



# Travel in London

Report 8



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# **Travel in London Report 8**

## **Overview**

## Overview

### Travel in London report 8

Travel in London summarises trends and developments relating to travel and transport in London. Its principal function is to describe how travel in London is changing and provide an interpretative overview of progress towards implementing the transport and other related strategies of the Mayor of London, 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 transport and travel in London.

This eighth Travel in London report draws on the latest available data, generally reflecting the 2014 calendar year, or the 2014/15 financial year, and sets these in the longer-term context of the evolution of transport and associated trends in London. It focuses particularly on developments over the period to date covered by the Mayor's Transport Strategy (MTS), nominally from a 2008 'baseline'.

This overview identifies and distils these insights, grouped loosely around the Mayor's goals for transport, as set out in the strategy. It also identifies a range of contemporary and future issues, arising from these trends, which will help inform the development of any new transport strategies or plans over the coming years.

### Supporting economic development and population growth – overall travel trends in London

**London has grown rapidly in recent years, despite the economic recession, leading to increased demand on the transport system.**

- In 2015, London's population stood at 8.6 million, equalling the previous high point of 1939. This reflects strong growth since the start of the century. The population of 2015 was 19.0 per cent higher than in 2000, and 10.3 per cent higher than in 2008. The growth since 2008 has been higher than that foreseen in the MTS, and this has been reflected in higher than expected increases in demand across the public transport networks, effectively 'bringing forward' the date by which the enhancements set out in the strategy would be required.
- A total of 26.6 million trips were made on an average day in 2014, some 2 per cent higher than the previous year and 8.2 per cent more than in 2008. These comprised 31.3 million journey stages, 2.3 per cent higher than in 2013 and 9.2 per cent higher than in 2008. This strong year-on-year growth has been a consistent feature of the last decade or so and is expected to continue in future years.

**Over the last 15 years London has experienced strong growth in public transport, walking and cycling, with a trend of falling car use, despite increasing population.**

- Since 2000, London has achieved a net shift in mode share (at the journey stage level) of 11.0 per cent away from private transport, principally the car, towards public transport, walking and cycling – a feat unprecedented in any major city. This shift has been consistent across the years with the net shift from 2008 being 3.3 per cent. This reflects consistent policies to encourage public transport use and enhancements to the public transport networks and to encourage walking and cycling.

- This shift in net mode share is also happening faster than that foreseen by the MTS, although data for the most recent two years suggests a return to growth in levels of road traffic, albeit that the net car mode share continues to decrease as public transport and cycling are growing faster.

**Strong growth is expected to continue for at least the next two decades; therefore developing plans to accommodate this growth and maintain and support London's economic success will continue to be a major preoccupation for Transport for London (TfL).**

- London's future growth is expected to be of the order of six new residents every hour, or two Tube trains' worth of people per week, reaching a population of 10.4 million by 2041 – the equivalent of adding both Birmingham and Glasgow to London between now and then.
- This means more trips – a total of 5.5 million more trips per day in 2041 compared to 2014 if current average trip rates remain unchanged.

**The composition of London's population is also expected to change, altering the emphasis of future demand pressures on the transport networks.**

- Much of this future growth will be focused on London's Opportunity and Growth Areas, which will feature dense, mixed-use developments with high public transport connectivity – particularly to the east of London.
- Set against this however London's population will feature more older people, whose travel behaviour will emphasise specific types of demand. The proportion of older people in outer London is expected to grow significantly, bringing challenges in terms of public transport connectivity and possibly increased car use.

**The overall picture of stronger than expected growth in population and travel demand has affected the various travel modes in different ways. There has been strong growth on the core public transport networks, but road traffic volumes have declined.**

- On the **London Underground (LU)**, usage growth has been consistently strong for many years. There was an aggregate 19.8 per cent growth in Underground journey stages between 2008/09 and 2014/15 – equivalent to 3.1 per cent per year on average, and a net 25.5 per cent growth in passenger kilometres travelled. As well as population and employment growth, this has also reflected the Tube upgrade programme, which has significantly increased capacity on several Underground lines.
- Following very strong growth in the early years of the last decade, the upward trend in **bus patronage** has levelled off in recent years, at least in part reflecting a similar trend in service supply. Between 2008/09 and 2014/15 bus passenger stages grew by 6.2 per cent, equivalent to one per cent per year, and bus passenger kilometres grew by 6.0 per cent. Nevertheless, bus patronage in terms of passenger kilometres in 2014/15 stood at 78.8 per cent higher than the start of the century in 2000/01. About half of all bus journeys in England are now made in London.
- On the TfL Rail modes the period since 2008 has also been marked by strong growth, reflecting substantial capacity enhancements that have been made to these networks. On the **Docklands Light Railway (DLR)** there was a net increase

of 67.1 per cent in journey stages and 86.8 per cent in kilometres travelled between 2008/09 and 2014/15, an average growth rate of 8.9 per cent per year (journey stages).

- The new **London Overground** network, largely established over the period since 2008, has seen a 321.4 per cent increase in journey stages over the period, on a like-for-like basis, equivalent to 27.1 per cent per year – reflecting the rapid development and enhancement of this network, including improved customer service aspects.
- Patronage on **Tramlink** increased by 13.7 per cent between 2008/09 and 2014/15 in terms of journey stages, equivalent to 2.2 per cent per year.
- Patronage of **National Rail** services serving London (London and South East operators) continued to grow strongly, with a 4.3 per cent increase in journey stages over the latest year. Journeys on National Rail totalled 1,155 million in 2014/15, an increase of 35.2 per cent since 2008, despite the economic recession, equivalent to 5.2 per cent per year.

**Levels of road traffic have fallen for much of the last decade, but have increased for the last two years. This reversal of trend, thought to reflect increasing population and economic growth post-recession, coupled with unprecedented demands on road network capacity to support a range of priorities, is bringing increased pressures to London's road networks.**

- Levels of **road traffic** in London have fallen for most of the last decade, but have shown signs of increasing again over the last two years. Taking the period from 2008 to 2014, the net decline has been 7.5 per cent in central London, 9.3 per cent in inner London, and 0.4 per cent in outer London, equating to an overall reduction of 3.1 per cent at the Greater London level. This fall in road traffic has been attributed to a much-improved public transport offering, various wider societal changes affecting car ownership and use, and reductions to available road network capacity.
- Over the most recent year traffic volumes have started to increase in all parts of London – by 3.4 per cent in central London, 1.4 per cent in inner London, and 1.9 per cent in outer London (1.8 per cent at the Greater London level), relative to 2013.
- This combines with increasing reallocation of available road network capacity to support a range of other MTS priorities, as well as increased general construction activity affecting the road network, leading to further renewed congestion pressures.

**Continued strong growth in cycling and on TfL River Services.**

- **Cycling** levels increased by 10.3 per cent between 2013 and 2014. The net growth since 2008 in terms of journey stages has been 31.9 per cent, equivalent to 4.7 per cent per year on average.
- TfL River Services has seen significant expansion between 2008/09 and 2014/15, with passenger traffic on the **Thames** increasing by 19.1 per cent in the latest year.

### **Increasing public transport use means more walking by Londoners.**

- Some 6.4 million **walk-all-the-way** trips were made on an average day in London in 2014. This is an increase of 9.3 per cent since 2008, but this increase mainly reflects population growth over the period (which was also 9.3 per cent). This gives a walking mode share (for all travel) of 24 per cent, which is identical to the position in 2008.
- However, there is evidence that increased public transport use has, as a by-product, increased the number of walk journey stages undertaken by Londoners. This brings health benefits, but is putting additional pressure on available pedestrian space on London's roads.

### **Clear recessionary effects for freight traffic and air travel, but recent rapid growth for vans.**

- Trends for the amount of **freight traffic** on London's roads have particularly mirrored the fortunes of the wider economy. **Van traffic** in London increased by 3.4 per cent in aggregate between 2008 and 2014, driven by an 8.3 per cent increase in outer London, although there were declines in central and inner London of 4.9 and 6.0 per cent respectively over the same period. However, this masks the effects of the recession. Between 2008 and 2011, van traffic declined by 6.1 per cent, but has been growing strongly since then, with van traffic in 2014 10.1 per cent higher than in 2011.
- **Heavy goods vehicle** traffic declined by 3.2 per cent between 2008 and 2014, with falls of 8.0 per cent in inner London and 1.9 per cent in outer London, although there was a 2.7 per cent increase in central London.
- Passenger traffic through London's main **airports** has also closely reflected the fortunes of the wider economy, with terminal passengers at London area airports increasing by just 1.4 per cent overall between 2008 and 2014. Between 2007 and 2010 terminal passengers decreased by an average of 3.1 per cent each year.

### **Stable trends for licensed taxis but strong growth for licensed private hire.**

- The number of **licensed taxis** and licensed taxi drivers in London has remained broadly stable over the period between 2008 and 2014, at about 22,500 and 25,000 respectively. However, recent technology change has seen the number of **licensed private hire** vehicles and drivers increase at a rapid rate – up by a net 27.2 and 41.1 per cent respectively between 2008 and 2014, and up by 18.8 and 19.9 per cent over the latest year alone. However, this does not appear to have fed through directly to significantly increased traffic levels.

## **Transport supply**

**Public transport in London has, over recent years, benefited from a long run of sustained high operational performance and service provision. All key indicators of service provision have shown a marked trend of improvement over the last decade.**

- A total of 80 million train kilometres were operated on the Underground in 2014/15, up by 14 per cent against 2008/09, with the benefits of the Tube

upgrade programme, including the current renewal of the entire sub-surface train fleet, now evident.

- In 2014/15, 489 million vehicle kilometres were operated on the bus network, a 2.4 per cent increase against 2008/09, continuing the high rate of service provision following the major increase to bus service levels in the earlier part of the last decade.
- On the other TfL Rail modes 2014 saw continued incremental development to the networks and the services operated on them. Between 2008/09 and 2013/14, the net increases in service provision have been 48.7 per cent on the DLR and 142.5 per cent on London Overground, reflecting the rapid expansion of this network, and 13.2 per cent on Tramlink.
- In terms of the overall capacity provided by the public transport networks, measured in terms of place-kilometres (a reflection of the maximum carrying capacity of the vehicles), the net increases between 2008/09 and 2014/15 were 9.8 per cent for Underground, 4.3 per cent for bus, 91.9 per cent for DLR and 13.1 per cent for Tramlink, equating to an overall increase of 9.6 per cent across the four networks in combination.
- This is a growth rate equivalent to 1.5 per cent per year, on average, in the capacity of London's key public transport networks. Despite falling short of the overall increase in travel demand, indices of customer satisfaction with crowding on the public transport networks have improved over the period.

**Alongside increased public transport provision, there have also been sustained improvements to the quality and reliability of public transport services, and corresponding increases in customer satisfaction.**

- Service reliability indicators in 2014/15 for the major public transport modes were also at, or close to, best-ever levels, following on from and maintaining the exceptional performance to support the London 2012 Olympic and Paralympic Games. London's public transport networks now carry more people, more reliably, than ever before.
- In 2014/15 London Underground operated 80 million train kilometres, reflecting 97.6 per cent reliability, against 73 million train kilometres operated in 2008/09, reflecting 96.4 per cent reliability. In terms of customer-focused measures, excess journey time for the Underground has reduced from an average of 6.6 minutes in 2008/09 to 4.6 minutes in 2014/15, a reduction of 30.3 per cent in this measure of unreliability.
- Bus reliability, in terms of the percentage of schedule operated, has been at consistently high levels throughout the period from 2008/09. In 2014/15 97.1 per cent of the schedule was operated, compared with 97.2 per cent in 2008/09. Achieving and maintaining these high levels of bus network reliability has been a major feature of the period since 2000. In terms of excess waiting times, for much of the period since 2008 the average bus passenger has had to wait just one minute longer than they would otherwise have to do if the service ran perfectly to schedule, although this has increased to 1.1 minutes in 2014/15, and there are signs that wider congestion trends during 2015 are beginning to impact on bus service reliability.

### **Exceptional performance by London Overground and London's light rail networks.**

- Reliability on London's two self-contained light rail networks has been excellent throughout the period since 2008/09. The Docklands Light Railway operated more than 99 per cent of the scheduled service for the last two years and five of the seven years since 2008/09 have seen over 97 per cent of the scheduled service operated. 2014/15 saw the highest ever level of scheduled service operated, at 99.3 per cent. Tramlink has performed similarly well, with at least 97 per cent of scheduled services operated in all years since 2008/09.
- Since its inception, London Overground has been at or close to the best performing National Rail operator serving London. The network has consistently recorded Passenger Performance Measures (PPM) of more than 94 per cent, with a value of 95 per cent in the most recent year. The PPM measure is a percentage value that combines measures of service reliability and timekeeping.
- On National Rail more widely in London, PPM measures have typically been in the 85 per cent to 95 per cent range, although scores for individual operators have varied considerably across the years. Services on the c2c, Chiltern Railways, and London Overground lines have tended to be the higher performers in terms of PPM, whereas those on First Great Western, Thameslink, London Midland and Southern lines have tended to consistently perform less well on the basis of this measure.

**For much of the period since 2008, average journey times, congestion (delay) and journey time reliability on London's roads have been maintained at consistent levels. However, there are signs of increasing pressure over the most recent two years.**

- On London's roads, for much of the period since 2008, average traffic speeds and delays (congestion) have been stable. Between 2008 and 2013, average traffic speeds and delay levels barely changed. However, between 2013 and 2014 there is evidence of growing pressures on the road network with a decrease of 4 per cent in average traffic speeds across London, coupled with a sharp 13 per cent increase in average traffic delay, providing a marked contrast to the historic trend.
- The historic stability in these trends is thought to reflect a combination of falling traffic levels and much improved network management, albeit that effective network capacity for general traffic continued to be reallocated to other MTS priorities.
- The recent change in trend is thought to reflect increasing traffic levels, coupled with temporary disruption from the unprecedented amount of construction activity affecting London's roads, both directly related to the roads themselves and also to wider economic growth. Clearly, this change in road network conditions will be a focus for future planning and network management, especially given the expected continued growth in London's population and the increasing requirement for improvements to the wider urban realm in London.
- Journey time reliability on the TfL road network (the TLRN) – has largely retained its historic stability in the most recent year, standing at a value of 88 per cent in 2014/15, against an average over the available time series of 89 per cent (of road journeys completed 'on time'). This reflects a strong focus by TfL to minimise

the impact of temporary disruptions and works, and to actively manage traffic to optimise overall network conditions.

## **Transport operational efficiency, fares and new technology**

**Over the period since 2008, we have reduced operating costs per passenger kilometre and maintained assets in a good state of repair.**

- TfL's net expenditure per passenger kilometre (public transport networks) has reduced over recent years, and currently stands at 2 pence per passenger kilometre.
- TfL is a public body, with no shareholders or parent companies, which means we can reinvest all surplus income in the transport network. For every pound we receive, 65 per cent is spent on operating the network, and 35 per cent on improving it for the future.
- The percentage of TfL's key assets deemed to be in 'good' condition (this measure mainly relates to asset age and not to safety-critical aspects) has been maintained at around 90 per cent consistently over the period since 2008. This reflects continued investment in new infrastructure and the inevitable fact that all assets age with the passage of time.

**Although public transport fares have increased in real terms, we are at the forefront with introducing new ticketing and payment technologies.**

- Real public transport fare levels increased in the latter years of the last decade but have been relatively stable over more recent years. Real fares in 2014, based on a weighted average indicator across the main public transport networks, stood at 8.0 per cent higher than in 2008, but showed no increase over the most recent year.
- The contactless payment card has already become the preferred option for travel for a large and steadily increasing number of customers. TfL has become the fastest growing contactless merchant in Europe, with the number of contactless transactions growing by about 11 per cent per month since September 2014 when this facility was rolled out to our rail networks.

**Making the most of new technology.**

- In the 12 months since it was launched in April 2014, our re-designed website has received 250 million visitors, with more than 1.2 billion page visits. In the latest customer survey, 90 per cent of respondents rated their experience of using the website as excellent, very good or above average. More than four-fifths (81 per cent) of Londoners use our site – up from 76 per cent a year ago.
- Demand for our social media feeds continues to rise strongly, with 2.3 million followers on Twitter and Facebook receiving real-time updates on bus and rail services and roads status. During 2014/15 we sent more than 263 million tailored email updates across more than 1,000 campaigns.
- We are actively analysing and improving our capability to apply big data to provide better transport: it can measure and anticipate the impact of changes to our services, as well as the effects of alterations to London's landscape such as new housing, offices and shopping developments. TfL is also making our data available to others to help facilitate new insights and developments in the information and tools that are available to customers.

## Enhancing the quality of life and improving opportunities for all Londoners

### Improvements to transport make jobs and services more accessible to Londoners.

- Between 0.25 and 0.5 million jobs are potentially available from the typical London home within 45 minutes travel time. However, this rises to around 2.5 million jobs potentially available to a resident of central London.
- This measure of access to jobs has increased by an average of 5.2 per cent across London over the period 2009–2015, with the average Londoner able to reach slightly more than 1 million jobs within 45 minutes. However, this largely reflects the background increase in the number of jobs available as opposed to dramatic improvements to network connectivity (although east London has benefitted in particular from new links provided by London Overground).
- A more substantial ‘step change’ will arise with the opening of Crossrail in late 2019, alongside an enhanced Thameslink network. This will offer a dramatic improvement in cross-London connectivity and mean, with other improvements, that for example, 50 per cent more jobs will be potentially reachable from Ilford town centre in 2031 compared to 2011.
- In terms of access to the public transport networks, as measured through our (PTAL) index, there has been a 14.2 per cent improvement (Greater London level average) between 2008 and 2015, reflecting numerous large- and small-scale improvements over the period, with a further aggregate improvement of 23.6 per cent expected between 2008 and 2021, given currently-committed schemes.

### There has been a clear and consistent improvement in key customer satisfaction indices for the main transport modes, and also for the wider transport environment in London, although some areas are performing better than others.

- Over the period of the Mayor’s Transport Strategy to date, the trend for TfL’s public transport customer satisfaction indicators have been generally upwards, reflecting the wide range of improvements to TfL’s services and the transport environment in London more generally. Customer satisfaction with Tramlink and the DLR is high at a score of 89 out of 100 each. Trends for the bus (85) and Underground networks (84) have been decisively upwards over the period covered, reaching the highest level since surveys began.
- Improving satisfaction for bus and Underground customers has come through a large reduction in the proportion of customers who are delayed, new vehicles and improved real-time information, especially for buses, via the growth in live bus information apps powered through TfL open data. This has been supported by staff as well as a steady stream of new innovations, including WiFi on the Tube, contactless payments, and effective communications - including the celebration of 150 years of the Underground, the Year of the Bus and behind-the-scenes TV documentaries.
- In terms of overall customer satisfaction with wider aspects of the transport system, the picture is one of slow but consistent improvement over the period, remembering of course that as conditions improve, so public expectations tend also to rise, and that we are not directly in control of many aspects of the wider urban environment. According to our norms and in 2014, both perception of the urban realm and satisfaction with the overall journey experience were rated as

'fair'; perception of transport-related noise was rated as 'fairly good' and satisfaction with public transport crowding was rated as 'good' – all having shown consistent improvement over the past five years.

### **Physical accessibility to the transport networks has improved.**

- We continue to invest to improve levels of physical accessibility to the transport networks. The composite indicator that measures this has increased from 36 per cent in 2008/09 to 54 per cent in 2014/15, this being the proportion of the public transport network that is fully accessible. This is a substantial improvement, but still means that just under half of the network is not fully accessible, therefore those with travel-related disabilities often face longer journeys and some journeys may not be physically possible.

### **Improving the safety and security of all Londoners**

**The number of people killed or seriously injured on London's roads is now at its lowest ever level. However, vulnerable road users account for a disproportionate number of casualties.**

- Recent years have seen substantial reductions in the number of killed or seriously injured (KSI) casualties from road traffic collisions in London.
- This has enabled us to meet the Mayor's target to reduce the number of people killed or seriously injured on London's roads by 40 per cent six years early. KSIs are now at their lowest level in London since records began and to build on this progress, the Mayor set a new target in 2015 for a further 50 per cent fall in KSIs by 2020.
- However, 'vulnerable' road users (pedestrians, cyclists and riders of two-wheeled motor vehicles) account for a disproportionate number of KSI casualties – some 80 per cent, requiring a continued intensive focus on measures to reduce these numbers further over the coming years. We are using innovative techniques to better understand the contributors to road collision risk and thereby help prioritise mitigation measures to maximum effect.

**London's public transport networks continue to offer a very safe environment for customers. All indicators of reported crime on the networks have decreased substantially in recent years, although fear of crime and anti-social behaviour continues to deter about one-fifth of Londoners, to some degree, when travelling.**

- London's public transport networks continue to offer a very safe environment for customers, with improvements in key customer safety indices from 2008 and over the longer term. Despite some inconsistencies in the available data, there have been typically slightly more than 120 incidents of customer injury on the Underground per year since 2008/09, with Underground patronage increasing by 19.8 per cent over this period. The trend for serious injuries on the bus network however, has been more definitively downwards, with a 53.0 per cent reduction between 2008 and 2014.
- Levels of recorded crime on the main public transport networks have broadly halved over the period since 2008/09, with average annual reductions of 10.4 per cent on the Underground and DLR (combined), 8.3 per cent on the buses, and 9.9 per cent on Tramlink. London Overground has the lowest overall level of reported crime, at 5.7 per million passenger journeys (2014/15), and has

shown a similar trend of improvement since the start of recording of this measure.

- The available indicators relating to fear of crime while travelling have also shown an improving trend over the review period. While not available on a consistent basis from 2008, from 2009 to 2011 between 95 and 97 per cent of Londoners felt safe while travelling during the day and between 76 and 78 per cent felt safe while travelling at night. Later evidence shows a consistent reduction in the proportion of Londoners for whom concerns over crime/anti-social behaviour affect the frequency of their public transport use by 'a lot', from typically 26-28 per cent in 2013 to 22 per cent in spring 2015.
- Nevertheless, it is clear that some customers still have significant concerns, and TfL is working to understand better the causes of these so that improvements can be more effectively targeted.

### **Reducing transport's contribution to climate change and improving local air quality**

**New estimates of London's key transport emissions show substantial reductions since 2008, reflecting a large range of initiatives to improve London's air quality.**

- On a provisional basis between 2008 and 2013, and reflecting the current update to the London inventories, CO<sub>2</sub> emissions from ground-based transport reduced by an estimated 10 per cent, PM<sub>10</sub> emissions from ground-based transport have reduced by 15 per cent, and NO<sub>x</sub> overall emissions from ground-based transport reduced by 21 per cent.

### **Ten years of TfL's London Travel Demand Survey: Some insights from contemporary travel demand trends**

TfL's London Travel Demand Survey (LTDS) is a continuous household survey of the Greater London area. LTDS has been running on a rolling basis since 2005/06, making the latest full survey year, 2014/15, the 10th year of available data. This report contains a special chapter looking at what this data can tell us about a variety of 'topical transport questions' over the last decade.

**Have there been any major changes in the overall amount of travel by Londoners over the last 10 years?**

- Overall travel patterns, in terms of number of trips per capita and average time and distance travelled by Londoners over the decade have been broadly stable, although the economic recession of the latter part of the last decade temporarily dampened the amount of travel made per capita, and there are some indications of a longer-term trend towards slightly less travel being made per capita on average, albeit that overall population and travel demand continues to increase.
- In looking for trends, there is some evidence of a small reduction in overall trip rates over the 10 year period – indicative of an overall reduction in the 'need to travel', and consistent with increasing densification of parts of London.
- There has however been a steady rise in the proportion of Londoners who make no travel on any given day – and this phenomenon accounts for the majority of the change in overall trip rates. This is thought to reflect broad changes in working patterns, although the impact of the recession in temporarily reducing trip rates is also visible in the data.

- The overall distance travelled and the time spent travelling by an average Londoner have also been broadly stable over the decade; however there are some indications that average trip lengths have become slightly longer overall.

### **How has car use by Londoners changed over the past 10 years?**

- Trends in the number of car driver trips, the distance travelled as a car driver and time spent travelling as a car driver in London have all been downward over the 10 year period covered by LTDS, despite rapid population growth and an absolute increase in traffic levels over the most recent year.
- This is consistent with the 'peak car' theory that, in relation to major western cities, proposes that per capita car travel has begun a decline from a peak. Increasing densification in London, and the response to this of more public transport provision, has contributed to the trend.
- The trend observed over this ten year period does not, however, necessarily mean that the future will continue to develop in exactly the same way. In particular, the recession in 2008 and a longer term lack of growth in real household incomes in outer London dating from before LTDS began have meant there was little upward pressure on car use in London. A return to stronger economic growth or increases in outer London incomes in the coming years could still contribute to the recent trend of reducing per capita car use slowing down or even reversing.

### **To what extent has increased density in inner London resulted in different travel trends?**

- Inner London's population has grown by 15 per cent over the 10 years that LTDS has been in place. Similarly, outer London's population has grown by 13 per cent. This means that both inner and outer London have become more dense over the last 10 years, with inner London seeing a much greater increase in density in absolute terms given its smaller land area – about a quarter of the size of outer London.
- The different starting points in absolute density in inner and outer London are associated with very different travel behaviour, with a larger share of outer Londoners' travel by car, and with inner Londoners' travel more likely to be by walking, cycling and public transport.
- It is evident that in the densest areas of London a greater proportion of trips are made by walking, cycling and public transport: in the 20 per cent densest areas of London only 16 per cent of residents travel to work by car, while in the 20 per cent least dense areas 45 per cent do so.
- Changes in density over time are associated with changes in travel behaviour, for example between 2001 and 2011 areas that experienced an increase in population density of more than 20 people per hectare saw a reduction in car travel to work mode share of 8 percentage points. This is in comparison to a reduction of 5 percentage points in areas that experienced population density increases of less than 1 person per hectare.

### **Are changing working patterns affecting travel demand?**

- Travel related to work (both commuting and on work business) accounts for 28.8 per cent of trips made by Londoners on an average weekday (2014/15), and is the primary driver of the maximum capacity required by the transport networks. As population and employment increase, so does the absolute number of work-related trips.
- Increasing flexibility of working patterns does however appear to have led through to an overall reduction in work-related travel demand over the 10 year review period on a per capita basis, with an average reduction of 0.4 per cent per year in commuting trips by an average Londoner. There is no clear trend, however, for employer's business trips, the frequency of which has remained broadly stable at the level of the individual.
- There is also evidence that Londoners are travelling more frequently between home and a work place other than the one they recognise as their 'usual workplace', which could be another manifestation of more flexible working patterns.
- Working from home is now broadly equivalent in scale to annual leave as a reason why those in full-time employment do not make a commuting trip on any given day.

### **How is the change in London's age balance likely to affect travel demand?**

- There are clear differences in travel patterns by age group among London residents. Older residents tend to travel less, make fewer work-related trips and more trips for leisure and personal business than average, tend to travel disproportionately at off-peak times, and make more use of cars and buses and less use of rail-based modes. Younger adults are more likely to travel for education than work (although the characteristics of both types of trip are not dissimilar), make more rail-based trips and are much less likely than average to drive, yet their levels of walking and cycling are not dissimilar to those of the overall population,
- There have not been substantial changes in these patterns over the 10 years of available data. This is potentially important in that it suggests that the patterns are relatively entrenched and may not therefore change radically when looking forward to the next 10 or 20 years.
- With the number of old people in London's population set to increase over the next two decades, disproportionate growth may be expected in the use of the modes, times and for the purposes most characteristic of these people, with an emphasis on increased demand for bus and car travel – particularly in outer London and at off-peak times.

### **How do Londoners travel at the weekend and how does this differ from working weekdays?**

- London residents make fewer trips on average at the weekend compared with weekdays (average trip rates of 2.5 for weekdays, 2.4 for Saturdays and 2.0 for Sundays). This is mainly due to fewer work-related and education trips being made at the weekend – commuting trips are almost six times higher on weekdays. This is partly offset by people making more leisure and shopping trips at the weekend. Eighty per cent of all trips at the weekend are for leisure or shopping purposes, compared with 45 per cent on weekdays.

- Within the overall context of growing absolute levels of demand, and while per capita trip rates on weekdays have declined slightly over the period of the survey, per capita weekend trip rates have remained relatively stable, with overall trip rates in 2014/15 almost the same as in 2005/06. Within this stable trend, however, there has been a decrease in shopping and personal business trips and a corresponding increase in leisure trips at weekends.
- The mode share of trips made at the weekend also differs from trips made on weekdays. More than 30 per cent of weekday trips by London residents are made using public transport, which falls to around 24 per cent at weekends. Almost half of all trips at the weekend are by private transport modes, with a much larger share of car passenger trips. Cycling tends to be more common on weekdays, reflecting the high share of commute trips on that particular mode.
- Trips at weekends have a very different time profile to weekday trips. In contrast to weekdays, trips at the weekend have one main peak in the middle of the day, with this peak being more pronounced on Sundays (between 12:00 and 13:00), and more spread out across the afternoon on Saturdays, with the peak running from 10:00 to 16:00. However, average trip lengths are remarkably similar on weekdays and weekends.

#### **What has been driving the net change in mode share towards public transport, walking and cycling for travel in London?**

- Between 1994 and 2014 there has been a net shift in mode share, at the trip level, of 13 percentage points away from the private car towards public transport, walking and cycling. This shift relates to all travel in London, whether by residents or non-residents. The equivalent shift over the period of the LTDS survey from 2005 to 2014 was 6.5 percentage points (all trips in London).
- Looking only at London residents, a similar pattern of modal shift has been seen in the 10 years that LTDS has been running. Among London residents, there was a net modal shift from private to public transport of 5 percentage points, with the public transport mode share rising from 26 per cent in 2005/06 to 31 per cent in 2014/15, and a corresponding decrease in private transport mode share from 42 per cent to 36 per cent. While this overall trend of modal shift is representative of changing travel patterns among London residents considered as a whole, there have been differing trends among different social groups and in different locations.
- There has been a sustained decline in private transport mode share among inner London residents, from 27 per cent in 2005/06 to 20 per cent in 2014/15. The increase in public transport mode share over this period was relatively small, moving from 37 to 38 per cent. Among inner Londoners, more of the modal shift away from private transport in the last 10 years has been towards cycling, with a 2 percentage point increase in mode share, and walking, which has seen a 3 percentage point increase.
- Outer London residents' private transport mode share also decreased between 2005/06 and 2014/15, but by a comparatively small 4 percentage points. The increase in public transport mode share among outer Londoners, however, was much greater than that in inner London, at 6 percentage points. Cycling too saw an increase in mode share among outer Londoners, of 1 percentage point, but the mode share of walk trips declined by 4 percentage points over 10 years.

- Across London as a whole, private transport mode shares fell by 6 percentage points both among men and women over the 10-year period. The changes in other modes, however, differed by gender. In particular, cycle mode share among men increased by more than 2 percentage points, while among women the increase was of less than half a percentage point. Walk mode share fell by 1 percentage point among men and was unchanged among women, while women saw an increase in public transport mode share of 6 percentage points – equal to the fall in private transport mode share – in comparison to a 5 percentage point increase among men.
- While all age groups had lower car driver trips rates in 2014/15 than in 2005/06, the reductions were larger among younger age groups.

## About Transport for London

We are London's integrated transport authority. Our role is to implement the Mayor's Transport Strategy to keep London working and growing and make life in the Capital better. Transport is a key driver of economic growth, jobs and development. We look ahead to plan London's future and unlock areas of growth. We also promote sustainable transport, better air quality and better health.

We are funded by fare and tax payers and by commercial revenue from property and advertising. Every penny of our income is reinvested in transport. We are delivering one of the world's largest programmes of transport capital investment, which includes building Crossrail, upgrading Tube services and stations, improving the road network and making the roads safer, especially for more vulnerable road users.

We are responsible for the London Underground, London Buses, the Docklands Light Railway, London Overground, London Tramlink, London River Services, Dial-a-Ride, Victoria Coach Station, Santander Cycles and the Emirates Air Line. We regulate taxis and the private hire trade, operate the Congestion Charging scheme, manage the 580km red route network of London's strategic roads, and operate 6,000 traffic signals.

# 1. Introduction and contents

## 1.1 Travel in London report 8

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 key 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 of London. It also provides an interpretative overview and 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 vitality of the Capital.

## 1.2 Transport goals and outcomes sought by the Mayor's Transport Strategy

Travel in London reports aim to provide a comprehensive and objective evidence base for the formulation of transport policy. The current Mayor's Transport Strategy (MTS) is built around six transport goals, summarised below, which provide a broad structure for the first part of this report.

- **Supporting economic development and population growth.** London is growing fast and needs a transport system that connects people to jobs and allows people, goods and services to move easily within and through the city.
- **Enhancing the quality of life for all Londoners.** Transport has a bearing on peoples' health and wellbeing. The strategy aims to make travel in the Capital simpler and more pleasant.
- **Improving the safety and security of all Londoners.** People should feel and be safe and free of fear of crime when cycling, walking, driving or using public transport.
- **Providing opportunities for all Londoners.** The connectivity provided by the transport network underpins growth and economic and social vitality.
- **Reducing the contribution of transport to climate change and improving its resilience to the impacts of climate change.** The Mayor aims to reduce London's CO<sub>2</sub> emissions by 60 per cent by 2025. Cleaning up London's transport system is a major part of this effort, as well as working towards improved local air quality.
- **Supporting the delivery of the London 2012 Olympic and Paralympic Games and their legacy.** We played a major role in the successful delivery of the 2012 Games and are now working to secure their long-term legacy.

These goals are set out in more specific terms in Table 1.1, which is reproduced from the MTS. The table also specifies a range of challenges and outcomes that relate to each of these goals.

## I. Introduction and contents

**Table I.1** Principal transport challenges and outcomes sought by the Mayor's Transport Strategy.

Goals	Challenges	Outcomes
Support economic development and population growth	Supporting sustainable population and employment growth	Balancing capacity and demand for travel through increasing public transport capacity and/or reducing the need to travel.
	Improving transport connectivity	Improving people's access to jobs. Improving access to commercial markets for freight movements and business travel, supporting the needs of business to grow.
	Delivering an efficient and effective transport system for people and goods	Smoothing traffic flow (managing delay, improving journey time reliability and resilience). Improving public transport reliability. Reducing operating costs. Bringing and maintaining all assets to a good state of repair. Enhancing the use of the Thames for people and goods.
Enhance the quality of life for all Londoners	Improving journey experience	Improving public transport customer satisfaction. Improving road user satisfaction (all users). Reducing public transport crowding.
	Enhancing the built and natural environment	Enhancing streetscapes, improving the perception of the urban realm and developing 'Better Streets' initiatives. Protecting and enhancing the natural environment.
	Improving air quality	Reducing air pollutant emissions from ground-based transport, contributing to European Union (EU) air quality targets.
	Improving noise impacts	Improving perceptions and reducing impacts of noise.
	Improving health impacts	Facilitating an increase in walking and cycling.
Improving the safety and security of all Londoners	Reducing crime, fear of crime, and anti-social behaviour	Reducing crime rates (and improving perceptions of personal safety and security). Reducing the numbers of road traffic casualties. Reducing casualties on public transport networks.
Improve transport opportunities for all Londoners	Improving accessibility	Improving the physical accessibility of the transport system. Improving access to services.
	Supporting regeneration and tackling deprivation	Supporting wider regeneration.
Reduce transport's contribution to climate change and improve its resilience	Reducing CO <sub>2</sub> emissions	Reducing CO <sub>2</sub> emissions from ground-based transport, contributing to a London-wide 60 per cent reduction by 2025.
	Adapting to climate change	Maintaining the reliability of transport networks.
Support delivery of the London 2012 Olympic and Paralympic Games and its legacy	Developing and implementing a viable and sustainable legacy for the 2012 Games.	Supporting regeneration and convergence of social and economic outcomes between the five Olympic Growth Boroughs and the rest of London. Physical transport legacy. Behavioural transport legacy.

### 1.3 Monitoring the implementation of the Mayor's Transport Strategy

At the top level, the long-term transport outcomes sought by the MTS are monitored through a set of 24 quantitative strategic outcome indicators. These provide a useful framework for assessing progress 'at a glance', and are updated as appropriate throughout this report. However, these do not cover all aspects of transport that will be of interest and do not, of themselves, provide a good insight into topical transport issues or their underlying causes.

It is therefore necessary to take a broader and deeper analytical view of transport trends and the factors affecting them. This leads to relevant policy insights and evidence to support the formulation of future transport strategies and plans. Providing these insights and evidence base is the core role for Travel in London reports.

This role is given added impetus this year as TfL is likely to need to develop a new Transport Strategy following the Mayoral elections in May 2016. It is therefore opportune for this eighth edition of Travel in London to take a more retrospective view in consolidating trends and developments over the nominal eight-year term of the current transport strategy so far and setting them, in a broad and non-judgmental way, against the expectations set out when the MTS was drafted. In this way, and taking newer or more recent developments into account, in particular those relating to the rapid growth of London, a broad evidence base can be provided to help those framing future strategies.

### 1.4 Structure and content of this report

This eighth Travel in London report is organised across two sections and 11 chapters. The first nine chapters focus on the Mayor's six transport goals. The remaining two are 'Spotlight' chapters, which provide an extended analytical focus on topical issues.

- **Travel demand and transport network performance (chapters 2 to 4).** This section assembles and summarises trends and developments in travel demand and transport network operational performance, including the underlying factors that influence these, such as population and economic growth. This section focuses on the first of the Mayor's six transport priorities – supporting economic development and population growth – and also provides essential contextual information.
- **Progress with MTS transport goals (chapters 5 to 10).** These chapters are framed around assessing progress towards the wider canvass of MTS transport goals relating to safety and security, quality of life and the customer experience, local air quality and CO<sub>2</sub>, transport opportunities, the contribution of transport to economic development, connectivity, accessibility and diversity and prudent financial and asset management. This section also updates some key indicators relating to the legacy of the 2012 Games.
- **Chapter 11** is a 'Spotlight' chapter focusing on TfL's London Travel Demand Survey. LTDS has now completed 10 years of continuous surveys, and it is therefore appropriate to 'take stock' of what has changed, in terms of Londoners' travel behaviour, over this decade. The format of the chapter is to take a range of topical questions and see what LTDS tells us about how things have actually changed over the decade.

## I. Introduction and contents

- **Chapter 12** extends the theme of contributing to the evidence base for future transport strategies by considering the implications of London's expected rapid growth and structural change on future transport and travel demand.

### **1.5 Further information**

For specific technical queries on the contents of this report, readers should contact [TILenquiries@tfl.gov.uk](mailto:TILenquiries@tfl.gov.uk).

## **Travel demand and performance of the transport networks**



## 2. Overall travel trends in London

### 2.1 Introduction and contents

This chapter looks at overall travel demand trends in London, in terms of the overall number of trips made, the mode shares for the different forms of transport, and the factors underlying these trends. It also explores how various aspects of travel in London have changed over recent decades, focusing on change over the term of the current MTS to date, from a nominal baseline of 2008.

Sections 2.3 to 2.5 provide consolidated ‘top-level’ estimates and trends for travel by all people travelling in London, including residents and visitors, covering all of the main transport modes.

The volume of travel in London has grown substantially over the last two decades or so, more recently at a notably faster rate than foreseen in the MTS, albeit matched by a consistent shift in mode share away from private car towards public transport, walking and cycling. These trends are projected to continue into the foreseeable future. It is important that the transport system continues to provide additional, appropriately-targeted capacity so that London can reach its full economic potential, and understanding past trends will allow TfL to make projections of future travel demand that are more firmly based. These themes are picked up in chapter 12 of this report.

Finally, this chapter looks at long-term travel demand trend data for London’s two principal economic agglomerations – central London and London’s Docklands. Section 2.7 draws principally on two long-established cordon count surveys to understand how the demand for travel to these two critical areas has evolved over the last decade or so.

### 2.2 Total travel in London

Previous Travel in London reports have consolidated historic information on travel trends over the last two decades or so. Principal features of these trends have been:

- Sustained growth in demand for travel, most directly reflecting population and employment growth.
- A substantial and sustained shift in mode share away from private car and towards public transport, in parallel with increased public transport supply.

In 2014:

- Total travel demand in London grew by 2.3 per cent over 2013, maintaining a consistent pattern of annual increases stretching back to the 1990s.
- A total of 26.6 million trips were made to, from, or within London on a typical 2014 day, with slightly higher growth (2.0 per cent) than previous years, this averaging 1.1 per cent per year over the last 10 years.
- This means that there are now 17.5 per cent more trips, and 23.5 per cent more journey stages, in London on an average day than in 2000. Compared with 2008, there are 8.2 per cent more trips and 9.2 per cent more stages on an average day.

## 2. Overall travel trends in London

- The net shift in mode share away from private transport towards public transport, walking and cycling that has been a major feature of the past decade continued in 2014. In relation to 2013 there was a further 0.3 percentage point fall in the private transport mode share, falling to 36.5 per cent of trips, and a 0.2 percentage point increase in the public transport mode share (at the trip level).
- This means that, over the period between 2000 and 2014, there has been a 10.1 percentage point net shift in mode share to public transport, walking and cycling away from private transport at the trip level, with public transport, walking and cycling now accounting for 63.5 per cent of all trips in London. The equivalent shift from 2008 has been 3.4 percentage points.
- The equivalent shift at the stage level between 2000 and 2014 has been an 11.0 percentage point shift in mode share away from private transport to public transport, walking and cycling. Between 2008 and 2014, the equivalent shift has been 3.3 percentage points.

### 2.3 Journey stages 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.

Travel in London report 5 also discussed the requirement that had arisen for TfL to revise the methodology used for calculating estimates of trips and journey stages in London. This requirement arose from changes to the input data series used to derive the estimates, most notably the release of data from the 2011 Census: Population Estimates for the United Kingdom, which revealed London's population to be higher than previously understood, but also series relating to road traffic volumes and bus passengers. The figures shown in table 2.1 are therefore on a consistent basis from 2007 to 2014.

#### Total number of journey stages

Daily journey stages in London in 2014 were 31.3 million, up from 30.6 million in 2013 and 30.2 million in 2012. This is a 2.3 per cent increase in journey stages in the latest year. In 2014 there were 23.5 per cent more journey stages per day in London than in 2000, and 9.2 per cent more than in 2008.

Annual growth in journey stages was particularly high for public transport, with strong growth of 5.6 per cent and 8.3 per cent on National Rail and DLR respectively. Underground stages also increased in 2014 at a faster rate than the increase in the resident population, and were 2.4 per cent higher than the previous year, while bus stages grew by 2.5 per cent.

Car driver stages rose for the first time since 2009, up by 1.1 per cent on 2013. Despite the increase in car driver and passenger stages, stronger growth on public transport has continued the established trend of increased mode share

for public transport use in London, with a corresponding continued net shift away from private motorised transport.

Notable from table 2.1 is the 15-year trend, showing a 23.5 per cent increase in total journey stages from 2000, with rail stages up by 76.4 per cent over the same period. Also notable is the 125.3 per cent increase in cycle stages since 2000, with a 10.3 per cent increase in the latest year.

Table 2.1 Aggregate travel volumes in Greater London. Estimated daily average number of journey stages by mode, 1994 to 2014. Seven-day week.

Year	Millions of journey stages										All modes
	Rail	Under-ground	DLR	Bus (incl. tram)	Taxi /PHV	Car driver	Car passenger	Motor cycle	Cycle	Walk	
1994	1.4	2.1	0.0	3.1	0.3	6.8	3.8	0.2	0.3	5.2	23.2
1995	1.5	2.1	0.0	3.3	0.3	6.8	3.7	0.2	0.3	5.2	23.4
1996	1.5	2.1	0.0	3.4	0.3	6.9	3.8	0.2	0.3	5.3	23.7
1997	1.6	2.2	0.1	3.5	0.3	6.9	3.8	0.2	0.3	5.3	24.1
1998	1.7	2.4	0.1	3.5	0.4	6.9	3.8	0.2	0.3	5.3	24.4
1999	1.8	2.5	0.1	3.5	0.4	7.1	3.8	0.2	0.3	5.4	25.0
2000	1.8	2.6	0.1	3.7	0.4	7.0	3.8	0.2	0.3	5.5	25.3
2001	1.8	2.6	0.1	3.9	0.4	6.9	3.7	0.2	0.3	5.5	25.6
2002	1.9	2.6	0.1	4.2	0.4	6.9	3.7	0.2	0.3	5.6	25.9
2003	1.9	2.6	0.1	4.6	0.4	6.8	3.6	0.2	0.4	5.6	26.2
2004	2.0	2.7	0.1	5.0	0.4	6.7	3.6	0.2	0.4	5.6	26.6
2005	2.0	2.6	0.1	5.0	0.4	6.6	3.6	0.2	0.4	5.7	26.7
2006	2.1	2.7	0.2	5.2	0.4	6.6	3.7	0.2	0.5	5.7	27.2
2007	2.3	2.9	0.2	5.9	0.4	6.4	3.7	0.2	0.5	5.8	28.3
2008	2.4	3.0	0.2	6.2	0.4	6.3	3.7	0.2	0.5	5.9	28.7
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
Percentage change											
2013 to											
2014	5.6	2.4	8.3	2.5	0.0	1.1	1.1	4.1	10.3	1.5	2.3
2000 to											
2014	76.4	32.7	194.4	80.8	9.7	-13.1	2.6	-11.4	125.3	18.0	23.5

Source: TfL Planning, Strategic Analysis.

1. A journey stage is a part of a trip made by a single mode of transport.

2. Each rail interchange between train operating companies is a new journey stage.

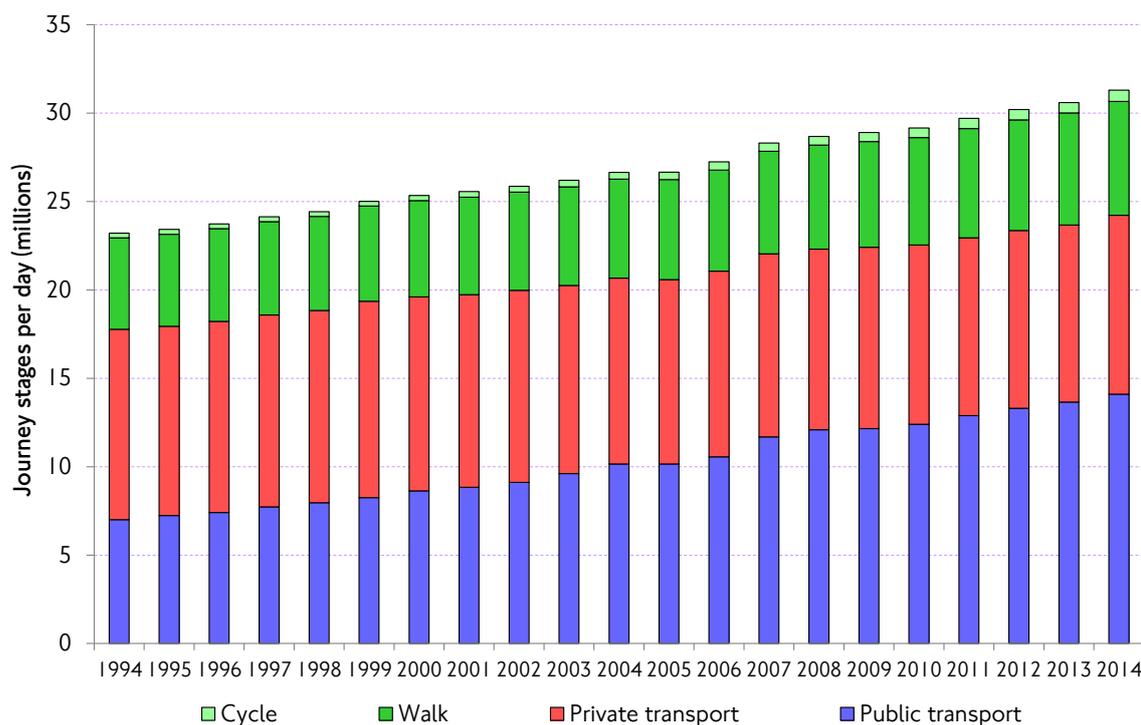
3. Bus journey stages are counted by starting a new stage each time a new bus is boarded.

4. Underground journey stages are counted by station entries; interchanges within stations are ignored.

5. 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.

## 2. Overall travel trends in London

Figure 2.1 Aggregate travel volumes in Greater London. Estimated daily average number of journey stages, 1994 to 2014. Seven-day week.



Source: TFL Planning, Strategic Analysis.

## 2.4 Trips in London

### Total number of trips

The number of trips made in London in 2014 averaged 26.6 million per day, an increase of 2.0 per cent over the previous year (table 2.2). This is a very similar increase to that observed for journey stages, and continues the established trend of growing travel demand.

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 2014 was 8.5 million, 1.5 per cent higher than in 2013 and 18.0 per cent higher than in 2000. The larger 'daytime population' of Greater London, including non-resident visitors, was estimated at 9.6 million in 2014, 1.5 per cent higher than the previous year.

Over the period since 2000, total trips have increased by 17.5 per cent, with particularly notable increases of 69.9 per cent in rail trips and 71.6 per cent in bus trips, with cycle trips (as main mode) increasing by 103.7 per cent. Car driver trips decreased by 13.3 per cent over the same period.

Table 2.2 Aggregate travel volumes in Greater London. Estimated daily average number of trips by main mode of travel, 1994 to 2014. Seven-day week.

Year	Millions of trips									
	Rail	Under-ground /DLR	Bus (including tram)	Taxi/ PHV	Car driver	Car passenger	Motor cycle	Cycle	Walk	All modes
1994	1.3	1.5	2.1	0.3	6.7	3.6	0.2	0.3	5.2	21.1
1995	1.3	1.6	2.2	0.3	6.6	3.6	0.2	0.3	5.2	21.2
1996	1.4	1.5	2.3	0.3	6.7	3.6	0.2	0.3	5.3	21.5
1997	1.5	1.6	2.3	0.3	6.7	3.6	0.2	0.3	5.3	21.8
1998	1.5	1.7	2.3	0.3	6.7	3.6	0.2	0.3	5.3	21.9
1999	1.6	1.8	2.3	0.3	6.9	3.6	0.2	0.3	5.4	22.4
2000	1.7	2.0	2.4	0.3	6.8	3.6	0.2	0.3	5.5	22.7
2001	1.7	1.9	2.6	0.3	6.8	3.6	0.2	0.3	5.5	22.9
2002	1.7	1.9	2.8	0.3	6.8	3.5	0.2	0.3	5.6	23.2
2003	1.8	1.9	3.2	0.3	6.7	3.5	0.2	0.3	5.6	23.4
2004	1.8	2.0	3.3	0.3	6.6	3.4	0.2	0.3	5.6	23.6
2005	1.8	1.9	3.2	0.3	6.5	3.4	0.2	0.4	5.7	23.4
2006	1.9	2.0	3.1	0.3	6.4	3.5	0.2	0.4	5.7	23.6
2007	2.1	2.0	3.6	0.4	6.3	3.5	0.2	0.4	5.8	24.3
2008	2.2	2.1	3.8	0.3	6.1	3.5	0.2	0.5	5.9	24.6
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
<i>Percentage change</i>										
2013 to										
2014	5.6	4.0	0.4	-0.9	1.2	1.2	4.1	11.3	1.5	2.0
2000 to										
2014	69.9	30.8	71.6	14.4	-13.3	2.4	-10.9	103.7	18.0	17.5

Source: TfL Planning, Strategic Analysis.

1. Trips are complete one-way movements from one place to another.

2. Trips may include use of several modes of transport and hence be made up of more than one journey stage.

3. In tables 2.2 and 2.4 trips are classified by the mode that is typically used for the longest distance within the trip.

4. Round trips are counted as two trips, an outward and an inward leg.

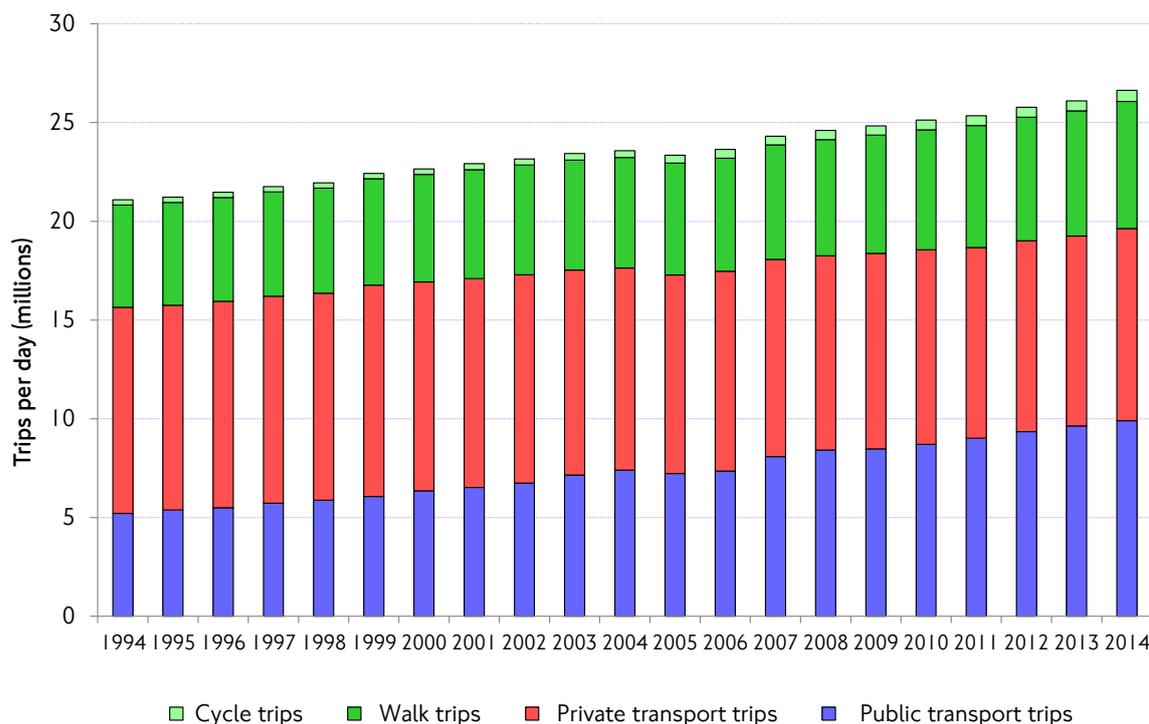
5. Values for 'rail' include London Overground.

Since 2008, trips have increased by 8.2 per cent, with particularly strong growth on rail and Underground, up by 30.5 per cent and 22.1 per cent respectively. Over the same period, cycle trips increased by 20.4 per cent, while car driver trips fell by 4.0 per cent.

Over the most recent year there were again noticeable increases in patronage on rail and Underground, although there was slower growth in bus trips. Car driver trips increased by 1.2 per cent, the first increase since 2009.

## 2. Overall travel trends in London

Figure 2.2 Trips in London – trend in total travel demand by principal mode. Estimated daily average number of trips by main mode of travel, 1994 to 2014. Seven-day week.



Source: TfL Planning, Strategy Analysis.

### Trip rates

Trip rates (the average number of trips per person per day) have been noticeably stable over the whole period covered by table 2.2, at around 2.7 to 2.8 trips per person per day. These rates are calculated for the average daily population, which makes allowance for overnight visitors and commuters from outside London making trips in the Capital. This relative stability indicates that the increase in stages and trips in London is driven primarily by increases in population, both of London residents and visitors to the Capital, rather than individuals making more trips.

Looking specifically at London residents, using our LTDS survey, average trip rates in 2014/15 were 2.4 trips per person per day, lower than the average of 2.7 for all travellers in London. 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.

Further details of trends affecting specific modes of transport are given in chapter 3 of this report.

## 2.5 Mode shares in London

### Journey stage based mode shares

In 2014, 45 per cent of journey stages in London were made by public transport, compared with 32 per cent by private transport. This reflects and continues a now well-established trend of a net shift in London away from private motorised transport to the public transport modes. Since 2000 the public transport mode share has increased by 11.0 percentage points. Over the term of the current MTS since 2008 the increase has been 2.9 per cent. In the latest year, the public transport mode share increased by a further 0.4 percentage points while the private transport mode share fell by a corresponding 0.4 percentage points, despite a small absolute growth in private transport volumes. Cycling and walking mode shares remained at around 2 and 21 per cent respectively.

Table 2.3 Percentage shares of journey stages by type of transport, 1994 to 2014.

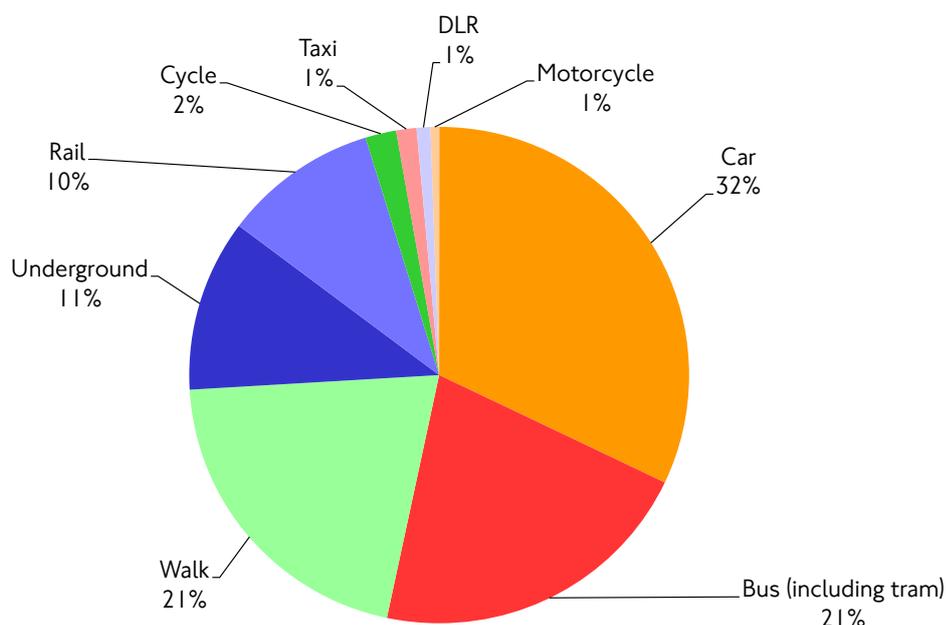
Year	Percentage of journey stages			
	Public transport	Private transport	Cycle	Walk
1994	30%	46%	1%	22%
1995	31%	46%	1%	22%
1996	31%	46%	1%	22%
1997	32%	45%	1%	22%
1998	33%	45%	1%	22%
1999	33%	44%	1%	22%
2000	34%	43%	1%	21%
2001	35%	43%	1%	22%
2002	35%	42%	1%	21%
2003	37%	41%	1%	21%
2004	38%	39%	1%	21%
2005	38%	39%	2%	21%
2006	39%	39%	2%	21%
2007	41%	37%	2%	20%
2008	42%	36%	2%	21%
2009	42%	35%	2%	21%
2010	43%	35%	2%	21%
2011	43%	34%	2%	21%
2012	44%	33%	2%	21%
2013	45%	33%	2%	21%
2014	45%	32%	2%	21%

Source: TfL Planning, Strategic Analysis.

Note: Mode shares are calculated from the consistent series for journey stages given in table 2.1. 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.

## 2. Overall travel trends in London

Figure 2.3 Modal shares of daily journey stages in London, 2014.



Source: TFL Planning, Strategic Analysis.

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.

### Trip based mode shares

The decrease of 11.0 percentage points between 2000 and 2014 in the private transport mode share in terms of journey stages is equivalent to a decrease of 10.1 percentage points in terms of trips. Similarly, public transport mode share, which increased by 11.0 percentage points in terms of journey stages, increased by 9.1 percentage points in terms of trips since 2000 (note that public transport trips typically involve more than one stage). Public transport accounted for 37.2 per cent of trips in 2014, up from 36.3 per cent in 2013 and 28.1 per cent in 2000. Over the most recent year, private transport mode share decreased by 0.3 percentage points to 36.5 per cent.

This means that the mode share for public transport trips in London remains higher than for private transport – continuing the trend first seen in 2013. This highlights the large shift in how people travel around London, given that in 1993 the public transport mode share was less than half the private transport mode share. Cycle and walk mode shares remained constant, at two per cent and 24 per cent respectively.

Table 2.4 Trip-based mode shares – public and private transport by main mode.

Year	Percentage of trips			
	Public transport	Private transport	Cycle	Walk
1994	25%	49%	1%	25%
1995	25%	49%	1%	24%
1996	26%	49%	1%	24%
1997	26%	48%	1%	24%
1998	27%	48%	1%	24%
1999	27%	48%	1%	24%
2000	28%	47%	1%	24%
2001	28%	46%	1%	24%
2002	29%	46%	1%	24%
2003	30%	44%	1%	24%
2004	31%	43%	1%	24%
2005	31%	43%	2%	25%
2006	31%	43%	2%	24%
2007	32%	43%	2%	23%
2008	34%	40%	2%	24%
2009	34%	40%	2%	24%
2010	34%	39%	2%	24%
2011	36%	38%	2%	24%
2012	36%	37%	2%	24%
2013	37%	37%	2%	24%
2014	37%	37%	2%	24%

Source: TfL Planning, Strategic Analysis.

### Trends in journey stages by mode

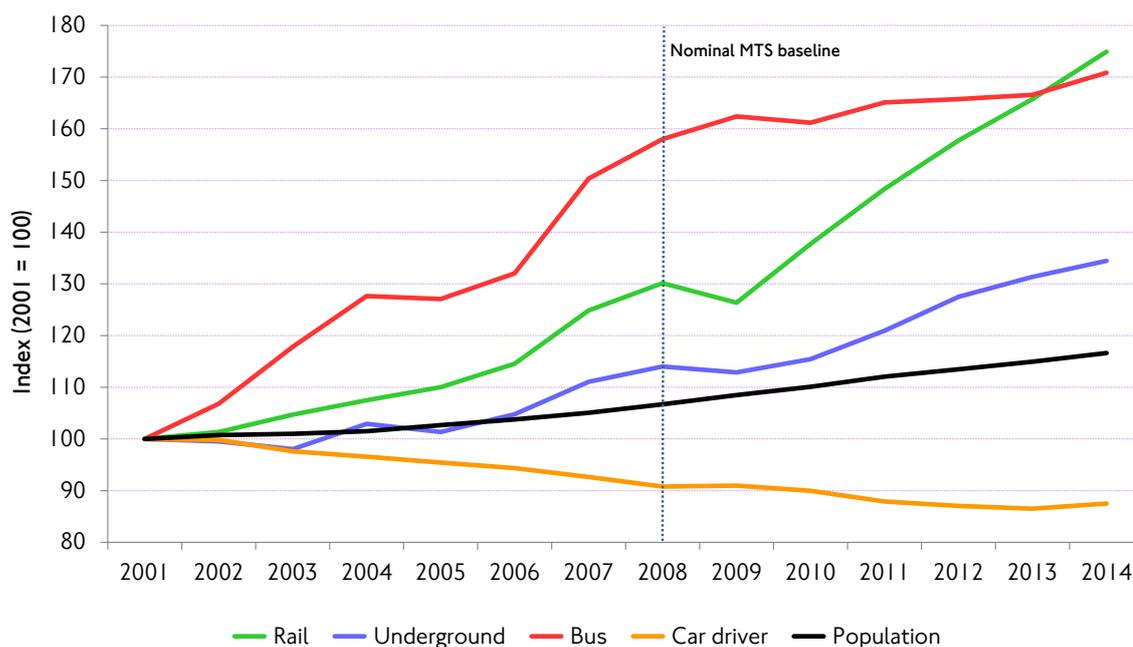
Figure 2.4 shows trends in patronage of the principal modes since 2001. Public transport use has grown strongly over this period, with demand for all of the public transport modes growing faster than population, reflecting changing mode shares. Initially, growth was strongest on the bus network, with a 27.6 per cent increase in bus journey-stages between 2001 and 2004, and despite a levelling off in growth in recent years, bus stages in 2014 were 70.8 per cent higher than in 2001.

Growth in National Rail use (including London Overground) was initially slower than bus use until 2009. Over the past five years, rail journey stages have increased by almost 40 per cent, partly helped by the opening of TfL's Overground network, with rail stages now 74.9 per cent higher than in 2001.

In contrast, Underground passenger growth closely followed population growth between 2001 and 2006, although use has started to grow at a faster rate in recent years, reflecting completion of upgrades to several lines, which has added extra capacity to the network. Despite growth in the latest year, car driver stages are 12.5 per cent below the 2001 level.

## 2. Overall travel trends in London

Figure 2.4 Growth in journey stages on selected modes, 2001 to 2014.



Source: TfL Planning, Strategic Analysis.

### 2.6 Comparison of outcomes with MTS expectation to date

Over the period covered by the MTS to date, between 2008 and 2014:

- London's resident population has grown by 9.3 per cent, while the 'daytime' population, which includes non-resident commuters and visitors, has grown by 9.6 per cent. This compares with the MTS expectation for London's population to grow by 4.7 per cent over the same period.
- Total travel demand has grown by 9.2 per cent in terms of journey stages, and 8.2 per cent in terms of trips – this being broadly in line with population growth.
- MTS expectation over the equivalent period was for an increase of 4.0 per cent in trips. This faster than expected growth has had the general effect of 'bringing forward' the time at which capacity enhancements are required to deal with London's growth, from the timeline originally envisaged by the MTS.
- In terms of public transport, the increase in travel demand in terms of trips has been 17.6 per cent, compared to an expectation of 4.6 per cent. It is clear that this rapid growth is already placing added pressures on the capacity of the networks.
- In terms of travel by road, the absolute number of car trips has reduced by 1.0 per cent, compared to MTS expectation of a 1.3 per cent increase, reflecting the strong shift in net mode share away from car travel in London.
- This reduction has, to some extent, facilitated the removal of available road network capacity for general traffic to pursue other priorities such as improved safety without, until the most recent year, adverse consequences for road network journey times and delays.

- In terms of mode share for public transport, there was a 3.0 per cent net shift at the trip level, and a 2.9 per cent net shift at the journey stage level, between 2008 and 2014. This is much greater than the MTS expectation of a net change in mode share of 0.2 per cent over the same period, and continues the consistent trend that has been seen in London over the last 14 years, with a 10.1 per cent shift in net mode share towards public transport, walking and cycling since 2000.

## **2.7 Morning peak travel to central London**

### **Background – the CAPC and Isle of Dogs Cordon Surveys**

Since the late 1970s TfL have monitored the numbers of people entering central London during the weekday morning peak period (07:00 to 10:00) through a long-established yearly count, taken in the autumn. The Central Area Peak Count (CAPC) survey covers all modes except walking and those travelling in commercial vehicles or travelling as part of their job (for example, licensed taxi drivers). Most of these people are commuting to work in central London, and this indicator provides a good picture of this one specific, but important, aspect of travel in London.

With the regeneration of London Docklands during the late 1980s, TfL extended this idea and instituted a similar cordon-based count survey to cover the Isle of Dogs. As well as the AM peak period this survey covers an extended weekday (05:00 to 23:00). Over the past 25 years, London Docklands has developed as an area of high density high-value employment, primarily in financial and business services, to complement the historic centre of these activities in central London. Taken together, therefore, the travel trends revealed by both surveys provide valuable insight into the growth and dynamics of travel to these two key central London employment hubs.

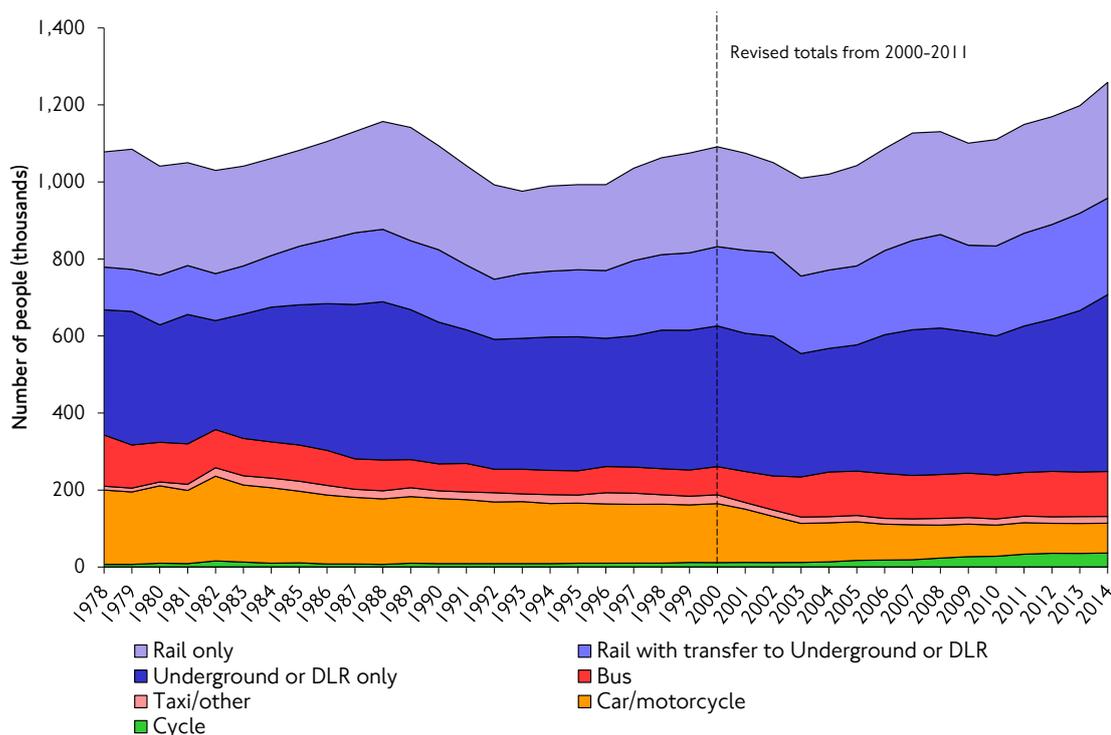
### **Morning peak travel to central London (CAPC)**

#### **Long-term trends**

Figure 2.5 shows the trend for the total number of people entering central London over the past 36 years. The year 2014 saw the highest number of people entering central London in the morning peak since the current survey started in 1978 – 1.26 million. The total number of people entering has varied relatively little over the period of the survey. These variations tend to follow the economic cycle in central London and interestingly show no clear trend over much of the period, although the trend over recent years has been sharply upwards.

## 2. Overall travel trends in London

Figure 2.5 People entering central London in the weekday morning peak, 1978 to 2014.



Source: TfL Planning, Strategic Analysis.

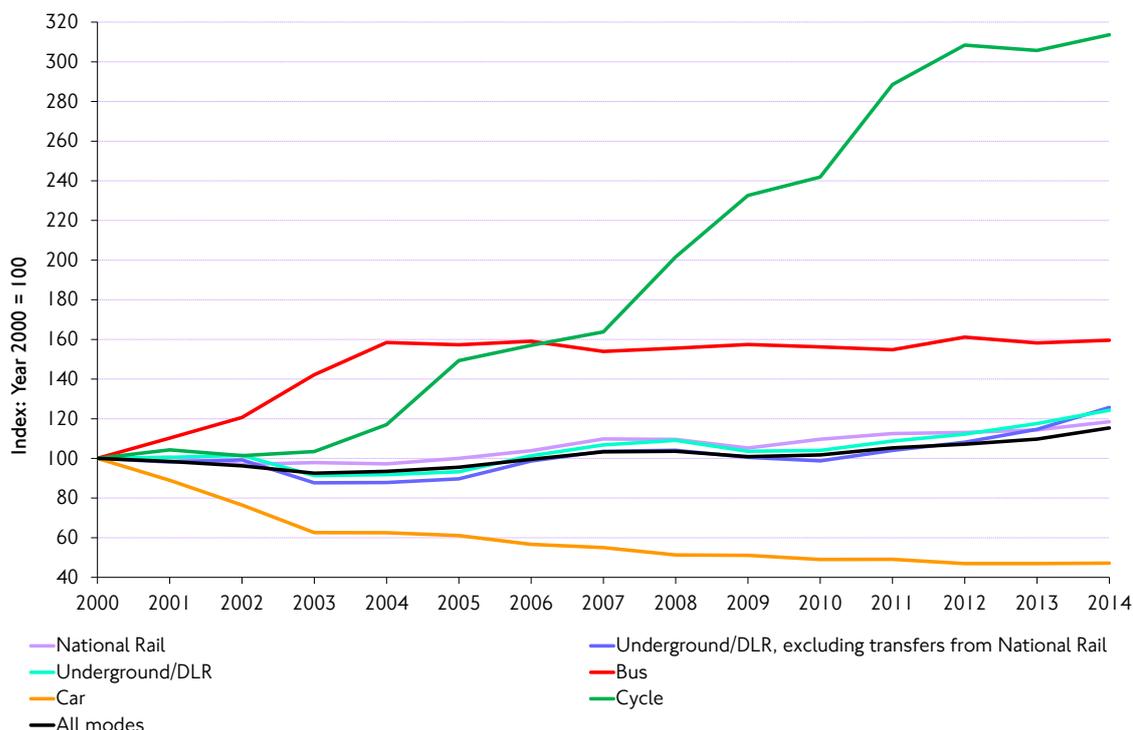
### Change between 2013 and 2014

Between 2013 and 2014 the number of people entering the central cordon in the morning peak by all modes increased by 5.1 per cent. This increase mainly reflected more people entering central London by rail modes, with the number of people using rail up by 7.7 per cent and the number of people using Underground or DLR up by 9.6 per cent. The number of people entering central London by bus and car remained relatively stable between 2013 and 2014, increasing by less than 1 per cent each, the latter however representing the first increase in this mode since 2000. The number of people cycling to central London continued to increase, up by 2.6 per cent since 2013.

### Changes in mode share

Within a relatively stable overall total there have nevertheless been some substantial shifts in the relative shares of the various modes of transport used to get to central London. These are best appreciated with reference to figure 2.6, which looks at the most recent 14 years and plots changes in the use of the principal modes of transport as an index against the position in year 2000 (see also table 2.5).

Figure 2.6 Trends by mode of transport for people entering central London during the weekday morning peak. Index year 2000=100.



Source: TfL Planning, Strategic Analysis.

Key developments over this 14-year period have been:

- A gradual decrease in total morning peak travel to central London until 2003, followed by a generally rising trend for the rest of the decade, with the level in 2014 being 15.3 per cent above that of 2000. The increase between 2013 and 2014 was 5.1 per cent, and that from 2008 was 11.3 per cent.
- A reduction of more than half – 53 per cent – in the number of people using the car. The impact of the introduction of Congestion Charging in 2003 is visible in the figure, but is not the only factor involved in this dramatic shift away from private transport for these journeys.
- An increase of 60 per cent in the use of the bus – broadly mirroring the pattern of large-scale increases in bus use seen more widely in London over the same period, with the bulk of this occurring in the early half of the last decade.
- A 203 per cent increase in cycling to central London, during the weekday morning peak period, again mirroring wider trends for this mode.

There has been growth on all rail modes since 2000; however interpretation of the use of rail services is not straightforward. This is because CAPC counting cordon coincides with the main central London rail termini, where interchange between National Rail and Underground services takes place. Looking at the numbers in table 2.5:

## 2. Overall travel trends in London

- Some 18.5 per cent more people used National Rail in 2014 compared with 2000.
- Of the 551,000 people using National Rail, 251,000 (22 per cent more than in 2000) transferred to Underground or DLR services on arrival at the central London rail terminus.
- There was a 25.7 per cent increase in the number of people using Underground or DLR without transferring from National Rail.
- The total number using Underground/DLR services rose by 24.2 per cent over this period.

The net outcome of all these changes over the period since 2000 has been that the mode share for public transport (all modes) for weekday morning peak travel to central London increased from 85 per cent to 91 per cent. The mode share for travel by car has halved, falling from 13 per cent to 5 per cent (table 2.6). The cycling mode share has trebled, up from 1 per cent in 2000 to 3 per cent in 2014.

**Table 2.5** People entering central London in the weekday morning peak, by mode of transport, 2000 to 2014.

Year	Thousands of people											
	All modes	National rail	Rail only	Rail of which transfer to LU/DLR	LU or DLR only	LU and DLR	Bus	Coach/minibus	Car	Taxi	Two-wheeled motor vehicles	Cycle
2000	1,091	465	259	206	365	571	73	15	137	8	17	12
2001	1,075	468	252	216	359	574	81	10	122	7	16	12
2002	1,050	451	234	217	363	580	88	10	105	7	15	12
2003	1,010	455	254	201	320	522	104	10	86	7	16	12
2004	1,020	452	249	204	321	524	116	9	86	7	16	14
2005	1,042	465	260	205	328	533	115	9	84	8	16	17
2006	1,087	483	265	218	361	579	116	8	78	7	15	18
2007	1,127	511	279	232	378	610	113	9	75	6	15	19
2008	1,131	510	267	243	381	623	114	11	70	7	15	23
2009	1,101	490	265	225	367	592	115	11	70	6	15	27
2010	1,110	510	276	234	361	594	114	10	67	6	14	28
2011	1,149	523	282	241	380	621	113	11	67	6	14	33
2012	1,169	526	280	246	395	641	118	11	64	6	14	36
2013	1,198	532	279	253	419	672	116	11	64	6	13	35
2014	1,259	551	301	251	459	710	117	11	65	6	13	36

Source: TFL Planning, Strategic Analysis.

Table 2.6 Mode shares of people entering central London in the weekday morning peak, 2000 to 2014.

Year	All modes	National rail	Rail only	Rail of which transfer to LU/DLR	Percentage							
					LU or DLR only	LU and DLR	Bus	Coach/minibus	Car	Taxi	Two-wheeled motor vehicles	Cycle
2000	100	43	24	19	33	52	7	1	13	1	2	1
2001	100	44	23	20	33	53	8	1	11	1	2	1
2002	100	43	22	21	35	55	8	1	10	1	1	1
2003	100	45	25	20	32	52	10	1	8	1	2	1
2004	100	44	24	20	31	51	11	1	8	1	2	1
2005	100	45	25	20	31	51	11	1	8	1	2	2
2006	100	44	24	20	33	53	11	1	7	1	1	2
2007	100	45	25	21	34	54	10	1	7	1	1	2
2008	100	45	24	21	34	55	10	1	6	1	1	2
2009	100	44	24	20	33	54	10	1	6	1	1	2
2010	100	46	25	21	33	54	10	1	6	1	1	3
2011	100	46	25	21	33	54	10	1	6	1	1	3
2012	100	45	24	21	34	55	10	1	5	1	1	3
2013	100	44	23	21	35	56	10	1	5	1	1	3
2014	100	44	24	20	36	56	9	1	5	0	1	3

Source: TfL Planning, Strategic Analysis.

### Changes over most recent years

The years since 2008 have been particularly affected by the economic recession and it is instructive to look more closely at trends in travel to central London over this period.

Total weekday morning peak travel to central London fell by 2 per cent between 2008 and 2010. However, since 2010, the number has increased gradually each year to stand 11 per cent higher than in 2008 in aggregate.

- Numbers travelling by Underground and DLR have increased gradually between 2008 and 2014. National Rail use increased by 8 per cent and Underground/DLR use increased by 14 per cent. Note here that growth in AM peak travel tends to be relatively constrained compared to growth over the whole day (see, for example, travel in London report 6), and that the large majority of the London Overground network is not included in the CAPC survey.
- The number of people travelling by car fell by 8 per cent between 2008 and 2014.
- Unlike rail modes, total travel by bus has been broadly stable since 2008, increasing by 2.6 per cent between 2008 and 2014.
- The number of people cycling to central London increased by 56 per cent between 2008 and 2014.

## 2. Overall travel trends in London

### Comparison with overall travel trends in London

The overall trends in travel to central London are similar to that of Greater London, in terms of strong growth in rail modes and a general shift away from car use. However, public transport mode share is much higher for morning peak travel to central London, increasing from 85 per cent in 2000 to 91 per cent in 2014, compared to the all-day Greater London average, which was 30 per cent in 2000, increasing to 37 per cent in 2014.

Bus mode share in Greater London and for travel to central London have remained relatively stable since 2000, and particularly since 2008. The bus mode share in Greater London has tended to be around 50 per cent higher than mode share for travel to central London, reflecting the availability of rail-based modes. In 2014/15, bus trips accounted for 15 per cent of all trips in Greater London, compared to 9 per cent of trips to central London in the morning peak.

Conversely, in recent years, the cycle mode share has increased more for travel to central London compared to the Greater London average. In 2000, the cycling mode share was 1 per cent for travel to central London and for all trips in Greater London; however in 2014 the mode share for morning peak travel to central London is 3 per cent, compared to a Greater London average of 2 per cent.

## 2.8 Travel to London Docklands

### The Isle of Dogs Cordon Survey

This survey counts trips into and out of the Isle of Dogs on a designated working day each autumn (except in 2009 when no survey was carried out). All trips that have an origin or destination within the Isle of Dogs or cross the boundary cordon are included. Through trips on the Jubilee line or DLR and interchange trips between the two rail modes that do not start or end in the Isle of Dogs are excluded on the basis of interchange surveys carried out on the same day. Internal trips within the Isle of Dogs are also excluded.

An additional cordon, inside the Isle of Dogs cordon, closely bounding Canary Wharf, is identified and used to measure the number of trips to and from Canary Wharf, including those to and from points within the Isle of Dogs. Canary Wharf is a major centre of employment within the Isle of Dogs, located at the northern end of the Opportunity Area.

### Inbound mode shares in the morning peak period

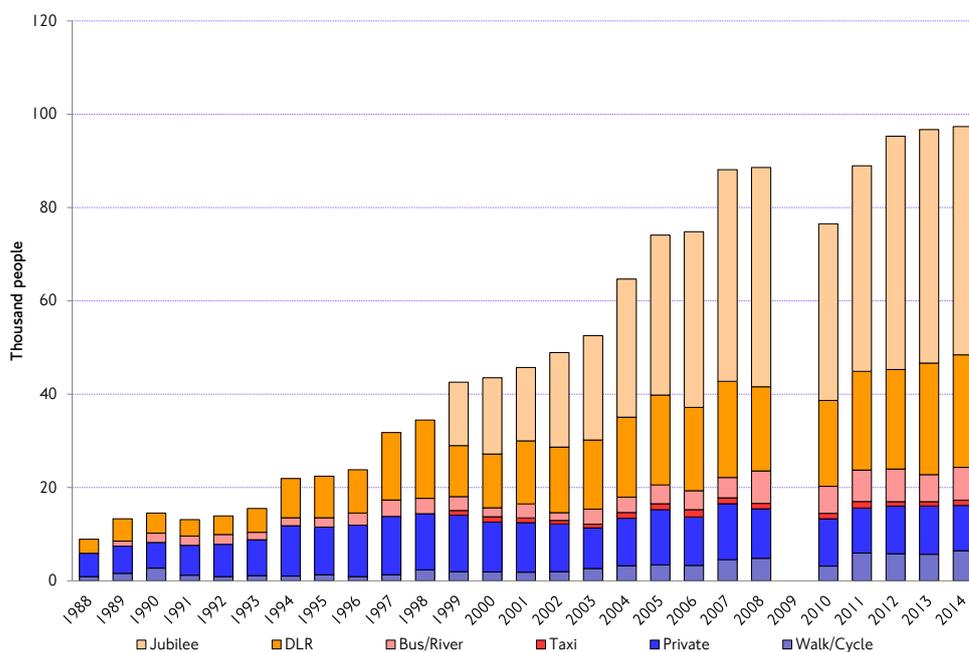
Figure 2.7 shows travel to the Isle of Dogs since 1988, the year in which construction started at Canary Wharf. It shows the number of people entering the Isle of Dogs during the weekday morning peak (between 07:00 and 10:00) by mode, thereby being comparable to figure 2.5 for central London.

The London Underground (Jubilee line) extension to Docklands was opened in 1999. Before that, the car had the highest mode share, accounting for half the trips in each year between 1991 and 1994, declining to 35 per cent by 1998. During this period, the DLR increased its share from 30 per cent to almost 50

per cent. The share for bus travel fluctuated between 7 per cent and 14 per cent.

The opening of the Jubilee line extension immediately accounted for 30 per cent of the inbound morning peak travel, while the DLR share dropped to 29 per cent, car to 28 per cent and bus to 7 per cent. Subsequently, the Underground has increased its share to 50 per cent in 2014 and the car mode share has dropped to 10 per cent. Walking and cycling accounted for 7 per cent of inbound morning peak travel and a quarter of inbound morning peak trips in 2014 were by DLR. These travel patterns reflect wider trends in London, with sustained and substantial shift in mode share away from the private car and towards public transport.

**Figure 2.7** Morning peak travel to the Isle of Dogs (including Canary Wharf) by mode of transport, 1988 to 2014.



Source: TfL Planning, Strategic Analysis.

### Trends in daily travel to and from the Isle of Dogs

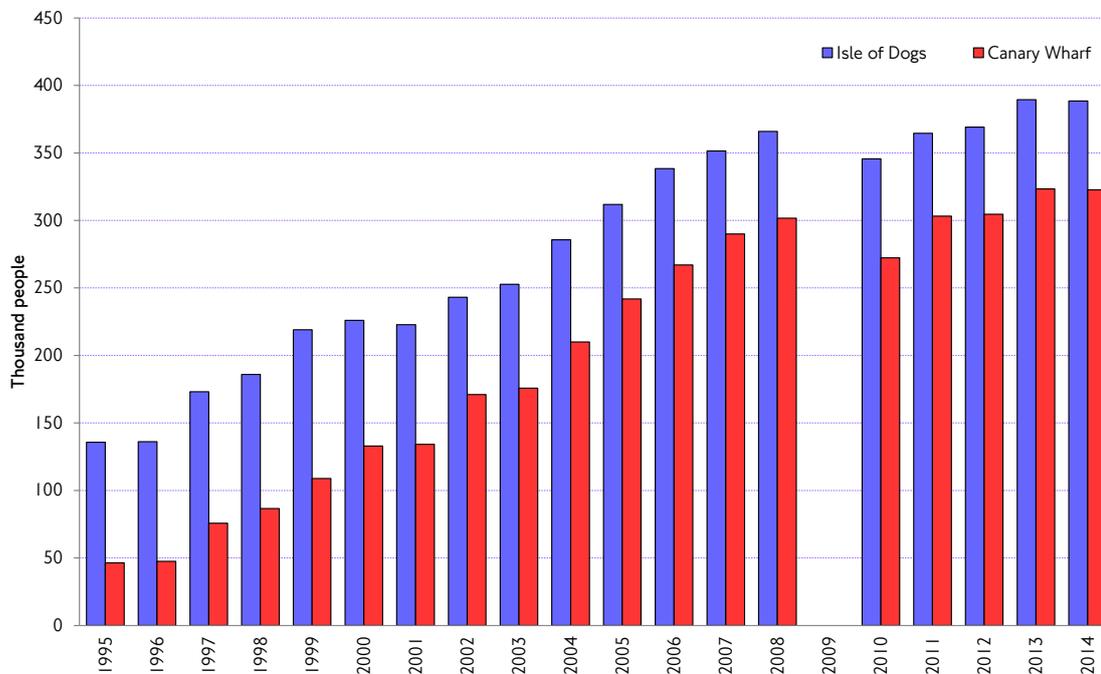
Figure 2.8 shows that between 2004 and 2014, the number of people travelling to and from the Isle of Dogs (on a weekday between 05:00 and 23:00) increased by 36 per cent, while travel to and from Canary Wharf increased by 54 per cent. As a share of the Isle of Dogs cordon crossings, travel to and from Canary Wharf accounts for 83 per cent of trips in 2014. Between 2008 and 2014, the equivalent increases were 6 and 7 per cent. These values are considerably lower than the growth over the 10-year period, which is to be expected given the effects of the recession in 2008.

Between 2013 and 2014, the number of trips made in London increased by 2 per cent as a result of population and employment growth as well as wider social and economic factors. The number of trips to and from the Isle of Dogs, however, decreased (between 05:00 and 23:00) by 0.3 per cent between 2013 and 2014. This is the first time there has been a decrease in trips since 2010

## 2. Overall travel trends in London

and compares to an increase in the number of trips of 5.5 per cent between 2012 and 2013. This indicates that 'background' travel demand is growing at a slower rate in the Isle of Dogs than in London as a whole.

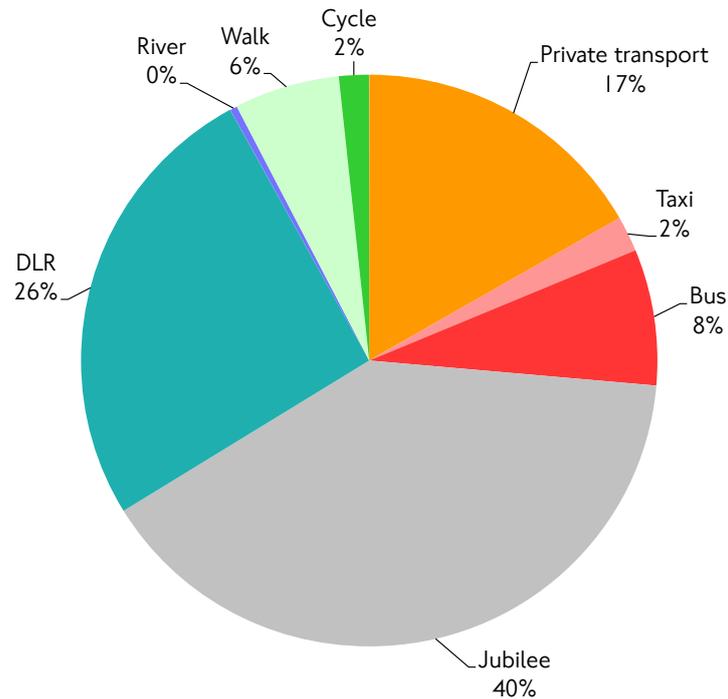
Figure 2.8 Daily travel to and from the Isle of Dogs and Canary Wharf, between 05:00 and 23:00 hours, 1995 to 2014.



Source: TfL Planning, Strategic Analysis.

Of these trips, 17 per cent were made by private transport, 76 per cent by public transport and 8 per cent were walked or cycled (figure 2.9). The Jubilee line carried 151,500 passengers with 40 per cent mode share, while the DLR carried just under 100,000 passengers, with slightly more than a quarter of the mode share to and from the Isle of Dogs. Public transport has a very high mode share in the Isle of Dogs compared to Greater London, where 45 per cent of trips are made by public transport and 32 per cent by private transport.

Figure 2.9 Mode share to and from the Isle of Dogs, 2014.

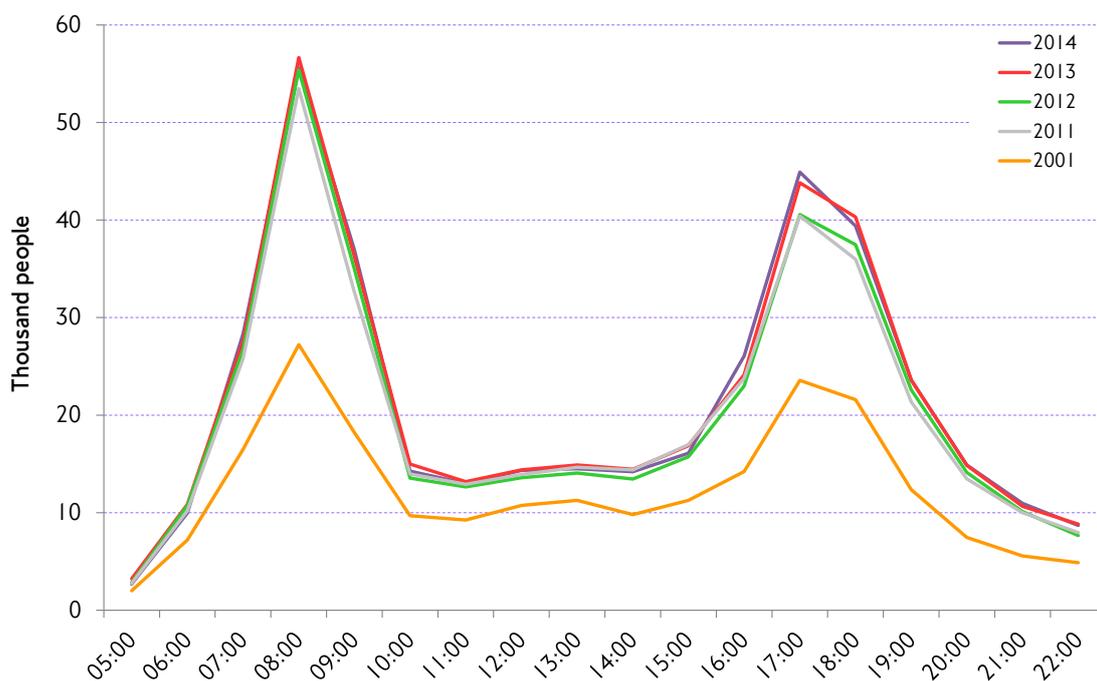


Source: TfL Planning, Strategic Analysis.

Within each weekday, travel to and from the Isle of Dogs shows the typical profile, similar to travel to central London, with pronounced peaks associated with commuting: a narrow peak in the morning between 07:00 and 10:00 and a flatter and more dispersed evening peak between 16:00 and 19:00 (figure 2.10). The figure also shows the overall growth since 2000.

## 2. Overall travel trends in London

Figure 2.10 Hourly distribution of travel to and from the Isle of Dogs.



Source: TFL Planning, Strategic Analysis.

### Travel trends by transport corridor

Table 2.7 shows a comparison of corridor shares between 2008 and 2014. Corridor shares have not changed substantially in recent years – the western corridor remains accountable for the majority of trips (61 per cent) to and from the Isle of Dogs and the eastern corridor accounted for approximately a third of trips in 2014. The difference between trips on the western and eastern corridors are most marked during the morning and evening peaks; at some points there are more than twice the number of trips to and from the west than to or from the east. During off-peak hours the split between the east and west corridor is much more even. This suggests that it is journey to work trips (predominantly made in the peaks) that are biased to the west, while other trips, for example shopping trips, are more evenly distributed between the two corridors. Although the southern corridor accounts for the smallest proportion of trips to and from the Isle of Dogs (7 per cent), it has seen the largest increase (12.3 per cent) in trips since 2008. Some 88 per cent of the trips in the southern corridor are made by DLR and the remainder of the trips are walk or cycle trips through the Greenwich foot tunnel.

Table 2.7 Daily travel to and from the Isle of Dogs between 05:00 and 23:00 by corridor.

Corridor	2008		2014		Percentage trips change
	Person trips	Corridor share	Person trips	Corridor share	
West	216,140	59%	237,659	61%	10.0%
East	124,880	34%	122,699	32%	-1.7%
South	24,989	7%	28,071	7%	12.3%
<b>Total</b>	<b>366,009</b>	<b>100%</b>	<b>388,429</b>	<b>100%</b>	<b>6.1%</b>

Source: TfL Planning, Strategic Analysis.

## 2.9 Key reference statistics

Table 2.8 brings together and summarises some key statistics from this chapter.

Table 2.8 Summary of key indicators of travel demand in London.

Indicator	Units	2008 or 2008/09	2013 or 2013/14	2014 or 2014/15	Difference (%) 2014 or 2014/15 vs	
					2008	2013/14
<b>All travel in London</b>						
Journey stages average day	Millions per day	28.7	30.6	31.3	9.1	2.3
Trips average day	Millions per day	24.6	26.1	26.6	8.1	1.9
Mode share – public transport	Percentage	42.2	44.7	45	6.6	0.7
Mode share – private transport	Percentage	35.6	32.7	32.3	-9.3	-1.2
Mode share - cycling	Percentage	1.7	1.9	2.1	0.4	0.1
Mode share - walking	Percentage	20.5	20.7	20.5	0	-0.2
<b>Travel to central London (weekday AM peak only)</b>						
Trips average day (inbound)	Thousands	1130.6	1194.8	1258.7	11.3	5.3
Mode share – public transport	Percentage	90.4	90.5	91	0.7	0.6
Mode share – private transport	Percentage	7.6	6.5	6.2	-18.4	-4.6
Mode share - cycling	Percentage	2.1	3	2.9	38.1	-3.3
Mode share - walking	Percentage	n/a	n/a	n/a	n/a	n/a
<b>Travel to Docklands (weekday AM peak only)</b>						
Trips average day (inbound)	Thousands	88.6	96.7	97.3	9.9	0.7
Mode share – public transport	Percentage	82.6	83.4	83.4	1.0	0.0
Mode share – private transport	Percentage	12.0	10.7	10.0	-16.5	-6.9
Mode share - cycling	Percentage	0.8	1.7	1.8	1.3	0.1
Mode share - walking	Percentage	4.7	4.4	5	0.1	0.1



## 3. Travel trends by mode

### 3.1 Introduction and contents

Chapter 2 of this report looked at trends in aggregate travel demand and mode shares in London, and considered some of the factors underlying recent changing travel patterns. The overall picture since 2000, and since 2008 in particular, is one of strong growth in London's population and travel demand. This growth has been at a faster rate than envisaged by the MTS, and has affected the main travel modes in different ways.

