night (60 per cent) are for leisure purposes. There are still a significant proportion of commute trips at night – 19 per cent of all trips, compared with 18 per cent during the day.

Night-time journeys by gender, age and geography

Women made up 50 per cent of London's population in 2018, but 59 per cent of trips at night are by men, compared with 49 per cent during the day (figure 4.28).

Figure 4.28 Gender split of night trips, LTDS 2018/19.

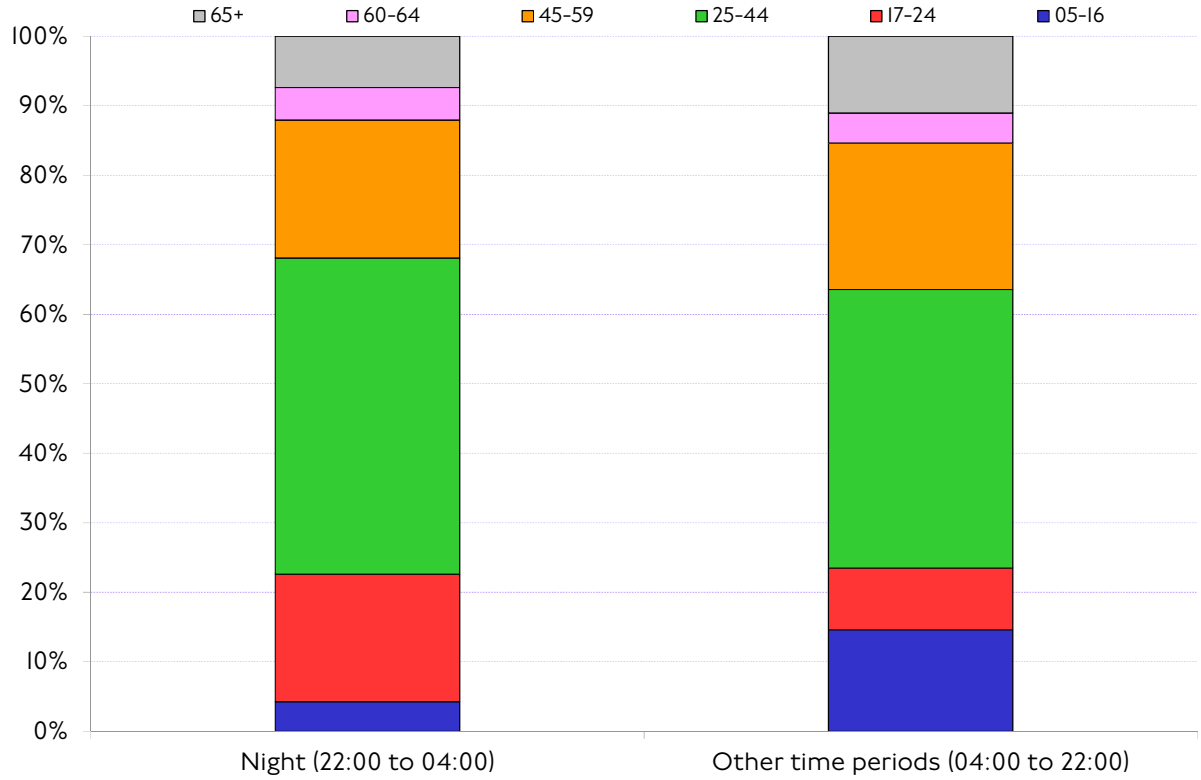


Source: Strategic Analysis, TfL City Planning.

London residents who travel at night are younger on average than those who travel in the day, with 18 per cent of trips at night made by 17-24 year olds, compared with 9 per cent during the day. Almost half of all trips at night are made by those aged 25-44 (figure 4.29).

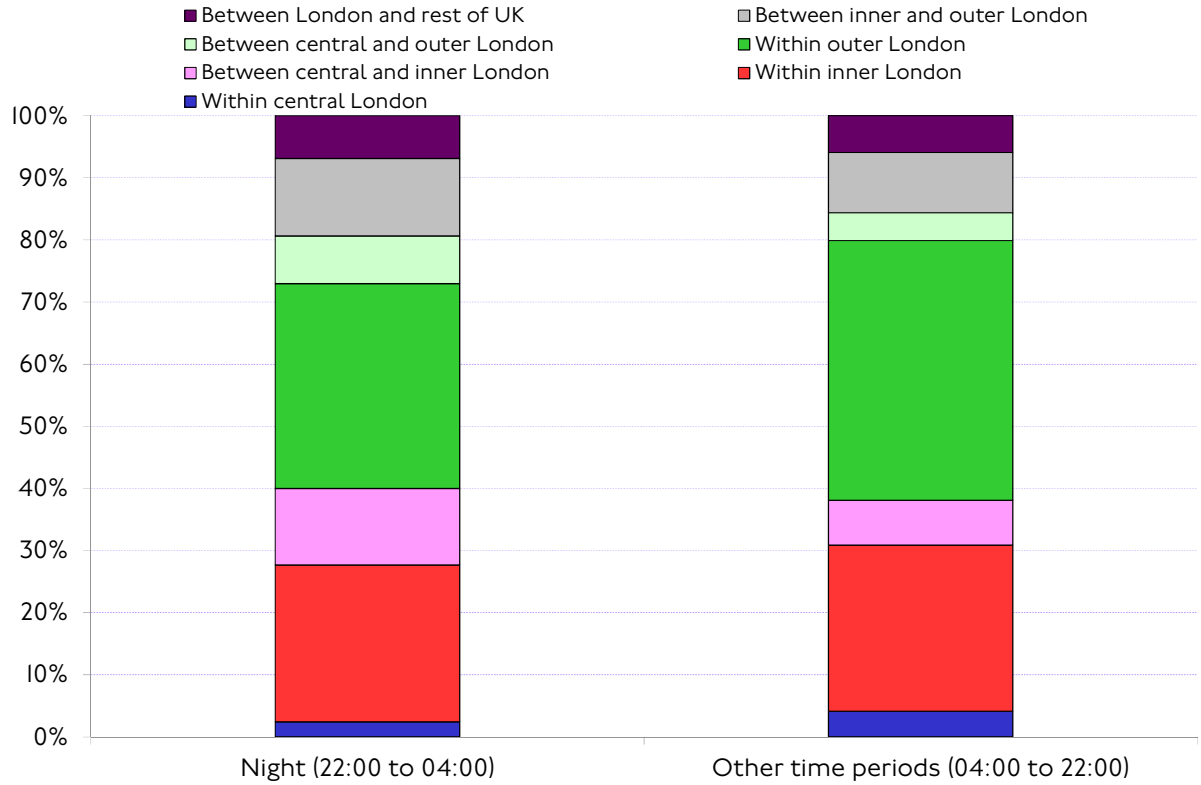
Looking at basic geographical patterns, there are a higher proportion of trips to and from central London at night, with 20 per cent of trips at night between central and inner/outer London, compared with 12 per cent during the day. Only 33 per cent of trips at night are wholly within outer London, compared with 42 per cent during the day (figure 4.30).

Figure 4.29 Age split of night trips, LTDS 2018/19.



Source: Strategic Analysis, TfL City Planning.

Figure 4.30 Origin and destination of night trips, LTDS 2018/19.



Source: Strategic Analysis, TfL City Planning.

Section 2: Healthy Streets and healthy people

5. Active travel and active people

5.1 Introduction

A key priority within the Mayor's Transport Strategy is to increase the proportion of Londoners who travel 'actively' so that by 2041, all Londoners will achieve the minimum requirement of 20 minutes of active travel each day that is needed to stay healthy (referred to as our Active People Target). This will deliver significant health and wellbeing benefits for Londoners and contribute to the Mayor's aim for 80 per cent of all trips made in London to be by active, efficient and sustainable modes by 2041.

The health benefits from regular physical activity are substantial and active travel is the easiest type of physical activity for people to engage in. Participation in active travel is far more equitable across a range of demographic groups than participation in sport. The rationale for the Active People target to be included within the transport strategy is twofold. Firstly, the Mayor has an ambition to create a healthier, fairer city, and one of the key ambitions within his Health Inequalities Strategy is for all Londoners to be doing the physical activity they need to stay healthy. Secondly, in order to achieve our overall active, efficient and sustainable modes aim, it is necessary to support Londoners to remain healthy throughout their lives so they can continue to travel by sustainable modes (as data shows that people with disabilities are less likely to walk, cycle or use public transport).

To enable people to be active through travel, they have to be provided with an attractive and accessible environment in which they are able to walk or cycle for shorter journeys and use public transport for longer journeys. Encouraging use of public transport is important because analysis shows that people using public transport typically do between eight and 15 minutes of active travel per day, compared to less than one minute per trip for those using a car. Half of all walking journeys in London are to or from public transport stations and stops.

Data from the Mini-Holland evaluation, further described in Chapter 6 of this report, has shown that this approach works, with an average of an extra 41.5 minutes of active travel per week seen among those living close to new infrastructure in Mini-Holland areas compared with those living in non-Mini-Holland outer London boroughs.

The Mayor's Transport Strategy sets out the full suite of Healthy Streets Approach policies and activities that will deliver our Active People Target by 2041. However in the short term, to increase the number of active people, we need to apply these policies in a focussed way in order to reach our 'near-market' of inactive people.

This chapter considers the role of active travel as part of people's daily travel routines and as part of the contribution to overall personal physical activity.

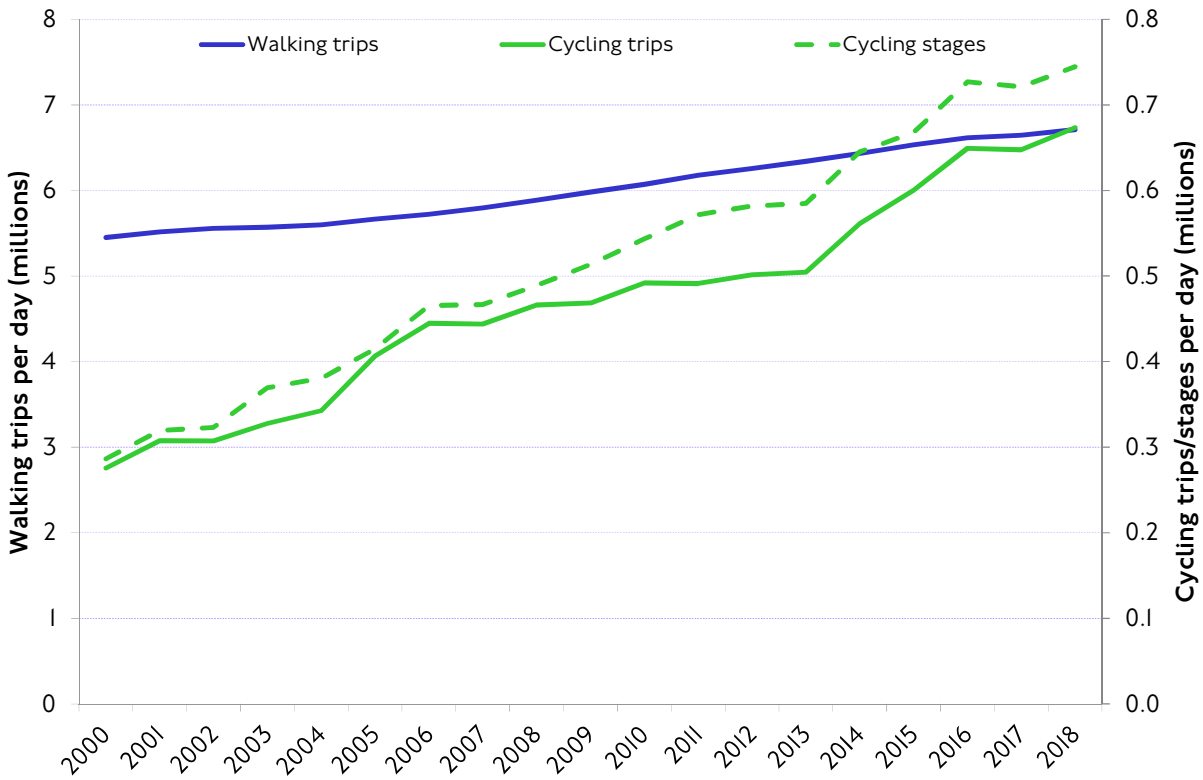
5.2 Active travel: overall trends

Figure 5.1 shows the historic trend in the number of trips in London made by active modes – cycling and walking – on an annual average day. While the absolute numbers of each differ in scale (note the dual axes of the graph) the trend for both has been steadily upwards over the period since 2000. This in part reflects population growth, particularly for walking, but also reflects enhancements to the

walking, cycling and public transport networks to improve their attractiveness as a means of travel.

The average annual rate of growth for walking since 2000 has been 1.2 per cent and for cycling the average annual growth rate has been 5.1 per cent. This compares to estimated population growth of 1.2 per cent per year over the same period. Since 2010 the average annual growth rates have been 1.3 and 4.0 per cent respectively, compared to an estimated population growth of 1.3 per cent, and over the latest year they were 0.9 and 4.0 per cent respectively. Growth in walking in London is closely related to the increase in London's population.

Figure 5.1 Number of walk trips and cycle trips/stages in London, average day, all travellers, 2000-2018.



Source: Strategic Analysis, TfL City Planning.

5.3 Physical activity and active travel

Introduction

The Mayor's Transport Strategy sets the aim for all Londoners to travel actively for at least 20 minutes every day by 2041. Progress towards this aim is currently measured using LTDS. This tells us the proportion of Londoners who report having walked or cycled for at least 20 minutes on the previous day. We take this as a proxy measure for Londoners travelling actively routinely. We acknowledge that a certain proportion of people will be routinely active but may not have travelled actively on the previous day eg due to sickness or caring responsibilities, so our proxy aim is for 70 per cent of adults to report 20 minutes of active travel on the previous day by 2041.

By measuring the proportion of people who report doing 20 minutes of walking or cycling on the previous day, we can show the percentage of Londoners who are

likely to be achieving minimum healthy levels of activity through active travel alone. This does not include other forms of physical activity, such as sport, which are additional to this measure; however we know that active travel is the easiest and most equitable type of physical activity for people to engage in.

Trend in achievement of recommended daily active travel

The LTDS survey offers the best available data source on active travel in London, giving a daily snapshot of travel behaviour by London residents. From this source, we see that approximately one-third of Londoners have reported achieving two ten-minute periods of active travel per day over recent years. In 2018/19, the proportion of adults aged 20+ achieving two ten-minute periods of active travel or more is 31.3 per cent, a slight increase on 2017/18.

New guidelines on physical activity

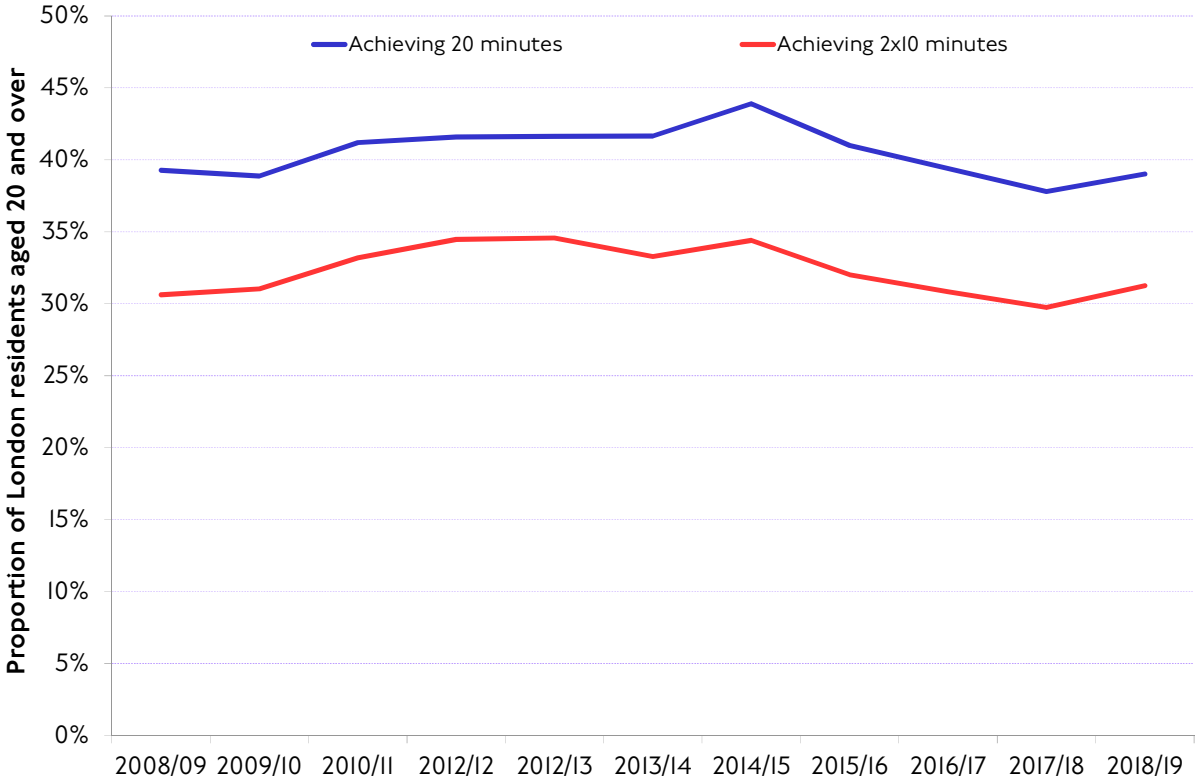
New guidelines on physical activity were released in September 2019 by the UK's Chief Medical Officers (see: www.gov.uk/government/publications/physical-activity-guidelines-uk-chief-medical-officers-report). These reflected the latest scientific evidence on how much activity is required to stay healthy. The guidance still recommends that adults should do at least 150 minutes per week of moderate to vigorous physical activity and aligns with our current aim for all Londoners to achieve 20 minutes of active travel per day. However, new evidence shows that health benefits are gained from even very short periods of physical activity, and therefore the guidance no longer states that activity needs to be done in minimum periods of ten minutes.

We therefore plan to move away from measuring whether London residents are achieving two ten-minute periods of active travel per day, to a simpler measure of whether they are accumulating a total of 20 minutes or more of active travel per day.

Figure 5.2 shows the ten-year trend in both series, backdated to allow comparison. The data shows that the trend in the two measures is very similar, although removing the ten-minute threshold means that a higher proportion of residents achieve the target (for example, by completing four 5-minute periods of active travel, which previously would not have qualified).

Although the new measure means that a higher proportion of residents are assessed to be already achieving the target, there is still considerable effort required to achieve our aim of all Londoners completing 20 minutes of active travel per day.

Figure 5.2 Percentage of London residents achieving 20 minutes of active travel per day, with and without 10-minute threshold, LTDS 2008/09-2018/19.



Source: Strategic Analysis, TfL City Planning.

5.4 New survey of pedestrian activity in central London

The need for better measurements of walking in London

Measuring walking through travel-diary-based surveys such as LTDS has several limitations. Foremost among these are limitations to the accuracy with which respondents recall the exact details of these trips, with a known tendency to under-report or miss very short or (what might be deemed, by the respondent) to be 'inconsequential' walk trips, such as short trips from the office at lunchtime, or a more lengthy walk between shops or services in the same town centre location.

Furthermore, there are uncertainties around the reporting or derivation of exact distances and duration of (particularly) shorter walk trips or stages, which inevitably leads to inaccuracies, albeit probably consistent ones overall, in the reporting of the key physical activity measure above. Then there are sampling limitations, leading to inaccuracies in attempts to examine spatial patterns in walking density. Finally, LTDS only surveys London residents, yet (particularly in central London) non-resident visitors (commuters and tourists) make up a substantial proportion of the daytime population. Although these limitations are common to most surveys of this type and are present even where (as in LTDS) stringent efforts are made to minimise them, they mean that the actual amount of walking tends to be under-estimated, and many of the key statistics have uncertainties that limit their usefulness for tracking relatively small changes.

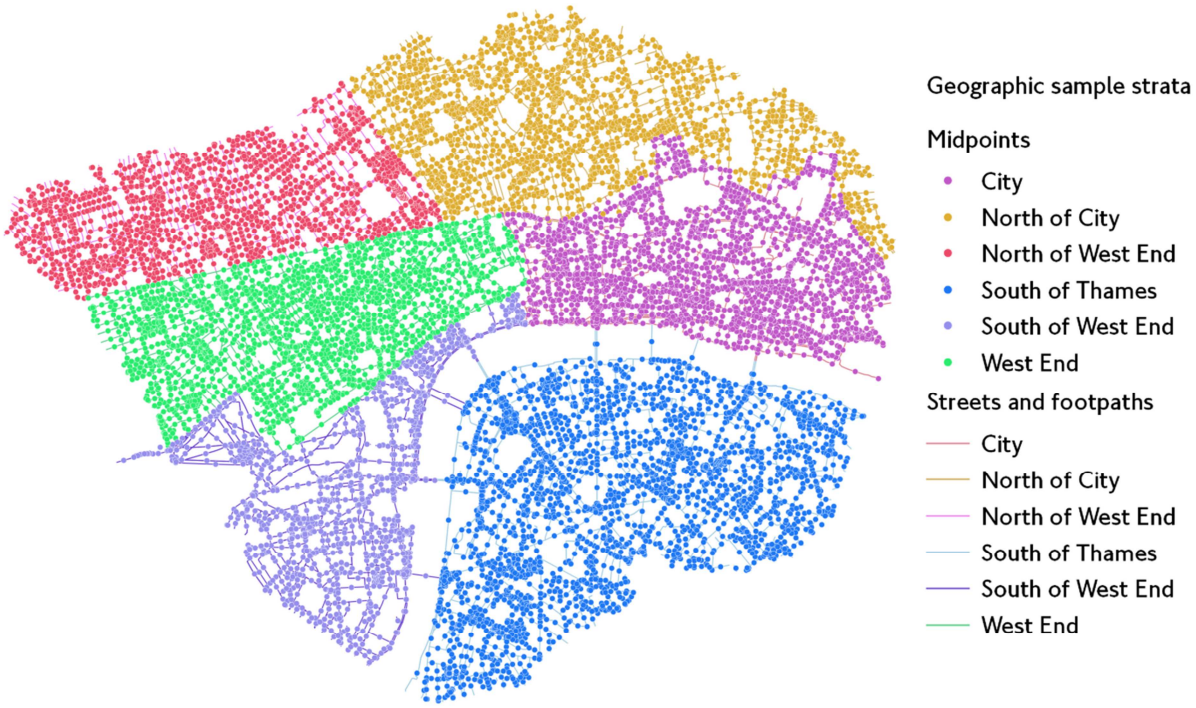
Travel in London report 11 outlined TfL's plans for a new survey of pedestrian populations (as a best proxy indicator for walking) in central London, with provision for possible future extension. This survey has now been running for one

year, and this section gives a brief description of the survey and the kind of outputs that are emerging.

The survey is designed to measure changes in walking in central London on a quarterly basis. In this respect it is similar in function to the quarterly estimate of cycling described in section 6.3 of this report. Fieldwork commenced in October 2018, with data now available for four quarters (Q3 2018/19-Q2 2019/20).

Each quarter, 600 sites are surveyed between 6am and 8pm for a two hour period, rotated across the day so as to be representative, with the same panel of sites repeated each quarter. For the survey, central London is defined as the area within the Congestion Charge zone, and has been divided into six geographical areas (figure 5.3). There are 100 sites surveyed within each of these geographical strata.

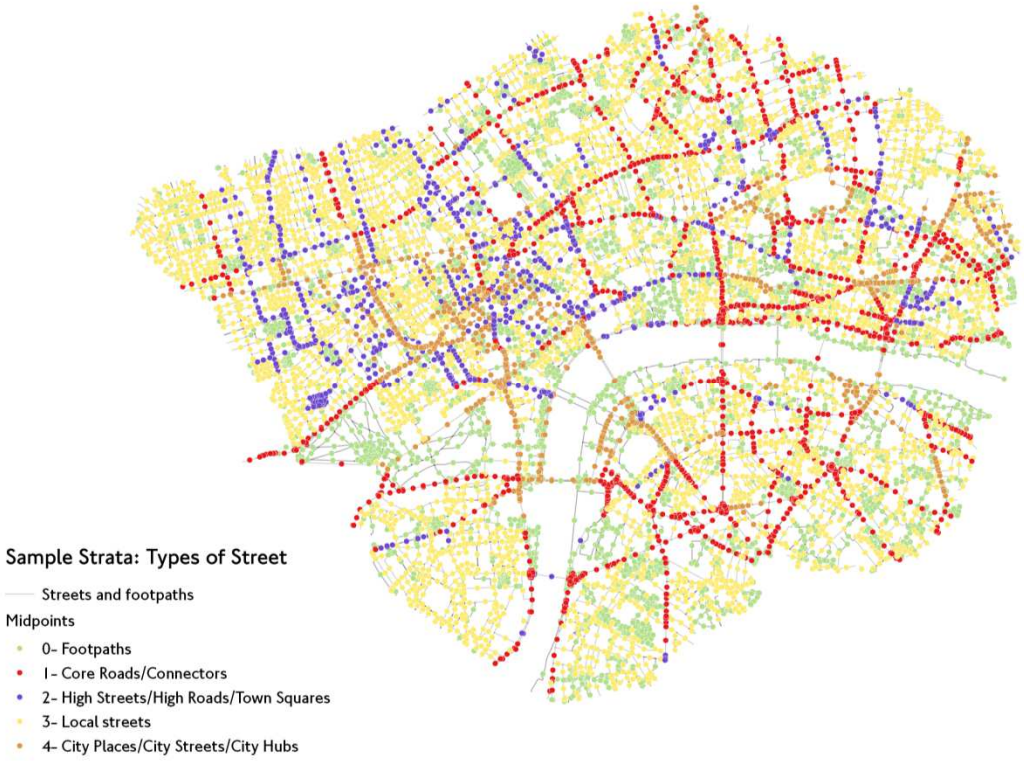
Figure 5.3 Six geographical sample strata.



Source: Strategic Analysis, TfL City Planning.

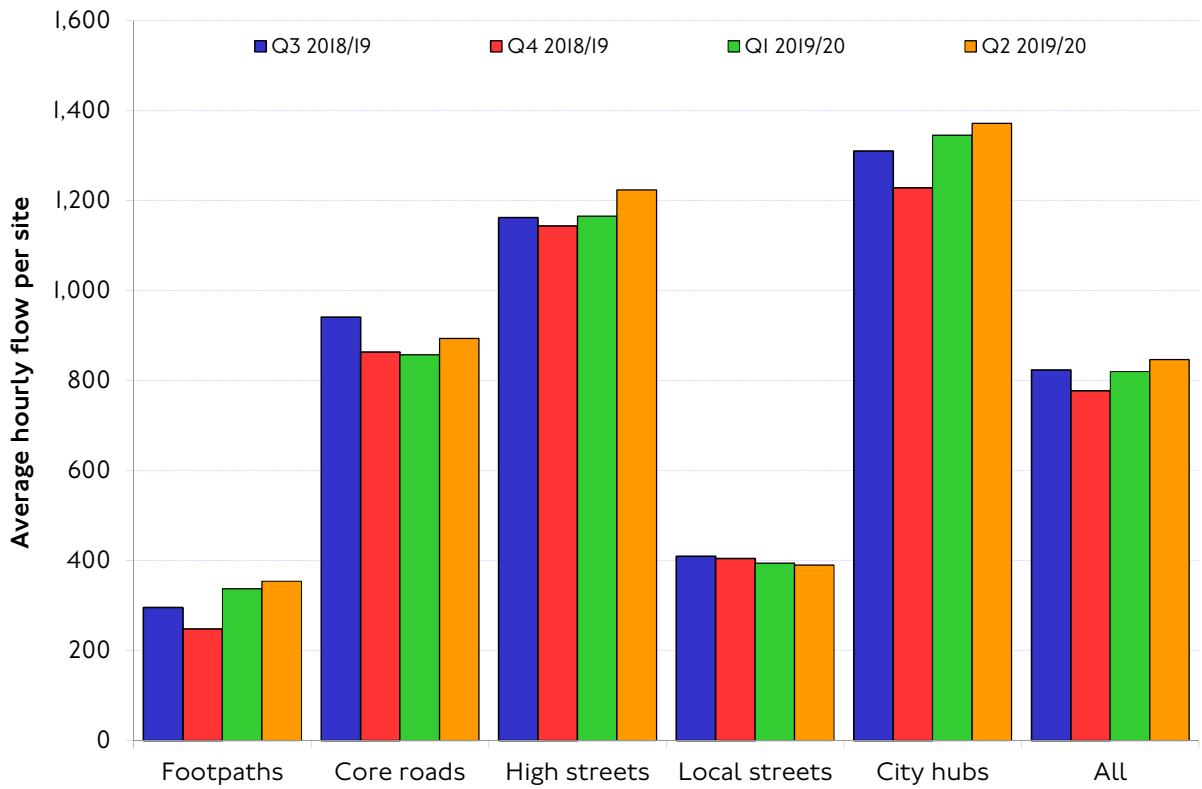
Within each geographical stratum, each street has been classified according to a streets classification (figure 5.4), with 20 sites sampled from each of the five categories. The survey will provide representative 'average day' volumetric indicators of the numbers of pedestrians in central London, alongside robust geographical, street type and temporal stratifications, which can be tracked on a quarterly basis.

Figure 5.4 Five street types.



Source: Strategic Analysis, TfL City Planning.

Figure 5.5 Pedestrian flows by street type, central London, Q3 2018/19-Q2 2019/20.



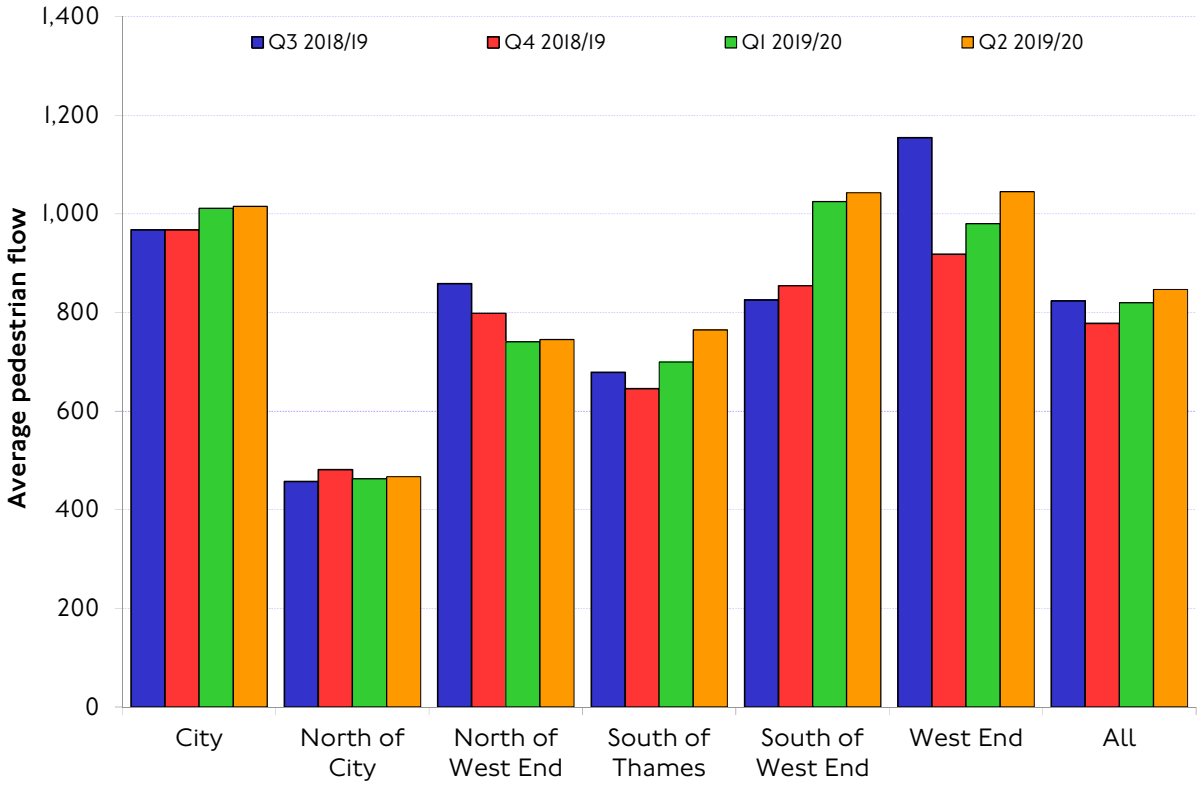
Source: Strategic Analysis, TfL City Planning.

Initial results demonstrate how pedestrian flows vary by street type and across central London (figure 5.5). Pedestrian flows are higher on street types 2 and 4, which are 'high streets' and 'city streets'. Flows tend to be lower on local streets and footpaths.

There is a gradual increase in overall flows from the start of the year to the summer period, with flows in Q2 2019/20(Jul-Sep) 8.9 per cent higher than in Q4 2018/19 (Jan-Mar). However, pedestrian flows were almost as high in Q3 2018/19 (Oct-Dec), presumably reflecting an increase in pedestrian activity for shopping and leisure related to Christmas. Overall, however, the seasonal variation is relatively modest.

Looking at pedestrian flows by area (figure 5.6), flows are highest in the West End and the City. Areas of central London that are more residential tend to have lower pedestrian densities, such as south of the Thames and particularly north of the City. Some noticeable features include high pedestrian flows in the West End in Q3 2018/19, reflecting an increase in shopping and leisure activity in the pre-Christmas period. The biggest seasonal change occurred to the south of the West End, perhaps due to the number of parks in this area, as well as the number of warmer weather events that take place in this part of central London.

Figure 5.6 Pedestrian flows by area of central London, Q3 2018/19-Q2 2019/20.



Source: Strategic Analysis, TfL City Planning.

This survey will primarily be used to track changes in pedestrian levels as part of the overall effort to monitor mode share trends, which will be possible from Q3 2019/20. It also has uses in relation to specific improvement schemes, where the methodology can be applied on a before/after basis to understand the magnitude of any changes in walking as a result of the scheme. Comparable statistics can also be gathered for limited areas or locations outside central London, for example town centres in outer London, as required.

5.5 Active people near-market segmentation

TfL's plan to increase the number of Londoners who achieve 20 minutes of active travel each day includes analysis to identify our 'near-market' population – those who are less likely to be achieving their 20 minutes per day of active travel, but who are more likely to be willing to change their behaviour in the short term. In the long term we will need to support all Londoners to achieve behaviour change, however in the short term it is important that we focus on populations where there are a larger number of people making inactive trips and there is potential and propensity for those trips to be switched to active modes.

Near-market by geography

Central London residents are the most likely to report achieving 20 minutes of active travel per day followed by inner London residents and then outer London residents. Although those in outer London are the least likely to be achieving the target level of active travel, our current 'near-market' is the inner London population as there is greater potential for change in the short term, due to the population being more geographically concentrated and living in an environment that is more conducive to active travel.

Near-market by age group

The proportion of Londoners achieving 20 minutes of active travel is highest in the 30-39 age group, followed by the 20-29 age group. The proportion of Londoners achieving 20 minutes of active travel per day shows a steady decline over the life course after the 30-39 peak. Our near-market is based not only on the groups who are currently doing less active travel, but also on the groups where there is the greatest potential for change, including scale of change. While we know that older people are less likely to be achieving 20 minutes of active travel, they also make fewer trips overall. Our near-market age range is therefore 30-59 as this is the age range where there are the greatest number of trips that could be switched from inactive to active modes.

Near-market by gender, ethnicity and income group

The proportion of Londoners achieving 20 minutes of active travel per day does not vary greatly based on gender, ethnicity or income group and therefore people of all genders, ethnicities and income groups form our near-market.

Near-market by mode

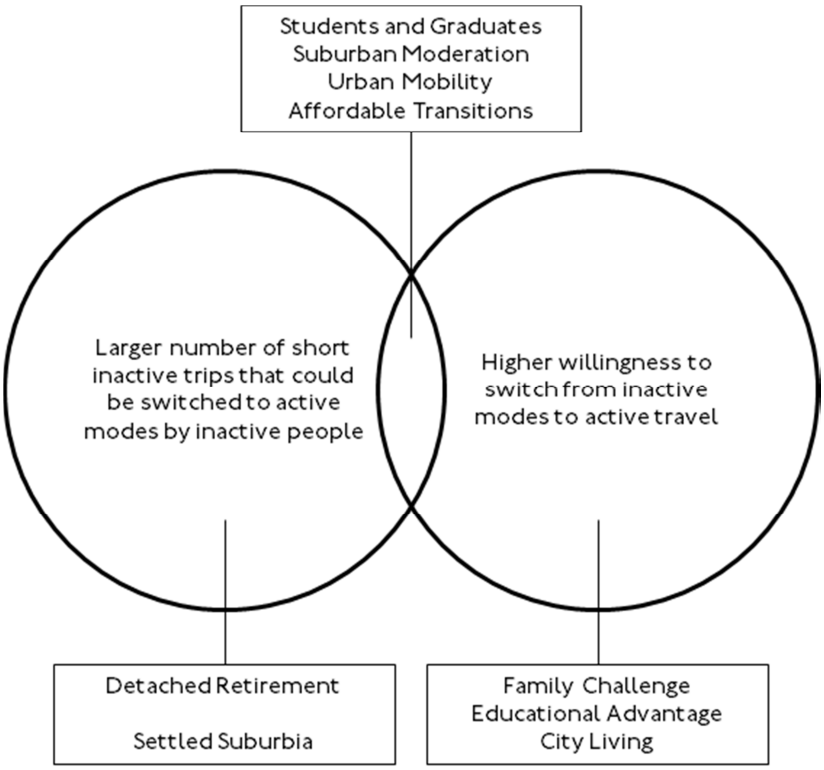
We know that car trips are on average associated with the least physical activity of any mode (less than one minute of physical activity per trip on average), however we also know that there are non-car owners who are also not achieving the active travel target. We therefore want to influence people to switch from car trips to cycling and public transport trips for longer trips and to walking for shorter trips, as well as influencing public transport users to look for ways to integrate additional active travel into their public transport trips.

Near-market by Transport Classification of Londoners (TCoL) segmentation

We have used the TCoL segmentation tool (see: www.tfl.gov.uk/cdn/static/cms/documents/transport-classification-of-londoners-presenting-the-segments.pdf) to identify the most appropriate TCoL segments to

target as our near-market. We looked for population segments where there was both a higher than average number of short, inactive trips that could be switched to active modes (potential to switch) as well as a higher than average willingness to switch from inactive to active modes (propensity to switch). This analysis enabled us to identify the four 'near-market' TCoL segments of 'Affordable transitions', 'Students and graduates', 'Suburban moderation', and 'Urban mobility' and as shown in Figure 5.7.

Figure 5.7 TCoL population segments by potential to improve the Active People trajectory in the near term.

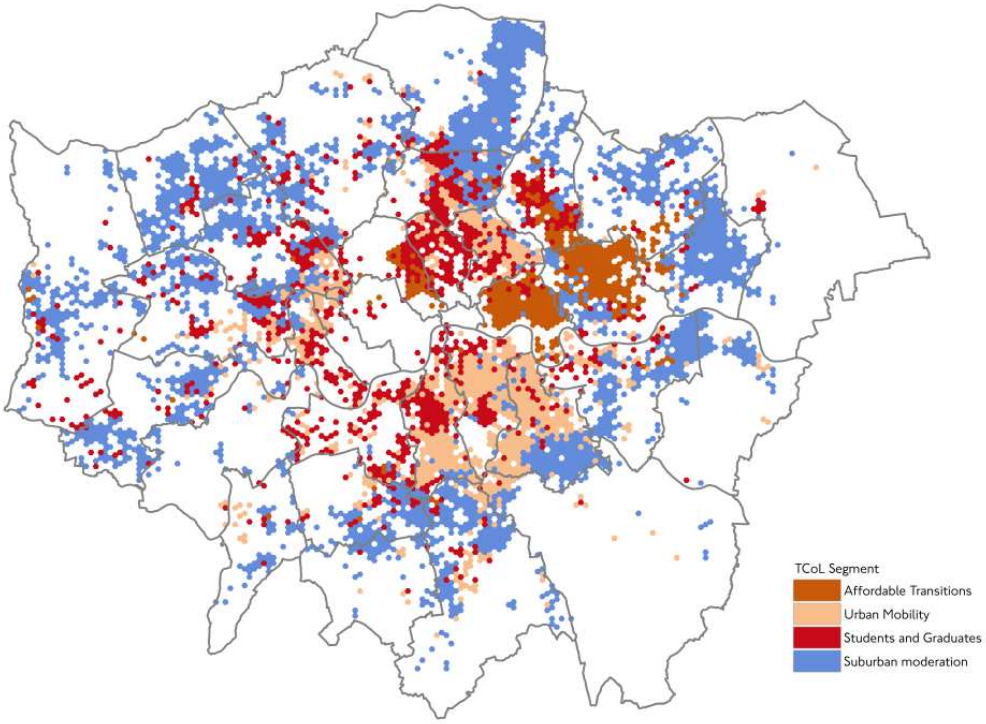


Source: TfL, City Planning.

- 'Affordable transitions' – residents in this group are likely to be experiencing life transitions such as starting a first job or having a new family. This group has the highest willingness to switch to active, efficient and sustainable modes.
- 'Students and graduates' – residents in this segment tend to live in inner London. They have average incomes and average propensity to change behaviour but a positive attitude towards cycling.
- 'Suburban moderation' – residents in this segment tend to live in outer London, have at least one child and are open to cycling.
- 'Urban mobility' – this group comprises mostly young working adults without children who are living in inner London and are highly receptive to switching to more active, sustainable and efficient modes.

Figure 5.8 shows the geographical spread of these TCoL segments across London which can be used, in combination with other data to target interventions where they will have greatest impact.

Figure 5.8 Geographical spread of near-market TCoL segments.



Source: TfL, City Planning.

In summary, our near-market for behaviour change in order to achieve an increase in the number of Londoners meeting the target for 20 minutes of active travel per day consists of:

- those living in inner London;
- those aged 30-59;
- all genders, ethnicities, income levels;
- car owners and non-car owners;
- those in TCoL segments of 'Affordable transitions', 'Students and graduates', 'Suburban moderation' and 'Urban mobility'.

5.6 Active people qualitative research

In order to move closer to our target of all Londoners achieving 20 minutes of active travel each day, TfL commissioned qualitative research to gain greater insight into the real life context and challenges of achieving 20 minutes of active travel every day.

Study goals

The research included a literature review of the existing evidence on physical activity and active travel, which highlighted the known environmental, psychological and social barriers to change. The qualitative study was then designed to explore active travel through a new lens. Londoners currently not meeting the target on more than three days a week were asked to try to achieve 20 minutes per day every day for two weeks. Researchers investigated how participants achieved this challenge, which factors they reported as helping and hindering and which journeys were the easiest to switch.

The study population was chosen to reflect the Active People Target's 'near-market' – Londoners who currently make a high number of switchable trips and who are considered to be the most willing and able to change travel behaviour in the near future (see section 5.5 above). The research was carried out in Liveable Neighbourhood areas in Ealing, Crouch End and Walthamstow as these areas contained a high proportion of the relevant near-market TCoL segments.

Participants and the challenge

A total of 46 participants were selected for the research. Screening took place to ensure they reflected the near-market in terms of age, gender, socioeconomic group, life stage and general activity levels. The sample included both car owners and non-car owners. None of the participants were achieving 20 minutes of active travel on more than three days per week prior to the start of the study.

Participants were challenged to achieve a total of 20 minutes of active travel as part of the journeys they make every day, for two weeks. Overwhelmingly people chose to walk rather than use other active modes, although they were able to choose between walking, cycling or running. Participants completed a travel diary for one week prior to commencing the challenge, and for the two-week challenge period. Deep-dive interviews took place with eight participants after the challenge was completed and group sessions were held to seek insights into the changes needed to better support the near-market in using active modes.

Prior to the challenge commencing, active modes of transport were not a feature of participants' daily lives. For most, physical activity was something they did at discrete times, and in discrete spaces, and was mentally separated from travel. Participants had a clear view of the best mode of transport for them for each journey and decisions were based on perceived efficiency, familiarity and comfort. Car use was the default among car owners for most non-commuting journeys with cost/benefit, comfort, ease and convenience cited as the key reasons for this choice.

Findings of the study

Participation in the study triggered a rapid change in behaviour and attitudes towards active modes and frequently the perceived barriers to change disappeared (figure 5.9).

Many participants reported that:

- Active travel was often quicker than expected.
- Active travel improved the overall journey experience.
- Active travel was often easier to fit in when compared with other forms of physical activity.

Figure 5.9 Perceived barriers to active travel and reported change.

"My doctor had told me to walk more before this study but he had suggested leisure walks which I struggled to fit in, but this is much easier."

"I thought it would be a drag but it was actually very pleasant and became one of the best parts of my day."

"I am surprised how much I like walking as I normally just jump in the car for most journeys."

Source: TfL, City Planning.

Prior to the challenge, some participants were concerned about the physical exertion required to do more walking or cycling. However, all participants found the physical aspect of the task achievable and the challenge uncovered a range of personal and social benefits of the change (figure 5.10):

- Feeling better – mentally more alert, improved mood, better days.
- Feeling healthier – physically better and more active.
- Feeling more connected to their local area, seeing more and enjoying London.
- Improved relationships – knock on effect of cognitive clarity, improved mood and ability to run errands for others.

Figure 5.10 Reported benefits of increased active travel.

"It's made me rethink my commute and made me think about how my commute can be more enjoyable by mixing it up a bit...it's left me feeling more positive to get out of routine and be outdoors more."

"I aim to keep this up (weather/work permitting) for as long as I can. I've really seen some improvements in my overall mood and attitude."

"I think what surprised me the most today is both the walks really helped me change my frame of mind. In the morning I was feeling really negative and unmotivated about work before I left the house, but by the time I got back I felt refreshed and ready to start the day." [Participant was working from home]

Source: TfL, City Planning.

As well as journey/part of journey switches, doing more active travel changed people's habits in other ways (figure 5.11):

- People changed the routes they used.
- They changed other regular habits eg switching from weekly to smaller, more frequent shops.
- They did things they had not done for a while eg went to the gym, visited a different area/shop.
- They fitted in more general leisure activity/explored their city.

Figure 5.11 Changes in habits associated with more active travel.

"Normally my partner does one big shop in the car each week, but because I was doing it by foot or bike I found myself doing lots of little shops at the nearby supermarket. It changed the way we structured our week."

"My partner and I went to a nearby restaurant since we could walk there. Normally, we'd drive to Edgware Road if we want to eat out."

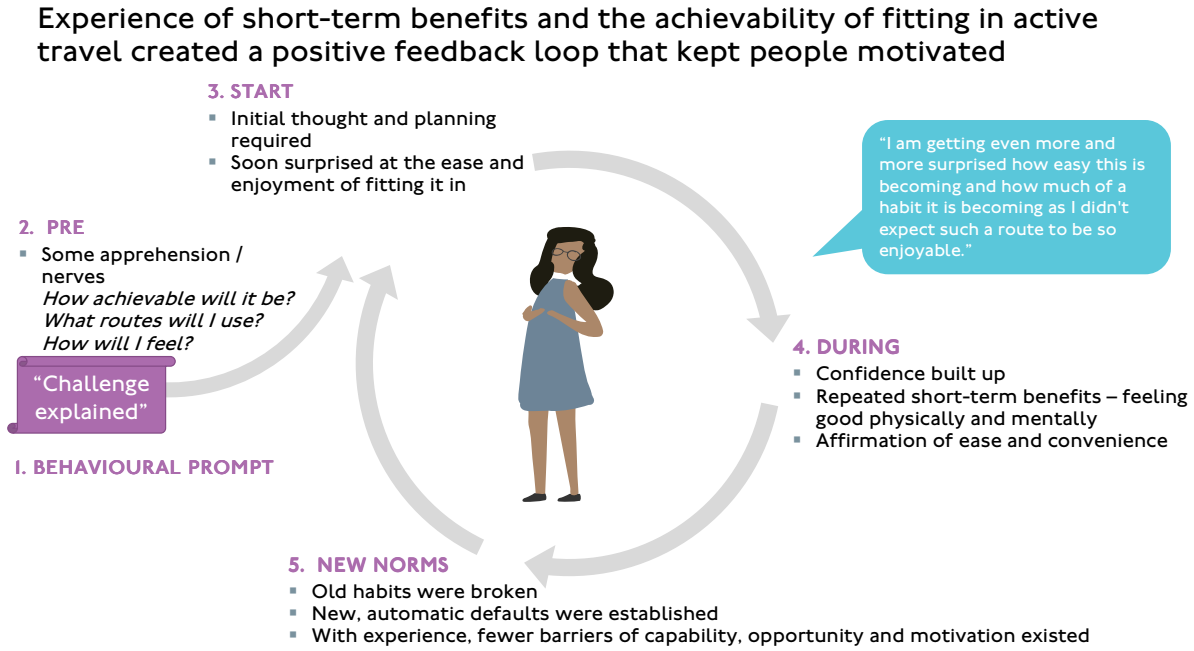
Source: TfL, City Planning.

Many felt that after the two-week challenge their habits had been changed and that they would continue to integrate active travel into their daily lives in the

future. Experiencing the short-term benefits and achievability of fitting in active travel created a feedback loop that kept people motivated (figure 5.12). For example:

"This travel challenge has totally and completely changed my attitude to walking in general. I often found an excuse to drive or take a mode of transport other than walking. However, having been part of this research trial, I have discovered a love for walking and find it quite therapeutic. I'm able to complete daily tasks and carry out my day-to-day life just as before but while getting some much-needed exercise and also reducing my carbon footprint."

Figure 5.12 Potential longer-term effects of increased active travel.



Source: TfL, City Planning.

While feedback from participants was overwhelmingly positive, local factors determined how easy or difficult participants found the challenge. Living near a high street, reliable public transport or green space made participation in the challenge easier. However, some local environments could be off-putting. Some participants avoided certain areas eg main roads, heavy traffic, hills or streets that felt unsafe. The study also took place during a period of hot weather, followed by heavy rain, which made it more challenging to complete.

Nevertheless, the vast majority completed the research project with a sense of accomplishment. Many described coming away from the challenge in positive terms, having now found a way to fit active travel into their regular routine. Participants became aware of the personal and social benefits of increasing active travel and were supportive of the goal of increasing active travel among Londoners. Participants also suggested activities that could help facilitate more walking and cycling such as improved wayfinding and improvements to local environments. It is planned to follow-up with participants after six months to establish the extent to which changes to active travel have been maintained and, if not, why not.

In summary, the research provides evidence of the huge opportunity that exists to increase active travel rates in the near-market population. Participants were

previously blinkered to the opportunity of piggybacking activity into their daily trips and unaware of how significant the benefits of a small change would be, or how quickly they could be felt.

6. Active travel: cycling in London

6.1 Introduction

This chapter reviews trends in the available indicators of cycling in London, covering cycle volumes, the characteristics of people who cycle, and feedback on responses to cycle investment.

In 2018, for the first time, cycling was estimated to account for 2.5 per cent of trips in London on an average day (see chapter 2 of this report). At the more disaggregate level, TfL undertakes volumetric counts of cycling in central, inner, and outer London, which give a good strategic view of cycling trends. Central London is counted each quarter; inner and outer London are counted each year. Of strategic interest are also the long-term series of counts of cycles crossing the central, inner, and GLA boundary cordons; in this case as part of established multi-modal traffic counts.

At a more local level, TfL has an extensive programme of counts along most cycle routes where investment in cycling is being made. These counts are a means to assess the impact of cycling initiatives at more local (scheme) level.

The overall picture is one of solid growth across London that builds upon the trends observed in the last decade, but at a pace that currently appears to fall short of the level of change required to achieve the Mayor's 2041 ambitions. It is significant, however, that where investment in cycling infrastructure has been made, the observed growth in cycling is higher than the London-wide (or relevant 'background') average.

6.2 Cycling volumes in central, inner, and outer London

TfL's key cycling volume statistics are area-based cycle counts that represent each of the central, inner and outer London areas within the GLA boundary. Table 6.1 summarises the latest results.

In 2018 the total distance cycled in London on an average day saw the highest growth recorded since monitoring began in 2015, increasing by almost 5 per cent from the previous year and exceeding for the first time an average daily volume of 4 million cycle-km. There was growth in all areas, but it was particularly strong in central London (over 8 per cent) and outer London (over 6 per cent).

Similar trends were observed in the cycling 'intensity' indicator of cycle-km per km of network in each area on an average day (which can also be interpreted as the average number of cycles per day in that area). However, it is worth noting that cycling 'intensity' in central London remain much higher than in other areas – around three times higher than in inner London and 10 times higher than in outer London. On the other hand, central London accounts for just less than 14 per cent of the daily kilometres cycled across the GLA, while inner and outer London account for the rest in almost equal measure (around 45 and 42 per cent, respectively). This continues to support the idea that trips in inner and outer London tend to be longer while central London sees more but possibly shorter cycle trips concentrated in a much smaller area.

Table 6.1 Summary of key estimates of cycling volume in London, 2015-2018.

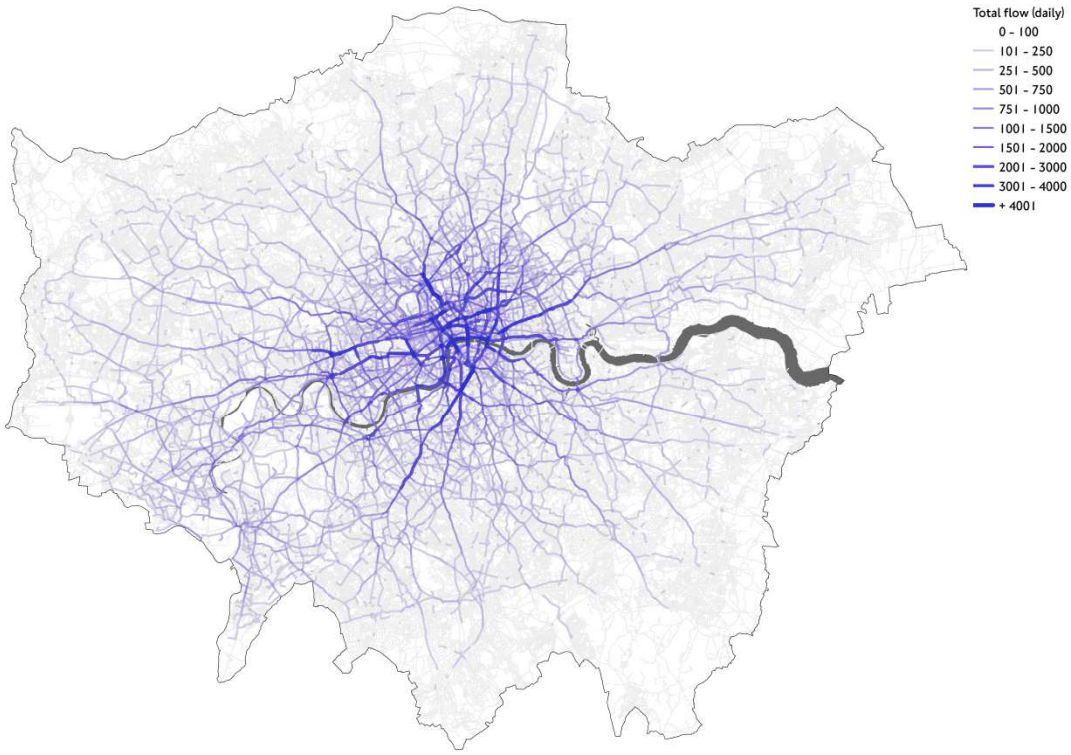
Average daily number of cycles (cycle-km per km of network)	**2015**	**2016**	**2017**	**2018**
Central London	1,291	1,287 (-0.3%)	1,298 (+0.9%)	1,405 (+8.2%)
Inner London	518	520 (+0.4%)	536 (+3.0%)	550 (+2.6%)
Outer London	125	121 (-3.1%)	129 (+7.0%)	137 (+6.0%)
GLA total	**232**	**231 (-0.4%)**	**240 (+3.9%)**	**254 (+4.9%)**
Average daily kilometres cycled (thousands)	**2015**	**2016**	**2017**	**2018**
Central London	527	525 (-0.3%)	530 (+0.8%)	573 (+8.3%)
Inner London	1,730	1,736 (+0.4%)	1,789 (+3.0%)	1,837 (+2.7%)
Outer London	1,556	1,507 (-3.1%)	1,612 (+7.0%)	1,714 (+6.3%)
GLA total	**3,813**	**3,768 (-1.2%)**	**3,931 (+4.3%)**	**4,125 (+4.9%)**

Source: TfL Traffic Data.

Spatial distribution of cycling demand

Our strategic cycling model Cynemon can provide a disaggregate representation of cycling volumes on London's highway network. This enables a better visualisation of how cycling demand varies across different parts of London.

Figure 6.1 Spatial distribution of daily cycling flows in London, 2016.



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Source: Strategic Analysis, TfL City Planning.

The demand estimates for Cynemon are based on data from the London Travel Demand Survey, Census data, central London termini surveys and Santander Cycles hire data. Its outputs are validated against our counts programme.

As an example, figure 6.1 shows the daily cycling demand in London for the base year model, which represents an average weekday in 2016. It shows that central London has the highest density of cycling flows, with some links estimated to be used by over 6,000 people cycling per day.

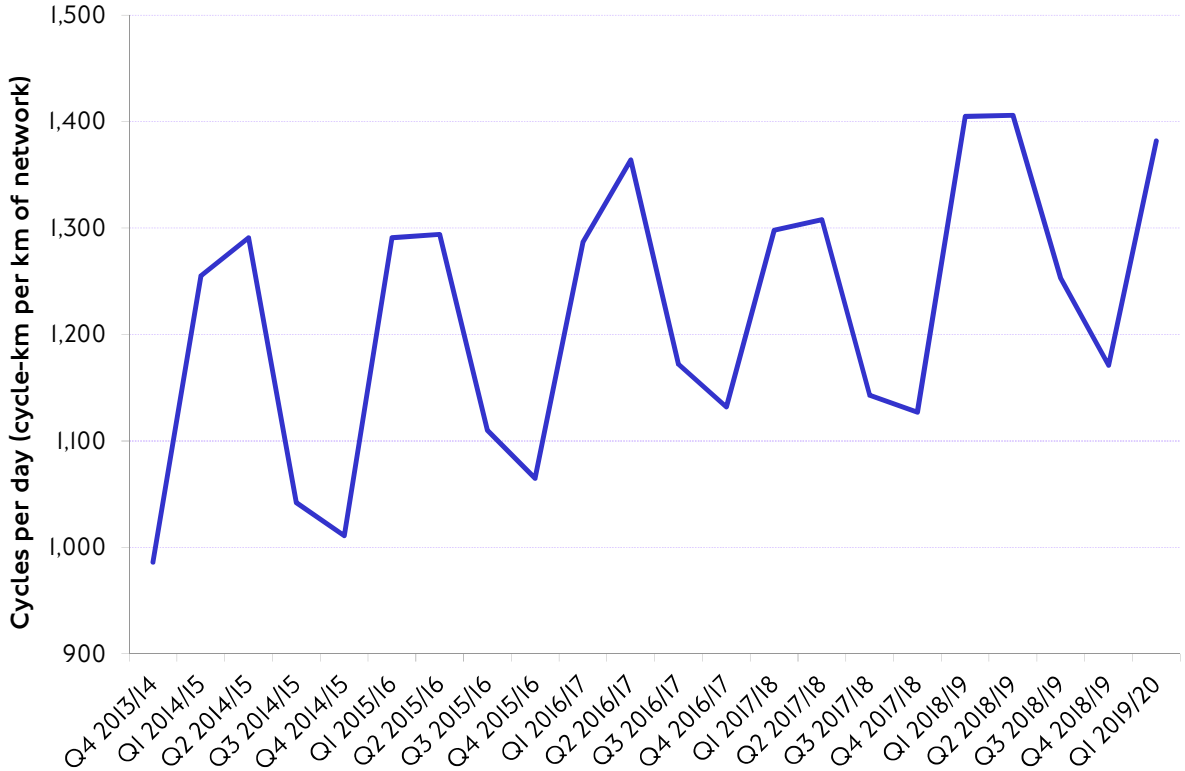
6.3 Temporal variations in cycling demand

The area-based cycle counts in the central, inner and outer London areas can be disaggregated by 15-minute period between 06:00 and 22:00, which allows for additional analysis of the demand profile throughout the day beyond the headline metrics above.

In 2018, as might be expected, the demand profile did not change significantly from the previous year, and so in all areas cycling remains concentrated mostly around the morning and evening peaks, where the maximum is reached a bit earlier in the morning and slightly later in the evening the further away from central London, where they are also relatively more pronounced.

Because the central London counts are repeated quarterly, this enables an indicative analysis of seasonal variations in cycling demand. Figure 6.2 shows the average number of cycles counted per day in central London by quarter since 2014. The seasonal peaks and troughs are evident, from year to year, within an overall trajectory of net growth. In this comparison, 2017 stands out as unusual, with a lower summer peak relative to the rest of the series.

Figure 6.2 Average number of cycles per day per (financial) quarter in central London, Q4 2013/14-Q1 2019/20.



Source: TfL Traffic Data.

The quarterly results also show sustained and strong cycling growth in central London during the January to March quarter, with a 19 per cent increase in 2018/19 since the equivalent 'baseline year' quarter (Q4 2013/14). This suggests that more people now cycle through the winter months. However, this season remains the quietest for cycling demand (typically around 10 per cent lower than the annual average).

Spatial distribution of cycling demand by time of day

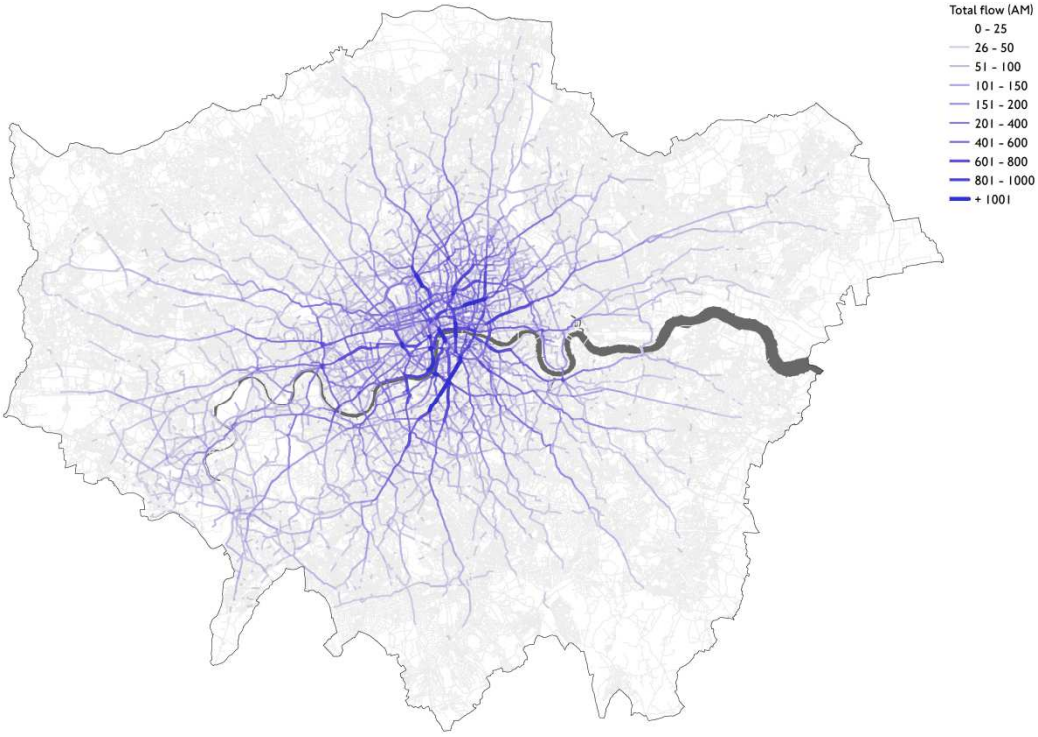
The Cynemon model can also produce outputs for different hours of the day to better represent how the spatial distribution of cycling demand changes over time. Figure 6.3 and figure 6.4 respectively show cycle flows for the 2016 base case in the morning peak hour (08:00-09:00) and an average hour in the inter-peak period (10:00-16:00).

The maps show that cycling demand in the morning peak hour stretches far out into outer London along main corridors but is highest in central London, with some roads seeing cycle flows above 1,000 cycles. The radial nature of commuting is also evident with particularly high cycle flows from inner London into central London, mostly concentrated on Cycleways and other strategic cycling corridors.

In contrast, overall cycling volumes are much lower in the inter-peak, and cycling demand is more concentrated in central London and certain parts of inner London. This further reflects the tidal nature of people travelling in to work in the morning and returning home in the evening. However, it should be noted that Cynemon is primarily used to model 'utility cycling', ie those trips aimed at reaching a destination, and does not account well for recreational cycling.

Finally, it is interesting to note a certain westward skew in cycle flows, which are higher and reach out further into this part of London. This geographical difference has been observed in other data and may be related to the presence of particularly attractive areas for cycling in the west (such as Richmond Park or the green areas along the Thames in this part of London) but also to the demographics of those areas, the traffic conditions, and the cycling facilities.

Figure 6.3 Spatial distribution of cycling flows in the morning peak hour, 2016.



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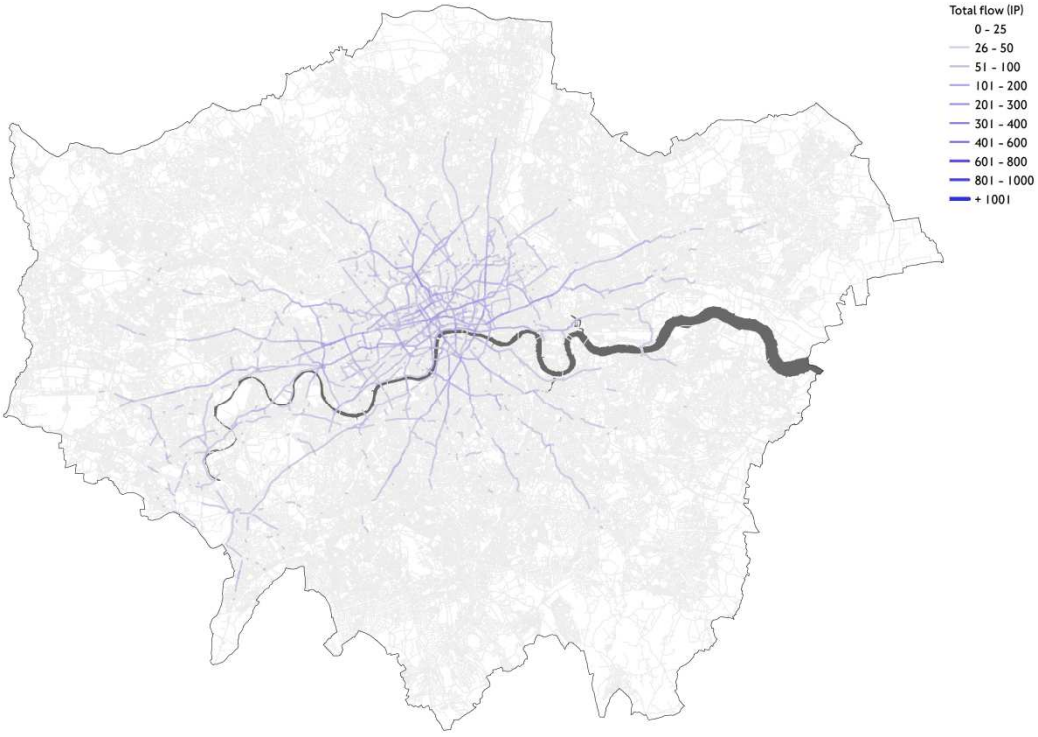
Source: Strategic Analysis, TfL City Planning.

Figure 6.4 Spatial distribution of cycling flows in an inter-peak hour, 2016.



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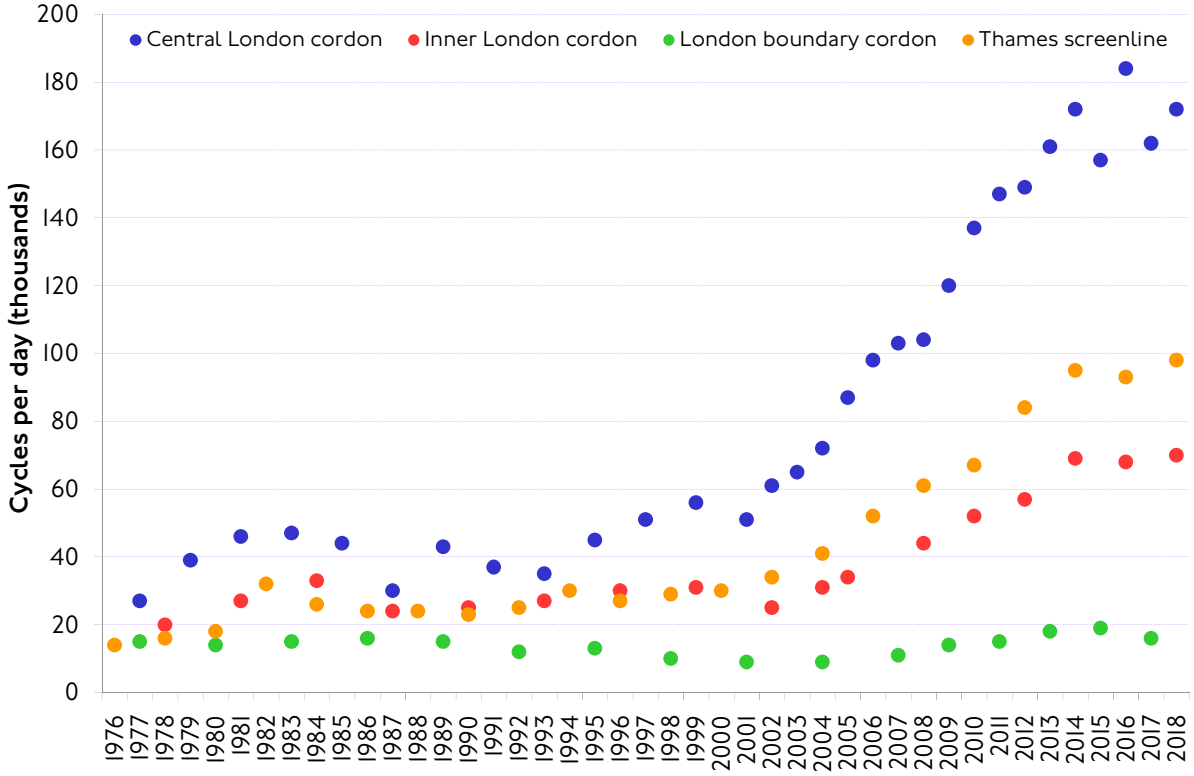
Source: Strategic Analysis, TfL City Planning.

6.4 Cycling volumes across strategic cordons and screenlines

TfL also collects data on the cycle journeys across strategic counting cordons and screenlines. Figure 6.5 shows cycling volumes across the central, inner, and GLA boundary cordons as well as the Thames screenline. The GLA boundary cordon was not updated in 2018 but has been included for reference. On both the central and inner cordons, as well as on the Thames Screenline, there was an increase in cycling volume compared to when they were counted previously:

- The central London cordon has seen a 6.2 per cent increase in volume in the year since 2017, with the total cycles crossing it now reaching approximately 172,000 per day. Looking at the graph, the counts on this cordon have shown significant variation over the last few years. This is likely to be due to the fact that these are one-day counts, and cycling volume is known to have significant day-to-day variability, to a great extent related to the weather.
- The number of cycles across the inner London cordon has increased by 2.9 per cent since it was last counted in 2016 (which represents an equivalent annual growth rate of 1.5 per cent).
- Finally, cycling volumes across the Thames screenline saw an increase of 5.4 per cent since 2016 (which represents an equivalent annual 2.7 per cent growth rate).

Figure 6.5 Trend in cycle flows across strategic cordons, 1976-2018.



Source: TfL Traffic Data.

6.5 Cycling volumes on recently opened infrastructure

This section looks at changes in cycling volume (with respect to pre-construction baselines) along cycle routes that were completed and opened in 2018. There was a change to the naming of cycle routes in 2018 – former names are given below for reference. The routes are:

- **Cycleway 3** – section a (Lancaster Gate to Birdcage Walk). Mostly segregated. This was completed in 2017, but the first 'after' data was collected in 2018. Formerly Cycle Superhighway 3 East-West (section a).
- **Cycleway 6** – section b (Stonecutter Street to King's Cross). Mostly non-segregated. Formerly Cycle Superhighway 6 North-South (section b).
- **Cycleway 27** (Bloomsbury to Walthamstow). Mostly non-segregated. Formerly Quietway 2.
- **Cycleway 12** (Kilburn to Gladstone Park). Non-segregated. Formerly Quietway 3.
- **Cycleway 5** – section b (Oval to Clapham). Mostly non-segregated. Formerly Quietway 5 (section b).
- **Cycleway 16** – section b (Wanstead Flats to Barkingside). Mostly non-segregated. Formerly Quietway 6 (section b).
- **Cycleway 20** (Green Lanes – A105, Enfield). Mostly segregated. Formerly Green Lanes, Mini-Holland Enfield.
- **Cycleway 31** (The Cut, Kingston). Mostly traffic-free. The first 'after' data for this route was collected in spring 2019. Formerly The Cut, Mini-Holland, Kingston.

On most of these routes there are several count sites. Table 6.2 provides a summary of post-construction cycle volumes and relative change from the baseline with ranges derived from the individual count sites on each route. These values relate to individual routes within the London cycle network and should not be taken as indicators of change at aggregate level or directly compared among each other without due consideration of local factors, such as the extent of abstraction from parallel routes.

Table 6.2 Cycling volume highlights for new cycle routes delivered in 2018.

Route	'After' annual average flows (adjusted[1])	'After' flows (unadjusted[2])	Sites with growth (from adjusted annual average)	Annual growth[3] (from adjusted annual average)
Cycleway 3 (section a)	2,400-7,100	2,600-7,800	5 out of 7	2%-32%
Cycleway 6 (section b)	800-8,500	900-8,000	5 out of 7	9%-41%
Cycleway 27	300-6,600	300-6,200	11 out of 12	1%-33%
Cycleway 12	~200	200-300	1 out of 2	11%*
Cycleway 5 (section b)	200-6,400	200-6,000	2 out of 2	2%-53%*
Cycleway 16 (section b)	0-200	0-100	2 out of 3	13%-16%*
Cycleway 20	200-400	200-500	6 out of 6	16%-42%
Cycleway 31	200	200	0 out of 1	n/a

Source: TfL Traffic Data.
1. These flows are an annual average of the total bidirectional cycle demand per day (6am-10pm) on each count site, where the adjustment removes the impact of seasonality. Figures are rounded to the nearest hundred.
2. Total bi-directional cycle demand per day (6am-10pm) on each count site, as measured. Figures are rounded to the nearest hundred.
3. Calculated on an annual equivalent basis from the adjusted flows among those count sites where growth was observed.
** These figures stem from a low baseline and are thus more prone to errors.*

The overall conclusion is that there was growth in cycling on routes that opened in 2018 when comparing their first 'after' counts with their respective pre-construction baselines. In fact, on most routes and count sites this growth was at

a rate higher than the average background growth observed London wide and in central, inner and outer London respectively (5 per cent background growth overall, 8 per cent in central London, 3 per cent in inner London and 6 per cent in outer London).

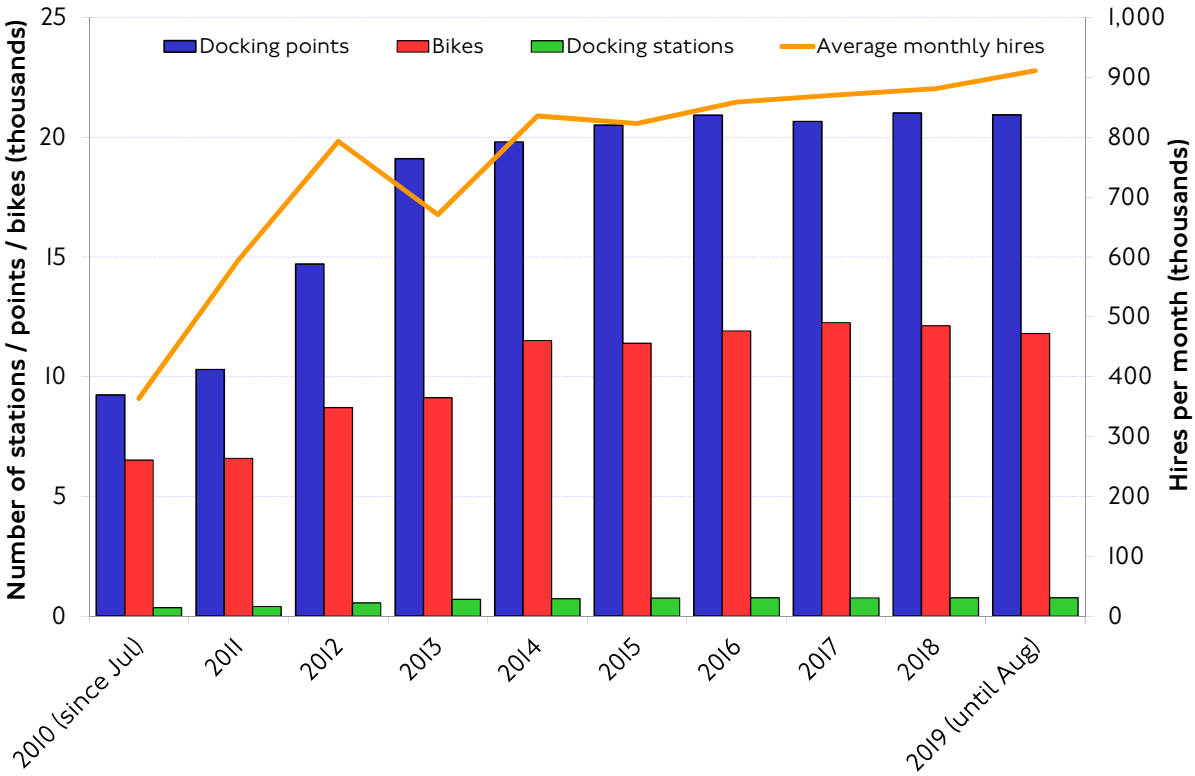
Further work is underway to quantify the extent to which this growth reflects new trips stimulated by the infrastructure, transfers from other modes, or abstraction from parallel routes. However, in general, the data thus far shows that where investment is made there is at least corresponding local growth in cycling.

