Transport for London

Travel in London

Report 4

MAYOR OF LONDON

Transport for London

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Overview

Travel in London report 4

Travel in London summarises key trends and developments relating to travel and transport in Greater London. Its principal function is to provide an interpretative overview of progress towards implementing the transport and other related strategies of the Mayor of London, together with an evidence and analysis base for the general use of stakeholders whose responsibilities cover many different aspects of transport and travel in London. This fourth Travel in London report draws on the latest available data, generally reflecting the 2010 calendar year, or the 2010/11 financial year, and sets these in the longer-term context of the evolution of transport and related trends in London.

Progress since year 2000 for travel and transport in London

The year 2010 and into 2011 saw continued progress with the implementation of the Mayor's Transport Strategy and with many aspects of transport and travel in London improving. Key developments over the last decade since year 2000, which set the historic context, have been:

- Development of the public transport system, in order to support population and economic growth. Thirty-three per cent more bus kilometres and 10 per cent more Underground (including DLR) kilometres were operated in 2010/11, compared to 2000/01.
- Alongside this growth in public transport there has been a reduction in the volume of road traffic in London. Seven per cent fewer vehicle kilometres were driven in 2010 than in 2000, this partly reflecting expanded public transport provision, and partly reflecting reductions in the capacity of the road network.
- These two trends have taken place in the context of a substantial growth in demand for travel, with an 8 per cent increase in population and a 5 per cent increase in jobs since 2000. Nine per cent more trips were made on an average day in 2010 compared to 2000, with 13 per cent more journey stages.
- Alongside this growth in demand, London has also achieved an unprecedented shift in mode shares for travel away from the private car towards public transport, walking and cycling. There was a 7 percentage point net shift in journey stage based mode share between 2000 and 2010 towards public transport, walking and cycling.
- In this way London is distinguished among major UK metropolitan centres, and is demonstrating a more sustainable accommodation of travel demand arising from economic and social development. Had the mode shares in London not changed in this way, and all other things had remained equal, in 2010 there would have been more than 1 million additional car trips per day.

Key definitions

A **Trip** is a complete door-to-door movement by an individual to achieve a specific purpose (eg to go from home to work).
A **Journey Stage** is a part of a trip made on a specific mode of transport, eg a trip of 3 stages comprising a walk stage from home to a bus stop, a bus stage to central London, and a further walk stage to a place of work.

- Alongside highest-ever levels of public transport service provision, there have also been sustained improvements to the quality and reliability of public transport services. Service reliability indicators in 2010/11 for bus, Underground, DLR, Tramlink and National Rail in London were either at – or close to – all-time highs, as they had been for most of the preceding 5 years. Typically in recent years 96 per cent of scheduled Underground train kilometres have been operated, 97 per cent of scheduled bus kilometres, 98 per cent of scheduled DLR kilometres, and 99 per cent of scheduled Tramlink kilometres.
- Key statistics and recent trends relating to travel and transport in London are collected together in Tables 3.1, 4.2, 4.3 and 4.4 of this report.

Alongside these overall strategic travel and transport trends there have been a range of other notable achievements over the decade. These include:

- Large-scale additions to London's transport infrastructure. Notable among these have been the new London Overground rail network, which has rapidly established itself as a high-quality metro-style rail network offering new orbital connections for many of London's more deprived communities, together with several incremental extensions to the Docklands Light Railway system, such as the latest to Stratford International, over the decade.
- Substantial improvements to the safety of London's travel environment, with 57 per cent fewer people being killed or seriously injured on London's roads in 2010 compared to the average between 1994 and 1998.
- Reductions of 51 per cent and 37 per cent, respectively, were recorded in the rate of reported crime on the bus and Underground networks since comparable records began in 2005/06.
- Good progress has also been made with reducing transport emissions of key local air quality pollutants and greenhouse gases (Nitrogen Oxides (NO_x), PM_{10} particulate and Carbon Dioxide – CO_2), although levels of all three continue to pose a significant challenge in absolute terms.
- Finally and more recently, the Mayor's 'Cycling Revolution' for London has brought the successful Barclays Cycle Hire scheme in central London, now responsible for 25,000 trips by hire bike on an average day, together with the developing network of Barclays Cycle Superhighways.

Developments in 2010 and 2011

Overall travel trends in London

- A total of 24.8 million trips were made to, from or within London on an average day in 2010 – an increase of 1 per cent over the previous year. Total trips had remained broadly static at around 24.5 million between 2007 and 2009, reflecting the economic recession. The recent increase, although largely reflecting population growth rather than a more fundamental change in travel behaviour, is comparable to the historic 1.1 per cent average annual growth rate in this measure before 2007. There was also a 0.8 per cent increase in journey stages - to 28.7 million on an average day.
- The shift in mode share away from private transport towards public transport, walking and cycling seen in London over the last decade has continued, with a 0.6 per cent net shift between 2009 and 2010 to public transport - with a mode share of 42 per cent compared to 41 per cent in 2009 – and with a corresponding 0.7 per cent shift away from private transport.

Travel demand trends by mode

- Public transport patronage grew strongly in 2010/11. There was a 3.0 per cent increase in the annual number of journey stages made by public transport in 2010/11 against 2009/10 – up from 3.45 billion to 3.56 billion. This was matched by an increase of 4.1 per cent in passenger kilometres travelled on the principal public transport networks. This increase partly reflected recovery, in terms of aggregate travel demand at least, from the recent economic recession, but also reflected population growth in London over the most recent year.
- Patronage on the Underground grew particularly quickly in 2010/11, with 5.0 per cent more passenger kilometres travelled and 3.9 per cent more journey stages, compared with 2009/10. There was also an increase of 0.9 per cent in passenger kilometres travelled by bus, with a corresponding increase of 1.4 per cent in bus journey stages.
- The recently-extended Docklands Light Railway and the rapidly-developing London Overground network also saw strong growth. There were 13.0 per cent more journey stages on the DLR (13.4 per cent more passenger kilometres) in 2010/11, partly reflecting continuing growth on the 2009 extension to Woolwich. On the London Overground network, the re-opening of the East London Line with extensions to Croydon and, more recently, Highbury and Islington saw a 55 per cent increase in journey stages and 39 per cent more passenger kilometres travelled. Patronage on National Rail in London also grew strongly, with an 8.9 per cent increase in passenger journeys and a 5.3 per cent increase in passenger kilometres on services operated by London and South East Train Operating Companies.
- The amount of traffic on London's roads continued to fall, with 0.9 per cent fewer kilometres driven in 2010 compared to 2009.
- The number of journey stages made by bicycle in 2010 increased by 5.8 per cent, following a 5.0 per cent increase in the previous year. On an average day in 2010 there were 540,000 cycle stages in London and 490,000 trips where cycle was the main mode. Within the overall trend for cycling there was a 15 per cent increase in the number of cycles counted on the TLRN road network, compared to a 5 per cent increase the previous year. This indicator has grown by 150 per cent over the last 10 years, reflecting significant investment to encourage the use of bicycles.
- Trends over recent years for the amount of freight moved from, to or within London have clearly reflected the impact of the economic recession, with an overall fall in the volume of road freight lifted of 25 per cent between 2008 and 2009, alongside falls of 8 and 12 per cent in rail and waterborne freight respectively. There is evidence of a recovery in 2010, with road freight up by 28 per cent on 2009, recovering much of the previous year's fall, and air freight moved up by 16 per cent on 2009, following a 10 per cent fall the previous year.

Performance of the public transport networks

Public transport in London has, over recent years, benefited from the longest run of sustained high operational performance and service provision ever recorded. All key indicators of service provision have shown a marked trend of improvement over the last decade, although performance in the most recent years has inevitably reflected disruptions associated with TfL's Tube Upgrade Plan, as well as periods of severe winter weather and industrial disputes on the Underground. Nevertheless, close to

highest-ever levels of service provision are being sustained and improved upon wherever possible.

- 500,000 fewer train kilometres were operated on the Underground in 2010/11 than in 2009/10, reflecting disruption related to the Tube Upgrade programme, together with industrial action at certain points in the year. However, this relatively small reduction of 0.7 per cent needs to be viewed in the context of the record high levels of service provision achieved in the previous two years, which were 8 per cent higher than in 2000/01.
- The reliability of Underground journeys was marginally affected by these difficulties, with excess journey times increased to 6.5 minutes on average (2010/11) from 6.4 minutes the previous year (2009/10). This still represents the second best year since this measure began, and there have been further improvements during 2011.
- Levels of service provision and reliability provided by the bus network reached new highs in 2010/11, with further incremental improvements to both kilometres operated (up by 0.5 percent to 485.5 million) and excess waiting times. These latter, for high-frequency routes, are now down to a 'best ever' minimum of 1.0 minute on average, from 1.1 minutes the previous year.
- The DLR built on recent network extensions and improved service frequencies to operate 2 per cent more train kilometres than in 2009/10, with reliability in terms of the percentage of scheduled services operated also increasing – from 97.2 per cent to 97.5 per cent. Further additional capacity was created by the move from two- to three-car operation on parts of the network in 2010/11, and the percentage of DLR trains 'on-time' recovered this year to stand comparison with 'best ever' levels recorded in previous years.
- Tramlink again returned a reliability value of 99.2 per cent of scheduled services operated – identical to the previous year.
- However, overall performance of National Rail services in London deteriorated over the most recent year (2010/11), this principally affecting peak time services and largely reflecting the severe winter weather.
- As well as substantially extending its network with the re-opening of the East London line and its southward extensions to New Cross and Croydon, London Overground recorded a 'Public Performance Measure' of 94.8 per cent. This was a substantial improvement on the value of 93.1 per cent for the previous year and was also the highest value for any London & South East Train Operating Company (according to the Office of Rail Regulation's performance measurement regime).

Performance of the road network

On London's road network recent data suggest that the established historic trend towards increasing levels of traffic congestion in London may have been halted. Newly-available data from in-vehicle satellite navigation systems, not available for before 2006, suggest that overall traffic speeds have been stable over the past three years. This applies equally to central, Inner and Outer London. Indicators of excess delay or congestion, also derived from this source, suggest a stable overall picture, with some evidence of improvement (ie reducing congestion), particularly in Outer London and on the TLRN, over the most recent three years.

The average Greater London traffic speed in 2010/11 was 28.6 kilometres per hour, and the average excess delay, according to GPS data, was 0.8 minutes per kilometre.

TfL's primary indicator of journey time reliability for road traffic suggests that between 88 and 90 per cent of road journeys in the Capital are accomplished reliably – compared to a target of 89 per cent for this measure. However, it is not yet possible to discern a clear directional trend in this measure over the two years of data that are currently available.

Performance of the transport networks – operational effectiveness

In terms of operational effectiveness:

- Average passenger occupancy levels for Underground trains increased in the most recent year, from an average of 121.9 passengers per train in 2009/10 to 128.9 passengers per train – an increase of 5.7 per cent - which mirrors the increase in overall passenger demand in the context of slightly reduced levels of service provision. However, average occupancy of buses remained stable, at an average of 16.6 passengers per vehicle.
- Changes to gross operating expenditure combined with rising fares revenue reduced TfL's net operating cost significantly, with all modes recording lower net operating expenditure in 2010/11 compared to the previous year. TfL's net operating cost per passenger kilometre averaged 5 pence in 2010/11. The out-turn in 2009/10 was 8 pence per passenger kilometre, although changes to accounting conventions between the years mean that these figures are not directly comparable.
- In terms of asset condition, the year 2010/11 saw completion of the comprehensive replacement of the London Overground train fleet, the near-completion of the fleet replacement programme for the Victoria Line, and the start of the roll-out of new sub-surface 'S' stock trains. In 2010/11 89.2 per cent of TfL's asset was deemed to be in 'good condition', although a strict comparison with the score of 89.1 per cent for 2009/10 is not possible owing to changes in asset accounting conventions between the two years.

Demographic and economic change

London's resident population has grown strongly over recent years. There were an estimated 223,000 additional people living in London in 2010 compared to 2007 – equivalent in scale to the addition of a medium-sized London borough. This increase has mainly been driven by natural population change, and is at a rate of increase higher than that expected by the Mayor's London Plan, on which the MTS is predicated. Whilst the significance of short-term fluctuations in the context of a long-term projection should not be over-stated, this higher than expected increase in population is a factor in explaining the continued increase in travel over the last 4 years, and particularly in the most recent year, despite the impact of the economic recession in reducing overall travel demand.

The UK and London have recently experienced one of the deepest economic recessions of recent times, with the latest economic indicators showing only a muted recovery from the recession, and with market and consumer confidence still big factors militating against further economic growth going forward. London's economy emerged from recession in Quarter 4 2009, having contracted by 6.5 per cent over the recessionary period. Although London's economy then grew by 3.3

percent over the period to Quarter 1 2011, and in so doing out-performed the UK, the overall level of growth remains relatively modest. About 198,000 jobs were lost in total over the recessionary period. London's employment rose for the first time in Quarter 4 2010 with an increase of 0.7 per cent, after 6 quarters of year on year falls.

The recessionary impact on travel was seen with a reduction of 3.7 per cent in total weekday morning peak travel to central London between 2008 and 2009, which subsequently recovered by 1.1 per cent between 2009 and 2010. There was an aggregate reduction of 13.1 per cent in weekday morning peak travel to the Isle of Dogs between 2008 and 2010.

More recently, the established trend towards growth on the principal public transport modes has reasserted itself. The year-on-year rate of growth in bus passenger journeys recovered to 2 per cent in the first Quarter of 2011, following an aggregate decline of 4 per cent year on year over the recessionary period. In comparison, Underground passenger journeys decreased by 10 percent in aggregate during the recession, but growth had recovered strongly to pre-recessionary levels of around 6 per cent year on year by September 2010. Having fallen by 1.4 per cent during 2009, patronage on London and South East National Rail services also recovered strongly, with year-on-year growth of 5 per cent in 2010/11.

Safety and security on the transport system

Recent years have seen strong improvement to the principal indicators of safety and security on London's transport networks. These positive trends continued in 2010, with further substantial reductions to the most serious categories of casualty arising from collisions on the roads, alongside continued reductions to levels of reported crime and customer injury on the public transport networks.

- 2010 saw a 10.6 per cent reduction, relative to 2009, in the number of people killed or seriously injured (KSI) on London's roads. The total of 2,886 was 57 per cent down on the 1994-98 average, well in excess of a national reduction target of 40 per cent and a more demanding London-specific target of 50 per cent over this timescale.
- Pedestrian KSIs were 57 per cent down on the 1994-98 average, against a London-specific reduction target of 50 per cent, the 2010 total of 913 reflecting a 13 per cent reduction on that of 2009.
- The number of casualties defined as having received 'slight' injuries rose to 26,003 in 2010, 5 per cent above 2009, but was still 33 per cent below the 1994-98 baseline, compared to reduction targets of 10 per cent (national) and 25 per cent (London-specific).
- The number of children killed or seriously injured in 2010 was 250, a 5 per cent reduction on 2009, and a 73 per cent reduction on the 1994 to 1998 baseline, against target reductions of 50 per cent (national) and 60 per cent (London).
- However, reductions to the number of KSIs among pedal cyclists and users of powered two-wheeled vehicles fell short, in absolute terms, of the targets that had been set for 2010. The target for pedal cyclists required a reduction of 50 per cent while the actual achieved reduction was 18 per cent. However, the substantial growth in cycling, which doubled over this period, implies a much larger reduction in the collision risk per trip. The target reduction for users of powered two wheeled vehicles was 40 per cent and the actual achieved reduction 34 per cent.

- London's public transport networks continue to offer a safe travelling environment. On the Underground the passenger injury rate in 2010 was similar to that of the last four years, with 127 recorded injuries (this having been between 125 and 127 for the last four years) and no fatalities. In 2010, 98 passengers were seriously injured travelling on buses and coaches in London, a 19 per cent reduction on the 121 injuries in 2009, also with no fatalities. The passenger serious injury rates for bus and coach travel in the early part of the last decade were typically more than double those of 2010.
- Rates of reported crime on or near the bus/coach network have more than halved since 2005/06, and those on the Underground/DLR have reduced by over one third. Progress in 2010/11 was consistent with these achievements, with further reductions of 5.4 per cent in the rate of reported crime on the bus network, and 10.9 per cent on the Underground/DLR network, together with a 5.6 per cent decrease on London Overground and a 15.4 per cent decrease on Tramlink.

Local air quality and greenhouse gas emissions

TfL is in the process of updating the London emissions inventories to reflect conditions in 2010. Provisional data suggest that ground-based transport (excluding aviation) was responsible for emitting 1,460 tonnes of particulate matter (PM_{10}) and 24,220 tonnes of Nitrogen Oxides (NO_x) in 2010. These totals show reductions over the respective values for 2009. However, method changes to the inventories mean that a direct comparison against previous years is not possible. Of these totals, road traffic contributed 84 per cent of PM_{10} and 70 per cent of NO_x.

CO_2 emissions from ground-based transport in 2010, again reflecting provisional figures, were 9.39 million tonnes. This is lower than the 9.56 million tonnes estimated for 2009, but method changes to the inventories again mean that the two estimates are not directly comparable.

Transport opportunities for all Londoners

Transport supports economic growth by providing effective access to jobs and services. One measure that can be used to quantify the development of the transport networks is the number of jobs that are potentially available within a given travel time (45 minutes being taken as the benchmark for this purpose). In 2011, 980,200 jobs were potentially available within 45 minutes travel time to the average London resident. This compares to 959,400 in 2009 – an increase of 2.2 per cent, and to 937,900 in 2006 – an increase of 4.5 per cent.

Although still far short of comprehensive, further incremental accessibility improvements to the rail networks in London have benefited people with mobility impairments. During the last two years, three Underground stations (King's Cross/St Pancras, Southfields and Kingsbury) were made fully accessible, alongside complete renewal of the train fleet on the Victoria Line and the installation of platform humps at stations, giving level access to trains, on this line that are intended to facilitate further accessibility improvements in future years.

Real adult fares levels measured by bus and Underground fares revenue per passenger kilometre (adjusted for inflation), in 2011 fell to a (provisional) 19.8 pence per kilometre, down 0.2 pence (or 1.3 per cent) from a value of 20.0 pence for the 2010 calendar year.

Quality of life

One way of gauging the impact of transport improvements on the quality of life of Londoners is through their perception of aspects of the transport system, and TfL undertakes regular surveys to understand these aspects of customer satisfaction. Passengers gave public transport services an average rating of 80 out of 100 in 2010/11, rated as a 'good' assessment according to TfL's norms for interpreting these results, and a level similar to that of the past three years. The equivalent score for road user customer satisfaction was 72, corresponding to a 'fairly good' level of satisfaction, whereas scores for overall perception of the journey experience and perception of the quality of the urban realm were both 66 in 2010, corresponding to a 'fair' level of satisfaction, the latter having improved from a score of 63 in 2009.

Traffic and other impacts of the removal of the Western Extension to the congestion charging zone in central London

The surveys carried out suggest that the removal of charging has gone smoothly, with no significant adverse road network or environmental impacts that are attributable to the removal of charging in the former zone.

- TfL's best estimate, based on a combination of continuous automatic and periodic manual traffic counts, is that traffic entering the former zone increased by around 8 per cent (vehicles with four or more wheels) as a direct result of the removal of charging. This compares to TfL's prior expectation of an attributable increase of between 8 and 15 per cent – the observed change is therefore towards the lower end of this range.
- TfL expected an increase of between 6 and 12 per cent in the volume of traffic circulating in the former zone. TfL's best estimate, based on the available data, is that there was an attributable 7 per cent increase in the volume of circulating traffic. This is again towards the lower end of TfL's range of prior expectation.
- TfL expected a small net attributable reduction, over the long term, of between 1 and 2 per cent in traffic entering the central London charging zone, which has remained in operation. This would reflect both the impact of removing the Western Extension, but also changes to the operation of the scheme in the central zone. The measured net reduction to traffic measured over the first seven months of the year was 1 per cent. This aggregate change is broadly in-line with TfL's expectations, although should be seen in the context of ongoing background decline to traffic volumes throughout London.
- Surveys of traffic speeds and congestion following removal of charging show a variable picture – in part reflecting seasonal factors associated with the timing of the surveys over the first six months of the year. Comparing equivalent surveys over the first six months of 2011 with those during the same period in 2010, congestion (measured as excess delay) was 3 per cent higher in 2011, whereas average traffic speeds were 1 per cent lower.
- There is no evidence of a significant differential impact on air quality in the former zone resulting from the removal of charging. In the first half of 2011, PM_{10} concentrations were notably higher in all parts of London, including the former extension zone, compared with the equivalent period in 2010. This reflected the recognised unusual weather patterns that prevailed across London in spring 2011. However, concentrations of NO_2 (Nitrogen Dioxide) were

generally lower across London and in the former extension in the first half of 2011 compared to 2010, although the reasons for this London-wide trend are not yet fully understood. It is however clear that air quality trends in the former extension behaved in a very similar way to those elsewhere in London.

The Mayor's Cycling Revolution for London – an update

2010 was the Mayor's Year of Cycling and saw the launch of Barclays Cycle Hire, the first two Barclays Cycle Superhighways and thirteen 'Biking Boroughs', alongside a wide range of interventions to improve conditions for cyclists and to raise the profile of cycling in London. There were 30,000 more cycle journeys in London on an average day in 2010 than in 2009, a 6 per cent increase over the year and a 70 per cent increase compared to 2001.

By the end of 2010 more than 130,000 people had become members of Barclays Cycle Hire and around 25,000 journeys were made by hire bicycle every weekday, the vast majority of which would not previously have been cycled. The Barclays Cycle Superhighways saw increased cycle flows and cyclists reported improved journey experiences and higher levels of cycle travel.

TfL's new sub-regional highway assignment transport (HAM) models now available to the transport planning community

TfL has recently developed a comprehensive set of new sub-regional highway assignment models, based on the SATURN suite of software. These models are being made generally available to practitioners and developers, and consultants acting on their behalf, and represent a major effort and investment by TfL in improving the transport planning tools available in London. The models are class-leading, embody several technical innovations, and address several shortcomings of previous practice.

Monitoring and Understanding the long-term Transport Legacy of the 2012 Olympic and Paralympic Games

London's hosting of the 2012 Olympic and Paralympic Games provides a major opportunity to enhance London's physical transport infrastructure, to promote positive changes in the ways in which people travel, and to contribute to the lasting wider regeneration of East London. All of these are part of the wider 'Games Legacy', which has the aim of supporting regeneration and the convergence of social and economic outcomes between the Olympic host boroughs and the rest of London. Whilst most of the immediate physical upgrades to the transport infrastructure are now in place ahead of the Games themselves, TfL will also be taking forward the monitoring of the achievement of these Legacy objectives over the longer term. This work will involve tracking a wide range of transport, travel, social, economic and behavioural indicators. Illustrative 'baselines' characterising pre-Games transport conditions in the Olympic boroughs are set out in this report.

Progress with implementing the Mayor's Transport Strategy – Strategic Outcome Indicators

The MTS included a set of 23 quantitative Strategic Outcome Indicators (SOIs), by which progress towards transport goals would be assessed over the long term. These are generally to be reported annually, and relate to changes in actual conditions (ie 'transport outcomes') experienced by Londoners. The SOIs provide a

manageable framework to quantify progress, in order to provide a broad understanding of the totality of effects of the strategy's interventions on transport and quality of life in London. The indicators are to be considered alongside the wider body of evidence and analysis contained in Travel in London reports. This provides essential contextual information to help understand and interpret trends, which are of course affected by a range of factors, including trends in the wider economy, in addition to the specific interventions made by TfL and related authorities. This broadens the canvas of analysis to cover many more aspects of transport and travel in London that are also relevant for effective policy formulation.

Many of these SOIs were newly-defined for MTS and did not have a lengthy track-record of historic data, somewhat limiting their use for interpretative purposes in previous Travel in London reports. For this report, however, a useful time-series of data is beginning to accumulate for most of the indicators, although method changes causing 'series breaks' are relatively frequent. The table below summarises the 23 SOIs, and gives data for the most recent three years in cases where these are available. It also gives a brief interpretation of progress towards MTS goals for each indicator, based on trends in these indicators over the available period, with further details given at the appropriate point in the main text (cross-references are given in the table).

Particular developments relating to specific indicators have been highlighted above. Looking across the 23 indicators as a group, the general picture is one of good overall 'evolutionary' progress - in terms of the ultimate 25-year timescale of the MTS - and the pace of change that is to be expected with most of these indicators.

Progress with the implementation of the Mayor's Transport Strategy (MTS)

MTS indicator	Brief definition	Units	2008 or 2008/09	2009 or 2009/10	2010 or 2010/11	Comment	Section
Travel demand	Number of trips or journey stages made to, from or within London - average day	Million	Trips:24.5 Stages:28.5	Trips:24.5 Stages:28.5	Trips:24.8 Stages:28.7	Steady growth reflecting both recession and increased population.	2.5 and 2.6
Mode share	Proportion of trips or journey stages undertaken by each mode to, from or within London per calendar year.	Per cent	Public: 41% Private 37% Walking: 20% Cycling 2%	Public: 41% Private: 37% Walking: 21% Cycling: 2%	Public: 42% Private: 36% Walking: 21% Cycling: 2%	Continued shift away from private transport towards public transport, walking and cycling.	2.7 and 2.9
People's access to jobs	Number of jobs within 45 minutes travel time.	Jobs	not available	959,400	980,200	Improving. The average Londoner can typically access just under1 million jobs within 45 minutes.	5.7
Smoothing traffic flow - journey time reliability	Percentage of journeys completed within five minutes of a specified typical journey time.	Per cent	not available	89.3	88.7	Although around 89 per cent of road journeys are achieved reliably - there has been a slight reduction over most recent year.	4.14 and 4.15
Public transport reliability	Reliability indicators for each principal PT mode.						
	LU excess journey time	Minutes	6.6	6.4	6.5	Relatively stable.	4.4 to 4.8
	Bus excess waiting time	Minutes	1.1	1.1	1.0	Improving – at 'best ever' levels.	
	DLR - trains on time	Per cent	94.6	94.8	97.4	Recovery to 'near best ever' levels.	
	Tramlink - schedule operated	Per cent	98.5	99.2	99.2	Highest ever levels.	
	National Rail – reliability	ORR PPM	91.0	91.4	91.1	Relatively stable.	
	Overground - reliability	ORR PPM	92.6	93.1	94.8	Highest score for any L&SE Train Operating Company 2010/11.	