This chapter looks more specifically at travel demand trends as they have affected each of the principal modes of transport. Chapter 4 of this report then looks at corresponding trends in service supply and operational performance for each of these modes.

This chapter covers trends updated to the 2014 calendar year or the 2014/15 financial year, with the focus on changes over the nominal term of the MTS to date, namely from 2008 to 2014/15.

### 3.2 Key modal trends

- On the **Underground**, usage growth has been consistently strong for many years. There was an aggregate 19.8 per cent growth in Underground journey stages between 2008/09 and 2014/15 – equivalent to 3.1 per cent per year on average, and a net 25.5 per cent growth in passenger kilometres travelled. The annual total of 1,305 million journeys in 2014/15 was the highest ever recorded on the Underground, with a 3.2 per cent increase over the latest year. As well as population and employment growth, this has also reflected the Tube upgrade programme, which has significantly increased capacity on several Underground lines.
- Following very strong growth in the early years of the last decade, the upward trend in **bus patronage** has levelled off in recent years, at least in part reflecting a similar trend in service supply. Between 2008/09 and 2014/15 bus passenger stages grew by 6.2 per cent, equivalent to one per cent per year, and bus passenger kilometres grew by 6.0 per cent. This trend broadly corresponds to that for bus service supply, as described in chapter 4 of this report of this report. Nevertheless, bus patronage in terms of passenger kilometres in 2014/15 stood at 78.8 per cent higher than at the start of the century in 2000/01. More than half of all bus journeys in England are now made in London.
- On the TfL Rail modes the period since 2008 has also been marked by strong growth, reflecting substantial capacity enhancements to these networks. On the **DLR** there was a net increase of 67.1 per cent in journey stages and 86.8 per cent in kilometres travelled between 2008/09 and 2014/15, an average growth rate of 8.9 per cent per year (journey stages). The new **London Overground** network, largely established over the period since 2008, has seen a 321.4 per cent increase in journey stages over the period, on a like-for-like basis, equivalent to 27.1 per cent per year – reflecting the rapid development and enhancement of this network, including improved customer service aspects. Patronage on **Tramlink** increased by 13.7 per cent between 2008/09 and 2014/15 in terms of journey stages, equivalent to 2.2 per cent per year. Growth rates in the very latest year (2013/14–2014/15) were 8.6 per cent on the DLR

### 3. Travel trends by mode

and 3.1 per cent on London Overground, while Tramlink saw a decrease of 1.5 per cent.

- Patronage of **National Rail** services serving London (London and South East Operators) continued to grow strongly, with a 4.3 per cent increase in journey stages over the latest year. Journeys on National Rail totalled 1,155 million in 2014/15, an increase of 35.2 per cent since 2008, despite the economic recession, equivalent to 5.2 per cent per year.
- Levels of **road traffic** in London have fallen for most of the last decade, but have shown signs of increasing again over the most recent two years. Taking the period from 2008 to 2014, the net aggregate decline has been 7.5 per cent in central London, 9.3 per cent in inner London, and 0.4 per cent in outer London, equating to an overall reduction of 3.1 per cent at the Greater London level.
- This fall in road traffic has been attributed to a much-improved public transport offering, various wider societal changes affecting car ownership and use, and reductions to available road network capacity. However, over the most recent year traffic volumes have started to increase – by 3.4 per cent in central London, 1.4 per cent in inner London, and 1.9 per cent in outer London (1.8 per cent at the Greater London level). This reversal of trend is thought mainly to reflect particularly rapid population growth and recovery from the recession, but it takes place in the context of a continued net shift in mode share away from the private car. This combines with increasing reallocation of available road network capacity to support a range of other MTS priorities, as well as increased general construction activity affecting the road network, leading to further renewed congestion pressures.
- **Cycling** levels increased by 10.3 per cent between 2013 and 2014 – a much stronger rate of growth than has been typical over recent years. The net growth since 2008 in terms of journey stages has been 31.9 per cent, equivalent to 4.7 per cent per year on average.
- Some 6.4 million **walk-all-the-way** trips were made on an average day in London in 2014. This is an increase of 9.3 per cent since 2008, and mainly reflects population growth over the period (which was also 9.3 per cent). This gives a walking mode share (for all travel) of 24 per cent, which is identical to the position in 2008. However, there is evidence that increased public transport use has, as a by-product, increased the number of walk journey stages undertaken by Londoners, with associated health benefits.
- Trends for the amount of **freight traffic** on London's roads have particularly mirrored the fortunes of the wider economy. **Van traffic** in London increased by 3.4 per cent in aggregate between 2008 and 2014, driven by an 8.3 per cent increase in outer London, although there were declines in central and inner London of 4.9 and 6.0 per cent respectively over the same period. However, this masks the effects of the recession. Between 2008 and 2011, van traffic declined by 6.1 per cent, but has been growing strongly since then, with van traffic in 2014 10.1 per cent higher than in 2011.
- **Heavy goods vehicle** traffic declined by 3.2 per cent between 2008 and 2014, with falls of 8.0 per cent in inner London and 1.9 per cent in outer London, although there was a 2.7 per cent increase in central London.
- TfL's **River Services** have seen significant expansion, with passenger traffic on the Thames increasing by 19.1 per cent in the latest year.

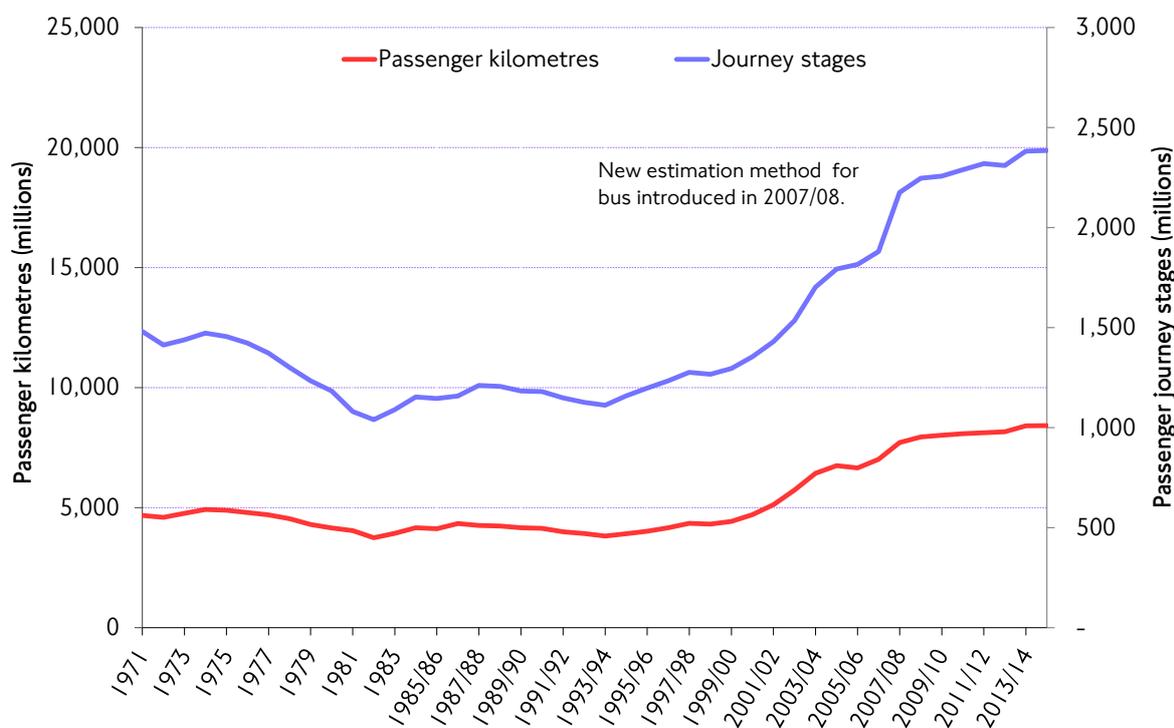
- Passenger traffic through London's main **airports** has also closely reflected the fortunes of the wider economy, with terminal passengers at London area airports increasing by just 1.4 per cent overall between 2008 and 2014. Between 2007 and 2010 terminal passengers decreased by an average of 3.1 per cent each year.
- The number of **licensed taxis** and licensed taxi drivers in London has remained broadly stable over the period between 2008 and 2014, at about 22,500 and 25,000 respectively. However, recent technology change has seen the number of **licensed private hire vehicles** and drivers increase at a rapid rate – up by a net 27.2 and 41.1 per cent respectively between 2008 and 2014, and up by 18.8 and 19.9 per cent over the latest year alone. However, this does not appear to have fed through directly to significantly increased traffic levels.

### 3.3 Modal trends: Bus

Figure 3.1 shows the long-term trend for bus patronage in London. The bus has been one of London's transport success stories, with the historic pattern of slowly declining patronage being dramatically reversed in the late 1990s to one of strong growth. Over the 13 years from 2000/01 to 2013/14, the number of bus journey stages in London increased by 59.9 per cent, and passenger-kilometres grew by 73.8 per cent.

The rate of growth has stabilised in more recent years, this corresponding to a slowing of the rate of increase in bus services. Over the period between 2008/09 and 2014/15 the increase in patronage was 6.2 per cent in terms of journey stages, and 6 per cent in terms of passenger kilometres. In the most recent year it was just 0.1 per cent in terms of journey stages and 0.1 per cent in terms of passenger kilometres.

Figure 3.1 Passenger kilometres and journey stages travelled by bus.

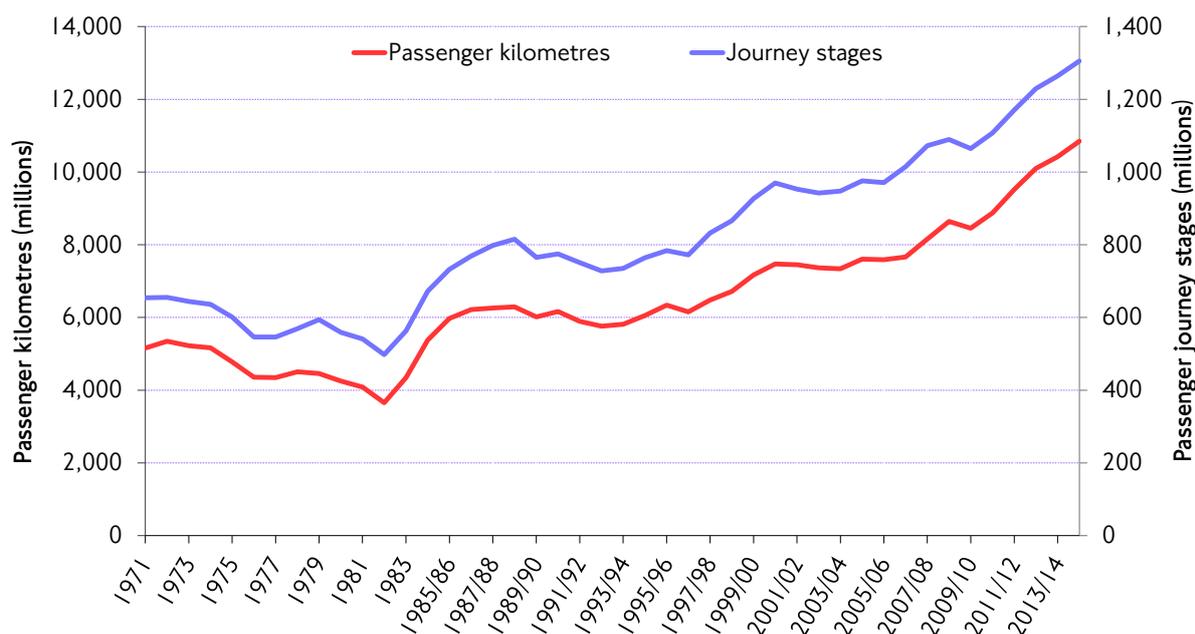


Source: TfL Service Performance data.

### 3.4 Modal trends: Underground

The number of people using the Underground in 2014/15 was the highest ever (figure 3.2), with 1,305 million passenger journeys (journey stages), a 3.2 per cent increase on the previous year and 19.8 per cent higher than 2008/09. Passenger kilometres increased by 4.1 per cent over the past year and have increased by 25.5 per cent since 2008/09. The continued strong growth of recent years, surpassing levels seen in 2012 in association with the London Games, emphasises the strength of the long-term upward trend in Underground patronage.

Figure 3.2 Passenger kilometres and journey stages by Underground.



Source: TfL Service Performance data.

Underground train kilometres operated have increased by 14 per cent over the period since 2008/09, this albeit at a slower pace than increasing demand.

London's population is continuing to grow and urban densities are increasing, which drives demand for high capacity rail modes. Furthermore, the Tube upgrades are still ongoing on some lines and the resulting increase in capacity and improvement to reliability can be expected to have further impact on demand, as seen following the completion of upgrades on several lines in the run-up to the London 2012 Games.

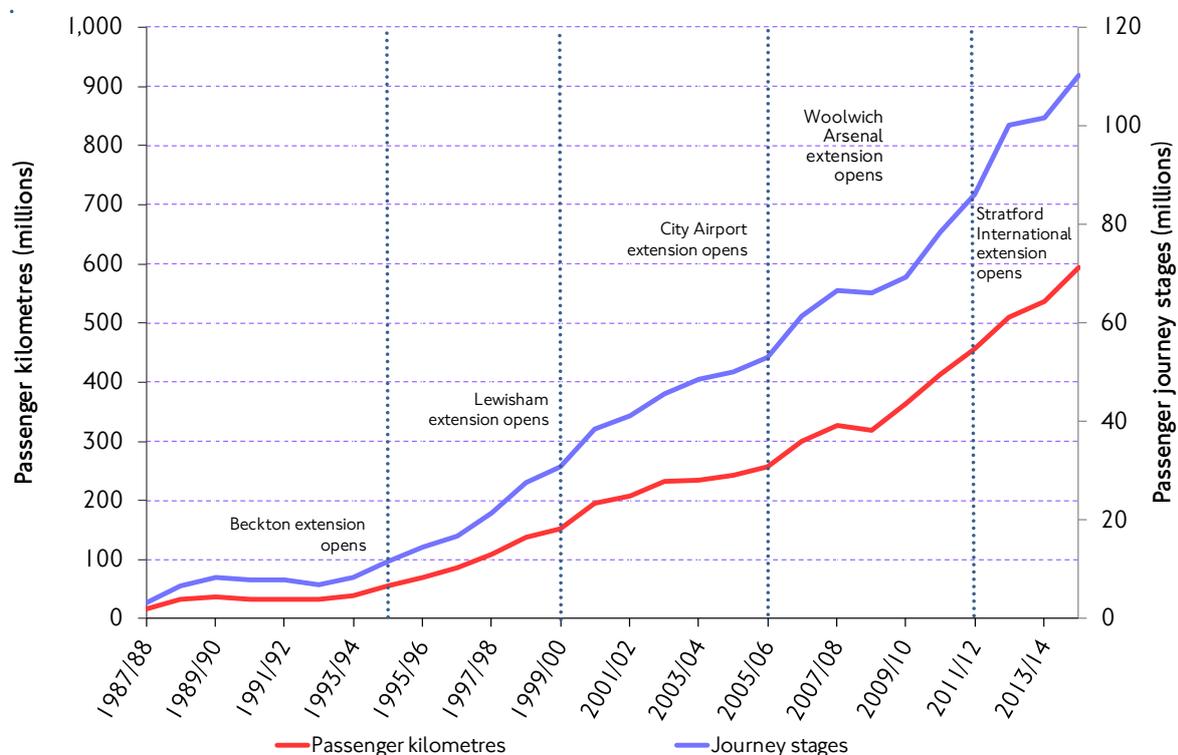
### 3.5 Modal trends: Docklands Light Railway

Figure 3.3 shows the trend for travel by DLR since its initial opening in 1987. Patronage has grown steadily over this period as the network has progressively expanded. Principal milestones in the development of the network are shown in the figure to aid interpretation.

In 2014/15, 594 million passenger kilometres were travelled on the DLR, equivalent to 110 million journey stages. The number of passenger kilometres has increased by

10.6 per cent since 2013/14 and by 86.8 per cent since 2008/09, while the number of journey stages has increased by 8.6 per cent since 2013/13 and by 67.1 per cent since 2008/09.

Figure 3.3 Passenger kilometres and journey stages by DLR.



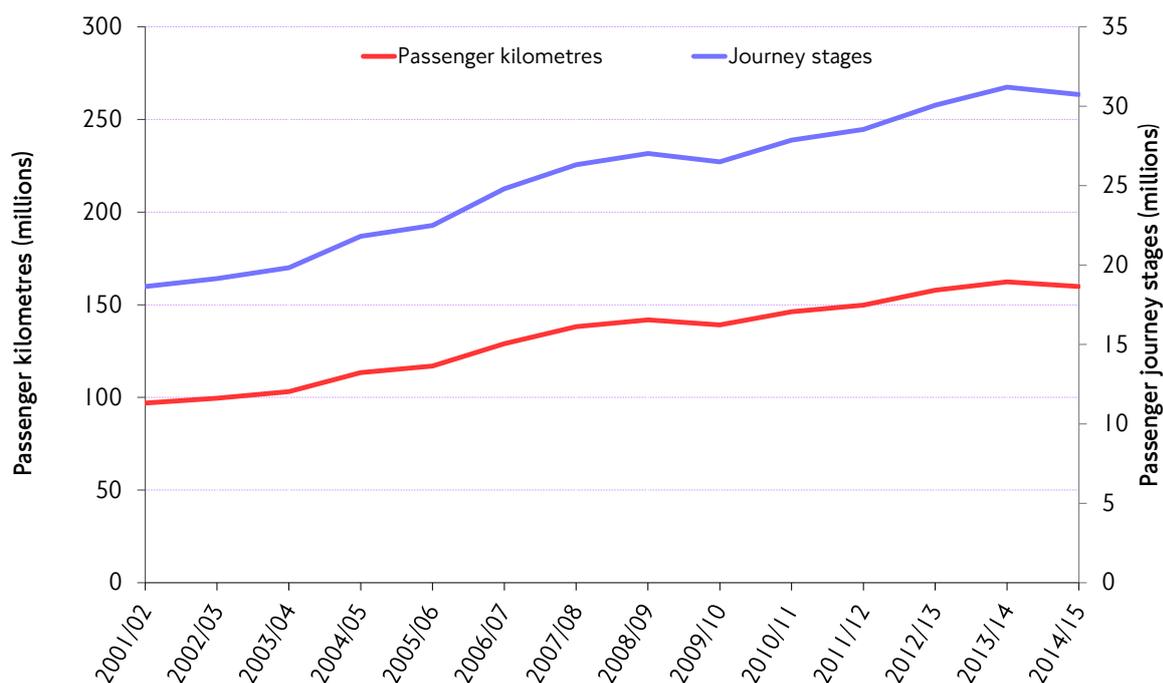
Source: TfL Service Performance data.

### 3.6 Modal trends: London Tramlink

London Tramlink initially opened in 2000 and the network has been relatively stable in extent since, albeit with a service restructuring in 2006. Figure 3.4 shows steady patronage growth averaging 4 per cent for passenger kilometres and journey stages over the period since opening although journey stages did decrease slightly, from 31.2 million in 2013/14 to 30.7 in 2014/15. Aggregate growth since 2008/09 has been 13.7 per cent for journey stages, and 12.7 per cent for passenger kilometres. Tram kilometres operated have increased by 13.2 per cent over the period since 2008/09.

### 3. Travel trends by mode

Figure 3.4 Passenger kilometres and journey stages by London Tramlink.



Source: TfL Service Performance data.

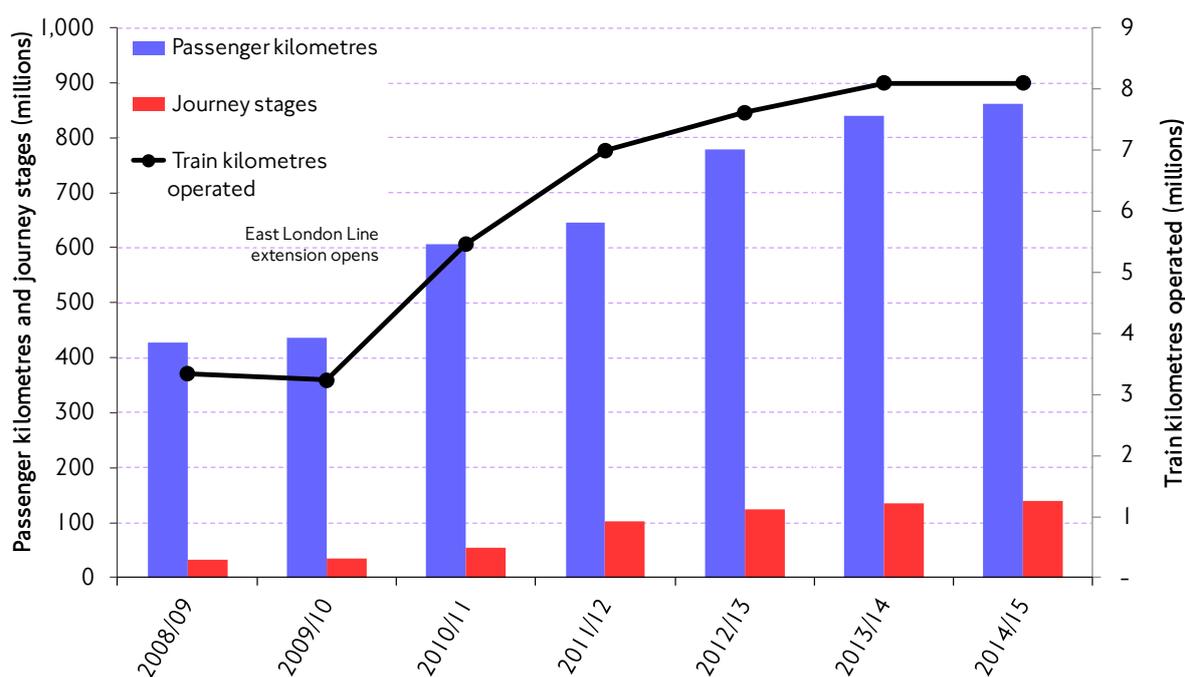
### 3.7 Modal trends: London Overground

Since the first full year of operation of the London Overground in 2008/09, passenger kilometres have increased by 102 per cent, with a 321 per cent increase in passenger journey stages and a 143 per cent increase in train kilometres operated. This reflects a shortening of journey stage lengths following the extensions of the network to a number of key travel interchanges, such as Clapham Junction.

This strong growth reflects the incremental development of the network. In April 2010, the East London line became part of the network when the phase one extension was completed. In 2011/12 a major infrastructure upgrade project led to the introduction of the May 2011 timetable which provided four peak trains an hour from Stratford to Richmond together with four peak trains an hour from Stratford to Willesden, and a 'turn up and go' service of eight trains an hour in the central section of the North London line. In December 2012, the South London line extension of the network from Clapham Junction to Highbury & Islington via Surrey Quays opened, completing the orbital route.

In 2014/15, passenger kilometres increased by 2.5 per cent on the previous year, to 861 million and passenger journey stages increased by 3.1 per cent to 140 million (figure 3.5).

Figure 3.5 Passenger kilometres and journey stages by London Overground.



Source: TfL Service Performance data.

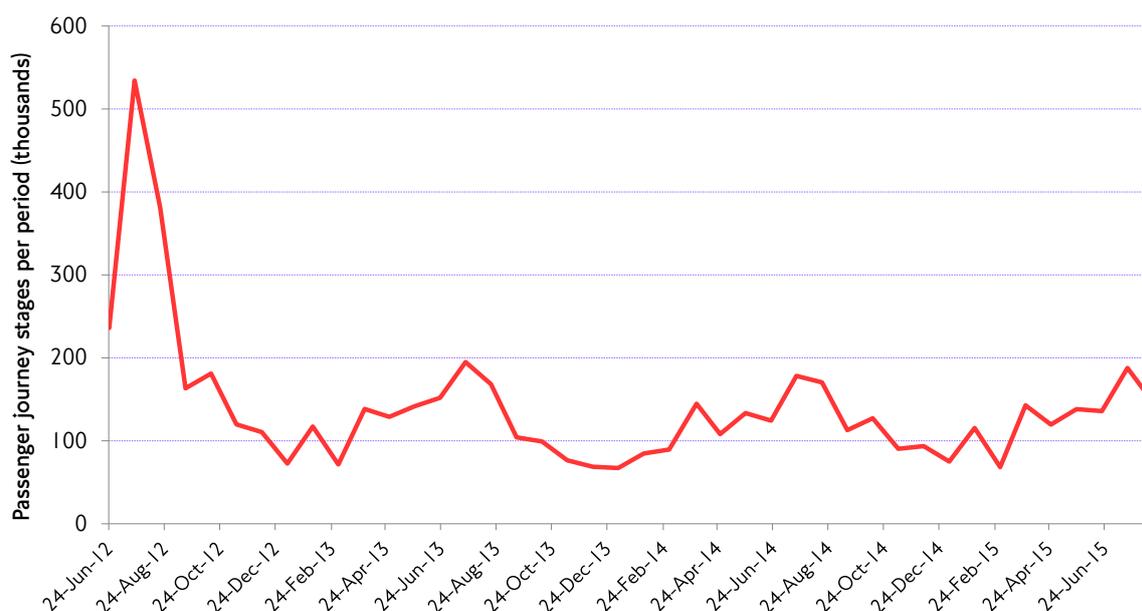
### 3.8 Modal trends: Emirates Air Line

The Emirates Air Line, providing a cable-car service across the Thames between the Greenwich Peninsula and the Royal Docks, opened in June 2012, just prior to the 2012 Games. During the Games themselves, the geographic proximity of the Air Line to Games-related tourism and the 'novelty factor' combined to see patronage exceed 750,000 people in the first two (four-week) periods of operation.

Figure 3.6 shows that, following the exceptional conditions of summer 2012, the Emirates Air Line has settled into a more regular pattern of use, typically between 80,000 and 200,000 passengers per four-week period, with more passengers seen during school holidays. In 2014/15, 1.55 million journeys were undertaken on the Emirates Air Line, a slight increase from the previous year.

### 3. Travel trends by mode

Figure 3.6 Number of journey stages by Emirates Air Line.



Source: TfL Service Performance data.

### 3.9 Modal trends: National Rail in London

National Rail travel has grown strongly at the national level over the past decade, with only a brief slowdown during the recent recession. This pattern is reflected for travel on services defined by the Office of Rail Regulation (ORR) as 'London and South East' (L&SE). Passenger kilometres and passenger journeys increased for the fifth year in a row with increases of 3.5 per cent in passenger kilometres and 4.3 per cent in journeys. Comparing 2014/15 with 2008/09, there has been a 22 per cent increase in passenger kilometres and a 35 per cent increase in the number of journey stages (table 3.1).

Table 3.1 Passenger kilometres and passenger journey stages by National Rail – operators classified by ORR as London and South East operators.

Year	Passenger kilometres (billions)	Year-to-year percentage change	Passenger journeys (millions)	Year-to-year percentage change
1998/99	17.1	..	616	..
1999/00	18.4	7.6	639	3.6
2000/01	19.2	4.3	664	4.0
2001/02	19.3	0.5	663	-0.1
2002/03	19.8	2.6	679	2.4
2003/04	20.1	1.7	690	1.6
2004/05	20.5	1.9	704	2.1
2005/06	20.7	1.1	720	2.2
2006/07	22.2	7.1	769	6.9
2007/08	23.5	6.1	828	7.7
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

Source: Office of Rail and Road.

### 3.10 Modal trends: Road traffic in London

#### Scope

This section considers road traffic volumetric trends in London. It first looks at vehicle-kilometre based estimates from the Department for Transport (DfT), and then looks at complementary traffic flow data from TfL's own traffic counts. The latest available DfT data is for the 2014 calendar year, and shows a return to traffic growth in London for the first time since 2006. TfL's traffic flow data shows a similar trend, continuing into 2015. If this apparent renewed trend towards increasing traffic in London continues, it will have significant implications for the management of the road network in the coming years.

#### Developments in 2014 (DfT data)

In 2014, vehicle kilometres in London were up by 1.8 per cent overall, with the biggest increase in central London, which was up by 3.4 per cent on the previous year – a very sharp turnaround compared to established trends. Traffic in inner London grew by 1.4 per cent, while traffic in outer London, which accounts for about 70 per cent of traffic in London, increased by 1.9 per cent. Traffic in outer London has now increased for three consecutive years (figure 3.7).

#### Trends since 2000 and 2008 (DfT data)

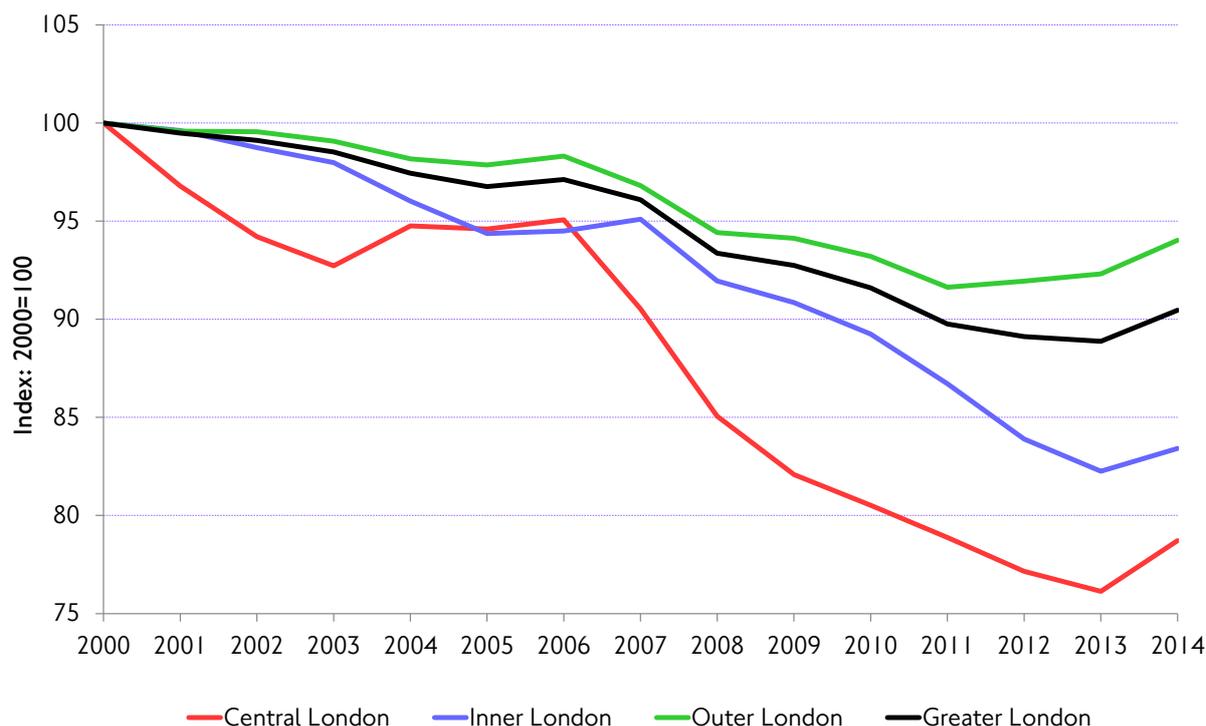
Despite the increases in the latest year, DfT data shows that vehicle kilometres in London in 2014 were 9.5 per cent lower than in 2000. This fall in road demand has been a consistent feature of the last decade, and has been particularly prominent in central London (although this indicator applies to an area larger than the central London Congestion Charging zone), where vehicle kilometres in 2014 were 21.3 per cent below the 2000 level, even taking into account the increase in the latest year.

### 3. Travel trends by mode

In inner London, the equivalent fall was 16.6 per cent, while vehicle kilometres in outer London fell by 6.0 per cent. Traffic in outer London only started to fall steadily in the second half of the decade, from 2007 onwards, after a slight increase in 2006, and in 2012 it started to increase again.

Between 2008 and 2014, on the basis of this indicator, traffic fell by 3.1 per cent in Greater London, compared to the MTS expectation of a 1.3 per cent increase in car trips.

Figure 3.7 Trends in road traffic (vehicle kilometres), all motor vehicles in central, inner and outer London. Index: Year 2000=100.



Source: Department for Transport.

In interpreting the trend for central London shown by figure 3.7, it is important to recognise that this reflects a different area and set of conditions to that previously reported by TfL through the Congestion Charging Impacts Monitoring reports.

At the national level, road traffic volumes increased by 2.4 per cent in 2014, making two consecutive years of growth. Vehicle-kilometres driven nationally remain slightly below pre-recession levels, around 1.0 per cent lower than the previous peak in 2007 (tables 3.2 and 3.3), but 7.4 per cent higher than in 2000. The opposing trends of continued growth at the national level, coupled with falls in London, were a consistent feature of the last decade.

Table 3.2 London road traffic (billion vehicle kilometres) by central, inner and outer London. All motor vehicles, with Great Britain comparison.

Year	Central London	Inner London	Outer London	Greater London	Great Britain
2000	1.3	9.0	22.1	32.4	466.2
2001	1.2	9.0	22.0	32.3	472.6
2002	1.2	8.9	22.0	32.1	483.7
2003	1.2	8.8	21.9	31.9	486.7
2004	1.2	8.7	21.7	31.6	493.9
2005	1.2	8.5	21.7	31.4	493.9
2006	1.2	8.5	21.8	31.5	501.1
2007	1.2	8.6	21.4	31.2	505.4
2008	1.1	8.3	20.9	30.3	500.6
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	500.5

Source: Department for Transport.

Table 3.3 Index of London road traffic (all motor vehicles, based on vehicle kilometres). Index: Year 2000=100. With Great Britain comparison.

Year	Central London	Inner London	Outer London	Greater London	Great Britain
2000	100.0	100.0	100.0	100.0	100.0
2001	96.7	99.6	99.6	99.5	101.4
2002	94.2	98.8	99.6	99.1	103.8
2003	92.6	98.0	99.1	98.5	104.4
2004	94.7	96.0	98.2	97.4	106.0
2005	94.5	94.4	97.9	96.8	105.9
2006	95.0	94.5	98.3	97.1	107.5
2007	90.6	95.1	96.8	96.1	108.4
2008	85.1	92.0	94.4	93.4	107.4
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	107.4

Source: Department for Transport.

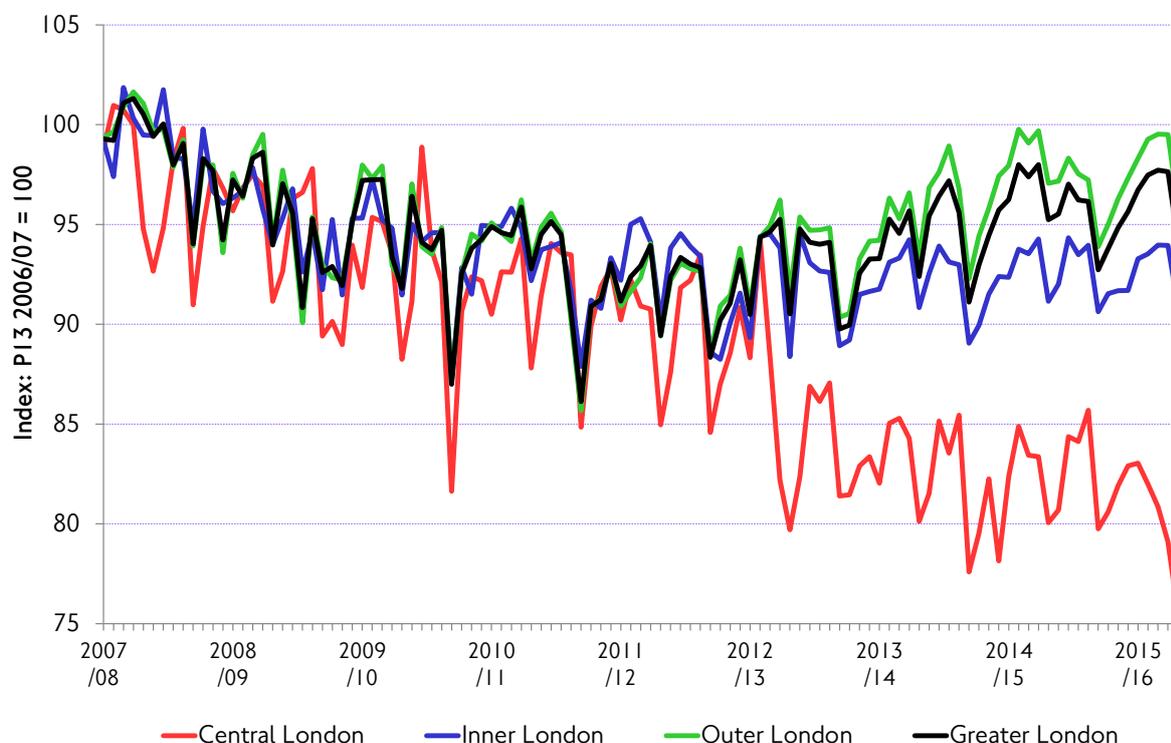
### Trend shown by TfL's volumetric data

Data from TfL's traffic counts highlight the seasonal nature of traffic flows, and also show broadly similar long-term trends to the traffic data above. The traffic flow data shows a large drop in flows in central London from 2012/13 onwards, with traffic flows almost 20 per cent lower than in period 13 2006/07. In inner London,

### 3. Travel trends by mode

flows declined to 2011/12, and have been relatively stable since then, and are almost 8 per cent lower than in 2006/07. Traffic flows in outer London also declined up to 2011/12, but recent data suggests a return to growth, with flows in 2014/15 just 2.6 per cent below 2006/07.

Figure 3.8 Trends in road traffic (traffic flows), all motor vehicles in central, inner and outer London. Index: P13 2006/07=100.



Source: TfL Surface Transport - Outcomes, Insight & Analysis.

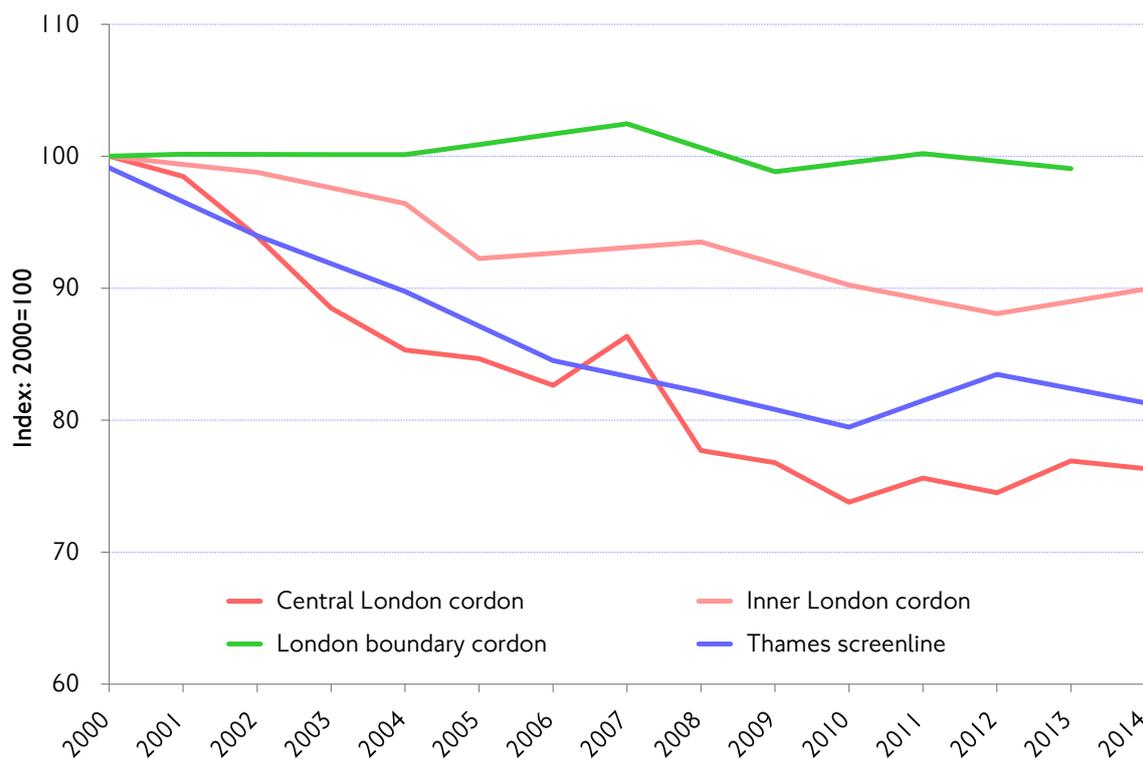
#### Trend shown by TfL's cordon count data

Trends in the numbers of motor vehicles crossing the three London cordons and the Thames screenline show a similar pattern to data on vehicle kilometres. Since 2000, the number of motor vehicles crossing the central cordon has fallen by 23.7 per cent, although there have been signs of growth since the low point in 2010. Across the inner cordon, the decline has been 10.1 per cent, while the boundary cordon has been relatively stable, with just a 0.9 per cent decrease comparing 2013 against 2000. The number of vehicles crossing the Thames has also declined over the same period, with 18.7 per cent fewer vehicles in 2014 compared with 2000.

Since 2008, the trend has been relatively stable across most of the cordons. The number of vehicles crossing the central cordon fell by 1.8 per cent over this period, with a similar decline of 1.6 per cent across the boundary cordon. There was a slightly larger decline of 3.8 per cent across the inner cordon.

Comparing the cordon data with the DfT traffic data in table 3.3, the overall trends since 2000 are relatively similar. Both data sources show a drop of over 20 per cent in central London, although the DfT traffic data suggests larger falls in both inner and outer London.

Figure 3.9 Daily number of motor vehicles crossing at the three cordons and Thames screenline. Index: 2000=100.



Source: TfL Surface Transport - Outcomes, Insight & Analysis.

### 3.11 Modal trends: Cycling

#### Scope

This section looks at recent trends in levels of cycling in London, including average daily cycle stages and trips, cycle flows on the TLRN major road network, the number of cyclists crossing a set of three strategic traffic counting cordons and the contribution of the Santander Cycles hire scheme.

#### Overall levels of cycling in London

Cycling has grown strongly in London in recent years, although the rate of growth in both 2012 and 2013 was relatively low compared to the longer-run average. The figures for 2014 suggest a return to strong growth in cycling, both in the number of cycle stages and cycle flows on major roads in London.

In 2014, there were 645,000 cycle journey stages in London on an average day, which is a 10.3 per cent increase on 2013. This follows a 0.5 per cent increase in the previous year, with an overall 69.6 per cent increase in cycle stages since 2004 (table 3.4). Since 2008, the growth has been 31.9 per cent.

### 3. Travel trends by mode

Table 3.4 Daily average cycle stages and trips in London.

	Cycle stages		Cycle trips
	Millions	Year-on-year change %	Millions
2004	0.38	3	0.33
2005	0.41	9	0.39
2006	0.47	12	0.42
2007	0.47	0	0.42
2008	0.49	5	0.44
2009	0.51	5	0.47
2010	0.54	6	0.49
2011	0.57	5	0.49
2012	0.58	2	0.50
2013	0.58	1	0.50
2014	0.65	10	0.56

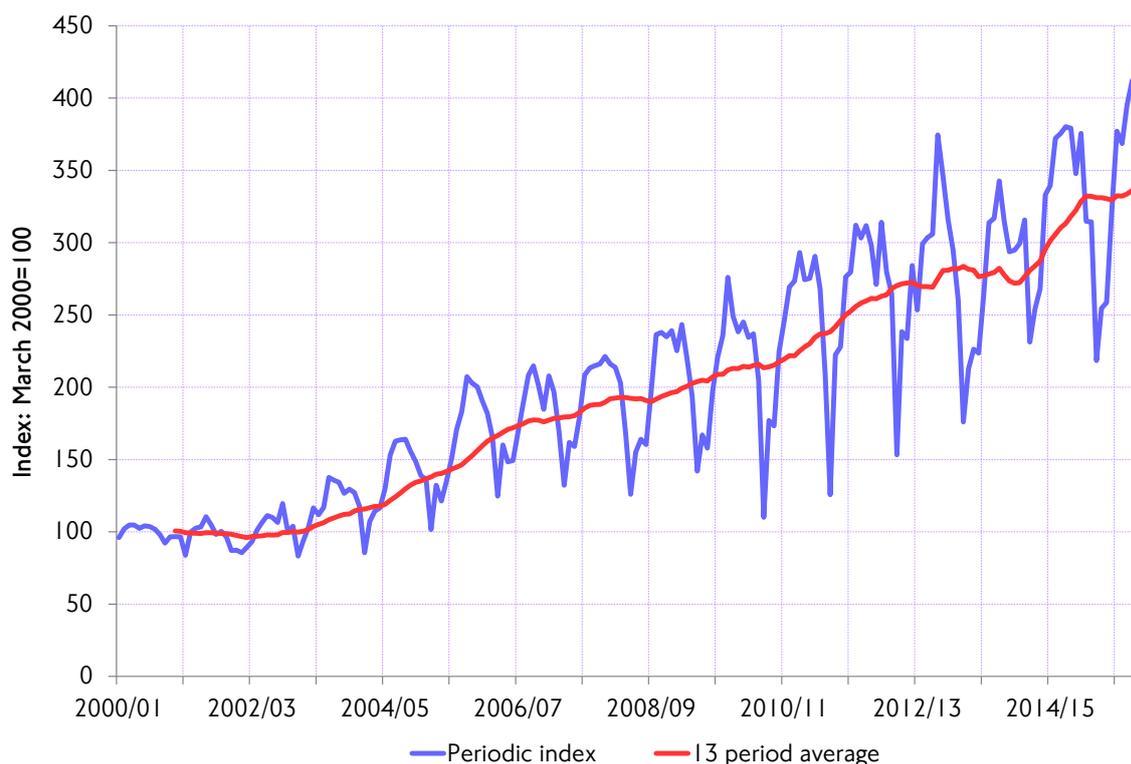
Source: TfL Planning, Strategic Analysis.

#### Cycle flows on major roads in London

TfL monitors levels of cycling on the TLRN major road network through data collected by automatic cycle counters. Figure 3.10 shows the data as an index with a base of March 2000, calculated as the average daily cycle flows within each four-week reporting period.

Between 2000/01 and 2014/15, the index increased by 230 per cent overall. Following a 7 per cent increase between 2012/13 and 2013/14 the index increased by a further 11.5 per cent in 2014/15. The chart illustrates the seasonal variations in cycling, with peaks and troughs in the series corresponding with summer and the Christmas and New Year holidays respectively. Over the period since 2008, the growth was 62.4 per cent.

Figure 3.10 Trends in cycle flows on the TLRN.



Source: TfL Surface Transport - Outcomes, Insight & Analysis.

### Cycling flows across strategic counting cordons and screenlines

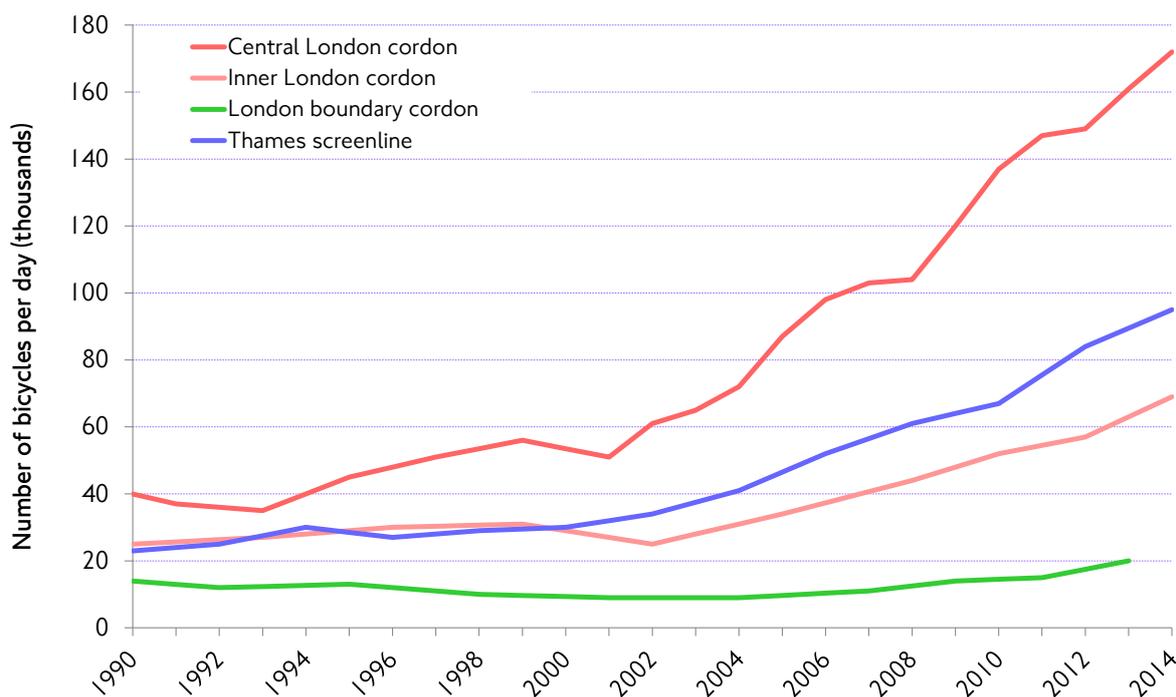
Figure 3.11 shows the number of cycles crossing the three strategic counting cordons in London (central, inner and London boundary) and the Thames screenline between 1976 and 2014. These data are the total number of cycles crossing the cordon in a full weekday (24-hours). Surveys are taken at the same time of year, to ensure there is no seasonal bias.

The long-term trends are clear, with cycling levels at all cordons remaining broadly constant until the year 2000, after which they started to increase. Rates of growth are highest at the central cordon and on the Thames screenline, with cycle flows at the Thames screenline growing by 13 per cent between 2012 and 2014. Flows across the central cordon, surrounding central London (not the same as the Congestion Charging zone), grew by 6.8 per cent in 2014, following growth of 8.1 per cent in 2013, with flows 237 per cent higher than in 2001.

Growth has also occurred at the inner and boundary cordons, although the growth started later and at a much lower rate than in central London. Cycle flows at the inner cordon increased by 21 per cent between 2012 and 2014. Flows at the boundary cordon also increased in 2013 (the last available year of data), and were 33 per cent higher than in 2011. However, cycle flows across the central cordon are almost twice as high as the inner and boundary cordon flows combined.

### 3. Travel trends by mode

Figure 3.11 Long-term trends in cycling across strategic cordons and screenlines in London, 24-hour weekdays, both directions.



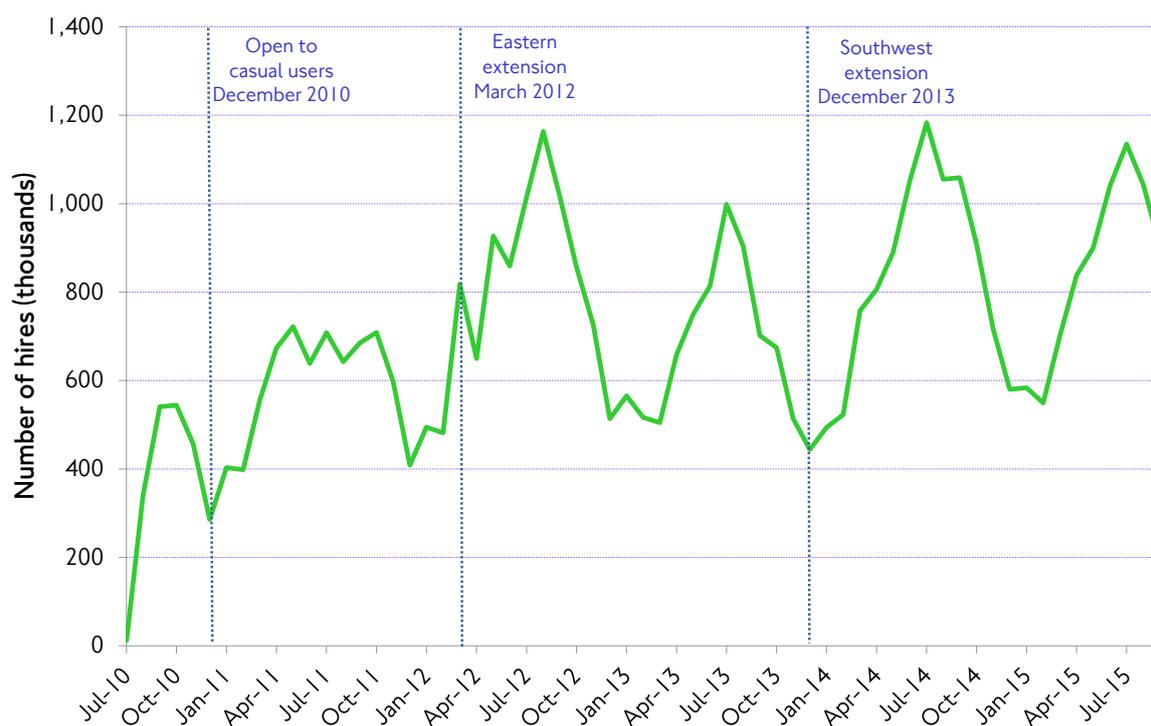
Source: TfL Surface Transport, Outcomes, Insight and Analysis.

#### Santander Cycles hire scheme

The Barclays Cycle Hire scheme began in July 2010 in central London. Since then there have been progressive enhancements, including the opening up of the scheme to casual members in December 2010, an expansion to the east in 2012 and an expansion to the south west in late 2013. From April 2015, the name of the scheme changed to Santander Cycles, to reflect a change of sponsor, although the operational aspects of the scheme remained substantially the same.

In the financial year to March 2015, there were a total of 10.1 million cycle hires, up from 8.2 million to March 2014, an increase of 22.5 per cent. This is the highest number of yearly cycle hires so far, with July 2014 having the highest number of hires since the scheme began (Figure 3.12).

Figure 3.12 Trend in monthly cycle hires by type of hire.



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

### 3.12 Modal trends: Walking

Some 6.4 million walk-all-the-way trips were made on an average day in London in 2014. This is an increase of 9.3 per cent since 2008, this increase mainly reflecting population growth over the period (which was also 9.3 per cent). This gives a walking mode share (for all travel) of 21 per cent, which is identical to the position in 2008. However, there is evidence that increased public transport use has, as a by-product, increased the number of walk journey stages undertaken by Londoners, with associated health benefits. Section 11.8 of this report considers the characteristics of walking in London, while section 9.7 looks at the contribution of walking to active travel in London.

### 3.13 Modal trends: Road-based freight and servicing

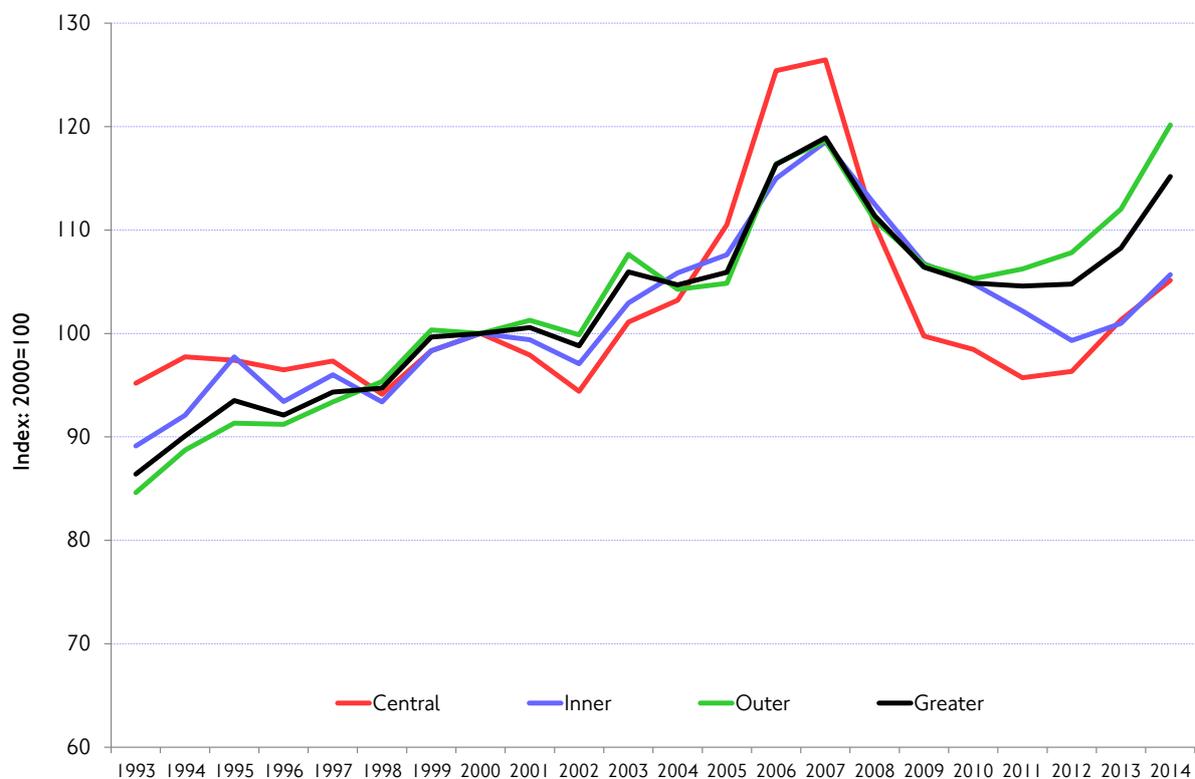
Road is by far the dominant mode for goods transport in London in terms of the weight of goods lifted. This section looks at trends in the volumes of road freight vehicles, in terms of vans and heavy goods vehicles. It uses two main sources of data – cordon crossing data from TfL's surveys and area-based volumetric data from DfT's traffic counts.

#### Vans

Figure 3.13 shows the trend in light goods vehicle traffic (vehicle kilometres) in central, inner, outer and greater London. Figure 3.14 is the equivalent trend in the volume of light goods vehicles crossing the central, inner and boundary cordons, corresponding to central London, inner London and the GLA boundary respectively. Note that the counting cordons relate to a specific set of locations, which are optimised to measure radial traffic movements. They therefore may not be representative of overall traffic trends or levels.

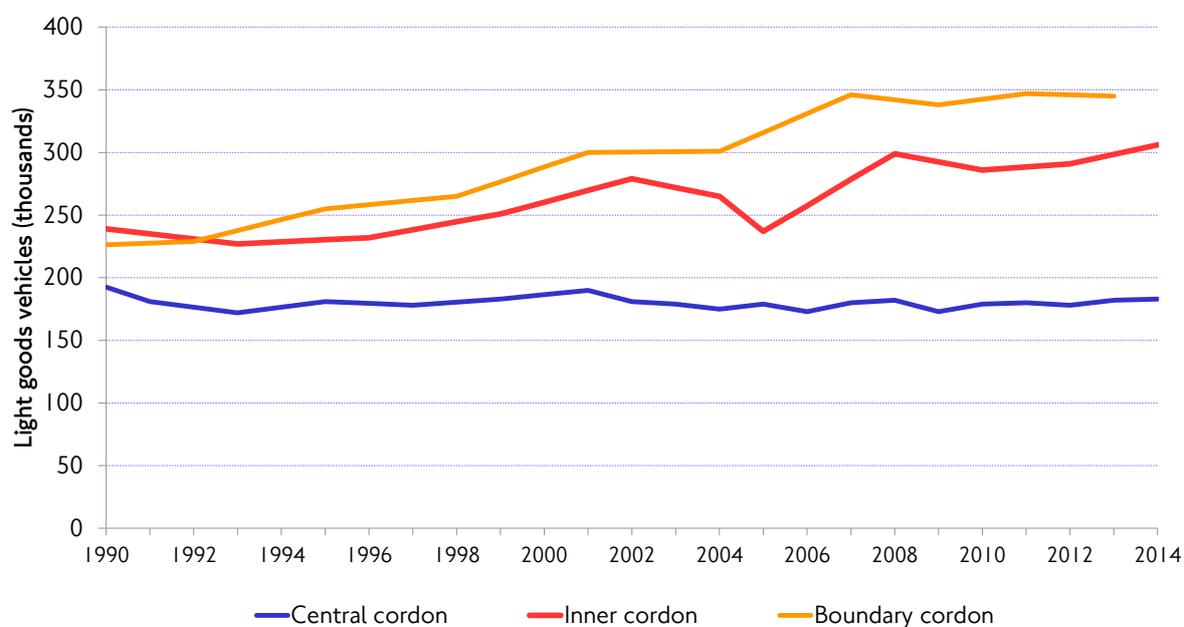
### 3. Travel trends by mode

Figure 3.13 Trends in LGV traffic (vehicle kilometres) in central, inner and outer London. Index: Year 2000=100.



Source: Department for Transport.

Figure 3.14 Daily number of light goods vehicles crossings at the three cordons: 24 hour flows, 1990-2014.



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

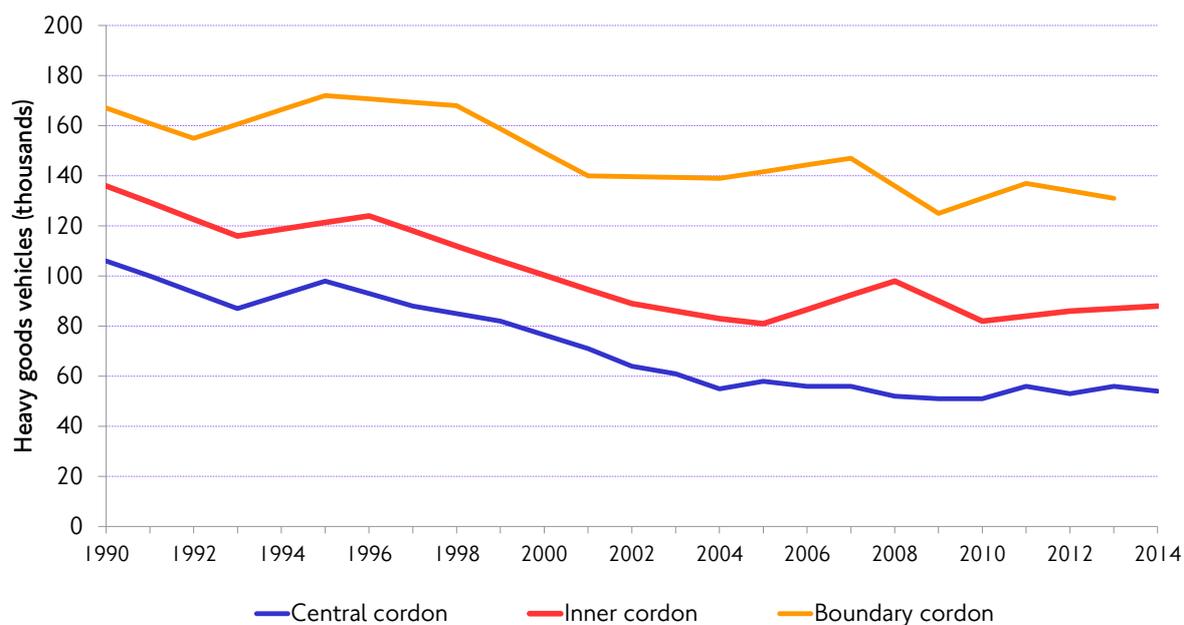
Light goods vehicles (LGVs) were responsible for 14 per cent of the vehicle kilometres travelled by all motorised road vehicles in London in 2014. After strong growth up to 2007, LGV traffic fell heavily post-recession between 2007 and 2011. LGV traffic has started to increase again, and is now 10.1 per cent higher than the 2011 low point. LGV traffic is 3.4 per cent higher than 2008 on a net basis, with particularly strong growth in outer London and in the most recent year.

Data on LGVs crossing the cordons shows a slightly different trend, without the pronounced recessionary decrease shown in the volumetric data. Compared to 2008, the number of LGVs crossing the central cordon was 0.5 per cent higher in 2014. Over the same time period, there was a 2.3 per cent increase across the inner cordon and a 0.9 per cent increase across the boundary cordon (to 2013).

### Lorries

Figure 3.15 shows the trends in the volume of heavy goods vehicles (HGVs) crossing the central, inner and boundary cordons, corresponding to central London, inner London and the GLA boundary respectively. Figure 3.16 is the equivalent trend for vehicle kilometres.

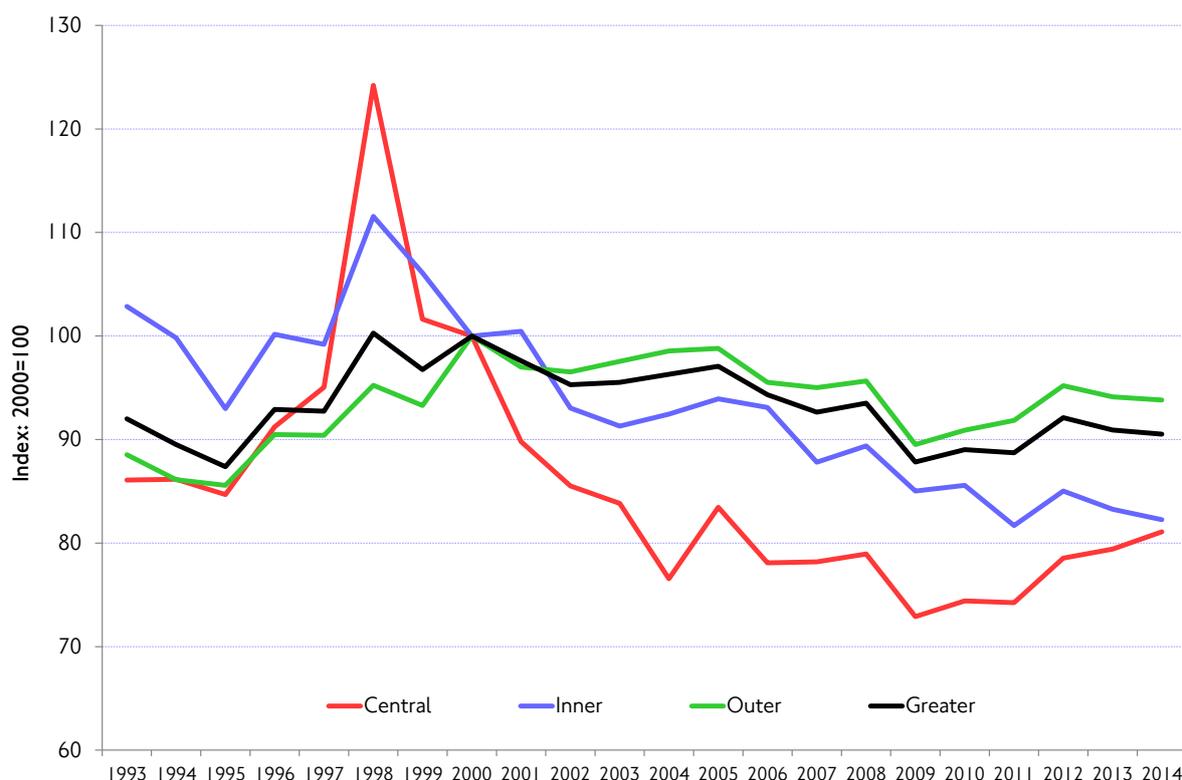
Figure 3.15 Daily number of heavy goods vehicles crossing at the three cordons: 24 hour flows, 1990-2014.



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

### 3. Travel trends by mode

Figure 3.16 Trends in HGV traffic (vehicle kilometres) in central, inner and outer London. Index: Year 2000=100.



Source: Department for Transport.

Looking at traffic data, HGV traffic has declined steadily across all areas of London, and is 9.5 per cent lower than in 2000, although this decline has levelled off in recent years. Since 2008, HGV traffic has declined by 3.2 per cent across London, although there has been growth of 2.7 per cent in central London over the same period.

Cordon data also shows a decline since 2008 in HGVs crossing the inner and boundary cordons of 10.2 per cent and 3.7 per cent (to 2013) respectively. Again, there is evidence of growth in the number of HGVs in central London, with the number of vehicles crossing the central cordon 3.8 per cent higher than 2008.

#### 3.14 Modal trends: River Services

##### Background

In February 2013 TfL published the River Action Plan (<https://tfl.gov.uk/corporate/publications-and-reports/river-action-plan>). This took forward the Mayor's proposals to realise the potential of the Thames, along with other navigable waterways in London, for passenger and freight transport.

##### Passenger traffic on the Thames

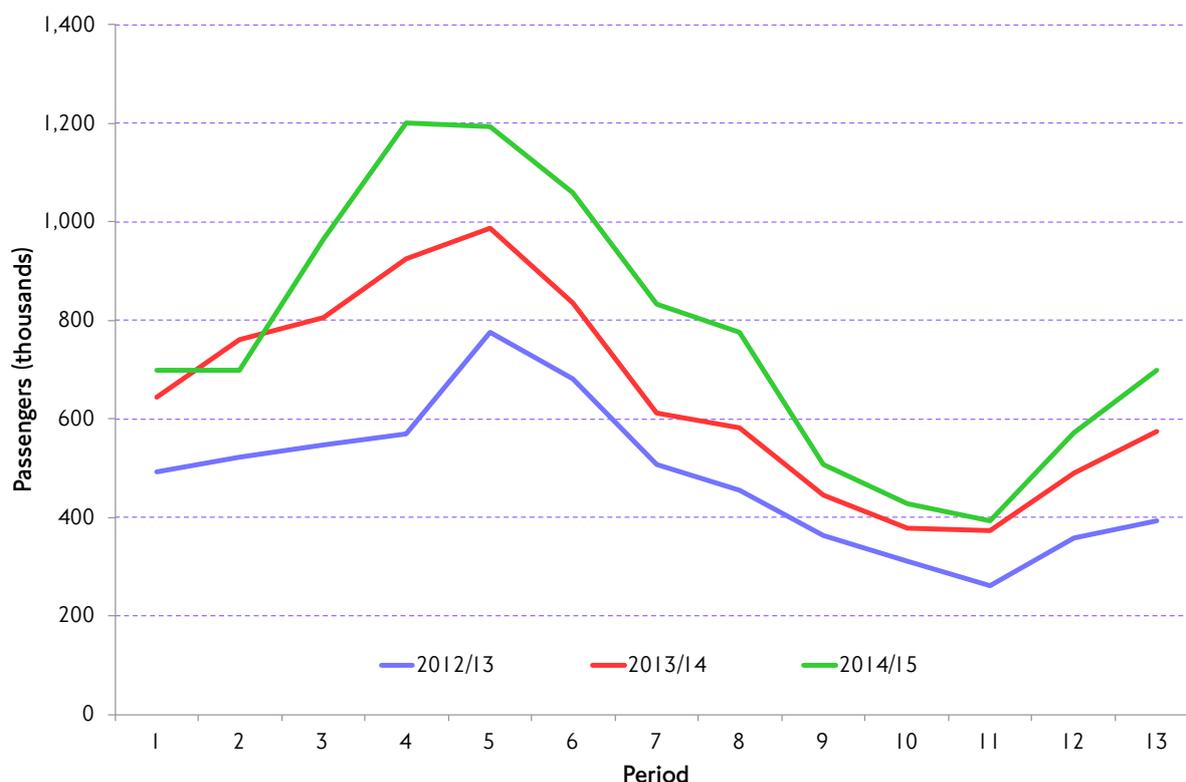
Patronage on TfL's River Services has seen strong growth in recent years, with more than 10 million passengers carried in 2014/15.

At the start of 2013/14, a new method of counting passengers was introduced that is intended to give more accurate information based on a full count of boarders and persons alighting at each pier, rather than previous data based partly on boarders

and partly on ticket sales. This means that patronage numbers for 2013/14 are not directly comparable with those from previous years.

Figure 3.17 shows data for the whole of 2012/13, based on the previous system of counting, and data for 2013/14 and 2014/15 based on the new system. On a comparable basis, there was a 19.1 per cent increase in passengers in 2014/15 over the previous year.

Figure 3.17 Passengers using TfL's River Services.



Source: TfL River Services.

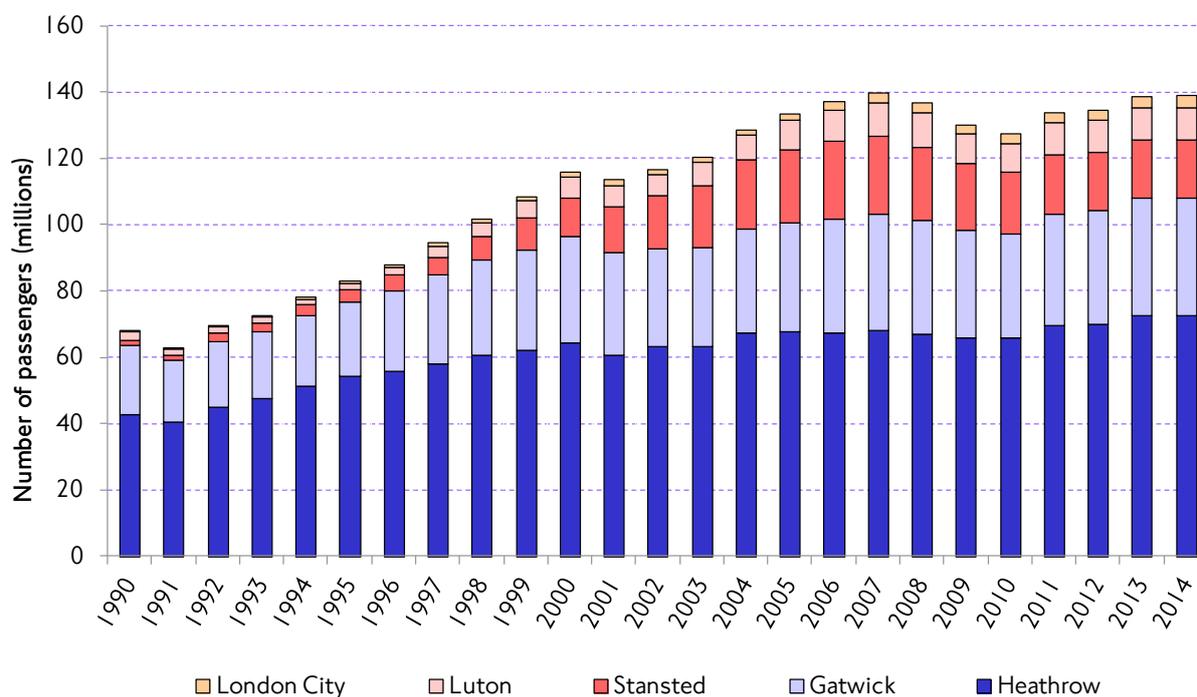
### 3.15 Modal trends: Travel by air

#### Travel by air

London has five international airports, of which two are among the 10 busiest airports in Europe. Heathrow saw the highest ever number of passengers in 2014, with 72.4 million passengers, up from 72.3 million in 2013. Heathrow accounted for 52 per cent of London's air passengers, with Gatwick accounting for 26 per cent. Overall there was a very small increase in the total number of passengers using London's airports between 2013 and 2014. Looking at the recent trend, the impact of the recession, and recent slow recovery, are clearly evident (figure 3.18).

### 3. Travel trends by mode

Figure 3.18 Terminal passengers by London area airport.



Source: Civil Aviation Authority.

Note: Terminal passengers are those passengers either joining or leaving an aircraft, including interlining and transfer passengers.

### 3.16 Modal trends: Licensed taxis and private hire vehicles

Figure 3.19 shows the trend in the number of licensed taxis and private hire vehicles (PHVs), along with their drivers, within London since 2008/09.

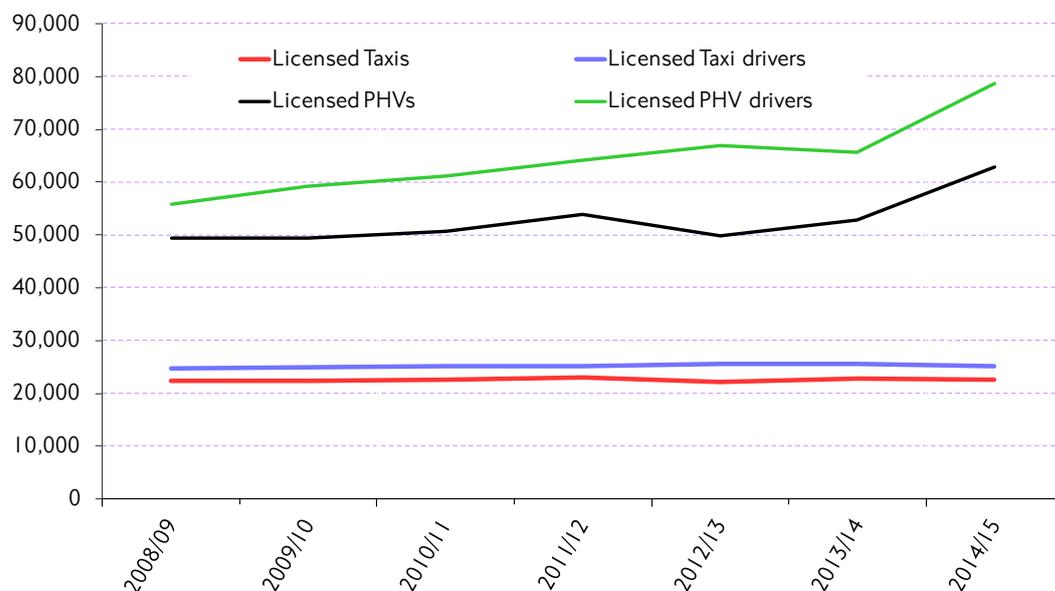
The number of licensed taxis in London has remained fairly stable in recent years. At the end of 2014/15 there were 22,500 – an increase of 0.9 per cent since 2008/09 – while there were 25,232 drivers licensed to ply for hire, representing an increase of 1.8 per cent since 2008/09.

The number of PHVs has increased by 27 per cent since 2008/09, up to 62,754 in 2014/15 and up by 19 per cent in the most recent year alone. While the number of registered PHVs has grown in most years, the number reduced by 8 per cent from 2011/12 to 2012/13. This is likely to have been caused at least in part by the introduction of a 10-year age limit for PHVs in June 2012, meaning any PHVs older than this were not able to renew their registration from that date.

Meanwhile the number of licensed PHV drivers has increased by 41 per cent over the same period, up to 78,690 in 2014/15. 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 2013/14 there was a 2 per cent reduction in registered PHV drivers, perhaps attributable to a lagged effect of the introduction of the PHV age limit described above. In the last year though, the number of registered PHV drivers has grown by 20 per cent. One factor that has contributed to this acceleration is the launch of Uber’s ‘UberX’ product in July 2013.

Although Uber was active in London from June 2012, at that time the firm operated only its 'UberLux' product, offering premium minicab services at relatively high prices. The launch of UberX in July 2013 represented a change in London's PHV market where it became easier, and in many cases cheaper, for people to find and use minicabs. Demand for this service appears to have created a larger market than previously existed, leading to more registrations of PHV drivers. However, this does not appear to have fed through directly to significantly increased traffic levels.

Figure 3.19 Recent trend of licensed London taxis and private hire vehicles.



Source: Taxi and Private Hire, TfL Surface Transport.

### 3.17 Key reference statistics

Table 3.5 brings together indicators of travel demand across the principal modes of transport, covering change over the most recent year, and looking back to 2008 or 2008/09 – the nominal period covered by the Mayor's Transport Strategy to date.

### 3. Travel trends by mode

**Table 3.5** Summary of key indicators of travel demand for principal travel modes in London.

Mode and indicator	Units	2008 or 2008/09	2013 or 2013/14	2014 or 2014/15	Difference (%) 2014 or 2014/15 vs	
					2008	2013
<b>Public transport (PT)</b>						
Total PT passenger kilometres	Millions per year	17,470	20,374	20,882	19.5	2.5
Total PT journey stages	Millions per year	3,462	3,915	3,971	14.7	1.4
Bus passenger kilometres	Millions per year	7,942	8,411	8,420	6.0	0.1
Bus journey stages	Millions per year	2,247	2,382	2,385	6.2	0.1
Underground passenger km	Millions per year	8,641	10,423	10,847	25.5	4.1
Underground journey stages	Millions per year	1,089	1,265	1,305	19.8	3.2
DLR passenger kilometres	Millions per year	318	537	594	86.8	10.6
DLR journey stages	Millions per year	66	102	110	67.1	8.6
London Tramlink passenger kilometres	Millions per year	142	162	160	12.7	-1.6
London Tramlink journey stages	Millions per year	27	31	31	13.7	-1.5
Overground passenger km	Millions per year	427	840	861	101.5	2.5
Overground journey stages	Millions per year	33	136	140	321.4	3.1
National Rail pass. km (L&SE)	Millions per year	24,222	28,615	29,593	22.2	3.4
National Rail journeys (L&SE)	Millions per year	854	1,107	1,155	35.2	4.3
<b>Road traffic</b>						
Motor vehicle km – GLA	Billions per year	30.3	28.8	29.3	-3.1	1.8
Motor vehicle km – central	Billions per year	1.1	1.0	1.0	-7.5	3.4
Motor vehicle km – inner	Billions per year	8.3	7.4	7.5	-9.3	1.4
Motor vehicle km – outer	Billions per year	20.9	20.4	20.8	-0.4	1.9
Central London cordon	'000 motor vehicles	1,193	1,181	1,172	-1.8	-0.8
Inner London cordon	'000 motor vehicles	2,015	n/a	1,938	-3.8	n/a
Outer London cordon	'000 motor vehicles	n/a	2,539	n/a	n/a	n/a
Thames screenline	'000 motor vehicles	798	n/a	790	-1.0	n/a
<b>Cycling</b>						
Cycle flows on TLRN	Cycles counted (index 2000/01=100)	207.2	295.6	329.6	59.1	11.5
Cycles – central cordon	Cycles counted thousand	104	161	172	65.4	6.8
Cycles – inner cordon	Cycles counted thousand	44	n/a	69	56.8	n/a
Cycles – outer cordon	Cycles counted thousand	n/a	20	n/a	n/a	n/a
Cycles – Thames screenline	Cycles counted thousand	61	n/a	95	55.7	n/a
<b>Other modes</b>						
Airport terminal passengers	Millions	136.8	138.7	138.7	1.4	0.0
River Thames passengers	Millions per year	n/a	8.4	10.0	n/a	19.1
Licensed taxis	Vehicles (thousand)	22.3	22.8	22.5	0.9	1.4
Licensed taxi drivers	Number (thousand)	24.8	25.5	25.2	1.8	1.2
Licensed private hire	Vehicles (thousand)	49.3	52.8	62.8	27.2	18.8
Licensed private hire	Drivers (thousand)	55.8	65.7	78.7	41.1	19.9

Source: TfL Planning, Strategic Analysis.

## 4. Performance of the transport networks

### 4.1 Introduction and contents

This chapter reviews aspects of the service supply and the operational performance provided by London's transport networks, updating the range of indicators introduced in previous Travel in London reports, and following on from the trends in travel demand on the individual transport modes described in the previous two chapters.

It provides a summary of the performance of the TfL-operated mass public transport networks, together with National Rail in London, in terms of indicators of service provision and operational reliability. It then looks at the performance of London's road network, covering measures such as traffic speeds, journey times and journey time reliability.

### 4.2 Key modal trends (service supply)

Public transport in London has, over recent years, benefited from a long run of sustained high operational performance and service provision. All key indicators of service provision have shown a marked trend of improvement over the last decade.

- A total of 80 million train kilometres were operated on the **Underground** in 2014/15, up from 76 million in 2013/14, and up by 14 per cent against 2008/09, with the benefits of the Tube upgrade programme, including the current renewal of the entire sub-surface train fleet, now evident.
- In 2014/15, 489 million vehicle kilometres were operated on the bus network, a 2.4 per cent increase against 2008/09, continuing the high rate of service provision following the major increase to bus service levels in the earlier part of the last decade.
- On the other TfL rail modes 2014 saw continued incremental development to the networks and the services operated on them. On the **Docklands Light Railway** there were 594 million kilometres operated in 2014/15, up from 537 million kilometres in 2013/14. On **London Overground** 8.1 million kilometres were operated in 2014/15, the same figure as in 2013/14. On **Tramlink** there were 3.01 million kilometres operated in 2014/15, down slightly from 3.03 million kilometres in 2013/14. Between 2008/09 and 2013/14, the net increases in service provision have been 48.7 per cent on the DLR, 142.5 per cent on London Overground, reflecting the rapid expansion of this network, and 13.2 per cent on Tramlink.
- In terms of the overall capacity provided by the public transport networks, measured in terms of place-kilometres, the net increases between 2008/09 and 2014/15 were 9.8 per cent for Underground, 4.3 per cent for bus, 91.9 per cent for DLR and 13.1 per cent for Tramlink, equating to an overall increase of 9.6 per cent across the four networks in combination. This is a growth rate equivalent to 1.5 per cent per year, on average, in the capacity of London's key public transport networks.

### 4.3 Key modal trends (operational performance)

Alongside increased public transport provision, there have also been sustained improvements to the quality and reliability of public transport services. Service reliability indicators in 2014/15 for the major public transport modes were also at,

#### 4. Performance of the transport networks

or close to, best-ever levels, following on from and maintaining the exceptional performance to support the London 2012 Games. For the first time in recent years, however, there is some evidence of deterioration in the performance of London's road network, reflecting increasing traffic levels and an unprecedented amount of construction activity temporarily affecting the network.

- Levels of service reliability on the **Underground** are at or about all-time highs. In 2014/15, 97.6 per cent of scheduled train kilometres were operated, slightly up on the 97.5 per cent of 2013/14 and reflecting an increase of 5.2 per cent in train kilometres scheduled. Over the period since 2008/09 London Underground has operated more train kilometres more reliably than ever before, with 80 million train kilometres operated in 2014/15 with 97.6 per cent reliability, against 73 million train kilometres operated in 2008/09, with 96.4 per cent reliability. In terms of customer-focused measures, excess journey time for the Underground has reduced from an average of 6.6 minutes in 2008/09 to 4.6 minutes in 2014/15, a reduction of 30.3 per cent in this measure of unreliability.
- **Bus** reliability, in terms of the percentage of schedule operated, has been at consistently high levels throughout the period from 2008/09. In 2014/15 97.1 per cent of the schedule was operated, compared with 97.2 per cent in 2008/09. Achieving and maintaining these high levels of bus network reliability has been a major feature of the period since 2000. In terms of excess waiting times, for much of the period since 2008 the average bus passenger has had to wait just one minute longer than they would otherwise have to do if the service ran perfectly to schedule, although this has increased to 1.1 minutes in 2014/15, and there are signs that wider congestion trends during 2015 are beginning to impact on bus service reliability.
- Reliability on London's two self-contained light rail networks has also been excellent throughout the period since 2008/09. On the **Docklands Light Railway** over 99 per cent of the scheduled service was operated for the last two years, and 5 of the 7 years since 2008/09 have seen over 97 per cent of the scheduled service operated. 2014/15 saw the highest ever level of scheduled service operated, at 99.3 per cent. **Tramlink** has performed similarly well, with at least 97 per cent of scheduled services operated in all years since 2008/09.
- Since its inception, **London Overground** has been at or close to the best performing National Rail operator serving London. The network has consistently recorded Passenger Performance Measures (PPM) of over 94 per cent, with a value of 95 per cent in the most recent year. The PPM measure is a percentage value that combines measures of service reliability and timekeeping.
- On National Rail more widely in London, PPM measures have typically been in the 85 per cent to 95 per cent range, although scores for individual operators have varied considerably across the years. Services on the c2c, Chiltern Railways, and London Overground lines have tended to be the higher performers in terms of PPM, whereas those on First Great Western, Thameslink, London Midland and Southern lines have tended to consistently perform less well on the basis of this measure.
- On **London's roads**, for much of the period since 2008, average traffic speeds and delays (congestion) have been notable for their stability. However, in the most recent year there is evidence of emerging pressures on the road network with a decrease of 4 per cent in average traffic speeds across London, coupled

with a sharp 13 per cent increase in average traffic delay, providing a marked contrast to the historic trend.

- The historic stability in these trends is thought to reflect a combination of falling traffic levels and much improved network management, albeit that effective network capacity for general traffic continued to be reallocated to other MTS priorities. The recent change in trend is thought to reflect increasing traffic levels, coupled with temporary disruption from the unprecedented construction boom affecting London's roads. Clearly, this change in road network conditions will need to be a focus for future planning, especially given the expected continued rapid growth in London's population and the increasing requirement for improvements to the wider urban realm in London.
- Journey time reliability on the TfL road network (the TLRN) – has largely retained its historic stability in the most recent year, standing at a value of 88 per cent in 2014/15, against an average over the available time series of 89 per cent (of road journeys completed 'on time'). This reflects a strong focus by TfL to minimise the impact of temporary disruptions and works, and to actively manage traffic to optimise overall network conditions.

#### 4.4 Summary of key service supply and operational performance statistics for London's key public transport networks

Table 4.1 below summarises key service supply and operational performance indicators for the most recent two years, these also compared to the position in 2000/01 and – covering the nominal terms of the current MTS – the position in 2008/09.

Table 4.1 Key indicators of public transport service provision and performance since 2000/01. Summary of typical values.

Mode	Measure	2000/01	2008/09	2013/14	2014/15
<b>Service provision</b>					
Buses	Kilometres operated	365 million	478 million	491 million	489 million
London Underground	Kilometres operated	64 million	71 million	76 million	80 million
DLR	Kilometres operated	2.9 million	3.9 million	5.8 million	5.8 million
London Tramlink	Kilometres operated	2.4 million	2.7 million	3.0 million	3.0 million
London Overground	Kilometres operated	n/a	3.3 million	8.1 million	8.1 million
<b>Service performance</b>					
Buses	Excess wait time	2.2 min	1.1 min	1.0 min	1.1 min
London Underground	Excess journey time	8.6 min	6.6 min	5.2 min	4.6 min
DLR	Reliability	96%	98%	99%	99%
London Tramlink	Reliability	99%	99%	99%	98%
National Rail	ORR L&SE PPM	78%	91%	90%	89%
London Overground	ORR PPM	n/a	n/a	96%	95%

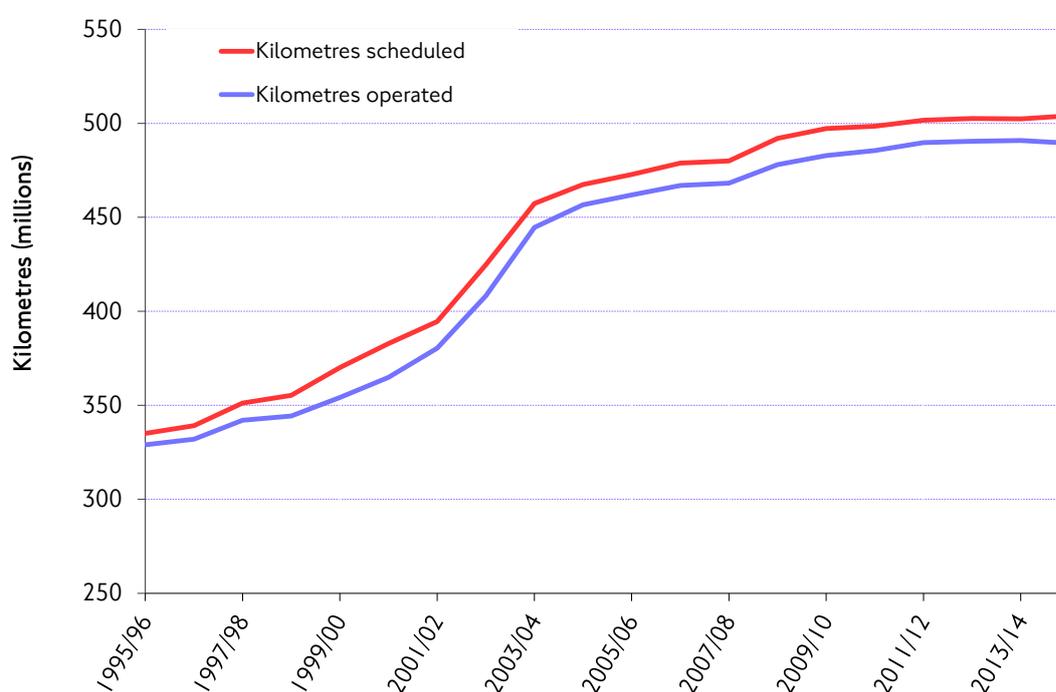
Source: TfL Planning, Strategic Analysis.

## 4.5 Modal performance indicators: Bus

### Bus service supply

The bus is one of London’s transport success stories, with service provision, service quality and patronage increasing substantially since the start of the last decade. Buses in London carried almost 2.4 billion people in 2014/15, and operated 489.4 million bus-kilometres (97.1 per cent of the scheduled service), a slight deterioration on performance compared to 2013/14 (see figure 4.1). This is partly due to a combination of industrial action by drivers, and an increase in traffic delays caused by an increase in traffic levels and construction activity affecting the road network. The percentage of kilometres operated is likely to continue to be negatively impacted by increased congestion, and TfL is working with the bus operators to mitigate the impact of this on the travelling public.

Figure 4.1 Bus service provision – scheduled and operated bus kilometres.



Source: London Buses.

## Bus service performance

Table 4.2 shows measures of bus service reliability. In 2014/15, the percentage of timetabled services 'on time' for low frequency bus routes decreased for the second year in a row, following the high in 2012/13, although this is partly due to a substantial expansion in the monitoring of these services.

The average actual waiting time for high frequency services increased slightly to 6.0 minutes. This follows the increase in 2012/13, which can be attributed to an expansion of monitoring to cover the period 05:00 – 24:00 continuously. Scheduled levels of service are lower at times of day not previously monitored such as late evenings and Sunday mornings. Despite these changes, monitored actual wait times are still 12 per cent below those of 2000/01, albeit 9 per cent higher than 2008/09.

Excess wait time increased slightly to 1.1 minutes for high frequency services in 2014/15, reflecting congestion caused by increased traffic levels and construction affecting the road network. While this shows the network is still very reliable most of the time, there have been isolated locations where reliability has been adversely affected. TfL is continuing to work with bus operators to mitigate the impacts at these locations.

Table 4.2 Indicators of bus service reliability.

Year	Kilometres scheduled (millions)	Percentage of scheduled kilometres			High frequency services <sup>1</sup>		Low frequency services <sup>2</sup>
		Operated	Lost due to traffic congestion <sup>4</sup>	Lost due to other causes <sup>5</sup>	Average wait time (minutes) <sup>6</sup>		Percentage of timetabled services on time <sup>3,7</sup>
					Actual	Excess	
2000/01	383	95.3	2.1	2.6	6.8	2.2	67.7
2001/02	395	96.4	2.0	1.6	6.6	2.0	69.4
2002/03	425	96.1	2.6	1.3	6.4	1.8	70.5
2003/04	457	97.2	1.7	1.1	5.8	1.4	74.6
2004/05	467	97.7	1.6	0.8	5.6	1.1	77.1
2005/06	473	97.7	1.7	0.6	5.6	1.1	77.2
2006/07	479	97.5	1.9	0.6	5.5	1.1	78.1
2007/08	480	97.5	2.0	0.5	5.5	1.1	79.1
2008/09	492	97.0	2.3	0.7	5.5	1.1	80.8
2009/10	497	97.1	2.3	0.6	5.5	1.1	80.5
2010/11	499	97.4	2.1	0.5	5.4	1.0	81.4
2011/12	502	97.6	1.9	0.5	5.4	1.0	83.2
2012/13	503	97.6	1.7	0.7	5.9	1.0	83.6
2013/14	502	97.7	1.9	0.4	5.9	1.0	82.5
2014/15	504	97.1	2.0	0.9	6.0	1.1	81.8

Source: London Buses.

1. High frequency services are those operating with a scheduled frequency of five or more buses an hour.

2. Low frequency services are those operating with a scheduled frequency of fewer than five 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.

4. Also includes other lost kilometres outside the control of the operator.

5. Includes all lost kilometres within the control of the operator.

6. Results for high frequency routes from 2012/13 reflect the move to a greatly expanded QSI system for monitoring of this group of routes.

7. Results for low frequency routes from 2013/14 reflect the move to a greatly expanded QSI system for monitoring this group of routes.