6.6 Santander Cycles

Santander Cycles is the name of TfL's cycle hire scheme. Launched in 2010, it currently comprises around 780 docking stations, 21,000 docking points and more than 11,800 bikes. Currently, some 1.31 million Londoners live within 400 metres of a docking station, and there are further extensions of the scheme planned for the near future.

As shown in figure 6.6, the demand for this service (measured as the number of hires) has been almost continually increasing since its launch, with a very high growth rate in the first few years of operation, largely corresponding to the expansion of the scheme, and a lower rate of expansion thereafter. Furthermore, in the last few years it has been observed that the demand has continued to increase in the context of a relatively constant level of supply (measured as the number of stations, docking points and bikes).

Figure 6.6 Average monthly hires and infrastructure provision, 2010-2019.



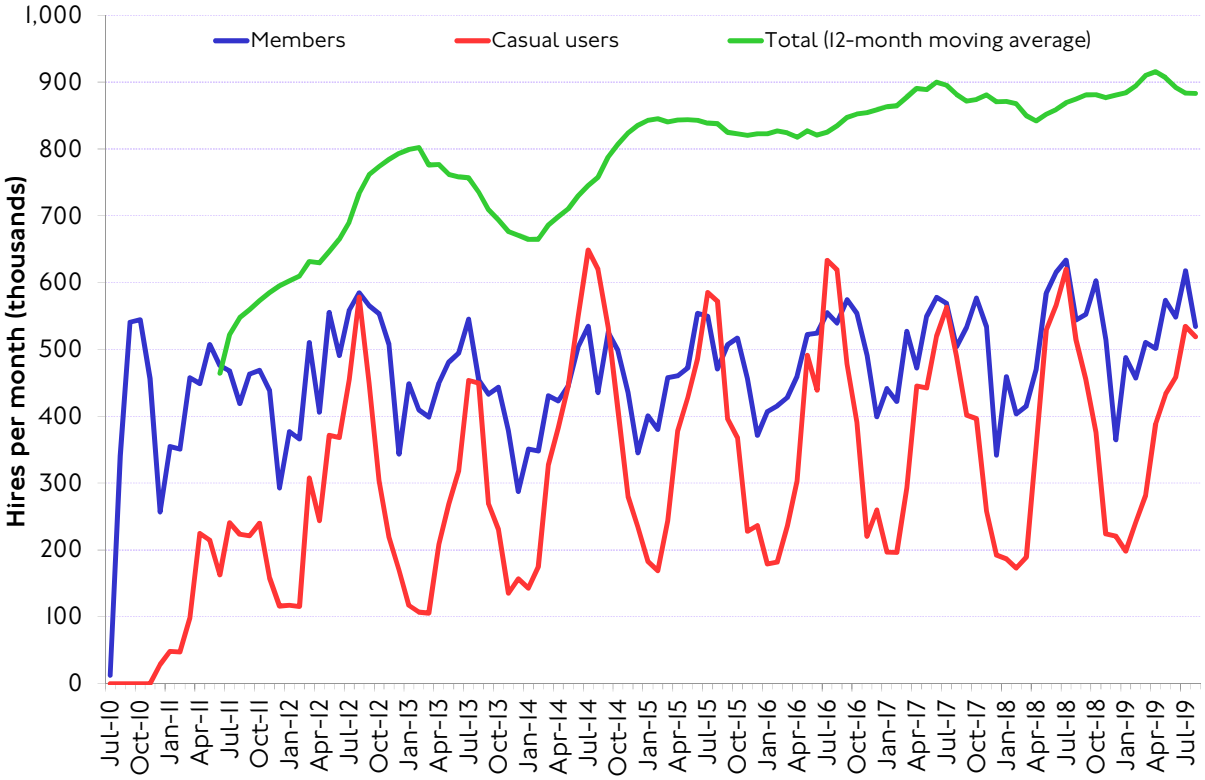
Source: TfL Cycle Hire.

The distribution of demand over time follows a similar pattern as observed for cycling in general. Within the day, the demand on Santander Cycles is largely concentrated around the traditional morning and evening peaks but there is also a

smaller peak in the middle of the day. Over time, this profile has remained largely consistent through the months and years, but in 2018 the growth from the previous year happened mostly in and after the evening peak period.

Within the year, demand for Santander Cycles is very seasonal, as shown in figure 6.7. As would be expected, the summers are busier and the variations are larger for casual users.

Figure 6.7 Total number of hires by user type per month, 2010-2019.



Source: TfL Cycle Hire.

6.7 Cycling demographics and attitudes: a summary

This section draws from several well-established surveys to look at the demographic profile of London's cycling population as well as their perceptions, attitudes and behaviours towards cycling. At a London-wide level, the London Travel Demand Survey (LTDS) remains the most suitable dataset to explore the demographics of people who cycle. However, TfL also conducts cycle intercept surveys along routes where investment in cycling is being made and the results from these can shed some light on the demographics and attitudes of the users of these facilities at more local level. Furthermore, TfL also commissions a longitudinal study looking into the changes in travel behaviour over time of people exposed to the Mini-Hollands investment programme, findings from which are outlined below.

The main findings are:

- According to the LTDS, in 2018/19 just below 21 per cent of Londoners reported having cycled at least once in the last year, which is the lowest proportion since 2010/11. This strongly suggests that the growth in cycling observed in volumetric counts is driven by population growth, and by people who already cycle making more trips.

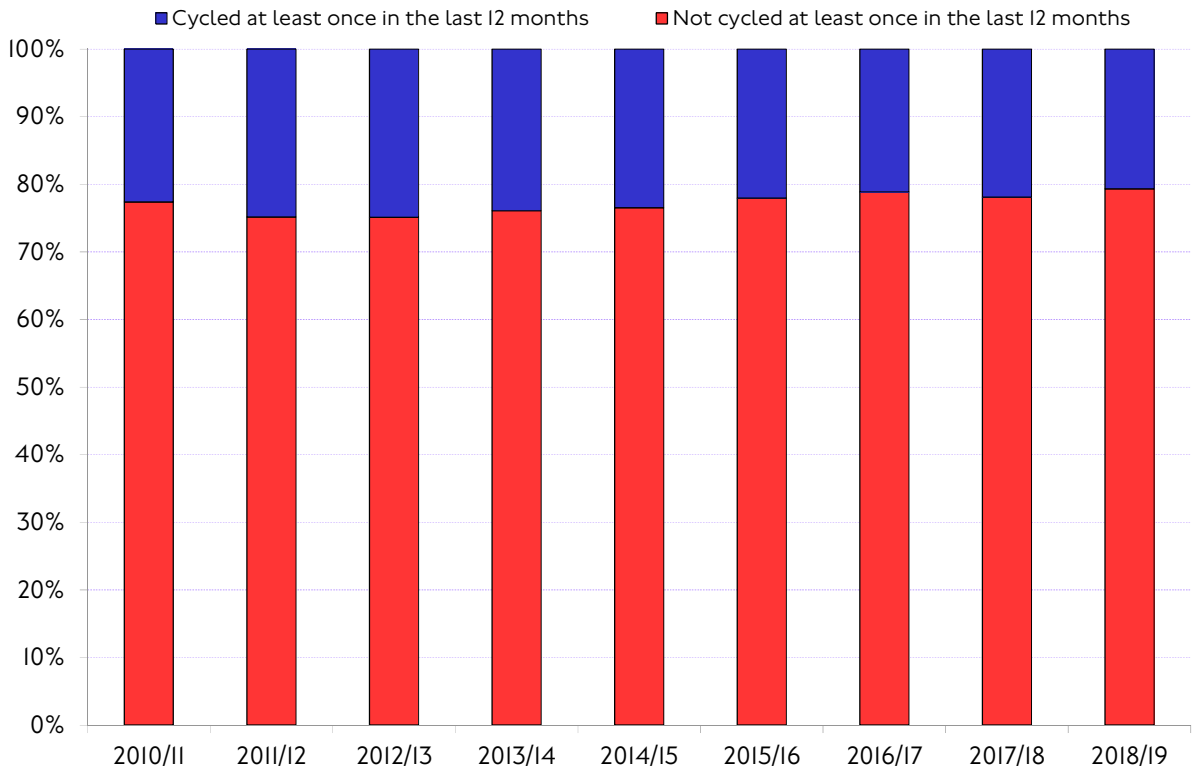
- Most people who cycle in London do so quite regularly and have been doing so for more than five years. They also tend to be mostly male, white, in employment, and with relatively higher household incomes.
- The cycle intercept surveys on cycle routes that were opened in 2018 show good overall user satisfaction with the improvements and a positive correlation between the provision of cycling infrastructure and the perception of safety, which may be stronger where the infrastructure is segregated. They also show that the demographic profile of users of these new cycle routes is not markedly different to that of the general cycling population in London.
- Most users of cycle routes where TfL has invested in cycling are people who also live in London, cycle very regularly, and who have been cycling on that route for a relatively long time. However, almost 75 per cent of users consider the cycling facilities along the route a significant factor in their choice of mode and route for that journey.

6.8 Cycling demographics among London residents

Travel in London report 11 considered results from TfL's Attitudes Towards Cycling survey. However, this survey is no longer available. In its absence, LTDS can be used to explore the demographic profile of Londoners who cycle.

Figure 6.8 shows the trend in the proportion of people who report having cycled at least once in the last 12 months. It is seen that, in 2018/19, some 21 per cent of Londoners reported having cycled in the last 12 months. This proportion varies from year to year, but the overall trend shown by the figure is slowly downwards.

Figure 6.8 Proportion of people who have cycled at least once in the last 12 months, 2010/11-2018/19.



Source: Strategic Analysis, TfL City Planning.

Since cycling volume has been increasing in this period, as described in the sections above, this would imply that such observed growth in the last year and more generally over the last decade is driven by population growth and those who already cycle doing so more often and further, rather than by cycling becoming more widespread among the whole population.

Table 6.3 further summarises the demographic distribution of Londoners who have cycled at least once in the year before the survey, for the most recent two years and for one year at the beginning of the decade.

Table 6.3 Demographic profile of people who cycled at least once in the last year, 2010/11, 2017/18 and 2018/19.

	Proportion of the total who state having cycled at least once in the last year			LTDS whole sample
	2010/11	**2017/18**	**2018/19**	**2018/19**
Gender				
Male	64%	61%	62%	50%
Female	36%	39%	38%	50%
Age				
5-24	37%	33%	33%	27%
25-34	20%	20%	20%	18%
35-44	21%	20%	21%	18%
45+	22%	27%	27%	36%
Ethnicity				
White	78%	75%	78%	62%
Non-white	22%	25%	22%	38%
Employment status				
Not in employment	46%	38%	36%	46%
In employment	54%	62%	64%	54%
Household income				
< £20,000	27%	15%	13%	25%
£20,000-£75,000	53%	51%	48%	49%
£75,000+	19%	34%	39%	26%

Source: Strategic Analysis, TfL City Planning.

The overall picture remains largely unchanged since last year, and only some variables show a clear long-term trend:

- **Gender:** Most people who cycled at least once in the previous year are male, and there only seems to be a very slow long-term increase in the proportion of women. This trend is also true when looking at commuting by cycle, where the proportion of men was 71 per cent in 2018/19.
- **Age:** The age profile for people who have cycled at least once in the previous year remained largely unchanged in 2018/19, but in terms of the proportion of people who ever commute by cycle there was a noticeable drop in the 0-24

years bracket with simultaneous increases in all other groups, particularly the 35-44 group.

- **Ethnicity:** In 2018/19, the proportion of non-white people who cycled at least once in the previous year was the lowest since at least 2010/11. This gap in ethnic diversity in cycling is even bigger for commuter cycling, where only 11 per cent of people who ever commute by cycling are non-white, again the lowest proportion since at least 2010/11.
- **Employment status:** Most people who cycled at least once in the previous year are in employment, and their share over the total of those who cycled in the last year has shown a long-term increase since at least 2010/11. This agrees with other observations, which show that commuting is one of the main purposes of cycle journeys, particularly among people who cycle regularly, and might also be related to the delivery of high-quality cycling infrastructure along radial routes into central London.
- **Household income:** In 2018/19, the proportion of people in the lowest income brackets who cycled at least once in the previous year was the lowest since at least 2010/11, while the proportion of people in the higher income brackets continued to increase. This continues a long-term trend of cycling being over-represented among higher earners.

Table 6.4 summarises other indicators from LTDS that look at changes over time of certain aspects of cycling behaviour:

Table 6.4 Cycling behaviour indicators, 2010/11, 2017/18 and 2018/19.

	2010/11	2017/18	2018/19
Length of time being a regular cyclist			
Less than a year	11%	11%	11%
Between 1 and 5 years	36%	32%	29%
More than 5 years	53%	57%	60%
Change in frequency of cycling since the previous year			
More cycling	16%	7%	7%
About the same	72%	90%	89%
Less cycling	13%	4%	4%

Source: Strategic Analysis, TfL City Planning.

The main findings are:

- **Length of time being a regular cyclist:** Compared to last year, there has been an increase in the proportion of people who have been cycling for a very long time (more than 5 years), but the proportion of what might be considered 'new' people who cycle has remained stable.
- **Change in amount of cycling since the previous year:** There continues to be a net increase in number of people cycling at the aggregate level, given that the number of people who cycle more than last year remains higher than the number of those who cycle less.

6.9 Cycling demographics and behaviours on recently opened routes

TfL has an extensive programme of cycle intercept surveys on most of the cycle routes where it has invested in cycling improvements. The main objective of these surveys is to evaluate how these interventions affect travel behaviour and the overall customer experience. Although these surveys have several limitations, they are nevertheless a suitable source for indicative conclusions about the local impacts of investment in cycling. This section looks at changes (with respect to their pre-construction baselines) in the perceptions, attitudes, and demographics of the cycling population on cycle routes that were delivered in 2018. Table 6.5 summarises the available data. Where there are gaps, these are due to insufficient sample sizes or data not yet available.

Table 6.5 Intercept survey data available for cycle routes completed in 2018.

		Intercept surveys	
Route	**Former name**	**Baseline**	**After**
Cycleway 3 (section a)	Cycle Superhighway 3 East-West (section a)	✓	✓
Cycleway 6 (section b)	Cycle Superhighway 6 North-South (section b)	×	✓*
Cycleway 27	Quietway 2	✓	✓
Cycleway 12	Quietway 3	×	✓
Cycleway 5 (section b)	Quietway 5 (section b)	×	✓
Cycleway 16 (section b)	Quietway 6 (section b)	✓	×
Cycleway 20	Green Lanes, Mini-Holland Enfield	×	✓
Cycleway 31	The Cut, Mini-Holland Kingston	×	✓

Source: Strategic Analysis, TfL City Planning.
** This data was actually collected in spring 2019, but it is the first 'after' data for this route.*

In terms of **perceived safety and cycling confidence**, the main findings are that:

- Across the assessed routes, most people (between 64 and 84 per cent depending on the route) state feeling safe for most or throughout the entire journey. On the two routes with baseline data, this proportion has increased by 7 and 17 percentage points with respect to the pre-construction baseline.
- On all but one of the assessed routes, more than half of the respondents (and up to 63 per cent) state that a reason to choose that route is because 'it feels safer than the alternatives'. Where baseline data is available, there have been increases of 4 to 10 percentage points to this proportion since the route opened.
- Most surveyed cyclists (64 to 81 per cent on different routes) feel confident cycling on most roads; and 25 to 41 per cent feel more confident than the previous year after the route opened, although the majority feel as confident as before.
- In general, these results suggest a positive correlation between the provision of cycling infrastructure and the perception of safety. There is also emerging evidence that this correlation may be stronger where the infrastructure is segregated.

With regards to the **demographics** of people who cycle on these new routes, the main findings are that:

- The proportion of women is relatively low (around 27 per cent on most routes), but this tends to be slightly higher (up to 34 per cent) on some (formerly) Quietway routes. Where data is available, this gender split has remained largely unchanged with respect to the pre-construction baselines.
- There are very low proportions of young (16-24 years old) cyclists – less than 6 per cent on all assessed routes. The proportion of older cyclists (aged 45 and over) varies but tends to be higher on suburban routes located further away from the centre.
- In terms of ethnicity, the large majority of people who cycle are white (above 85 per cent on all assessed routes), and this proportion does not appear to have changed following construction of the routes.
- The proportion of people in full-time employment who cycle is higher than 73 per cent on all assessed routes, with some as high as 87 per cent, demonstrating the strong relationship between cycling and commuting. This tends to be lower on outer London routes.
- The proportion of people in low-income households (less than £20k pa) who cycle is very low (below 14 per cent on all assessed routes) relative to their prevalence in the general population (around 26 per cent). On all but one route the proportion of cyclists from middle-income households (£20k to £75k pa) is higher than the other income brackets, although the proportion of cyclists from households with incomes above £75k pa is significant (often exceeding 20 or 30 per cent) and seems to be increasing slightly.
- In terms of general cycling frequency, on all assessed routes the vast majority of people cycle regularly (on more than 5 days a week), with proportions varying between 50 and 73 per cent, reaching up to and above 80 or 90 per cent when looking at those who cycle at least 2 days per week.

Although these emerging results are subject to various statistical limitations, the conclusions are broadly consistent with other London-wide surveys such as the London Travel Demand Survey (LTDS). In general, these findings suggest that cycling infrastructure of itself is not yet leading to a substantial shift in the overall demographics of people who cycle in London. Therefore, additional actions seem necessary to make cycling more representative and accessible to wider demographic groups.

In terms of **user satisfaction** with the new infrastructure, the key findings are that:

- On all routes, more than 60 per cent of respondents rate the quality of the route where they were intercepted as 'quite pleasant' or 'very pleasant'.
- When asked about the satisfaction with specific elements of the route, 'Quality of road surface' stands out as a poor performer. Former Quietways tend to also fall short on 'helpfulness of signs and markings for cyclists' and 'space for cyclists', and on one of the former Cycle Superhighway routes, the 'volume of traffic' indicator has deteriorated since opening.
- On all routes, the proportion of respondents who agree with the proposition 'I would encourage new cyclists to use this route' is greater than 70 per cent and greater than 80 or 90 per cent on some routes. Agreement with the statement 'the quality of my journey has improved since the changes' is also quite high and above 60 per cent on all but two of the assessed routes.

- Agreement with the proposition 'I am happy to cycle further in order to be able to use this route' is greater than 50 per cent only on former Cycle Superhighway 3 East-West (section a), thus suggesting a higher catchment for the more radical interventions.
- Although the satisfaction scores are quite variable across the routes, in general satisfaction with the assessed routes is good and so are recommendation scores and the perceived quality of the overall journey experience.

With regards to the impacts of the infrastructure on **travel behaviour**, the main findings are that:

- The proportion of respondents who say that they cycle more than the previous year in the after surveys on the assessed routes is between 29 and 45 per cent; this tends to be at the higher end of that range where there is substantial segregation from general traffic. This proportion is much higher than that of those who cycle less than the previous year, thus confirming the net increase in cycling volume observed.
- Although 'better/more cycling infrastructure' is not one of the top statements cited by respondents as a reason to cycle more in the current year, on most of the assessed routes around 40 per cent of respondents do mention it, and this proportion is up to 55 per cent on the Green Lanes route.
- The impacts of the assessed routes on the amount and frequency of cycling, mode shift to cycling, and re-routeing are mixed, but the Green Lanes route stands out as best performer on all of them.
- In general, the impacts of cycling infrastructure on travel behaviour vary widely on each individual route but, overall, they all progress in the right direction. The particularly good performance of the Green Lanes route suggests that the impact is greater on a high profile, largely segregated route in an area (London Borough of Enfield) where there are complementary measures in place to promote cycling.

6.10 Active travel behaviour among residents in the Mini-Holland boroughs

Travel in London report 11 provided a comprehensive review of the Mini-Hollands programme up to 2018. This section presents an update on the longitudinal 'People and Places' study, which tracks a sample of individuals living in Mini-Holland boroughs and other 'control' boroughs over time to assess their changes in active travel behaviour.

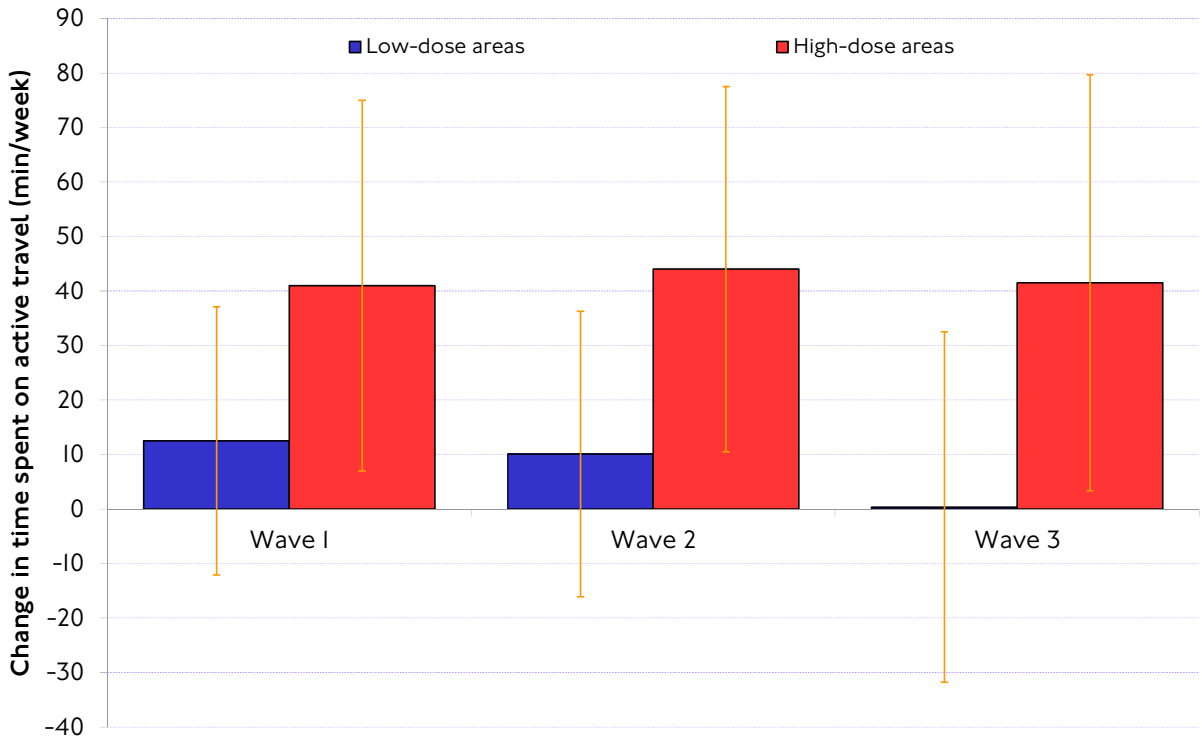
Details about the methods for this research, which is conducted for TfL by Dr Rachel Aldred at the University of Westminster, can be found in Travel in London report 11. However, an important aspect for the interpretation of the results in this section is the definition of 'high-dose' and 'low-dose' Mini-Holland areas. These definitions are agreed by stakeholders from the three Mini-Holland boroughs in order to distinguish between residents of the borough who are considered to have been directly affected by the interventions ('high-dose') and those who are considered to have been exposed mostly to the marketing and behaviour change campaigns and only indirectly to the infrastructure improvements ('low-dose').

The third 'after' survey wave of this study was completed between May and June 2019 by just less than 1,500 participants (approximately 100 fewer than in the

previous wave), which represents a follow-up rate of 44 per cent. In this wave, 71 per cent of participants in Waltham Forest were classified as living in a 'high-dose' area (the rest in a 'low-dose' area), while this proportion was 39 per cent in Kingston and 26 per cent in Enfield.

Preliminary results of this analysis are shown in figure 6.9 and are described below. While interpreting these findings it is important to be mindful of the limitations of a study of this sort, primary among which is the limited sample size. Wherever possible, the results are presented alongside indicators of statistical significance. However, some of these might still only be indicative and should be treated as such.

Figure 6.9 Change in minutes spent travelling by walking or cycling, 2016-2019.



Source: TfL and University of Westminster.
Note: The chart shows 95 per cent confidence intervals. The chart controls for demographic differences between areas which might affect changes in active travel.

- In wave 3 of the study, it was again found that living in a 'high-dose' Mini-Holland area was associated with increased active travel in the previous week, compared to the control group, by 41.5 extra minutes of active travel per week (see figure 6.9). This is consistent with the findings from waves 1 and 2 and thus provides further evidence that these interventions are associated with people spending more time walking or cycling.
- For the first time in wave 3, new analysis looked at likelihood of spending at least 150 minutes a week walking or cycling. This threshold was chosen to reflect the Mayor's ambition for all Londoners to complete at least 20 minutes of active travel per day. It was found that in 'high-dose' areas people were 13 per cent more likely to meet this target than in the control groups, this result being significant in waves 1 and 3 and borderline significant in wave 2.
- Also for the first time in this wave, additional analysis looked at the impacts of the Mini-Holland interventions on the number of days when an individual does

at least 30 minutes of physical activity. This threshold was chosen to reflect the World Health Organisation's recommendation that all adults spend at least 150 minutes per week on moderate-to-vigorous physical activity. It was found that people living in Mini-Holland boroughs were more likely to be physically active for five days in the past week, this result again being significant in waves 1 and 3 and borderline significant in wave 2. In this case there was not any difference between 'high-dose' and 'low-dose' areas.

- The study also looked at whether people living in the 'high-dose' areas were more likely to participate in any active travel at all in the previous week. In wave 1, there was a statically significant increase in participation in cycling, but not in walking or in overall active travel. In wave 2, by contrast, a trend to increased participation in cycling still appeared but was no longer statistically significant, although there was increased participation in walking and active travel among those living in a 'high-dose' area. The results in wave 3 are like those in wave 1, but with slightly stronger effects. There was borderline statistical significance towards higher cycling levels in the Mini-Holland group compared to the control group and this difference was larger and was significant in the 'high-dose' areas. This effect was strongest in areas nearest to new cycle routes, and was particularly strong in Waltham Forest.
- As in previous waves, there was evidence in wave 3 that living in a Mini-Holland borough and the proximity to new routes were associated with an increasingly positive attitude towards the local neighbourhood, due to improvements in the cycling environment.

In summary, the main findings of this study so far suggest reasonably consistent trends across the three waves in terms of active travel behaviour and attitudes to transport and the local environment. However, not all of these trends were statistically significant every year. Mini-Holland interventions in 'high-dose' areas seem to be causing increased uptake of active travel, both in terms of increased average time spent on active travel (in all waves), and participation in cycling (waves 1 and 3) and any active travel (wave 2). On the other hand, trends related to car use are more contradictory, with only some weak evidence in wave 2 of reduced car use. Finally, there continues to be evidence that these interventions have led to improved perceptions of the local environment.

Further insights about cycling from the cycle intercept surveys

Although the main objective of the cycle intercept surveys is to monitor the impact of cycling investment along each of a series of well-defined cycle routes, the programme of surveys is now mature enough that there is sufficient data to attempt further analyses looking holistically at all of the cycle routes with a view to drawing some conclusions that may be applicable at a more strategic level.

A first piece of analysis tried to quantify the proportion of non-Londoners who cycle in London and, using the sample of respondents from surveys on cycle routes where TfL has invested in cycling as a proxy, it showed that in 2017 and 2018, on average, 96 per cent of respondents were London residents, with virtually no presence of overseas visitors and the rest living elsewhere in the UK. Although the intercept surveys methodology is expected to bias the results away from casual and foreign cyclists, the overall magnitude seems plausible.

Other work looked at the different types of bike used across London (again using the sample of surveyed cycle routes as a proxy), and how this has changed in

recent years. Table 6.6 provides a summary by London area for routes surveyed in 2017 and 2018.

Table 6.6 Bike type by London area, 2017-2018.

Area	Conventional pedal cycles	Santander Cycles	Folding bicycles	Other (eg e-bikes, adapted)
Central	78%	11%	9%	3%
Inner	89%	3%	5%	2%
Outer	93%	0%	4%	3%
London total	86%	5%	6%	3%

Source: Strategic Analysis, TfL City Planning.

Unsurprisingly, most bikes are conventional pedal cycles, but more than one in ten bikes in central London is a Santander Cycle and there is also a noticeable share of folding bikes across all areas.

6.11 London's developing cycle network

Access to the cycle network

TfL has worked with the London boroughs and other partners to improve London's cycle facilities and create a connected, high quality and easily accessible network of cycle routes for all Londoners.

The Healthy Streets Approach in the Mayor's Transport Strategy further includes the continued expansion of London's network of quality cycle routes as a key element to make streets more attractive and accessible for people to walk, cycle and use public transport. Specifically, TfL's Cycling Action Plan has an ambition to increase the proportion of Londoners living within 400 metres of a high quality cycle route to around 28 per cent by 2024. In 2018, this proportion was 11.5 per cent (up from 9.9 per cent a year earlier), while the total length of the cycle network was around 140 kilometres.

Rebranding of London's cycle network

On the back of this, TfL has recently launched the new Cycleways network, which from autumn 2019 onwards will replace the existing naming on all our routes.

Cycleways will be a single, unified cycle network offering good quality cycle routes throughout London using a range of different infrastructure types, including segregation, quiet streets and parks. Rather than focusing on one type of infrastructure, they will be designed to provide the best cycling route between key destinations as part of a connected and unified network. All new routes delivered as part of the Cycleways network will need to meet the new quality criteria. This will ensure that whatever type of infrastructure is used as part of the new Cycleways, the routes will offer a high quality cycling experience and address traffic dominance. Furthermore, the new Cycleways network will have a simple numbering system with consistent signs on all routes to overcome the potential confusion that exists now between Cycle Superhighways and Quietways, which have different signing and numbering systems. Over the next few months, signs and road markings on existing routes will be progressively updated.

7. Healthy Streets

7.1 Introduction

The Healthy Streets Approach is central to the Mayor's vision to create a better city for all Londoners. It is an overarching framework for the design and management of London's streets, incorporating measures to encourage walking, cycling and use of public transport, to reduce road danger, tackle poor air quality, reduce car dependency, improve the environment and deliver an accessible and inclusive transport system. The Healthy Streets Approach is intended to improve Londoners' experiences of the Capital's streets, helping everyone to be more active and to enjoy the health benefits that this brings.

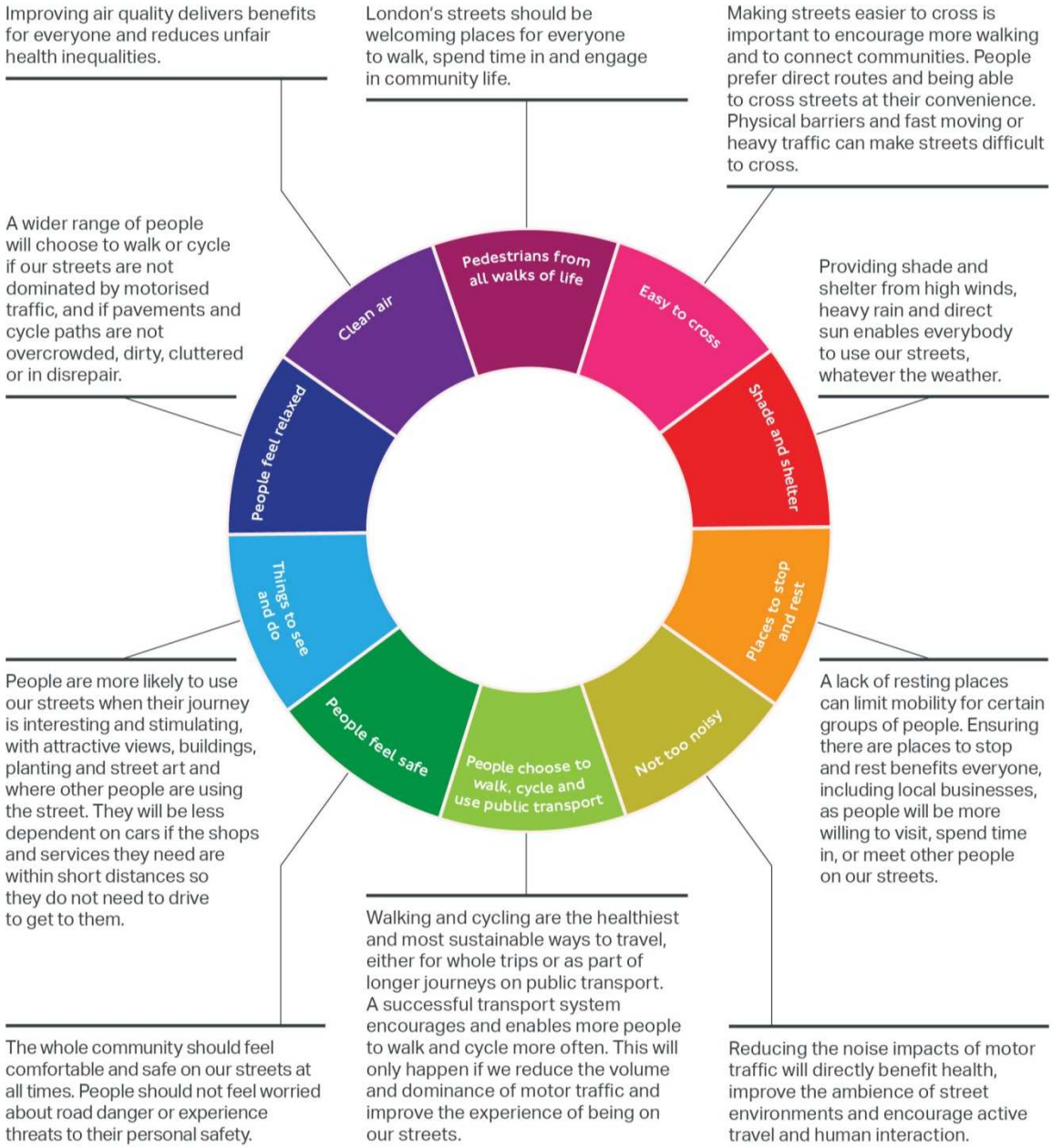
The Healthy Streets Approach also has wide applicability, including implications for the development of the wider public transport system to encourage active, efficient and sustainable travel, and for the planning of transport for new developments, homes and jobs.

This chapter describes a range of tools that are being used to support the Healthy Streets Approach. London's streets provide an opportunity for people to stay active. Their design and management can facilitate walking and cycling, and can reduce the impact of motorised traffic on people's health and wellbeing. Most journeys made by Londoners start, end or happen entirely on our streets. The Healthy Streets Approach provides a framework to inform our decision making – in our own schemes, our relationships with boroughs, and our role in planning for London's growth. More details on this Approach and how it is being taken forward in terms of strategic and local planning in London can be found at: www.tfl.gov.uk/corporate/about-tfl/how-we-work/planning-for-the-future/healthy-streets.

7.2 The Healthy Streets Indicators

There are 10 Healthy Streets Indicators (figure 7.1), which summarise the essential elements that make a street an inclusive and healthy environment. To deliver a healthy street a wide range of individual features are needed. One of the best ways to assess the health of a street is to spend time on the street, observing how it looks and feels, and how it is being used by people. However, the Indicators can be assessed through more formal quantitative measures as well.

Figure 7.1 The 10 Healthy Streets Indicators.



Source: Lucy Saunders, Mayor's Transport Strategy.

7.3 Healthy Streets Mystery Shopper Survey

Background

There are several different ways to quantitatively measure the 10 Healthy Streets Indicators; each has its strengths and weaknesses. The 'state of play' with our knowledge was described in Travel in London report 11. Ideally, we would use a mix of methods to get a rounded picture of how streets are performing. At present we have limited data for describing how well we are delivering against each Indicator at a London-wide level, although this is improving. Our new Healthy Streets Mystery Shopper Survey and new walking and established cycle counts will be very helpful for building a richer picture.

October 2018 saw the launch of TfL's Healthy Streets Mystery Shopper Survey. For the first time, this survey provides strategic insight about the experience of being on London's streets, allowing us to track changes over time. Now with a full year of data, the survey is beginning to reveal new insights about London's streets. This section explains the methodology behind this innovative survey and describes summary insights from the first year of results.

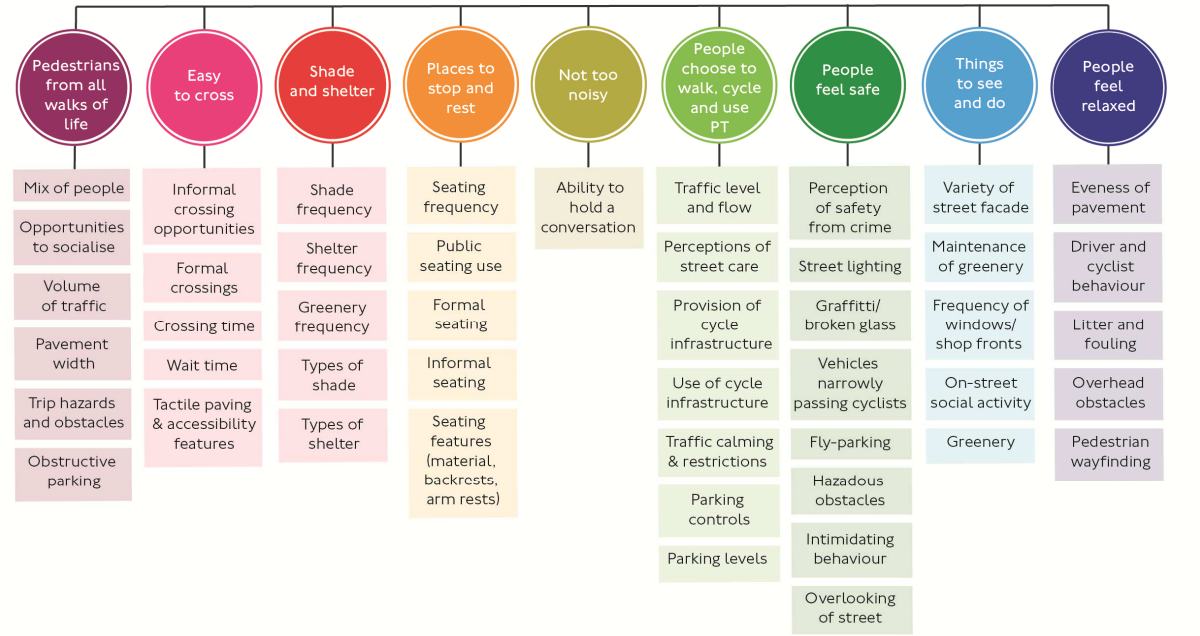
The Mystery Shopper Survey assesses street performance during a surveyor visit to the street. The increased scale of sample that is possible with this approach will give coverage that is usefully representative from a strategic monitoring point of view.

Mystery Shopping London's streets

Mystery Shopper methodologies are well established and widely used by TfL to assess the quality and performance of other aspects of the transport environment such as stations and bus services.

In a similar vein, the Healthy Streets Mystery Shopper Survey has been designed to give consistent feedback across a wide range of London streets contexts. At each site, a dedicated surveyor assesses a 100-metre stretch of street against approximately 100 metrics, entering their responses in real time via an app. Questions relate to one of the Healthy Streets Indicators (figure 7.1), with multiple aspects relating to the indicator considered (figure 7.2). This allows a score to be calculated for nine of the 10 Indicators ('Clean air' cannot accurately be assessed by this method). The results provide detailed information at each street location, which can be used to identify local needs as well as strategic trends.

Figure 7.2 Question topics feeding into the Healthy Streets Indicators.



Source: Strategic Analysis, TfL City Planning.

Monitoring and evaluating progress

This methodology can be used both to monitor change over time across London and evaluate the impact of specific street improvement schemes through 'before' and 'after' surveys. This idea is shown in figure 7.3.

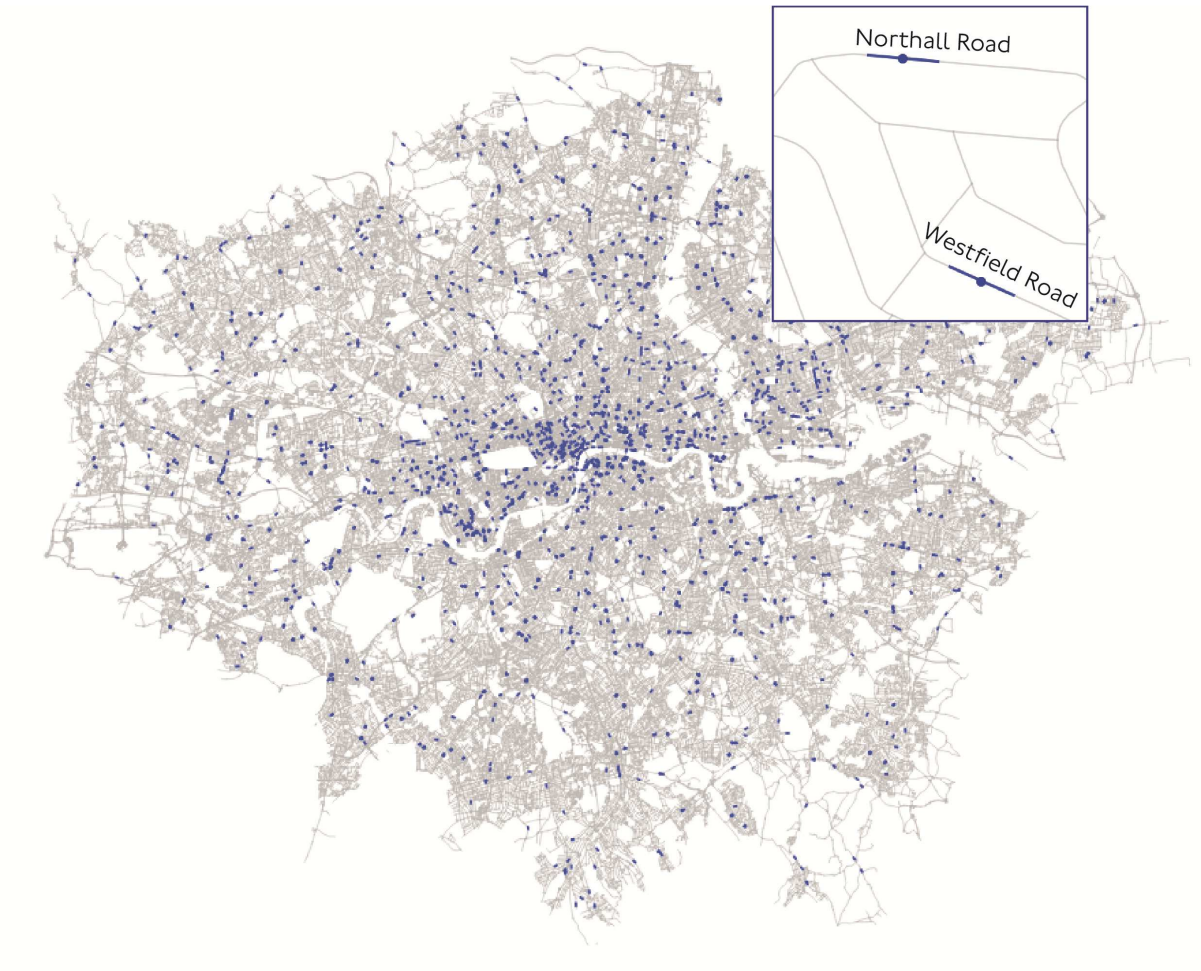
Figure 7.3 Sample giving both strategic and 'tactical' views.

Source: Strategic Analysis, TfL City Planning.

The 'core' sample

The 'core' survey assesses a changing sample of 1,520 sites annually which are assessed on a continuous (quarterly) basis throughout the year to minimise seasonal bias (figure 7.4). Streets are randomly selected, but sampled by geographical area, type of street and time of day (table 7.1). In total, the 'core' sample assesses approximately one per cent of London's street network each year. This allows progress against the Healthy Streets Indicators to be monitored over time as London's street network changes, both by type of street and area of London. It also provides evidence about which aspects of our streets require improvement, and therefore where to target investment.

Figure 7.4 Exemplar annual core sample sites.



Source: Strategic Analysis, TfL City Planning.

Table 7.1 Sampling frame for Healthy Streets Mystery Shopper Survey.

Area	Arterials/ connectors	High streets	Local streets	City places/hubs
Central London	50	50	50	57
Inner-north	50	50	50	20
Inner-east	50	50	50	17
Inner-south	50	50	50	8
Inner-west	50	50	50	12
Outer-north	50	50	50	19
Outer-east	50	50	50	4
Outer-south	50	50	50	11
Outer-west	50	50	50	22

Source: Strategic Analysis, TfL City Planning.

Scheme surveys

Alongside the core sample, the Mystery Shopper methodology can also be used to assess locations that have undergone specific improvements (through equivalent before/after surveys). In these cases, scheme-specific scores can be compared to those from the 'core' sample and on a before/after basis in relation to the scheme itself, and the survey can also serve a diagnostic function in relation to locations or aspects in need of improvement.

The Healthy Streets Mystery Shopper Survey complements the Healthy Streets Check for Designers and the two should be used alongside each other for scheme design and appraisal. The Healthy Streets Check for Designers (see Travel in London report 10, section 6.3) measures 'objective' components of a street that can be influenced in scheme design through the provision of infrastructure, such as the width of clear continuous walking space or the availability of street seating. But it does not set out to capture the more experiential aspects and how it feels to be on that street at any given time, taking into account factors such as the weather, noise, construction, standards of maintenance, other street users and driver behaviour. These are important determinants of whether people choose to walk, cycle or spend time on a street, and should be assessed in context using the Healthy Streets Mystery Shopper Survey.

How are streets performing against the Healthy Streets Indicators?

To encourage people from all walks of life to choose to walk, cycle and use public transport in London, it is essential that streets deliver on all of the Healthy Streets Indicators. Cumulative survey scores help us to understand which Indicators perform well across London, and which Indicators we need to work harder on.

Figure 7.5 shows that 'People feel safe' and 'People feel relaxed' are the best performing Indicators across London. This reflects that streets are generally well maintained and functional eg pavements are even, level and wide enough for the number of people using them.

Scores are lower for Indicators that would encourage people to socialise and spend more time on-street rather than just pass through eg 'Things to see and do'

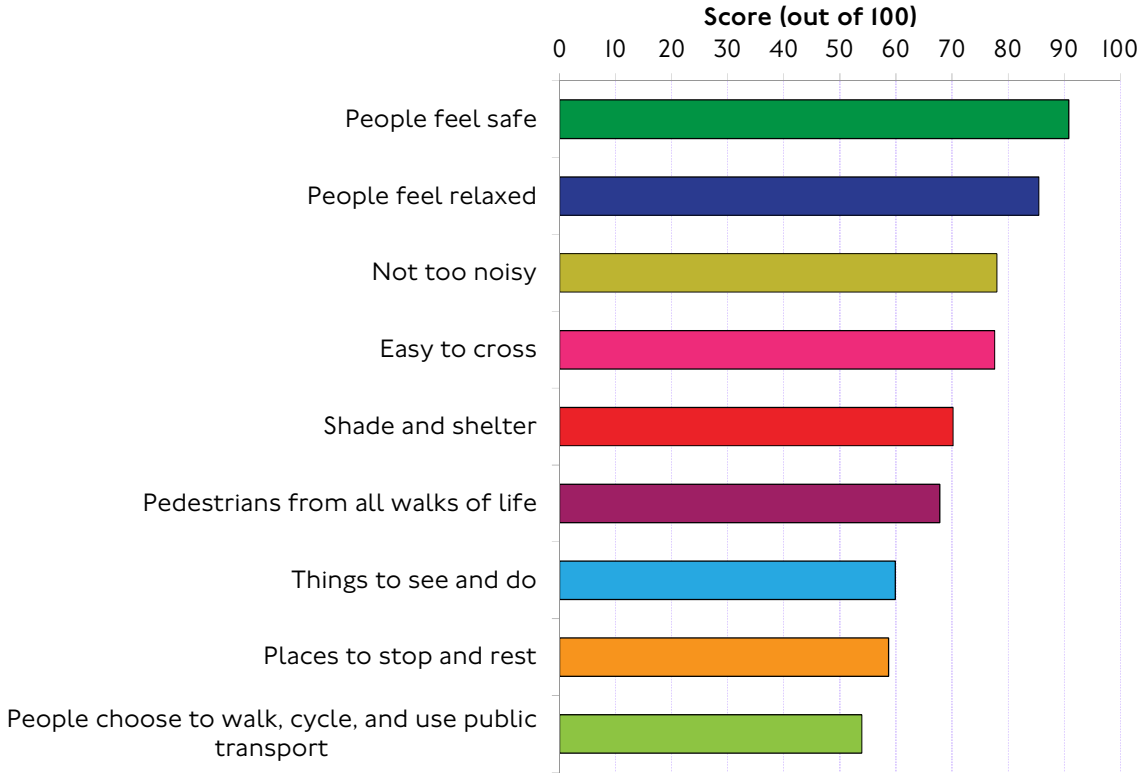
and 'Places to stop and rest'. The lowest scoring Indicator is 'People choose to walk, cycle and use public transport'. This specifically reflects high levels of traffic, limited pedestrian priority, traffic restrictions and a lack of cycle infrastructure across London's streets – it is not intended to be an overall outcome indicator.

How is this changing over time?

We can also track these scores quarterly to give an indication of performance over time. Figure 7.6 shows how the Healthy Streets Indicators performed during the first four quarters of the survey.

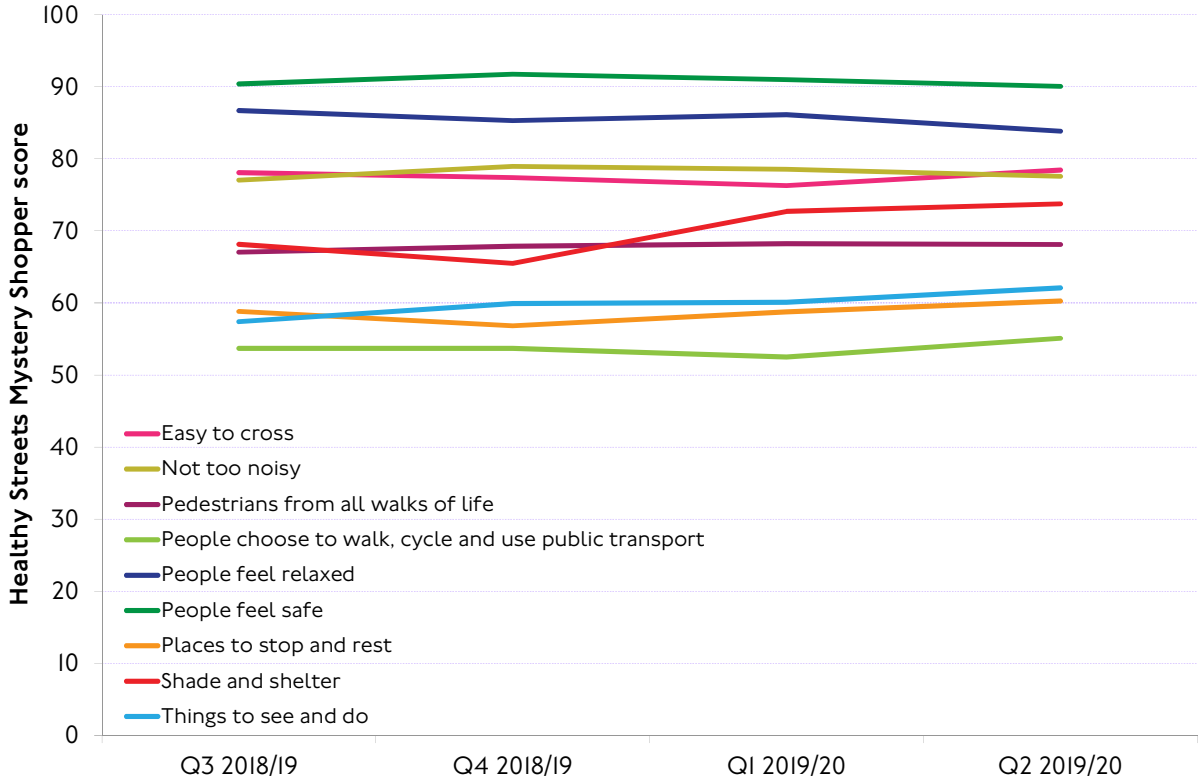
Quarter to quarter, it is not expected that scores will vary significantly. Some Indicators are likely to be more seasonal than others. For example, 'Shade and shelter' is noticeably improved when trees have greater leaf cover in the summer months. But as we track data over the longer term, we might see improvement or deterioration in certain aspects of the street in response to our policies and interventions or for other reasons.

Figure 7.5 Healthy Streets Indicators cumulative scores, Q3 2018/19-Q2 2019/20.



Source: Strategic Analysis, TfL City Planning.

Figure 7.6 Healthy Streets Indicator trends over time, Q3 2018/19- Q2 2019/20.



Source: Strategic Analysis, TfL City Planning.

How do street scores vary across London?

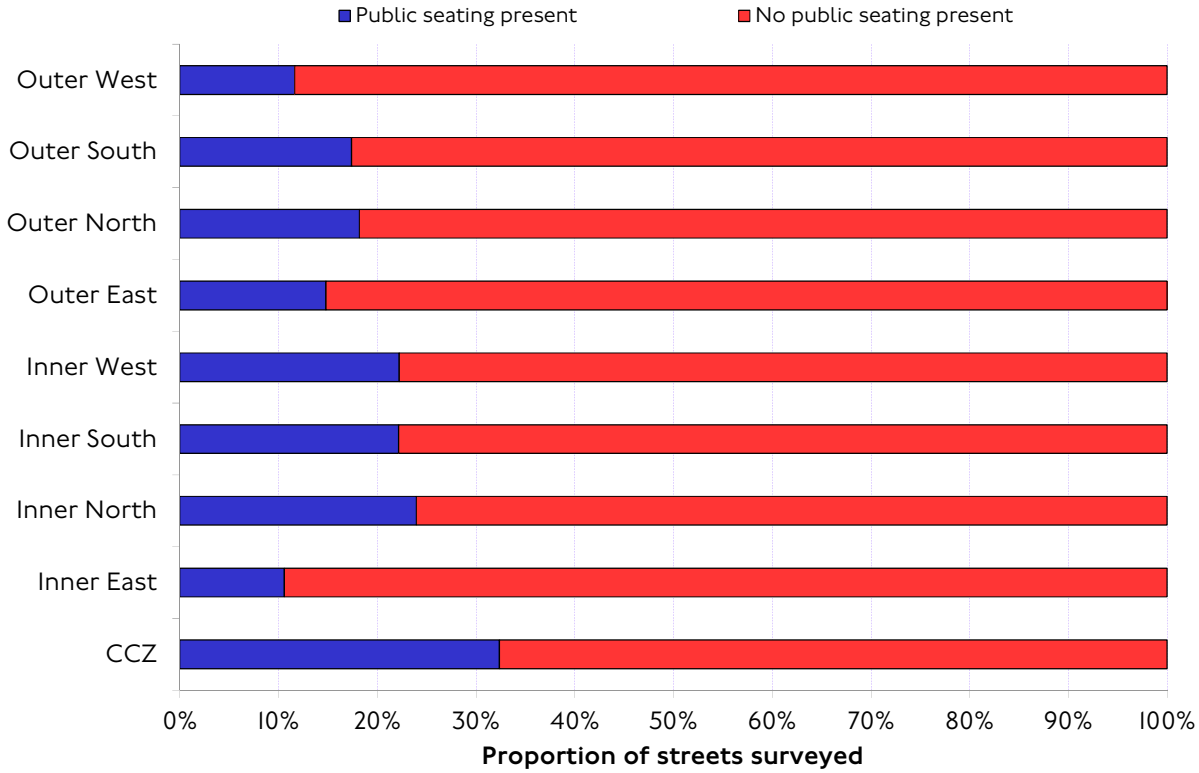
Table 7.2 shows how scores vary across London. Central London (the Congestion Charge zone) streets have the highest scores overall with the best provision and use of social spaces, and higher levels of seating, shelter and shade. Central London streets also have more to see and do, with a greater diversity of land use recorded, despite lower levels of greenery. Inner London streets are the easiest to cross, while outer London streets score well in terms of safety and noise levels.

Table 7.2 Healthy Streets scores by London area, Q3 2018/19-Q2 2019/20.

Healthy Street indicator	Central	Inner	Outer
Easy to cross	75.5	78.5	77.5
Not too noisy	74.2	77.9	79.4
Pedestrians from all walks of life	68.4	68.2	67.2
People choose to walk, cycle and use public transport	59.3	54.4	49.4
People feel relaxed	85.5	84.9	86.1
People feel safe	90.1	90.1	91.7
Places to stop and rest	60.7	58.8	57.9
Shade and shelter	73.6	71.6	67.4
Things to see and do	64.4	59.7	58.6

Source: Strategic Analysis, TfL City Planning.

Figure 7.7 Provision of public seating by area of London, Q3 2018/19-Q2 2019/20.



Source: Strategic Analysis, TfL City Planning.

Looking within these regions, wide variation can be seen in the provision of some street features. For example, figure 7.7 shows that just 11 per cent of streets surveyed in inner east London had public seating or benches, compared to an average of 21 per cent of streets across other regions. As we survey more streets and the sample size increases, borough-level analysis will also be possible.

What about different types of streets?

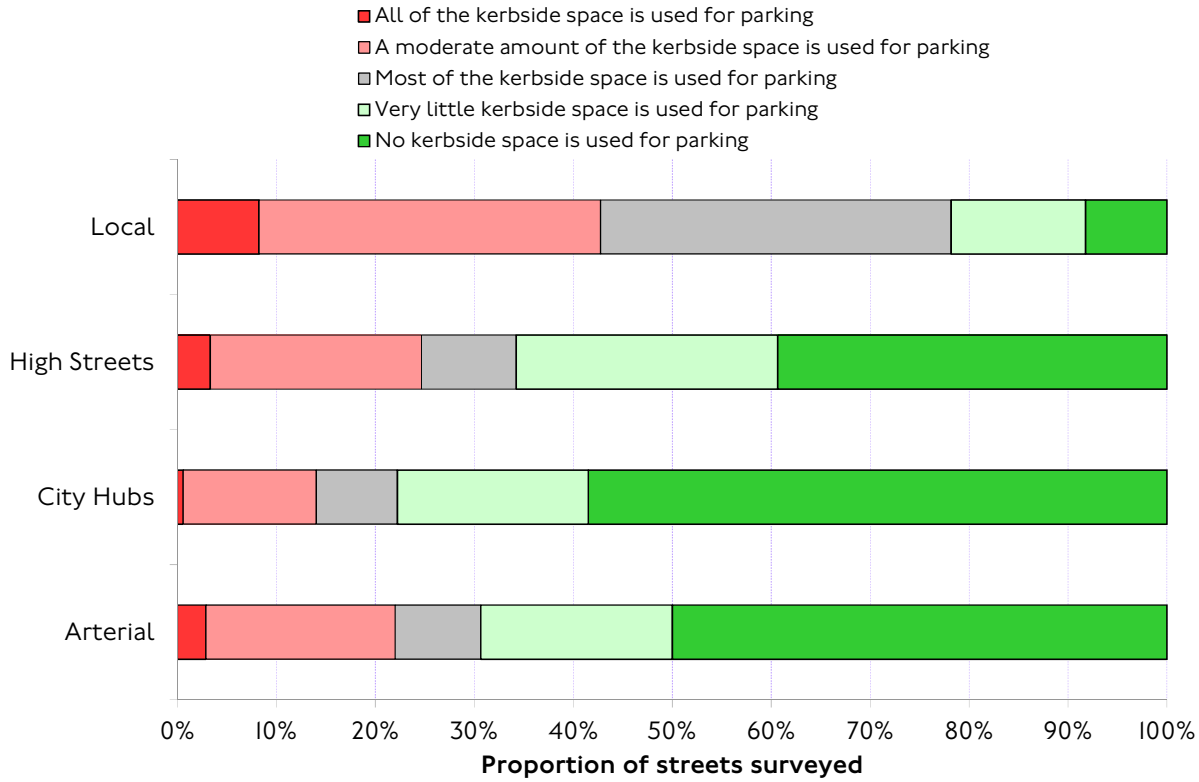
The type of street has a relationship to how it performs against the Healthy Streets Indicators. For the purpose of this survey, TfL's nine Street Types have been grouped into four categories: Arterial roads, High streets, City places and Local streets (table 7.3). When taking into account all measures, High streets perform best. High streets and City hubs offer more to see and do and provide more places to stop and rest and shade and shelter than Arterial or Local streets.

Table 7.3 Street Types grouping diagram.

Combined street type	Street Types
Arterial/connectors	Core Road / Connector
High streets	High Street / High Road / Town Square
Local streets	Residential Streets
City places/hubs	City Place / City Street / City Hub

Source: Strategic Analysis, TfL City Planning.

Figure 7.8 Kerbside space taken up by parking, by street type, Q3 2018/19-Q2 2019/20.



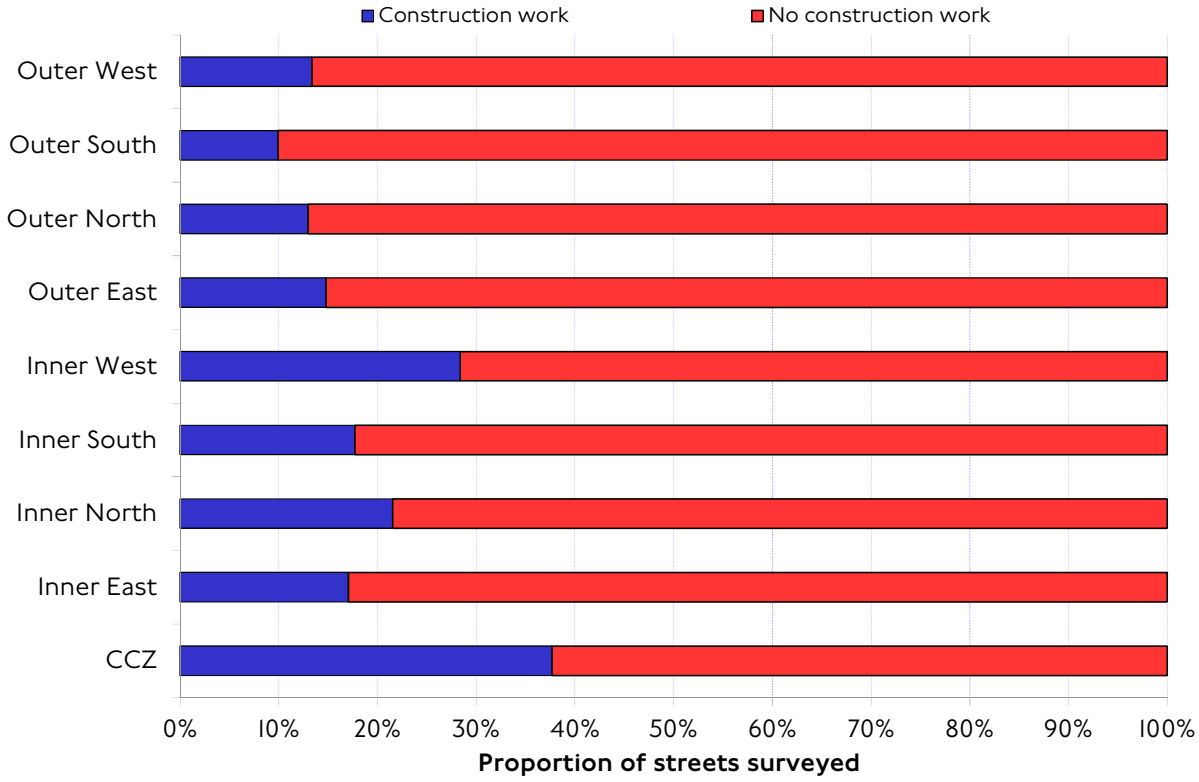
Source: Strategic Analysis, TfL City Planning.

Arterial roads, despite high levels of traffic and noise, tend to have the widest pavements and most even footways, making them more accessible for those with accessibility needs. Local streets are the least noisy and score highest on the 'Easy to cross' Indicator, despite their high levels of parked vehicles (figure 7.8). On 44 per cent of Local streets, parked vehicles took up most or all of the kerbside space. A reduction in cars on the road would make a big difference to the feel and use of space in Local streets and provide more space for social activities.

The pace of change on London's streets

Remarkably, construction work was recorded on 20 per cent of the streets surveyed. In central London, 38 per cent of streets were affected by construction. This includes building work as well as road and pavement works and highlights the sheer pace of change happening on London's streets. It is important to track both how these changes affect the experience of being on London's streets in the short term, and whether they are making street environments more attractive for walking, cycling and accessing public transport in the long term.

Figure 7.9 Streets with on-street construction, Q3 2018/19-Q2 2019/20.



Source: Strategic Analysis, TfL City Planning.

Summary

In summary, London's streets are changing rapidly. Previously, it has not been possible to monitor the experience of being on London's streets from a strategic viewpoint in any consistent way. The new Healthy Streets Mystery Shopper Survey provides a way to track these changes across London and over time. The data collected provides an important evidence base to inform future schemes and strategies.

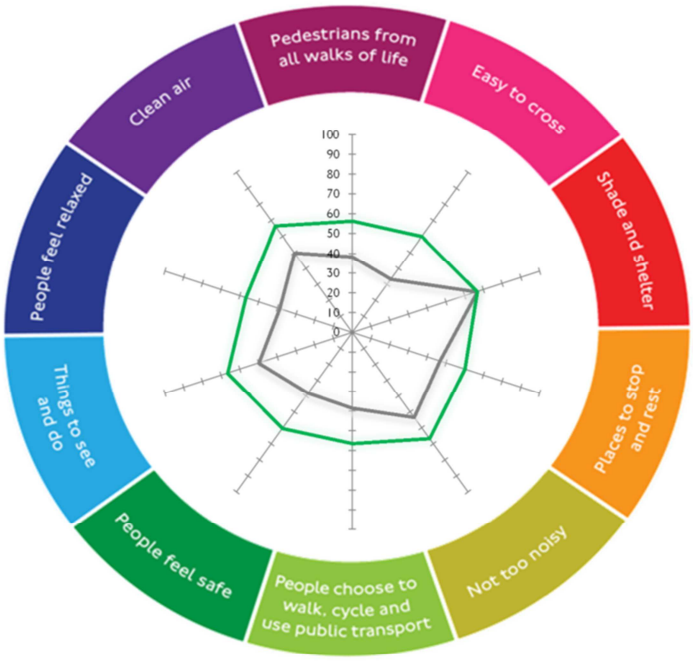
Over time, this data will build a baseline picture of London's streets, allowing us to monitor progress towards the goals of the Mayor's Transport Strategy.

7.4 Healthy Streets Check for Designers

The Healthy Streets Check for Designers (HSCD) is a design tool to help embed the Healthy Streets Approach across London. The HSCD assessment involves assessing and comparing an existing and proposed street layout using a spreadsheet tool. This process allows designers to assess the extent to which proposed changes deliver improvements that contribute towards the 10 Healthy Streets Indicators. The Check can then be used to inform designers and decision makers on how well a project fits with Healthy Streets policy and to prompt them to adjust the design accordingly.

The HSCD is required on all Healthy Streets Portfolio projects on the Transport for London Road Network. Schemes delivered by boroughs using LIPs or other TfL funding (aside from Liveable Neighbourhoods) are not required to apply the HSCD but they are encouraged to do so where the project is expected to have a significant impact on the experience of people walking, cycling and accessing public transport.

Figure 7.10 Warwick Road – example Healthy Streets Check for Designers score.



	Existing layout	Proposed layout	% point change
Overall Healthy Streets Check score	40	59	19

Source: Strategic Analysis, TfL City Planning.

The Check is conducted at several points in the project lifecycle. It is first used to assess the existing street environment to aid the designer in shaping their design solution (Option Selection). It is then used as part of the proposed redesign of the street, at Concept Design and Detailed Design stages.

The HSCD assessment produces an overall score for the existing layout and proposed redesign. The score will only increase if the street has been changed to address road danger issues and prioritise people walking, cycling and accessing public transport. Scores from the HSCD are used to communicate proposed scheme designs to the public during consultation and give an indication of the extent of improvement being proposed. An example of a recent project is shown in figure 7.10, highlighting how the results are presented.

We will continue to use the tool to assess all applicable projects as part of our Scorecard.

7.5 The contributions of green infrastructure to the Healthy Streets Approach

The MTS sets the aim to increase the number of street trees and seek additional opportunities to build new green infrastructure into the existing transport estate to enhance London's natural environment. Green infrastructure in an urban setting like London may include parks, woodlands, private gardens, street trees, allotments, playing fields, green roofs and sustainable drainage systems (SuDS). Well planned, designed and maintained green infrastructure can provide many different benefits.

The Mayor aims for London to be a National Park City where more than half of its area is green, where the natural environment is protected and the network of

green infrastructure is managed to benefit all Londoners. Within this context, protecting and enhancing green infrastructure on transport land will help to improve the natural environment and contribute to London's overall resilience to climate change.

One of the ways we are encouraging this is highlighting how the inclusion of green infrastructure in street schemes can contribute to the full range of Healthy Streets Indicators. We have therefore produced the Healthy Streets green infrastructure wheel (figure 7.11) which summarises the potential contribution and benefits of green infrastructure. This resource, and the relevant evidence base underlying it is available as part of our suite of Healthy Streets tools (see: www.tfl.gov.uk/corporate/about-tfl/how-we-work/planning-for-the-future/healthy-streets).

Figure 7.11 Healthy Streets green infrastructure wheel.

Source: Lucy Saunders.

Pedestrians from all walks of life

Good quality local greenery that feels safe and welcoming, is attractive and easy to access and encourages a range of different groups and ages to be more physically active on and around the street.

Easy to cross

Green infrastructure can be combined with measures that make streets easier to cross. For example, rain gardens can be incorporated into buildouts that slow traffic. They also help to reduce or prevent flooding, which could itself form a barrier to crossing. Trees can also be used as bollards to protect crossing or refuge points.

Shade and shelter

Trees and hedges can provide shade from the sun. On a sunny day, a tree-lined street can be several degrees cooler than a similar one without any trees. Hedges and trees can also offer protection from rain, wind and other bad weather.

Places to stop and rest

Green infrastructure can serve as a place to stop and rest. For example, places to sit can be installed on the edges of planter boxes. Placing benches around or under trees makes a resting place more inviting and sheltered.

Not too noisy

Green infrastructure can act as a sound barrier to noise from traffic and other sources. By improving the ambience of the street, it can also reduce the subjective experience of noise. By making the street feel narrower, green infrastructure can also act as a form of psychological traffic calming, causing drivers to reduce their speed, and so making the street a quieter and more relaxing place to be.

People choose to walk, cycle and use public transport

Green infrastructure is an attractive asset for a street, making it somewhere people will choose to walk and cycle in order to enjoy the greenery. The street itself becomes the destination or a place for walking and cycling for leisure, rather than just a travel route. Greening streets is linked with uplifts in walking and cycling.

People feel safe

Green infrastructure can improve the ambience of a street – we know that people feel safer when an area is attractive and well maintained. Green infrastructure on streets is linked to improved social behaviour and reduced traffic collisions.

Things to see and do

Green infrastructure is an important part of London's cultural heritage that is visually attractive, for example through flowers and changing leaf colour. It also supports biodiversity that captures public interest, such as butterflies and birds. When combined with schemes like community gardening to maintain flower beds, green infrastructure can also provide something for people to do on the street and can help bring people together.

People feel relaxed

Green infrastructure can help make streets more relaxing and has a positive effect on stress and mental health.

Clean air

Green infrastructure, such as hedges, can act as a barrier to air pollution, reducing the exposure of those on the street.

8. Road danger reduction

8.1 Introduction

This chapter reviews personal injury road traffic collisions and casualties in Greater London in 2018 compared with 2017 and the back-estimated average for 2005-2009. Road danger reduction is the central theme of the Mayor's Vision Zero approach, and the 2005-2009 average is the baseline against which TfL measures progress towards the Mayor's target of a 65 per cent reduction in people Killed or Seriously Injured (KSI) casualties by 2022, set out in the Vision Zero Action Plan (see: http://content.tfl.gov.uk/vision-zero-action-plan.pdf).

8.2 Road danger reduction: key trends

This section provides a summary of personal injury road traffic collisions and casualties in Greater London in 2018 compared with 2017 and the back-estimated average for 2005-2009. Data in this section is for personal injury road traffic collisions occurring on the public highway within Greater London, and reported to or by the police, in accordance with the STATS 19 national reporting system. Reference was made in Travel in London report 11 to changes affecting the reporting and comparability of casualty data over the longer term. The trends reported here are related to a back-estimated series reflecting the new methodology, and are comparable between years on this basis. It should be noted that large percentage changes in small numbers might not necessarily be statistically significant.

In 2018 compared to 2017:

- **The number of people killed** on London's roads fell to the lowest level recorded. Within this total, the number of people killed while walking also fell to the lowest level on record. However, half of all people killed in road traffic collisions were walking. Despite reductions in motorcyclist deaths, to the equal lowest level on record, motorcyclists continue to make up a disproportionate number of deaths and serious injuries. No children were killed in road traffic collisions during 2018.
- **Serious casualties** increased, in particular among car occupants. Serious injury among people cycling also increased, in particular where a car was involved in the collision. In contrast, the number of people seriously injured while walking and motorcycling fell. The number of children seriously injured in collisions also fell, with the greatest absolute reduction among those walking. However, the number of children seriously injured as car passengers increased.
- **The number of people slightly injured** fell, in particular people walking, bus and coach passengers and children. Despite these positive trends, the number of cyclists suffering slight injury increased, partly reflecting continued increases in cycling to the highest level on record.
- **The number of people killed or seriously injured** was 37 per cent down against the back-estimated 2005-09 baseline and the number of children killed or seriously injured was also down by 60 per cent against the back-estimated baseline. However, the number of cyclists killed or seriously injured was up on the back-estimated 2005-09 baseline. This increase should be seen in the context of a considerable increase in cycling over many years, with the number of journeys cycled having more than doubled since 2000.

- **People walking, cycling and motorcycling** made up 79 per cent of all people killed or seriously injured, showing the need to focus efforts on making the streets safer for the people most at risk.

8.3 Recent trends in casualties

Table 8.1 shows that a total of 25,637 collisions were reported by the police during 2018, resulting in 30,591 casualties. Of these, 112 people were killed, 3,953 were seriously injured and 26,526 were slightly injured.

In 2018 compared to 2017:

- The number of people killed fell from 131 people in 2017 to 112 people in 2018, which is the lowest level on record. No children aged less than 16 years were killed in road collisions. However, two 16 year olds and a 17 year old pedestrian were killed in a road collision. A 17-year-old motorcyclist was also killed in a road collision.
- A total of 4,065 people were either killed or seriously injured in 2018. This is an increase of 5 per cent and within this total the number of serious injuries also increased by 5 per cent.
- Slight injuries fell by 8 per cent to 26,526, with the greatest absolute reduction among people walking.
- Overall, all casualties fell by 6 per cent with the greatest absolute reduction among people walking.

Table 8.1 Casualties in London by severity and mode of travel, including change from previous year, 2018.

Mode of travel	Fatal	Serious	Slight	Total	Share of total
Pedestrian	57 (-22%)	1,309 (-2%)	4,396 (-16%)*	**5,762 (-13%)***	18.8%
Pedal cycle	12 (20%)	770 (14%)*	3,973 (4%)	**4,755 (5%)**	15.5%
Motorcycle	22 (-29%)	1,058 (-1%)	4,042 (-10%)*	**5,122 (-8%)***	16.7%
Car	16 (14%)	607 (28%)*	11,181 (-6%)*	**11,804 (-5%)***	38.6%
Taxi or private hire	2 (∞)	44 (-2%)	911 (6%)	**957 (6%)**	3.1%
Bus or coach	1 (-50%)	111 (5%)	1,339 (-19%)*	**1,451 (-17%)***	4.7%
Goods vehicle	0 (-100%)	40 (54%)*	594 (2%)	**634 (4%)**	2.1%
Other vehicle	2 (∞)	14 (-7%)	90 (-44%)*	**106 (-39%)***	0.3%
Total	**112 (-15%)**	**3,953 (5%)***	**26,526 (-8%)***	**30,591 (-6%)***	**100%**
Share of total	0.4%	12.9%	86.7%	**100.0%**	

Source: STATS19.
Note: Asterisks (*) indicate where changes are significant at the 95 per cent confidence level, applying the Poisson probability distribution.

8.4 Longer-term trends in casualties

Table 8.2 shows changes in casualties during 2018 against the back-estimated 2005-09 baseline and 2017.

Comparing the number of casualties by severity in 2018 against the back-estimated 2005-09 baseline:

- The number of people killed was down by 47 per cent.

- The number of people killed or seriously injured was down by 37 per cent and the number of children killed or seriously injured was down by 60 per cent.
- Slight casualties were up by 4 per cent; however, the number of children slightly injured was down by 5 per cent.

Comparing the number of people killed or seriously injured in 2018 by different road users against the back-estimated 2005-09 baseline:

- The number of people killed or seriously injured while walking was down by 32 per cent.
- The number of people killed or seriously injured while motorcycling was down by 23 per cent.
- The number of people killed or seriously injured while cycling increased by 6 per cent. This increase should be seen in the context of the number of journeys cycled in London more than doubling since 2000, to 745,000 journeys cycled each day.

Table 8.2 Casualties in London in 2018 compared with the 2005-09 average and 2017.