MTS indicator	Brief definition	units	2008 or 2008/09	2009 or 2009/10	2010 or 2010/11	Comment	Section
Public transport capacity	Planning capacities for the various train/tram/bus types, multiplied by kilometres operated.	Million place – kms[1]	LU: 64,193 Bus: 28,817	LU: 63,099 Bus: 29,311	LU: 62,446 Bus: 29,751	Affected by operational issues. Incremental increase – most since 1950s.	4.10
			DLR: 1,715	DLR: 2,027	DLR: 2,338	Substantial increase, service extensions.	
			Tram: 556	Tram: 544	Tram: 564	Stable network.	
Operating costs per passenger kilometre[2]	Operating cost per passenger kilometre, for the principal public transport modes.	Cost per passenger km	Gross cost: 25 pence	Gross cost: 24 pence	Gross cost: 22 pence	Improvement.	4.16
			Net cost: 8 pence	Net cost: 8 pence	Net cost: 5 pence	Series break at 2010/11 - reflecting change to accounting practice.	4.16
Asset condition[3]	Percentage of in-scope asset that is deemed to be in good condition.	Per cent	92.58	89.13	89.21	Series break at 2010/11 - reflecting change to asset benchmarks for Underground.	4.18 and 4.19
NO_x emissions[4]	Emissions from ground-based transport in London per year.	Tonnes	28,150	25,630	24,220	Incremental reduction, but 2010 data is not immediately comparable with previous years.	7.3
PM_{10} emissions[5]	Emissions from ground-based transport in London per year.	Tonnes	1,550	1,470	1,460	Small incremental reduction, but 2010 data is not immediately comparable with previous years.	7.3
Public transport customer satisfaction	Overall satisfaction with the operation of the principal public transport modes.	Score out of 100	80	79	80	Stable at what TfL considers to be a 'good' level of customer satisfaction.	9.3

MTS indicator	Brief definition	units	2008 or 2008/09	2009 or 2009/10	2010 or 2010/11	Comment	Section
Road user customer satisfaction	Satisfaction of private road users with the maintenance/operation of the road network.	Score out of 100	not available	not available	72	First data point, reflecting what TfL considers to be a 'fairly good' level of customer satisfaction.	9.4
Public transport crowding	Satisfaction with the level of crowding inside the vehicle, on the principal PT modes.	Score out of 100	76	76	76	Stable.	4.10
Perception of journey experience[3]	Perception of London residents of their overall journey experience.	Score out of 100	Not available	64	66	Non-significant marginal change. Value for 2011 is 66.	9.5
Perception of noise	Perception of London residents of transport-related noise levels in their local area.	Score out of 100	Not available	70	71	Improving. Value for 2011 is 74.	7.6
Perception of the urban realm	Perception of London residents of the quality of the urban realm (local area).	Score out of 100		63	64	Improving. Value for 2011 is 66.	9.6
Road traffic casualties	People killed or seriously injured in road traffic collisions in London per year.	People KSI	3,526	3,227	2,886	Good progress – 57 per cent reduction achieved since 1994/98 against target of 50 per cent reduction.	6.3
Crime rates on public transport	Crimes per million passenger journeys by principal public transport modes.	Crimes	Bus: 12.1 LU/DLR: 13.1	Bus: 11.1 LU/DLR: 12.8	Bus: 10.5 LU/DLR: 11.4	Continued good progress.	6.6 and 6.7

MTS indicator	Brief definition	units	2008 or 2008/09	2009 or 2009/10	2010 or 2010/11	Comment	Section
Perception of crime/safety	Perception of London residents of their sense of safety and fear of crime when travelling in the city.	Per cent feeling safe when travelling	not available not available	Day-time: 95 Night: 78	Day-time: 97 Night: 78	Some evidence of improvement.	6.8
Access to services	Local area score of average journey time by public transport, walking and cycling to jobs and local services.	Minutes	17.4	not updated	not updated	Indicator updated on 3-yearly cycle. Next benchmarking due 2011.	8.2
Physical accessibility to the transport system	Level of step-free access across the public transport and TfL Streets networks.	Per cent of network accessible	36	37	38	Continued incremental improvement.	8.5
Real fares levels	Cost of full adult fares for a representative 'basket' of trips.	Pence per km (2009 prices)	18.8	19.8	20.0	Recent stability. Provisional value for 2011 is 19.8 pence.	8.9
CO_2 emissions[6]	Emissions from all identifiable ground-based transport sources in London, expressed as tonnes of CO_2.	Million tonnes	9.92	9.56	9.39	Incremental reduction, but 2010 data is not immediately comparable with previous years.	7.3

1. *Place-kms reflect the 'planning capacities' of vehicles for passengers used by TfL for service planning.*
2. *The comparability of this measure between 2010/11 and preceding years has been affected by changes to the accounting conventions used by TfL. Further details are given in TfL's Annual Report 2010.*
3. *The comparability of this measure between 2010/11 and preceding years has been affected by changes to the asset accounting conventions used by TfL. Further details are given in TfL's Annual Report 2010.*
4. *These are provisional values as the emissions inventories for London are currently being updated to reflect conditions in 2010. Comparability between these provisional values for 2010 and those for earlier years is affected by method and data changes incorporated in the 2010 update.*
5. *These are provisional values as the emissions inventories for London are currently being updated to reflect conditions in 2010. Comparability between these provisional values for 2010 and those for earlier years is affected by method and data changes incorporated in the 2010 update.*
6. *These are provisional values as the emissions inventories for London are currently being updated to reflect conditions in 2010. Comparability between these provisional values for 2010 and those for earlier years is affected by method and data changes incorporated in the 2010 update.*

1. Introduction

1.1 Travel in London report 4

Travel in London is TfL's annual publication that summarises trends and developments relating to travel and transport in London. It provides an authoritative source of transport statistics, and tracks developments, trends and progress in relation to the implementation of the transport and other related strategies of the Mayor of London. It provides an interpretative commentary that looks across the immediate impacts of TfL and its delivery partners, as well as external influences and trends, in shaping the contribution of transport to the economic vitality of the Capital and the daily lives of Londoners.

This Travel in London report 4 provides an update on key developments, wherever possible covering the 2010 calendar year, the 2010/11 financial year, or later, and looks in more detail at several specific topics of contemporary interest related to the implementation of the Mayor's Transport Strategy (MTS). In particular, it provides an update in respect of the 24 Strategic Outcome Indicators (SOIs) that have been set up to help assess progress towards key Mayoral transport goals, interpreting these in the wider context of other trends and developments affecting travel and transport in London.

1.2 Monitoring the implementation of the Mayor of London's Transport Strategy

Feedback on the impact of specific policies in driving change, and an understanding of the 'background' factors and trends which they act on and influence, are essential to ensure that policy formulation is effectively grounded in evidence and insight. TfL's Travel in London reports aim to provide this evidence and analysis base, firstly and specifically in the context of the MTS, but also more widely for more general use by stakeholders whose responsibilities cover many different aspects of transport and travel in London.

The key goals of the MTS are:

- Supporting economic development and population growth.
- Enhancing the quality of life for all Londoners.
- Improving the safety and security of all Londoners.
- Improving transport opportunities for all Londoners.
- Reducing the contribution of transport to climate change and improving its resilience to the impacts of climate change.
- Supporting delivery of the London 2012 Olympic and Paralympic Games and their legacy.

At the top level, the long-term outcomes sought by the MTS are monitored through a set of 23 quantitative Strategic Outcome Indicators (SOIs), plus a specific 24th indicator relating to the Transport Legacy of the London 2012 Olympic and Paralympic Games. These provide a straightforward and manageable means of tracking overall progress with indicators that reflect the key outcomes sought by the MTS. These indicators relate to actual conditions experienced by Londoners, ie the net outcomes of both specific MTS interventions and other (external) factors and trends. They help to assess the overall direction and pace of change in relation to

MTS transport goals, and provide an appreciation of the overall 'totality of effects' of the strategy interventions on transport and the wider quality of life in London.

The 23 SOIs do not cover all aspects of transport that will be of interest. Furthermore, because the relationship between specific interventions and net outcomes is rarely direct or straightforward, it is necessary to take a much broader analytical view of trends and their causes. The MTS SOIs are therefore presented and interpreted alongside appropriate supporting and contextual information about wider trends and developments for transport and travel in London. This allows changes, developments and the relative contributions of specific policies and external factors to be more appropriately assessed, and specific issues to be explored through the gathering and analysis of information, leading to an 'evidence base' to support the formulation of future policies. This wider appreciation and evidence base is at least as important as the formal SOIs in informing future policy development.

1.3 Developments for this Travel in London report 4

This fourth Travel in London report builds on the general format and level of presentation established by previous reports in this series - which is optimised to serve several different purposes. Two developments have been introduced for this report which should help improve clarity and usability for the more general reader.

- Clearer treatment of the MTS SOIs, reflecting the fact that several years of data have now accumulated for many of the indicators, allowing a meaningful view to be taken on the overall direction of progress relative to certain of the MTS goals.
- Greater clarity in the sequencing and content of the 'core' chapters of the report – with each still relating broadly to a specific MTS goal, but with clearer separation in particular between trends for travel demand and transport supply (service provision), and between directly-measured and perception/customer satisfaction-based indicators of change.

1.4 Contents of this report

This report is prefaced by an **Overview**, which provides an interpretative summary of long-term trends and more recent developments in the context of the MTS Goals. This is then followed by a summary assessment and interpretation of the quantitative **Strategic Outcome Indicators** for MTS.

The remainder of the report is organised as eight 'Core' chapters, each relating broadly to one or more MTS goals (see also Table 1.1), and three 'Spotlight' chapters, which look in detail at specific aspects of travel and transport in London that are of particular contemporary interest. The eight 'core' chapters are:

- **Chapter 2**, which looks at overall travel demand and mode share trends in London, firstly covering travel by all people – both residents and visitors – and, secondly, looking in more depth at key travel trends amongst residents of Greater London using TfL's London Travel Demand Survey (LTDS).
- **Chapter 3** looks at travel demand trends across each of the principal travel modes in turn, firstly covering the public transport networks, then considering trends for road traffic volumes in London and finally looking at trends for other modes such as air and river travel.
- **Chapter 4** examines the operational performance of the transport networks, looking at levels of service provision and at trends in service performance and

related outcomes such as journey times, reliability, asset condition and crowding across the different transport networks.

- **Chapter 5** updates data and trends relating to London's population and economy, including consideration of recent economic trends following the severe recession of 2008/09, and focusing also on long-term trends in travel to the London Docklands and TfL's plans for monitoring the Transport Legacy of the London 2012 Olympic and Paralympic Games.
- **Chapter 6** covers the safety and security of Londoners using the transport system, including road safety, crime and the perception of crime.
- **Chapter 7** updates trends in emissions and concentrations of key local air pollutants from transport – Oxides of Nitrogen (NO_x) and particulate matter (PM_{10}) – together with emissions of the key greenhouse gas CO_2, using the latest version of London's atmospheric emissions inventories. This chapter also looks at the perception of transport-related noise in London.
- **Chapter 8** considers trends in indicators relating to accessibility including the effectiveness of the transport system in facilitating access to jobs and services, physical accessibility to the transport networks, and fares and prices for transport.
- **Chapter 9** looks at on how transport contributes to Londoners' quality of life, considering a range of perception/customer satisfaction-based indicators of aspects of transport system performance and the travel environment.

The three 'Spotlight' chapters for this report, dealing with topics of particular contemporary interest, are:

- **Chapter 10**, which summarises the information now available relating to the traffic, congestion and air quality impacts of the removal of the Western Extension to the central London congestion charging scheme, which took effect from Christmas 2010.
- **Chapter 11** provides an update on developments with the Mayor's goal of spearheading a 'cycling revolution' in London, including updates on the Barclays Cycle Hire scheme and Barclays Cycle Superhighways.
- **Chapter 12** gives an overview of TfL's newly-developed sub-regional Highway Assignment (traffic) Models (HAMs). These represent a major investment by TfL in developing and making available state of the art transport planning tools for the Capital. This chapter describes and illustrates their capabilities and modes of use for both local and more strategic analysis.

Appendices to the report cover:

- A 'Notes and definitions' section, which provides supplementary information on definitions and statistical sources (Appendix A).
- Appendix B presents the annual update of disaggregate borough-level data in respect of performance indicators for the monitoring of borough Local Implementation Plans (LIPs).

Table 1.1 Indicative mapping of the six MTS goals to core Travel in London report chapters.

MTS Goal	Chapter(s)
Travel trends context and background	2, 3, 4
Supporting economic development and population growth	4, 5, 8
Enhancing the quality of life for all Londoners	7, 9
Improving the safety and security of all Londoners	6
Improving transport opportunities for all Londoners	5, 8
Reducing the contribution of transport to climate change and improving its resilience to the impacts of climate change	7
Supporting delivery of the London 2012 Olympic and Paralympic Games and their legacy.	5

1.5 Further information

For specific technical queries on the contents of this report, readers are directed in the first instance to contact:

TILenquiries@tfl.gov.uk

2. Key travel trends in London

2.1 Introduction and content

This chapter looks at overall travel trends in Greater London, in terms of the number of trips made, and in terms of mode shares - the percentages of journey stages or trips made by the different methods of transport.

Sections 2.5 to 2.9 provide consolidated estimates and trends for all people travelling in Greater London (both residents and visitors) covering all of the main travel modes. Section 2.10 looks specifically but briefly at overall travel trends among London residents, drawing on TfL's annual London Travel Demand Survey (LTDS). Section 2.11 looks at peak period travel to central London based on TfL's Central Area Peak Count (CAPC) survey – a long-standing indicator of work-related travel to central London, and Section 2.12 compares travel in London with that in other UK urban areas.

Chapter 3 of this report provides more detailed estimates and trends in travel demand for each of the individual travel modes, whilst chapter 4 reviews aspects of service provision and performance provided by the transport networks.

2.2 Summary of historic trends for overall travel in London

Previous Travel in London reports consolidated historic information on travel trends in the Capital over the last decade or more. Key amongst these long-term trends have been:

- A sustained growth in demand for travel, reflecting population and employment growth but also wider social and economic factors and increases to the supply of public transport. For example, on an average day in 2010, there were 9 per cent more trips made in London than in 2000, reflecting an increase in population of 8 per cent since 2000 and 4.8 per cent more jobs.
- A progressive and sustained shift in mode share away from the private car towards public transport. There was a 7 percentage point net shift in the journey-stage based mode share towards public transport, walking and cycling between 2000 and 2010. At the trip level, the equivalent shift was 6 percentage points. If the mode share in London had not changed in this way, and all other things had remained equal, people in 2010 would have made about 1 million more trips per day driving cars than they actually did.
- These top-level changes reflected substantial demand growth on the principal public transport networks, together with progressively-declining volumes of road traffic. Overall public transport passenger-kilometres rose by 45 per cent between 2000 and 2010/11, with patronage on buses (passenger-kilometres) rising by 67 per cent, and that on the Underground by 19 per cent, over the same period. Meanwhile, the total vehicle kilometres driven on London's roads fell by 6.7 per cent – or 2.2 billion vehicle kilometres.

2.3 Summary of recent developments in overall travel demand in London – 2010 and 2010/11

Over the most recent year these now well-established trends continued, with further increases to overall travel demand, and a continuation of the shift away from private road travel towards public transport.

- There were 24.8 million trips made to, from or within London on an average day in 2010. This was an increase of 1.0 per cent over the previous year. Total trips had remained broadly static at 24.5 million per day between 2007 and 2009 – reflecting the economic recession. This recent increase is comparable to the 1.1 per cent historic average growth rate in this measure.
- Growth in travel in London over the four years since 2006, used for base-lining the assumptions underpinning the MTS, has been higher than that assumed by MTS - projecting to 2031. This largely reflects higher-than-expected population growth in London and, although a point of interest, should not yet be interpreted as representing a significant departure from MTS expectation.
- Journey stages in London on an average day rose from 28.5 million in each of the previous two years to 28.7 million in 2010 – an increase of 0.8 per cent following a marginal decrease (0.2 per cent) between 2008 and 2009.
- In 2010, 42 per cent of all journey stages in London were made by public transport, and 36 per cent were made by private transport – principally cars. This compares with the corresponding mode shares in 2009 of 41 per cent for public transport and 37 per cent for private transport. Private transport decreased its share by 0.7 percentage points between 2009 and 2010, with the public transport share increasing by 0.6 percentage points. These results therefore show a continuation of the established trend away from private transport towards public transport for travel in London.

2.4 Key concepts for estimating travel in London: trips, journey stages and estimates of total travel

This section briefly explains key concepts and definitions underpinning the analysis of travel trends. Further details can be found at Appendix A. Travel can be measured in several different ways. The most commonly-used measures are **trips** and **journey stages**.

Trips

A **trip** is a one-way movement from one place to another to achieve a specific purpose (eg to go from home to work).

Trips are the units of travel that best correspond to the movements of people and are a natural unit of travel demand. We may think of travel demand as being built up from a large number of individual people's intentions and choices, to move from one place to another as they seek to satisfy various needs.

Every trip has an **origin** and a **destination**, and a single **purpose** - which is the reason for making the trip. If a traveller has a number of purposes in mind in making a trip, then either one purpose is so dominant that the others may be treated as incidental and ignored, or if each purpose is sufficiently important to define a separate trip, the trip should be divided up accordingly. Examples of the first kind would be buying a paper at the station, or stopping to fill up with petrol, on the way to work. But if either activity means making a significant detour, then it should be treated as defining a separate trip.

An example of the second kind would be a driver taking the children to school and then going on to work. This would be divided into (at least) 2 trips, the first with the trip purpose 'escort-education' and the second with purpose 'work'. If there were

more than one child, each dropped off at a different school, then each school would be the destination of a separate 'escort-education' trip.

Journey stages

To complete a trip a traveller may use several different forms of transport, or 'modes'. This is most common with public transport trips, which may require changing between services or from one mode to another: for example, walking from home to the station, train to central London, an onward Underground journey and a further short walk to the place of work. The individual components, each using a single mode of transport, are referred to as journey stages. In this example there are four journey stages. However, a trip may consist of a single stage, for example in the case of a 'walk all the way' trip. A **journey stage** is therefore a component of a trip using a single mode of transport from one interchange (or from the trip origin) to another (or to the trip destination).

Journey stages, divide up travel into components that correspond to the way services are provided by transport operators, in terms of the different modes and the interchanges between them. They, therefore, provide the natural way of describing the contribution of each mode to total travel and hence measuring mode shares.

2.5 Trips in London

The total number of trips in London in 2010 was 24.8 million per day, an increase of 1.0 per cent over the previous year, having remained at 24.5 million trips per day between 2007 and 2009. This increase is comparable to the historic average rate of growth of 1.1 per cent per annum between 1993 and 2007, a period when the resident population of London increased by an average of 0.6 per cent per annum. The growth in travel demand was interrupted by the downturn in the economy in 2008 and 2009, but resumed in 2010 (Table 2.1 and Figure 2.1).

Included in these totals are all trips with origin, 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. This larger 'daytime population' of Greater London was estimated at 8.8 million in 2010, 1.4 per cent higher than in the previous year. The London resident population in 2010 was 7.8 million, 0.9 per cent higher than in 2009, but non-residents contributing to the growth in trips increased at a higher rate-by 5 per cent (from 950,000 to 1 million).

Table 2.1 also gives percentage changes for 2000-2010 and for the latest year 2009-10. Over the 10-year period from 2000, total trips increased by 9.4 per cent, with particularly notable increases of 33.6 per cent in rail trips, 51.6 per cent in bus (including tram) trips, and an 84.6 per cent increase in cycle trips (as main mode). Car driver trips decreased by 7.3 per cent, and trips by powered two-wheeled vehicles fell by 13.2 per cent. These values are based on calendar years, and consequently differ from estimates based on financial years given elsewhere in this report.

Over the most recent year there were notable increases in rail, bus and taxi trips, but the indicated decrease for Underground trips reflects the timing of the calendar year, the end of which saw a strong recovery in Underground patronage.

Table 2.1 Daily average number of trips in Greater London, 1993 to 2010, by main mode. Seven day week.

	Millions of trips									
Year	Rail	Under-ground /DLR	Bus (including tram)	Taxi/ PHV	Car driver	Car passenger	Motor cycle	Cycle	Walk	All modes
1993	1.3	1.4	2.1	0.3	6.6	3.6	0.2	0.3	5.2	20.9
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	22.6
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	5.5	23.1
2003	1.8	1.9	3.2	0.3	6.7	3.5	0.2	0.3	5.5	23.4
2004	1.8	2.0	3.3	0.3	6.6	3.4	0.2	0.3	5.6	23.5
2005	1.8	1.9	3.2	0.3	6.5	3.4	0.2	0.4	5.6	23.3
2006	1.9	2.0	3.1	0.3	6.5	3.6	0.2	0.4	5.7	23.8
2007	2.1	2.1	3.2	0.4	6.5	3.8	0.2	0.4	5.7	24.5
2008	2.2	2.2	3.4	0.3	6.5	3.6	0.2	0.5	5.8	24.5
2009	2.1	2.2	3.5	0.3	6.4	3.6	0.2	0.5	5.8	24.5
2010	2.3	2.1	3.7	0.3	6.3	3.6	0.2	0.5	5.9	24.8
Percentage change										
2009 to 2010	*6.8*	*-3.1*	*3.6*	*8.4*	*-0.9*	*0.5*	*-5.4*	*4.7*	*0.9*	*1.0*
2000 to 2010	*34.8*	*6.6*	*51.4*	*3.5*	*-7.3*	*0.3*	*-13.2*	*84.6*	*8.1*	*9.4*

Source: TfL Strategy and Planning.
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 2.1 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.

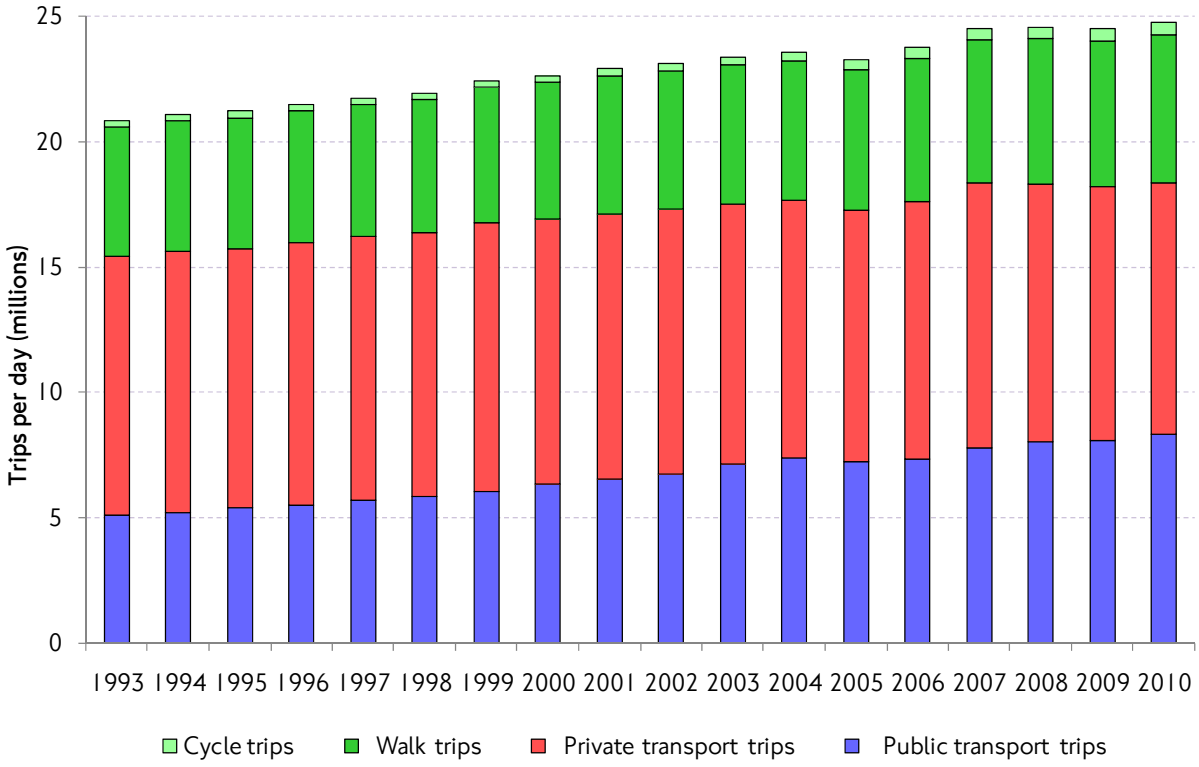
Comparison of recent trends for travel demand with MTS expectation

The MTS, published in May 2010, is based on forecast trends for population, employment and trip making in London to the year 2031. It is now possible to take an initial view on how these forecasts compare with the available data for the first few years covered by the Strategy. In the 4 years since 2006, the actual growth in trips has been somewhat higher than those long-term projections. The increase in total daily average trips between 2006 and 2010 was 4.2 per cent - compared with a projected increase of 2.6 per cent. This amounts to 160 million extra trips in the year, the net result of 280 million additional trips by public transport and 120 million fewer trips by private vehicles. Actual numbers of walking and cycling trips show no significant difference from the expectations in the MTS.

Part of the difference is due to higher than projected growth in London population (see also section 5.3 of this report) which is estimated to be 1 per cent higher in mid 2010 than implied by the London Plan population projections that were used for the MTS. In terms of the distribution of travel demand between the different modes of

transport, observed growth in trips by public transport (13 per cent) over this period was higher than projected (3 per cent) while trips by private modes, mainly the private car, continued to decline, by 2.4 per cent since 2006, compared with projected growth of 1 per cent.

Figure 2.1 Aggregate travel volumes in Greater London. Estimated daily average number of trips, 1993 to 2010.



Trip rates

Trip rates (average number of trips per person per day) have been noticeably stable over the whole period, 1993 to 2010, covered by Table 2.1, varying between 2.7 and 2.9 trips per person per day, these values applying to all travellers in London. These rates are calculated for the average daily population, which makes allowance for overnight visitors and commuters from outside London who are present and making trips in the Capital. Within the overall picture of stability, trip rates have shown a gradually increasing trend, by about 4 per cent over 18 years, with the highest value (2.85) being recorded in 2007. Trip rates fell back slightly in 2008 and 2009, but increased again in 2010 to 2.84 trips per person per day, only slightly below the 2007 level, and 1.8 per cent above 2006. Looking specifically at London residents (see also section 2.10 of this report) average trip rates in 2010/11 were 2.49 - somewhat lower than the average for all travellers in London. This is as might 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.

2.6 Journey Stages in London

Daily journey stages in London in 2010 were 28.7 million, up from 28.5 million in each of the previous two years. This represents an increase of 0.8 per cent in journey stages between 2009 and 2010, following a marginal decrease between 2008 and 2009. The resumption of growth is an indication that London was emerging from the recession of 2008-09, that had suppressed travel demand from the second half of 2008 until late 2009, but it also reflects an increase in population.

The figures for 2009 have been revised since the publication of Travel in London report 3, following a revision to the estimate for car traffic between 2008 and 2010 (see also Section 3.11 of this report). Total journey stages remained almost constant between 2008 and 2009, the net result of a 0.6 per cent increase in the London daytime population but a similar percentage reduction in stages per person, reflecting the economic recession. Stage rates continued to decrease at a similar rate between 2009 and 2010 but higher post-recession growth in the daytime population (which increased by 1.4 per cent) resulted in the net increase in total journey stages in 2010.

The growth in demand was seen for public transport overall, with rail, Underground and DLR all increasing between 2009 and 2010, with bus showing a marginal decrease (0.6 per cent). Journey stages by car, both driver and passenger, continued to fall, both down by 1 per cent. Numbers of cycle stages increased by 5.8 per cent, while walking increased by 0.9 per cent - in line with the increase in the resident population. The net result was a continuation of the trend of declining private motorised transport and a net shift towards public transport, as well as increasing cycling.

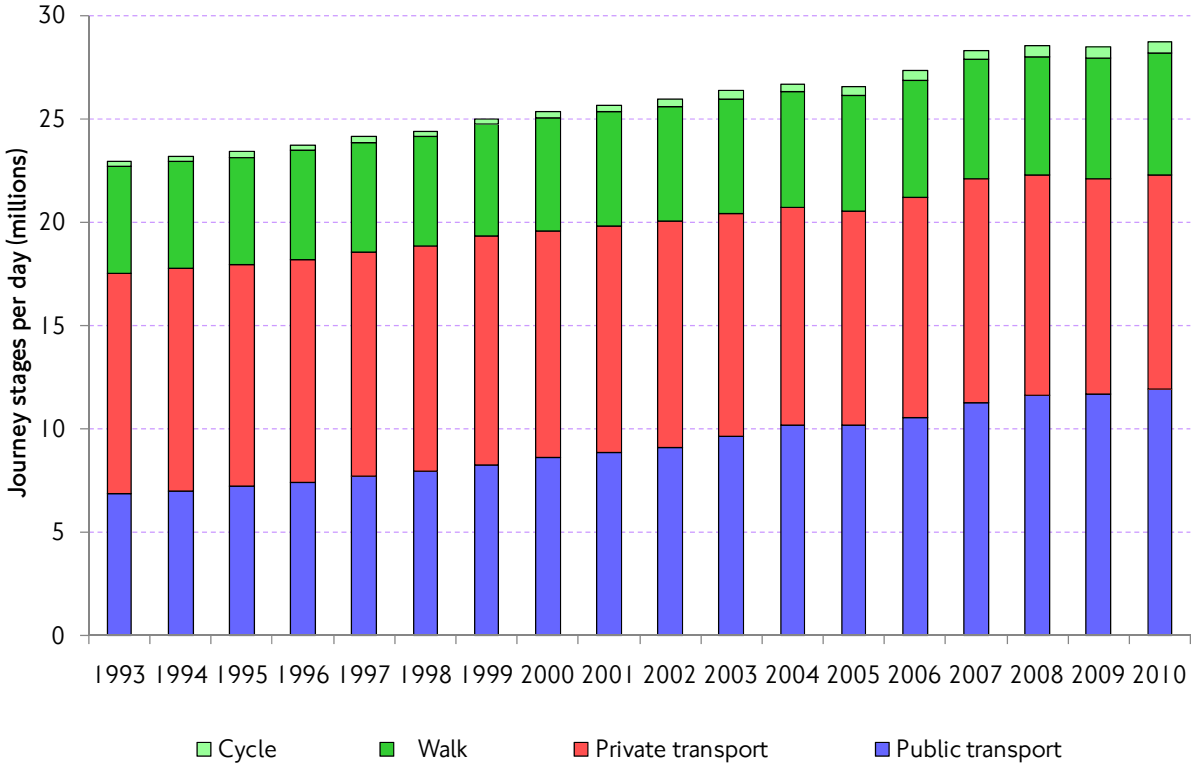
Table 2.2 Aggregate travel volumes in Greater London. Estimated daily average number of journey stages by mode, 1993 to 2010. Seven day week.