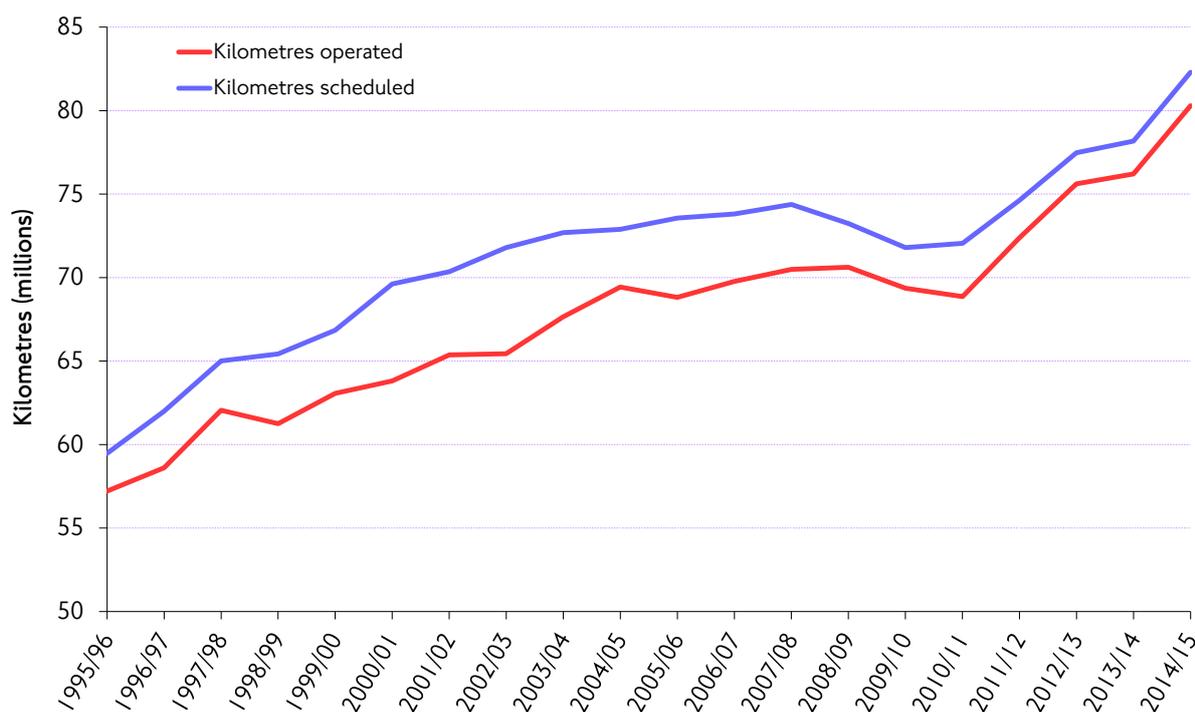
## 4.6 Modal performance indicators: Underground

London Underground has substantially increased its service offering over the last decade – in the context of a largely static physical network in terms of its extent. This reflects the success of the Tube upgrade programme, providing the ability to increase both capacity and service reliability.

Underground train kilometres scheduled in 2014/15 were 19 per cent higher than in 2000/01, while train kilometres operated were 27 per cent higher, denoting an improvement in operational reliability. The year 2014/15 saw five per cent more train kilometres scheduled and five per cent more train kilometres operated than in 2013/14 (see figure 4.2). More than half of the increase in kilometres was on the Northern line, following modernisation of the signalling system, with an increase of capacity through central London of around 20 per cent. Other lines benefitting from an increase in kilometres operated include the Metropolitan, Jubilee and Central lines.

Comparing against 2008/09, scheduled train kilometres were 12.4 per cent higher in 2014/15.

Figure 4.2 London Underground: Train kilometres scheduled and train kilometres operated.



Source: London Underground.

Figure 4.2 shows two other significant features. The three years 2008/09 to 2010/11 saw small falls in both measures (note the origin point of the graph, the actual fall was quite modest). This largely reflects the impact of the Tube upgrade plan itself, in the form of planned closures of parts of the network at the weekends for upgrade work. The second feature is that the gap between the service scheduled and that actually operated has tended to narrow – reflecting a more reliable service. In 2014/15, 97.6 per cent of scheduled train kilometres were operated, the highest

in the series. Performance in 2013/14 was very marginally lower, with 97.5 per cent of scheduled train kilometres operated.

Underground reliability can also be expressed in terms of customer-focused measures such as average journey time and excess journey time (see table 4.3). The latter is the additional time that customers have to wait over and above that implied by the schedule as a result of unreliability in the service. Excess journey time has continued to fall in 2014/15, from 5.2 minutes in 2013/14 to a record low of 4.6 minutes in 2014/15.

Table 4.3 London Underground – service reliability and journey times.

Year	Train kilometres scheduled (millions)	Percentage of scheduled kilometres operated	Average actual journey time (minutes)	Average generalised (weighted) journey time (minutes)	Excess journey time (weighted) (minutes)	Excess as % of generalised journey time
2000/01	69.6	91.6	28.6	45.7	8.6	18.9
2001/02	70.4	92.9	28.3	45.2	8.1	18.0
2002/03	71.8	91.1	29.1	46.7	9.7	20.7
2003/04	72.7	93.1	27.9	44.3	7.4	16.8
2004/05	72.9	95.3	27.7	44.0	7.2	16.4
2005/06	73.6	93.6	27.8	44.3	7.5	16.9
2006/07	73.8	94.5	28.0	44.7	8.1	18.0
2007/08	74.4	94.8	27.8	44.5	7.8	17.4
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

Source: London Underground.

1. Excess journey time is the difference between actual journey time and that expected if services run to time, and weighted to reflect how customers value time.

#### 4.7 Modal performance indicators: Docklands Light Railway

Since 2000/01 the Docklands Light Railway (DLR) has doubled the number of kilometres operated from 2.9 million to 5.8 million, as shown in table 4.4 – reflecting both network expansion and enhanced service levels. The year 2014/15 saw the percentage of scheduled services operated reach a record level of 99.3 per cent. To bring the DLR in line with other TfL modes, in 2014/15 the ‘percentage of trains on time’ measure was replaced by a measure of Excess Waiting Time (EWT), which has been back-cast to 2011/12 for comparison. 2014/15 saw an EWT figure of 0.07, which is the lowest of the series so far.

#### 4. Performance of the transport networks

Table 4.4 DLR service provision and reliability.

Year	Kilometres operated (millions)	Percentage of scheduled services operated	Percentage of trains on time	Excess Waiting Time (EWT)
2000/01	2.9	98.2	96.3	
2001/02	2.9	98.3	96.6	
2002/03	3.2	98.1	96.3	
2003/04	3.4	98.2	96.6	
2004/05	3.3	98.5	97.1	
2005/06	3.6	98.7	97.3	
2006/07	4.3	99.2	97.8	
2007/08	4.4	99.1	97.3	
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

Source: Docklands Light Railway.

#### 4.8 Modal performance indicators: London Tramlink

London Tramlink performance dipped slightly in 2014/15, with 97.9 per cent of scheduled services being operated, down from 98.9 per cent in 2013/14. Overall London Tramlink delivers a very high level of reliability – 2014/15 was the fourteenth successive year that this measure has been above 97 per cent (table 4.5).

Table 4.5 London Tramlink service reliability.

Year	Scheduled kilometres (millions)	Operated kilometres (millions) <sup>1</sup>	Percentage of scheduled services operated
2001/02	2.44	2.41	99.1
2002/03	2.49	2.46	98.9
2003/04	2.50	2.48	99.0
2004/05	2.49	2.42	97.2
2005/06	2.50	2.44	97.4
2006/07	2.57	2.54	98.7
2007/08	2.60	2.57	99.0
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

Source: London Tramlink.

1. Operated kilometres exclude replacement bus services operated during period of track repair works.

#### 4.9 Modal performance indicators: National Rail and London Overground

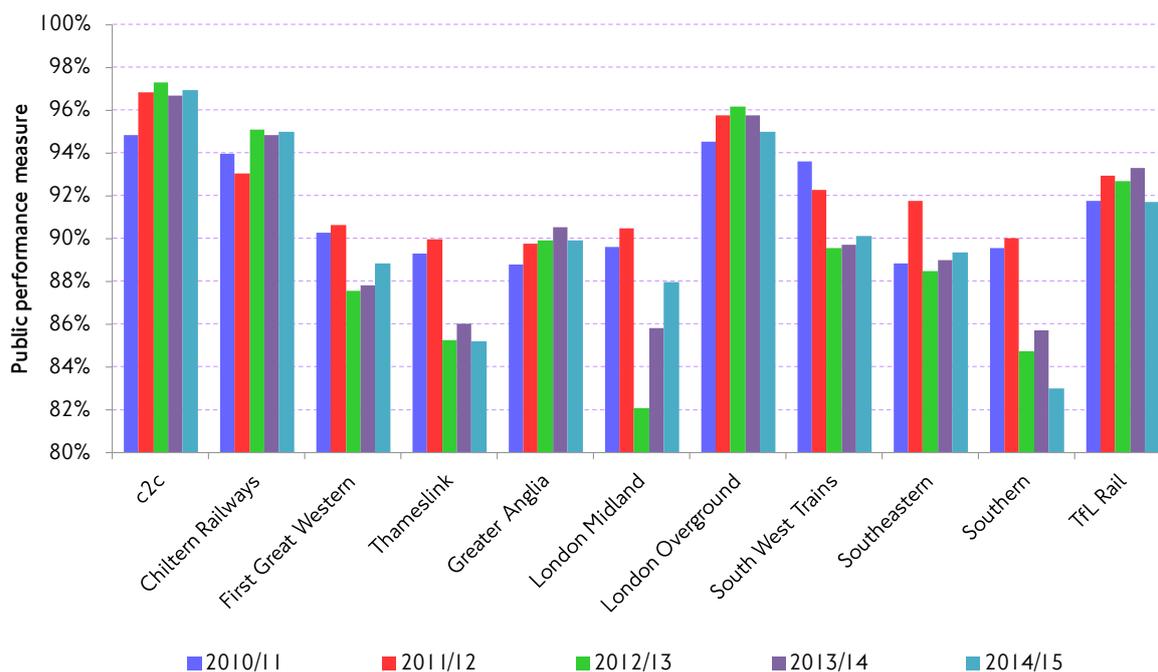
This section looks at the performance of National Rail services in London, including TfL's London Overground network. The reliability of National Rail services is measured through the Public Performance Measure (PPM), which combines figures for punctuality and reliability into a single measure. The PPM is therefore the percentage of trains 'on time' compared to the number planned. A train is defined as 'on time' if it arrives no later than five minutes after the planned destination arrival time for services defined by the ORR as 'London and South East' (L&SE) and regional operators, or not later than 10 minutes for long-distance operators.

##### National Rail service performance

Figure 4.3 shows PPM measures for all services operated by L&SE operators over the last five years. The general trend over the most recent year was mixed – services of some operators showing an improvement balanced by others whose PPM measure had fallen. The most notable changes were for London Midland (medium-distance services from London Euston) and for Southern. The score for London Midland increased to 88 per cent in 2014/15, up from 82.1 per cent in 2012/13 and 85.8 per cent in 2013/14. Southern shows the lowest score at 83 per cent in 2014/15. London Overground was the joint second-best performing operator for PPM with a score of 95 per cent, the same as Chiltern, and just behind c2c (services from London Fenchurch Street), which maintained its position as the best performing L&SE operator.

#### 4. Performance of the transport networks

Figure 4.3 National Rail – public performance measure for London and South East operators (moving annual average as at quarter four each year).



Source: Office of Rail and Road (ORR).

#### National Rail crowding

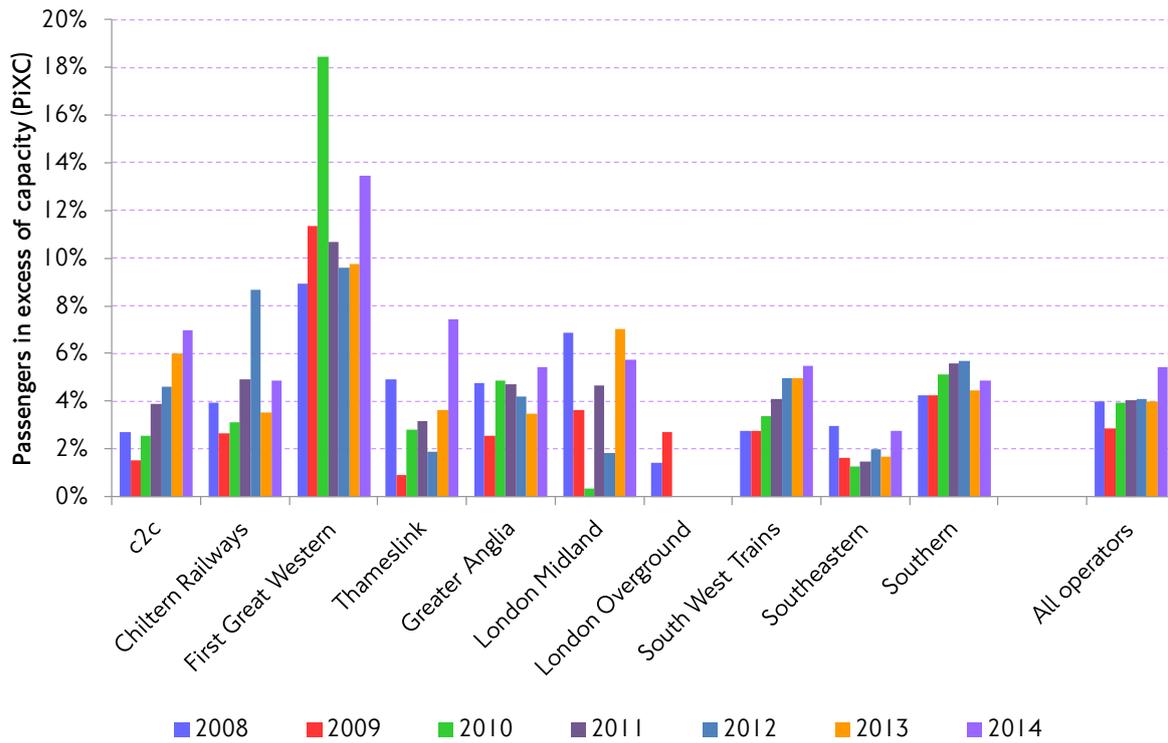
Crowding on National Rail is monitored using the DfT’s passengers in excess of capacity (PiXC) measure. This compares planned capacity on services arriving in or departing from central London against actual demand, with PiXC being the difference between the two. Figure 4.4 shows PiXC results (for the morning peak period only) from 2008 by train operator. In 2014 the PiXC value across all operators (combined) increased to 5.4 per cent, up from around 4 per cent in the previous four years. London Midland was the only operator to see a reduction in crowding in the most recent year, down to 5.7 per cent from 7 per cent in 2013.

In the context of continuing strong growth in demand for rail services, significant reductions in PiXC values for individual operators are usually associated with the acquisition of new rolling stock and/or the provision of new services. Likewise, where the network is relatively static, demand growth from year to year would tend to drive a corresponding increase in PiXC values.

Although London Overground is notable for having PiXC values of zero for each of the last five years, this measure only relates to the Euston-Watford services (other parts of the Overground network are not measured for PiXC, as it is a measure applicable to ‘radial’ commuter routes), and this line itself benefited from new rolling stock, offering higher capacities, in 2010.

First Great Western services into London Paddington have the highest morning peak PiXC values for the fifth consecutive year, and while the current level is better than in 2010, the PiXC value increased from 9.7 per cent in 2013 to 13.5 per cent in 2014.

Figure 4.4 Passengers in excess of capacity (PiXC) for National Rail operators in London during the weekday morning peak.



Source: Office of Rail and Road (ORR).

#### 4.10 Public transport reliability

This section brings together and summarises key reliability statistics for the principal public transport modes in London, including National Rail. Values for each mode are shown separately in table 4.6 below. Values for the most recent year are either at, or close to, their long-term historic highs, indicating that high levels of performance on the public transport networks are being sustained.

#### 4. Performance of the transport networks

**Table 4.6** Summary of key reliability indicators for the principal public transport modes.

Mode	Units/measure	2008/09	2013/14	2014/15
Underground	Standardised journey time (minutes)	43.9	43.4	42.3
Underground	Excess waiting time (minutes)	6.6	5.2	4.6
London Buses	Excess waiting time for high-frequency routes (minutes)	1.1	1.0	1.1
London Buses	Low frequency routes – percentage of buses on time	80.8	82.5	81.8
DLR	Percentage of trains that ran to time	n/a	0.08	0.07
London Tramlink	Excess waiting time	98.9	98.9	97.9
National Rail	ORR's PPM measure for L&SE operators (all services, average for year)	91.0	89.6	89.0
London Overground	ORR's PPM measure (all services)	n/a	95.8	95.0

Source: TfL Planning, Strategic Analysis.

Since 2008/09, reliability indicators across the principal transport modes have remained consistently high. On the Underground, excess waiting time decreased from 6.6 minutes in 2008/09 to 4.6 minutes in 2014/15, while for bus excess waiting time for high-frequency routes was 1.1 minutes in both years, although for much of the period this stood at 1.0 minute.

#### 4.1.1 Public transport capacity

Over the most recent year Underground capacity has increased by 0.7 per cent following line upgrades and increased off-peak service levels. London Tramlink capacity also increased, by 4.3 per cent, while bus capacity increased marginally, by 0.2 per cent. There was a small decrease in DLR capacity, of 2.3 per cent, due to the more frequent use of longer trains during the London 2012 Games; however capacity remains substantially greater than in 2011/12, following the continued roll out of three-car operation to the network.

Table 4.7 Total yearly capacity provided by the principal public transport modes. Million place-kilometres.

Mode	2008/09	2013/14	2014/15	Percentage change 2008/09 to 2014/15	Percentage change 2013/14 to 2014/15
Underground	64,193	67,328	70,493	9.8	4.7
Bus	28,817	29,605	30,057	4.3	1.5
DLR	1,715	3,234	3,291	91.9	1.8
London Tramlink	556	632	629	13.1	-0.5

Source: TfL Planning, Strategic Analysis.

Notes: Values for Underground have been revised to reflect published London Underground assumptions for standing capacity. The absolute values given in the table reflect these revised assumptions, and are internally consistent. They do differ, however, from equivalent values published in previous Travel in London reports, although the percentage changes between years are the same.

\*Figure re-based mixed operation double deck capacity on certain routes.

Since 2008/09, Underground, bus and London Tramlink capacity has increased by 9.8 per cent, 4.3 per cent and 13.1 per cent respectively. DLR capacity has increased by 91.9 per cent over the period, following line extensions to Woolwich Arsenal and Stratford International.

## 4.12 Performance of the road network for movement by motorised vehicles – average traffic speeds and delays (congestion)

### Introduction and content

This section updates established indicators of road network performance in London, looking at average traffic speeds and delay (congestion) levels, based on Trafficmaster GPS data, as well as TfL's indicator of journey time reliability on major roads. These indicators focus on motor vehicle traffic only, and provide a relatively short-run view broadly corresponding to the term of the current MTS.

### Established measures of road network performance in London

There are three established measures of road network performance for motor vehicle traffic:

- **Average traffic speed** is the simplest measure, but does not indicate how actual network performance compares to what might be 'expected' for the network. This would vary, for example, between major and minor or residential roads.
- **Excess delay** is the conventional measure used to describe traffic congestion. It compares the actual travel rate (in minutes per kilometre) for a given journey against the travel rate for the same journey under uncongested conditions (typically and for practical purposes taken as the overnight period).
- **Journey time reliability** is the MTS outcome indicator for traffic smoothing, which quantifies the variability of actual journeys around a nominal average. The measure is independent of both absolute average speed and delay. This measure is described more fully in Travel in London report 3.

These are essentially 'pragmatic' measures that provide a good and consistent overview of the performance of the road network for general motorised traffic. However, TfL is also giving consideration to potential other measures that could

#### 4. Performance of the transport networks

allow a more meaningful quantification of the impact of traffic congestion and unreliability on the economic vitality of London, as well as for the fuller range of road users.

##### **Summary of long-term trends for traffic speeds and delays in London**

Previous Travel in London reports have described the trends over two decades towards slower average traffic speeds and increased congestion (delay) in London. They also described the relationship of these trends to levels of traffic demand, which had been falling for much of the last decade, and interventions, such as urban realm improvements, that have reduced the effective capacity of London's road network for general motorised traffic.

The consistency of this relationship, visible in the historic data from moving car observer surveys up to 2006/07, has more recently been obscured as newer Trafficmaster GPS data (which replaced the traditional method of recording speeds and delays) has shown a notable lack of trend at the aggregate level since first becoming available in late 2006. This was in spite, or perhaps because of, continued reductions in traffic volumes, and a continuing wide range of interventions by TfL and delivery partners intended to improve the operation and management of the road network. Possible reasons for the remarkably stable trend over recent years were reviewed in Travel in London report 6.

Over the most recent two years, however, there are clear indications that the long-standing trends are changing, with evidence of both increasing volumes of motor vehicle traffic on London's roads (see section 3.10 of this report) and a sharp deterioration in average traffic speeds and delays, this also coinciding in the most recent year with a substantial increase in road and street works on the network, reflecting an increase in large-scale construction activity as London emerges from the recession, as well as the Roads Modernisation Programme, including new infrastructure to support the Mayor's Cycling Vision.

##### **Average traffic speeds**

Figure 4.5 shows the trend in average traffic speeds by functional sector of London since late 2006, when Trafficmaster data first became available. Values are summarised in table 4.8.

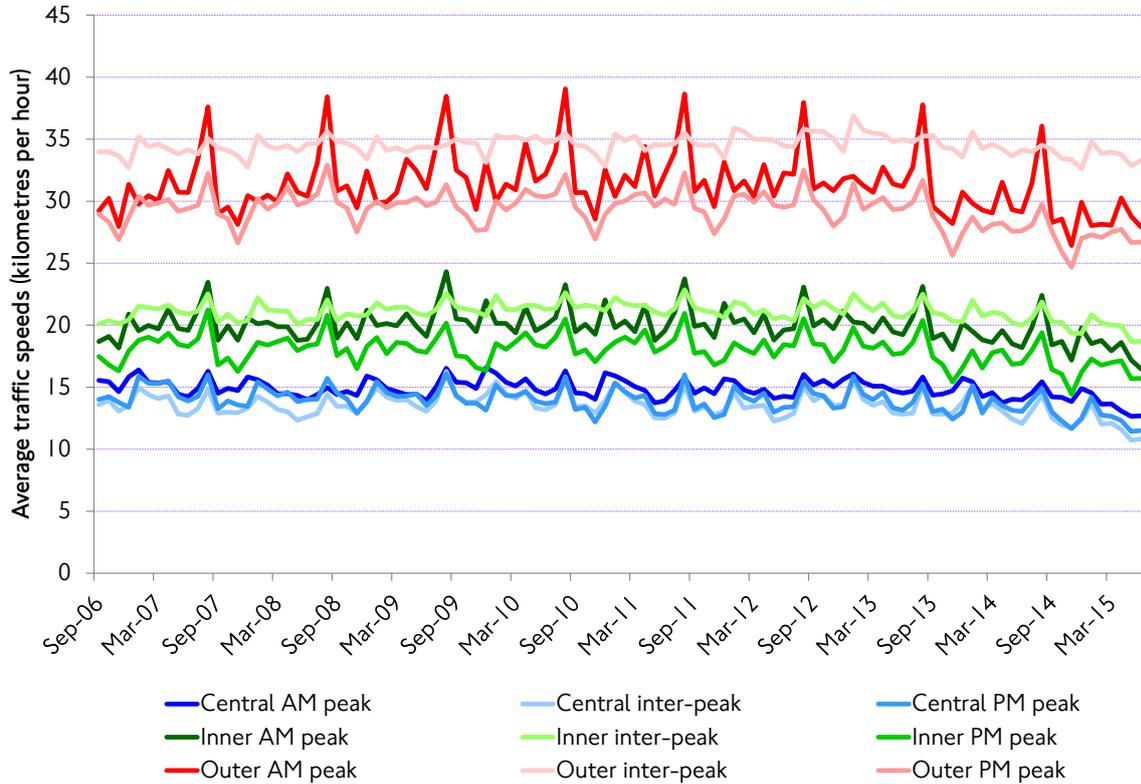
There are clear and expected patterns associated with seasonality and the fluctuations in traffic demand on the network over the course of each year. There are also clear and expected differences in the prevailing average speeds for each of central, inner and outer London, reflecting the density and characteristics of the different networks. The overall trend was remarkably stable between 2007 and 2012; however since this time the trend for average vehicle speed in all parts of London has been sharply downwards.

Table 4.8 summarises the values in terms of annual averages. Table 4.9 shows a comparison of data over equivalent periods between 2008-09 and 2014-15 (18 months in each case). Average traffic speeds have declined in all sectors and time periods between 2014 and the first half of 2015. The largest declines in average traffic speed were all in the central area, by 9 per cent in the interpeak, and 7 per cent in the AM peak and PM peak respectively. The average decline in traffic speed in inner London was 4 per cent over the time periods and 3 per cent in outer

London. Greater declines in average traffic speeds in the central area are likely to be attributable to greater temporary disruption to the road network in central London.

Looking at the 18-month comparison between 2008/09 and 2014/15 (table 4.9), average traffic speeds have declined the most in the PM peak, by 9 per cent in the central area and 8 per cent in the inner and outer areas respectively.

Figure 4.5 Average traffic speeds (kilometres an hour) by functional sector of London. Working weekdays by time period. TfL's 'network of interest'.



Source: TfL Surface Transport, Outcomes Delivery.

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**Table 4.8** Average traffic speeds (kilometres per hour) by functional sector of London. Working weekdays, by time period. TfL's 'network of interest'.

Area and time period	2007 speed (kph)	2008 speed (kph)	2009 speed (kph)	2010 speed (kph)	2011 speed (kph)	2012 speed (kph)	2013 speed (kph)	2014 speed (kph)	2015 speed (kph) <sup>1</sup>
Central AM peak	15.2	14.7	15.1	15.2	14.9	15	15.1	14.4	13.4
Central inter-peak	13.6	13.3	14.2	14	13.6	13.6	13.6	13	11.8
Central PM peak	14.5	14.3	14.3	14	13.8	14.1	13.8	13.4	12.5
Inner AM peak	20.2	20	20.7	20.5	20.4	20.3	20	19.1	17.9
Inner inter-peak	21.1	21	21.4	21.6	21.4	21.2	21.2	20.6	19.7
Inner PM peak	18.4	18.4	18.1	18.5	18.4	18.3	18	17.1	16.6
Outer AM peak	31	31.6	32.3	32.2	32.4	32	31.4	29.9	28.5
Outer inter-peak	34.2	34.5	34.4	34.7	34.7	35	35.1	34	33.8
Outer PM peak	29.4	30	29.5	29.8	29.8	29.8	29.2	27.6	27.2

Source: TfL Surface Transport, Outcomes Delivery, based on data from Trafficmaster.  
1. Data for first six months of 2015.

Table 4.9 Average traffic speeds (kilometres per hour) by functional sector of London. Working weekdays, by time period. TfL's 'network of interest'. 2008/09 vs. 2014/15.

Area and time period	2008/09 average speed (18 month period)	2014/15 average speed (18 month period)	% change
Central AM peak	14.7	14.1	-4%
Central inter-peak	13.5	12.6	-7%
Central PM peak	14.4	13.1	-9%
Inner AM peak	20.0	18.7	-6%
Inner inter-peak	21.1	20.3	-4%
Inner PM peak	18.4	16.9	-8%
Outer AM peak	31.5	29.4	-6%
Outer inter-peak	34.5	33.9	-2%
Outer PM peak	29.9	27.4	-8%

Source: TfL Surface Transport, Outcomes Delivery, based on data from Trafficmaster.

### Vehicle delay (congestion)

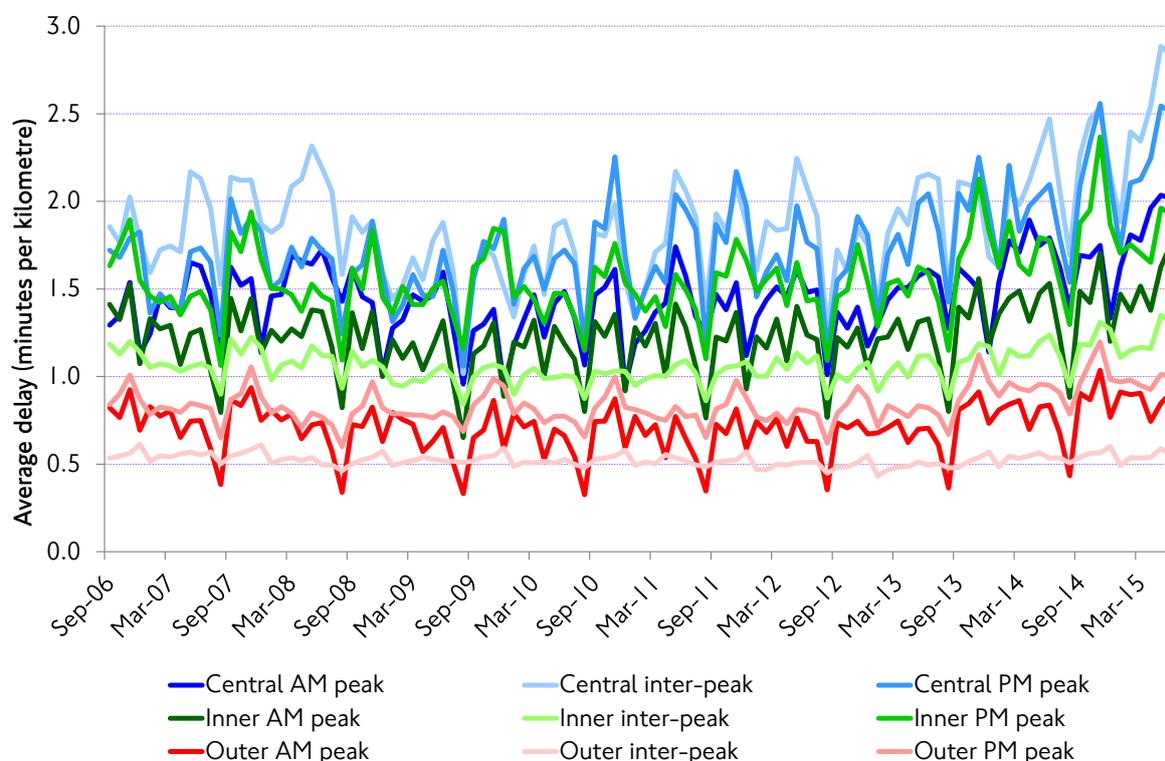
Figure 4.6 shows the trend for congestion (delay), corresponding directly to the average speed data in figure 4.5 above. Trafficmaster delay values are calculated against a variable 'uncongested' night-time speed, which is that actually measured on a day-by-day basis, rather than a fixed nominal 'night-time' speed, as was the case with previous moving car observer data. Furthermore, Trafficmaster 'uncongested' speeds relate to the period from 22:00 to 06:00 – a period that, in many parts of London, sees substantial volumes of traffic. Previous indicators based on moving car observer data used a faster night-time speed.

As well as the expected seasonal and geographical patterns shared with the speed data, figure 4.6 shows large differences in the degree of variability of traffic congestion by both area and time period. So, inter-peak congestion in outer London has historically remained remarkably stable from month-to-month at about 0.5 minutes per kilometre, whereas morning peak congestion here may vary by up to 100 per cent from month-to-month. In inner London the degree of variation in peak-period congestion is also roughly twice that of inter-peak congestion. In central London the pattern is reversed – inter-peak congestion being the most variable and this coinciding with the period of highest traffic demand on the network. This pattern is characteristic of networks where traffic demand routinely approaches the carrying capacity of the network. Congestion, as a measure of

#### 4. Performance of the transport networks

network instability, increases at a greater rate, and journey times are therefore more variable, the closer that traffic demand is to the carrying capacity of the network.

Figure 4.6 Average vehicle delay (minutes per kilometre) by functional sector of London. Working weekdays, by time period. TfL's 'network of interest'.



Source: TfL Surface Transport, Outcomes Delivery.

Average delay has shown a similar pattern to average speeds, with the time series remaining relatively stable to late 2013, after which there has been a sharp increase in all parts of London. Table 4.10 summarises the comparisons in terms of annual averages, and Table 4.11 shows a comparison of 2008-09 and 2014-15 (based on 18 month periods in each case).

Figure 4.6 shows that, similar to trends in average speeds, the greatest increases in average vehicle delay between 2014 and the first half of 2015 are all in the central area. In the interpeak period, average vehicle delay increased by 18 per cent and by 10 per cent in the AM and PM peak respectively. Delay increased by 9 per cent in the AM peak for both inner and outer London, however there was a slight decline in delay in the PM peak for inner and outer London, at 1 per cent and 3 per cent respectively.

Looking at the comparison between 2008/09 and 2014/15 (table 4.11), there have been large increases in average traffic delay, particularly in the PM peak. The greatest increase in the PM peak is in the central area, where average traffic delay has increased by more than 30 per cent. The increase in traffic delay during the interpeak in outer London is much lower than all other sectors and time periods in London, increasing by only 5 per cent between 2008/09 and 2014/15.

Table 4.10 Average vehicle delay (minutes per kilometre) by functional sector of London. Working weekdays, by time period. TfL's 'network of interest'.

Area and time period	2007 delay (m/km)	2008 delay (m/km)	2009 delay (m/km)	2010 delay (m/km)	2011 delay (m/km)	2012 delay (m/km)	2013 delay (m/km)	2014 delay (m/km)	2015 delay (m/km) <sup>1</sup>
Central AM peak	1.4	1.5	1.3	1.3	1.4	1.4	1.5	1.7	1.9
Central inter-peak	1.9	1.9	1.6	1.7	1.8	1.8	1.9	2.1	2.5
Central PM peak	1.6	1.6	1.5	1.7	1.7	1.6	1.8	2	2.2
Inner AM peak	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.4	1.5
Inner inter-peak	1.1	1.1	1	1	1	1	1.1	1.2	1.2
Inner PM peak	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.8	1.8
Outer AM peak	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9
Outer inter-peak	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Outer PM peak	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1	1.0

Source: TfL Surface Transport, Outcomes Delivery, based on data from Trafficmaster.  
1. Data for first six months of 2015.

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**Table 4.11** Average vehicle delay (minutes per kilometre) by functional sector of London. Working weekdays, by time period. TfL's 'network of interest'. 2008/09 vs. 2014/15.

Area and time period	2008/09 average delay (18 month period)	2014/15 average delay (18 month period)	% change
Central AM peak	1.5	1.7	17%
Central inter-peak	1.8	2.3	23%
Central PM peak	1.6	2.1	31%
Inner AM peak	1.2	1.4	19%
Inner inter-peak	1.0	1.2	12%
Inner PM peak	1.5	1.8	20%
Outer AM peak	0.7	0.8	19%
Outer inter-peak	0.5	0.5	5%
Outer PM peak	0.8	1.0	23%

Source: TfL Surface Transport, Outcomes Delivery, based on data from Trafficmaster.

### 4.13 Journey time reliability for general road traffic

#### Introduction

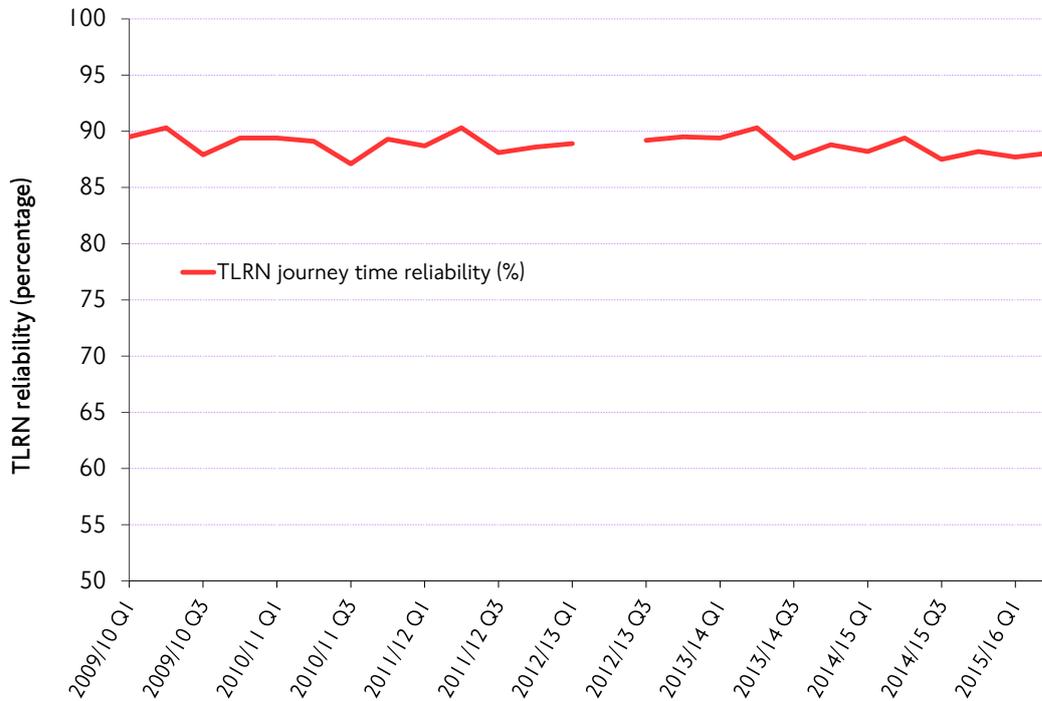
TfL's assessment of road network performance for MTS is primarily based on the concept of journey time reliability, which is one manifestation of smoother traffic. TfL's journey time reliability metric considers the relationship of actual measured journeys (using ANPR cameras) to a nominal average journey time that is representative of motor vehicle journeys by road in London. This is measured quarterly on a road corridor basis, covering most of the TLRN major road network in London, and is aggregated to a London-wide index for the purpose of MTS assessment (figure 4.7).

#### MTS trend

Against a current working target of 87 per cent of road journeys in London to be achieved within five minutes of the nominal 30-minute average journey time, recorded performance since the start of this measure in 2009 has mostly been between 88 and 90 per cent. Seasonal factors are evident in the graph, for example with JTR peaking at 90.3 per cent in the summers of 2009, 2011 and 2013. There is little evidence of a clear trend in this indicator, although the recent tendency has been very slowly downwards, indicating a marginal deterioration in reliability. Note that, due to the widespread alterations made to the operation of the major road

network in London during the 2012 Games, a comparable value for this period is not available.

Figure 4.7 AM peak journey time reliability on the TLRN. Percentage of journeys completed within an allowable 'excess' of a normalised average journey time.



Source: TfL Surface Transport, Outcomes Delivery.

Again, the slow downwards trend in journey time reliability over the most recent two years can be broadly attributed to increased disruption on the network, alongside rising traffic volumes. It is noteworthy, however, that the change in this measure has been much less than for the measures of average traffic speeds and delays described above. This reflects increased emphasis on minimising the impacts of disruptions arising from construction activity and other causes by TfL and delivery partners.

## 4. Performance of the transport networks

### 4.14 Key reference statistics

Table 4.12 brings together indicators of transport supply and operational performance across the principal modes of transport, covering change over the most recent year, and looking back to 2008 or 2008/09 – the nominal period covered by the Mayor’s Transport Strategy to date.

Table 4.12 Indicators of public transport service provision and performance by mode.

Service and indicator	Units	2008 or 2008/09	2013 or 2013/14	2014 or 2014/15	Difference (%) 2014 or 2014/15 vs	
					2008	2013
<b>Underground</b>						
Level of service scheduled	Million train km	73.2	78.2	82.3	12.4	5.3
Level of service operated	% of schedule	96.4	97.5	97.6	1.2	0.1
Service reliability	Standardised journey time	43.9	43.4	42.3	-3.6	-2.5
Service reliability	Excess journey time	6.6	5.2	4.6	-30.3	-11.2
<b>Bus</b>						
Level of service scheduled	Million bus km	492.0	502.4	504.0	2.4	0.3
Level of service operated	Per cent	97.0	97.7	97.1	0.1	-0.6
Service reliability	Excess waiting time	1.1	1.0	1.1	0	10.0
<b>DLR</b>						
Level of service operated	Million train km	3.9	5.8	5.8	48.7	1.1
Level of service operated	% of schedule	94.6	99.2	99.3	5.0	0.1
Service reliability	Excess waiting time	n/a	0.08	0.07	n/a	-12.5
<b>London Tramlink</b>						
Level of service scheduled	Million train km	2.70	3.06	3.03	12.2	-1.0
Level of service operated	% of schedule	98.5	98.9	97.9	-0.6	-1.0
<b>National Rail</b>						
Service reliability – all L&SE operators (peak)	ORR PPM (% peak only)	n/a	85.0	83.5	n/a	-1.8
Service reliability – all L&SE operators	ORR PPM (% all services)	91.0	89.6	89.0	-2.2	-0.7
Service reliability – London Overground	ORR PPM (% all services)	n/a	95.8	95.0	n/a	-0.8
<b>Road network</b>						
Average traffic speed – central London	km per hour	14.1	14.2	13.6	-3.5	-4.2
Average traffic speed – inner London	km per hour	19.8	19.7	18.9	-4.5	-4.1
Average traffic speed – outer London	km per hour	32.0	31.9	30.5	-4.7	-4.4
Average traffic delay – central London	Minutes per km	1.7	1.7	1.9	11.8	11.8
Average traffic delay – inner London	Minutes per km	1.3	1.3	1.5	15.4	15.4
Average traffic delay – outer London	Minutes per km	0.7	0.7	0.8	14.3	14.3

Source: TfL Planning, Strategic Analysis.

# Progress towards MTS transport goals



## 5. Operational efficiency, public transport fares, asset condition and payment technologies

### 5.1 Introduction and contents

The preceding chapters have looked in detail at trends in travel demand and transport operational performance in London, thereby quantifying the changing context and background to the MTS, in terms of aggregate travel demand and transport supply.

The following six chapters cover the wider canvass of MTS objectives. This chapter looks at aspects of TfL's operational efficiency, covering outcomes relating to TfL's operating costs and asset management, trends in public transport fares levels and changing payment technologies.

### 5.2 Key trends – operating costs, asset condition and public transport fares

Over the period since 2008/09, TfL has significantly reduced operating costs per passenger kilometre, reflecting real efficiencies in operations and the strong growth in patronage on the public transport networks. Asset condition, in terms of the average age of key assets, has been maintained, although very significant 'step' changes such as the wholesale replacement of the train fleet on the sub-surface Underground lines, are counterbalanced by the wider ageing process that affects all of TfL's assets. This highlights the point that continued investment is needed just to stand still.

- TfL's operating costs, measured in passenger kilometre terms, reduced over the period between 2010/11 to 2014/15 – that for which comparable measurements are available. This reflects both actual efficiencies in terms of how TfL provides and operates services, but also a rapid growth in passenger demand.
- Gross expenditure on operating services in 2014/15 was £4.7bn, compared with £4.1bn in 2010/11, with gross operating costs per passenger kilometre of 23 pence respectively. In terms of net expenditure, TfL spent £401m in 2014/15 (equivalent to 2 pence per passenger kilometre) against £702m in 2010/11 (equivalent to 4 pence per passenger kilometre). Passenger kilometres grew by 15 per cent over this period.
- TfL is a public body, with no shareholders or parent companies, which means we can reinvest all surplus income in the transport network. For every pound we receive, 65 per cent is spent on operating the network, and 35 per cent on improving it for the future.
- The percentage of TfL's key assets deemed to be in 'good' condition (this measure mainly relates to asset age and not to safety-critical aspects) has been maintained at around 90 per cent consistently over the period since 2008. This reflects continued investment in new infrastructure and the inevitable fact that all assets age with the passage of time.
- Real public transport fare levels increased in the latter years of the last decade but have been relatively stable over more recent years. Real fares in 2014, based on a weighted average indicator across the main public transport networks,

## 5. Operational efficiency, public transport fares, asset condition and payment technologies

stood at 8.0 per cent higher than in 2008, but showed no increase over the most recent year.

- The contactless payment card has become the preferred option for travel for a large and steadily increasing number of TfL customers. Since its launch in September 2014 on the Tube, trams, DLR, London Overground and most National Rail services in London, TfL has become the fastest growing contactless merchant in Europe, with the number of contactless transactions growing by about 11 per cent per month.

### 5.3 Transport operational efficiency and asset management

Seeking ways to reduce operating and other costs is important as it contributes to the aim of improving value-for-money, limits the demands made upon tax and fare payers, and helps to ensure that TfL has a budget that balances income against costs. In a similar way, management of the assets which TfL owns and which underlie services is crucial to ensure that TfL can meet its objectives of operating a safe, secure and reliable network, while also optimising investment decisions about asset maintenance and replacement.

#### Operational costs (gross and net expenditure per passenger kilometre)

Table 5.1 shows a segmental analysis of TfL's expenditure on public transport services for the most recent five years. In table 5.1, gross costs are total costs, and net costs are gross costs less fares and other income. Net expenditure effectively corresponds to public transport support provided by TfL to keep services running. Data prior to 2010/11 are not available in comparable form owing to a change in accounting conventions.

Looking across all five years, gross operating costs per passenger kilometre have been broadly stable, lying in the range of 22 to 23 pence. Net costs per passenger kilometre have however fallen over the review period, from 4 pence in 2010/11 to 2 pence in the latest year.

Table 5.1 TfL's expenditure and revenue on public transport services. 2010/11-2014/15.

	Passenger kilometres* (millions)	Gross expenditure (£m)	Gross expenditure per passenger kilometre (£)	Net expenditure (£m)	Net expenditure per passenger kilometre (£)
2014/2015					
London Buses <sup>1</sup>	8,417	2,068	0.25	493	0.06
London Underground	10,847	2,296	0.21	-114	-0.01
Docklands Light Railway	594	116	0.20	-30	-0.05
London Tramlink	160	31	0.19	6	0.04
London Overground	861	205	0.24	46	0.05
<b>All above modes</b>	<b>20,879</b>	<b>4,716</b>	<b>0.23</b>	<b>401</b>	<b>0.02</b>

## 5. Operational efficiency, public transport fares, asset condition and payment technologies

2013/2014	Passenger kilometres <sup>(1)</sup> (millions)	Gross expenditure (£m)	Gross expenditure per passenger kilometre (£)	Net expenditure (£m)	Net expenditure per passenger kilometre (£)
London Buses <sup>1</sup>	8,420	1,993	0.24	455	0.05
London Underground	10,423	2,222	0.21	263	0.03
Docklands Light Railway	537	116	0.22	14	0.03
London Tramlink	162	29	0.18	(6)	-0.03
London Overground	840	193	0.23	(35)	-0.04
<b>All above modes</b>	<b>20,350</b>	<b>4,553</b>	<b>0.22</b>	<b>692</b>	<b>0.03</b>
2012/2013	Passenger kilometres <sup>(1)</sup> (millions)	Gross expenditure (£m)	Gross expenditure per passenger kilometre (£)	Net expenditure (£m)	Net expenditure per passenger kilometre (£)
London Buses <sup>1</sup>	8,160	1,917	0.23	463	0.06
London Underground	10,099	2,320	0.23	20.6	0.00
Docklands Light Railway	524	139	0.27	8	0.02
London Tramlink	156	35	0.22	12	0.08
London Overground	780	207	0.27	74	0.09
<b>All above modes</b>	<b>19,729</b>	<b>4,618</b>	<b>0.23</b>	<b>578</b>	<b>0.03</b>
2011/2012	Passenger kilometres (millions)	Gross expenditure (£m)	Gross expenditure per passenger kilometre (£)	Net expenditure (£m)	Net expenditure per passenger kilometre (£)
London Buses <sup>1</sup>	8,133	1,853	0.23	486	0.06
London Underground	9,519	2,180	0.23	19	0.00
Docklands Light Railway	455	104	0.23	0	0.00
London Tramlink	148	30	0.20	8	0.05
London Overground	645	196	0.30	93	0.14
<b>All above modes</b>	<b>18,900</b>	<b>4,363</b>	<b>0.23</b>	<b>606</b>	<b>0.03</b>
2010/2011	Passenger kilometres (millions)	Gross expenditure (£m)	Gross expenditure per passenger kilometre (£)	Net expenditure (£m)	Net expenditure per passenger kilometre (£)
London Buses	8,082	1,824	0.23	524	0.06
London Underground	8,875	2,050	0.23	109	0.01
Docklands Light Railway	414	92	0.22	3	0.01
London Tramlink	146	29	0.20	9	0.06
London Overground	691	125	0.18	57	0.08
<b>All above modes</b>	<b>18,208</b>	<b>4,120</b>	<b>0.23</b>	<b>702</b>	<b>0.04</b>

Source: TfL Group Financial Accounting.

Note: Due to accounting conventions, passenger kilometres may not match those in chapter 3.

1. Change in methodology by the Greater London Bus Passengers Survey (GLBPS) to Oyster clicks made in 2013/14 for child journeys 11-15-year-olds to be applied within TfL from 2011/12 data onward.

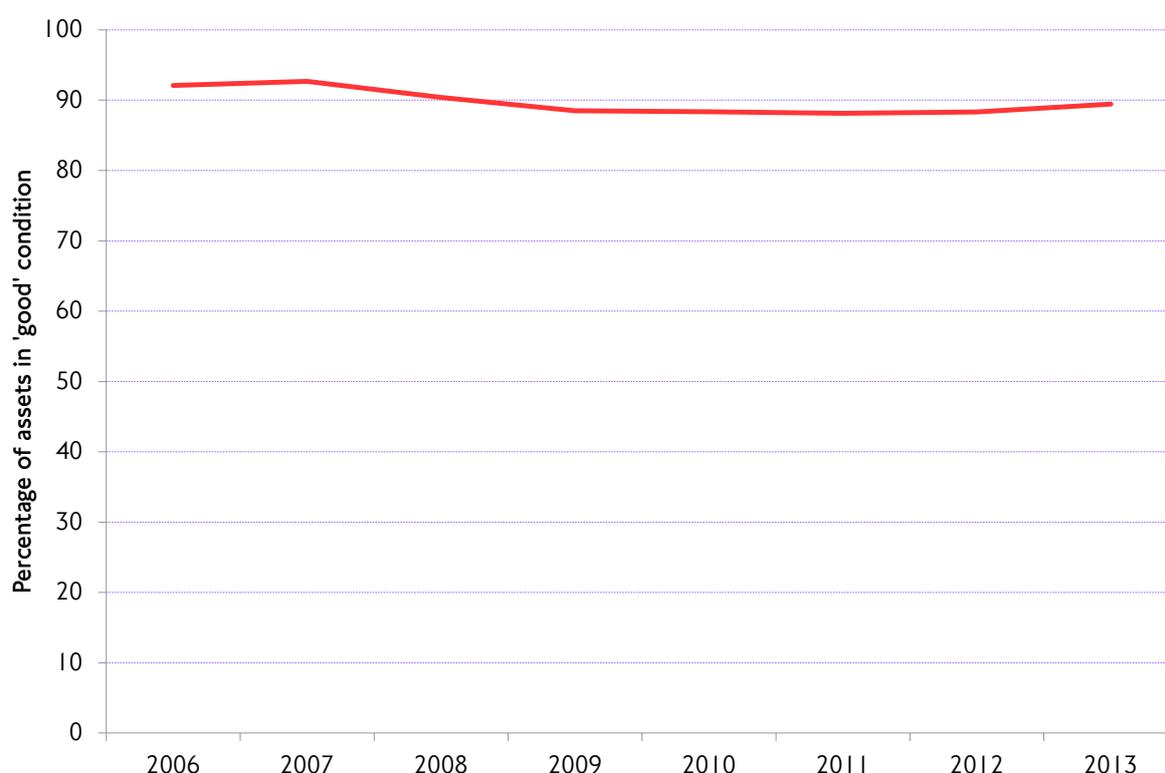
## Reinvesting income to improve London's transport network

As TfL is a public body, with no shareholders or parent companies, we can reinvest every pound of income in the transport network. For every pound we receive, 65 per cent is spent on the everyday running costs of the network, and 35 per cent on improving it for the future. TfL invests in numerous projects, from building the new Crossrail to modernising roads and helping customers plan journeys by providing live travel information. Sustained investment is making it possible to make real improvements to the transport network for the millions of people who rely on TfL every day.

### Asset condition

Knowledge of the condition of assets that TfL owns and which underlie services is important to enable us to operate a safe, secure and reliable network, while also optimising investment decisions regarding asset replacement. For the purposes of MTS monitoring, a composite asset condition measure that describes the condition of TfL's assets across the modes has been developed. This is based on the percentage of key assets meeting basic 'pragmatic' standards, usually in terms of age or state of repair; the specific measures for each mode are weighted according to the relative use made of that mode, as described in greater detail in previous Travel in London reports.

Figure 5.1 Composite asset condition indicator. Percentage of in-scope assets that are deemed to be in a 'good' condition (weighted by relative use of each mode).



Source: TfL Planning, Strategic Analysis.

Figure 5.1 shows the available time series for this indicator, in terms of the percentage of in-scope (monitored) assets deemed to be in 'good' condition. The indicator has remained fairly stable at close to 90 per cent across the time series,

although the 2014 value of 87.8 is lower than in previous years, down from 89.5 in 2013 and 90.4 in 2008. It should be emphasised that the passage of time ages all of the assets in the current capital stock. Therefore, to maintain overall assets in good condition, it is necessary to replace a proportion of them every year.

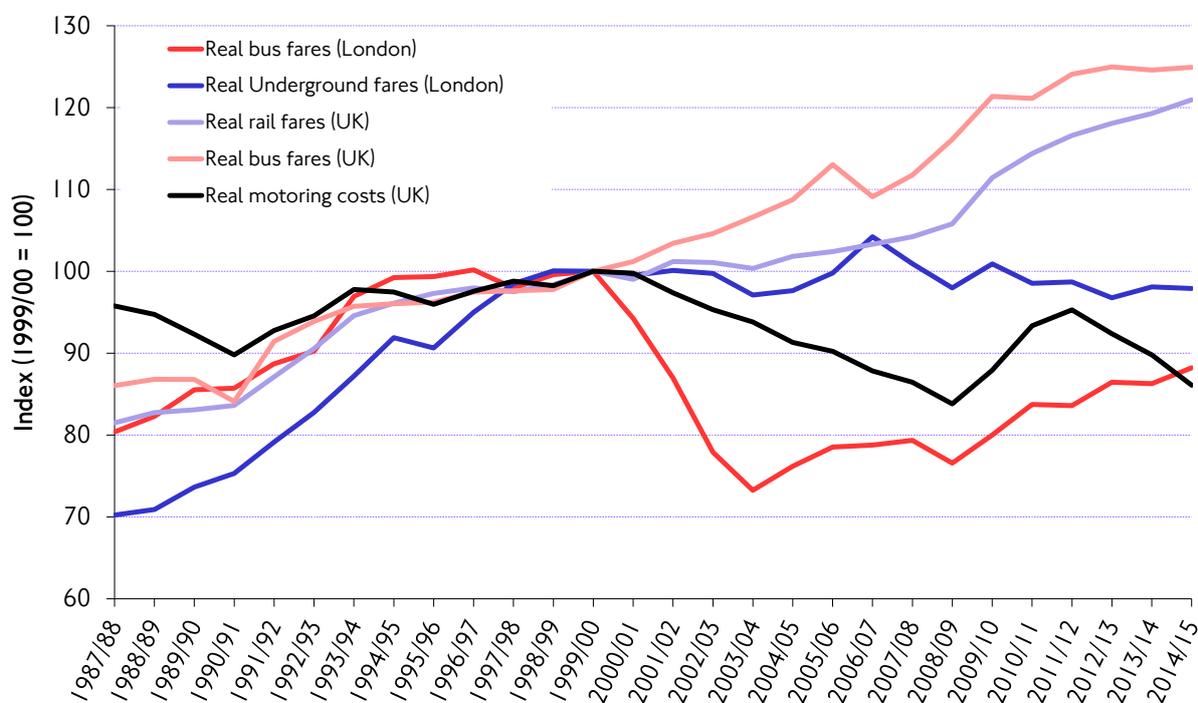
## 5.4 Public transport fares

Figure 5.2 shows indexed real public transport fares in London (deflated by the Retail Prices Index) alongside national public transport fares and motoring costs for comparison.

While bus fares in London have been increasing since 2008/09, they still remain 14 per cent lower than in 1999/2000 in real terms following a sharp fall between 1999/2000 and 2003/04. In contrast, real bus fares in the UK as a whole increased steadily over the last decade and have only recently levelled off at about 25 per cent higher than 1999/2000. Similarly, while Underground fares have remained relatively constant in real terms (currently standing two per cent below the value for 1999/2000), real rail fares in the UK as a whole have increased by 19 per cent.

The trend for motoring costs has been much more variable. Real costs declined steadily between 1999/2000 and 2008/09, eventually bottoming out at 16 per cent below the 1999/2000 value. They have since fluctuated, rising to within five percentage points of the 1999/2000 value in 2011/12 before falling again. This period has been marked by diverging trends in the components of motoring costs, with a sharp increase in the costs of vehicle tax, insurance and petrol at the end of the last decade being compensated for by a slight decline in the costs of vehicle purchase since 2010/11.

Figure 5.2 Public transport fare trends – London and UK compared.



Source: TfL Customer Experience.

### 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 passengers paying full adult fares, adjusted for inflation and divided by corresponding actual bus and Underground passenger kilometres.

In 2014, the average adult composite bus and Underground fare was 20.3 pence per kilometre, the same as in 2013 (table 5.2).

Table 5.2 Real fares levels public transport (pence, 2009 prices).

2008	2009	2010	2011	2012	2013	2014
18.8	19.8	20.0	19.9	19.9	20.3	20.3

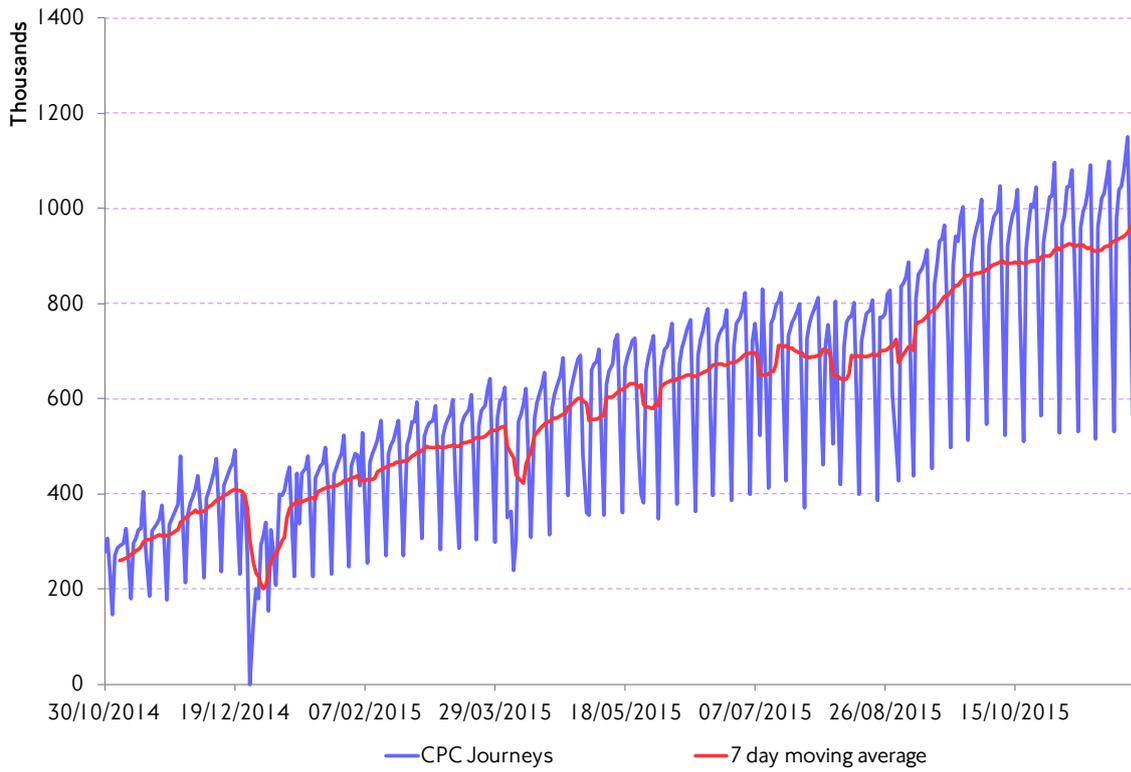
Source: TfL Customer Experience.

This indicator has been relatively stable for the past six years following an increase in 2009.

### 5.5 Payment technologies – contactless

The contactless payment card has become the preferred option for travel for a large and steadily increasing number of TfL customers. Since its launch in September 2014 on the Tube, trams, DLR, London Overground and most National Rail services in London, TfL has become the fastest growing contactless merchant in Europe, growing by around 11 per cent per month. Customers can now pay for their rail journeys simply by touching their debit, credit or charge card on the reader at the beginning and end of each trip. People have been able to touch in on buses with their cards since December 2012. Contactless payment charges are the same fare as Oyster. Those using contactless cards can also benefit from daily Monday-Sunday capping. This means that once the cap has been reached, there are no further charges. Figure 5.3 shows the rapid growth in the number of contactless journeys since launch.

Figure 5.3 Number of journeys processed by TfL made using contactless payment.



Source: TfL Customer Experience



## 6. Safety and security on the transport networks

### 6.1 Introduction and contents

This chapter looks at aspects of safety and security on London's transport networks, covering the important topics of road safety, operational safety for those travelling on the public transport networks, recorded crime and fear of crime.

Over the term of the current MTS, travel in London has become safer – all key indices showing improvement, many substantially so. However, there can be no resting and important challenges remain, especially in terms of further protecting vulnerable road users, who accounted for 51.9 per cent of all road casualties and 80.2 per cent of those killed or seriously injured (KSI) in 2014, and in dealing with adverse trends in aspects of reported anti-social behaviour on the public transport networks.

### 6.2 Key trends – safety and security on the transport networks

- Recent years have seen substantial reductions in the number of KSI casualties from road traffic collisions in London. TfL has made significant progress by building new infrastructure that protects vulnerable road users and working with our partners implementing new ideas and technologies. This has enabled TfL to meet the Mayor's target to reduce the number of people killed or seriously injured on London's roads by 40 per cent some six years early.
- KSIs are now at their lowest level in London since records began and to build on this progress, the Mayor has now set a new target for a further 50 per cent fall in KSIs by 2020.
- However, 'vulnerable' road users (pedestrians, cyclists and riders of two-wheeled motor vehicles) account for a disproportionate number of KSI casualties – some 80.2 per cent, requiring a continued intensive focus on measures to reduce these numbers over the coming years. TfL is using innovative techniques to better understand the contributors to road collision risk and thereby help prioritise mitigation measures to maximum effect.
- London's public transport networks continue to offer a very safe environment for customers, with improvements in key customer safety indices from 2008 and over the longer term. Despite some inconsistencies in the available data, there have been typically slightly more than 120 incidents of customer injury on the Underground per year since 2008/09, with Underground patronage increasing by 19.8 per cent over this period. The trend for serious injuries on the bus network however, has been more definitively downwards, with a 53.0 per cent reduction between 2008 and 2014.
- Levels of recorded crime on the main public transport networks have broadly halved over the period since 2008/09, with average annual reductions of 10.4 per cent on the Underground and DLR (combined), 8.3 per cent on the buses, and 9.9 per cent on Tramlink. London Overground has the lowest overall level of reported crime, at 5.7 per million passenger journeys (2014/15), and has shown a similar trend of improvement since the start of recording of this measure.
- The available indicators relating to fear of crime while travelling – which can be a powerful disincentive for people to use public transport – have also shown an improving trend over the review period. While not available on a consistent

## 6. Safety and security on the transport networks

basis from 2008, between 2009 and 2011, 95 to 97 per cent of Londoners felt safe while travelling during the day, and between 76 and 78 per cent felt safe while travelling at night. Later evidence shows a consistent reduction in the proportion of Londoners for whom concerns over crime/anti-social behaviour affect the frequency of their public transport use 'a lot' from typically 26-28 per cent in 2013 to 22 per cent in spring 2015.

- Nevertheless, it is clear that certain groups still have significant concerns, and TfL is working to understand the causes of these better so that improvements can be more effectively targeted.

### 6.3 Road safety

#### Summary

Recent years have seen substantial reductions in the number of killed or seriously injured (KSI) casualties from road traffic collisions in London. TfL has made significant progress by building new infrastructure that protects vulnerable road users and working with our partners implementing new ideas and technologies. This has enabled us to meet the Mayor's target to reduce KSI casualties on London's roads by 40 per cent six years early.

KSIs are now at their lowest level in London since records began and to build on this progress, the Mayor has now set a new target for a further 50 per cent fall in KSIs by 2020.

#### Casualty trends in London

Figure 6.1, indexed to the Government's 2005-2009 baseline for measuring progress, shows the long-term trend of casualty reduction in London since 2005.

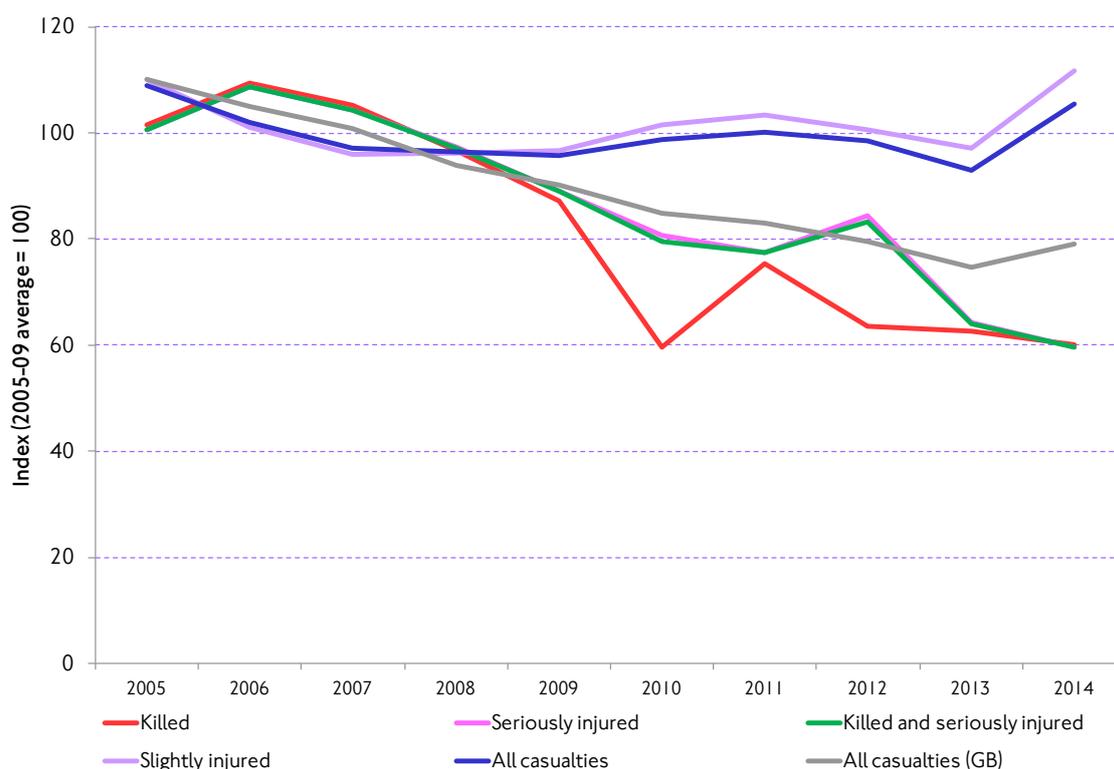
In 2014 a total of 30,785 personal injury casualties were reported by the police in London. Of these, 127 were fatally injured, 2,040 were seriously injured and 28,618 were slightly injured.

Compared to 2013:

- Fatalities fell by 4 per cent, from 132 to 127, the second lowest since records began. The number of fatalities fell among all modes with the exception of motorcyclists.
- There was a 7 per cent decrease in all serious casualties from 2,192 to 2,040, the lowest level since records began.
- Slight casualties increased by 15 per cent (28,618 compared to 24,875).
- Overall casualties (all injury severities) in 2014 increased by 13 per cent compared with 2013 – largely driven by an increase in slight casualties.

Although TfL is taking the lead to make roads safer, we cannot achieve these casualty reductions alone. Ninety five per cent of London's streets (by length) are the responsibility of boroughs and there are many other partners involved in reducing casualties. Forecast growth in London's population and increasing levels of cycling pose an ongoing challenge to meet the Mayor's new road safety target.

Figure 6.1 Long term trend for road traffic casualties in London, by severity of injury. Index values relative to 2005-2009 average baseline.



Source: TfL Surface Transport - Strategy & Outcome Planning.

Table 6.1 shows casualties on London's roads for 2013 and 2014 compared against the 2005-2009 baseline. Changes in collisions and casualties during 2014 should be considered in the context of long-term casualty trends in London, as year-on-year fluctuations are not always indicative of long-term trends. It should also be noted that large percentage changes in small numbers might not be statistically significant.

In 2014 against the 2005-2009 baseline:

- Fatalities were 40 per cent below the 2005-2009 average.
- All KSI casualties were 40 per cent below the 2005-2009 average.
- Child KSIs were 50 per cent below the 2005-2009 average.
- Slight casualties were 12 per cent above the 2005-2009 average.
- Cyclist KSIs were three per cent above the 2005-2009 average.
- Motorcyclist KSIs were 34 per cent below the 2005-2009 average.
- Pedestrian KSIs were 36 per cent below the 2005-2009 average.

## 6. Safety and security on the transport networks

Table 6.1 Road collision casualties in Greater London in 2014 compared with 2005-2009 average and 2013.

Casualty severity	User group	Casualty numbers			Percentage change in 2014 over		
		2005-2009 average	2013	2014	2013	2005-2009 average	
Fatal	Pedestrians	96.0	65	64	-2%	-33%*	
	Pedal cyclists	16.6	14	13	-7%	-22%	
	Powered two-wheeler	43.4	22	27	23%	-38%*	
	Car occupants	49.4	25	19	-24%	-62%*	
	Bus or coach occupants	2.4	1	0	-100%	-100%	
	Other vehicle occupants	3.2	5	4	-20%	25%	
	<b>Total</b>	<b>211.0</b>	<b>132</b>	<b>127</b>	<b>-4%</b>	<b>-40%*</b>	
	<b>Children (under 16 years)</b>	<b>11.6</b>	<b>6</b>	<b>3</b>	<b>-50%</b>	<b>-74%*</b>	
Fatal and serious	Pedestrians	1,216.4	838	779	-7%	-36%	
	Pedal cyclists	420.6	489	432	-12%	3%	
	Powered two-wheeler	791.2	510	526	3%	-34%*	
	Car occupants	949.0	335	316	-6%	-67%*	
	Bus or coach occupants	139.6	90	71	-21%	-49%*	
	Other vehicle occupants	109.8	62	43	-31%	-61%*	
	<b>Total</b>	<b>3,626.6</b>	<b>2,324</b>	<b>2,167</b>	<b>-7%*</b>	<b>-40%*</b>	
	Child pedestrians	231.8	153	139	-9%	-40%*	
	Child pedal cyclists	32.8	17	13	-24%	-60%*	
	Child car passengers	42.2	7	6	-14%	-86%*	
	Child bus or coach passengers	11.6	4	5	25%	-57%	
	Other child casualties	11.8	6	3	-50%	-75%*	
	<b>Children (under 16 years)</b>	<b>330.2</b>	<b>187</b>	<b>166</b>	<b>-11%</b>	<b>-50%*</b>	
	Slight	Pedestrians	4,214.0	4,343	4,834	11%*	15%*
		Pedal cyclists	2,718.2	4,134	4,714	14%*	73%*
		Powered two-wheeler	3,806.4	3,992	4,707	18%*	24%*
		Car occupants	12,426.8	9,850	11,487	17%*	-8%*
		Bus or coach occupants	1,429.8	1,381	1,508	9%*	5%
Other vehicle occupants		1,004.8	1,175	1,368	16%*	36%*	
<b>Total</b>		<b>25,600.0</b>	<b>24,875</b>	<b>28,618</b>	<b>15%*</b>	<b>12%*</b>	
<b>Children (under 16 years)</b>		<b>1,889.0</b>	<b>1,677</b>	<b>1,811</b>	<b>8%*</b>	<b>-4%</b>	

## 6. Safety and security on the transport networks

All severities	Pedestrians	5,430.4	5,181	5,613	8%*	3%*
	Pedal cyclists	3,138.8	4,623	5,146	11%*	64%*
	Powered two-wheeler	4,597.6	4,502	5,233	16%*	14%*
	Car occupants	13,375.8	10,185	11,803	16%*	-12%*
	Bus or coach occupants	1,569.4	1,471	1,579	7%	1%
	Other vehicle occupants	1,114.6	1,237	1,411	14%*	27%*
	<b>Total</b>	<b>29,226.6</b>	<b>27,199</b>	<b>30,785</b>	<b>13%*</b>	<b>5%*</b>
	<b>Children (under 16 years)</b>	<b>2,219.2</b>	<b>1,864</b>	<b>1,977</b>	<b>6%</b>	<b>-11%*</b>

The asterisks indicate where changes are significant at the 95 per cent confidence level, applying the Poisson probability distribution. Significance testing helps to identify where change is associated with random change and where it is statistically significant. Given a set of two different numbers, the difference between these numbers is statistically significant where we are 95 per cent confident that this is not due to randomness.

Source: TfL Surface Transport - Strategy & Outcome Planning.

### Strategic frameworks for road safety

Road safety data indicates that approximately 92 per cent of all contributory factors recorded for collisions in London were due to human error. This has informed our whole approach to road safety, which is now refocused on ensuring our actions more effectively address the five main sources of road danger:

- travelling too fast
- becoming distracted
- undertaking risky manoeuvres
- driving under the influence of alcohol or drugs
- failing to comply with the laws of the roads.

TfL has been working towards the six commitments published in Safe Streets for London (<https://tfl.gov.uk/corporate/safety-and-security/road-safety/safe-streets-for-london>).

### Lead the way in reducing the number of people killed or seriously injured on the Capital's roads by 50 per cent by 2020

- The Safer Lorry Scheme is in operation: since 1 September 2015 all HGVs above 3.5 tonnes must be fitted with additional safety mirrors and side-guards in order to drive in London.
- Improving freight safety with the design of safer urban construction vehicles that reduce deadly blind-spots and improve drivers' direct vision to give maximum visibility of vulnerable road users. Earlier this year, 15 new or modified vehicles with hugely reduced blind spots were exhibited in London and are now being trialled by a range of companies.

### Prioritise the safety of the most vulnerable groups – pedestrians, cyclists and motorcyclists

- Featuring road safety and cycle training across all 33 London boroughs.
- Wide-ranging awareness campaigns that target the main causes of death and serious injury on London's roads (the 'sources of danger' approach).

## 6. Safety and security on the transport networks

### **More funding for road safety, invested in the most effective and innovative schemes**

- Major infrastructure improvements as part of the Mayor's £4bn investment in the Road Modernisation Plan, including: the Better Junctions Programme, in which 33 of the worst performing junctions for cyclists will be redesigned; and the development of the North-South and East-West Cycle Superhighways

### **Increase efforts with the police, boroughs and enforcement agencies in tackling dangerous and careless road user behaviour that puts people at risk**

- Road safety operations with the Metropolitan Police Service Roads and Transport Policing Command (RTPC), where hundreds of officers are deployed to junctions across London to advise road users and enforce the rules of the road as part of Operation Safeway.
- Operation Winchester was a month long campaign to firstly engage with motorcyclists, and later provide increased enforcement and presence to reduce risky behaviours.
- Targeting the most dangerous commercial vehicles through the Industrial HGV task force, funded by TfL and the DfT. In 2014, the Task Force conducted roadside operations that stopped 2,928 vehicles, issued 1,174 penalty notices and seized 25 vehicles

### **Campaign for changes in national and EU law**

- TfL is lobbying the DfT to revise the Highway Code to better promote the safety of pedestrians, cyclists and motorcyclists. We are lobbying the DfT for the ability to civilly enforce advanced stop lines and mandatory cycle lanes. We will continue to ask the DfT for the Traffic Signs and Regulations General Directions to allow greater flexibility in road and signage design.
- TfL is asking the European Commission to mandate pedestrian Automated Emergency Braking and Intelligent Speed Assistance in all new cars. TfL is also asking that the General Safety Regulations include ambitious requirements on direct driver vision for HGVs

### **Work in partnership with boroughs and stakeholders to improve best practice and share data and information**

- TfL has provided London boroughs with free access to road safety data through MAST (Market Analysis and Segmentation Tools), an advanced online road safety analysis tool. MAST allows users to gain insights into collisions using a socio-demographic database, to help target marketing and behaviour change campaigns and to monitor trends in road safety.
- In September 2015 TfL launched the Capital's first interactive digital collision map at [www.collisionmap.london](http://www.collisionmap.london), which is part of a continued drive to improve road safety awareness to reduce the number of casualties on London's roads. This creates a useful new way to inform road users about junctions with high collision histories and aiding improvement work in line with TfL's commitment to improve transparency for customers and stakeholders.

### **Open data**

There are many benefits in making road safety data open such as enabling members of the public and stakeholders to interrogate, monitor and more effectively track

road safety performance and raise awareness of road safety and road safety behaviours in London.

TfL publishes and shares road safety data where possible. This includes publishing quarterly provisional road safety data, in line with the DfT, and responding to a variety of requests from, among others, road safety professionals, boroughs and the general public. Data is open to the public through a range of different formats, including bespoke listings, detailed online open data files and regularly published reports at: <http://www.tfl.gov.uk/corporate/publications-and-reports/road-safety>.

Open road safety data in machine readable format is published annually on our road safety website for the period 2005 to 2014, giving the most recent finalised figures available from the police, alongside a data guide.

TfL is looking for ways to make more of this data available to stakeholders and to the public.

### **Risk**

Road safety analysis has traditionally focused on casualty and collision numbers as key indicators of safety and to prioritise interventions. While it is important to focus on absolute numbers – as they directly reflect the negative effects and loss of life associated with road collisions – it is also important to view those numbers in the context of overall travel patterns across the Capital.

Safe Streets for London investigated collision and casualty figures and added to this analysis with a deeper understanding of risk. An updated analysis and publication of road user risk profiles is presented in this section.

Analysis of risk controls for changes in mode shares and helps to normalise for different levels of exposure between road users. Risk analysis helps identify where road user risk is due to user behaviour or the road environment, among other factors.

The approach taken has been to calculate the number of casualties per billion kilometres of travel, in other words, a casualty rate. The casualty rate provides an indication of the risk associated with different road user groups. For example, road users in a group experiencing 100 casualties per billion kilometres are at a lower risk than those in a group experiencing 1,000 per billion kilometres.

### **Change in road user risk in London**

Table 6.2 shows the number of vulnerable road users killed or seriously injured for every billion passenger kilometres travelled in London in April 2010 to March 2014, compared to April 2006 to March 2010. This shows that there has been a statistically significant reduction in KSI risk of 18 per cent among vulnerable road users over this period.

## 6. Safety and security on the transport networks

Table 6.2 Change in KSI risk by vulnerable road user and time period.

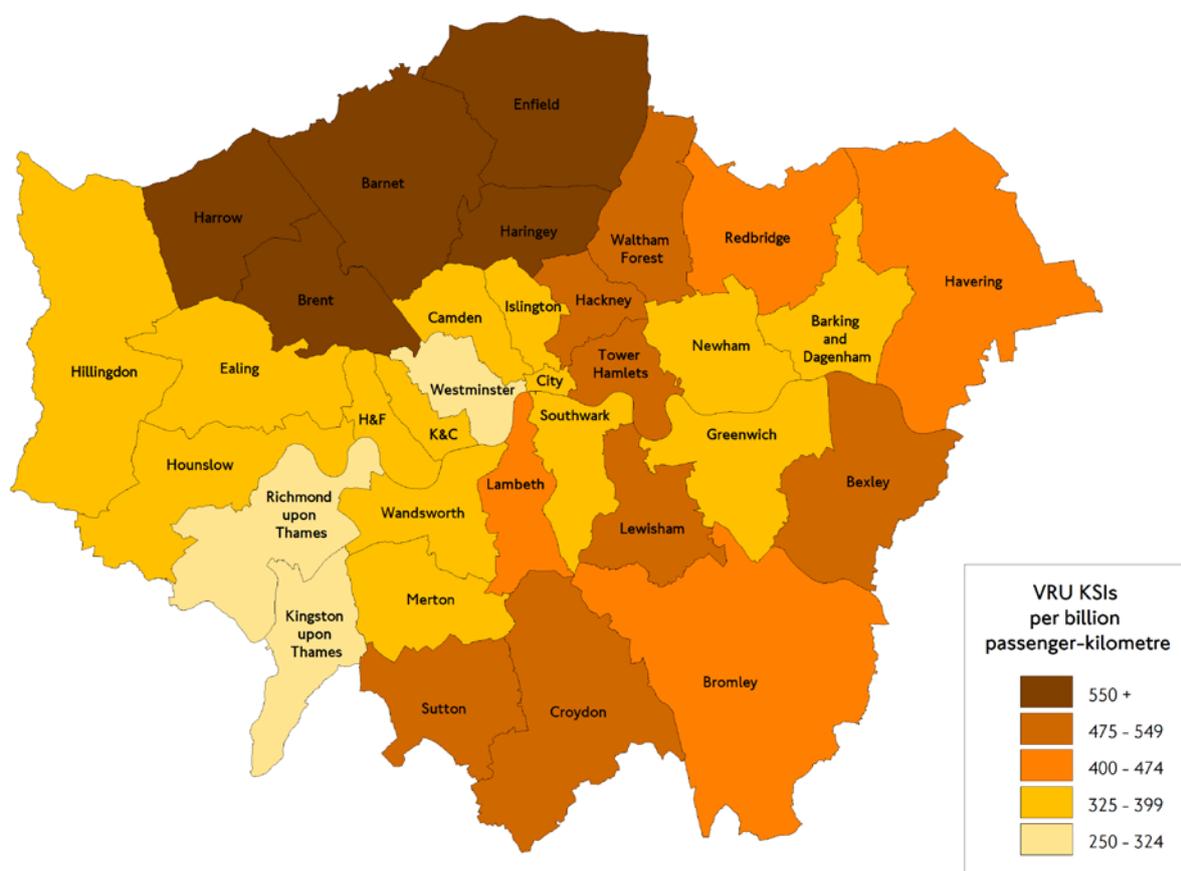
User group	KSI casualties per billion passenger kilometre		
	April 2006- March 2010	April 2010- April 2014	Change
Pedestrians	299	241	-19%
Pedal cyclists	740	677	-9%
Powered two-wheeler	2026	1551	-23%
Vulnerable road users (VRU)	484	397	-18%

Source: TfL Surface Transport - Strategy & Outcome Planning.

### Risk to vulnerable road users by London borough

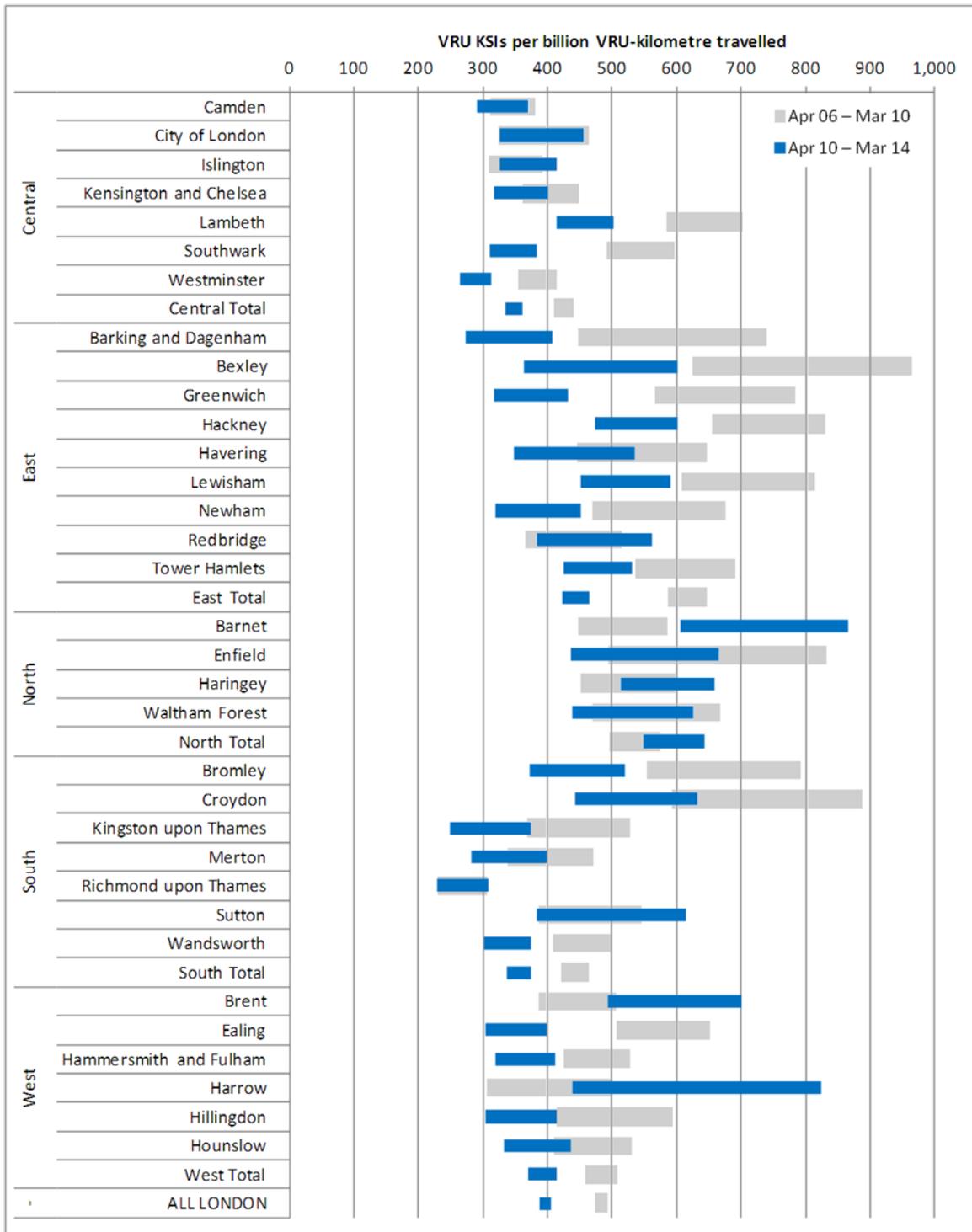
The road environment varies substantially across London, as does the mix of road user types. To understand whether these geographical variations have an impact on risk, it is informative to calculate risk at a borough level. Figure 6.2 shows the KSI casualty risk by borough among vulnerable road user groups in London. Note that these risk figures have a level of uncertainty (see figure 6.3) so that in some cases apparent differences may not be statistically significant at a sufficient level to merit action.

Figure 6.2 Heat map showing KSI risk for vulnerable road users by borough (April 2010 to March 2014).



Source: TfL Surface Transport - Strategy & Outcome Planning.

Figure 6.3 Vulnerable road user KSI risk by borough and by time period, with 90 per cent confidence intervals, controlling for changes in mode share.



Source: TfL Surface Transport - Strategy & Outcome Planning.

### Risk to vulnerable road users by London borough over time

Risk can be monitored over time, and each borough has had two consecutive four-year period casualty rates calculated. This information is plotted in figure 6.3 using horizontal bars representing statistical confidence intervals. The more data that is available, the more confident we can be with the estimation of risk, and the shorter

## 6. Safety and security on the transport networks

the bar will appear on the chart. This explains why the confidence interval is smaller in London overall than it is for individual boroughs. The blue bars correspond to the most recent time period and the grey ones represent the older period. For a given borough, where there is no overlap between two bars, we can be confident that the level of risk has changed. The figure indicates that most boroughs have become significantly safer in recent years.

### How risk information is being used

TfL uses risk figures alongside absolute casualty figures to prioritise interventions and identify where the most casualty reductions can be made. TfL also use this wide range of data analysis to monitor the effect of these interventions. Currently engineering, education, training, marketing and enforcement campaigns are taking advantage of this additional level of intelligence to better target locations or age groups for action.

Among other sources of information, casualty rates are used in the borough engagement process, as they help identify if a particular user group is over-represented in casualty statistics in an individual borough.

## 6.4 Passenger safety on the public transport networks

Overall, particularly when viewed in the context of rising service levels and patronage, London's public transport networks continue to offer a safe travelling environment, with overall improvements to passenger safety over more recent years.

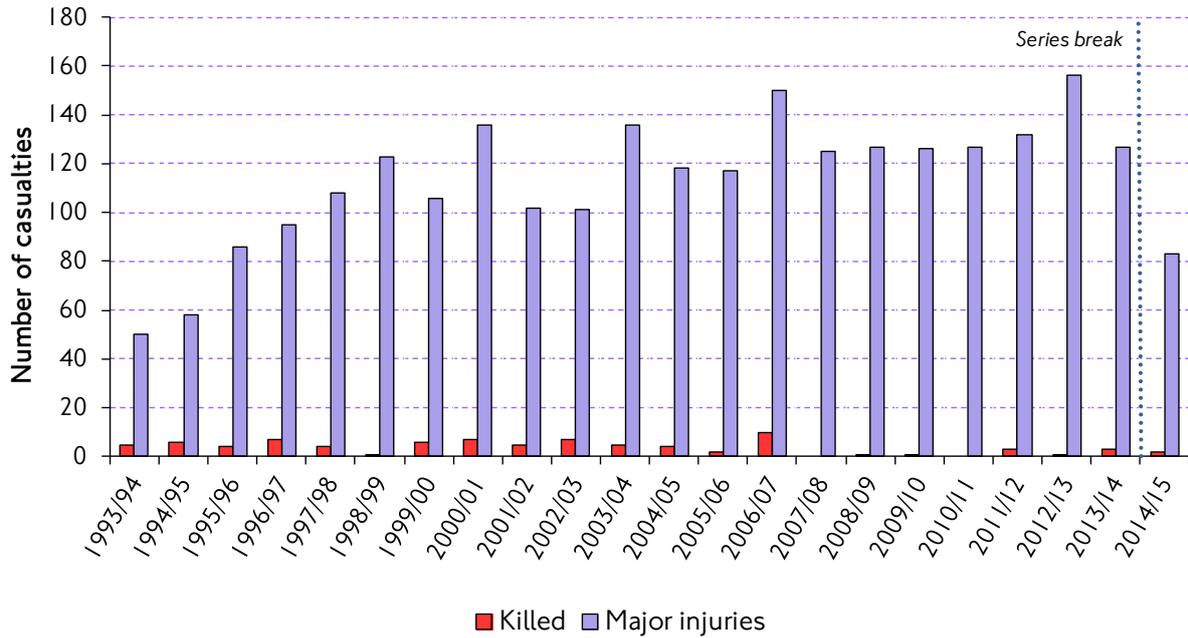
### London Underground

On the Underground, 2014/15 saw 83 passenger injuries and two fatalities. The reason for the reduction in numbers of major injuries to passengers in 2014/15 was a change to the list of 'specified injuries' that had the effect of removing dislocations from the 'major injury' definition. The figures for the latest year are therefore not directly comparable to those for previous years. Also, the number of passenger fatalities for 2013/14 has been revised from 1 to 3, following receipt of HM Coroners verdicts for two incidents (at Green Park and Latimer Road) that were previously classified as 'suicide', but were subsequently ruled to be 'accidental death'.

### Buses and coaches

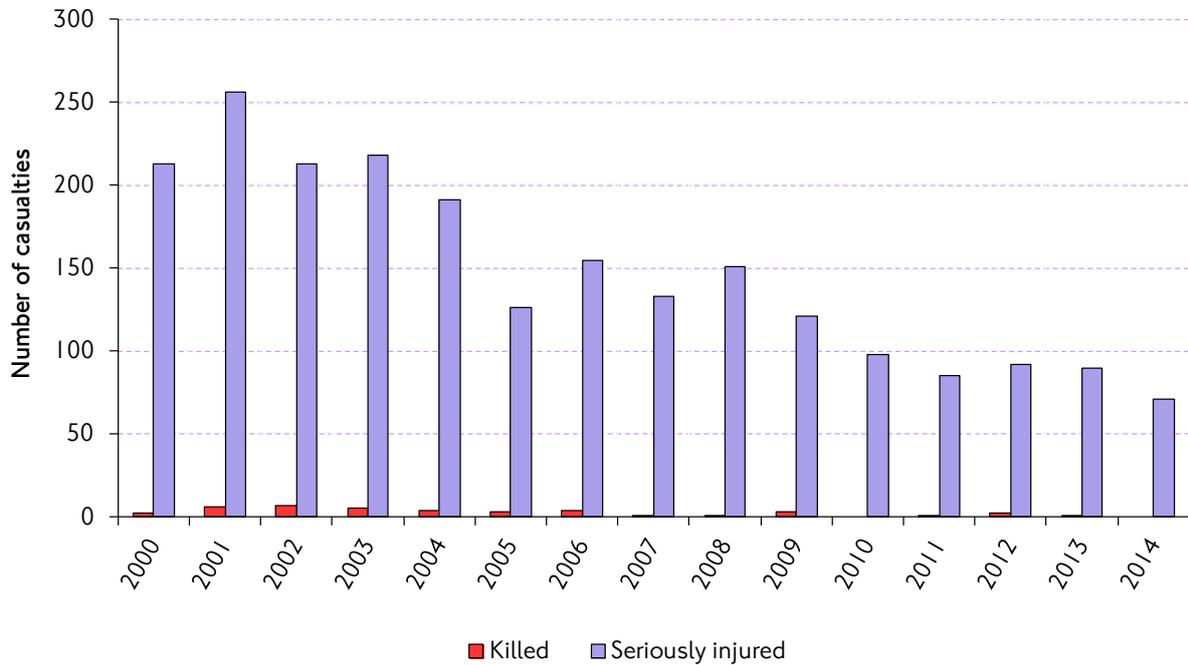
In 2014, 71 bus or coach occupants were killed or seriously injured in London, with no fatalities. These casualty numbers exclude pedestrian and other vehicle users who might have been injured in collisions involving buses or coaches – these are included in the statistics described in table 6.1. Figure 6.5 shows a consistent trend of improvement in bus or coach passenger injuries over the last decade. The number of people killed or seriously injured while using a bus or coach in 2014 stood at roughly half of the value in 2008. This also coincides with an approximate 6 per cent increase in bus or coach patronage, and therefore also represents a substantial reduction in risk per passenger.

Figure 6.4 Number of people killed or injured while travelling on London Underground.



Source: London Underground  
Excludes suicides and victims of assault and terrorist activity.

Figure 6.5 Number of bus/coach occupants killed or seriously injured in London.



Source: TfL Surface Transport - Strategy & Outcome Planning.  
Excludes suicides and victims of assault and terrorist activity.