		Casualty numbers			Change in 2018 from	
Severity	**User group**	**2005-2009**	**2017**	**2018**	**2017**	**2005-2009**
Fatal	Pedestrians	96.0	73	57	-22%	-41%*
	Pedal cyclists	16.6	10	12	20%	-28%
	Motorcyclists	43.4	31	22	-29%	-49%*
	Car occupants	49.4	14	16	14%	-68%*
	Bus/coach occupants	2.4	2	1	-50%	-58%
	Other vehicle occupants	3.2	1	4	300%	25%
	Total	**211.0**	**131**	**112**	**-15%**	**-47%***
	Children (under 16 years)	**11.6**	**3**	**0**	**-100%**	**-100%***
Fatal and serious	Pedestrians	[2,020.8]	1,412	1,366	-3%	-32%*
	Pedal cyclists	[737.2]	685	782	14%*	6%
	Motorcyclist	[1,396.8]	1,099	1,080	-2%	-23%*
	Car occupants	[1,773.1]	490	623	27%*	-65%*
	Bus/coach occupants	[277.3]	108	112	4%	-60%*
	Other vehicle occupants	[197.4]	87	102	17%	-48%*
	Total	**[6,402.5]**	**3,881**	**4,065**	**5%***	**-37%***
	Child pedestrians	[422.8]	187	176	-6%	-58%*
	Child pedal cyclists	[62.5]	20	17	-15%	-73%*
	Child car occupants	[81.5]	12	19	58%	-77%*
	Child bus/coach occupants	[23.4]	10	9	-10%	-61%*
	Other child casualties	[18.0]	16	20	25%	11%
	Children (under 16 years)	**[608.1]**	**245**	**241**	**-2%**	**-60%***

Slight	Pedestrians	[3,855.9]	5,240	4,396	-16%*	14%*
	Pedal cyclists	[2,672.9]	3,836	3,973	4%	49%*
	Motorcyclist	[3,592.2]	4,478	4,042	-10%*	13%*
	Car occupants	[12,843.9]	11,885	11,181	-6%*	-13%*
	Bus/coach occupants	[1,434.0]	1,644	1,339	-19%*	-7%*
	Other vehicle occupants	[1,017.0]	1,603	1,595	0%	57%*
	Total	**[25,416.0]**	**28,686**	**26,526**	**-8%***	**4%***
	Children (under 16 years)	**[1,805.3]**	**2,152**	**1,720**	**-20%***	**-5%***
All	Pedestrians	[5,876.7]	6,652	5,762	-13%*	-2%
	Pedal cyclists	[3,410.0]	4,521	4,755	5%*	39%*
	Motorcyclist	[4,989.0]	5,577	5,122	-8%*	3%
	Car occupants	[14,617.0]	12,375	11,804	-5%*	-19%*
	Bus/coach occupants	[1,711.2]	1,752	1,451	-17%	-15%*
	Other vehicle occupants	[1,214.5]	1,690	1,697	0%	40%*
	Total	**[31,818.5]**	**32,567**	**30,591**	**-6%**	**-4%**
	Children (under 16 years)	**[2,413.4]**	**2,397**	**1,961**	**-18%**	**-19%**

Source: STATS19.
Note: Child casualties are a subset of the total number of reported fatal, serous, slight and all casualties in London. Figures in square brackets [ ] are back-estimated from the 2005-09 baseline. Asterisks (*) have the same meaning as in table 8.1.

8.5 Casualties by road user during 2018

Vulnerable road users (people walking, cycling and motorcycling) made up more than half (51 per cent) of all people injured on London's roads. Vulnerable road users made up 91 of the 112 people killed (81 per cent) and 3,137 out of 3,953 people seriously injured (79 per cent) in 2018.

People walking accounted for:

- 19 per cent of all casualties.
- 33 per cent of all serious injuries.
- 51 per cent of all people killed.

People cycling accounted for:

- 16 per cent of all casualties.
- 19 per cent of all serious injuries.
- 11 per cent of all people killed.

People riding or pillions of motorcycles accounted for:

- 17 per cent of all casualties.
- 27 per cent of all serious injuries.
- 20 per cent of all people killed.

Car occupants accounted for:

- 39 per cent of all casualties.
- 15 per cent of all serious injuries.

- 14 per cent of all fatalities.

Bus and coach occupants accounted for:

- 5 per cent of all casualties.
- 3 per cent of all serious injuries.
- 1 per cent of all fatalities.

Taxi and private hire occupants accounted for:

- 3 per cent of all casualties.
- 1 per cent of all serious injuries.
- 2 per cent of all fatalities.

Goods vehicle occupants (including light, medium and heavy goods vehicles) accounted for:

- 2 per cent of all casualties.
- 1 per cent of serious injuries.

8.6 Trends in casualties by road user

For the road users shown in table 8.2 the following compares casualty figures in 2018 with 2017:

- The number of people killed while **walking** fell from 73 to 57, which is the lowest level on record. In particular, the involvement of large goods vehicles (3.5 tonnes or more) in these collisions has almost halved. However, goods vehicles were still involved in 11 pedestrian fatalities. The number of people killed or seriously injured while walking also fell by 3 per cent, with reductions in the involvement of cars, goods vehicles and buses and coaches in these collisions. Slight injuries among people walking also fell by 16 per cent.
- There were 12 people killed while **cycling** compared to 10 in 2017. The number of people killed or seriously injured while cycling increased by 14 per cent, in particular in collisions involving cars. The number of cyclists slightly injured increased by 4 per cent, in the context of a 3 per cent increase in cycle journeys in London to the highest level recorded. There were 16 reported serious and 72 slight cycle hire rider casualties, and two reported serious and six slight pedicab rider casualties.
- The number of people killed while **motorcycling** fell from 31 to 22 fatalities, the equal lowest number on record. However, 20 per cent of people killed were riding or pillions of a motorcycle, despite making up less than 1 per cent of journeys in London. The number of people killed or seriously injured while motorcycling also fell by 2 per cent.
- The number of **car occupants** killed in road traffic collisions increased from 14 to 16. Over half of these deaths involved loss of control. The number of car occupants killed or seriously injured increased by 27 per cent, in particular in collisions involving heavy goods vehicles. However, slight injuries fell by 6 per cent and all car occupant casualties fell by 5 per cent.
- There were no **goods vehicle occupant** fatalities, however all goods vehicle occupant casualties increased by 4 per cent.

- Of **other vehicles**, one person was killed while riding a horse and trap and one person was killed while using a mobility scooter.

8.7 Casualties resulting from collisions involving a bus or a coach

Casualties involving buses and coaches are now reported separately by the police. Of those collisions involving a bus or coach during 2018 compared to 2017:

- One bus passenger was killed in a road collision and no coach occupants were killed. In addition, nine pedestrians, one cyclist and one car occupant were killed in collisions involving a bus.
- Of those people injured in collisions involving a bus or coach, 96 per cent were injured in collisions involving a bus and 4 per cent in collisions involving a coach. The equivalent figures for people who were seriously injured were 97 per cent involving a bus and 3 per cent involving a coach.
- The number of people killed or seriously injured in or by a bus fell by 8 per cent, to 239 people, which is the lowest number on record. This is 59 per cent down on the 2005-09 baseline. The number of people killed or seriously injured in or by a coach also fell, from 17 people in 2017 to 10 people in 2018.
- The number of bus or coach occupants seriously injured increased from 108 to 112 casualties. However, the number of bus or coach occupants slightly injured fell by 19 per cent, from 1,644 to 1,339 people.

8.8 Differences by casualty gender and age

Table 8.3 shows that men accounted for 64 per cent and women for 36 per cent of casualties in 2018. It shows considerable variation in the proportion of casualties between men and women for different modes of travel that, in part, reflect different travel choices.

- Men accounted for 93 per cent of motorcyclist casualties, and on average made 84 per cent of all motorcycle journeys in 2018/19. Men also accounted for 76 per cent of cyclist casualties, with 73 per cent of cycle journeys being made by men.
- Of casualties among people walking, 51 per cent were men and 49 per cent women. Men made on average 48 per cent and women 52 per cent of walking journeys.
- Of car occupant casualties, 53 per cent were men and 47 per cent women, with men making on average 48 per cent and women 52 per cent of car journeys. Analysis of car occupants shows that men accounted for 58 per cent of car driver casualties and 53 per cent of car driver journeys, and women made up 58 per cent of car passenger casualties and 62 per cent of car passenger journeys.
- Women accounted for 66 per cent of bus or coach occupant casualties, making on average 56 per cent of bus journeys in 2018/19.

Table 8.3 also shows that there is a wide variation in casualties according to age group for each mode of travel. Age was known for 96 per cent of all casualties in 2018.

- **Of young adult casualties** (16-24 years), 39 per cent were car occupants, 26 per cent were motorcyclists, 17 per cent were people walking, and 13 per cent were people cycling.

- **Of adult casualties** (25-59 years), 38 per cent were car occupants, 18 per cent were motorcyclists, 19 per cent were people cycling and 15 per cent were people walking.
- **Of older road user casualties** (60 years and over), the largest groups were car occupants (37 per cent), people walking (34 per cent) and bus or coach occupants (16 per cent).

Table 8.3 Casualties in London by age group, gender, and mode of travel, 2018.

	Age group					Gender		
Mode of travel	**0-15**	**16-24**	**25-59**	**60+**	**Unknown**	**Male**	**Female**	**Total**
Pedestrian	992	846	2,885	924	115	2,960	2,802	5,762
Pedal cycle	146	629	3,687	149	144	3,611	1,144	4,755
Motorcycle	30	1,312	3,636	99	45	4,778	344	5,122
Car	557	1,960	7,519	999	769	6,264	5,540	11,804
Taxi or private hire	28	88	718	75	48	739	218	957
Bus or coach	203	78	689	429	52	498	953	1,451
Goods vehicle	4	51	522	34	23	570	64	634
Other vehicle	1	15	65	15	10	74	32	106
Total	**1,961**	**4,979**	**19,721**	**2,724**	**1,206**	**19,494**	**11,097**	**30,591**
Share of total	6.4%	16.3%	64.5%	8.9%	3.9%	63.7%	36.3%	100.0%

Source: STATS19.

8.9 Child casualties

Table 8.4 shows that for child casualties (under 16 years), 51 per cent were walking, 28 per cent were car occupants, 10 per cent were bus or coach passengers and 7 per cent were cycling.

During 2018 no children were killed in road collisions, compared to three children who were killed during 2017. The number of children seriously injured fell slightly, from 242 to 241 injuries, however the number of children seriously injured while travelling as passengers of cars increased, from 12 to 19 children. The number of children slightly injured fell by 20 per cent, to 1,720, and the total number of children injured fell by 18 per cent in 2018 compared to 2017.

Table 8.4 Child casualties (under 16), by severity and mode of travel, including change from previous year, 2018.

Mode of travel	Fatal	Serious	Slight	Total	Share of total
Pedestrian	0 (-100%)	176 (-4%)	816 (-20%)*	992 (-17%)*	50.6%
Pedal cycle	0 (∞)	17 (-15%)	129 (4%)*	146 (1%)*	7.4%
Motorcycle	0 (∞)	18 (29%)*	12 (-37%)*	30 (-9%)*	1.5%
Car	0 (∞)	19 (58%)*	538 (-25%)	557 (-24%)	28.4%
Taxi or private hire	0 (∞)	2 (100%)	26 (0%)	28 (4%)	1.4%
Bus or coach	0 (∞)	9 (-10%)	194 (-20%)*	203 (-19%)*	10.4%
Goods vehicle	0 (∞)	0 (∞)	4 (-43%)	4 (-43%)	0.2%
Other vehicle	0 (∞)	0 (-100%)	1 (-67%)*	1 (-75%)*	0.1%
Total	**0 (-100%)**	**241 (0%)**	**1,720 (-20%)***	**1,961 (-18%)***	**100.0%**
Share of total	0.0%	12.3%	87.7%	100.0%	

Source: STATS19.
Note: Asterisks (*) have the same meaning as in table 8.1.

8.10 Casualties by location: inner and outer London

There are several differences in casualty patterns between inner and outer London. In 2018 compared to 2017:

- **The total number of people injured** fell by 5 per cent in inner (including central) London and fell by 7 per cent in outer London.
- **The number of people injured while walking** fell by 12 per cent in inner London and by 14 per cent in outer London.
- **The number of people injured while cycling** increased by 4 per cent in inner London and increased by 7 per cent in outer London. Levels of cycling increased by 3 per cent in inner London and by 6 per cent in outer London.
- **The number of people injured while motorcycling** fell by 9 per cent in inner London and by 8 per cent in outer London.
- **The number of people injured as car occupants** fell by 4 per cent in inner London and by 5 per cent in outer London.

These changes should be seen in the context of changes in traffic in London. Levels of motorised traffic fell within central and inner London during 2018, compared to 2017, but increased slightly within outer London. Overall total motorised traffic levels during 2018 remained broadly unchanged from those in 2017.

In terms of the number of casualties by injury severity, in 2018 compared to 2017:

- **The number of people killed** fell by 22 per cent in inner London to 42 people and fell by 9 per cent in outer London to 70 people.
- **The number of people suffering serious injury** increased by 7 per cent in inner London and increased by 4 per cent in outer London.
- **The number of people killed or seriously injured** also increased by 6 per cent in inner London and increased by 3 per cent in outer London.
- **The number of people slightly injured** fell by 7 per cent in inner London and fell by 8 per cent in outer London.

- **The total number of people injured** fell by 5 per cent in inner London and fell by 7 per cent in outer London.

8.11 Vehicles involved in collisions

In 2018 compared to 2017:

- **Cars** made up 47 per cent of all vehicles involved in collisions in inner London and 69 per cent of vehicles in outer London.
- **Cyclists** made up 16 per cent of vehicles involved in collisions in inner London and 6 per cent of vehicles involved in collisions in outer London. The involvement of cyclists in collisions increased by 4 per cent, partly reflecting a 3 per cent overall increase in cycle journeys in London.
- **Motorcyclists** made up 16 per cent of vehicles involved in collisions in inner London and 10 per cent in outer London. The involvement of motorcycles in collisions fell by 8 per cent.
- **Goods vehicles** (including light, medium and heavy goods vehicles) made up 7 per cent of vehicles involved in collisions in inner and outer London respectively. Overall, goods vehicles were involved in 3 per cent fewer collisions.
- **Taxis and private hire vehicles** made up 8 per cent of vehicles involved in collisions in inner London and 3 per cent of collisions in outer London, similar proportions to 2017.
- **Buses and coaches** made up 4 per cent of vehicles involved in collisions in inner and outer London respectively. The involvement of buses and coaches in collisions fell by 17 per cent in inner London and by 15 per cent in outer London.

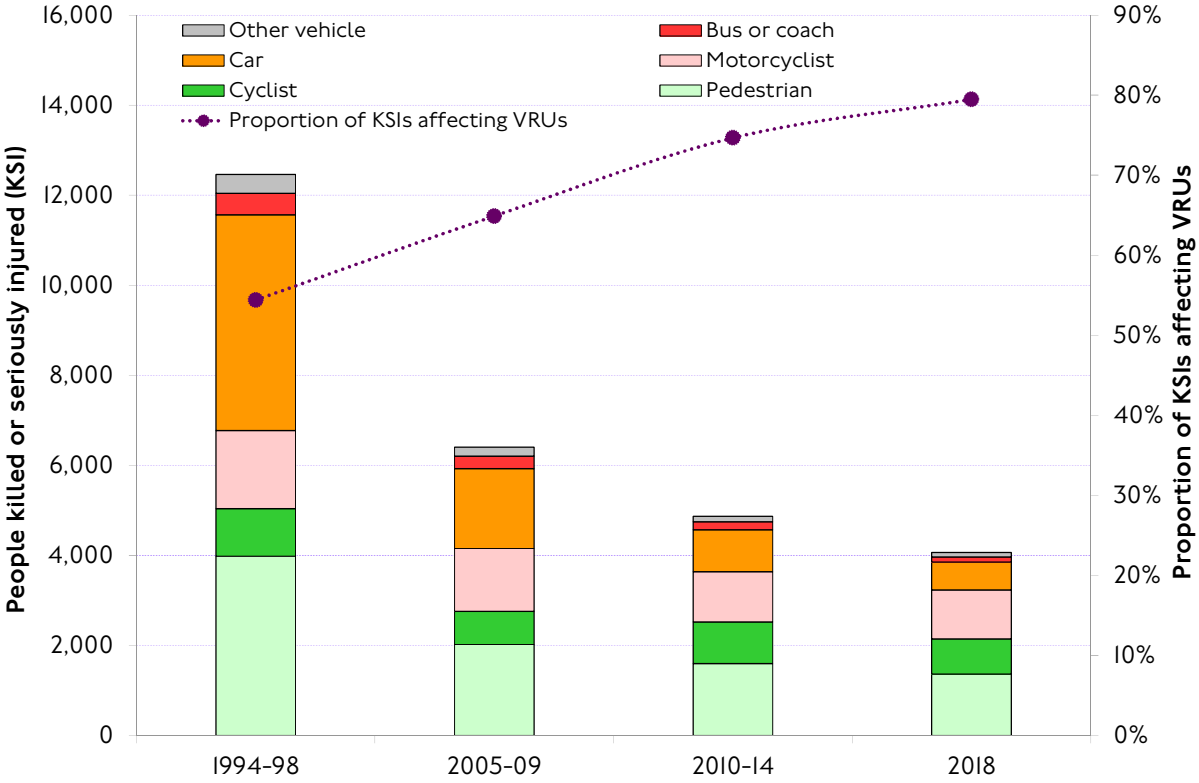
8.12 Wider contextualisation of road casualty trends in London

Developing effective approaches to Vision Zero requires that the available data are used to best effect to identify and target interventions. This section looks at recent casualty trends from several different perspectives to help shed light on the factors that underlie them, and highlight areas that require particular focus.

Vulnerable road users

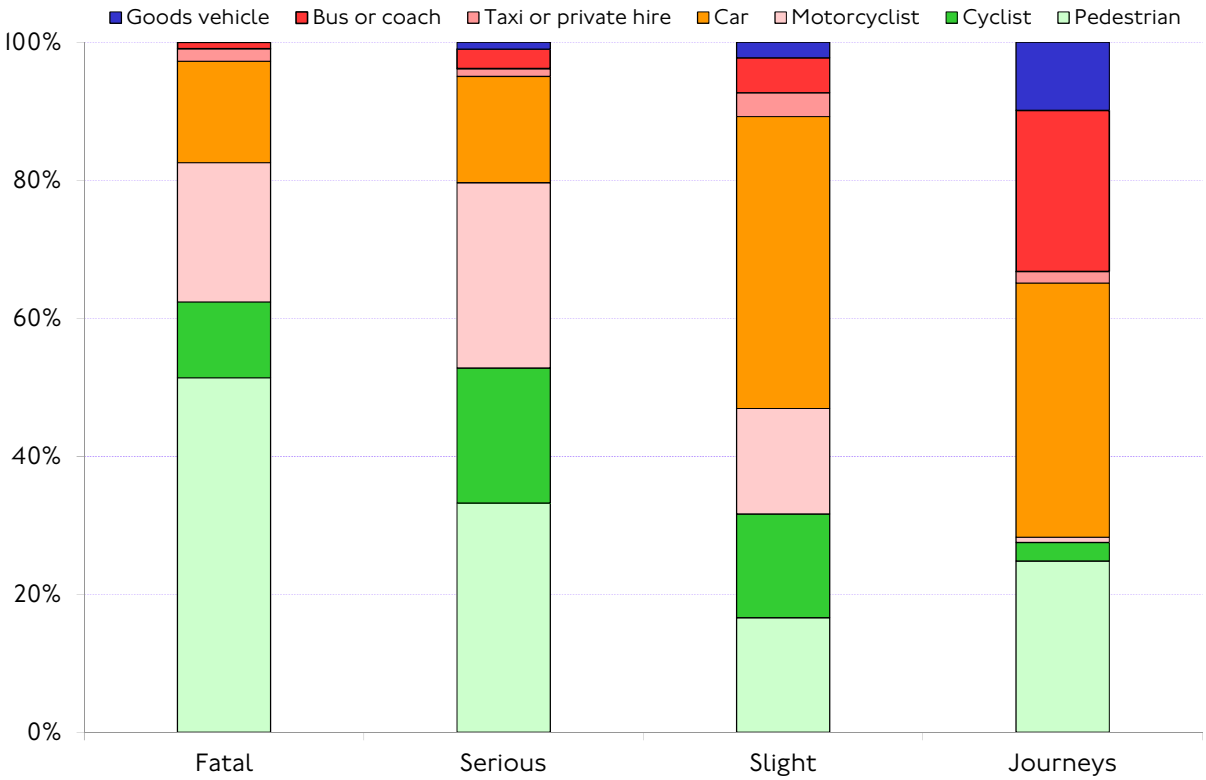
London has seen fewer people killed or seriously injured in recent years, but improvements have not been consistent across all road users. There has been a substantial fall in the number of people killed or seriously injured in London since the 1990s. Almost half of this reduction has been among car occupants, largely reflecting in-car safety improvements. Casualty reductions for non-car users have been less substantial, which means an increasing proportion of serious and fatal injuries are falling on people walking, cycling or motorcycling (vulnerable road users – VRUs), as shown in the bottom three bars in figure 8.1.

Figure 8.1 Number of people killed or seriously injured by road user type and proportion of total affecting vulnerable road users, 1994-98 to 2018.



Source: Strategic Analysis, TfL City Planning.

Figure 8.2 Proportion of casualties by road user type and severity, 2018.



Source: Strategic Analysis, TfL City Planning.

The number of pedestrians killed or seriously injured has fallen by 68 per cent against the 1994-98 average. However, people walking still make up a third of those killed or seriously injured. Motorcyclists make up over one quarter of people killed or seriously injured, despite making up less than 1 per cent of journeys in London. People cycling make up a fifth of people killed or seriously injured, with the number of journeys cycled more than doubling since 2000.

Relative risk

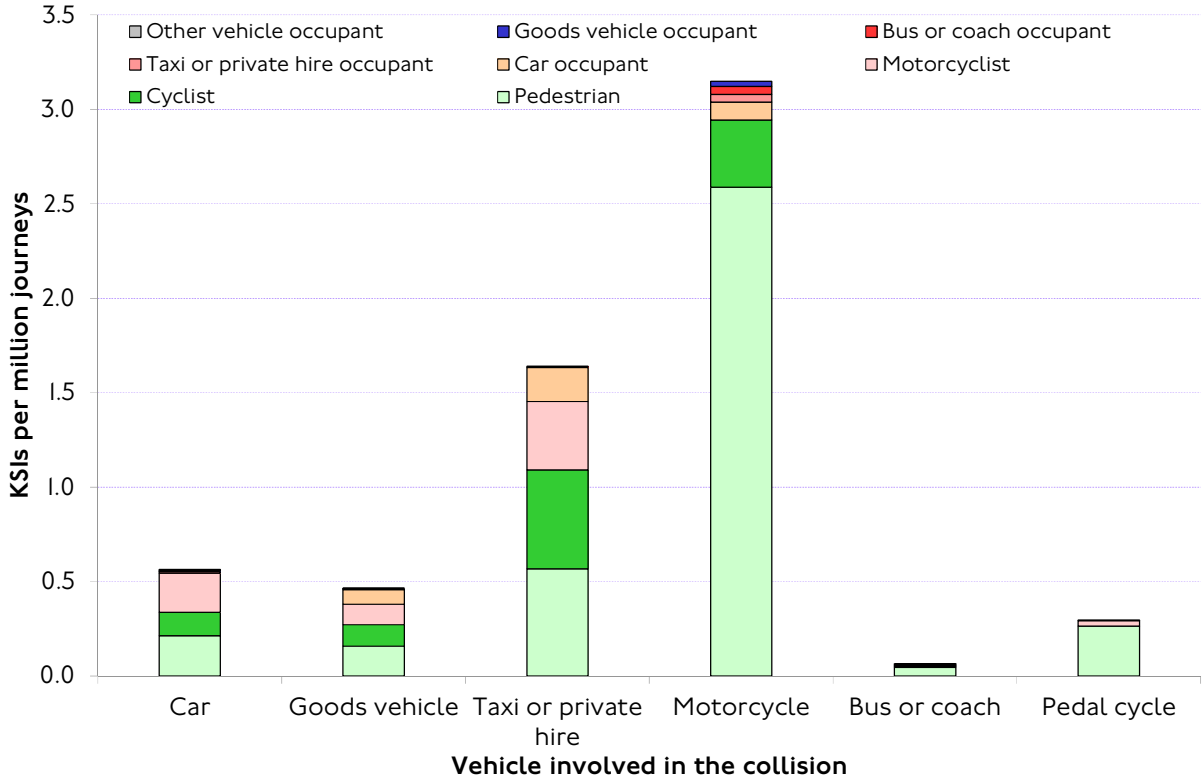
As well as absolute numbers of casualties, this can also be looked at in terms of risk. The absolute number of people killed or seriously injured and the level of risk in London (the number of people killed or seriously injured per million journey stages) has fallen for all modes of travel since 2012. However, there is a lot of variation between modes.

The risk of being killed or seriously injured remains very high for people motorcycling or cycling compared to other modes. In 2017 and 2018 there were almost 15 motorcyclists killed or seriously injured per million journey stages motorcycled compared to just 0.2 casualties among car occupants. The number of people killed or seriously injured while cycling or walking was 2.7 and 0.6 per million journey stages travelled respectively.

- Calculated as the number of people sustaining a fatal or serious injury per million journeys, motorcyclist risk is around 35 times higher than average across all modes, and 85 times higher than for car occupants.
- Cycling risk has fallen by almost 43.6 per cent since 2012, while levels of cycling have increased by around 25 per cent.
- The risk to car occupants increased in 2018, having historically fallen.

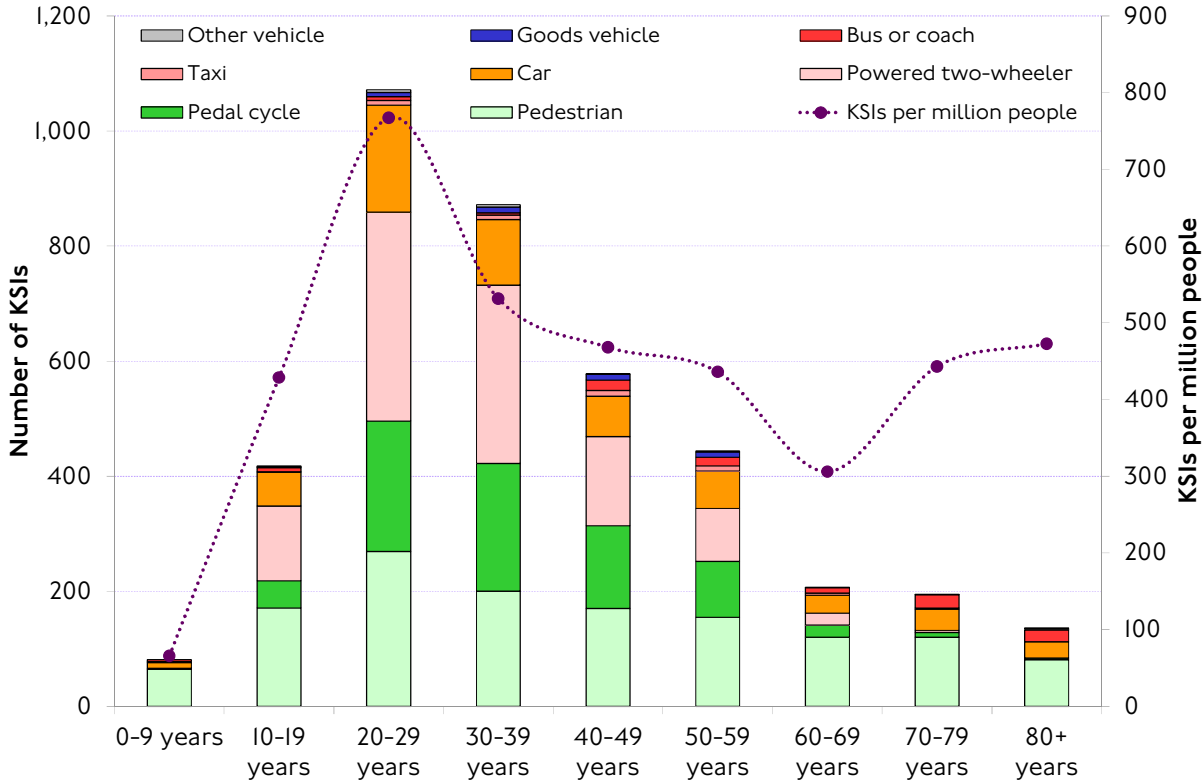
Figure 8.3 shows the risk posed to other road users of being killed or seriously injured per million journey stages. Taking into account the number of journey stages travelled, motorcycles pose the greatest risk of being involved in a collision with another road user that results in death or serious injury, in particular to people walking.

Figure 8.3 Risk of fatal or serious injury to another road user by vehicle involved in a collision (per million journeys travelled by that vehicle), 2018.



Source: Strategic Analysis, TfL City Planning.

Figure 8.4 Number of people killed or seriously injured, by age group and mode of travel, 2018.



Source: Strategic Analysis, TfL City Planning.

The risk of injury varies by age and mode of travel, with young people most at risk when motorcycling and cycling.

Those aged 20-29 years old suffer the highest number of serious and fatal injuries, and the highest rate of injury per million people. After falling from the age of 30 years, the killed or seriously injured rate per person rises from the age of 60 years, partly because of greater physical vulnerability to injury (figure 8.4). While young people are involved in a larger number of serious collisions while motorcycling and cycling, the risk of being killed or seriously injured increases with age among people walking, using buses and driving.

Identifying the types of conflict most frequently giving rise to personal injury collisions

Table 8.5 shows the most common conflicts resulting in people cycling, walking or motorcycling being killed or seriously injured. There is consistency in the kind of conflicts resulting in people walking being killed or seriously injured. There is more variety in the types of conflicts resulting in cyclists and motorcyclists being fatally or seriously injured.

Table 8.5 Types of conflict most frequently giving rise to killed and serious injury collisions, 2018.

Rank	Pedestrian KSI	Cyclist KSI	Motorcyclist KSI
1	Vehicle going ahead, pedestrian crossing (not on formal crossing)	Other vehicle fails to give way/disobeys junction control and turns right into path of cyclist	Other vehicle fails to give way/disobeys junction control and turns right into path of motorcyclist
2	Vehicle going ahead, pedestrian crossing (on formal crossing)	Cyclist hitting/swerving to avoid open door	Other vehicle turns right across path of oncoming motorcycle
3	Vehicle going ahead, pedestrian crossing from near formal crossing	Other vehicle turns left across path of cyclist	Motorcyclist performs overtaking manoeuvre into path of right-turning vehicle
4	Vehicle moving off, pedestrian on footpath/verge or in road not crossing	Other vehicle fails to give way or disobeys junction control and collides with pedal cyclist	Other vehicle changes or pulls out into path of the motorcyclist

Source: Strategic Analysis, TfL City Planning.

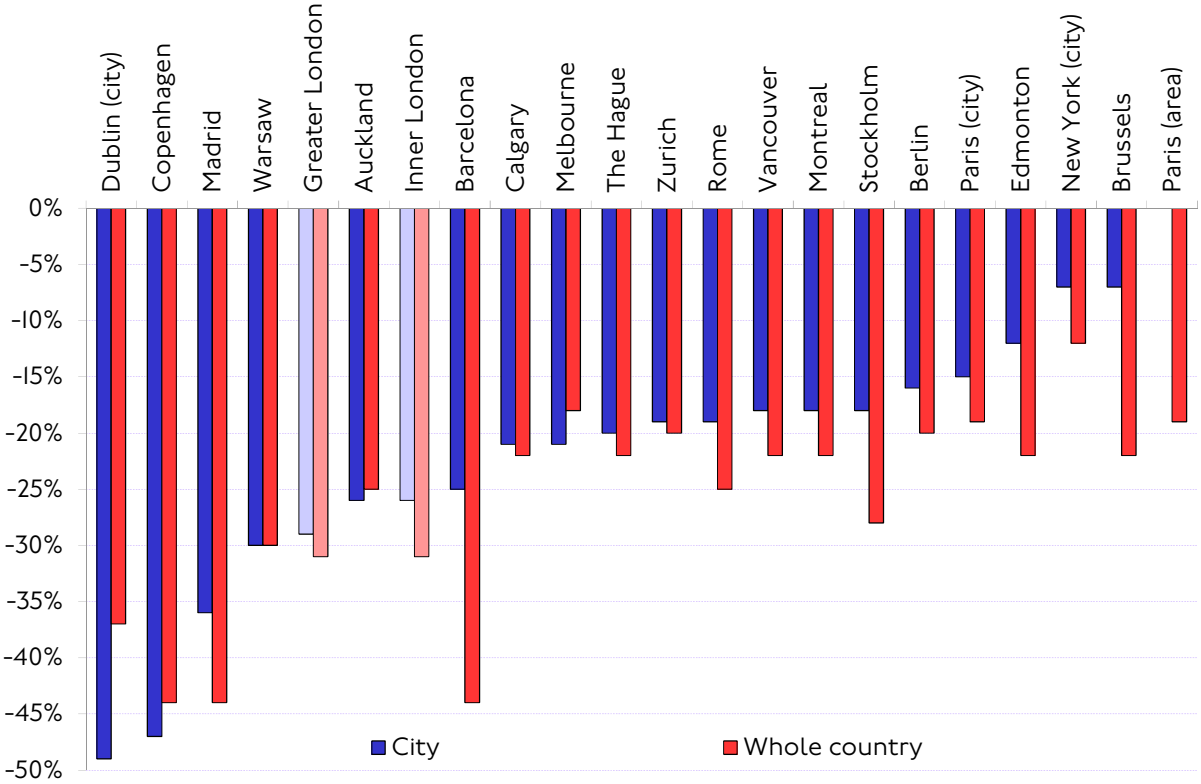
Fatal and serious injury among people walking primarily involves crossing away from a formal crossing place, while the other vehicle failing to give way when turning right is the main conflict for people cycling and motorcycling. For people cycling, 'dooring', where a door of a parked vehicle is opened in front of an approaching cyclist, is also a frequent conflict.

International comparisons

Compared to other cities, risk of fatal injury in London is low in terms of population, but relatively high in terms of distance travelled. TfL is collaborating with the OECD's International Transport Forum (ITF), Safe City Streets network, in developing a global road safety benchmark. This work showed that the number of people killed per resident is lower in London than in other comparable cities. The

number of people killed has also fallen further in London than comparable global cities, although these reductions do fall behind some European cities such as Copenhagen, which have higher levels of active travel (figure 8.5). The risk of being killed or seriously injured per kilometre walked, cycled or motorcycled is also lower in London than nationally, but is higher than some other European cities such as Berlin. TfL is continuing to engage with this global network, to further improve the sharing and measurement of road danger and to share best practice across cities.

Figure 8.5 Fatalities, percentage changes from 2006-10 to 2011-15.



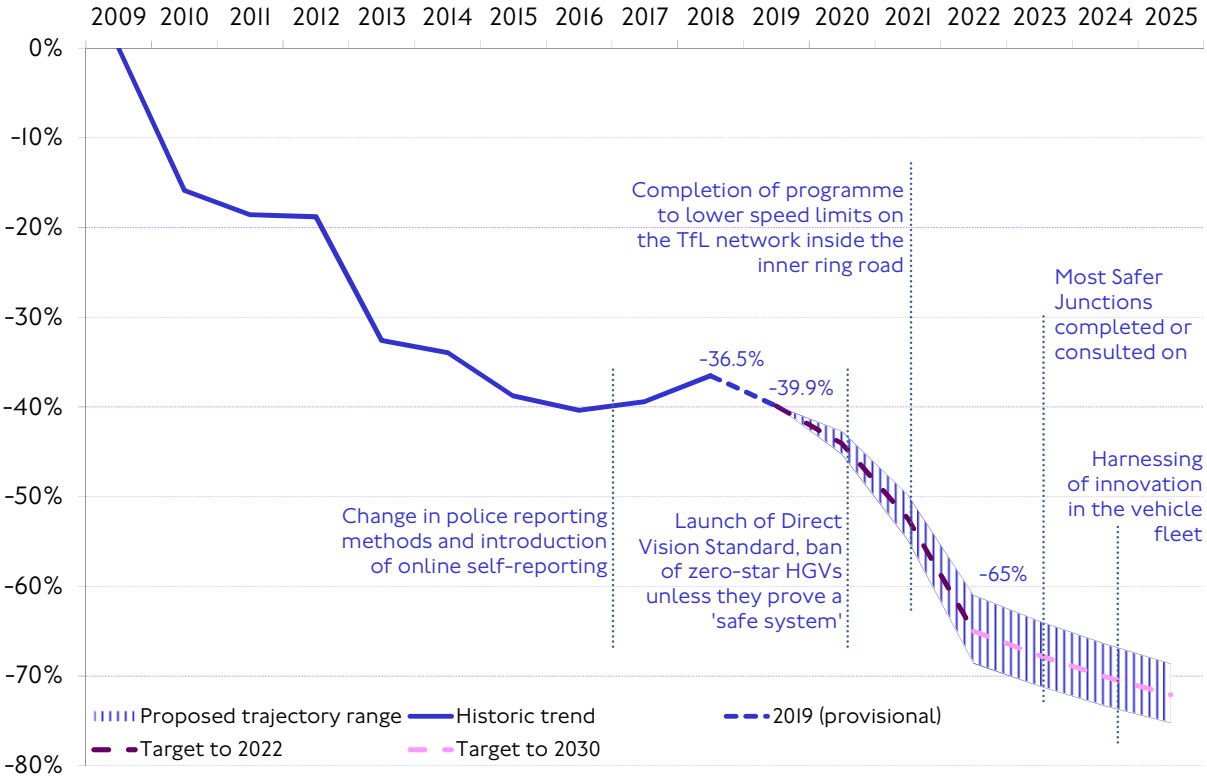
Source: OECD Safer City Streets.

8.13 Progress towards Vision Zero targets

Meeting our 2022 target will be very challenging given the recent levelling in the rate of reduction of people killed or seriously injured. The target set out in the Mayor's Transport Strategy is for a 65 per cent reduction in the number of people killed or seriously injured in London by 2022 against the 2005-09 baseline.

Figure 8.6 shows the forecast trajectory to the 2022 target for the number of people killed or seriously injured. This forecast considers road safety interventions to date and planned future road danger reduction. TfL's Business Plan includes funding for a series of targeted interventions, set out in the Vision Zero Action Plan, published in July 2018. These are designed to deliver further reductions in road danger to be on track to achieve the Mayor's road safety target by 2022.

Figure 8.6 Observed, projected and target trajectory in number of people killed or seriously injured, annotated with key interventions, 2009-2025.

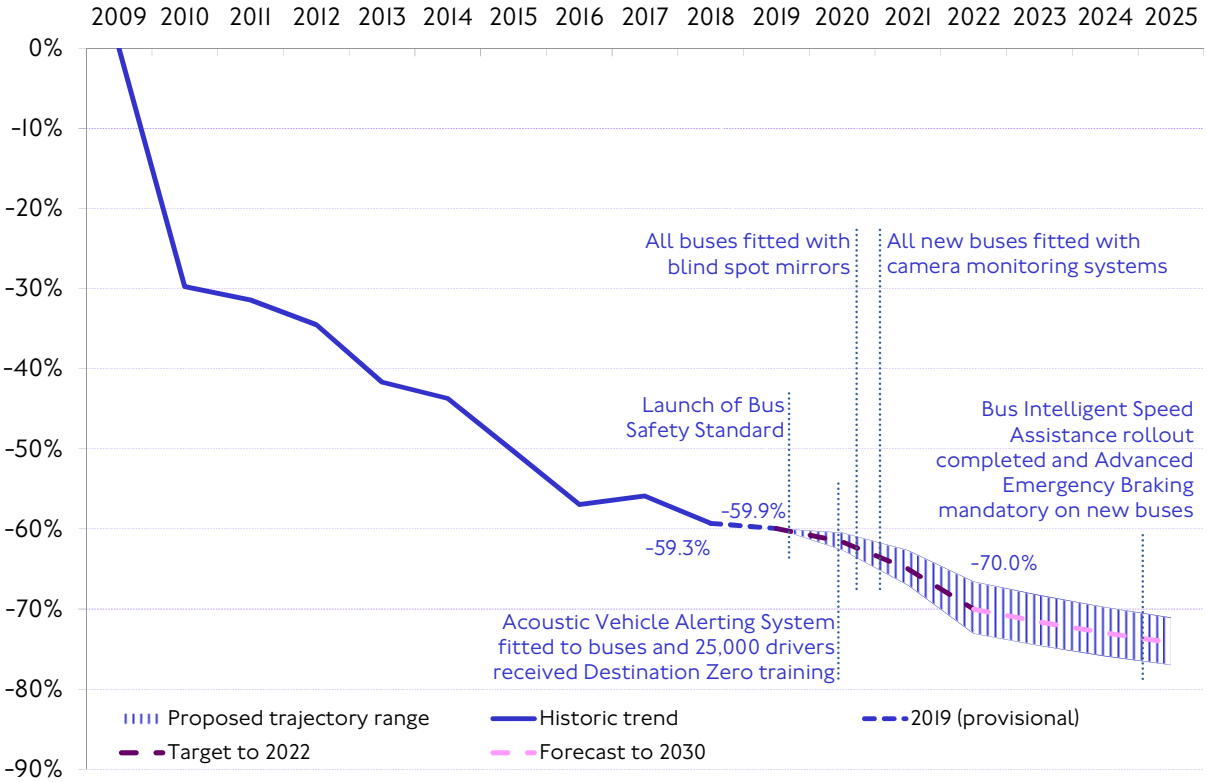


Source: Strategic Analysis, TfL City Planning.

Buses play a key role in our Vision Zero approach. We have introduced a world leading Bus Safety Standard to be applied across the entire bus fleet, which will be incorporated into new bus operator contracts.

Figure 8.7 shows the forecast trajectory to the 2022 target for the number of people killed or seriously injured in or by a bus. During 2018, the number of people killed or seriously injured in collisions involving a bus fell by 8 per cent, when compared to 2017 and 59 per cent down on the back-estimated 2005-09 baseline. This is on track to meet the target of a 70 per cent reduction in the number of people killed or seriously injured in or by a bus by 2022, as set out in the Vision Zero Action Plan.

Figure 8.7 Observed, projected and target trajectory in people killed or seriously injured in or by a bus, annotated with key interventions, 2009-2025.



Source: Strategic Analysis, TfL City Planning.

9. Travel demand trends: motorised road travel

9.1 Introduction

This section considers trends in the volumes of motorised road traffic in London. In 2018, some 37.0 per cent of all trips in London were made by private transport, principally the car (but also including taxis and PHVs). The Mayor's aim of an 80 per cent mode share for active, efficient and sustainable modes by 2041 requires a reduction in this percentage share to 20 per cent by 2041. However, it is necessary to recognise that London's population is expected to continue to grow over this period, and that a growing, more prosperous city will continue to put increasing demands on London's limited road space to accommodate more journeys by car and other vehicles. Other significant trends affecting motorised road traffic over recent years have been a substantial growth in van traffic and the availability of new forms of private hire travel.

This section first looks at vehicle-kilometre based traffic trend estimates for London from the Department for Transport (DfT), and then looks at complementary traffic flow data from TfL's own traffic counts. It then considers the factors underlying recent trends in freight travel and new data that begins to characterise the market for private hire in London.

9.2 Overall trends for motorised road traffic in London

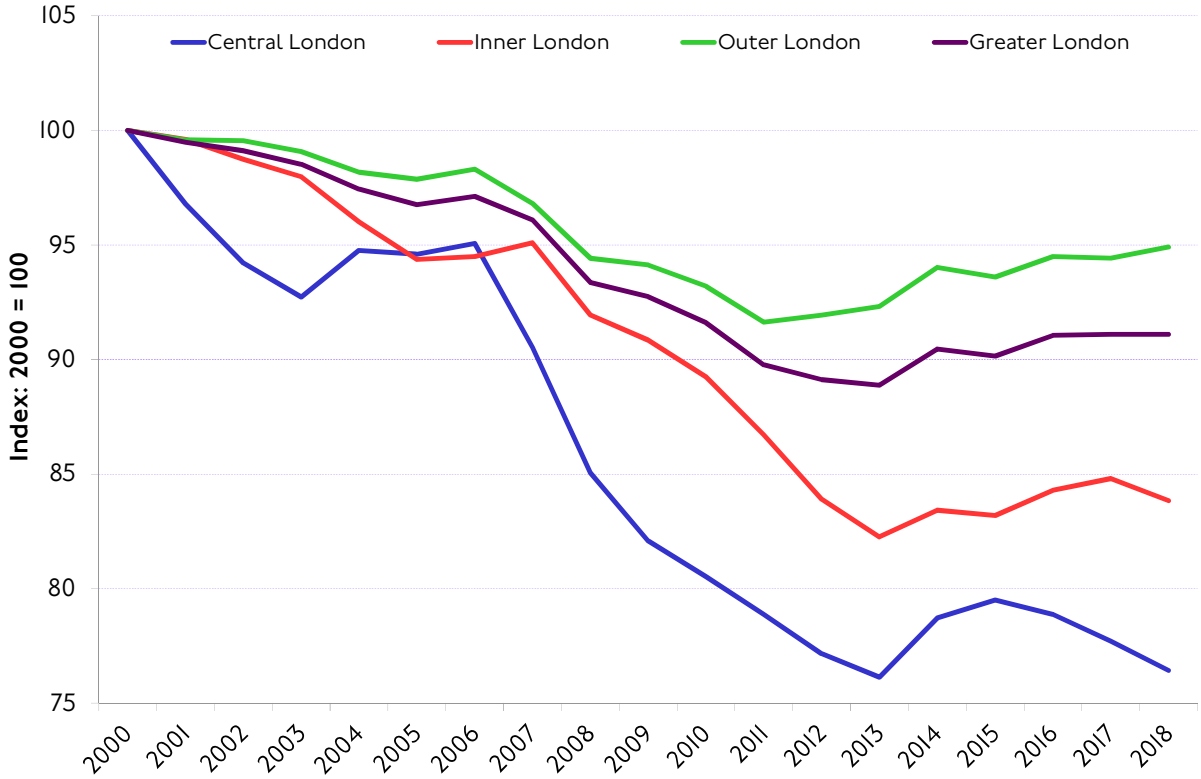
Overall motorised vehicle kilometres

The DfT produces an annual estimate of vehicle kilometres in London. This is part of a wider national traffic survey, but it does provide a good long-term indicator of traffic trends in London. The latest available DfT data is for the 2018 calendar year. It shows no change in overall motorised vehicle kilometres compared to 2017. Despite this, traffic levels in London remain at their highest since 2010. While traffic in central and inner London decreased (by 1.6 per cent and 1.1 per cent respectively), traffic in outer London, which accounts for about 70 per cent of all traffic in London, increased by 0.5 per cent (figure 9.1). Note that the definition of central London used for the DfT data is different to the Congestion Charge zone.

DfT data shows that vehicle kilometres in London as a whole in 2018 were 8.9 per cent lower than in 2000. In central London, vehicle kilometres in 2018 were 23.6 per cent below the 2000 level. In inner London, the equivalent aggregate fall was 16.2 per cent, while vehicle kilometres in outer London are down over the period by 5.1 per cent. At the national level, road traffic volumes increased by 0.3 per cent in 2018, the sixth successive year of increase.

Car traffic (including taxis and PHVs), according to the DfT statistics, has remained the same as in 2017. Car traffic is now 14.8 per cent lower than in 2000 at the Greater London level and almost 5 per cent lower than in 2010, with no change over the last two years. The recent increase in traffic is not therefore immediately due to an increase in car (or PHV) trips. Van (LGV) traffic, in particular, has grown strongly since 2012 across all parts of London, to a point higher than the previous high in (pre-economic crisis) 2007. However, growth has slowed in the latest year, with LGV traffic just 0.5 per cent higher than in 2017. In contrast, HGV (lorry) traffic fell by 1.3 per cent in the latest year.

Figure 9.1 Trends in road traffic (vehicle kilometres), all motor vehicles in central, inner, outer and Greater London. 2000-2018.



Source: Department for Transport.

Table 9.1 All motor vehicles road traffic (billion vehicle kilometres) by London area with Great Britain comparison, 2000-2018.

Year	Central London	Inner London	Outer London	Greater London	Great Britain
2000	1.3	9.0	22.1	32.4	466.2
2009	1.0	8.2	20.8	30.1	495.8
2010	1.0	8.0	20.6	29.7	487.9
2011	1.0	7.8	20.3	29.1	488.9
2012	1.0	7.6	20.3	28.9	487.1
2013	1.0	7.4	20.4	28.8	488.8
2014	1.0	7.5	20.8	29.3	501.5
2015	1.0	7.5	20.7	29.2	509.7
2016	1.0	7.6	20.9	29.5	519.7
2017	1.0	7.6	20.9	29.5	526.4
2018	1.0	7.6	21.0	29.5	528.0

Source: Department for Transport.

Table 9.2 All motor vehicles road traffic index (based on vehicle kilometres, 2000 = 100), by London area with Great Britain comparison, 2000-2018.

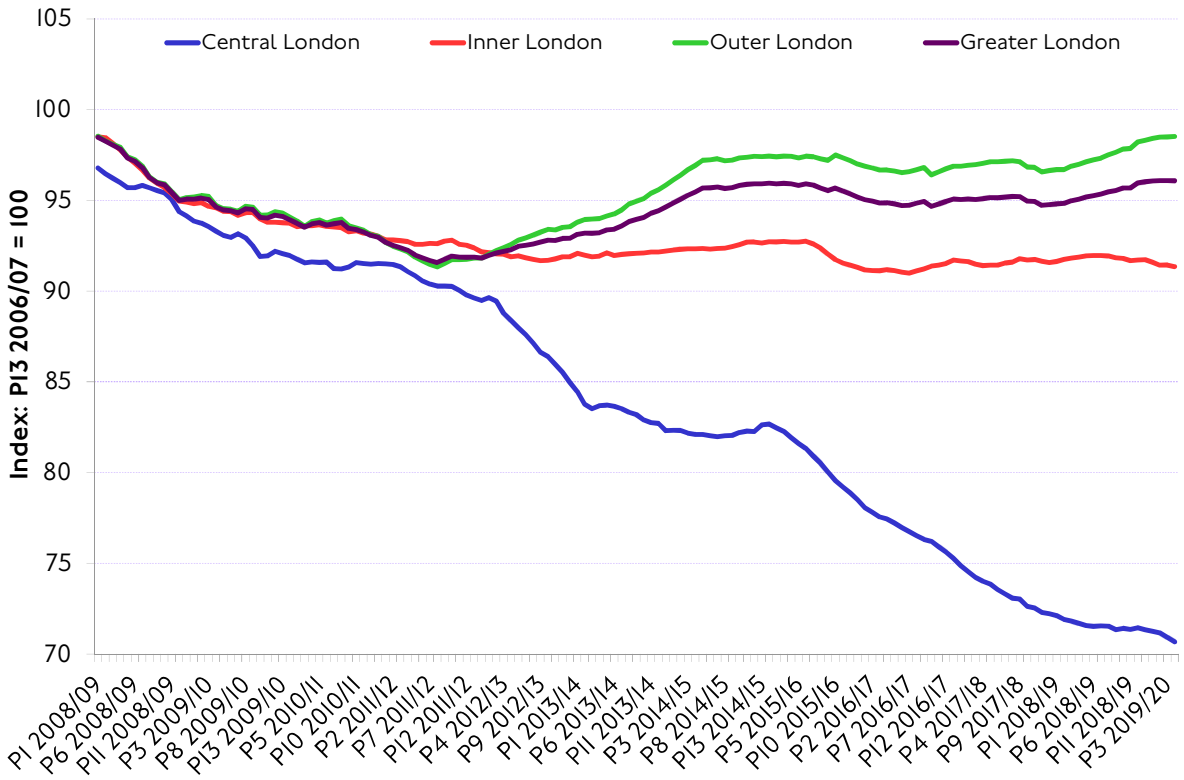
Year	Central London	Inner London	Outer London	Greater London	Great Britain
2000	100.0	100.0	100.0	100.0	100.0
2009	82.0	90.9	94.1	92.7	106.4
2010	80.5	89.2	93.2	91.6	104.7
2011	78.9	86.7	91.6	89.8	104.9
2012	77.2	83.9	91.9	89.1	104.5
2013	76.1	82.3	92.3	88.9	104.8
2014	78.7	83.4	94.0	90.5	107.6
2015	79.5	83.2	93.6	90.1	109.3
2016	78.9	84.3	94.5	91.1	111.5
2017	77.7	84.8	94.4	91.1	112.9
2018	76.4	83.8	94.9	91.1	113.3

Source: Department for Transport.

Trend shown by TfL's volumetric data

Data from TfL's traffic counts provide a second indicator of traffic trends. It is important to note that they measure different indices to the DfT counts, although they show broadly similar long-term trends.

Figure 9.2 Trends in road traffic (traffic flows), all motor vehicles in central, inner, outer and Greater London, 13 period average, 2008/09-2019/20.



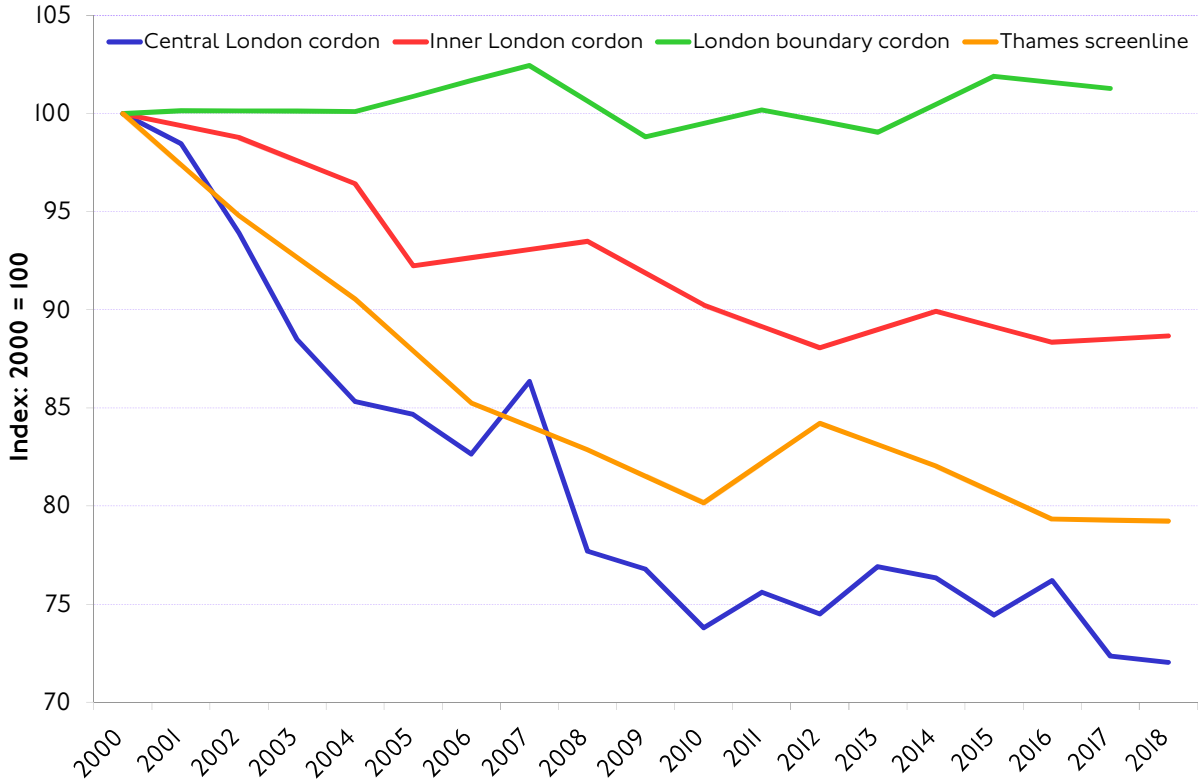
Source: TfL Surface Transport, Outcomes, Insight and Analysis.

The data shows a large drop in flows in central London (in this case using a definition aligned with the Congestion Charge zone), with traffic flows almost 30 per cent lower than in early 2007. In inner London, flows declined to 2011/12, and have been relatively stable since then, and are around 8 per cent lower than in 2006/07. Traffic flows in outer London also declined up to 2011/12, and after a return to growth up to 2014/15, flows have been relatively stable.

Trend shown by TfL's cordon count data

Trends in the numbers of motor vehicles crossing the three London strategic counting cordons and the Thames screenline provide a third indicator of traffic volumes, and they also show a broadly similar pattern to the other two indicators.

Figure 9.3 Daily number of motor vehicles crossing at the three cordons and the Thames screenline, 2000-2018.



Source: TfL Surface Transport, Outcomes, Insight and Analysis.

Since 2001, and bearing in mind that not all cordons are surveyed every year, the number of motor vehicles crossing the central cordon (enclosing a third definition of central London which is not aligned either with the Congestion Charge zone or with the DfT definition) has fallen by 26.9 per cent.

Across the inner cordon, the decline has been 10.2 per cent (from 2002), while flows at the boundary cordon have been relatively stable, with a net 1.1 per cent increase between 2001 and 2017. The number of vehicles crossing the Thames throughout Greater London has also declined, with 20.8 per cent fewer vehicles observed doing so in 2018 compared with 2000. In considering these cordon and screenline counts, it should be noted that there may be considerable variation locally from the trends quoted here, as they include a wide range of locations with differing road network and traffic growth characteristics.

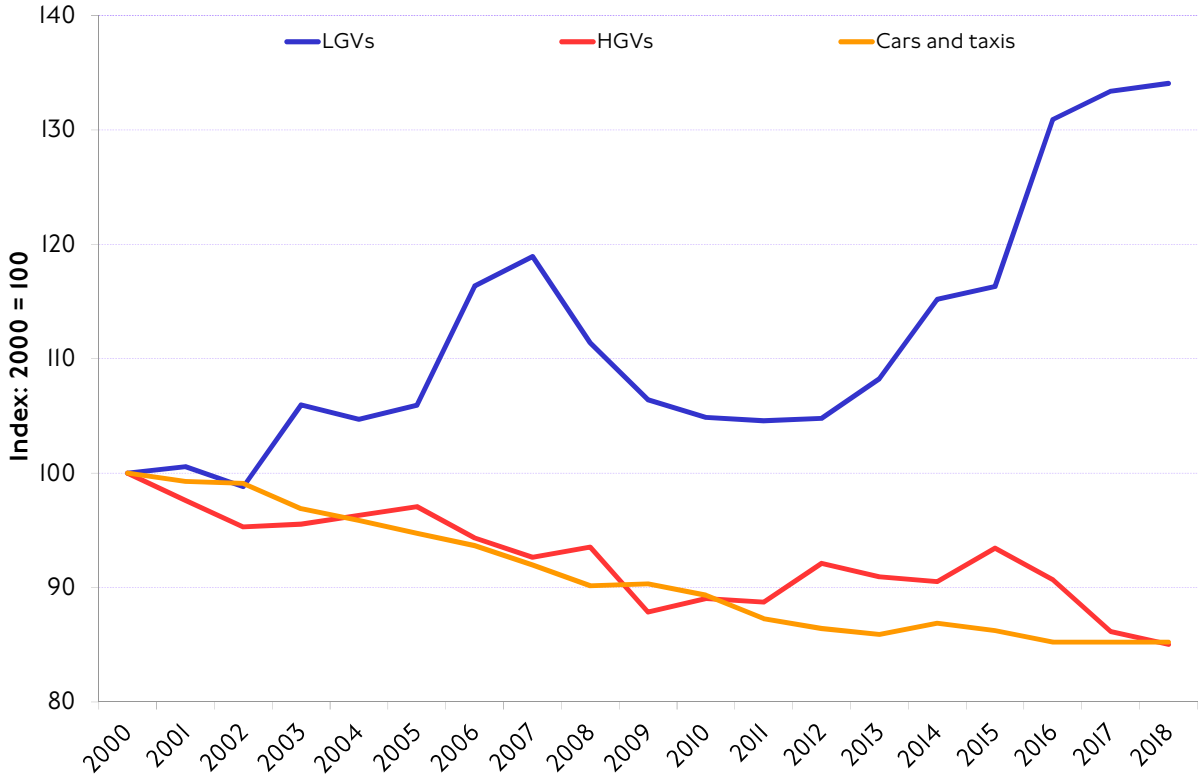
Comparing the cordon data with the DfT traffic data in figure 9.1, the overall trends since 2000 are relatively similar. Both data sources show a drop of more than 20 per cent in central London, albeit that neither is directly aligned with the Congestion Charge zone, although the DfT traffic data suggests larger falls in both inner and outer London.

Trends for motorised traffic by main vehicle type

Motorised road traffic consists of several different types of vehicle, not all of which have shown the same trends. DfT vehicle kilometre data gives an indicator of trends as they affect the principal motorised vehicle types.

Figure 9.4 shows the basic trend in vehicle kilometres for cars and taxis, light goods and heavy goods vehicles over the period since 2000. It is seen from the figure that vehicle kilometres by cars and taxis (including PHVs) and HGVs have been declining steadily since 2000, and are both down by about 15 per cent on 2000 levels. In contrast, vehicle kilometres by LGVs increased by 19 per cent between 2000 and 2007, followed by a decline of 12 per cent between 2007 and 2011. Since then, LGV vehicle kilometres have increased fairly sharply, and in 2018 are above the previous high seen in 2007.

Figure 9.4 Trends in motorised vehicle kilometres in London, by main vehicle type, 2000-2018.



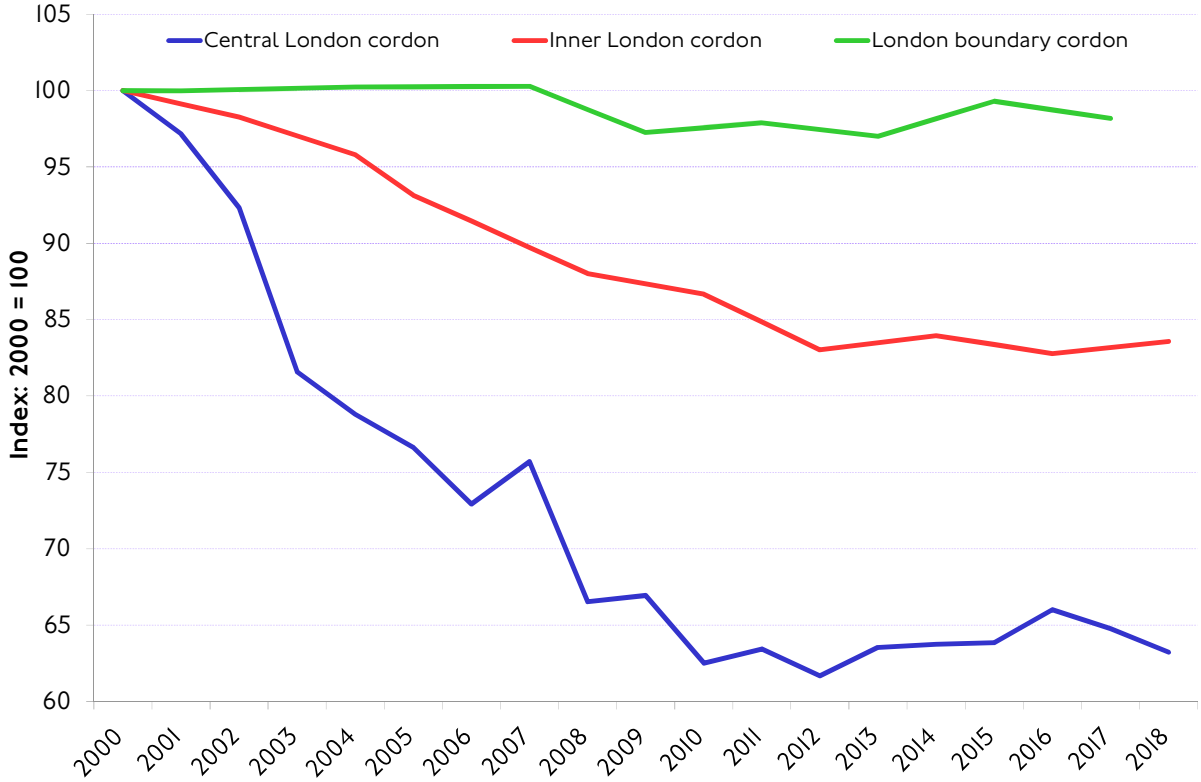
Source: Department for Transport.

9.3 Motorised traffic: car (including PHVs)

The overall picture of declining car volumes over recent years has not affected all parts of London in the same way. Figure 9.5 shows the time-series of crossings of the TfL cordons by cars. Note that this includes licensed private hire vehicles,

which cannot be distinguished in this type of traffic count, but does not include licensed taxis.

Figure 9.5 Trend in cars (including PHVs) crossing TfL cordons, 2000-2018.



Source: TfL Surface Transport, Outcomes, Insight and Analysis.

The decline has been greatest across the central cordon, with 34.9 per cent fewer cars crossing the cordon in 2018 compared with 2001. There has been a 14.9 per cent decline in cars crossing the inner cordon between 2002 and 2018, whereas at the boundary cordon, flows in 2017 were 1.8 per cent lower than in 2001. There is evidence of a recent increase in car flows across the central cordon, which has seen an increase of 3 per cent since 2012. This could be a result of an increase in private hire vehicles over this time period rather than private cars, however, and the central cordon encloses an area larger than the Congestion Charge zone.

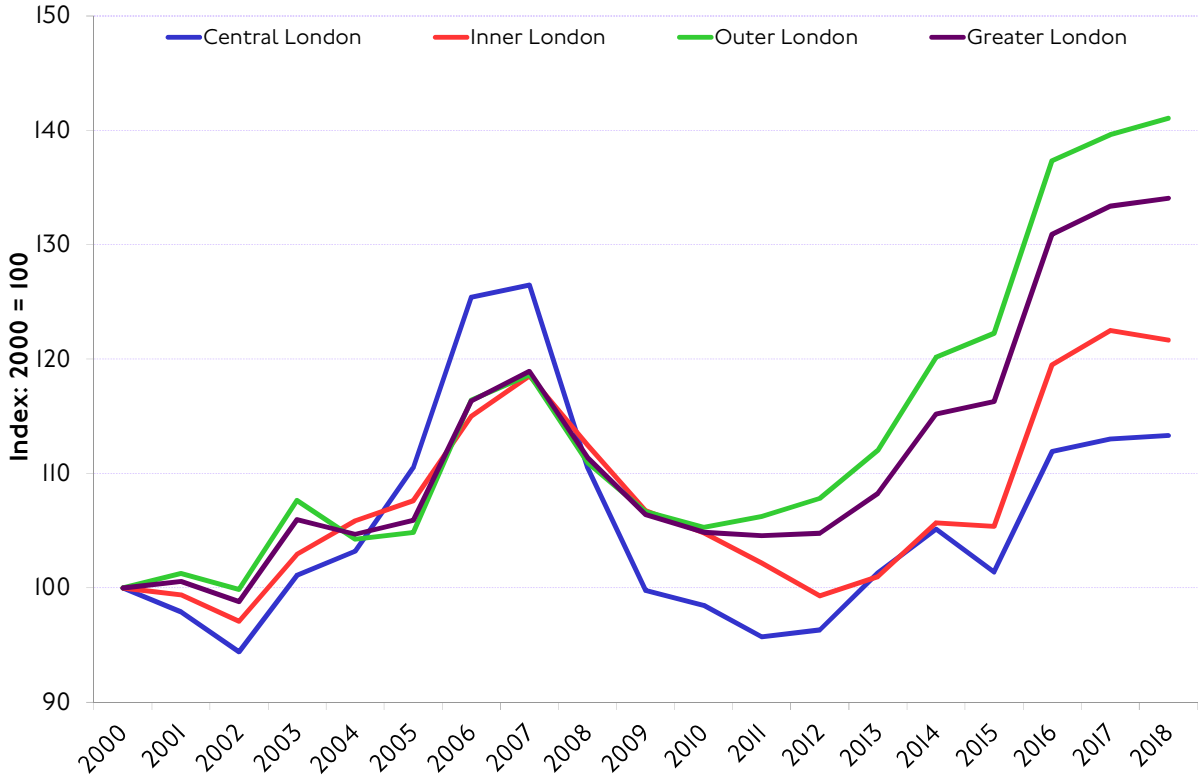
9.4 Motorised traffic: freight

Road is by far the dominant mode for goods transport in London in terms of the weight of goods lifted – accounting for around 90 per cent of all tonnage. This section looks at trends in the volumes of road freight vehicles, in terms of vans or light goods vehicles (LGVs) and lorries or heavy goods vehicles (HGVs).

Trend in volumes of vans

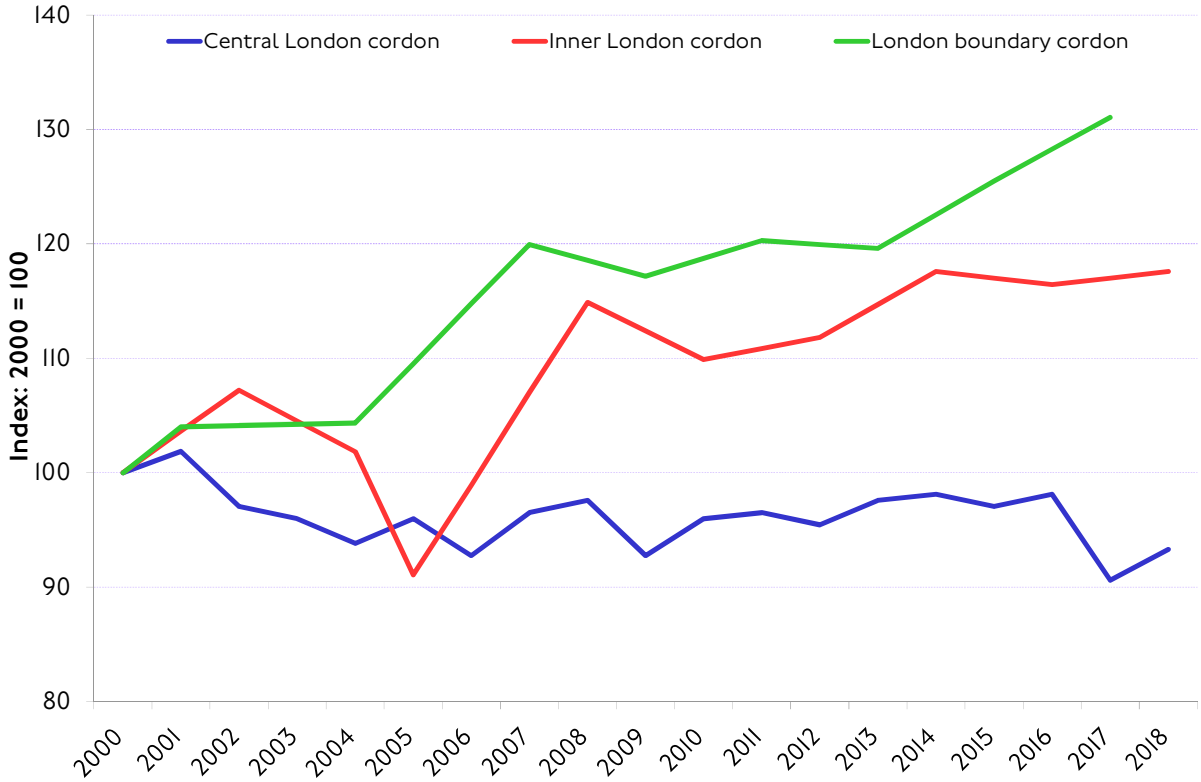
Vans have been increasing in absolute terms and as a proportion of total traffic in London over recent years. Figure 9.6 shows the trend in light goods vehicle traffic (vehicle kilometres) in central, inner, outer and Greater London. Figure 9.7 is the equivalent trend in the volume of light goods vehicles crossing the central, inner and boundary cordons, corresponding to central London, the outer boundary of inner London and the GLA boundary respectively.

Figure 9.6 Trends in LGV traffic (vehicle kilometres) in central, inner, outer and Greater London, 2000-2018.



Source: Department for Transport.

Figure 9.7 Daily number of LGVs crossing the three cordons: 24-hour flows, 2000-2018.



Source: TfL Surface Transport, Outcomes, Insight and Analysis.

Figures 9.6 and 9.7 show evidence of a progressive if relatively slow increase in vans, dating back to at least 2000. On a long-run basis based on figure 9.6, the average annual increase in vans (annual vehicle kilometres) over the period between 2000 and 2018 has been 0.7 per cent in central London, 1.1 per cent in inner London, 1.9 per cent in outer London and 1.6 per cent in Greater London as a whole. Cordon-based data shows a slightly different trend, with an overall decrease of 8.4 per cent at the central London cordon since 2001, an increase of 9.7 per cent at the inner cordon (between 2002 and 2018), and an increase of 26.0 per cent at the London boundary cordon (between 2001 and 2017).

LGVs accounted for 16 per cent of the vehicle kilometres travelled by all motorised road vehicles in London in 2018, compared to 11 per cent in 2000.

The most notable difference between figures 9.6 and 9.7 is the notional impact of the recession in the latter part of the last decade. Figure 9.6 shows this effect as being significant, with powerful growth pre-recession and an equally steep decline following it. Although perhaps intuitive, given the known connection between goods vehicle traffic and economic activity, the cordon data, however, does not clearly show this feature.

Also notable – evident from both figures 9.6 and 9.7, is that the rate of growth in central London has been relatively muted – the central cordon, for example, suggesting a generally flat trend and recent totals below those of the early 1990s. This may be considered surprising, given the acknowledged servicing needs of the growing central London economy, but it is not out of line with the equivalent trend for general traffic at this cordon, which fell by 26.9 per cent between 2001 and 2018.

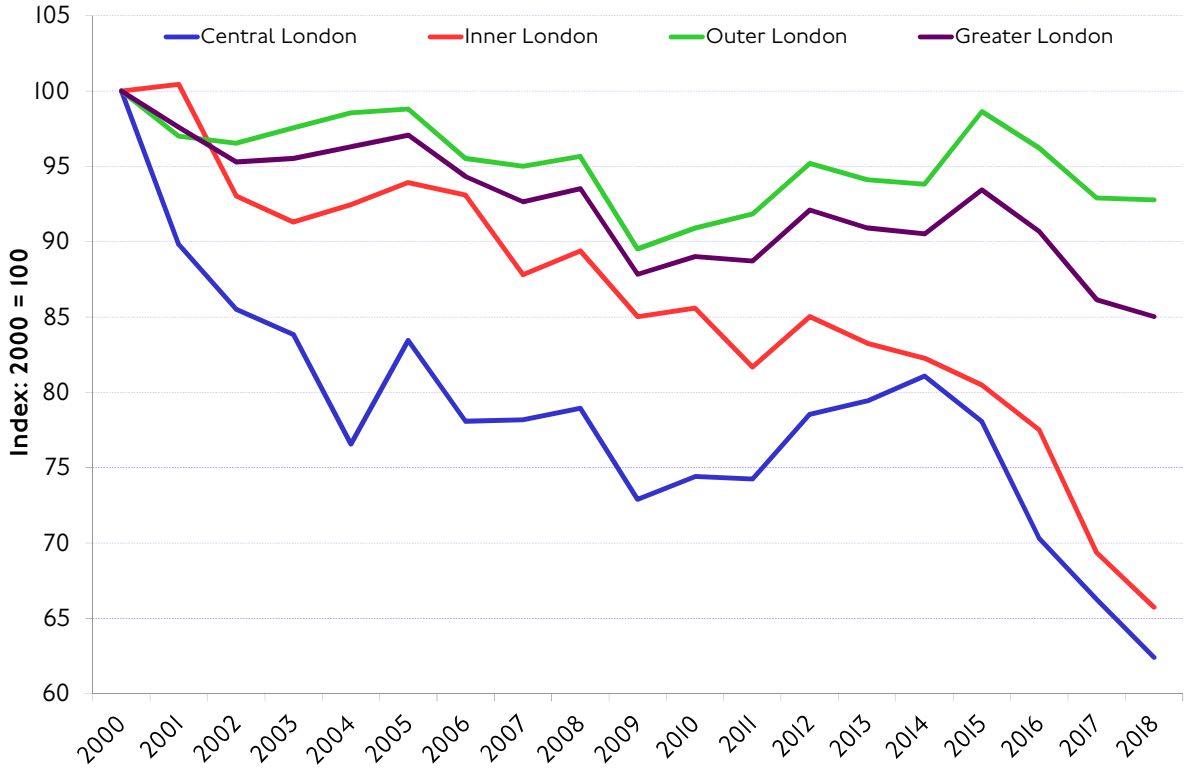
Trends in the volume of heavy goods vehicles

Figure 9.8 shows the trend in heavy goods vehicle traffic (vehicle kilometres) in central, inner, outer and Greater London. Figure 9.9 is the equivalent trend in the volume of HGVs crossing the central, inner and boundary cordons, corresponding to central London, inner London and the GLA boundary respectively.

Looking first at the vehicle kilometre data, HGV traffic has declined steadily across all areas of London, and is 15 per cent lower than in 2000 at the Greater London level. HGV traffic continued to decline in 2018, particularly in both central and inner London. In 2018 HGVs accounted for 2 per cent of total vehicle kilometres in central London, 2 per cent in inner London, 4 per cent in outer London, and 3 per cent at the Greater London level.