	Millions of journey stages										
Year	Rail	Under-ground	DLR	Bus (incl tram)	Taxi /PHV	Car driver	Car passenger	Motor cycle	Cycle	Walk	All modes
1993	1.4	2.0	0.0	3.1	0.3	6.8	3.7	0.2	0.3	5.2	23.0
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	7.0	3.8	0.2	0.3	5.5	25.7
2002	1.9	2.6	0.1	4.2	0.4	7.0	3.7	0.2	0.3	5.6	25.9
2003	1.9	2.6	0.1	4.6	0.4	6.9	3.7	0.2	0.4	5.6	26.4
2004	2.0	2.7	0.1	5.0	0.4	6.7	3.6	0.2	0.4	5.6	26.7
2005	2.0	2.6	0.1	5.0	0.4	6.6	3.5	0.2	0.4	5.6	26.6
2006	2.1	2.7	0.2	5.2	0.4	6.6	3.7	0.2	0.5	5.7	27.3
2007	2.3	2.9	0.2	5.4	0.4	6.7	4.0	0.2	0.5	5.7	28.0
2008	2.4	3.0	0.2	5.7	0.4	6.6	3.8	0.2	0.5	5.8	28.5
2009	2.3	2.9	0.2	5.9	0.4	6.5	3.8	0.2	0.5	5.8	28.5
2010	2.5	3.0	0.2	5.8	0.3	6.4	3.7	0.2	0.5	5.9	28.7
Percentage change											
2009 to 2010	*9.0*	*2.3*	*7.5*	*-0.6*	*-1.2*	*-1.0*	*-1.0*	*-5.8*	*5.8*	*0.9*	*0.8*
2000 to 2010	*39.0*	*14.0*	*106.3*	*57.8*	*-5.6*	*-8.0*	*-1.2*	*-13.4*	*89.8*	*8.1*	*13.3*

Source: TfL Strategy and Planning.
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 start 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.

Notable from Table 2.2 is the 13.3 per cent increase in journey stages over the period 2000 to 2010, alongside increases of 57.8 per cent for bus stages, and 89.8 per cent for cycle journey stages.

Figure 2.2 Aggregate travel volumes in Greater London. Estimated daily average number of journey stages, 1993 to 2010.



2.7 Mode shares

In 2010, 42 per cent of journey stages in London were made by public transport while 36 per cent were made by private transport, principally private cars. This compares with the corresponding shares in 2009, 41 per cent for public transport and 37 per cent for private transport. Results for the latest year, therefore, show a continuation of the previous trend of a substantial net shift in London away from private transport to the public modes. Private transport decreased its share by 0.7 percentage points between 2009 and 2010, with public transport share increasing by 0.6 percentage points. The substantial increase in cycling, which grew by 6 per cent in the year, resulted in a 0.1 percentage point increase in the cycling mode share, while the walking mode share remains unchanged, at 21 per cent.

Table 2.3 shows that the trend towards higher public mode shares in London has been in evidence since the early 1990s and had accelerated in the years after 2000. It continued, despite the economic downturn, in 2008 and 2009 when travel demand was depressed and resumed in 2010 as travel by private transport (other than cycling) continued to decrease while public transport increased. There was a 7 percentage point increase in the share of public transport stages between 2000 and 2010 (6.9 per cent in aggregate between 2000 and 2009, and 7.5 per cent between 2000 and 2010).

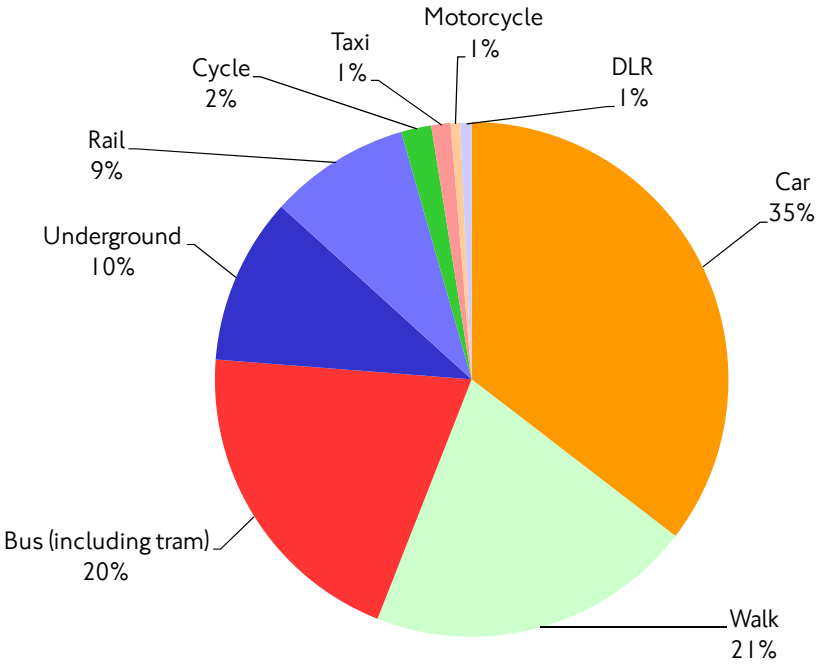
Table 2.3 Percentage shares of journey stages by type of transport, 1993 to 2010.

	Percentage of journey stages			
Year	Public transport	Private transport	Cycle	Walk
1993	30%	46%	1%	22%
1994	30%	46%	1%	22%
1995	31%	46%	1%	22%
1996	31%	46%	1%	22%
1997	32%	45%	1%	22%
1998	33%	44%	1%	22%
1999	33%	44%	1%	22%
2000	34%	43%	1%	22%
2001	34%	43%	1%	21%
2002	35%	42%	1%	21%
2003	36%	41%	1%	21%
2004	38%	40%	1%	21%
2005	38%	39%	2%	21%
2006	39%	39%	2%	21%
2007	40%	38%	2%	20%
2008	41%	37%	2%	20%
2009	41%	37%	2%	21%
2010	42%	36%	2%	21%

Source: TfL Strategy and Planning.
Note: Mode shares are calculated from the consistent series for journey stages given in Table 2.2. If the method change for reporting bus journey stages is taken into account (see section 3.4), the mode share for public transport is 42 per cent in each year 2008 and 2009, while on this basis private transport mode share is 37 per cent and 36 per cent in 2008 and 2009 respectively.
Totals may not sum to 100 per cent due to rounding.

The decrease of 7 percentage points between 2000 and 2010 in the private transport mode share in terms of journey stages is equivalent to a decrease of 6 percentage points in terms of trips. Similarly public transport mode share, which increased by 7.5 percentage points in terms of journey stages, increased by 5.5 percentage points in terms of trips since 2000. Public transport accounted for 34 per cent of trips in 2010, up from 33 per cent in 2009, 28 per cent in 2000 and 24 per cent in 1993.

Figure 2.3 Modal shares of daily journey stages in London, 2010.



Source: TfL Strategy and Planning.

Table 2.4 Trip-based mode shares – public and private transport, 1993 to 2010, by main mode.

	Percentage of trips			
Year	Public transport	Private transport	Cycle	Walk
1993	24%	50%	1%	25%
1994	25%	49%	1%	25%
1995	25%	49%	1%	25%
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	31%	44%	1%	24%
2004	31%	43%	1%	24%
2005	31%	43%	2%	24%
2006	31%	43%	2%	24%
2007	32%	43%	2%	23%
2008	33%	42%	2%	24%
2009	33%	41%	2%	24%
2010	34%	41%	2%	24%

Source: TfL Strategy and Planning..

2.8 MTS Strategic Outcome Indicator: Travel demand

Definition of indicator

The number of trips made in London in a calendar year is a measure of the total demand for travel that is accommodated by the transport system. As such, it is a basic statistic for understanding the context for the MTS. The strategy is predicated on stated assumptions and projections concerning future growth in travel demand. This indicator, with the trends and mode share indicators derived from it, provides a means to check at a basic level the continuing validity of these assumptions.

Values for 2010 calendar year and assessment of recent trend

There were **24.8 million trips** in London on an average day in 2010. This includes all trips either wholly or partly within London. It compares to 24.5 million trips in both 2008 and 2009.

There were **28.7 million journey stages** in London on an average day in 2010. This compares with equivalent values of 28.5 million in both 2008 and 2009.

On an annual basis, there were 9.0 billion trips and 10.5 billion journey stages in London in 2010.

These estimates are from the consistent series shown in Tables 2.1 and 2.2. When the method change for the estimation of bus journey stages, explained in the footnote to Table 3.2 of this report, is taken into account, the 2010 estimate of average daily trips is 25.1 million, and that for journey stages 29.2 million.

The annual total of trips in London in 2010 is 2 per cent higher than implied by the projections used for the MTS. This amounts to 160 million extra trips in the year, the net result of 280 million additional trips by public transport and 120 million fewer trips by private vehicles. Actual walking and cycling trips show no significant difference from the projected numbers in the MTS.

2.9 MTS Strategic Outcome Indicator: Mode shares

Definition of indicator

Whereas the total numbers of trips and journey stages are measures of the demand for travel, the split between the usage of the different means of transport shows how the demand is being met, and is a starting point for assessing the overall suitability of existing transport provision in the context of wider MTS goals.

This indicator is derived by calculating the percentage shares for each mode of transport from the data which make up the aggregate indicators of travel demand in London. Modes may be classified into the following broad groups: public transport, private transport, cycling and walking. Two measures of mode share may be derived from the statistics of trips and journey stages, respectively. The **journey stage based measure** is used as the primary indicator because it is the one that may be continuously monitored from modal data and impacted by policies directed at individual transport modes.

Values for 2010 calendar year and assessment of recent trend

Mode shares in 2010 were: public transport 42 per cent, private transport 36 per cent, walking 21 per cent and cycling 2 per cent. Compared with 2009, public transport further increased its mode share by 0.6 per cent, cycling increased by 0.2

per cent while private transport decreased by 0.7 per cent. These most recent values continue the established trend of a net shift towards public transport, walking and cycling, and are consistent with MTS expectation.

2.10 Travel by London residents – TfL's London Travel Demand Survey (LTDS)

Introduction to the LTDS survey

London residents account for about three-quarters of all travel in London. The travel behaviour of Londoners is surveyed annually in depth through TfL's LTDS survey. Results from this survey provide essential information about how Londoners use the transport system - the reasons why they travel, when, where and how, and the ways in which their socio-demographic characteristics are related to the travel choices they make. It can therefore provide a unique window on the travel needs of Londoners, and their likely responses to a range of potential policies.

This section provides a brief summary of selected findings from the 2010/11 (financial year) round of this survey in the context of longer-term travel trends among residents. The full database, which can be accessed and manipulated through TfL's Romulus portal (see also: http://romulus.tfl.gov.uk/webview), supports a much wider range of analyses, for example disaggregate analysis of residents' travel at the sub-regional level and the detailed 'profiling' of the users of the various modes of transport. More extensive summaries of results and findings from previous surveys are also published on TfL's website.

Travel by London residents – personal trip rates

Trip rates measure the frequency with which people travel. In 2010/11, London residents made 2.49 trips per day on average (on the basis of a 7-day week). This was 3.6 per cent higher than the equivalent value for 2009/10, reflecting recovery from the recent economic recession, but was still lower than trip rates that were typical over the period 2005 to 2008 (around 2.6 trips per person per day).

Table 2.5 Trips per person per day, by main mode. Seven day week.

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
National Rail	0.11	0.11	0.11	0.11	0.12	0.12
Underground/ DLR	0.17	0.17	0.19	0.19	0.17	0.19
Bus/tram	0.35	0.37	0.36	0.37	0.36	0.38
Taxi/ Other	0.03	0.04	0.03	0.03	0.03	0.03
Car driver	0.75	0.73	0.73	0.63	0.62	0.64
Car passenger	0.33	0.36	0.35	0.30	0.31	0.31
Motorcycle	0.01	0.02	0.01	0.01	0.01	0.01
Cycle	0.04	0.05	0.05	0.05	0.05	0.06
Walk	0.79	0.80	0.81	0.74	0.73	0.75
All	**2.59**	**2.65**	**2.64**	**2.42**	**2.41**	2.49

Source: TfL Strategy and Planning.

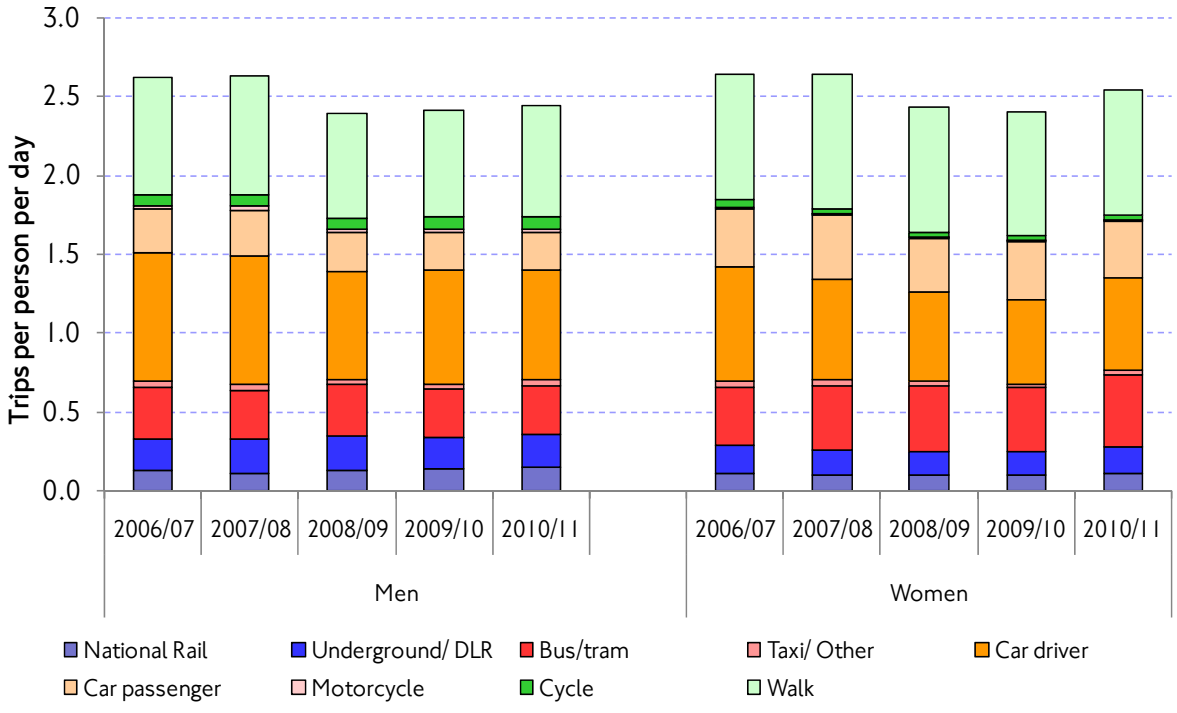
Table 2.5 shows how these average trip rate values break down across the principal travel modes, with the 'main mode' of a multi-mode trip being defined as the method of transport used for the longest distance stage. Previous Travel in London

reports have detailed the impact of the recent economic recession on travel in London, and in the LTDS results this is most visible through reduced trip rates as car driver or passenger, particularly among residents of Outer London. Also of interest is an eight per cent increase in public transport trips from 2009/10, with trip rates on the London Underground up by 12 per cent. Cycle trip rates have increased progressively over the period covered by the survey – increasing by a further 12 per cent in 2010/11 (up by 41 per cent since the first LTDS survey in 2005/06).

Travel by London residents – how personal trip rates vary by age, gender and residential location

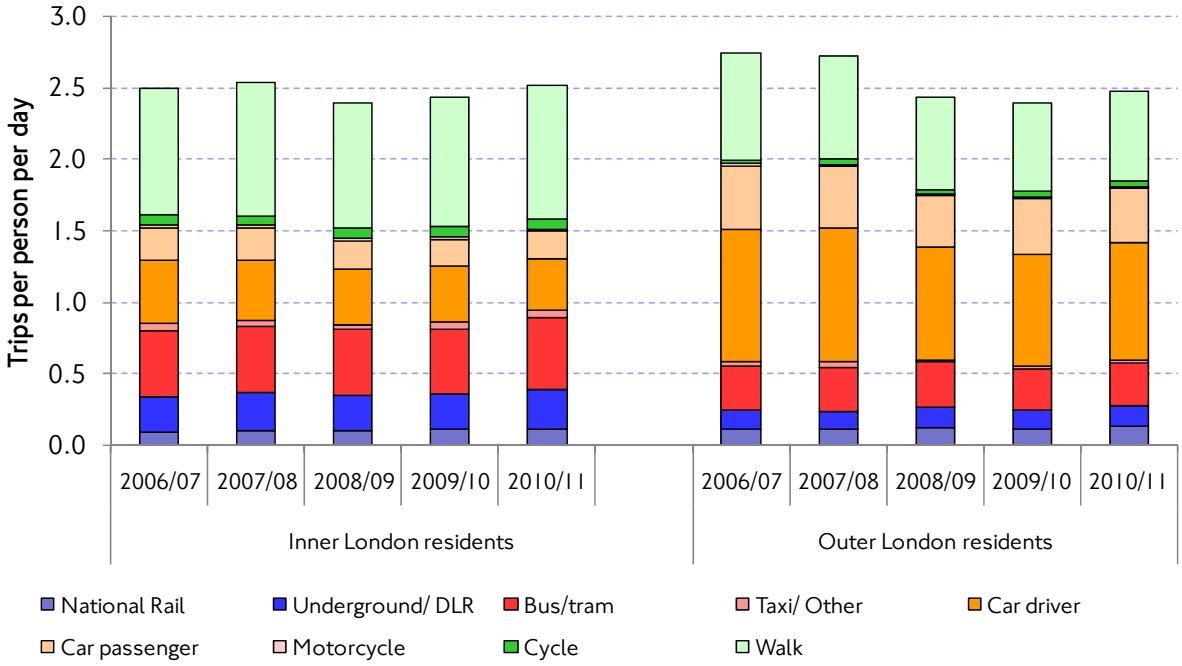
Figure 2.4 shows how these trip rates break down by gender, whilst Figure 2.5 shows differences between residents of Inner (including central) and Outer London. The basic patterns and distinctions shown by these graphics, including established gender biases towards the use of certain modes of transport, and differences in modal usage by residents of Inner and Outer London, have been described in previous Travel in London reports. Of particular interest from the latest survey results are that the increase in trip rates largely resulted from additional trips made by women (up 6 per cent), compared to a 1 per cent increase for trips made by men; that trip rates increased by a similar magnitude for both residents of Inner and Outer London; and, that cycling trip rates increased among residents of both Inner and Outer London, by 10 per cent and 14 per cent respectively.

Figure 2.4 Personal trip rates by gender and main mode of transport.



Source: TfL Strategy and Planning.

Figure 2.5 Personal trip rates by residency of Inner and Outer London and main mode of transport.

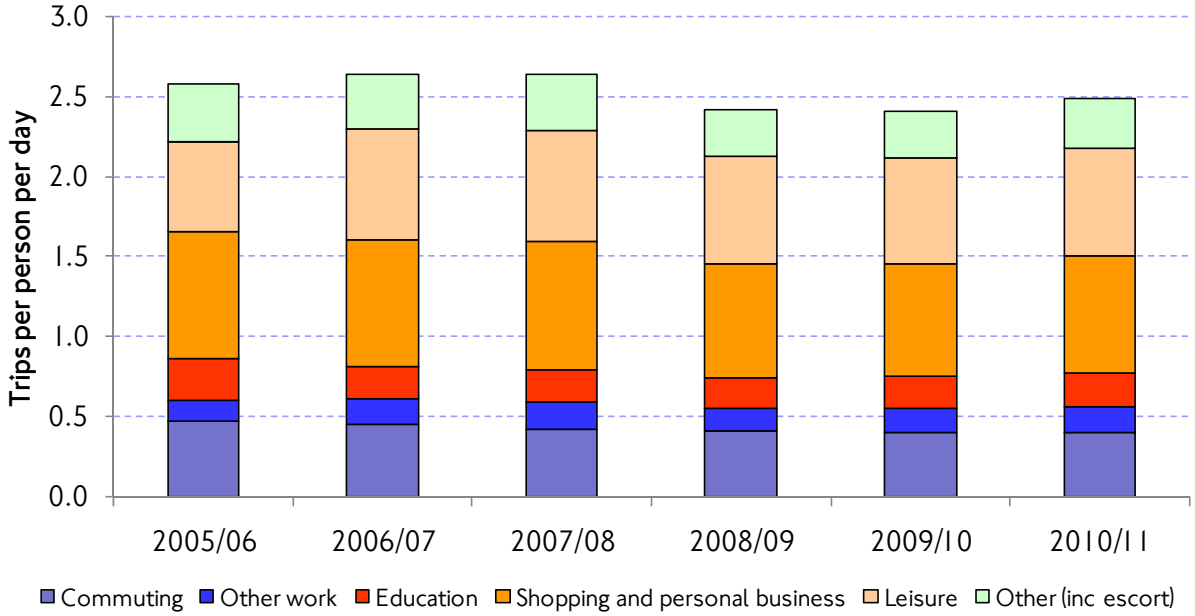


Source: TfL Strategy and Planning.

Trip rates and journey purposes

Figure 2.6 shows trip rates by journey purpose for London residents. These typically change little from year to year, although the five years of comparable data now available (from 2006/07 to 2010/11) do show some interesting trends. Primary among these is a fall in trip rates to or from a regular workplace ('commuting') – down by 11 per cent. This is much higher than the overall loss of jobs in London from the recent recession (see Section 5.5 of this report), but is partly offset by the growth in in-commuters (up by 9 percent between 2006 and 2010 and accounting for about 17 percent of London's jobs), together with a small rise in trips for 'other work purposes', such as travelling from home to a non-regular work location. Trip rates for shopping and personal business decreased by seven per cent overall, consistent with other evidence on the impact of the recession, although trip rates for leisure purposes have been more stable, reducing by just 3 per cent over the period.

Figure 2.6 Trip rates by journey purpose – London residents.



Source: TfL Strategy and Planning.

Travel by London residents – mode shares

Trends in trip-based mode shares for London residents are shown in Table 2.6. These largely reflect the trends for all people travelling in London, as described in Section 2.7 of this report, with progressive increases to the mode share of the principal public transport modes, alongside corresponding reductions to car travel and an increase in the mode share for cycling.

Table 2.6 Mode share of trips by London residents. Trip-based main mode.

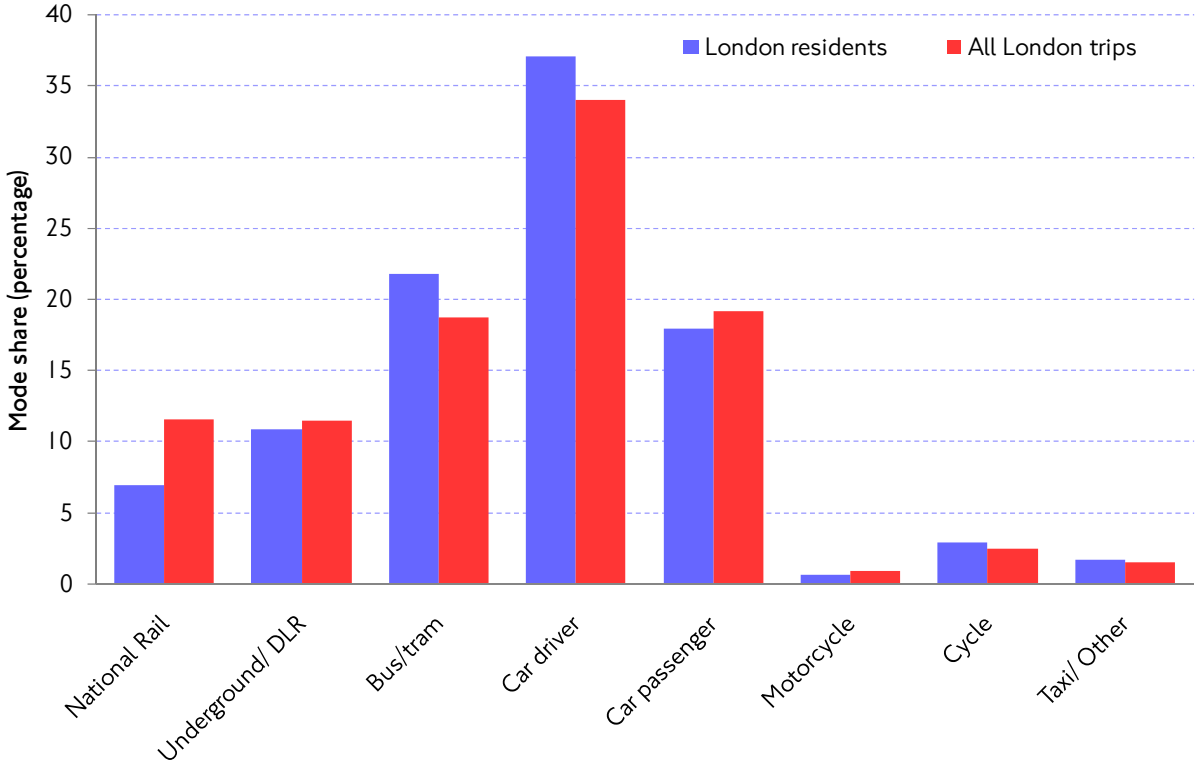
	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
National Rail	4.3	4.1	4.0	4.7	4.8	5.0
Underground/ DLR	6.5	6.6	7.0	7.7	7.2	7.8
Bus/tram	13.7	14.0	13.8	15.4	14.9	15.2
Taxi/ Other	1.1	1.5	1.3	1.1	1.3	1.4
Car driver	29.0	27.7	27.5	25.9	25.9	25.7
Car passenger	12.7	13.6	13.4	12.3	12.9	12.2
Motorcycle	0.6	0.7	0.6	0.5	0.5	0.3
Cycle	1.5	1.7	1.9	1.9	2.1	2.2
Walk	30.6	30.2	30.5	30.4	30.4	30.0
All modes	**100**	**100**	**100**	**100**	**100**	**100**

Source: TfL Strategy and Planning.

Figure 2.7 compares the mode shares, based on trips, for non-walk trips by London residents with the mode shares for all trips in London (derived from the results in Table 2.1 above). In general the two distributions are similar. Walks have been excluded in order to compare like with like because, although data are available from

LTDS on residents' walk trips, there are no equivalent data for walk (all the way) trips by non-residents in London. Notable differences, however, are the higher mode share of National Rail within the 'all travellers' trips - which reflects the importance of rail for travel to and from London by non-residents – and the lower relative share of buses, which reflects their predominant use for local travel by Londoners.