## 6.5 Crime and antisocial behaviour on the public transport networks

### Summary

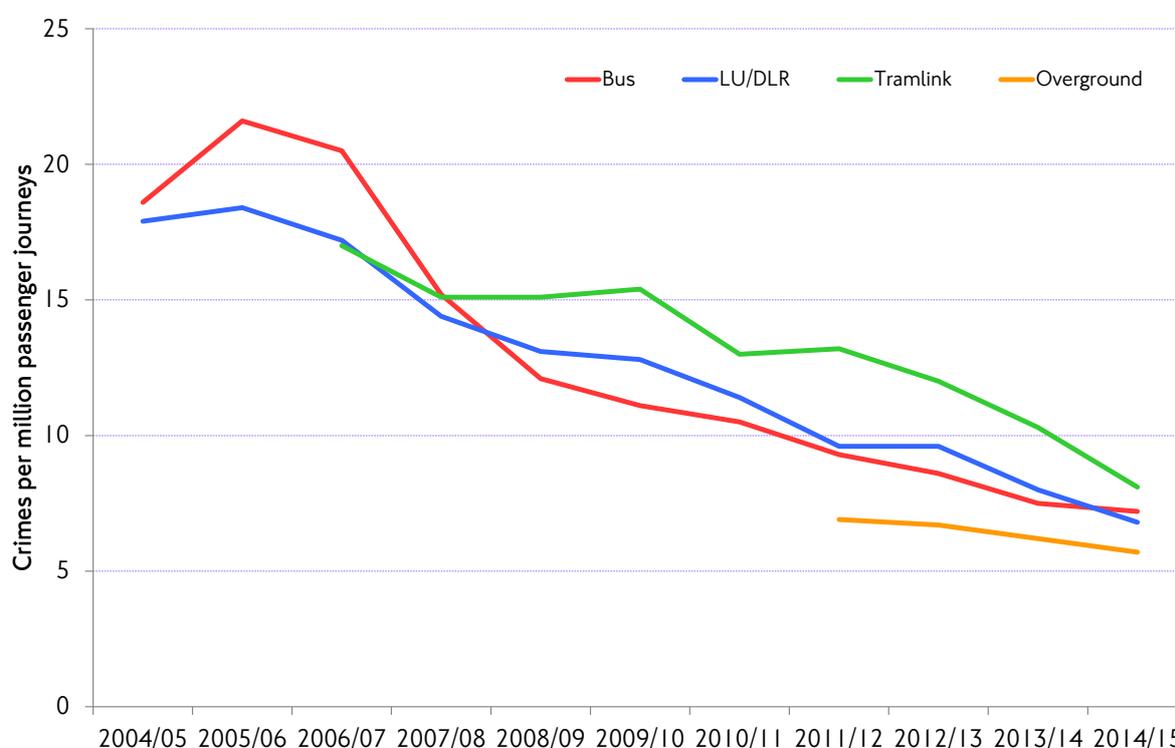
Levels of crime on TfL’s transport system have continued to fall in 2014/15 – down by 8.2 per cent on 2012/13. The rate of crime on TfL’s public transport system has fallen to 7.0 crimes per million passenger journeys, down from 7.6 in 2013/14. Between 2008/09 and 2014/15, overall reported crime on London’s public transport network has fallen by 44 per cent. The risk of becoming a victim of crime while travelling on TfL’s transport system is now at its lowest recorded level.

### Trend for recorded crime on London’s public transport networks

Progress during 2014/15 was broadly consistent with recent trends (figure 6.6). There were reductions on the number of reported crimes per million journeys across the entire public transport network compared to 2013/14.

There were 7.2 reported crimes per million customer journeys on the bus network, down from 7.5 in the previous year (a reduction of 4.0 per cent). There were also reductions of reported crime on Tramlink and London Overground over the previous year, these falling by 21.4 per cent and 8.1 per cent respectively. On the Underground and DLR networks, there was a 15.0 per cent reduction in the number of reported crimes per million customer journeys. However, masked within this decrease in overall crime rate, there has been an increase in the number of sexual offences reported on the Underground, primarily as a result of the Project Guardian initiative (see also below).

Figure 6.6 Reported crime on TfL’s public transport networks. Rate per million passenger journeys.



Source: TfL Enforcement and On-street Operations.

## Project Guardian

Project Guardian was launched in April 2013, following a survey that revealed 15 per cent of female public transport users in London had experienced some form of unwanted sexual behaviour and that around 90 per cent of incidents were not reported.

Project Guardian is a collaborative initiative aiming to reduce sexual assault and unwanted sexual behaviour on public transport in London by increasing awareness and confidence among the public to report such behaviour. Around 2,000 police officers have been trained to deal with specific cases, and officers continue to patrol the network to identify offenders and prevent crime. TfL is working closely with other campaigns to raise awareness and give victims and witnesses a discreet way to report offences via a text number.

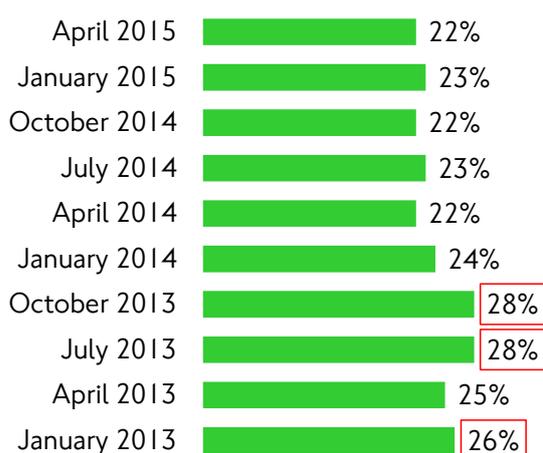
Since the launch of the initiative, there has been a 20 per cent increase in the reporting of sexual offences and a 32 per cent increase in the detection of sexual offences, although this does not necessarily reflect any change to the actual number of offences, either reported or unreported. The actions taken as part of this initiative help to address barriers to travel and to ensure that Londoners and visitors to the Capital feel safe on the public transport network.

## 6.6 Perception of crime and antisocial behaviour

### Indicators of fear of crime and anti-social behaviour

Despite the reducing levels of recorded crime, as discussed in section 6.4 above, around one quarter of Londoners report in TfL's recent surveys that fear of crime and anti-social behaviour significantly affect the frequency with which they use public transport (figure 6.7), although this too has reduced in recent years. The impact is greater when thinking about travel at night and is more pronounced on buses and the Tube than on trains.

Figure 6.7 Proportion of Londoners for whom concerns over crime/anti-social behaviour affect the frequency of their public transport use 'a lot'.



Source: TfL Customer and Employee Insight.

The data in figure 6.7 arises from a new series of surveys that TfL put in place during 2013. Before this time, until 2011, progress was tracked through the indicator in table 6.3, which measured London residents' sense of safety and fear of

## 6. Safety and security on the transport networks

crime while travelling during the day or at night. Taken together, both indices show an improving situation over the course of the MTS.

**Table 6.3** Perception of London residents of their sense of safety and fear of crime while travelling. Percentage feeling safe while travelling during the day or at night.

Year	During the day	At night
2009	95	78
2010	97	78
2011	95	76

Source: TfL Customer and Employee Insight.

### Typology of worry

A method of classifying Londoners based on their response to survey questions has been developed by TfL. This groups respondents into the typology shown by table 6.4.

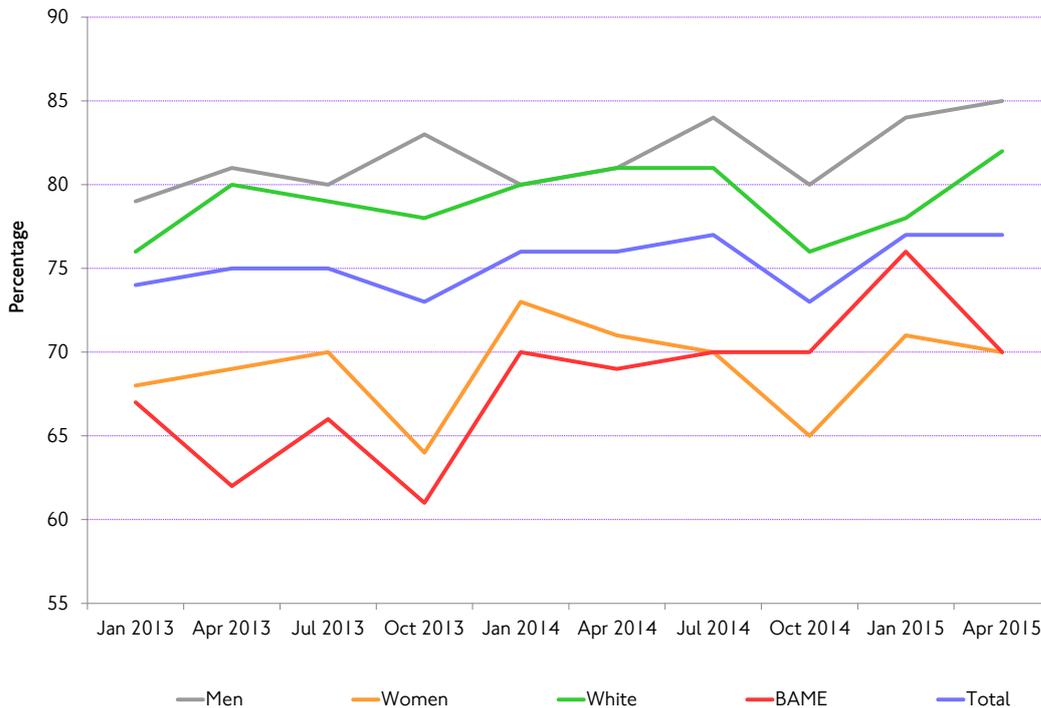
**Table 6.4** TfL's typology of worry as applied to assessing fear of crime and anti-social behaviour when travelling on the public transport networks.

Name	Definition
Unworried	Reports no general worry, and no episodes of worry
Unexpressed fear	Reports no general worry, but specific episodes
Anxious	Reports general worry, but no specific episodes
Worried	Reports general worry, and specific episodes
Don't know	Doesn't know

Source: TfL Customer and Employee Insight.

It is of interest to examine how the proportions of Londoners who fall in to these groups have changed over the period covered by the available (quarterly) surveys. Figure 6.8 shows the proportion of respondents categorised as 'unworried'. The overall trend is clearly upwards – meaning that fewer Londoners are concerned about this aspect of travel. However, it is also notable that men score significantly higher than women, and that there is a similar gap between white and black, Asian and minority ethnic (BAME) Londoners.

Figure 6.8 Trend in respondents categorised by TfL as 'unworried' when travelling on London's public transport networks.

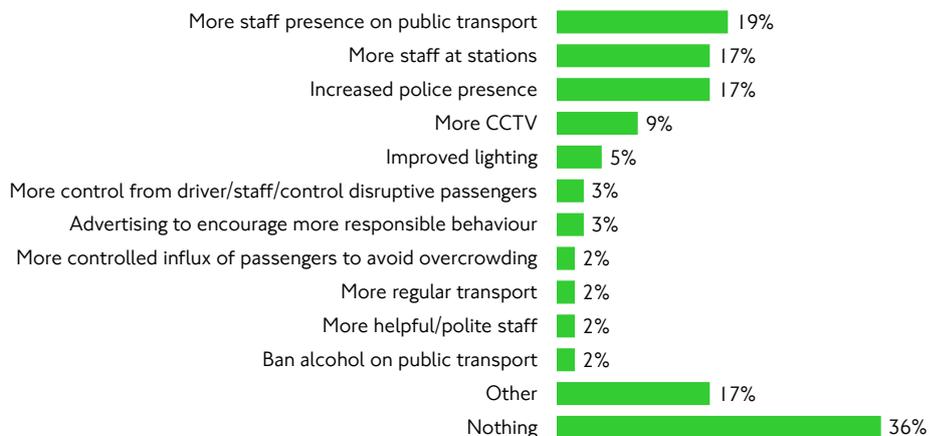


Source: TfL Customer and Employee Insight.

### How can TfL improve this?

Figure 6.9 shows responses to questions seeking to understand what measures TfL could take to improve perceptions for those that have experienced worrying incidents. Unsurprisingly, the most popular suggestions relate to increased staff and police presence on the transport networks. However, a substantial proportion of respondents also think that TfL should do nothing in this regard or had no specific suggestions.

Figure 6.9 Suggestions by Londoners who have experienced worrying incidents as to what TfL can do to improve matters. Note multi-code question – responses do not add to 100 per cent. (July 2014 – April 2015).



What could TfL have done in this situation to help you feel safer?

Source: TfL Customer and Employee Insight.

## 6. Safety and security on the transport networks

## 7. The customer experience

### 7.1 Introduction and content

A comprehensive, effective and efficient transport system is essential to keep London working and growing. However, the Mayor's Transport Strategy also recognises the crucial part that transport plays in overall quality of life, and in helping to make life in London better. It therefore made improving the quality of Londoners' overall daily travel experiences a priority. In order for TfL to deliver this in today's climate of rising population and limited public funds, a clearly understood and strong customer focus is essential. This is because:

- TfL needs to demonstrate that it is investing efficiently and making the improvements that matter the most to customers.
- Good customer service helps to keep fares down through maintaining ridership levels on public transport, being seen as an attractive commercial partner, and optimising our ability to borrow funds for investment.
- TfL is a public service so it is important that this role is fulfilled well.
- Providing good customer service also helps maintain public support during industrial action, road works or at times of disruption on the public transport networks.

This chapter reviews TfL's developing understanding of customer needs in terms of our Customer Model. It then looks at the trend in selected indicators of customer perception and customer satisfaction over recent years, before finally considering what this insight tells us about future customer priorities – thus providing an evidence base for the development of future policy. Finally it covers digital changes and closes with a review of progress towards MTS strategic outcome indicators for customer perception and satisfaction.

### 7.2 Summary

Over the period covered by the MTS to date, the trend for TfL's public transport customer satisfaction indicators have been generally upwards, reflecting the wide range of improvements to TfL's services and the transport environment in London more generally. Customer satisfaction with Tramlink and the DLR is high at a score of 89 out of 100 each. Trends for the bus (85) and Underground networks (84) have been decisively upwards over the period covered, reaching the highest level since surveys began.

Improving satisfaction for bus and Underground customers has come through a large reduction in the proportion of customers who are delayed on their last journey, new vehicles and improved real-time information, especially for buses, via the growth in live bus information apps powered through TfL open data. This has been supported by staff as well as a steady stream of new innovations, including WiFi on the Tube, contactless payments, and effective communications - including the celebration of 150 years of the Underground, the Year of the Bus and behind-the-scenes TV documentaries.

In terms of overall customer satisfaction with wider aspects of the transport system such as roads, transport noise and the urban realm, the overall picture is one of slow improvement over the period. Use of digital information is on the rise – more than four-fifths (81 per cent) of Londoners use our website, up from 76 per cent the

previous year, and our website remains the most common source of real-time travel information in London, used by 61 per cent of internet users.

### 7.3 Understanding where improvement was required

Despite touching millions of people's lives every day, feedback during the middle part of the last decade suggested that customers had little understanding about TfL, did not feel the organisation had strong values, and felt that we acted like a monopoly. The customer experience was mixed: people saw transport as one of the best and worst things about living in London.

Although services were improving they were still unreliable (particularly on the roads), and often inconsistent and overcrowded. There was a feeling that TfL was failing to get the basics right, which suggested a lack of care for customers.

Examples of shortcomings on public transport included poor reliability on some Tube lines, a website that did not respond to modern mobile phones and a Journey Planner that needed upgrading to improve accuracy and ease of use. More than half of Londoners (52 per cent) thought we would not manage transport very well during the 2012 Games, and this assumed increasing importance in the public eye as a high profile 'test' of TfL's ability to organise and manage transport effectively.

In the event, as was comprehensively reviewed in Travel in London report 5, transport played a key role in the very successful Games. This reflected a combination of prior investment and preparation, as well as operational excellence during the Games themselves. Some 95 per cent of customers thought that TfL managed transport during the Games 'very' or 'quite well' – a remarkable turnaround from the pre-Games pessimism. This success, in turn, has provided a springboard for further improvement since the Games.

It would be incorrect to imply, however, that post-Games all is perfect, or that the improvement in the customer experience over the period of the MTS solely reflects preparation for the Games. Previous Travel in London reports have highlighted a range of non-Games-specific improvements and innovations. Customer feedback continues to provide TfL with pointers for further improvement, sometimes reflecting deep-seated problems such as congestion on the road network, or emerging new issues, for example the need to stay one step ahead of the rapid evolution of mobile technologies and customer expectations in this regard. TfL's Customer Model helps us understand these issues and assign relative priorities for improvement.

### 7.4 TfL's Customer Model

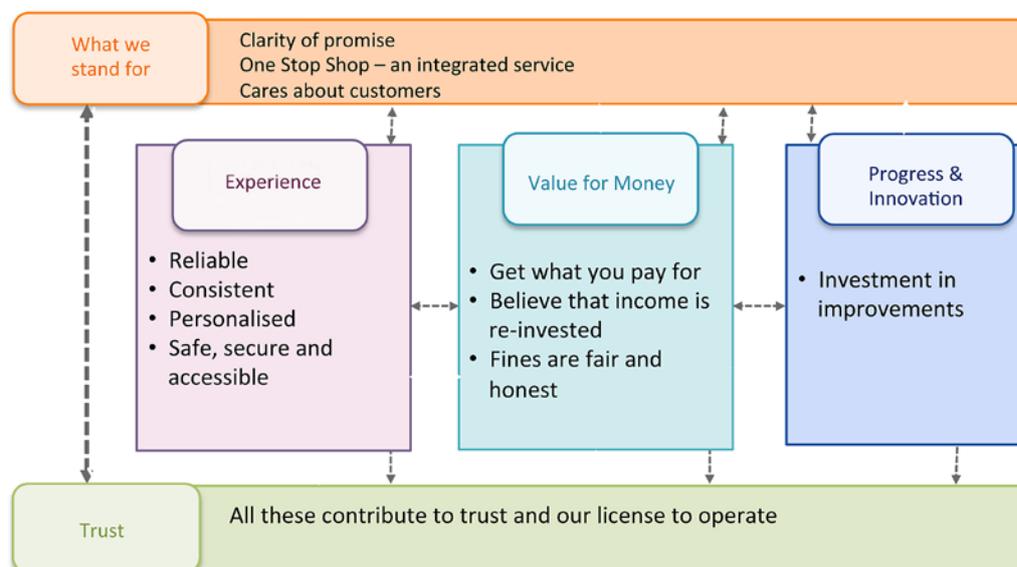
TfL's Customer Model sets out the five aspects of what customers want from us, covering both public transport and roads, including walking and cycling (figure 7.1).

These five aspects are:

- That TfL is the one-stop shop for all types of transport. We listen to our customers, see things from their point of view, and understand that every journey matters.
- That the experience consistently meets customer needs. TfL gets the basics right and supports them when things go wrong.
- TfL continuously innovates and improves.
- That customers feel they are getting good value for money.

- That customers trust us.

Figure 7.1 TfL's Customer Model – what customers expect from us.



Source: TfL Customer and Employee Insight.

This Customer Model has been used to shape our customer strategy and provides a framework for our Business Plan, underpinning our approach to delivery.

## 7.5 A track record of continuous improvement

Overall progress is perhaps best appreciated by considering the trends shown by figure 7.2, which tracks indicators of overall customer satisfaction for each of the main public transport modes since 2009/10 while indicators for roads are shown in figure 7.10.

The overall trend for each mode is steadily upwards – with all indicators now at or about their all-time highs. The scores for Tramlink and the DLR reflect the relatively high reputation of these self-contained networks, which are relatively new. Customer satisfaction for London Overground shows large gains over the period when this network was being formed from a collection of previously National Rail routes, with associated radical improvements in train frequency and service quality. Trends for the longer-established and more complex bus and Underground networks have also been decisively upwards over the period covered, reaching the highest level since surveys began.

Improved satisfaction for bus and Underground customers has come through:

- Improving perceptions of reliability, with a big reduction in the proportion of customers who are delayed on their last journey.
- Delivery of the Tube improvement programme – this has transformed a number of lines with increased frequency, shorter journey times and new trains, including air conditioned trains on the sub-surface lines.
- Improved real-time information, especially for buses. The roll out of more Countdown signs and the growth in live bus information apps powered through TfL open data, means that customers feel more in control of their journeys.

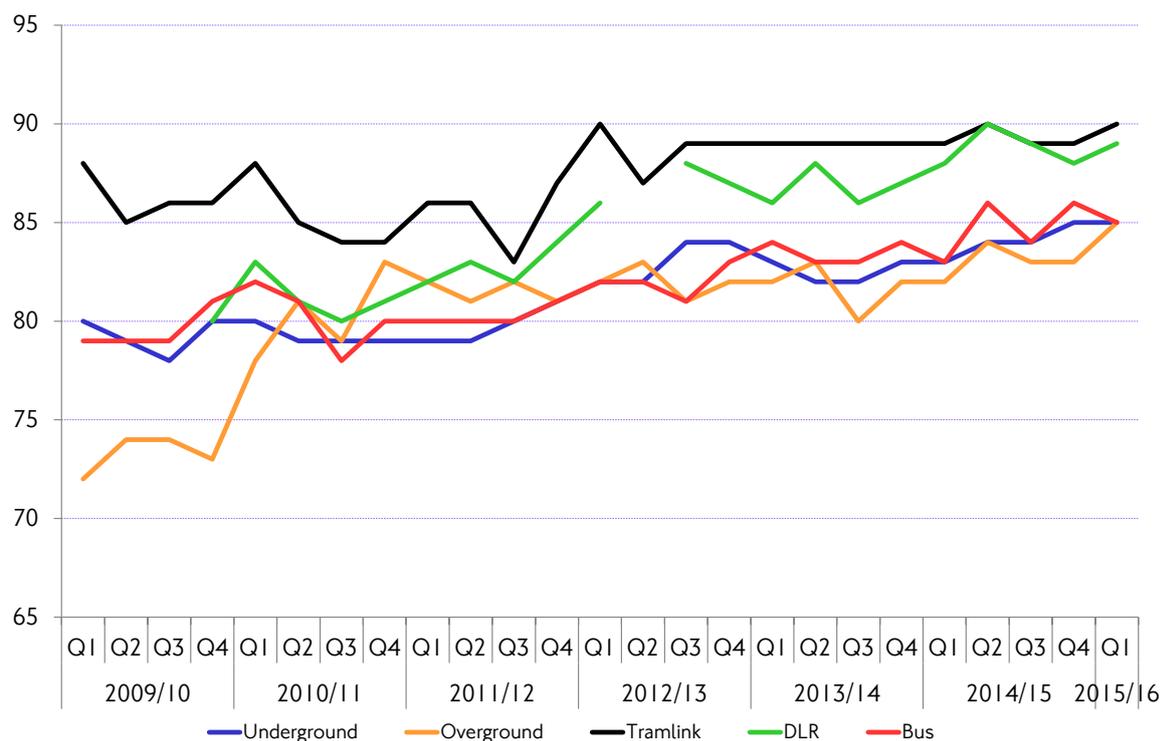
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- New buses (including new Routemasters) and improved maintenance meaning that buses are clean for customers.
- Improving customer service, especially from Underground station staff. TfL is also ensuring staff are available to help customers where and when they want help.
- A steady stream of new innovations, including WiFi on the Tube, and contactless payments allowing bus and Tube customers to pay using their bank card.
- Effective communications, including the celebration of 150 years of the Underground, Year of the Bus celebrating the history of bus travel in the Capital, TV documentaries providing a behind-the-scenes look at how the Tube and bus services operate, what is involved in managing the road network, the launch of our new website, managing disruption during major events such as the Tour de France and our friendly Twitter feeds which have more followers than many major retailers.

On the roads a number of improvements have been introduced including:

- Our traffic management system helping traffic to flow more smoothly, coordinating road works through the London Highways Alliance Contract (LoHAC) – a new joint initiative between TfL and the boroughs.
- Our traffic news Twitter feeds providing up-to-the-minute information on events helping customers to avoid hold ups and delays.
- New facilities for cyclists including the cycle hire scheme and dedicated infrastructure through the network of Cycle Superhighways, with work commencing on a network of quieter cycle routes and on the central London cycling grid.
- Pedestrian Countdown at crossings providing safer places to cross and Legible London signage helping people navigate and making it easier to get around on foot.
- Urban realm improvements creating a more pleasant environment and places where people want to spend time.

Figure 7.2 Overall customer satisfaction scores for each of the main public transport modes.



Source: TfL Customer and Employee Insight.

The delivery of these improvements means that customers' expectations continue to rise for our future services. In turn, these improvements in overall customer satisfaction have fed through to consistent improvements in MTS strategic outcome indicators relevant to quality of life (see section 7.8 below).

## 7.6 Our customer service today and understanding the challenges ahead

Levels of customer satisfaction are currently at or about their highest across all modes. As reliability has improved customers trust us to get them from A to B more than they used to. Innovative changes to information, vehicles and new services have had a major impact on satisfaction. Within the transport industry, TfL is often seen as the model of how to manage transport in cities.

Although we have prioritised the things that customers tell us need to be improved, many inconsistencies remain:

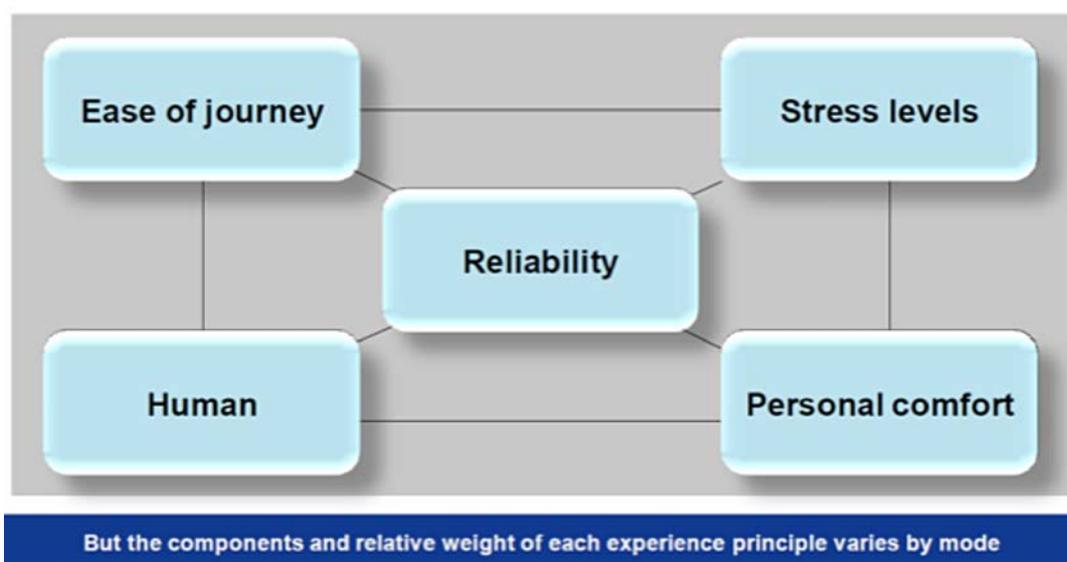
- Customers often do not feel supported when things go wrong. For example, there is often a lack of real-time information during disruption and getting a refund could be made easier.
- Customers tell us about rude and unhelpful behaviour by bus drivers and other staff.
- The customer experience on roads can be negative due to traffic congestion (only 32 per cent of customers agree that traffic flows freely), different road users competing for a finite amount of space, and the behaviour of other road users.

## 7. The Customer Experience

- Customers still have little sense of what TfL stands for. While they appreciate the improvements we have made and recognise that we contribute to the quality of life in London, awareness of our responsibilities – particularly on roads – is still quite low; there is low appreciation of our values (that every journey matters and we care about our customers); and a perception that we are not always as open and honest as we could be. For example, sometimes we tell them there is a good service on the Underground when they are experiencing delays; or they are sitting in a traffic jam caused by roadworks but there is no information on how long the works will take to complete.

TfL has identified five 'core experience principles' that contribute to the overall travel experience and drive customer satisfaction (figure 7.3). The impact and effect of these principles differ by mode of travel.

Figure 7.3 Five core experience principles that make up the holistic travel experience.



Source: TfL Customer and Employee Insight.

- Reliability – and therefore congestion on the roads – is at the heart of customer experience. Customers want to get from A to B, know how long their journey will take, and not to be delayed or disrupted.
- Ease of journey – it should be easy to plan a journey, to know where to catch the bus or find the station, and buy a ticket or pay the Congestion Charge. If there are diversions or delays it should be easy to find an alternative route and be reassured you can complete your journey.
- Stress levels – crowding, not being able to get on the first Tube or bus, lack of information and the behaviour of other customers or road users all contribute to stress levels.
- Human – all our transport systems should feel like they are designed for people, not just for machines. Customers appreciate it when we recognise the impact we have on them emotionally when they travel. They want a pleasant environment that is welcoming, such as well-lit stations or green spaces and well-designed town centres. And, of course, staff can have a big impact on customers, especially when they are approachable and helpful.

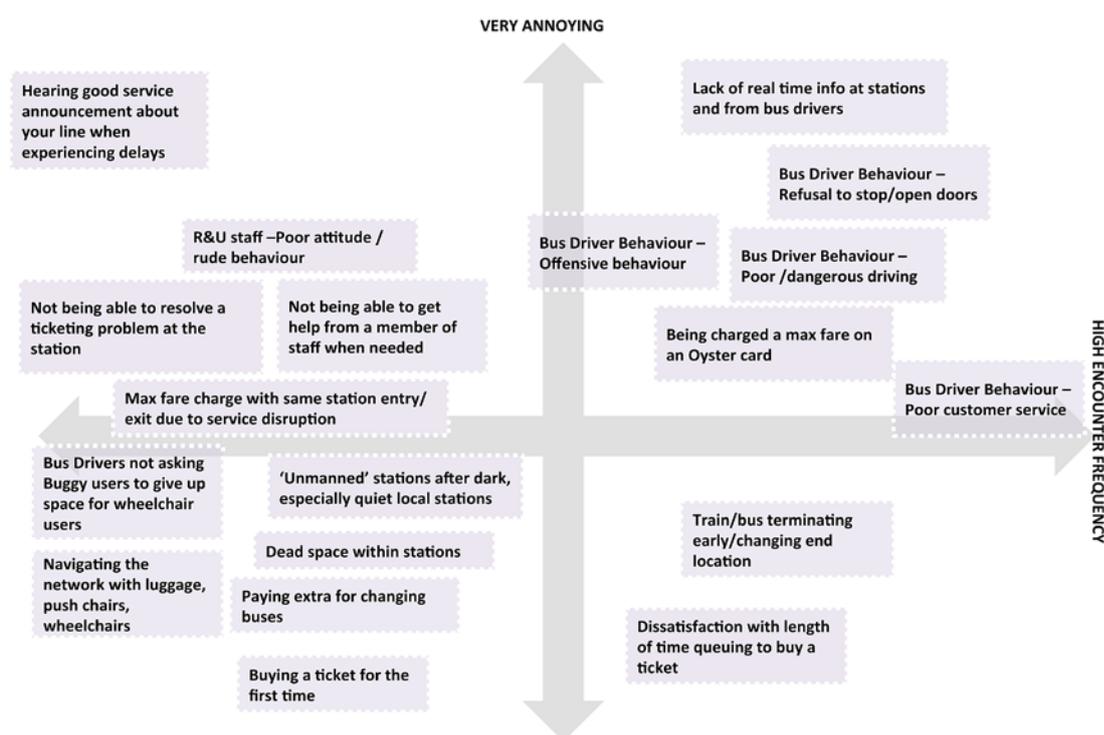
- Personal comfort – this is influenced by crowding, temperature, noise, cleanliness and being able to get a seat on public transport

When we get it right there is a positive impact on customer satisfaction but when we do not or we do not consistently meet customers' expectations this results in annoyance, pain and dissatisfaction.

Looking at the major modes of public transport in turn, the key factors that have an impact on satisfaction with bus services are: reliability; information; ambience/design and bus driver performance. Customers feel that bus travel is improving; this is due to improved reliability, the availability of live bus information through apps, and the presence of the iconic New Routemaster bus. The former allows customers to self-serve and be in control, while the latter gives customers a sense of progress and innovation, both of which deliver to the five drivers and the overall Customer Model.

To deliver a better customer experience TfL needs to address the things that most annoy customers and make them priorities for improvement. Figure 7.4 sets these out for public transport, based on TfL customer research, as well as analysis of complaints and social media.

Figure 7.4 Key frustrations and annoyances – public transport.



Source: TfL Customer and Employee Insight.

In the future, satisfaction scores could be improved through better bus driver engagement with customers. Many bus drivers give great service already but customers express dissatisfaction with the inconsistency of this part of the bus travel experience. Customers want the following from all bus drivers:

- Acknowledgement or eye contact when they get on the bus (basic expectation).

## 7. The Customer Experience

- To be helpful when they have a question.
- Personally announce and explain disruptions/delays.
- Drive smoothly and comfortably.

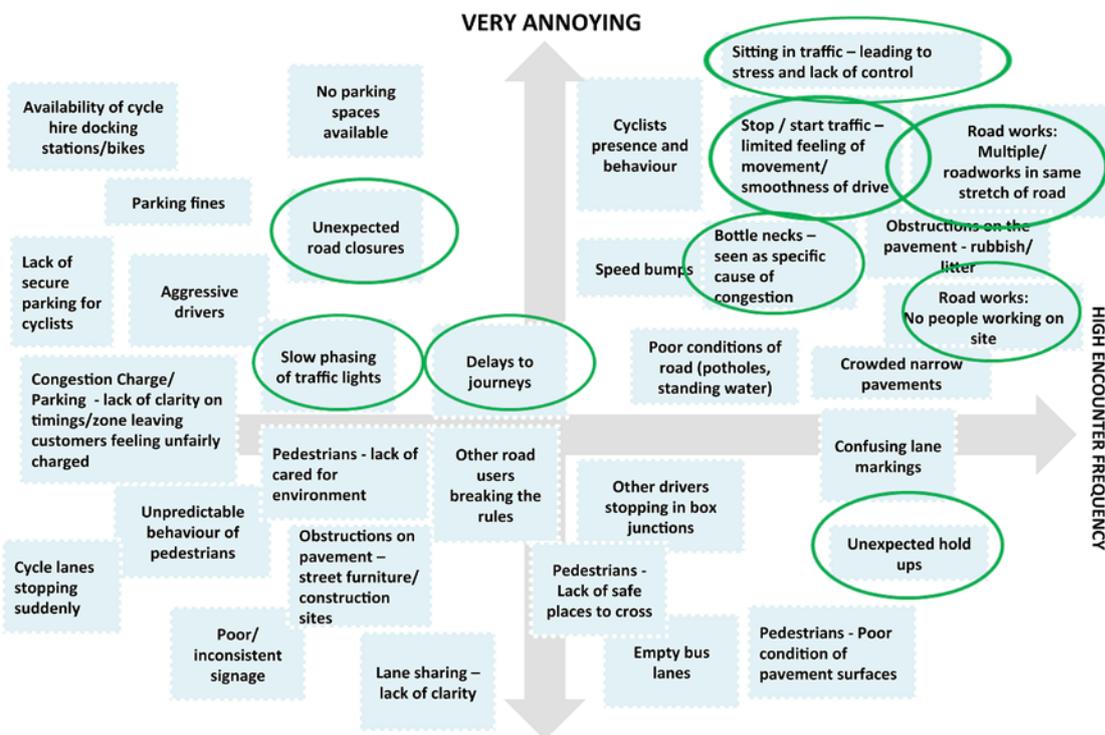
For Underground travel, getting from A to B without hassle is the benchmark of satisfaction for most customers. Accordingly, delays and disruptions to journey time have a greater negative impact on journey experience than positive aspects that exceed expectations. There is an opportunity to capture the emotional impact of more functional factors affecting satisfaction, for example the impact on stress levels of dot matrix screens providing real-time information; and overcrowding on personal comfort. A more 'humanised' Underground experience (for example, helpful and personalised driver announcements) can also significantly raise satisfaction.

Satisfaction levels with the Overground vary significantly by line, with reliability and frequency making the most difference. Lack of available staff and real-time information can cause frustration, but the Overground continues to be well-regarded, particularly compared with other London train operating companies.

Trams and the DLR are considered to be very reliable modes. When compared to buses, the tram is considered much more reliable primarily due to the absence of disruption from traffic which drives greater confidence among customers that they will get from A to B without delay.

Driving in London exists against a backdrop of negativity. This can centre on congestion, roadworks/highway condition, lack of real-time information and the behaviour of others (figure 7.5). When things run according to expectations, drivers feel relaxed and in control of their journeys. When things are going well the smallest 'delighters' such as positive interaction with others, listening to the radio and enjoying green spaces and scenery can also improve overall satisfaction. As for other types of travel the basics, such as smooth traffic flow, have to be in place first. The Road Modernisation Plan, which is a major investment programme consisting of hundreds of projects to make London's road network safer and more reliable, addresses the key aspects of satisfaction for cyclists, pedestrians, private car and commercial drivers.

Figure 7.5 Key frustrations and annoyances for road users.



Source: TfL Customer and Employee Insight.

Cycling is an active means of travel and maintaining momentum is a priority for cyclists. The things that annoy them most are the behaviour of other road users and having to stop and start in traffic. This is particularly annoying as it reduces the feeling of being in control which is a key motivator for choosing to cycle. The condition of the highway and provision of dedicated cycle lanes are also important; potholes or a lack of cycling facilities makes cyclists feel that their needs are not being addressed.

Walking can be an active choice or incidental to travelling and positive and negative emotions can exist simultaneously. Pedestrians can feel their needs are not prioritised. Control is less consciously noticed but still at the heart of pedestrian satisfaction. This is closely linked to ease of movement, a relaxed experience with pleasant interactions with others and personal comfort, such as places to stop and rest. Stress is more of a secondary emotion as walking is generally associated with lower levels of frustration. A pleasant environment and open spaces also make walking an enjoyable experience.

### Formulating a model of what 'good service' looks like

To provide good customer service and demonstrate that every journey matters, TfL must consistently provide the things that customers expect as a minimum and those things that show we are continually improving. Until we get the basics right, which includes both hygiene and critical success factors in figure 7.6, we will not be able to make a real difference to our customers' everyday experience and satisfaction.

## 7. The Customer Experience

Figure 7.6 Our strategy for improvement.



Source: TfL Customer and Employee Insight.

Hygiene factors are things that do not in themselves improve customer satisfaction, but their lack reduces satisfaction. Safety is a prime example of a hygiene factor. Organisations must reach minimum standards, but further investment will not increase satisfaction. Critical success factors are key drivers of satisfaction in that the more we provide them, the better satisfaction will be. They can both increase and decrease satisfaction. Reliability is an example of a critical success factor. When we do not achieve the standard expected of us, it results in pain for our customers.

The factors critical to delivering good service centre on reliability and frequency, real-time information and service from our staff. On the roads this means consistent journey times and smooth flowing traffic with real-time information as well as information about the purpose and duration of roadworks.

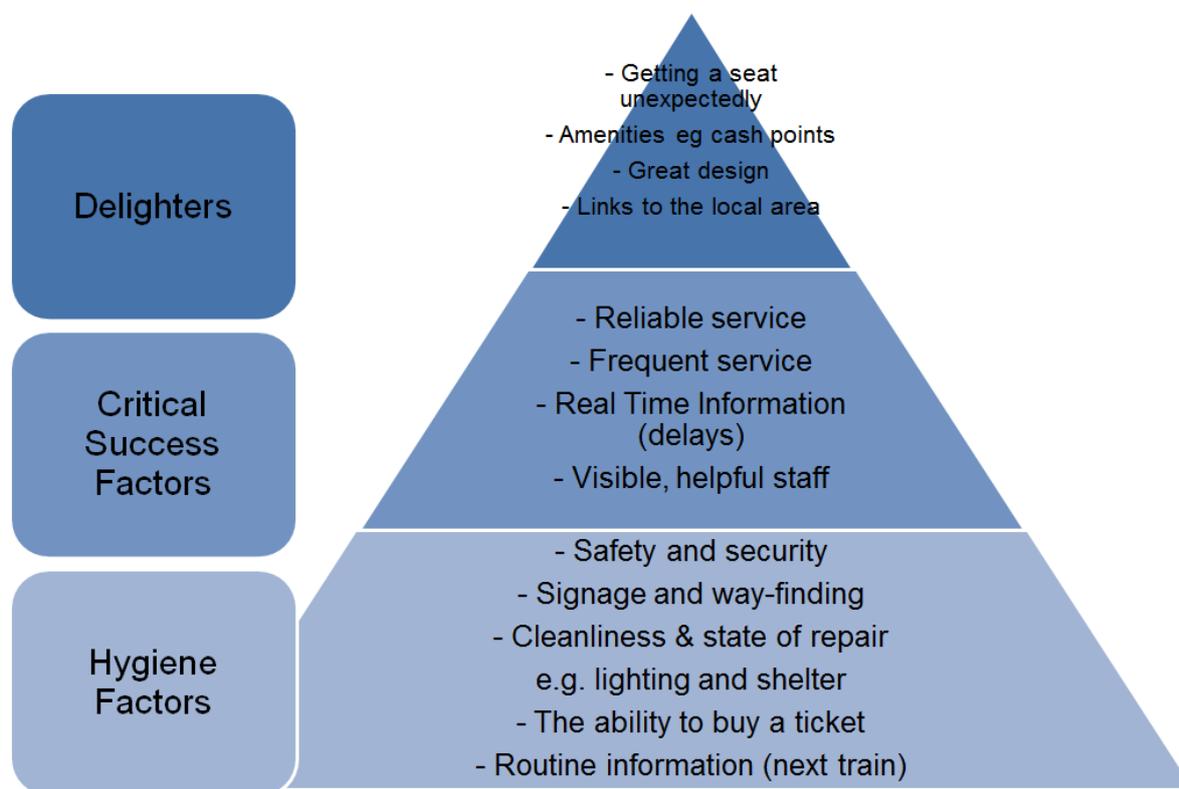
Overall TfL needs to make the customer experience more consistent by addressing the hygiene factors and critical success factors first, removing the pain; we can then apply focus to the things that delight. If we improve delighters first, customers see this as wasting money on 'extras' that should go on the basics – this is a classic mistake in seeking to achieve customer focus.

From our customer research and insight TfL can populate this model for each of our main modes of transport.

### Translating this in to a model for each of the main transport modes

Looking first at Underground and taking into account everything that we know, good customer service looks like figure 7.7.

Figure 7.7 Improving customer service – London Underground.



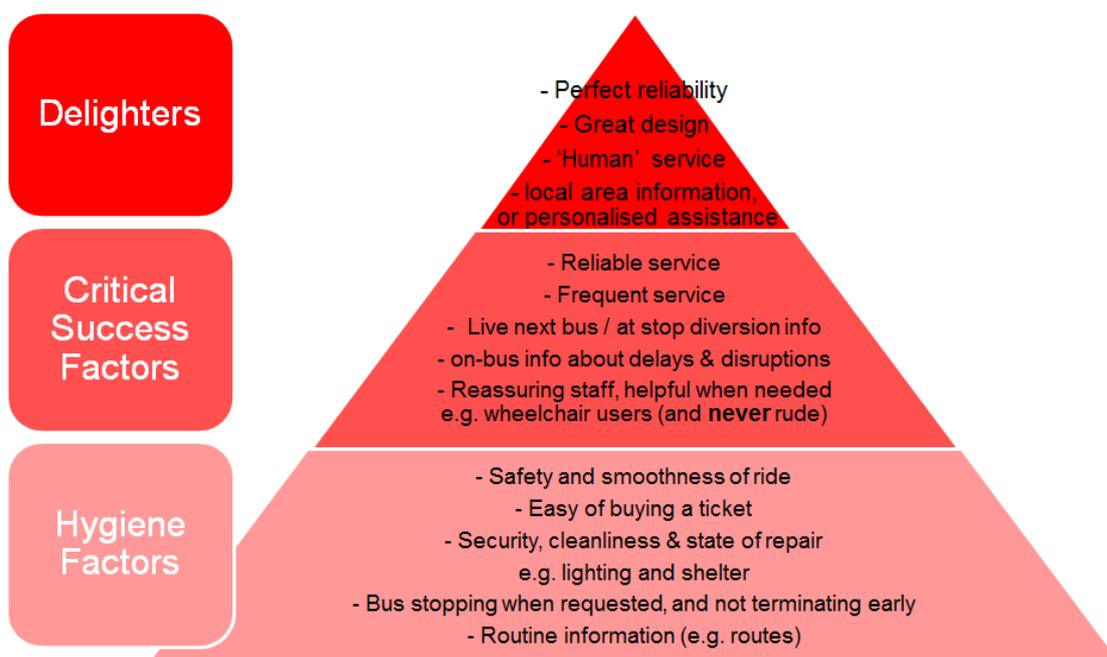
Source: TfL Customer and Employee Insight.

Underground customers expect at the very least that the service will be safe and secure; it will be a clean environment; easy to find their way around and to pay for their journey. When travelling by Underground the service should be consistently reliable; real-time information readily available and accurate, and staff always helpful and approachable. Extras are things like getting a seat when they expect to stand, great design such as new stations or trains, and stations that feel part of the local area.

Buses should be easy for everyone to use to get anywhere – customers should feel welcomed every day. They expect similar hygiene factors of safety, cleanliness, information and ease of buying a ticket. Customers feel pain when journeys are disrupted or buses don't stop when requested. The critical success factors are similar to the Underground, including frequent service, real-time information and helpful staff especially when things go wrong. Customers recognise that traffic impacts on buses, too, so what delights them is perfect reliability and receiving local information or personal assistance. This means each bus customer feels they are being treated like an individual, the experience is personalised, and they feel helped and valued.

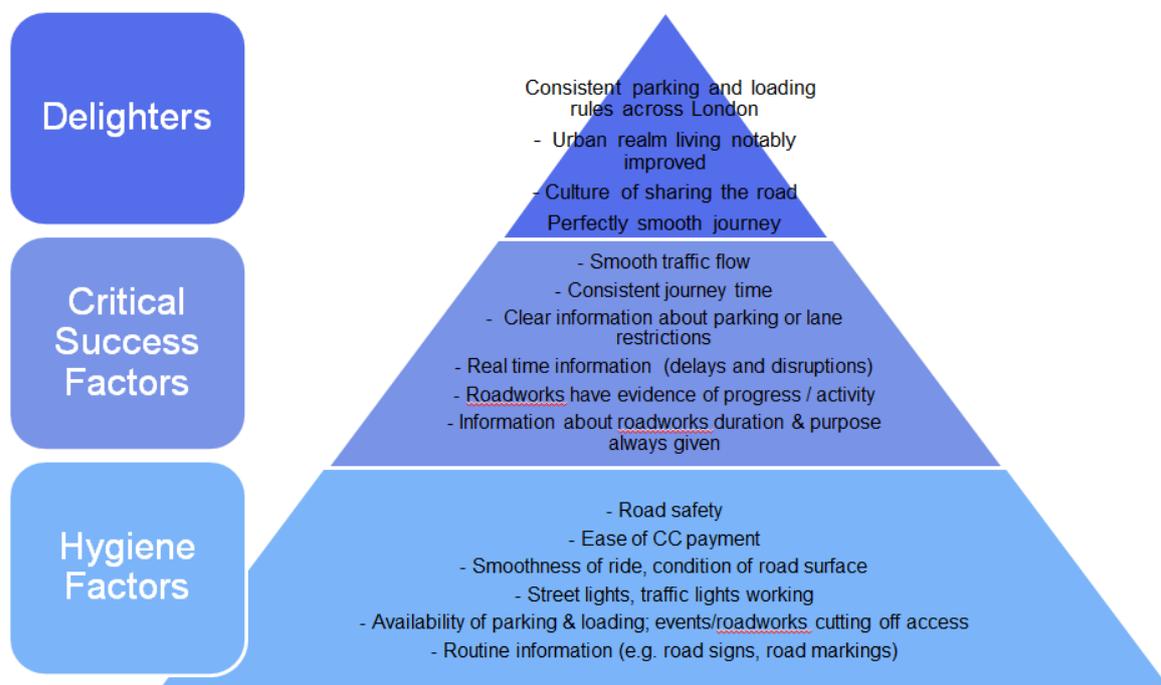
## 7. The Customer Experience

Figure 7.8 Improving customer service – buses.



Source: TfL Customer and Employee Insight.

Figure 7.9 Improving customer service – road users.



Source: TfL Customer and Employee Insight.

On the roads our customers and users expect the environment to be safe and the roads and pavements well-maintained. Information such as road signage and road

markings needs to be clear and accurate. Those who travel in the Congestion Charging zone or who use the cycle hire scheme expect it to be easy to pay.

Improving customer experience means reducing stress levels and improving reliability. This includes traffic flowing smoothly; consistent journey times; cycle hire customers always able to find a bike and a docking station available. Providing up-to-the-minute information about delays or disruptions and clear signage around roadworks with evidence that work is taking place start to demonstrate that we care.

The factors that 'delight' pedestrians and other road users focus on a perfectly smooth journey, dedicated lanes for cyclists, and a culture of everyone sharing the road. Consistent rules for parking and loading, a pleasant environment and urban realm improvements are also part of the top-level delighters for road users.

### **What are the priorities for the future?**

Rising population will put continued pressure on TfL's services. Public transport services will be more crowded making capacity increases imperative; while on the roads there is little scope for capacity improvements.

What TfL can do is keep improving our customer service whether people call in, contact us via Twitter or online, or talk to our staff in person. We will provide new types of training and support to bus drivers and recognise them when they help customers out. We will provide improved real-time information including on the roads and particularly for customers with disabilities. We will make our bus, Tube, rail and DLR stations easier to navigate and pleasant to use. We will design London's urban space and roads to be more pleasant. See section 7.7 below for ways we are using technology to do this.

### **Key priorities**

- Provide a consistently good customer service.
- Address those issues that customers tell us are important and cause the most pain.

For example, for bus customers this centres on information when things go wrong and driver behaviour. On the Tube it is about coordinating service announcements that reflect what the customer is experiencing, helpful staff and simpler fares and ticketing. On the roads the focus is on relieving congestion, reducing hold ups caused by road works and ensuring traffic flows smoothly, plus providing up-to-the minute information if there are problems.

The introduction of new services will also have an impact. Looking to the future, Crossrail tunnelling is nearing completion and work will soon be starting on fitting out the new and fully accessible railway. This and other new services will help meet the demands of a growing population.

## **7.7 Using digital information and technology to improve customer service**

### **TfL's website**

In the 12 months since it launched in April 2014, TfL's re-designed website has received 250 million visitors, with more than 1.2 billion page visits. Satisfaction levels with the website are higher than they've ever been. In the latest customer survey, 90 per cent of respondents rated their experience of using the website as excellent, very good or above average.

With the rapid growth in use of smartphones and tablets, it was recognised that the old website, itself an award winner in previous years, needed to be updated to make it more responsive to customers on the move who increasingly rely on hand-held devices to get information. TfL adopted a customer-driven design process so the site was developed in partnership with users through an extensive period of testing.

This input from customers means that information is provided in a way that suits them. It is easy to access and responsive to all types of mobile device. It is also cleverer – remembering, for instance, customers' settings and their last five journeys providing a more personalised service. In the coming months, Journey Planner options for bus and cycle hire users will be improved, as will the travel alerts service. The 'Help and contact' page will also be modified to make it easier for customers to ask questions or raise issues.

We also make travel data openly and freely available to more than 6,000 app developers. There are now 30 data feeds available to developers and more than 360 apps have been created that are helping customers to see when their next train is due or decide which journey to take.

TfL's goal is to ensure that any person needing travel information when they are in the Capital can get it wherever and whenever they wish, in any way they want.

### **Social media feeds**

Demand for TfL's social media feeds continues to rise strongly, with 2.3 million followers on Twitter and Facebook receiving real-time updates on bus and rail services and roads status. Since April 2014, a further 150,000 people have signed up to the @TfLTrafficNews Twitter feed, taking the total number of followers to 350,000 and TfL now has 13,500 followers of our @TfLAccess feed, designed to help disabled customers.

### **Email updates**

Based on customers' individual journeys and travel habits, TfL sends out regular email updates with information ranging from changes to our services to more convenient ways to pay. During 2014/15 we sent more than 263 million tailored email updates across more than 1,000 campaigns.

### **Big data**

London's rapid growth provides us with many exciting challenges; not least our customers' expectation that information and responses will be instantly accessible – and increasingly personalised – travel information. The city's population is constantly on the move. The 26.6 million trips taken on an average day (a significant

proportion of which are made with the 9.46 million Oyster cards that are in regular use) are captured by TfL's ticketing and other automated systems, providing a huge amount of information – 'big data' – about how people travel around the Capital.

TfL is actively analysing and improving its capability to apply big data to provide better transport: we can measure and anticipate the impact of changes to our services, as well as the effects of alterations to London's landscape such as new housing, offices and shopping developments. Of course, to protect customers' private information, TfL removes all personal details from the data that we analyse: but while the information used is anonymised, the benefits are increasingly personalised.

As part of our work to manage rising travel demand, we are using big data to develop programmes that encourage customers to explore alternative travel options. This is particularly useful during peak times when the transport system is close to capacity. With the information our customers provide, their needs can be 'segmented'. This means that we can email them with travel information updates that match their travel patterns and typical choice of transport service. TfL is also using big data to send automatic refunds to customers when there has been a material delay to their journey.

## **7.8 Customer perception and satisfaction of the wider transport experience**

Previous Travel in London reports have detailed a wide range of improvements to aspects of the customer experience, and the overall impact of these on selected customer perception/satisfaction indicators related to the wider transport environment in London that have been tracked as part of the formal MTS strategic outcome indicator set.

Results are presented in terms of mean scores out of 100 (these are not percentage scores), based on a response ranking system from zero (lowest satisfaction) to 10 (highest satisfaction). TfL interprets these scores in a semi-subjective way, based on experience (this albeit open to different interpretation by different people). Figure 7.10 shows the available time series for these indicators – note that not all indicators are available on a consistent basis for the entire review period, and that TfL's subjective assessment of the scores is represented by the bar to the right of the graphic.

### **Perception of journey experience**

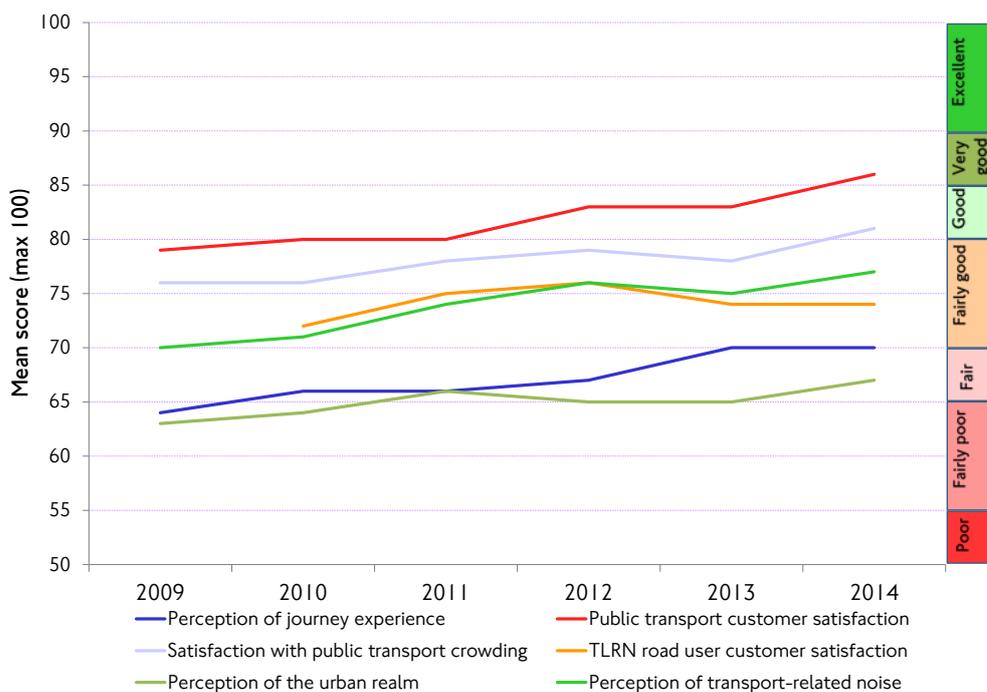
This indicator looks at how London residents perceive their journeys overall. It complements mode-specific scores reported above and recognises the complex interaction between modes that is typical of travel in London.

The average satisfaction rating for travel in the Capital among Londoners in 2014 was 70 out of 100. This was the same as in 2013, but reflecting a substantial uplift since the earliest measure in 2009, due to the range of improvements described above in section 7.5.

### Public transport customer satisfaction

This is a composite indicator based on scores for each of the individual modes weighted by their respective share of total public transport travel in London (see also figure 7.2 and the subsequent analysis). Scores have improved over recent years, with a particular improvement to a value of 86 in 2014 – a ‘very good’ score according to TfL norms.

Figure 7.10 Summary of trends in perception-based MTS strategic outcome indicators for transport and quality of life. Mean scores out of 100.



Source: TfL Customer and Employee Insight.

### Satisfaction with public transport crowding

Scores for this indicator have increased gradually over the review period, reaching a new high of 81 in 2014. The values correspond to a ‘good’ assessment according to TfL criteria.

### TLRN road user customer satisfaction

This indicator is defined as the satisfaction of London residents with the operation of the Transport for London Road Network. The survey includes those who travel on the TLRN by car (as driver), bus, cycle, motorcycle, commercial vehicle or as a pedestrian. The index has been broadly stable over the review period at between 74 and 76, with a value of 74 in the latest available year.

### Perception of urban realm

This indicator has shown an overall trend of slow improvement over the review period. Scores are relatively low compared to those that look at aspects of the transport system specifically, reflecting the fact that transport occurs in the context

of the wider urban realm, not all of which can be controlled directly by transport providers.

#### **Perception of transport-related noise in local area**

Thinking about the area where they live, Londoners rated their satisfaction with transport-related noise as 77 out of 100 on average in 2014, which is regarded as being 'fairly good' according to TfL's scale, and continues a steady upward trend in this indicator over the previous five years.

## 7. The Customer Experience

## 8. Transport connectivity, physical accessibility and understanding London's diverse communities

### 8.1 Introduction and content

This section considers themes around the connectivity and accessibility provided by the transport network. The key role of London's transport system is to provide access to jobs, services and other opportunities so that London can function effectively and its economy continues to grow. Although London has relatively dense transport networks, on a day-to-day level it is known that the availability of transport can still act as a constraint on, for example, the ability of people to reach suitable employment opportunities. Furthermore, as London's population continues to grow, new and improved transport links to cater for this growth assume increasing importance.

Using TfL's tools such as PTALs and the newly-released WebCAT connectivity analysis tool, this chapter examines the improvements that have taken place over the relatively short-term, corresponding where possible with the nominal baseline of 2008 for the MTS, as well as looking forward to what can be expected in 2031, given committed schemes.

Disabled people face particular barriers in accessing and using the transport network. The chapter picks up this theme by looking at how physical accessibility to the networks has improved over recent years.

It then broadens the canvass to look at London's diverse communities and transport more generally, focusing on what we know about the specific requirements of these groups, and how this evidence informs TfL's plans for improvements over the coming years.

### 8.2 Key trends – transport connectivity and physical accessibility

- Typically, for people living in outer London, between 0.25 and 0.5 million jobs are potentially available from their home location within 45 minutes travel time. However, this rises to typically around 2.5 million jobs potentially available to a resident of central London. This measure of access to jobs has increased by an average of 5.2 per cent across London over the period 2009–2015, with the average Londoner able to reach slightly more than 1 million jobs within 45 minutes. However, this largely reflects the background increase to the number of jobs available in London as opposed to dramatic improvements to network connectivity (although east London has benefitted in particular from new links provided by London Overground).
- A more substantial 'step change' in this indicator will arise with the full opening of Crossrail in late 2019, alongside the expanded Thameslink network, which will offer a dramatic improvement in cross-London connectivity. It will mean, for example, that 50 per cent more jobs will be potentially reachable from Ilford town centre in 2031 compared to 2011.
- In terms of access to public transport, as measured through TfL's PTAL index, there has been a 14.2 per cent improvement (Greater London level average) between 2008 and 2015, reflecting numerous large - and small-scale improvements over the period, with an aggregate improvement of 23.6 per cent expected between 2008 and 2021, given currently-committed schemes.

## 8. Transport connectivity, physical accessibility and understanding London's diverse communities

- We continue to invest to improve levels of physical accessibility to the transport networks. The composite indicator that measures this has increased from 36 per cent in 2008/09 to 54 per cent in 2014/15, this being the proportion of the public transport network that is fully accessible. This is a substantial improvement, but still means that just under half of the network is not fully accessible, therefore those with travel-related disabilities often face longer journeys and some journeys may not be physically possible.

### 8.3 Transport connectivity – access to jobs

One measure that can be used to quantify the development of the transport networks in terms of the support that they give to London's economy is the number of jobs (whether filled or currently vacant) that are potentially available within a given travel time from a particular residential location. The basis for assessing this is a travel time contour of 45 minutes by the principal public transport modes, expressed as an aggregate measure across Greater London.

Figure 8.1 shows these results for 2015. The map should be interpreted in terms of, from any one point, the number of jobs that are potentially reachable in 45 minutes by public transport. As might be expected, the map reflects the concentric pattern of employment density and also the primarily radial orientation of the public transport networks. Typically, for people living in outer London, between 0.25 and 0.5 million jobs are potentially available from their home location within 45 minutes travel time. However, this rises to typically around 2.5 million jobs potentially available to a resident of central London.

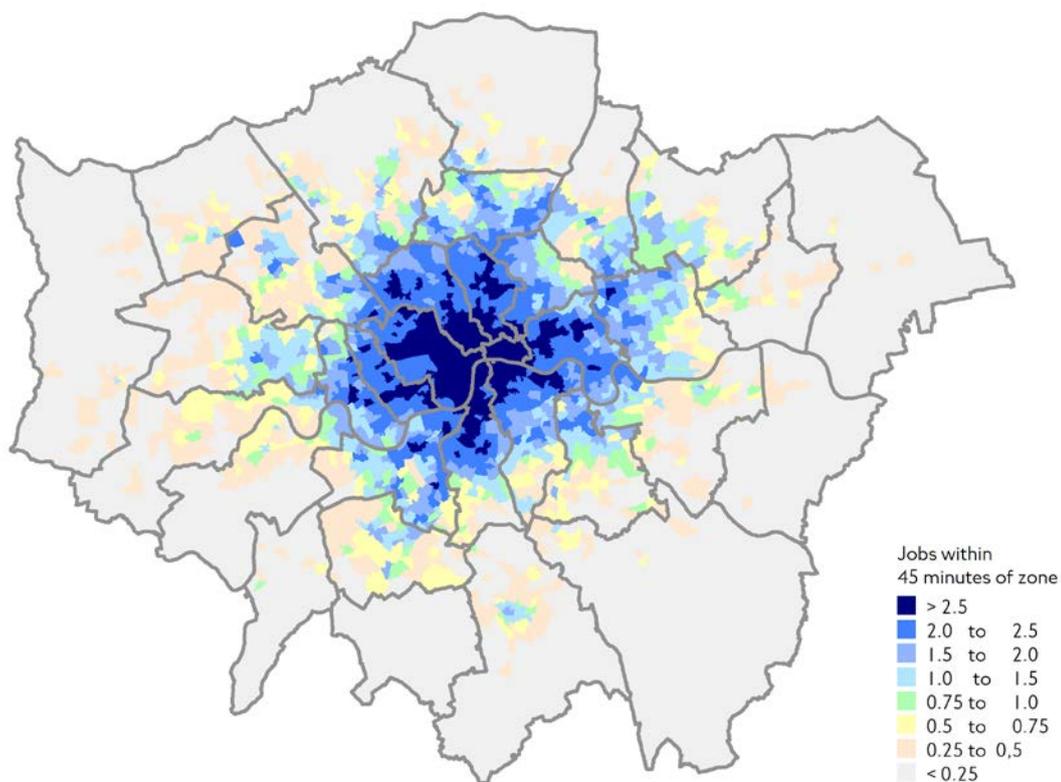
Table 8.1 shows the available time-series for this indicator, and shows steady progress in terms of increased access to employment in London, with a 5.2 per cent increase between 2009 and 2015 (using values on a consistent basis). In interpreting this indicator, it should be recognised that the recent increase to the number of jobs available in London will also have an impact, as more jobs will have become available irrespective of any change to the transport networks.

Table 8.1 Number of jobs available by mass public transport within 45 minutes travel time, 2013. London-wide average of small-area scores.

Year	Number of jobs available within 45 minutes travel time
2006	937,900
2009	959,400
2011	980,200
2012	989,450
2013	995,950
2014	1,002,523
2015	1,009,124

Source: TfL Planning, Strategic Analysis.

Figure 8.1 Number of jobs available by mass public transport within 45 minutes travel time, 2015.



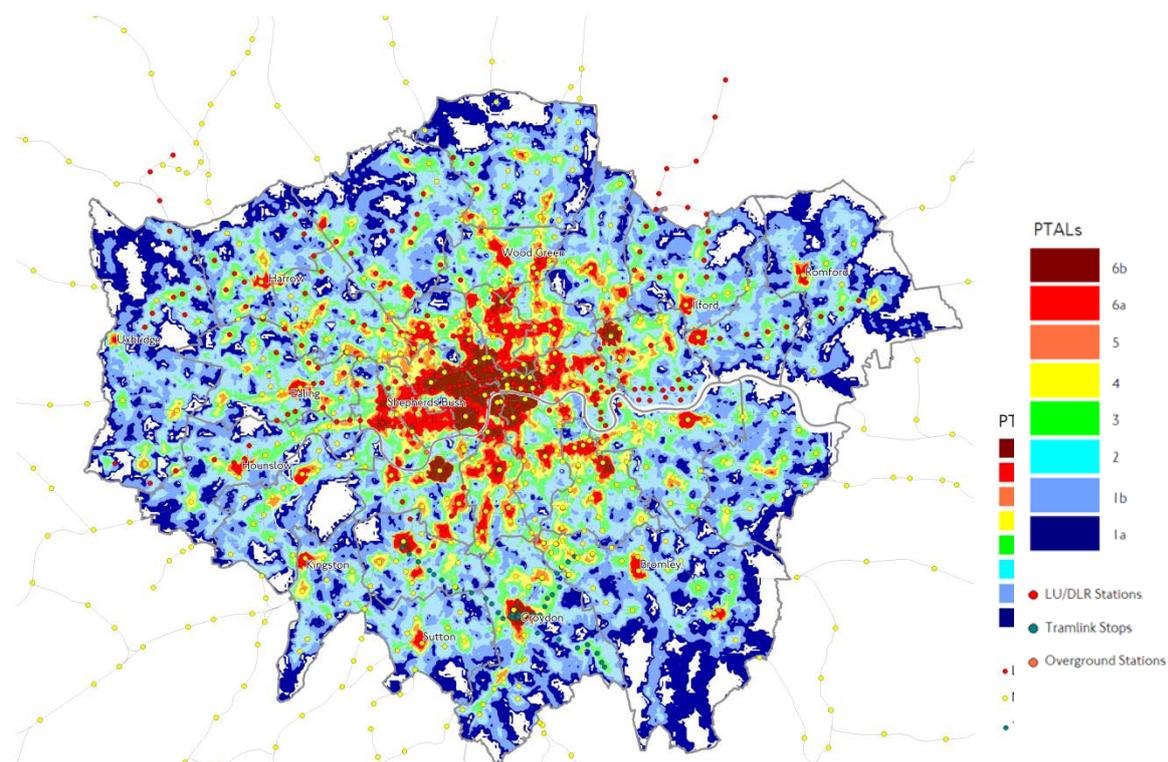
Source: TfL Planning, Strategic Analysis.

#### 8.4 Transport connectivity – access to public transport

PTALs (public transport access levels) indicate relative connectivity to the public transport network for any location in London. The term ‘connectivity to the network’ indicates that the PTAL measure focuses on the proximity to public transport services, and not on where these services actually take people to or indeed how accessible they are to all members of the population.

Figure 8.2 shows Greater London PTALs for 2015. Clearly central London is dominated by high PTAL values, as are other metropolitan town centres, such as Croydon, Kingston and Harrow. The predominantly radial orientation of the main public transport corridors is also visible in the figure. Note that PTAL values are on a scale from 1 to 6, with 6 representing the highest connectivity level.

Figure 8.2 Public transport access level, 2015.



Source: TfL Planning, Strategic Analysis.

Despite frequent incremental improvements to the public transport networks, the overall pattern of PTAL scores changes only slowly at the Greater London level. However, specific additions to the networks, such as the opening of the East London line, and Games-related improvements around Stratford, can make a substantial difference locally, as has been illustrated in previous Travel in London reports. At the borough level (in terms of average PTAL scores across a borough) the nature of these improvements over time becomes more apparent (table 8.2). Note that the actual PTAL score, on a scale from 1 to 6, is derived from an access index, which is on a linear scale.

Here, looking over the broad term covered by the MTS, improvements in all but one London borough can be seen. The overall PTAL score (access index) for Greater London increased by 14.2 per cent between 2008 and 2015.

Projecting forwards to 2021, post-dating the expected opening date of Crossrail, further improvements are expected, equating to an improvement of 23.6 per cent between 2008 and 2021, although note that Crossrail will largely use existing infrastructure outside of the central area, and that PTAL values in central London are already very high. Nevertheless the number of boroughs with the highest average PTAL value of 6 will rise from two in 2008 to five in 2021.

## 8. Transport connectivity, physical accessibility and understanding London's diverse communities

Table 8.2 Public transport access levels by borough – 2008, 2015 and 2021.

Borough	PTAL access index 2008	PTAL value 2008	PTAL access index 2015	PTAL value 2015	PTAL access index 2021	PTAL value 2021
Havering	2.9	1b	3.0	1b	3.2	1b
Bromley	3.7	1b	3.9	1b	4.0	1b
Hillingdon	3.5	1b	3.9	1b	4.0	1b
Bexley	4.4	1b	4.9	1b	5.0	1b
Enfield	4.5	1b	5.0	1b	5.1	2.0
Richmond-upon-Thames	5.0	1b	5.2	2.0	5.5	2.0
Sutton	5.8	2.0	5.8	2.0	5.8	2.0
Kingston-upon-Thames	5.4	2.0	5.8	2.0	5.9	2.0
Barnet	5.4	2.0	5.9	2.0	6.0	2.0
Redbridge	5.6	2.0	6.1	2.0	6.2	2.0
Barking & Dagenham	5.6	2.0	6.0	2.0	6.4	2.0
Harrow	4.7	1b	6.2	2.0	6.6	2.0
Hounslow	5.9	2.0	6.3	2.0	6.6	2.0
Croydon	7.0	2.0	7.2	2.0	7.2	2.0
Waltham Forest	6.9	2.0	8.3	2.0	8.5	2.0
Greenwich	8.3	2.0	8.8	2.0	9.1	2.0
Merton	8.6	2.0	9.0	2.0	9.2	2.0
Ealing	8.4	2.0	8.9	2.0	9.3	2.0
Brent	9.3	2.0	9.7	2.0	10.2	3.0
Newham	9.6	2.0	11.5	3.0	12.8	3.0
Haringey	11.7	3.0	13.1	3.0	13.2	3.0
Lewisham	12.2	3.0	13.1	3.0	13.2	3.0
Wandsworth	11.7	3.0	14.4	3.0	14.9	3.0
Hammersmith & Fulham	15.0	3.0	16.8	4.0	18.4	4.0
Hackney	15.5	4.0	17.9	4.0	19.1	4.0
Tower Hamlets	16.4	4.0	19.0	4.0	22.2	5.0
Southwark	16.7	4.0	21.0	5.0	22.5	5.0
Lambeth	21.0	5.0	22.7	5.0	22.7	5.0
Kensington and Chelsea	21.9	5.0	23.7	5.0	26.2	6a
Camden	22.8	5.0	24.8	5.0	27.0	6a
Islington	23.9	5.0	27.2	6a	29.5	6a
City of Westminster	35.3	6a	40.2	6b	44.1	6b
City of London	75.3	6b	91.4	6b	109.8	6b
<b>Average GLA</b>	<b>12.7</b>		<b>14.5</b>		<b>15.7</b>	

Source: TfL Planning, Strategic Analysis.

PTALs are relatively simple calculations because they only measure access to the public transport network, and ignore what happens once a passenger has 'entered' this network. They do not consider aspects of the journey such as the final

destination, vehicle capacity or service quality. For this reason PTALs should not be used to estimate how many people will actually use public transport. Two sites with the same PTAL scores will most likely offer different levels of public transport service.

## 8.5 Using PTALs – TfL's WebCAT tool

### What is WebCAT?

TfL's web-based Connectivity Assessment Toolkit (WebCAT) was launched in April 2015. The toolkit currently contains two main tools: PTAL and travel time mapping (TIM). WebCAT allows users to create their own PTAL maps and view PTALs for future scenarios. PTAL values are pre-calculated using a grid of points at 100 metre intervals across the Greater London area. TIM complements PTALs by providing travel time analysis for any point in London. Users of WebCAT have a wide variety of different scenarios they can use and compare travel times for a chosen location now and in the future, based on the following parameters:

- Year: 2011, 2021, 2031
- Mode: All PT, bus, step-free
- Time of day: AM peak, inter-peak, PM peak
- Direction: to, from, average.

It also includes new features such as PTAL values estimated for future scenarios based on suggested improvements to the transport network. WebCAT can be accessed at: <https://tfl.gov.uk/info-for/urban-planning-and-construction/planning-with-webcat/webcat>

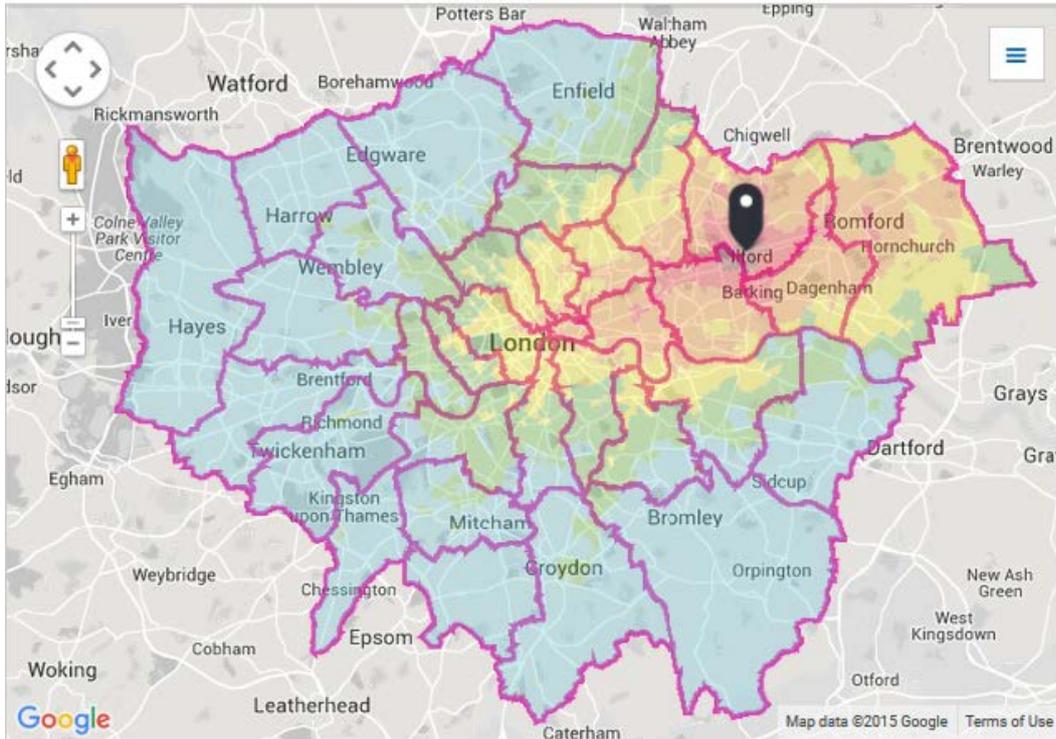
### Using WebCAT – an example of improved connectivity – Ilford town centre in the weekday AM peak

Figures 8.3 and 8.4 demonstrate the capabilities of WebCAT and also illustrate the scale of connectivity improvements that are expected to arise, primarily in this case from Crossrail, over the course of the current decade. The maps both show the 'catchment' of Ilford town centre, in terms of locations in London that are accessible within a series of 15 minute travel time contours. The boundary between the blue and green areas represents the 45 minute contour – a travel time that is regarded as a reasonable reflection, on average, of an employment catchment.

Looking at the position in 2011, being broadly reflective of 2008, the large majority of central and east London is accessible from Ilford town centre within 45 minutes, largely reflecting the main railway line into Liverpool Street and onward connections from there. In 2021, following the opening of Crossrail, the 45 minute contour is clearly extended to cover more parts of west London, reflecting the new direct services provided, as well as more generally to parts of south and north London.

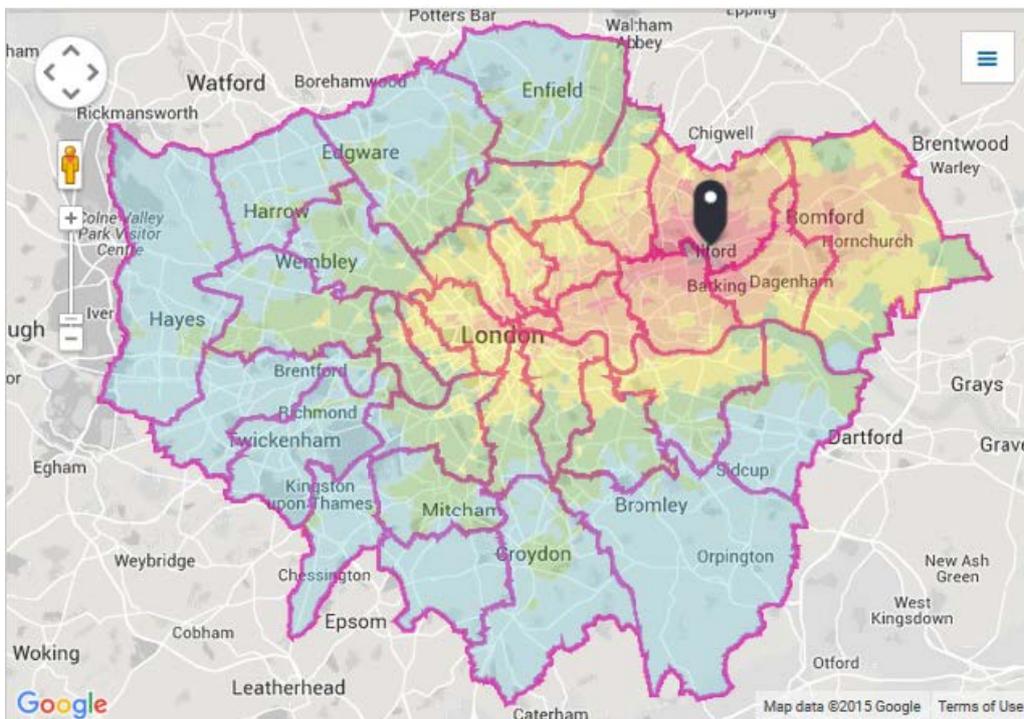
8. Transport connectivity, physical accessibility and understanding London's diverse communities

Figure 8.3 Ilford town centre catchment. 15-minute travel time contours for 2011 by public transport.



Source: TfL Planning, Strategic Analysis.

Figure 8.4 Ilford town centre catchment. 15-minute travel time contours for 2021 by public transport.



Source: TfL Planning, Strategic Analysis.

## 8. Transport connectivity, physical accessibility and understanding London's diverse communities

Table 8.3 shows the change in the number of people and jobs that are located within each travel time contour in relation to Ilford town centre.

**Table 8.3** Ilford town centre catchment. Number of people and jobs accessible within travel time contours – 2011 and 2031 compared.

### 2011 forecast population

Time	<30 minutes	<45 minutes	<60 minutes	<75 minutes
2011 network	349,800	1,314,300	2,547,700	4,532,800
2031 network	402,600	1,543,900	3,271,500	5,762,400

### 2011 forecast employment

Time	<30 minutes	<45 minutes	<60 minutes	<75 minutes
2011 network	130,500	1,240,500	2,599,500	3,456,400
2031 network	128,800	1,871,200	2,902,100	3,937,400

Source: TfL Planning Strategic Analysis.

### Using WebCAT – town centre connectivity

Town centres are important as they contain concentrations of services and opportunities that are commonly accessed from both the local area and further afield. Table 8.4 looks at connectivity to 'metropolitan' and 'major' town centres on a borough basis, demonstrating the scale of improvement in connectivity that is expected to take place between 2011 and 2031, equating to the broad horizon of the MTS, given currently-committed schemes.

It can be seen that there is widespread general improvement, with certain boroughs particularly benefiting from new infrastructure such as Crossrail.

8. Transport connectivity, physical accessibility and understanding London's diverse communities

Table 8.4 Change in connectivity to metropolitan and major town centres in London 2011 to 2031.

Borough	Average no, of centres accessible within 45 minutes 2011	Average no, of centres accessible within 45 minutes 2031	Difference	Average time to the nearest centre 2011	Average time to the nearest centre 2031	% change
Barking & Dagenham	4	4	0	25.2	24.9	-1.3
Barnet	3	4	1	28.8	27.4	-4.9
Bexley	3	3	0	26.0	25.8	-1.0
Brent	6	8	1	22.4	22.2	-1.0
Bromley	3	3	0	25.8	25.7	-0.4
Camden	16	20	4	16.6	16.2	-2.6
City of London	25	30	5	21.1	20.1	-5.0
City of Westminster	22	27	5	19.0	18.0	-5.1
Croydon	3	3	0	25.9	25.8	-0.6
Ealing	7	8	1	23.6	23.4	-0.9
Enfield	2	3	1	27.1	26.8	-1.2
Greenwich	6	6	1	18.5	18.3	-1.1
Hackney	9	12	2	17.4	17.3	-1.0
Hammersmith & Fulham	13	15	2	15.1	15.0	-0.8
Haringey	6	7	2	19.8	19.4	-1.6
Harrow	3	4	1	24.3	23.8	-2.2
Havering	2	3	0	28.9	28.7	-0.8
Hillingdon	2	2	1	32.8	31.5	-3.8
Hounslow	5	6	1	22.0	21.8	-0.7
Islington	13	18	5	13.2	13.0	-1.0
Kensington and Chelsea	16	19	3	13.0	12.9	-0.8
Kingston	3	4	0	24.7	24.6	-0.4
Lambeth	14	16	3	18.5	18.2	-1.5
Lewisham	6	7	1	19.2	19.1	-0.6
Merton	8	9	1	20.4	20.1	-1.3
Newham	7	8	1	18.6	18.2	-2.5
Redbridge	4	5	1	25.9	25.1	-3.1
Richmond-upon-Thames	6	6	0	21.5	21.4	-0.5
Southwark	12	15	3	20.2	19.9	-1.6
Sutton	2	3	0	24.4	24.2	-0.8
Tower Hamlets	12	15	3	19.0	18.4	-3.0
Waltham Forest	5	6	1	23.3	23.2	-0.7
Wandsworth	13	15	2	16.3	16.1	-1.4

Source: TfL Planning, Strategic Analysis.

## 8.6 Physical accessibility to the transport system

Previous Travel in London reports have set out statistics describing the accessibility status of key elements of the transport infrastructure. These have been combined into a ‘physical accessibility’ strategic outcome indicator for the MTS, expressed in terms of a weighted percentage score across the modes. The trend for this indicator is one of relatively slow but continuous improvement (table 8.5), and the most recent value for 2014/15 continues this trend, with a score of 54 per cent. Although this score indicates that slightly more than half of the public transport networks are now accessible, it refers to the extent of the network rather than the intensity with which different parts are used. It also reveals that slightly less than half of the network is not fully accessible, according to this definition. The speed of progress with this indicator also reflects the generally low level of historic provision and the large-scale, capital-intensive nature of the changes to infrastructure that are often required.

Table 8.5 Modal composite physical accessibility score.

Year	Composite physical accessibility score (%)
2007/08	(36)
2008/09	(36)
2009/10	37
2010/11	38
2011/12	44
2012/13	46
2013/14	50
2014/15	54

Source: TfL Planning, Strategic Analysis.

Note TfL: values prior to 2009/10 are based on a dataset that differs in minor respects to that used from 2009/10.

## 8.7 Understanding London’s Diverse Communities

### Introduction and scope

The Equality Act 2010 requires TfL to have due regard for the needs of all of London’s communities when developing our services. This section provides an overview of ‘Understanding the travel needs of London’s diverse communities’, a fuller document which sets out in detail a collection of research and insight, looking from a customer perspective: <https://tfl.gov.uk/cdn/static/cms/documents/travel-in-london-understanding-our-diverse-communities.pdf>.

TfL uses this to inform and develop existing and future services by putting the customer at the heart of everything we do. The data used comes from a variety of sources, including commissioned qualitative and quantitative research, published third party reports and external sources such as the 2011 Census and other information from the Office for National Statistics (ONS).

TfL have identified seven groups of Londoners who experience particular barriers when accessing transport:

- Black, Asian and minority ethnic groups (referred to as BAME throughout)

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- Women
- Older Londoners (aged 65 and over)
- Younger Londoners (aged 24 and under)
- Disabled Londoners
- Londoners on lower incomes (with household income of less than £20,000 per year)
- Lesbian, gay, bisexual and transgender Londoners (referred to as LGBT throughout)

TfL recognises that there may be barriers to transport faced by some transgender women and men, however TfL does not yet have sufficient data to provide a detailed analysis. LGB is used where data for transgender women and men is not available.

Considerable equality improvements have been achieved over the past five to ten years. Many of these improvements were centred on the 2012 Games, particularly for accessibility, where substantial investment ensured they were the most accessible ever held.

### Key findings and trends

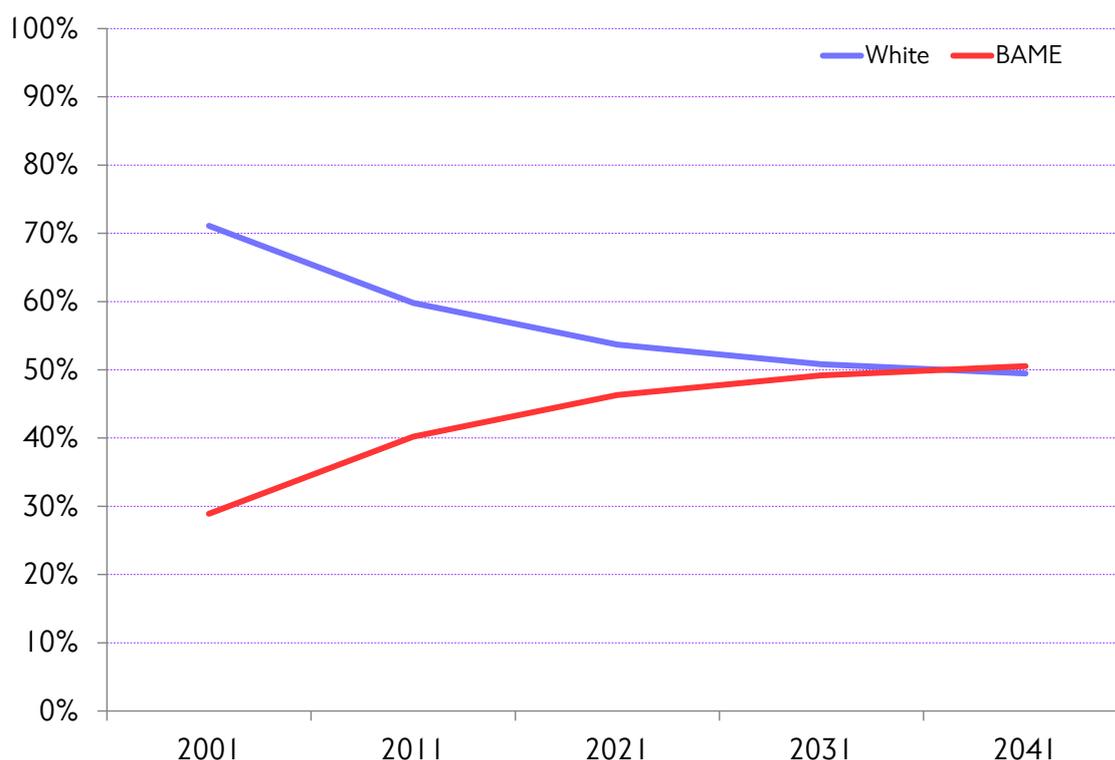
- London is hugely diverse, and this diversity is increasing with the growing population.
- Many of the challenges faced by London's diverse communities can and are being addressed through transport.
- Trip rates have been broadly stable over the last 10 years by equality group, with women continuing to have the highest trip rate and older people tending to make a lower number of trips.
- Walking and bus are the most used forms of transport by the equality groups.
- Barriers to using transport more are consistent across equality groups, with overcrowding, cost of tickets, and slow journey times the three most common barriers (although these are decreasing).
- Some differences do exist by group, for example accessibility-related issues can be a particular barrier for disabled people.
- In general, Londoners do not feel worried about their security or safety while using public transport, although some equality groups such as LGB, BAME and women are the most likely to be worried.
- Use of technology is growing among all equality groups, but still remains lower for older and disabled Londoners.

### London: A diverse, changing city

One of the key changes is an increasing proportion of BAME Londoners, who are projected to reach 50 per cent of the Greater London population by 2038 and expected to increase from 3.3 million people in 2011 to 5.2 million in 2041.

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Figure 8.5 Changing proportion of Londoners of white/BAME ethnicity.



Source: TfL Planning, Strategic Analysis.

The growth in London's BAME population is not expected to be even across each group. Far greater growth is projected in Chinese and Asian communities than black Caribbean and Indian.

Although international immigration into London is falling, previously higher levels now mean that more than half (55 per cent) of births in London in 2012 were to mothers born overseas.

The population is predicted to age in net terms, with the number of people aged 65 and over projected to increase by 75 per cent between 2011 and 2041 compared with a 26 per cent increase of the Greater London population as a whole.

The geographic distribution of age groups across London varies, and therefore the transport challenges in each area will vary. For example, as is described in chapter 11 of this report, outer London is expected to see a particular rise in the population aged 65 years and over, leading to particular requirements and challenges for future transport plans in these areas.

The proportion of younger Londoners (under 25) is however projected to increase at a slower rate than the rest of the population with a 13 per cent increase between 2011 and 2041, although London is still a relatively 'young city'. This is also important from a perspective of future planning since many of the key transport trends seen over the last decade are thought to relate to distinctive and changing travel behaviour by younger people, for example a decrease in driving licence and car ownership.

### Addressing these challenges through transport

An accessible transport system is vital to help address these challenges, to provide opportunities for all of our diverse communities and to make life in London better. Access to a range of transport modes improves access to employment, health, education and leisure services. Enabling walking and cycling for as many as possible as part of a journey, or for the entire journey, will be an important contributor to reducing polluting emissions and improving Londoners' health.

To understand what the barriers to travel are and what can be done to address them; TfL conduct and commission extensive surveys, research and consultation. As well as listening to our customers and stakeholders including specific independent advisory boards such as the Independent Disability Advisory Group (IDAG), we have developed our Single Equality Scheme (SES). This sets out our goals and activities to remove barriers to travel in London.

TfL invests funds across the entire network to improve our services. Recent improvements have included:

- Increasing the number of pedestrian crossings with Countdown timers to 340 sites across London.
- Upgrading 39 additional pedestrian crossings to provide tactile paving and rotating cones/audible alerts. We are aiming to have upgraded all crossings to this standard by 2016.
- Expansion of the Travel Better campaign, which includes raising awareness of the need to be considerate on the Tube, particularly ensuring that seats are provided for those that may need them.
- Additional step-free access at stations, with works in progress at Bond Street, Greenford, Tottenham Court Road, Vauxhall, Victoria and Finsbury Park. Some 45 per cent of Tube and rail stations are now step-free (at least street to platform).
- Tactile paving has been installed on 696 of 711 Tube platforms.
- Successfully trialled 'zero tolerance' areas for advertising boards to reduce street clutter where demand for footways and pavement widths are constrained, providing a more accessible environment to all.
- New trains on the District, Circle, Hammersmith & City and Metropolitan lines. These trains provide level access, wide doors, a 'walk-through' design to reduce overcrowding, dedicated wheelchair spaces, advanced audio and visual announcements and low floors.
- Modification of the Emirates Air Line cable car cabins to allow motorised scooters on board (to a particular size).
- Hosting the first accessible transport exhibition, Access All Areas, to provide people with a range of transport information and give first-hand experience with full-scale mock-ups of Tube stations equipped with ramps and 'talking' bollards which give directions to visually-impaired people. The event was free to attendees and following its success will now be held biannually.

These are just some of the recent improvements that TfL has made. However there is more that we can do to respond to the needs of London's diverse and growing population (see also below).

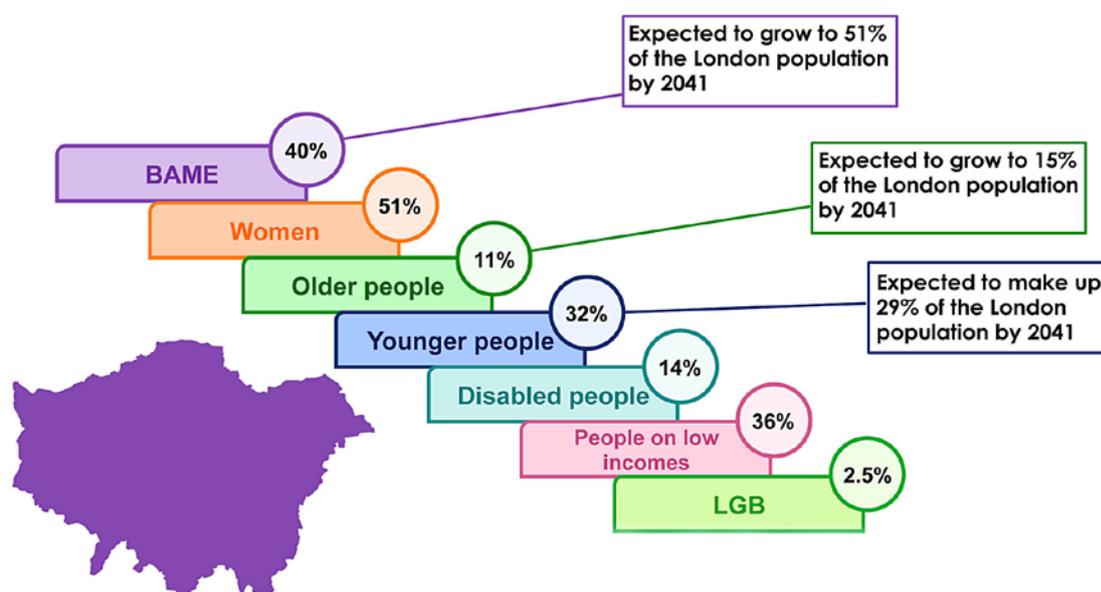
## Understanding our diverse communities

Identifying and addressing barriers to travel requires a good understanding of the nature and extent of barriers to transport use. This section summarises key insights relating to London's diverse population and transport.

### London's demographic profile and 'crossover' characteristics of diverse communities

The 2011 Census recorded that there were 8,173,941 people who usually lived in London and this is set to grow in the coming decades. London's population is extremely diverse and ever-changing. Based on current population trends, it is projected that there will be a greater proportion of BAME and older people by 2041. Figure 8.6 shows some key statistics relating to these groups.

Figure 8.6 Composition of the equality groups in London.



Source: TfL Customer and Employee Insight.

There are differences in the profile of Londoners who make up each equality group, with members of one group often more likely than the population as a whole to also have characteristics that relate to another group. For example:

- Londoners living in a lower income household (less than £20,000 per year) and older Londoners (aged 65 or over) are more likely to be women.
- BAME Londoners are more likely to be younger, while women and those living in lower income households are more likely to be older.
- Men are more likely than women, and white Londoners are more likely than BAME Londoners, to be working, this may be linked in part to the different age profile of these equality groups.

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Figure 8.7 shows these ‘crossover’ characteristics, where, for example, disabled people are more likely than average to also be people on low incomes, and the BAME group has a higher proportion of younger people than average for the whole population. The green circles in the figure indicate where a group has a higher proportion of another characteristic than average for the whole population.

Figure 8.7 Table showing the cross-over of characteristics within each equality group.

	BAME	Older people	Younger people	People on low incomes	Disabled people	Women
BAME		19%	47%	45%	30%	37%
Older (65+)	7%			23%	44%	13%
Younger (24 & under)	36%			31%	9%	28%
Low income (<£20,000)	43%	65%	41%		69%	40%
Disabled	9%	37%	4%	20%		11%
Women	51%	55%	49%	56%	56%	

More likely than other groups to be...

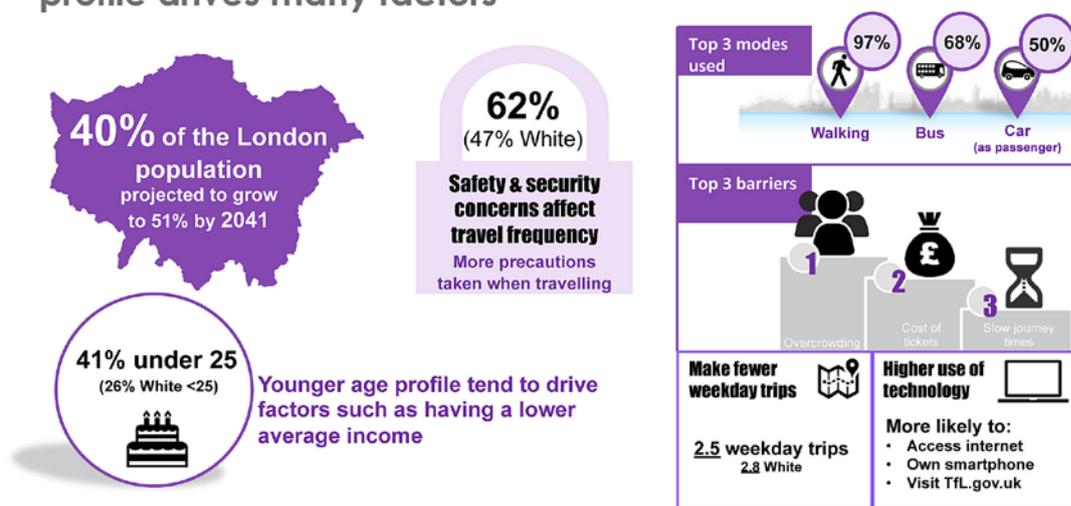
- Younger
- Low income and disabled
- BAME
- BAME, older and disabled
- Low income and older

Source: TfL Customer and Employee Insight.  
 Note: LGBT Londoners are not shown as the data is not available

Figure 8.8 illustrates these interrelationships in terms of BAME Londoners. In this case, the relatively younger age profile among these groups drives a number of specific barriers, for example the cost of tickets.