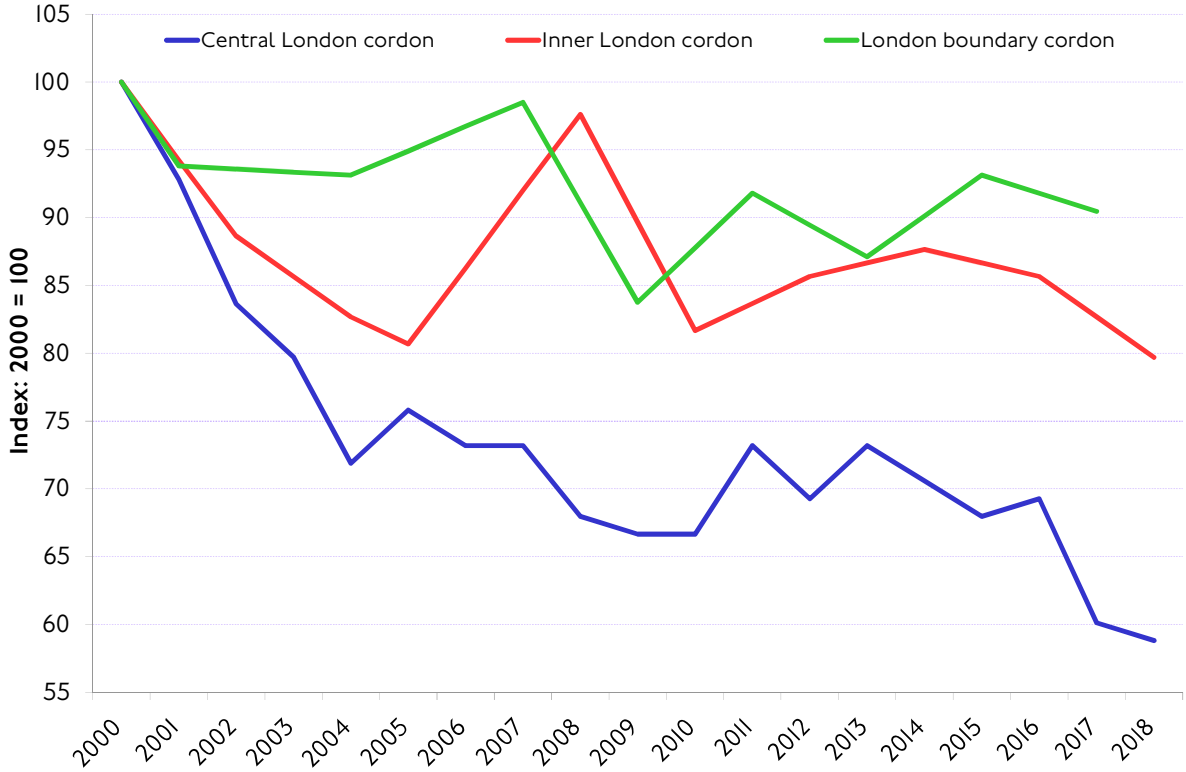
Cordon data (figure 9.9) also shows a long-term trend of decline in HGV volumes, in this case fairly consistently across all parts of London. On this basis the number of HGVs crossing the central cordon in 2018 was 36.6 per cent lower than in 2001, with equivalent reductions of 10.1 per cent for the inner cordon (from 2002 to 2018), and 3.6 per cent at the London boundary cordon (from 2001 to 2017).

Figure 9.8 Trends in HGV traffic (vehicle kilometres) in central, inner, outer and Greater London, 2000-2018.



Source: Department for Transport.

Figure 9.9 Daily number of heavy goods vehicles crossing the three cordons: 24-hour flows, 2000-2018.



Source: TfL Surface Transport, Outcomes, Insight and Analysis.

9.5 Understanding the drivers of freight demand in London

Freight activities affect almost every aspect of life in London with the size and number of visible trucks and vans being the outcome of many economic activities taking place. As described in section 9.4, these trends have been changing over the past few decades. TfL have quantified the extent to which key industries and economic factors have driven the historic trend in HGV and LGV kilometres.

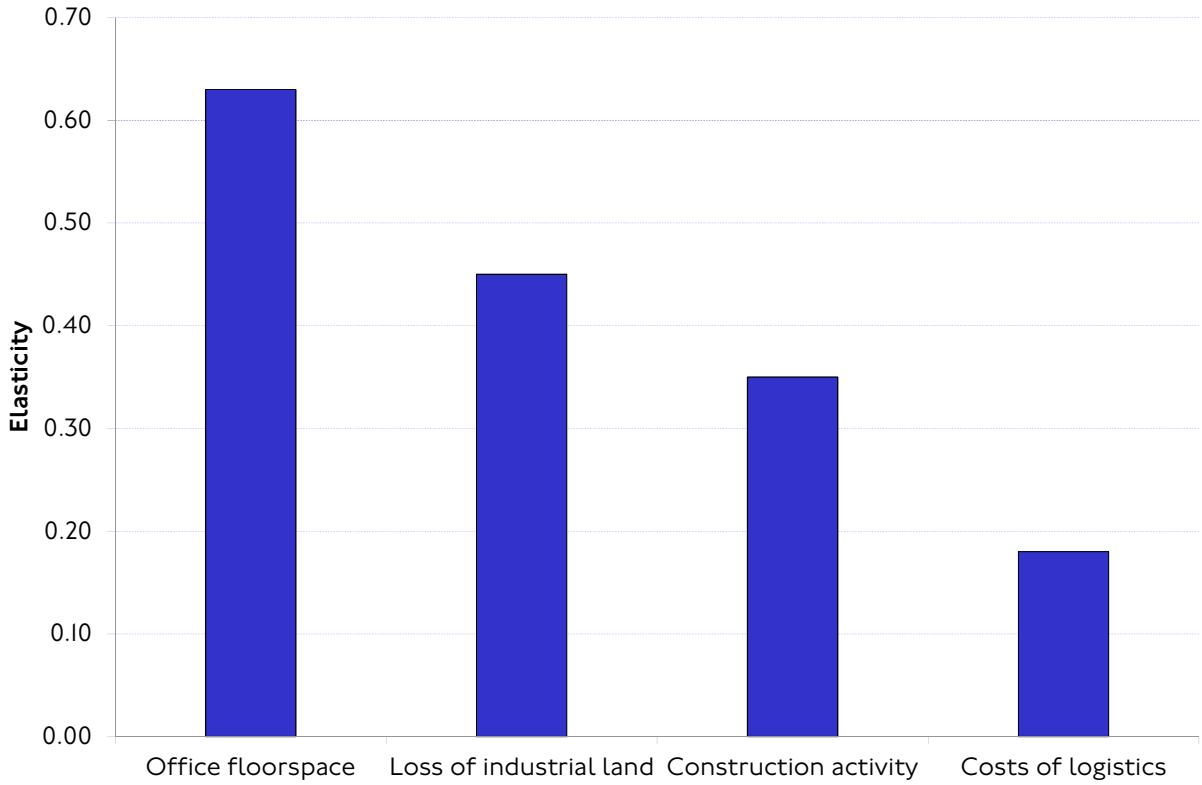
Approach

The main relationships that were explored are:

- How key industries such as commercial office space and construction directly drive the demand for freight.
- How rising house prices and the demand for housing has reduced industrial floor space in London, increasing the distance between businesses and customers.
- How logistic costs negatively affect freight.
- The role of macro-economic factors such as population and disposable household incomes.
- The impact that online retail has had on total vehicle kilometres in London.

Figure 9.10 shows the main drivers of the historical trends for freight in London and their relative contribution.

Figure 9.10 Impact on goods vehicle kilometres from a one per cent change in each of the key drivers of demand.

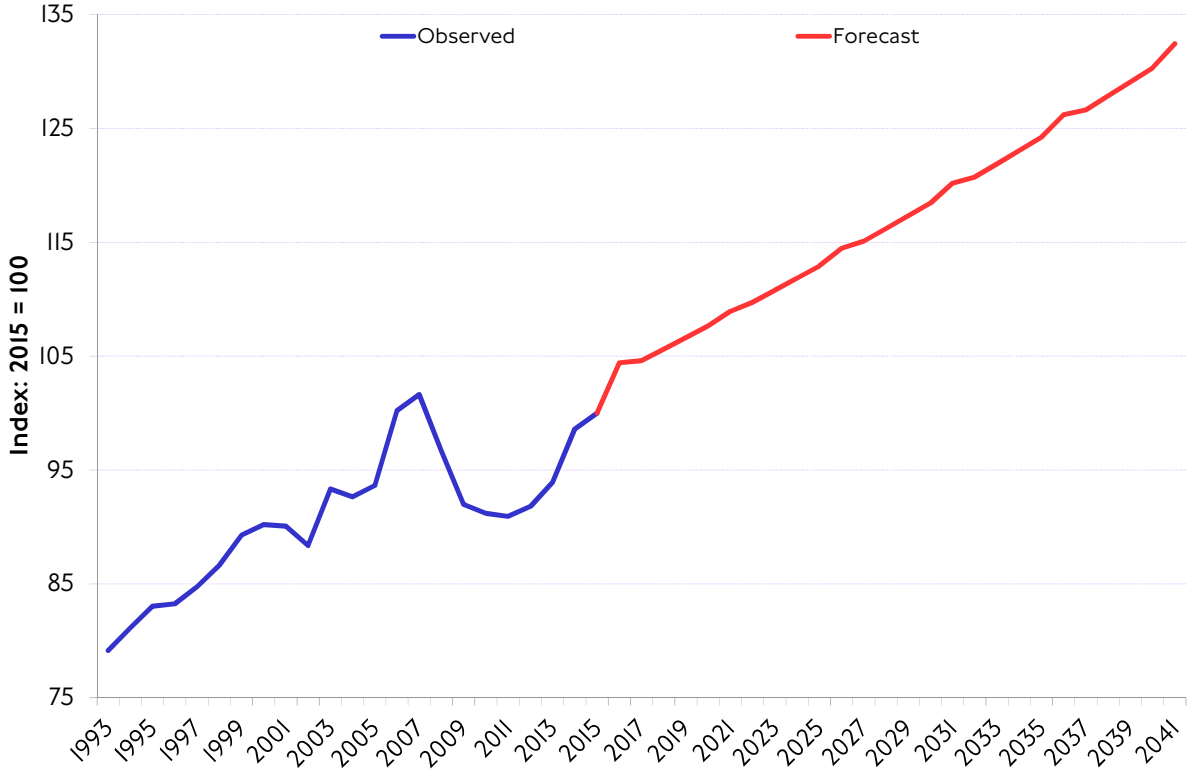


Source: Strategic Analysis, TfL City Planning.

This model can also be used to forecast future vehicle kilometres in London (figure 9.11). This shows that there could be more than a 30 per cent increase in

total HGV and LGV kilometres without further interventions by 2041. LGVs currently contribute around 80 per cent of the total road freight kilometres in London and this is expected to increase to around 85 per cent by 2041. Continued regulation of larger vehicles and a reduction in professional drivers underlie greater LGV usage. In addition, as warehousing and depots move further away from shops, trips become longer and more frequent, which are often more appropriately served by smaller vehicles. However, it will always be more cost-effective to fill a larger vehicle and so the growth in LGVs will be dampened by these economies of scale. Increasing online retail will favour growth in LGVs but to date the contribution to historical growth has been weak compared to other drivers in the economy.

Figure 9.11 Observed and forecast goods vehicle kilometres, 1993-2041.



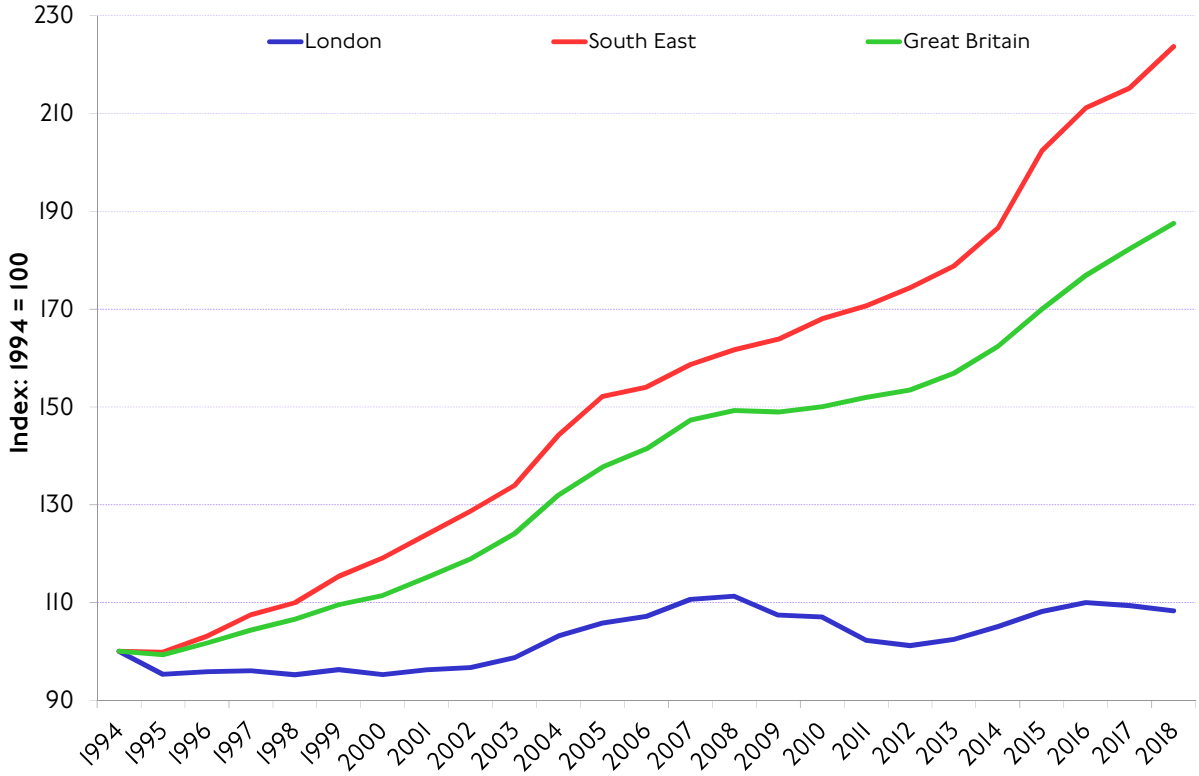
Source: Strategic Analysis, TfL City Planning.

Goods vehicles in London: registrations and routes

Over the past decade LGVs in London have been getting larger. In 2008 40 per cent of LGV kilometres driven in London were by smaller NI Class III size vans (typically referred to as a 'car derived' van). By 2016 this decreased to less than 20 per cent.

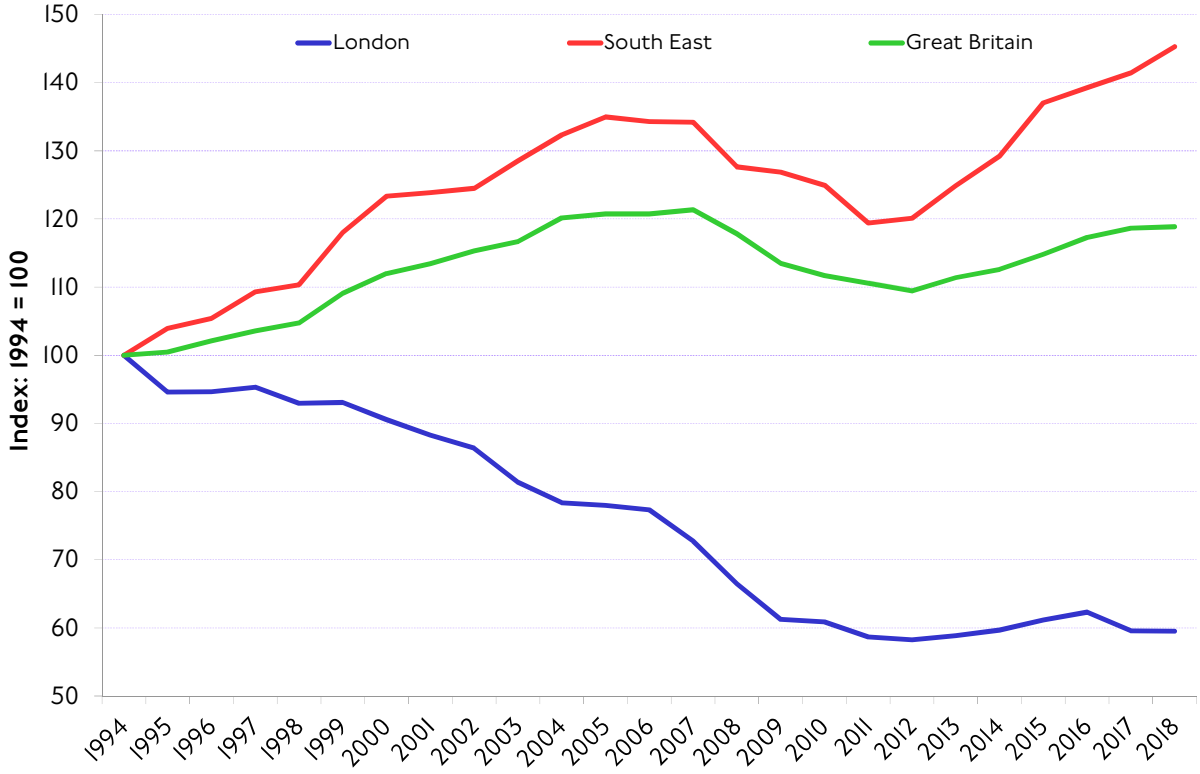
While LGV vehicle kilometres have increased in London, the number of vehicles registered has remained fairly flat with 2018 registrations only 8 per cent higher than in 1994. This compares to registrations in Great Britain as a whole and the South East specifically which have seen increases of 88 per cent and 224 per cent respectively (figure 9.12).

Figure 9.12 Trend in LGV registrations in London, the South East and Great Britain, 1994-2018.



Source: Department for Transport.

Figure 9.13 Trend in HGV registrations in London, the South East and Great Britain, 1994-2018.



Source: Department for Transport.

HGVs have declined by 40 per cent in London over the same period with registrations in Great Britain increasing by nearly 20 per cent and increasing in the South East by 45 per cent (figure 9.13). Therefore vehicles seen in London are more likely to be registered outside of the city than in the past. This could be due to a number of factors including the displacement of industry or company headquarters to outside of London. It is important to note that the location of registration may not reflect the true starting location of the vehicle.

Despite this change in where vehicles are registered we still see that most of the goods being moved to and from London by HGV are moved relatively locally. In 2018, some 81 million tonnes were lifted by HGVs starting in London and 90 million tonnes lifted by those going to London with around 50 million moving within London itself.

Fleet Operator Recognition Scheme

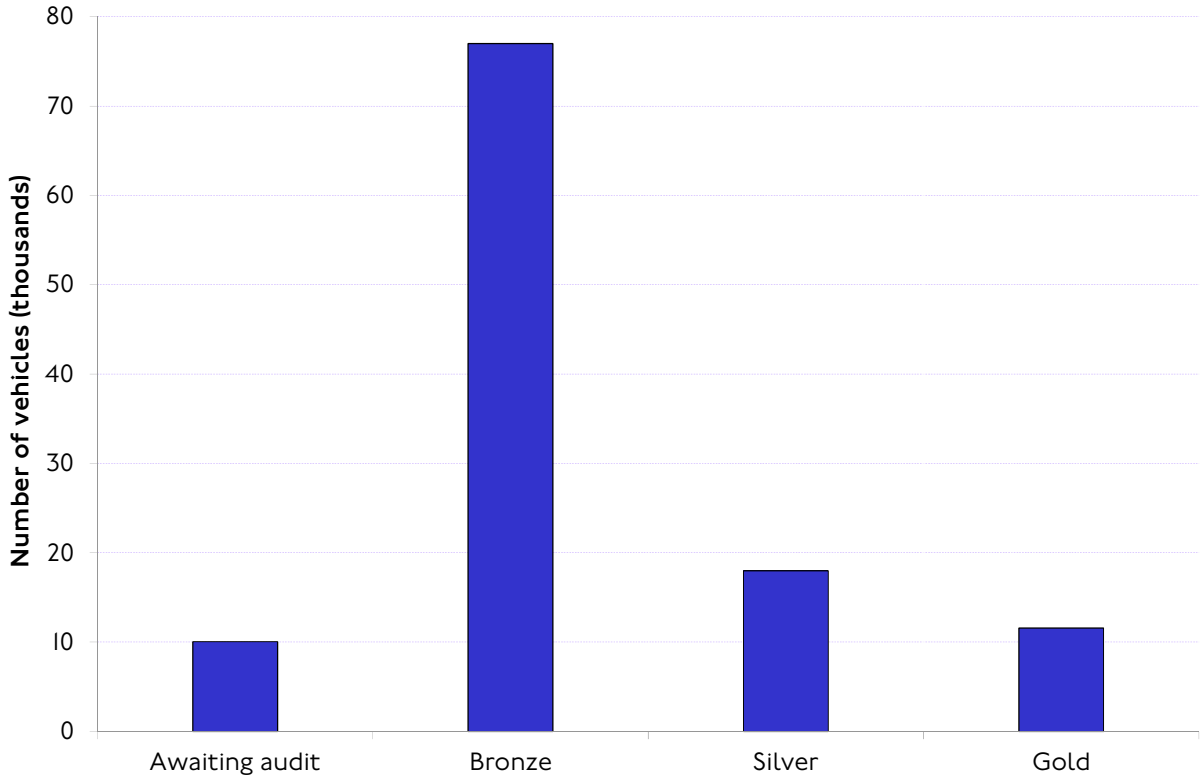
The Fleet Operator Recognition Scheme (FORS) is a voluntary accreditation scheme for fleet operators. FORS aims to incentivise the safe and sustainable operation of commercial vehicles by encouraging operators to go beyond legal compliance, allowing the road freight sector to compete on quality and not just cost. FORS raises the bar, promotes best practice and provides a recognisable credential through an independent onsite audit, staff training and support material.

There are three levels of FORS accreditation (bronze, silver, and gold) that can be achieved by operators demonstrating at audit that they have adopted operational and managerial requirements including:

- Policy, procedures and risk assessments.
- Additional vehicle safety equipment.
- Driver training on: vulnerable road user safety, environmental protection, security and terrorism.
- Competent and trained management.
- Driver licence checks.
- Driver eyesight checks.

By mid-2019, FORS has over 5,000 accredited operators across 17 countries that operate over 105,000 vehicles. Figure 9.14 shows the split of vehicles by accreditation level. More information is available at: www.fors-online.org.uk/cms/.

Figure 9.14 Number of FORS registered vehicles, 2019.

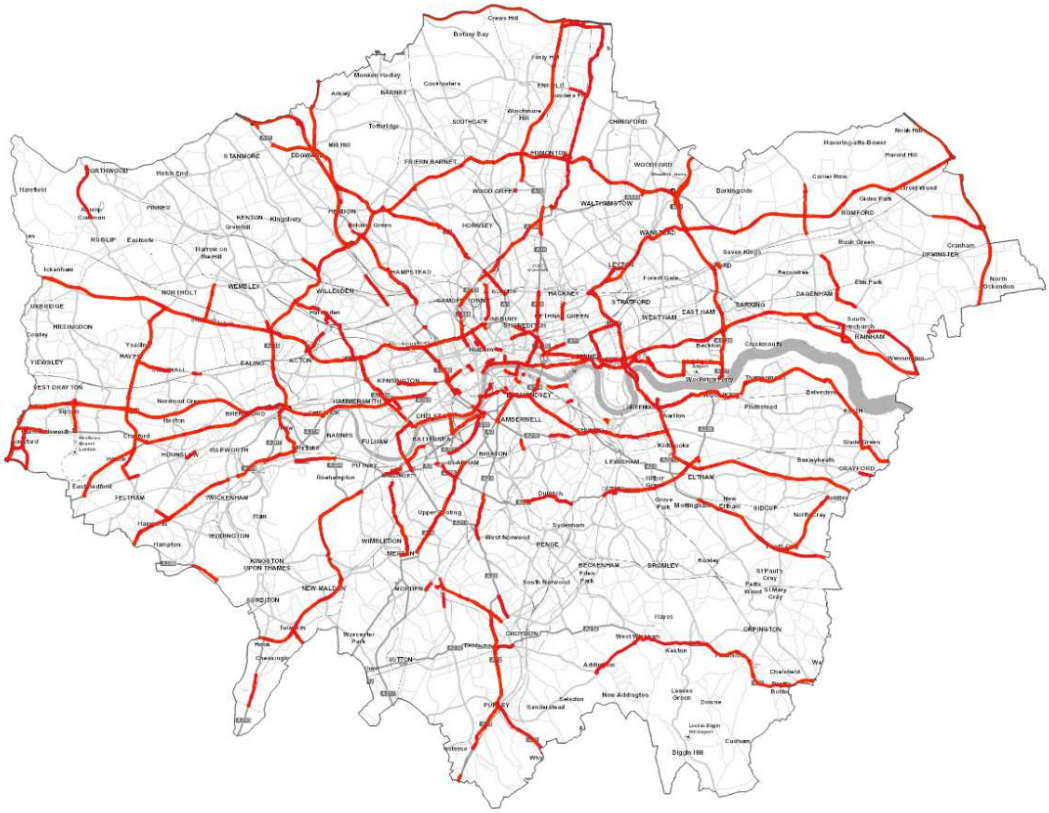


Source: FORS.

Goods vehicle routes

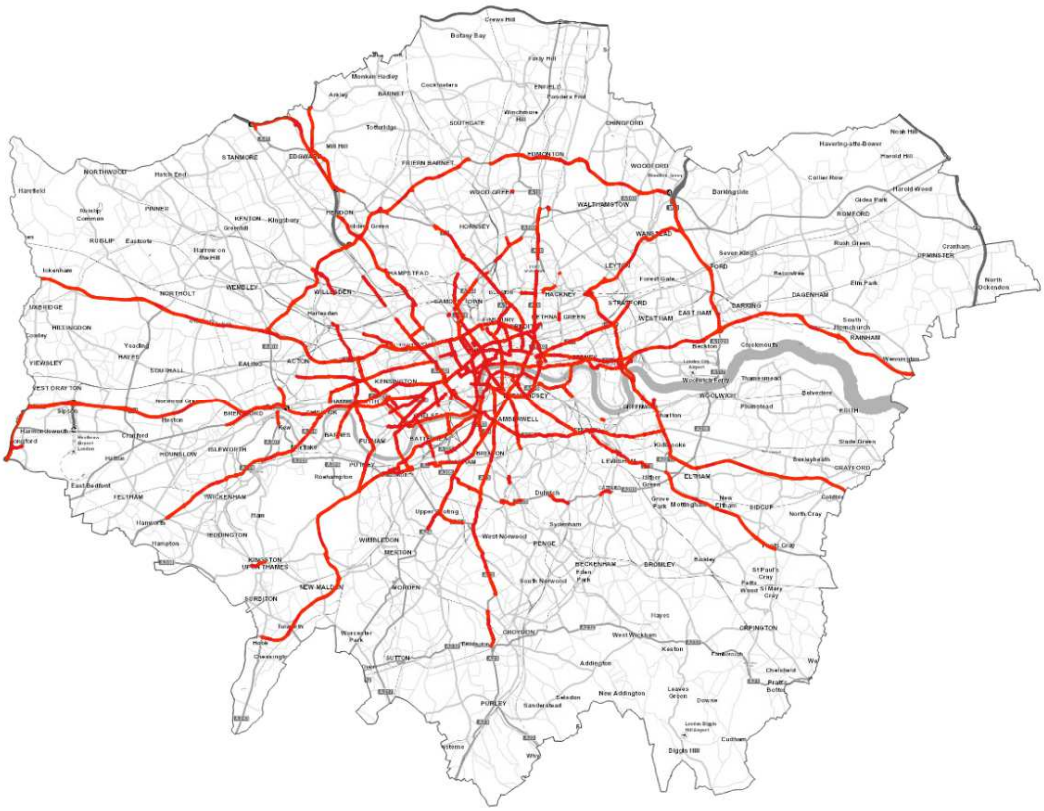
Understanding the main routes used by goods vehicles assists in the planning of transport infrastructure and determining how London's scarce road space is prioritised for different modes. Figures 9.15 and 9.16 show the top 25 per cent of roads used by LGVs and HGVs. The networks have some differences with the high flow HGV roads consisting of the main strategic corridors into the city and orbital routes. For LGVs, the area within the North and South circulars becomes more important, reflecting their greater use in service based industries.

Figure 9.15 Top 25 per cent of roads used by HGVs in London.



Source: Strategic Analysis, TfL City Planning, based on DfT traffic count data.

Figure 9.16 Top 25 per cent of roads used by LGVs in London.



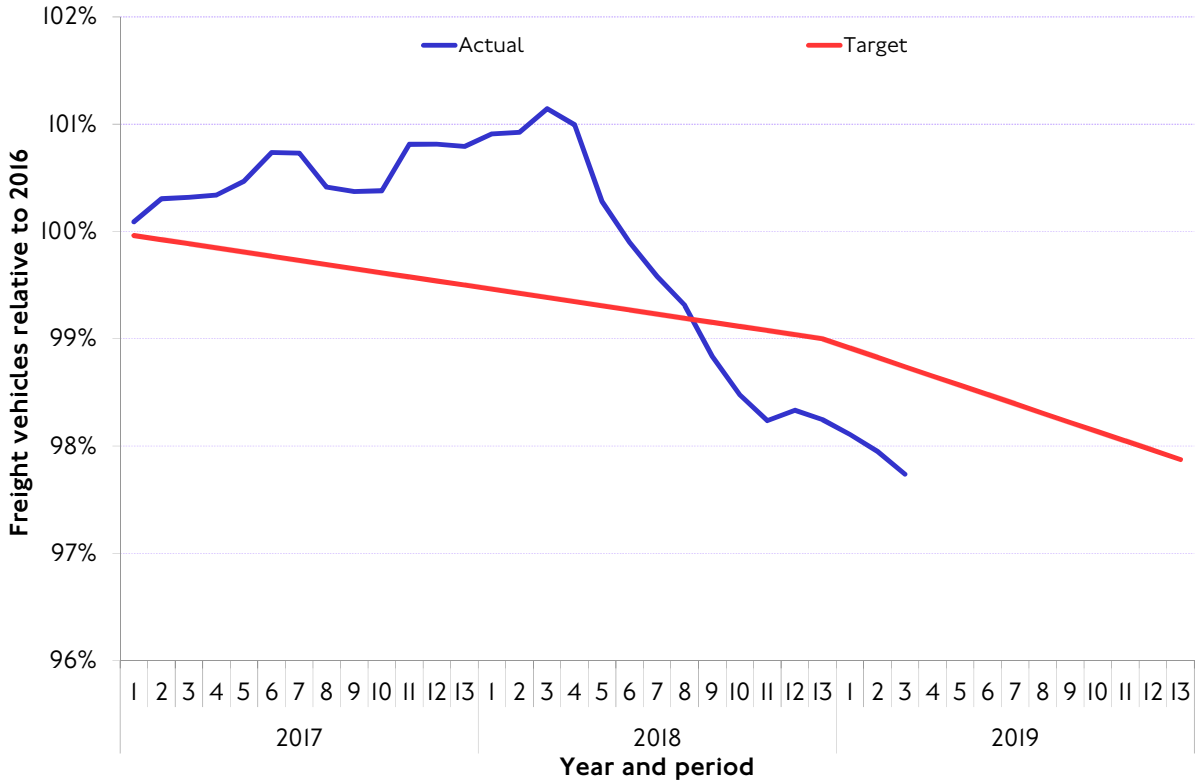
Source: Strategic Analysis, TfL City Planning, based on DfT traffic count data.

9.6 Goods vehicles entering the central London Congestion Charge zone

A specific aim of the transport strategy is to reduce the number of heavy goods vehicles circulating in the central London Congestion Charge zone during the weekday morning peak by 10 per cent by 2026, from 2016 levels. This reflects particular pressures on the road network at this time, and would help to reduce road danger.

Figure 9.17 shows the observed trend over recent years and sets this in the context of the nominal trajectory required to meet the target. Although a degree of variability in the actual trajectory is to be expected, the overall trend is compatible with steady progress towards this aim.

Figure 9.17 Number of freight vehicles entering the Congestion Charge zone relative to 2016. 13 period moving average.



Source: TfL Surface Transport, Outcomes, Insight and Analysis.

9.7 Motorised traffic: licensed taxis and private hire vehicles

Licensed taxis

Figure 9.18 shows the trend in the number of licensed taxis and private hire vehicles (PHVs), along with their drivers, within London since 2008/09. The number of licensed taxis in London has shown a gradual decline in recent years, decreasing by a further 5 per cent in 2018/19 to 20,065. The total number of licensed taxi drivers declined by 3 per cent to 23,177 in 2018/19, 9 per cent below the high in 2012/13.

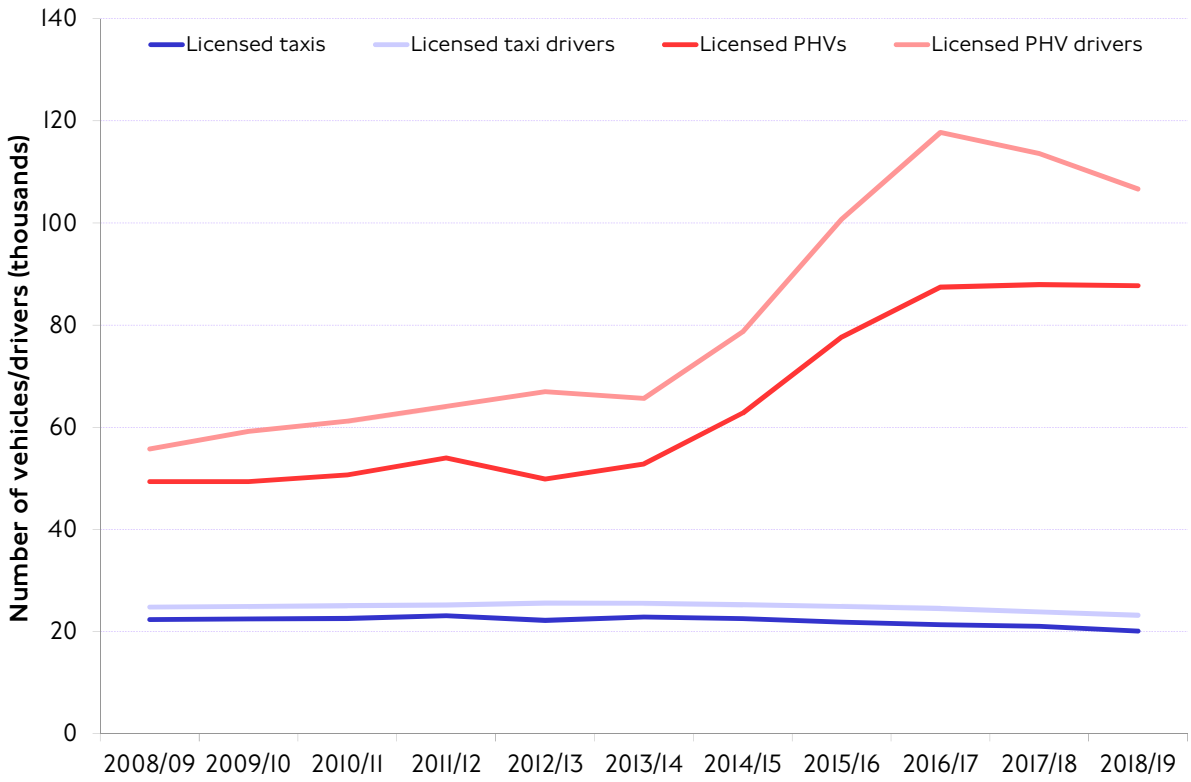
Licensed private hire

The number of licensed PHVs in London has increased by 78 per cent since 2008/09, up to 87,745 in 2018/19, despite a slight fall of 0.2 per cent in the latest year. The number of licensed PHV drivers decreased by 6 per cent in 2018/19, down to 106,650.

From 2008/09 through to 2012/13 the number of licensed PHV drivers grew steadily at an average rate of around 5 per cent per year. In 2016/17, the number of registered PHV drivers grew by 17 per cent, although there have been declines in the last two years.

Despite the increase in the number of licensed PHVs and drivers in recent years, the number of private hire operators in London is declining. In 2018/19, there were 2,202 operators in London, a decline of 7 per cent on the previous year and a decrease of 30 per cent since 2012/13, indicating consolidation in the industry.

Figure 9.18 Recent trend of licensed London taxis and private hire vehicles and drivers, 2008/09-2018/19.



Source: Taxi and Private Hire, TfL Surface Transport.

Estimating the number of PHV trips and recent trends

The growth of the PHV market has been a significant factor affecting the level and composition of road traffic in London over recent years. These trips are not easily quantified by traditional surveys such as conventional manual classified traffic counts or LTDS, for a variety of reasons that are well understood. Consequently, it has been difficult to accurately quantify the number of PHV trips, for use in top-level estimates of travel demand and mode shares, or to understand the impact of recent changes to the PHV market in London. However, new camera-based data and a new behavioural survey of PHV users are providing new insights into the

scale and nature of this important market. This section reviews several insights provided by these new data sources.

Prevalence of PHVs in general road traffic

Travel in London report 9 revealed data from specialist surveys of the traffic composition in the central London Congestion Charge zone undertaken during 2016 that suggested that the number of PHVs circulating in this area was much greater than had previously been appreciated.

It was shown that, during Congestion Charge hours on a typical spring 2016 weekday, PHVs comprised 40 per cent of vehicles that would (in conventional manual classified traffic counts) be classified as 'cars', accounting for a corresponding 12 per cent share of total motorised traffic in the zone.

As well as being substantial in their own right, these figures needed to be seen in the context of general trends in traffic volumes in central London, which have consistently trended downwards for many years (see figures 9.1, 9.2 and 9.5). The combination of these factors suggested that there had been a large-scale 'substitution' of private car trips by PHV (car) trips, with a rapid decline in private car trips, and a corresponding, although not necessarily directly related, growth in PHV trips. Although overall traffic volumes are the primary determinant of congestion levels, the conclusion was nevertheless that levels of congestion and delay in the Congestion Charge zone would otherwise have been substantially lower, had this segment of the market not grown so substantially.

New camera-based data is now available that extends the capability to estimate the prevalence of PHVs in traffic across the whole of Greater London. Table 9.3 shows data from March 2019, based on this source. The values are averages across all hours of the week and show the proportion of total motorised traffic, and the proportion of vehicles with body type 'car', identified as PHVs. They pre-date the removal of the Congestion Charge exemption for PHVs, effective from April 2019.

Table 9.3 Proportion of traffic (nominal vehicle kilometres) accounted for by private hire vehicles, daily average in March 2019.

PHV share of traffic (unweighted)	All motorised modes	Cars
Central	29%	47%
Inner	19%	26%
Outer	8%	9%

Source: Strategic Analysis, TfL City Planning.

The values for central London (Congestion Charge zone), at 47 per cent of cars, broadly corroborate data from the 2016 survey. What is new, however, is the relatively large values for inner and outer London (26 and 9 per cent of cars identified as being PHVs respectively).

This is the first time that estimates have been available for these areas and, while the proportions are rather lower than those in the charging zone, which accounts for just 3 per cent of total motorised traffic in London, they are nevertheless substantial in their own right and apply to the remaining 27 and 70 per cent of motorised traffic in inner and outer London respectively. Across the whole of Greater London, according to these numbers, PHVs account for 11 per cent of all

motorised vehicle kilometres, and 15 per cent of all kilometres undertaken by vehicles with body type car.

The data available still has some limitations. They do not, for example, translate readily to estimates of trips, or permit a historic comparison of how these trends have developed over time. Nevertheless, the magnitude of their contribution to total traffic and congestion, and the potential impact of their growth on patronage trends on other modes, and the Mayor's aim for an 80 per cent share for active, efficient and sustainable modes by 2041 more generally, are increasingly significant factors for TfL's overall planning.

Impact of the removal of the exemption from the Congestion Charge for private hire vehicles

On 8 April 2019, PHVs ceased to be eligible for the exemption from the Congestion Charge, which had applied since the original scheme was introduced in 2003. This change occurred at the same time as the introduction of the Ultra Low Emission Zone (see also section 10.1 of this report). Because of these exogenous factors affecting traffic levels in and around central London, it is not yet possible to give a robust quantitative assessment of the impact of the exemption removal on PHV activity within the charging zone. Initial indications however are that the number of unique PHVs circulating within the zone has reduced broadly in line with the published expectations, which were for a reduction of up to 45 per cent in unique PHVs entering the zone, translating to an average reduction of about 1 per cent in total circulating motorised traffic.

9.8 Motorised traffic: understanding the nature of the market for private hire vehicles in London

Background

The private hire vehicle (PHV) industry in London has changed significantly in recent years, with the emergence of new, technology-enabled business models, leading to increased supply in the market, increased customer usage and increasing numbers of PHVs on the roads. New business models are targeting specific markets, often those less well served by established modes, such as homeward trips late at night. Increasing presence in traffic is also contributing to overall congestion, particularly in central London.

Their success demonstrates that they offer an attractive mode for certain types of trip, at certain times, and for certain segments of the market. The rapidity of recent change, and the potential continuing role of technology in enabling new and attractive models of mobility, particularly forms of 'mobility on demand', exemplified by app-based PHV ride hailing, mean that better understanding these trends, and gauging likely future ones, is of key interest for our medium-term planning.

This section highlights some findings from a survey of PHV users undertaken in London in November 2018, among 2,113 Londoners, a sample designed to be broadly representative of London residents (not only people who use PHVs). The objective of the survey was to characterise the 'market' of PHV users, in terms of their socio-demographic characteristics, the extent and nature of PHV usage, and the factors that motivate their travel behaviour.

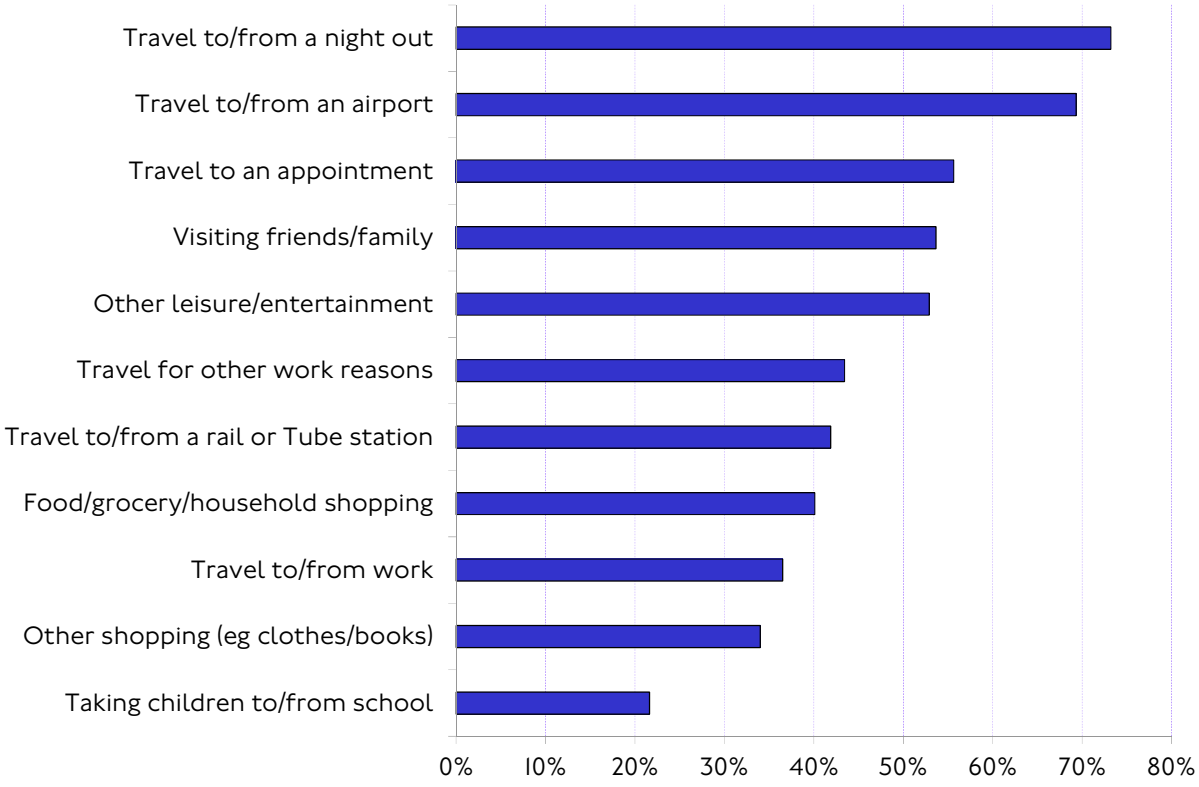
Characterising PHV users

Some 85 per cent of respondents reported using a PHV at least once within the last year. PHVs are typically used alongside other modes as part of a normal daily travel itinerary, yet they are used particularly frequently for trips with particular characteristics that are planned (eg to/from an airport), or for more spontaneous trips in certain circumstances poorly served by established modes (eg homeward from a night out). Demographically, more frequent PHV use was found among younger people in inner London. Non-PHV users tended to be older and live in outer London. Non-users cite cost as a major disincentive and, as a group, considered themselves unlikely to change their level of PHV usage in future. This duality is illustrated by half of Londoners spending less than £25 per month on PHVs; however some 13 per cent spend in excess of £100 per month.

Characterising PHV trips

Overall, people's travel to or from a night out and to or from an airport were the most frequent trip purposes, with around 70 per cent of people using a PHV in the last year having made one of these trips. While 'night out' trips tended to be spontaneous, trips to the airport were almost always planned, demonstrating two 'niche' markets to which the PHV offer is well suited (figure 9.19).

Figure 9.19 Relative incidence of PHV trip purposes across all respondents.



Source: Strategic Analysis, TfL City Planning.

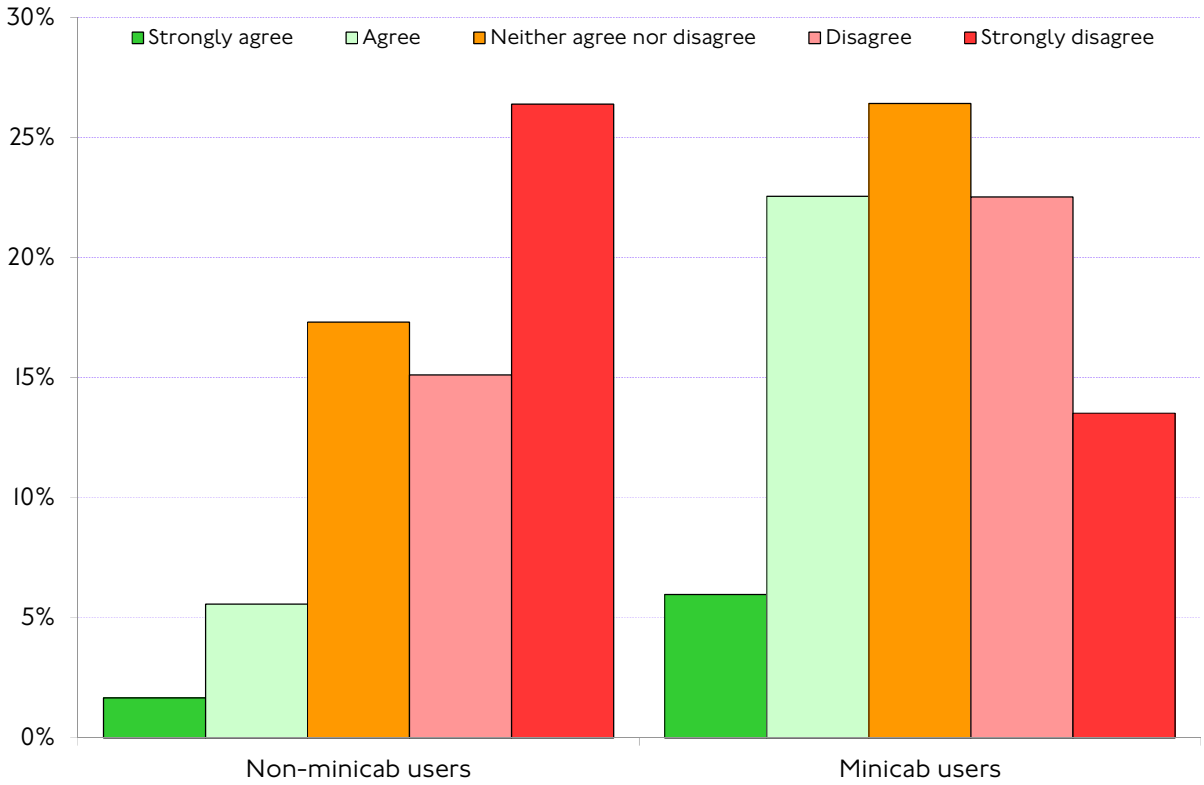
Interaction with other modes

Only 28 per cent of 'trips' (in terms of an itinerary) that used a PHV were made by PHV for both the outward and return legs. This illustrates that, for the large majority of such itineraries, PHVs are not used in isolation. Trips to or from an airport are an example where PHVs would typically be used for both outward and return legs. However, trips in conjunction with a night out were more likely to be

one-way by PHV only. For other trips, the individual typically has several options from which to choose, which are used interchangeably, and of which PHV is attractive over other modes in certain circumstances. Some 75 per cent of PHV users said that they sometimes use a PHV to make a particular trip and other times they use another mode, or that they use PHVs in combination with other modes. Some 40 per cent of PHV trips are to or from a rail or Underground station, demonstrating this interaction with other modes.

A proposition explored by the survey was that 'the availability of minicabs means I no longer need a car'. Of respondents who had used a minicab at least once, some 29 per cent agreed, while 36 per cent disagreed. Figure 9.20 shows how agreement with the proposition varies between PHV users and respondents who had not used a PHV.

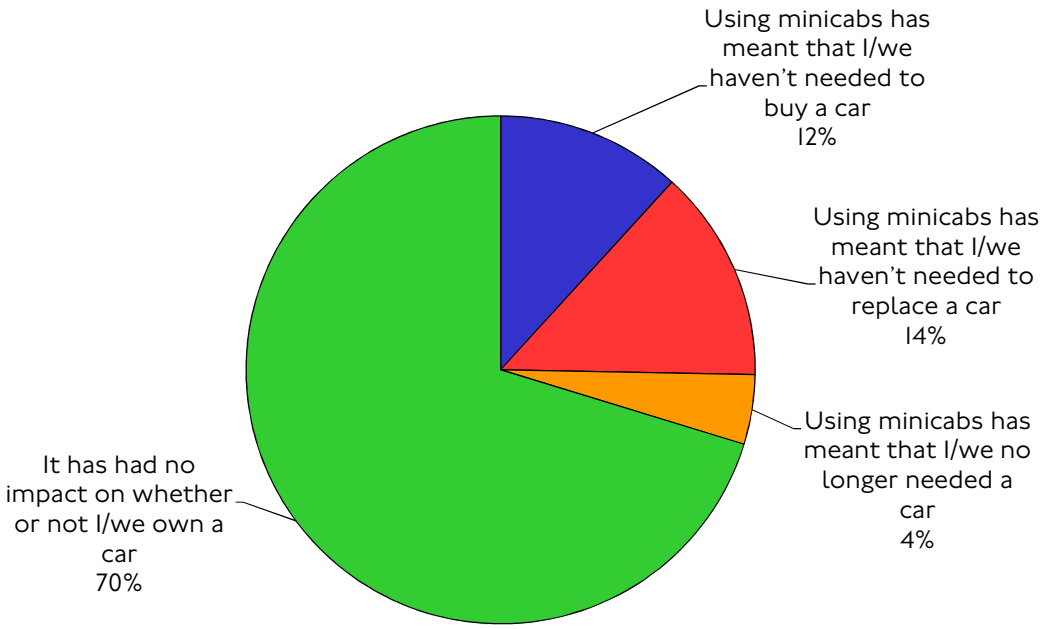
Figure 9.20 Agreement that the availability of minicabs means respondents no longer need a car.



Source: Strategic Analysis, TfL City Planning.

When asked specifically about the kind of impact of minicab availability on car ownership, 30 per cent of PHV users say they have not needed to buy, replace or have a car as shown in figure 9.21. This means that 70 percent of minicab users do not believe that the availability of minicabs would enable them to reduce their car ownership.

Figure 9.21 Impact of minicab availability on car ownership for PHV users.



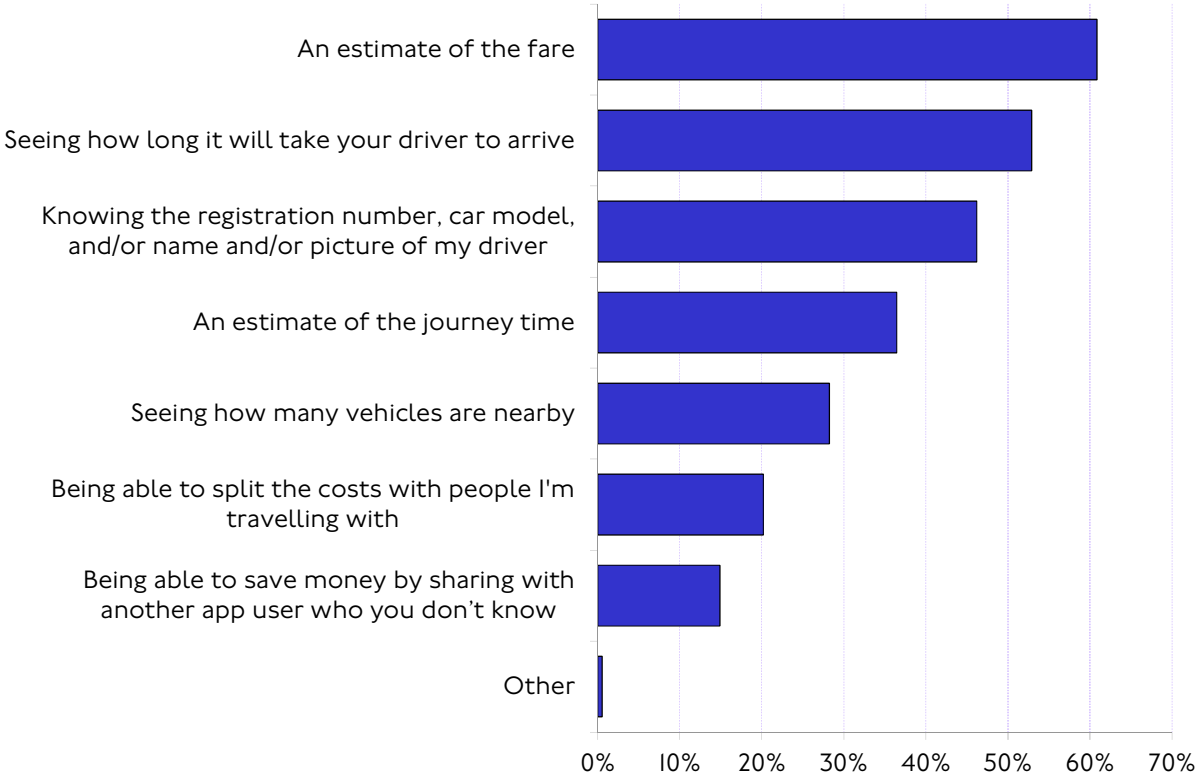
Source: Strategic Analysis, TfL City Planning.

Technology enablement

Of the 85 per cent of Londoners reporting at least one incidence of PHV use within the last year, 'traditional' telephone bookings were used (at least once) by 89 per cent of this sub-sample, while 73 per cent used an app. While both methods are therefore commonly used, and used interchangeably by individuals, app bookers tend to be the more frequent PHV users. Of these, 11 per cent book using app only, 27 per cent use traditional booking methods (such as attending an office or placing a booking by telephone) and 62 per cent use a mixture of both.

Figure 9.22 shows the features of app-based hire that users found most useful. The ability to get an advance estimate of the fare and the likely interval before the vehicle arrived were most popular, yet arguably common to the public transport offering, but other elements, such as those relating to personal security and ability to split the cost with other users, are unique to PHVs.

Figure 9.22 Relative incidence of stated 'best' features of an app-based hire.



Source: Strategic Analysis, TfL City Planning.

10. Cleaner air and climate change

10.1 The Ultra Low Emission Zone in central London

On 8 April 2019 the Mayor launched the world's first Ultra Low Emission Zone. Six months on, our data indicates the scheme is having a significant effect – although further data will be needed to fully assess the impact of the scheme.

What is the Ultra Low Emission Zone (ULEZ)?

The central London ULEZ started on 8 April 2019 and operates in the existing central London Congestion Charge zone. Unlike the Congestion Charge (which operates Monday to Friday between 07:00 and 18:00) the ULEZ operates 24 hours a day, every day of the year. Vehicles must meet strict emission standards to drive in the ULEZ area:

- Euro 4 for petrol cars and vans (less than 14 years old in 2019).
- Euro 6 for diesel cars (less than five years old in 2019).
- Euro 6 for diesel vans (less than four years old in 2019).
- Euro 3 for motorcycles and other L-category vehicles.
- Euro VI for lorries, buses and coaches.

Vehicles that do not meet these standards must pay a charge:

- £12.50 per day for cars, motorcycles and vans.
- £100 per day for lorries, buses and coaches.

All TfL buses operating in the charging zone meet the ULEZ standards. The ULEZ replaces the T-Charge in central London and is in addition to the Congestion Charge. Alongside the ULEZ, the private hire vehicle exemption to the Congestion Charge was removed on 8 April 2019.

This section reviews trends covering: February 2017 (when the Mayor announced the T-charge and the accelerated change in the vehicle fleet began), March 2019 (the month before the scheme was introduced) and April to September 2019 (the first six months of the operation of the scheme).

Key findings from the first six months of operation:

- After the first six months of operation the average compliance rate with the ULEZ standards was 77 per cent in a 24-hour period, and 74 per cent in Congestion Charge hours. This is significantly higher than 39 per cent in February 2017 and 61 per cent in March 2019 during Congestion Charge hours.
- Between February 2017 and September 2019, there has been a 32 micrograms per cubic metre ($\mu g.m^{-3}$) reduction in roadside concentrations of nitrogen dioxide (NO_2) in the zone, a reduction of 36 per cent.
- Trend analysis shows that NO_2 concentrations at roadside locations in central London are on average 24 micrograms per cubic metre ($\mu g.m^{-3}$) lower, equating to a reduction of 29 per cent compared to equivalent conditions where there was no ULEZ.
- Preliminary estimates indicate that, after six months, NO_x emissions from road transport in the Congestion Charge zone have reduced by 31 per cent (200 tonnes) compared to equivalent conditions where there was no ULEZ. This is

ahead of schedule to meet the 45 per cent NO_x emission reduction expected in the first year.
- Preliminary estimates indicate that, after six months, CO_2 emissions from road transport in the Congestion Charge zone have reduced by 4 per cent (9,800 tonnes) compared to a scenario where there was no ULEZ.
- Air quality monitoring stations located on ULEZ boundary roads have also shown decreases in NO_2 concentrations since the introduction of the scheme.
- Preliminary analysis of traffic flows indicates that the introduction of the central London ULEZ has contributed to an observed reduction in traffic flows in central London from May to September 2019 of between 3 and 9 per cent when compared to 2018, although further analysis is needed to better understand long-term complex changes in traffic flows as result of ULEZ.
- From March to September 2019 there was a large reduction in the number of older, more polluting, non-compliant vehicles detected in the zone: some 13,500 fewer on an average day, a reduction of 38 per cent. This is higher than the 9,400 vehicle reduction reported after one month and the 12,500 vehicle reduction after four months.
- There was a 34 per cent decrease in the proportion of vehicles in the Congestion Charge zone that were non-compliant with the ULEZ standards from March 2019 to September 2019.

To fully understand the impact of the scheme it is necessary to take into account pre-compliance (ie people and businesses preparing ahead of time for the start of the new scheme). With this in mind, the changes between February 2017 and September 2019 were as follows:

- There was a large reduction in the number of older, more polluting, non-compliant vehicles detected in the zone: a reduction of 40,200 vehicles on an average day, equating to a 65 per cent reduction.
- There was an 89 per cent increase in the proportion of vehicles detected in the central zone that were compliant from February 2017 to September 2019.

Methodology for assessing the impacts of the ULEZ

The purpose of the ULEZ is to improve air quality in and around central London by reducing the number of older more polluting vehicles that enter the Congestion Charge zone. We assess the impacts of ULEZ using a number of different metrics including:

- Air quality monitoring
- Modelling of vehicle emissions
- Number of vehicles and compliance rates
- Traffic flow data

Air pollution concentrations are affected by many different factors including the weather and regional contributions from outside London, as well as impacts from other local schemes, therefore analysis of air quality monitoring will need to continue over a longer period of time to obtain a more definitive assessment of impacts.

At present we can report the reduction in air pollution concentration at locations that have air quality monitoring stations. In 2020 (once the ULEZ has been in

operation for a full year) an air quality model of concentrations across London will be produced, based on observed data. This will enable further assessments of the improvements in air quality as a result of the scheme at all locations across London.

Vehicle compliance refers to the number of vehicles that 'comply' or meet the ULEZ emission standards. Non-compliant vehicles do not meet the strict ULEZ emissions standards and have either:

- Paid the daily charge
- Incurred a penalty charge
- Not been required to pay the daily ULEZ charge as they are eligible for a 100 per cent discount or exemption

Limitations of this analysis

To assess the impact of the scheme we have compared the number of vehicles detected in the zone and compliance rates from February 2017 and from March to September 2019. In February 2017 the Mayor confirmed the introduction of the T-charge as a stepping stone for the ULEZ and this can be seen as the start of the accelerated change in the vehicle fleet as Londoners and businesses prepared for the new schemes. In addition, the removal of the exemption from the Congestion Charge for private hire vehicles also commenced on 8 April 2019. March 2019 was the month before the ULEZ was introduced and September 2019 is the latest available full month of data.

The ULEZ is a 24-hour scheme; however, historic data was collected during Congestion Charge hours only (07:00 to 18:00, Monday to Friday). When assessing the impact of the first six months of ULEZ compared to historic months, comparison has been made based on Congestion Charge hours to ensure the comparison is fair. 24-hour data for the months since the scheme has been in operation is also available.

The removal of the exemption from the Congestion Charge for private hire vehicles coincided with the launch of the ULEZ. This may also have had an effect on traffic volumes and air quality within the zone, but it is too early at this stage to separate the respective effects.

Disruptions to traffic flow in the central zone in April 2019

There were a number of non-typical events in central London in April 2019, affecting comparisons in the early weeks of the scheme. These included:

- Road works (leading to signed diversions into the ULEZ).
- The Extinction Rebellion climate protests, leading to further diversions into the central zone and an unknown impact on the number of motorists choosing to drive in central London.
- Easter holidays and bank holidays. The timing of the introduction of ULEZ was specifically chosen to target a 'quiet' week when there would be fewer vehicles in the zone.

As a result, a limited number of days were used for analysis of the first month of the scheme. Data for April 2019 presented in this report is the average over 'typical

days' only. However, using only typical days exclusively in the month of April has little effect on the results.

Unique vehicles detected in the charging zone and relation to traffic flow

Vehicle volumes relate to the daily number of confirmed unique vehicles detected in the Congestion Charge zone. Unique vehicle volumes will be different in scale to changes in traffic volumes entering or within central London for a number of reasons:

- Unique vehicle volumes do not take into account how a vehicle is used. For example, a proportion of traffic is associated with a minority of vehicles that make multiple trips a day within the charging zone, eg delivery vehicles, private hire vehicles and taxis.
- Trips made wholly within the charging zone are currently less likely to be captured by our monitoring than trips crossing the boundary (for which all entry and exit points are monitored). There is currently less incentive for internal trips to change as local residents have a 100 per cent ULEZ discount grace period until 24 October 2021.
- Analysis of changes in traffic data based on automatic traffic count sites in London is compared to the same months in the previous year, to minimise seasonal effects. However, traffic volumes do exhibit seasonal variation, and further analysis will be undertaken once a full year of traffic data is available.

Concentrations of pollutants in the atmosphere

Reducing the number of older, more polluting vehicles that enter the Congestion Charge zone will reduce the amount of NO_x emissions emitted, which in turn will reduce nitrogen dioxide (NO_2) concentrations in the charging zone. Around half of London's NO_x emissions are from road transport sources and bringing London closer to compliance with the legal air quality limit values for NO_2 is a key aim of the scheme.

This section uses data from London's automatic monitoring network. This data is publicly available from the London Air Quality Network (www.londonair.org.uk/) and Air Quality England (www.airqualityengland.co.uk/) websites.

Air quality monitoring stations are grouped by site type. This analysis focuses on the two most common types of site in London; roadside and urban background.

Roadside sites are located within 1-5 metres of a busy road and usually located at breathing height. These sites give the best estimate of public exposure on busy roads. Roadside sites are useful for identifying potential health hazards from traffic hotspots, especially those frequented by large numbers of pedestrians.

Urban background sites are located further away from sources of emissions. The benefit of urban background sites is that they are usually representative of all the other urban background locations within an area of several square kilometres.

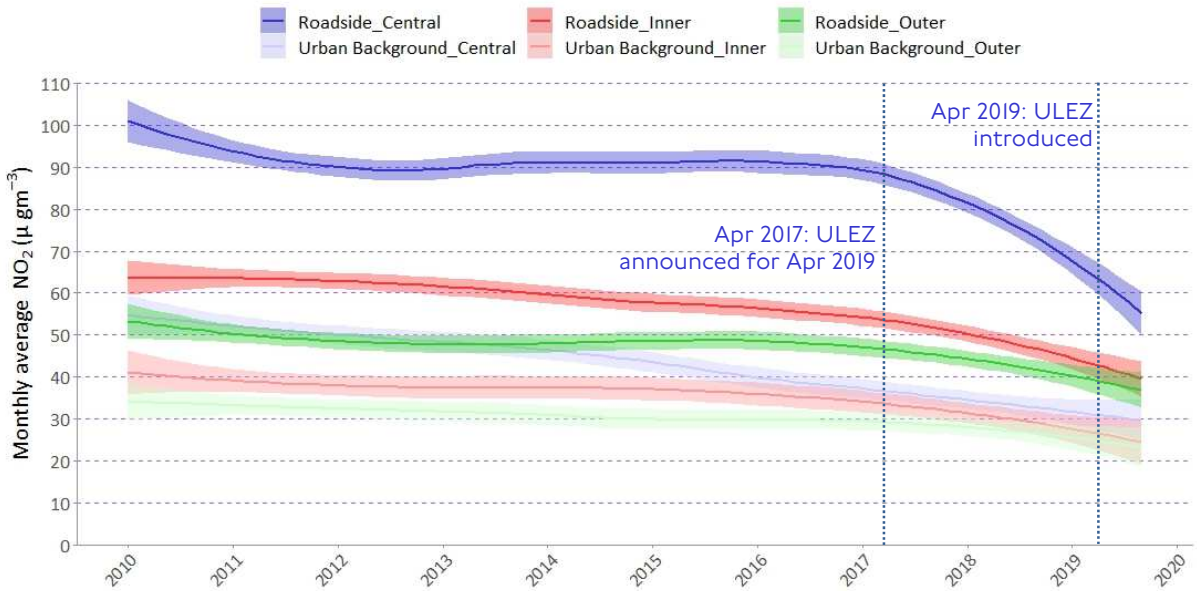
Air pollution concentrations are highly sensitive to the prevailing meteorology, such as wind speed, wind direction, precipitation and temperature, as well as the associated long-range transport of pollutants from outside London. To account for this, when assessing trends in air pollution, it is important to assess over a sufficiently long time period and to use statistics to create trend curves to smooth out short-term variability. In this section monthly average concentrations

are used to calculate trends in concentration in the period from 2010 to the end of September 2019.

Impacts: Trends in Nitrogen Dioxide (NO_2)

Figure 10.1 shows the trends in nitrogen dioxide (NO_2) at monitoring sites in London from 2010 to 2019. The graph shows the monthly average NO_2 concentration grouped by site type and location.

Figure 10.1 Trends in NO_2 at selected groupings of ambient monitoring sites in London, 2010-2019.



Source: Strategic Analysis, TfL City Planning.

There was a slight downward trend in concentrations of NO_2 at monitoring sites across London between 2010 and 2016, most likely reflecting natural turnover of vehicles in the passenger fleet as well as slow 'background' traffic reduction in central London. At central London roadside locations (darker blue line), an accelerated reduction in NO_2 begins in 2017, becoming a steeper downward curve from 2018 to 2019. A similar, although less pronounced trend also occurs in inner London roadside locations (darker red line). This change in trend is in line with when Londoners began to prepare for the ULEZ and buses in central London began to be upgraded to become ULEZ compliant.

Modelling produced before the scheme forecast that it would reduce concentrations of NO_2 across London, with the greatest reductions in central London and more modest reductions in inner London. The trends in figure 10.2 indicate that this has been the case.

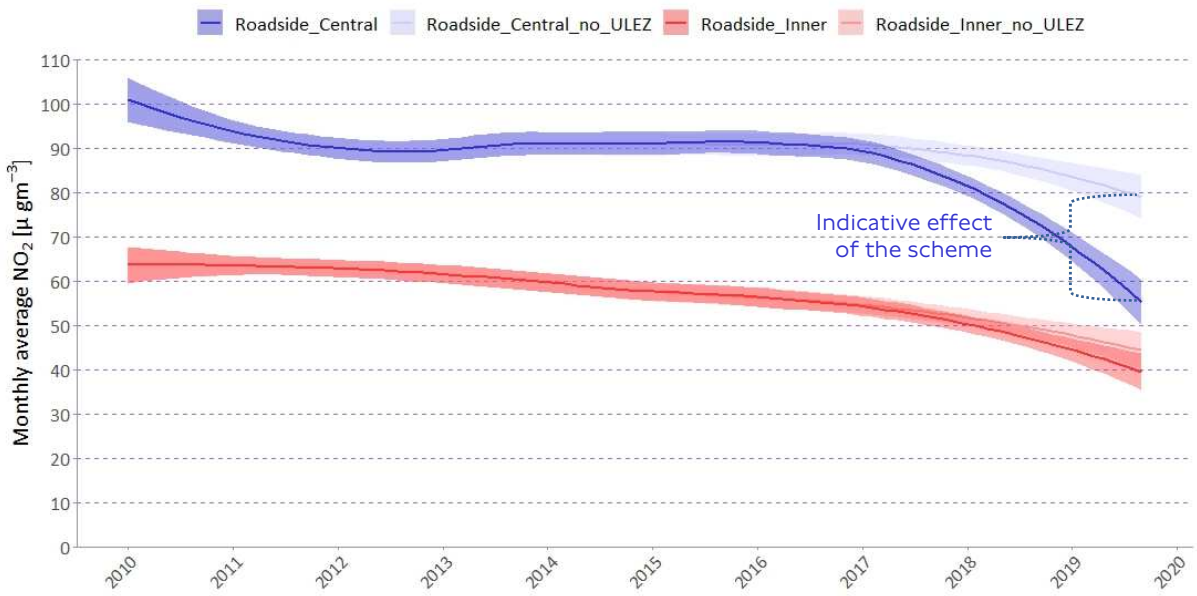
Reduction attributable to the central London ULEZ

Air pollution is influenced by many complex factors. It is therefore important to perform additional analysis to ensure the trends reported above were not a product of natural variability and to quantify the proportion of the recent reduction in NO_2 concentrations that can be provisionally attributed to the central London ULEZ.

A technique often used to isolate the proportion of pollution that relates to traffic sources is to subtract the background concentration from the roadside concentration. This is referred to as the 'roadside increment'. This technique has been used to create a hypothetical 'no ULEZ' scenario for roadside sites in central and inner London (figure 10.2). This can be compared to the actual measured concentrations and the difference between the two can be considered to be the change attributable to ULEZ.

Cleaner vehicles travel more widely throughout inner and outer London, so the scheme also has a beneficial impact in these areas. The difference in central London is clearly much greater than inner London, indicating that the change here was of a much greater magnitude than that which would be due to the natural replacement (turnover) of the vehicle fleet.

Figure 10.2 Comparison of 'business as usual' trends in NO_2 concentrations with observed concentrations in central and inner London, 2010-2019.



Source: Strategic Analysis, TfL City Planning.

Table 10.1 shows the difference between actual roadside measurements and the hypothetical scenario where there was no ULEZ in place over three-month periods in 2019. This can be understood as the reduction at central and inner London sites that is in addition to the changes measured at outer London roadside sites, which are considered to be representative of the effect of the natural replacement of the vehicle fleet.

In July to September 2019, the most recent period for which data is available, the ULEZ reduced NO_2 concentrations at roadside sites by 23 $\mu g.m^{-3}$, a reduction of 29 per cent compared to equivalent conditions where no ULEZ is in place. A smaller reduction of 10 per cent was measured at roadside sites in inner London.

Table 10.1 Reduction in NO_2 concentrations provisionally attributable to ULEZ, compared to business as usual, 2019.

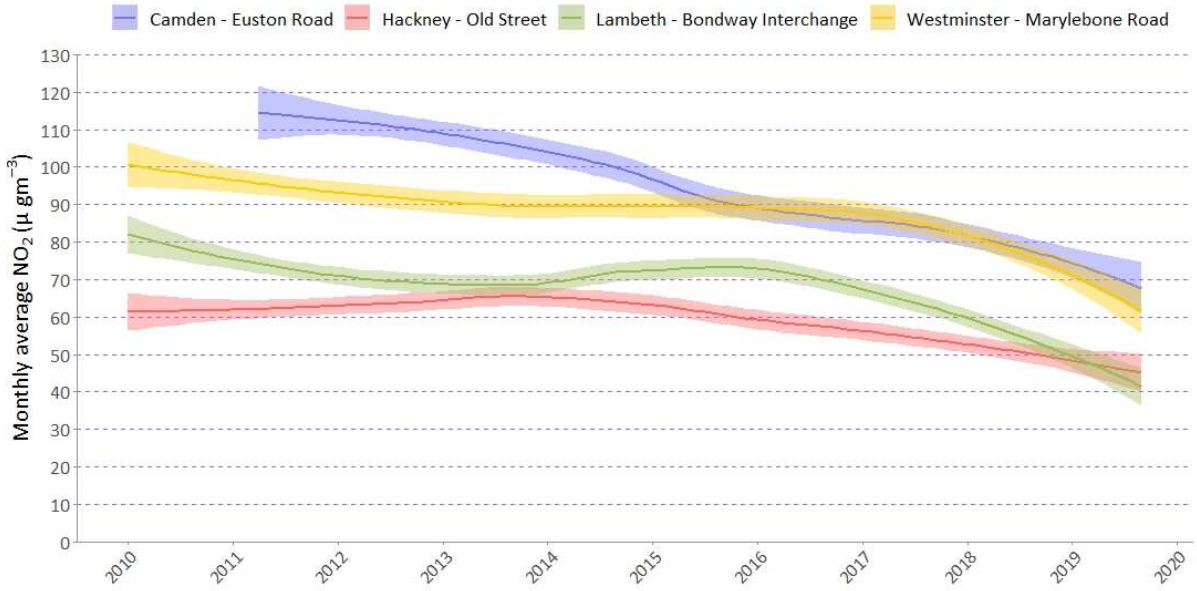
	Central London reductions		Inner London reductions	
Period	**Absolute (µg.m^{-3})**	**Relative (%)**	**Absolute (µg.m^{-3})**	**Relative (%)**
Jan – Mar 2019	17	20	3	7
Apr – Jun 2019	20	24	4	9
Jul – Sep 2019	23	29	5	10

Source: Strategic Analysis, TfL City Planning.

Trends in Nitrogen Dioxide on boundary roads

When charging schemes, such as the ULEZ or Congestion Charge, are introduced in part of a city it is always important to measure the impact of the scheme not only in the charging zone itself but also in the surrounding area.

Figure 10.3 Trends in NO_2 on ULEZ boundary roads, 2010-2019.



Source: Strategic Analysis, TfL City Planning.

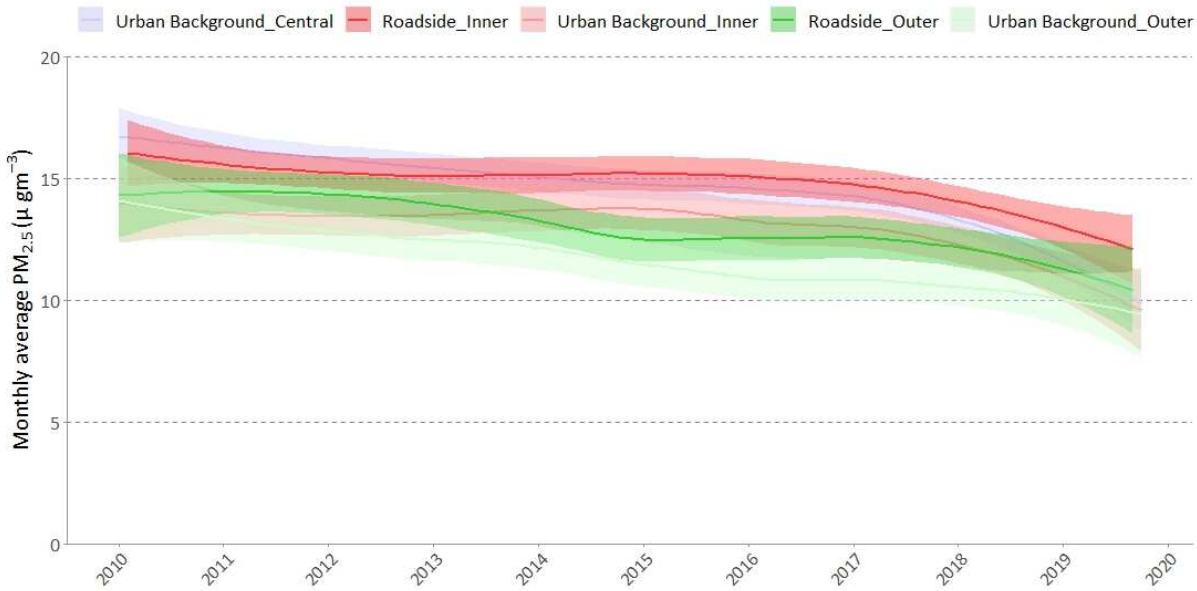
The trends shown in figure 10.3 are a strong indication that there has been a positive impact on air pollution on the ULEZ boundary roads. A full picture of the impact on boundary roads will be available in 2020 (once data is available after the ULEZ has been in operation for a full year) when an air quality model of concentrations across London will be produced.