Figure 2.7 Mode shares for trips (excluding walk trips) by London residents and all London trips (average day 2008 to 2010).

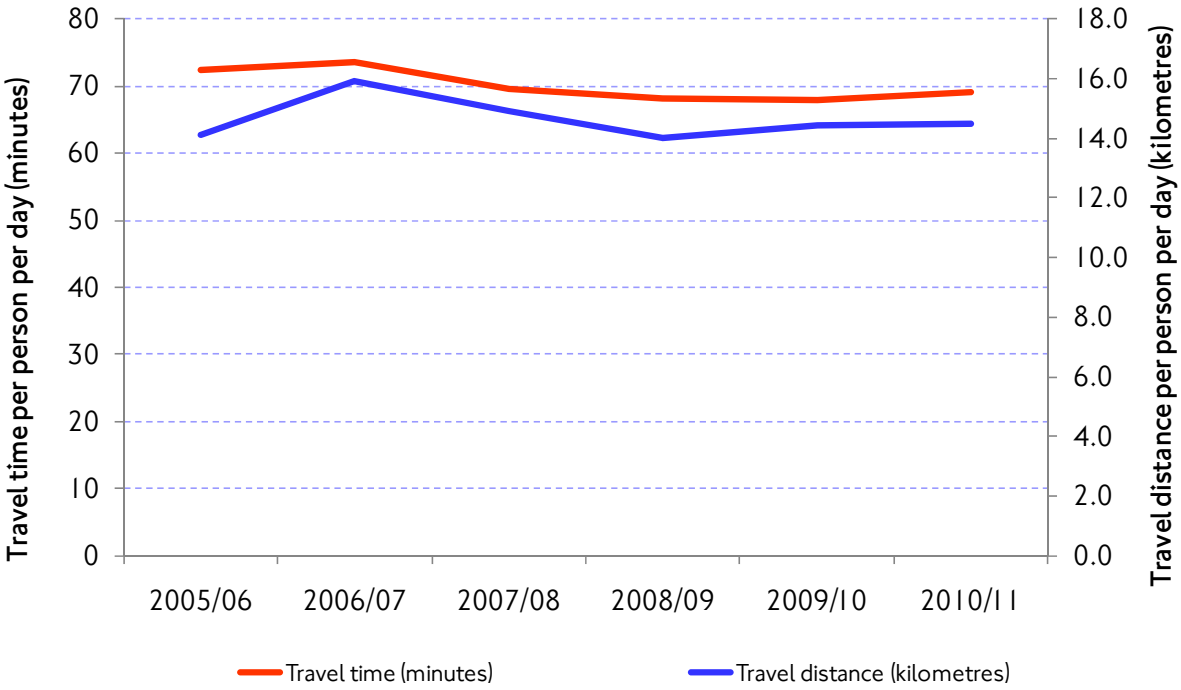


Source: TfL Strategy and Planning.

Travel by London residents – travel time and distance

Figure 2.8 shows recent trends in both the average distance travelled by London residents and the time spent travelling per day (based on a 7 day week). Previous Travel in London reports have highlighted the relative stability in these measures over time and this is apparent from the figure, albeit that there is a discernible trend towards small reductions in both quantities over the time span of the available data. Caution is required when interpreting average travel speeds implied by Figure 2.8, as the LTDS survey measures travel distance on a 'crow-fly' (ie straight line) basis between ultimate origins and destinations.

Figure 2.8 Average travel time and travel distance per person per day. London residents, 2005/06 – 2010/11.



Source: TfL Strategy and Planning.

Looking at average time per person spent travelling, broken down by main mode of trip in Table 2.7, it is possible to see relationships with the trends in trip rates. Both travel time and trips per person fell by 6 per cent between 2006/07 and 2010/11. There were notable increases in time spent travelling by the rail modes (National Rail, Underground and DLR) and also for cycling, and a decrease in time spent travelling by car, reflecting the changes in modal shares over this period. There is an apparent reduction in time spent walking (in 'walk all the way' trips) which is consistent with the dip in walk trip rates in Table 2.5, although their mode share has remained relatively stable. The particularly high value for walk times (and distances) in 2005/06 is anomalous and may be partly a result of seasonal differences in survey timing compared with all subsequent years.

Table 2.7 Time spent travelling per day by London residents (trip-based). Minutes, average day (7-day week).

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
National Rail	7.1	7.6	7.1	7.8	8.1	8.5
Underground/ DLR	8.6	9.1	9.5	9.7	9.2	10.1
Bus/tram	14.7	14.4	13.9	14.7	14.2	14.5
Taxi/ Other	0.8	1.4	1.1	0.7	1.0	0.9
Car driver	18.4	18.5	17.7	16.8	16.4	16.6
Car passenger	8.0	9.4	8.4	7.5	8.0	7.3
Motorcycle	0.5	0.5	0.4	0.4	0.3	0.3
Cycle	0.8	1.0	1.0	1.0	0.9	1.2
Walk	13.4	11.5	10.5	9.5	9.7	9.6
All	**72.4**	**73.4**	**69.6**	**68.1**	**67.8**	**69.0**

Source: TfL Strategy and Planning.

The equivalent trends for distance travelled per person, by main mode of trip, are shown in Table 2.8, and may be expected to be strongly related to time spent travelling. The increases in average distances travelled by rail modes are indeed recognisable and accord with trends in travel time and overall trip rates. Distances travelled by car fell, coinciding with the substantial fall in car trip rates after 2007/08, although car trips, on average, got longer over the review period, particularly in 2008/09 and 2009/10.

Table 2.8 Distance travelled per day by London residents. Kilometres, average day (7-day week).

	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11
National Rail	1.9	2.4	2.1	2.2	2.5	2.6
Underground/ DLR	1.6	1.7	1.7	1.8	1.6	1.9
Bus/tram	1.5	1.7	1.6	1.5	1.6	1.6
Taxi/ Other	0.2	0.4	0.4	0.2	0.3	0.2
Car driver	5.2	5.7	5.5	5.1	4.9	5.0
Car passenger	2.3	2.9	2.7	2.5	2.6	2.5
Motorcycle	0.1	0.1	0.1	0.1	0.1	0.1
Cycle	0.1	0.2	0.1	0.2	0.1	0.2
Walk	1.3	0.8	0.7	0.5	0.5	0.5
All	**14.1**	**15.9**	**14.9**	**14.0**	**14.5**	**14.5**

Source: TfL Strategy and Planning.

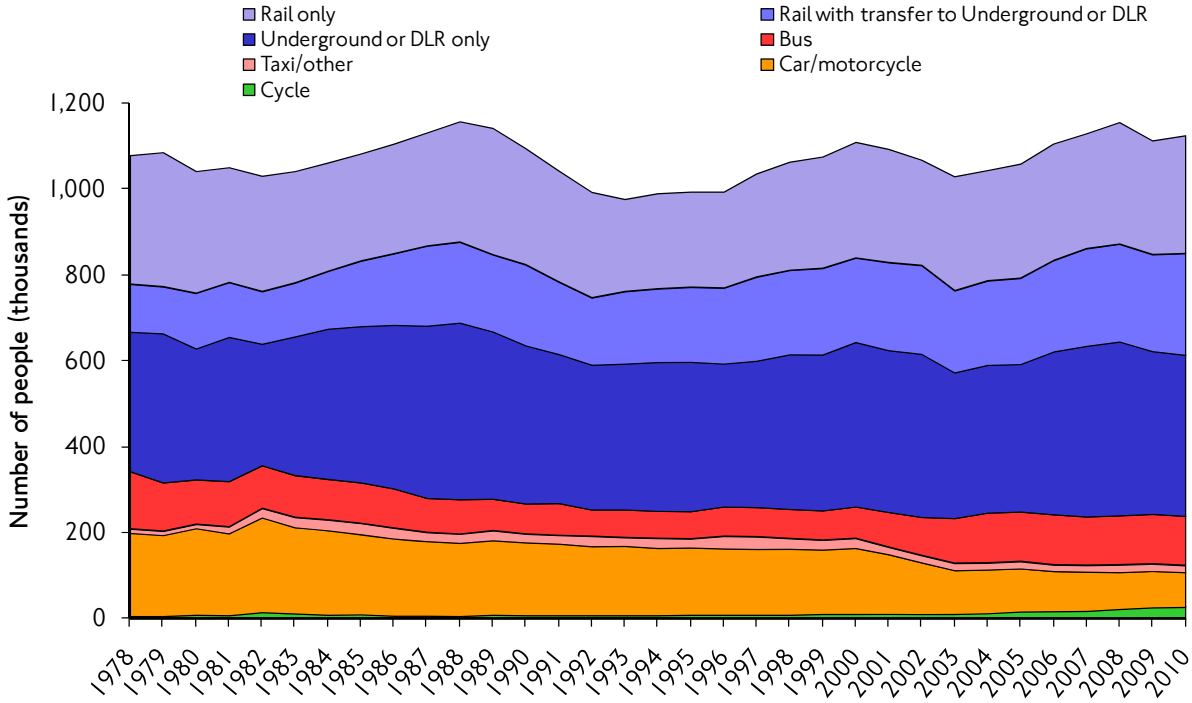
2.11 Focus on: Travel to central London in the weekday AM peak – TfL's Central Area Peak Count survey (CAPC)

TfL's CAPC survey is a long-established yearly count, taken in the autumn, of people entering central London in the weekday morning peak period (07:00 to 10:00). 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. The counts cover all modes of transport apart from walking and people travelling in vans and other commercial vehicles.

Long-term trends

Over the 33 years covered by Figure 2.9, the total number of people entering central London has varied between 0.976 million in 1993 and 1.157 million in 1988. These variations tend to follow the economic cycle in central London and interestingly show no clear directional long-term trend over the period. In recent years, the total in 2008, at 1.155 million was only slightly below the 1988 highest recorded peak.

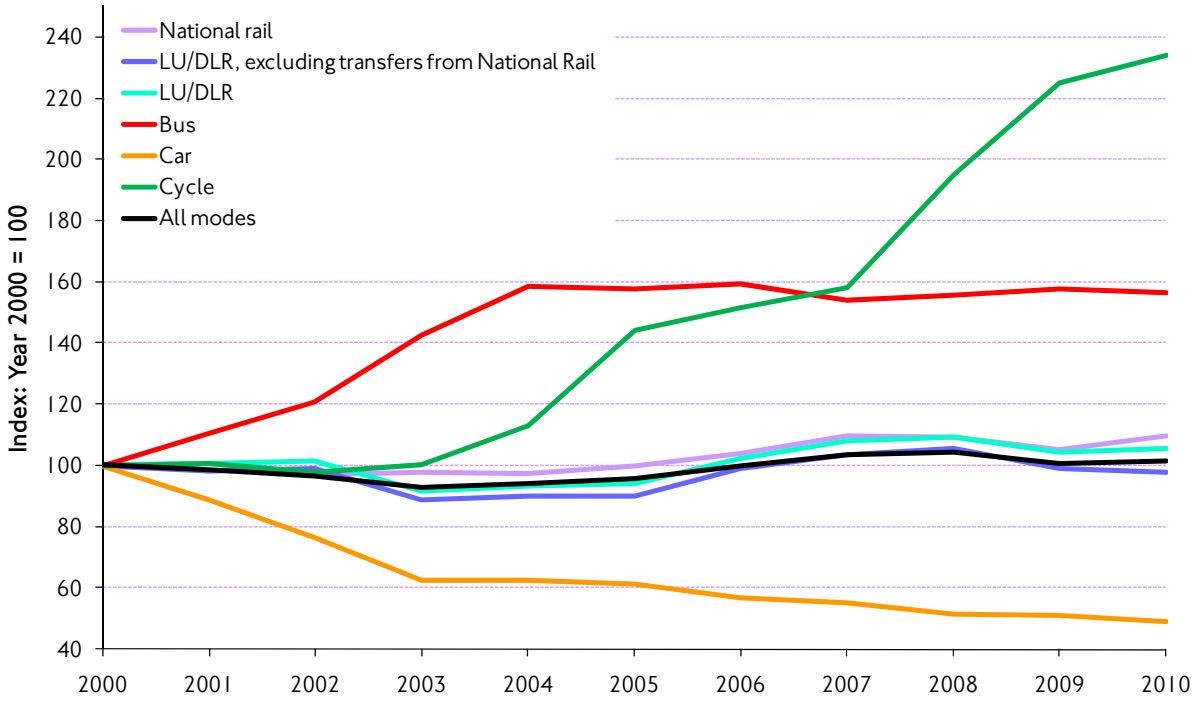
Figure 2.9 People entering central London in the weekday morning peak, 1978 to 2010.



Source: TfL Strategy and Planning.

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 2.10, which looks at the most recent 10 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 2.10).

Figure 2.10 Trends by mode of transport for people entering central London during the weekday morning peak. Index year 2000=100.



Source: TfL Strategy and Planning.

Key developments over this 10-year period have been:

- A gradual decrease in morning peak travel to central London until 2003, followed by a generally rising trend for the rest of the decade, with the level in 2010 being 1.5 per cent above that of 2000.
- A reduction of over half – 51 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 clearly not the only factor involved in this dramatic shift away from private transport for these journeys (see also Sections 4.12 and 4.13 of this report).
- An increase of 57 percent 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 (see also section 3.5 of this report).
- A 134 per cent increase in cycling to central London, again mirroring wider trends (see section 3.13 of this report).

Interestingly, there has been only a relatively small change in the numbers using rail services, with aggregate growth over the decade of 4.4 per cent overall for all combinations of rail modes. Interpretation of this is not straightforward, however, as the 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 2.9:

- 9.7 per cent more people used National Rail in 2010 compared with 2000.

- Of the 510,000 people using National Rail, 236,000 (20.4 per cent more than in 2000) transferred to Underground or DLR services on arrival at the central London rail terminus.
- However, there has been a slight decline (2.1 per cent) in the number of people using Underground or DLR without transferring from National Rail.
- The total number using Underground/DLR services rose by 5.6 per cent over the decade – a rate of growth in this specific context much lower than that for the whole Underground network cited elsewhere in this report (see Section 3.6).

The net outcome of all these changes over the decade since 2000 has been that the mode share for public transport (all modes) for weekday morning peak travel to central London increased from 84 per cent to 89 per cent. The mode share for travel by car has halved, falling from 12 per cent to 6 per cent (Table 2.10). That for cycling has more than doubled, up from 1.1 per cent in 2000 to 2.5 per cent in 2010.

Table 2.9 People entering central London in the weekday morning peak, by mode of transport, 2000 to 2010.

Thousands of people

Year	All modes	National Rail	of which transfer to LUL or DLR	LUL and DLR	Bus	Coach/ minibus	Car	Taxi	Two-wheeled motor vehicles	Cycle
2000	1,108	465	196	579	73	15	137	8	17	12
2001	1,093	468	204	581	81	10	122	7	16	12
2002	1,068	451	206	586	88	10	105	7	15	12
2003	1,029	455	190	530	104	10	86	7	16	12
2004	1,043	452	196	540	116	9	86	7	16	14
2005	1,058	465	200	544	115	9	84	8	16	17
2006	1,105	483	212	591	116	8	78	7	15	18
2007	1,146	511	227	624	113	9	75	6	15	19
2008	1,155	510	227	632	114	11	70	7	15	23
2009	1,112	490	225	604	115	11	70	6	15	27
2010	1,124	510	236	611	114	10	67	6	14	28

Source: TfL Strategy and Planning.
Note: the total for National Rail between 2007 and 2009 has been revised since Travel in London report 3.

Table 2.10 Mode shares of people entering central London in the weekday morning peak, 2000 to 2010.

Percentage

Year	All modes	National Rail	of which transfer to LUL or DLR	LUL and DLR	Bus	Coach/ minibus	Car	Taxi	Two-wheeled motor vehicles	Cycle
2000	100	42	18	52	7	1	12	1	2	1
2001	100	43	19	53	7	1	11	1	2	1
2002	100	42	19	55	8	1	10	1	1	1
2003	100	44	19	51	10	1	8	1	2	1
2004	100	43	19	52	11	1	8	1	2	1
2005	100	44	19	51	11	1	8	1	2	2
2006	100	44	19	54	11	1	7	1	1	2
2007	100	45	20	54	10	1	7	1	1	2
2008	100	44	20	55	10	1	6	1	1	2
2009	100	44	20	54	10	1	6	1	1	2
2010	100	45	21	54	10	1	6	1	1	2

Source: TfL Strategy and Planning.

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. It is necessary to note that results in Tables 2.9 and 2.10 incorporate the correction this year of some minor issues with the National Rail component of the survey over the preceding three years: these affect numbers since 2007 that are now shown on a consistent basis.

- Total weekday morning peak travel to central London fell by 3.7 per cent between 2008 and 2009, but partially recovered between 2009 and 2010, to stand 2.7 per cent lower than 2008 in aggregate.
- Numbers travelling by National Rail and bus have remained broadly unchanged between 2008 and 2010, whereas total travel by Underground (including people transferring from National Rail) fell by 3.3 per cent and those travelling by car fell by 4.6 per cent.
- The number of people cycling increased by 20 per cent between 2008 and 2010.

Onward travel from central London rail terminal stations

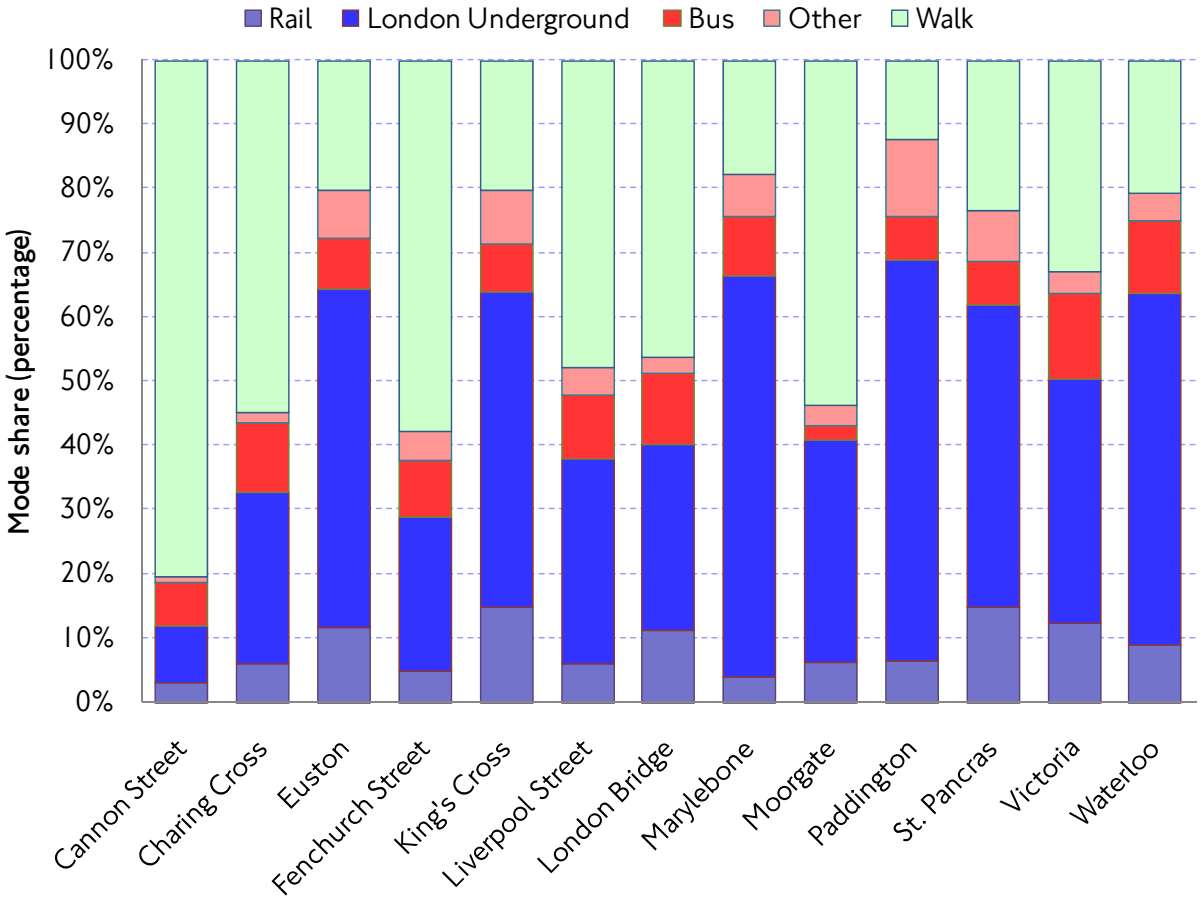
The onward dispersion of people from the main central London National Rail terminal stations is one of the topics studied in TfL's Central London Rail Termini study published in September 2011 (see http://www.tfl.gov.uk/travelinlondon). Figure 2.11, taken from this report, shows the mode shares for onward travel from the main London stations, covering both of the weekday peak periods – morning (07:00-10:00) and evening (16:00-19:00). Table 2.11 gives the total number of people counted, either arriving at or departing, from each station over the two weekday peak periods combined, giving context to the mode shares.

Across all surveyed stations, the most popular mode for onward journeys was the Underground, with 40 per cent of arriving and departing passengers stating that they used it on the day of the survey. With a 36 per cent mode share, walking was the next most popular mode for onward journeys while bus was used by 10 per cent of

passengers. Nine per cent of passengers made an interchange between National Rail services at the termini, continuing their journey with another rail service. Finally, 5 per cent used other modes, including: 1.8 per cent who cycled; 1.2 per cent who used taxis, and just 0.5 per cent using car for their onward journey.

The use of different modes for onward travel varies considerably between the stations, generally reflecting the different length distributions for onward journeys. Cannon Street, for example, had an 80 per cent walk mode share for onward journeys, reflecting proximity to the City, while Paddington, at the other extreme, had a walk mode share of just 12 per cent, reflecting its relative remoteness from both the City and West End. The use of Underground at these stations was similarly polarised, with 62 per cent of passengers using Underground for onward travel at Paddington, against only 9 per cent of passengers at Cannon Street.

Figure 2.11 Mode shares for onward travel from principal central London rail termini. Both weekday peak periods combined.



Source: TfL Strategy and Planning.

Table 2.11 Total arrivals and departures at principal central London rail termini, by station. Both weekday peak periods combined.

Station	Total (thousands)
Cannon Street	51
Charing Cross	66
Euston	68
Fenchurch Street	43
King's Cross	45
Liverpool Street	137
London Bridge	149
Marylebone	25
Moorgate	20
Paddington	64
St Pancras	53
Victoria	137
Waterloo	208
All stations	**1,066**

Source: TfL Strategy and Planning.

2.12 Travel in London compared with other GB metropolitan areas.

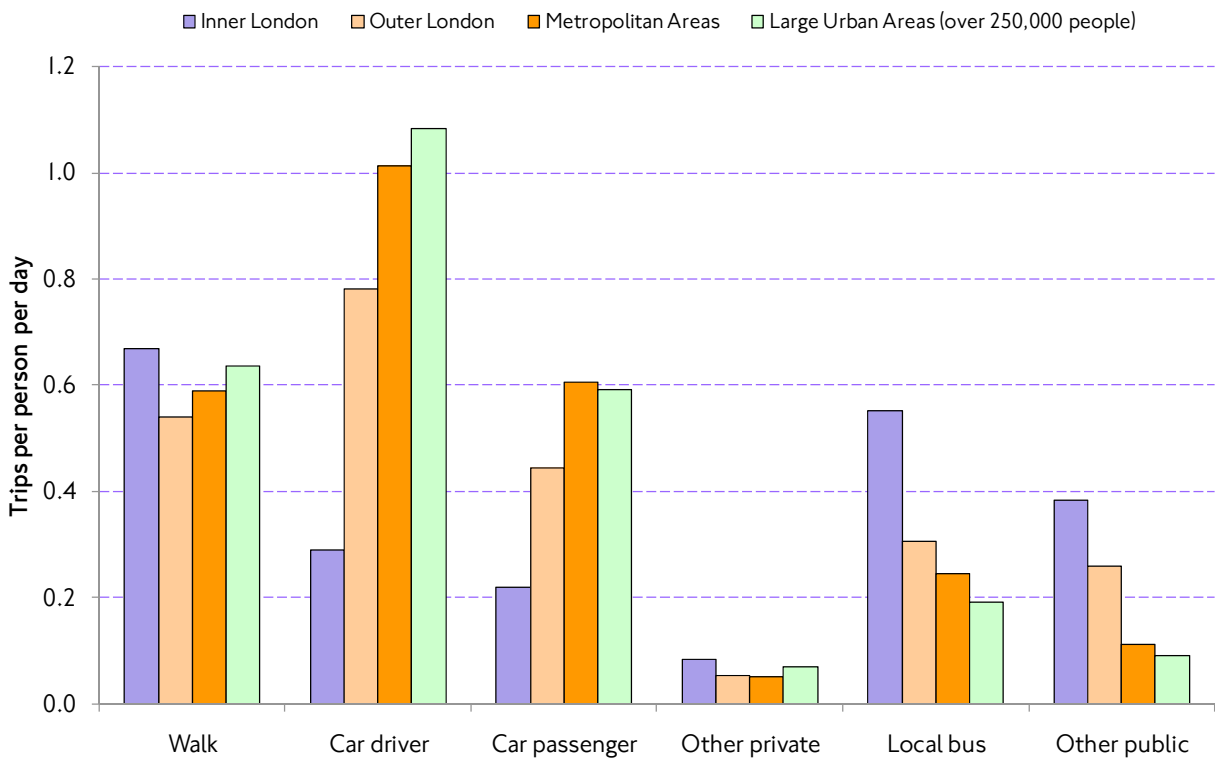
The Department for Transport's National Travel Survey (NTS – see also: http://www.dft.gov.uk/statistics/series/national-travel-survey/) allows comparisons to be made between travel in London and that in the rest of Great Britain. The NTS is a household survey providing data on personal travel across Great Britain, which can be split down to provide data on a regional level.

Figures 2.12 and 2.13 show key indicators of travel from NTS. They compare Inner (including central) London with Outer London and other metropolitan areas, as well as with all other large urban areas of more than 250,000 people.

There is a clear difference between residents of Inner and Outer London in terms of modes used. In fact, travel by residents of Outer London is more similar, in terms of mode share, to other urban areas in GB than to Inner London.

Car use in Inner London is comparatively low, with 0.3 car driver trips per person per day, compared with 0.8 in Outer London, and over 1.0 in other metropolitan and urban areas. Conversely, public transport use is much higher in Inner London, with 0.9 trips per person per day compared with 0.6 in Outer London and less than 0.4 in other urban areas.