Figure 8.8 Specific characteristics and barriers to travel for BAME Londoners.

**BAME have more barriers to transport use – their younger age profile drives many factors**



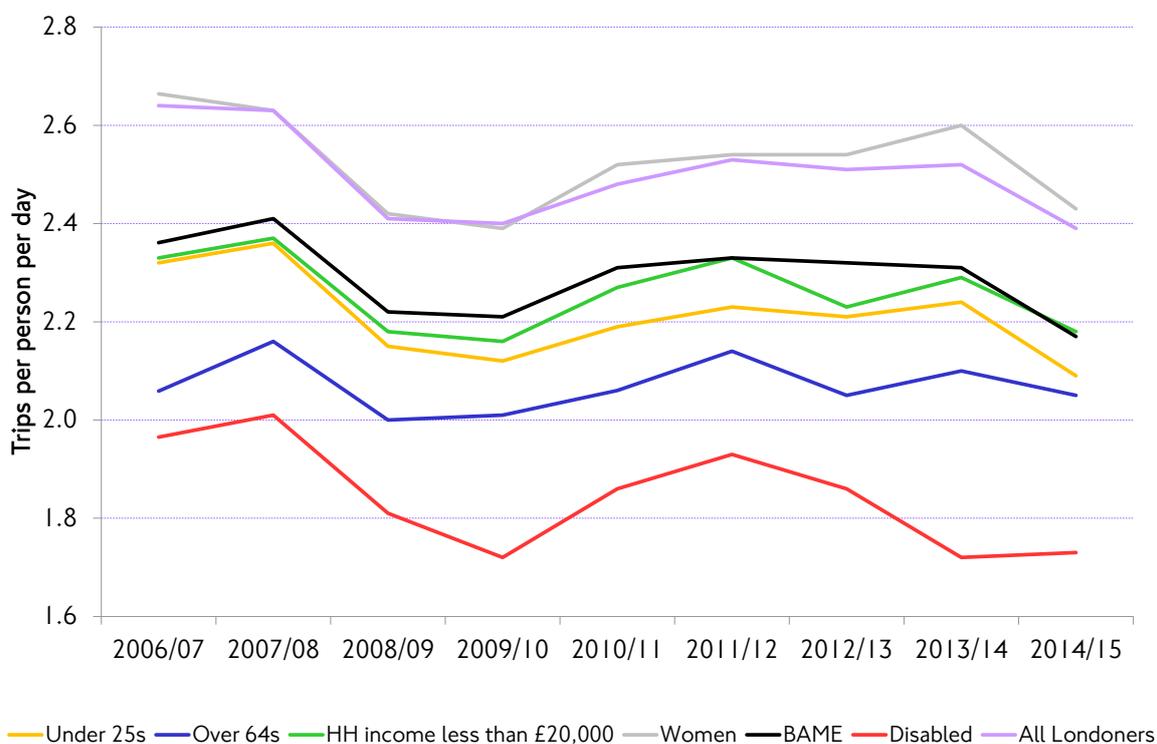
Source: TfL Customer and Employee Insight.

### Travel behaviour

This section looks at aspects of travel behaviour by London’s diverse communities, drawing on TfL’s London Travel Demand Survey over the past ten years of available data (see also chapter 11 of this report).

In terms of trip rates (the average number of trips made per person per day), women make the highest average number of trips per day and older people tend to make a lower number, followed by people on low incomes and younger people (figure 8.9). The relative number of trips made by each group is informative, with disabled people making, on average, 32 per cent fewer trips per person per day than the population as a whole. While overall trip rates have varied, reflecting factors such as the economic recession at the end of the last decade, as well as an apparent decline in the most recent year, the relativity between the groups in terms of trip making has been remarkably stable. It is worth noting that although women make a higher number of trips, they tend to be shorter. This is likely to be due to ‘trip chaining’ where several small trips are linked together.

Figure 8.9 Overall trip rates for an average day by equality group.



Source: TfL Planning, Strategic Analysis.

Table 8.6 shows the frequency with which different groups use the different forms of transport. Walking is the most frequently used form of transport for all Londoners. Almost all Londoners walk (in terms of making a recordable walk trip in the LTDS survey) every week (96 per cent). Disabled Londoners are less likely to walk at least weekly (78 per cent) and almost all younger Londoners walk at least once a week in London (99 per cent).

The bus is the next most frequently used type of transport in London: 61 per cent of Londoners use it at least once a week. Younger Londoners are the most likely equality group

## 8. Transport connectivity, physical accessibility and understanding London's diverse communities

to use the bus at least weekly; 7 in 10 Londoners aged less than 25 do so (71 per cent). Men and white Londoners are slightly less likely than average to use the bus once a week (58 per cent and 57 per cent respectively).

Disabled Londoners and Londoners over 65 years old use the Tube less than other groups on a weekly basis (16 per cent of disabled Londoners and 23 per cent of Londoners aged 65 or over; compared with 39 per cent of all Londoners).

**Table 8.6** Proportion of Londoners (aged five and over) using modes of transport at least once a week 2014/15.

%	All	Men	Women	White	BAME	Aged 24 & under	65+	<£20,000	Disabled	Non- disabled
Base	(15,700)	(7,518)	(8,182)	(10,044)	(5,563)	(4,220)	(2,475)	(5,510)	(1,821)	(14,114)
Walking	96	97	96	96	97	99	88	95	76	98
Bus	61	58	64	58	67	68	64	71	54	62
Car passenger	47	40	54	46	49	64	44	42	44	47
Car driver	38	43	32	42	30	8	42	24	25	39
Tube	40	43	37	41	37	33	24	33	16	42
National Rail	18	19	16	20	14	13	11	12	6	19
Overground	10	11	9	10	10	9	4	9	4	11

Source: TfL Planning, Strategic Analysis.

### Barriers to using transport

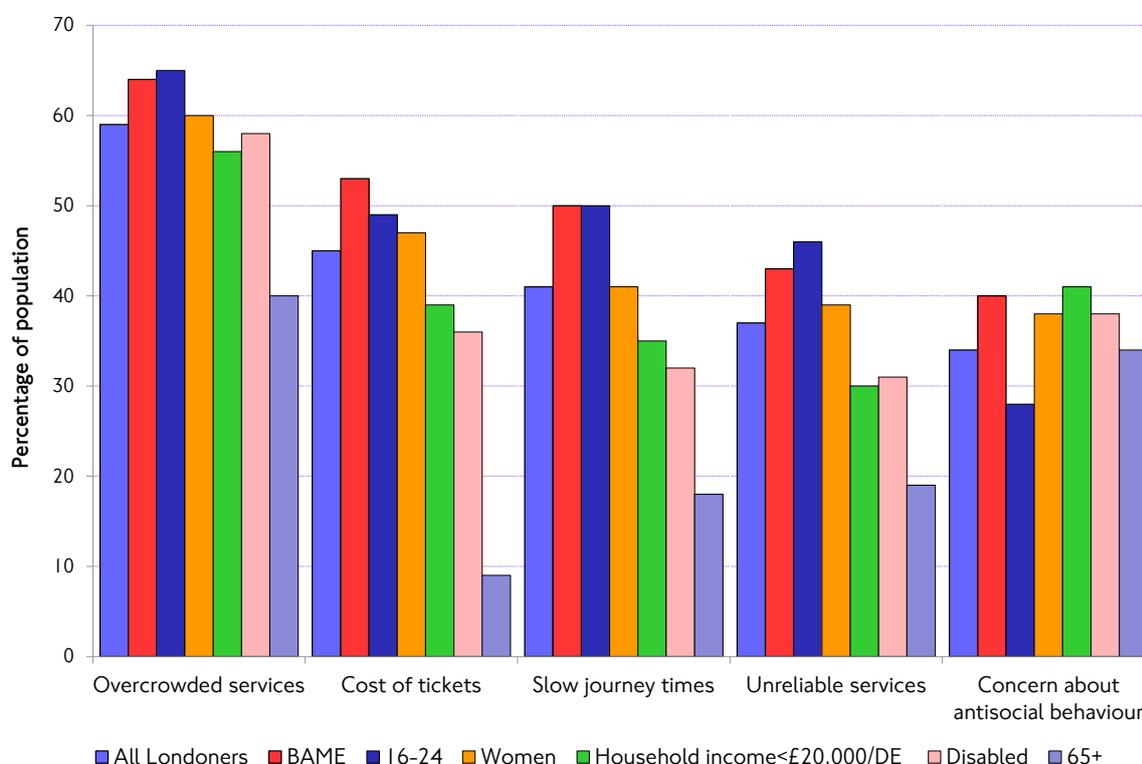
Figure 8.10 identifies specific barriers to using London's transport among diverse communities (TfL's Attitudes to Safety and Security Survey 2014). Barriers to using public transport are largely consistent across equality groups, but some key differences do exist. The most commonly mentioned barrier to using public transport more often across all Londoners is overcrowded services, which is mentioned by 59 per cent of Londoners. The most likely equality groups to cite this barrier are 16 to 24 year olds (65 per cent), BAME Londoners (64 per cent), and women (60 per cent). Some key observations from figure 8.10 are as follows:

- Cost of tickets, safety and security issues, and slow journey times are more commonly mentioned as barriers to public transport use by some equality groups than across all Londoners.
- Cost of tickets is more often mentioned as a barrier to public transport use by BAME Londoners (53 per cent) and younger Londoners (49 per cent aged between 16 and 24).
- Slow journey times is also one of the main barriers to public transport use mentioned (41 per cent of all Londoners). This is a particularly important barrier for younger Londoners aged between 16 and 24 and BAME Londoners (both 50 per cent).
- Concerns about anti-social behaviour and crime are particularly mentioned as barriers to public transport use by Londoners living in DE households (social grade D refers to semi-skilled and un-skilled manual workers and E refers to state pensioners, casual/lowest grade workers and unemployed Londoners) of

## 8. Transport connectivity, physical accessibility and understanding London's diverse communities

whom 41 per cent say that concerns about antisocial behaviour affect their travel frequency, BAME Londoners (40 per cent), disabled Londoners (38 per cent) and women (38 per cent). The average among all Londoners is 34 per cent.

Figure 8.10 Top five barriers to using public transport in 2014, across equality groups.



Source: TfL Customer and Employee Insight.

### Barriers to using transport for disabled people

The main barriers that disabled Londoners experience and which have an impact upon their ability to make public transport journeys as often as they would like are often the same as those expressed by non-disabled Londoners, namely overcrowding and concerns about the antisocial behaviour of other customers. Disabled customers also see accessibility-related issues, cost and comfort as barriers to travel on public transport. Disabled Londoners also experience barriers when using private transport and using London's streets.

Figure 8.11 illustrates the range of frustrations and annoyances that are particularly relevant to disabled Londoners using the public transport networks. Figure 8.12 develops a theme first explored in chapter 7 this report, overlaying the specific frustrations and barriers experienced by disabled customers on those of the more general population. Of particular note is that some failures or inconsistencies that are encountered relatively frequently, for example, lack of priority seating or poor bus driver behaviour, can make a journey exceedingly difficult or even impossible and which, in turn, means that the person is much less likely to take what is perceived as 'a risk' next time. It is particularly important to recognise that these are additional frustrations because those given for the general population also apply.

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Figure 8.11 Disabled customers experience a range of specific frustrations which act as barriers to travel.

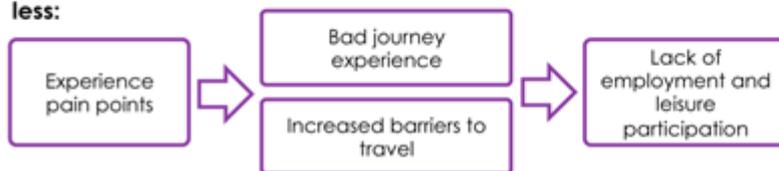
### Disabled customers experience a range of pain points which can lead to barriers to travel

Journey pain points affect a range of Londoners.

Pain points impacting most on disabled Londoners include:



If not addressed, pain points can lead to disabled people travelling less:



**Journey needs**

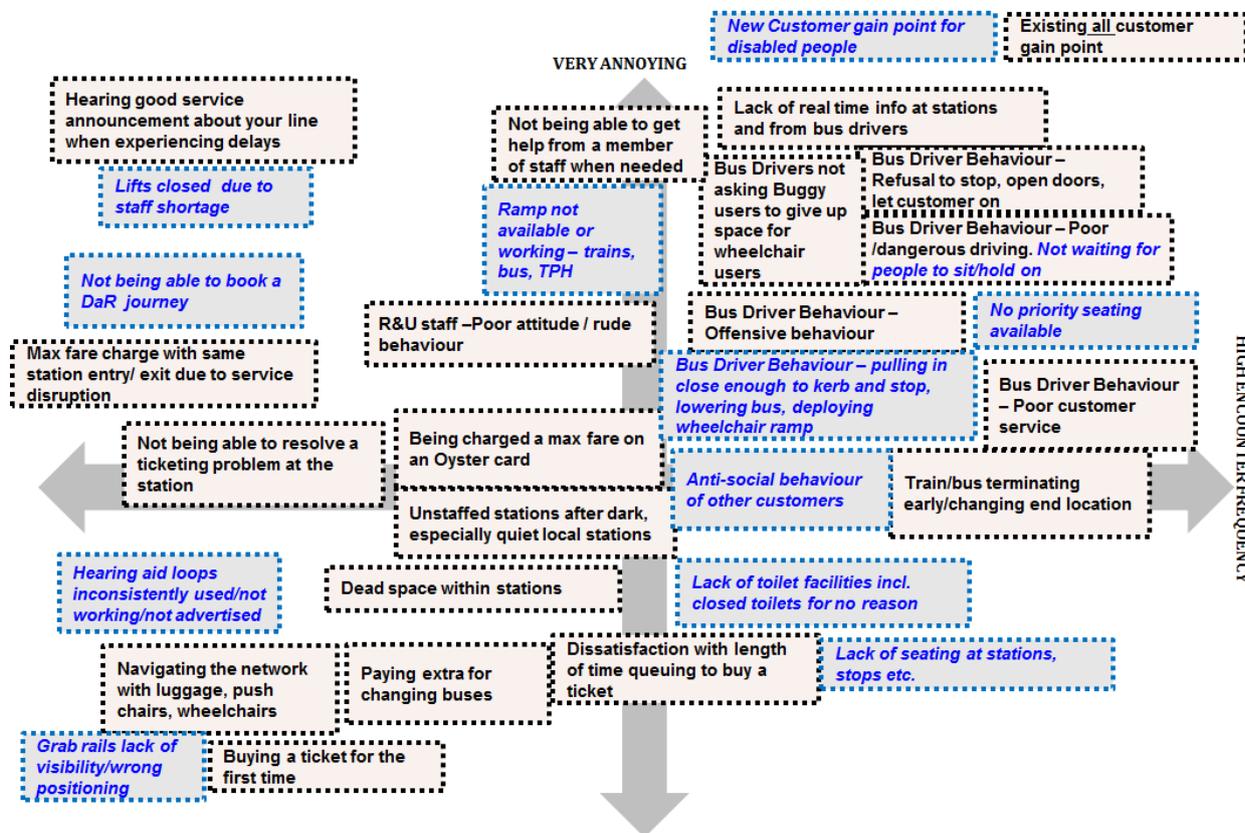
Disabled people's journey needs fit together like cogs in a wheel, each one impacts on another, however reassurance is key.

Pain points will impact reassurance, navigation, access and comfort, this resulting in not having an easy journey and feeling stressed

Other topics into which pain points are grouped include congestion and road management, information, ticketing and environment

Source: TfL Customer and Employee Insight.

Figure 8.12 Specific additional frustrations and barriers affecting disabled people using public transport, in blue, overlaid on those of the general population.



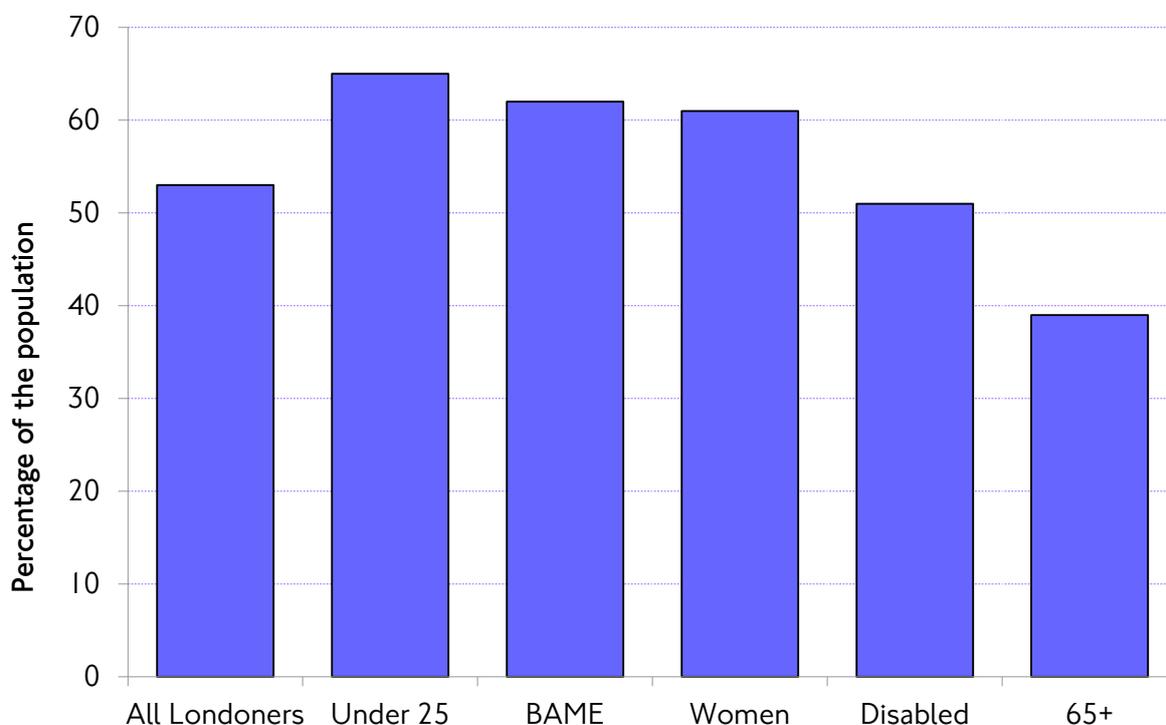
Source: TfL Customer and Employee Insight.



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The relationship between concerns around safety and security and equality groups is complex. For example, age, ethnicity, income and whether a person is disabled are all likely to be interrelated. Likewise the travel patterns, preferences and the area in which someone lives also play a part. See previous section 7.6 for more information on the factors affecting travel experience.

Figure 8.14 Percentage of the population who have safety and security concerns that affect travel frequency, by equality group.



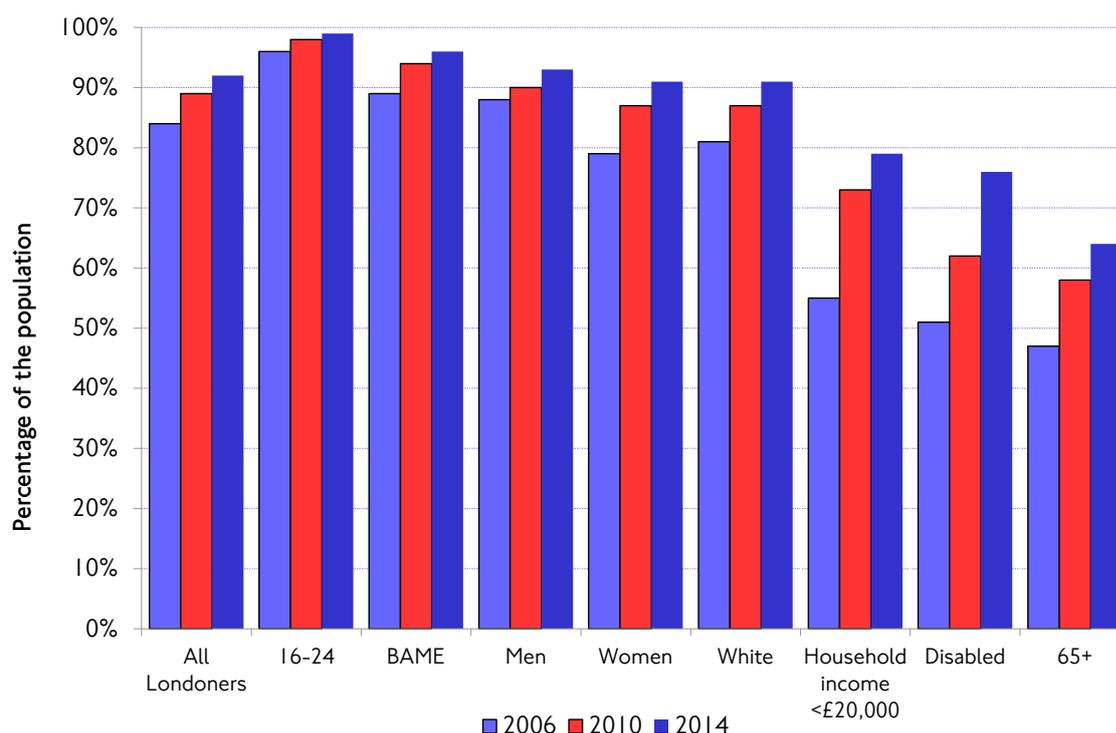
Source: TfL Customer and Employee Insight

### Access to information

Use of technology is growing among all equality groups, but still remains lower for those who are older or disabled compared to the average Londoner (figure 8.15). Ninety-two per cent of Londoners have access to the internet. Older Londoners who are aged 65 or over and disabled Londoners are least likely to have access (64 per cent and 76 per cent access the internet respectively). Almost all young Londoners aged between 16 and 24 have internet access (99 per cent). Use of the internet decreases as age increases.

## 8. Transport connectivity, physical accessibility and understanding London's diverse communities

Figure 8.15 Use of internet by equality group.



Source: TfL Customer and Employee Insight.

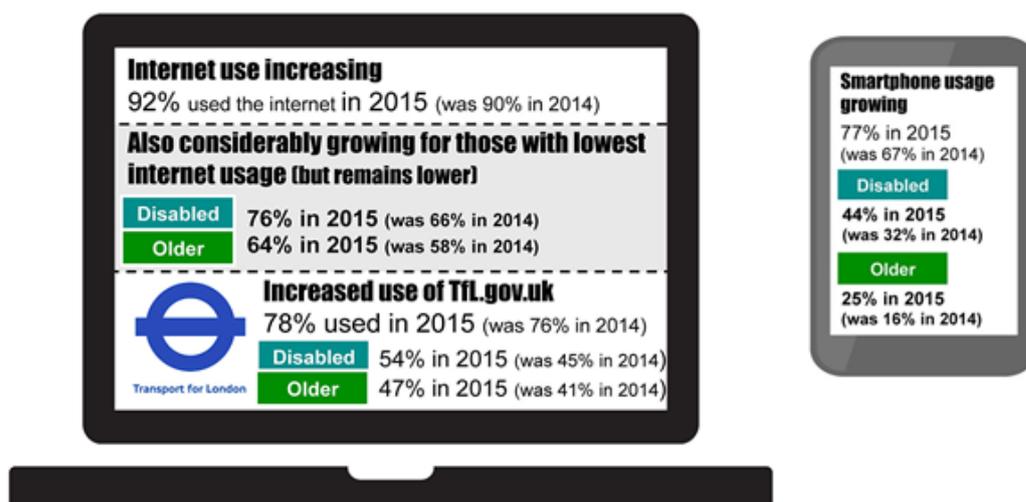
Nearly 4 out of 5 Londoners use a smartphone (77 per cent). Older Londoners (25 per cent) and disabled Londoners (44 per cent) are least likely to use smartphone. In comparison, almost all 16 to 24 year olds own or use a smartphone (96 per cent).

Nearly 4 in 5 Londoners (78 per cent) use the TfL website. This figure is lower among those aged 65 and over and disabled Londoners (47 per cent and 54 per cent respectively). Younger Londoners are most likely to access the TfL website, with 83 per cent of Londoners aged 16-24 using it.

Use of technology continues to grow across all equality groups in terms of internet access, smartphone use and use of the TfL website. However, it is worth noting that although there has been growth in technology use among older and disabled Londoners, use remains lower than for the overall population.

## 8. Transport connectivity, physical accessibility and understanding London's diverse communities

Figure 8.16 Use of internet and smartphones across equality groups.



Source: TfL Customer and Employee Insight.

### 8.8 Action on equality

Under the Equality Act 2010, TfL is required to publish its equality objectives, proposed activities to deliver these objectives and annual progress reports. TfL's current equality objectives are captured in the 2012-2015 Single Equality Scheme (SES) (see <https://tfl.gov.uk/corporate/about-tfl/corporate-and-social-responsibility/equality-and-inclusion>). The 2015 SES final progress report is due for publication by the end of 2015. TfL's equality commitments for the next four years to 2020 are currently being developed and are due to be published in March 2016 in a new equality scheme called Action on Equality: TfL's commitments to 2020. A new key performance indicator (KPI) will be developed to demonstrate TfL's commitment to improving equality outcomes.

It is important to note that we are not starting from scratch in drafting new objectives for the next four years. Much of the work that was started in the previous SES will be built upon. The activities we committed to previously are ongoing but in drafting new objectives for 2016-2020 we will be able to assess the progress that has been made to date, the gaps that remain and new activity that will be required to address those issues.

The equality objectives we are developing for the next four years will:

- Build on TfL's equality and diversity achievements to date.
- Focus on the desired outcomes from our equality activities.
- Reflect our understanding of what matters to our staff and the diverse communities TfL serves.
- Take into account progress against current equality commitments, ongoing programmes and new pieces of research will also inform our commitments.
- Be underpinned by our vision for equality.

Action on Equality will include customer and employee commitments.

#### Customer commitments

Findings of Travel in London: Understanding our diverse communities (2015), other research and insight from customers and stakeholders have all been used to identify

## 8. Transport connectivity, physical accessibility and understanding London's diverse communities

key barriers to travel for equality groups in London, improving travel experience and accessibility – and removing customer pain. The key insights identified above are feeding into our equality objectives. London is hugely diverse, and this diversity is increasing with the growing population. Many of the challenges faced by London's diverse communities can and are being addressed through transport. Some of the key customer themes identified so far are:

- Removing barriers to using public transport
- Improving travel experience and accessibility – removing customer frustrations
  - Improving infrastructure
  - Improving access to information
  - Improving perceptions of safety and security.

### **Accessibility Implementation Plan (AIP)**

TfL is currently improving its understanding of how to further improve access to transport for disabled people, including identifying the priority areas to be developed. The AIP, which is published as part of the Mayor's Transport Strategy, also sets out the current situation with regards to network accessibility including progress made, key challenges for the future and how the AIP should address them to make London more accessible. As an organisation, we have made progress in improving the accessibility of our network and seek to embed accessibility into everything that we do.

## 9. London's air quality and greenhouse gas emissions and transport and public health

### 9.1 Background and content

This chapter looks at the related topics of local air quality and climate change emissions from ground-based transport in London. The transport sector is an important primary contributor of local air quality and greenhouse gas emissions, and is also an important secondary determinant through, for example, its influence on urban geography and the need to travel. The MTS therefore sets out a broad framework for reducing these emissions from ground-based transport. These are elaborated in a wider context via the Mayor's Air Quality Strategy (see <http://www.cleanerairforlondon.org.uk/policy/mayors-air-quality-strategy>) and his Climate Change Mitigation and Energy Strategy (see: [https://www.london.gov.uk/sites/default/files/gla\\_migrate\\_files\\_destination/CMES%20annual%20report\\_2013-14\\_0.pdf](https://www.london.gov.uk/sites/default/files/gla_migrate_files_destination/CMES%20annual%20report_2013-14_0.pdf)). The first part of this chapter gives a broad review of progress in tackling these emissions over the term of the current MTS to date.

During 2015 TfL has revised and updated London's emissions inventories – comprehensive datasets that identify and quantify emissions to air from transport and all other polluting activities. TfL has yet to fully validate these new data and evaluate their full significance for air quality and greenhouse gas policy in London. Full results from the inventory updates will be published during 2016 and the datasets made available for general use by air quality practitioners. Some initial findings – relating specifically to changes in London's emissions from ground-based transport between 2008 and 2013 – are however published in this chapter on a provisional basis.

### 9.2 Local air quality and greenhouse gas emissions – recent initiatives

#### Why pollution matters

Air pollutants can have a detrimental effect on the health of people and ecosystems, and are linked to climate change. The most common pollutants of concern in London are particulates, particularly those fine particles under 10 microns in size (PM<sub>10</sub> and PM<sub>2.5</sub>), NO<sub>x</sub> and NO<sub>2</sub>, and CO<sub>2</sub>. It is generally accepted that particles have a zero threshold, in that any levels can potentially be dangerous to human health, but standards have been set at the EU level (known as limit values) which sets a recommended level at which pollution levels should be below in order to protect the population from wider health effects.

Fine particles can penetrate deeply into the lungs and enter the blood stream; chronic exposure to particles contributes the long term risks of developing cardiovascular and respiratory diseases. Health impacts of NO<sub>2</sub> are less understood but it is now accepted that longer term exposure to high levels of NO<sub>2</sub> can affect lung growth and function in children, particularly those with underlying health conditions such as asthma. NO<sub>x</sub>/NO<sub>2</sub> is an important precursor in the formation of particles and ozone.

TfL/GLA recently commissioned King's College to quantify the health impacts of PM<sub>10/2.5</sub> and NO<sub>2</sub>. For the first time, the health burden of these pollutants was estimated at around 9,400 equivalent deaths brought forward in 2010. The study

## 9. London's air quality and greenhouse gas emissions and transport and public health

highlighted the importance of air pollutants on both short and long term health effects including hospital admissions due respiratory and cardiovascular difficulties as a result of air pollution, alongside the potential economic costs.

### Strategic framework

In 2010, the Mayor published *Clearing the air: The Mayor's Air Quality Strategy*, and in 2011 he published *Delivering London's Energy Future: The Mayor's Climate Change Mitigation and Energy Strategy*. Together these contain a range of transport and non-transport measures to reduce emissions to mitigate climate change and improve London's air quality. Since then significant progress has been made in delivering these improvements and building on the wide ranging measures set out in these strategies. In 2014, TfL published its *Transport Emissions Road Map (TERM)*, which took stock of progress to date and sought to establish priorities and recommendations for future policy in this area (see <http://content.tfl.gov.uk/transport-emissions-roadmap.pdf>). This section summarises the key progress so far, based on TERM.

### Summary

Steps taken to reduce emissions can generally be categorised into four types. The section below summarises progress under these headings:

- Promoting a shift towards more sustainable travel choices
- Environmentally efficient use of existing vehicles and technology
- Development and uptake of low emission vehicles and technologies
- Tackling local air pollution focus areas or 'hot spots'.

#### Promoting a shift towards more sustainable travel choices

- Permitting greater densities of development in areas that have good public transport access.
- Continuing to expand and enhance public transport capacity in London, for example through the Tube upgrade programme, and new infrastructure such as Crossrail.
- More accessible bus network, to further encourage its use.
- Improving the urban realm and streetscape to make walking more attractive for short-distance trips.
- Transforming cycling, through the Mayor's Vision for Cycling.
- Travel demand management, encouraging smarter travel and supporting initiatives such as car clubs.

#### Environmentally efficient use of existing vehicles and technology

- Traffic signal optimisation, using SCOOT (Split Cycle Offset Optimisation Technique), which now operates at about 5,000 of the 6,000 signal-controlled junctions in London.
- Lane rental scheme for road works, minimising disruption on the network.
- Freight Operator Recognition Scheme (FORS), a voluntary accreditation scheme that encourages sustainable freight operations.
- Encouraging out-of-hours delivery, smarter driving and reduced engine idling.

### Development and uptake of low emission vehicles and technologies

- London's Low Emission Zone, first introduced in 2008 and progressively extended since.
- Congestion Charging Ultra Low Emission Discount – a 100 per cent discount for the lowest emitting vehicles.
- Cleaner TfL buses – ensuring that London's bus fleet continues to reflect the latest and cleanest emissions technologies.
- Zero emission vehicles and charge points, encouraged through the Mayor's Electric Vehicle Delivery Plan.
- Cleaner licensed taxis and PHVs, through the introduction of age limits that encourage lower-emission vehicles.
- Reducing the energy used by the Tube, through initiatives such as regenerative braking, and diversifying the energy supply to encourage low carbon sources.
- Facilitating improvements to other modes, such as the forthcoming electrification of the Gospel Oak to Barking line, and improvements to the emissions performance of the River Services fleet.

### Tackling local pollution focus areas or 'hot spots'

- The Mayor's Air Quality Fund provides match funding for boroughs to deliver innovative air quality improvement projects. This complemented the Clean Air Fund, which during 2013 implemented a range of measures at particulate matter (PM<sub>10</sub>) hot spots, funded by the Department for Transport.
- Clear Zones – providing support and funding for Clear Zones where specific measures were implemented to give spot treatments (implemented in Camden, Westminster and Tower Hamlets). Also, supporting access restrictions more generally where road space is given over to other uses, restricting road space and lowering traffic and emissions in the area.

## 9.3 Trends in London's ambient air quality

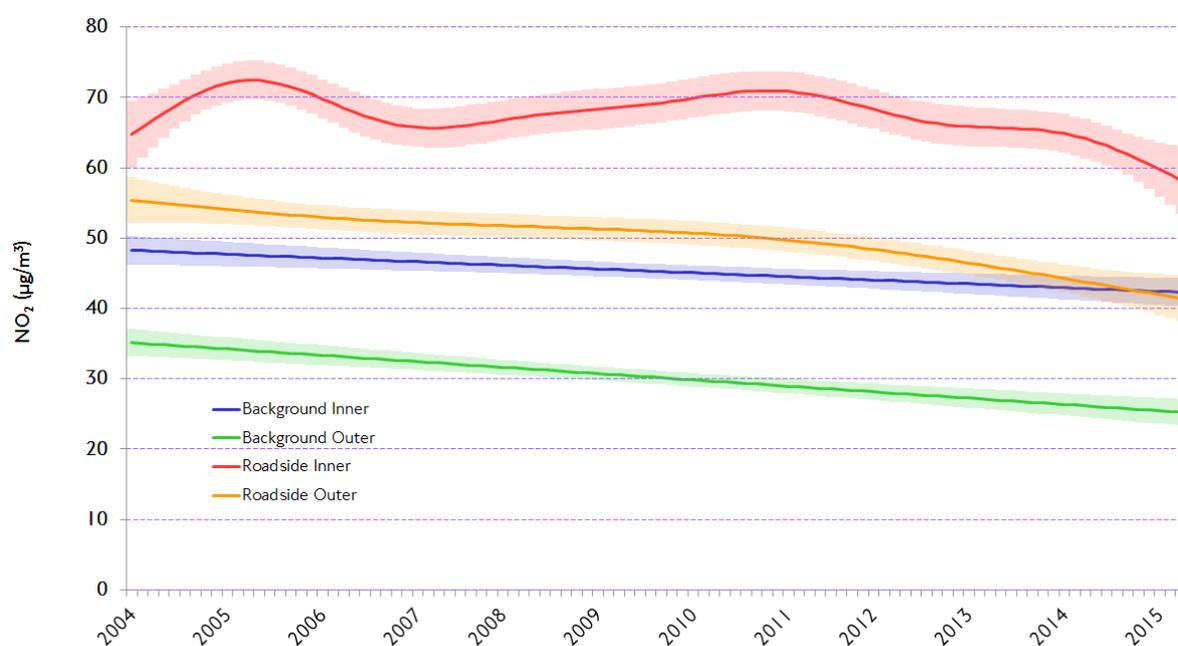
London has a comprehensive air quality monitoring network, funded by London boroughs, the GLA, TfL and Heathrow Airport. Many of these sites are part of the London Air Quality Network (LAQN), managed by King's College London's Environmental Research Group and some are also part of the Defra AURN UK Network used for compliance reporting.

This network provides unique opportunities to understand trends in London's air quality. One way to view air quality monitoring data is to group monitors based on their location and distance from the roadside and look at the average concentrations. For example, roadside monitors are within five metres of roads, while 'background sites' are located away from major sources of pollution.

Figures 9.1 and 9.2 below show the improving trend in nitrogen dioxide (NO<sub>2</sub>) and particulate matter (PM<sub>10</sub>) concentrations at sites that are part of the LAQN. Overall, there has been a gradual reduction in NO<sub>2</sub> and PM<sub>10</sub> concentrations at background sites in inner and outer London and at outer London roadside sites. Inner London NO<sub>2</sub> roadside sites have shown a more variable trend but have seen a steeper decline from 2012. This decline is also reflected in the inner London PM<sub>10</sub> roadside sites.

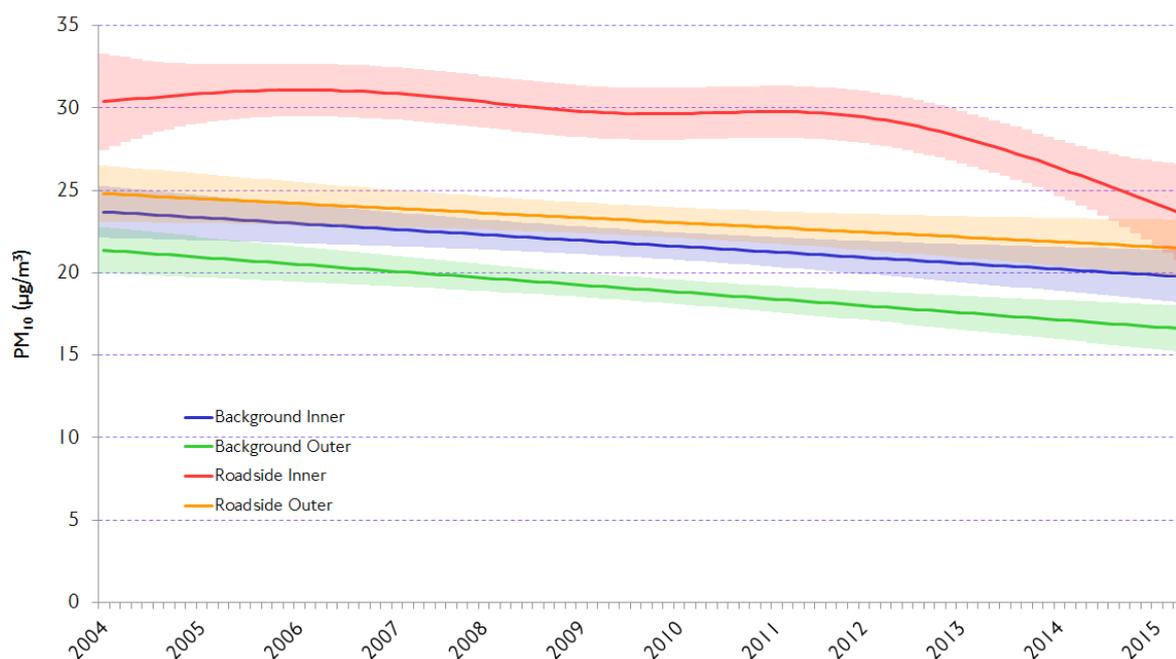
## 9. London's air quality and greenhouse gas emissions and transport and public health

Figure 9.1 Trends in NO<sub>2</sub> in London – 2004-2014.



Source: the London Air Quality Network and analysis by King's College London.

Figure 9.2 Trends in PM<sub>10</sub> in London – 2004-2014.



Source: the London Air Quality Network and analysis by King's College London.

These reductions are important as they show, overall, that air quality is improving in London. This is supported by analysis at most individual monitoring sites, although the dynamic nature of air pollution and the way it is affected by multiple factors (temporary issues like construction activity, weather, local road layouts etc) means concentrations at some sites can go up while the overall trend across the city is improving.

These averages do not however reflect the variability between individual site characteristics and trends. In addition they reflect all pollution sources experienced at a monitoring site and not just locally emitted pollution or road based pollution specifically.

Pollutant concentrations in London are affected by emissions in London, pollution from outside London and the UK, and other factors such as weather. Using sophisticated statistical models it is possible to 'remove' the weather effect from trends in concentrations of the main pollutants monitored at sites in the LAQN. This allows for the production of trends where the impact of variable weather conditions is reduced. An analysis recently conducted by Kings College has quantified the following trends between 2008 and 2013:

- Nitrogen Oxide (NO<sub>x</sub>) at roadside sites show a downward trend of 1.25 per cent per year, equivalent to a total reduction over the six-year period of 7.5 per cent.
- NO<sub>2</sub> at roadside sites show a downward trend of 2.1 per cent per year, equivalent to a total reduction over the six-year period of 12.6 per cent.
- PM<sub>10</sub> at roadside sites show a downward trend of 1.4 per cent per year, equivalent to a total reduction over the six-year period of 8.4 per cent.
- PM<sub>10</sub> at background sites shows a downward trend of 0.65 per cent per year, equivalent to a total reduction over the six-year period of 3.9 per cent.
- PM<sub>2.5</sub> at roadside and background sites shows a downward trend of 2.2 per cent per year, equivalent to a total reduction over the six-year period of 13.2 per cent.

#### **Variability at individual air quality monitoring sites**

Related to this, Kings College London also investigated the variability in changes in roadside measurements across the Capital. Specifically this analysis looked at the difference or 'increment' between the roadside measurement and that at an equivalent background site to quantify the air pollution from traffic as distinct from other regional and urban sources.

It is clear from this analysis that the traffic contribution to pollution concentrations at some sites is improving much faster than at others. For example, NO<sub>2</sub> and PM<sub>10</sub> concentrations have reduced at Marylebone Road and other sites over the last four years but this trend has not been seen at all roadside sites in inner London. Marylebone Road is not unique in displaying these air quality improvements. Understanding the reasons for changes at some sites and not others will provide evidence on the types of policies and actions that can help reduce pollution across London as a whole.

### **9.4 Greenhouse gas emissions**

Unlike local air quality pollutants, which have direct impacts on the health of the public, emissions of greenhouse gases such as carbon dioxide (CO<sub>2</sub>) are of concern because of their longer-term impact on global climate and the natural environment.

#### **CO<sub>2</sub> reduction target**

The Mayor's Climate Change Mitigation and Energy Strategy (CCMES) set an overall target to reduce CO<sub>2</sub> emissions in London by 60 per cent, against 1990 levels, by 2025. Transport would be expected to play its part in achieving this overall reduction; however it accounts for slightly more than one fifth of CO<sub>2</sub> emissions

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from all sources, and the reductions to be achieved from transport would not necessarily be exactly proportionate to the overall 60 per cent reduction, mainly because the cost-effectiveness of reduction initiatives varies between different economic sectors.

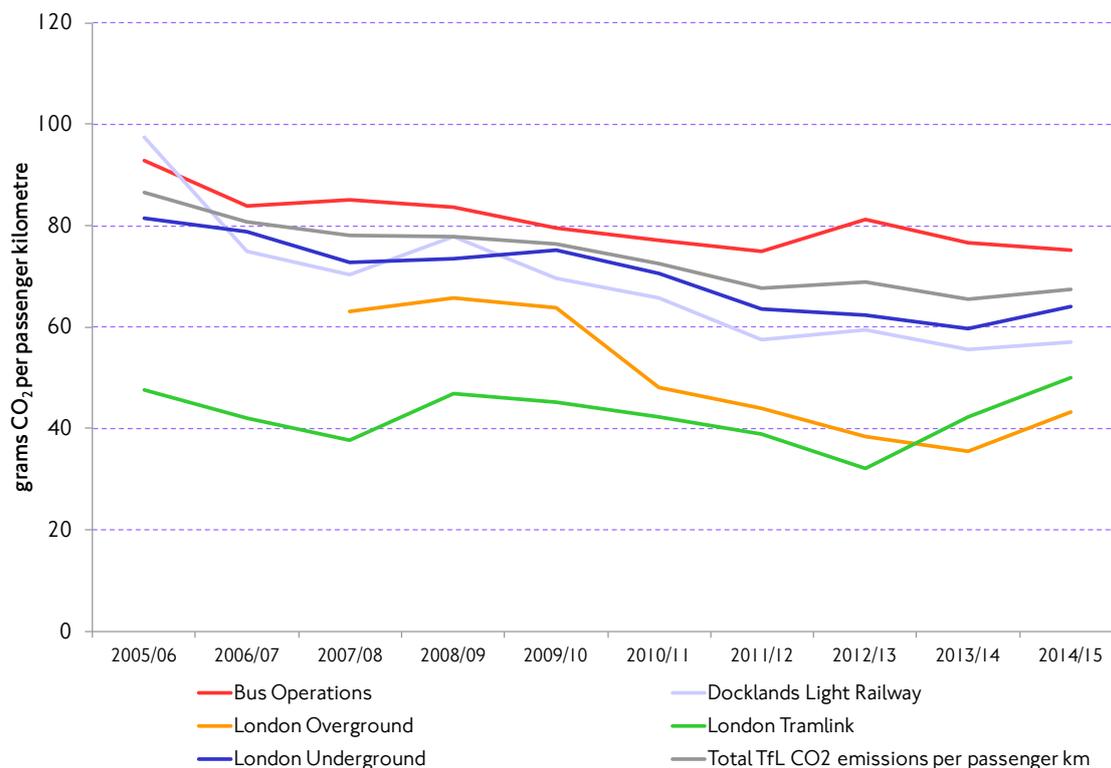
The CCMES analysis broke down the contributions to the 60 per cent target by sector as follows (these are reductions by 2025 from 1990 levels):

- Industrial and Commercial 71 per cent reduction (14.07 MtCO<sub>2</sub>)
- Domestic 53 per cent (8.45 MtCO<sub>2</sub>)
- Transport 48 per cent (4.52 MtCO<sub>2</sub>)

### CO<sub>2</sub> emissions from transport in 2013

Interim figures from the London Energy and Greenhouse Gas Inventory (LEGGI) showed that emissions from transport were 8.67 MtCO<sub>2</sub> in 2013, and accounted for 22 per cent of London's CO<sub>2</sub> emissions. This is a low proportion when compared to the national average of 27 percent in 2012. Note that these estimates will be updated on the basis of the new London emissions inventories, as described in the following sections. Nevertheless, they do provide a basis for better understanding the challenge that the Mayor's CO<sub>2</sub> reduction target presents in the context of a rapidly growing city.

TfL's Health, Safety and Environment Report 2013-14 sets out medium-term trends for CO<sub>2</sub> emissions from the main public transport modes in London. Carbon dioxide reduction targets are framed in terms of absolute tonnages of emissions, however, London's rapidly growing population, and the need to provide enhanced public transport to accommodate this and provide for future economic growth, mean that steps to reduce CO<sub>2</sub> emissions are more appropriately assessed on a normalised (per passenger kilometre) basis. TfL's target is to reduce normalised CO<sub>2</sub> emissions from the main public transport modes, as measured in grams CO<sub>2</sub>e (carbon dioxide equivalent) per passenger kilometre, by 20 per cent in 2017/18 as measured against a 2005/06 baseline. Figure 9.3 shows progress towards this target to be broadly on track. However, the equivalent pace of reduction in absolute tonnages falls short of the wider Mayor's reduction target.

Figure 9.3 Normalised emissions of CO<sub>2</sub> by mode of public transport.

Source: TfL Health, Safety and Environment (Rail and Underground).

### CO<sub>2</sub> emissions – understanding the scale of the challenge

Figure 9.4 shows an assessment of progress towards the Mayor's reduction targets from ground-based transport in London. It is based on the version of the London inventories current in 2010, and is therefore due to be updated once the new inventories are fully available.

Based on a business-as-usual scenario, including only funded schemes as at mid-2015, the figure suggests that there will be a 3.45 million tonne 'excess' of transport CO<sub>2</sub> emissions in 2025, compared against the nominal transport contribution (48 per cent) to the 60 per cent reduction against 1990 levels. To put this into perspective, 3.45 million tonnes of CO<sub>2</sub> per year would be equivalent to 45 per cent of London's total road vehicle kilometres in 2025. The essential reason for this is that measures previously assumed when framing targets are not delivering the reductions that were expected and not all measures were identified in CCMES. One area in particular where progress has been slower is the electrification of the road vehicle fleet.

The Climate Change Act established a target for the UK to reduce its emissions by at least 80 per cent from 1990 levels by 2050. To ensure that regular progress is made towards this long-term target, the Act also established a system of five-yearly carbon budgets, to serve as stepping stones on the way. The 2<sup>nd</sup> UK Carbon budget (2013–17) is 2,782 MtCO<sub>2</sub>e, which is a 29 per cent reduction on 1990 levels. To put this in perspective, London's emissions reduced by 10.8 per cent in 2013 (non-weather corrected), compared to 1990 levels, although on a per capita basis, the reduction is 27.9 per cent.

## 9. London's air quality and greenhouse gas emissions and transport and public health

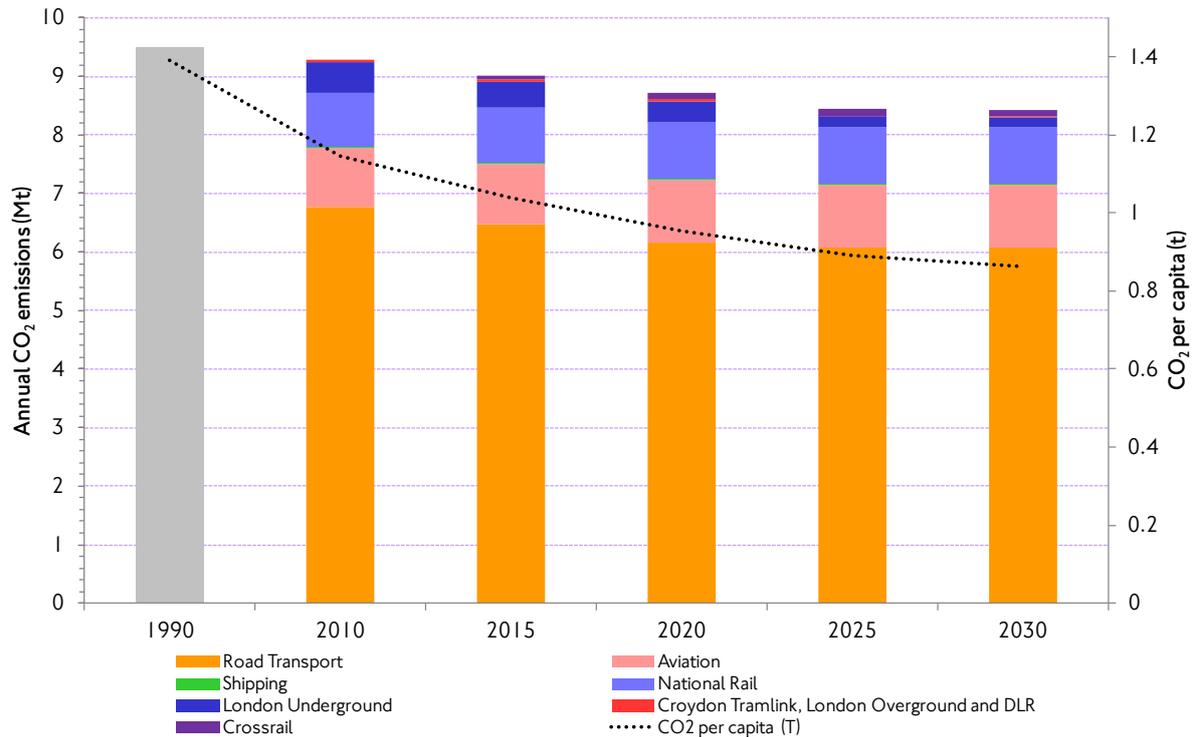
The 4th UK Carbon budget (2023-27) is 1,950 MtCO<sub>2</sub>e, which is 50 per cent reduction by 2025 over 1990 baseline. The CMMES target of 60 per cent is higher than this, which is indented to represent the Mayor's commitment to London leading the way. Only forward projections for the transport sector part of CCMES target are available. Based on a business-as-usual scenario a 36.4 per cent reduction in transport emissions is forecast for 2025 compared to 1990 levels.

In terms of future policies, projections such as these demand a revised approach, based around a more fundamental approach to reducing transport CO<sub>2</sub>. This might include increased emphasis on measures such as:

- Developments that minimise transport emissions and the need or desire to travel.
- Transforming the way in which existing areas operate, for example through Low Emission Neighbourhoods.
- Maximising climate change mitigation being a core consideration of transport and spatial planning decisions.
- Increase in the rate of transition to low carbon and renewable sources of transport energy for both road and rail based transport.
- Increase in transport energy efficiency and the proportion of trips made by more sustainable modes, such as walking and cycling.

Ultimately, meeting CO<sub>2</sub> reduction targets point to a need for a step change in the way Londoners live and how London itself, for example through its transport system, enables them to live more sustainable lives built around a circular and shared economy.

Figure 9.4 Progress towards CO<sub>2</sub> reduction targets – emissions from ground-based transport in London.



Source: TfL Planning Strategic Analysis.

## 9.5 Emissions of CO<sub>2</sub>, PM<sub>10</sub> and NO<sub>x</sub> from ground-based transport in London

### Introduction

This section provides provisional updated estimates of the trends in key greenhouse gas and local air quality pollutants from ground-based transport in London between 2008 and 2013.

The data reflect early results from TfL's update to the London Atmospheric Emissions Inventories, which is currently nearing completion. The data in this section are therefore presented on a provisional basis. Full details of the updated inventories will be published during 2016, and the data made available to air quality practitioners.

### What is the LAEI?

The LAEI provides estimates of the annual emissions of a wide variety of pollutants including NO<sub>x</sub>, PM<sub>10</sub> and CO<sub>2</sub>, from many different sources within London. These sources include ground-based transport (road transport, shipping, rail and aviation), along with other emissions from domestic and commercial gas use, industrial sources, and Non-Road Mobile Machinery (NRMM) related to construction activities.

The LAEI2013 provides Excel and GIS files of emissions over grids, which represent the GLA and areas roughly within the M25. The emissions for the years 2008, 2010, 2013, 2020, 2025 and 2030 are included. Emissions from each source can be

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determined for every grid square within the inventory area, and summarised by London Borough, Central, inner and outer London.

The current will provide an updated baseline for the year 2013 – the LAEI 2013. The inventory provides back calculations and forecasts of pollutant emissions for years 2008, 2010, 2020, 2025, and 2030, which enables TfL and others to assess the impact of policies on emission in London.

The LAEI 2013 is a major update to previous inventories such that the forecast emissions in 2020 and beyond incorporate the presence of the Ultra Low Emission Zone (ULEZ), which will dramatically decrease emissions from road transport, particularly in Central London.

The LAEI forms the basis for the London Modelling Toolkit operated by King's College Environmental Research Group on behalf of TfL. This model is used to forecast the concentration of pollutants across London taking into account location of sources, weather and background pollution levels from outside London, thereby providing a detailed picture of current and future air quality in London which can be used for forward planning, policy development and by London Boroughs in relation to their local air quality management duties (LLAQM).

### **Improvements to the LAEI methodology**

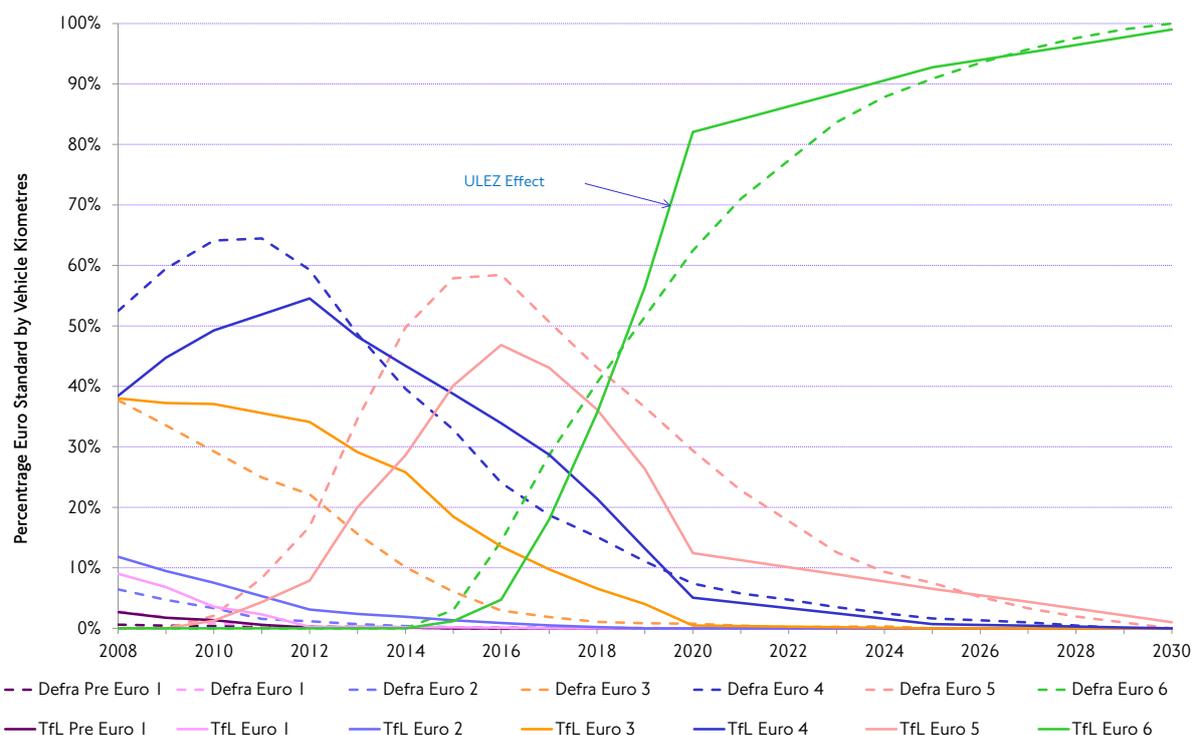
The current LAEI update incorporates some improvements to the methodologies used to estimate emissions, alongside updated activity information such as gas use and road traffic flows.

Key improvements with the LAEI 2013 include:

- Non-Road Mobile Machine (NRMM) estimates have been updated to include detailed data from the London Development Database (LDD), which provided information on the locations of all construction sites across London. This enables a much more representative distribution of NRMM emissions across London compared to the previous LAEI which was based on limited information.
- Fleet Compositions providing information on fuel splits, ages and Euro standards of vehicles have been updated to incorporate TfL traffic monitoring from ANPR data. This has provided information on the proportions of petrol and diesel cars specifically for London, whereas previous inventories have used Defra UK wide estimates for these. The analysis of ANPR data indicates that London has a slightly higher proportion of petrol cars than the national average, which includes more significant proportions of motorway driving.
- The ANPR data has been used to analyse the age of vehicles and the number of times each unique vehicle is seen within the London ANPR network. These relationships have been used to estimate the fleet turnover of vehicles in London and then estimate the age and Euro standards. The analysis has shown, for example, that the rate at which Euro 6 diesel cars increase in the London fleet are slightly lower than the estimates based on UK wide data. Similarly, the ANPR data for diesel LGVs in London indicates that Euro 5 vehicles have not increased at the same rate as the UK average. TfL estimates that the maximum proportion of Euro 5 diesel LGVs in London would reach around 50 per cent, whereas the national estimate is 60 per cent.

- Fleet projections from 2020 have been updated to incorporate the ULEZ. This means that London now has 3 zones of fleet estimates taking account of impact of ULEZ on uptake of cleaner petrol and diesel vehicles on Central, Inner and Outer London. Figure 9.5 shows the fleet projections for diesel LGVs in Central London used in the updated LAEI2013 versus Defra projections for London.

Figure 9.5 Comparison of Defra and LAEI 2013 Fleet Projections - diesel LGV, Central London. Percentage of Euro Standards (based on vehicle kilometres).



Source: TfL Planning, Strategic Analysis.

The fleet projections also now incorporate Defra estimates of the uptake of electric cars and LGVs, and hybrid cars and LGVs (full and plug-in) within the fleet. These result in estimates of about 20 per cent of petrol car vehicle kilometres being hybrids by 2030, and about 10 per cent being diesel hybrids. Some 3 per cent of car vehicle kilometres are estimated to be made by electric cars by 2030.

Over time, the LAEI is reviewed and new information on observed vehicles within London will be incorporated into the fleet projections so that delivery of existing policies can be reflected within the datasets.

### How will the LAEI be used?

TfL will produce packages of information on air quality including emission and concentrations modelling for the Boroughs so these can be more readily used for planning purposes and in the LLAQM reporting requirements.

Modelling of ambient pollution concentrations based on the new inventory will be available in early 2016 and will be based on the standard COPERT emission factors currently used throughout the UK and the majority of Europe. TfL has continued to undertake its own vehicles emissions testing programme and is in the process of

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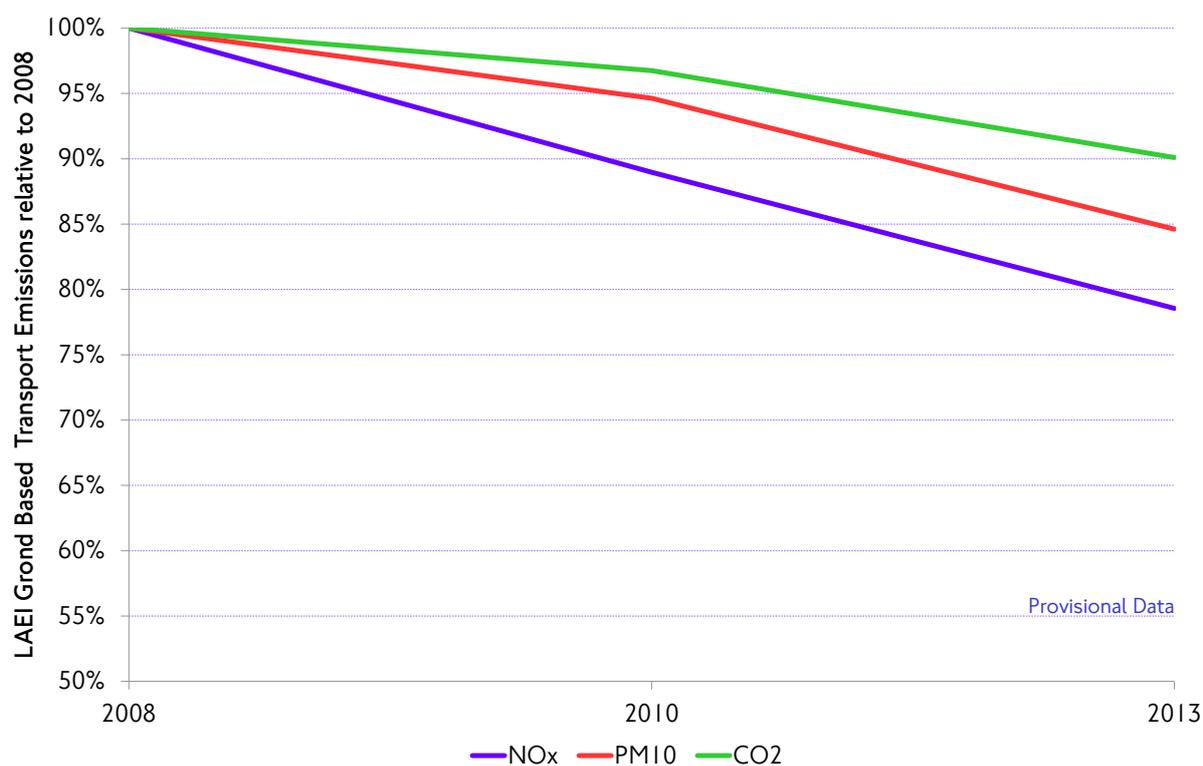
developing London specific emissions factors with the aim of reflecting London urban driving cycles more accurately. Once these are developed TfL will undertake sensitivity testing to understand the implications for London's air quality concentrations projections.

### Trend in emissions between 2008 and 2013

Figure 9.6 shows the trend, as an index, in emissions of CO<sub>2</sub>, PM<sub>10</sub> and NO<sub>x</sub> from ground-based transport in London. Ground-based transport includes:

- Aviation (includes aircraft emissions from landing and take-off cycle up to 1000m).
- Shipping – both passenger and freight.
- Rail - freight and National Rail passenger (both diesel and electric), TfL rail, Overground, Underground, DLR and Tram.
- Road transport; exhaust emissions from cars, vans and minibuses, lorries and buses etc.

Figure 9.6 Emissions of key air pollutants from ground-based transport in London, 2008-2013. Index 2008=100.



Source: TfL Planning, Strategic Analysis.

In terms of change between 2008 and 2013, and on a provisional basis at this stage:

- For CO<sub>2</sub> overall emissions from ground-based transport have reduced by 10 per cent.
- For PM<sub>10</sub> overall emissions from ground-based transport have reduced by 15 per cent.

- For NO<sub>x</sub> overall emissions from ground-based transport have reduced by 21 per cent.
- The provisional data from the LAEI 2013 inventory for years 2008 to 2013 are broadly in line with the previous inventory whereby between 2008 and 2012 [discuss] ground based transport emissions were expected to reduce by 21 per cent for NO<sub>x</sub>, 13 per cent for PM<sub>10</sub> and 7 per cent for CO<sub>2</sub> (excluding electric rail).

## 9.6 Climate change adaptation and mitigation

### The scale of the challenge

In collaboration with the GLA and as part of the Mayor's Climate Change Adaptation Strategy (2011), TfL has assessed and evaluated the risks from extreme weather today and from future climate impacts on its assets and services. TfL has identified that the key risks in the 2050s are likely to be:

- Higher summer temperatures, with the average summer days being 2.7°C warmer and very hot days 6.5°C warmer than the baseline average
- Warmer winters – winters will be warmer with the average winter day being 2.2°C warmer and a very warm winter day 3.5°C above the baseline.
- More seasonal rainfall – summers will be drier, with the average summer 19 per cent drier and the driest summer 39 per cent drier than the baseline average
- Wetter winters – the average winter 15 will be per cent wetter and the wettest winter 33 per cent wetter than the baseline average
- Sea level rise – sea levels are projected to rise by up to 96 centimetres by the end of the century.

Current weather-related risks are more likely to include winter ice, rainfall and shorter periods of summer heat. These can occur throughout London and we have assessed known 'hotspot' locations for the different risks in all our businesses.

In the short to medium term for flooding and high temperatures there is likely to be increased frequency and consequence, for example flooding from increased frequency and intensity of winter storms. High temperatures are more likely to become common in the summer months from the mid-21st century.

In most cases, the longer term risks will be similar. For flooding and high temperatures there is likely to be increased frequency and consequence e.g. flooding from increased frequency and intensity of winter storms. High temperatures are more likely to become common in the summer months from the mid-21st century. The temperatures reached in the hot summer of 2003 are likely to feel average by the 2040's and cool by the 2080's. For low temperature snow and ice events, there is likely to be increased severity when such events occur, although they may not be as frequent.

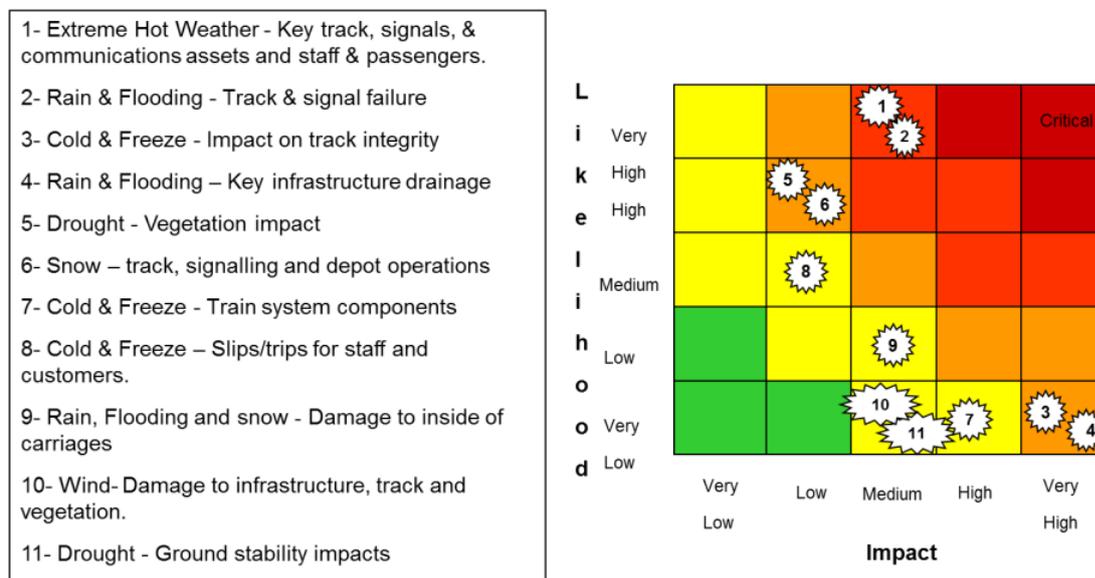
### Assessing the risk

TfL analyses extreme weather and other risks to its assets and services as part of its corporate approach to risk assessment. Each business area uses a scoring methodology based on this approach, and risk maps have been generated for each key business area.

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Figure 9.7 London Underground combined extreme weather and climate risk map.

London Underground Combined Extreme Weather and Climate Risk Map



Source: TfL Health, Safety and Environment (Rail and Underground).

Figure 9.7 shows an example of these maps – in this case relating to London Underground. Events of extreme hot weather and rain and flooding are increasingly likely and would have a ‘medium’ impact on the service when they occur, such as temporary flooding of parts of the system. More serious, in terms of their impact, are events that impact on the integrity of the infrastructure, such as track and land stability, although the scale of event necessary to generate this kind of damage is likely to remain infrequent.

**How risks from extreme weather and climate change are managed by TfL**

There is political and senior leadership commitment and support to keep TfL’s services running and safe when extreme weather events are forecast. This is an important element of keeping London moving and operating smoothly. TfL achieves such resilience by having a range of approaches in our business as usual systems. This starts with advance seasonal weather planning. Well before the start of each season, TfL uses Met Office seasonal forecasts to plan for the likely weather patterns, for example predominantly wet and windy, cold and icy, hot.

On a day to day basis, all TfL businesses use regular weather forecasts supplemented by business specific, local real-time monitoring, for example of track or road surface temperature. These inform us whether critical thresholds such as temperature, humidity or rainfall are imminent and if so, this triggers well-rehearsed plans to carry out activities that help minimise the impact of such events.

For example, Surface Transport responds to forecasts of heavy rainfall with well-practised plans for maintenance contractors to clean out key gullies. For cold

weather and ice forecasts, there are processes for applying salt and grit to road surfaces, bus station approaches, platforms etc.

London Underground has a set of '54321' plans where all key roles know their responsibilities for managing the activities from five days before a particular weather event is forecast to arrive. The LU operational daily morning phone conference in which the most senior leaders review service issues includes a weather report and a reminder of whether we are in a particular day of a '54321' status. It includes a reminder that all relevant plans for managing such an event should be ready.

For management of current heat issues, LU has doubled the capacity of ventilation shafts on the Victoria line to provide more air flow. We have installed air-cooling units and mechanical chillers at two busy stations, Oxford Circus and Green Park. We are also looking at technologies and opportunities to reduce traction energy consumption and to recover braking energy before it is converted to heat. We are looking at opportunities to extract waste heat from the system and find beneficial uses and markets for it. LU and TfL Rail also respond to include stressing the tracks when alerted to nearing critical rail temperatures, to prevent rail buckling. This is achieved using agreed plans to use speed restrictions, driver observation, track walking and detailed real-time information to communicate to customers the nature of the impact on services, for example a storm where a tree may have come down across the tracks.

Where there is an impact from a weather event, the operational staff and franchisees have planned activities to ensure that the service is able to resume within the shortest time frame possible. This planning, proactive plans and resilience means that TfL has been recognised for keeping services running during the weather events of the last few years.

## **9.7 Improving the health of Londoners – active travel**

### **Introduction and background**

TfL's Health Action Plan, published in 2014 ([see: http://www.tfl.gov.uk/cdn/static/cms/documents/improving-the-health-of-londoners-transport-action-plan.pdf](http://www.tfl.gov.uk/cdn/static/cms/documents/improving-the-health-of-londoners-transport-action-plan.pdf)), committed to improving public health through transport. We highlighted the importance of physical inactivity as one of the biggest threats to the health of Londoners which the transport system has a central role in tackling. Currently it is estimated that only 57.8 per cent of adults in London are meeting the minimum recommended physical activity levels while 27 per cent do not manage even 30 minutes of activity per week (Active People Survey, Public Health England, 2014).

The MTS has contributed to improving the health of Londoners over the past eight years by enabling more Londoners to travel by public transport, which has increased the amount of active travel that Londoners do. In Travel in London report 6 we showed that half of all walking in London is done as part of longer public transport trips.

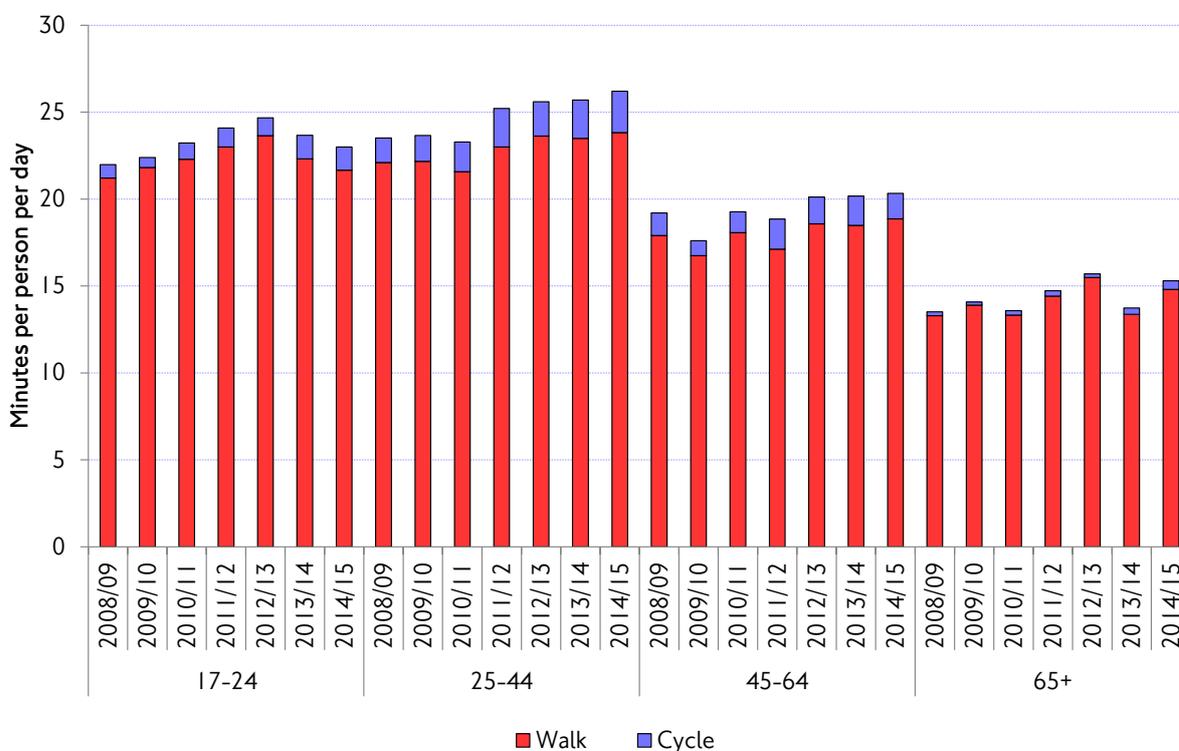
In 2015, a partnership of agencies across London (including the Mayor of London, London Councils, Public Health England, NHS England and London Clinical Commissioning Groups) jointly committed to a shared ambition that by 2020, 70 per cent of adults in London will get 150 minutes of moderate-intensity aerobic

physical activity each week in periods of ten minutes or more. This is the level of activity recommended by the Chief Medical Officer for avoiding the greatest health risks associated with a lack of physical activity such as Type 2 diabetes, depression, coronary heart disease and some cancers. Moderate-intensity aerobic activity includes brisk walking and cycling. New evidence is indicating that active travel is proving to be the biggest determinant of whether the population are getting enough exercise to stay healthy. A new study from the Netherlands (Fishman et al, 2015: Adult active transport in the Netherlands: An analysis of its contribution to physical activity requirements) analysed travel survey data to assess the contribution of active travel to adults meeting their physical activity needs. This study found that those who did any walking or cycling at all were likely to exceed the 150 minutes per week threshold and overall 38 per cent of Dutch adults met or exceed minimum activity levels from active travel alone. This same central role of active travel to achieving physical activity recommendations has also been shown in studies for England (Belanger et al, 2011: Age related differences in physical activity profiles of English adults).

### Trends in active travel by age group

The London Travel Demand Survey (LTDS) can be used to quantify active travel by London residents. Figure 9.8 shows the number of minutes spent walking and cycling per adult per day for London residents. The graph shows that across all age groups there has been a general upward trend in minutes per person per day spent travelling actively between 2008/09 and 2014/15.

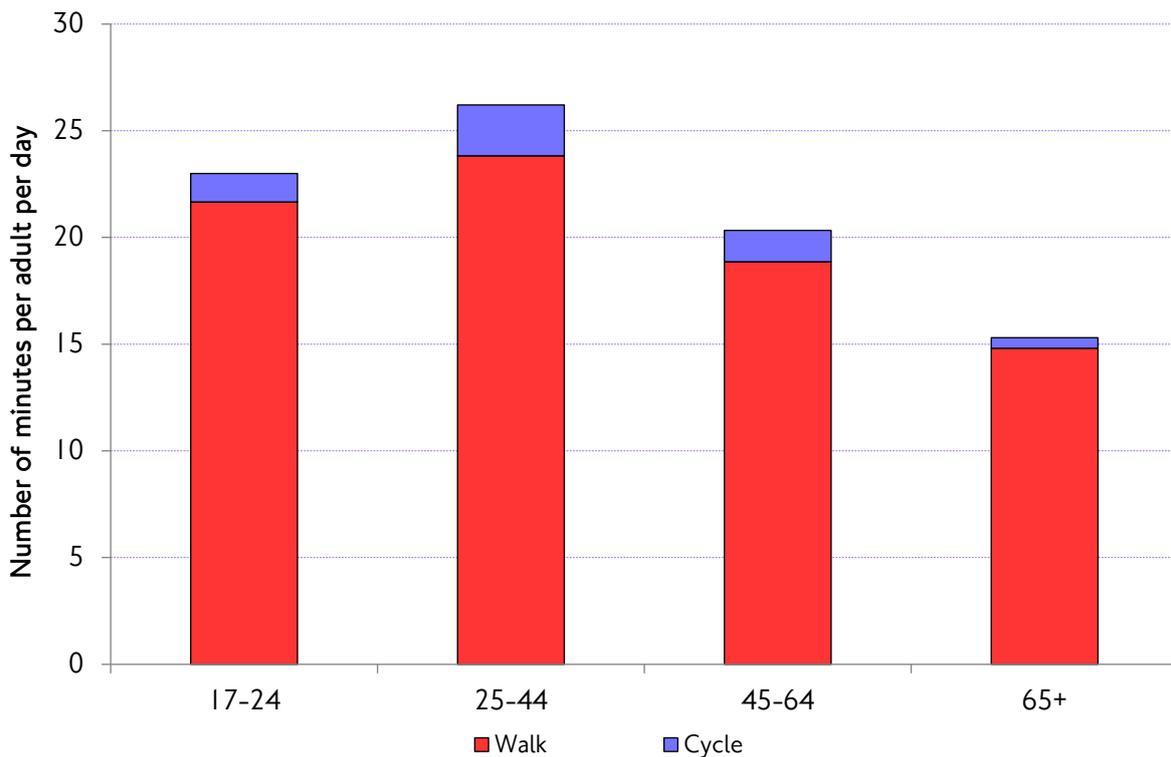
Figure 9.8 Number of minutes spent walking and cycling per person per day, by age group, 2008/09 – 2014/15.



Source: TfL Planning, Strategic Analysis.

There are, however, variations in the number of minutes spent travelling actively per day by age. The 25-44 age group have the highest average number of active travel minutes per day (26.2 minutes in 2014/15) followed by 17-24 year olds (23 minutes), 45-64 year olds (20.3 minutes) and over 65s (15.3 minutes). Most active travel is in the form of walking, despite recent increases in the numbers of trips cycled. The proportion of active travel done on foot is lowest among 25-44 year olds (91 per cent), followed by 45-64 year olds (93 per cent), 17-24 year olds (94 per cent) and is highest among over 65s (97 per cent), reflecting the age profile of cyclists (figure 9.8).

Figure 9.9 Number of minutes spent walking and cycling per person per day, by age group, 2014/15.

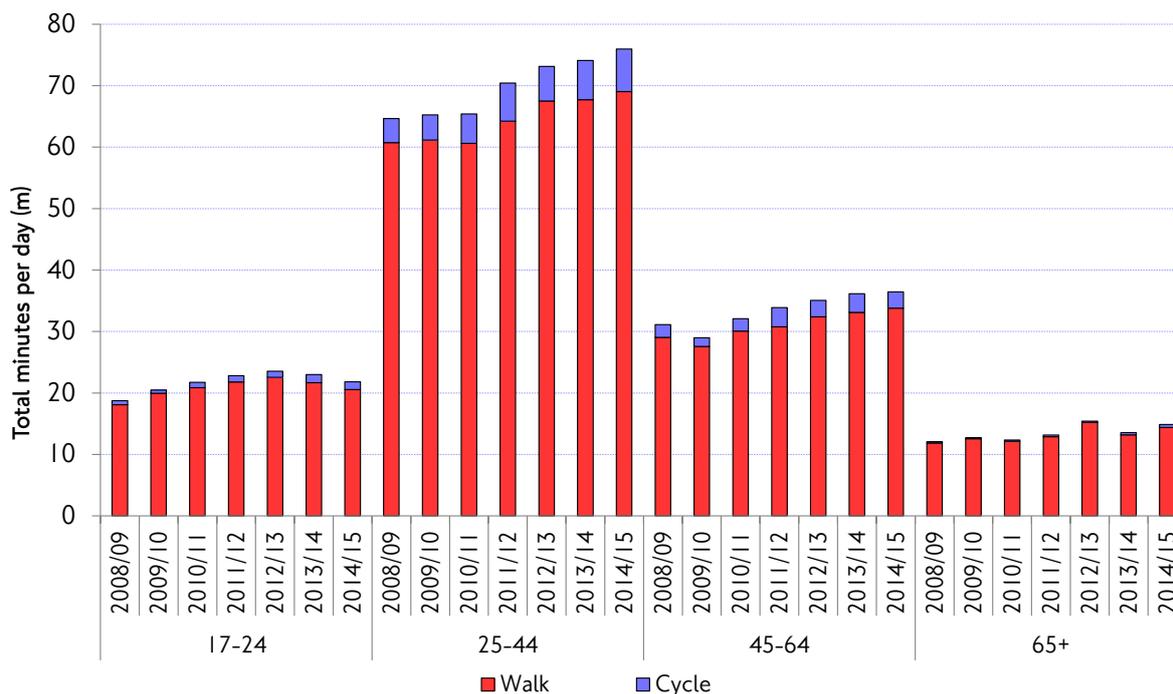


Source: TfL Planning, Strategic Analysis.

Because London's population is not equally distributed between these age groups, the total number of minutes spent travelling actively is also not spread evenly. Figure 9.10 shows the total minutes (in millions per day) spent travelling actively by all people in each age group from 2008/9 to 2014/15. The largest age group, in terms of population, is 25-44 years and hence this group has a much larger number of active travel minutes each day, followed by the 45-64 age group. The group aged 65 and over have the lowest total minutes per day, however as this group is slightly larger than the 17-24 age group in terms of population, this shows that older people, on average, spend less time travelling actively per person than the 17-24 age group.

9. London's air quality and greenhouse gas emissions and transport and public health

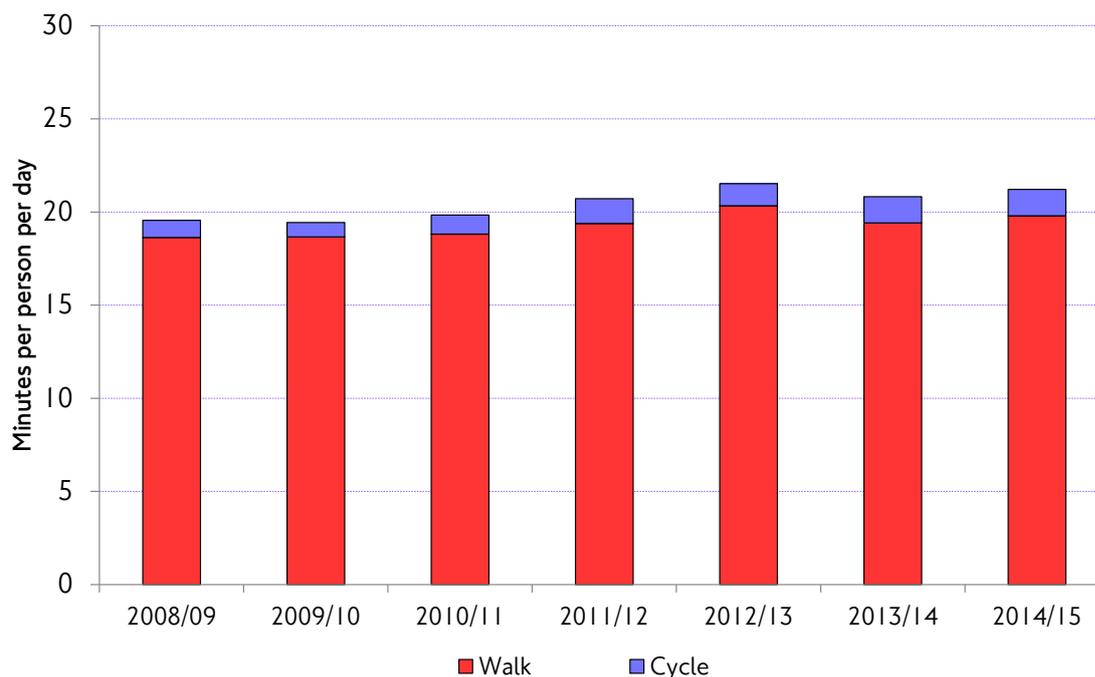
Figure 9.10 Total minutes spent walking and cycling per day, by age group, 2008/09 – 2014/15.



Source: TfL Planning, Strategic Analysis.

Figure 9.11 shows the average number of minutes of active travel per day per adult Londoner from 2008/9 to 2014/15. The total number of minutes has increased on average by 2 minutes over this period, from 19 minutes to 21 minutes. Figure 9.11 also shows the relative contribution of walking and cycling to average minutes spent travelling actively, where the majority of active travel in London is walking. In 2014/15, approximately 20 of the 21 minutes travelling actively were done on foot (93.3 per cent). In 2014/15, the proportion of active travel done by bicycle has increased from 4.7 per cent in 2008/09 to 6.7 per cent in 2014/15.

Figure 9.11 Average number of minutes spent walking and cycling per adult per day, 2008/09-2014/15.



Source: TfL Planning, Strategic Analysis.

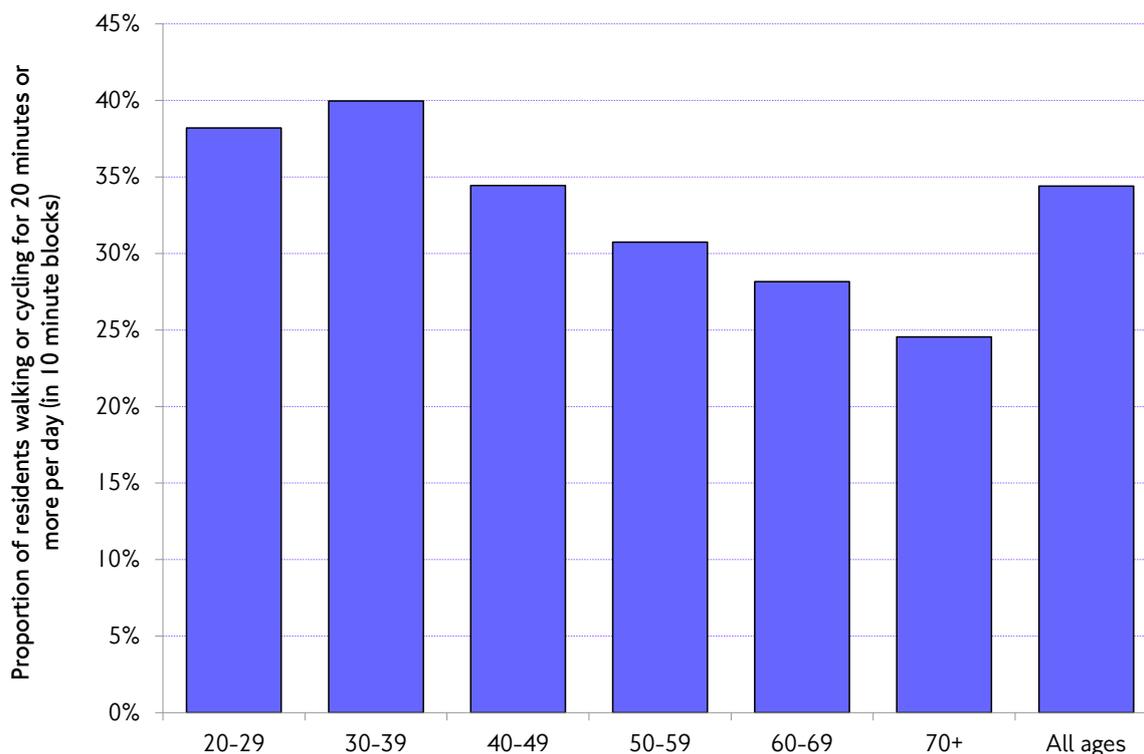
### 'Activating' London's population

Given the importance of active travel for enabling adults to meet their physical activity needs Transport for London has developed an ambition in line with the cross-London partnership. This ambition is for 70 per cent of adults in London to achieve 150 minutes of active travel per week in periods of ten minutes or more. It is not possible to directly extract weekly physical activity levels of London's population from the one-day LTDS survey and so it is not possible to directly measure the proportion of Londoners achieving 150 minutes of active travel per week in periods of ten minutes or more.

Physical activity recommendations are to get some activity on most days; dividing the 150 minutes into periods of ten minutes spread over the week translates into achieving two ten-minute periods of activity each day. The Active People Survey collects data on activity over a four-week period and this indicates that people achieving two ten-minute periods of activity in one day are highly likely to achieve the 150 minutes of activity per week. This can therefore be taken as a proxy measure of LTDS data for adults meeting their physical activity needs. This approach is quite conservative, given that 27 per cent of adults do not manage three ten-minute periods of activity in a week in London from any activity source, not just active travel.

Figure 9.12 shows that, on average across the age groups, 34 per cent of adults in London achieve two ten-minute periods of active travel per day. The proportion of adults falling into this category would therefore need to approximately double to meet the ambition by 2050. Travel in London report 7 showed that car ownership was a strong determinant of adults travelling actively in London, so declining car ownership could be an important contributor to meeting the goal.

Figure 9.12 Percentage of adults who achieve two ten-minute periods of walking or cycling per day, 2014/15.

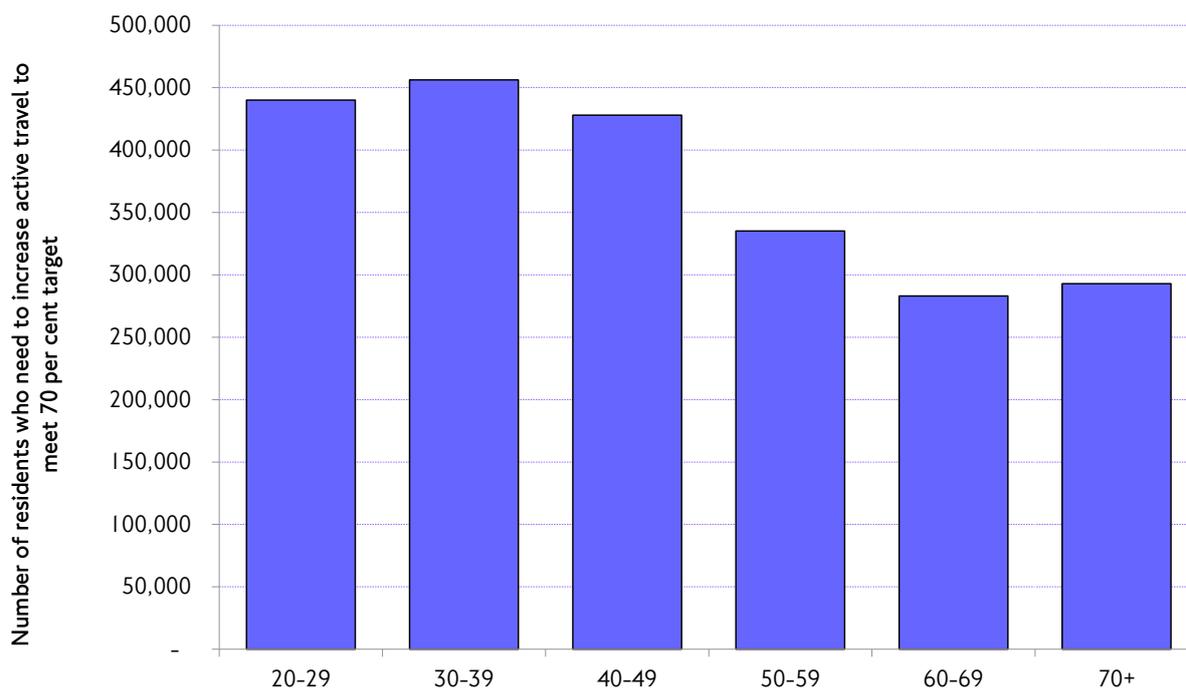


Source: TfL Planning, Strategic Analysis.

Figure 9.13 shows the numbers of people in each age group that need to be 'activated' to spend at least two ten-minute periods walking or cycling between now and 2050 (although with projected population growth these figures would increase). The graph shows that even though younger age groups are already the most likely to be active, they are also the larger age groups, therefore they hold the largest numbers of people that need to be activated. In total, over two million adults in London's current population need to be enabled to incorporate two ten-minute periods of active travel into their daily routine to achieve the target.

If this ambition were met then it is estimated that in London there would be a 12.5 per cent reduction in premature deaths from any cause each year (all cause mortality), over 1,000 fewer people diagnosed with coronary heart disease each year and over 30,000 new cases of Type 2 diabetes avoided each year (<http://www.apho.org.uk/resource/view.aspx?RID=123459>).

Figure 9.13 Number of adults who need to achieve two ten-minute periods of walking or cycling per day, by age group, 2014/15.



Source: TfL Planning, Strategic Analysis.

In summary, there have been small increases year on year in total minutes spent travelling actively by Londoners since 2008, mostly reflecting the greater use of public transport over this period. This will have delivered some health benefits to Londoners. However, activity levels among Londoners are still significantly below what is needed to prevent a range of avoidable short and long-term illnesses. Looking to the future TfL will need to consider how to support the two million adults in London who are not getting the activity they need to stay in good health and to achieve the ambition of 70 per cent of adults in London meeting their physical activity requirements through their daily travel.

## 9. London's air quality and greenhouse gas emissions and transport and public health

## 10. The London 2012 Games and their legacy – an update

### 10.1 Introduction and content

As is generally recognised, the London 2012 Games were a great success, and were particularly noteworthy for the outstanding way that transport contributed to both the Games themselves and the equally important task of keeping the rest of London moving and open for business – amply fulfilling the prospectus set out in the Mayor’s Transport Strategy. Securing the long-term legacy of the Games will be a key task over the next two decades.