Trends in particulate matter ($PM_{2.5}$)

Road transport is the largest single source of particulate matter in London, accounting for around 30 per cent of emissions. However, unlike NO_2, over half of London's concentrations of $PM_{2.5}$ come from regional, and often transboundary (non-UK), sources outside of London. There is also a large proportion of $PM_{2.5}$ emitted within London that the Mayor does not currently have the powers to mitigate, for example, from wood burning. In addition, a growing proportion of road transport $PM_{2.5}$ emissions are now non-exhaust emissions including road wear, resuspension of particles and tyre and brake wear.

For these reasons, the ULEZ would be expected to have a less pronounced impact on $PM_{2.5}$ concentrations than seen for NO_2. Figure 10.4, which draws on data from the relatively small number of $PM_{2.5}$ monitoring sites across London, shows there has been a downward trend in $PM_{2.5}$ since 2010 which continued after the introduction of the ULEZ. It is not yet possible however to identify a clear ULEZ impact in these trends.

Figure 10.4 Trends in $PM_{2.5}$ in London, 2010-2019.



Source: Strategic Analysis, TfL City Planning.

Estimating emissions

Emissions from road transport have been modelled to estimate how NO_x emissions from vehicles have changed since the ULEZ was introduced. Emissions reductions are calculated using current compliance rates compared to a 'no ULEZ' scenario for the period July to September in 2019.

Table 10.2 Estimated reductions in emissions attributable to the ULEZ, compared to 'no ULEZ' scenario, central London only, Jul-Sep 2019.

Pollutant	Absolute reduction (tonnes)	Relative reduction (%)
NO_x	200	31%
$PM_{2.5}$	5	13%
CO_2	9,800	4%

Source: Strategic Analysis, TfL City Planning.

Preliminary estimates indicate that, between July and September 2019 NO_x emissions from road transport reduced by 31 per cent (or 200 tonnes of NO_x) compared to a scenario where there was no ULEZ. Modelling done by TfL as part of the ULEZ consultation process forecast that by the end of the first year of the scheme ULEZ would result in a 45 per cent reduction in NO_x emissions from road transport in the central zone. After only six months, two-thirds of the expected emissions reductions in the first year have already been delivered.

Similarly, it has been estimated that between July and September 2019 $PM_{2.5}$ emissions from road transport reduced by 5 tonnes, a reduction of 13 per cent compared to a 'no ULEZ' scenario.

CO_2 emissions are estimated to have reduced by 9,800 tonnes, a reduction of 4 per cent compared to a scenario with no ULEZ in place. CO_2 emissions are also more sensitive to changes in vehicle kilometres due to the dependence on fuel use.

In addition, there will have been reductions in emissions outside of the ULEZ zone, as cleaner vehicles travel more widely.

Traffic flows

TfL uses automatic traffic count data at representative sites across London to monitor changes in traffic flows. These sites provide total traffic flows (all vehicles) for each hour of the day. The sites are averaged over each month to allow estimates of changes in traffic flows in central, inner and outer London to be determined (table 10.3).

Table 10.3 Change in average 24-hour traffic flow in London from 2018-2019.

2018 to 2019 change	All days of week			Weekdays			Weekends		
	Central	Inner	Outer	Central	Inner	Outer	Central	Inner	Outer
January	0%	-1%	2%	0%	-1%	2%	-1%	-1%	2%
February	0%	-1%	2%	0%	-1%	2%	0%	-2%	2%
March	2%	2%	4%	1%	2%	3%	4%	3%	6%
April	-2%	-2%	2%	-2%	-1%	2%	-3%	-2%	1%
May	-3%	-1%	1%	-2%	-2%	1%	-6%	0%	1%
June	-5%	0%	0%	-5%	0%	0%	-6%	1%	0%
July	-5%	-1%	-	-5%	-2%	-	-5%	0%	-
August	-8%	-4%	-	-7%	-4%	-	-9%	-3%	-
September	-9%	-2%	-	-9%	-2%	-	-11%	-1%	-

Source: Strategic Analysis, TfL City Planning.

Traffic flows change across the year reflecting seasonal patterns such as holiday periods. Therefore, the best way to evaluate a change in traffic flow is to compare against the same period in previous years. In table 10.3, monthly data for 2019 has been compared to 2018 and the percentage change in average flows calculated.

The table shows that in early 2019 there was very little change in average traffic flows in central and inner London when compared to 2018, while there was around 2 per cent increase in outer London. Traffic in inner and outer London between April and July varied by up to 2 per cent compared to the same months in 2018. However, after March, reductions in average traffic flows of around 2 to 9 per cent are reported in central London when compared to the previous year. Similar estimates have been seen across weekdays and weekends.

This is an indication that the introduction of the ULEZ is contributing to reducing traffic flows in central London. However, it is too soon to fully attribute these changes solely to ULEZ, as more data is required for analysis over a longer period.

When comparing weekdays, a similar pattern is seen – whereby changes in central London in 2019 are greater than those for inner London. For weekends, the difference appears to be greater still. This is likely to reflect the fact that weekends are now subject to a potential charge for the first time, unlike the Congestion Charge which only applies on weekdays.

Analysis of changes in traffic flows across different times of the day shows similar trends to that seen for 24-hour data. However, the data suggests more substantial differences between 2018 and 2019 in the evening, late and night-time hours, which are hours where charges have not been applied before.

Traffic flow changes are still preliminary, and data will continue to be collected over the coming months in order to understand if trends are sustained and how these vary across the different times of day and weekends.

Trends in vehicle compliance with the requirements of the scheme over the first six months of operation

Table 10.4 compares vehicle numbers and compliance rates for the month immediately before the scheme was introduced (March 2019) and the scheme's first six months of operation. This excludes non-typical days for April 2019. The table captures the more immediate effects following the launch of the scheme and does not take into account those who changed their behaviour ahead of time in preparation of the scheme; this is captured in the pre-compliance data described below.

Table 10.4 Vehicles detected in the Congestion Charge zone during charging hours, Mar-Sep 2019.

	Number of vehicles per day			Proportion of vehicles per day	
Date	**Unique vehicles detected[1]**	**Non-compliant vehicles**	**Compliant vehicles**	**Non-compliant vehicles**	**Compliant vehicles**
Mar 2019	91,035	35,578	55,457	39.1%	60.9%
Apr 2019	89,380	26,195	63,185	29.3%	70.7%
May 2019	88,796	25,610	63,186	28.8%	71.2%
Jun 2019	87,113	24,549	62,564	28.2%	71.8%
Jul 2019	83,899	23,054	60,844	27.5%	72.5%
Aug 2019	80,128	21,133	58,994	26.4%	73.6%
Sep 2019	85,854	22,133	63,721	25.8%	74.2%
Change Mar-Sep 2019					
Absolute	-5,181	-13,445	+8,264	-13.3 pp[2]	+13.3 pp
Relative	-5.7%	-37.8%	14.9%	-	-

Source: Strategic Analysis, TfL City Planning.
1: Not representative of traffic flow.
2: Percentage points.

Key impacts of the first few months of the scheme compared to March 2019 (the month before the scheme was implemented) are:

- In September 2019 the compliance rate with the ULEZ standards was around 74 per cent. This is much higher than the 39 per cent in February 2017 and 61 per cent in March 2019.

- From March to September 2019 there was a large reduction in the number of older, more polluting, non-compliant vehicles detected in the zone: some 13,450 fewer on an average day, a reduction of around 38 per cent.
- There was around a 34 per cent decrease in the proportion of vehicles in the charging zone that were non-compliant between March and September 2019.

'Pre compliance' and latest month: changes in vehicle numbers and compliance (February 2017-September 2019)

Table 10.5 shows the change in vehicle compliance from February 2017 to September 2019. This is presented as an absolute change in the number of vehicles detected, the change in the percentage of vehicles that are compliant, and also the change in the proportion of vehicles that are compliant.

Table 10.5 Vehicles detected in the Congestion Charge zone during charging hours, Feb 2017 to Sep 2019.

	Number of vehicles per day			Proportion of vehicles per day	
Date	**Unique vehicles detected[1]**	**Non-compliant vehicles**	**Compliant vehicles**	**Non-compliant vehicles**	**Compliant vehicles**
Feb 17	102,493	62,310	40,184	60.8%	39.2%
Sept 19	85,854	22,133	63,721	25.8%	74.2%
Change Feb 17–Sep 19					
Absolute	-16,639	-40,177	23,537	-35.0 pp[2]	+35.0 pp
Relative	-16.2%	-64.5%	58.6%	-57.6%	89.3%

Source: Strategic Analysis, TfL City Planning.
1: Not representative of traffic flow.
2: Percentage points.

Key findings for the first few months of the scheme compared to February 2017, taking pre-compliance into account, are that:

- From February 2017 to September 2019 there was a large reduction in the number of older, more polluting, non-compliant vehicles detected in the zone: some 40,180 fewer on an average day, a reduction of 65 per cent.
- There was an 89 per cent increase in the proportion of vehicles detected in the zone that met the ULEZ standards between February 2017 and September 2019. As mentioned previously, the proportion of vehicles that are compliant is the best way of comparing changes in the vehicle fleet, given the number of unique vehicles detected in the zone also changed over this period.

Comparison between Congestion Charge hours and 24-hour data

To ensure a fair comparison with historic data the previous section compares data for Congestion Charge hours only. Table 10.6 below includes vehicles numbers and compliance rates for Congestion Charge hours only and 24-hour average daily vehicles detected in the zone for September 2019.

Table 10.6 Vehicles in the Congestion Charge zone during charging hours and on the whole day, September 2019.

	Number of vehicles per day			Proportion of vehicles per day	
Time	Unique vehicles detected*	Non-compliant vehicles	Compliant vehicles	Non-compliant vehicles	Compliant vehicles
CC hours	85,854	22,133	63,721	25.8%	74.2%
24-hour	116,601	27,044	89,557	23.2%	76.8%

Source: Strategic Analysis, TfL City Planning.
**Not representative of traffic flow.*

As was the case in the preceding months, the majority of unique vehicles detected in the zone (around three quarters) were detected during Congestion Charge hours. There was a slight increase in compliance rate between Congestion Charge hours and 24-hour data, this indicates that vehicles entering the zone in evening and weekends were less likely to be older more polluting vehicles.

Table 10.7 Vehicles in the Congestion Charge zone over a day, April–September 2019.

	Number of vehicles per day			Proportion of vehicles per day	
Time	Unique vehicles detected*	Non-compliant vehicles	Compliant vehicles	Non-compliant vehicles	Compliant vehicles
Apr 2019	121,664	32,137	89,527	26.4%	73.6%
May 2019	117,289	30,146	87,144	25.7%	74.3%
Jun 2019	118,021	29,434	88,588	24.9%	75.1%
Jul 2019	116,082	28,562	87,520	24.6%	75.4%
Aug 2019	108,932	25,802	83,130	23.7%	76.3%
Sep 2019	116,601	27,044	89,557	23.2%	76.8%

Source: Strategic Analysis, TfL City Planning.
**Not representative of traffic flow.*

Table 10.7 shows the number of unique vehicles detected in the charging zone and compliance rate for an average day (24 hours) from April to September 2019. For all months the 24-hour compliance rate was higher than the Congestion Charge hours compliance rate. Data before April 2019 was collected during Congestion Charge hours only and we are therefore unable to compare 24-hour data to a time before the ULEZ was introduced.

Charge payments and penalty charges

On an average day in September 2019, around 27,000 non-compliant, unique vehicles were detected in the charging zone (compared to 28,560 in July). Of these:

- Around 14,000 (52 per cent) paid the charge (3,490 ULEZ web or call centre payments, 6,790 Congestion Charge Auto Pay payments and 3,750 ULEZ fleet charge payments).
- Around 2,610 (10 per cent) were in contravention of the scheme and incurred a penalty charge.
- Around 10,410 (38 per cent) were not required to pay the daily ULEZ charge as they are eligible for a 100 per cent discount or exemption.

10.2 Climate change

Climate change and the impacts of it present significant challenges. The average temperature between 2009 and 2018 has been on average 0.3 °C warmer than the 1981-2010 average and 0.9 °C warmer than the 1961-1990 average. All of the top ten warmest years in the UK have occurred since 2002. Furthermore, our winters are becoming wetter, with more extreme weather events. Projections indicate, under a business as usual scenario, that summer temperatures could rise by between 3.7 °C and 6.8 °C by the 2070s, and that the sea level rise around the UK's coasts could be up to one metre.

In December 2018, the Mayor produced his Climate Action Plan. This will see London reduce its CO_2 equivalent emissions by 60 per cent on 1990 levels by 2030 and by nearly 80 per cent by 2040. London's zero carbon pathway sees its emissions reducing to almost 90 per cent below 1990 levels by 2050.

London's zero carbon trajectory

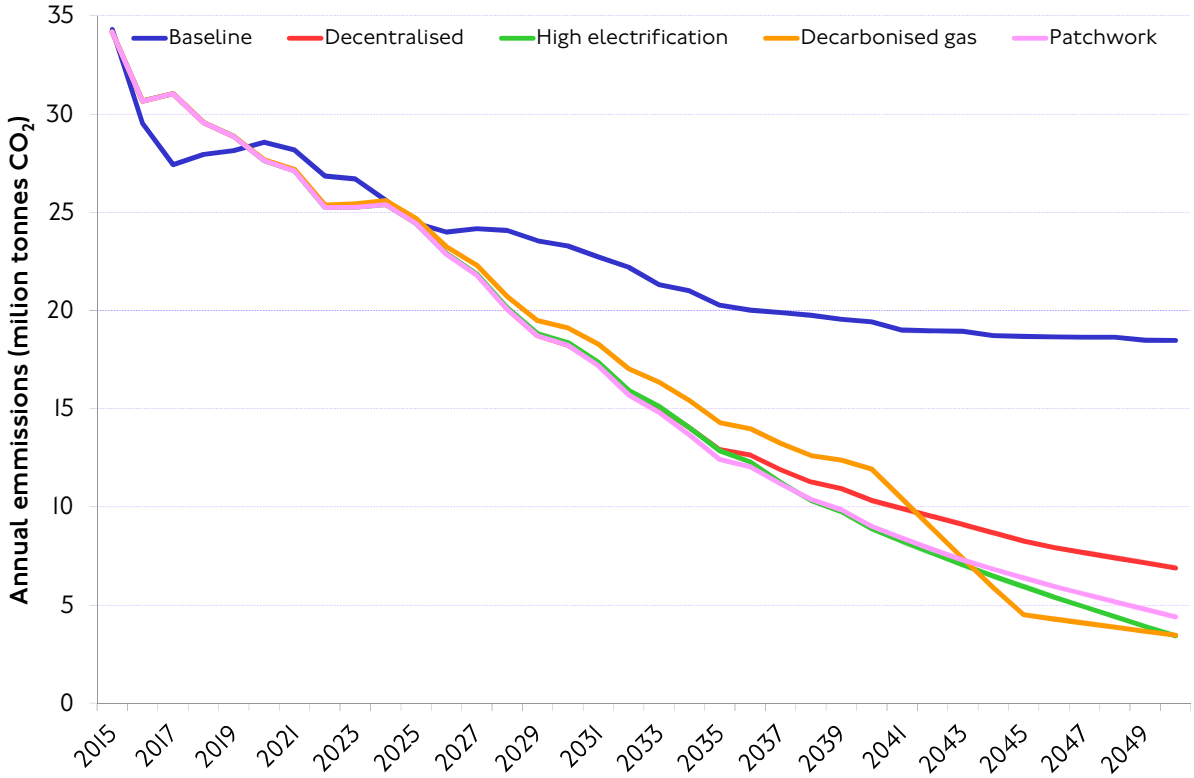
Reducing emissions to this level cannot be achieved through the Mayor's powers alone; it also requires actions by national Government. Approximately 35 per cent of emissions reductions could be achieved through existing national and city level policies. An additional 30 per cent reduction can be achieved through continued decarbonisation of the UK electricity grid, combined with actions at the UK level needed to achieve the UK's carbon budgets. The remaining 35 per cent of reductions would require additional actions at the city level, 25 per cent of which would require putting in new policies and enhancing existing policies and programmes for London. This would require additional funding for London from national government. This would leave 10 per cent of emissions that would need to be offset through the use of negative emissions technologies, such as carbon capture and storage.

As part of our aim to reach net zero, the GLA have adopted an approach of five-year carbon budgets from 2018-2032, in order to set London on the right pathway to achieving zero carbon by 2050. This requires us to reduce emissions by 60 per cent below 1990 levels by 2030 (for the period 2028-2032). We are currently on track to meet the first carbon budget for 2018-2022, provided the government forecasts for decarbonisation of the electricity grid (largely by generating more power from large-scale renewables like wind farms) are met.

Figure 10.5 shows future projections under a range of different technology scenarios, and compares them to a baseline scenario. These are:

- Decentralised energy – a focus on heat networks.
- High electrification – heat pumps dominate (electric heating).
- Decarbonised gas – hydrogen replaces gas in the gas grid (relies on carbon capture and storage).
- Patchwork – a combination of heat pumps, heat networks and a partial hydrogen network.

Figure 10.5 London's projected greenhouse gas emissions under different technology scenarios.



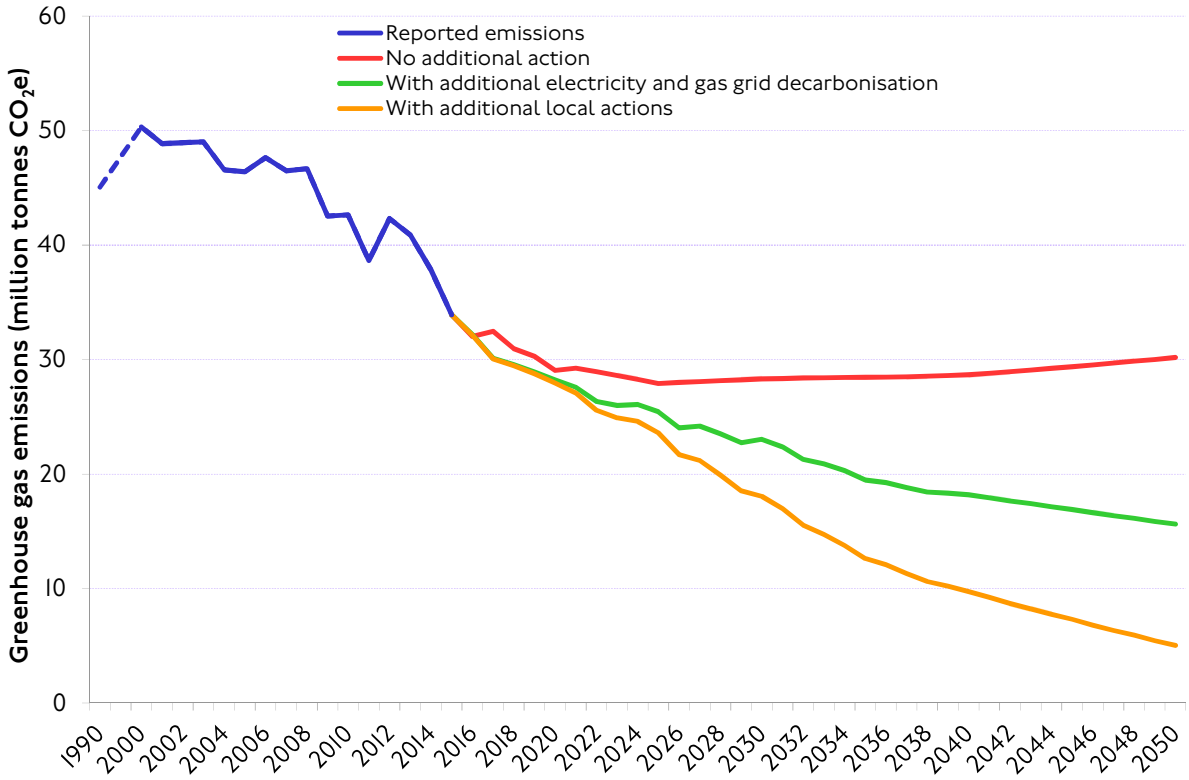
Source: Greater London Authority.

All four of these scenarios achieve deep decarbonisation but some have higher cumulative emissions and are more risky. For example, the decarbonised gas scenario relies on carbon capture and storage to enable high volumes of hydrogen to be made from natural gas. This has not yet been proven at scale and there are no firm plans to roll this out nationally. In contrast, the Patchwork scenario used in the 1.5C pathway is less risky because it relies on a mix of technologies.

We have explored several possible pathways for achieving net zero carbon by 2050. These rely on different technology and policy mixes and focus the policy efforts in distinct areas (eg district heating, heat pumps or full hydrogen grid conversion).

Significant carbon reductions have and will be achieved by electricity sector decarbonisation. However, greater action is needed to reach our carbon targets. With only the levels of grid electricity decarbonisation committed to in current national government policy, London's emissions will only be 35 per cent lower than 1990 levels by 2050. If government further decarbonised energy systems and buildings UK wide, we could reduce carbon by an extra 30 per cent. This is in line with current government policies and proposals to achieve UK carbon budgets. Figure 10.6 illustrates these trajectories.

Figure 10.6 London's greenhouse gas emissions trajectory to zero carbon.



Source: Greater London Authority.

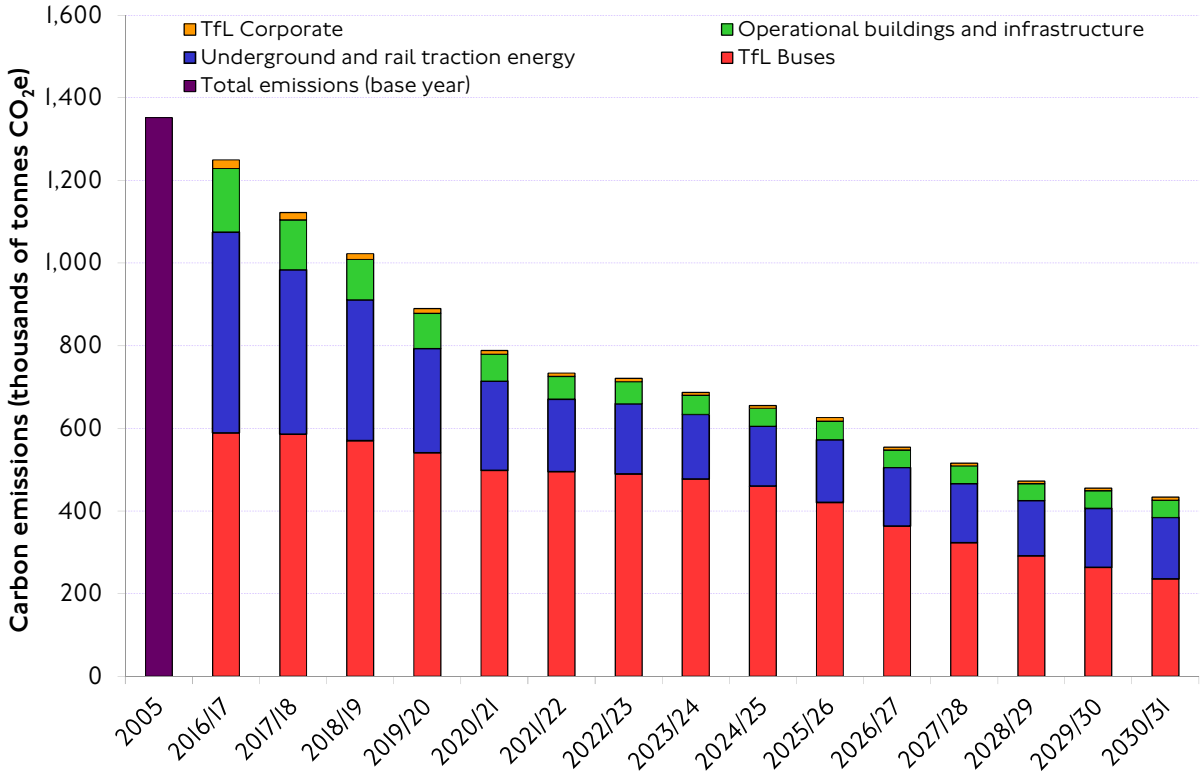
However, there are a series of short-term actions which London must meet during the 2020s regardless of any scenario, to support technologies at minimum levels present in all scenarios to be able to make a decision on the preferred scenario in the late 2020s. These include the following:

- Bringing 70 per cent of London's buildings up to at least an energy efficiency level of EPC C.
- Rollout of heat networks to an additional 70,000 homes by 2025.
- Deployment of heat pumps in more than 300,000 buildings by 2025.
- New build regulations mandating high energy efficiency and low carbon heating.
- Coordination of the deployment of charging infrastructure for electric vehicles.

Emissions from TfL's operations

Figure 10.7 shows the TfL-specific contribution to this aim through to 2030/31. Greenhouse gas emissions from TfL's operations have decreased since 2005, as reductions in the carbon intensity of the grid-supplied electricity has offset the expansion of TfL's rail services. Emissions are forecast to reduce further in the next ten years, driven primarily by the conversion of TfL buses to zero emission.

Figure 10.7 Trajectory for reductions in attributable CO_2 emissions for transport in London.



Source: Strategic Analysis, TfL City Planning.

Electrification of road vehicles is one important initiative. London has the largest electric bus fleet in Europe (210 buses), zero emission-capable taxis (2,600) and other electric vehicles such as private hire and vans already in use on London's roads, in greater numbers than any other UK city. Numbers of electric vehicles are increasing, with one in every 47 new cars registered in the UK now plug-in, and one in every 36 for London. London's Electric Vehicle Infrastructure Delivery Plan sets out how infrastructure will be provided and other conditions created to help achieve the goal of all cars and vans on London's roads being zero emission from 2030.

Section 3: A good public transport experience

11. Public transport: travel demand trends

11.1 Introduction

Chapter 2 of this report reviewed aggregate travel demand and mode share trends, including specific reference to public transport modes as a whole. Throughout the 2000s there was strong growth in London's population that drove increases in overall travel demand, with growth rates on public transport exceeding those of population growth. However, in the last few years there has been a slowdown in this historic trend, primarily reflecting wider demographic and economic trends. The latest year (2018/19), however, shows signs of recovery on some but not all public transport modes. These mode-specific demand trends are explored in more detail in this chapter.

Other chapters (chapters 12 and 13) in this section look at related aspects of the Mayor's aims in terms of a good public transport experience, considering, firstly, service delivery and operational performance, and, secondly, considerations of customer safety, accessibility, customer satisfaction and fares.

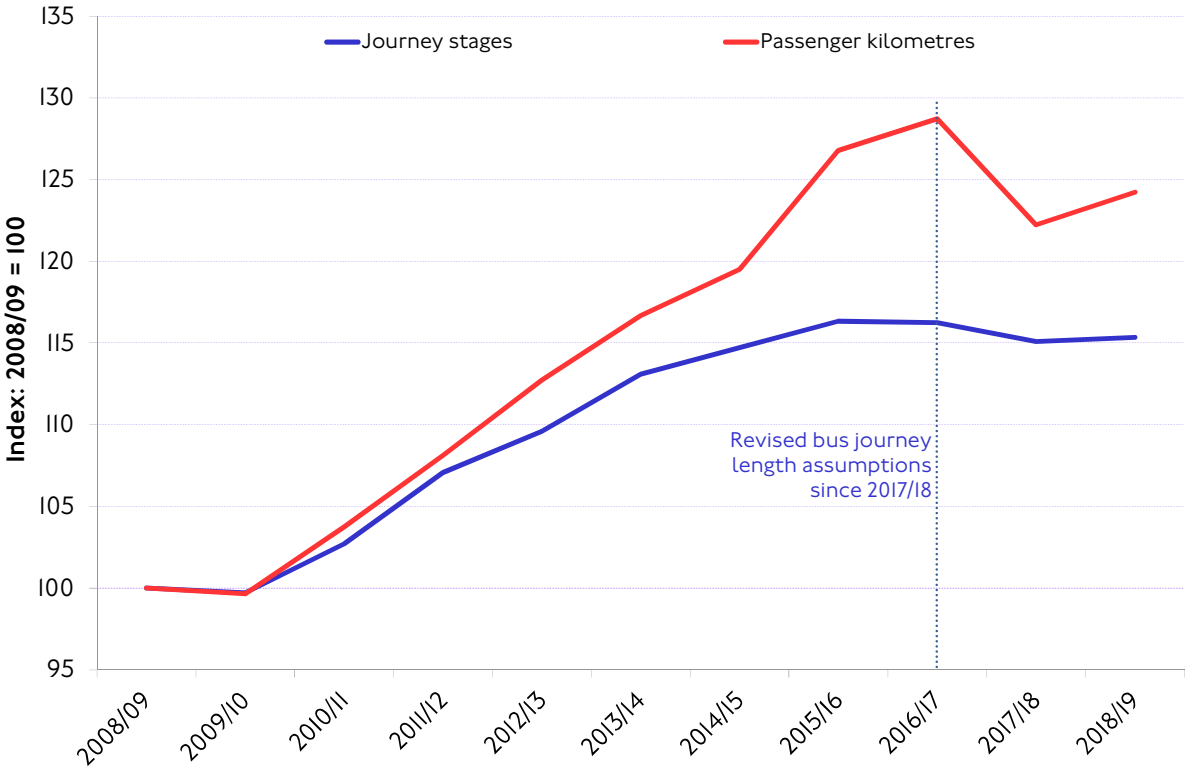
11.2 Public transport demand: overall trends

Figure 11.1 shows the trend in journeys and passenger kilometres on the principal TfL public transport modes over the last 10 years. After the economic recession in the latter part of the previous decade, both these indicators of public transport patronage grew strongly for several years, although more recently there has been a flattening and a small decline, although the evidence suggests a slow recovery in the latest year.

Due to a change in the methodology, there is a break in the time series for passenger kilometres after 2016/17. Therefore, comparisons across this threshold should be avoided. In any case, the latest year has seen an increase in public transport demand both in terms of total number of journeys and passenger kilometres relative to the previous year, and so it is reasonable to conclude that the overall trajectory continues to be upwards.

The graph shows that the growth rates of these two indicators have been increasingly diverging from each other over the last decade, suggesting that passenger kilometres have grown faster than journey stages. At an aggregate level, this can be interpreted as an increase in the average journey length.

Figure 11.1 Change in journey stages and passenger kilometres on TfL public transport modes (excludes National Rail, Emirates Air Line and River Services), 2008/09-2018/19.

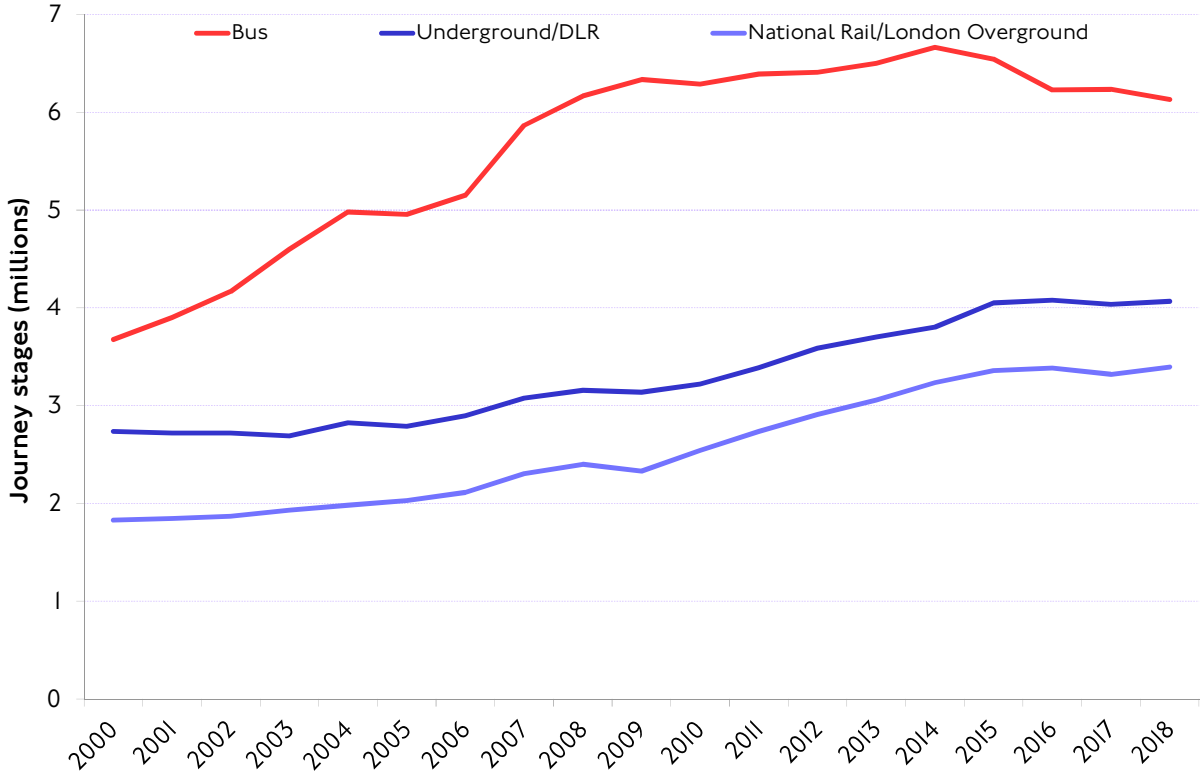


Source: Strategic Analysis, TfL City Planning.
Note: There is a break in the time series after 2016/17 due to a change in the assumptions about average length of bus journeys. For details please see section 11.3.

Public transport patronage by mode

Considering the period 2000 to 2018, the total demand for public transport in London – measured in journey stages – grew by 64.9 per cent. In the longer-term historic context this level of growth was unprecedented. However, the growth has been focused on particular modes at different points in time. Figure 11.2 shows the demand growth trend for each of the principal public transport modes over this period. The figure is in terms of the absolute number of journey stages per day in each year, by all travellers in London, and therefore it also illustrates the differences in scale – in terms of the total volume of travel – across these modes.

Figure II.2 Trend in journey stages on selected modes, 2000-2018.



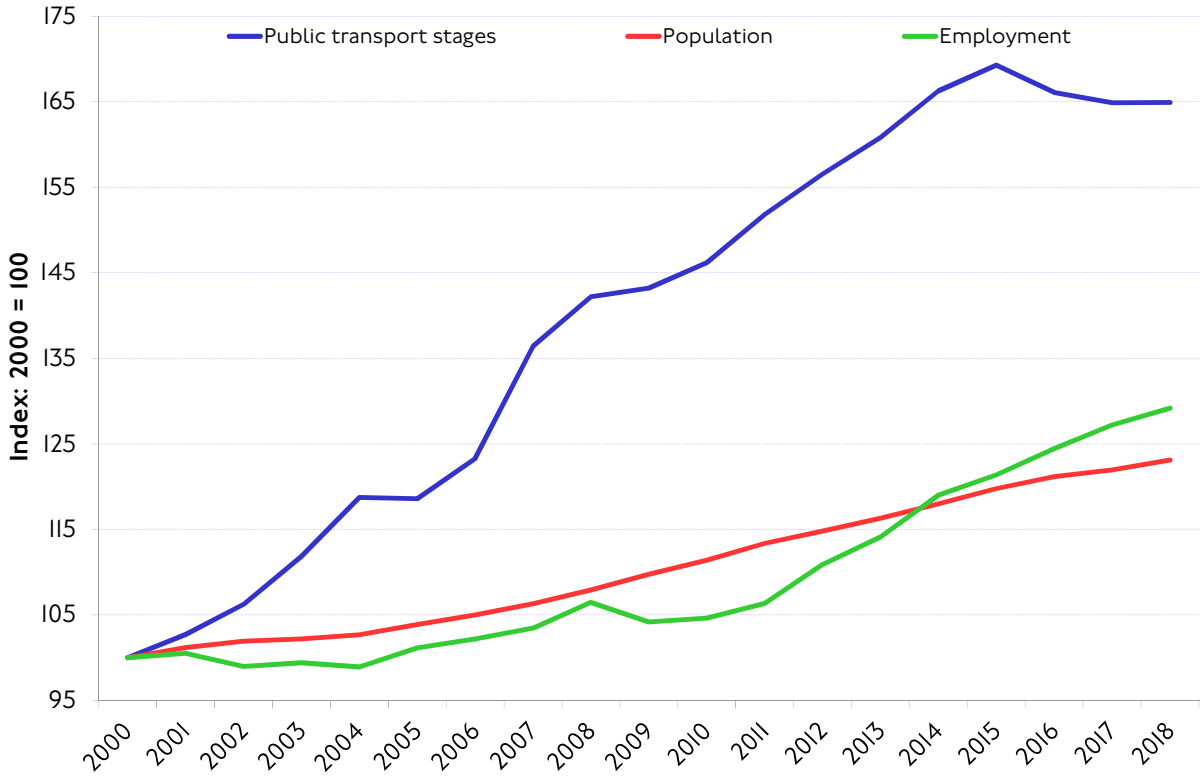
Source: Strategic Analysis, TfL City Planning.

All modes have seen a growth in demand between 2000 and 2018, with the greatest growth on National Rail (85.7 per cent over the period), followed by bus (66.7 per cent) and Underground/DLR (48.6 per cent). Growth in bus demand was particularly strong between 2000 and 2008, corresponding to a period of particular investment in the bus network, and, after a period of levelling off, has declined by 8.0 per cent since 2014. Despite the slower growth rate and the decline in the latest two years, the absolute number of journeys made on the bus network is still much higher than the number of journeys made on rail or Underground/DLR.

Rail demand was most noticeably affected by the economic recession, dropping by 2.9 per cent between 2008 and 2009. Between 2009 and 2015, however, rail demand has been strong, increasing by 44.1 per cent over that period. However, growth in 2016 was just 0.7 per cent, followed by a decline of 1.9 per cent in 2017, although there was an increase in demand in 2018 of 2.3 per cent. Underground demand also increased between 2009 and 2015, by 29.1 per cent. Growth in Underground demand has slowed down since then, with net growth of just 0.4 per cent between 2015 and 2018.

The growth in demand for public transport in part reflects London's population growth. However, while population grew by 23.1 per cent between 2000 and 2018, public transport demand grew by 64.9 per cent – therefore public transport demand has grown much faster than population growth (figure II.3), reflecting an underlying shift in mode share towards public transport.

Figure 11.3 Growth in demand (journey stages) on the principal public transport modes compared with growth in population and employment in London, 2000-2018.



Source: Strategic Analysis, TfL City Planning.

11.3 Public transport modes: Bus

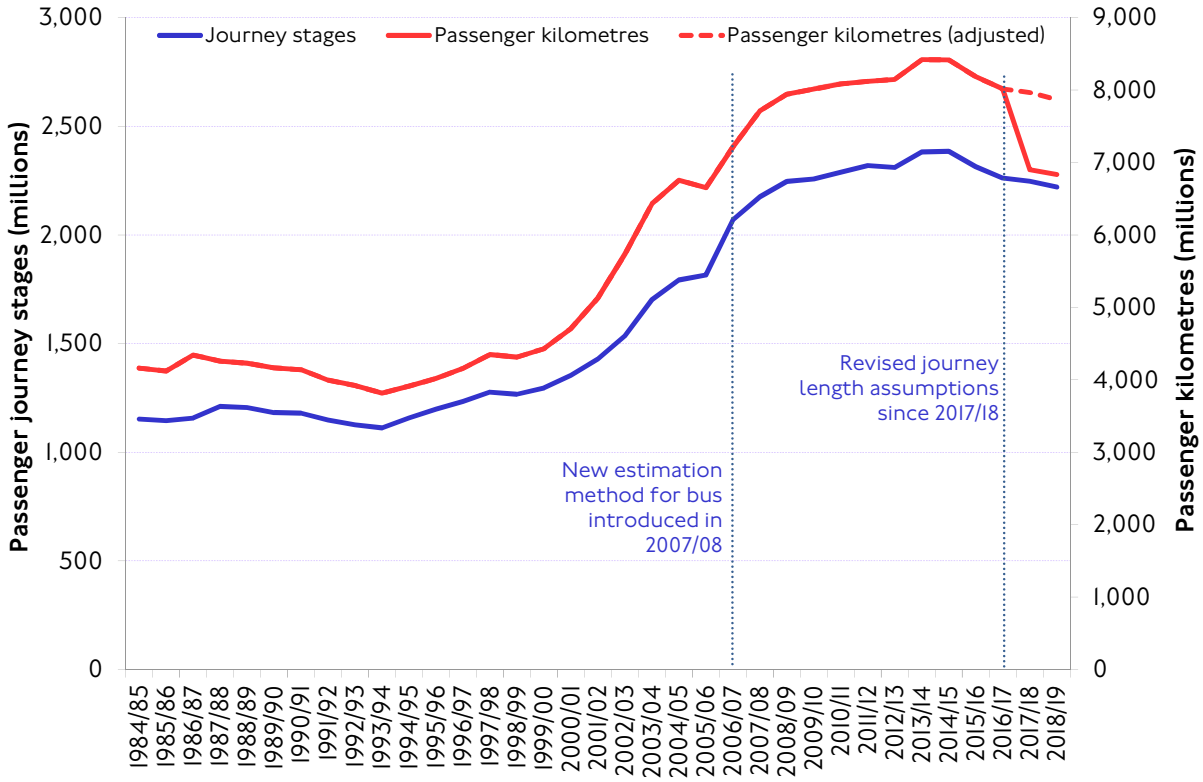
Long-term trend in bus patronage

The long-term trend in bus patronage is shown in figure 11.4. Following several years of strong growth in bus demand starting in the late 1990s, the late 2000s and early 2010s saw a slowing growth rate that, after 2013/14, turned into a decline in patronage both in terms of journeys and passenger kilometres.

In 2018/19, journey stages declined by 1.2 per cent with respect to 2017/18, while passenger kilometres went down by 0.9 per cent. This might suggest that shorter journeys have declined more than longer ones over the longer term, but the difference is small and appears to have stabilised in more recent years.

TfL's assumptions about average bus journey length were updated in 2017/18 using the smartcard data-based 'ODX' tool. This created a break in the time series for passenger kilometres that does not allow comparisons across this threshold. However, to enable like-for-like long-term analysis, an additional data series has been added to figure 11.4 with the adjusted passenger kilometres series using the old assumptions (which overestimated average bus journey length relative to the new method).

Figure 11.4 Passenger kilometres and journey stages by bus, 1984/85-2018/19.



Source: TfL Service Performance data.

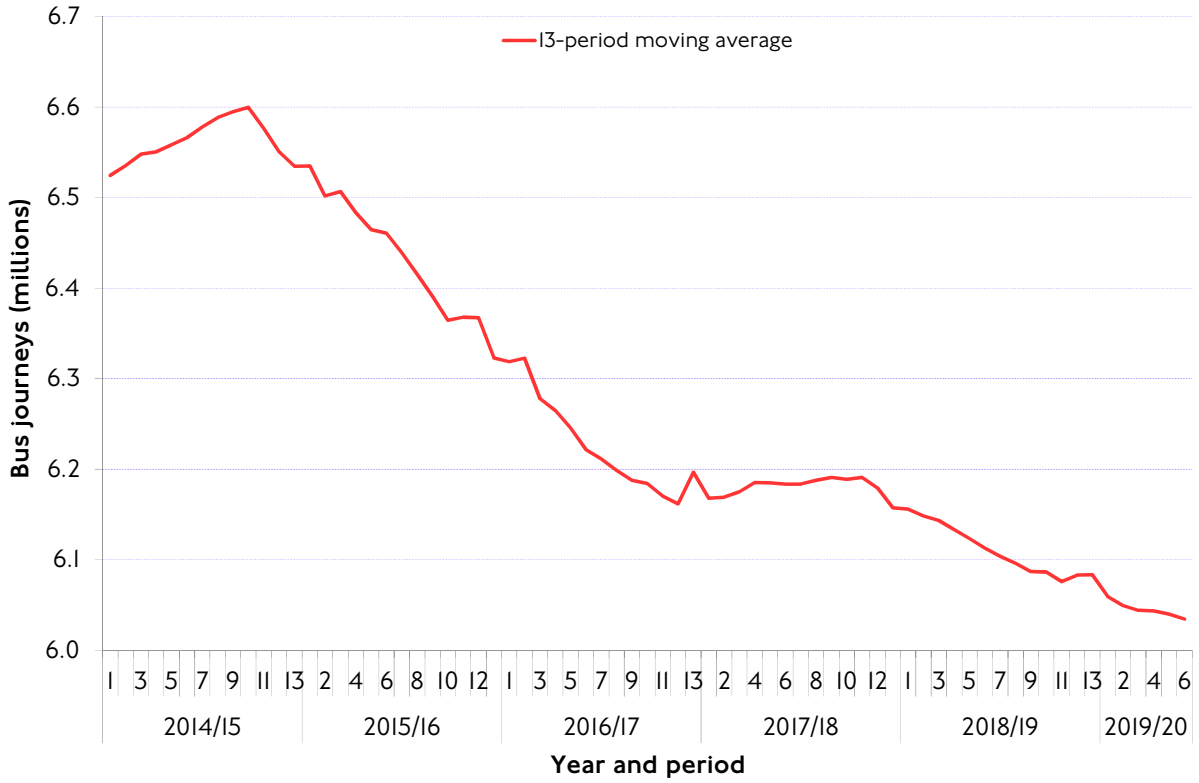
Short-term trend in bus patronage

A period-by-period trend in bus patronage over the last five and a half years, showing moving averages across the 13 four-week TfL financial periods, is shown in figure 11.5. Note that the 'base' value of the graph axis is 6 million journeys. The figure shows that:

- The turning point when the growth trend changed to one of decline occurred towards the end of 2014, during the 2014/15 financial year.
- Throughout financial year 2017/18, bus patronage was fairly flat.
- Since then, bus demand has continued to fall steadily and, in the latest period for which data is available (period 6 of 2019/20), it is 2.5 per cent lower than the high point in period 11 of 2017/18 and 8.6 per cent lower than the high point in period 10 of 2014/15.

These trends should be interpreted in the context of continued growth in London's population over the same period, which would otherwise have been expected to result in patronage growth each year.

Figure 11.5 Trend in bus passenger journeys per day, 13 financial period moving average, 2014/15-2019/20.



Source: TfL fares and ticketing.

Trends in bus patronage by time of day

Analysis shows that the proportion of bus journeys in each time period has remained constant in each four-week financial period over the last couple of years. This would imply that aggregate changes in demand have happened more or less consistently across all times of day.

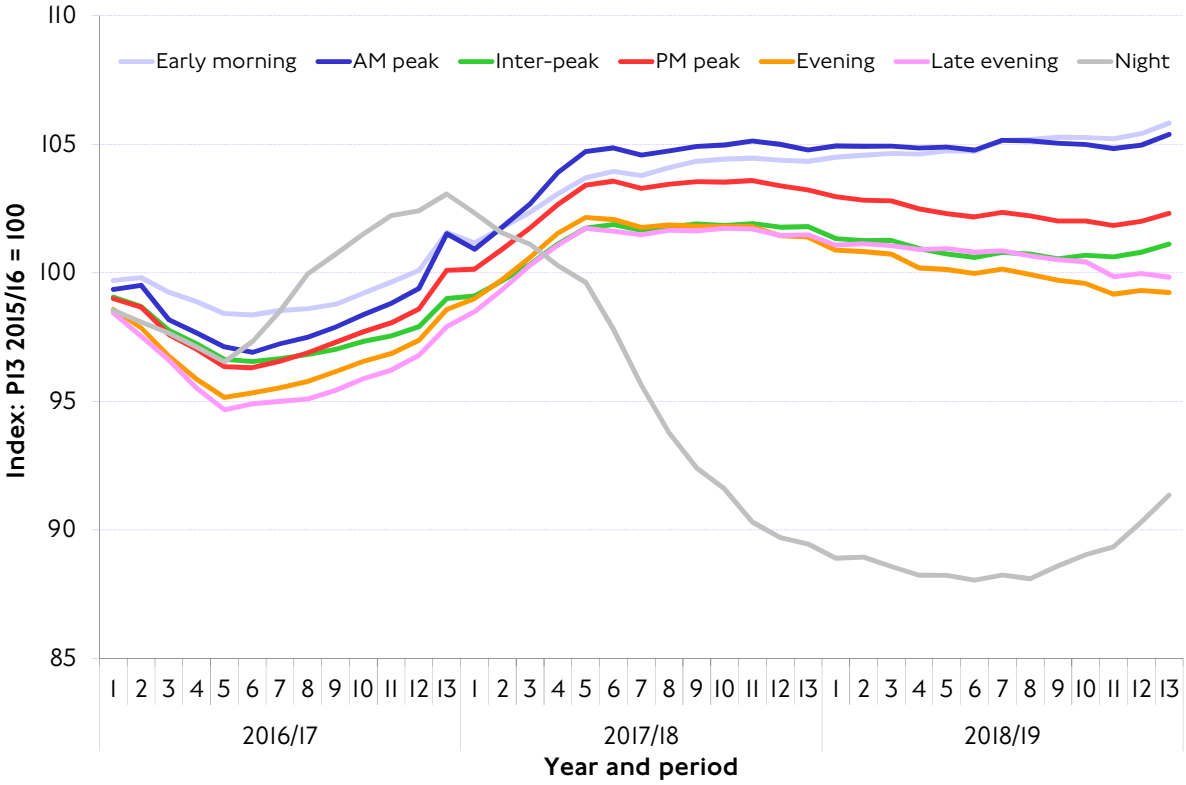
Figure 11.6 further explores the temporal variations in demand throughout the day over the years by looking at the relative change in the number of journeys by time period.

It is important to acknowledge that the data underlying this graph stems from smart payment 'taps' and excludes other tickets. Therefore, relative changes in the observed number of journeys using this dataset may not necessarily be a true reflection of absolute changes in patronage.

What is most interesting to see is how the different time periods have evolved over time. While the times after the morning peak and until the end of the day have all followed a similar pattern and show a slow but steady decline since the middle of 2017/18, the early morning and morning peaks have grown slightly over the same period.

On the other hand, the night period has followed a completely different trend, largely driven by the introduction of the Night Tube and London Overground Night Service on Friday and Saturday nights after period 5 of 2016/17. It is notable how demand during the night seems to have started to increase again in the latest few periods.

Figure 11.6 Recent trend in 13-period moving average of bus journeys by time of day (smartcard payments only), 2016/17-2018/19.



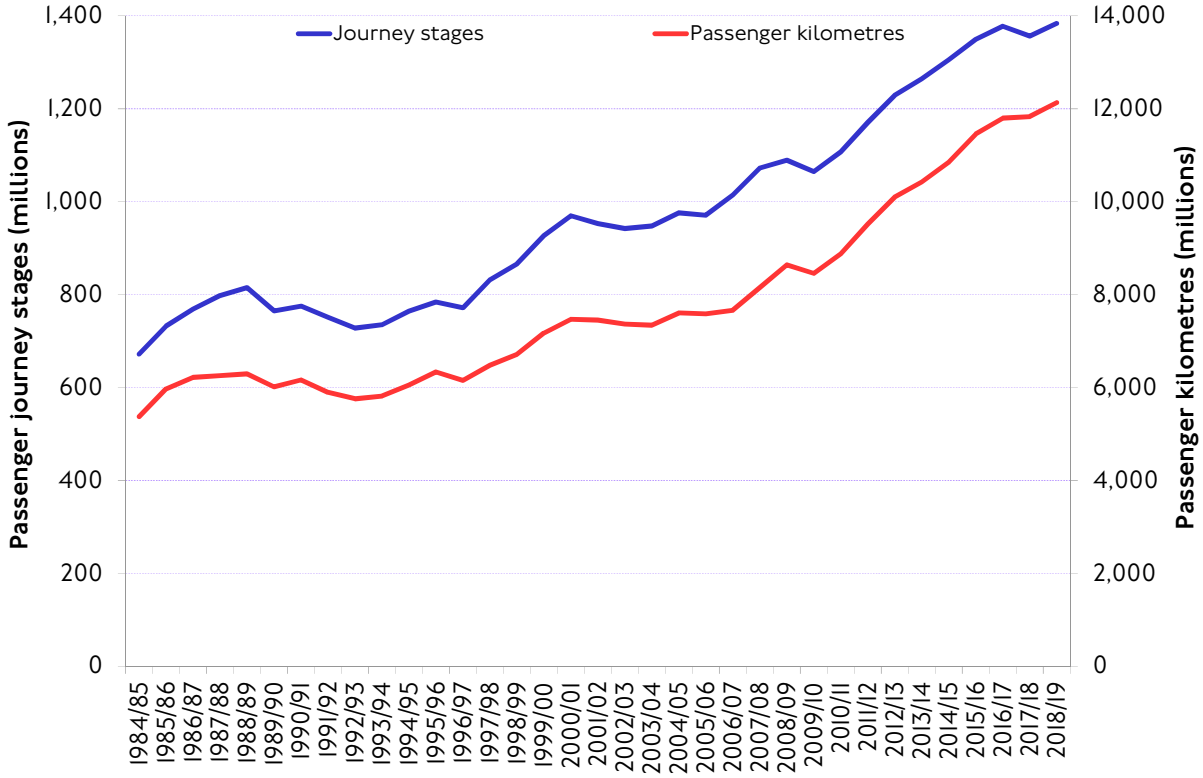
Source: TfL Public Transport Service Planning.

11.4 Public transport modes: London Underground

Long-term trend in Underground patronage

A long-term series of Underground patronage is shown in figure 11.7. The trend since the beginning of the series is one of strong and almost steady growth. Following a flattening and small decline in 2017/18, in 2018/19 there has been growth again and Underground demand has reached record levels both in terms of passenger journeys, which grew by 2 per cent in that year, and also passenger kilometres, which increased by 2.6 per cent and for the first time exceeded the 12 billion per year mark.

Figure 11.7 Passenger kilometres and journey stages by Underground, 1984/85-2018/19.



Source: TfL Service Performance data.

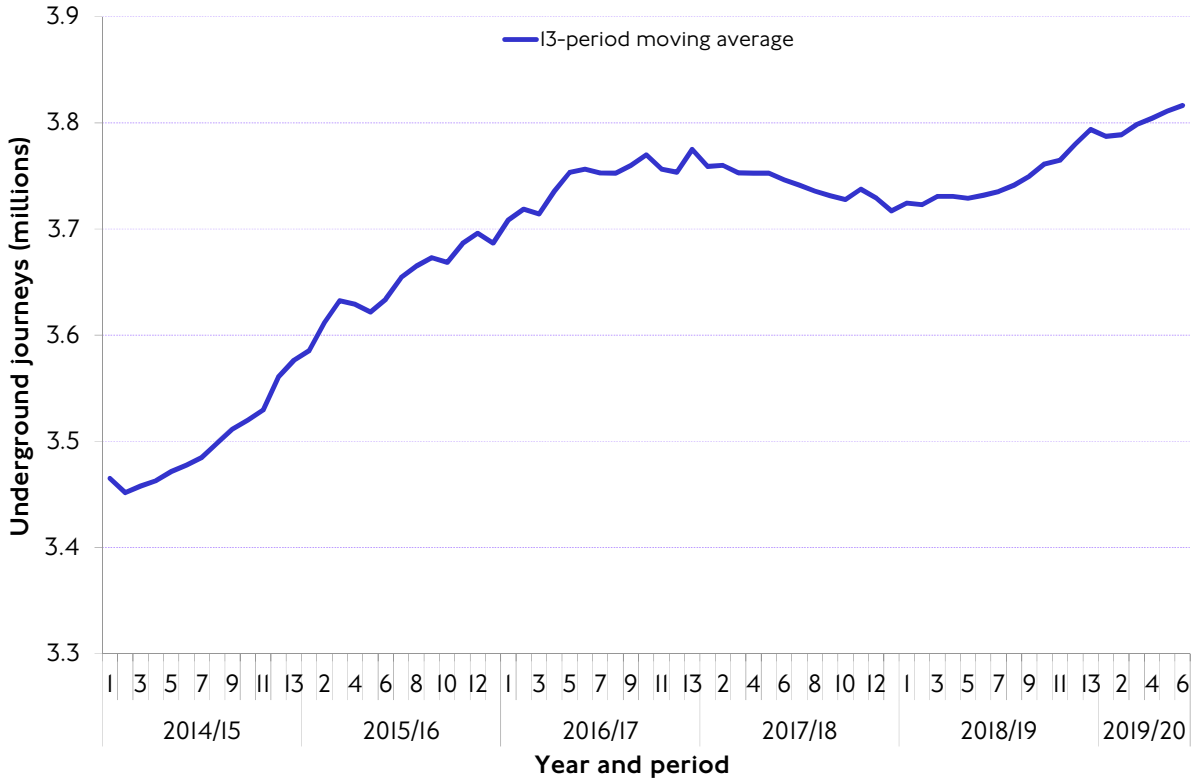
Short-term trend in Underground patronage

A period-by-period trend in Underground patronage over the last five and a half years, showing moving averages across the 13 four-week TfL financial periods, is shown in figure 11.8. Note that the 'base' value of the graph axis is 3.3 million journeys. The figure shows that:

- There was steady growth up until the end of 2016/17, a turning point after which demand on the Underground decreased slightly until the end of 2017/18. From then on, it has continued to grow almost steadily and exceeded previous record levels.
- From the high point in period 13 of 2016/17 until the low point in period 13 of 2017/18, Underground demand fell by 1.5 per cent.
- From that point onwards, demand has increased again by 2.7 per cent up to the most recent period.

Section 11.12 of this report explores how the overall demand trend for Underground varies by time of day and day of the week. From this analysis it is seen that the trends are not uniform, and are disproportionately affecting certain types of travel, notably 'discretionary' trips, and certain times of the week. Overall daily commuting demand remains relatively robust and is the principal factor underlying capacity constraint on the network, which is, and which is forecast to continue to be, a significant factor constraining London's growth and quality of life (see also section 14.4 of this report).

Figure 11.8 Recent trend in Underground passenger journeys per day, 13 financial period moving average, 2014/15-2019/20.

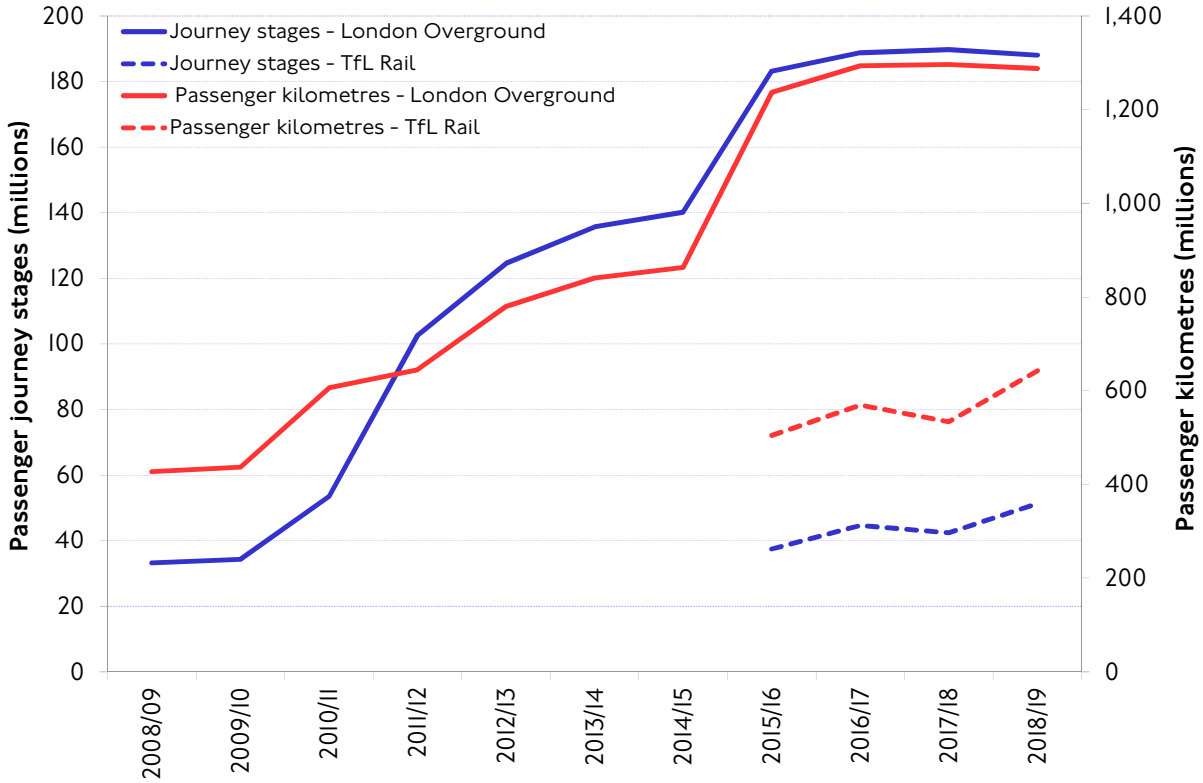


Source: TfL fares and ticketing.

11.5 Public transport modes: London Overground and TfL Rail

As shown in figure 11.9, demand on London Overground services saw very strong growth in the first half of the 2010s – largely in line with the expansion and upgrade of the network – but the pace of growth has slowed since 2015/16. Record levels of patronage were attained in 2017/18 but from then until 2018/19 there was a very small decline of 0.9 per cent in journey stages and 0.7 per cent in passenger kilometres. This overall trend is similar to that reported for travel demand more generally.

Figure 11.9 Passenger kilometres and journey stages by London Overground and TfL Rail, 2008/09-2018/19.



Source: TfL Service Performance data.

TfL Rail services (due to become Elizabeth line in the future) are also included in figure 11.9. These services have seen increased numbers of passengers since operation started in May 2015. However, due to progressive extensions of the network (the latest one being TfL's operation of Heathrow Connect services in May 2018), it is difficult to establish equivalent year-on-year comparisons.

11.6 Public transport modes: Docklands Light Railway (DLR)

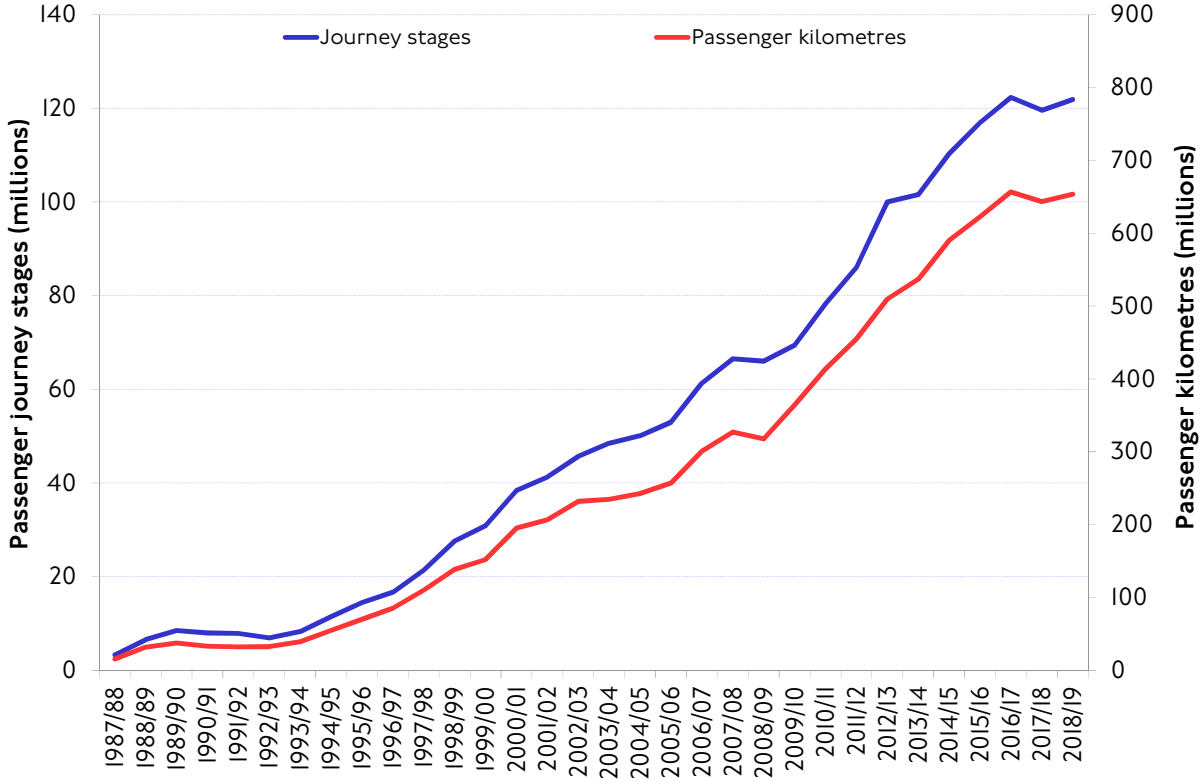
Figure 11.10 shows how patronage on the DLR has grown very rapidly since it started operation, partly due to progressive expansions of the network and service upgrades.

Except for the impacts of the recession in the late 2000s and another small decline in the early 1990s, demand on the DLR was steadily growing until 2016/17, after which it declined slightly. In 2018/19, patronage on this mode has returned to growth (1.5 per cent increase in journey stages and 1.9 per cent in passenger kilometres), but at a lower rate than previously.

11.7 Public transport modes: London Trams

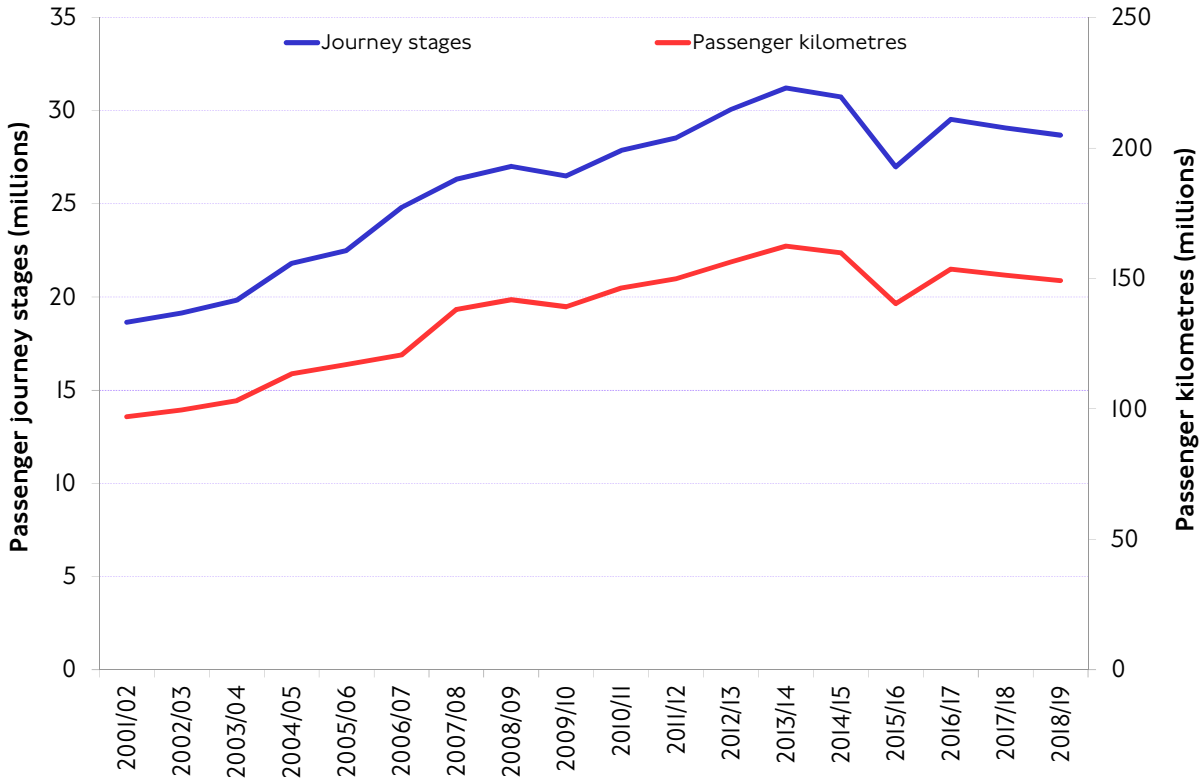
Following more than 10 years of steady growth since they first started operating, London Trams have seen a slow decline in patronage over recent years. In 2018/19, demand on London Trams declined by 1.3 per cent both in terms of passenger kilometres and journey stages with respect to the previous year. This represents a net 8.1 per cent decrease since the high point in 2013/14.

Figure 11.10 Passenger kilometres and journey stages by DLR, 1987/88-2018/19.



Source: TfL Service Performance data.

Figure 11.11 Passenger kilometres and journey stages by London Trams, 2001/02-2018/19.



Source: TfL Service Performance data.

11.8 Public transport modes: National Rail in London

Table 11.1 shows the trend in National Rail patronage over the last 10 years (Train Operating Companies defined as 'London and South East' by the Office of Rail and Road). Following declines in patronage over the previous two years, the year 2018/19 has seen a return to a trend of strong growth (3.9 per cent in terms of journeys and 3.3 per cent in passenger kilometres with respect to the year before) but short of the record levels of growth observed at the beginning of the 2010s. It is likely that the impact of large-scale infrastructure works and industrial disputes over the previous two years have worked through, and that a proportion of the increase in the latest year reflects a recovery from these difficulties. It is also likely that a proportion of the recovery seen on National Rail has fed through to the recent patronage trends for Underground, reviewed in section 11.4. However, there have also been substantial increases in service supply, particularly completion of the latest stage in the Thameslink programme.

Table 11.1 Passenger kilometres and journey stages by National Rail: operators classed by ORR as London and South East operators, 2008/09-2018/19.

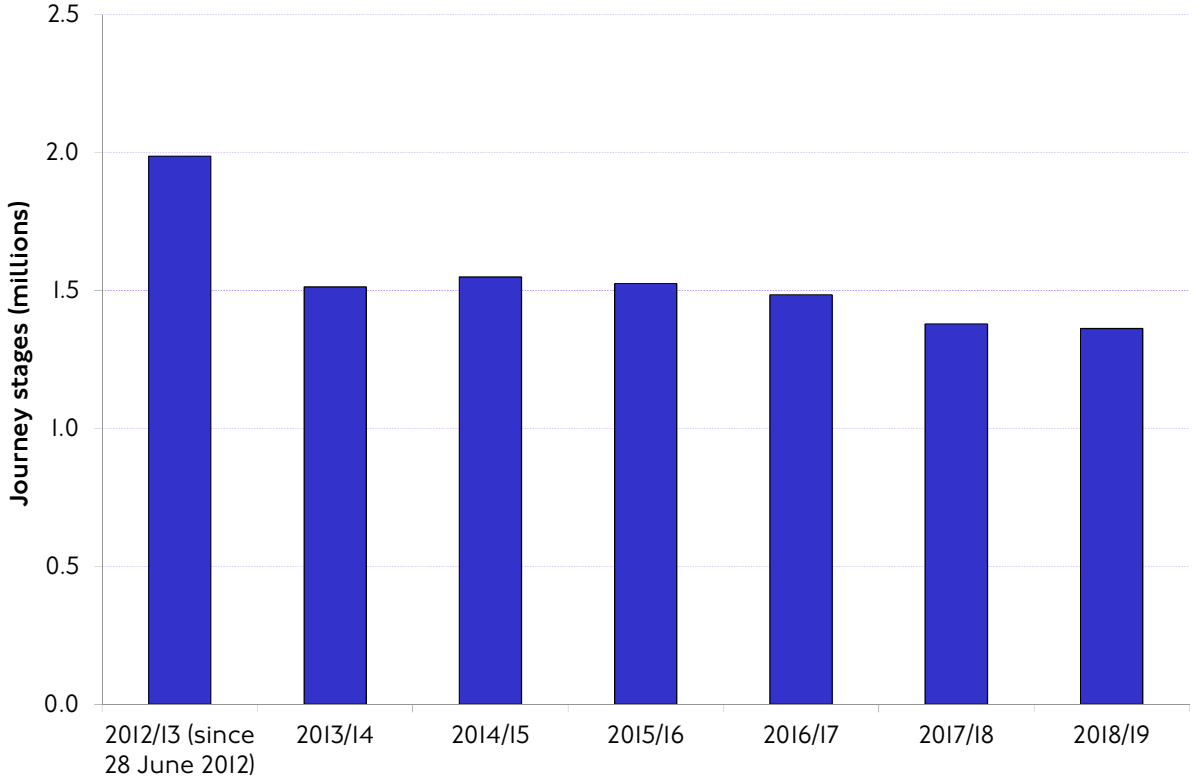
Year	Passenger kilometres (billions)	Year-to-year percentage change	Passenger journeys (millions)	Year-to-year percentage change
2008/09	24.2	2.9	854	3.1
2009/10	23.8	-1.8	842	-1.4
2010/11	25.0	5.2	918	9.0
2011/12	26.4	5.3	994	8.3
2012/13	27.3	3.4	1,032	3.9
2013/14	28.6	4.9	1,107	7.2
2014/15	29.6	3.4	1,155	4.3
2015/16	30.5	3.0	1,203	4.2
2016/17	30.6	0.4	1,197	-0.5
2017/18	30.1	-1.5	1,171	-2.1
2018/19	31.1	3.3	1,217	3.9

Source: Office of Rail and Road.

11.9 Public transport modes: Emirates Air Line

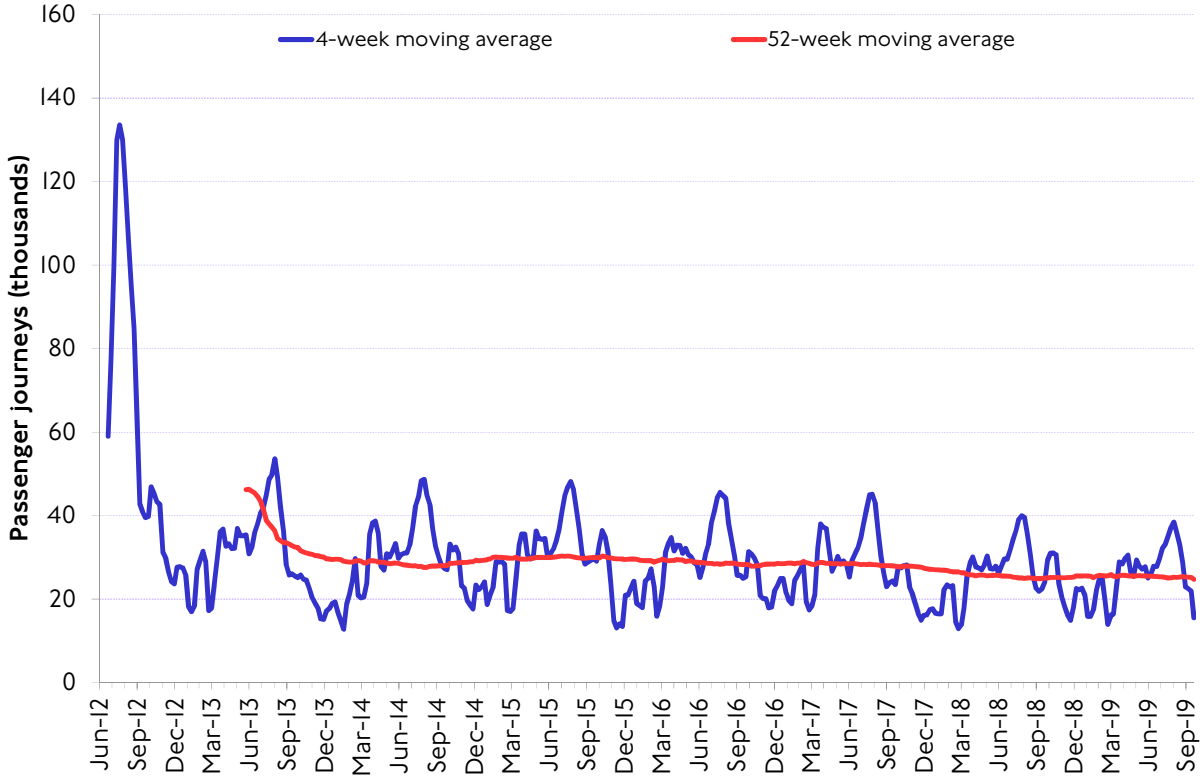
Figure 11.12 shows the number of journeys per year on the Emirates Air Line, which is London's cable car providing a river crossing between the Greenwich Peninsula and the Royal Docks. With the exception of the first year of operation (unusually busy due to the London 2012 Olympic and Paralympic Games), the Emirates Air Line has seen declining demand since a high point in 2014/15. In 2018/19, demand on this service had fallen by 12 per cent since that high point and by 1.2 per cent since 2017/18. As shown in figure 11.13, demand on this service also tends to be very seasonal, with some four-weekly periods having as many as 40,000 journeys and others with as few as 15,000 passengers.

Figure II.12 Journey stages per year on the Emirates Air Line, 2012/13-2018/19.