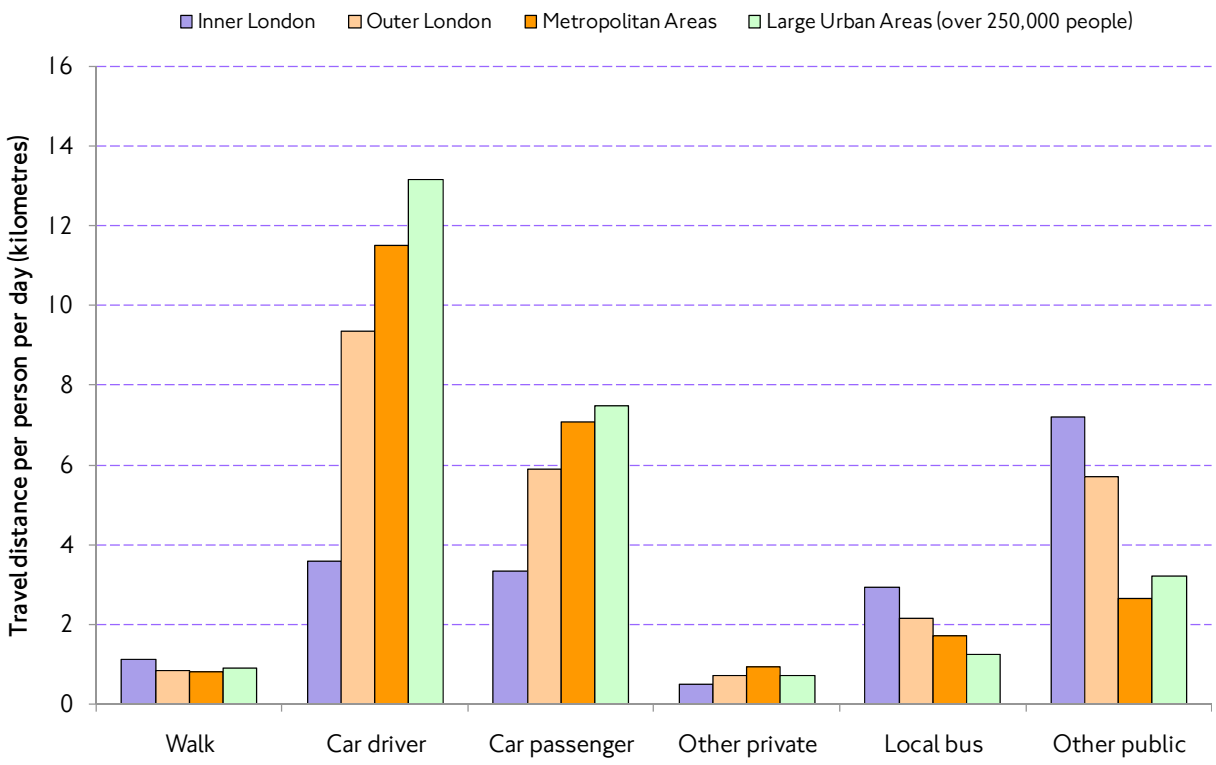
Figure 2.12 Trips per person per day, by main mode of transport: London compared with metropolitan and other large urban areas. NTS 2009-10 (combined years).



Source: Department for Transport.

In terms of travel distance (Figure 2.13), the most striking feature is the much lower distance travelled by residents of Inner London, around 19 kilometres per person per day, compared with 25 kilometres in both Outer London and other metropolitan areas.

Figure 2.13 Travel distance per person per day, by main mode of transport: London compared with metropolitan and other large urban areas. NTS 2009-10 (combined years).



Source: Department for Transport.

3. Travel trends by principal travel modes

3.1 Introduction and content

Chapter 2 of this report described trends and developments in relation to overall travel demand and mode shares in London. This chapter looks in more specific detail at travel demand trends for each of the principal travel modes. Chapter 4 of this report then looks at the corresponding trends in 'supply-side' factors for each of the principal modes, covering aspects of service provision, operational performance and reliability.

3.2 Summary of key historic trends up to 2009

Public transport

Use of public transport in London has grown substantially over recent years, reflecting large-scale enhancements to the public transport networks and population and employment growth. TfL's Travel in London report 3 looked back over the previous nine years and highlighted the following key trends:

- At the journey stage level, the mode share of public transport for all travel in London grew from 34 percent in 2000 to 41 per cent in 2009. At the trip level the equivalent proportions were 28 per cent in 2000 and 33 per cent in 2009.
- Total passenger kilometres travelled on public transport services operated by TfL in 2009/10 were almost 40 per cent higher than in 2000/01, and more than 70 per cent higher than in 1991/92.
- Across the individual public transport modes and comparing the 2009/10 financial year with 2000/01: 13 per cent more passenger kilometres were travelled on Underground services; 87 per cent more on the DLR, and 65 per cent more passenger kilometres were travelled on the bus networks.

Roads – general traffic levels

In parallel with the pattern of strong growth in public transport patronage over the last decade, the volume of traffic on London's roads has declined – by about 6 per cent overall. This trend was well-established in both central and Inner London over most of the last decade, but has now also become established in Outer London. Over the longer term, this trend is thought to reflect improved public transport, together with road capacity restraint resulting in increased congestion following the reallocation of road network capacity for other policy priorities, such as road safety and infrastructure replacement works.

Other modes

Among significant developments over the decade have been:

- An estimated 61 per cent increase in cycle journey stages in Greater London since 2001 – these having been broadly unchanged during the 1990s – reflecting measures to encourage the use of bicycles by successive Mayoral administrations.
- A doubling of passenger traffic on the River Thames – reflecting an expansion of river services during the early part of the decade, although this counterbalanced by a slow but consistent decline in volumes of freight carried by water – this down by 24 per cent over the decade.

- An increase of 6 per cent in the number of licensed taxi drivers in London, and with the licensing of London's Private Hire sector since 2003, almost 60,000 private hire drivers (and 50,000 vehicles) licensed to work in London in 2009.

3.3 Recent developments – focusing on 2010 and 2010/11

Table 3.1 summarises key changes over the most recent 3 years. Looking at 2010 (or 2010/11) in comparison to 2009 (or 2009/10):

- There was a 3.0 per cent increase in the number of journey stages made by public transport – up from 3,453 to 3,556 on an average day. This was matched by a 4.1 per cent increase in passenger kilometres travelled on the principal public transport networks.
- There was an increase of 0.9 per cent in passenger kilometres travelled by bus, with a corresponding increase of 1.4 per cent in bus journey stages.
- Patronage on London Underground grew particularly strongly, with 5 per cent more passenger kilometres and 3.9 per cent more journey stages compared with the previous year.
- There was also particularly strong growth on both the Docklands Light Railway (DLR) and London's rapidly-developing Overground rail network. There were 13.4 per cent more journey stages on the DLR in 2010/11 (13 per cent more passenger-kilometres), partly reflecting continuing growth on the 2009 extension to Woolwich Arsenal. The year 2010 was also marked by the re-opening of the East London Line as part of the Overground network, together with its southward extensions to New Cross, West Croydon and Crystal Palace. Fifty-five per cent more journey stages were made on this network in 2010/11 compared to 2009/10, with 39 per cent more passenger kilometres.
- Patronage on National Rail (London and South East operators) also grew strongly, with an 8.9 per cent increase in passenger journeys and a 5.3 per cent increase in passenger kilometres – more than reversing the recession-related aggregate dip of 1.4 per cent in journeys the previous year.
- The amount of traffic on London's roads continued to fall, with 0.9 per cent fewer vehicle kilometres driven in 2010 compared to 2009. This change brings the net reduction in road traffic (vehicle kilometres) since 2000 to 5.9 per cent.
- On an average day in 2010 there were 540,000 cycle stages in London and 490,000 trips where cycle was the main mode, usually to cycle all the way. This was a 5.8 per cent increase in the number of cycle journey stages since 2009, following an increase of 5 per cent the previous year. Over the whole period since 2001, the number of cycle journey stages per day in London has increased by 70 per cent.
- Within the overall trend for cycling, there was a 15 per cent increase between 2009/10 and 2010/11 in the number of cycles counted on the TLRN – London's main road network. This compares to a 5 per cent increase in the previous year. This indicator has grown by 150 per cent over the last 10 years, reflecting measures by all Mayoral administrations to encourage the use of bicycles.
- Growth in cycling has mainly been concentrated in central and Inner London, particularly this latest year reflecting the opening of the Barclays Cycle Hire Scheme in central London and the first two Barclays Cycle Superhighways along key radial corridors to central London (as these opened during the course of 2010 they are only partly reflected in the overall values for 2010/11). The number

of bicycles crossing the central London traffic counting cordon increased by 14.2 per cent between 2009 and 2010, following an increase of 15.4 per cent between 2008 and 2009.

- The amount of freight moved to, from or within London showed clear evidence of the impact of the economic recession, with an overall fall of 25 per cent in the volume of road freight lifted between 2008 and 2009, alongside falls of 8 and 12 per cent in rail and waterborne freight respectively, although there is evidence of recovery in the most recent year, with road freight tonnage in particular rebounding by 28 per cent.

Table 3.1 Summary of key indicators of transport demand, 2008-2010.

Mode and indicator	Units	2008 or 2008/09	2009 or 2009/10	2010 or 2010/11	% change 2010 or 2010/11 on previous year
Public transport					
Total PT passenger kms	Millions per year	17,470	17,410	18,124	+4.1
Total PT journey stages	Millions per year	3,462	3,453	3,556	+3.0
Bus passenger kms	Millions per year	7,942	8,013	8,082	+0.9
Bus journey stages	Millions per year	2,247	2,257	2,289	+1.4
Underground passenger kms	Millions per year	8,641	8,456	8,875	+5.0
Underground journey stages	Millions per year	1,089	1,065	1,107	+3.9
DLR passenger kms	Millions per year	318	365	414	+13.4
DLR journey stages	Millions per year	66	69	78	+13.0
Tramlink passenger kms	Millions per year	142	139	146	+7.4
Tramlink journey stages	Millions per year	27	27	28	+7.3
Overground passenger kms	Millions per year	427	437	606	+38.8
Overground journey stages	Millions per year	33.1	34.6	53.6	+54.9
National Rail passenger kms	Billions per year	24.2	23.8	25.0	+5.3
National Rail journeys	Millions per year	854	842	917	+8.9
Road traffic and vehicle flows					
Motor vehicle kms – GLA	Billions per year	31.4	30.6	30.3	-0.9
Car vehicle kms – GLA	Billions per year	25.0	24.6	24.3	-1.2
Van vehicle kms – GLA	Billions per year	3.8	3.5	3.5	-2.1
Other goods vehicle kms – GLA	Billions per year	1.1	1.1	1.2	+11.7
Motor vehicle kms – central	Billions per year	1.1	1.0	1.0	+0.4
Car vehicle kms – central	Billions per year	0.8	0.7	0.7	-1.9
Van vehicle kms – central	Billions per year	0.2	0.1	0.1	-2.3
Other goods vehicle kms – central	Billions per year	<0.1	<0.1	<0.1	-0.9
Motor vehicle kms – inner	Billions per year	8.4	8.1	8.1	-0.6
Car vehicle kms – inner	Billions per year	6.4	6.2	6.2	-0.7
Van vehicle kms – inner	Billions per year	1.2	1.1	1.1	-0.1
Other goods vehicle kms – inner	Billions per year	0.3	0.3	0.3	+11.9
Motor vehicle kms – outer	Billions per year	21.9	21.4	21.2	-1.1
Car vehicle kms – outer	Billions per year	17.9	17.7	17.4	-1.4
Van vehicle kms – outer	Billions per year	2.5	2.3	2.3	-3.0
Other goods vehicle kms – outer	Billions per year	0.8	0.8	0.9	+12.1
Central London cordon	Million motor vehicles per day	1.19	1.18	1.13	-3.9
Inner London cordon	Million motor vehicles per day	2.02	1.98	1.95	-1.8
Outer London cordon	Million motor vehicles per day	2.58	2.53	n/a	n/a
Thames screenline	Million motor vehicles per day	0.80	0.79	0.77	-1.7

Table 3.1 (continued) Summary of key indicators of transport demand, 2008-2010.

Mode and indicator	Units	2008 or 2008/09	2009 or 2009/10	2010 or 2010/11	% change 2010 or 2010/11 on previous year
Cycling					
Cycle flows on TLRN	(index 2000/01=100)	207.2	217.5	250.1	+15.0
Cycle average flows on major roads	Thousands per day	0.44	0.45	0.48	+6.0
Cycles – central cordon	Thousands per day	104	120	137	+14.2
Cycles – inner cordon	Thousands per day	44	48	52	+8.3
Cycles – outer cordon	Thousands per day	13	14	n/a	n/a
Cycles – Thames screenline	Thousands per day	61	64	67	+4.7
Other modes					
Road freight lifted	Million tonnes	137	103	132	+27.9
Waterborne freight lifted	Million tonnes	9.3	8.1	7.8	-12.5
Air freight lifted	Million tonnes	1.7	1.6	1.8	+15.6
Airport terminal passengers	Millions per year	136.9	130.1	127.2	-2.3
River Thames passengers	Number (million)	3.9	4.2	4.1	-1.1
Licensed taxis	Vehicles (thousand)	22.3	22.4	22.6	+0.5
Licensed taxi drivers	Number (thousand)	24.8	24.9	25.0	+0.6
Licensed private hire	Vehicles (thousand)	49.3	49.4	50.7	+2.7
Licensed private hire	Drivers (thousand)	55.8	59.2	61.2	+3.4

3.4 Patronage of principal TfL-operated public transport modes – recent history and relationship to principal travel demand drivers

Table 3.2 show the long-term trends in the use of the principal public transport modes in London, updated to include values for 2010/11. The general story is one of continuous growth from the mid-1990s, with a 92 per cent increase in the number of public transport journey stages and an 88 per cent increase in public transport passenger kilometres since the historic low point in 1993/94.

Over this period the number of journey stages made by bus has grown by 105 per cent, and that by Underground by 51 per cent. Noteworthy are the trends for newer public transport modes. The DLR, which opened initially in 1987 and has been expanded subsequently in several stages, increased patronage almost ten-fold (from 8 million to 78 million journey stages) since 1993/94. The number of journey stages travelled on Tramlink has increased by 47 per cent since that system opened in 2001/02 – on the basis of a generally comparable network. Further details for each specific mode are given in the following sections.

Table 3.2 Annual passenger kilometres and journey stages travelled by public transport (millions), 1991/92 to 2010/11.

Million passenger kilometres

Year	Bus	Underground	DLR	Tramlink	Overground	Total
1991/92	3,996	5,895	32	-	-	9,923
1992/93	3,922	5,758	33	-	-	9,713
1993/94	3,819	5,814	39	-	-	9,672
1994/95	3,912	6,051	55	-	-	10,018
1995/96	4,018	6,337	70	-	-	10,425
1996/97	4,159	6,153	86	-	-	10,398
1997/98	4,350	6,479	110	-	-	10,939
1998/99	4,315	6,716	139	-	-	11,169
1999/00	4,429	7,171	152	-	-	11,753
2000/01	4,709	7,470	195	-	-	12,374
2001/02	5,128	7,451	207	97	-	12,883
2002/03	5,734	7,367	232	100	-	13,432
2003/04	6,431	7,340	235	103	-	14,110
2004/05	6,755	7,606	243	113	-	14,717
2005/06	6,653	7,586	257	117	-	14,613
2006/07	7,014	7,665	301	129	-	15,109
2007/08	7,714	8,155	326	138	-	16,334
2008/09	7,942	8,641	318	142	427	17,470
2009/10	8,013	8,456	365	139	437	17,410
2010/11	8,082	8,875	414	146	606	18,124

Source: TfL Service Performance data.

Million journey stages

Year	Bus	Underground	DLR	Tramlink	Overground	Total
1991/92	1,149	751	8	-	-	1,908
1992/93	1,127	728	7	-	-	1,862
1993/94	1,112	735	8	-	-	1,855
1994/95	1,159	764	12	-	-	1,935
1995/96	1,198	784	15	-	-	1,997
1996/97	1,234	772	17	-	-	2,023
1997/98	1,277	832	21	-	-	2,130
1998/99	1,267	866	28	-	-	2,161
1999/00	1,296	927	31	-	-	2,254
2000/01	1,354	970	38	-	-	2,362
2001/02	1,430	953	41	19	-	2,443
2002/03	1,536	942	46	19	-	2,543
2003/04	1,702	948	49	20	-	2,718
2004/05	1,793	976	50	22	-	2,840
2005/06	1,816	971	53	22	-	2,862
2006/07	1,880	1,014	61	25	-	2,981
2007/08	2,176	1,072	67	26	-	3,341
2008/09	2,247	1,089	66	27	33.1	3,462
2009/10	2,257	1,065	69	27	34.6	3,453
2010/11	2,289	1,107	78	28	53.6	3,556

Source: TfL Service Performance data.

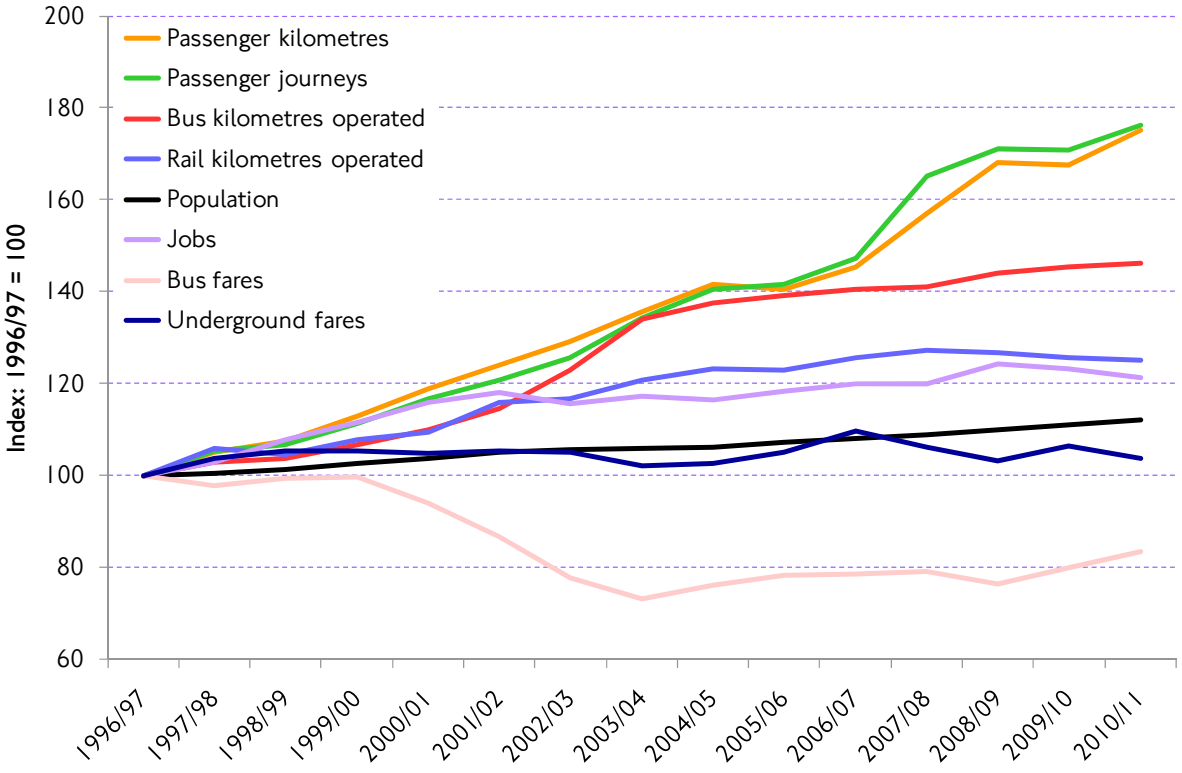
Note on bus journey stages: *From 2007/08 TfL changed the methodology used to estimate annual bus journeys. Before 2007/08 the statistics were based on ticket sales, supplemented by survey data used to estimate the rate of use of period tickets. From 2007/08 onwards the estimates are derived from Oyster card validations wherever appropriate. The new series also includes some bus journeys not previously counted, including journeys using staff and police passes, and bus travel by under five-year-olds. It is estimated that the net effect of these changes was to increase the estimates of bus journey stages by about 10 per cent and passenger kilometres by about 3 per cent. The pre-2007/08 series has not been revised. According to the new methodology, journey stages by bus in 2006/07 are estimated at 2,069 million, with a total distance travelled of 7,215 million passenger kilometres, compared to 1,880 million journey stages using the previous method.*

More recently, the impact of the economic recession has made itself felt in terms of what now appears to have been a temporary pause to the historic pattern of strong growth, with overall public transport patronage being generally flat between 2008/9 and 2009/10. However, values for the most recent year (2010/11) across all the major public transport modes suggest a return to the pattern of growth, despite continuing economic uncertainty, although this mainly reflects population growth (see also section 5.3 of this report) in the most recent year.

Relationship of historic growth in public transport use to principal travel demand drivers

Figure 3.1 shows the long-term aggregate trend in public transport use, as index values based on 1996/97. It also shows contemporary trends for a selection of principal travel demand drivers at the Greater London level. These are: resident population, total employment, service level (supply) and real public transport fares for both bus and Underground.

Figure 3.1 Trend in public transport patronage and relationship to principal travel demand drivers.



Source: TfL Strategy and Planning.

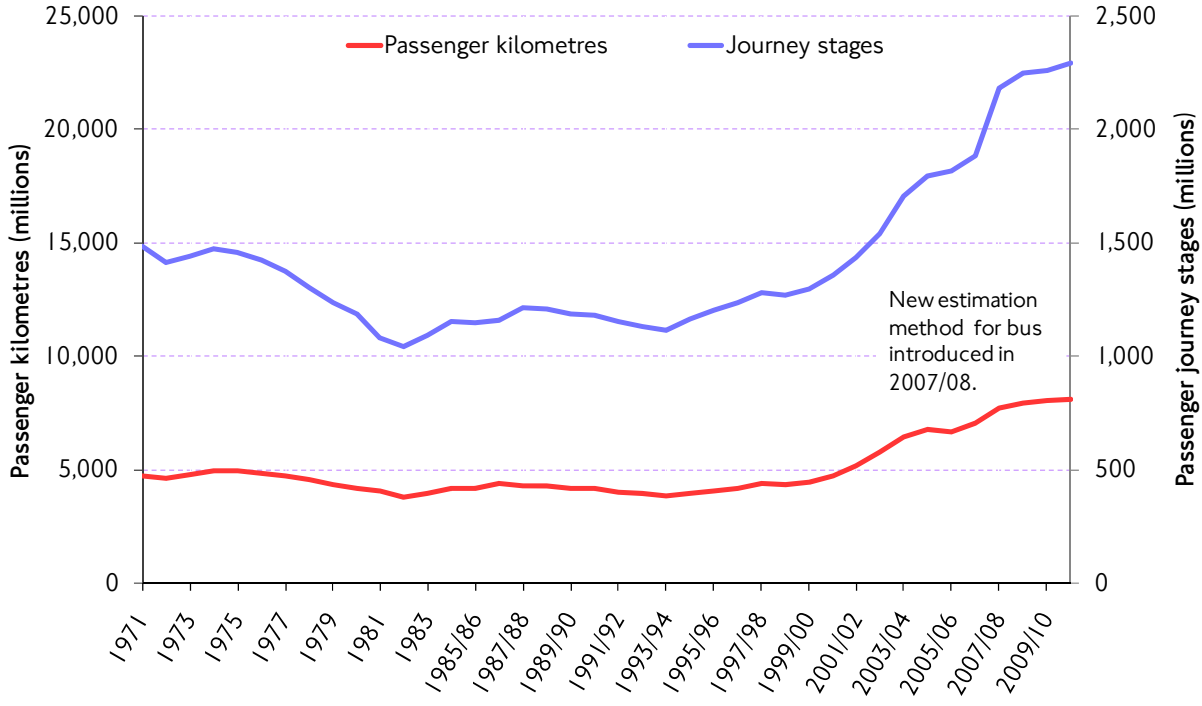
The detailed nature of the relationships between these variables is currently being investigated by TfL. However, it is clear from the figure that public transport patronage has increased at a much faster rate than would be commensurate with the

increase in resident population and jobs. This suggests that increases to service supply, particularly buses, and the static or falling (in real terms) cost of fares are significant explanatory factors.

3.5 Modal trends – travel by bus

Figure 3.2 shows the long-term trend for travel by bus in London. During the 1970s and 1980s the pattern was one of slow decline, continuing a trend that dated from the 1950s. From the early 1990s however this was dramatically reversed, with particularly strong growth since 2000/01. Over the ten years from 2000/01 to 2010/11, bus journey stages increased by 54 per cent, and passenger kilometres by 67 per cent. The rate of growth has levelled out in more recent years, with 2010/11 featuring 1.4 per cent more journey stages and 0.9 per cent more passenger kilometres than the previous year – rates of increase comparable to that for the three most recent years. The parallel increase in bus service supply (kilometres operated) over the most recent year was lower at 0.5 per cent. It is noteworthy that the figure implies a general trend towards shorter overall stage lengths (although note the different scales) – reflecting perhaps intensification of the bus network in Inner London and trends in fares and ticketing, such as reducing overall fares in real terms (see also section 8.8 of this report), Oystercard, which in particular offers a daily fares 'cap' at the same price as a daily Travelcard, and the general extension of concessionary travel in recent years.

Figure 3.2 Passenger kilometres and journey stages by bus.



Source: TfL Service Performance data.

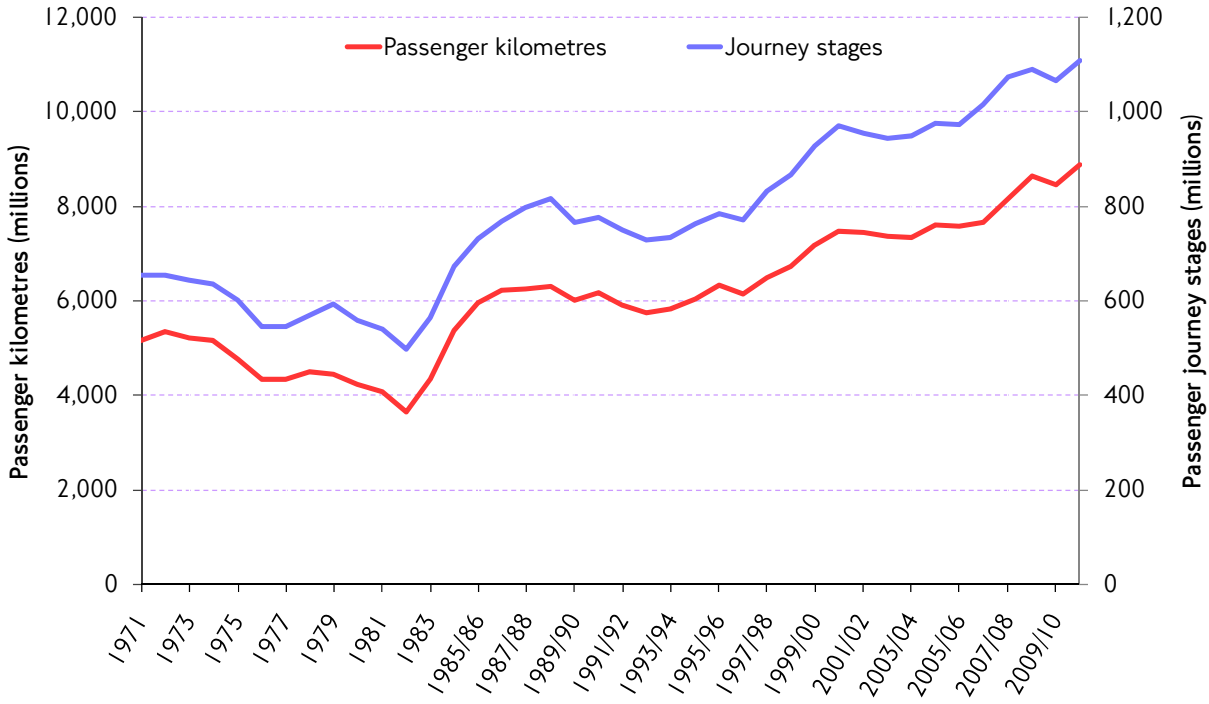
3.6 Modal trends – travel by Underground

Figure 3.3 shows the long-term trend for travel by Underground. Here the trend was one of falling patronage until the early 1980s, when substantial changes to the fares structure stimulated increases in passenger demand of roundly two-thirds during the remainder of that decade. Demand was fairly static during the late 1980s and early

1990s but started to grow again in the late 1990s and has continued to grow steadily since.

The number of people using the Underground in 2010/11 was the highest ever recorded, 1,107 million passenger journeys (journey stages). Growth during the last year was particularly strong, with 3.9 per cent more journey stages and 5 per cent more passenger kilometres than the previous year, despite a reduction of train kilometres operated of 0.7 per cent.

Figure 3.3 Passenger kilometres and journey stages by Underground.



Source: TfL Service Performance data.