The six London Games ‘Growth’ boroughs are already benefitting from the substantial ‘physical’ transport legacy of new and improved infrastructure, reflecting an investment of £6.5 million in the run up to the Games. The Queen Elizabeth Olympic Park is being transformed into a major venue for sporting events and will also host arts and cultural events, conferences and music concerts.

This chapter provides an update on Games legacy transport indicators that were first set out in Travel in London report 6. There are emerging signs in the data reviewed in this chapter of improved social and economic conditions in the six Growth boroughs, for example there have been some substantial improvements in indices of multiple deprivation and relative ranking, although the population of these boroughs is growing very rapidly and they are also participating in London’s wider economic growth.

However, the trend in the transport behavioural aspects of the legacy, for example a move towards more sustainable and active travel such as walking and cycling by residents, is currently more difficult to see in the very limited data available so far.

Note that TfL expects to publish updated results for the Olympic Park multi-modal cordon counting survey separately in early 2016.

### 10.2 The London 2012 Olympic and Paralympic Games

#### Background

The Mayor’s Transport Strategy of 2010 set out a prospectus for supporting the London 2012 Games, and for securing their longer-term legacy. Travel in London report 5 contained extensive coverage and analysis of travel demand patterns during the Games themselves. It highlighted the exceptional role performed by transport in making the Games a great success and the adaptations to travel behaviour made by many Londoners to help accommodate Games-related travel demand on the networks.

Travel in London report 6 picked up the Games transport legacy and described and base-lined a set of quantitative indicators and other evidence to be used by TfL, over the long term, to help track progress and ensure that the transport goals of the legacy were being met. The MTS identified both physical and behavioural aspects of the transport legacy, with the wider aim of supporting regeneration in east London and the achievement of social and economic convergence between the six Growth Boroughs and the rest of London over a 20-year period

This section briefly reviews the key transport features of, and lessons learned from, the 2012 Games, following on from the detailed coverage in Travel in London report 5. Subsequent sections then proceed to update some key transport legacy indicators – some three years after the Games.

### **Key transport features of the 2012 Games**

The Games were a major success – both as sporting events and in the way that the transport networks operated to support them. TfL, London 2012 and transport delivery partners had the twin objectives of delivering a great Games and keeping London moving and open for business. All of the indicators showed that these aims were comprehensively achieved.

The travel of more than 6.2 million Olympic spectators over 17 days and 2.7 million Paralympic spectators over 11 days, together with the Games workforce and the Games Family had to be provided for, alongside the trips made for other purposes in London. This meant delivering an enhanced level of service on routes to and from Games venues, and taking steps to manage demand arising from regular travellers, at particular places and at particular times, so that the exceptional numbers making their way to and from events could be accommodated.

To help achieve this aim, £6.5bn was invested in new infrastructure in the run up to the Games; this also having a longer-term role in facilitating the regeneration in the six Games Growth Boroughs. Together with our partners, TfL undertook detailed planning to ensure that the right level of service was provided at Games time, and particular emphasis was given to ensuring the reliability of services. Ticketed spectators were issued with a Games Travelcard – offering free public transport on the day of their event. On the roads, TfL designed and implemented the Olympic and Paralympic Route Networks, to expedite Games Family traffic and meet London's contractual commitments to the International Olympic Committee in respect of journey times for the Games Family.

TfL recognised that enhanced services would be insufficient on their own to deliver a successful Games. A significant change in travel behaviour by businesses and regular travellers, to encourage avoidance of the busiest times and places on the transport networks, was also needed. To deliver this behavioural change, a major programme of travel demand management (TDM) was put in place. This was supported by the high profile 'Get Ahead of the Games' media campaign. Importantly, the scale and content of this advice was varied as the Games progressed, reflecting actual conditions on the networks and optimising the successful balance that was, in the event, achieved.

Analysis of travel patterns during the Games suggested that relatively small adaptations by a large number of people – in terms of the four pillars (the 'four R's') of the TDM campaign – created sufficient headroom for Games traffic to be accommodated almost entirely without major incident. Travellers were encouraged to adapt their travel by Reducing the amount they travelled during Games time; by Re-timing journeys so as to avoid the busiest times on the networks; by Re-moding to other less-busy modes of transport and by Re-routing to avoid the busiest locations. All of this enabled London to continue to function and be 'open for business' on a day-to-day basis for non-Games activities.

During the Games:

- London's public transport networks carried record numbers of people. On the roads, while traffic was reduced in central and inner London, in outer London traffic levels were comparable to those normally expected during the summer holiday period.
- TfL calculated that background (ie non-Games) travel reduced by about 5 per cent during the Olympics, and by about 3 per cent during the Paralympics, compared to what would normally be expected at those times of year. This provided a degree of headroom to accommodate overall demand (including both Games and non-Games demand) that was estimated to be 5.5 per cent (Olympics) and 3.9 per cent (Paralympics) higher than would otherwise have been expected at that time of the year.
- It was estimated that more than 95 per cent of Games related trips used public transport, and the evidence suggested that the public response to the TDM messages was almost optimally targeted in terms of time and location.
- The transport networks performed very well in operational terms with no major issues. Reliability for Games Family journeys by road exceeded the 95 per cent target set by the International Olympic Commission, and journey time reliability on the roads for other traffic was similar to that usually delivered.
- Reliability levels for the main public transport networks were comparable to, or exceeded, the high levels of operational reliability now routinely delivered.

#### **Main lessons learned from the 2012 Games**

A combination of several factors made the Games a transport success. Among the most significant were:

- An integrated transport system – TfL's unique breadth of responsibilities, unique for a host city, plus measures such as the London spectator Travelcard, multi-agency co-ordinated operations and customer communications all helped to greatly improve the traveller experience.
- Outstanding levels of operational performance – transport reliability during the Games was strong, at 98 per cent or more on the Tube, DLR and London Overground, continuing the improving performance of recent periods, and reflecting enhanced maintenance and other measures for Games time,
- Exceptional customer experience – with extra staff and volunteers, eye-catching magenta signage, and integrated real-time customer information, transport operators provided an exceptional customer experience for spectators, Games Family and regular travellers over the summer.
- Effective management of the road network – TfL balanced the needs of the Games Family and regular road users effectively, through active traffic management, the design of robust Olympic and Paralympic Route Networks, and by opening Games lanes (for Games Family vehicles only) to normal traffic when they were not needed.
- Successful communication strategy and travel demand management (TDM) - with an integrated communications and TDM strategy, travellers were informed in real-time about the best ways to use the transport system, and by following advice to avoid the busiest times and places to keep the transport system moving despite record passenger numbers.

## 10. The London 2012 Games and their legacy – an update

- Effective freight planning and operations – following a comprehensive engagement programme, advice and support from the Traffic Commissioners and the development of tools such as the Freight Journey Planner, freight operators and businesses adapted during the Games, keeping London stocked and serviced and demonstrating innovative practices such as quieter out-of-hours deliveries.
- More walking and cycling across London – efforts to encourage people to walk and cycle during the Games were successful. Pedestrian counts across London showed walking was up by seven per cent during the Olympic Games and by 18 per cent during the Paralympic Games, while cyclists crossing the Thames were up 20 per cent during the Olympic Games and Barclays Cycle Hire saw record use.
- A more accessible transport system – efforts were made to make the transport network as accessible as possible, including major alterations at Green Park and Southfields stations. New lifts were installed, accessible shuttle services were provided, manual boarding ramps were used and new audio/visual displays were provided. This was in addition to an already fully accessible DLR, bus network and taxis.

TfL has subsequently integrated many of these successful practices and insights gained into future planning and daily operational delivery, ensuring a lasting legacy from these aspects of the Games experience.

### Physical transport legacy update - 2014

The 2012 Games legacy continues to influence developments within London's transport network. The unparalleled levels of face-to-face customer service seen during the event will become the norm under Tube modernisation plans. The following specific initiatives, put in place during 2014, continue to extend both the physical and operational legacy aspects of the Games:

- **New station.** The new Pudding Mill Lane station, the largest on the DLR network, opened in April 2014 with double-tracked rails that allow an extra 1,100 customers to be carried every hour.
- **More buses.** A new bus service was introduced to Queen Elizabeth Olympic Park in November 2014, providing better transport connections for the area. Stops include the London Aquatics Centre and ArcelorMittal Orbit.
- **More ramps.** Continuing the legacy of accessible travel promised after the 2012 Games, the UK's first 'bridge style' boarding ramps were unveiled in May 2014 and introduced at three stations the following month. The ramps are used at stations where there is a step down between platform and train.
- Many major **accessibility improvements** are currently under way, along with dozens of smaller step-free projects, with a target of at least 25 more Tube and London Overground stations, plus dozens of National Rail and Crossrail stations, step-free within the next 10 years.
- **Cycling in the park.** It was announced in November 2014 that the cycle hire scheme will expand into Queen Elizabeth Olympic Park with eight new docking stations and 320 docking points.
- **Helping hands.** Our Travel Ambassadors continue to help keep London moving when major events, including the Notting Hill Carnival and strike action, put the transport network under pressure. Since the 2012 Games Travel Ambassadors have been deployed at many major events including RideLondon 2014.

### 10.3 Socio economic indicators of convergence

#### Introduction

A range of socio-demographic and economic indicators for the Growth Boroughs are available via the GLA London Datastore (see <http://data.london.gov.uk>). This source also contains comparison totals for Greater London. Tables 10.1 to 10.4 update a sample of these indicators, as previewed in Travel in London report 6.

#### Basic population indicators

Table 10.1 Basic demographic indicators. Olympic Growth Boroughs and appropriate comparators.

Borough/area	Resident population			No. of households		
	2011 actual	2015 projection	% change	2011 actual	2015 projection	% change
Barking & Dagenham	185,900	205,400	10.5%	70,100	77,100	9.9%
Greenwich	254,600	281,600	10.6%	101,400	112,900	11.3%
Hackney	246,300	262,700	6.7%	102,100	107,600	5.4%
Newham	308,000	338,000	9.7%	102,300	114,100	11.5%
Tower Hamlets	254,100	284,300	11.9%	102,100	113,500	11.2%
Waltham Forest	258,200	271,400	5.1%	97,400	101,400	4.1%
Inner London	3,231,900	3,440,300	6.4%	1,370,800	1,449,400	5.7%
Outer London	4,942,000	5,192,600	5.1%	1,907,600	1,986,600	4.1%
Greater London	8,173,900	8,632,900	5.6%	3,278,300	3,435,900	4.8%

Borough/area	Population density actual, per hectare			Average age (years)		% of resident population born abroad	
	2011	2015	% change	2011	2015	2011	2014
Barking & Dagenham	51.5	56.4	9.5%	33.4	32.9	29.2	37.4
Greenwich	53.8	57.7	7.2%	34.6	34.9	35.2	32.9
Hackney	129.3	139.3	7.7%	32.4	32.8	37.2	38.9
Newham	85.1	91.9	8.0%	31.3	31.7	49.6	51.8
Tower Hamlets	128.5	145.1	13.0%	30.9	31.2	30.9	37.8
Waltham Forest	66.5	70.6	6.1%	34.4	34.7	37	36.0
Inner London	101.2	107.7	6.5%	32.4	34.4	37.2	39.9
Outer London	39.4	41.6	5.7%	36.6	36.7	32.9	34.5
Greater London	52	55.1	6.0%	35.6	35.8	35.9	36.6

Source: GLA London Datastore, Borough Profiles: <http://data.london.gov.uk/datastore/package/london-borough-profiles>. Note that previous estimates for certain quantities have been re-based using the 2011 Census population actual totals which, as described in section 2.5 of this report, differed from the previous Census mid-year estimates.

Table 10.1 compares a selection of pre-Games socio-demographic indicators, based on the 2011 Census of population, with the latest available data. In 2011 the six Growth Boroughs contained 575,400 households and were home to 1,507,100 people. In 2015, the population had increased by 9.0 per cent to 1,643,400 and the

number of households increased by 8.9 per cent to 626,600. Growth in these boroughs has been greater than the London average, where there was a 5.6 per cent increase in population and a 4.8 per cent increase in the number of households between 2011 and 2015.

Demographically, the six boroughs are far from homogenous, with distinct differences between them in terms of population density, age profiles and ethnic make-up. This is, of course, not surprising given the geographical extent of the Growth Boroughs. Population density has increased in all of the boroughs between 2011 and 2015. Tower Hamlets has shown the largest increase over this period with population density increasing by 13.0 per cent, more than double that of the London average.

The percentage of the resident population born abroad varies across the Growth Boroughs. Newham has the highest percentage, at almost 52 per cent. Barking & Dagenham and Tower Hamlets have shown the greatest increase in the percentage of resident population born abroad between 2011 and 2015, at 28 per cent and 22 per cent respectively. In contrast, Greenwich and Waltham Forest have seen a decline in the proportion of the population born abroad over the period, of 7 per cent and 3 per cent respectively.

### **Basic economic indicators**

Table 10.2 shows some basic indicators relating to jobs and employment. In contrast to the demographic indicators above it is clear from these data that the Growth Boroughs as a group currently under-perform other London comparators.

The number of jobs by workplace and gross annual pay of residents has increased in all of the Growth Boroughs between the comparison years. The change in employment rate between 2012 and 2014 is more varied, with the largest increases in Hackney and Tower Hamlets. Greenwich and Waltham Forest have seen a slight decline in the employment rate, by 4 per cent and 1 per cent respectively, and Newham has seen no change. All of the Growth Boroughs have a 2014 employment rate that is lower than the Greater London average. The number of active businesses has increased in all of the Growth Boroughs between 2012 and 2013, and at a faster rate than the London average. The number of active businesses increased by between 9 and 10 per cent in all of the Growth Boroughs, compared to a London average of 6 per cent.

Table 10.2 Basic economic indicators (employment). Olympic Growth Boroughs and appropriate comparators.

Borough/area	Number of jobs by workplace		Residents gross annual pay (£)		Employment rate (%)		Number of active enterprises	
	2012	2013	2012	2014	2012	2014	2012	2013
Barking & Dagenham	53,000	54,300	24,000	27,252	62.3	63.6	4,580	5,055
Greenwich	81,000	83,400	26,000	30,800	69.6	66.7	7,665	8,320
Hackney	112,000	123,300	27,000	32,269	63.7	68.2	12,980	14,180
Newham	89,000	100,300	20,000	25,815	60.5	60.5	7,750	8,540
Tower Hamlets	251,000	269,600	29,000	35,276	61.6	68.7	13,740	15,030
Waltham Forest	72,000	81,100	25,000	27,893	68.2	67.8	8,265	8,970
Inner London	3,033,000	3,263,300	30,000	34,365	67.2	70.8	230,730	245,615
Outer London	1,990,000	2,098,800	27,000	31,906	70.1	71.5	208,675	220,520
Greater London	5,023,000	5,362,600	28,000	32,781	68.9	71.2	439,405	466,135

Source: GLA London Datastore, Borough Profiles: <http://data.london.gov.uk/datastore/package/london-borough-profiles>.

Especially notable are the indices of multiple deprivation, which were recently updated in September 2015. All of the Growth Boroughs have seen an improvement in terms of their average deprivation score ranking – particularly notable is that Hackney and Newham have moved out of top ten most deprived local authorities in England since 2010.

It is useful to look at the actual deprivation scores for the Growth Boroughs to see how the level of deprivation has changed between 2010 and 2015 rather than a measure of relativity. All of the Growth Boroughs show a reduction in deprivation except Barking & Dagenham, which has seen a marginal increase. Newham has seen the largest decrease (21 per cent) in deprivation over the 5 year period, closely followed by Greenwich, with a 20 per cent decrease (table 10.3).

Table 10.3 English indices of deprivation. Olympic Growth Boroughs.

Borough/area	Indices of multiple deprivation		Indices of multiple deprivation		
	Rank of average score	Rank of average score	Average score	Average score	% change
	2010	2015	2010	2015	
Barking & Dagenham	22	12	34.2	34.6	1%
Greenwich	28	78	31.9	25.5	-20%
Hackney	2	11	42.9	35.3	-18%
Newham	3	23	41.8	32.9	-21%
Tower Hamlets	7	10	39.6	35.7	-10%
Waltham Forest	15	35	35.4	30.2	-15%

Source: Department for Communities and Local Government, Indices of Multiple Deprivation: <https://www.gov.uk/government/collections/english-indices-of-deprivation>

### Environment, education, crime/safety and active travel

National-level data, available through the London Datastore, provide indices relating to many of the social objectives of convergence. Table 10.4 shows a

diverse selection of these, relating to green space, crime, cycling frequency, educational attainment and house prices. These are of both general and specific interest, although again primarily highlight the diversity of the six Growth Boroughs.

So, for example, reported crime rates in 2014/15 in each of the six Growth Boroughs are in fact lower than the average for inner London, and have declined since 2012/13. Hackney remains the borough with the highest rates of cycling compared to the other Growth Boroughs, however significant growth is seen in Tower Hamlets, where the percentage of adults who cycle at least once a month is now higher than the inner London average.

Average house prices remain generally lower than average for inner London, but the median house price in all Growth Boroughs has increased between 2011 and 2014, with particularly large increases (of around 40 per cent) in Hackney and Waltham Forest. The difference in house prices in part reflects substantial differences in the nature of the dwelling stock in each borough, and should not of itself be taken as an indicator of relative deprivation.

**Table 10.4** Selected indicators relevant to convergence. Olympic Growth Boroughs and appropriate comparators. Most recent-available year.

Borough/area	Crime rate per 1,000 population		Adults who cycle at least once a month (%)		Children attaining 5 or more GCSEs, inc. English & Maths, Grade A*-C (%)		Median house price (£)	
	2012/13	2014/15	2010/11	2013/14	2011/12	2013/14	2011	2014
	-1		-2		-3			
Barking & Dagenham	92.2	83.4	9.0	6.5	58.6	58.0	170,000	215,000
Greenwich	82.5	79.4	14.0	11.6	63.7	58.8	249,950	317,000
Hackney	112.2	99.6	22.0	24.1	58.6	60.6	312,000	433,000
Newham	102	90.8	11.0	7.1	61.2	55.7	219,000	250,000
Tower Hamlets	113.4	99.9	15.0	19.3	62.1	59.2	300,000	383,000
Waltham Forest	94.1	78.0	11.0	12.8	56.4	58.3	232,000	320,000
Inner London	121.7	106.4	18.4	17.5	n/a	n/a	360,000	465,000
Outer London	75.7	69.4	12.7	12.7	n/a	n/a	250,000	318,000
Greater London	93.9	84.0	16.0	14.2	62.6	61.8	293,200	365,000

Source: GLA London Datastore, Borough Profiles: <http://data.london.gov.uk/datastore/package/london-borough-profiles>.

Notes:

1. Values are for 2012/13 financial year. Based on Census mid-year population estimates 2010 and consequently subject to change reflecting availability of actual population data from the 2011 Census.

2. From Active People Survey - <https://www.gov.uk/government/organisations/department-for-transport/series/walking-and-cycling-statistics>

3. Relates to pupils at maintained schools only. By borough of residence.

## 10.4 Travel behaviour change in the Olympic Growth Boroughs

### Approach

Travel in London report 6 described a method for monitoring aspects of the travel behaviour of residents of the Olympic Growth Boroughs and Londoners more generally using TfL's London Travel Demand Survey. This survey provides an annual sample of approximately 1,100 households across the six Olympic Growth

Boroughs, in the context of a whole-London sample of about 8,000 households. Travel in London report 6 also set out groupings of ‘comparator’ boroughs that could be used to identify differential change in the six Growth Boroughs, reflecting progress towards Games legacy goals. When comparing results from this survey over time, it is important to recognise that the relatively small sample each year limits the level of disaggregation at which it is possible to identify change. Also the wider backdrop of demographic change in the Growth Boroughs will have an effect on the consistency of these indicators over time.

### Overall person trip rates and household car availability

Average person trip rates are a basic measure of travel, and are normalised so as to take account of differing absolute levels of population in each borough. Car ownership rates are a similarly basic measure of access to this form of transport, changes to which should be viewed in the context of transport mode share aspirations for London and the Growth Boroughs specifically. These are of particular interest given the observed trend towards lower levels of car ownership and use observed across London over recent years, and the historic connection between car ownership levels and general prosperity. Table 10.5 summarises key data for both indicators.

**Table 10.5** Person trip rates (all modes) and household car ownership rates for Olympic Growth Boroughs (residents of boroughs only). Seven-day week, multi-year average values.

Borough/area	Resident average trip rate (3 year pre-Games)	Resident average trip rate (2 year post-Games)	Resident households with access to one or more cars (3 year pre-Games)	Resident average households with access to one or more cars (2 year post-Games)
	2009/10-2011/12	2013/14-2014/15	2009/10-2011/12	2013/14-2014/15
Barking & Dagenham	2.1	2.1	55%	61%
Greenwich	2.1	2.6	64%	60%
Hackney	1.9	2.1	36%	34%
Newham	2.4	2.3	45%	44%
Tower Hamlets	2.4	2.3	37%	28%
Waltham Forest	2.0	2.5	60%	58%
Growth total/average	2.2	2.3	49%	46%
‘Geographic’ comparison	2.6	2.6	57%	58%
‘Most similar’ comparison	2.4	2.5	51%	52%
Non-legacy boroughs	2.5	2.5	60%	58%
Inner London	2.5	2.5	43%	40%
Outer London	2.4	2.4	69%	68%
Greater London	2.5	2.5	58%	57%

Source: TfL Planning, Strategic Analysis.

It is seen from table 10.5 that overall person trip-rates tend to be lower than average in the Growth Boroughs, compared to the various London comparators, as in general do car ownership rates – a feature that has not changed significantly with the latest data. There is also little evidence of differential change between the

Growth Boroughs and comparators in either person trip rates or car ownership, although the latest data are suggestive of a particular increase in car ownership rates in Barking & Dagenham and a substantial fall in Tower Hamlets, which may particularly be associated with rapid population growth.

Taken across the Growth Boroughs as a whole these trends – of a broadly stable trip rate and modest reduction in the rate of car ownership – would be consistent with both legacy and wider transport strategy goals. It should be borne in mind, of course, when interpreting comparisons such as these, that the Growth Boroughs, whether in inner or outer London, will predominantly tend to share the characteristics of either inner or outer London, and it is in this context that features such as the particularly low person trip rate for residents of Hackney should be seen.

### Trip rates by mode for residents of Growth Boroughs

While foreseeing growing overall volumes of travel in the Growth Boroughs, reflecting increasing population and economic activity, a key transport goal is that higher proportions of this travel are undertaken on public transport and, in particular, by walking or cycling. The popularity of these latter two ‘active travel’ modes is expected to benefit from the wider ‘sporting legacy’ of the Games, as well as substantial investment in facilities designed to encourage their use.

Table 10.6 looks at trip rates for residents (the average number of trips made per person per day) by overall main mode. In interpreting this table it is important to be aware that the criterion for inclusion is being resident in the appropriate area. The trips themselves may however have been made elsewhere.

Table 10.6 Person trip rates for Olympic Growth Boroughs. Average number of trips per day for residents over five years of age – by main mode. Seven-day week, multi-year averages.

Borough/area	Resident trip rate car driver and passenger		Resident trip rate PT		Resident trip rate walking and cycling (combined)	
	2009/10-2011/12	2013/14-2014/15	2009/10-2011/12	2013/14-2014/15	2009/10-2011/12	2013/14-2014/15
Barking & Dagenham	0.9	0.9	0.6	0.6	0.5	0.6
Greenwich	0.9	1.1	0.6	0.8	0.6	0.7
Hackney	0.3	0.4	0.8	0.8	0.7	0.8
Newham	0.6	0.6	0.9	0.9	0.9	0.8
Tower Hamlets	0.4	0.4	0.8	0.9	1.1	1.1
Waltham Forest	0.7	0.9	0.6	0.7	1.1	0.9
Growth total/average	0.6	0.7	0.7	0.8	0.8	0.8
‘Geographic’ comparison	0.9	0.9	0.8	0.8	0.9	0.9
‘Most similar’ comparison	0.8	0.8	0.8	0.8	0.8	0.9
Non-legacy boroughs	1.0	0.9	0.7	0.7	0.8	0.8
Inner London	0.6	0.5	0.9	0.9	1.0	1.0
Outer London	1.2	1.1	0.6	0.6	0.7	0.7
Greater London	0.8	0.9	0.7	0.7	0.8	0.8

Source: TfL Planning, Strategic Analysis.

Table 10.6 reveals a great deal of disparity between person trip rates and mode use across the six Growth Boroughs. Looking first at car travel, the highest rates among the Growth Boroughs are found for residents of Barking & Dagenham, Greenwich and Waltham Forest, although these are not substantially different to the relevant comparator for outer London. Hackney and Tower Hamlets are notable for relatively low car trip rates – each with an average of less than half a car trip per resident per day. Public transport trip rates for residents of the Growth Boroughs however tend to be typical of the relevant comparators. On the basis of this comparison there is as yet little evidence of systematic change. At the ‘all Growth Boroughs’ level both car and public transport trip rates are effectively the same before and after the Games.

Looking at trip rates for walking and cycling – the two ‘active’ modes of travel, table 10.6 shows a very mixed picture. Residents of Tower Hamlets and Waltham Forest walk and cycle considerably more, on average, than the relevant comparators. This pattern is thought to reflect particular socio-demographic and economic factors relating to residents of these boroughs. It is not therefore a ‘Games effect’ itself, and it does not necessarily follow that increasing walk and cycle trip rates in boroughs such as these would be a predictable or desirable legacy outcome, despite the health benefits attributed to these modes of travel.

#### **Mode shares for public transport for all London residents making trips that originate in the Growth Boroughs**

It is possible to extend this analysis by looking specifically at public transport mode share, by either Growth Borough residents or, as in this case; by all residents of Greater London making trips in the Growth Boroughs (table 10.7). This is a potentially interesting perspective, as it should ultimately be possible to understand the extent to which travel behaviour change is specifically a feature of people who live in the Growth Boroughs, who may be ‘new’ to the area, or is reflective more generally of London residents, as a response to changed transport provision in the Growth Boroughs.

Table 10.7 Mode shares – Olympic Growth Boroughs compared. All trips by London residents with an origin in listed boroughs. Multi-year averages.

Borough/area	Total trips ('000s)		Mode share car driver and passenger		Mode share PT		Mode share walking and cycling (combined)	
	2009/10	2013/14	2009/10	2013/14	2009/10	2013/14	2009/10	2013/14
	2011/12	2014/15	2011/12	2014/15	2011/12	2014/15	2011/12	2014/15
Barking & Dagenham	876	623	42%	42%	27%	27%	29%	29%
Greenwich	1,361	1,185	45%	39%	25%	29%	29%	31%
Hackney	1,255	880	18%	19%	36%	37%	45%	42%
Newham	1,950	1,435	29%	26%	31%	34%	39%	39%
Tower Hamlets	1,721	1,233	18%	18%	37%	40%	45%	41%
Waltham Forest	1,262	1,054	39%	38%	27%	24%	32%	37%
Growth total/average	8,426	6,410	30%	29%	31%	32%	38%	37%
'Geographic' comparison	8,907	6,222	34%	33%	29%	30%	35%	36%
'Most similar' comparison	9,596	7,118	33%	31%	31%	30%	35%	38%
Non-legacy boroughs	46,090	31,585	37%	35%	28%	29%	34%	34%
Inner London	24,390	17,280	21%	19%	38%	39%	40%	41%
Outer London	30,125	20,714	48%	46%	21%	23%	29%	30%
Greater London	54,516	37,995	36%	34%	29%	30%	34%	35%

Source: TfL Planning, Strategic Analysis.

Again there is considerable variety between the mode share of trips originating in the Growth Boroughs – car trips account for between 18 and 42 per cent of trips. Trips originating in Tower Hamlets and Hackney have a low car mode share, which corresponds with a public transport mode share that is typical of inner London. This is thought to reflect the relative intensity of public transport provision in these boroughs. With the notable exception of Waltham Forest, public transport mode shares have increased for trips originating in all of the Growth Boroughs between 2009/10-2011/12 and 2013/14-2014/15.

### Mode shares – walking and cycling

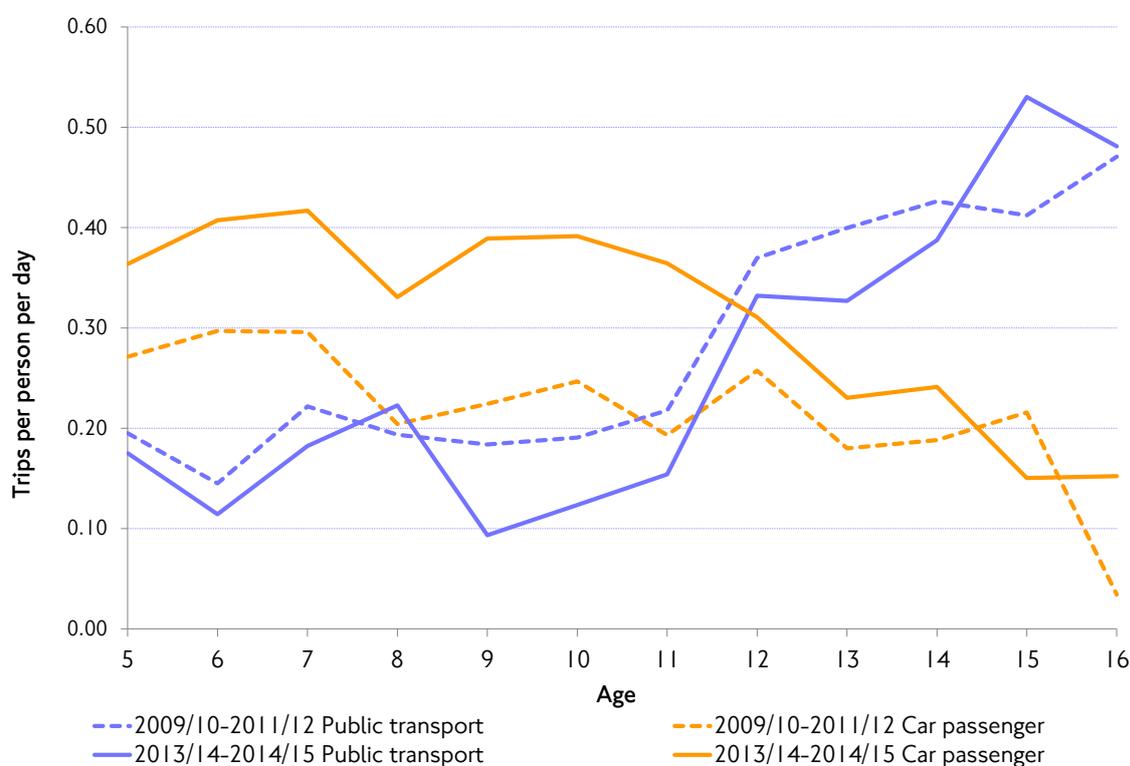
Table 10.7 shows similar statistics for walking and cycling trips. Trips originating in Tower Hamlets and Hackney have the highest walking and cycling mode share, both more than 40 per cent. Active travel mode shares have not changed considerably between the two time periods and there is no apparent trend across the Growth Boroughs – there has been no change in for trips originating in Barking & Dagenham or Newham, a decline in mode share for Hackney and Tower Hamlets and an increase for Greenwich and Waltham Forest. All outer London Growth Boroughs have walk and cycle mode shares that are above the outer London average except for trips originating in Barking & Dagenham.

### Child travel and activity rates – mechanised modes

Promoting healthier travel among young people is an important legacy aim. TfL's LTDS survey collects travel information for all persons aged five and over. It is therefore of interest to see what LTDS can tell us about the ways in which children travel in the six Growth Boroughs, in comparison with children in the rest of London.

Figure 10.1 shows trip rates by main mode (mechanised modes only) for all children resident in the six Growth Boroughs. Figures 10.2 and 10.3 show child trip rates for the two 'active travel' modes of walking and cycling only.

Figure 10.1 Trip rates by mechanised modes for children aged 5-16. Residents of six Olympic Growth Boroughs. Average 2009/10-2011/12 vs., 2013/14-2014/15.



Source: TfL Planning, Strategic Analysis.

Figure 10.1 shows that, of the mechanised modes, younger children's travel is dominated by car passenger travel. Use of public transport is fairly low, at around 0.2 trips per person per day for children of primary school age. The use of rail-based modes is negligible, with the majority of public transport trips made by bus. As children approach their teenage years, a mode switch occurs which sees a dramatic increase in their public transport trip rate, along with a reduction in their car passenger trip rate.

According to the data, public transport trip rates for children are slightly lower after the Games compared to the pre-Games period. In contrast, car passenger trip rates are generally higher compared to the pre-Games period. This trend is not consistent

with that for residents of the Growth Boroughs, where public transport trip rates increased slightly between the pre and post-Games period.

### **Child travel and activity rates – walking and cycling**

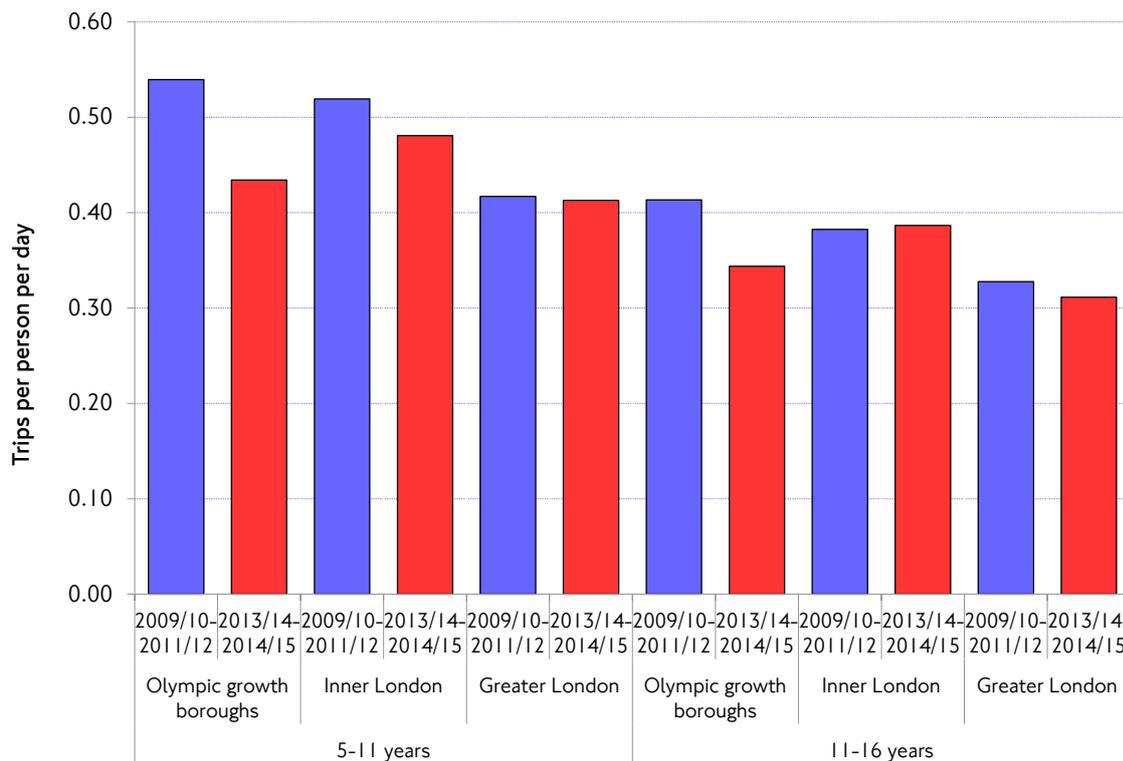
On average, younger children resident in the Growth Boroughs make about 0.5 trips on foot per day. However, this generally reduces as they grow older, with a notable decline corresponding to secondary school age. Cycling trip rates are relatively very low – much less than 0.05 trips on average per child per day (about one-tenth of the walking trip rate). These are the baselines against which progress towards transport legacy objectives will be assessed. Figure 10.2 however reveals many other interesting features.

Looking for example at the relative profiles of the Growth Boroughs against the averages for inner and Greater London, children living in the Growth Boroughs are seen to be more likely to walk than those in Greater London but slightly less likely to walk than those in Inner London. Partly, this reflects known socio-demographic and geographical differences. However, it may also reflect relative deprivation, where walking is used ‘out of necessity’, for example to save paying public transport fares or, less-obviously, deprivation in terms of socio-economic opportunities may mean that there is less need for people to travel longer distances.

Child cycling rates in the Growth Boroughs show the same pattern as walking rates for 5 to 11 year olds. Young children resident in the Growth Boroughs are marginally more likely to cycle than residents of the same age in inner London and Greater London. However, the cycle trip rate among young children has increased more in the Growth Boroughs compared to inner London and Greater London between 2009/10-2011/12 and 2013/14-2014/15.

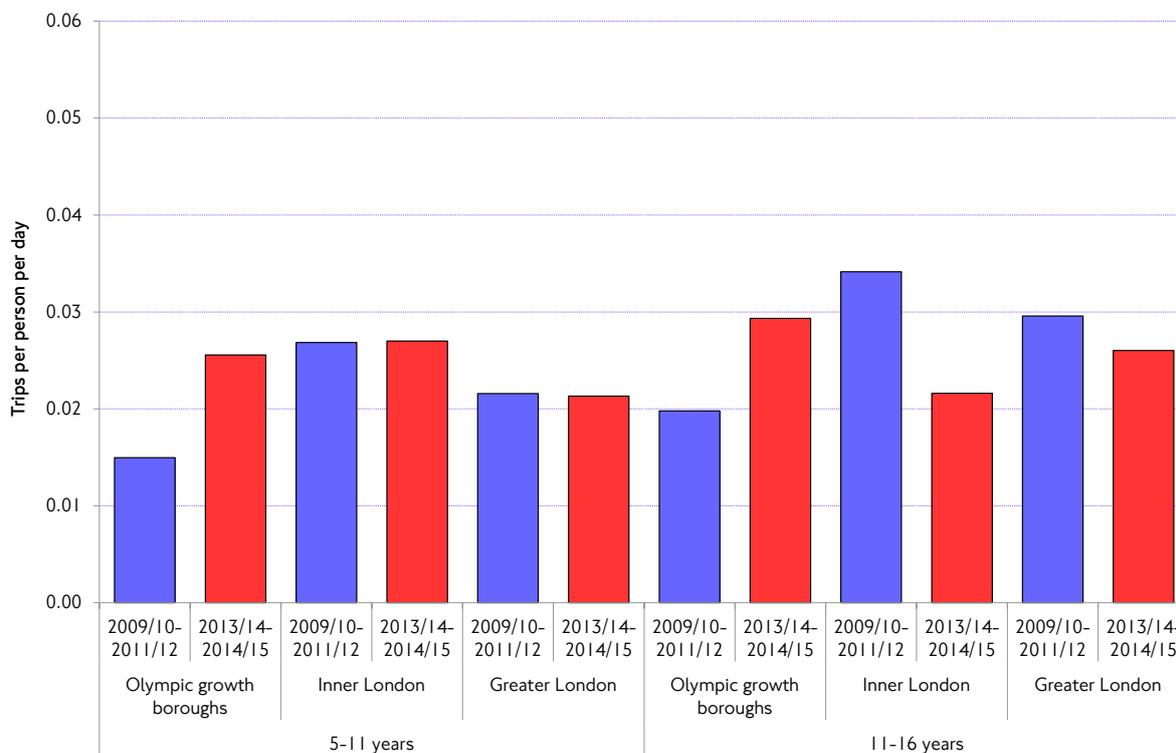
Similarly, cycling rates for children aged 11 to 16 in the Growth Boroughs have increased between 2009/10-2011/12 and 2013/14-2014/15 whereas cycle trip rates for 11 to 16 year olds in inner London and Greater London have declined slightly between the two periods. This means that the Growth Borough cycle trip rate for 11 to 16 year olds is now higher than the inner London or Greater London average.

Figure 10.2 Walk trip rates for children aged 5-11 years (primary school) and 11-16 years (secondary school). Average 2009/10-2011/12 vs. 2013/14-2014/15.



Source: TfL Planning, Strategic Analysis.

Figure 10.3 Cycle trip rates for children aged 5-11 years (primary school) and 11-16 years (secondary school). Average 2009/10-2011/12 vs. 2013/14-2014/15.



Source: TfL Planning, Strategic Analysis.

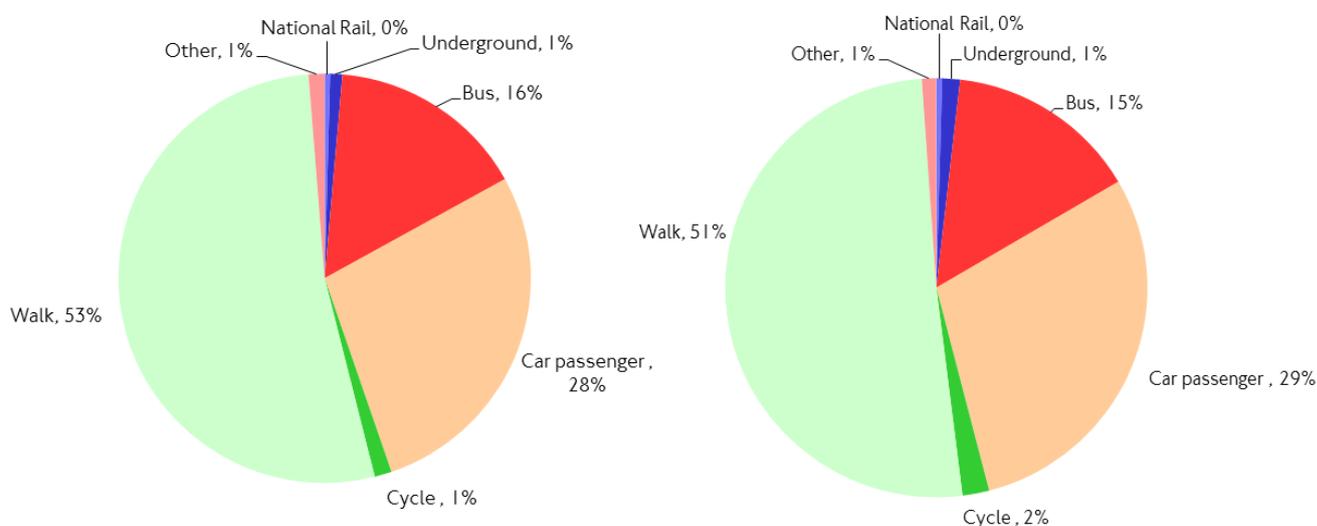
### Child travel and activity rates – travel to and from education

Figure 10.4, for children resident in the six Growth Boroughs, shows long-term average mode share for education trips for children aged 5 to 11 (broadly corresponding to primary education). The two graphs show very little change in mode share over the comparator time periods suggesting the 2012 Games had little impact on overall mode share. Rail and Underground use for travel to school is low, representing less than 1 per cent of trips respectively. Bus mode share remains at 15 per cent, which is in line with the Greater London average and slightly lower than the inner London average of 19 per cent. Around a third of trips to school are made as a car passenger, which is much higher than the inner London average of 15 per cent and much more in line with the Greater London average. Cycle mode share remains negligible, at 1 per cent of trips, and slightly more than half of trips (51 per cent) to school are on foot.

Figure 10.5 shows average mode share for education trips for children aged 11–16 (broadly corresponding to secondary education). Again there has been little change over the comparator time periods. Secondary age children are relatively more likely to use public transport (35 per cent compared to 17 per cent for primary age children), almost certainly reflecting unaccompanied travel by these (older) children.

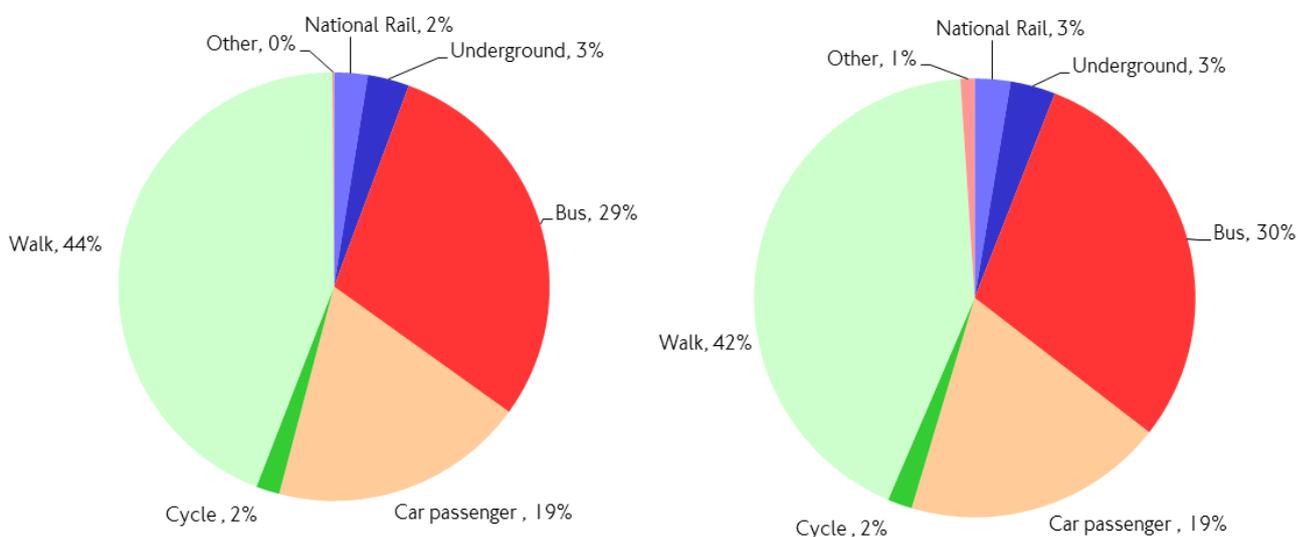
Of the public transport modes, bus is by far the most popular; accounting for 30 per cent of home-school trips for secondary age children, double that of primary age children. This bus mode share is low in comparison with the inner and Greater London averages, at 42 per cent and 43 per cent respectively. Walk mode share for Growth Borough residents in secondary education is 42 per cent, which is slightly lower than children in primary education, however it is higher than the inner and Greater London average, at 39 per cent and 32 per cent respectively. Despite this, the car passenger mode share for children in secondary education in the Olympic boroughs is also higher than the inner and Greater London average, at 19 per cent, compared to 9 per cent for inner London and 16 per cent for Greater London. As for children of secondary education age, the cycle mode share of 11–16 year olds remains very low, at 2 per cent of trips.

Figure 10.4 Mode share for education trips for children aged 5-11 years. Residents of six Olympic Growth Boroughs. Average 2009/10 - 2011/12 vs. 2013/14 - 2014/15.



Source: TfL Planning Strategic Analysis, LTDS Survey.

Figure 10.5 Mode share for education trips for children aged 11-16 years. Residents of six Olympic Growth Boroughs. Average 2009/10 - 2011/12 vs. 2013/14 - 2014/15.



Source: TfL Planning, Strategic Analysis.

### Overall conclusions about baseline personal travel behaviour for the Olympic Growth Boroughs

The Olympic Growth Boroughs are very diverse, comprising often quite different geographic, transport network and socio-demographic features. It is therefore difficult and potentially dangerous to generalise. There has been little change in the travel patterns in the Growth Boroughs over the comparator time periods that can be isolated from general travel trends in Greater London.

Perhaps the one feature that clearly stands out is the relatively greater use of walking and cycling by residents of the Growth Boroughs. More 'active travel' is seen as bringing health benefits, as well as potentially freeing up capacity on public transport where it substitutes for a short-distance public transport trip. Certainly, residents of the Growth Boroughs are already 'above average' on the basis of this indicator, although it is not clear from this analysis to what extent this reflects relative deprivation, cultural preferences, a positive preference for healthier modes of travel, or simply geographic features of the boroughs themselves.

If it mainly reflects the first two of these possible factors, then improved economic conditions in the Growth Boroughs might, perversely, result in less walking and cycling in future years.

## Spotlight topics



## 11. Spotlight: How has travel by Londoners changed - insights from 10 years of the London Travel Demand Survey (LTDS)

### 11.1 Brief description of LTDS

TfL's London Travel Demand Survey is a continuous household survey of the Greater London area, covering all 32 London boroughs and the City of London. It has been running on a rolling basis since 2005/06, making the latest full survey year, 2014/15, the 10th year of available data. LTDS is a successor to the household survey component of the London Area Transport Survey (LATS), last carried out in 2001.

#### How is the survey carried out?

LTDS captures information on households, people, trips and vehicles. All members of the household are surveyed, with complete trip detail for a single day recorded for all household members aged 5 years and over. Three questionnaires are used – a household questionnaire, individual questionnaires for all household members, and trip sheets. The household questionnaire is completed by any responsible adult within the household, and gives details of household structure with basic demographic information on household members and household characteristics such as income, housing tenure and vehicle ownership. The individual questionnaire has to be completed by all members of the household aged 5 and over. This includes further demographic and travel-related information, including working status, frequency of use of transport modes, and details of driving licences and public transport tickets held.

Finally, trip sheets are completed by every household member aged 5 and over. This captures data on all trips made on a designated travel day, the same day for all members of the household. Details captured include trip purposes, modes used, trip start and end times, and the locations of trip origins and destinations and intermediate interchange points (ie journey stages).

#### Accessing LTDS data

Top-level findings from LTDS to accompany this report can be found on the LTDS webpage at: [www.tfl.gov.uk/corporate/publications-and-reports/london-travel-demand-survey](http://www.tfl.gov.uk/corporate/publications-and-reports/london-travel-demand-survey). Specific data requests should be sent to the LTDS team directly, by emailing [LTDSenquiries@tfl.gov.uk](mailto:LTDSenquiries@tfl.gov.uk).

### 11.2 Some topical transport questions

The availability of ten years of LTDS data makes it possible to look back over a decade of change, broadly corresponding to the term of the current MTS. The key trends and developments relating to aggregate travel demand in London and the travel behaviour of Londoners are relatively well-known (see, for example, chapter 2 of this report), as are the external drivers that have affected them – for example, the prolonged economic recession that affected much of the latter part of the last decade.

In October 2014 TfL published 'Drivers of Demand for Travel in London: A review of trends in travel demand and their causes' (see: <http://content.tfl.gov.uk/drivers->

[of-demand-for-travel-in-london.pdf](#)). This identified the principal drivers behind changing travel patterns in London and highlighted the need for further investigation so that the relationships could be more fully understood. At the same time wider developments have thrown the spotlight on specific issues that will be of policy concern in the future – for example an increased appreciation of the links between active travel and public health outcomes. There also remain many questions about the various behavioural changes contributing to aggregate outcomes, the reasons for these, and where the trends are most likely to go next.

The material in this chapter picks up eight ‘topical transport questions’ and uses the ten years of LTDS data now available, alongside evidence from other sources where appropriate, to provide a brief analytical perspective on each of these questions. The intention is not necessarily to provide definitive or comprehensive ‘answers’; rather it is to highlight what LTDS data can contribute to the debate in each case.

### **Important note**

The focus in this chapter is on London residents (as opposed to travel by all people in London). In interpreting statistic presented on a per capita basis, it should be recognised that the absolute number of people resident in London has increased substantially in recent years (see also chapters 2 and 12 of this report).

## **11.3 Have there been any substantial changes in the way that Londoners travel over the last 10 years?**

### **Introduction**

It is sometimes held that developments to technology and factors such as flexible working patterns would reduce the need for people to travel, although in aggregate terms travel does not, from the evidence presented in chapter 2 of this report, appear to be reducing. Total travel demand in London is broadly rising in line with increasing population. A related observation, but one with different implications, is that people on average tend to have ‘fixed’ time and travel budgets, at least at an unconscious and collective level. An implication of this would be that, as average travel speeds increase or decrease, the distance travelled changes correspondingly, or vice versa, thereby influencing factors such as home and workplace location over the long term. What does LTDS tell us about these things?

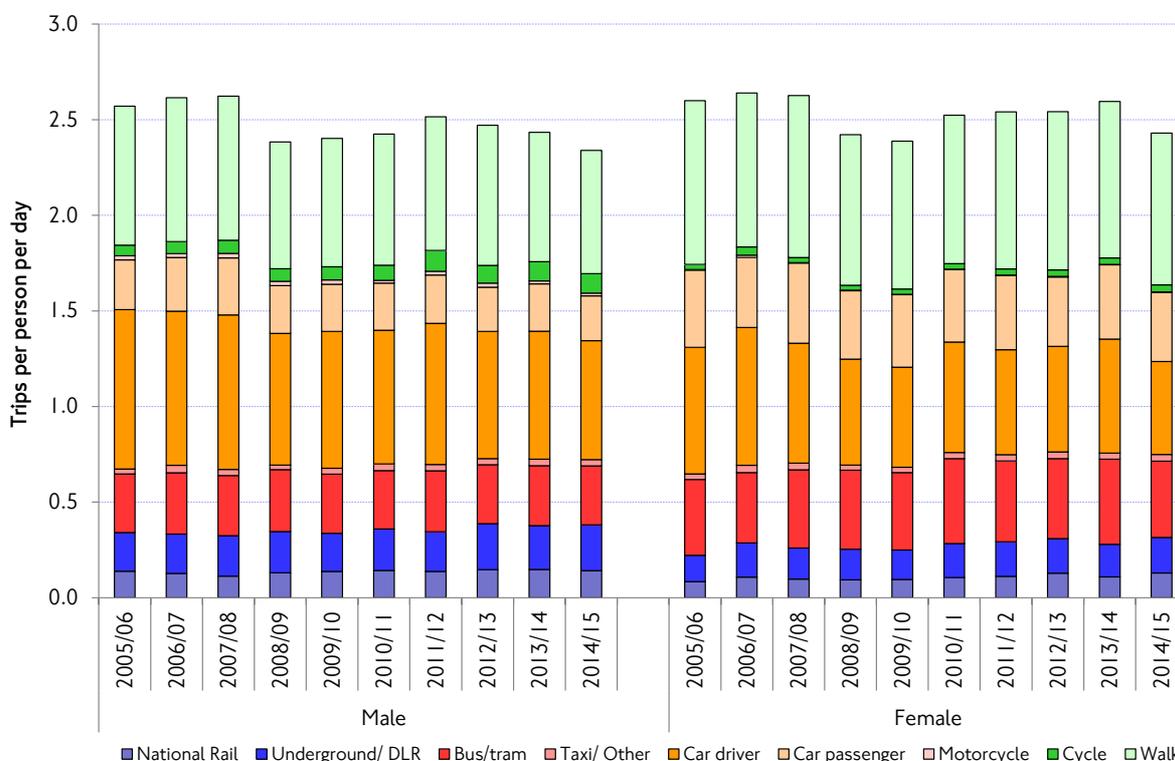
### **Personal trip rates**

Figure 11.1 shows the average number of trips per person by London residents over the 10 years of LTDS, sub-divided by gender. It is apparent from the graphic that there is, in fact, a slow but consistent downward tendency in per capita trip rates for London residents, with average falls of 1.0 per cent per year for men, and 0.7 per cent per year for women.

The relatively sharp reduction of 2008/09 and the following 2 years is at least partly a reflection of the economic recession, feeding through to lower activity levels and trip rates. Although later years show a recovery, the balance of the trend since the start of the current decade is clearly downwards. On the basis of this evidence, therefore, it would seem that the last decade has seen a tendency for London residents to travel less, on average, per capita. A particularly notable feature of the graphic is the reduction in car based trip rates – reflecting the wider modal shift that has been seen in London. Although there has been a corresponding shift towards

greater public transport use, the reduction in car use accounts for the bulk of reduced trip making overall.

Figure 11.1 Trip rates by gender and main mode of transport (average day, seven day week).



Source: TfL Planning, Strategic Analysis.

### Non-travel

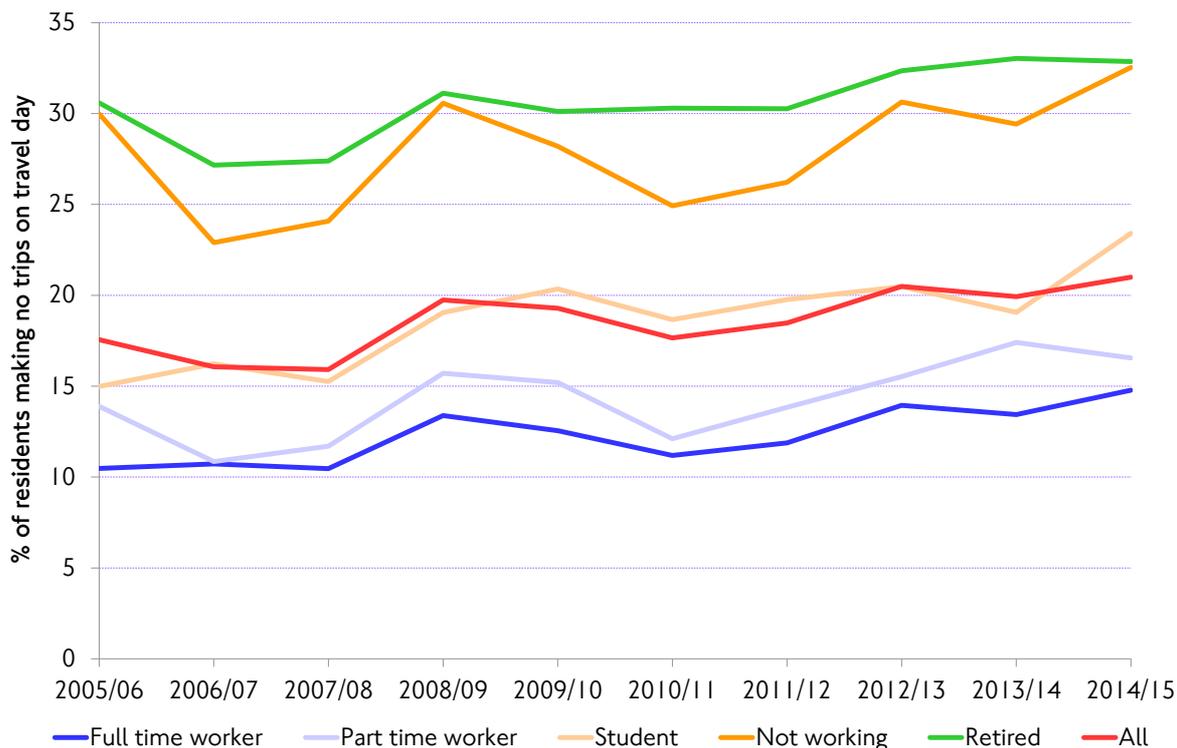
LTDS also includes details of those who make no trips during the course of the survey day. This is so that the sample can be representative of all Londoners. These ‘non travellers’ comprise a relatively high proportion of Londoners – just short of 20 per cent on any given day. The values in figure 11.1 are averages across all people, and so it is of interest to examine rates of non-travel to understand if these have been a significant contributor to the observed overall trend.

Figure 11.2 shows rates of non-travel by London residents according to their working status. Unsurprisingly those who are retired, for example, are less likely to travel on a given day than those in employment, although even these latter people have a non-travel rate in excess of 10 per cent. However, the key observation from the graph is that rates on non-travel have shown a slow but steady increase over the review period. Overall rates of non-travel have increased, by almost 20 per cent since 2005/06.

This raises a related question – what has happened to average trip rates among those who do travel, ie if those who make no trips on the survey day are excluded? Figure 11.3 shows that they show a similar slow downward trend to overall trip rates. It can therefore be concluded that an increase in non-travel is only one of several factors contributing to the overall trend.

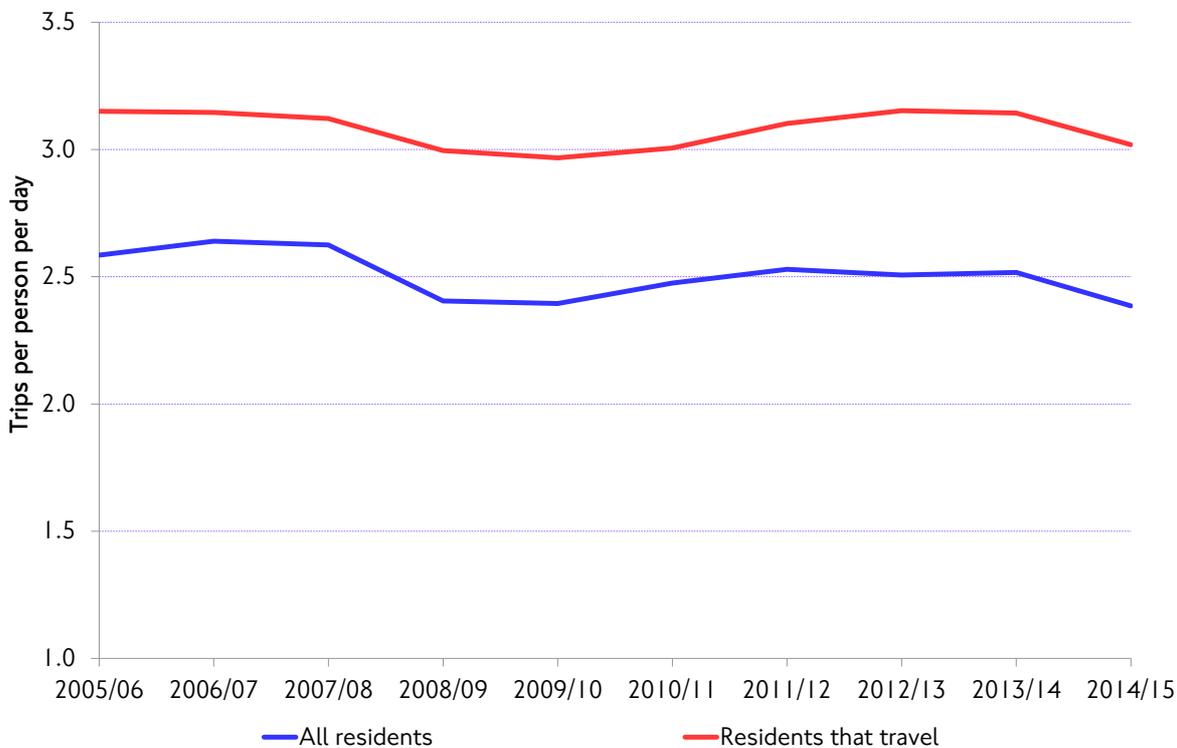
11. Spotlight: How has travel by Londoners changed – insights from 10 years of the London Travel Demand Survey (LTDS)

Figure 11.2 Percentage of Londoners making no trips on survey day – by working status. Seven day week.



Source: TfL Planning, Strategic Analysis.

Figure 11.3 Trip rates for residents making at least one trip on travel day.

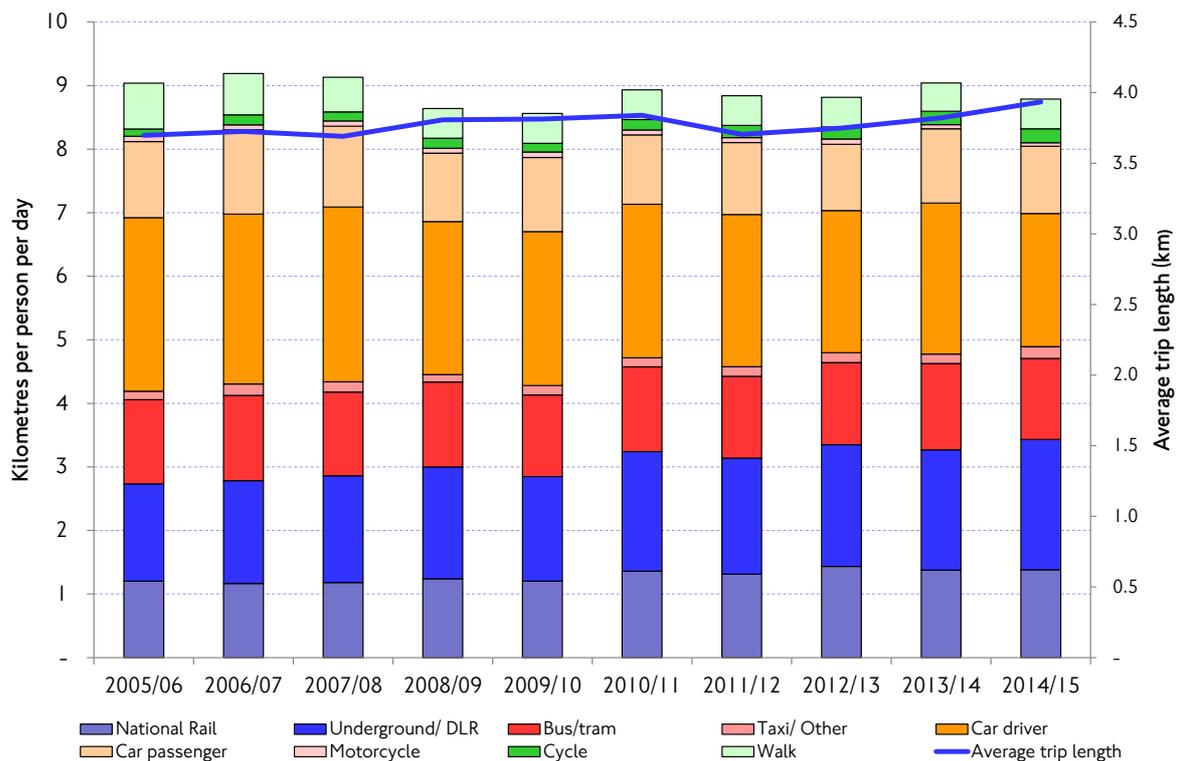


Source: TfL Planning, Strategic Analysis.

### Distance and time spent travelling

Figure 11.4 shows the average distance travelled across all London residents, this time focusing only on trips wholly within Greater London. The general profile is similar to that for trip rates, but the changes from year-to-year are less pronounced, suggesting an element of trip lengthening. Overlaid on the graph (right hand axis) is the average trip length each year, with the slow increase evident. So, although people are making fewer trips, on average, the individual trips are tending to get slightly longer in terms of distance.

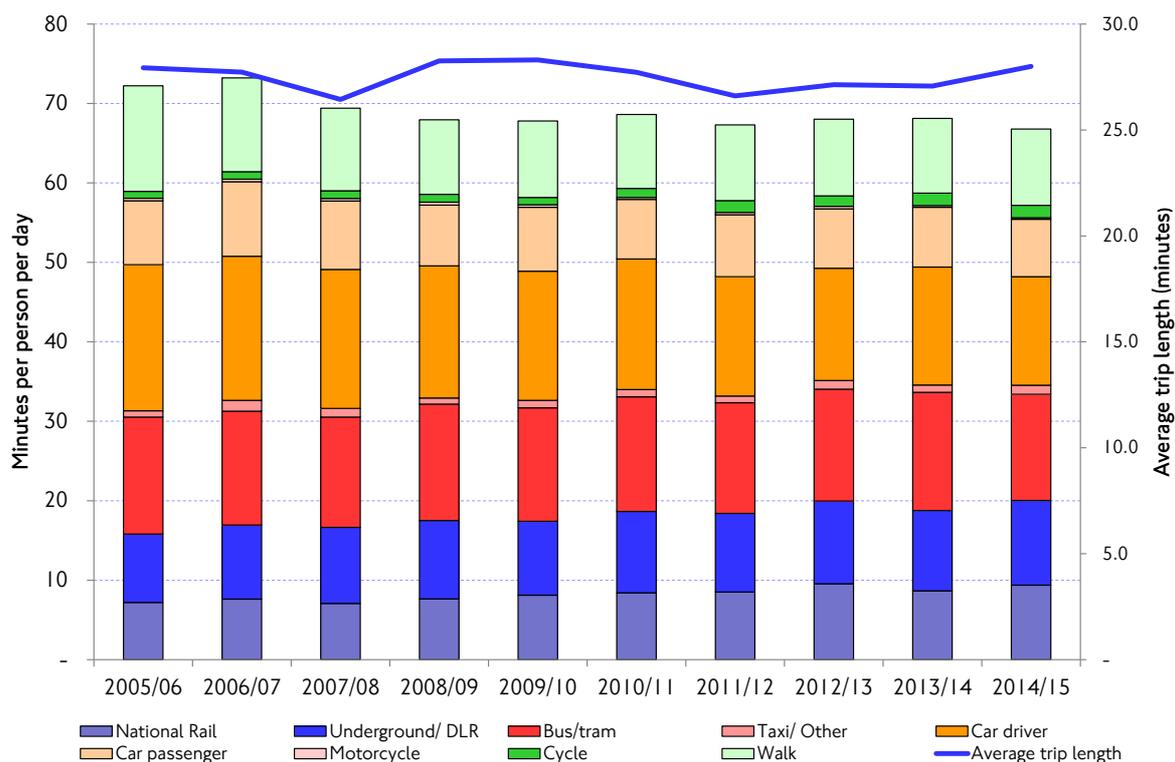
Figure 11.4 Average daily travel distance (trips with origin and destination in Greater London). LTDS average day, seven day week.



Source: TfL Planning, Strategic Analysis.

Looking at average time spent travelling (figure 11.5), there has been a slight downward trend in recent years, reflecting the rise in non-travel rates. The average London resident spends around 8 per cent less time travelling per day than in 2005/06. Despite this, the average duration of a trip has remained relatively stable, with evidence of a slight increase in average trip duration in recent years to 28 minutes per trip. This is consistent with the trend towards longer trips described above.

Figure 11.5 Average daily travel time (trips with origin and destination in Greater London). LTDS average day, seven day week.



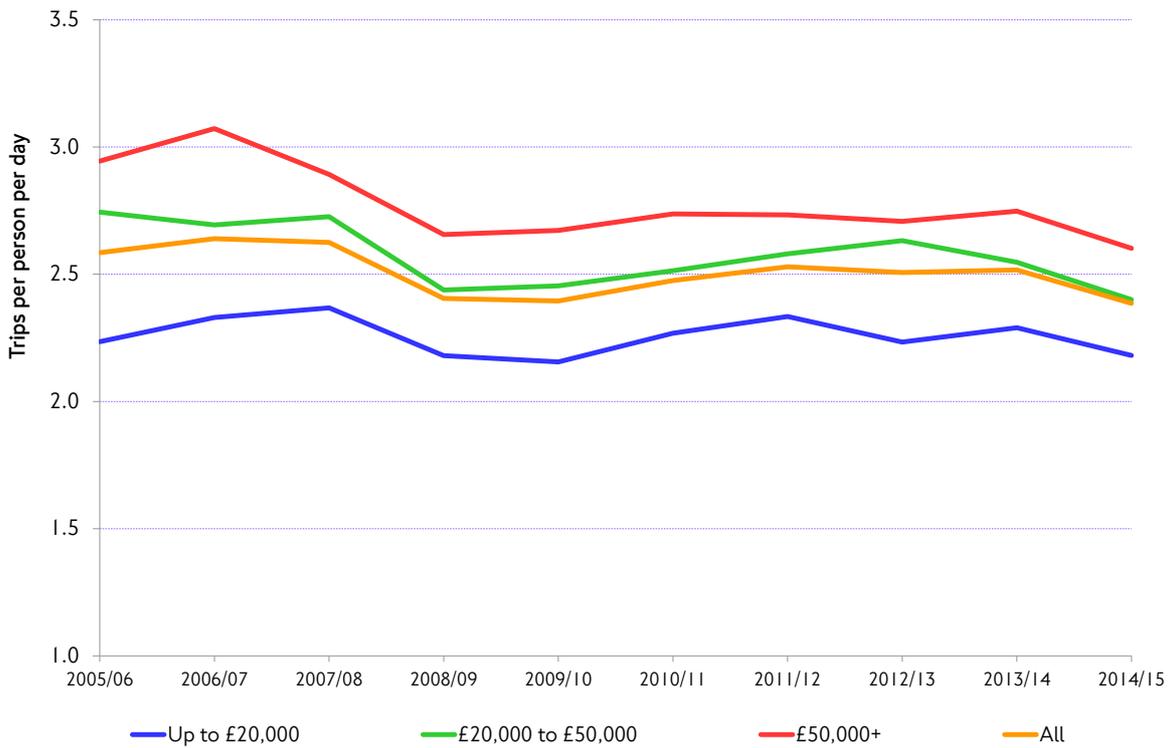
Source: TfL Planning, Strategic Analysis.

### Are there any particular changes by socio-demographic group?

Figure 11.6 shows the trend in average trip rates by household income group. There is a clear tendency for those living in households with higher incomes to have reduced their average trip rate to a greater extent than those with lower household incomes. This could possibly reflect more flexible working patterns or greater use of technology. It also seems to be related to the overall decline in car ownership and use – this tending to disproportionately affect those with higher incomes.

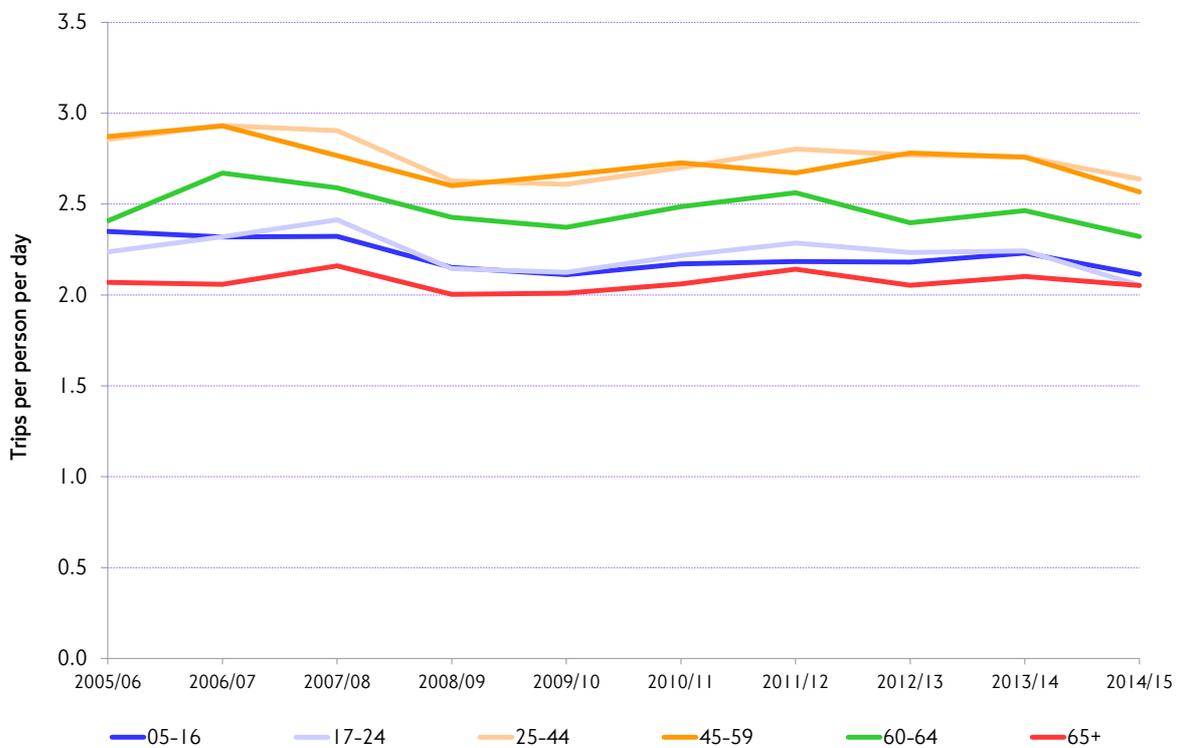
The trends in trip rates by age group are shown in figure 11.7. There is a clear difference between older and younger London residents, who both make fewer trips on average, and those aged between 25 and 59, who make the most trips per day. However, the decline in trip rates has been similar across all age groups except for those aged 65 and over, where trip rates have remained stable over time. Again, this is likely to be the result of a variety of factors such as an increase in flexible working and the greater use of technology, both for leisure and shopping.

Figure 11.6 Trip rates by household income (average day, seven day week).



Source: TfL Planning, Strategic Analysis.

Figure 11.7 Trip rates by age band (average day, seven day week).



Source: TfL Planning, Strategic Analysis.

## 11.4 How has car use by Londoners changed over the past 10 years?

### Introduction

The ‘peak car’ hypothesis proposes that volumes of car use per capita have reached a peak, and that the trend of growth in traffic will now reverse, leading to a sustained decline into the future. This could be either in absolute terms or, in the context of a rapidly growing city such as London, in relative terms, looking in this case at car use per capita. What does LTDS tell us about this in London?

### Traffic volumes and personal car travel

In London traffic volumes in terms of vehicle-kilometres reached a peak in 1999 and have been observed to be declining almost every year since then, with the number of vehicle-kilometres travelled now around 10 per cent lower than it was in 2000. There has, however, been something of a turnaround in the very latest year – overall traffic volumes (all types of road traffic) in London increasing by 1.8 per cent.

LTDS has been used to explore to what extent the trend of reducing road traffic since 1999 is apparent in London residents’ travel patterns. It should be noted that traffic volumes as recorded on the network relate to a wider realm of travel than that captured by LTDS, which enquires only about personal travel, and covers only London residents. This means that the trend in vehicle-kilometres on the network as a whole may differ from that suggested by LTDS, with the difference accounted for by, for example, travel in the course of work, freight traffic or travel by non-Londoners.

Of the data collected through LTDS, that relating to car driver trips is of most relevance to the peak car question. Trips made as a car driver correspond one to one with a vehicle being driven on the network. While trips as a car passenger are also of interest in many contexts, these do not correspond to vehicle usage. On this basis, information relating to car driver trips is presented here to explore the extent to which observations made through LTDS are consistent with the peak car hypothesis.

### London residents’ car travel

Over the 10 years of LTDS, car driver trip rates, distance travelled as a car driver, and time spent travelling as a car driver have all decreased by around 25 per cent (figure 11.8). Taking into account growth in London’s population of 14 per cent between 2005 and 2014, this means a net absolute reduction of 16 per cent in car travel by London residents. This is greater than the net reduction of approximately 8 per cent in the volume of car traffic (measured in vehicle-kilometres) in London between 2005 and 2014. The implication of this is that the trend relating to personal travel of London residents is more consistent with the peak car hypothesis than is the pattern relating to travel in London more generally.

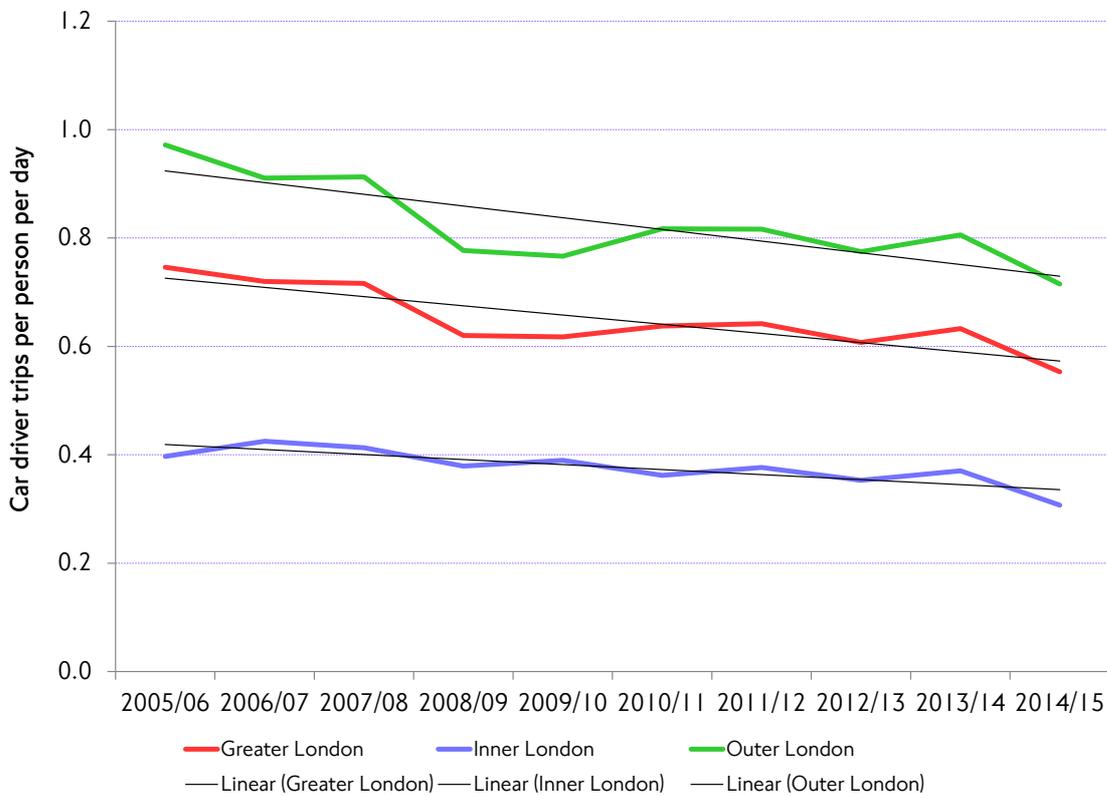
The trend of reducing car driver trip rates is evident for residents of both inner and outer London. This trend has seen an average annual reduction in car driver trip rates of about three per cent in both. Given the already higher car driver trip rates for residents of outer London, this percentage reduction represents a larger annual reduction in car driver trip rates in outer London in absolute terms (figure 11.9).

Figure 11.8 Indicators of car travel among London residents.



Source: TfL Planning, Strategic Analysis.

Figure 11.9 Car driver trip rates, inner, outer and all London residents compared.

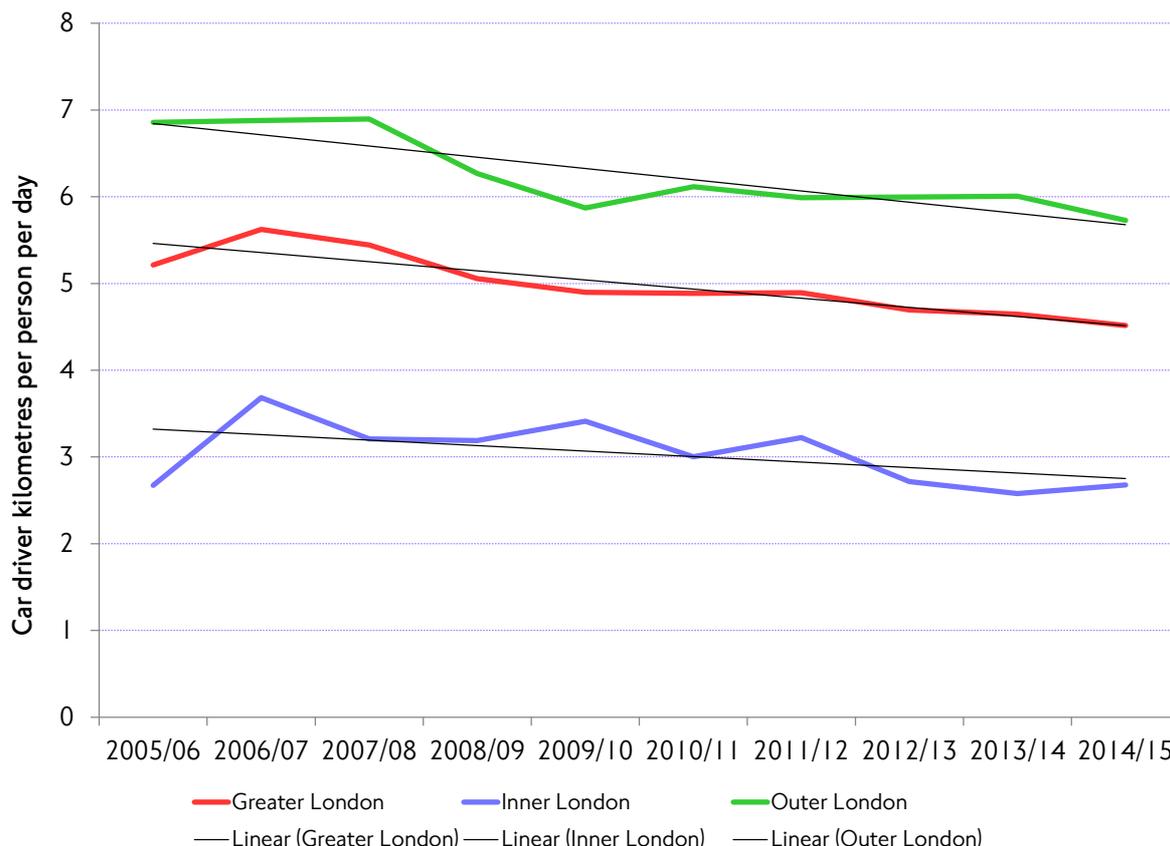


Source: TfL Planning, Strategic Analysis.

## 11. Spotlight: How has travel by Londoners changed – insights from 10 years of the London Travel Demand Survey (LTDS)

The trend in distance travelled as a car driver has also been downward for residents of both inner and outer London. The rate of reduction has been faster among inner London residents, who saw an annual average reduction of 3.5 per cent in distance travelled as a car driver. Outer London residents saw a smaller average annual decline of around 2 per cent. In both cases, this meant the average London resident travelled about 1 kilometre less each day as a car driver in 2014/15 compared to in 2006/07, amounting to a reduction in distance per person of 20 per cent over the period (figure 11.10).

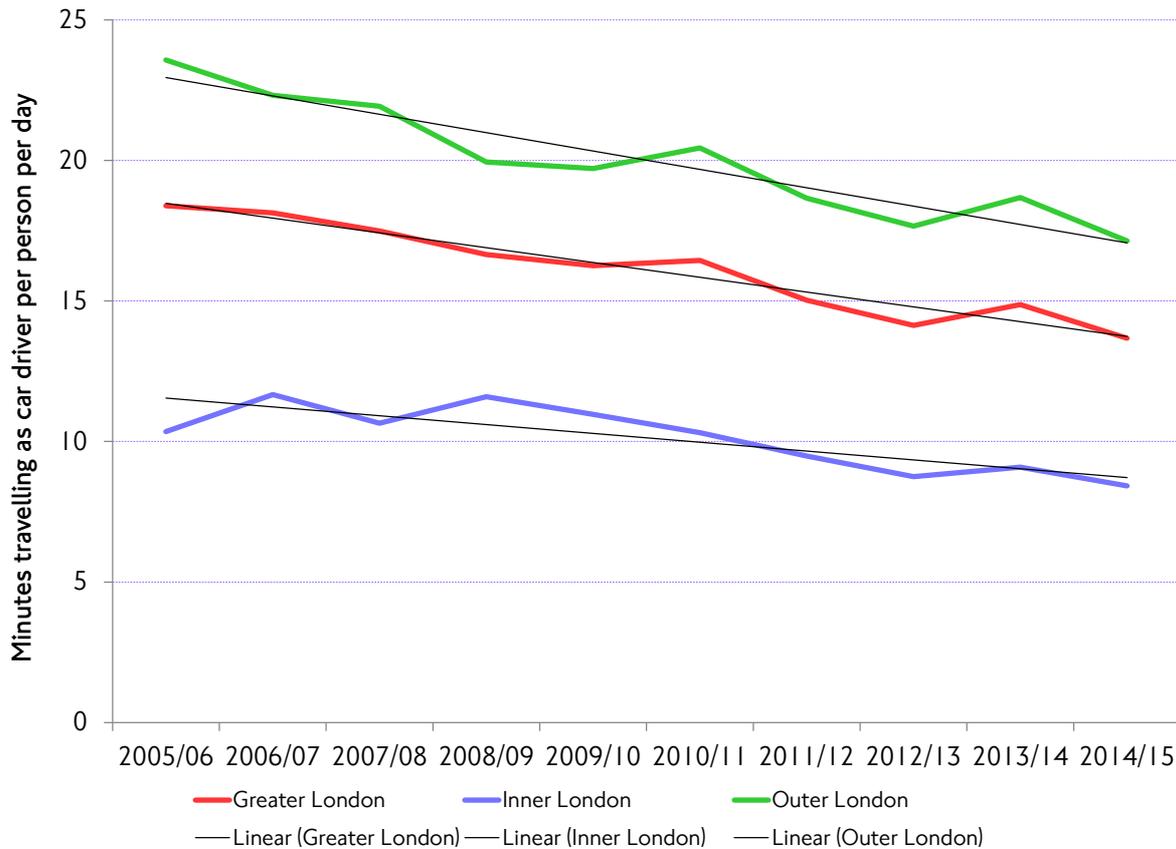
Figure 11.10 Distance travelled per day as car driver – all London residents.



Source: TfL Planning, Strategic Analysis.

Similarly, the trend in time spent travelling as a car driver each day has been on a declining trajectory over the past ten years. On average, a resident of outer London now spends 6.5 minutes less per day driving a car compared to 10 years ago, equating to a reduction of a quarter on the 23.6 minutes spent driving each day in 2005/06. Inner Londoners also saw a reduction of 20 per cent in the average time spent travelling as a car driver over the 10-year period, down from 10.4 minutes to 8.4 minutes.

Figure 11.11 Time spent travelling per day as car driver – London residents.



Source: TfL Planning, Strategic Analysis.

### Summary

For London residents the trends in car driver trips, distance travelled as a car driver and time spent travelling as a car driver have all been downward over the 10 year period covered by LTDS. This is consistent with the ‘peak car’ hypothesis that proposes per capita car travel has begun a decline from a peak. Increasing densification in London, and the response to this of more public transport provision, has contributed to the trend.

The trend observed over this ten-year period does not, however, guarantee that the future will continue to develop in exactly the same way. In particular, the occurrence of the recession in 2008 and a longer-term lack of growth in real household incomes in outer London dating from before LTDS began, have both meant there was little upward pressure on car use in London. A return to stronger economic growth or increases in outer London incomes in the coming years could still see the recent trend of reducing per capita car use slow down or even reverse again.

## **11.5 To what extent has increased density in inner London resulted in different travel trends?**

Various studies have linked population density to travel characteristics. Higher densities can influence travel in a number of ways, such as by increasing the number of activities that can be carried out within walking distance, or through making car use less attractive as a result of increased competition for road space and parking. Over the 10 years LTDS has been in place London's population has grown substantially, and therefore densities have increased. Travel characteristics that could be affected by this increase in density can be analysed to identify changes.

### **Changes in density in inner and outer London**

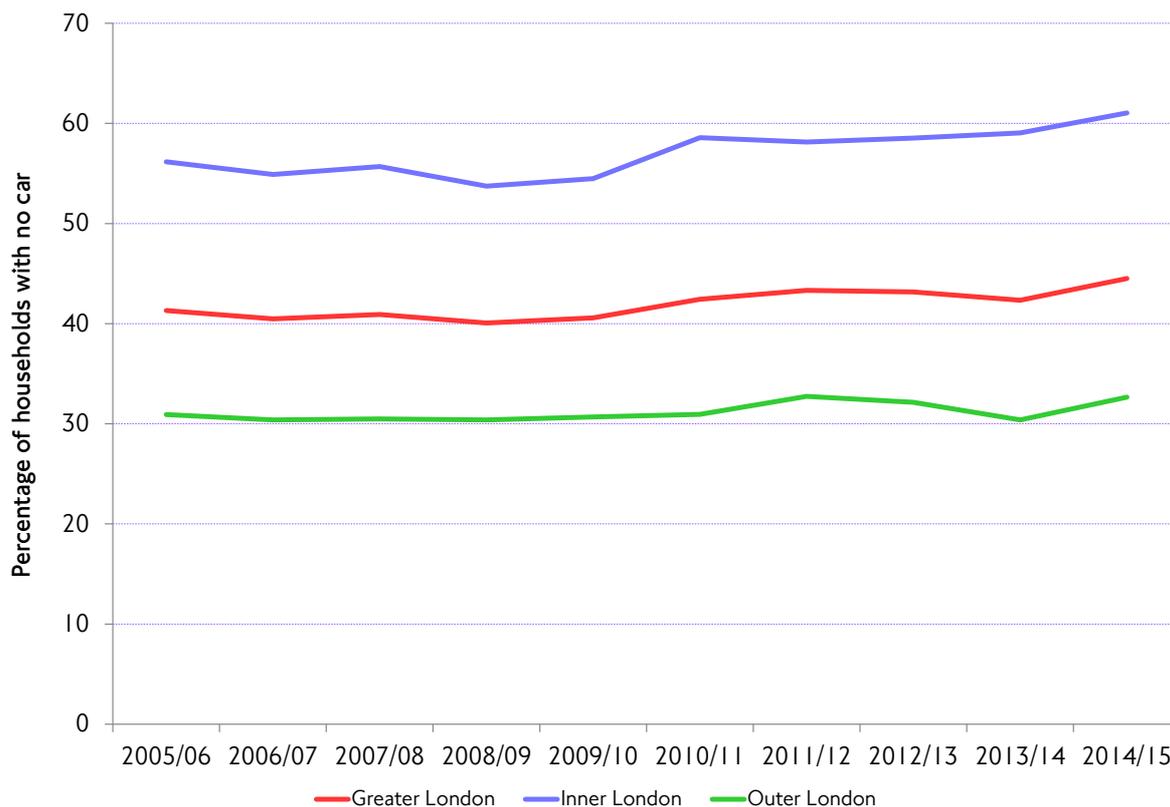
Inner London's population has grown by 15 per cent over the 10 years that LTDS has been in place. Similarly, outer London's population has grown by 13 per cent. This means that both inner and outer London have become more dense over the last 10 years, but it also means that inner London has seen a much greater increase in density in absolute terms given its smaller land area, about a quarter of the size of outer London. Inner London's density has increased by more than 1,000 residents per square kilometre to reach 10,800 people per square kilometre, while outer London's has risen by 400 residents per square kilometre to 4,100 people per square kilometre.

The different starting points in absolute density in inner and outer London are associated with very different travel behaviour, with a larger share of outer Londoners' travel by car, and with inner Londoners' travel more likely to be by walking, cycling and public transport. While outer London's density has increased over the past 10 years, it remains much more similar to what it was like 10 years ago than to the inner London of 10 years ago.

### **Car ownership rates**

The differences in density and in changes in density over time between inner and outer London can be seen in household car ownership statistics from LTDS. In 2005/06, some 56 per cent of inner London households had no car, while in outer London the figure was 31 per cent. In inner London the trend over the last 10 years has been for growth in the proportion of households with no car, rising from 56 to 61 per cent of households by 2014/15. A smaller increase in the proportion of households with no car has been seen in outer London, from around 30 per cent in the early years of LTDS, to around 32 per cent in more recent years.

Figure 11.12 Proportions of inner and outer London households with no access to a car.



Source: TfL Planning, Strategic Analysis.

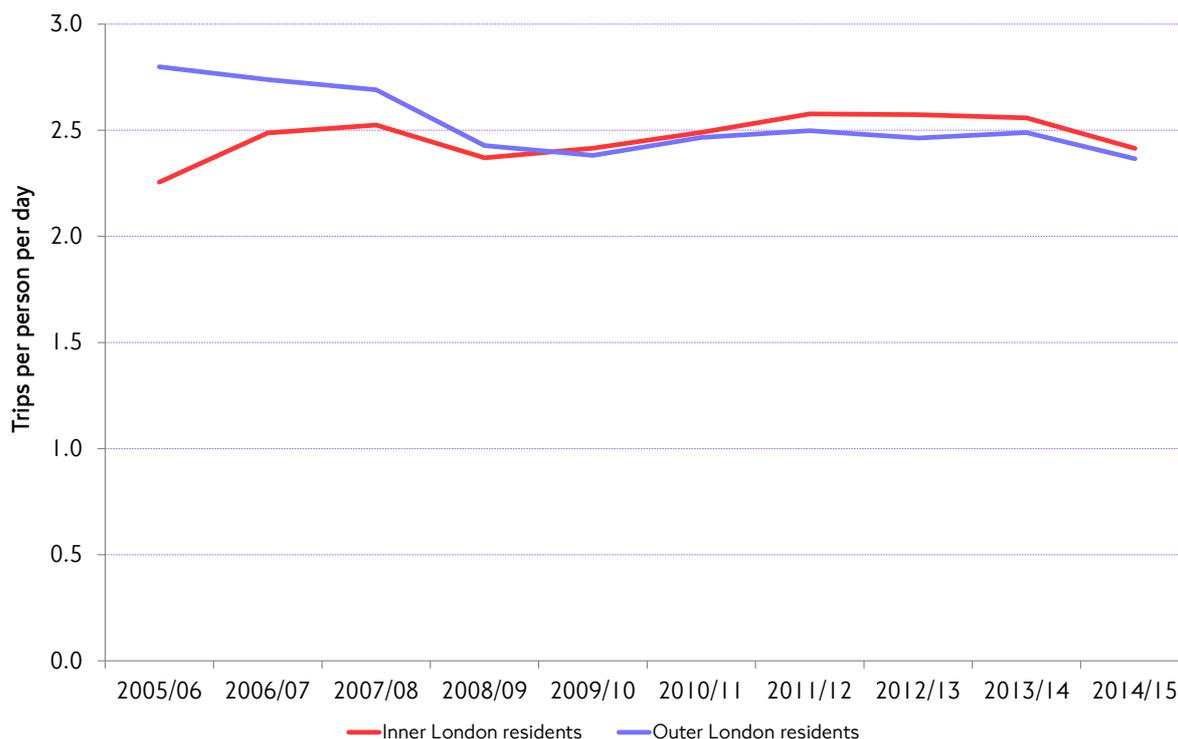
### Density and dependence on motorised transport

The differences in density levels and changes in density also affect travel behaviour. As noted elsewhere in this chapter, inner and outer London have both seen modal shift away from private car travel, but in inner London’s case this has largely moved to walking and cycling trips whereas in outer London public transport gained most. This can be interpreted as inner London’s increasing density allowing residents to be less dependent on motorised transport, while the relatively low density of outer London means residents remain dependent on motorised transport whether that is private car or public transport.