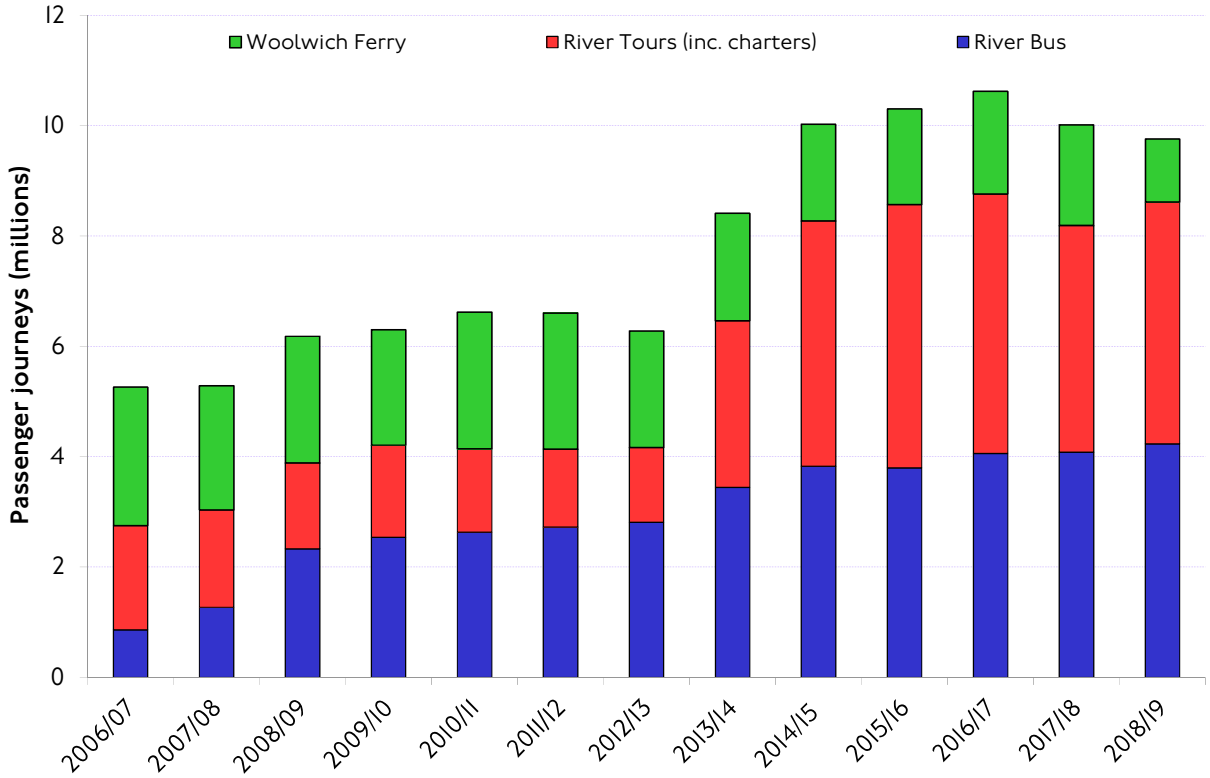
Source: TfL Service Performance data.

Figure II.13 Journey stages per period on the Emirates Air Line, 2012/13-2019/20.



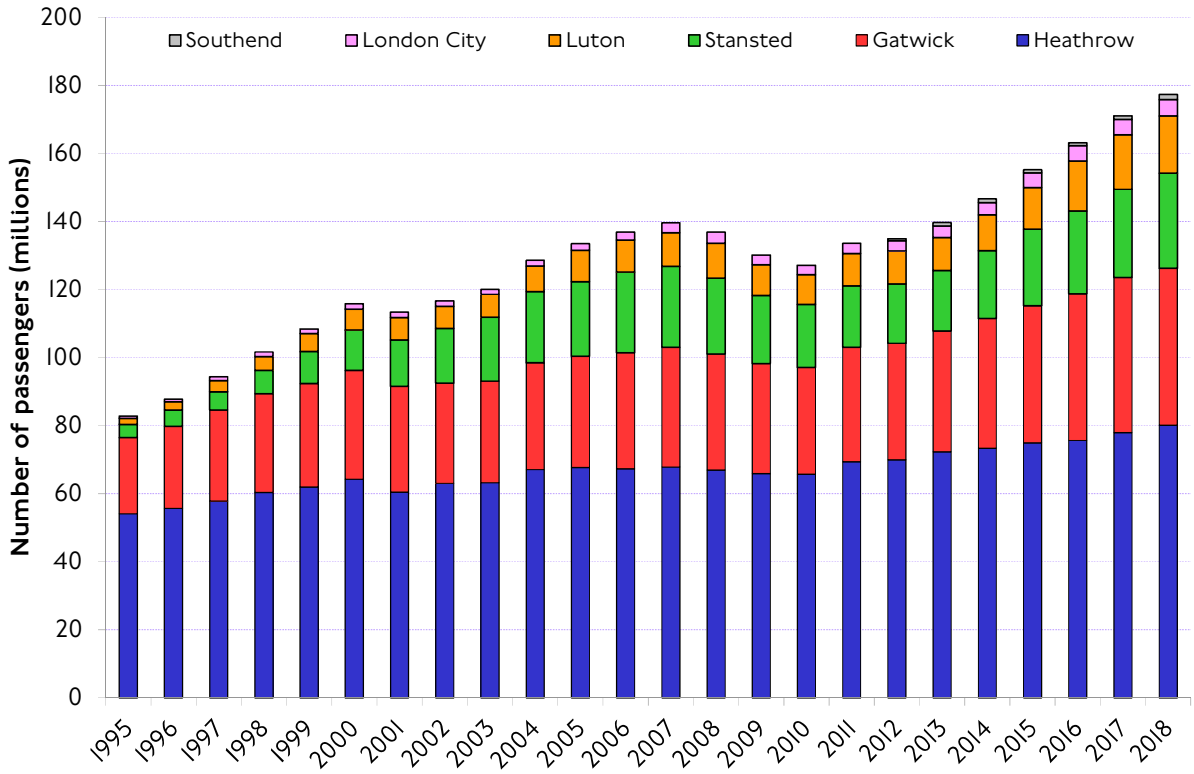
Source: TfL Service Performance data.

Figure 11.14 Passengers using TfL's River Services, 2006/07-2018/19.



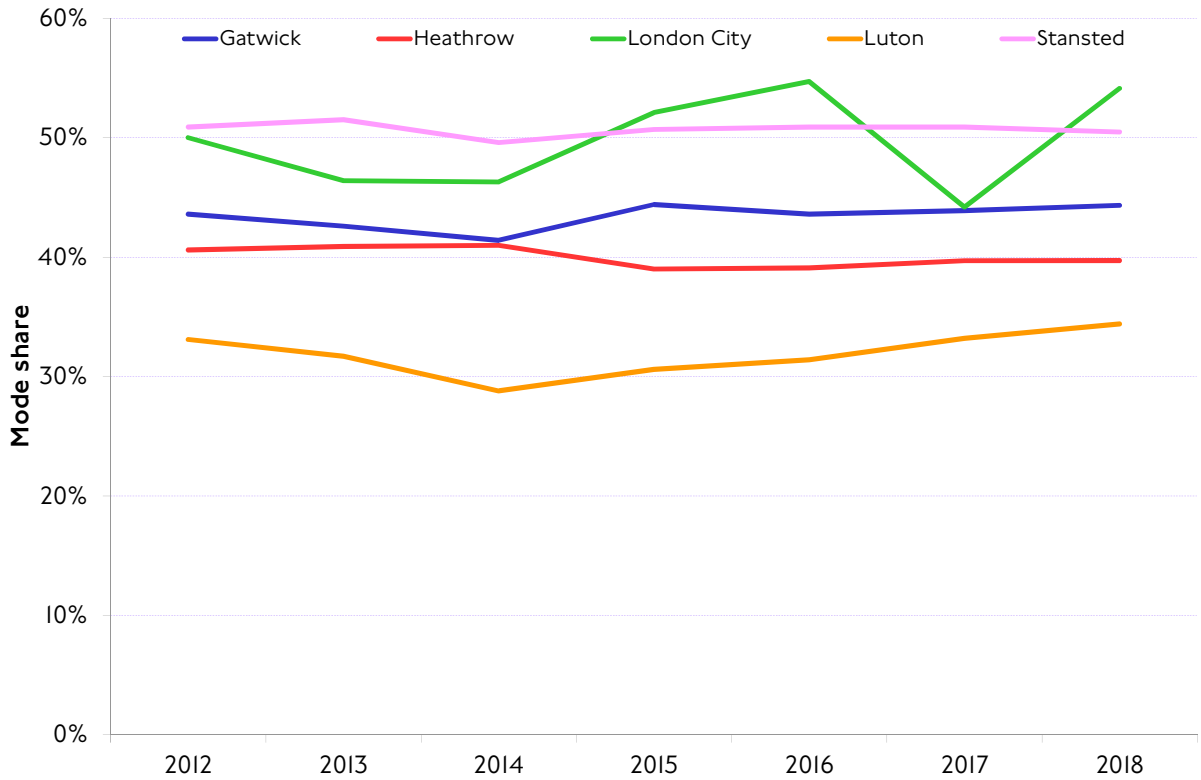
Source: TfL River Services.

Figure 11.15 Number of terminal passengers by London area airport, 1995-2018.



Source: Civil Aviation Authority.

Figure 11.16 Public transport mode share of terminal passengers by London area airport, 2012-2018.



Source: Civil Aviation Authority.

11.10 Public transport modes: River Services

Figure 11.14 shows the trend in annual patronage on TfL's River Services. Following significant growth between 2012/13 and 2016/17, aggregate demand has followed a declining trend over the most recent two years. However, the decrease in patronage from 2017/18 until 2018/19 can be explained by the long closure of the Woolwich Ferry between the last week of period 7 until the end of period 11 of 2018/19. In fact, the other two components of total River Services demand have grown by 4 per cent (River Bus) and 7 per cent (River Tours).

11.11 International air travel

Demand for air travel through London's airports continues to grow strongly year-on-year, reflecting a recovery from the recession in the latter part of the last decade. There were a total of 177 million terminal passengers passing through London's six main airports in 2018 – up 4 per cent on 2017. Heathrow airport accounted for 45.2 per cent of the total, with Gatwick accounting for 26 per cent (figure 11.15).

The public transport mode share remains below 50 per cent for most of London's airports, with only City and Stansted having more than half of trips being by public transport. Mode shares have changed little over recent years, with public transport mode share to Heathrow (London's busiest airport) being around 40 per cent (figure 11.16).

11.12 Focus on: temporal variations in public transport demand

Introduction

While the analysis of public transport patronage at aggregate level described earlier in this chapter is essential in understanding changes in travel demand, it is now becoming increasingly important to further explore whether and how these trends vary at different levels of temporal disaggregation, namely by time of day, day of the week and time of the year. The reason for the increasing relevance of this more disaggregate analysis is that it can provide further evidence to inform the question of whether there is underlying change in the travel patterns and behaviour of public transport users, perhaps supported by new technologies and changes in travel and activity habits among the population, or perhaps partly as a response to crowding. The material in this section considers the initial findings of an ongoing programme that aims to use as much of the available information as possible to explore this topic.

This section provides an analysis of temporal variations in demand by time of day and day of the week since 2010, firstly using data for London residents from the London Travel Demand Survey (LTDS). It then focuses more specifically on London Underground demand patterns using station entry and exit data.

Summary

In terms of overall London resident trip rates:

- Overall trip rates (all modes, all purposes) are higher on a typical Friday compared to Tuesday, Wednesday and Thursday and trip rates on Mondays are the lowest of all weekdays. The trend over the last few years seems to have strengthened this difference, particularly owing to declines in shopping and leisure trips as well as, potentially, commuting trips (but to a lesser extent).
- This suggests that the changes in the economy, lifestyle and working patterns that could be affecting travel demand are impacting only specific kinds of travel on certain days. Therefore, alongside forecast growing demand reflecting population increase, capacity issues on the networks around the peak travel times are likely to remain a key constraint in London in the foreseeable future.
- London Travel Demand Survey data shows that trip rates on London Underground have tended to be highest on Fridays, although since 2008/09-2009/10 growth in trip rates on Fridays has been slower than Tuesday-Thursdays and Saturdays.

Looking more specifically at differences by day of week and in terms of Underground patronage specifically:

- Fridays have always tended to be the busiest day, although closely followed by Thursdays. However, their proportionate share of the weekly total seems to have declined slightly in recent years. On the other hand, Mondays are the quietest weekday (and their proportionate share of the whole week is decreasing more than other weekdays) and Sundays are the quietest days overall.
- Also, London Underground demand on the Friday (and to a lesser extent, Monday) morning peaks is lower than any other day of the week and has grown

more slowly than the others since 2010. For most other time periods, Fridays tend to be relatively busier than other weekdays and Mondays is the quietest weekday. Over the last few years, some time periods on Saturdays and Sundays have become busier than the same times on any other weekday.

Demand variations by day of the week: London residents

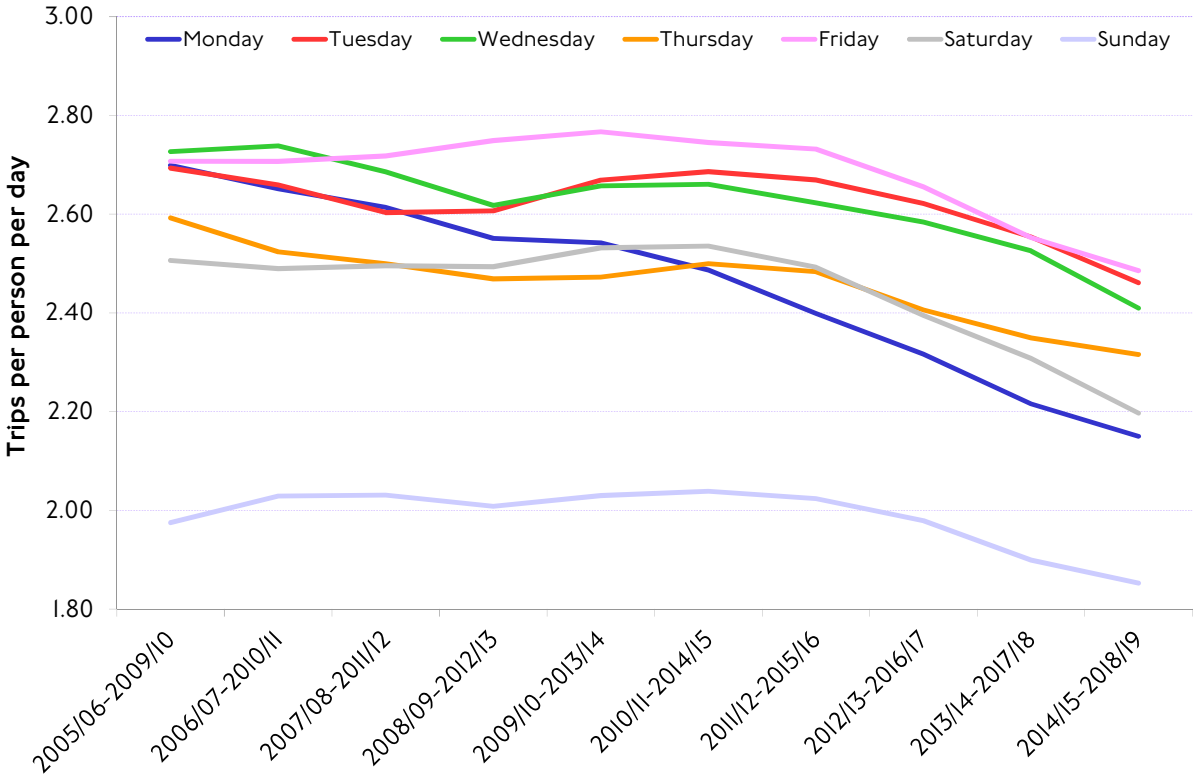
This section looks at variations in travel demand by day of the week. It is expected that there would be differences between weekdays, Saturdays and Sundays, driven by the traditional working patterns and the associated provision of public transport services. However, the aim of this analysis is to explore other not-so-obvious relative differences, for example between each of the weekdays – which may suggest a shift in working patterns or in the absolute levels of demand at the weekends compared to weekdays.

Figure II.17 shows how average **trip rates for all modes and purposes** have changed since the start of the LTDS survey in 2005/06. Values have been grouped into five-year averages to enable comparison with National Travel Survey data.

The main features of figure II.17 are that:

- Trip rates are generally highest on Fridays and lowest on Sundays.
- Trip rates have declined on all days of the week over the study period, but particularly from around 2015/16, with the greatest decline occurring on Mondays (down 15 per cent since 2009/10-2013/14). Mid-week trip rates (Tuesdays, Wednesdays and Thursdays) have declined by 6 to 9 per cent, while at the weekend, they have declined more on Saturdays than on Sundays.

Figure II.17 Trip rates (all modes, all purposes) by day of week (London residents only), five-year rolling averages, 2009/10-2018/19.



Source: Strategic Analysis, TfL City Planning.

Similar data are available at national level from the National Travel Survey (NTS). A comparison with the London (LTDS) trend shows that:

- Similar to London, trip rates are generally highest on Fridays and lowest on Sundays.
- Trip rates have declined on all days of the week, but the largest decline since 2009-2013 by residents of England has been on Fridays (by 3 per cent), while declines on the other days of the week are generally smaller. Trip rates on Mondays and Sundays have declined the least since 2009-2013 (by less than 1 per cent respectively), the trend on Mondays nationally being quite different from the London results.
- However, despite detail differences, the overall similarity of the declining trip rate trend shown by both LTDS and NTS is notable, in that it suggests the factors underlying these changes are not specific to conditions in London.

Besides these top line results, it is also interesting to look at **trip rates by purpose for London residents**:

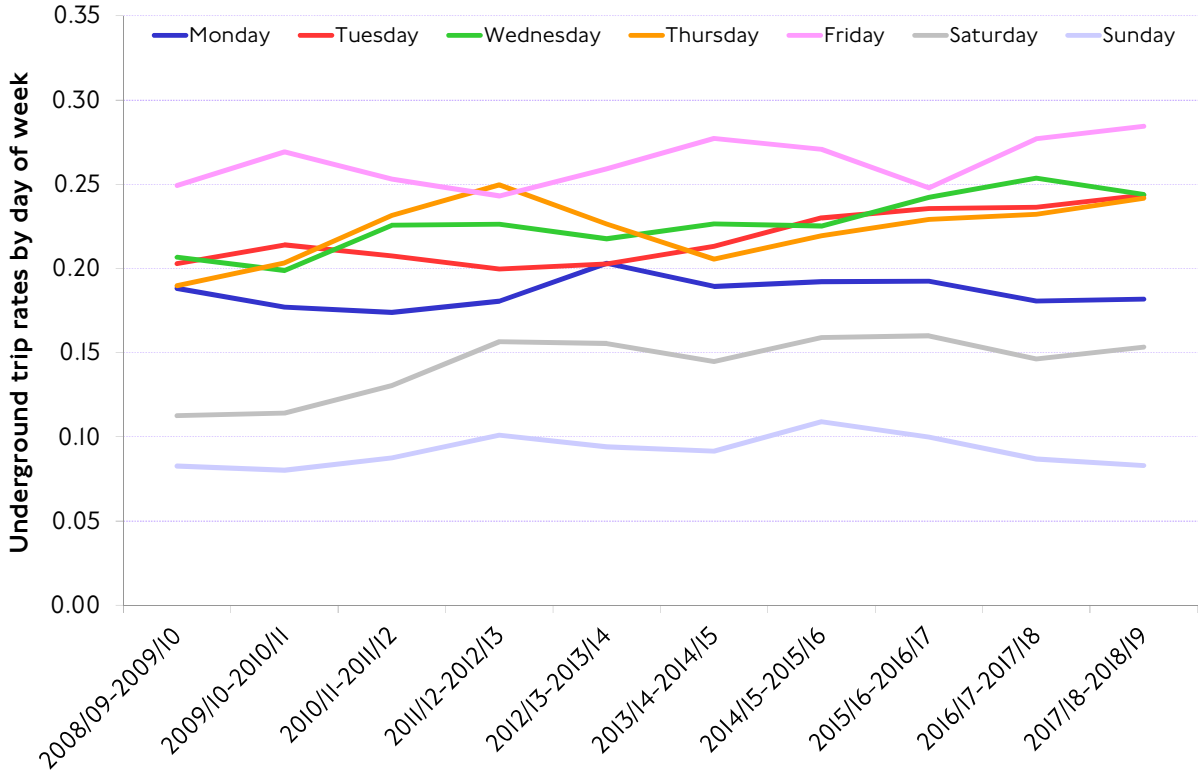
- Commuting trip rates (to or from the usual place of work) have declined by the same proportion as the trip rate for all purposes on Mondays. By contrast, commuting trip rates on all other weekdays have increased slightly (by 2-3 per cent) since 2009/10-2013/14, while those at the weekend were down.
- Shopping trip rates have declined on all days of the week by a fairly uniform proportion, although the decline has been slightly greater than average on Fridays and Saturdays and lower than average on Sundays.
- Finally, leisure trip rates are higher at weekends compared to weekdays, and slightly higher on Fridays compared with all other weekdays. Since 2009/10-2013/14, the greatest declines in leisure trip rates have been on Mondays (down by 17 per cent) and Fridays (down by 16 per cent). Leisure trip rates on Saturdays and Sundays are down by 8 per cent respectively.

Demand variations by day of the week: Underground (LTDS data for residents)

Given this backdrop of declining overall trip rates, it is of interest to look more specifically at how this applies to the demand on individual modes.

All-purpose **trip rates for London Underground** are shown in figure 11.18. Note that in this case the averages are over two years of data instead of five. This is to better compare the LTDS data with annual station entry and exit data also considered in this section, while still ensuring a robust sample size.

Figure 11.18 London Underground trip rates (all purposes) by day of week (London residents only), two-year rolling averages, 2009/10-2018/19.



Source: Strategic Analysis, TfL City Planning.

The main findings are that:

- Underground trip rates are generally highest on Fridays and lowest on Sundays (this reflecting the pattern of overall trip rates).
- However, over the period, Underground trip rates on Fridays have grown at a slower rate than trip rates on Tuesdays, Wednesdays and Thursdays.
- The greatest growth in Underground trip rates over the period has been on Saturdays, increasing by 36 per cent since 2008/09-2009/10.

Underground day of week patterns using station entry and exit data

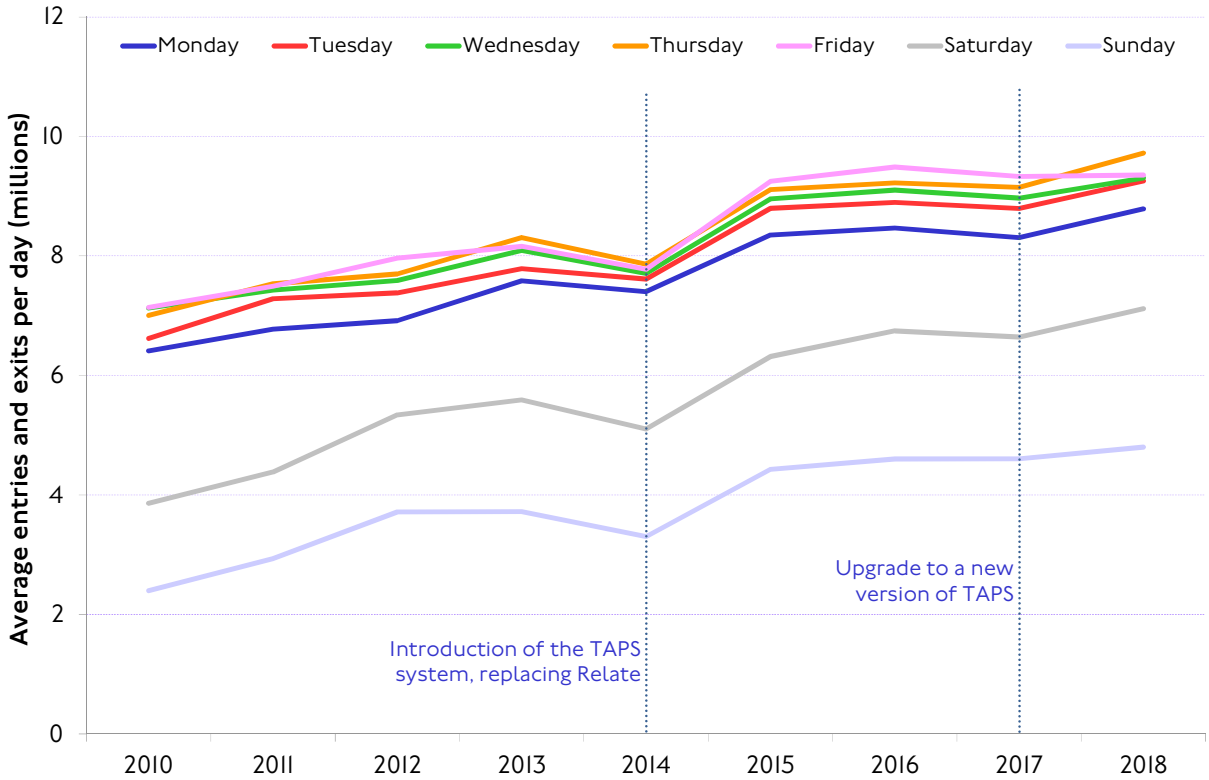
Another perspective on London Underground patterns is given by station entry and exit data from a four-week period after the autumn half term holidays (excluding days affected by industrial action) in each year since 2010 (figure 11.19). Data from this source has undergone several revisions as the technology has developed. These are shown as 'series breaks' on the figure, and the exploratory nature of these data and analysis should be recognised.

Figure 11.19 shows that:

- For the most part, Friday has always tended to be the busiest day of the week, albeit closely followed and sometimes surpassed by Thursday. This agrees with the intuitive perception that Fridays see both daytime work-related travel as well as high volumes of leisure travel in the evening leading to the weekend.
- On the other hand, Mondays are the weekday with the lowest demand and Sundays are the quietest day overall, as would be expected.

- However, since 2010 the absolute demand on Sundays has seen the greatest relative growth (almost doubling), followed by Saturdays (over 80 per cent growth), which is also above the weekly average growth.
- Over the same period, demand on weekdays has grown at much slower rates (between 30 and 40 per cent), with Tuesdays and Thursdays seeing the highest growth rates and Wednesday the lowest.

Figure 11.19 Average London Underground entries and exits per day on a representative autumn period by day of week, 2010-2018.



Source: TfL Public Transport Service Planning.

While the changes in absolute volumes are valuable to provide context, the most interesting analysis is one which is normalised by the total volume of travel and looks at the relativities among each day of the week, ie at whether the 'significance' of each day of the week has shifted over the years in terms of proportionate contribution to overall demand, which would suggest a behavioural shift underlying the background growth trend.

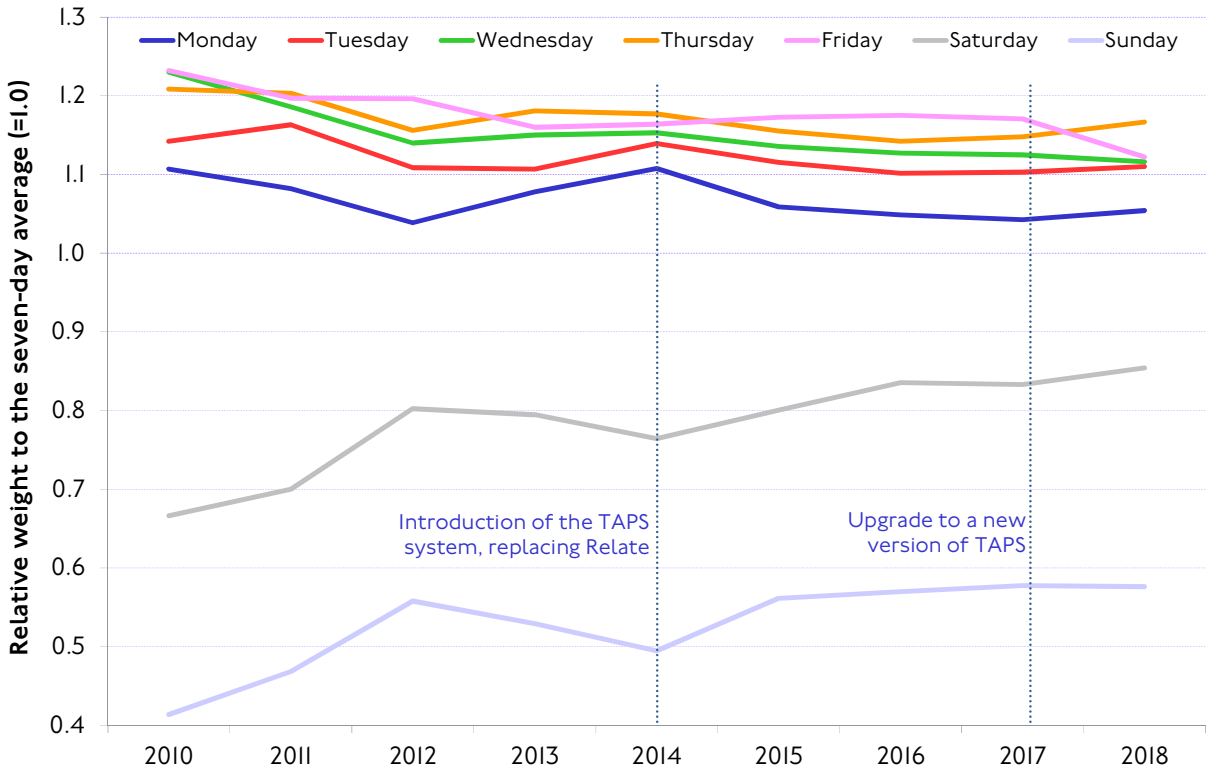
Figure 11.20 shows the relative contribution of each day with respect to the seven-day average, which is represented by 1.0. Note that for best resolution the graph axis starts at 0.4 instead of zero.

The main conclusions from this graph are that:

- The proportionate share of the weekly total of all weekdays has declined slightly while that of weekends has increased. This decline on weekdays has been larger on Mondays (which have always been the quietest of the weekdays) and Wednesdays.
- On the whole, the earlier part of the week (Mondays and Tuesdays) has relatively lower 'weight', in terms of proportionate contribution to total weekly demand, than the latter part of the week (Wednesday to Friday).

- In the last year, the proportionate contribution of Fridays to the weekly total has become lower than that of Thursdays, after several years of Fridays having a greater share of the weekly average.

Figure 11.20 Relative 'weight' of each day of the week on London Underground demand on a representative autumn period, 2010-2018.



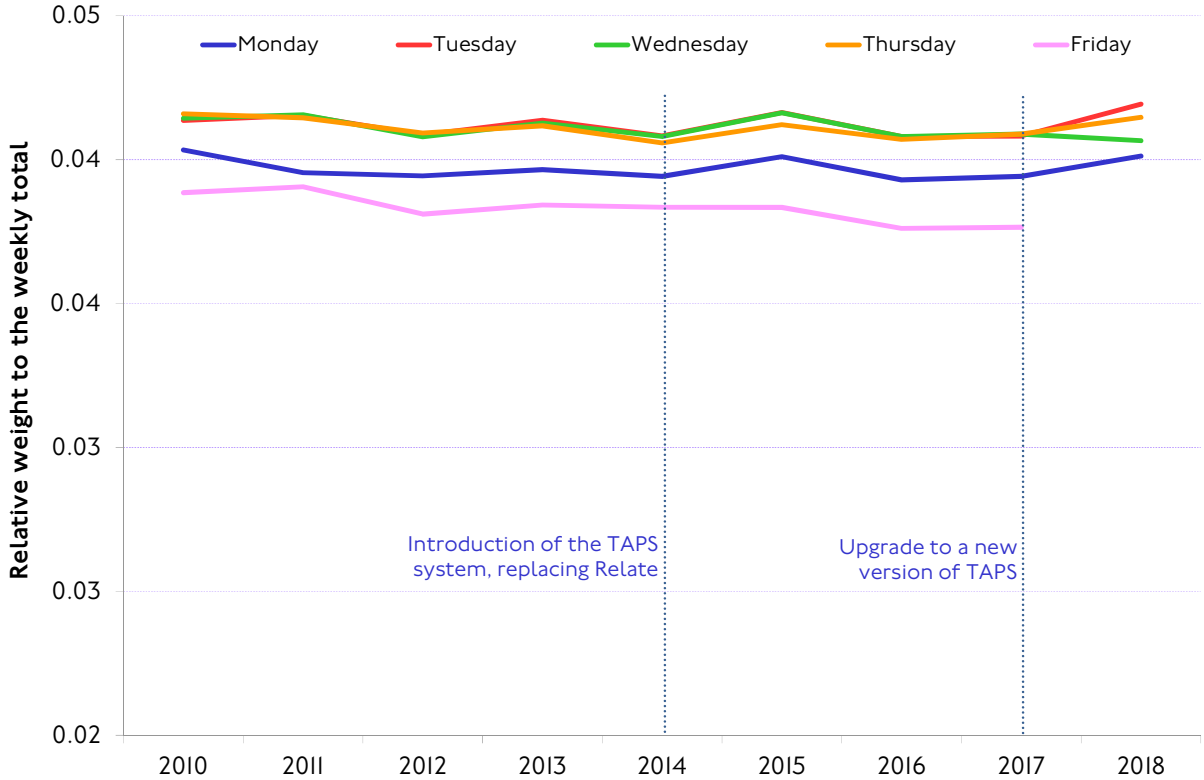
Source: TfL Public Transport Service Planning.

Demand variations by time of day

This section looks at variations in travel demand by time of day as well as by day of the week, ie it compares different time periods in different days of the week over the years. There are well-established peaks and troughs on the distribution of demand throughout each day. However, the aim here is to try to unpick whether and how this distribution has changed over the years for each day of the week and whether this may be indicative of behavioural changes such as spreading of peak travel, changes in the off-peak periods that may be related to flexible working patterns or other factors. This analysis is based on **London Underground station entry and exit data** only.

Figure 11.21 shows the trend in morning peak (07:00 to 10:00) London Underground demand by day of the week since 2010. Note that 2018 AM peak data for Fridays is not included in this analysis, because of data issues.

Figure II.21 Relative 'weight' of the morning peak London Underground demand on a representative autumn period by day of the week, 2010-2018.



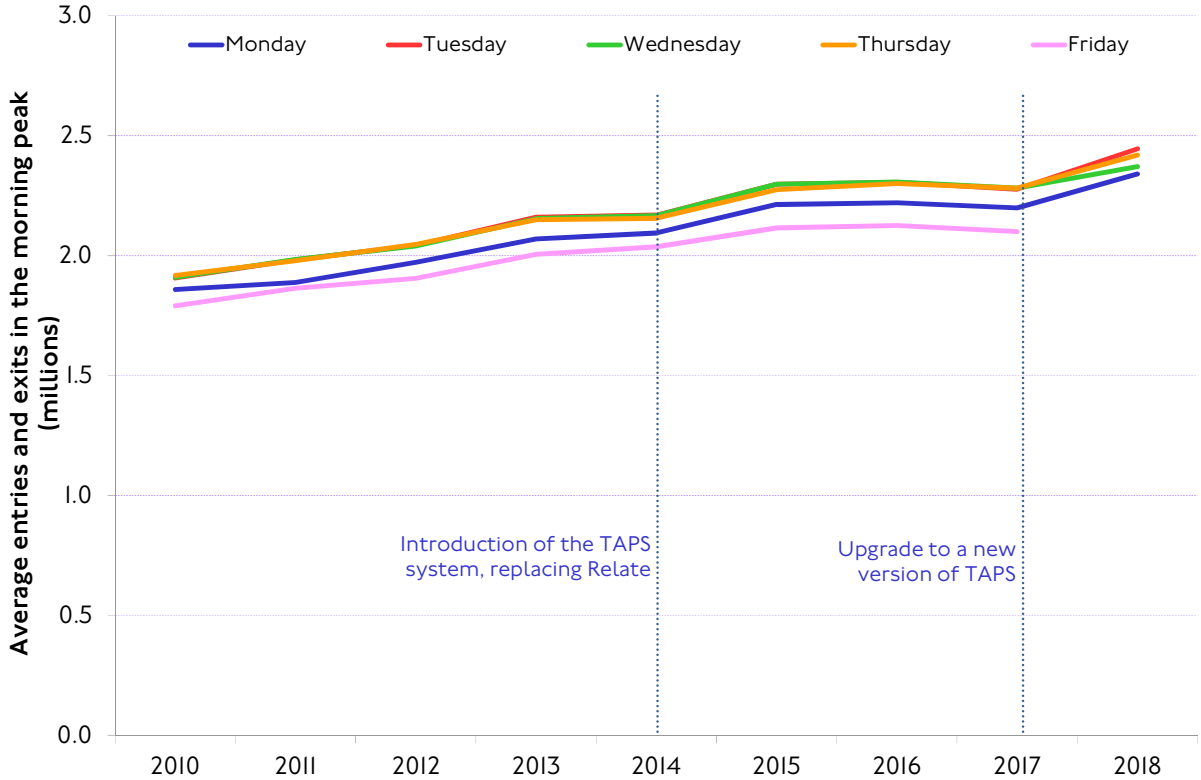
Source: TfL Public Transport Service Planning.

The main findings are that:

- In terms of relative share of the weekly total, demand on the Friday morning peak has always been lower than any of the other weekdays. Monday mornings are also noticeably quieter than the days in the middle of the week, while the mid-week days have followed almost identical trends over the years.
- Accounting for several known discontinuities in the available data, the general trend seems to be that the relative 'weight' of the morning peak, in terms of its proportionate contribution to the weekly total, has decreased for all days of the week over the study period. However, this decline has been of greater magnitude on Fridays and Mondays.

What this means in absolute terms, as shown in figure II.22, is that the demand on Fridays has grown slower than other days of the week, and in particular the mid-week days (Tuesday, Wednesday and Thursday) have grown the strongest. This also implies that the mid-week morning peak has never been busier than it is now.

Figure II.22 Average morning peak London Underground entries and exits on a representative autumn period by day of the week, 2010-2018.



Source: TfL Public Transport Service Planning.

Similar analysis can be done for the **other time periods**. The key findings are that:

- **Early morning** (05:00-07:00): The proportionate share of the weekly total in this period has increased substantially since 2010 on all weekdays. However, Fridays and Mondays have always been relatively lower, as was the case in the morning peak.
- **Inter-peak** (10:00-16:00): Fridays have always been the busiest weekday (in terms of their relative contribution to the weekly total), while Mondays are the quietest. Furthermore, over the study period all weekdays have seen a decrease in their relative contribution to the weekly total.
- **PM peak** (16:00-19:00): The relative share of the weekly total is markedly lower on Mondays than on any other weekday, but the differences among the other weekdays are less clear and have varied over time. In the long term, however, there seems to have been a slow decline in the proportionate share of the weekly total in this time period since 2010, but there are signs of recovery in the latest year.
- **Evening** (19:00-22:00): Unsurprisingly, Fridays are the weekday when the proportionate contribution to the weekly total in the evening period is highest. On the other hand, Monday evenings are the quietest in terms of this same metric. Over time there does not seem to have been much net change in this time period on any weekday, in terms of the relative share of the weekly total.
- **Late evening** (22:00-00:00): A similar pattern to the evening is seen in this period, but the relative differences between Fridays (busiest) and Mondays (quietest) are higher, and so are the differences between each of the other days. Since 2010, there seems to have been a slow decline in the proportionate

contribution to the weekly total of this time period for all days of the week. However, when looking at the whole day profile, it is observed that the so-called 'late evening peak', which occurs at around 22:30, has become more pronounced on all weekdays, probably due to the steady growth of the night-time economy.

- **Night** (00:00-05:00): The most striking change in this time period is due to the introduction of the Night Tube on Friday (and Saturday) evenings, which has made the proportionate share over the whole week much higher on Fridays than on any other day of the week. In terms of this same metric, Mondays are still the quietest during the night period, but not too different from Tuesdays or Wednesdays, while Thursdays are noticeably higher than any of these three weekdays. The net changes since 2010 are rather small.

Saturdays and Sundays have been analysed separately because they present quite a distinct daily demand profile from the weekday pattern. However, this profile is somewhat similar between the two weekend days, with a very small and short peak in the morning at around 07:30 and then a long midday peak, typically between 10:00 and 19:00. On Saturdays, however, that midday peak is less flat and it is possible to observe two smaller peaks, one between approximately 12:00 and 15:00 and another one from 16:00 to 19:00. In the evenings, Saturdays also have the 'late evening peak' that is seen on weekdays and since the introduction of Night Tube in 2016, it sees demand through the night, unlike Sundays.

Over time since 2010, absolute demand on both Saturdays and Sundays has increased but this growth seems to have been fairly uniform throughout the day (again with the exception of Night Tube), so the shape of the profile has not substantially changed other than because of the late evening peak on Saturday becoming more pronounced, as also happened on weekdays.

There has been however one interesting change in that while in 2010 the demand on weekends was always below that of the corresponding weekdays, in recent years there are several times of the day (notably during the weekday inter-peak) where the demand on Saturdays and Sundays is greater than that of the weekdays at those same times. This has implications for service planning, for example where replicating the weekday off-peak service patterns on the weekends may not be suitable anymore. In terms of planning capacity enhancements for major upgrades, however, the weekday morning peak, and increasingly the evening peak, continue to be the busiest times and hence those that continue to put the highest pressure on the network.

12. Public transport: service provision and operational performance

12.1 Introduction

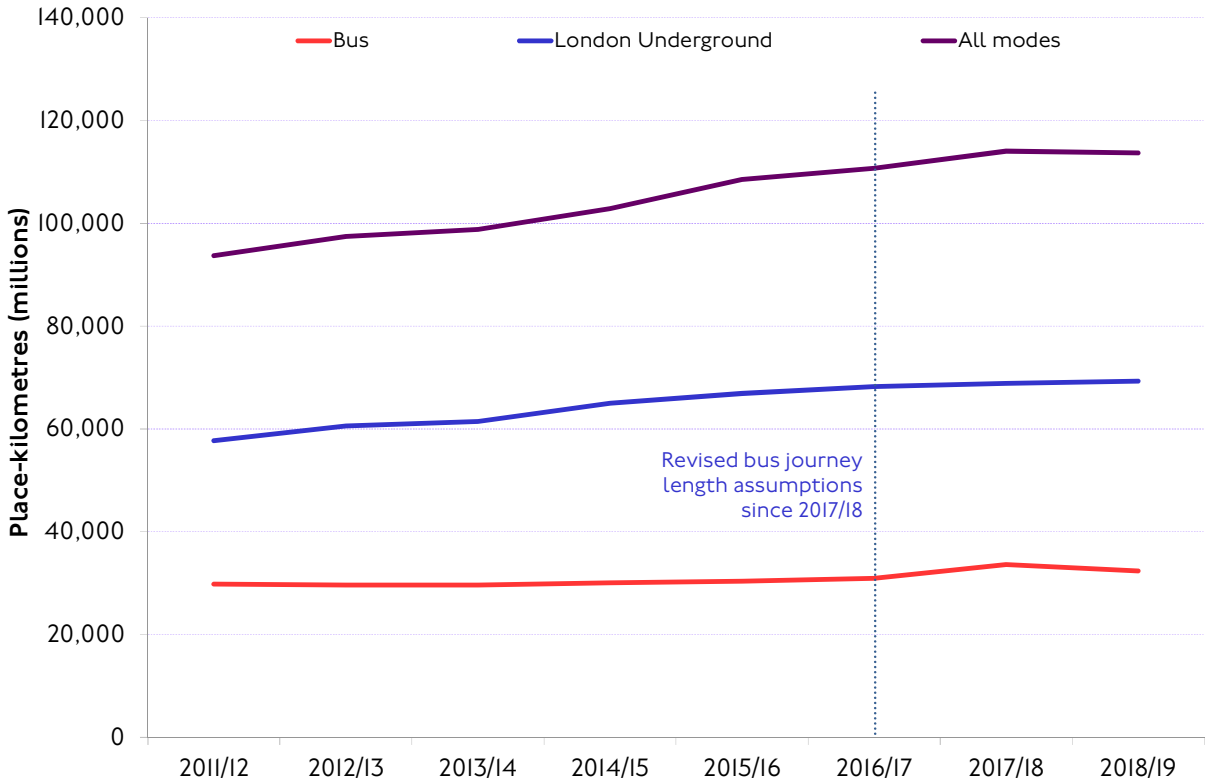
This chapter examines some key operational indicators of service provision, capacity, performance and reliability which underpin the experience of the public transport networks for all passengers and contribute to create an attractive, safe, reliable, comprehensive and accessible public transport network in line with the Mayor's aims.

12.2 Overall capacity provided by the public transport networks and recent demand trends

Capacity of the public transport networks

As shown in figure 12.1 and table 12.1 (where only the main modes are displayed), TfL public transport networks (excluding TfL Rail) have seen an increase in capacity in terms of total place-kilometres offered for most of the current decade, although capacity declined slightly (by 0.3 per cent) in 2018/19 compared to the previous year. That decrease was largely driven by a reduction of 3.7 per cent in bus place-kilometres, likely owing to the recent consolidation of bus services into fewer routes, particularly in central London. There was also a 1.9 per cent decrease in London Trams capacity. Longer-term comparisons are harder to establish because in 2017/18 there was a change in the methodology to calculate bus capacity, following a review of the bus occupancy assumptions.

Figure 12.1 Capacity on the main public transport modes (excluding TfL Rail and National Rail), 2011/12-2018/19.



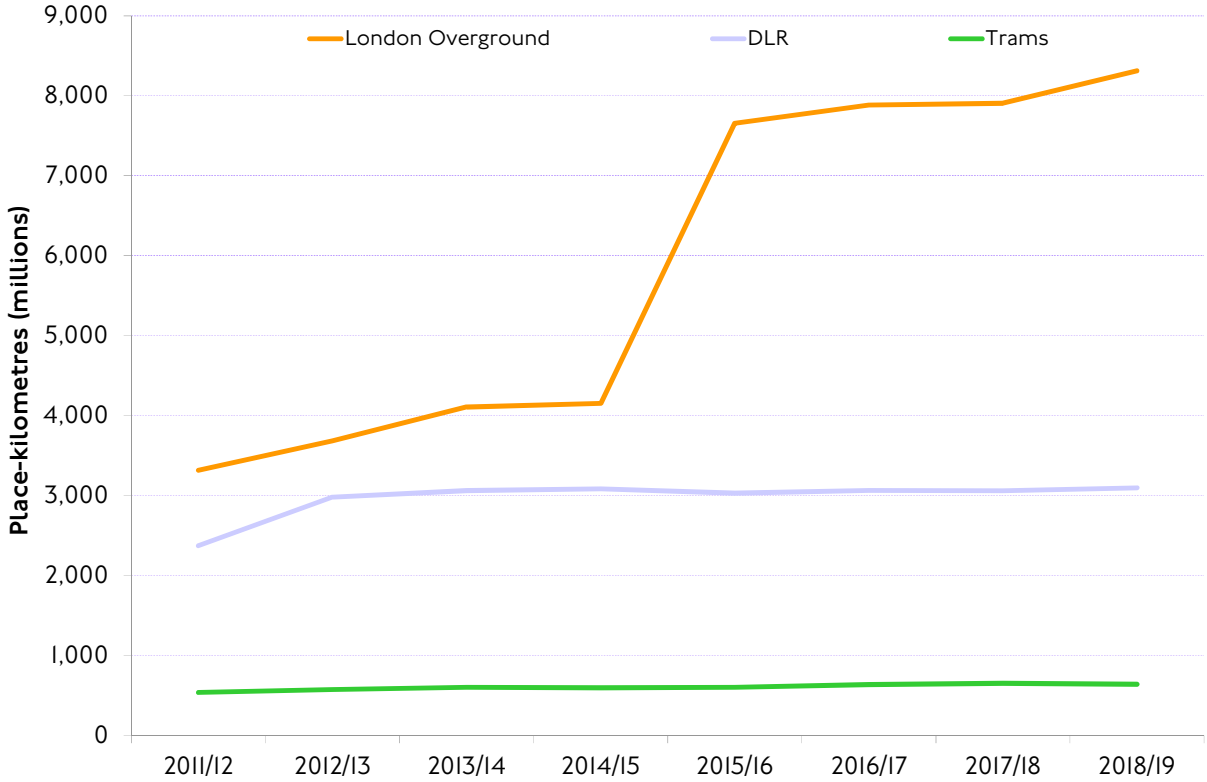
Source: Strategic Analysis, TfL City Planning.

Table 12.1 Capacity (million place-kilometres) provided by the principal public transport modes, 2009/10-2018/19.

Year	Bus	London Underground	London Overground	DLR	London Trams	Total
2009/10	29,311	54,921	31	1,824	515	86,602
2010/11	29,175	54,567	1,788	2,104	534	88,168
2011/12	29,804	57,694	3,317	2,371	536	93,722
2012/13	29,626	60,572	3,686	2,980	574	97,439
2013/14	29,605	61,461	4,106	3,061	599	98,832
2014/15	30,057	65,010	4,153	3,083	596	102,899
2015/16	30,386	66,880	7,654	3,029	601	108,550
2016/17	30,903	68,224	7,885	3,065	634	110,711
2017/18	33,602[1]	68,844	7,906	3,060	653	114,066
2018/19	32,360[1]	69,310	8,312	3,096	640	113,718

Source: Strategic Analysis, TfL City Planning.
Note: Values for all rail modes consistently represent capacity using a uniform standing density assumption of 4 people per square metre. They differ from equivalent values published in reports prior to Travel in London report 11.
1. Since 2017/18, a new methodology to calculate bus capacity is used, and therefore these values are not directly comparable with previous years.

Figure 12.2 Capacity on other TfL modes, 2011/12-2018/19.



Source: Strategic Analysis, TfL City Planning.

Figure 12.2 shows the trend for other modes. While DLR and London Trams capacity have not changed much (the former increasing by 1.2 per cent, the latter decreasing by 1.9 per cent in the year to 2018/19), London Overground services in 2018/19 have seen a 5.1 per cent increase in place-kilometres from the previous

year. However, in absolute terms, the overall contribution of all these modes to the total public transport capacity is still much lower than that of buses or Underground.

Relationship between public transport demand and supply

During the first half of the 2010s (until 2014/15), public transport demand measured in passenger kilometres grew slightly faster than supply (in terms of place-kilometres). This trend reversed after that and in the next two years (up to 2016/17) demand flattened and supply grew at a slightly faster rate.

From that point on it is not possible to establish fair comparisons using that same 2009/10 base for the index, because from 2017/18 there was a change in the methodology used to calculate both bus demand (new assumptions about average bus journey length) and supply (new assumptions about average occupancy) that introduced a break in the time series.

To avoid this problem, a new series has been derived in table 12.2 with a 2017/18 base. This shows that in the year to 2018/19 total public transport demand on TfL's main modes increased slightly (by 1.2 per cent) while supply saw a small 0.3 per cent decline, thus starting to reduce the gap accumulated over the previous three years.

Table 12.2 Comparison of demand and supply trends on TfL's principal public transport networks (excludes TfL Rail, National Rail, Emirates Air Line, and River Services), 2009/10-2018/19.

	Index (2009/10 = 100)		Index (2017/18 = 100)	
Year	**Demand**	**Supply**	**Demand**	**Supply**
2009/10	100	100	-	-
2010/11	104	102	-	-
2011/12	108	108	-	-
2012/13	113	113	-	-
2013/14	117	114	-	-
2014/15	120	119	-	-
2015/16	124	125	-	-
2016/17	126	128	-	-
2017/18	-	-	100.0	100.0
2018/19	-	-	101.2	99.7

Source: Strategic Analysis, TfL City Planning.

12.3 Service provision and operational performance: Bus

As shown in table 12.3, London Buses operated some 480 million bus-kilometres in 2018/19, which is slightly below (by 2.2 per cent) the operated kilometres in the previous year. This is due to a small reduction in the scheduled capacity. The record proportion of 98.1 per cent operated kilometres of those scheduled achieved in 2017/18 was maintained in 2018/19, and further improved with a small reduction in the proportion of capacity lost to traffic congestion, while maintaining average bus speeds.

Table 12.3 Overall bus service provision and reliability, 2008/09-2018/19.

		Percentage of scheduled kilometres...			
Year	Scheduled kilometres (millions)	...operated	...lost due to traffic congestion[1]	...lost due to other causes[2]	Speed (mph)
2008/09	492	97.0	2.3	0.7	
2009/10	497	97.1	2.3	0.6	
2010/11	499	97.4	2.1	0.5	
2011/12	502	97.6	1.9	0.5	
2012/13	503	97.6	1.7	0.7	
2013/14	502	97.7	1.9	0.4	9.6
2014/15	504	97.1	2.0	0.9	9.5
2015/16	507	97.2	2.3	0.5	9.3
2016/17	508	97.4	2.0	0.6	9.2
2017/18	500	98.1	1.4	0.5	9.3
2018/19	489	98.1	1.3	0.5	9.3

Source: London Buses.
1: Also includes other lost kilometres outside the control of the operator.
2: Includes all lost kilometres within the control of the operator.

Table 12.4 Bus punctuality and reliability by service type, 2008/09-2018/19.

	Average wait time[1] (min) on high-frequency services[2]		Customer journey time (min) on high-frequency services	Percentage of timetabled services on time[3] on low-frequency services[4]
Year	Actual	Excess		
2008/09	5.5	1.1		80.8
2009/10	5.5	1.1		80.5
2010/11	5.4	1.0		81.4
2011/12	5.4	1.0		83.2
2012/13	5.9	1.0		83.6
2013/14	5.9	1.0		82.5
2014/15	6.0	1.1		81.8
2015/16	6.1	1.2		80.6
2016/17	6.1	1.1		80.1
2017/18	6.0	1.0	32.4	82.3
2018/19	6.1	1.0	32.5	82.3

Source: London Buses.
1. The rise in AWT in 2012/13 reflects the move to a greatly expanded QSI monitoring system for high frequency routes from PI 12/13. This figure is now based on continuous monitoring between 0500-0000 hours at an expanded number of locations. Scheduled levels of service are lower at additional times of day not previously monitored such as late evenings and Sunday mornings.
2. High frequency services are those operating with a scheduled frequency of five or more buses an hour.
3. Buses are defined as 'on time' if departing between two and a half minutes before and five minutes after their scheduled departure times. Results for low frequency routes from 2013/14 reflect the move to a greatly expanded QSI system for monitoring this group of routes.
4. Low frequency services are those operating with a scheduled frequency of fewer than five buses an hour.

Table 12.4 shows some punctuality and reliability indicators for high- and low-frequency bus routes. It shows that in 2018/19 the picture was broadly similar to the previous year.

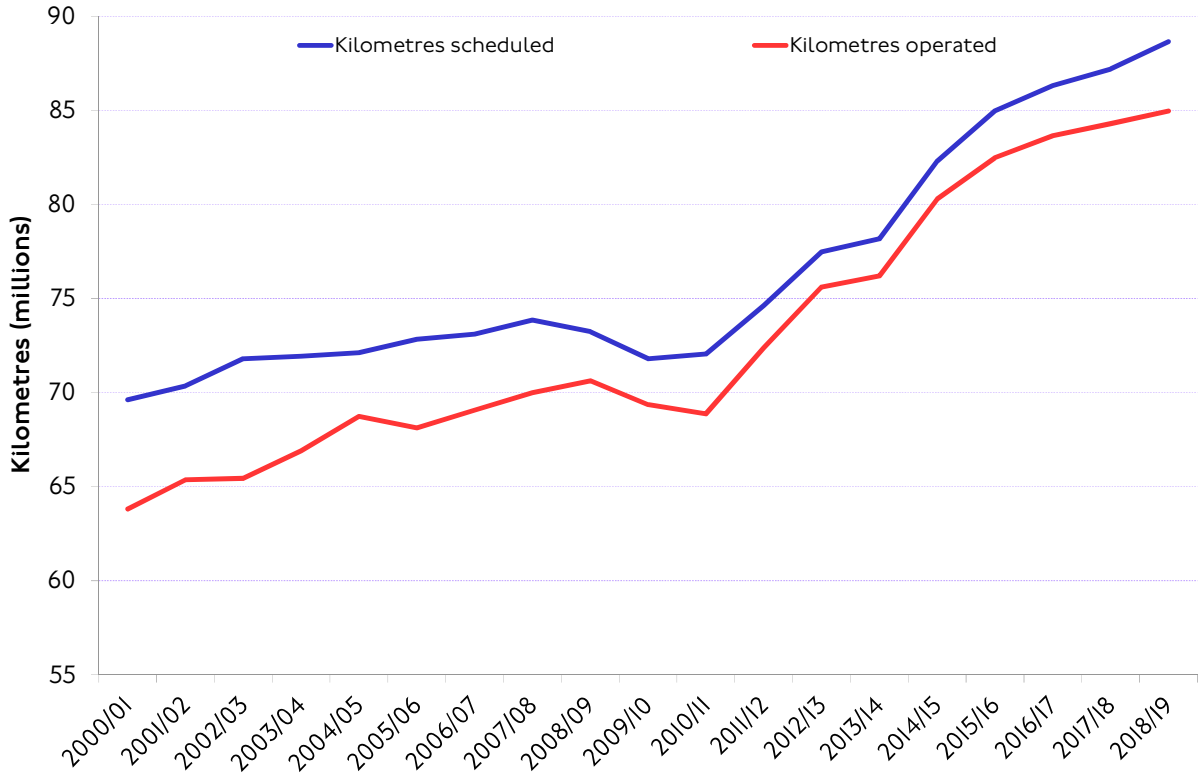
This table also includes the new bus customer journey time metric, introduced in 2017/18, which aims to better capture the customer experience on high-frequency bus routes by taking into account all components of the journey time (in-vehicle time, wait time and interchange time) and its variability (including planning buffers) as well as the different value of time weightings of each journey component, eg for crowding. It is presented as a network-level weighted average for all high-frequency bus routes.

12.4 Service provision and operational performance: London Underground

The trend of increasing capacity on the London Underground initiated in 2009/10 continued in 2018/19, when scheduled kilometres increased by 1.7 per cent from the previous year (figure 12.3). Over the same period, operated kilometres also increased, albeit at a lower rate (0.8 per cent). In absolute terms, these are both record levels of service provision.

These trends should be interpreted in the context of a network that is limited and largely static in its extent, and hence this reflects high levels of optimisation of the network capability supported by ambitious upgrade programmes.

Figure 12.3 London Underground train kilometres scheduled and operated, 2000/01-2018/19.



Source: London Underground.

A summary of some key performance indicators is presented in table 12.5. It shows that the proportion of scheduled kilometres that were actually operated decreased slightly in 2018/19 with respect to the previous year. However, at 95.8 per

cent it still falls behind the record levels achieved a few years ago, although in absolute terms the operated kilometres have continued to increase. All other metrics have remained broadly unchanged over the last year.

Table 12.5 London Underground service provision, reliability and journey times, 2008/09-2018/19.

Year	Train kilometres scheduled (millions)	Percentage of scheduled kilometres operated	Average actual journey time (min)	Average generalised (weighted) journey time (min)	Excess journey time (weighted) (min)	Excess as % of generalised journey time
2008/09	73.2	96.4	27.5	43.9	6.6	15.1
2009/10	71.8	96.6	27.7	44.1	6.4	14.5
2010/11	72.1	95.6	28.0	44.6	6.5	14.6
2011/12	74.6	97.0	27.5	45.1	5.8	12.9
2012/13	77.5	97.6	26.8	43.6	5.3	12.1
2013/14	78.2	97.5	26.8	43.4	5.2	12.0
2014/15	82.3	97.6	26.5	42.3	4.6	11.0
2015/16	85.0	97.1	26.3	41.7	4.6	11.0
2016/17	86.3	96.9	26.2	41.7	4.7	11.0
2017/18	87.2	96.7	26.1	41.6	4.6	11.2
2018/19	88.7	95.8	26.1	41.6	4.6	11.0

Source: London Underground.
1. Excess journey time is the difference between actual journey time and that expected if services run to time, weighted to reflect how customers value time.

12.5 Service provision and operational performance: London Overground and TfL Rail

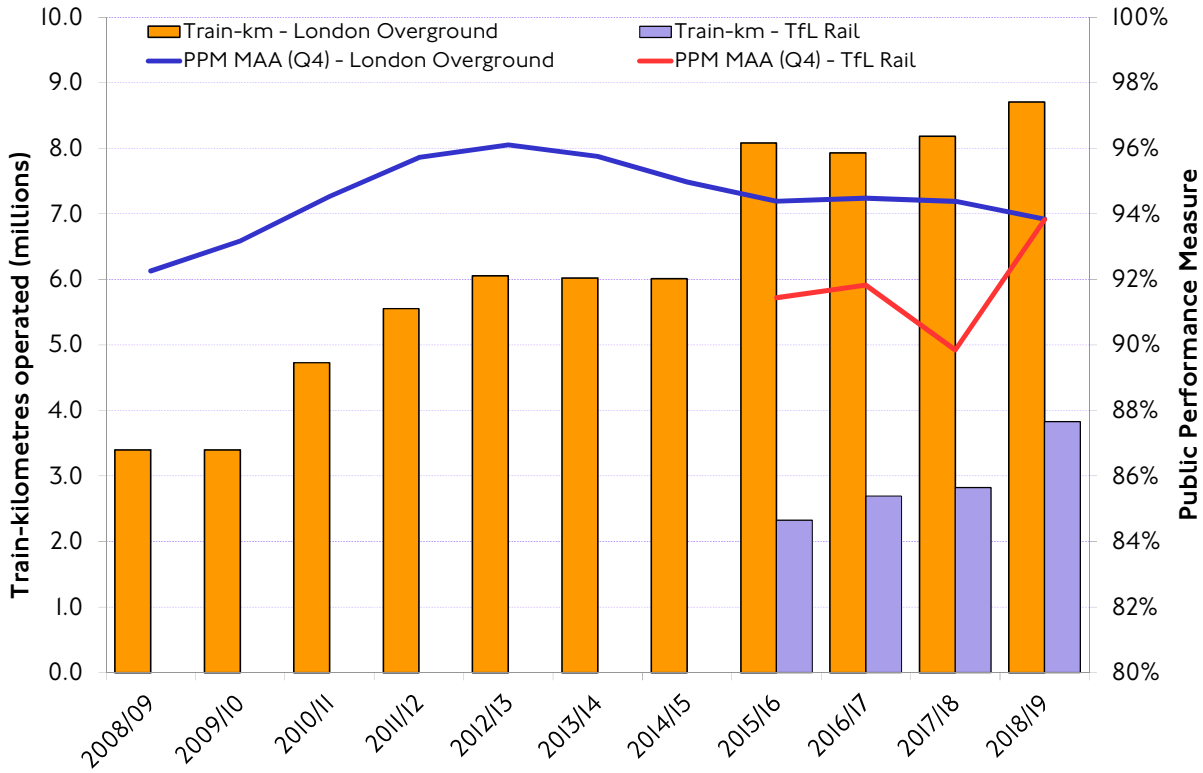
Indicators of service provision (train kilometres operated) and performance (the Public Performance Measure – PPM) for London Overground and TfL Rail services are shown in figure 12.4.

The Public Performance Measure is a metric that combines punctuality and reliability to represent the proportion of all scheduled trains that are 'on time', which for operators in the London and South East region (to which London Overground and TfL Rail belong) means arriving at the destination no later than five minutes after the scheduled arrival time.

In 2018/19, the operated train kilometres on London Overground increased by 6.4 per cent from the previous year, while on TfL Rail services this increase was above 35 per cent, due to the extension of the network to include services into Heathrow since May 2018. These trends build upon a long-term, mostly stepped increase in service provision on these networks that have been significantly expanded and upgraded since they started operating.

In terms of performance, the PPM for London Overground declined slightly in 2018/19 (by half a percentage point) but still remains well above 90 per cent. On TfL Rail services, the PPM in 2018/19 was much improved with respect to what was previously recorded but year-on-year comparisons are challenging due to the changes in the extent of the network.

Figure 12.4 London Overground and TfL Rail service provision and reliability (moving annual average of the Public Performance Measure at quarter four each year), 2008/09-2018/19.



Source: Office of Rail and Road.

12.6 Service provision and operational performance: Docklands Light Railway (DLR)

Table 12.6 summarises some performance indicators for the DLR. The number of train kilometres operated in 2018/19 increased very slightly (by 0.4 per cent) with respect to the previous year, thus reaching another record level of service provision. It is worth noting that this is partly because 2017/18 was affected by a two-day strike in March 2018 and a shortage of serviceable vehicles, which meant that although most train services were maintained, some of those were operating in a 2-car rather than a 3-car formation.

The proportion of scheduled services actually operated also increased by 0.6 percentage points, thus suggesting improved reliability. However, it is important to acknowledge that this proportion is based on the planned schedule for each day and as such does not capture the impact of planned closures, because the metric is calculated from the amended timetable.

The year 2018/19 also saw a small reduction in the excess waiting time, down to 0.09 minutes.

Table 12.6 DLR service provision and reliability, 2008/09-2018/19.

Year	Kilometres operated (millions)	Percentage of scheduled services operated	Percentage of trains on time	Excess waiting time (min)
2008/09	3.9	98.4	94.6	
2009/10	4.6	97.2	94.8	
2010/11	4.7	97.5	97.4	
2011/12	4.9	97.7	97.5	0.23
2012/13	5.7	98.5	98.8	0.14
2013/14	5.8	99.2	99.3	0.08
2014/15	5.8	99.3	n/a	0.07
2015/16	5.9	98.5	n/a	0.09
2016/17	6.0	99.0	n/a	0.10
2017/18	6.1	98.4	n/a	0.11
2018/19	6.1	99.0	n/a	0.09

Source: Docklands Light Railway.

12.7 Service provision and operational performance: London Trams

As shown in table 12.7, service provision on London Trams declined slightly in 2018/19 both in terms of tram-kilometres scheduled and operated (by 1.9 per cent in both cases). However, reliability measured as the proportion of operated services compared to that scheduled was maintained at 98.5 per cent.

Table 12.7 London Trams service provision and reliability, 2008/09-2018/19.

Year	Scheduled kilometres (millions)	Operated kilometres (millions)[1]	Percentage of scheduled services operated
2008/09	2.70	2.66	98.5
2009/10	2.62	2.60	99.2
2010/11	2.72	2.70	99.2
2011/12	2.74	2.71	98.9
2012/13	2.98	2.90	97.3
2013/14	3.06	3.03	98.9
2014/15	3.03	3.01	97.9
2015/16	3.07	3.04	99.0
2016/17	3.30	3.20	97.1
2017/18	3.35	3.30	98.5
2018/19	3.28	3.23	98.5

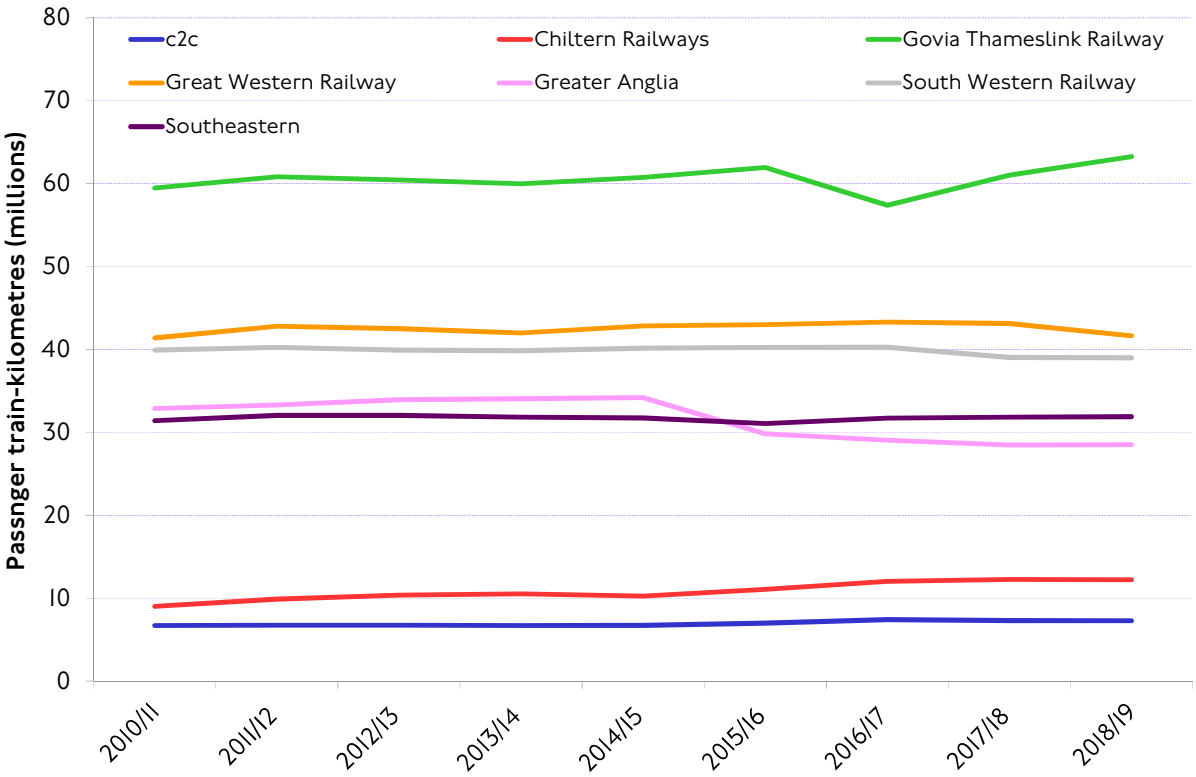
Source: London Trams.
1. Operated kilometres exclude replacement bus services operated during period of track repair works.

12.8 Service provision and operational performance: National Rail

A summary of the train capacity provided by National Rail operators in the London region is provided in figure 12.5. In general, the picture over the last decade has been fairly static, with only small changes for most operators.

In the last few years, capacity on most operators has remained fairly stable with the exceptions of Govia Thameslink Railway, which in 2018/19 saw an increase of 3.6 per cent in train kilometres operated on the previous year, thus building upon a strong growth trend since 2016/17 likely due to the completion of successive stages of the Thameslink Programme; and Great Western Railway, which saw a 3.4 per cent decline in capacity in the year to 2018/19, owing mainly to the transfer of services between Paddington and Hayes & Harlington to TfL Rail.

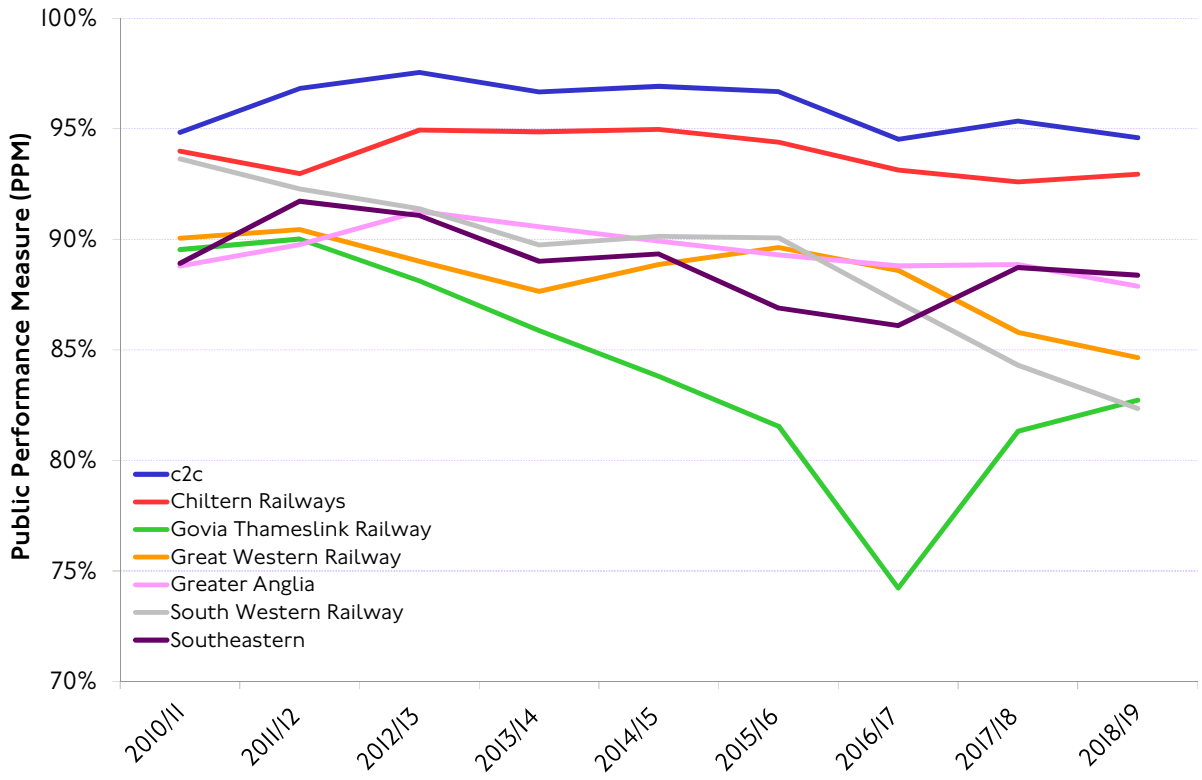
Figure 12.5 Service provision (train kilometres) on franchised London and South East operators, 2010/11-2018/19.



Source: Office of Rail and Road.

For those same operators, figure 12.6 summarises the trend in PPM over the last few years. Note that the 'base' value of the graph axis is 70 per cent. The trajectory has been different for each operator but in general none of them have been able to return to the typically higher performance levels of the beginning of the decade, and only Chiltern Railways and Govia Thameslink Railway have seen improvements in the most recent year. However, it should be noted that several changes in the franchises over the last few years (notably the incorporation of Southern and Gatwick Express services to the Govia Thameslink Railway franchise in 2015) make it difficult to establish equivalent comparisons over time.

Figure 12.6 Performance (moving annual average of the Public Performance Measure at quarter four each year) on franchised London and South East operators, 2010/11-2018/19.



Source: Office of Rail and Road.

12.9 Public transport crowding

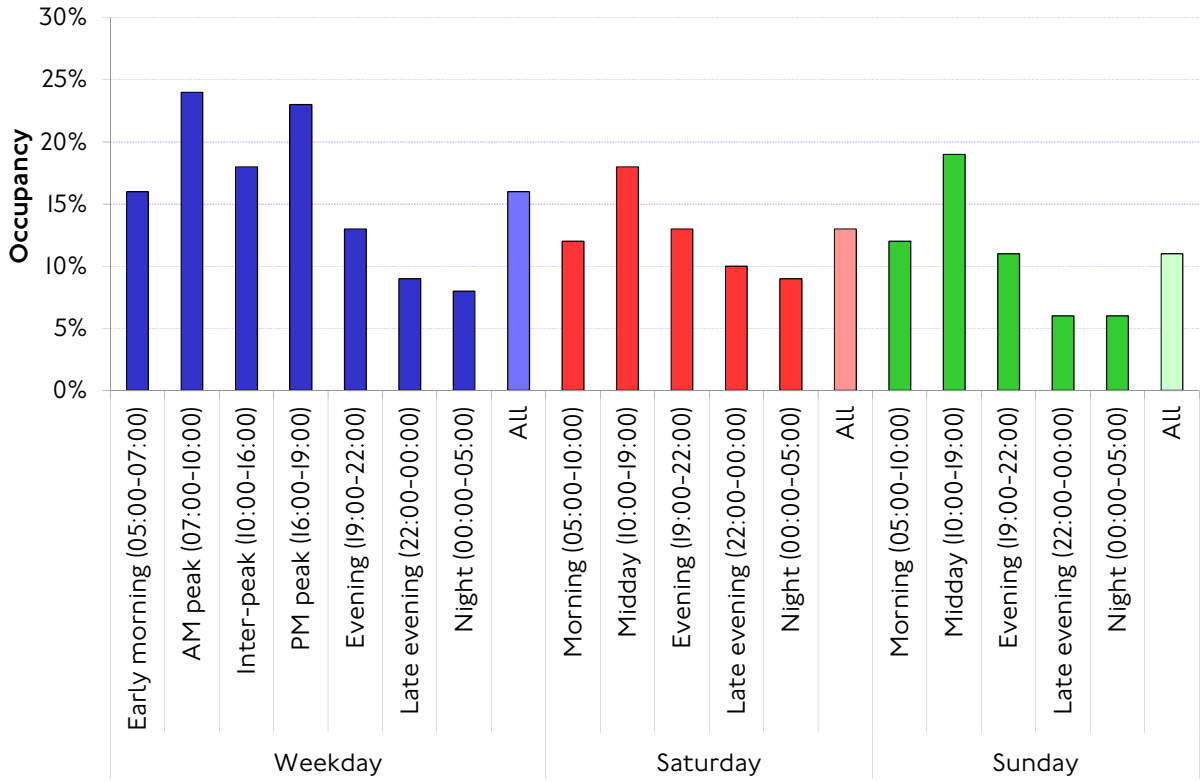
Crowding occurs when the demand for a service exceeds a certain level of comfort and it is a main driver of customer satisfaction on public transport. However, it can also have a significant impact on reliability and service performance. Crowding is a very subjective experience and each person perceives it differently and may be affected more or less severely by it depending on their circumstances. However, it is often monitored using 'objective' metrics based on occupancy or standing passenger density.

Travel in London report 11 provided a comprehensive review of the existing crowding data available for each public transport mode and described strategic trends in crowding over time for each of those modes. This section provides an update of some indirect crowding indicators on the main public transport modes.

Crowding on buses

Over the last year, a new tool to analyse bus travel demand on a typical autumn day has been developed that allows the calculation of a network-level estimate of bus occupancy by time of day. Results from 2018 are provided in figure 12.7. Unfortunately, given the newness of the tool, there is no historic series for these measures.

Figure 12.7 Average occupancy on the entire bus network by time of day, 2018.



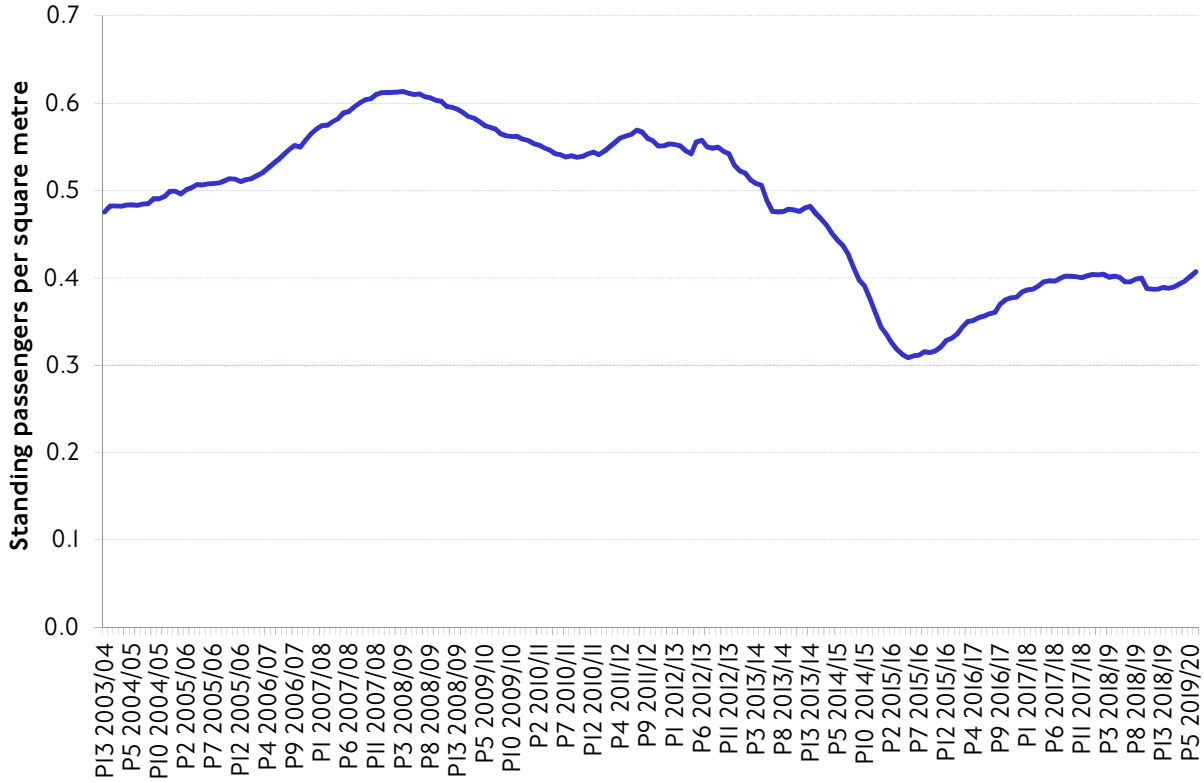
Source: TfL Public Transport Service Planning.