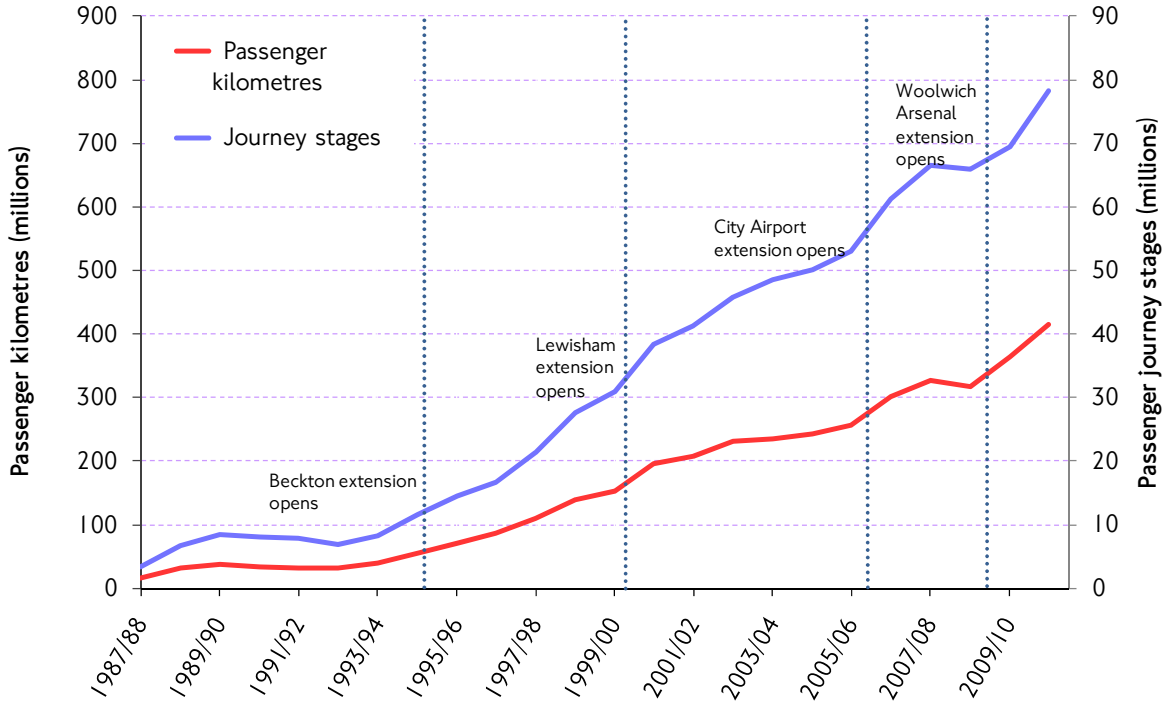
The relationship between passenger kilometres and journey stages is rather more consistent than the equivalent for bus, perhaps reflecting the comparatively stable nature of the Underground network and pricing disincentives to short journeys, particularly in the central area.

3.7 Modal trends – travel by DLR

Figure 3.4 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 2010/11 414 million passenger kilometres were travelled on the DLR, equivalent to 78 million journey stages. Despite successive 'step' enhancements to the network, the rate of growth in DLR patronage has been relatively consistent since the opening of the initial network in 1987, averaging 17 per cent per year for passenger kilometres and 16 per cent per year for journey stages. Indicators of service supply for the DLR are not straightforward, as changing train lengths have also been a significant factor. Nevertheless, train kilometres operated have increased at an (indicative) rate of 11.6 per cent per year since the opening of the initial network.

Figure 3.4 Passenger kilometres and journey stages by DLR.

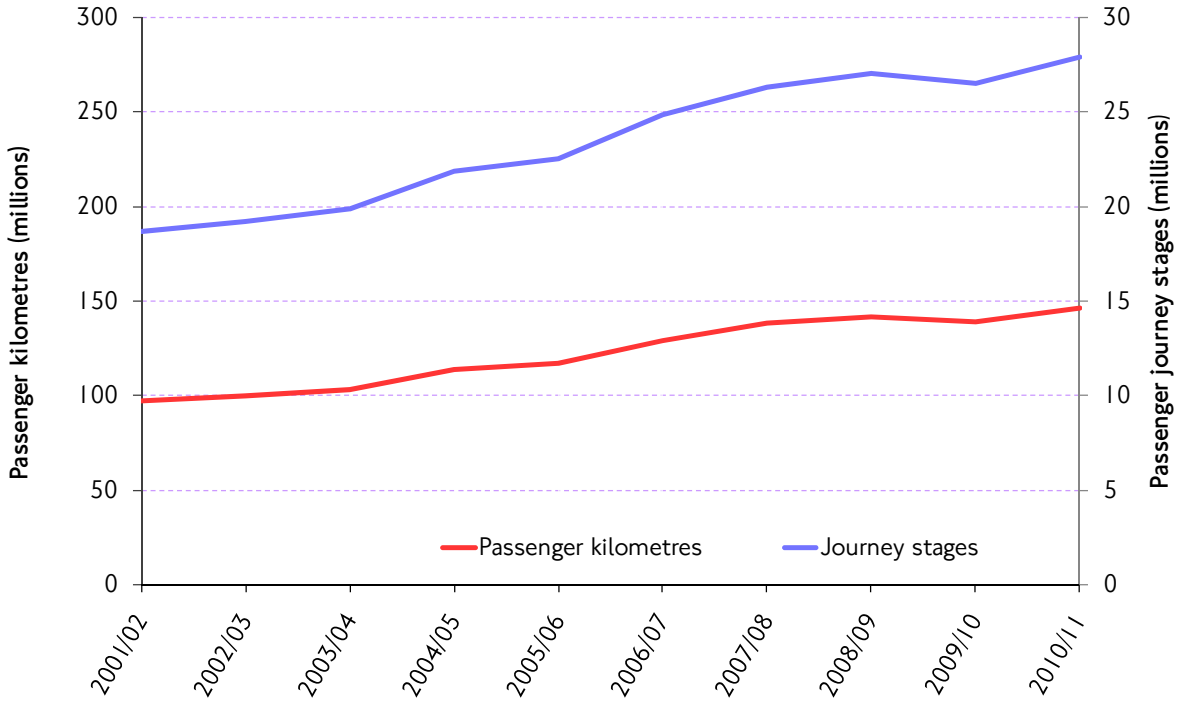


Source: TfL Service Performance data.

3.8 Modal trends – travel by Tramlink

Tramlink initially opened in 2000 and the network has been relatively stable since, albeit with a service restructuring in 2006. Figure 3.5 shows steady patronage growth averaging 4.7 per cent, for passenger kilometres, and 4.6 per cent for journey stages, over the period since opening in 2000. Aggregate growth since opening has been 49.4 per cent for journey stages, and 50.9 per cent for passenger kilometres. Train kilometres operated have increased by 12.0 per cent over the period since 2001/02. In the most recent year there were 7.4 per cent more passenger kilometres and 7.3 per cent more journey stages than in 2009/10.

Figure 3.5 Passenger kilometres and journey stages by Tramlink.



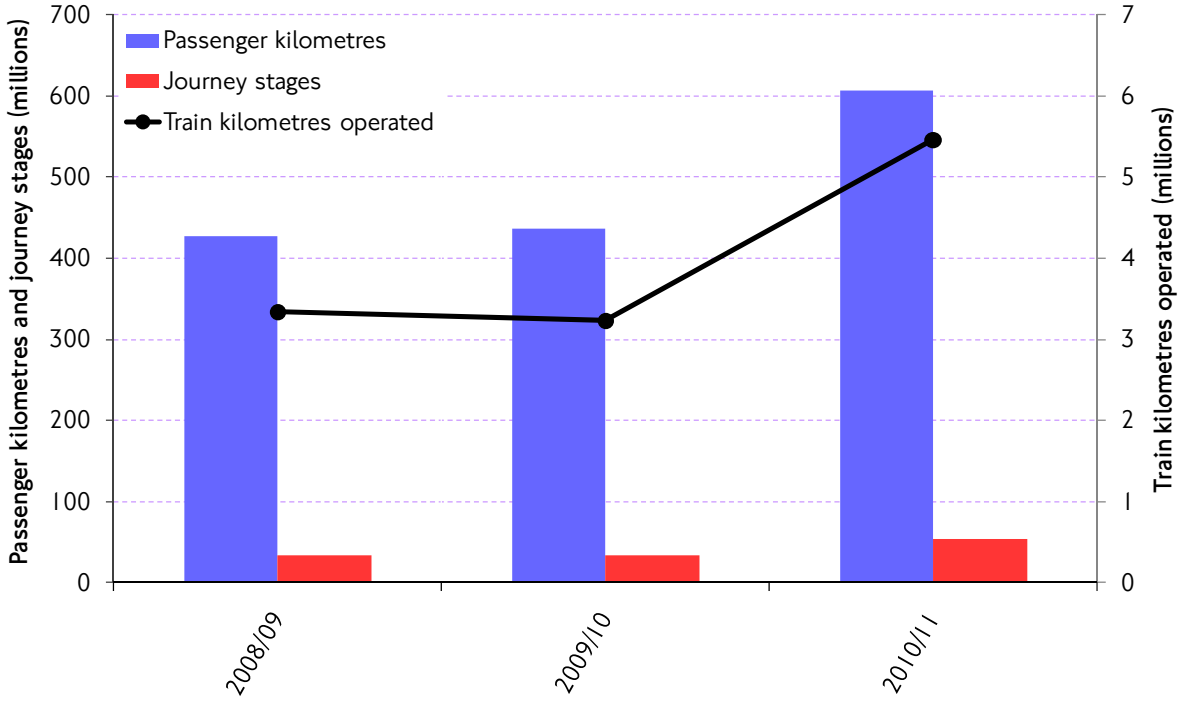
Source: TfL Service Performance data.

3.9 Modal trends – travel by London Overground

The London Overground rail network was launched in November 2007, with TfL initially assuming responsibility for the operation of several metro-style rail links in north London - as an integral part of the National Rail network. Since 2007 the network has been rapidly expanded and, in 2011, consisted of five distinct service groups serving 20 of London's 33 boroughs.

Figure 3.6 shows the trend in recorded patronage to date, although this should be interpreted in the context of an expanding network (a measure of train kilometres operated is also included on the figure). There were 54 million journey stages and 606 million passenger kilometres travelled on this network in 2010/11, the respective 55 and 39 per cent increases over the previous year mainly reflecting the reopening of the East London Line and its southward extensions to New Cross, West Croydon and Crystal Palace in May 2010, as well as the extension to Highbury and Islington in February 2011.

Figure 3.6 Passenger kilometres and journey stages by London Overground.



Source: TfL Service Performance data.

3.10 Modal trends – travel by National Rail in London

Basic statistics of National Rail patronage are compiled by the Office of Rail Regulation (ORR), although these do not permit specific identification of trips that are to, from or wholly within Greater London. Similarly, franchise changes mean that it is not possible to make consistent comparisons over an extended period for individual train operators. The best approximation that can be made is to look at trends in respect of all services classified by the ORR as 'London and South East operators' (L&SE) services, although these include many services that operate within the 'home counties' and, in some cases, well beyond.

Table 3.3 shows that the latest year was marked by strong growth in patronage, measured as passenger journeys, which were up 8.9 per cent - in spite of continued difficulties in the wider economy (which were reflected in an overall 1.4 percent decrease in patronage the previous year).

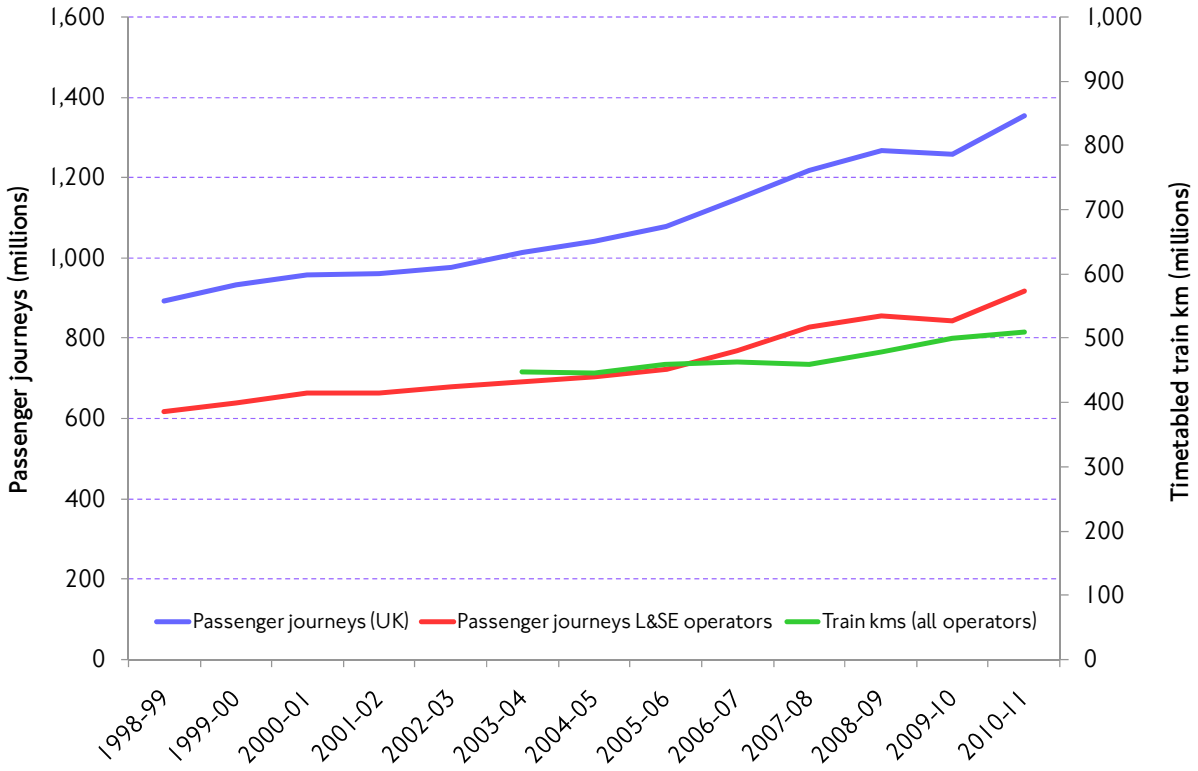
Table 3.3 Passenger kilometres and passenger journeys by National Rail – operators classified by ORR as L&SE operators.

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	5.3	917	8.9

Source: Office of Rail Regulation

Figure 3.7 sets this growth for L&SE operators against that for all operators nationally. Whilst the overall trend towards strong growth is shared, growth in journeys using L&SE services over the period covered by the graph (48.9 per cent) has been slightly lower than that for all operators – at 51.7 per cent. Also shown on Figure 3.7 is a measure of service supply – annual train-kilometres operated nationally. Whilst the relationship between passenger journeys and train kilometres operated is not direct, for example in not accounting for changes in train formations or journey lengths, the 13.5 per cent growth in this measure between 2003/04 and 2010/11 compares to patronage increases of 33.7 and 32.8 per cent for national and L&SE journeys respectively. Notable also is the proportion of UK rail journeys that are made on services classified as 'London and South East' (68 per cent for the most recent year).

Figure 3.7 Passenger journeys and service supply by National Rail – all operators and London and South East operators compared.



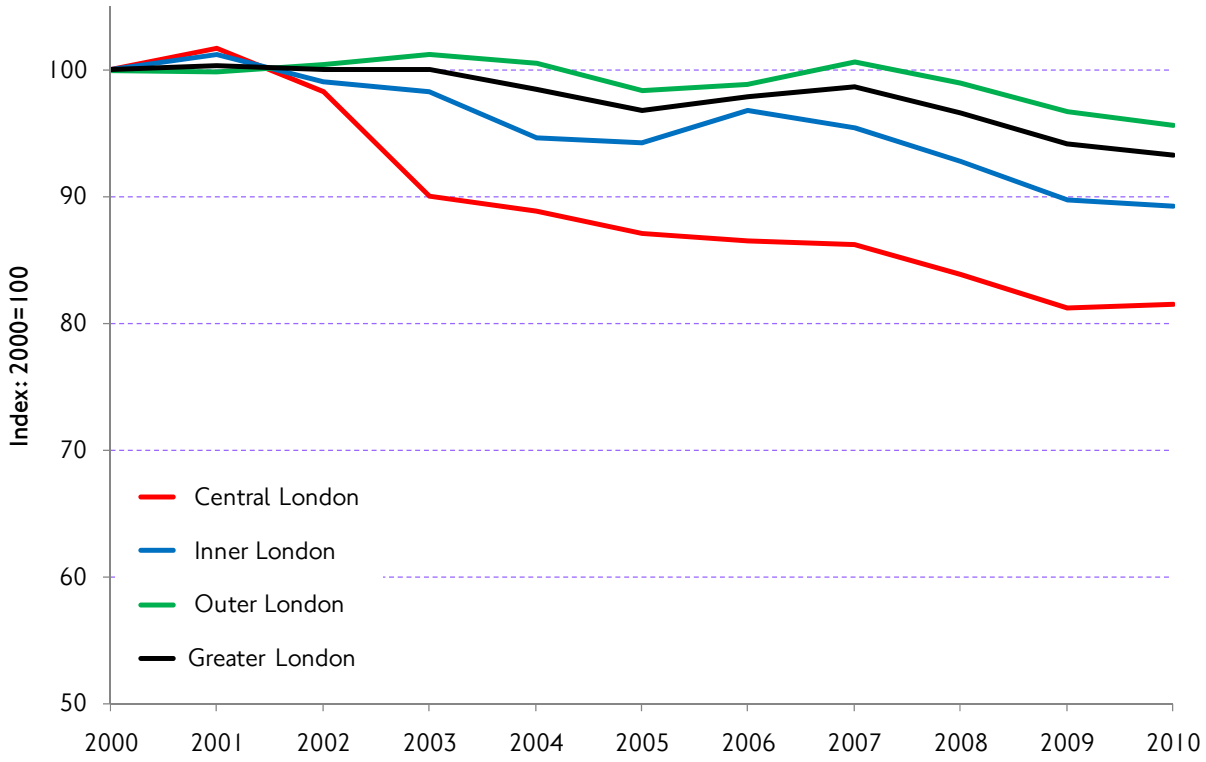
Source: Office of Rail Regulation.

3.11 Modal trends – overall road traffic volumes

Over the last decade the general pattern has been for a progressive decline in the volume of traffic on London's roads. Total vehicle kilometres in the 2009 calendar year were estimated to be 5.9 per cent lower than in 2000 - a net loss of approximately 1.9 billion vehicle kilometres. However, the years between 2005 and 2007, before the economic recession, saw small overall year-on-year growth. The trend towards lower traffic flows was most pronounced in central London, where vehicle kilometres fell by 18.8 per cent between 2000 and 2009, this only partly reflecting the impact of congestion charging from 2003. In Inner London the equivalent fall was 10.3 per cent, and in Outer London a fall of 3.3 per cent.

Figure 3.8 shows this historic trend and is updated to show 2010 values, from which it is clear that recent years have seen a continuation of the established trend. To account for a change in the sample of traffic counting sites available to calculate the 2010 values, the values for 2009, previously published in Travel in London report 3, have been re-based so that the 2009 and 2010 values are consistent in Figure 3.8. Total road traffic by motor vehicles in London continued to fall in 2010, down by 0.9 per cent in relation to the revised estimate for 2009 and 7 per cent lower, in aggregate, than in 2000. Looking at the most recent two years, Greater London traffic overall fell by 3.5 per cent, with falls of 3.8 and 3.4 per cent in Inner and Outer London, respectively.

Figure 3.8 Trends in road traffic (vehicle kilometres), all motor vehicles in central, Inner and Outer London. Index: year 2000=100.



Source: TfL Strategy and Planning.

Noteworthy from Tables 3.4 and 3.5 are that:

- Central London accounts for just 3.3 per cent of all traffic in Greater London. Inner London accounts for 26.7 per cent. Outer London, however, accounts for 70 per cent of all traffic in London, and hence trends in total London traffic most closely reflect trends in Outer London.
- Falling traffic levels in central and Inner London have been a persistent feature for most years of the last decade.
- Whilst the trend towards falling traffic levels has been established in London for almost a decade, 2008 saw the first falls in traffic volume at the national level since the oil crises of the mid 1970s. This was repeated in both 2009 and 2010, with UK traffic in 2010 being 3.3 per cent lower than the high point of 2007.
- Reductions in vehicle kilometres have been proportionately greater on minor roads compared to major roads, which may reflect a tendency towards greater 'traffic calming' measures on the former, and less preferential diversion to minor roads for longer journeys – given reduced overall traffic and relatively constant congestion (see also section 4.12 of this report).

Table 3.4 London road traffic (billion vehicle kilometres) by central, Inner and Outer London. All motor vehicles.

	Billion vehicle kilometres				
Year	Central London	Inner London	Outer London	Greater London	Great Britain
1993	1.3	8.7	20.7	30.7	412.3
1994	1.3	8.8	21.0	31.1	421.5
1995	1.3	8.9	21.0	31.2	429.7
1996	1.3	8.9	21.3	31.5	441.1
1997	1.3	8.9	21.5	31.7	450.3
1998	1.3	8.9	21.7	31.9	458.5
1999	1.3	9.1	22.3	32.7	467.0
2000	1.3	9.0	22.2	32.5	467.1
2001	1.3	9.1	22.1	32.6	474.4
2002	1.3	8.9	22.3	32.5	486.5
2003	1.2	8.9	22.5	32.5	490.4
2004	1.1	8.6	22.3	32.0	498.6
2005	1.1	8.5	21.8	31.4	499.4
2006	1.1	8.7	21.9	31.8	507.5
2007	1.1	8.6	22.3	32.0	513.0
2008	1.1	8.4	21.9	31.4	508.9
2009	1.0	8.1	21.4	30.6	504.0
2010	1.0	8.1	21.2	30.3	495.9

Source: TfL Strategy and Planning.

Table 3.5 Index of London road traffic (all motor vehicles, based on vehicle kilometres). Index: year 2000=100.

Year	Central London	Inner London	Outer London	Greater London - major roads	Greater London - minor roads	Greater London - all roads	Great Britain
2000	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2001	101.7	101.2	99.8	100.7	99.5	100.3	101.6
2002	98.2	99.0	100.5	100.3	99.5	100.0	104.2
2003	90.0	98.3	101.3	100.3	99.4	100.0	105.0
2004	88.8	94.6	100.6	99.4	96.8	98.5	106.7
2005	87.0	94.3	98.4	96.0	98.2	96.8	106.9
2006	86.5	96.8	98.9	97.4	98.6	97.8	108.6
2007	86.2	95.4	100.6	99.2	97.7	98.6	109.8
2008	83.8	92.7	98.9	97.4	95.2	96.6	108.9
2009	81.2	89.7	96.7	95.1	92.5	94.1	107.9
2010	81.5	89.2	95.6	95.0	90.2	93.3	106.2

Source: TfL Strategy and Planning.

3.12 Modal trends – road traffic crossing strategic counting cordons and screenlines

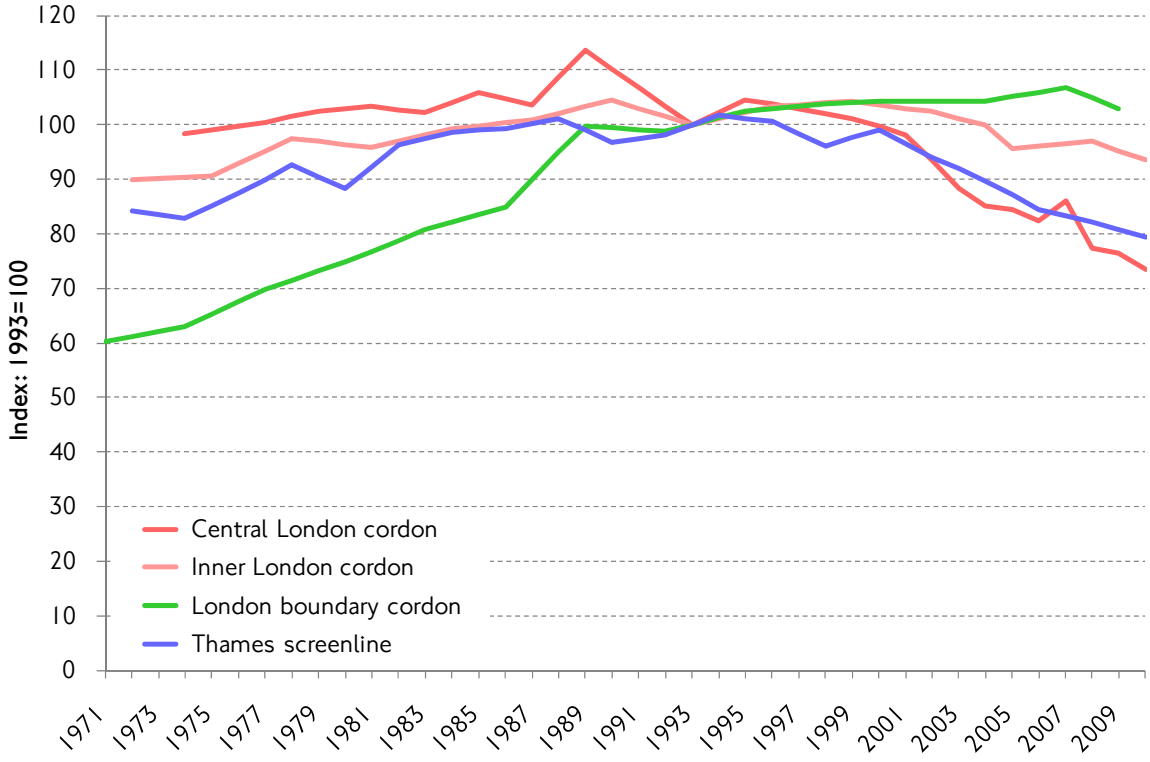
Long term trends in traffic are also monitored by TfL's regular surveys of vehicles crossing strategic cordons and screenlines in London. These provide a complementary view of overall traffic trends and generally mirror the trends described in the previous section, but on a different geographical basis. Estimates

from TfL's three long-standing cordons are best thought of as reflecting vehicles entering and leaving the area enclosed by the respective cordon (ie the cordon at the outermost periphery of that area). Estimates from TfL's Thames screenline are for traffic crossing the river Thames within the Greater London boundary, across the limited number of bridges and other crossing points that are available. Cordons and screenlines are counted on either an annual or biennial basis.

Overall traffic trends as shown by cordons/screenlines

Figure 3.9 shows trends for all motor vehicles. The general picture is similar to that shown by Figure 3.8, with recent years tending to see falling levels of traffic, particularly across the central cordon and Thames screenline. Between 2000 and 2010 all indicators have registered overall falls, these being 26.2 per cent at the central cordon, 9.8 per cent at the inner cordon, 1.2 per cent at the outer cordon (to 2009) and 19.8 per cent across the Thames screenline. Over the most recent year (2009-2010), equivalent reductions were: 3.9 per cent at the central cordon, 1.8 per cent at the inner cordon, 1.8 per cent at the outer cordon (to 2009) and 1.7 per cent across the Thames screenline.

Figure 3.9 Vehicles crossing cordons enclosing central, Inner and Outer London, and crossing the River Thames screenline. Index year 1993=100. Weekdays, both directions, all motor vehicles.