This dependence on motorised transport in outer London can be linked to differences in the trends in trip rates among inner and outer London residents that have been observed over the last 10 years. Although there have been some fluctuations, inner Londoners’ trip rates by all modes have been reasonably constant at around 2.5 trips per person per day. In contrast, outer Londoners’ trip rates have been on a declining trend, with decreases seen most years including a large decrease of around 10 per cent in 2008/09 as the recession hit.

With increasing density making car use less appealing, in inner London this has meant modal shift to public transport walking and cycling, whereas in outer London there has been a net loss in the number of trips made per capita.

Figure 11.13 Trip rates by all modes among inner and outer London residents.



Source: TfL Planning, Strategic Analysis.

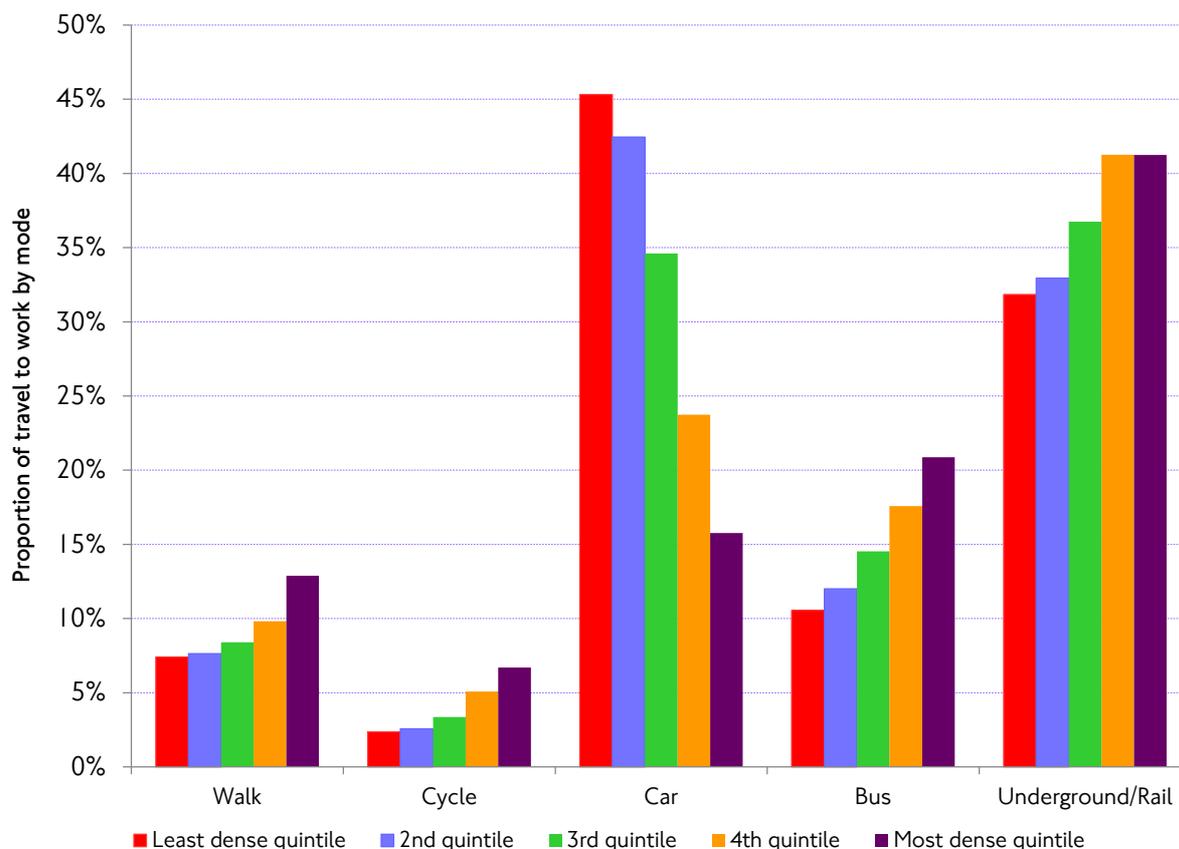
### Relationship between density and mode share

Census travel to work statistics can be used as a complementary data source to LTDS giving information about the relationship between density and travel behaviour. Here analysis of travel to work mode shares of Lower Super Output Areas (LSOAs) within London by their population density is presented.

Dividing London's LSOAs into quintiles according to their densities it is apparent that mode shares differ according to density. Among residents of the least dense 20 per cent of LSOAs in London, car mode share for travel to work is 45 per cent. This declines as density increases, with just 16 per cent of residents of the densest 20 per cent of LSOAs travelling to work by car.

Modal shares of public transport, walking and cycling are generally higher in areas of higher density. The one exception to this appears to be the share of journeys to work made by rail modes among residents of the densest 20 per cent of LSOAs, which at 41 per cent is the same as that for LSOAs in the second density quintile. This is explained by the fact that the LSOAs in the top density quintile are more concentrated in central London, with many residents living close to their workplaces and the convenience of travelling by rail rather than walking, cycling or bus reaching a plateau due to short travel distances.

Figure 11.14 2011 travel to work mode shares of London LSOAs by density quintile.



Source: TfL Planning, Strategic Analysis, Census 2001 and 2011 LSOA statistics

### Changes in density and changes in mode share

Further insight into the effect of changing densities on aggregate travel patterns can be gained from a comparison of Census travel to work statistics from 2001 and 2011. Using both Census years, many of the same areas can be tracked, with both changes in population density and changes in mode share observed. A simple match across the two Census years was carried out, linking LSOAs from 2001 to those in 2011, although without addressing the small number of LSOAs that changed in the intervening period.

Here again the LSOAs are divided into five groups, but this time based on their ranking by how great an increase in population density they experienced between 2001 and 2011. Roughly 20 per cent of LSOAs fall into each of the bands shown in figure 11.15, although these are not exact quintiles as were used above.

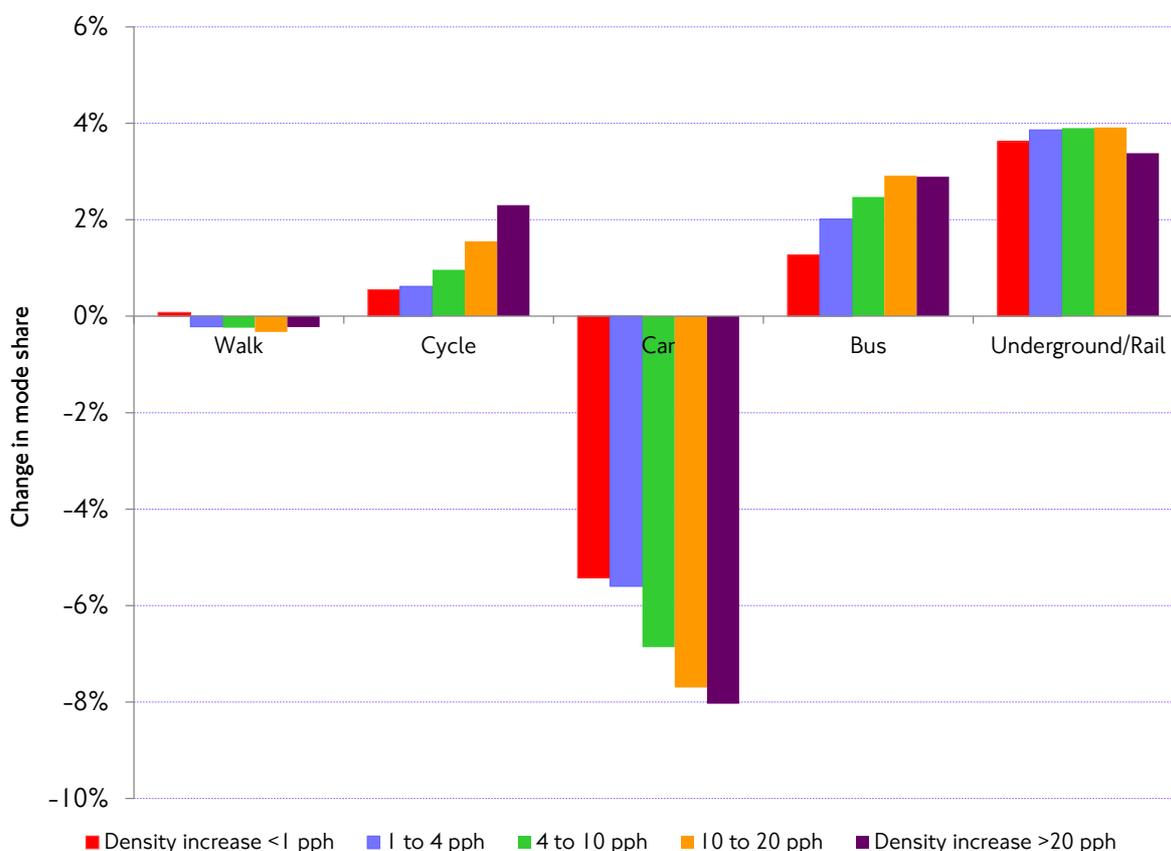
Differences in travel to work mode shares can be seen across the bands of changes in density. The LSOAs that experienced density growth of less than 1 person per hectare saw a reduction in car travel to work mode share of 5 percentage points, while LSOAs that experienced a population density increase of more than 20 people per hectare saw a greater reduction in car travel to work mode share of 8 percentage points.

Increases in bus and cycle mode share for travel to work were greater in LSOAs that experienced greater increases in population density, while walk mode shares

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changed little across population density change bands. Interestingly, the increase in rail and Underground mode share across all the groups was relatively uniform at around 4 percentage points.

Figure 11.15 Change in travel to work mode share among London LSOAs 2001 to 2011.



Source: TfL Planning, Strategic Analysis, Census 2001 and 2011 LSOA statistics

**Summary**

Population density has increased substantially both in inner London and in outer London over the period LTDS has been in place. As this has happened, there has been a trend of increasing numbers of households not having access to a car, with this trend more pronounced in inner London than in the much lower density and more car-dependent outer London.

There is some evidence of the effect of increasing population density making car use less attractive leading to modal shift in inner London, but to a net loss in trip making per capita in outer London where the range of alternatives is often more restricted.

The densest areas of London have greater shares of trips made by public transport, walking and cycling, and it is also the case that the areas that have experienced the greatest increases in population density have seen the greatest reduction in car travel to work mode share.

## 11.6 Are changing working patterns affecting travel demand?

### Introduction

Travel to/from and in the course of work is the most significant reason for personal travel, accounting for 28.8 per cent of all trips made by Londoners on an average weekday (2014/15). Key features of work travel, such as a focus on the morning and evening peak periods, are well known – for example it is peak demand that drives the requirement for capacity on the transport networks. However, it is also evident from the wider literature that working patterns are changing rapidly, with increasing flexibility of working hours, increasing home or remote working, and the impact of technology on business travel. While all of these trends have been apparent for some time, it is not clear that they have fed through to significant differences in travel patterns at the aggregate level. This section looks at what LTDS can tell us about changes in work-related travel over the past 10 years.

### Work-related travel – overall trip rates

Table 11.1 shows the total number of trips and associated average trip rates for work-related travel by London residents. The most striking observation is that there has been a clear fall in the average number of trips made per person per day to or from a usual workplace (ie commuting trips). This equates to 3.4 per cent over the 10-year review period, or a reduction of about 0.4 per cent per year.

The trend for trips made in the course of work, typically on employer's business, is however not so clear. If the first year of the available series (2005/06) is omitted as being atypical, the trend would be best characterised as broadly stable over the review period. Therefore, there is evidence that people on average are making fewer regular commuter trips, but there is no strong evidence of a trend, either positive or negative, in work-related employer's business travel (all on a per capita basis).

A feature of interest is the change during the years affected by the economic recession. While there was a relatively sharp fall in commuting trip rates at this time, they have not recovered correspondingly as the economy has improved – suggesting that the recession may have been a catalyst for embedding new working practices as the economy has recovered.

**Table 11.1** Total trips and trip rates for usual workplace and other work made by London residents.

	Usual workplace		Other work	
	Trips (millions)	Trip rate	Trips (millions)	Trip rate
2005/06	4.2	0.60	1.2	0.16
2006/07	4.2	0.59	1.4	0.20
2007/08	4.0	0.55	1.5	0.21
2008/09	4.0	0.54	1.3	0.18
2009/10	3.9	0.53	1.4	0.19
2010/11	3.9	0.53	1.5	0.20
2011/12	3.8	0.50	1.4	0.19
2012/13	3.9	0.50	1.6	0.21
2013/14	4.1	0.52	1.7	0.21
2014/15	4.1	0.51	1.7	0.21

Source: TfL Planning, Strategic Analysis.

### Work-related travel by age group and household income

Table 11.2 shows changes in work-related trip rates for two age groups – ‘younger’ workers aged between 18 and 29 and those aged between 30 and 64. The best conclusion from the table is that there is little evidence of differential change by age group. The trends displayed are closely similar to that for the overall population.

**Table 11.2** Total trips and trip rates for usual workplace and other work made by London residents. By selected age group.

	Usual workplace		Other work	
	18-29	30-64	18-29	30-64
2005/06	0.76	0.86	0.16	0.25
2006/07	0.79	0.85	0.18	0.30
2007/08	0.77	0.77	0.24	0.31
2008/09	0.75	0.77	0.17	0.26
2009/10	0.67	0.77	0.18	0.28
2010/11	0.64	0.77	0.21	0.29
2011/12	0.62	0.73	0.20	0.27
2012/13	0.64	0.73	0.23	0.30
2013/14	0.66	0.75	0.20	0.32
2014/15	0.67	0.73	0.21	0.32

Source: TfL Planning Strategic Analysis.

**Table 11.3** Total trips and trip rates for usual workplace and other work made by London residents. By household income group.

	Usual workplace			Other work		
	Up to £20,000	£20,000 to £50,000	£50,000+	Up to £20,000	£20,000 to £50,000	£50,000+
2005/06	0.27	0.79	0.88	0.08	0.21	0.23
2006/07	0.28	0.73	0.89	0.10	0.24	0.29
2007/08	0.26	0.70	0.81	0.11	0.28	0.30
2008/09	0.22	0.69	0.78	0.09	0.21	0.25
2009/10	0.23	0.67	0.76	0.10	0.23	0.25
2010/11	0.26	0.66	0.76	0.10	0.25	0.28
2011/12	0.22	0.64	0.72	0.11	0.22	0.26
2012/13	0.23	0.62	0.72	0.11	0.26	0.28
2013/14	0.22	0.60	0.77	0.11	0.26	0.27
2014/15	0.26	0.59	0.70	0.14	0.24	0.26

Source: TfL Planning Strategic Analysis.

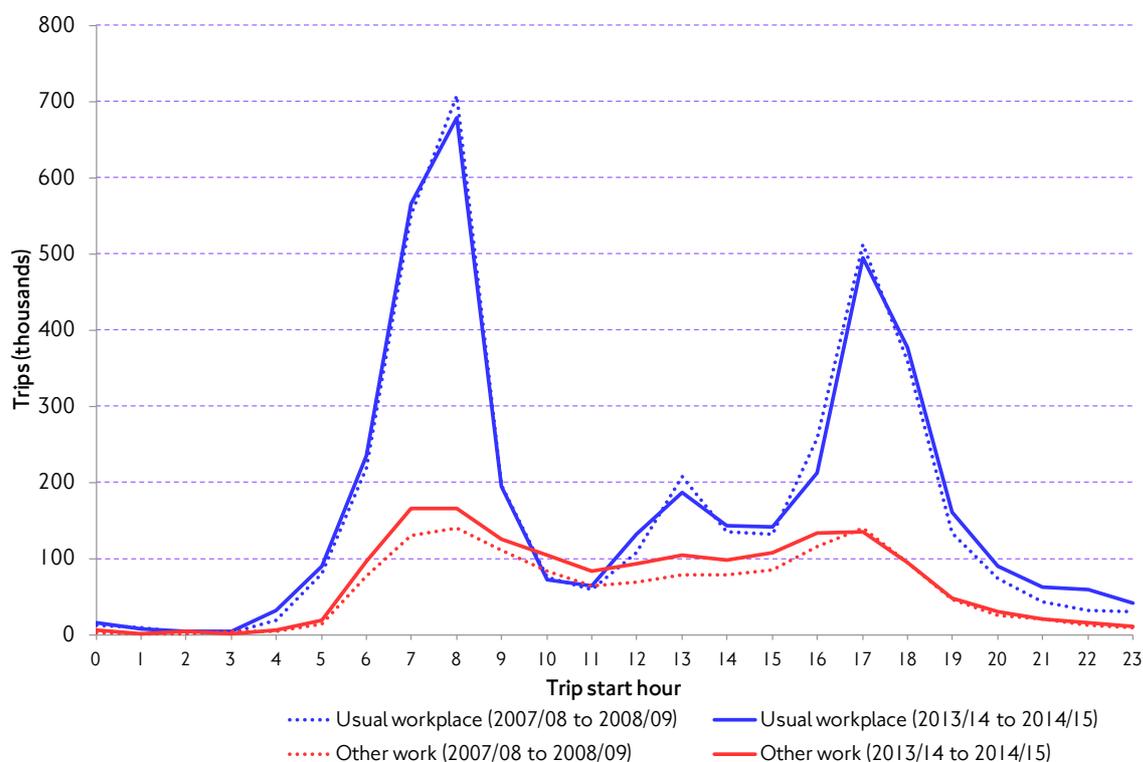
### Time of day effects

If there has been an increase in flexible working then it might be expected to be visible in a relative reduction in peak-time travel, and a corresponding increase in off peak travel. Figure 11.16 shows that, for commuting trips, this has not been the case. The two blue lines – spanning the 10-year review period, are virtually identical. Note however that the graphic shows the absolute number of trips. Therefore, while the total population of London has increased the decrease in commuting trip rates observed above has largely cancelled it out. One area of

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change from the graphic is an increase in commuting trips made during the evening, perhaps reflecting the growth of the night-time economy.

Figure 11.16 Work related trips by time of day. London residents only.



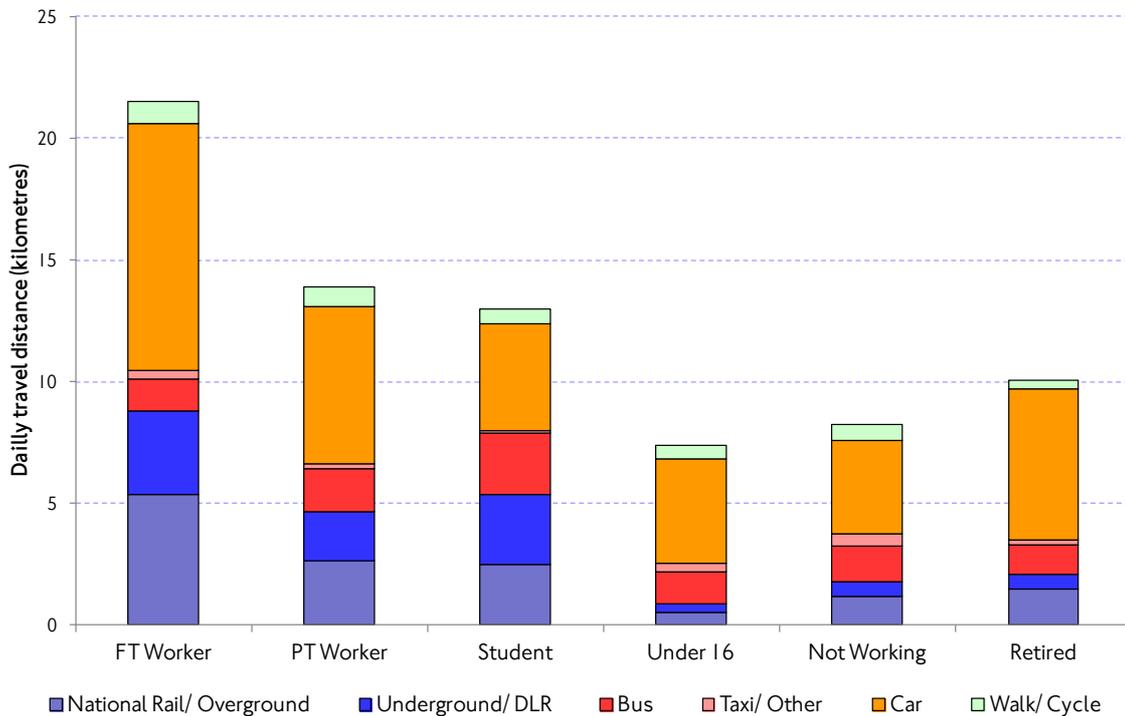
Source: TfL Planning, Strategic Analysis.

In contrast to commuting trips, the number of trips made for other work purposes shows evidence of a small but consistent increase across the working day. This may reflect a genuine increase in ‘other’ work trips, but could also reflect a particular type of flexible working pattern where people commute to several different work places that are not regarded, in terms of the survey, as their ‘usual’ workplace. This would be more consistent with the observation of stable overall demand patterns for conventional commuter trips.

### Differences by working status

Figure 11.17 shows daily travel distances by mode and working status. It shows that Londoners in full-time employment generally travel much further than those working part-time or out of work. Londoners in full-time employment travel an average of 21.5 kilometres a day, compared to 13.9 kilometres travelled for those in part-time work. People in employment show a higher propensity to use rail-based modes. Retired Londoners are the only group to show a shorter bus distance than those in fulltime work – this in part is a reflection of the short-distance nature of older Londoners’ travel, rather than less bus use on a trip basis.

Figure 11.17 Daily travel distance by mode and working status, LTDS 2014/15 (seven day week).



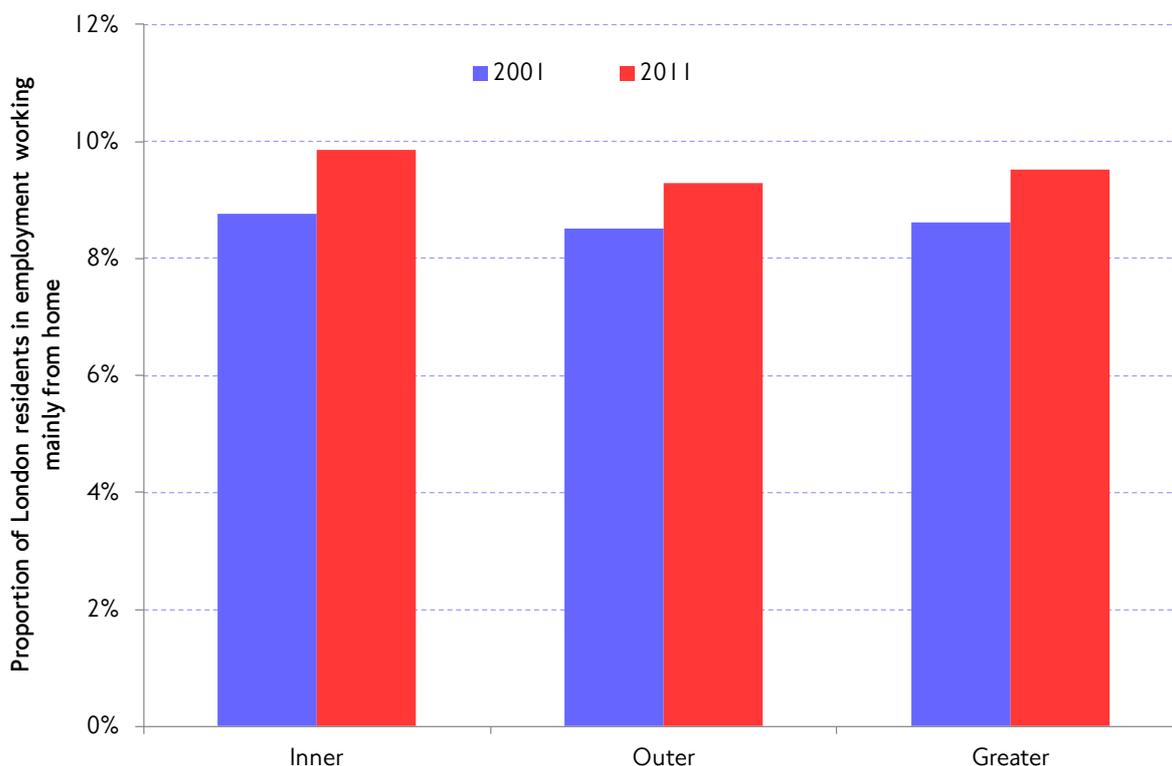
Source: TfL Planning, Strategic Analysis.

### Working from home

One outcome of a move towards flexible and ‘smarter’ working would be an increase in the number of Londoners working from home. This does not necessarily mean that no trips were made on the survey day – it would be reasonable, for example, to visit a local shop for lunch or to go for a ‘walk around the block’ at some point during the day. Furthermore, other activities may be undertaken outside of working hours. But the absence of a commuting trip would be the distinguishing feature.

Figure 11.18 shows that in Greater London, the proportion of people in employment that mainly work from home increased from 7 per cent to 9.5 per cent between the 2001 and 2011 Censuses. Working from home is slightly more prevalent in inner London (9.8 per cent in 2011) than outer London (9.3 per cent in 2011).

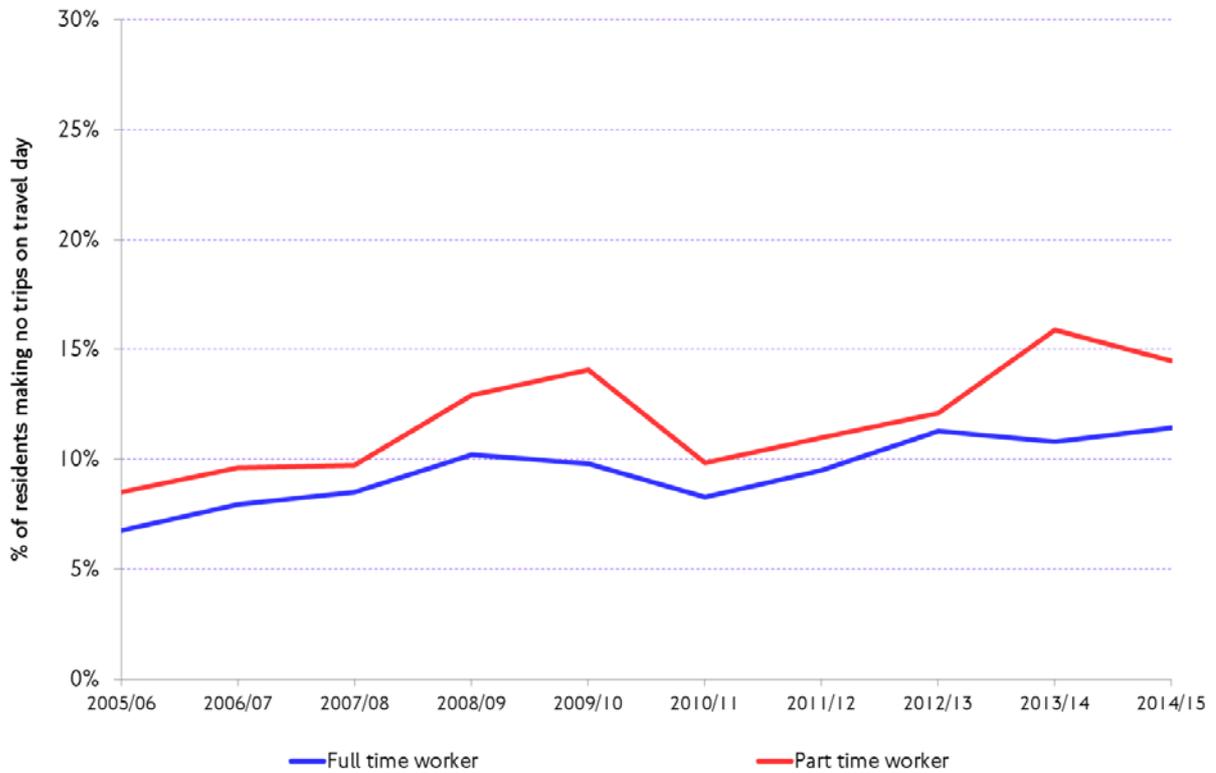
Figure 11.18 Proportion of London residents in employment working mainly from home. 2001 and 2011 Censuses.



Source: Census of Population 2001 and 2011.

It is not possible to get a direct measurement from the LTDS survey of the impact of working from home on commuting demand. However, figure 11.19 shows the trend in non-travel among those in full time or part time work over the 10-year review period. Importantly, this graphic is based on a five-day working week. The first observation is that around 1 in 10 people in work make no trips on any given weekday. The second observation is that the rate of non-travel has steadily increased for both full and part time workers over the ten-year review period.

Figure 11.19 Proportion of London residents in employment making no trips on survey day, by working status. Employed residents only. Working weekdays only.



Source: TfL Planning, Strategic Analysis.

Table 11.4 is based on data from LTDS that is only available for the most recent three years of the survey, showing reasons for non-travel by those in employment, directly complementing the data in figure 11.19. In interpreting these numbers, it is necessary to bear in mind that full-time workers are not necessarily confined to working just on weekdays, hence the relatively large proportion of people who ‘do not work’ on the survey day compared to those who were taking leave. Looking specifically at those working from home, some 20 per cent of full time workers who did not make a work-related trip on a given day were working from home. The values are closely comparable for those citing annual leave as a reason for not making a work trip, suggesting that working from home is as significant a reason for not making a work trip as annual leave – typically on average between 20 and 30 days per year for an average worker.

**Table 11.4 Reason for not making a work trip on travel day, weekdays only vs. 7-day week (LTDS 2011/12 to 2013/14 average).**

	Full-time worker		Part-time worker	
	Weekdays	Whole week	Weekdays	Whole week
Do not work on that day	50%	78%	73%	83%
Not well	3%	1%	1%	1%
Working from home	20%	9%	13%	9%
On annual leave	19%	8%	7%	5%
On maternity/paternity leave	5%	3%	2%	2%
Other	3%	2%	2%	2%
All	100%	100%	100%	100%

Source: TfL Planning, Strategic Analysis.

## Summary

Travel related to work accounts for 28.8 per cent of trips made by Londoners on an average weekday (2014/15), and is the primary driver of the maximum capacity required by the transport networks. Increasing flexibility of working patterns does appear to have fed through to an overall reduction in work-related travel demand over the 10-year review period, with an average reduction of 0.4 per cent per year in commuting trips by Londoners. In absolute terms in terms of peak demand on the travel networks, however, this has been more than cancelled out by overall population growth. There is no clear trend, however, for employer’s business trips, the frequency of which has remained broadly stable at the level of the individual.

There is also evidence that Londoners are travelling more frequently between home and a work place other than the one they recognise as their ‘usual workplace’, which could be another manifestation of more flexible working patterns. Working from home, which is distinguished by the absence of a commuting trip but not necessarily the absence of other travel, is broadly equivalent in scale to annual leave (2012/13-2014/15) as a reason why those in full time employment do not make a commuting trip on any given working day.

## 11.7 How are changes in London’s age balance affecting travel demand?

### Introduction

The age profile of London’s residents affects the types of trips that Londoners make, including their frequency, purpose, timings and mode. This section looks at what LTDS can tell us about the travel patterns of people of different age groups, and how (if at all) these have changed over the available 10 years of data. Some of the implications of this are considered in Chapter 12 of this report, which looks at future projections of London’s population and travel demand.

## Population change in London

In 2015, London’s population topped 8.6 million, equalling the previous peak in 1939. Population growth is expected to continue, reaching 10.4 million people in 2041, with a particular increase in the number of older people (those aged 65 plus). This age group is expected to increase by 68 per cent between 2014 and 2041.

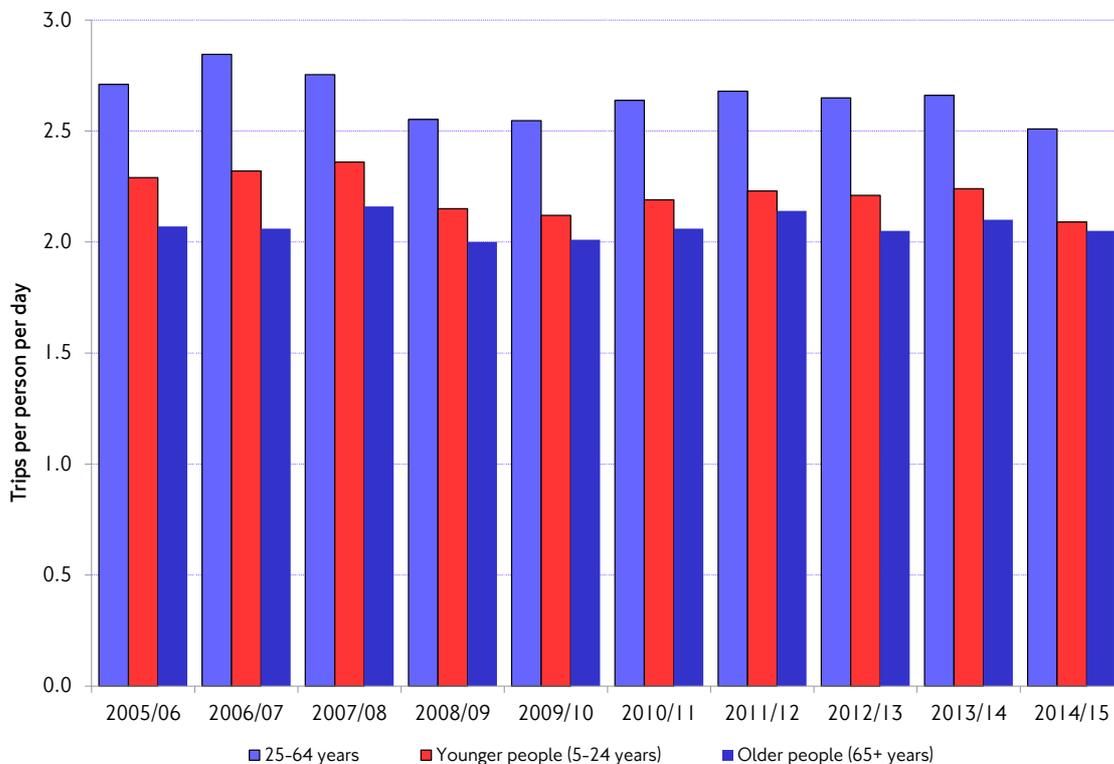
## Trip rates

Figure 11.20 shows the number of trips made per person per day by age group between 2005/06 and 2014/15. The number of trips made per person per day varies by age group and has also varied over the ten year time period. Trip rates for all age groups were highest between 2005/06 and 2007/08, after which they decreased as a result of the economic recession in 2008. Since 2008, trip rates have slowly increased, although have not fully recovered to 2006/07 levels.

Generally, 25-64-year-olds make the highest number of trips per person, at around 2.7 trips per day, although this has decreased slightly to 2.5 trips per day in 2014/15. Younger and older residents make fewer trips on average, at slightly more than two trips per person per day.

All other things being equal, therefore, an increase in the proportion of older people from 11 to 16 per cent of the population between 2014 and 2041 might lead to an 18 per cent reduction in total travel demand in terms of trips per capita, against that which would be expected if the age profile and total population remained unchanged.

Figure 11.20 Trip rates by age group, whole-week sample, 2005/06–2014/15.



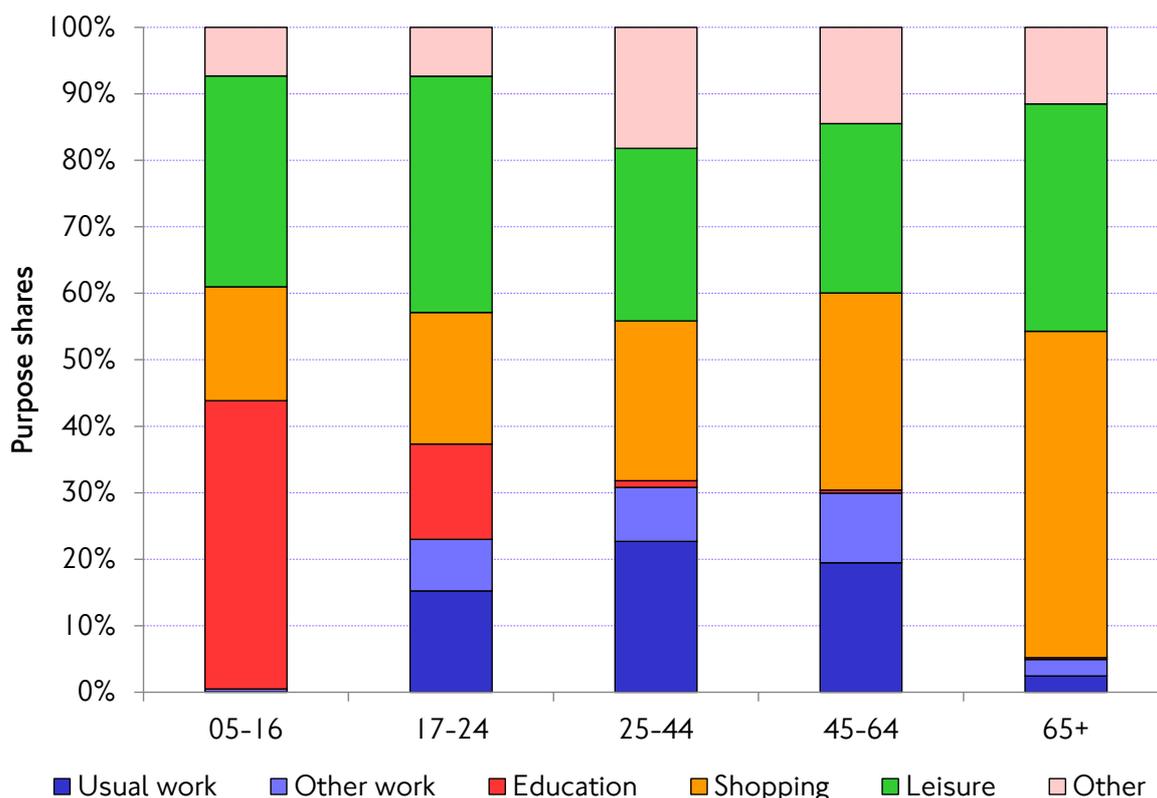
Source: TfL Planning, Strategic Analysis.

### Trip purpose – differences by age group

Figure 11.21 summarises the journey purpose mix for all age groups for the most recent survey year. The figure shows how journey purpose for younger and older residents compares to the rest of the London population.

- The majority of trips made by young children are for education purposes, accounting for approximately 45 per cent of trips by people between the ages of 5 and 16.
- Residents between the ages of 25 and 64 make one in three of their trips for work related purposes with a greater proportion of trips made for ‘other’ purposes, which includes, for example, taking children to school.
- Work related trips account for just 5 per cent of trips for those aged 65 and over, as to be expected, and the overwhelming majority of trips (83 per cent) by older people are made for shopping or leisure purposes. Shopping and leisure trips tend to have different characteristics compared to work or education trips and this has important implications for travel demand.

Figure 11.21 Trip purpose by age group, whole-week sample, 2014/15.



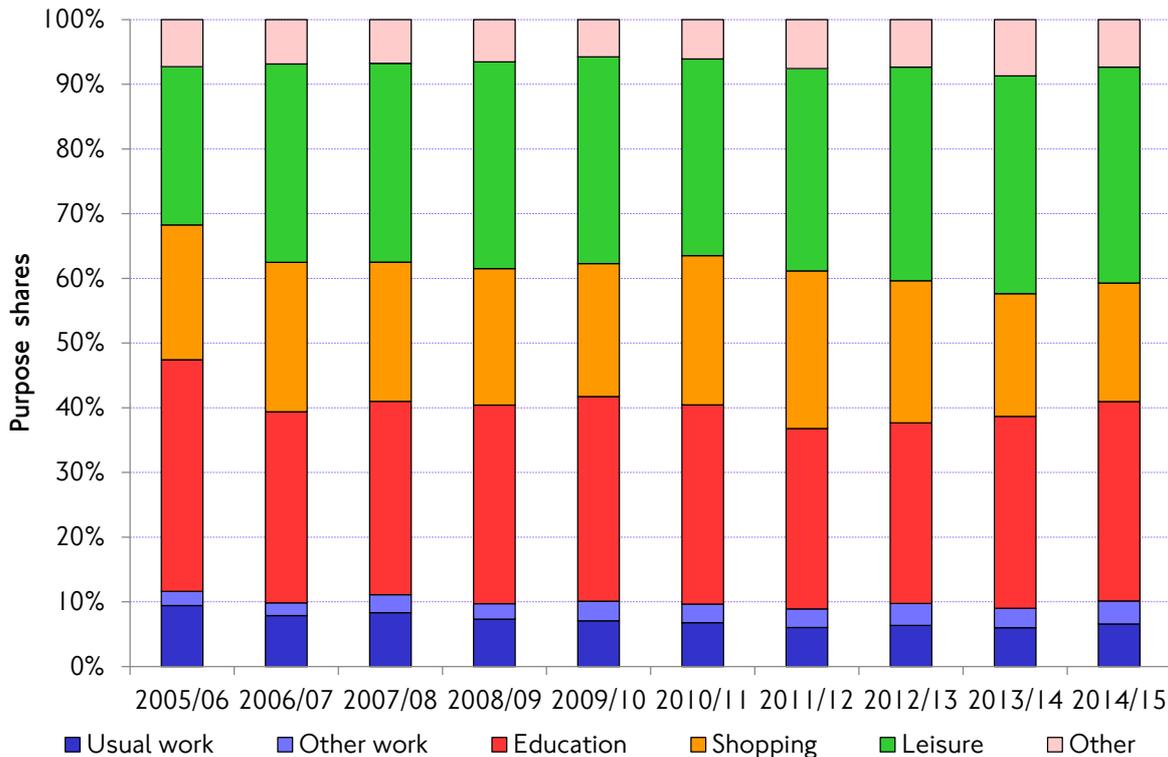
Source: TfL Planning, Strategic Analysis.

### Trip purpose – change over time for key age groups

Focusing in on younger adults, figure 11.22 shows the proportion of trips made for different purposes over time for those between 5 and 24. There has been little change in the purpose shares between 2005/06 and 2014/15; typically one in three trips are made for education purposes, 10 per cent for work-related purposes, and,

one third of trips for leisure purposes. However the proportion of shopping trips has declined slightly over the time period from 21 per cent of trips in 2005/06 to 18 per cent of trips in 2014/15. This trend is not unique to 5 to 24 year olds, and has been seen across all age groups due perhaps to factors such as increasing use of online shopping.

Figure 11.22 Trip purpose for 5–24 year olds, whole-week sample, 2005/06 – 2014/15.

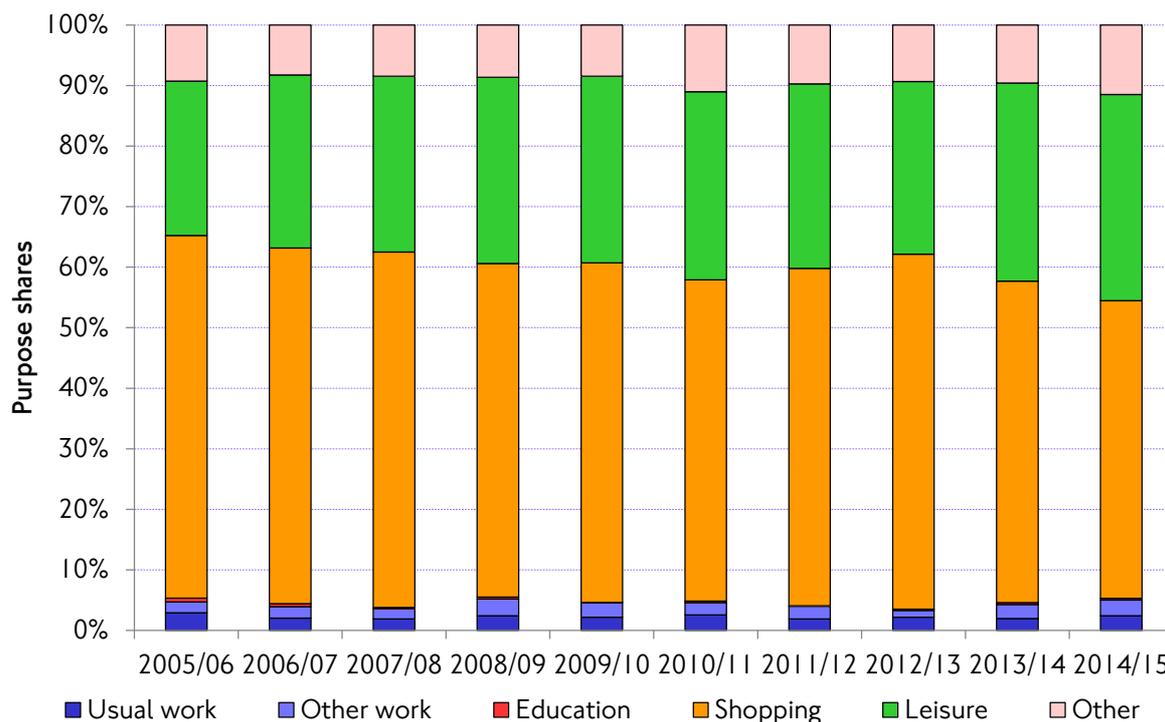


Source: TfL Planning, Strategic Analysis.

Figure 11.23 shows that, although trip purpose shares for Londoners aged 65 and over differ significantly to younger residents, they have also remained fairly stable over the period from 2005/06 to 2014/15. The majority of trips (more than 80 per cent) are made for shopping or leisure purposes and less than 10 per cent of trips are made for work related purposes. Again, the proportion of shopping trips has decreased over the ten-year time period, accounting for 60 per cent of trips by residents aged 65 and over in 2005/06 and just 49 per cent of trips in 2014/15.

Therefore, all other things being equal and looking forwards, an increasing proportion of older people will tend to reduce the relative demand for peak-time travel, for example, travel associated with work and education, relative to what would be the case if the age structure of the population remained unchanged. However, there would be a corresponding increase in leisure and shopping travel, mainly focused on the inter-peak periods.

Figure 11.23 Trip purpose for residents aged 65 and over, whole-week sample, 2008/09 -2014/15.

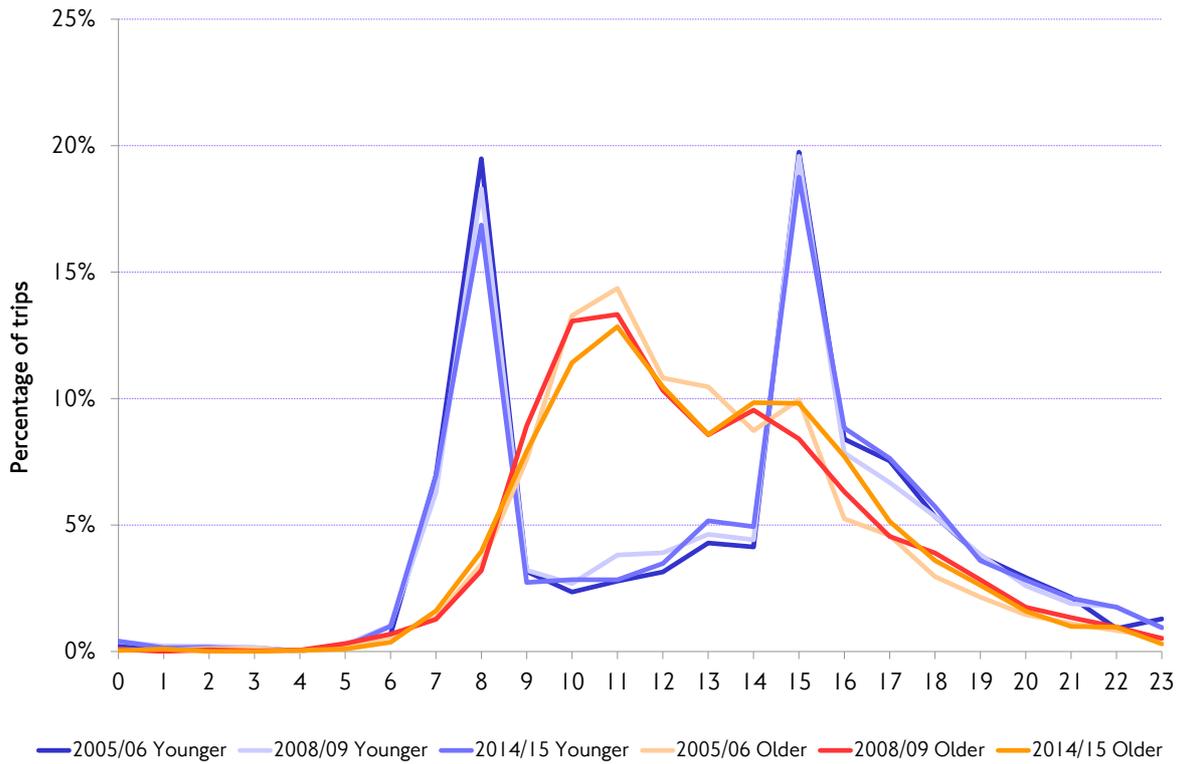


Source: TfL Planning, Strategic Analysis.

### Time of day

The differences in journey purposes may be expected to have implications for the time of day at which people of different age groups travel. Figure 11.24 shows trips by start hour for younger adults and older people in London, comparing three different years across the ten-year period. The time of day profiles of weekday trips differ substantially between the two groups; however there has not been substantial change in the overall trip patterns of these groups over the period. Trips by younger people showing a clear morning and evening peak, representing trips to and from education or work. In contrast, trips by older people, the majority of which are made for shopping or leisure, are more spread throughout the day, with the highest number of trips starting between 12:00 and 13:00.

Figure 11.24 Trips by start hour, weekdays only.

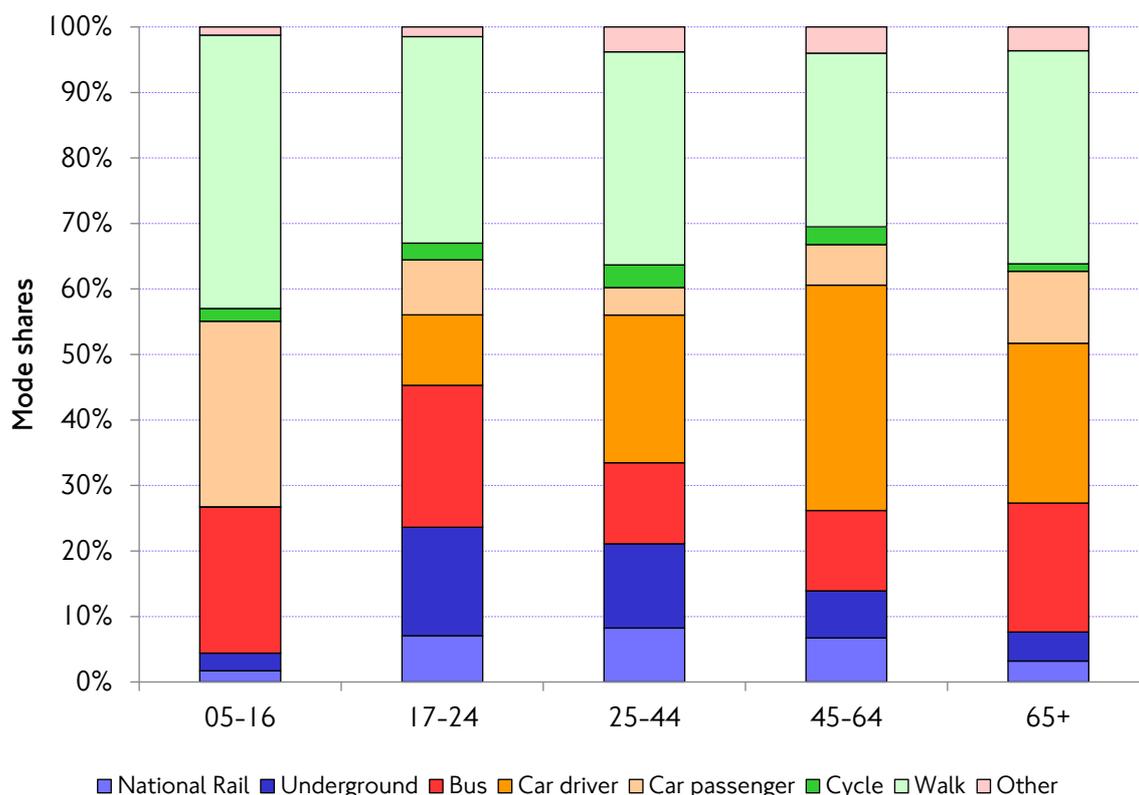


Source: TfL Planning, Strategic Analysis.

### Mode share

Figure 11.25 shows mode share for trips made during the week. The graph shows that compared to 25–64 year-olds, younger people make a greater proportion of trips by bus and as a car passenger. Slightly more than 40 per cent of trips made by 5–16 year olds during the week are walked, and this is the highest of any age group. Older people are also more likely to use the bus, and make few trips using rail-based modes. Slightly more than a third of trips by older people are walked, however as an age group they are least likely to cycle, with a cycle mode share of just 1 per cent. The car driver mode share for this group is quite high, with a quarter of trips during the week made by car.

Figure 11.25 Mode share by age group, weekday sample, 2014/15.



Source: TfL Planning, Strategic Analysis.

### Summary

The analysis above shows that there are clear differences in travel patterns by age group among London residents. However, there have not been substantial changes in these patterns over the 10 years of available data. This is potentially important in that it suggests that the patterns are relatively entrenched and therefore may not change radically when looking forward the next 10 or 20 years. These travel patterns will have important implications for the nature of travel demand in the future if the strong growth in older residents occurs as population forecasts suggest.

## 11.8 What are the characteristics of walk trips in London?

### Introduction

Walking is a near-universal mode of transport that does not require complex infrastructure, is pollution-free and has acknowledged health benefits. This section summarises what LTDS can tell us about this important mode of transport, looks across recent trends in the number of walk journeys, and considers the nature of changes that may be seen in the future.

### Key features of walking in London

- 6.4 million walk-all-the-way trips were made on an average day in London in 2014. This is an increase of 9.3 per cent since 2008, this increase mainly reflecting population growth over the period (which was also 9.3 per cent).

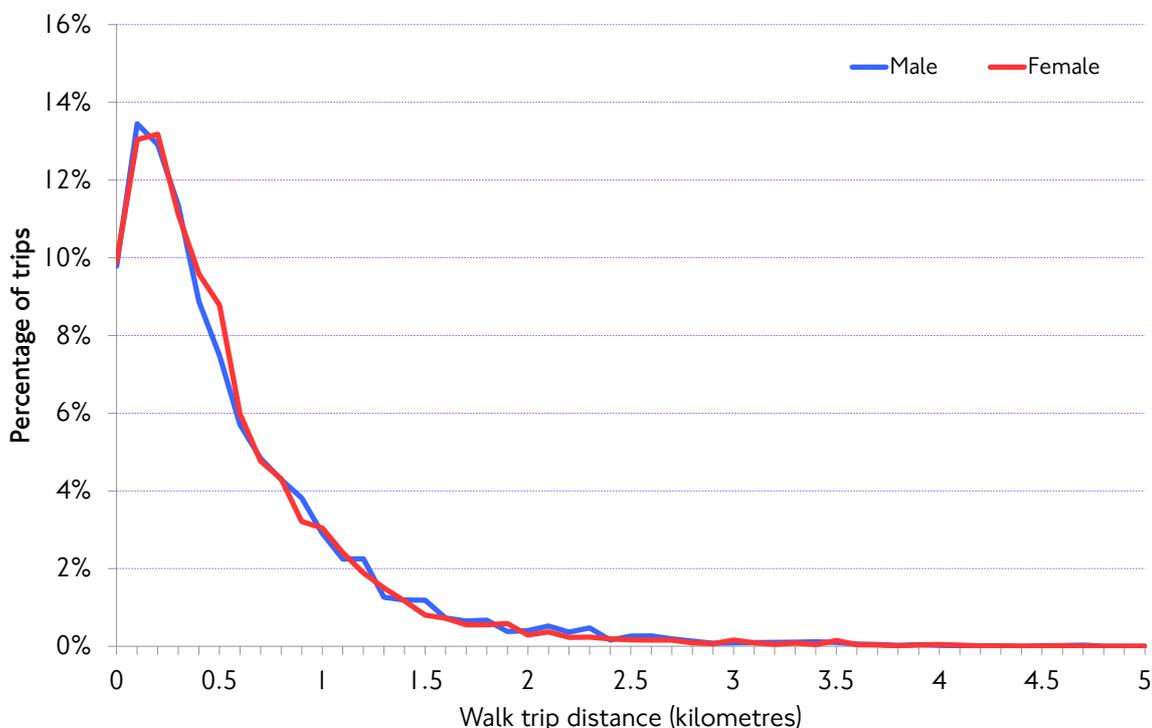
- This gives a trip-based mode share for walk (considering all travel) of 24.2 per cent, which is 0.3 percentage points higher than in 2008.
- Walking accounts for 30 per cent of all trips made by Londoners – higher than that for all people travelling in London. People tend to walk short trips: two-thirds of journeys of one mile or under are made on foot.
- People need to walk to access public transport, where walking forms one part of a multi-stage trip. In fact, there are more than three times as many walk stages than walk trips made every day.
- It is estimated that around 20 million walk stages are made every day in London by London residents alone, and including the additional trips made by non-residents in London, it is estimated that around 29 million walk stages were made every day in London in 2015. Note that these estimates differ from those given in chapter 2 of this report, as individual walk stages are not included in those estimates.

### Walking and key demographics

Women residents tend to make more walk trips than men – an average of 0.83 walk trips per person per day as compared to 0.68 for men. Looking at the average distance walked however, figure 11.26 shows remarkably similar distributions for both genders.

The mean walk trip length for both is around 650 metres, and there is no evidence that men or women disproportionately make particularly short or long trips – perhaps surprising given the larger total number of walk trips made by women.

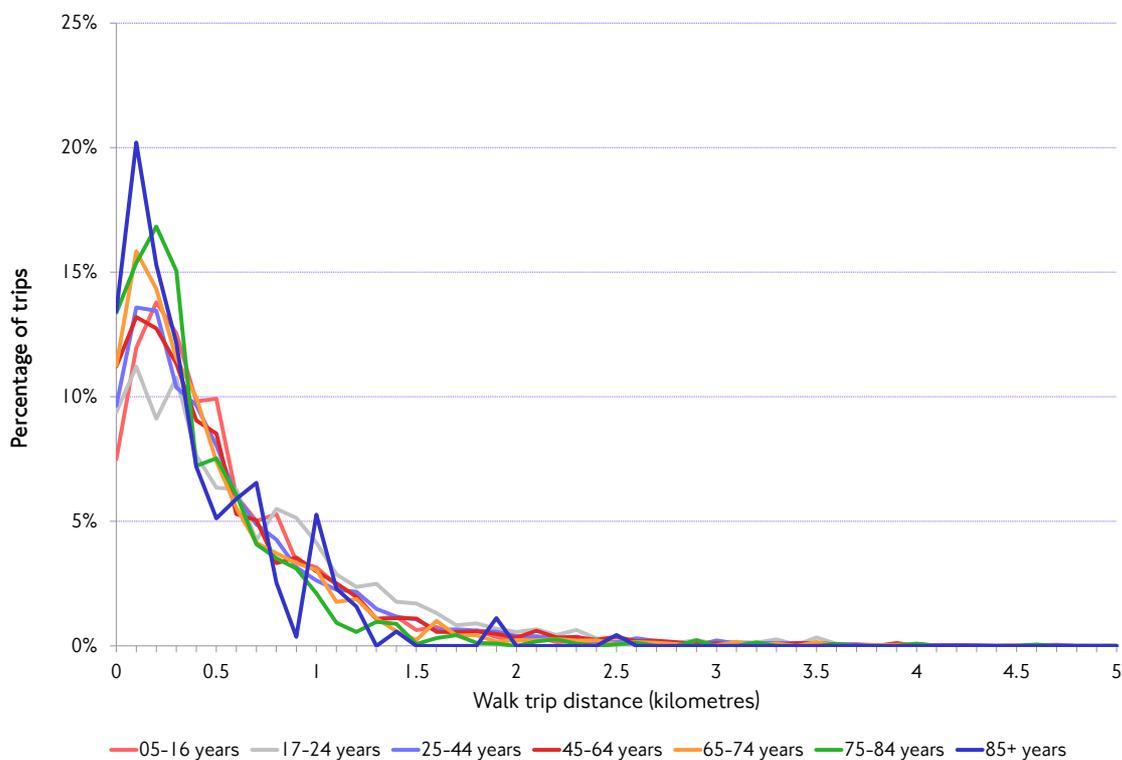
Figure 11.26 Distance walked by gender – London residents.



Source: TfL Planning, Strategic Analysis.  
1. Walk trip distances are calculated as the crow flies.

Walking trip distributions by length are however perhaps more intuitive (figure 11.27), with a prevalence of short trips among older Londoners and younger Londoners making longer trips on average. Some 75 per cent of walking trips made by Londoners over the age of 85 are 500 metres or less in length, whereas the average walking trip length for Londoners aged between 17 and 24 is 800 metres.

Figure 11.27 Distance walked by age – London residents.

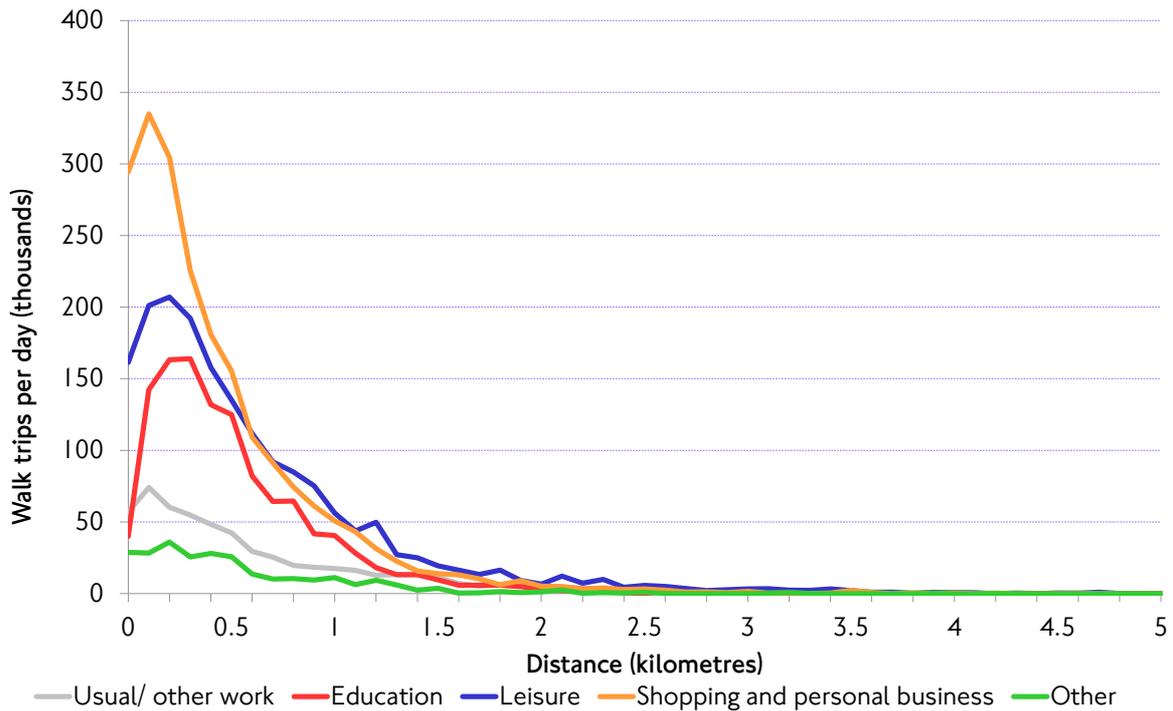


Source: TfL Planning, Strategic Analysis.  
1. Walk trip distances are calculated as the crow flies.

### Which journeys are being walked?

As might be expected, walking mode share is particularly high for shorter trips: 91 per cent of all trips under 500 metres made by Londoners are made on foot. In terms of journey purpose (figure 11.28), the overall profile is similar across the journey purposes, although there are proportionately more short trips for shopping and personal business.

Figure 11.28 Distance walked by journey purpose – London residents.

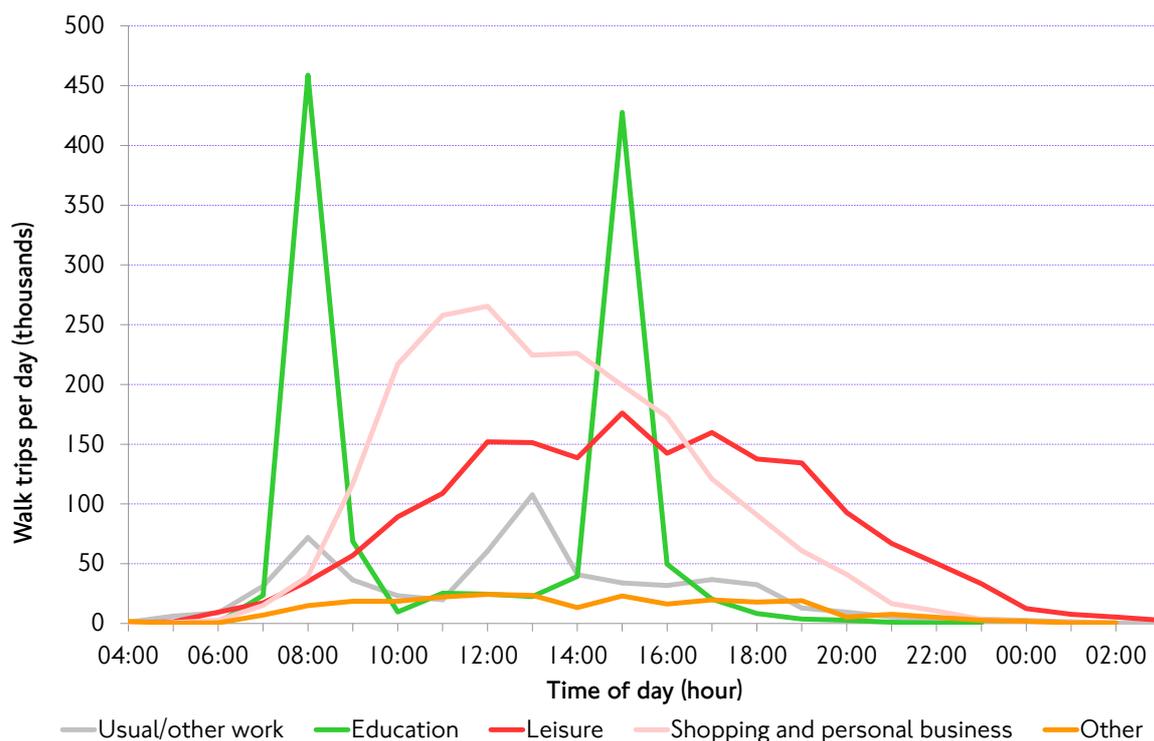


Source: TfL Planning, Strategic Analysis.  
 1. Walk trip distances are calculated as the crow flies.

Figure 11.29 shows the temporal distribution of London residents walk trips by journey purpose. As might be expected, walk trips to/from education are very focused in the period immediately before and after the school day. Walk journeys for shopping occur in relatively large numbers throughout the day, while the majority of leisure walk trips occur in the afternoon period. The profile for walk trips related to work reflects a relatively low mode share, with a small ‘peak’ around lunch-time and a more spread out evening ‘peak’.

## 11. Spotlight: How has travel by Londoners changed – insights from 10 years of the London Travel Demand Survey (LTDS)

Figure 11.29 Temporal profile of London residents' walk trips by purpose.



Source: TfL Planning, Strategic Analysis.

Walking is the most common mode for shopping trips, for trips to and from school and escort trips in connection with education (table 11.5).

Table 11.5 Mode shares for selected journey purposes (London residents only).

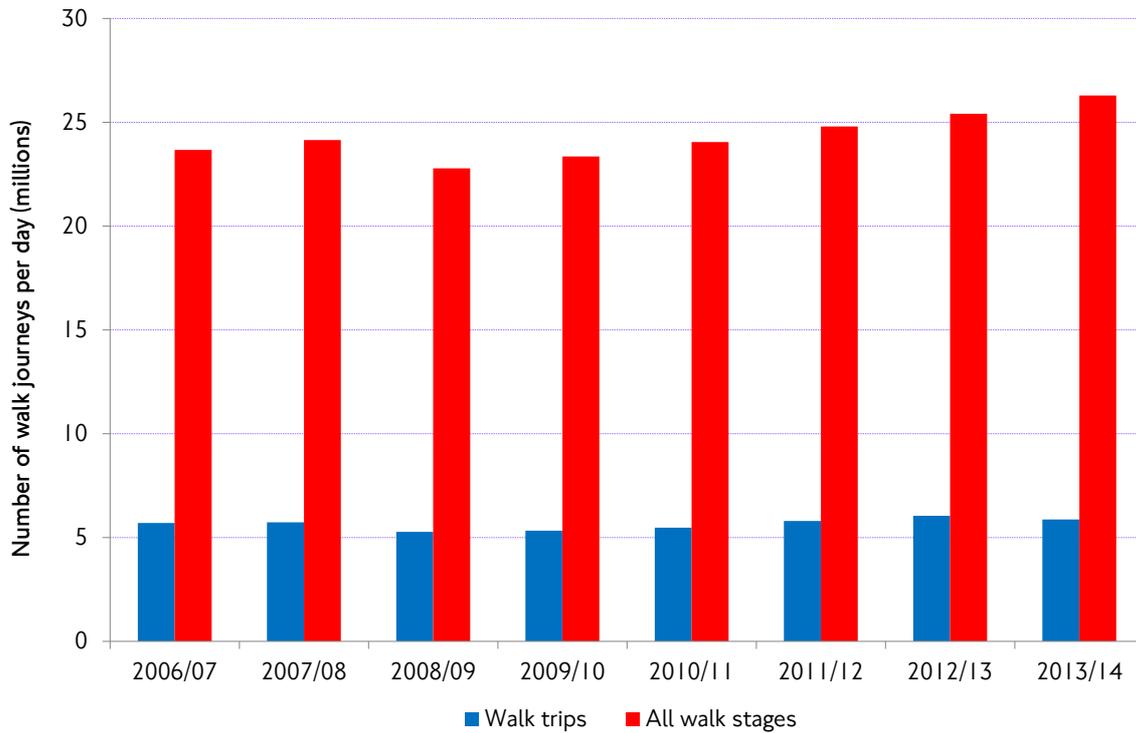
Journey purpose	Walk	Cycle	Private motor vehicle	Public transport
Usual/other work	14%	5%	35%	45%
Education (including pick-up/drop-off)	44%	2%	28%	26%
Leisure	32%	3%	39%	24%
Shopping and personal business	43%	2%	33%	22%
Other	17%	1%	69%	12%
All	30%	3%	38%	28%

Source: TfL Planning, Strategic Analysis. London Travel Demand Survey 2011/12-2013/14, excluding trips made wholly outside the GLA and summary shopping trips. If summary shopping trips are included, the walk mode share for shopping & personal business increases to 43 per cent.

### Walk stages made as part of a longer multi-mode trip

Walk stages are almost always needed in order to access public transport modes, forming part of a longer multi-stage trip. The relative growth in walk stages reflects the prevailing mode shift for travel more generally in London towards public transport (figure 11.30).

Figure 11.30 Number of walk trips, and number of walk stages made as part of a trip by another main mode. London residents only.



Source: TfL Planning, Strategic Analysis. London Travel Demand Survey 2011/12-2013/14, trips and stages made by London residents, excluding trips made wholly outside the GLA and summary shopping trips. The figures for walk stages show only walk stages made as part of a trip by another main mode – they exclude single stage walk trips (which are shown separately in the blue bar).

Figure 11.31 shows that the length and duration of these walk stages varies according to the public transport mode, with bus (as a main mode for the trip) being associated with shorter walk stages (reflecting the comprehensive coverage provided by the bus network), and National Rail being associated with longer walk stages, reflecting the relatively more sparse geographic coverage of this mode.

Figure 11.31 Characteristics of walk stages made as part of a longer multi-stage public transport trip. London residents only.



Source: TfL Planning, Strategic Analysis

### Recent trends for walking in London

Walking is the most common way to get around in London, and the number of walk trips and stages are expected to grow in line with population growth and increased public transport usage. Table 11.6 shows how key indicators of walking have evolved over the period covered by LTDS.

Table 11.6 Trends in walking in London. All people.

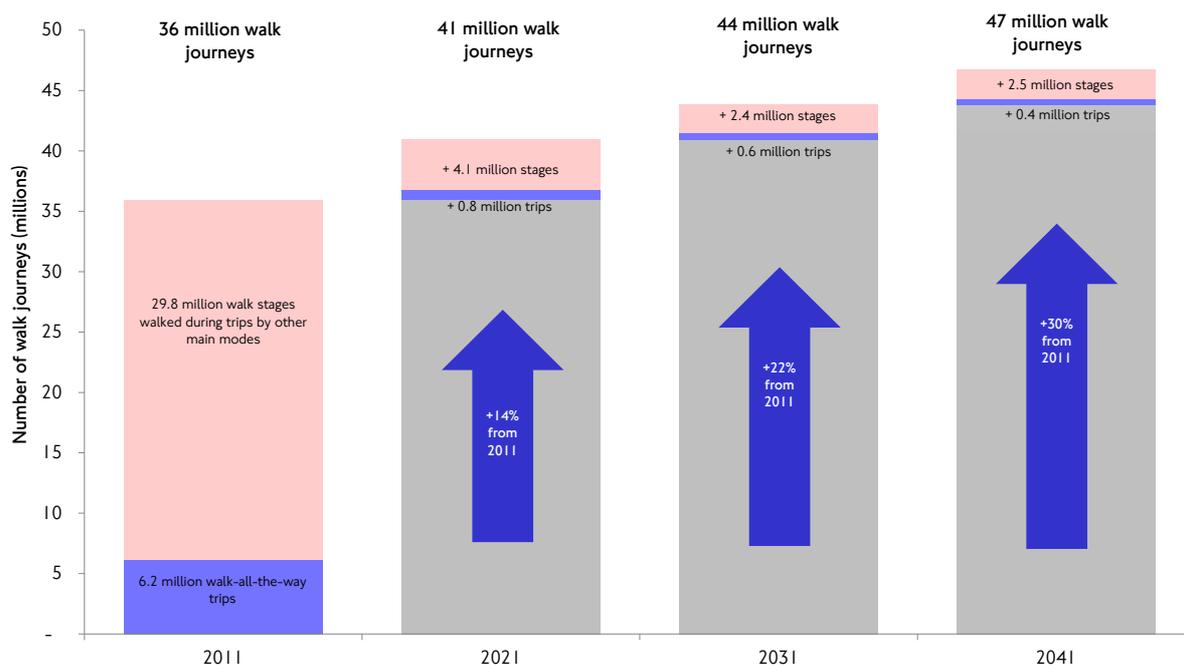
Year	Number of walk trips (millions)	Number of trips (millions)	Walk mode share (%)	Growth in walk trips (% change from previous year)	Growth in all trips (% change from previous year)
2006	5.7	23.8	24.1%	1.0%	1.8%
2007	5.8	24.3	23.8%	1.3%	2.3%
2008	5.9	24.6	23.9%	1.5%	1.2%
2009	6	24.8	24.1%	1.7%	0.9%
2010	6.1	25.1	24.2%	1.5%	1.2%
2011	6.2	25.3	24.4%	1.8%	0.9%
2012	6.3	25.8	24.3%	1.3%	1.7%
2013	6.3	26.1	24.3%	1.3%	1.2%

Source: TfL Planning, Strategic Analysis.

### Future projections of walking in London

Figure 11.32 shows expected future trends for walking in London. Focusing on the total London figures (not just London residents), the number of daily walk trips is expected to increase from 6.2 million in 2011 to 8.0 million in 2041 (an increase of 29 per cent), largely reflecting population growth.

Figure 11.32 Forecast long-term trajectory for walking in London.



Source: TfL Planning, Strategic Analysis.

## 11.9 How do Londoners travel at the weekend?

### Introduction

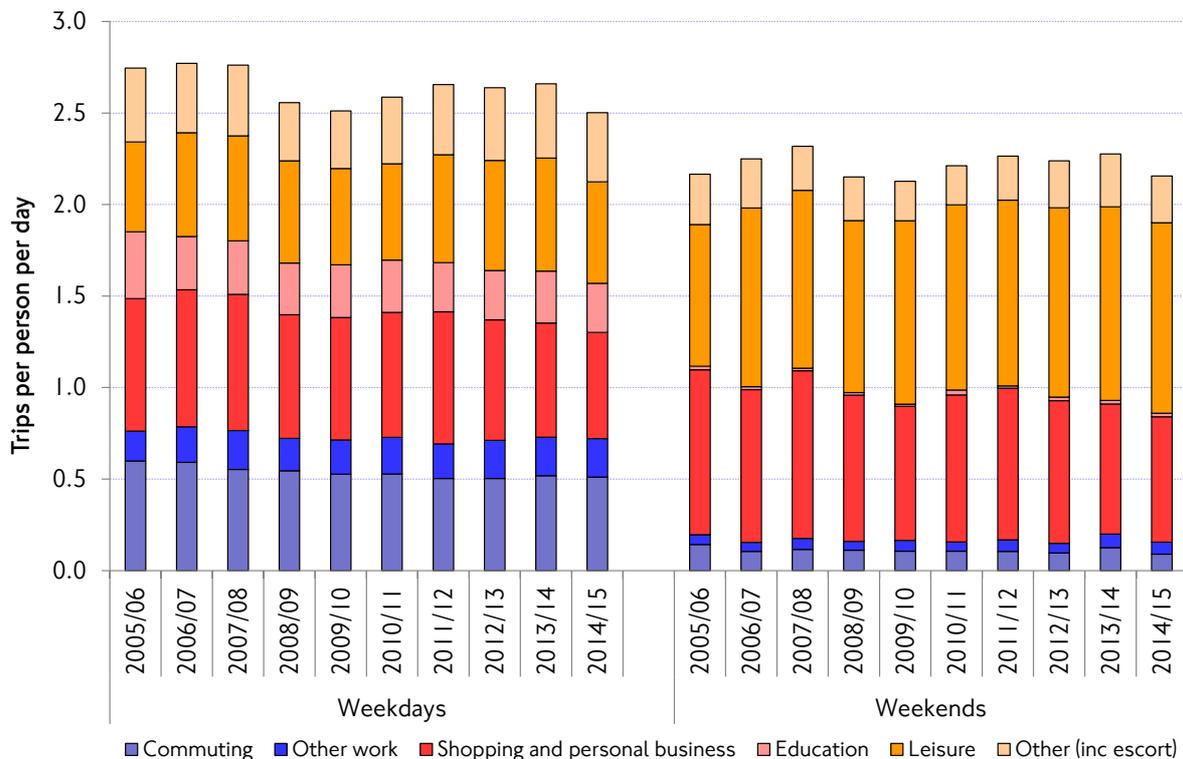
Travel research and transport planning has traditionally focused on weekday travel, particularly during peak periods. A feature of LTDS is that the data covers weekends as well as weekdays. This section looks at how travel patterns differ between weekdays and weekends, and whether these patterns have changed over the 10 years of the survey.

### Trip rates by purpose

London residents make fewer trips on average at the weekend compared with weekdays. This is mainly due to fewer work-related and education trips being made at the weekend – commuting trips are almost six times higher on weekdays. This is partly offset by people making more leisure and shopping trips on Saturday and Sunday. Eighty per cent of all trips at the weekend are for leisure or shopping purposes, compared with 45 per cent on weekdays.

While trip rates on weekdays have declined over the period of the survey, weekend trip rates have remained relatively stable, with overall trip rates in 2014/15 almost the same as in 2005/06. Within this stable trend, however, there has been a decrease in shopping and personal business trips and a corresponding increase in leisure trips at the weekend (figure 11.33).

Figure 11.33 Personal trip rates by day of week and purpose.

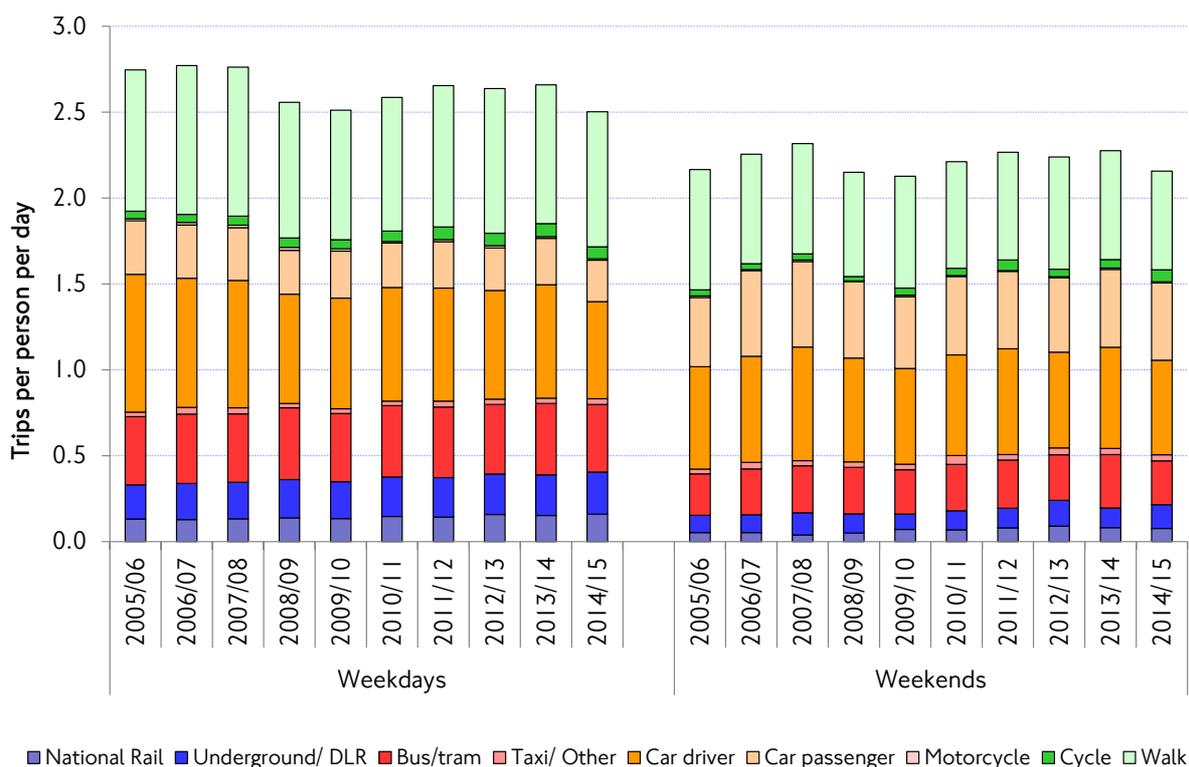


Source: TfL Planning, Strategic Analysis.

### Mode share

The mode share of trips made at the weekend also differs from trips made on weekdays. More than 30 per cent of weekday trips by London residents are made using public transport, which falls to around 24 per cent at weekends. Almost half of all trips at the weekend are by private transport modes, with a much larger share of car passenger trips. Cycling tends to be more common on weekdays, reflecting the high share of commuter trips on that particular mode. Interestingly, the decline in car mode share seen on weekdays is not so apparent at the weekend (figure 11.34).

Figure 11.34 Mode share of trips by day of week.

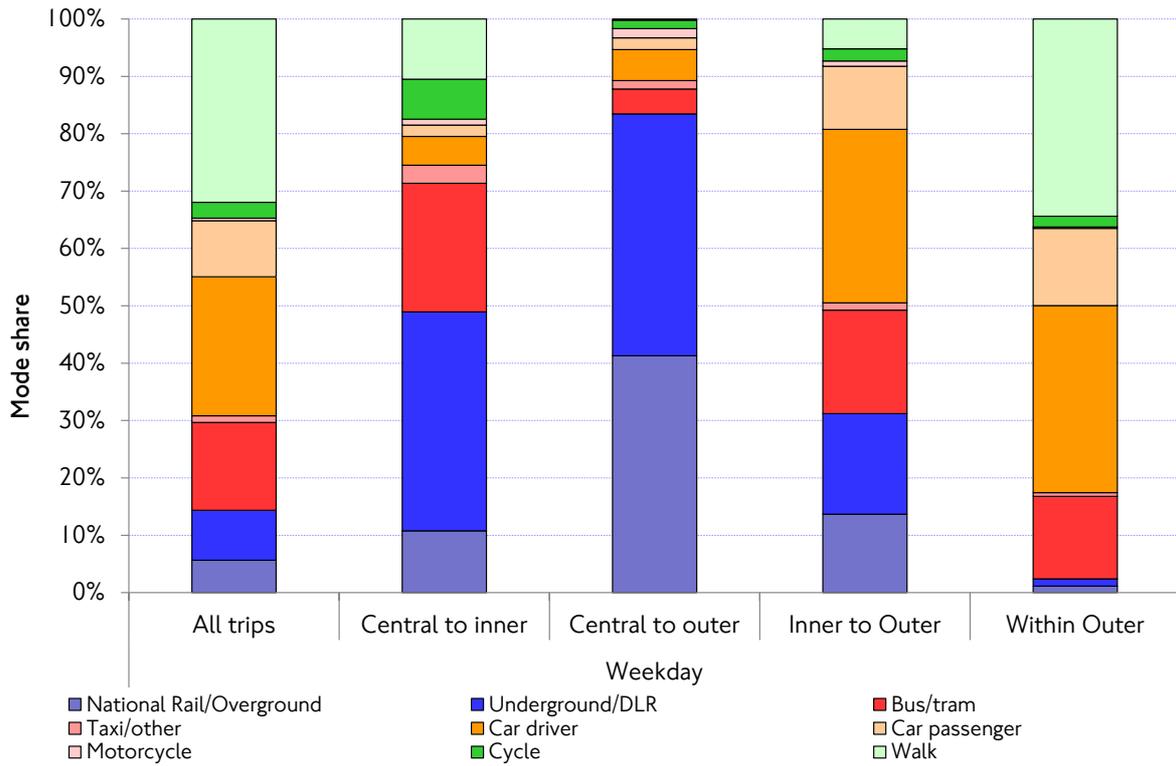


Source: TfL Planning, Strategic Analysis.

Figures 11.35 and 11.36 look at mode share by origin and destination. There is a very clear difference in travel to/from central London, and trips between other areas of London. Trips to central London are dominated by public transport modes – 83 per cent of all trips between central and outer London are by rail-based modes. Trips within outer London are more car-orientated, with only 17 per cent of trips within outer London by public transport.

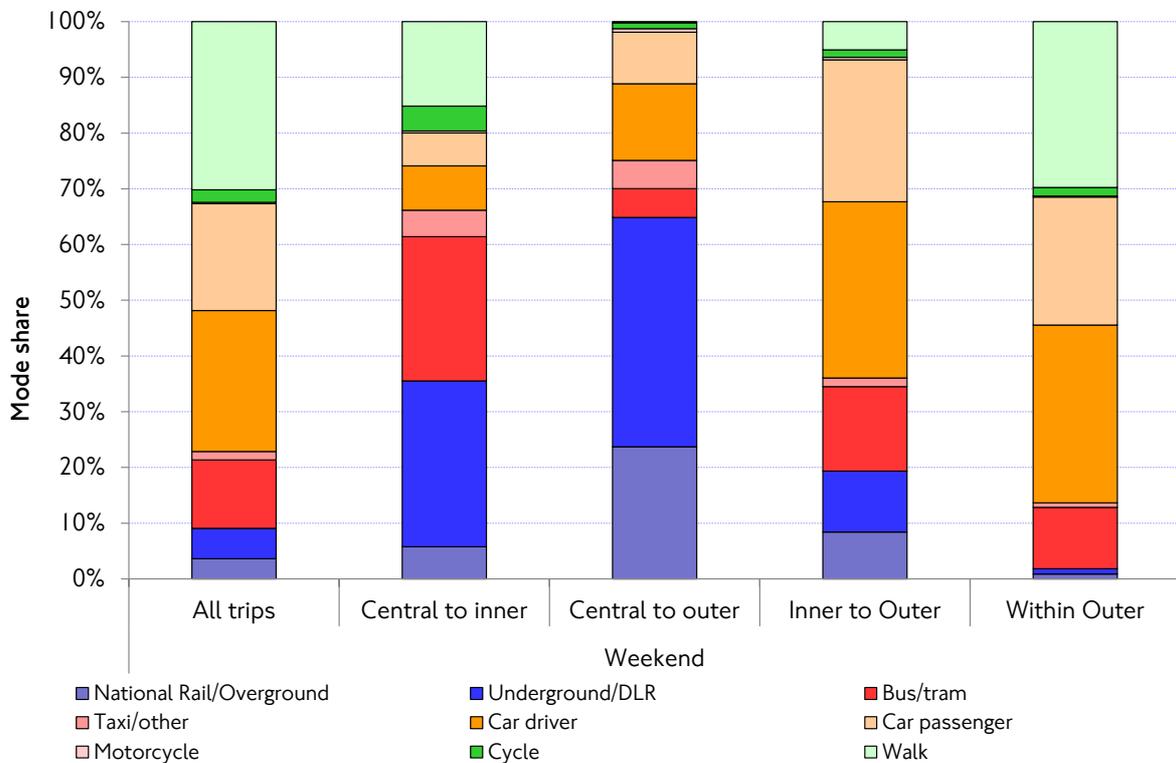
At the weekend, the general mode share patterns remain similar, although car use becomes more significant for all types of trips. On weekdays, only 7 per cent of trips between central and outer London are by car, whereas on weekends this increases to 23 per cent. Rail and Underground use is a lot lower for all types of trips.

Figure 11.35 Mode share of trips by origin and destination, weekdays.



Source: TfL Planning, Strategic Analysis.

Figure 11.36 Mode share of trips by origin and destination, weekends.



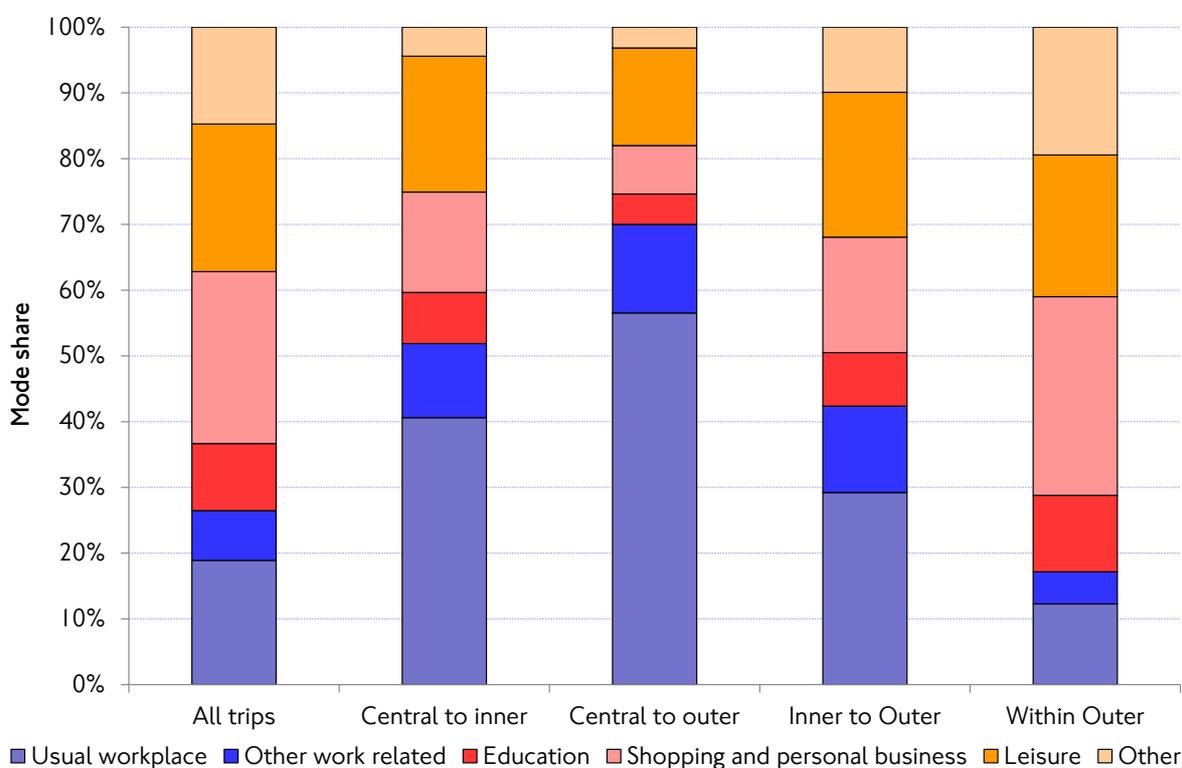
Source: TfL Planning, Strategic Analysis.

### Purpose share

Figures 11.37 and 11.38 show trip purpose shares by origin and destination. On weekdays, trips to central London are mainly for work purposes – 52 per cent of all trips between central and inner and 70 per cent of all trips between central and outer. Trips between other areas of London are more evenly split between work and non-work purposes, with only 17 per cent of weekday trips in outer London being for work.

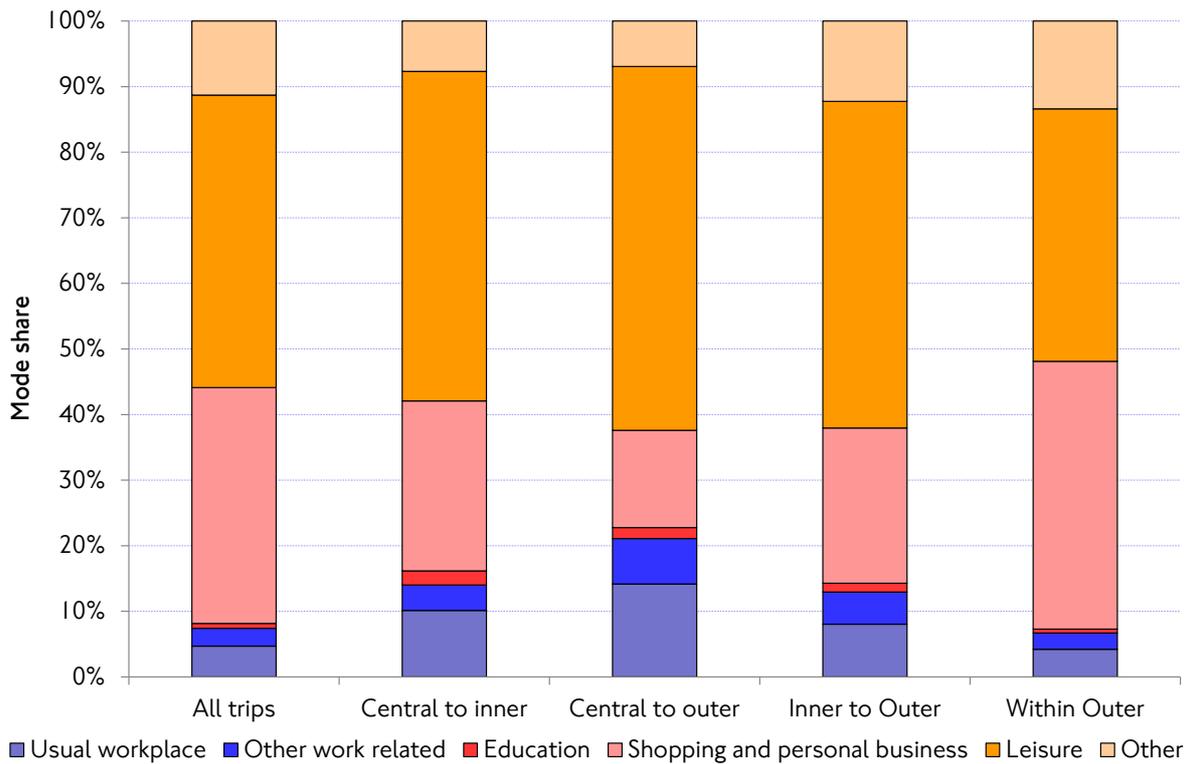
At the weekend, shopping and particularly leisure trips dominate, even for trips to central London. Some 70 per cent of all trips between central and outer London are for shopping or leisure purposes at the weekend. However, there is still a large number of work related trips taking place at the weekend – more than 1 in 5 trips between central and outer London are work-related.