This figure shows relative differences in occupancy across a typical week. Besides the expected results of crowding being highest during the weekday peaks, it is interesting that the weekend midday peaks see similar or higher crowding at a network level than the weekday inter-peak. This needs to be seen in the context of different service frequencies and service patterns on the bus network at different times in the week, and also considering that crowding varies spatially across London.

Crowding on London Underground

A way of analysing changes in crowding over time on the London Underground network is through its impact on the Journey Time Metric that is used for performance reporting, from which an implicit measure of crowding can be derived. The results up to the most recent TfL financial four-week period are shown in figure 12.8.

Figure 12.8 Trend in London Underground crowding, 13-period moving average, 2003/04-2019/20.



Source: TfL Public Transport Service Planning.

Tube improvements led to a significant reduction in crowding up to 2016, however since then, aggregate levels of crowding have shown a generally increasing trend. There are currently significant capacity pressures on the network in particular places and at particular times. Although the forthcoming Elizabeth line will provide some relief on some corridors, as is shown in Chapter 14 of this report, the impact on crowding relief will be temporary, and crowding is expected to return to, and then exceed, contemporary levels before 2030.

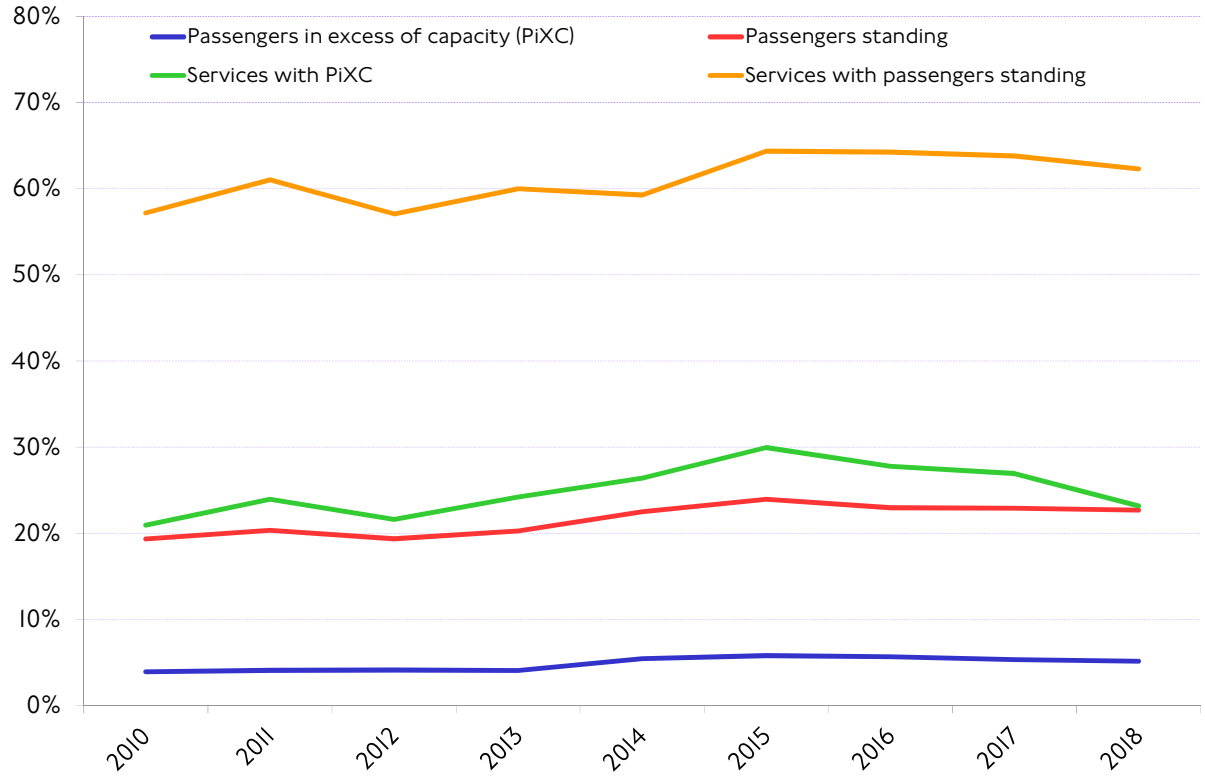
Crowding on National Rail services in London

The Department for Transport uses the Passengers in Excess of Capacity (PiXC) metric, which represents the difference between capacity and actual demand, to monitor crowding on National Rail services.

Figure 12.9 shows the trend for this and other metrics over the last few years. The PiXC metric has been declining slowly since 2015, but at currently 5.2 per cent it is still slightly above the 2010 level of 4.0 per cent. All other metrics have followed similar trends, ie crowding on National Rail has improved slightly in recent years.

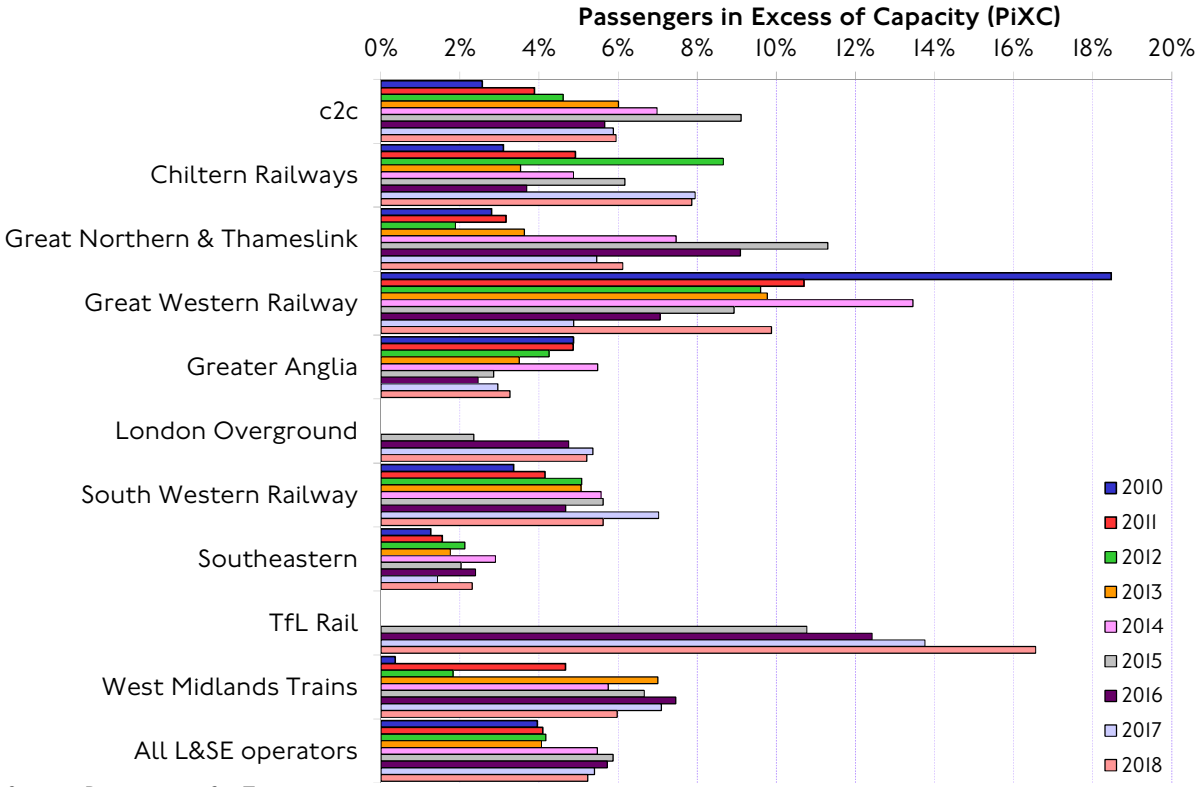
In 2018, the trend of decreasing PiXC across London and South East operators continued with another slight reduction, but is still above the historic average at the beginning of the decade. Reductions in PiXC in 2018 were seen on some operators, namely Southern, South Western Railway, West Midlands Trains and London Overground. Chiltern Railways and c2c saw almost no change while the remaining operators saw an increase in PiXC (figure 12.10).

Figure 12.9 Measures of crowding on National Rail services approaching London terminals in the weekday morning peak (07:00 to 10:00), 2010-2018.



Source: Department for Transport.
Note: PiXC is calculated from observations on departure from the last stop before arrival at the relevant London terminal.

Figure 12.10 Passengers in excess of capacity (PiXC) for National Rail operators in London during the weekday morning peak, 2010-2018.



Source: Department for Transport.

13. Public transport: safety and the customer experience

13.1 Introduction

Customers need to be confident that the public transport networks are safe – both in terms of risk of injury from operational incidents, freedom from crime and fear of crime. This section reviews trends relating to customer injury and crime on the principal public transport networks. This year, the basis for reporting public transport safety statistics has been changed to align with, and be a summary of, those presented in our Health, Safety and Environment annual report for 2018/19, which contains further information, and can be found at the following link (see: http://content.tfl.gov.uk/tfl-hse-annual-report-2018-19.pdf).

TfL also measures various aspects of customer satisfaction with our services, and the latest trends are also summarised in this chapter, alongside indicators of physical accessibility to the public transport networks, recognising that shortcomings can limit journey opportunities or make journeys longer for some, and in recognition of the Mayor's aim to minimise these differentials as soon as possible.

13.2 Public transport safety

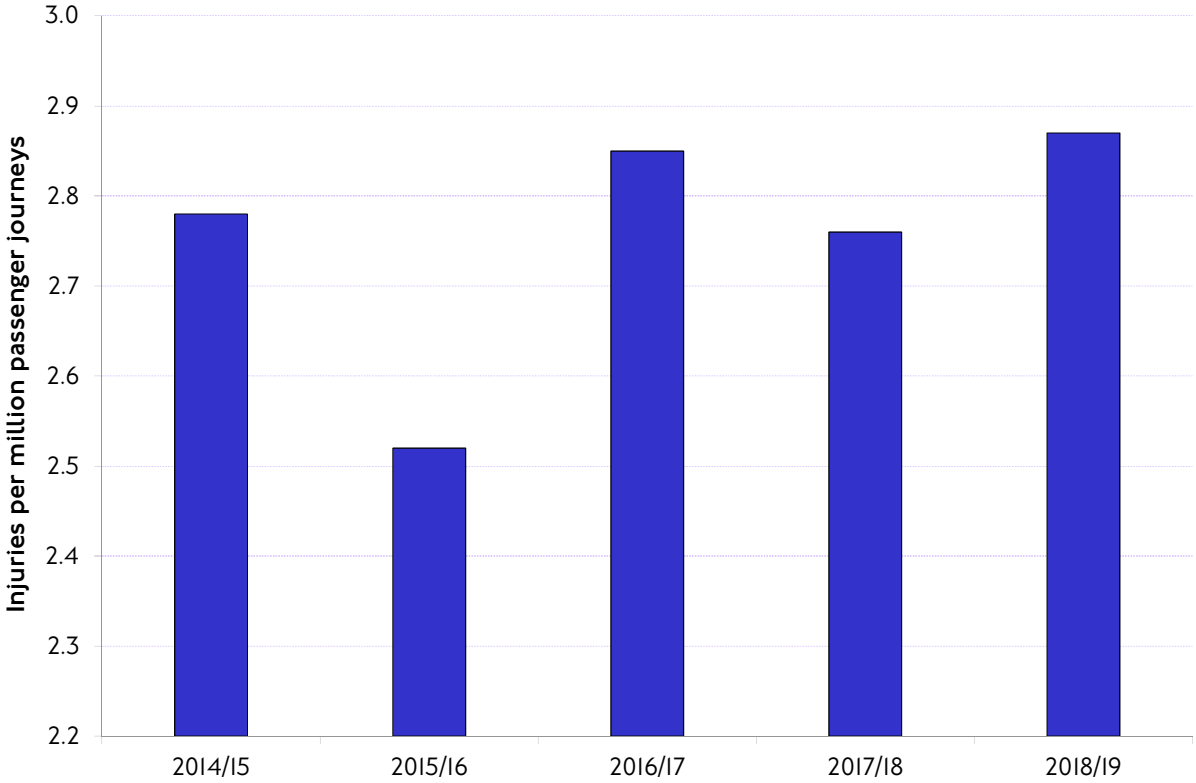
Customer injuries: Underground

During 2018/19, there were 3,968 injuries reported on the London Underground, an increase of 226 (6 per cent) from 2017/18. This represented 2.87 injuries per million passenger journeys in 2018/19, compared to 2.76 in 2017/18, an increase of 4 per cent (figure 13.1). There were increases in both minor and major injuries.

Customer injuries: bus

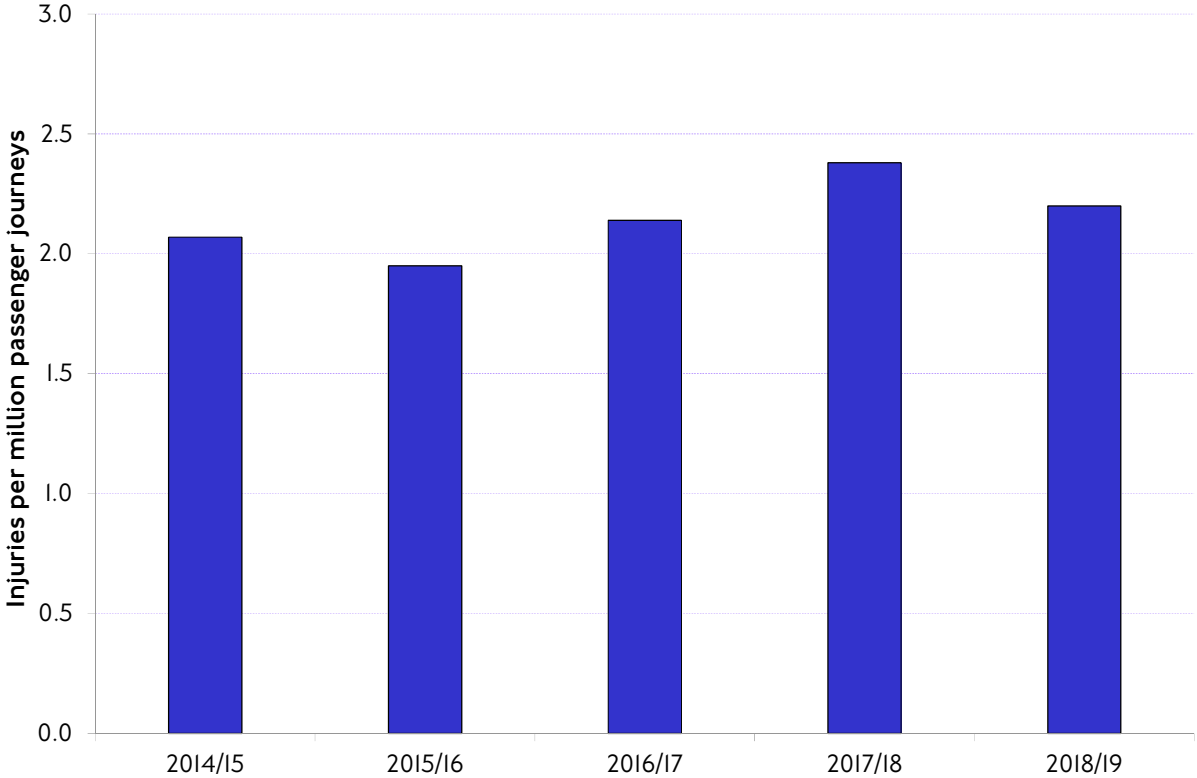
During 2018/19, there were 4,889 injuries reported on London's buses, a reduction of 459 (8.6 per cent) from 2017/18. This represented 2.2 injuries per million passenger journeys in 2018/19, compared with 2.38 in 2017/18 (figure 13.2). There were reductions in both minor and major injuries.

Figure 13.1 Customer injuries per million passenger journeys on London Underground, 2014/15-2018/19.



Source: TfL Health, safety and environment report, 2018/19.

Figure 13.2 Customer injuries per million passenger journeys on London buses, 2014/15-2018/19.

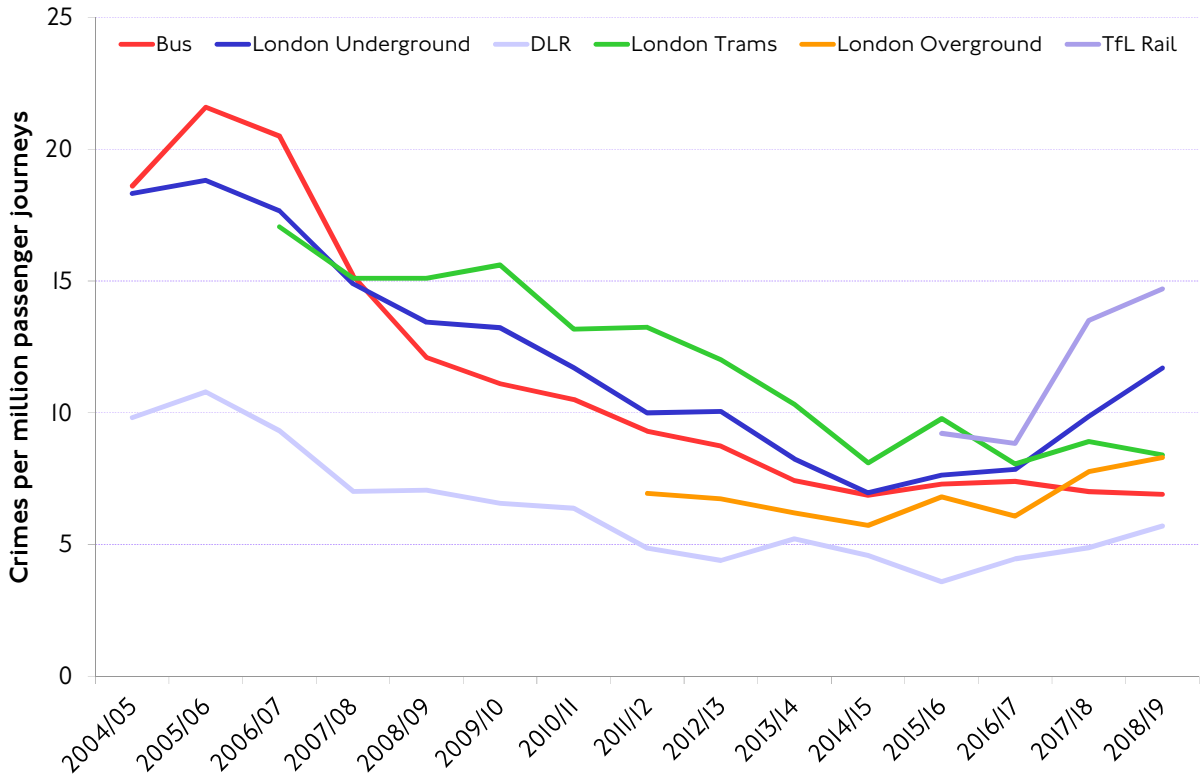


Source: TfL Health, safety and environment report, 2018/19.

13.3 Crime and antisocial behaviour

Public transport in London continues to be a low-crime environment, with crime rates substantially lower than those seen in the period 2005/06 to 2010/11. Currently, over ten million passengers travel on TfL's public transport services each day with very few of them ever experiencing or witnessing crime. In 2018/19, however, reported levels of transport crime increased on most modes (except bus and trams). However, it should be noted that comparability of reported crime statistics across years may be affected by initiatives to encourage greater reporting of crime, which has led to an increase in reporting also seen nationally (figure 13.3).

Figure 13.3 Reported crime on TfL's public transport networks, 2004/05-2018/19.



Source: TfL Enforcement and on-street operations.

Tackling transport crime and disorder is one of TfL's main priorities because crime, antisocial behaviour and the fear or crime can have a major effect on people's willingness to travel. Improving safety and security will help improve the quality of life and make London a fairer and more prosperous city. TfL is working with the British Transport Police to reduce crime and antisocial behaviour and to identify opportunities and areas for improvement so that Londoners feel safe travelling at any time of day or night.

Below are a few examples of measures that have been put in place to tackle crime on the network:

- High-visibility policing.
- Targeted action against offenders.
- Communications activities to encourage improved passenger behaviour in response to an increase in low-level violence and passenger aggression.

- Plain clothes police patrols to target thieves on buses and London Underground.
- Providing crime prevention advice to customers.
- A range of activity to tackle hate crime eg Operation Safer Travel for All, which seeks to reassure customers and give them practical information about what to do should they ever experience or witness hate crime. It also includes a communications campaign #WeStandTogether to reassure the travelling public that the network is safe and encourage them to report issues so action can be taken.

13.4 Public transport customer satisfaction and Care

Care and customer satisfaction are our primary measures for understanding the quality of the customer experience we deliver, from a customer perspective. They are complementary elements in determining how we are working for our customers, providing a rounded picture of our performance.

What is 'Care'?

'TfL cares about its customers' is the measure we use to understand whether we are meeting expectations and making Every Journey Matter for our customers. Care measures Londoners' overall perceptions of TfL, and is the best reflection of how we meet expectations during every interaction with us (eg all journeys, interactions with the Contact Centre, communications such as email updates), not just the last journey.

TfL tracks Care through an online survey, which asks a sample of Londoners every quarter about their opinions of TfL. An ongoing focus on Care will help us understand, in the short term, how we work for our customers and in the longer term, how to encourage greater use of active, efficient and sustainable modes.

The key influences on the Care score

Understanding the key influences, or drivers, of the Care score allows us to prioritise actions to improve the overall customer experience.

We used key drivers analysis to identify the key drivers of Care. These are:

- Supporting customers when things go wrong.
- Communicating openly and honestly.
- Providing good value for money for fare payers.
- Having friendly and helpful staff.
- Investing to improve journeys.

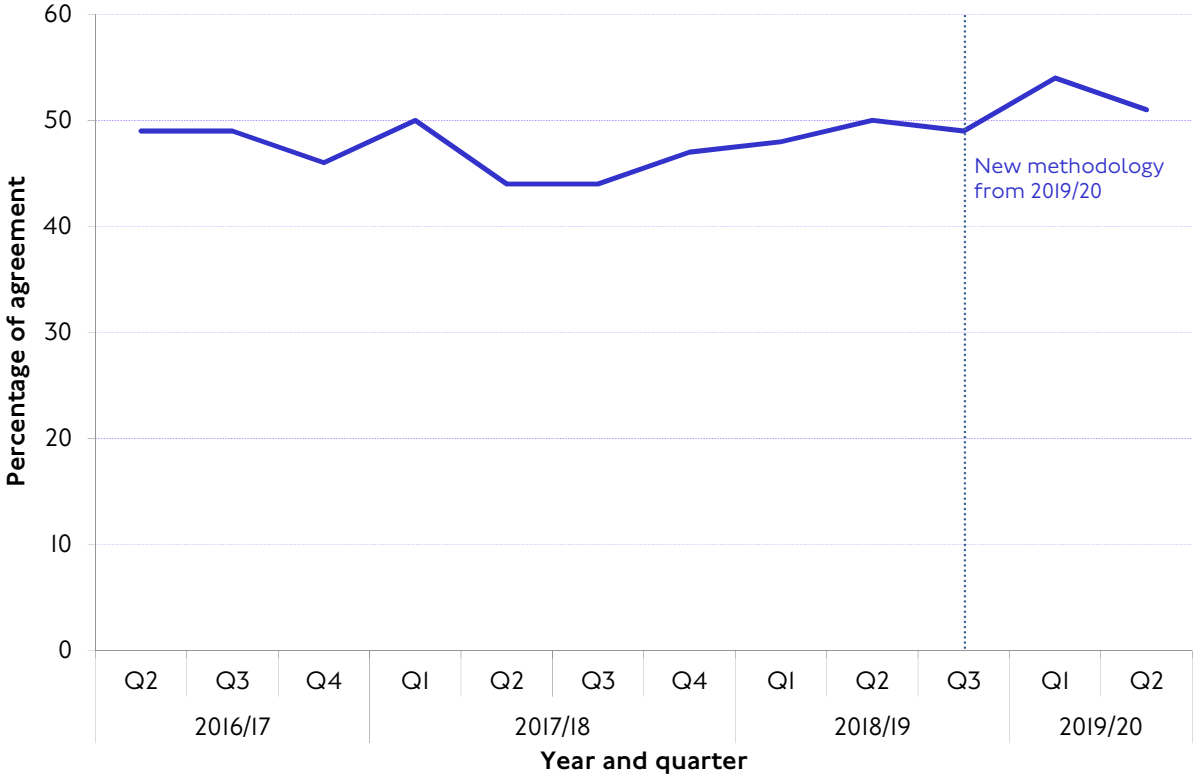
Supporting customers when things go wrong is the greatest driver of Care. When things go wrong on the network, our response, and how well supported customers feel, is crucial. The operational response to network problems is usually swift and effective but – while the problem is being fixed (a process usually invisible to customers) – our 'human' response is sometimes perceived as not being as strong, leaving customers feeling unsupported. Key aspects of demonstrating support include supporting customers with live information, empathising with customer needs and rectifying mistakes. Supporting customers also means taking preventative measures, such as providing advance information

about forthcoming engineering work or how customers can obtain best value for money, for example through fare capping.

Trend in Care scores

Figure 13.4 shows the recent trend for the Care measure since Q2 2016/17, in terms of the percentage of customers who agree that 'TfL cares about its customers'. Historically, the trend showed strong improvement between 2012 and 2014, but with improvements to the score plateauing since then. In broad terms, this is thought to reflect a particular focus on customer service improvements during the early period (eg the introduction of contactless payments and the commencement of the Night Tube), and a relative lack of visible innovations, and progress against rising customer expectations, over more recent years. Issues with strikes, reliability of London Underground and, particularly, bus services over this period are also thought to have been underlying factors affecting these scores.

Figure 13.4 Overall trend for agreement with the proposition 'TfL cares about its customers', 2016/17-2019/20.



Source: TfL Customer Research and Insight.
Note: Q4 2018/19 data not available due to data validity issues.

In Q1 2019/20, we transitioned to a new methodology to track customer perceptions of TfL, including 'TfL cares about its customers' to improve the quality of our insights. Our new methodology asks more Londoners (around 3,000, versus 1,000 previously) about their perceptions of TfL each quarter, providing us with more data and allowing us to better understand our performance and areas for improvement.

The transition to the new methodology has resulted in a new baseline for the Care metric and associated key drivers. In Q1 2019/20, 54 per cent of Londoners agreed 'TfL Cares about its customers'. This is higher than previous scores due to changes

to the methodology. Relative performance of the key drivers of Care remain the same with 'supporting customers when things go wrong' and 'communicating openly and honestly' our top priorities for improvement.

13.5 Impact of physical accessibility on journey times

Additional travel time required for those using the step-free network

Improving the accessibility of public transport is critical to delivering a better whole-journey experience for all Londoners, but in particular for those with specific physical accessibility needs. Currently, 45 per cent of disabled Londoners find planning and making trips on public transport stressful. A more accessible public transport system will improve the journey experience and make it easier for disabled and older people to travel more spontaneously and independently. It will also improve the quality of public transport for all travellers.

People with specific physical mobility needs can be disadvantaged in terms of trip making since not all of the public transport networks are fully accessible. In Travel in London report 10, figure 8.10 showed how the connectivity provided by the step-free rail network is considerably less than the full rail network. Using the more limited step-free network can often result in longer, more time-consuming journeys or, in some cases, may mean that the trip cannot be made on public transport. This can further contribute to social and economic disadvantage for these people. TfL is working to improve this situation, with a Mayoral aim to halve the additional journey time required by those using the step-free network only so that journey times on the step-free network become more closely comparable to those on the wider public transport network.

In 2018/19, an average journey using only bus and step-free stations was estimated to take 9 minutes longer than the average by the fastest available route, as shown in table 13.1.

Table 13.1 Comparison of average journey time by fastest available route and step-free network only, current network, 2018/19.

	2018/19
Average journey time by quickest route (minutes)	77
Average journey time using bus and step-free stations only	87
Relative additional journey time (minutes)	9
Relative additional journey time (%)	12

Source: Strategic Analysis, TfL City Planning.
Note: Journey times are averages reflecting door-to-door journeys between each zone and all other zones in the RailPlan model of London. They are hypothetical and do not reflect observed or frequently made journeys.

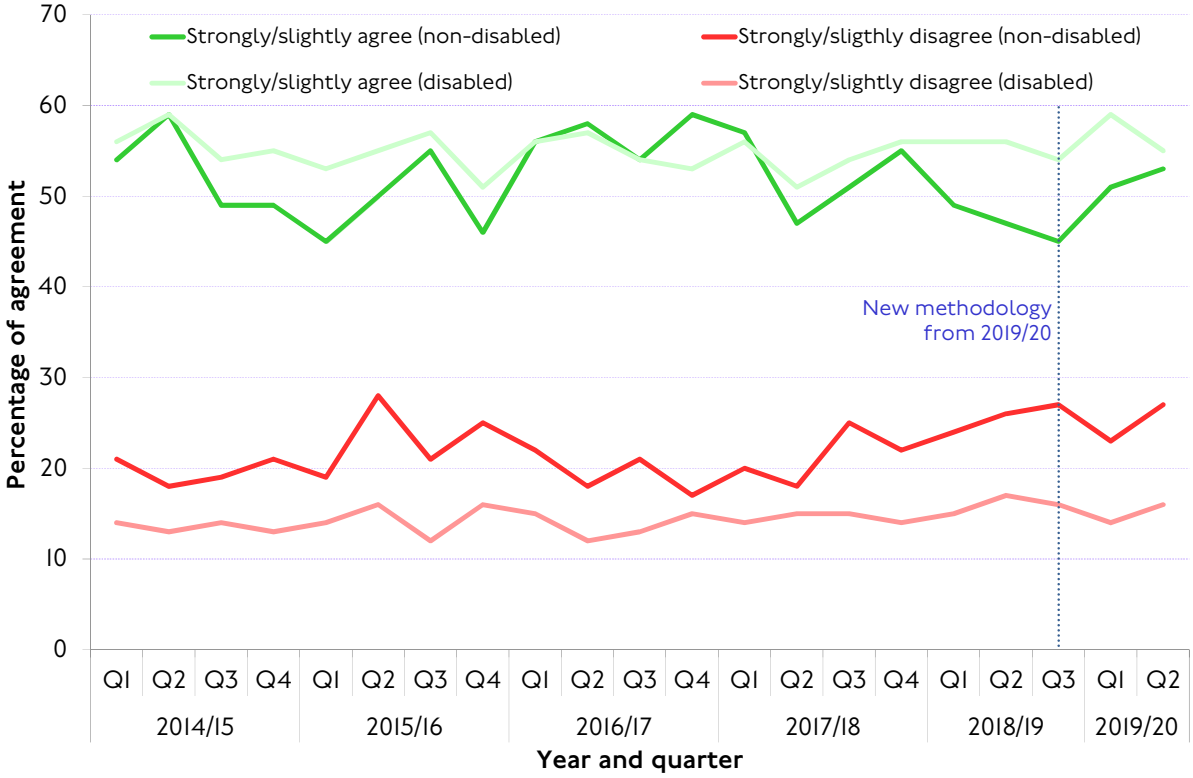
It is important to note that step-free features such as lifts and level platforms are also beneficial to those carrying heavy loads, those with children in buggies and, potentially, other travellers such as older people and those feeling unwell. In this way, the overall appeal of the public transport network is also enhanced.

Extent to which people agree that TfL is 'making it easier for disabled people to get around'

TfL collects a broad range of feedback to understand the travel experience of disabled Londoners. 'TfL is making it easier for disabled Londoners to get around'

is a measure that reflects awareness and effectiveness of our accessibility programmes. This is asked of the general population. Figure 13.5 illustrates the level of agreement and disagreement with this proposition.

Figure 13.5 Percentage agreement with the proposition that 'TfL is making it easier for disabled people to get around', 2014/15-2019/20.



Source: TfL Customer Research and Insight.
Note: Q4 2018/19 data not available due to data validity issues.

A change in the methodology for collecting this feedback in Q1 2019/20 means results from Q1 onwards are not directly comparable to previous scores. So while a lessening in the difference in agreement between disabled and non-disabled Londoners is potentially promising, it is too soon to say if this is a result of the methodology change or a change in sentiment.

Other collected feedback helps to explain what is driving these responses for disabled Londoners. Recent accessibility research that uses complaints and regular journey experience feedback from disabled customers shows that the barriers they experience are often very similar to those experienced by all customers, but that disabled customers are often more negatively impacted by these barriers. The customer experience is inconsistent, and while there are areas of excellence across the network, ensuring that the level of customer experience is consistent remains a challenge. Factors such as crowding and availability of on-board seating and space, and the behaviour of other customers tend to impact disabled Londoners to a greater extent compared to other Londoners. Improving accessibility information, staff assistance and customer awareness and consideration towards disabled people are current objectives for TfL.

Recent research has also shown that the travel experience does vary among disabled people, with those who have cognitive or visual impairments encountering issues more frequently compared to those with a mobility

impairment for example. TfL is striving to improve the customer experience for all of our customers by working to increase staff awareness of the needs of different people while travelling.

13.6 Public transport fares and affordability

Real fares trends

Affordable public transport fares are essential for encouraging a shift from car to public transport, and to allow all Londoners to take advantage of the opportunities that the city offers.

Figure 13.6 shows indexed real public transport fares in London (deflated by the Retail Prices Index) alongside national public transport fares and motoring costs for comparison. Over the past two decades, public transport fares in London have compared favourably with those at the national level.

In real terms, bus fares in London remain significantly lower than in 2000/01 following a sharp fall in fares between 2000/01 and 2003/04 and the recent fares freeze. In contrast, real bus fares in the UK as a whole have increased steadily over the last decade and more dramatically in the past couple of years. They are now 43 per cent higher than in 2000/01. Similarly, while Underground fares have remained relatively constant in real terms, real rail fares in the UK as a whole have increased by 20 per cent. The Mayor's fares freeze does not apply to Travelcard rates, which include National Rail services.

Over the same period, the costs associated with motoring have fallen. Nationally, motoring is now 14 per cent cheaper than in 2000/01 when adjusting for inflation. But London drivers face additional costs related to parking and the Congestion Charge. The fall in real motoring costs to 2015/16 was driven by a large fall in petrol costs and a smaller decline in the costs of vehicle purchase. Over the past few years, motoring costs have increased slightly, but they remain significantly lower than in 2000/01 when adjusted for inflation.

Real fares levels

A real fares level indicator measures the average actual fare paid in London per kilometre travelled. It is a composite measure, covering bus and Underground only, calculated as the total actual fares revenue for all passengers paying the full adult fare, adjusted for inflation and divided by corresponding actual bus and Underground passenger kilometres.

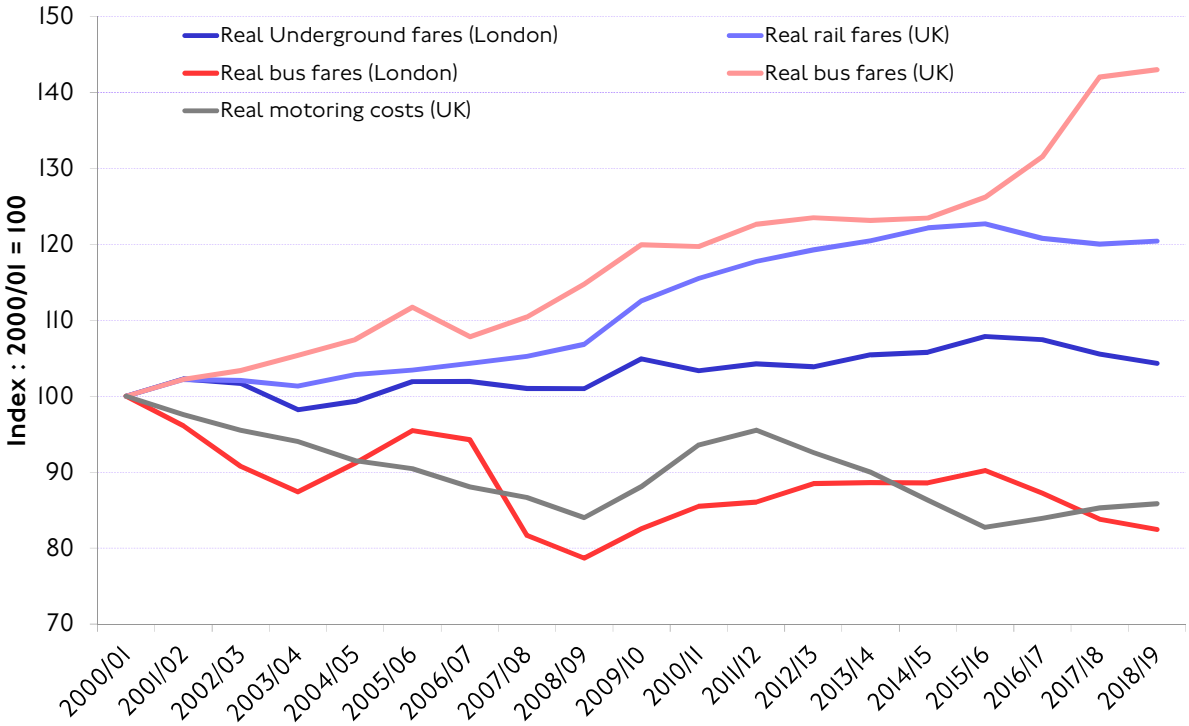
The trend from 2009/10 is shown in table 13.2. In 2018/19, the average adult composite bus and Underground fare was 16.6 pence per kilometre, the lowest figure in the period shown. When inflation is taken into account, both Underground and bus fares have fallen in recent years. The fall in real fares levels since 2016/17 partly reflects the Mayor's fares freeze which came into effect from January 2017.

Table 13.2 Real revenue (pence) per kilometre for passengers paying full adult fare on London Underground and buses, 2009/10-2018/19.

2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
18.9	18.9	17.1	17.1	17.4	17.5	17.6	17.4	16.8	16.6

Source: TfL Tech and Data.
Note: RPI indexed to 100 in 1999/00.

Figure 13.6 Public transport fare trends: London and UK, 2000/01-2018/19.



Source: Strategic Analysis, TfL City Planning.

Section 4: Supporting London's development

14. Travel demand and mode share trends: past, present and future

14.1 Introduction

This chapter looks at travel demand and mode share trends across a broad sweep of time, considering how trends in social, economic and policy conditions in London have influenced these historically, and how TfL is forecasting future travel trends.

It starts by reviewing the broad travel demand and policy context for the observed trends in mode share over a 25-year historic period. This highlights the role of 'macro-scale' conditions underlying change, in particular the historic shift towards active, efficient and sustainable modes. It then looks more specifically at how public transport in London has performed an ever-more efficient role in facilitating population and economic growth in the Capital.

Turning to the future, the chapter then explores TfL's latest travel demand forecasts for the period to 2041, setting them out in broad terms, with a focus on future expected housing development and the implications of forecast demand trends on rail crowding, bearing in mind future committed improvement schemes.

Finally, the chapter looks at how TfL is using scenario planning techniques to better ensure that our plans for the future are robust to a range of possible future conditions.

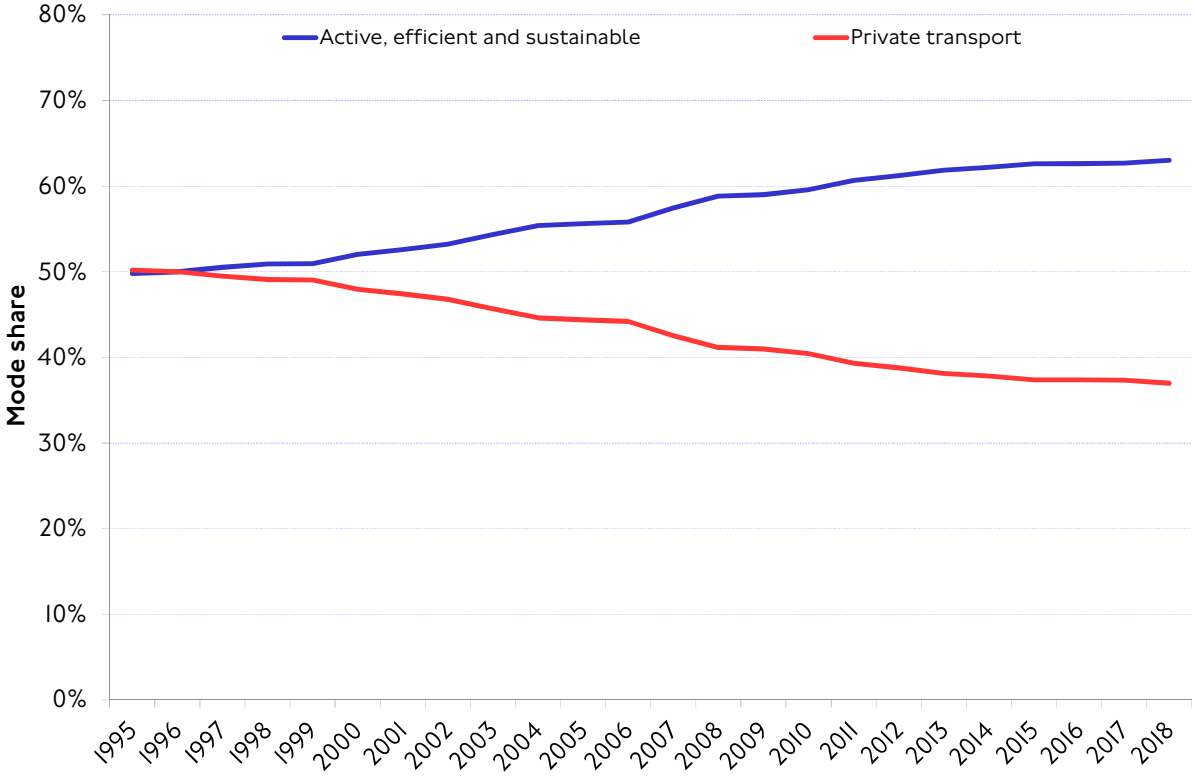
14.2 Active, efficient and sustainable mode shares: historic trends and the factors affecting them

Since the mid-1990s and, in particular, since the formation of TfL in 2000, overall travel demand in London has featured two principal trends. The first of these has been growing demand for travel, reflecting London's population and economic growth. The number of trips undertaken on an average day in 2018 was 18.5 per cent higher than in 2000 – at 26.9 million. Population growth over the same period is estimated at 23.1 per cent. The second has been a progressive shift in the overall mode share for these trips. The active, efficient and sustainable mode share in 2018 was 63.0 per cent, compared to 52.0 per cent in 2000 – a shift of 11 percentage points over this period.

This shift in mode share has taken place in the context of the population growth and growing overall travel demand, and has both prompted, and been facilitated by, investment in public transport and other active travel modes, as well as wider 'macro' conditions in society and the economy, for example the relative concentration of jobs in central London. Investment and related policies have included sustained improvements in the bus network, followed by Tube improvements, the transformation of the London Overground and innovations such as the Oyster card. Meanwhile, a fall in traffic reflected increasing constraints on the roads, the impact of the Congestion Charge and an overall shift away from the car towards more attractive public transport, walking and cycling.

One implication is that, in 2018, there are an estimated 2.9 million fewer trips by car per day in London than there would have been, had the mode shares of 2000 still applied in 2018 (figure 14.1).

Figure 14.1 Change in mode shares for all trips in London, 1995-2018.



Source: Strategic Analysis, TfL City Planning.

As well as investment in the transport networks, there have also been changes in wider 'macro' conditions affecting travel demand, the investment climate, and the evolving policy emphasis. Figure 14.2 summarises these over the past 25 years, considering a broad categorisation of supply, structural, economic and policy factors. The diagram is colour coded to reflect a subjective judgment of the degree to which conditions have been 'favourable' to the trends that we have seen.

The immediate impression from the figure is that the middle of the period, broadly from 2000 to 2015, was characterised by conditions that were generally favourable to both travel demand growth and the progressive mode shift towards active, efficient and sustainable modes. In this context the creation of the Greater London Authority, the Mayor of London and TfL in 2000 had a substantial catalytic effect at the turn of the century, alongside improving economic and wider policy conditions. As has been described in Chapter 3 of this report, it is also clear from the figure that conditions since 2015 have been generally less favourable to these trends, creating a more challenging environment and corresponding to the lower growth in total travel and a slower, yet still positive, change in mode shares.

Figure 14.2 Illustration of key drivers of mode shift over time, 1995-2018.

		1995-2000	2001-2005	2006-2010	2011-2015	2015-present
Supply	Public transport capacity	Slow growth	Large-scale increase in bus capacity	Enhancements to Underground network	Further enhancements for 2012 London Olympics	Slower growth
	Road capacity	Stable	Some loss	Greater reduction, particularly in central London		Further reductions
	Cost of public transport travel	High but falling	Stable	Increasing cost of fares		Fares Freeze
	Cost of car travel (motoring costs)	High: fuel cost rising	Congestion Charge zone introduced	Fluctuation	Reducing	Broadly reducing, but fuel cost up in 2017
	Public transport quality	Stable	Improving – increase in customer satisfaction		Very high customer satisfaction	Funding pressure
Structural	Population growth/ densification	Population growth ~2.5% per annum			Population growth ~1.4% per annum	Flattening of growth
	Population structure (age distribution/ migration)	Increase in non-UK born Londoners, who are less likely to own cars and more likely to use public transport				EU migration and share of young Londoners decreasing
	Travel behaviour	Stable trip rates	Fluctuation in trip rates but overall growing demand for public transport			Decline in trip rates, demand for PT down
Economic	Cost of living	Slow growth in disposable incomes and housing costs rising	Financial crisis, incomes begin to fall	Austerity – squeeze on wages, credit spending up		Out-migration of young people due to high costs
	Jobs/ economy	Growth in jobs, unemployment falling	Slow growth in jobs, unemployment stable	Stronger growth in jobs, unemployment falling		Economic uncertainty
Policy	London Plan Policy	Pre-GLA, no policy document in place	First London Plan, focus on public transport oriented development and maximum parking standards	Second London Plan in development, Government pushback on parking		Draft London Plan consulted on with ambitious approach

Legend	Negative contribution to active, efficient and sustainable mode share	Broadly neutral effect	Positive contribution to active, efficient and sustainable mode share

Source: Strategic Analysis, TfL City Planning.

On the supply side, the early investment in the bus network, improvements to the quality of service on the public transport network and initiatives to reduce the cost of travel acted to make public transport more attractive relative to the car. These were reinforced by initiatives such as the introduction of the Congestion Charge in central London and a progressive reduction in the effective capacity of the road network for private vehicles, reflecting the re-purposing of some road

space to other policy goals and the overall more efficient use of this space. Meanwhile, London's population grew rapidly, leading to greater densities, and changed in composition. With it, societal change and cultural factors such as a shift in the age structure and cultural norms of the population meant that car ownership levels also fell. The result has been an almost consistent reduction in the total amount of road traffic in London over the period, despite important trends such as growing van, and more recently, private hire vehicle traffic.

The financial crisis of 2007 had only limited immediate effect on travel demand, which was seen to recover relatively quickly. However, it is now clear that the initial shock was followed over the succeeding decade by a period of austerity, whereby incomes fell in both absolute and relative terms, and costs, particularly housing costs, rose rapidly. The net effect of this over the decade has been a significant squeeze on personal disposable incomes, particularly affecting younger people in London. While the number of jobs in London and related commuting remains buoyant, there are fewer 'discretionary' trips, such as for shopping and leisure, being made. Together with slower population growth, the more immediate economic uncertainties associated with the vote to leave the European Union and more general cost pressures affecting TfL's investment programme have led to progress towards policy aims being slower over more recent years.

The main change in trend over recent years underlying this has been the slowing in growth of demand for public transport, mostly affecting non-peak discretionary travel, rather than a resurgence of road traffic growth. Active travel, such as walking and cycling, continued to grow relatively strongly and road traffic levels have been relatively flat. Although at the time of writing there remains considerable short-term uncertainty about the UK's relationship with the European Union, which is impacting on economic confidence, most commentators still expect relatively rapid population and economic growth in London over the next two decades.

14.3 Two decades: the increasing role of public transport

Table 14.1 shows some of the key changes to London's transport networks that have taken place over the last two decades, during which time London's population increased by 1.7 million people.

Particularly noticeable over the early period was the growth of the bus network – the number of bus passengers annually increasing by 66 per cent in conjunction with large-scale investment in the bus network. There were also substantial falls in road traffic, reflecting a range of initiatives including the introduction of the Congestion Charge in central London in 2003.

Over the most recent decade there has been a 2 per cent reduction in road traffic, and a 20 per cent increase in train kilometres operated on the Underground, with a corresponding 20 per cent increase in ridership. The former illustrates the long-term trend towards more active, efficient and sustainable mode shares, with 52 per cent more cycling trips also notable. The latter, occurring within the constraints of a fixed physical network in terms of extent, illustrates how limited assets are being used much more efficiently to maximise capacity, although crowding remains a significant current and future issue.

Table 14.1 London's travel demand and transport networks, 2000/01-2018/19.

	2000/01	2008/09	2018/19 (% change from 2008/09)
Population (millions)	7.2	7.8	8.9 (+14%)
Active, efficient and sustainable mode share	52%	59%	63% (+4pp*)
Bus kilometres operated (millions)	365	477	480 (+1%)
Annual bus passengers (millions)	1,354	2,247	2,220 (-1%)
Underground kilometres operated (millions)	64	71	85 (+20%)
Annual Underground passengers (millions)	970	1,089	1,384 (+20%)
Annual road traffic (billion kilometres)	32.4	30.3	29.5 (-2%)
Annual cycle journeys (millions)	105	179	272 (+52%)

Source: Strategic Analysis, TfL City Planning.
** Percentage points*

14.4 Latest TfL forecasts of travel demand and mode shares to 2041

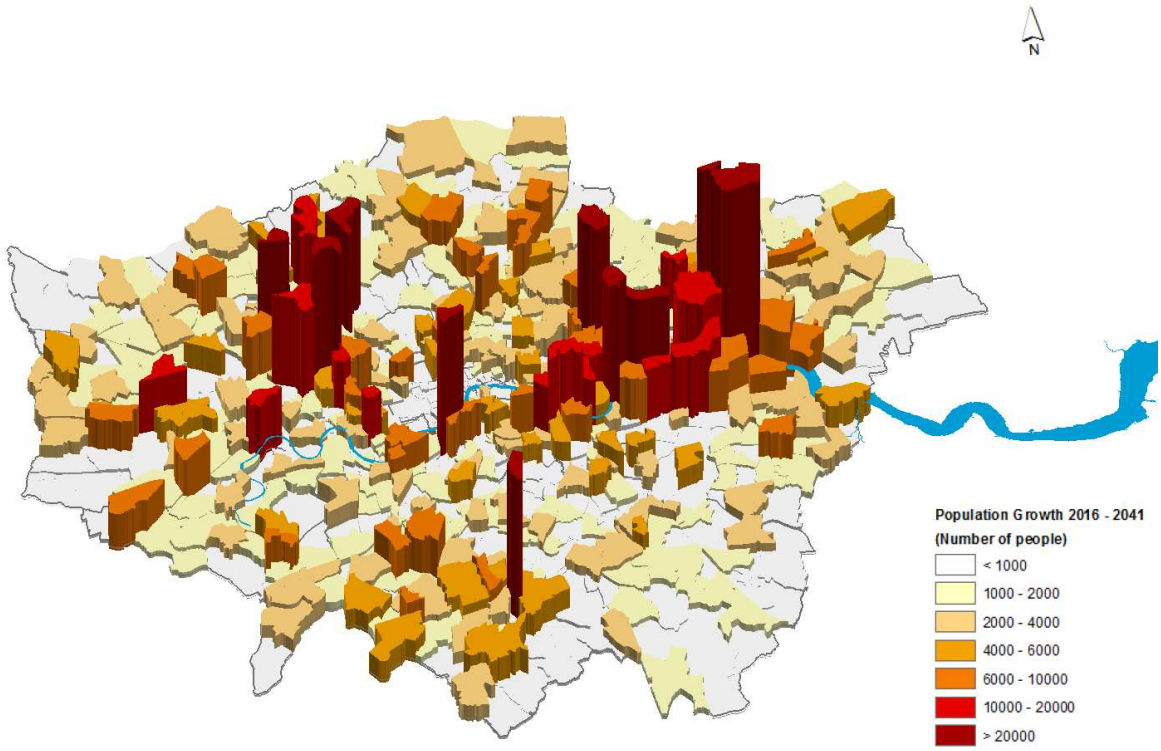
TfL has new forecasts for travel in London which can be used to inform our investment decisions. The previous set of forecasts was produced for the Mayor's Transport Strategy evidence base, published in 2017 and 2018. These updated forecasts reflect our latest funded investment programme and revised assumptions on funded interventions and economic growth forecasts, using the latest version of our strategic models. The results show that, without further investment, London faces significant future public transport crowding challenges, alongside the need to progress the wider set of transport strategy aims.

Drivers of travel demand in a changing London

Our strategic transport models forecast future travel demand every five years to 2041, with an additional long-term 2050 forecast. They take inputs such as growth in homes and jobs from GLA projections, information on our investment programme from the TfL Business Plan and other economic assumptions to give us a view of what travel will be like in the future given committed and funded investment only. The models take estimates of the relationship of travel to the principal drivers of demand, derived from observations from surveys such as LTDS, and projected into the future taking into account factors such as the expected future costs of travel by mode, crowding, congestion etc.

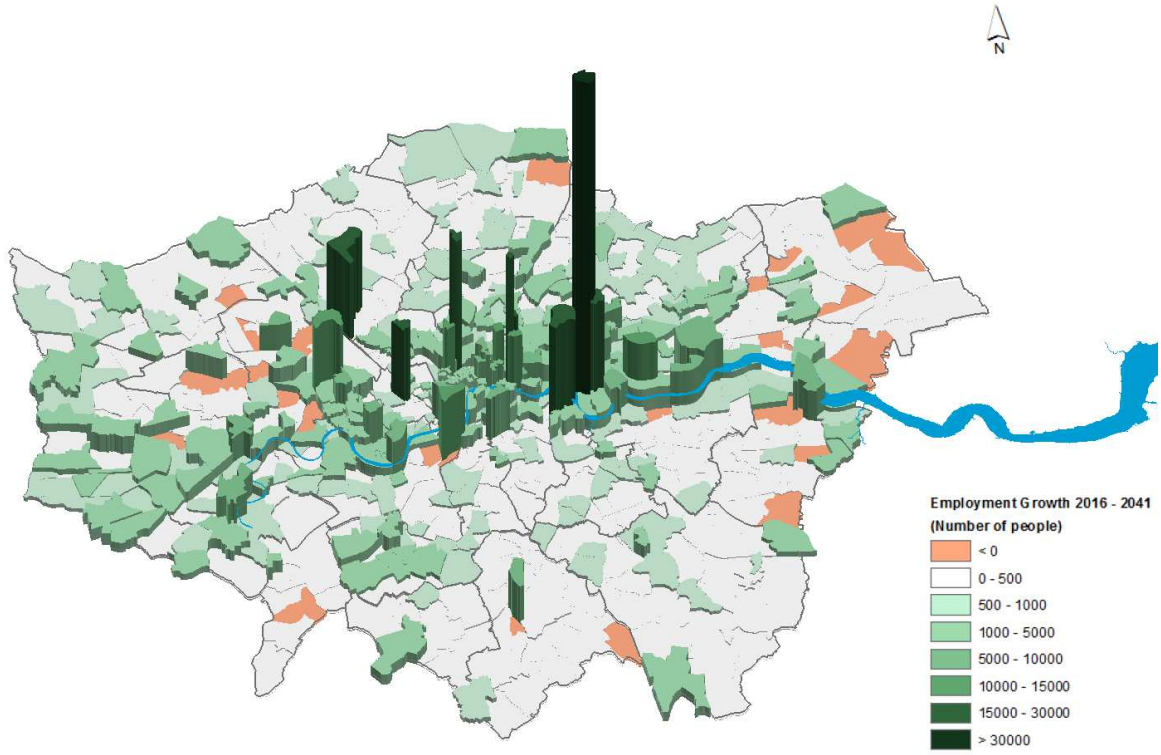
A central projection shows London's population continuing to grow from 8.9 million people in 2018 to 10.8 million in 2041. Employment is expected to grow, from 5.7 million jobs in 2016 to 6.9 million in 2041. These projections informed the draft London Plan, and were also assumed in the forecasts for the transport strategy. They are shown in figures 14.3 and 14.4, from which it is notable that the highest levels of growth are forecast to be in the Central Activities Zone and its satellite areas. However, other assumptions reflect weaker growth, such as a reduction in trip rates for discretionary travel (shopping and leisure), based on observed trends.

Figure 14.3 Estimated population growth, 2016 to 2041.



Source: Strategic Analysis, TfL City Planning.

Figure 14.4 Estimated employment growth, 2016 to 2041.



Source: Strategic Analysis, TfL City Planning.

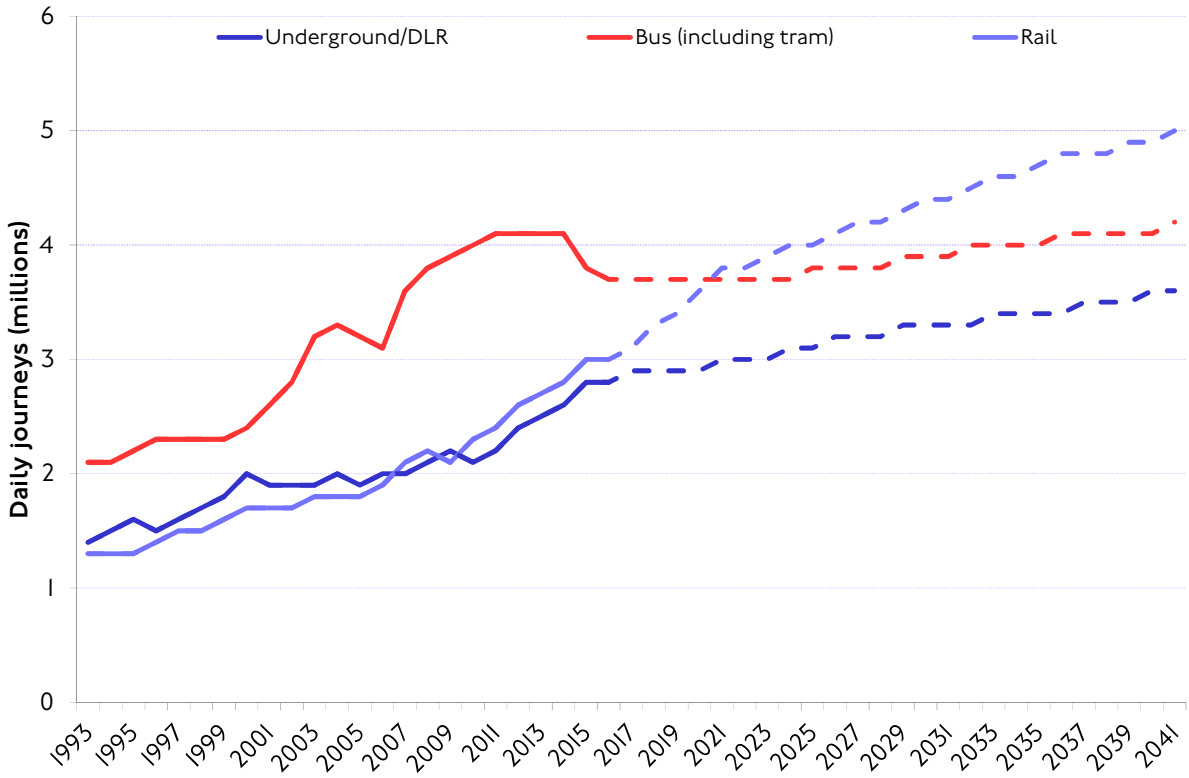
Future forecast trends in the principal drivers of travel demand inform our forecasts of future travel in London, for example, changes in observed trip rates in London and the UK as a whole (see section 4.2 of this report). The number of

journeys per day made for shopping and other discretionary purposes has reduced by more than 15 per cent over five years. These changes and similar ones are reflected in assumptions about the number of journeys people make per day in our modelling.

Forecasts of a changing London

The key outputs from the strategic modelling are forecast changes in demand by mode of travel. Figure 14.5 shows the forecast increase in daily journeys by mode to 2041 for rail, Underground/DLR and bus.

Figure 14.5 Change in daily journeys by mode to 2041.



Source: Strategic Analysis, TfL City Planning.

In our latest forecasts, rail trips increase significantly with Thameslink improvements and then the Elizabeth Line increasing demand. However, even without further investment beyond the mid-2020s, we expect rail demand to grow by an additional one million journeys between 2025 and 2041, reflecting population and economic growth, and putting particular pressures on capacity in the weekday morning peak periods.

Underground travel will increase with planned investment including the Four Lines Modernisation project on the sub-surface lines, but growth will be more moderate. Thameslink and the Elizabeth line will provide some short-term relief on the Underground.

Recent trends in bus patronage informed our plans for the bus network, and we are forecasting more modest growth in bus demand than other public transport modes. Bus trip numbers are forecast to be steady until 2026 followed by a slight increase in the late 2020s and 2030s.

Public transport crowding

Figures 14.6 through 14.9 show how public transport crowding in the weekday morning peak is expected to change over time from 2016 to 2041, given the demand trends forecast by the model. The figures show the most severely crowded routes only. We are forecasting a short-term decrease in public transport crowding in the period to 2021, followed by longer-term increases. A limited pipeline of further committed enhancements will mean that by 2031, without further funding, crowding pressure is forecast to be significantly greater than today, with widespread severe crowding by 2041 and beyond.

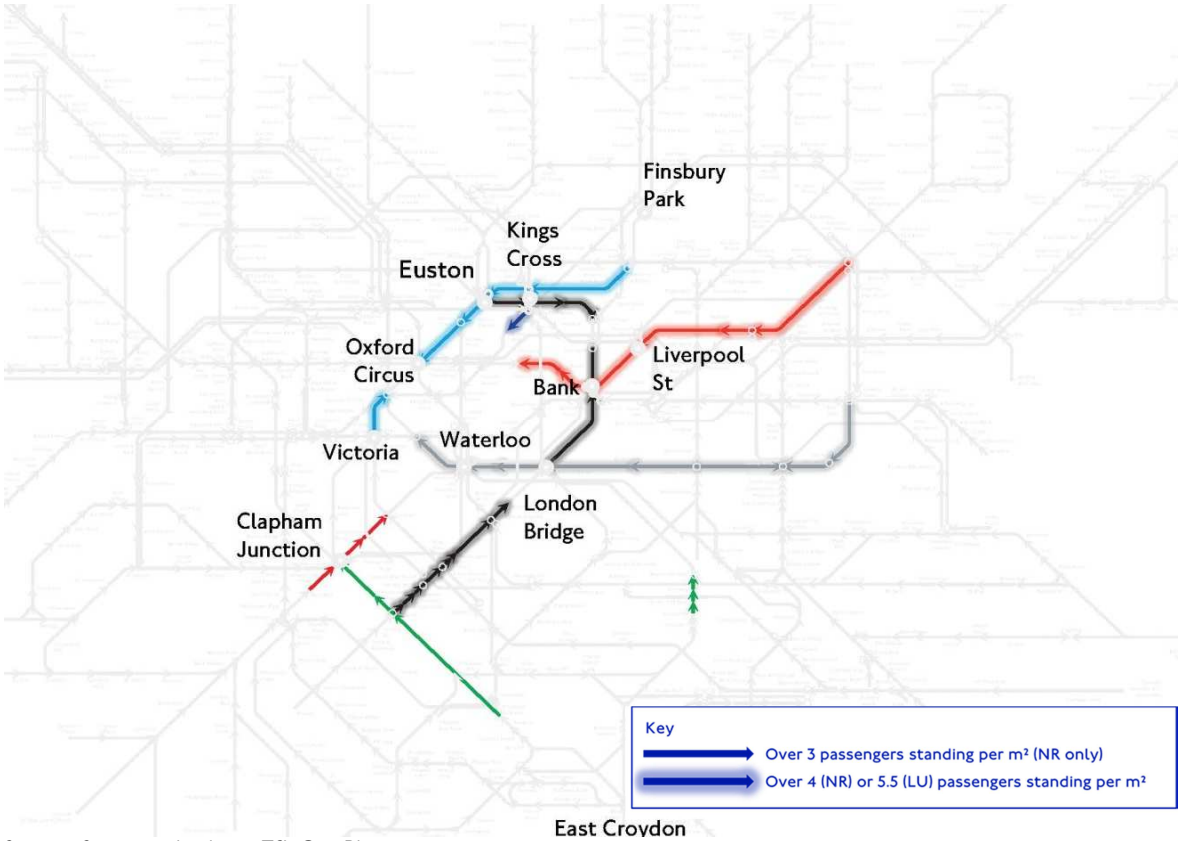
From 2016 the Thameslink upgrade, higher Victoria line frequencies and the introduction of the Elizabeth Line and new South Western Railway rolling stock by 2021, will reduce crowding, notably on parts of the Central, Jubilee and Victoria lines and on National Rail services through Clapham Junction into Waterloo. However, by 2031, crowding will return on all of the previously relieved lines with added increased pressure on the London Bridge to East Croydon corridor.

By 2041, without further committed funding, crowding pressure is forecast on a majority of Underground lines in inner London and key National Rail corridors. Some 14 of the 20 most crowded links are forecast to be on the Northern Line. In east London there is pressure on the Jubilee and Central lines. Severe crowding pressures are particularly apparent in the south west – north east corridor.

This picture is replicated at an aggregate level, with the amount of passenger travel in severely crowded conditions expected to fall in the short term, reflecting growth in capacity provided, but increasing to more than double 2016 levels by 2041. Inability to board trains in the weekday morning peak is also expected to increase significantly and be 60 per cent higher than 2016 levels in 2041.

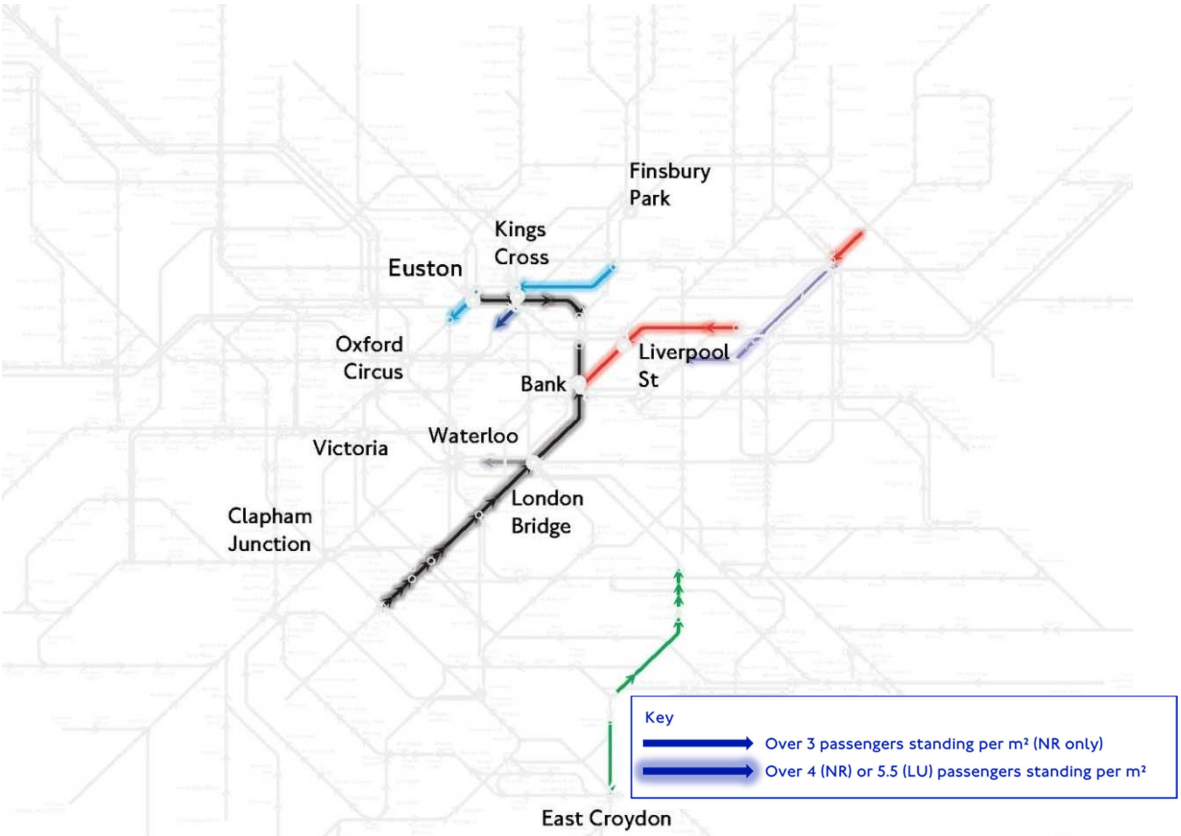
Although these forecasts present significant future challenges for capacity, they do reflect the overall outcomes of high-density development in well-connected locations, which is compatible with the overall aims of the transport strategy.

Figure 14.6 Public transport crowding, weekday morning peak, 2016 baseline.



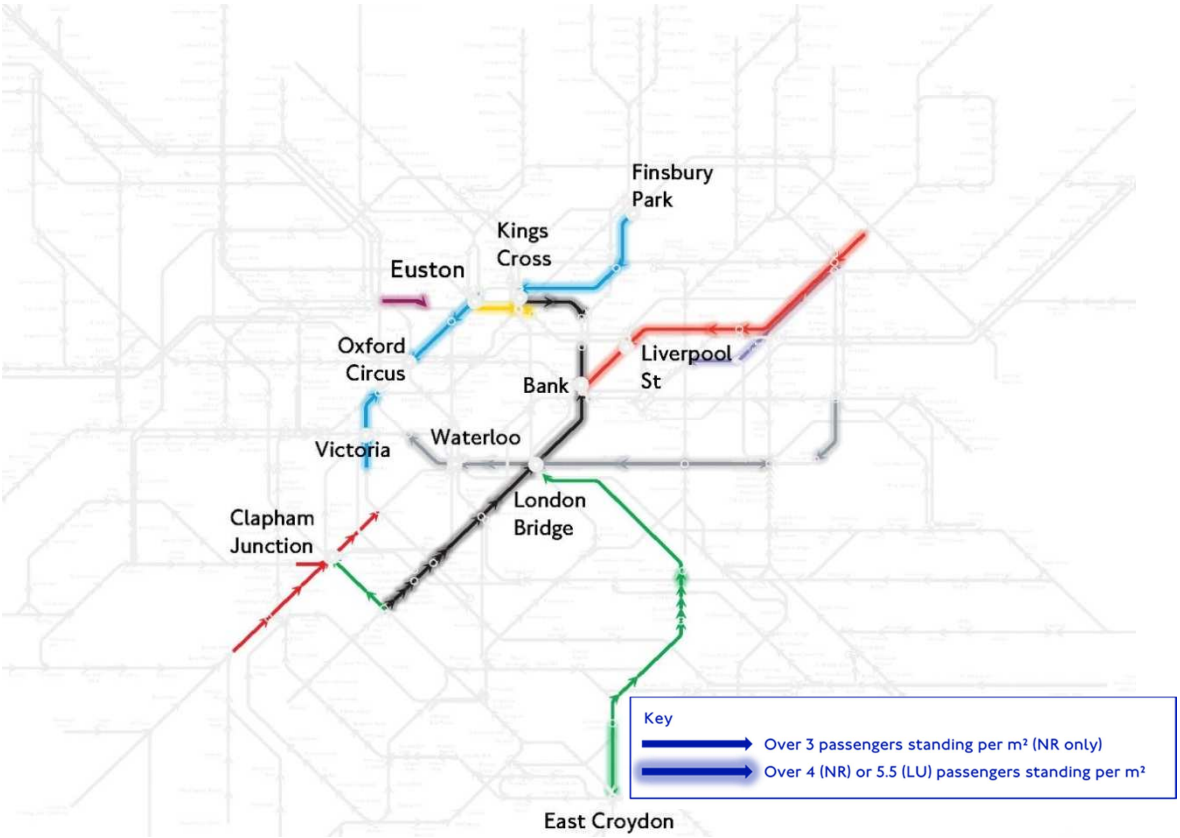
Source: Strategic Analysis, TfL City Planning.

Figure 14.7 Public transport crowding, weekday morning peak, 2021 forecast.



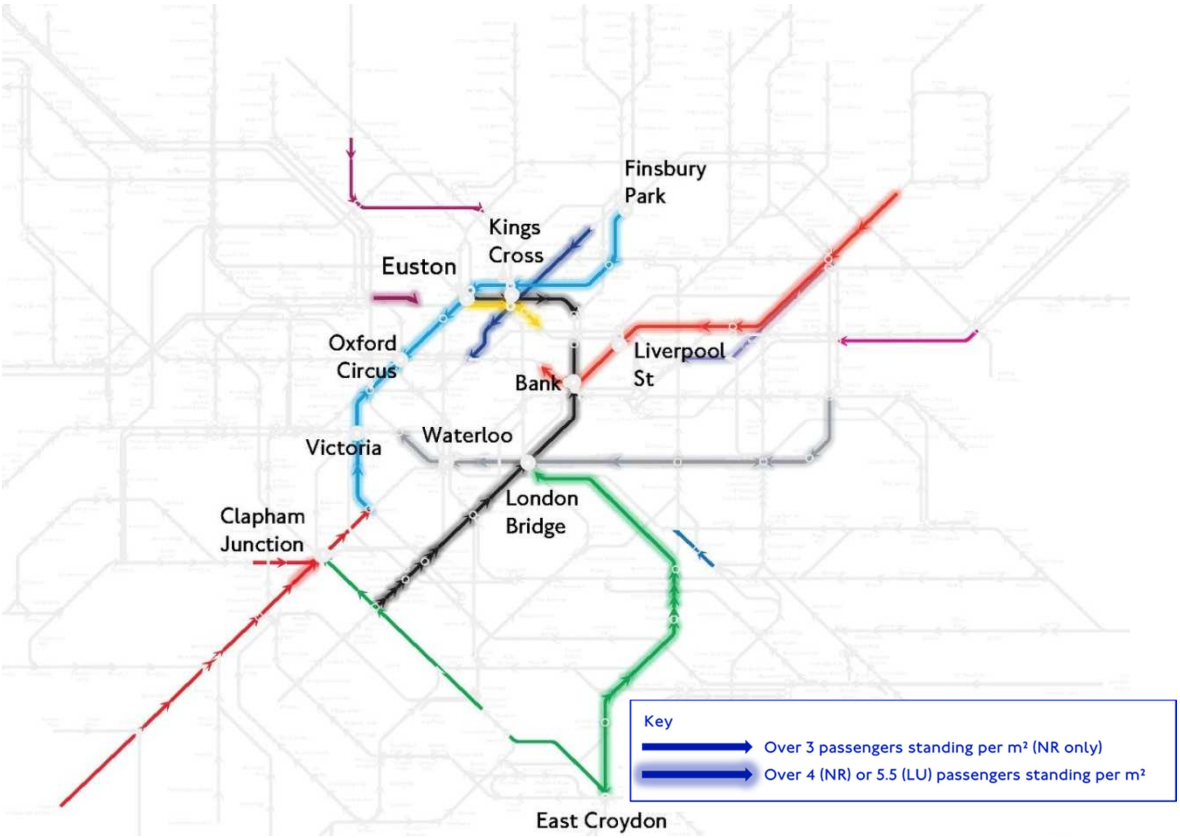
Source: Strategic Analysis, TfL City Planning.

Figure 14.8 Public transport crowding, weekday morning peak, 2031 forecast.



Source: Strategic Analysis, TfL City Planning.

Figure 14.9 Public transport crowding, weekday morning peak, 2041 forecast.



Source: Strategic Analysis, TfL City Planning.

Using forecasts to inform investment in London

The severity of forecast 2041 weekday morning peak public transport crowding on some corridors suggests that safety measures such as exit-only stations, non-stopping trains and closing interchange routes will be required on an increasing basis.

While the Elizabeth Line will provide major crowding relief for London, pressures remain severe and in many key locations, planning applications are coming forward at higher densities, putting further pressure on rail and Underground capacity.

London jobs are forecast to increase by over 1.1 million between 2016 and 2041. Some 59 per cent of this employment growth will be within 1 kilometre of a station forecast to have severe crowding, including 56 per cent of the jobs growth within inner London and nearly all of the jobs growth in central London (table 14.2).

Table 14.2 Employment growth in areas within 1 kilometre of stations where severe crowding is forecast in 2041, 2016 to 2041.