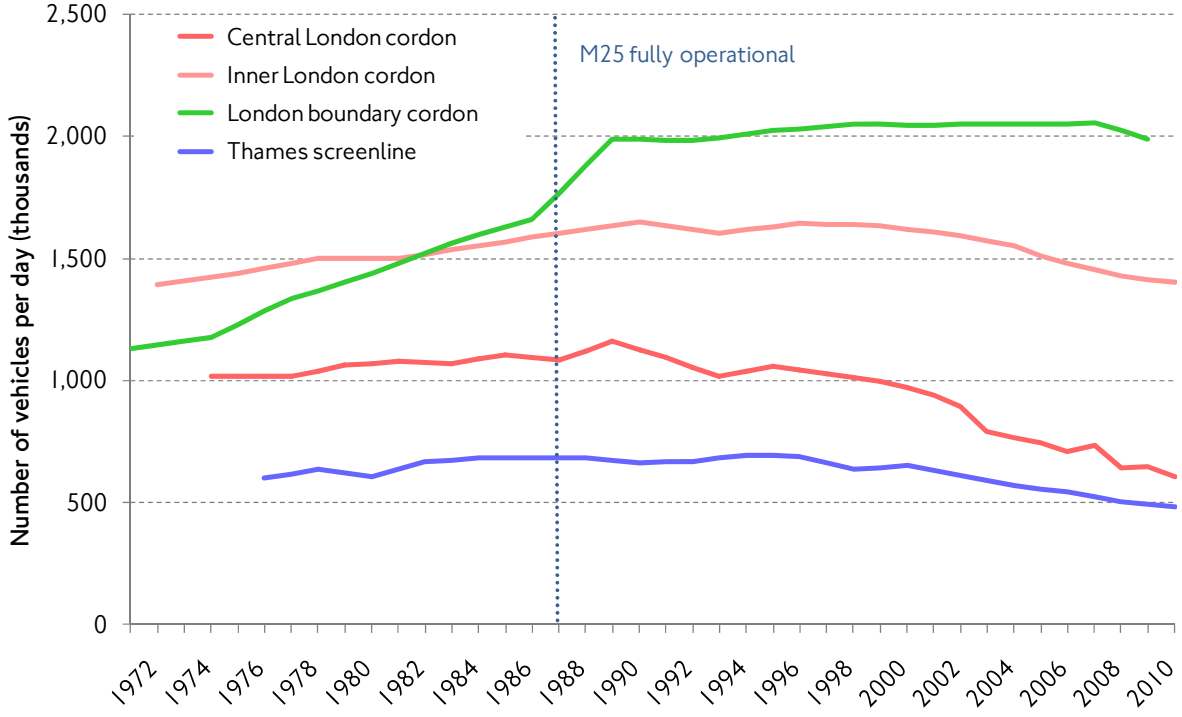
Source: TfL Road Network Performance.

Trends for cars as shown by cordons/screenlines

Cars account for about 80 per cent of all motorised vehicle kilometres in London, although the proportion varies from 82 per cent in Outer London to about 55 per cent in central London. Figure 3.10 shows trends for cars only at TfL's cordons and screenlines. Given the predominance of cars in the overall traffic mix, it is not surprising that the trends generally mirror those of Figure 3.9 for general traffic.

However, there are some interesting differences. Overall reductions in numbers of cars at the central, inner and London boundary cordons and the Thames screenline between 2000 and 2010 were greater than for all motor vehicles, at 37 per cent, 13 per cent, 3 per cent (to 2009) and 26 percent, respectively. These are comparable to reductions of 26 per cent, 10 per cent, under 1 per cent and 20 per cent, respectively, in motor vehicles of all types.

Figure 3.10 Cars crossing cordons enclosing central, Inner and Outer London, and the River Thames, thousands. Weekdays, both directions.



Source: TfL Road Network Performance.

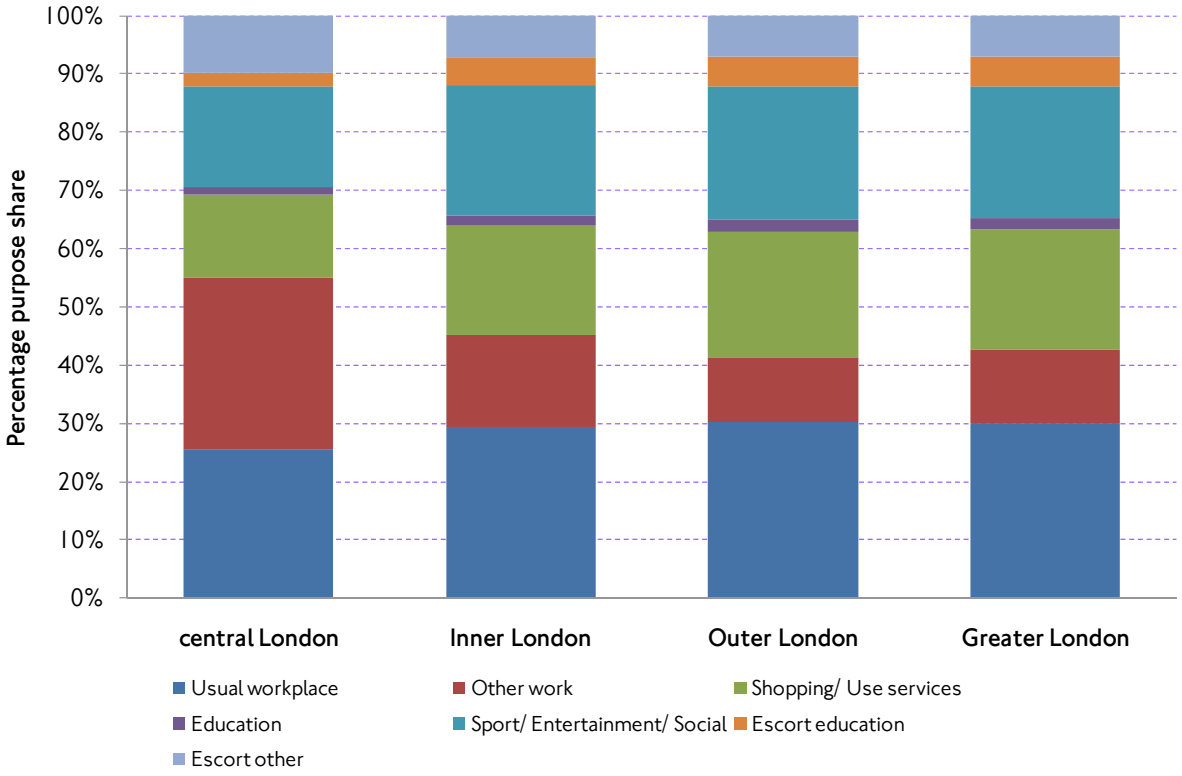
Traffic trends for other vehicle types as shown by cordons/screenlines

It is also possible to examine trends for other vehicle types using TfL's cordon and screenline data. Trends for freight vehicles (vans and lorries) are examined in section 3.14 of this report, whilst those for pedal cycles are considered in section 3.13.

Indicative journey purpose split for car travel

Establishing the purposes for which people make car trips is increasingly important from the perspective of developing policies to optimise the use of scarce road space, and to incentivise the use of public transport alternatives, or walking and cycling. During 2008/09 TfL conducted a large-scale programme of roadside interview surveys (RSIs), which involved stopping samples of drivers at the roadside and administering a short questionnaire. The primary purpose of these surveys was to gather data for calibration of TfL's new sub-regional Highway Assignment Models (see also Chapter 12 of this report). However, the surveys also produced data of more general use, including those underlying Figure 3.11, which shows (by area of London) the range of journey purposes captured – which is representative of traffic in each of the three areas considered. Note that the purpose splits shown relate to the car driver.

Figure 3.11 Indicative journey purpose split for car driver trips. Working weekdays 06:00 to 20:00, 2008/09.



Source: TfL Strategy and Planning.

Overall, between a quarter and one third of car-driver trips in London are for the purpose of getting to or from a usual workplace – this proportion becoming progressively higher with distance away from central London. The next most frequent purpose – sport/entertainment/social (ie leisure purposes) accounts for up to one quarter of all trips, the proportion again tending to increase with distance from central London. This is also the case with trips for shopping or using services – these 'personal business' trips together accounting for around half of all car driver trips in London. Trips for other work purposes (typically employer's business trips) predominate in central London, where they account for roundly 40 per cent of all trips, but diminish considerably in proportion with distance from central London. Trips made for the purpose of escorting another person ('escort trips') account for roundly 10 per cent of car driver trips in all areas of London.

3.13 Modal trends – cycling

This section looks at the recent trends in levels of cycling in London, concentrating on the main measures of cycling activity, including average daily stages and trips by cycle, and cycle flows on the road network. Chapter 11 of this report provides a more detailed look at the London Year of Cycling in 2010 and reports on the progress of the schemes, including the Barclays Cycle Hire Scheme and Barclays Cycle Superhighways, introduced to stimulate growth in cycling – which is a key aim of the Mayor's Transport Strategy.

Cycle journey stages and trips

A new method for tracking the daily average numbers of cycle stages and trips in London was introduced in Travel in London report 3. The estimates are based on counts of cyclists on the road network, expressed in terms of total cycle kilometres travelled, from which aggregate numbers of cycle journey stages and trips are derived using data from the LTDS survey. Within this total, data from TfL's automatic counters are used to give the growth of cycling on the main TLRN road network. The same method has been used to update the results to 2010, and the series for both cycle journey stages and cycle trips, are shown in Table 3.6. These results are also included in the aggregate statistics of daily journey stages and trips, by mode of transport, discussed in Chapter 2 (see Sections 2.5 and 2.6, and Tables 2.1 and 2.2) where they are used to derive both stage-based and trip-based mode shares.

On an average day in 2010 there were 540,000 cycle stages in London and 490,000 trips where cycle was the main mode, usually to cycle all the way. The difference is due to cycle stages used in conjunction with other modes of transport, such as cycling to or from a station before or after a rail journey stage. There was a 5.8 per cent increase in London's cycle journey stages between 2009 and 2010. This follows an increase of 5.0 per cent in the previous year, and results in a net increase of 70 per cent over the whole period between 2001 and 2010.

Table 3.6 Daily average cycle stages and trips in London.

	cycle stages		cycle trips
	Millions	year on year change %	Millions
2000	0.29	*6*	0.27
2001	0.32	*12*	0.30
2002	0.32	*1*	0.30
2003	0.37	*14*	0.32
2004	0.38	*3*	0.33
2005	0.41	*9*	0.39
2006	0.47	*12*	0.42
2007	0.47	-	0.42
2008	0.49	*5*	0.44
2009	0.51	*5*	0.47
2010	0.54	*6*	0.49

Source: TfL Strategy and Planning.

Cycle flows on the TLRN

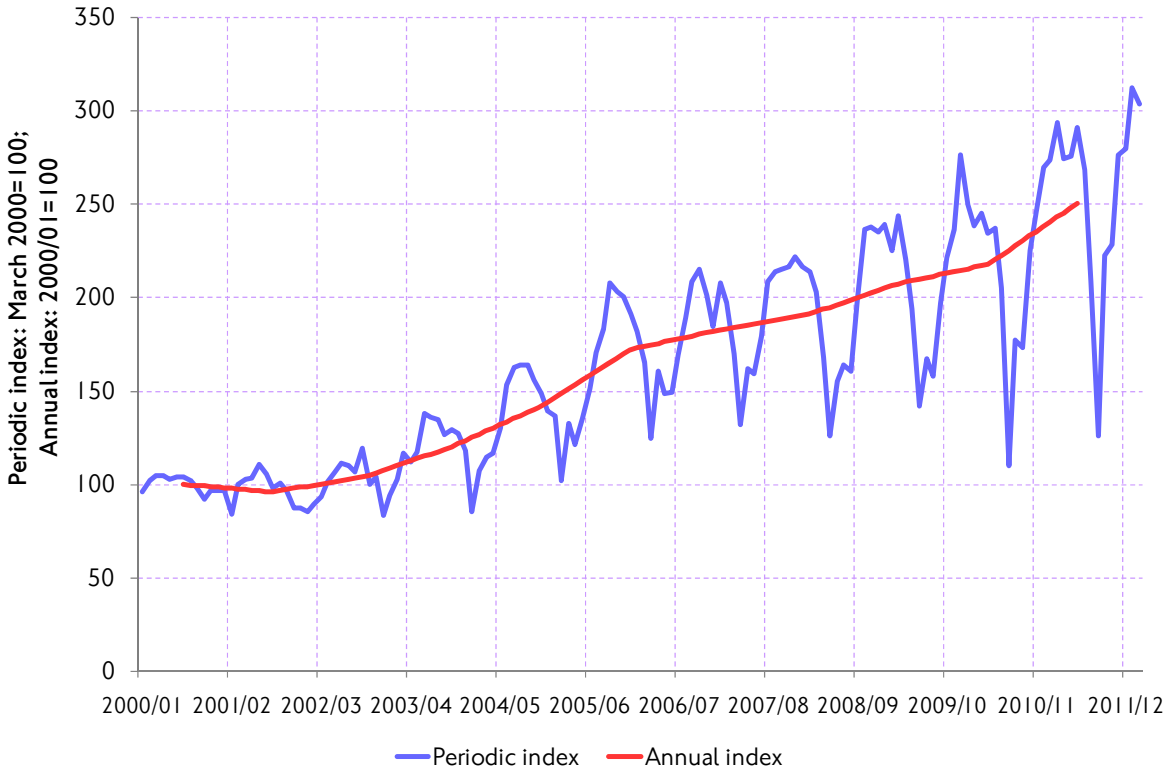
TfL monitors levels of cycling on the TLRN through data collected by permanent automatic cycle counters. Figure 3.12 shows the TLRN cycling index, calculated from these data as the average over the sites of daily flows within each 4-week reporting period, and expressed as an index with base year 2000/01.

Between 2000/01 and 2010/11 the index increased by 150 per cent – that is, average cycle flows on the TLRN grew by a factor of 2.5 over the 10 years. The index

increased by 15 per cent between 2009/10 and 2010/11, following an increase of 5 per cent in the previous year.

The chart also shows the seasonal variation in levels of cycling, shown by the peaks and troughs in the series, which may be affected by abnormal weather conditions as well as the natural tendency of more people to cycle in summer than in winter. The winter troughs also coincide with the holiday period around Christmas and the New Year, when cycling for commuting on the TLRN is expected to be very low. These troughs were particularly deep in the relatively severe winters of 2009/10 and 2010/11 affecting the index for both 2009 and 2010 calendar years. The percentage change between 2009 and 2010 was 11.7 per cent, lower than the 15 per cent increase on a financial year basis between 2009/10 and 2010/11. Highest rates of growth in 2010/11 were in the final quarter, January to March 2011, averaging 27 per cent year-on-year growth. This higher growth may be attributed to a number of factors including better weather conditions compared with the same period in 2010, increasing take up of Barclays Cycle Hire and use of the Barclays Cycle Superhighways.

Figure 3.12 Trends in cycle flows on the TLRN – annualised and periodic indices.

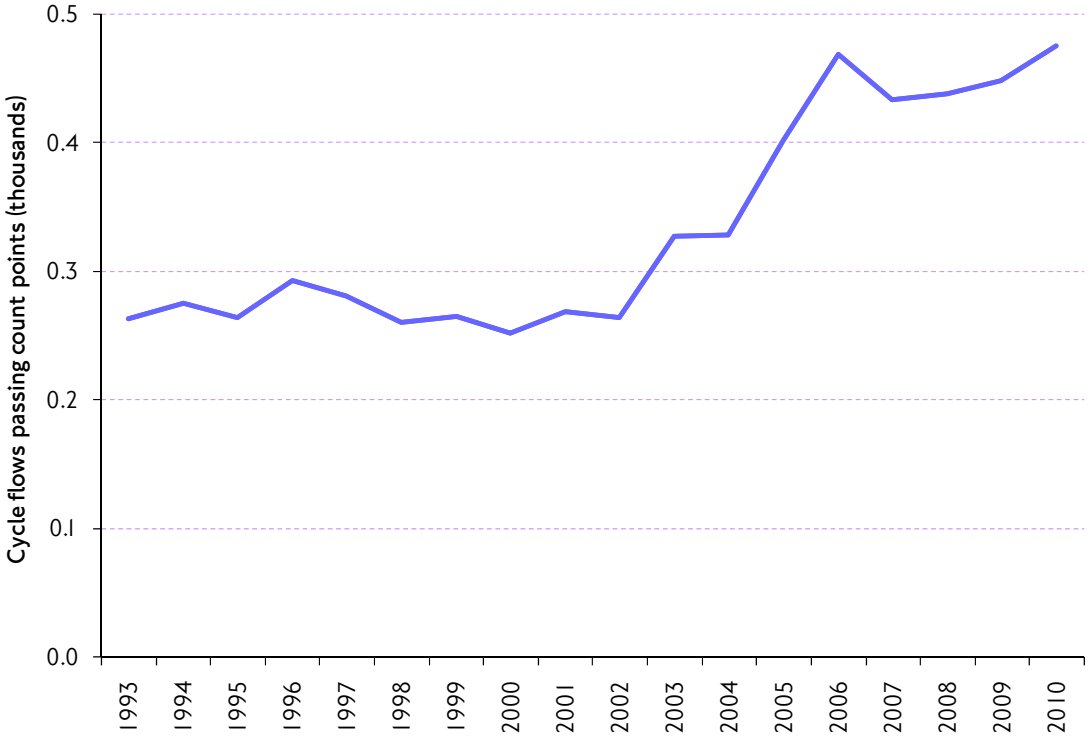


Source: TfL Surface Transport.

Average cycle flows on London's major roads

Figure 3.13 shows average daily two-way cycle flows on London's major roads since 1993, based on the DfT National Road Traffic Survey. (Major roads are all class A (principal) roads in London, including boroughs principal roads as well as the TLRN). Similarly to the TfL cordon counts, they show a change in trend at about the start of the last decade. The trend was effectively flat between 1993 and 2002, but has since increased in all years apart from between 2006 and 2007. Average daily flows in 2010 were 77 per cent higher than in 2001 and 6 per cent higher than in 2009. These growth rates for major roads are similar to the growth rates for all cycle stages in London as set out at the beginning of this section (Table 3.6).

Figure 3.13 Trends in cycle flows on major roads in London.



Source: Department for Transport.

Cycle flows at the strategic cordons

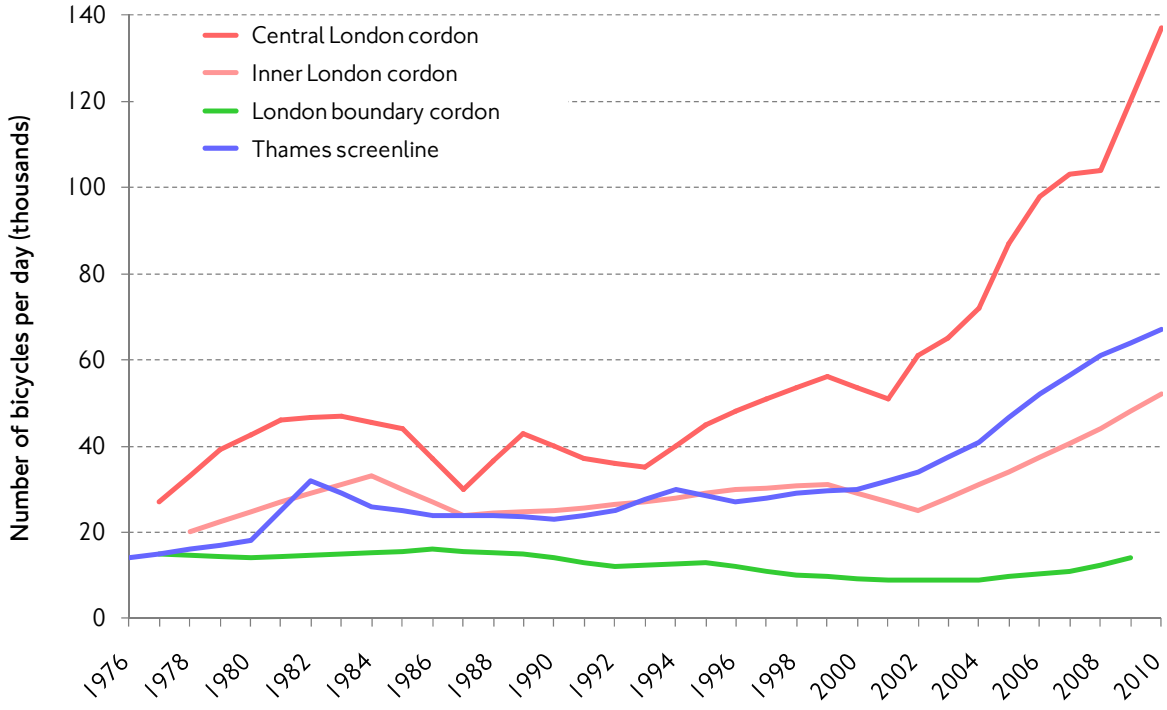
Figure 3.14 shows the levels of cycle flows crossing the three strategic cordons in London and the Thames screenline between 1976 and 2010, taken from TfL's annual programme of traffic monitoring counts. These data are the total number of cycles crossing the cordon in a full weekday (24-hours). Surveys for a cordon are taken at the same time of year on each occasion, with a programme of single day counts at each site being spread over several weeks. Since 2001, the central London cordon has been counted every year, with other cordons surveyed every 2-3 years and interpolated for the intervening years.

Although there is some statistical fluctuation due to daily variation of flows, the long-term trends are clear. At all cordons, cycling levels remained almost constant until around year 2000 and then started to increase. Rates of growth are highest at the central London cordon and on the Thames screenline, which continued to experience growth throughout the decade. The Thames screenline increased at the higher rate until 2008 but at a lower rate than the central London cordon for the latest 2 years. The central cordon grew by 15 per cent between 2008 and 2009 and 14 per cent between 2009 and 2010; while the Thames screenline grew by nearly 5 per cent a year in this period (see Table 3.7).

Growth in cycling has also occurred at the Inner London cordon and, from a much lower base, at the London boundary cordon, but in both cases this started later, with low growth before 2004, and continued at a lower rate than for central London. The inner cordon grew by 9 per cent a year between 2008 and 2010 (the boundary cordon was not surveyed in 2010).

This shows that the upward trend in cycling over the past 10 years has been widely spread across London as a whole, but the recent acceleration has been concentrated mainly towards the centre of London.

Figure 3.14 Long-term trends in cycling across strategic cordons and screenlines in London, 24-hour weekdays, both directions.



Source: TfL Strategy and Planning.

Table 3.7 Trends in cycle flows across strategic screenlines and cordons in London.

	Central London cordon	Thames screenline	Inner London cordon	London boundary cordon
Index (year 2000=100)				
2000	100	100	100	100
2004	135	137	107	96
2008	194	203	152	134
2009	224	213	166	150
2010	256	223	179	..
Annual percentage rate of growth				
2000 to 2004	*8%*	*8%*	*2%*	*-1%*
2004 to 2008	*10%*	*10%*	*9%*	*9%*
2008 to 2009	*15%*	*5%*	*9%*	*12%*
2009 to 2010	*14%*	*5%*	*9%*	..

Source: TfL Strategy and Planning.

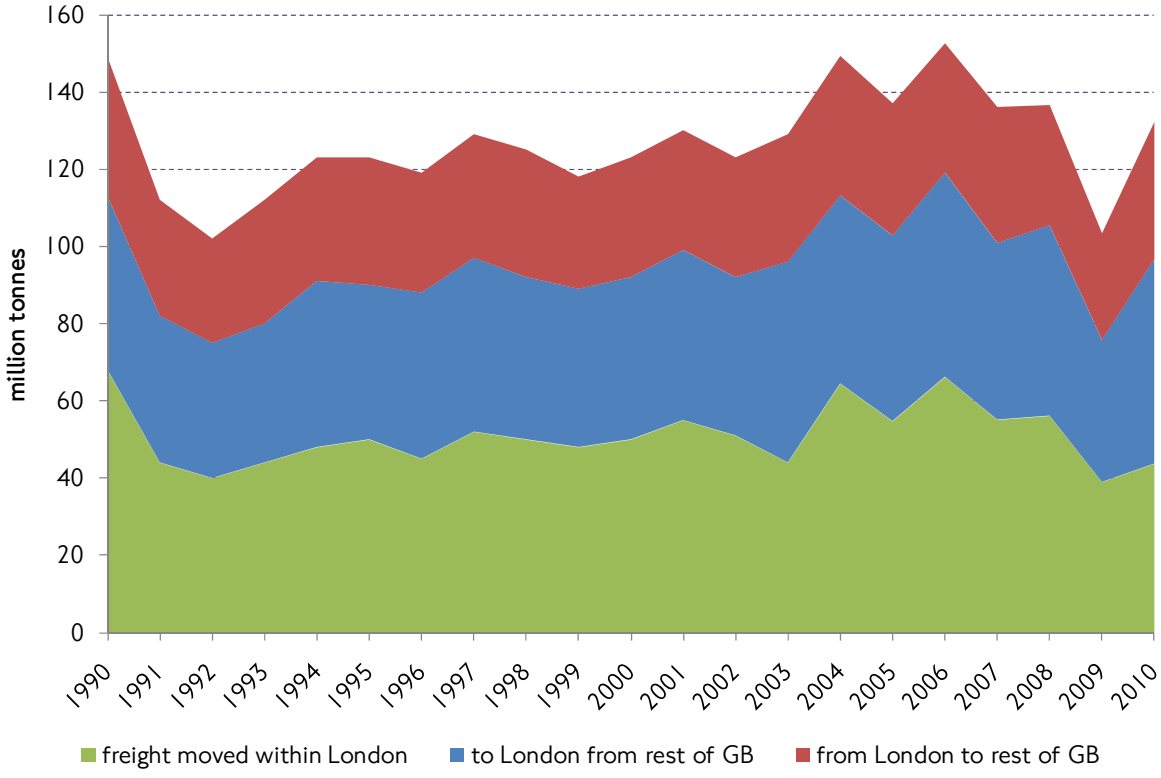
3.14 Modal trends – freight in London

The volumes of freight moved to, from or within London showed clear evidence of the impact of the economic recession, with Travel in London report 3 recording a fall of 25 per cent between 2008 and 2009 in the volume of road freight lifted, alongside reductions of 8 and 12 per cent in rail and waterborne freight respectively. Available indicators for 2010, however, suggest recovery, particularly for road freight.

Road freight – tonnage lifted

Road freight moved in London by GB registered vehicles increased sharply in 2010, recovering from the dip in 2009 and increasing by 29 per cent to 132 million tonnes, just 3 per cent lower than in 2008. Goods moved from outside London to a destination within London, which make up 40 per cent of the tonnage, increased most, by 44 per cent. Goods moved from within London to destinations outside (27 per cent of tonnage) increased by 29 per cent. A third of goods are moved wholly within London and these increased by 12 per cent. Aggregates, crude minerals and construction materials contributed most of the increased weight of goods moved, reflecting recovery in construction activity, while petroleum products and machinery also increased.

Figure 3.15 Tonnage of road freight lifted in London by GB registered heavy goods vehicles.



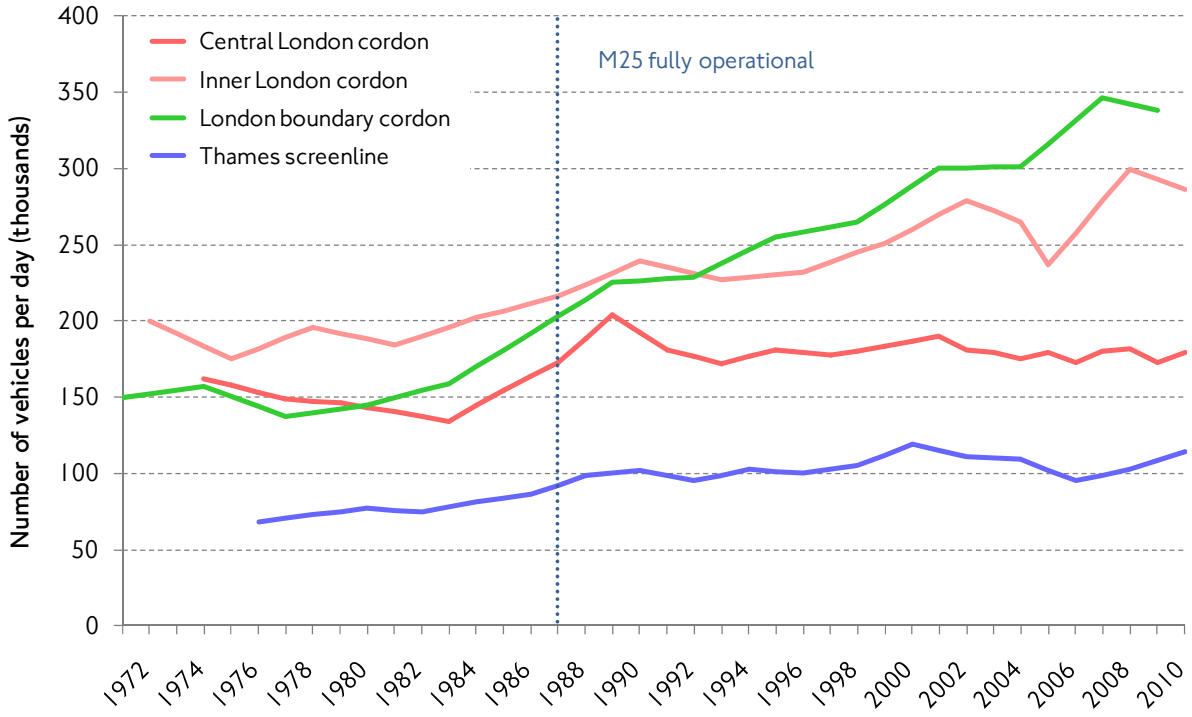
Source: TfL Strategy and Planning.