Figure 11.37 Purpose share of trips by origin and destination, weekdays.



Source: TfL Planning, Strategic Analysis.

Figure 11.38 Purpose share of trips by origin and destination, weekends.

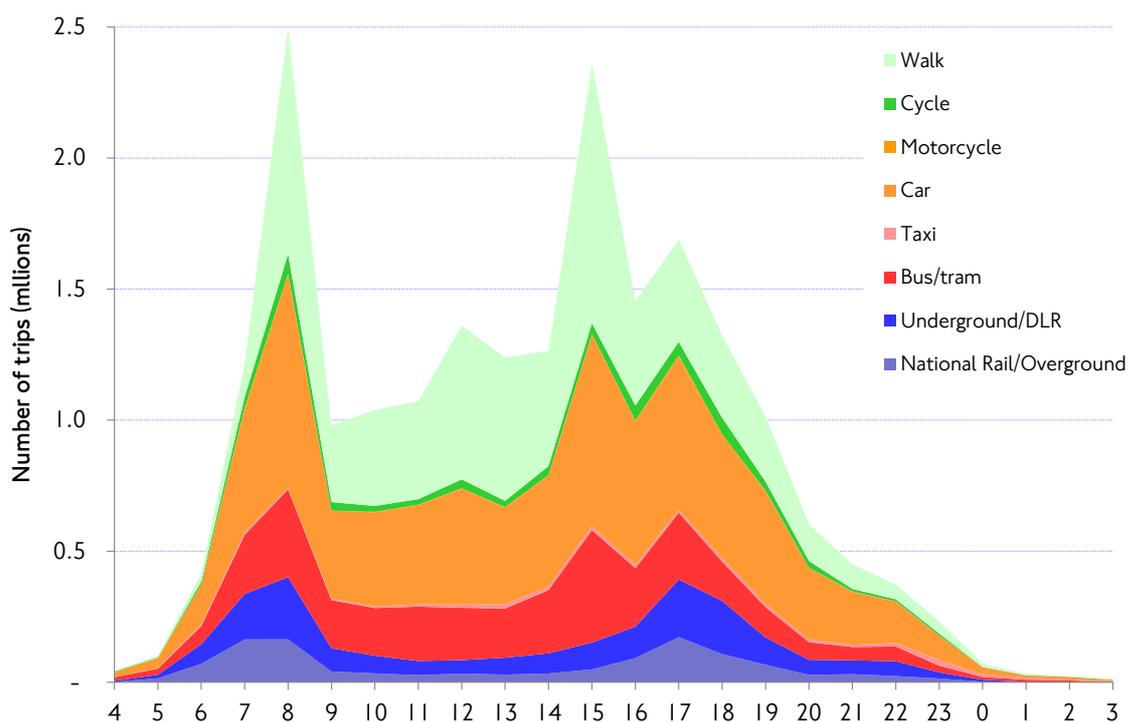


Source: TfL Planning, Strategic Analysis.

### Time of day profile

On weekdays there are three distinct peaks of travel. The morning peak occurs between 08:00 and 09:00, with two further peaks in the afternoon. The highest volume of trips in the afternoon occurs between 15:00 and 16:00, with the majority of these trips for education purposes. There is a second peak between 17:00 and 18:00, corresponding with people leaving work to commute home. There is also a significant number of trips during the inter peak period, with large volumes of trip making until 22:00.

Figure 11.39 Weekday trips by mode and trip start time.

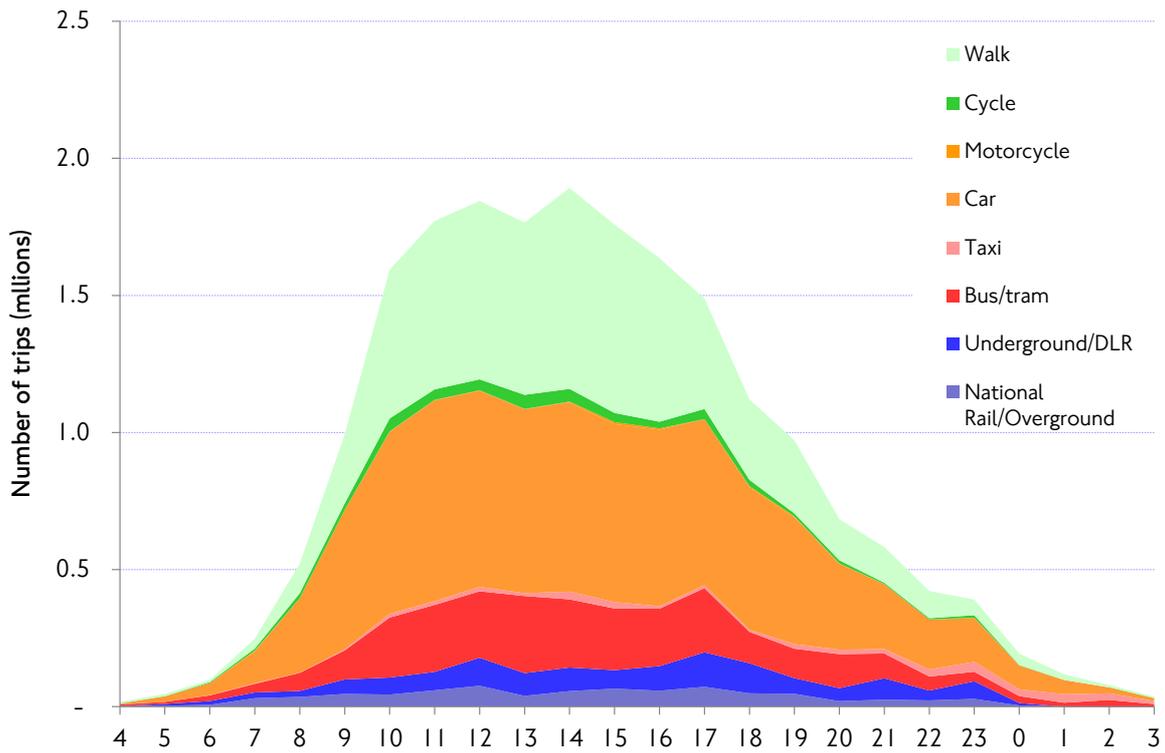


Source: TfL Planning, Strategic Analysis.

Trips at weekends have a very different profile to weekday trips. Figure 11.40 shows trips by start hour on Saturdays, with figure 11.41 the equivalent for Sundays. In contrast to weekdays, trips at the weekend have one main peak in the middle of the day, with this peak being more pronounced on Sundays (between 12:00 and 13:00), and more spread out across the afternoon on Saturdays, with the peak running from 10:00 to 16:00.

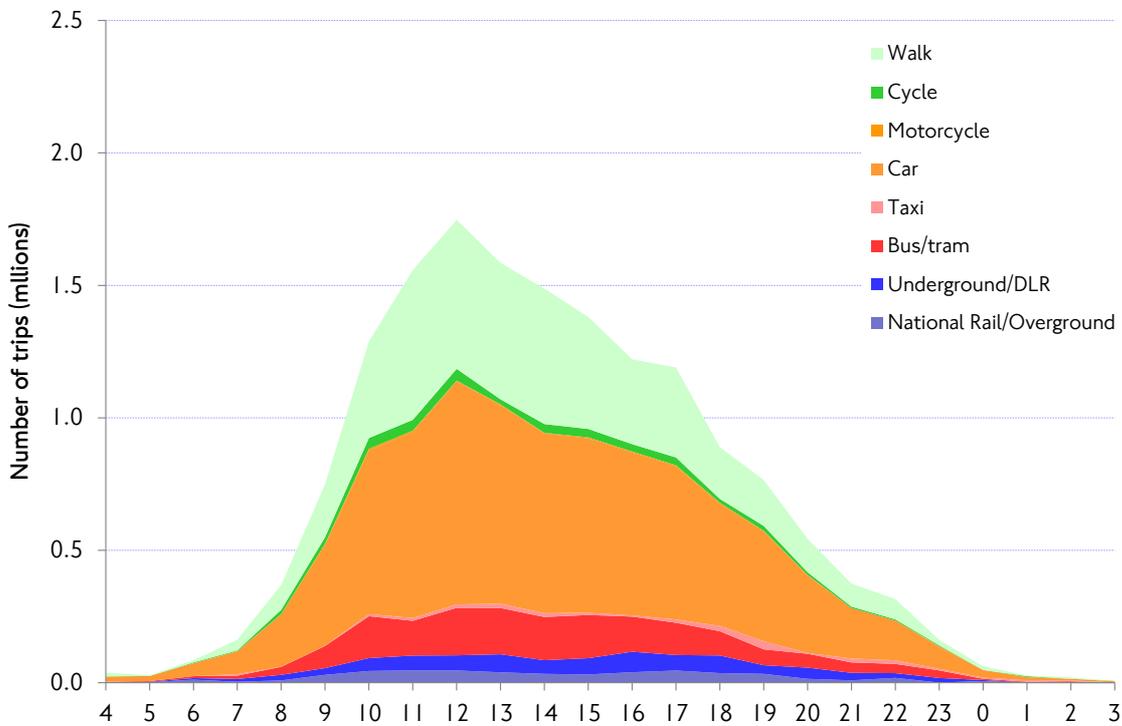
11. Spotlight: How has travel by Londoners changed – insights from 10 years of the London Travel Demand Survey (LTDS)

Figure 11.40 Saturday trips by mode and trip start time.



Source: TfL Planning, Strategic Analysis.

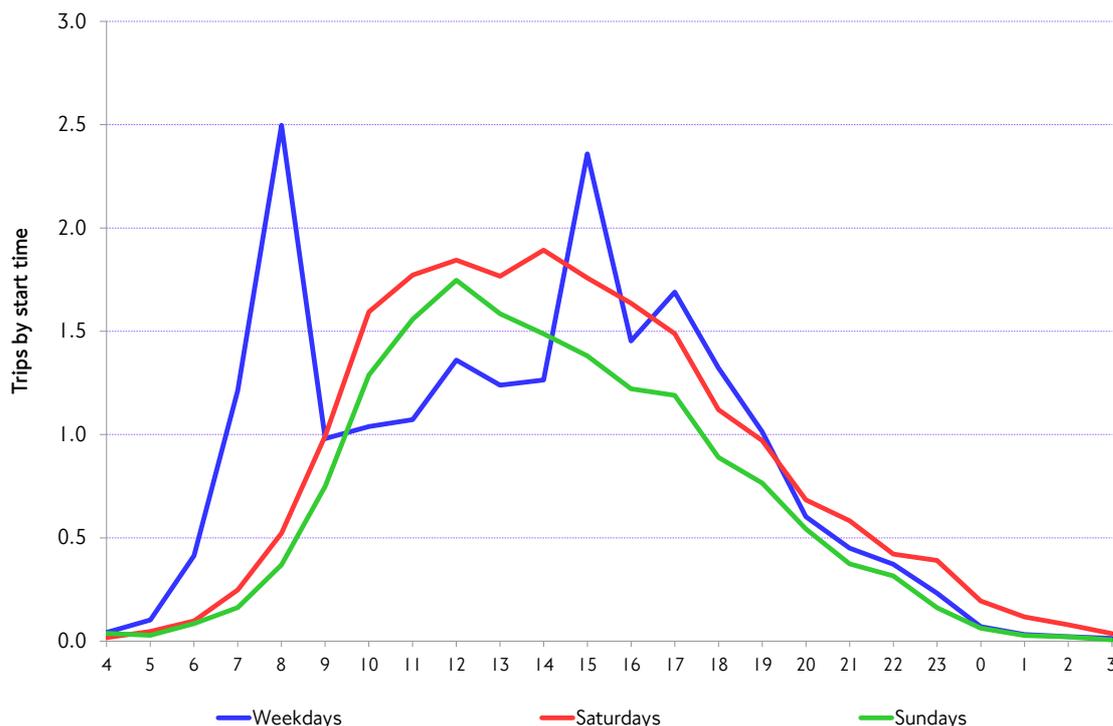
Figure 11.41 Sunday trips by mode and trip start time.



Source: TfL Planning, Strategic Analysis.

Figure 11.42 compares the trip profiles of weekdays and weekend days. Notable from the graph is the fact that there are more trips in the inter peak period at the weekend than in the week. Between the hours of 10:00 and 15:00, there are 48 per cent more trips on Saturdays than an average weekday, and 28 per cent more trips on Sundays (London residents only). On Saturdays, there are also more trips than weekdays from 20:00 onwards. In fact, for 15 hours of the day, there are more trips on Saturdays by London residents than on an average weekday.

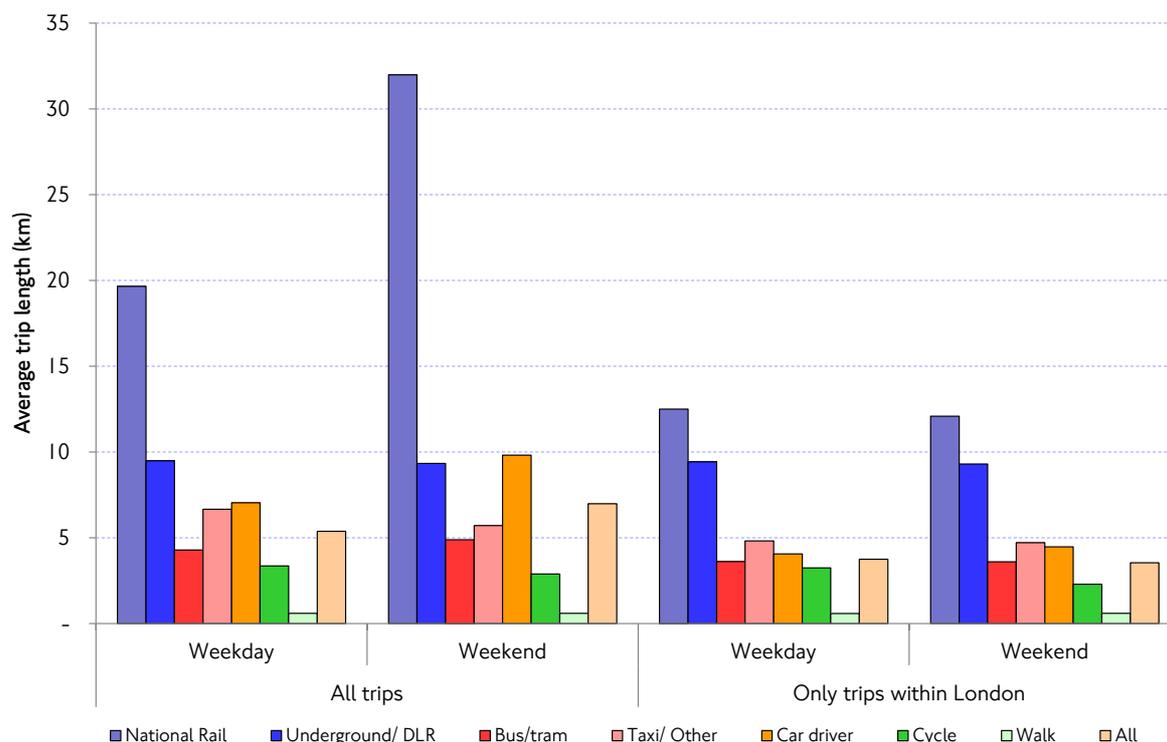
Figure 11.42 Trips by day of week and trip start time.



Source: TfL Planning, Strategic Analysis.

Average trip lengths are remarkably similar on weekdays and weekends (figure 11.43). The main difference occurs when trips that go beyond the Greater London boundary are included. This shows that at weekends, residents tend to make longer trips outside Greater London, particularly by rail or car. When excluding these types of trips, the average trip lengths are very similar, at 3.7 kilometres per trip on weekdays and 3.5 kilometres per trip at weekends.

Figure 11.43 Average trip lengths by mode, weekdays and weekends.



Source: TfL Planning, Strategic Analysis.

## Summary

Travel volumes at the weekend are significant, particularly on Saturdays. The reasons why people travel are very different to weekdays, with most trips being for leisure or shopping purposes. The modes used to travel are also different, with more car use and less public transport use. The locations people travel to are also different at the weekend, with fewer trips to central London and a greater proportion either wholly within inner or outer London. While weekday trip rates have been declining, at the weekend they have remained relatively stable.

### 11.10 What has been driving the change in mode share for travel in London?

#### Introduction

In the 20 years from 1994 to 2014, the proportion of all trips in London made by private transport fell from 49 per cent to 37 per cent. There was also a corresponding increase from 25 per cent to 37 per cent in trips made by public transport, completing the picture of a 13 percentage point modal shift from private to public transport, walking and cycling over the past 20 years. This reflects all travel in London, whether by residents or visitors. It is of interest to understand how these trends have specifically affected London residents and to briefly explore key socio-demographic dimensions of the aggregate level mode shift.

### **Overall modal trends for London residents**

Looking only at London residents, a similar pattern of modal shift has been seen in the 10 years that LTDS has been running. Among London residents, there was a net modal shift from private to public transport of five percentage points, with public transport mode share rising from 26 per cent in 2005/06 to 31 per cent in 2014/15, and a corresponding decrease in private transport mode share from 42 per cent to 36 per cent.

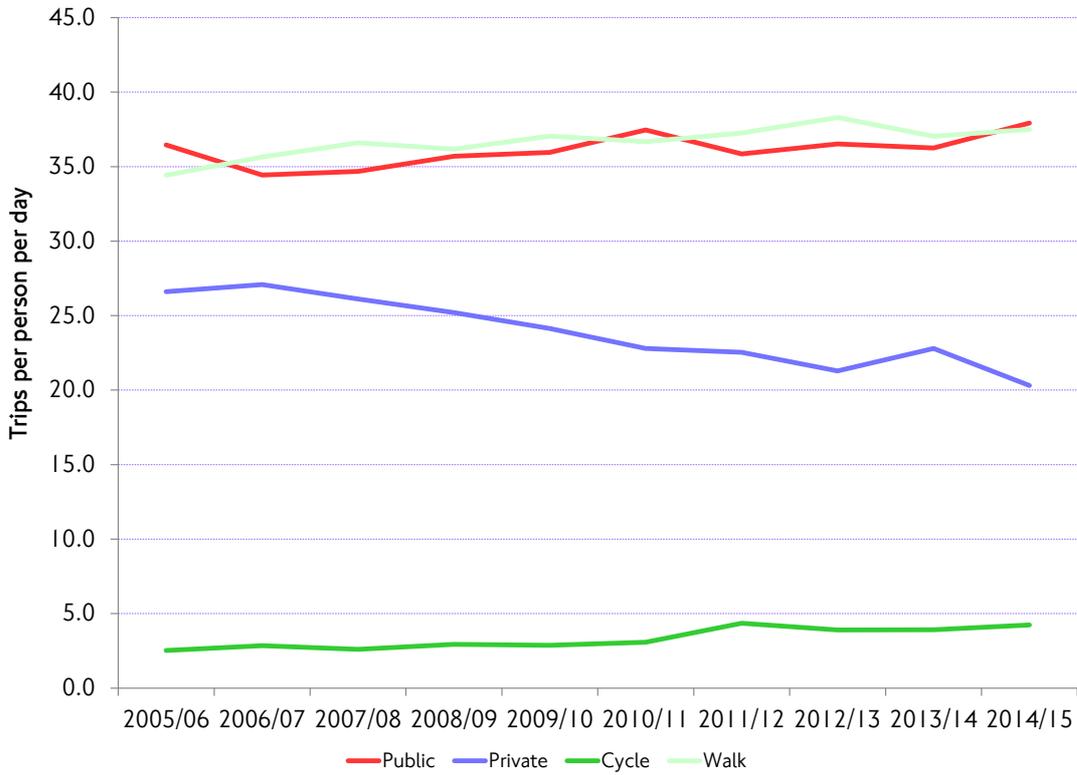
While this overall trend of modal shift is representative of changing travel patterns among London residents considered as a whole, there have been differing trends among different social groups and in different locations.

### **Mode shares in inner and outer London**

There has been a sustained decline in private transport mode share among inner London residents, from 27 per cent in 2005/06 to 20 per cent in 2014/15 (figure 11.44). The increase in public transport mode share over this period was relatively small, however, moving from 37 to 38 per cent. Among inner Londoners, more of the modal shift away from private transport in the last 10 years has been toward cycle, with a 2 percentage point increase in mode share, and walk, which has seen a 3 percentage point increase.

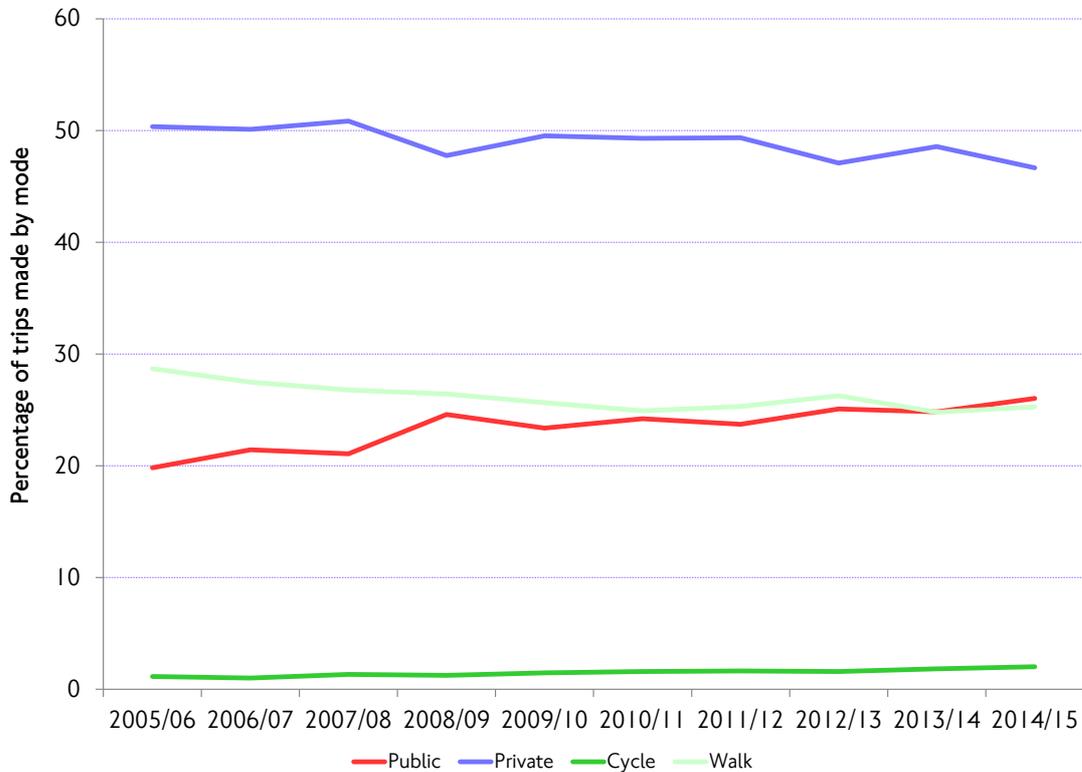
Outer London residents' private transport mode share also decreased between 2005/06 and 2014/15, but by a comparatively small 4 percentage points (figure 11.45). The increase in public transport mode share among outer Londoners, however, was much greater than that in inner London, at 6 percentage points. Cycling saw an increase in mode share among outer Londoners, of 1 percentage point, but the mode share of walk all the way trips declined by 4 percentage points over 10 years.

Figure 11.44 Mode shares among inner London residents. LTDS 2005/06-2014/15.



Source: TfL Planning, Strategic Analysis.

Figure 11.45 Mode shares among outer London residents. LTDS 2005/06-2014/15.



Source: TfL Planning, Strategic Analysis.

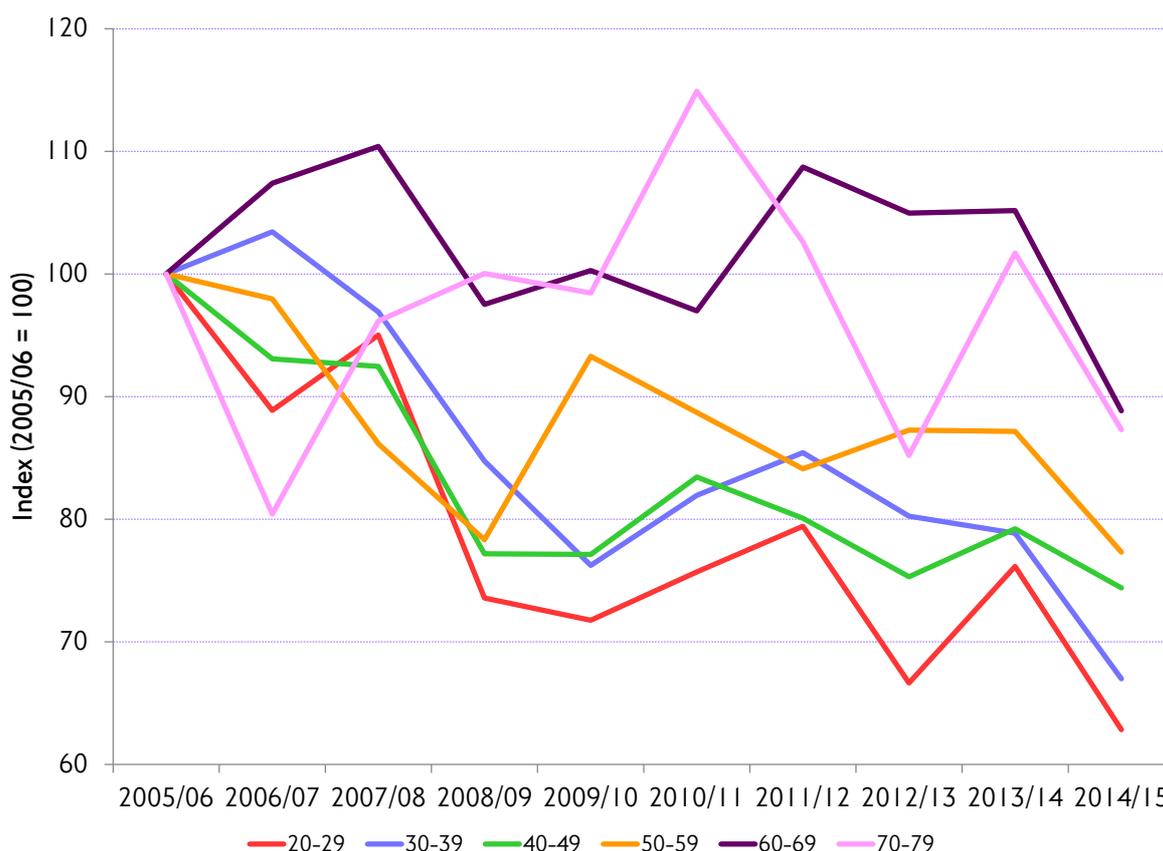
### Mode shares by gender

Private transport mode shares fell by 5 percentage points both among men and women over the 10-year period covered by LTDS. The changes in other modes, however, differed by gender. In particular, cycle mode share among men increased by more than 2 percentage points, while among women the increase was of less than half a percentage point. Walk mode share fell by 1 percentage point among men and was unchanged among women, while women saw an increase in public transport mode share of 6 percentage points – equal to the fall in private transport mode share – in comparison to a 4 percentage point increase among men.

### Trends by age band

Car driver trip rates have been observed to be declining among Londoners since 2005/06. While all age groups had lower car driver trips rates in 2014/15 than in 2005/06, the reductions were larger among younger age groups. Over the 10 years car driver trip rates fell by around 25 per cent among Londoners in their 20s, with sequentially smaller reductions among each age band up, until those in their 60s and 70s, who – after some fluctuations – each had around a 10 per cent lower car driver trip rate in 2014/15 than in 2005/06 (figure 11.46).

Figure 11.46 Indexed changes in car driver trip rates by age band.



Source: TfL Planning, Strategic Analysis.

## Summary

London residents account for an estimated three-quarters of all travel in London on a typical day. It is therefore not surprising that similar modal trends are seen among London residents to that of all travellers in London. However, the shift has clearly not been uniform. The shift away from cars has been led by younger people, while there has been a marked increase in the proportion of walking and cycling in inner London.

## 11. Spotlight: How has travel by Londoners changed – insights from 10 years of the London Travel Demand Survey (LTDS)

## 12. Spotlight: The transport challenge of London's future growth

### 12.1 Introduction and contents

London's expected rapid growth is currently a major preoccupation for future transport planning. Population and employment growth signifies an economically successful city, and it is a key role of transport to facilitate this. However, it is also crucial to ensure that this is done in the most effective and efficient way – not simply planning to accommodate the projected increases in travel demand, but in developing plans to ensure, for example, that the need to travel is minimised, alongside the negative externalities of travel such as carbon dioxide emissions. Furthermore, the changing composition and characteristics of London's future population will lead to shifts in the nature of travel demand – whether in terms of modes used, times of day, location or accessibility needs. These are important dimensions that need to be properly understood if appropriate future plans are to be developed.

This chapter looks at the transport challenge presented by London's future growth and related population and employment change; firstly reviewing the latest population and employment projections from the GLA and describing their implications, and secondly by describing the latest travel demand forecasts developed by TfL. These forecasts will underpin the development of a future MTS, as well as a range of specific contemporary and future transport schemes in the Capital.

Figure 12.1 An illustration of the magnitude of London's projected population growth.



Source: TfL Marketing and Communications.

## 12.2 The demographic backdrop: London’s changing population

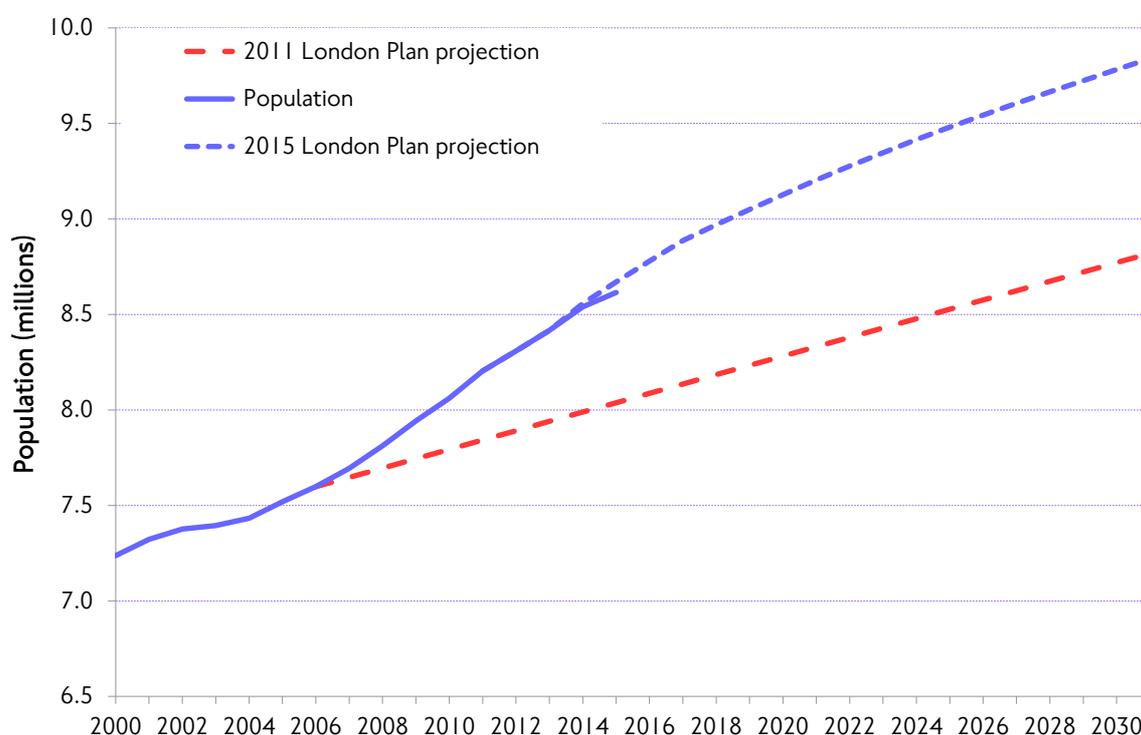
### Overall population growth

In 2015, London’s population topped 8.6 million, equalling the previous peak last reached in 1939. Since 2001, London’s population has increased by more than 1.3 million people (18 per cent) – more than the entire population of Birmingham. This growth has been much faster than was expected when the current MTS was written. Figure 12.2 shows it rapidly outstripping 2009-based projections reported in the 2011 London Plan. The population projections in the 2015 London Plan have been updated to be more in line with recent trends.

The 2013 round of population projections, and emerging 2014-based projections, suggest a slight slowing in the future rate of growth in comparison with the last few years, but see London reaching a resident population of 10.4 million in 2041. This is the equivalent of adding both Birmingham and Glasgow to London between now and 2041, which graphically illustrates the scale of the challenge.

Population growth will increase demand for travel. London residents make around 2.5 trips each per day on average, and so it follows that more people will mean more trips on the transport networks – a total of 5.5 million extra trips per day by Londoners in 2041 compared to 2014 if current average trip rates are unchanged.

Figure 12.2 Projected and actual population growth in London. 2015 London Plan, using 2013 round of projections.



Source: GLA.

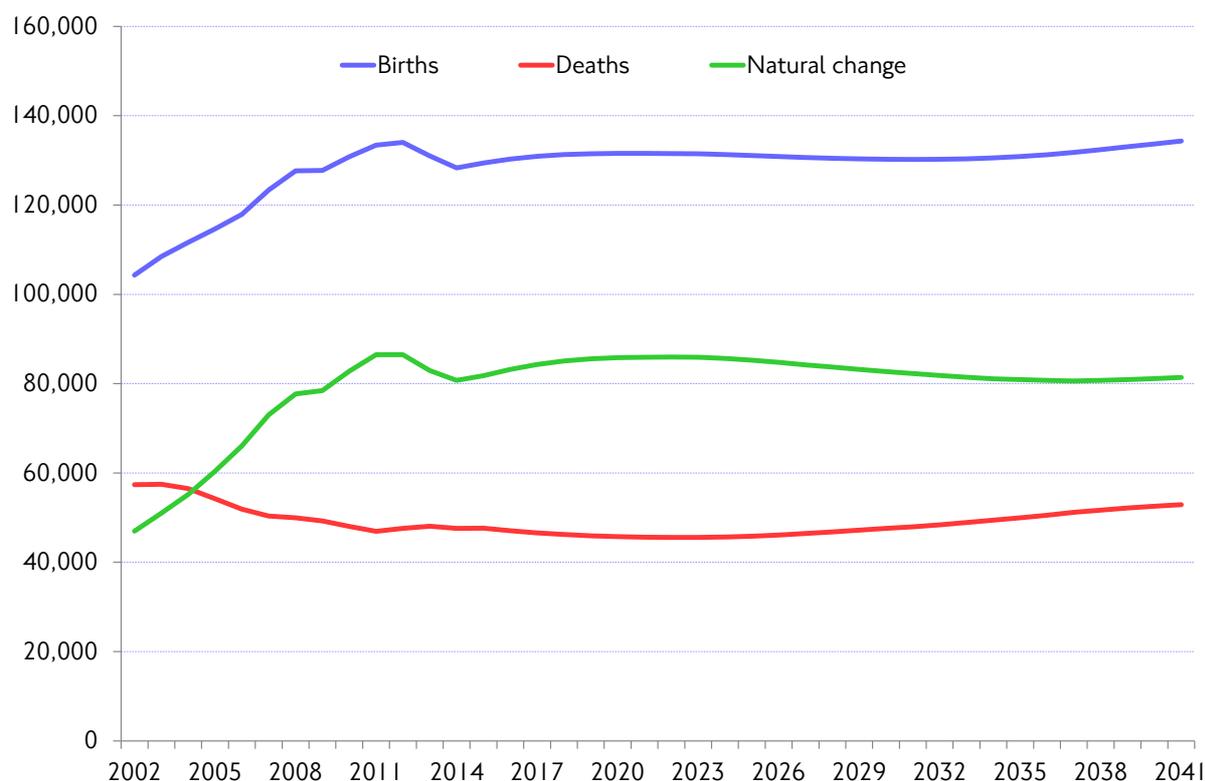
### Principal contributors to population growth – natural change and net migration

Natural change (an excess of births over deaths) has been, and will continue to be, the primary driver of London’s population growth. Figure 12.3 shows the rate of

births running at roughly twice the rate of deaths, among the resident population, since 2002. Over this period the trends have intensified, with an increase of nearly 30 per cent in the rate of births, and a decrease of 25 per cent in the rate of deaths. The net effect was that natural change increased from around 50,000 to around 80,000 residents per year over the period 2002-2013.

Projecting forwards, the number of births in London is expected to stabilise at around 130,000 per year with a moderate increase in the 2030s. The number of deaths is also expected to stabilise, at around 50,000 per year, with a slowly increasing trend reflecting an increasingly ageing population. These trends would still give rise to a natural change increase of around 80,000 per year – which will remain the primary driver of population increase in London.

Figure 12.3 Natural population change in London – 2002 to 2041.



Source: GLA.

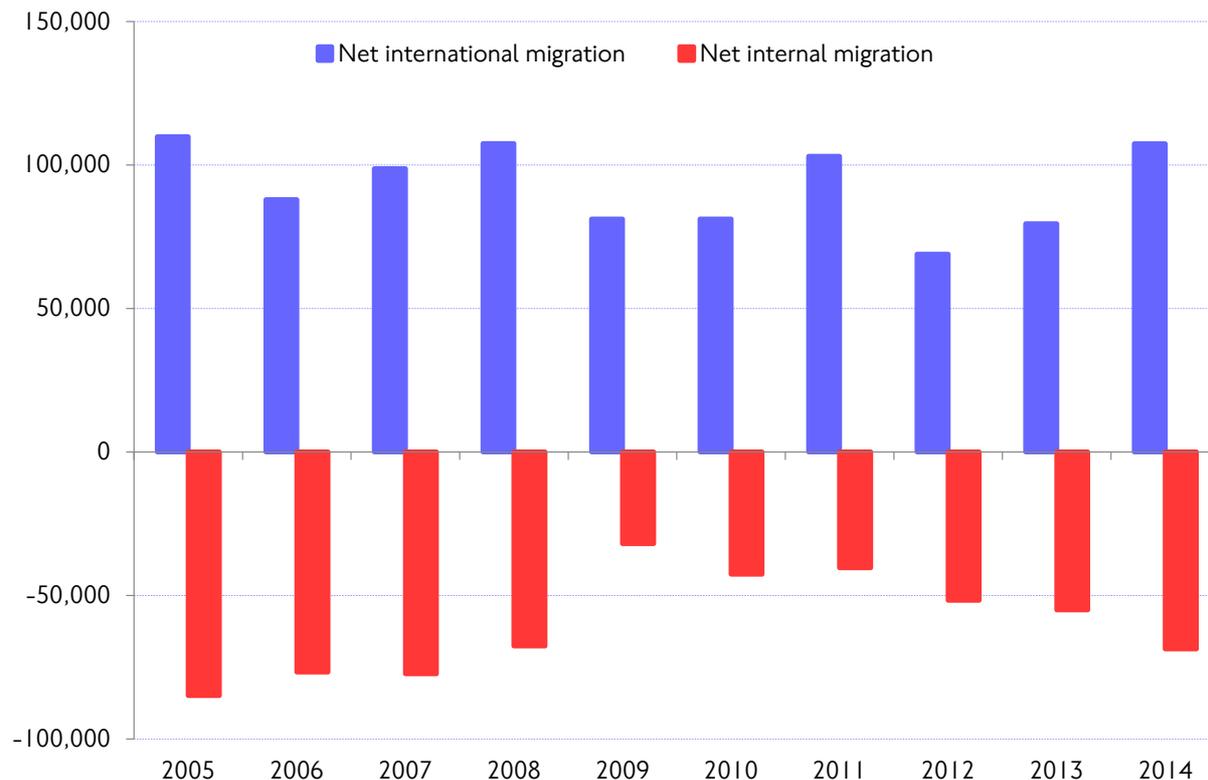
Net international migration has played a major role in the increase of London's population over the past decade, and has typically been between 75,000 and 100,000 per year. However, this has been partly balanced by Londoners moving to other parts of the country – typically a loss of about 50,000 per year. This means that the net population change from migration overall has been more modest than that from natural change – in recent years an increase of about 50,000 people per year.

Over recent years, the combined effect of established strong growth from natural change of about 80,000 per year, a net annual increase in international migration of 75,000-100,000 and a lower annual loss from domestic migration of about 50,000, has led to a strong net annual increase in London's population of more than 100,000.

## 12. Spotlight: The transport challenge of London's future growth

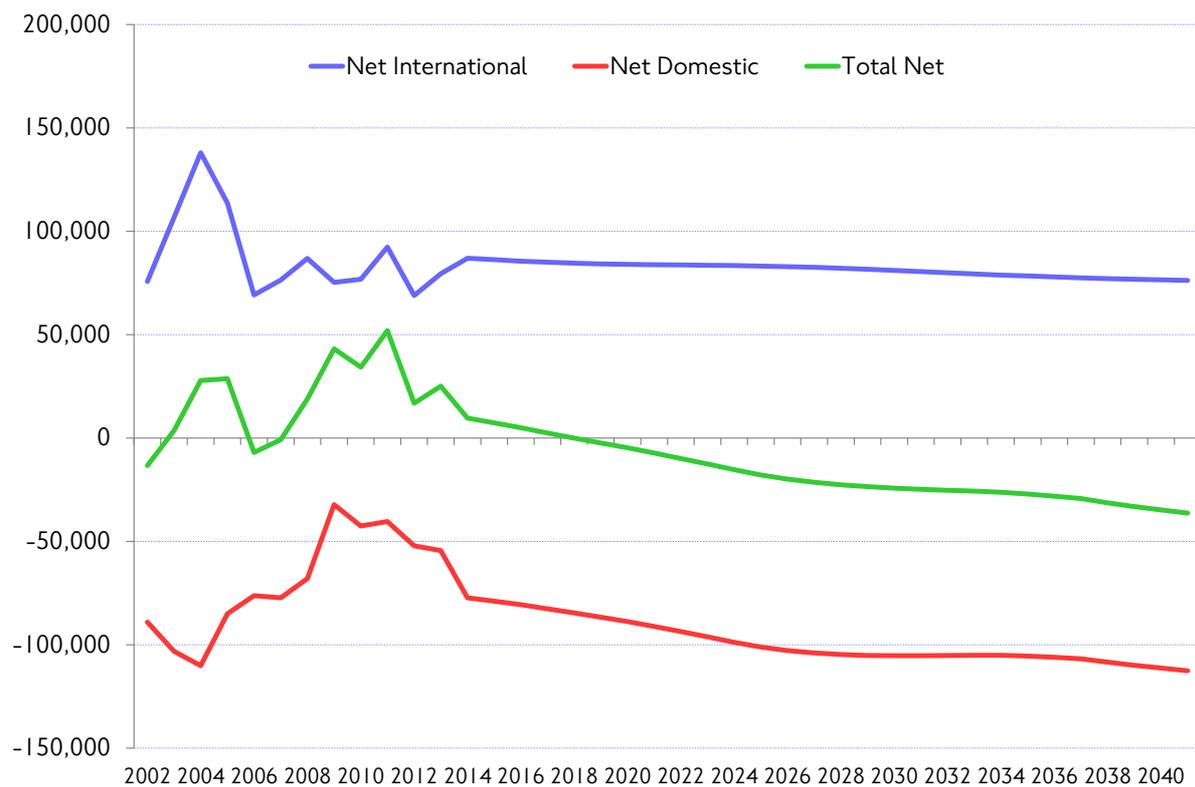
Projecting forwards however, these patterns are expected to change significantly, with net migration rapidly becoming less of a contributor to growth. From the latter part of the current decade net overall migration is expected to turn negative – London losing people to other parts of the country more rapidly than they are being replaced by international migrants (figure 12.4). From 2025 it is expected that around 100,000 London residents will move to other parts of the UK each year (figure 12.5).

Figure 12.4 Contribution of migration to population growth – 2004 to 2014.



Source: GLA.

Figure 12.5 Contribution of migration to population growth – 2002 to 2041.



Source: GLA.

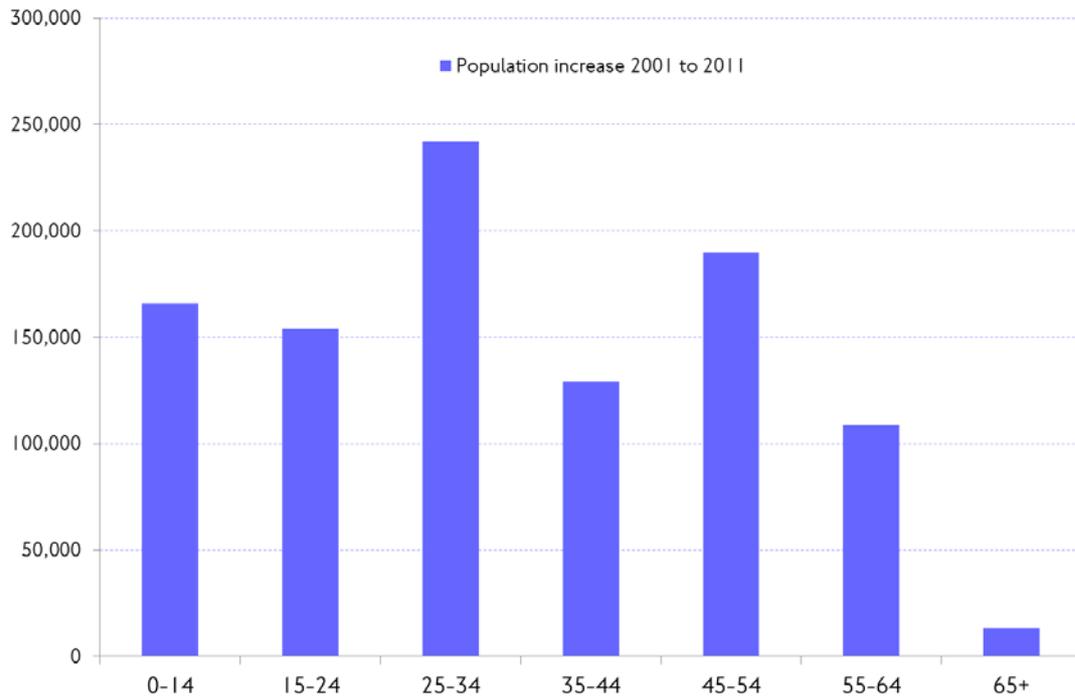
### The changing characteristics of London's population

As well as growth in numbers, London's population is also expected to change in terms of composition – demographic characteristics such as age and household composition being related to particular types of travel behaviour. For example, a relative growth in the number of older residents would lead to increased demand for travel outside of the peak periods. It would also increase the need to make the transport networks more accessible. On the other hand, continued growth in younger workers and international migrants would tend to lead to increased demand focused on the peak periods and on rail-based modes (see also section 11.7 of this report).

London's rapid population growth over the last decade has been driven particularly by younger people of working age (figure 12.6), with very low growth in the numbers of older people. This has contributed to the key changes in travel patterns that have been seen over the decade and which are described elsewhere in this report. Younger people tend to live in smaller households, focused in inner London, and are less likely than average to own a car. It is not the case that London's population has been 'ageing' over the last decade; on the contrary London has become a 'younger' city and is much more diverse.

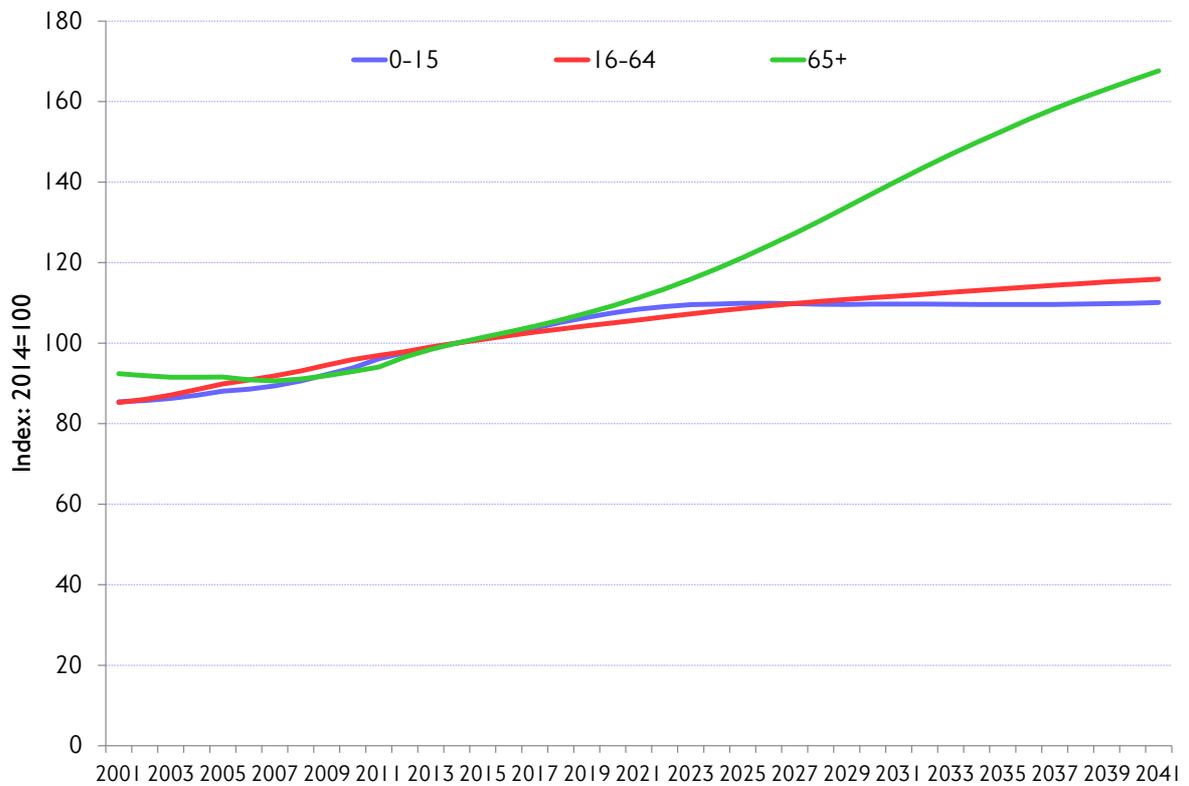
## 12. Spotlight: The transport challenge of London's future growth

Figure 12.6 Population change by age group, 2001-2011.



Source: Census of Population.

Figure 12.7 Population change by age group, 2001-2041.

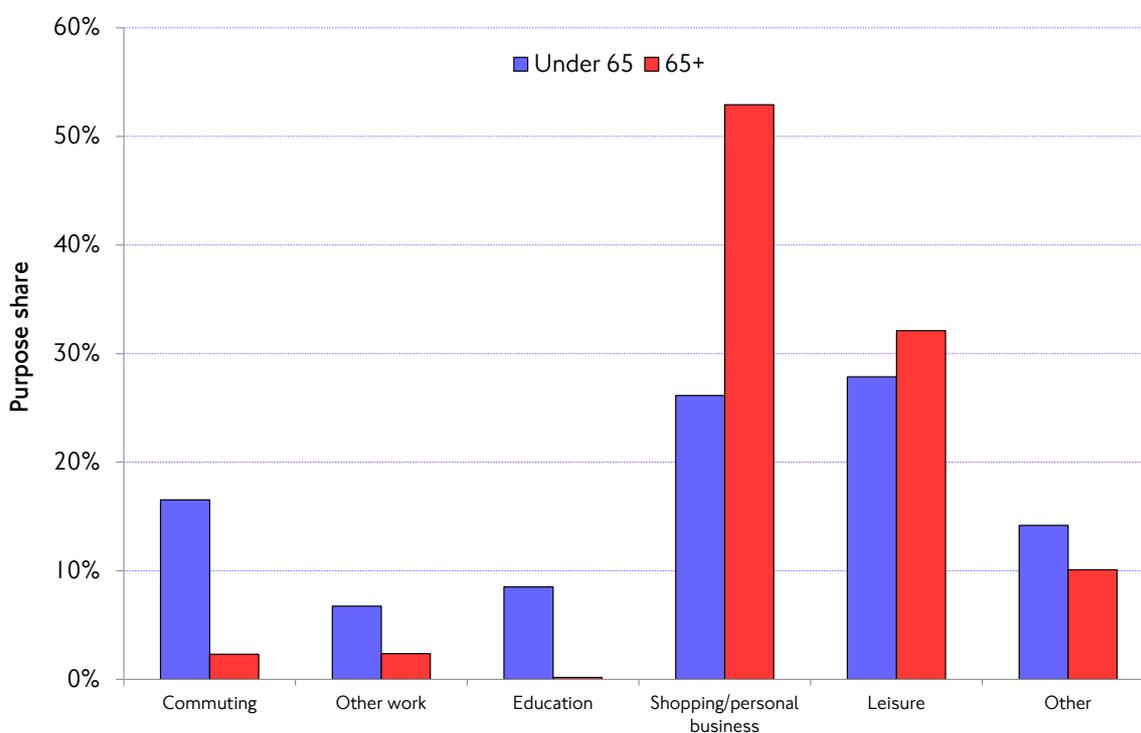


Source: GLA.

Projecting forward however (figure 12.7), growth is expected to be much higher among those aged 65 and over, particularly from 2020. The number of London residents aged 65 and over is expected to be 68 per cent higher in 2041 than in 2014 – a major shift that has significant implications for future transport provision in terms of factors such as total travel demand, mode share, and the times of day that people travel.

People aged 65 and over have a lower overall trip rate, with an average of 2.2 trips per person per day compared to 2.6 for the rest of the population. Unsurprisingly, they also have a very different journey purpose mix than that for working people (figure 12.8), with over 80 per cent of trips for leisure, shopping or personal business and, partly reflecting this, have quite different patterns of trip making across the day (figure 12.9), with 64 per cent of all trips being made in the inter peak period, compared to 42 per cent for those under 65.

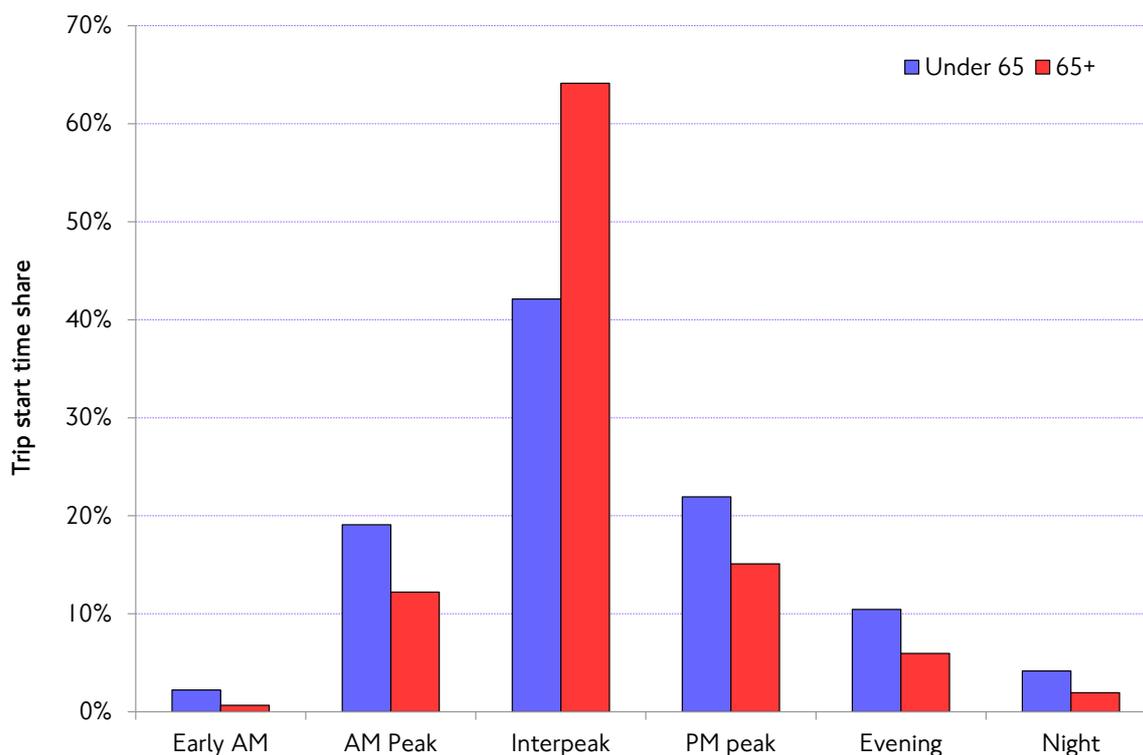
Figure 12.8 Journey purpose – people aged 65 years or more compared with those aged under 65 years, LTDS 2011/12 to 2013/14 average.



Source: TfL Planning Strategic Analysis.

## 12. Spotlight: The transport challenge of London's future growth

Figure 12.9 Time of day of travel – people aged 65+ years compared with those aged under 65 years, LTDS 2011/12 to 2013/14 average.



Source: TfL Planning Strategic Analysis.

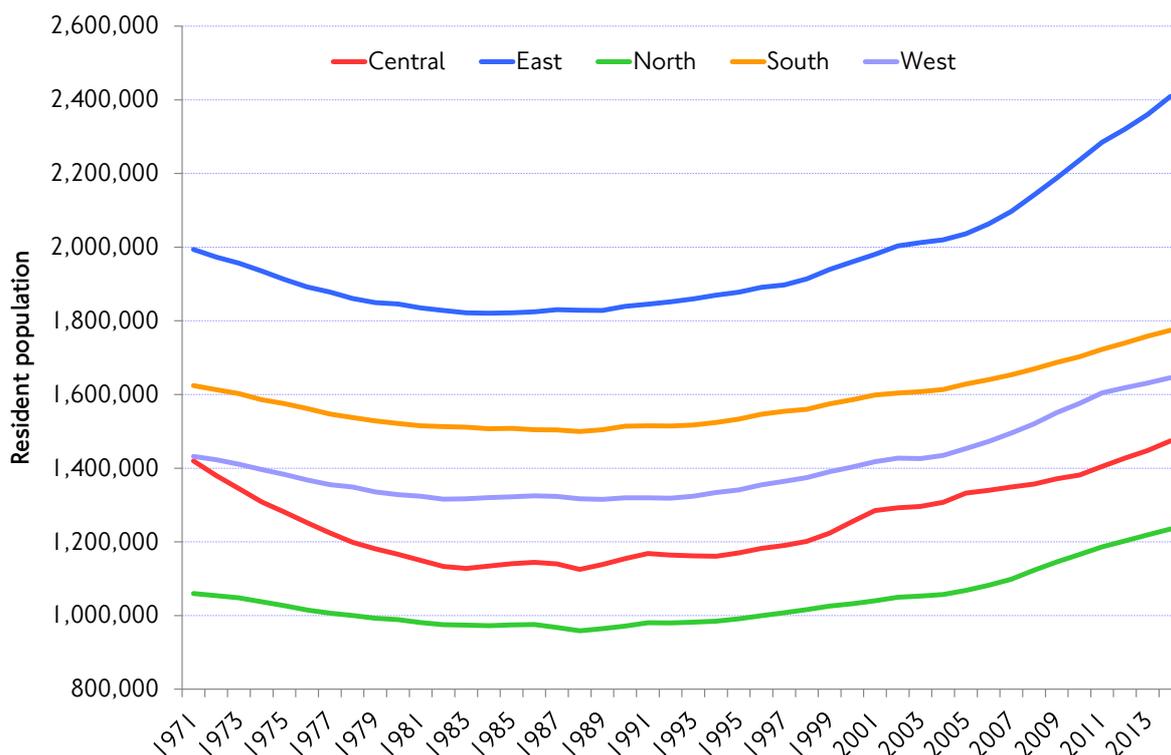
### Spatial aspects of population growth

The spatial aspects of this growth, particularly in terms of the locations of new homes and workplaces, will have a key impact on where travel demand pressures will become particularly intense, and will also affect the character of that demand.

Inner London residents tend to travel more, compared to outer London residents, and are more likely to use public transport. Outer London residents tend to use cars more, and so growth here may lead to a particular increase in car travel. Concentration of future growth around London's Opportunity and Growth Areas, for example growth associated with the Olympic Growth Boroughs in east London, should lead to growth that is more efficient – in transport terms – by offering the prospect of co-located homes and workplaces alongside high public transport connectivity.

Looking historically at the spatial distribution of population growth over the last decade, figure 12.10 shows that growth has been highest in the East sub region – a 15 per cent increase between 2001 and 2015. Almost 30 per cent of London's population now live in the East sub region.

Figure 12.10 Population change by London sub region, 1971-2011.

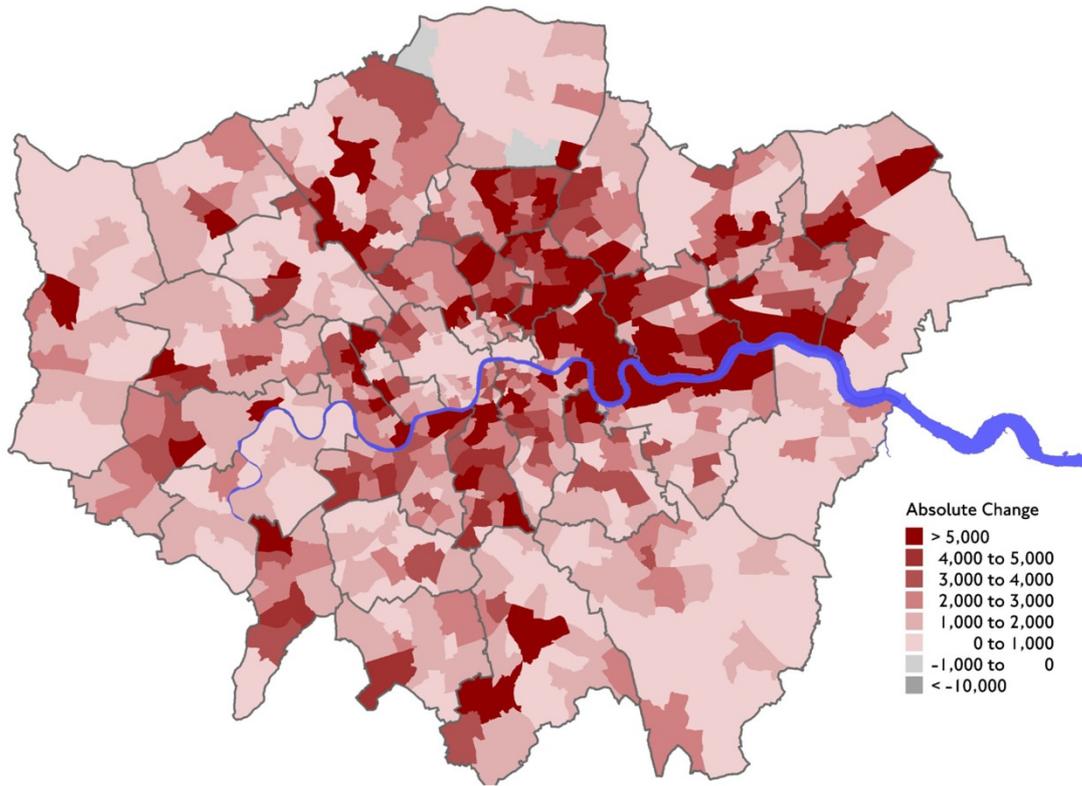


Source: TfL Planning, Strategic Analysis.

Looking forwards (figure 12.11), growth is expected to remain focused on the East sub region, with about 40 per cent of London's population growth to 2041 within this area. This will mean an additional 600,000 people, about the same population as Glasgow, living in the east sub region.

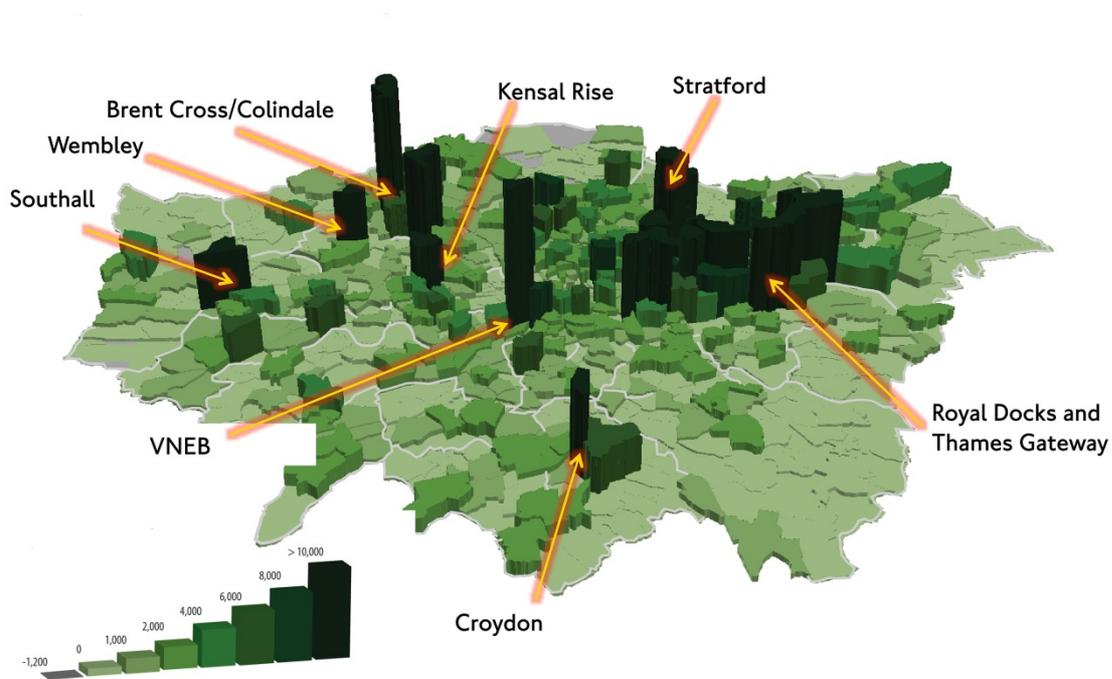
12. Spotlight: The transport challenge of London's future growth

Figure 12.11 Population change in London, 2011-2041.



Source: TfL Planning, Strategic Analysis.

Figure 12.12 Projected population change to 2031 – biggest changes in London's Opportunity and Growth Areas.

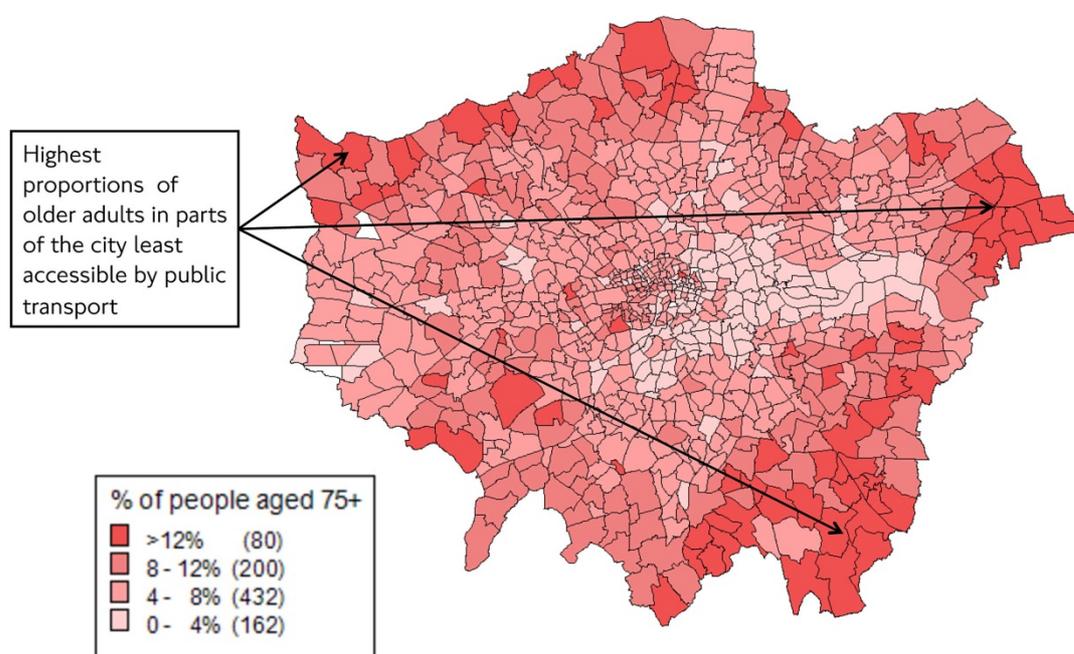


Source: TfL Planning, Strategic Analysis.

Narrowing the horizon to growth to 2031, there is more certainty over the expected spatial distribution, which has a major focus on London's Opportunity and Growth Areas (figure 12.12). If the Opportunity Areas and Areas of Intensification meet the indicative or minimum levels set out in the London Plan, then these have capacity to accommodate about 750,000 residents and nearly 600,000 jobs.

However, growth in these highly-connected areas may well be focused on younger people of working age. Older people will not only make up more of the population in the rest of London, but their growth will tend to be more focused in outer London (figure 12.13), locations that tend to have less public transport connectivity and, at least in historic terms, a greater dependence on the car for travel.

Figure 12.13 Proportion of older residents in 2031.



Source: TfL Planning, Strategic Analysis.

## 12.3 Changing employment in London

### Current and future employment

Along with increasing and changing population, changes to the number and type of jobs in London are important factors to be taken into account in developing forecasts of future travel demand. It is estimated that there were 4.9 million jobs in London in 2011, with 3.0 million jobs located in central and inner London, and 1.9 million in outer London. Furthermore, there were 6.7 million workplaces in the East and South East Government Regions surrounding London.

Between 1992 and 2014 the number of jobs in London grew by over 1.6 million, and is currently estimated as 5.5 million. This has included several distinct growth periods, punctuated by economic slowdowns. Following the recession of the early 1990s, the number of jobs in London grew by 750,000 between 1992 and 2001. There was another slowdown in 2002, followed by a period of growth, until a

## 12. Spotlight: The transport challenge of London's future growth

further economic decline and fall in jobs in 2008 and 2009. Since then, job growth has been exceptionally strong. Between 2011 and 2014 the number of jobs in London grew by 640,000, an annual average of 4.2 per cent or more than 200,000 jobs per year. This recent strong growth compares with an average growth rate of 0.7 per cent or 29,000 jobs per year between 1984 and 2011.

The large increase in the number of jobs has been accompanied by a significant change in the structure of London's economy since the 1980s. The number of manufacturing jobs halved between the mid-1980s and mid-1990s, and then halved again by 2011. In contrast, the professional, real estate, scientific and technical services sector grew over this period, with jobs in this sector doubling between the 1980s and 2011. Since 2011 growth in this sector has been higher than other major sectors and much higher than the longer-term trend, growing by annual average rate of 7.3 per cent compared with an annual average of 3.0 per cent between 1984 and 2011.

Figure 12.14 Projected growth in employment in London, 2011-2041.

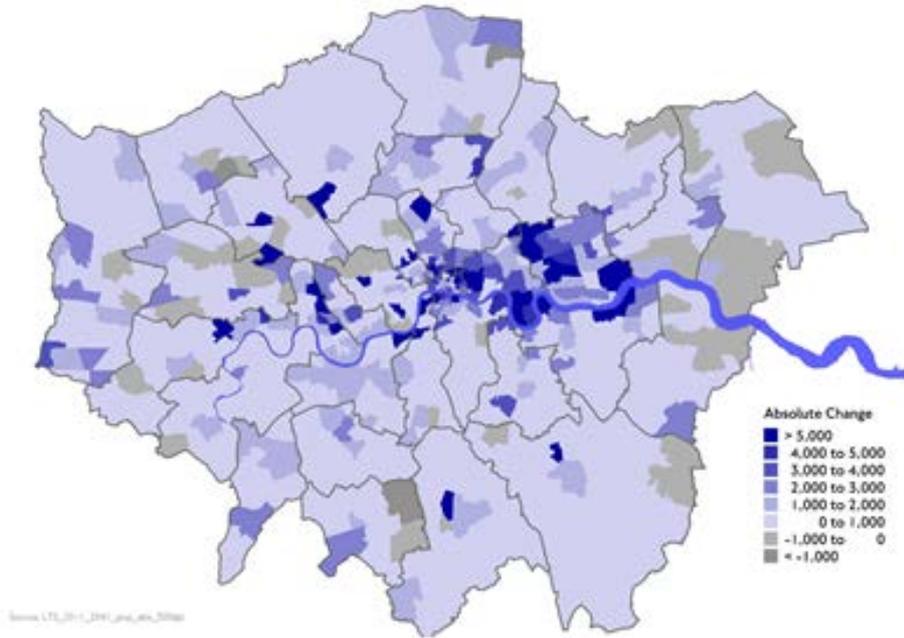


Source: TfL Planning, Strategic Analysis.

### Spatial patterns of future employment growth

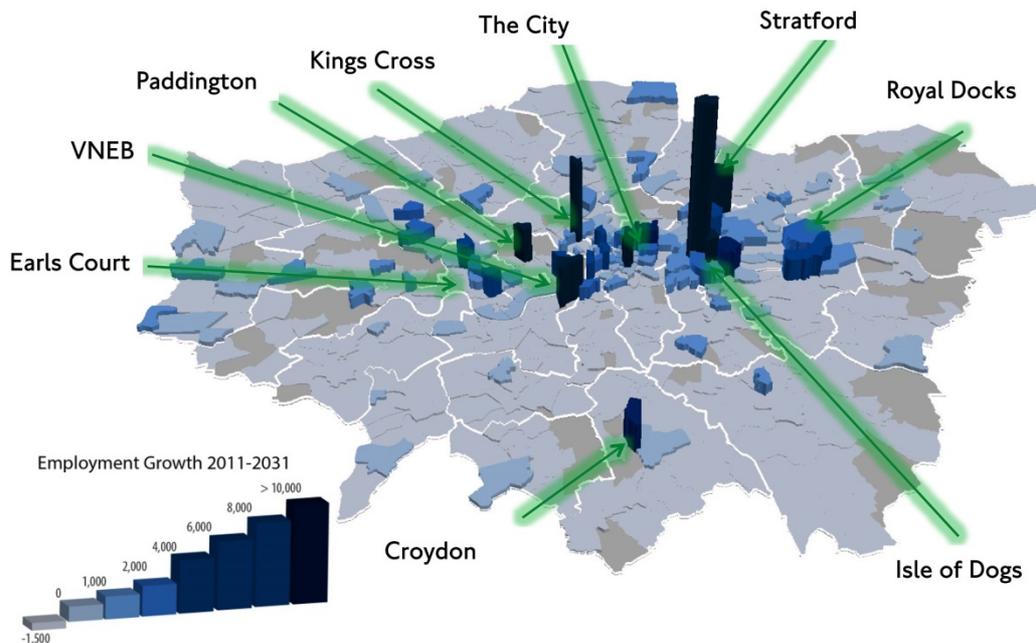
Projecting forward to 2041 (figure 12.15), the largest growth in employment will be in central and inner London. Narrowing the focus to 2031, London's Opportunity and Growth areas are expected to play a key role in supporting London's growth, with potential capacity to support nearly 600,000 jobs. In the east the Opportunity areas in the Isle of Dogs, Lower Lea Valley and the Royal Docks have total capacity for 200,000 jobs (figure 12.16).

Figure 12.15 Employment change – 2011 to 2041.



Source: TfL Planning, Strategic Analysis.

Figure 12.16 Projected employment change to 2031 – biggest changes in London's Opportunity and Growth areas.



Source: TfL Planning, Strategic Analysis.

### Interim update to projections of London's employment

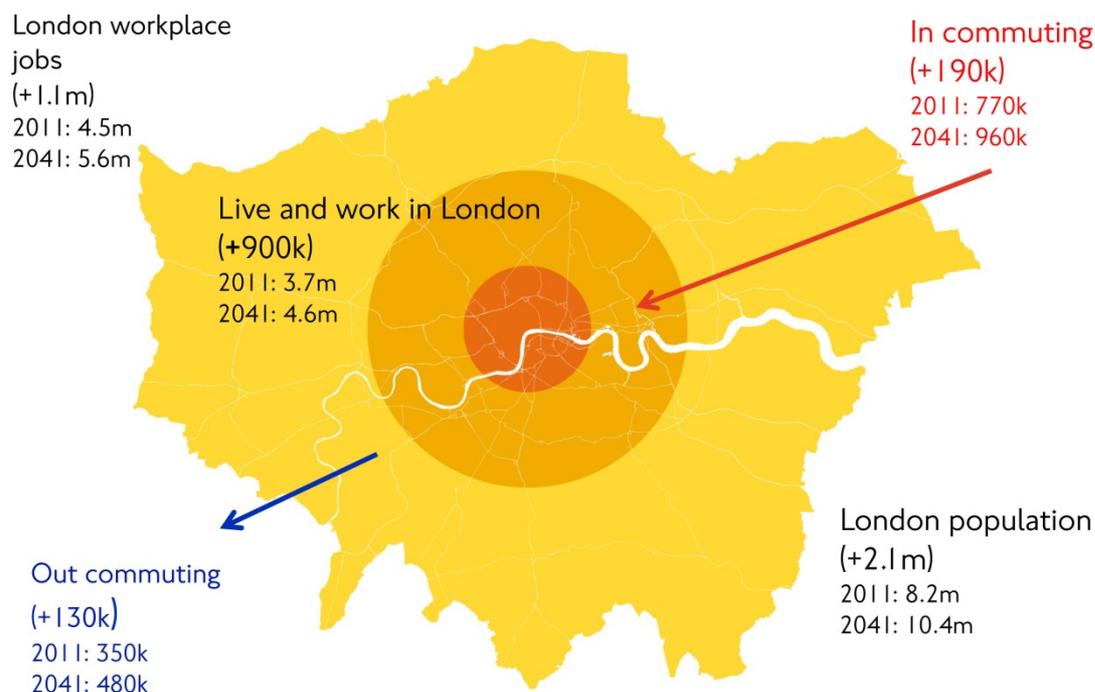
In July 2015 the GLA published updated interim trend-based employment projections to 2036 (*Working Paper 67: Updated employment projections for London, GLA Economics*). These new projections used the latest employment data for 2014 as a new base for the projections and therefore took account of the strong growth in jobs between 2011 and 2014. Therefore the starting point for the new projections was over 600,000 higher than the previous projections and this scale of uplift was carried through to the forecasts with an additional 628,000 jobs projected for 2036. The GLA will continue to review the projections, and will refine them by taking account of site capacity and transport accessibility.

### London's labour market balance

Jobs in London are taken up by London residents and by in-commuters from the areas around London. In turn, some London residents travel to jobs outside Greater London. It was estimated that, in 2011, about 800,000 people commuted into London on an average day from areas outside. Out-commuting was much less, at an estimated 350,000 people per day. The remaining 3.7 million workplace jobs in London were filled by those who also lived in London.

Relative changes in these components to 2031 will also affect future travel patterns in London, although the overall pattern is expected to remain similar to the present (figure 12.17). In-commuting is expected to increase in proportion to employment growth, with 900,000 in-commuters expected daily in 2031 (an increase of 17 per cent over 2011). Although the major share of new jobs will be taken up by London residents, it is clear that longer-distance commuting will continue to present capacity challenges that extend beyond the GLA area and particularly affect the National Rail network.

Figure 12.17 London's changing labour market balance.



Source: GLA.

## 12.4 Implications for travel demand

### TfL's approach to strategic travel demand forecasting

The demand for travel in London is constantly changing and will continue to do so as the city evolves. Analysing that change and forecasting the scale of the future challenge is critical to developing the right policy solutions to support London's future success. This section looks at TfL's latest strategic forecasts for travel demand in London, which are based on the population and employment projections considered in the preceding sections.

TfL prepares forecasts of travel demand up to 25 years ahead in order to inform policy and investment decisions. These forecasts take into account the main factors that influence travel demand, and include population and employment growth in London and the surrounding region, car ownership, the cost of using public transport and car, and expected changes to the transport system as set out in the TfL Business Plan. The forecasts are based on the growth assumptions set out in the latest London Plan, analysis of recent London travel trends and the latest Government advice in WebTAG.

In the latest forecasts, TfL has reviewed recent trends, as reported in *Drivers of Demand for Travel in London* [see: <http://content.tfl.gov.uk/drivers-of-demand-for-travel-in-london.pdf>], and considered the extent to which similar influences on travel demand will continue into the future.

Future work will focus on what this growth in travel demand will mean for indicators such as congestion, crowding, connectivity and ultimately London's liveability and success.

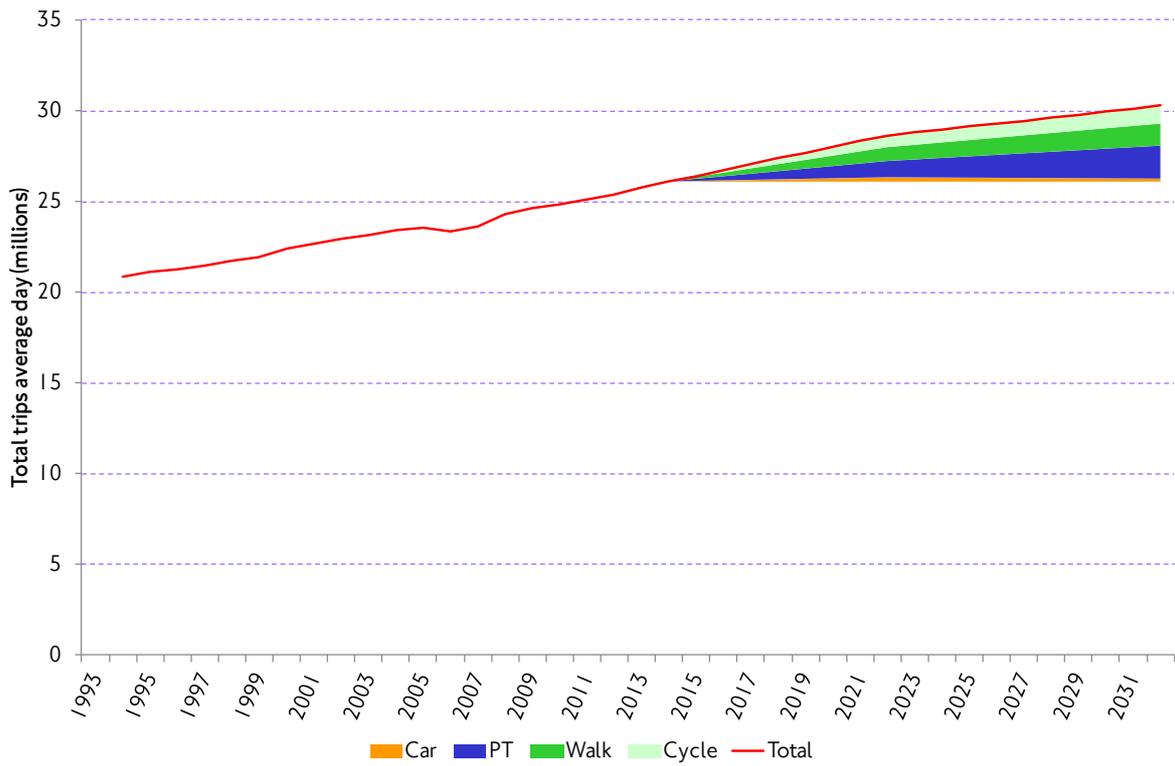
### 'Low Car' and 'High Car' scenarios

TfL has produced a range of forecasts, reflecting the uncertainties in forecasting outcomes in a system as complex as London's transport network. The difference between these forecasts is that one reflects national assumptions on vehicle efficiency, maintains current car ownership levels and assumes parking costs rise in line with economic growth. The other forecast is less optimistic about improvements in fuel efficiency given London's congested driving conditions, has a continuation of the trends of reducing car ownership and assumes a higher growth in London parking costs. These have been termed the 'high car' and 'low car' scenarios respectively, and are characterised by differing levels of car use as shown in figures 12.18-12.19.

Other scenarios, representing uncertainty in some of the key influences on demand, are being developed including the scale and distribution of population and employment and variation in other key input assumptions.

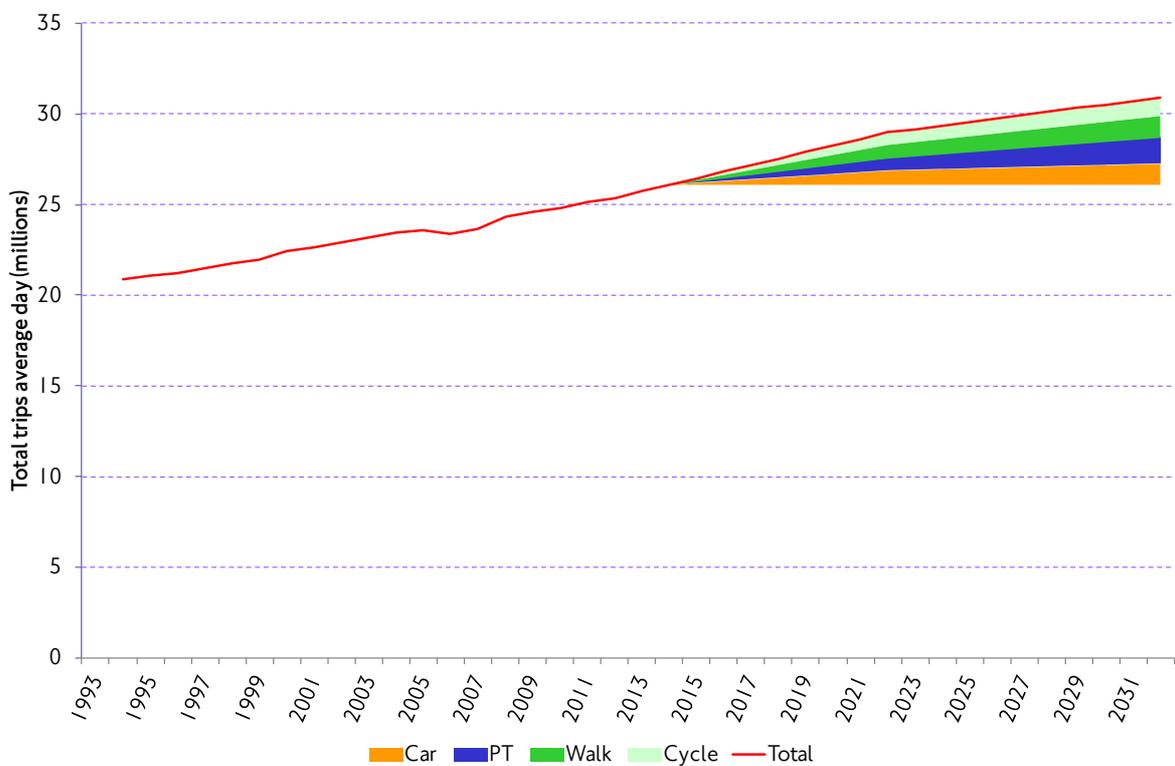
## 12. Spotlight: The transport challenge of London's future growth

Figure 12.18 Projected trip growth to 2031 ('low car' scenario).



Source: TfL Planning, Strategic Analysis.

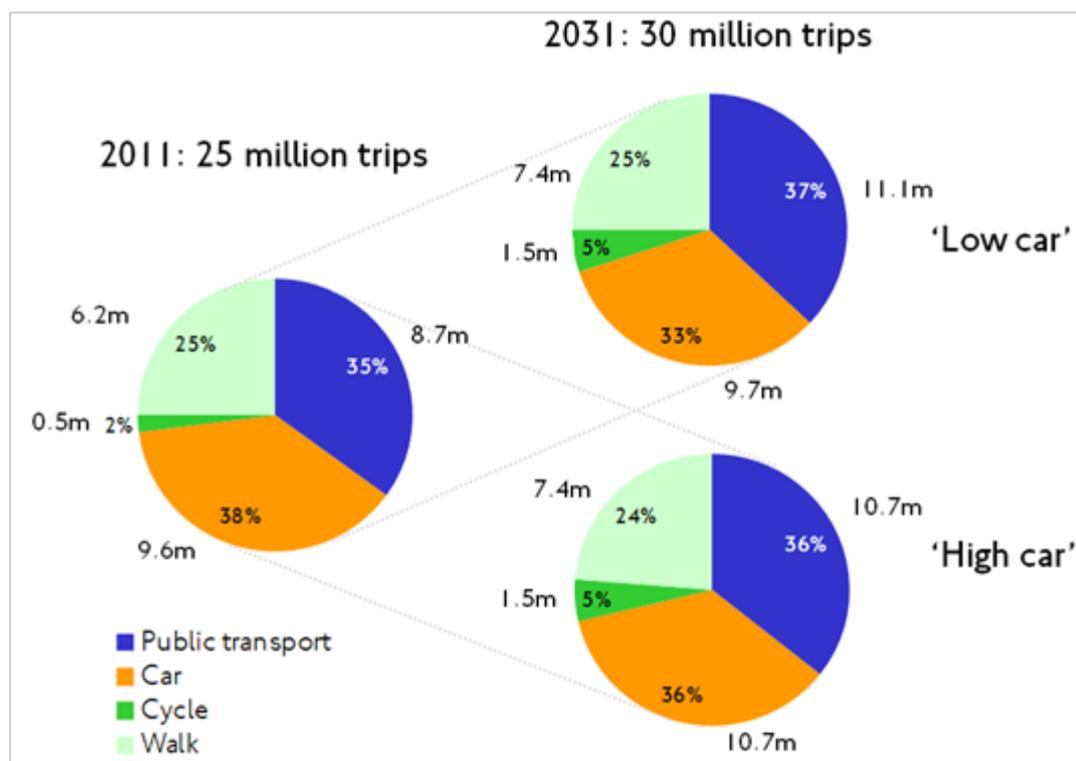
Figure 12.19 Projected trip growth to 2031 ('high car' scenario).



Source: TfL Planning, Strategic Analysis.

Figure 12.20 compares the 'low car' and 'high car' scenarios, showing the overall increase in trips and the share of the growth between the main modes of travel. In both the low and high car scenarios the total volume of trips is expected to increase from 25 million in 2011 to 32 million in 2041. Again, in both scenarios the share of total travel by cycle and public transport increases, and the share of travel by car reduces. Car mode share falls from 38 per cent in 2011 to between 31 and 34 per cent in 2041, and public transport mode share increases from 35 per cent in 2011 to between 36 and 38 per cent in 2041.

Figure 12.20 Projected trip growth to 2041 ('low' and 'high car' scenarios compared).



Source: TfL Planning, Strategic Analysis.

### Some key characteristics of the growth scenarios

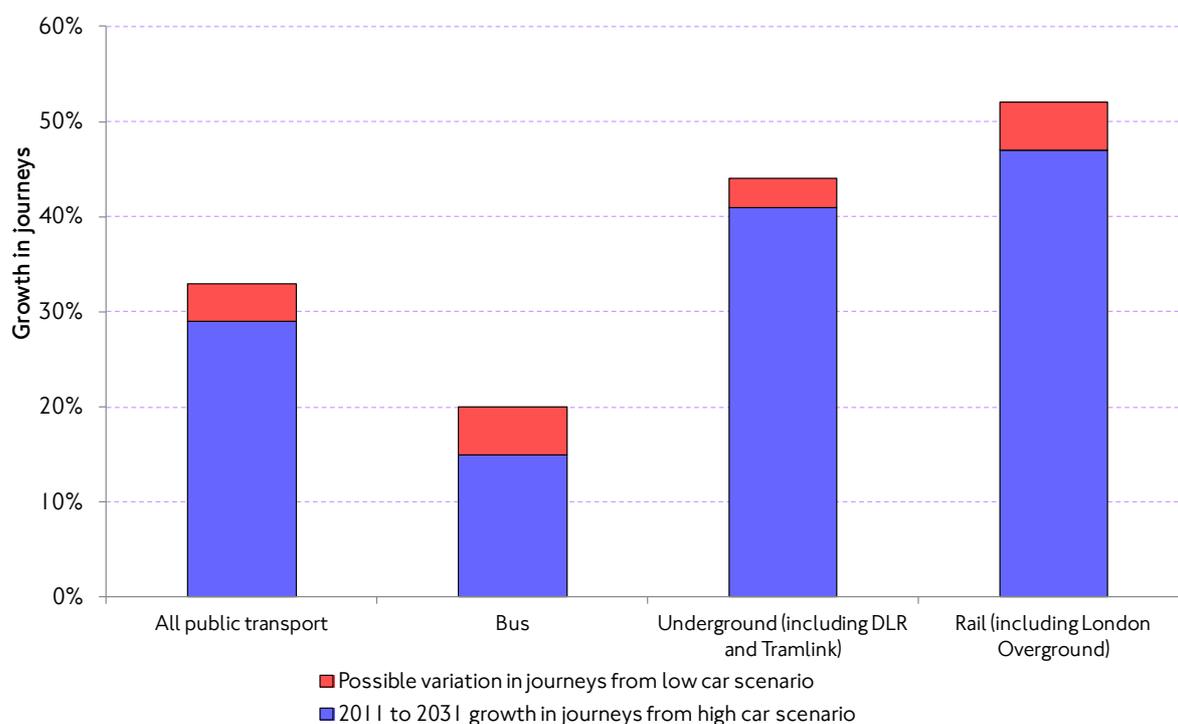
The projected fall in car mode share is consistent with the notion of 'peak car' (see also section 11.4 of this report). Car trips in outer London, which on average are longer than those in inner London, are estimated to make up a greater proportion of car travel in 2041. Combined with improvements in fuel efficiency and the resulting fall in the relative cost of driving, this may lead to a moderate increase in average car trip length in London overall.

The growth in car and vehicle traffic varies between central, inner and outer London. In central London car traffic is expected to decline, alongside large improvements in the capacity and connectivity of the public transport system and growth in cycling, whereas continued growth in population is expected to lead to some growth in car kilometres in inner and outer London. Light goods vehicles are expected to grow in response to London's rising population and jobs and, with only moderate growth in car traffic and no overall growth in heavy goods vehicles, will make up a larger share of overall traffic volumes, especially in central London.

## 12. Spotlight: The transport challenge of London's future growth

Public transport demand has been growing rapidly over the past decade and TfL forecasts continued strong growth in rail and Underground demand, as shown in Figure 12.21, reflecting committed investment such as Crossrail and the Tube upgrades. Bus demand is expected to grow in line with population growth, which is lower than in the recent past and reflects planned investment, which is more moderate than the significant service increases in the 2000s.

Figure 12.21 Demand growth by public transport mode.



Source: TfL Planning, Strategic Analysis.

### 12.5 Some key challenges arising from TfL's demand projections

Population is projected to grow across London, with particularly strong growth in east London and the Opportunity Areas, but also in less well connected areas of outer London. Differences in the composition of the population in different parts of London will have implications for future travel demand. The location of population growth and connectivity levels and improvements will play a significant role in the resultant mode share and particularly car use.

The higher concentrations of employment growth are forecast to be located in central and inner areas of London, and will depend on high capacity radial public transport to carry workers from the rest of London and the surrounding region. Future connectivity improvements will play an important role in the viability of jobs and economic performance.

The demand growth expected on public transport is very significant, particularly in inner and central London and links serving Growth and Opportunity Areas. The increase in population is also likely to lead to some growth in car use, particularly in outer London, although there is uncertainty about the scale of this growth. These growth pressures will lead to crowding and congestion challenges which will need to be addressed.

Walking is projected to grow in line with population change and cycling is expected to continue to grow strongly to meet the Mayor's cycling target in 2026. This growth in cycling will also help mitigate some of the increase in public transport demand and crowding.

Since the publication of the Further Alterations to the London Plan in March 2015, [see: <https://www.london.gov.uk/what-we-do/planning/london-plan/past-versions-and-alterations-london-plan/further-alterations-london>] the GLA has produced an interim higher employment forecast which will put even more pressure on the transport system. The location of most of the new jobs in areas highly connected by public transport means that the impact will be focused particularly on public transport.