Area	Employment growth
Central London	99%
Inner London	56%
Outer London	11%
GLA Total	59%

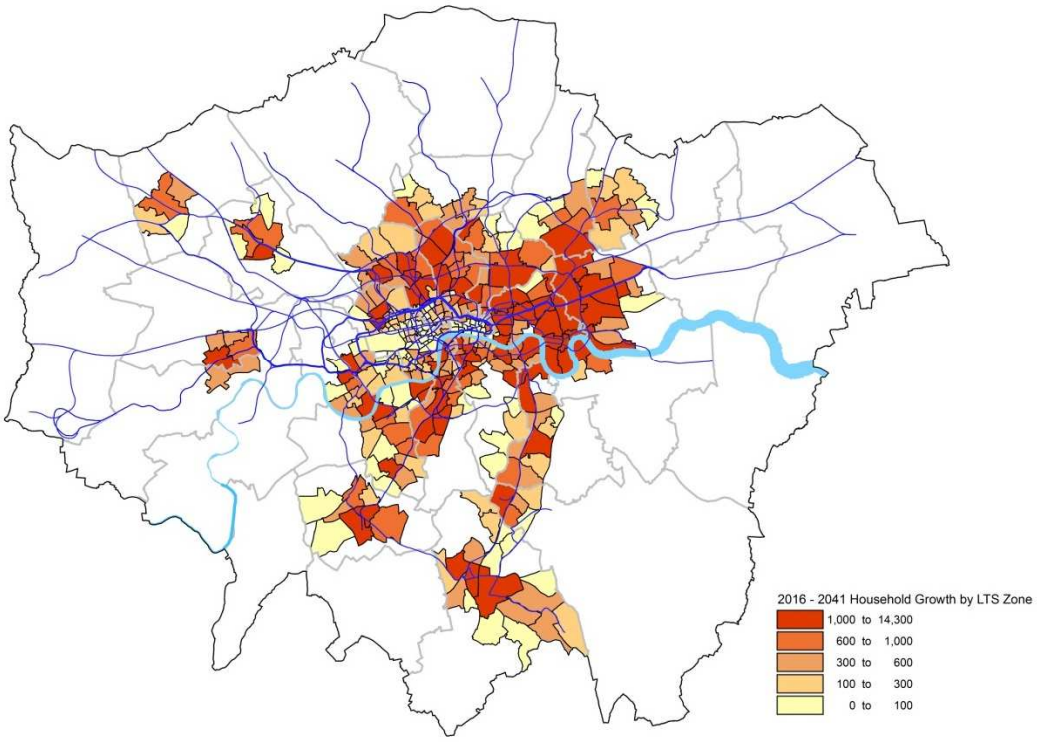
Source: TfL City Planning, Strategic Analysis

Equally, London's housing growth will be constrained by a crowded network. Figure 14.10 shows the forecast housing growth from 2016 to 2041 within 1 kilometre of a TfL station with at least one departing link having greater than 4 standing passengers per square metre. The figure shows TfL stations only and does not include National Rail stations served by heavily crowded trains.

The crowding problem can be analysed by line to understand where on each line the pressure will be most acute and how individual lines compare to each other. Figures 14.11 and 14.12 show this analysis for the Piccadilly line and Jubilee line. The pressure on the Jubilee line is constant for a long stretch from West Hampstead to Stratford with more homes affected in the east, whereas the Piccadilly line has three areas where new homes have been identified but the Underground is already crowded.

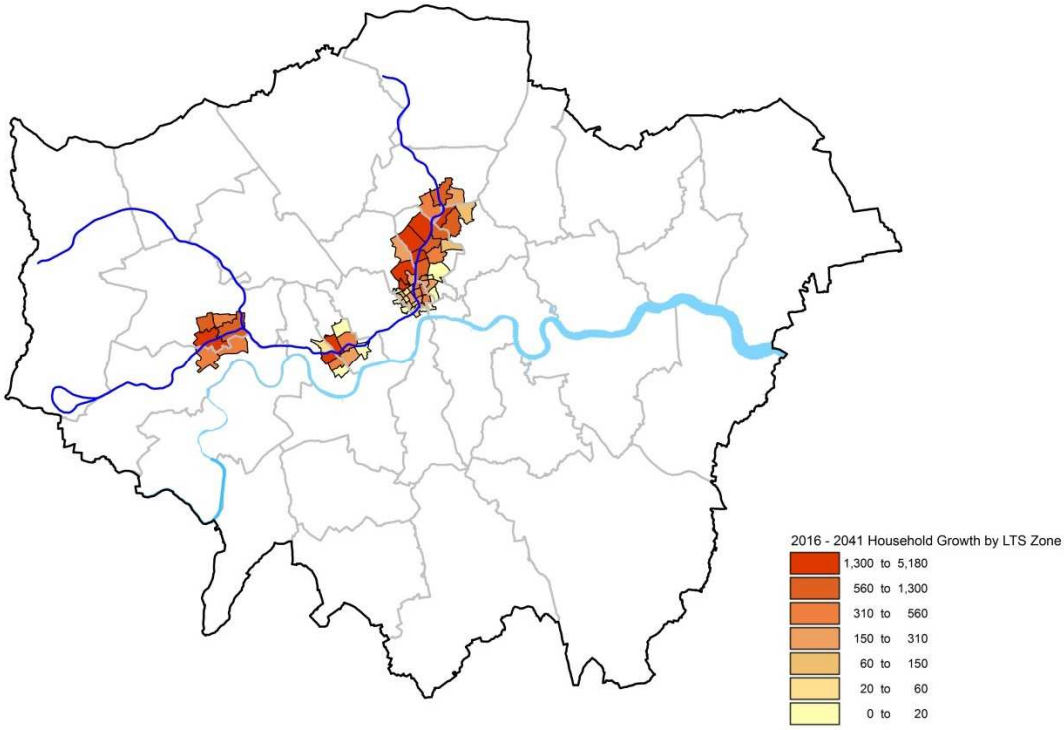
London will need investment in transport beyond our funded programme in order to keep crowding at a manageable level and to support growth in jobs and housing across the city.

Figure 14.10 Household growth 2016 to 2041 within 1 kilometre of a TfL station served by crowded trains.



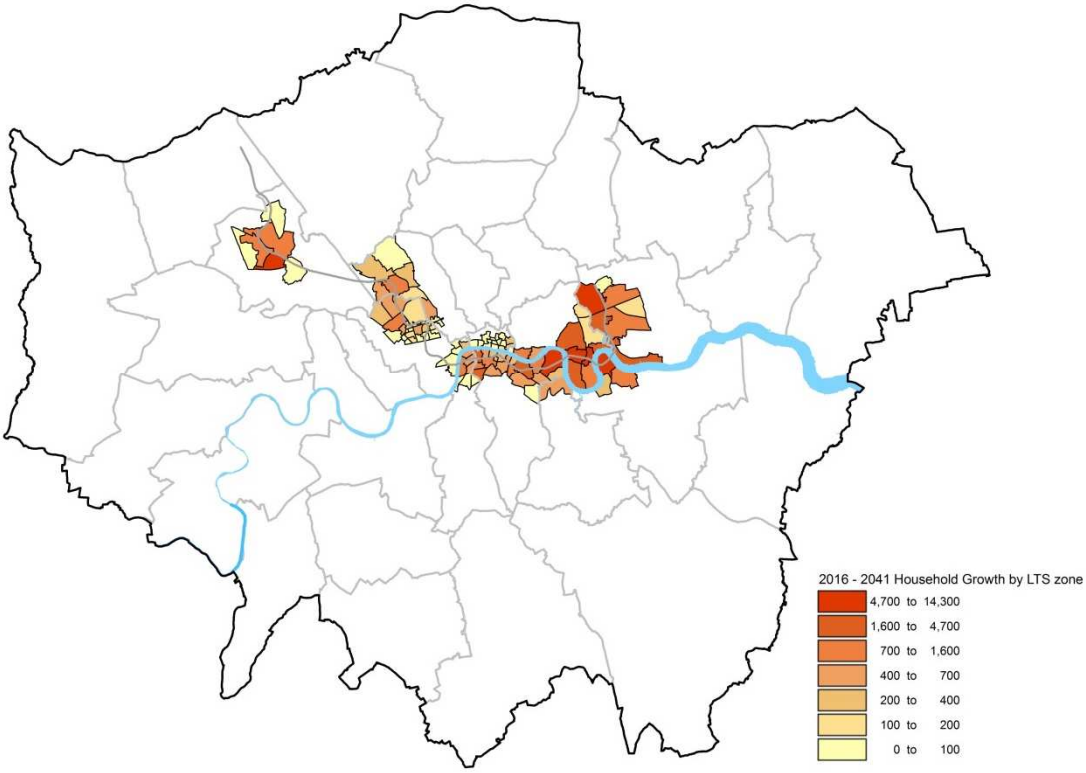
Source: TfL City Planning, Strategic Analysis.

Figure 14.11 Household growth 2016 to 2041 within 1 kilometre of a TfL station served by crowded Piccadilly line trains.



Source: TfL City Planning, Strategic Analysis.

Figure 14.12 Household growth 2016 to 2041 within 1 kilometre of a TfL station served by crowded Jubilee line trains.



Source: TfL City Planning, Strategic Analysis.

14.5 Scenario planning: future-proofing our plans

Planning for growth in an uncertain future

What will London be like in 20-30 years from now – and will the plans that we lay today still make sense? Change and uncertainty are constantly with us, yet the future seems perhaps more unpredictable than ever. There is economic uncertainty in the UK and London and we are seeing changes in the way people travel.

As an organisation, we need to be prepared to deliver the Mayor's Transport Strategy in an uncertain future. Our business plans typically cover timescales of around five years, but decisions on major infrastructure and strategic policies can have implications spanning several decades.

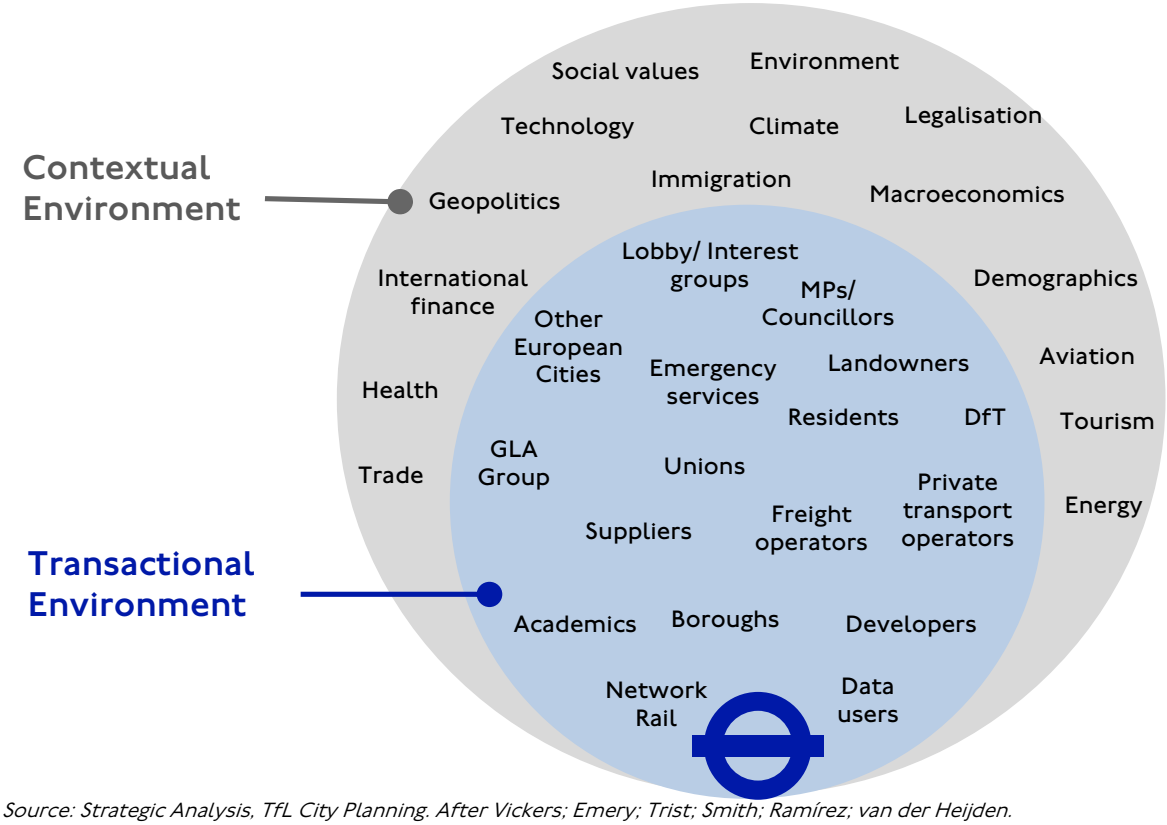
Scenarios are illustrative stories about the wider context in which TfL could operate in future, to be used to improve our business planning. They are not formal or definitive forecasts of how future conditions may develop.

TfL regularly interacts with a variety of 'actors' within our immediate 'transactional environment'. The transactional environment is shaped and disrupted by changes in the wider 'contextual environment', where we have less direct influence (figure 14.13).

We have developed scenarios as a practical way of better 'future-proofing' ourselves against uncertainty in the wider contextual environment. Scenarios are stories about the 'big picture', but these futures present real opportunities but

also challenges to the lives of Londoners. This section summarises work that explores the envelope of future uncertainty for the factors affecting travel in London.

Figure 14.13 TfL's 'transactional' and 'contextual' environments.



Source: Strategic Analysis, TfL City Planning. After Vickers; Emery; Trist; Smith; Ramírez; van der Heijden.

Our central case

London's population is projected to continue to grow to almost 11 million people by 2040 (figure 14.14), with record numbers of homes built in the city. London is also expected to remain at the heart of the UK economy, with the Capital continuing to accommodate a high proportion of highly-skilled, productive jobs, and a key location for foreign direct investment.

The current assumptions do not see technology making major changes to where and how people work and travel. Increases in density are forecast to continue to drive sustainable travel and demand for public transport.

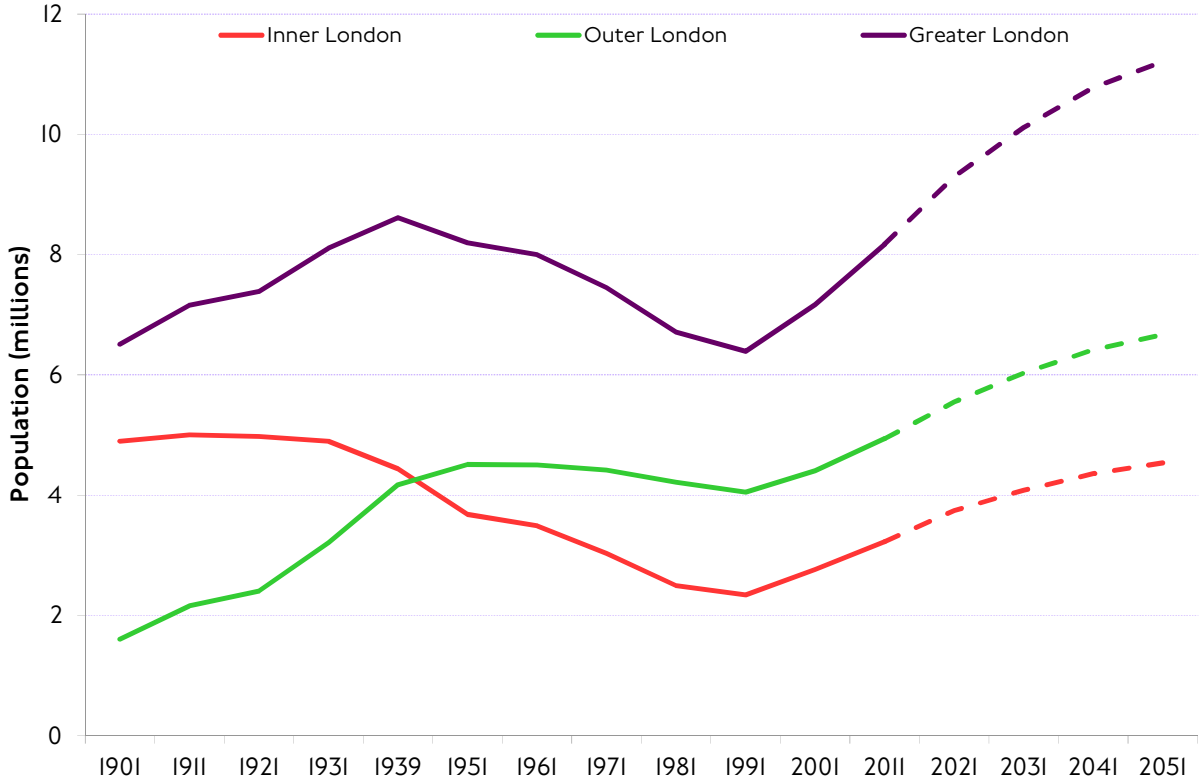
These factors mean that we are forecasting increased crowding and congestion. Without investment to support sustainable travel and measures to manage demand on London's roads, our system will not be able to cope.

However, our central case does not take account of the uncertainty inherent in the future of travel in London such as future geopolitical, technological and behavioural trends that at present cannot be foreseen or forecast with any certainty. These have the potential to change how people live, work and travel.

Scenarios do not try to predict how these trends might develop, but they do reflect a range of possible and plausible outcomes, with which to define a useful 'envelope of uncertainty'. It is a reflection of the plausibility of the scenarios that each can accommodate a number of potentially emerging trends. On the other

hand, in all scenarios, London will continue to need transport investment to meet the Mayor's aims for the city.

Figure 14.14 TfL's 'Central Case' future population growth estimates, with historic trends.



Source: Strategic Analysis, TfL City Planning.

Scenario building

We have used the Oxford Scenario Planning Approach (Ramírez and Wilkinson, 2016), which has been used effectively by major private and public sector firms to help them deal with uncertainty. As part of this approach, we conducted interviews and workshops with TfL leaders and experts from external organisations. We explored potential interactions between factors, and developed a range of possible 'stories' for London in 2040. Part of this work involved detailed research on factors affecting life in London, which was used as stimulus material to help develop the scenarios. Seven key themes affecting the future of travel in London emerged: London's place in the world, London's place in the UK, emerging business models, ways of working, living in London, the environment, and culture and values.

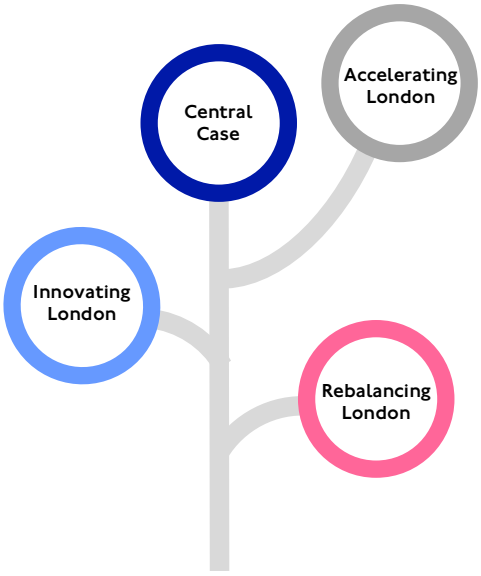
The three scenarios and their key implications for travel

The output of this work is three scenarios, which show how the continuation of emerging trends could develop into different futures, alongside our core forecast. They are essentially three different 'stories' about the future. None of the three scenarios is to be considered more likely, desirable or plausible than others. Their main purpose is to better define the 'envelope of uncertainty' affecting our medium- to long-term plans.

Divergent possible futures

Innovating London, Rebalancing London and Accelerating London demonstrate three alternatives to the future assumed in our central case (figure 14.15).

Figure 14.15 Scenarios demonstrating divergent possible futures.



Source: Strategic Analysis, TfL City Planning.

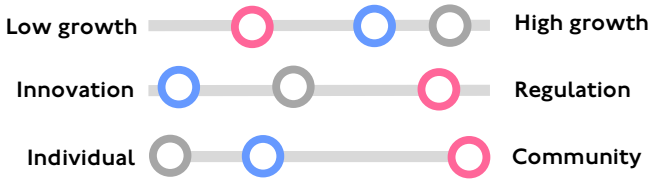
Innovating London is the story of London reinventing itself as a young, urban innovator, where technology changes how people live and work, but leaves some behind.

Rebalancing London is the story of a more equal but ageing society with lower economic growth, that focuses on self-sufficiency and liveability as world power moves east.

Accelerating London is the story of an ever-growing, expanding London which acts as the beating heart of the world financial system, but struggles to deliver a high quality of life for all.

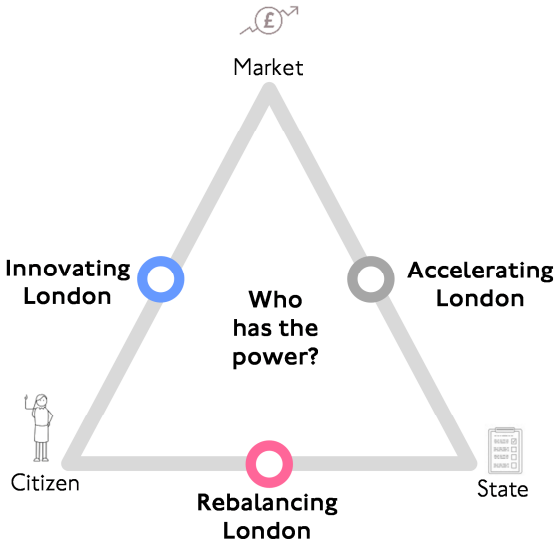
One way of thinking about scenarios and how they relate to each other is as part of a framework. Figures 14.16 and 14.17 show some ideas of how the scenarios differ in terms of the core assumptions that underpin the stories. Figure 14.16 looks at the relative balance between key factors such as economic growth and the role of the individual in determining outcomes, while figure 14.17 shows how the scenarios differ in terms of assumptions about the 'balance of power' between the market, the citizen and the state.

Figure 14.16 Scenarios in terms of assumptions about key factors determining future conditions in London.



Source: Strategic Analysis, TfL City Planning.

Figure 14.17 Scenarios in terms of the balance of power between the market, citizen and the state.



Source: Strategic Analysis, TfL City Planning.

Innovating London

In this scenario, big technology companies grow in power. They control data and develop new transport solutions to meet changing consumer demands. Traditional regulators struggle to keep up and there are concerns over data security and social inequality as private companies do not always act in the public interest.

Some trends, now beginning to be observed, that may continue to develop in this scenario, include:

- Technology-enabled consumer demand for flexibility and individualised on-demand services.
- Flexible working.
- Shift from ownership to sharing, including in housing.
- Rise in power and reach of technology companies in new areas, including new business models and artificial intelligence.
- Breakdown in traditional relationships between activities and travel, eg shopping.

Some possible outcomes, that may condition the travel environment in this scenario, include:

- London sees a shift from traditional financial services towards technology, but retains its global status with high immigration.
- London receives high levels of investment and attracts young, skilled workers from across the UK and beyond, and there is a political drive for an open and innovative city.
- More jobs, activities and travel facilitated by technology, and high levels of flexible working.
- More informed and demanding consumers, with a preference for sharing, leasing and subscription services rather than ownership.

- An agile private sector gains power and influence – particularly technology companies, which become the primary point of access for consumer services.
- Innovation thrives in the transport sector, eg shared and autonomous services, which blur the distinction between public and private transport. Traditional regulators struggle to keep up.
- People look to technology for environmental solutions, with full electrification of the road vehicle fleet and innovative delivery services, for example using drones.
- High levels of inequality between young and old, employment status and skills, with increased social isolation.

Rebalancing London

In this scenario economic growth slows, and the economy diversifies. While there is less incentive for young people to move to London, families take advatnage of reduced house prices and seek liveable nighbourhoods. Green spaces are preserved and high streets have a stronger role to play. Roads and public transport are less crowded, and higher taxes are spent on health care and accessibility rather than new transport connections.

Some trends, now beginning to be observed, that may continue to develop in this scenario include:

- A shift in global economic power away from the west.
- An ageing population, with younger workers leaving and not coming to London.
- Government policies to rebalance the UK economy.
- Protectionist trade policy.
- Environmental degradation leading to concern over air quality and waste.
- Public focus on quality of life and health.

Some possible outcomes, that may condition the travel enviroment in this scenario, include:

- A decline in the role of financial services and loss of global status, with growth engines now in Asia and Africa.
- Low economic growth, with low immigration and reduced reliance on global trade.
- Fewer jobs in central London, with employment more evenly spread across London and reduced pressure on long-distance commuter routes. Reduced income inequality.
- A slower pace of life, with a focus on neighbourhoods and the local community.
- Moderate disposable incomes with a strong state and relatively high taxes.
- London embraces improvements to public health and social care, with an adoption of technologies after they are proven elsewhere.
- Emphasis on resource security, climate change, the protection of green space and improved urban realm, although at the cost of some areas of the city becoming neglected and run down.
- Stable population size, not attracting young workers but more families stay in London. Inner London population falls and increased emphasis on suburban living with an older, less diverse population.

Accelerating London

In this scenario, London retains its global status and population growth accelerates. Strong economic growth and a growing population contribute to growing travel demand. Fares income and tax revenues secure the funding needed for major infrastructure investments. However, government spending is unable to adequately address the problems of housing supply, inequality and environmental deterioration that result from such rapid and unequal growth.

Some trends, now beginning to be observed, that may continue to develop in this scenario include:

- Large increases in London's population, with high in-migration.
- London as the centre of the UK economy.
- Agglomeration advantage in financial and professional services.
- High housing costs despite densification.
- High levels of inequality and rising crime rate.
- Challenges to quality of the urban environment.

Some possible outcomes, that may condition the travel enviroment in this scenario, include:

- London retains its place as a global professional and financial services hub. London becomes a 'megacity', receiving high levels of international investment and international immigration.
- A widening imbalance between the South East and rest of UK, with increased commuting distances and increased need for infrastructure funding in London.
- The city of London is strengthened through agglomeration, with only limited uptake of remote working. Strong employment growth, but with the rise of the informal economy and poor working conditions in certain sectors.
- Reduced expectations of quality of life with associated impacts on public health – an increasing inequality in health, wealth and living standards. People tolerate high living costs and crowded conditions in search of high salaries and vibrant culture.
- Innovation is highly regulated but public services and infrastructure are unable to keep pace with growth, although higher fares and tax revenues allow investment in major infrastructure projects.

Using the scenarios

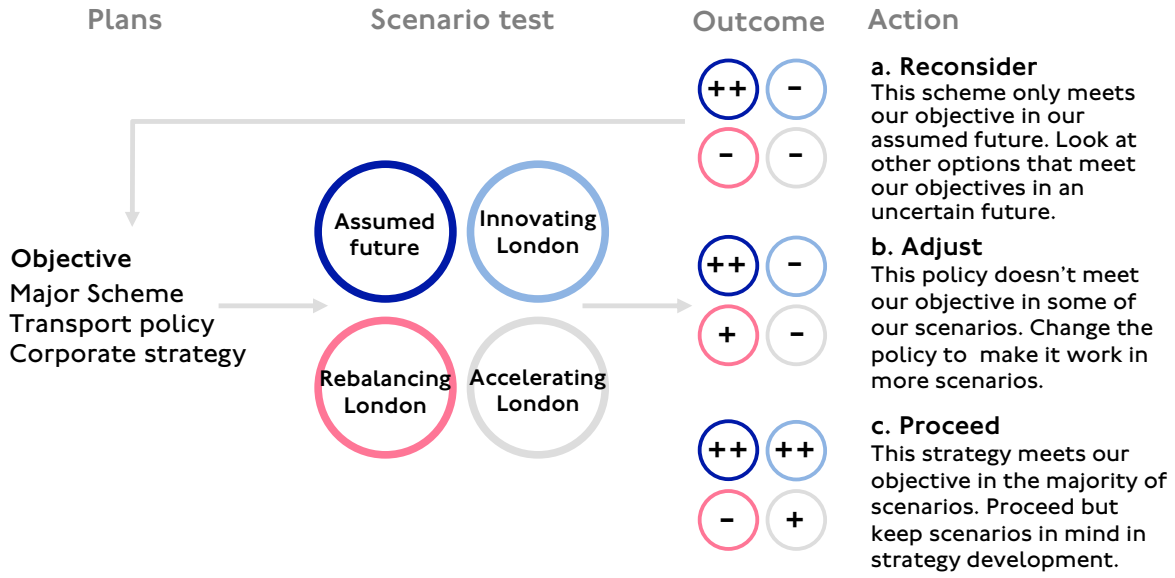
The aim of the scenarios is to challenge our assumptions about the future and to have a more structured approach to considering uncertainty in our planning so that TfL makes the best possible decisions about investment. Scenarios can be used to:

- Ensure our future plans and infrastructure proposals are robust to a range of different futures.
- Inform the way we shape our business to reflect a changing world.
- Shape our proposals and build the right flexibility into large infrastructure projects.
- Reflect uncertain technological change in our planning process.

As part of our evidence-based approach, we are working to make the scenarios available within our transport models. These will be available next year and will enable us to better quantify the impacts of scenarios on our plans.

Scenarios inevitably pose some difficult questions for our plans for the future, but this is their purpose. Asking the question 'does this proposal work under this set of circumstances and, if not, how can I make it as strong as possible?' is the core of the scenario-based planning approach. Scenario planning will not undermine either the Mayor's Transport Strategy or decisions that we have taken in our Business Plan, being based as they are on our current central scenario, or 'assumed future'. Indeed we already know that in all scenarios London will continue to need transport investment to meet the Mayor's aims for the city. However, future plans and the way that we implement the transport strategy can be tested against the scenarios, and reconsidered or adjusted to help better meet our business objectives in an uncertain future. Figure 14.18 illustrates this process.

Figure 14.18 How scenarios can be used to refine and adjust our future plans.



Source: Strategic Analysis, TfL City Planning.

It will be of intrinsic interest to see, over the coming years, if and how unfolding trends point towards any one of the three possible alternative futures described, or alternatively, conform to our central case. However, scenario-based planning is intended to be an iterative process, with periodic review and refresh of the scenarios, perhaps on a five-yearly basis. Observed developments will then be used to refine our central case scenario, and a new range of alternative scenarios developed to reflect a view of emerging challenges suggested by contemporary conditions and trends at that time. Whatever future unfolds, it is certain that London will continue to need further transport investment to meet the Mayor's aims for the city.

15. Supporting new homes and jobs

15.1 Introduction

New homes and jobs is a strategic theme in the Mayor's Transport Strategy with two outcomes that directly support this:

- Transport investment will unlock the delivery of new homes and jobs.
- Where there are new developments, active, efficient and sustainable travel will be the best option.

This chapter reviews progress against these aims.

London is home to 8.9 million people and the functional economic area for over 14 million people – one fifth of the UK total. Further growth is expected, and the transport strategy aims to provide for a future where, in 2041, London is expected to have 10.8 million residents, around 30 per cent higher than in 2011, and 6.9 million jobs, an additional one million jobs compared to today.

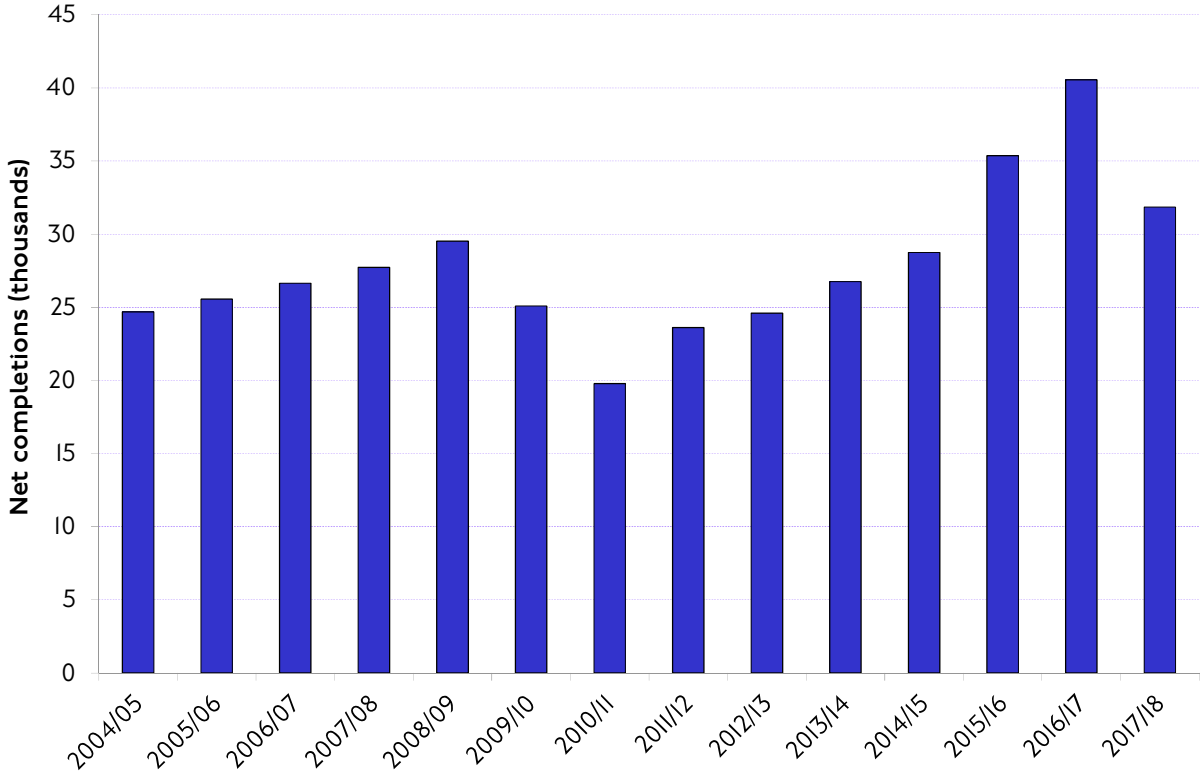
London's continued success depends on delivering new homes in places where local amenities are accessible by walking, bicycle or public transport: known as 'good growth'. The aim is for people to be able to lead fulfilling lives and have good access to opportunities and services, without the need to use a car. The London Plan (see: www.london.gov.uk/what-we-do/planning/london-plan) sets out a clear vision for London with integrated transport and land-use strategies, built around creating high-density, mixed-use places in well-connected locations, and unlocking the growth potential in London's Opportunity Areas.

15.2 New homes

In the last two decades the number of jobs in London has grown by 42 per cent and the number of people by 26 per cent, but the number of homes grew by only 16 per cent. This means that new housing supply has failed to keep up with demand. The GLA sets housing delivery targets for London and the boroughs. Across London there were more than 32,000 housing completions in 2017/18. Of these, 4,700 were affordable homes. This is below the adopted London Plan target of 42,000, and is a reduction in housing delivery from the previous year, which saw the highest number of completions recorded.

Figure 15.1 shows the net conventional housing completions since 2004/05. The latest year is a 28 per cent decrease on 2016/17, ending the upward trend each year since 2010/11 when completions were below 20,000. Some 15 per cent of completions in 2017/18 were affordable.

Figure 15.1 New housing completions.



Source: Greater London Authority.

How TfL is delivering more affordable homes

The release or repurposing of publicly-owned land for residential development has a key role to play in meeting housing targets. As one of the Capital's largest landowners, TfL can play a key role in building a better London by working with communities and our partners to create affordable and vibrant spaces of the future.

Since 2016 our development programme has been gathering pace. The sites already brought to market will deliver more than 50 per cent affordable housing. Our long-term development pipeline will start to deliver 10,000 homes, as well as two million square feet of offices, shops and workspace.

We are adopting a variety of routes to help us fulfil the potential of our sites, which will help us deliver the homes London needs quickly, with 50 per cent being affordable. We have made significant progress on our Build to Rent investment portfolio. In 2019, following a competitive procurement process, we announced our partnership with Grainger plc called Connected Living London. Together, we will transform seven sites, including Limmo Peninsula near Canning Town station in the East and Southall in the West. Connected Living London will deliver more than 3,000 quality rental homes, 40 per cent of which will be affordable.

We continue to bring forward other sites for development, ranging in size and scale. They include our affordable housing-led projects, such as Rayners Lane, Stanmore and Canon's Park in Harrow where we are working with Catalyst – a leading housing association – to provide 500 affordable homes, and commercial led schemes at South Kensington and Landmark Court.

We continue to support the Mayor's Small sites, Small builders programme, releasing small sites for development each year. Construction has started on one of the first sites at Beechwood Avenue, which is due to be completed by 2021. We will work closely with the boroughs to pool our land and unlock larger town centre regeneration schemes, ensuring we can deliver homes, generate revenue and create great places where people want to live and work.

When our development programme is at its peak, we will need around 7,000 workers, in construction and other industries, so ensuring we have the right people with the right skills is important. By the end of 2019/20, we will have provided 1,700 training opportunities to Londoners through the Mayor's Construction Academy programme, of which we expect at least 600 to secure jobs in the construction industry. The newly skilled workers could help us deliver the homes London desperately needs, and we are excited that some candidates have joined up with the Blackhorse Road development team which will provide 350 new homes, of which 50 per cent will be affordable.

15.3 How public transport has supported growth

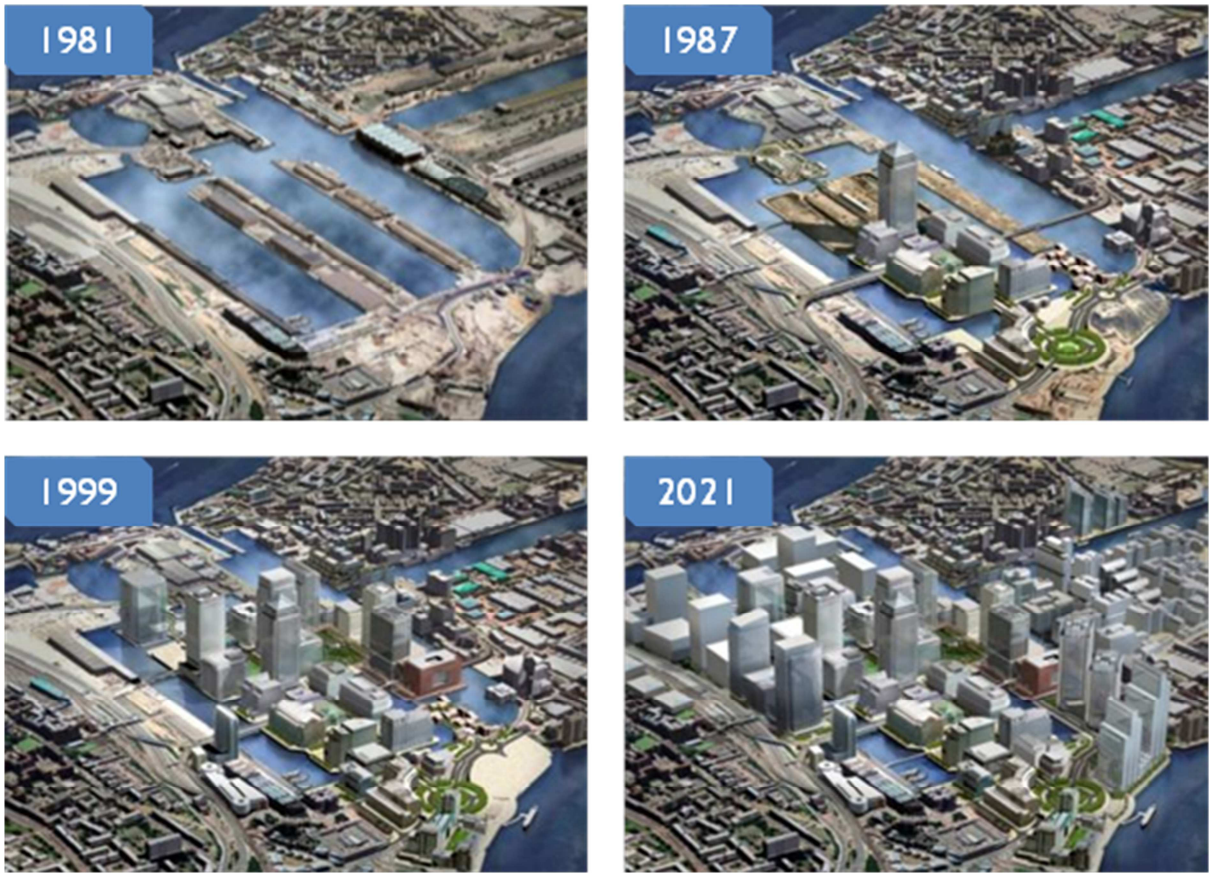
Since TfL formed in 2000, London has experienced rapid population growth, with an additional 1.7 million people living in the Greater London area. The only way to accommodate this growth has been by expanding and improving the public transport network. The location and quality of transport infrastructure has been fundamental to the development of the city. There is well-established economic theory which links connectivity to agglomeration and productivity improvements (outlined in Chapter 1 of the evidence base for London's Local Industrial Strategy, see: www.london.gov.uk/sites/default/files/lis-evidence-base-interim-report.pdf).

London's rail network plays a particularly strong role in connecting businesses and people in London to the wider South East and beyond, with rail-based modes making up 80 per cent of the 1.2 million trips to central London in an average weekday morning peak. In addition, London's extensive bus network offers low cost, accessible travel across London.

In the last ten years, public transport capacity (in terms of place-kilometres on the main public transport modes, excluding National Rail) has grown by some 30 per cent. This substantial investment in public transport capacity has supported mode shift away from private car, and an increase in travel by public transport and active modes.

East London has seen rapid population and jobs growth, partly due to the dramatic improvements in public transport infrastructure and capacity in that part of London. For example, over the past 25 years, transport networks have been extended in parallel with growth in London's Docklands. The area has developed high-density, high-value employment, concentrated in the Isle of Dogs, 3 kilometres east of the City of London. This was supported by the development of the DLR network from 1987 with a station at Canary Wharf in 1991, and the Jubilee line extension which opened in 1999. Figure 15.2 represents this pictorially and shows how expected future growth will be unlocked by the Elizabeth line. In total, rail investment is expected to have unlocked 200,000 jobs around Canary Wharf.

Figure 15.2 Canary Wharf at key points of public transport delivery in the past 40 years, and looking to 2021.



Source: TfL City Planning.

Isle of Dogs

The redevelopment of London's Docklands since the 1980s and distinctive geography of the Isle of Dogs makes it a unique case study for research into the interactions between employment growth, transport provision and travel patterns. TfL instituted a cordon-based count survey to cover the Isle of Dogs and Canary Wharf in 1988. Travel in London report 11 shared the latest results from the Isle of Dogs cordon survey. These weekday surveys record trips entering and exiting the area. The main findings are growth in the number of people entering the cordon (from 9,000 trips in 1988 to 107,000 in 2015, an average annual percentage increase of 10 per cent), highlighting the challenge of accommodating high volumes in the peak direction at peak times. There is also a trend towards longer distance commuting, and a decrease in car mode share.

In October 2019, the GLA, TfL and Tower Hamlets published an Opportunity Area Planning Framework (OAPF) for the Isle of Dogs and South Poplar. The Isle of Dogs and South Poplar is one of the fastest growing areas in London. The OAPF provides a framework to enable good growth while supporting existing communities, the employment centre around Canary Wharf and further residential growth over the coming decades (see: www.london.gov.uk/what-we-do/planning/implementing-london-plan/opportunity-areas/opportunity-areas/isle-dogs-and-south-poplar-opportunity-area).

The Transport and Movement Strategy that accompanies the OAPF is designed to support the aims of the transport strategy. For example it sets out a multi-modal

package of transport measures to ensure that over 90 per cent of travel to, from and within the area is by active, efficient and sustainable modes.

Housing growth in east London

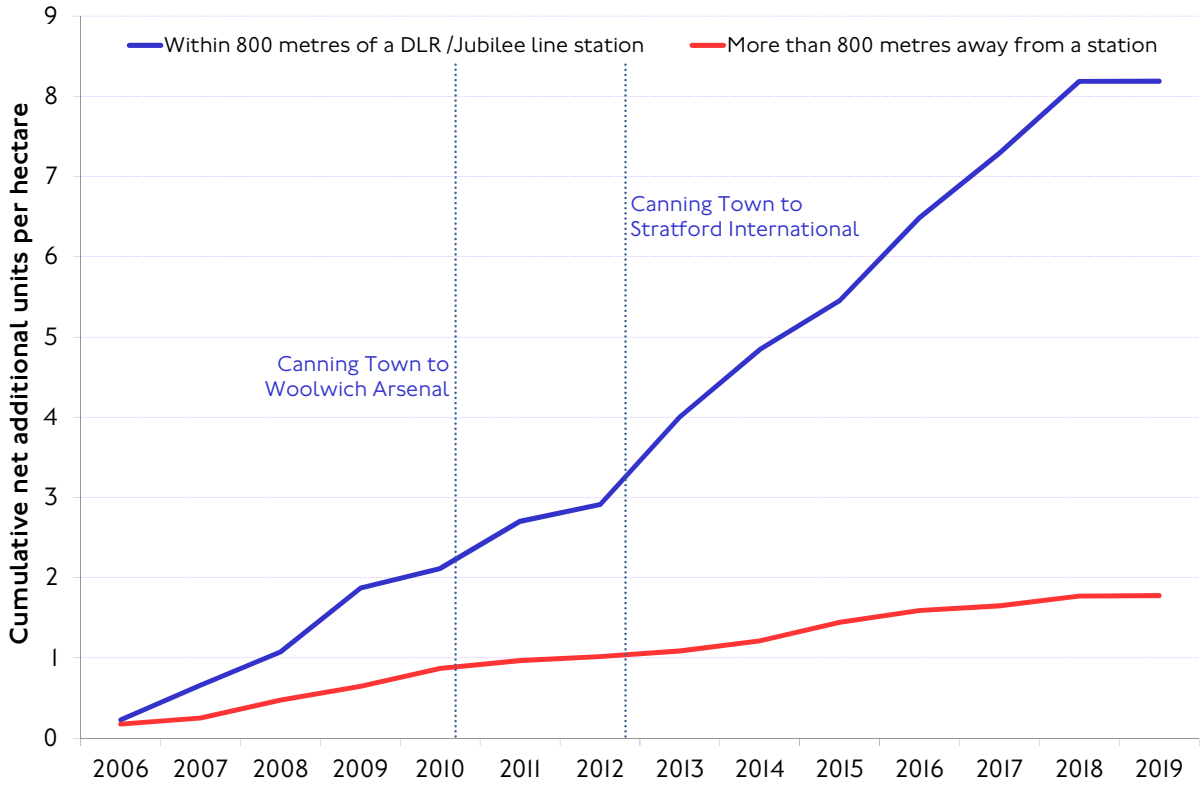
Transport has helped shape the location and density of housing development in east London by improving connectivity and access to jobs and services. New analysis has shown that housing growth along the DLR network and Jubilee line extension (from Green Park to Stratford in 1999) has been concentrated within 800 metres of stations. In total, 21 per cent of all net additional housing built in London from 2006 to 2019 was built within 800 metres of stations on the DLR or Jubilee line extension. This equates to over 81,500 homes in London, the majority of which are found in just four boroughs: Tower Hamlets, Newham, Greenwich and Southwark.

Figures 15.3 and 15.4 show the number of new homes delivered by Newham and Southwark between 2006 and 2019. To make the figures comparable they are presented as cumulative net additional housing per hectare. They compare the delivery of housing close to and away from stations. This shows the higher rate of delivery of new homes near rail infrastructure.

Between 2006 and 2019 an additional 17,000 residential units were delivered within 800 metres of DLR or Jubilee line stations in Newham, while less than 3,000 new units were delivered in locations without close proximity to the DLR or Jubilee line. When this is standardised to a per hectare figure, this shows that over four times the number of additional units per hectare were delivered in locations near DLR or Jubilee line stations in Newham (eight units per hectare) compared to two units per hectare in the rest of the borough. An increase in delivery close to stations is also suggested in the years following extensions to the DLR network in the early 2010s.

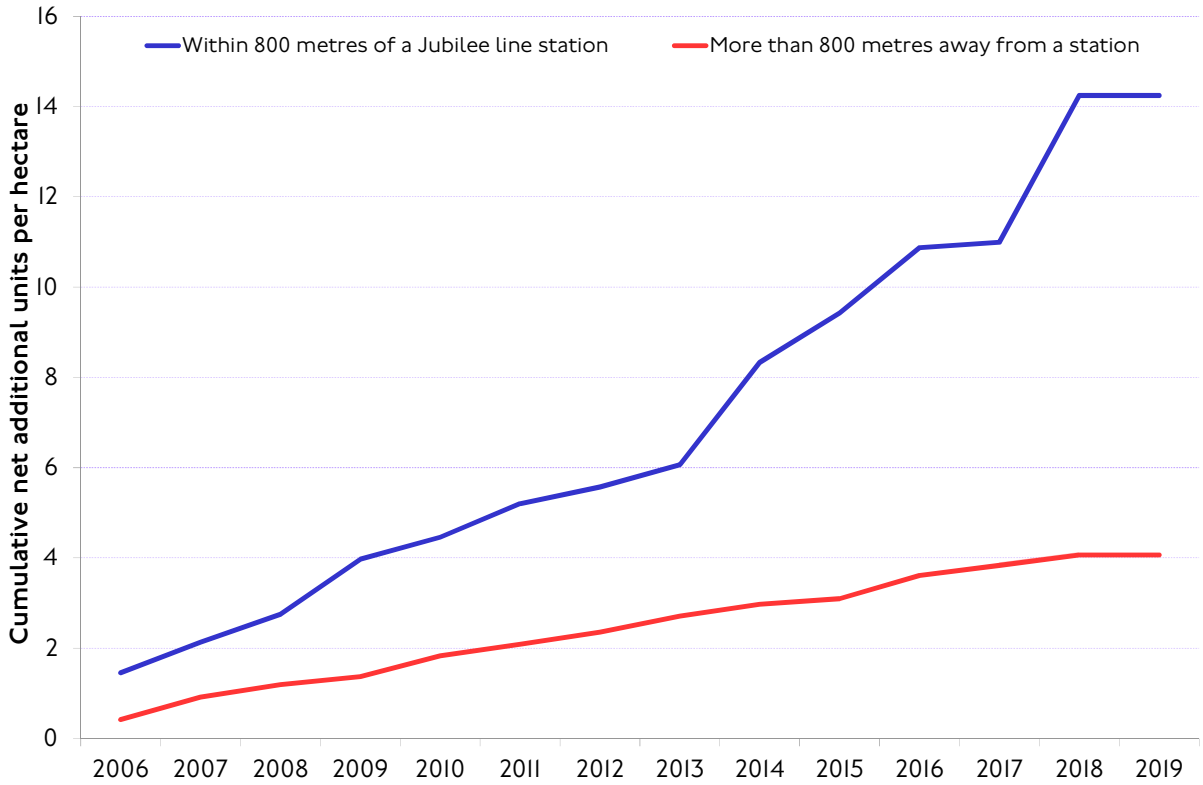
A similar picture is seen in Southwark which delivered an additional 19,000 housing units since 2006. The rate of housing units per hectare delivered near Jubilee line stations is 3.5 times that of locations in the rest of the borough.

Figure 15.3 Cumulative additional housing units per hectare, Newham, 2006-2019.



Source: Strategic Analysis, TfL City Planning using data from London Development Database 2006 to October 2019.

Figure 15.4 Cumulative additional housing units per hectare in Southwark, 2006-2019.



Source: Strategic Analysis, TfL City Planning using data from London Development Database 2006 to October 2019.

15.4 Transport infrastructure to unlock new homes: Housing Infrastructure Fund and TfL's Growth Fund

Given the high level of housing growth required in London, public transport investment is needed to support sustainable population growth. Transport can be part of the solution, by improving the quality and capacity of existing connections or providing new infrastructure giving access to previously less accessible locations. This is particularly the case for large sites with the potential for regeneration, designated as Opportunity Areas. The London Plan identifies Opportunity Areas which have significant capacity to accommodate new housing, commercial and other development. The Strategic Housing Land Availability Assessment (2017) estimated that Opportunity Areas account for 68 per cent of London's estimated overall capacity for new housing on large sites between 2017 and 2041, potentially providing around 460,000 new homes (see: www.london.gov.uk/sites/default/files/2017_london_strategic_housing_land_availability_assessment_0.pdf). In order for the potential of these areas to be fully realised, transport connectivity and capacity improvements will often be required.

Recognising this, recent bids to government have been successful in securing funding to enable housing development in areas where the current rail infrastructure would be unable to meet increased demand at stations and on the trains. This includes the Housing Infrastructure Fund (HIF) for DLR improvements including new trains, depot expansion and a new station to unlock 18,000 new homes. A further HIF for the East London line will see investment to increase train frequency, provide a new rail station, and upgrade a rail and bus station to support delivery of 14,000 new homes.

TfL's Growth Fund

TfL's Growth Fund focuses targeted investment in areas where transport currently acts as a constraint to the delivery of new homes. Spending in Phase 1 contributed to the design of 12 schemes with the potential to deliver over 75,000 homes and 100,000 jobs. This included the Barking Riverside Overground Extension, Bromley-by-Bow highway improvements, Elephant & Castle Northern Line ticket hall, and White Hart Lane station completing in late summer.

Ilford Station is an example of a current project being supported by TfL's Growth Fund. Work is about to commence on site to deliver a new additional southern entrance which will enhance station capacity and accessibility. This work compliments and runs parallel with National Rail's overall refurbishment of the station which includes step-free access. The station works are important to the future growth of Ilford where there are three Housing Zone sites set to deliver over 1,000 new homes as well as a number of local labour and apprentice opportunities.

As a future Elizabeth line station, the enhancements will support the vision for Ilford to deliver 16,000 new homes by 2030. The Elizabeth line will also enable Ilford to be a convenient and accessible town centre, with new workspace, education and leisure facilities supporting future growth. One current regeneration scheme in the town centre, Ilford Circus, will focus on high density development and place-making interventions through public investment in infrastructure, streets, spaces and civic facilities. The new southern station entrance is supported by TfL's Growth Fund (£750k along with the borough of Redbridge's contribution of £1.25m) and is due to complete early 2020.

15.5 Enabling good growth

The Mayor's policies aim to focus housing in areas that are well connected by public transport. This 'good growth' will ensure residents have access to a range of suitable opportunities – a key element in tackling inequality and improving quality of life. Good public transport connections will also enable people to travel more sustainably. Given the challenges of air quality, health and road danger, 'good growth' is essential if London is going to grow sustainably and feed into the success of the London region, the wider South East, and beyond.

Evidence suggests we are going in the right direction in terms of the location of housing development. For example, most new housing has been delivered within one kilometre of a rail or tube station (89 per cent of all new units from 2006 to 2018). This reflects the fact that good public transport access increases the attractiveness of housing to residents and developers.

This contributes to a growing proportion of London's households living in well-connected areas. Table 15.1 uses data from the London Development Database and the Public Transport Access Level (PTAL) score to show the location of existing households and new development in relation to public transport connectivity. Currently more than one third of households are in higher connectivity areas of PTAL 4 or above (36 per cent). More than half of new housing from January 2012 to July 2019 was delivered in areas of PTAL 4 or above (55 per cent), reflecting the policy and market focus on housing growth in well-connected locations.

Table 15.1 Current households and new housing units (completions and start-ups) by PTAL level.

	Households in 2016		New housing units (Jan 2012-Jul 2019)	
PTAL	**Number**	**Proportion**	**Number**	**Proportion**
0	85,937	2%	3,226	1%
1a	535,309	15%	4,087	2%
1b	147,608	4%	25,143	10%
2	924,485	26%	36,196	15%
3	648,421	18%	42,544	17%
4	435,914	12%	26,387	11%
5	291,065	8%	36,983	15%
6a	342,716	10%	40,164	16%
6b	182,798	5%	32,364	13%
Total	3,594,252	100%	247,094	100%

Source: London Development Database.
Note: New housing units are completions and start-ups.

Development in higher PTAL areas contributes to a virtuous cycle by supporting the viability of public transport services, which in turn enable a higher population to travel sustainably and efficiently. The draft London Plan seeks to further support this by setting maximum car parking standards, with many developments in well-connected areas required to be car-free or car-lite. London's already congested roads, together with the need to create a globally attractive, liveable city, means that car-based development in London is not a viable option. This

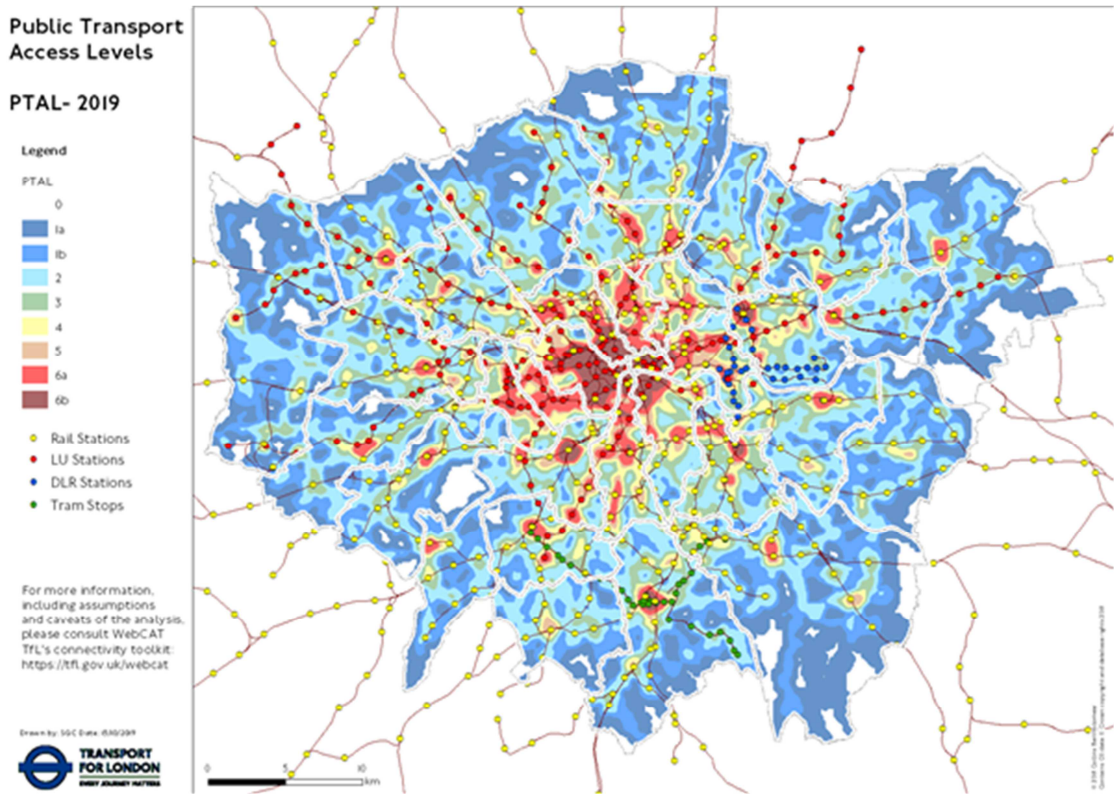
restraint on car parking reduces the space requirements and traffic impacts of development, enabling more housing to be delivered on the limited land that is available, while also supporting the Mayor's aims for healthier, cleaner transport.

15.6 Transport connectivity and PTAL

Connectivity refers to how well places are connected to each other using the transport network. PTAL is TfL's main measure of connectivity and is used to inform appropriate development location and density. For a chosen location PTAL combines walk access time to public transport access points (stops and stations) together with service availability at those points during the weekday morning peak. PTAL measures access to the public transport network and also gives more weight if there are routes serving a greater number of destinations. PTAL values are on a scale from 1 to 6, with 6b representing the greatest level of connectivity.

Figure 15.5 shows PTALs across London for 2019. Central London has higher PTAL values, as do metropolitan town centres such as Croydon, Stratford and Harrow. These locations act as key transport hubs with a wide range of public transport modes and services available. PTAL values are generally lower in outer London reflecting the lower density of the public transport network and fewer built-up areas. Many town centres in outer London have PTAL values of 5 or 6, reflecting better access to multiple bus routes and, in many cases, rail stations.

Figure 15.5 Public Transport Access Levels (PTAL), 2019.



Source: Strategic Analysis, TfL City Planning.

PTAL is an established part of the planning process and is used by developers, planners and local authorities. PTAL is available to the public via WebCAT; TfL's web-based Connectivity Assessment Toolkit (see: www.tfl.gov.uk/WebCAT). The website displays PTAL as well as other connectivity measures via an interactive map interface. WebCAT functionality includes:

- View London/borough-wide PTAL maps.
- View site-specific grid PTAL outputs and reports.
- View travel time plots for any selected location in London using the following variables: year (current, 2021, 2031), mode (all public transport, bus, cycle, step-free), time period (AM peak, inter-peak, PM peak), direction (to, from, average).
- Alter travel time bands (5, 10, 15, 20, 30 or 45 minutes) to fit the specific analysis.
- View cumulative catchment bar charts for a chosen location and travel time bands, showing how many people, jobs, town centres, schools, and health services are within the time bands displayed.
- Compare one travel time variable against another for the chosen location and display the travel time differences on the map and view the catchment results in a bar chart.

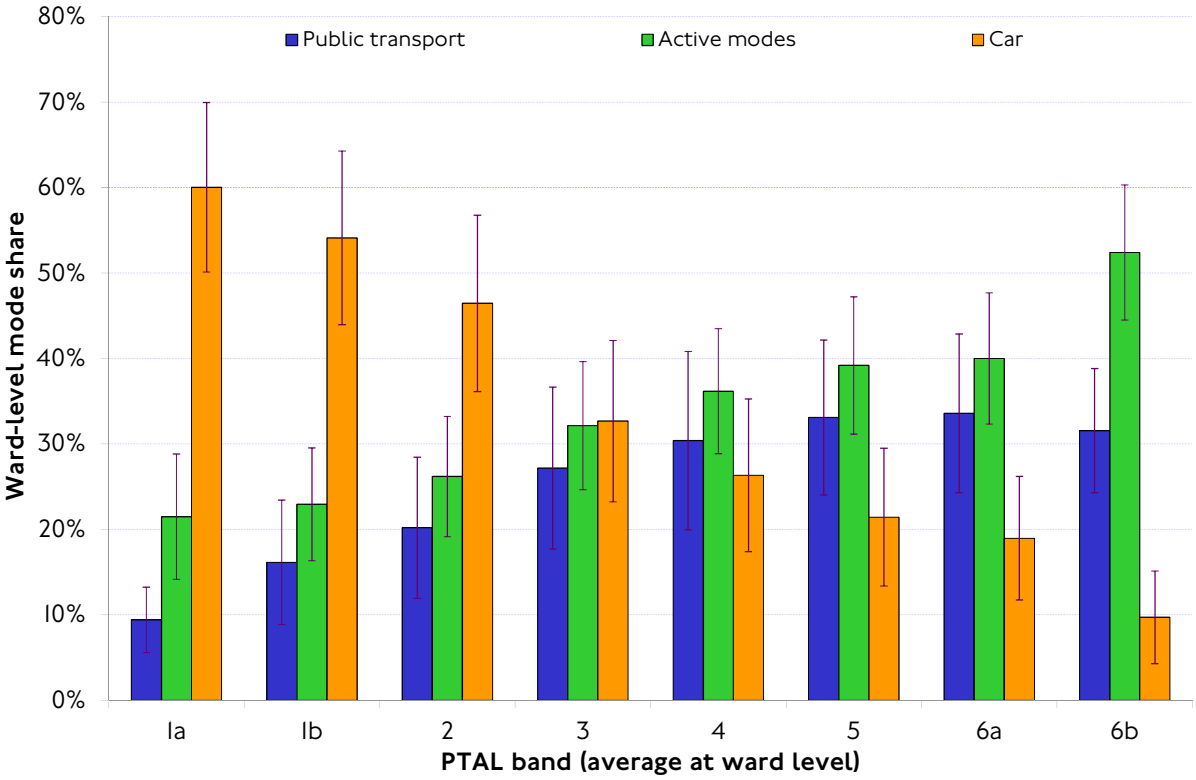
15.7 Relationship between connectivity and sustainable travel choices

Higher density housing is being delivered near stations, and in the more well-connected areas of London. This is essential if we are to meet the Mayor's target of an 80 per cent active, efficient and sustainable mode share by 2041.

Figure 15.6 shows that people living in more well-connected areas (with higher PTAL) make more trips by public transport, and by active modes (walking or cycling). Car mode share is higher in less well-connected areas: for example, more than 50 per cent of trips to and from home in lower connectivity areas with PTALs of 1a and 1b are made by car, compared to less than 20 per cent for people living in PTAL 6a or 6b (highest connectivity).

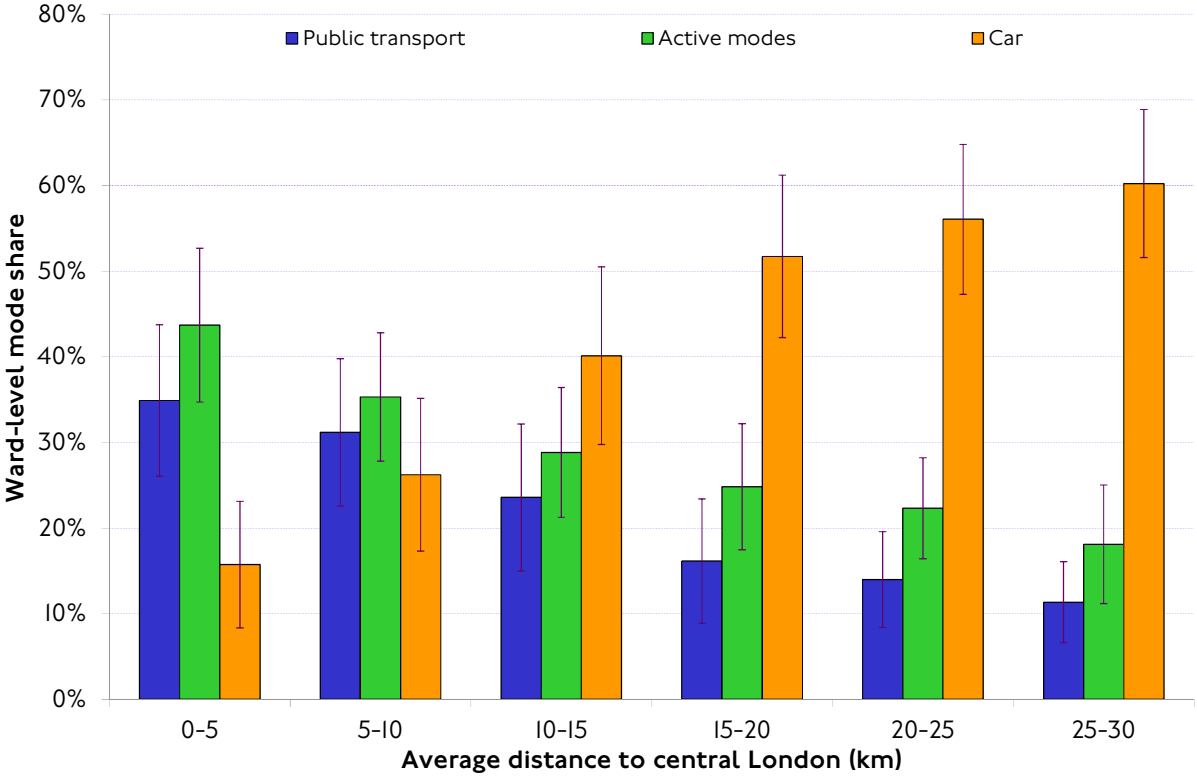
Car mode share also correlates with distance of home or workplace from the centre of London, with the highest car mode share in outer London and the lowest in central London. This is reflected in analysis using crow-fly distance to central London in figure 15.7, which shows the lowest car mode share for those living within 5 kilometres of central London, and car mode shares above 50 per cent for people living more than 15 kilometres from the centre.

Figure 15.6 Average mode share of home-based trips by PTAL band, LTDS 2005/06-2014/15.



Source: Strategic Analysis, TfL City Planning.
Note: trips are by London residents only with 'home' as purpose for trip origin or destination.

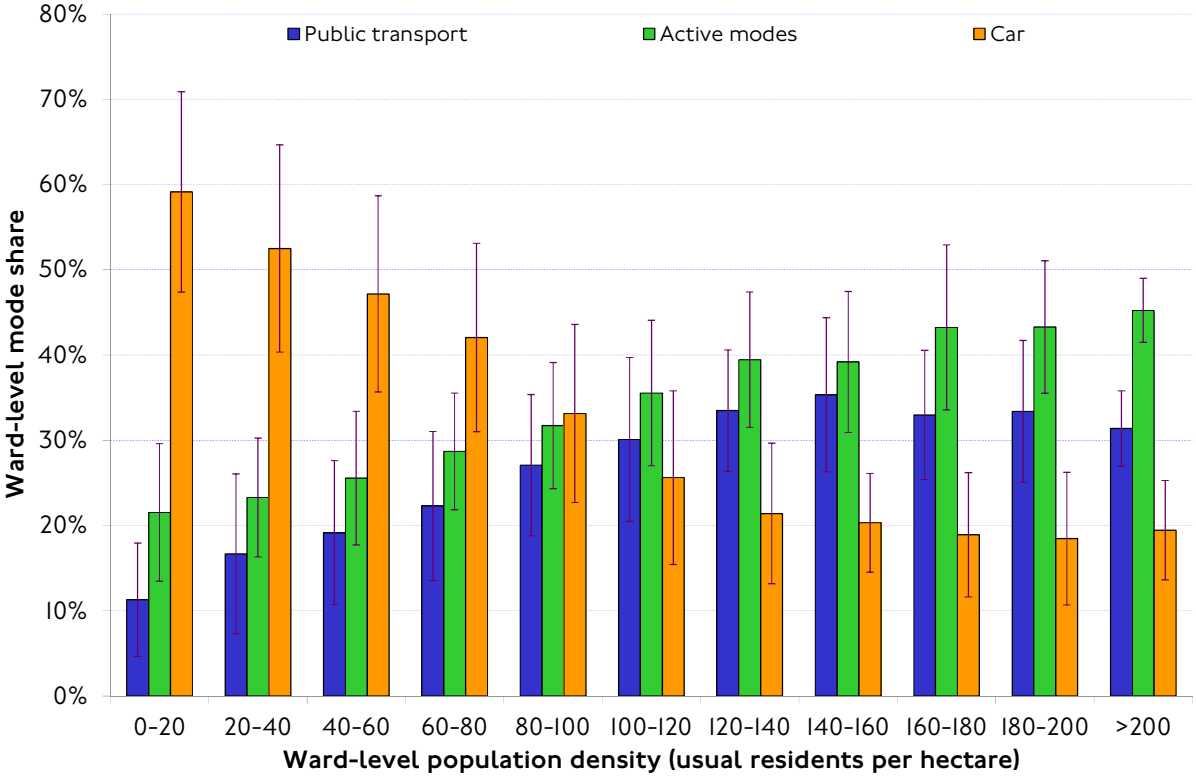
Figure 15.7 Mode share of home-based trips by distance from central London, LTDS 2005/06-2014/15.



Source: Strategic Analysis, TfL City Planning.

It was also found that denser development supports sustainable transport outcomes. Figure 15.8 shows higher public transport and active travel mode shares towards the right side of the chart, reflecting higher population densities. Averaged at a ward level, car mode share is highest in areas with lower population densities.

Figure 15.8 Mode share of home-based trips by population density, LTDS 2005/06-2014/15.



Source: Strategic Analysis, TfL City Planning.

Analysis has shown that car mode shares are lower for people living in areas with better public transport connectivity, closer to central London and in high density areas. If we want to achieve the active, efficient and sustainable mode share we need to make existing areas more similar to this and build new homes in areas with these characteristics, ie provide high quality public transport and active travel connections, and higher population densities.

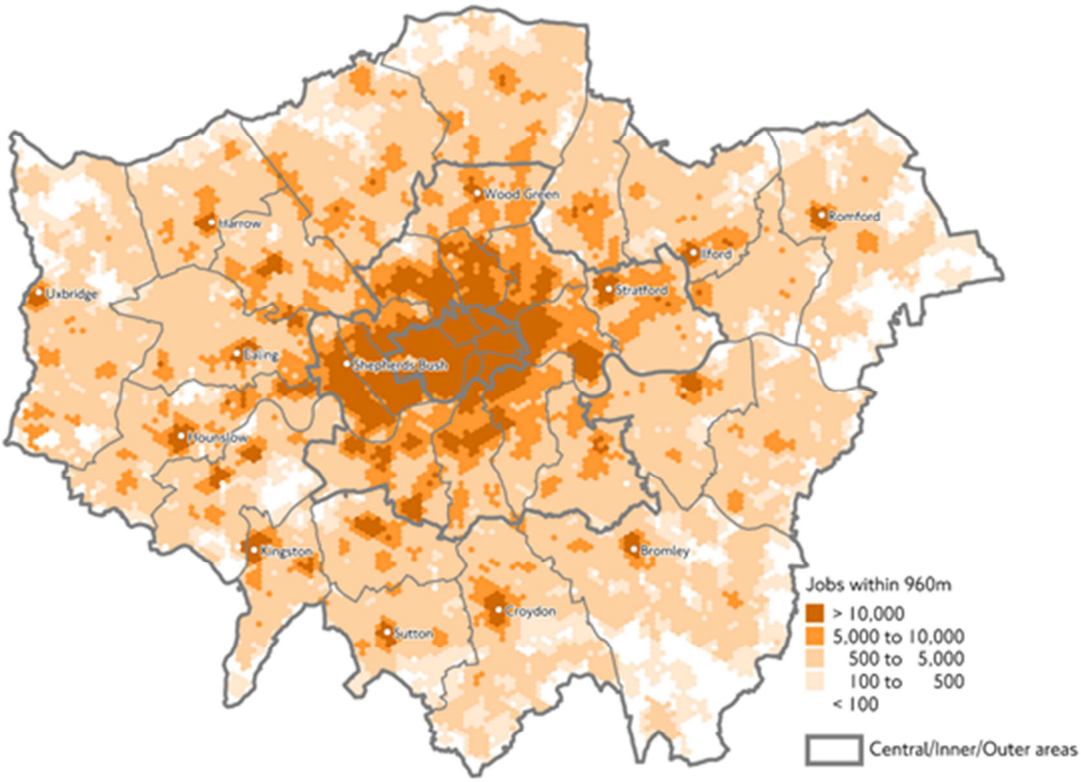
15.8 Walking and local connectivity in relation to development

Walking is essential to good connectivity and a crucial component in the PTAL calculation. Walking is essential to access public transport, whether by walking from home to a bus stop, or from a rail station to the final destination. Walking is also important to make connections within the transport network, for example to interchange between rail and bus, or change from one Underground line to another. In some cases these interchanges require a substantial walk. A value of 960 metres is typically used for planning purposes as the reasonable maximum walk distance to access rail and Underground services. This is the walk distance used in the calculation of PTAL, and represents a nominal 12 minute walk. For some people a reasonable walk distance might be substantially longer or shorter than this, reflecting personal circumstances (eg age, disability) and the particular trip (eg if carrying heavy bags, or travelling in a group). The draft London Plan

refers to 800-metre catchments calculated as a 'crow-fly' distance. This roughly equates to 960 metres on the actual walk network, estimated to add 20 per cent to the 'crow-fly' distance.

Walking is also an important transport mode in its own right. Walking the whole trip is the most common form of travel in London. Assessment of the walk network enables us to look at access to jobs and town centres by walking alone. Figure 15.9 shows the number of jobs within a 960-metre walk distance from each location in London. The map should be interpreted in terms of, from any one point (a single hexagon), the number of jobs that are reachable within a 960-metre walk. The darker areas offer the best opportunity in terms of access to jobs on foot, central London and the metropolitan town centres being among the most significant.

Figure 15.9 Number of jobs within a 960-metre walk of any location in London.



Source: Strategic Analysis, TfL City Planning.

Analysis of the walk network and the London Development Database has shown that much recent housing growth has been in areas with a good level of walk access to jobs (defined in this case as being over 5,000 jobs within a 960-metre walk). Good walk access to jobs also correlates with higher PTAL and proximity to central London and town centres, so it is not necessarily a causal relationship, but one way to explore the importance of local walk access. Based on the central, inner and outer definition of London:

- In central London 100 per cent of new housing completions and start-ups since 2012 took place in areas with access to at least 5,000 jobs within 960 metres.
- In inner London 82 per cent of new housing completions and start-ups since 2012 took place in areas with access to at least 5,000 jobs within 960 metres.

- In outer London only 37 per cent of new housing completions and start-ups since 2012 took place in areas with access to at least 5,000 jobs within 960 metres, although this varies considerably depending on proximity to town centres.

Town centres have the potential to offer a range of essential services that could support new residential development at the local level. They range from large metropolitan centres such as Croydon and Ealing to local district centres such as Coulsdon or Pinner. Some 58 per cent of London's population currently live within 960 metres of a designated town centre although this only represents 35 per cent of London's total land area.

Figure 15.10 shows areas within a 960-metre walk of a town centre and/or station overlaid with housing completions and start-ups from January 2012 to July 2019. There is a clear pattern of growth concentrating near stations and town centres. Some 87 per cent of units have been developed in areas within walk distance of a town centre and/or a station.

Figure 15.10 Housing developments since 2012 (shown as red dots) have been concentrated in areas within a 960-metre walk of a town centre and/or rail/Underground station.

Source: Strategic Analysis, TfL City Planning using data from the London Development Database.

Over half of housing development (52 per cent of housing units) since 2012 has taken place in areas within 960 metres walking distance of both a town centre and rail/Underground station. A further quarter of housing units (27 per cent) have come forward in areas within a 960-metre walk of a station. A smaller proportion (9 per cent) of units have been completed or started within walk distance of a town centre (but not a station).

Alongside PTAL, this analysis shows that other factors are important in understanding how well connected a place is, eg access to jobs, proximity to rail stations and town centres. Having proximity and good access to jobs, services and town centres is important when deciding how to accommodate growth and plan for new homes. Walk access to local services and neighbourhoods is an important consideration in 'good growth'.