Road freight – freight vehicle traffic trends

Figures 3.16 and 3.17 show long-term trends for vans and other goods vehicles (lorries) in London, based on the cordon and screenline based traffic counts described in Section 3.12 of this report.

For vans, there has been strong growth since year 2000 at the London boundary cordon but some decline between 2007 and 2009, in line with the economic downturn. The inner cordon also showed a decline following strong growth between 2005 and 2008. By contrast, the number of vans crossing into central London or crossing the Thames screenline has been quite stable since the mid-1990s. Net growth at each cordon or screenline between years 2000 and 2010 has been as follows: central 4 per cent, inner10 per cent, boundary17 per cent (to 2009), and Thames 4 per cent.

Figure 3.16 Vans crossing cordons enclosing central, Inner and Outer London, and crossing the River Thames screenline, thousands. Weekdays, both directions.

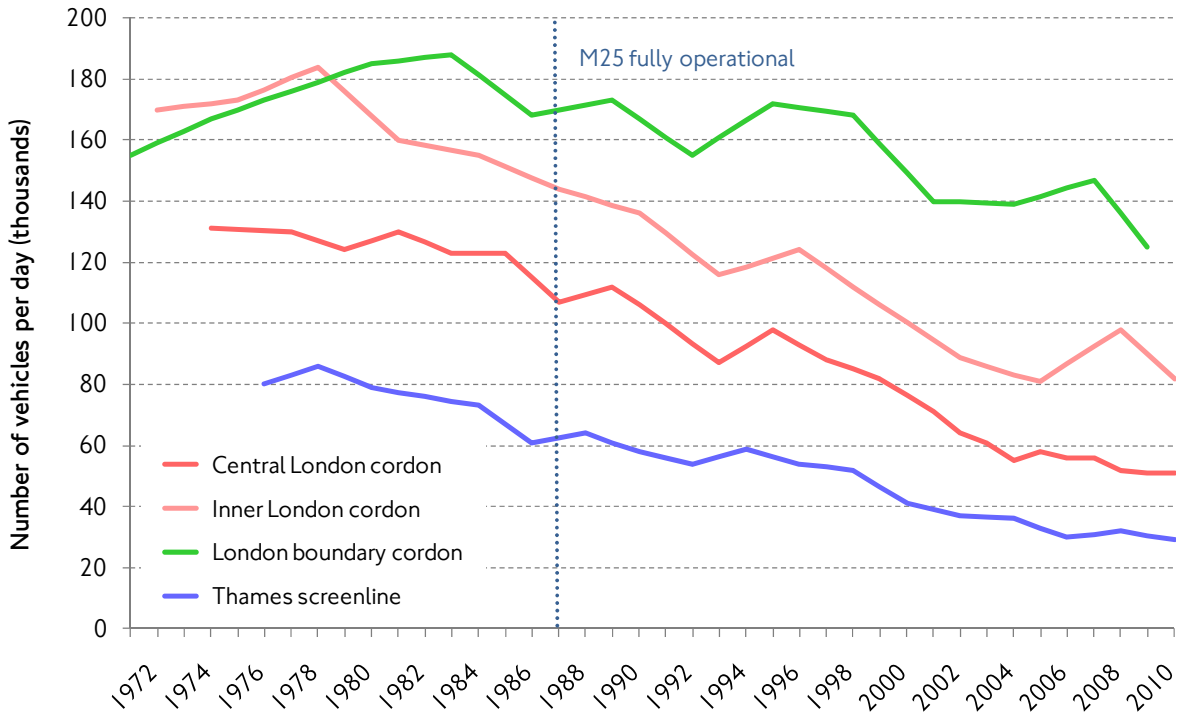


Source: TfL Road Network Performance.

Other goods vehicles (lorries) show distinctly different trends (Figure 3.17), with strong declines across all cordons, particularly into central London and across the Thames. After growth in other goods vehicles crossing the inner and boundary cordons between 2005 and 2007, the recession seems to have had a more enduring impact than for vans, with the prevailing downward trend continuing post 2008. Net growth at each cordon or screenline between years 2000 and 2010 has been central 33 per cent, inner 18 per cent, boundary 16 per cent (to 2009), and Thames: 29 per cent.

Cordon crossings for HGVs for the latest year are, however, at variance with the upturn for road freight lifted, as shown in Figure 3.15, showing continued decline at those cordons for which a vehicle count was made in 2010. Whilst related, these two estimates measure different things, and it is possible that changes to the pattern of freight distribution (eg increased use of vans), or factors specific to the cordon counts (time of year) account for the apparently differing trends shown.

Figure 3.17 Other goods vehicles crossing cordons enclosing central, Inner and Outer London, and crossing the River Thames screenline, thousands. Weekdays, both directions.



Source: TfL Road Network Performance.

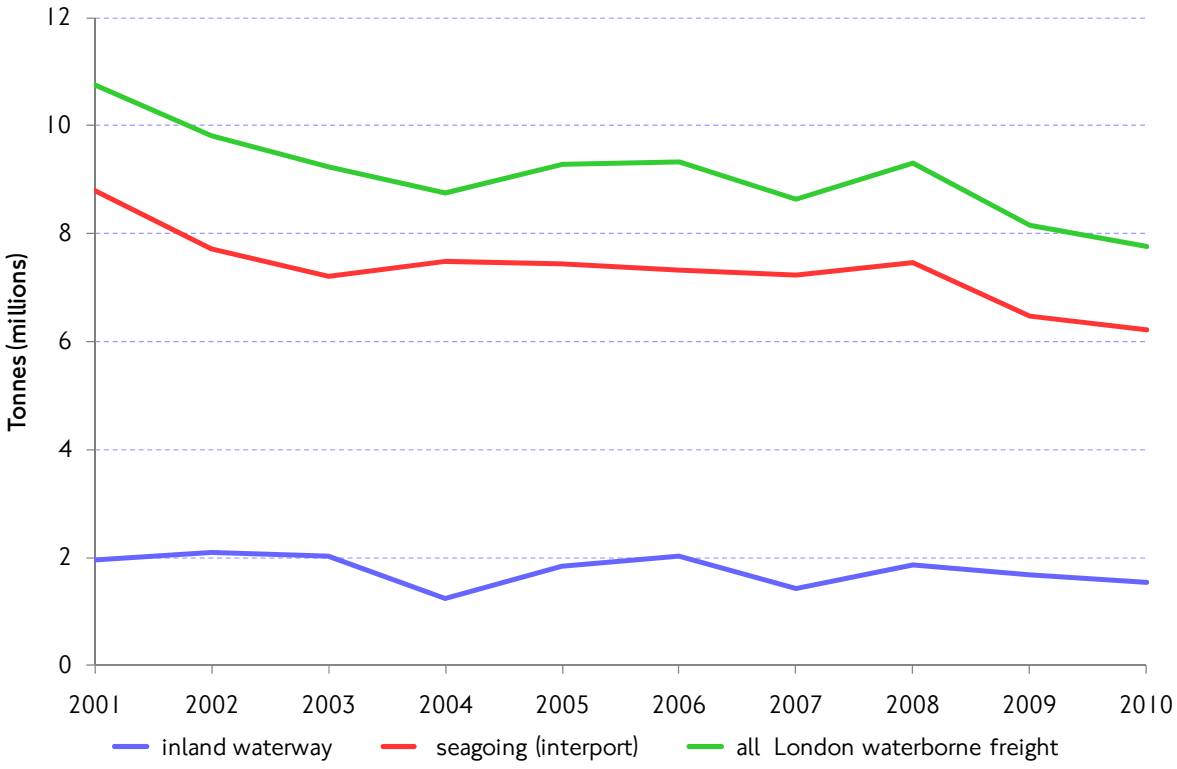
Rail freight

Travel in London report 3 recorded that 6.7 million tonnes of rail freight was lifted in London during 2009. This was 8 per cent less than in 2008. It is not possible to update this indicator for 2010 as the required data are not yet available.

Waterborne freight

Waterborne freight to and from Thames wharves accounts for about 7 per cent by weight of all freight lifted in London. This traffic is of two types, inland waterway freight and sea-going cargo through the Port of London. Overall trends are shown by Figure 3.18. Tonnes lifted have edged down in recent years and have continued to do so in the most recent year.

Figure 3.18 Waterborne freight lifted in Greater London: inland waterway and seagoing cargos.

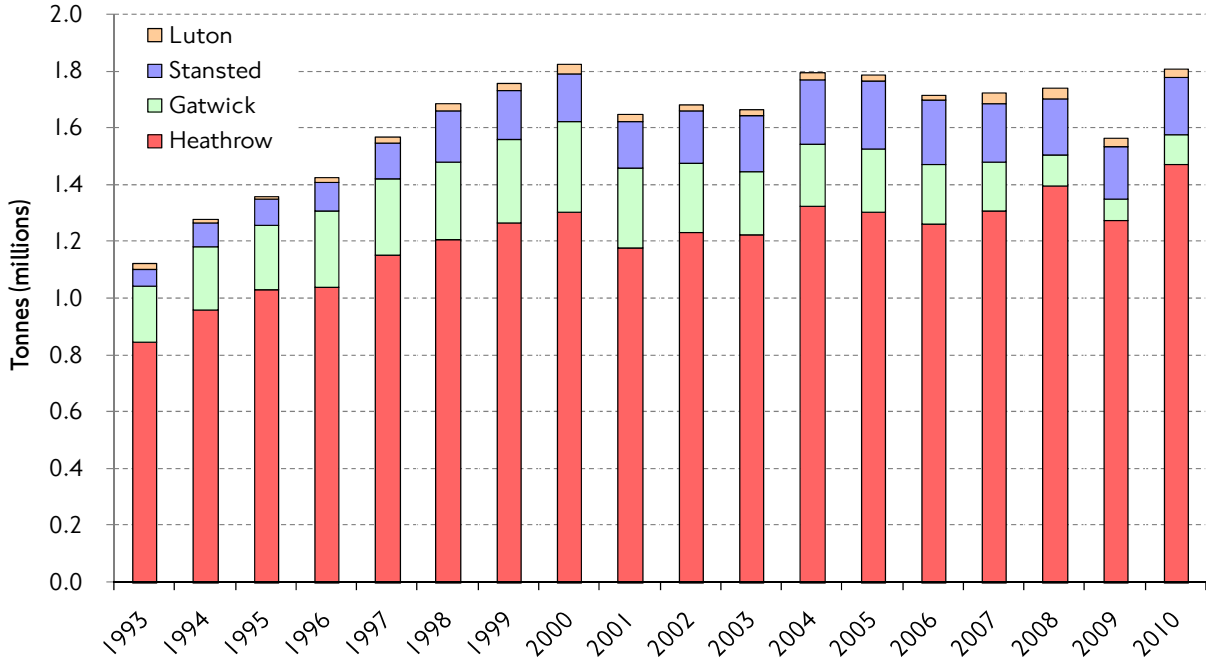


Source: TfL Strategy and Planning.
Note: revised estimate for 2009

Air freight

Air freight recovered strongly in 2010 with an increase of 16 per cent over 2009, following a dip of 10 per cent between 2008 and 2009 (Figure 3.19).

Figure 3.19 Air freight moved through London's principal airports.

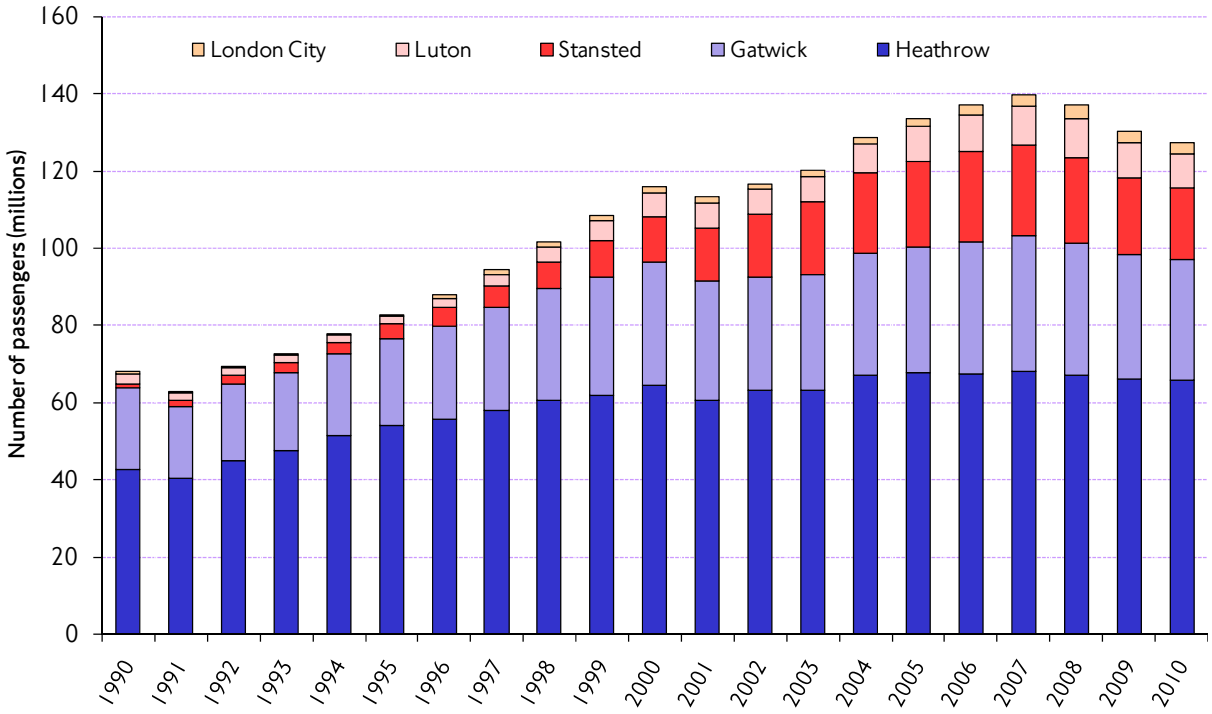


Source: Civil Aviation Authority.

3.15 Modal trends – travel by air

London has five international airports, of which three are among the 25 busiest airports in Europe. Heathrow accounts for 51.7 per cent of passengers using London's airports, with Gatwick a further 24.6 per cent, although the proportionate shares of Stansted (14.6 per cent in 2010) and Luton (6.9 per cent) continue to grow, reflecting their use by low-cost airlines. In 2010, 127 million people passed through London's airports, 2.3 per cent down on 2009 and 8.9 per cent down on the recent historic high point of 140 million in 2007, this continuing to reflect the recession and its aftermath (Figure 3.20) and with little evidence so far of a recovery.

Figure 3.20 Terminal passengers by London area airport.

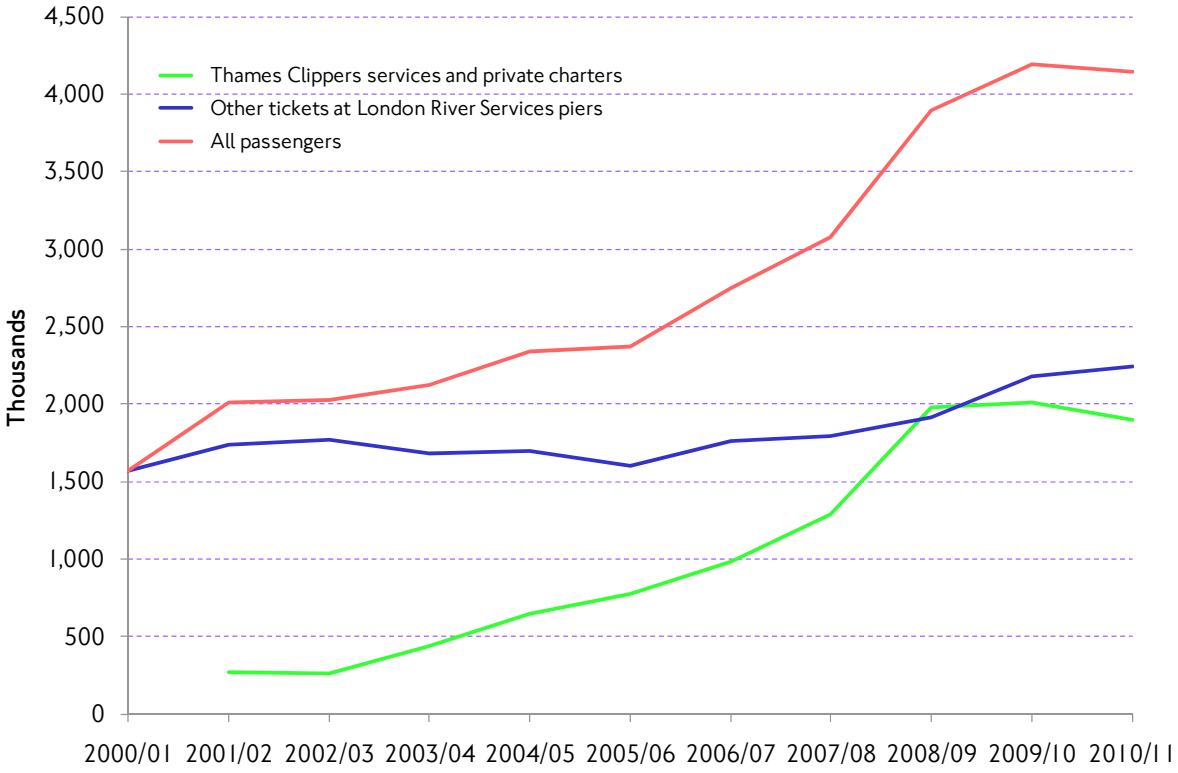


Source: Civil Aviation Authority.
Note: Terminal passengers are those passengers either joining or leaving an aircraft, including interlining and transfer passengers.

3.16 Modal trends – travel by river services

Over the past decade, the river Thames has increasingly been seen as providing an alternative to the major public transport networks for travel to, from and within central London, offering services to match the needs of commuters and leisure travellers. The recent growth in patronage for river services coincides with an expansion of the services provided and, from November 2009, the integration of Oyster 'pay-as-you-go' to commuter services. Figure 3.21 shows a pattern of strong growth, totalling 106 per cent overall since 2000, although the rate of growth has levelled off and patronage in fact declined slightly (by 2 per cent overall) during the most recent year.

Figure 3.21 Trends for passenger traffic using the River Thames.



Source: TfL Strategy and Planning.

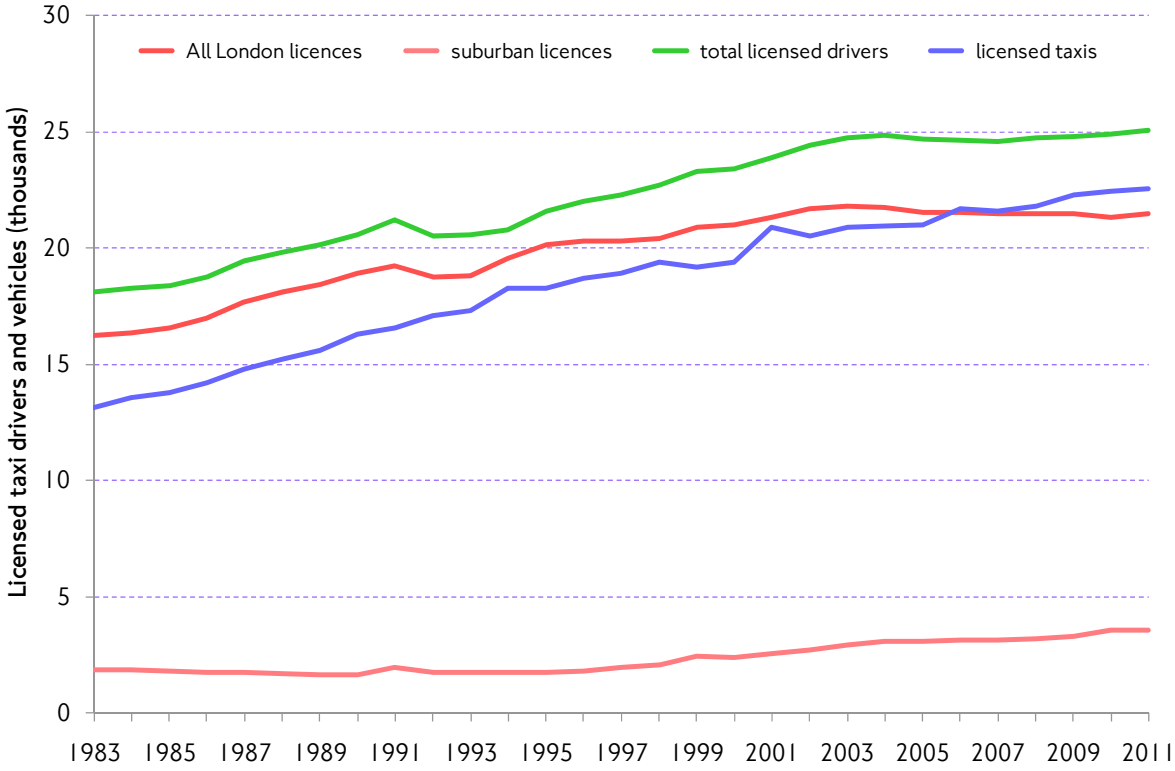
3.17 Modal trends – licensed taxis and private hire

Patronage of licensed London taxis ('black cabs') and TfL-licensed private hire vehicles ('minicabs') is not measured directly. However, it is known from combining several survey sources that licensed taxis account for around 200,000 journey stages per day, these particularly focused around central London, and that licensed private hire vehicles account for about 150,000 journey stages per day, these being more evenly distributed throughout London.

Licensed London taxis

Figure 3.22 shows the trend for numbers of licensed taxis (vehicles) and licensed taxi drivers. The historic trend is one of steady increase in all of the measures, although this has flattened noticeably over the last 4-5 years. As of 2011 there were 25,000 drivers in London licensed to ply for hire across the whole city - a marginal 1 per cent increase on 2010 and the highest figure ever recorded - together with 23,000 vehicles.

Figure 3.22 Key trends for licensed taxis and drivers in London.

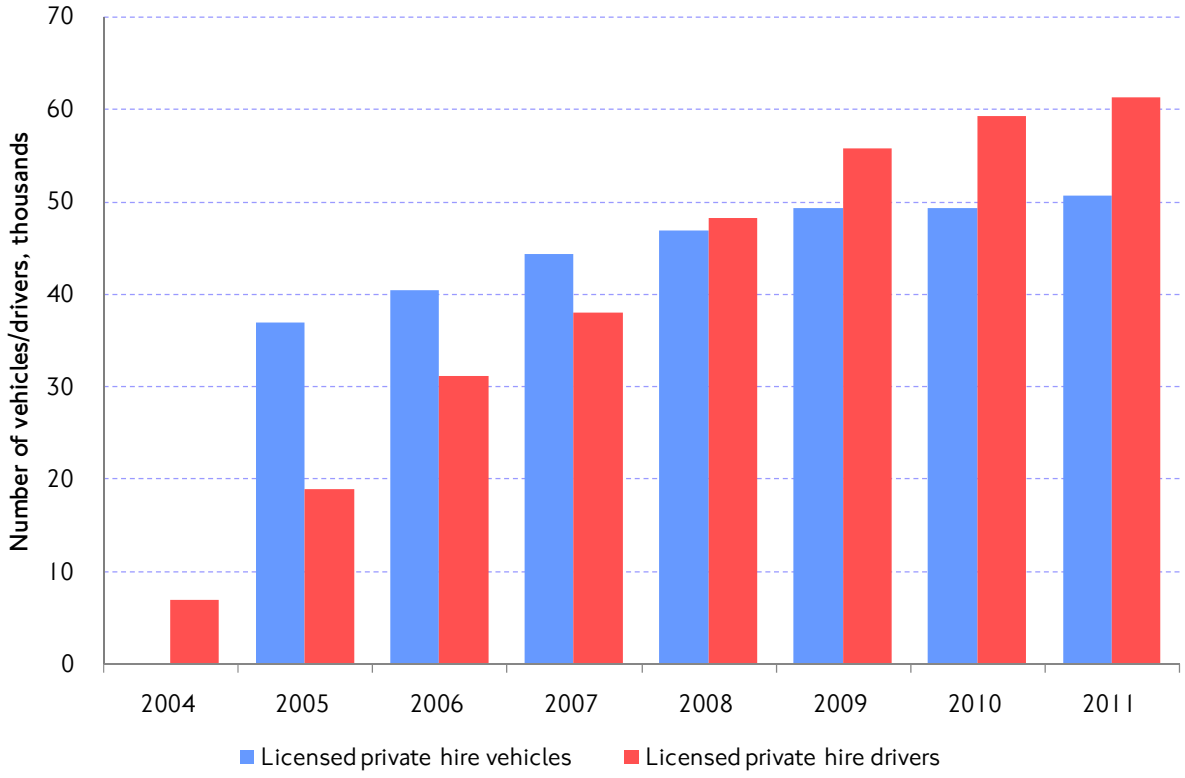


Source: TfL London Taxi and Private Hire directorate.
Note: Taxi drivers' licences are of two kinds. The majority (87 per cent) have an All London licence or 'Green Badge' that allows the driver to ply for hire anywhere within Greater London and at Heathrow airport. The remainder have Yellow Badges that are valid only in suburban sectors for which they are licensed. Outer London is divided into nine suburban areas and Yellow Badge drivers must apply to be licensed for those areas in which they wish to work. These drivers may accept a fare in their area to go anywhere in Greater London but must return to the area for which they are licensed before they can pick up another hiring.

Licensed London private hire vehicles

Licensing of private hire operators, vehicles and drivers was introduced progressively by TfL, commencing with operators from 2001, drivers from 2003 and vehicles from 2004, and this progression is reflected in Figure 3.23. Looking at the most recent four years as representing 'steady state' conditions with the licensing process, the trend is one of steady year-on-year increase.

Figure 3.23 Licensed private hire vehicles and drivers in London.



Source: TfL London Taxi and Private Hire directorate.

4. The performance of the transport networks

4.1 Introduction and content

The Mayor's Transport Strategy seeks to develop London's transport system to accommodate sustainable population and employment growth. It is expected in the MTS that there will be an additional 1.25 million people and 750,000 additional jobs in London by 2031. As well as developing the level of service offered, either through new infrastructure or intensification of existing services, it is also important that the transport networks offer a reliable level of service.

This chapter looks at the service supply and 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 discussed in the previous chapter. It covers the following ground:

- A summary of the performance of the key TfL operated mass public transport networks, together with National Rail in London, in terms of trends in transport service provision and operational reliability.
- The performance of the road network in London, in terms of traffic speeds, congestion and journey time reliability.
- Indicators of operating cost and asset condition for the road and public transport networks – basic indicators of operational effectiveness.

A Focus Topic within this chapter looks at quantifying the progressive removal of 'effective capacity' for London's road network, as referred to in previous Travel in London reports.

4.2 Review of historic trends

Service provision and operational performance of London's public transport networks

Public transport in London has, over recent years, benefitted from the longest run of sustained high performance and service provision ever recorded. All key indicators of service provision and performance have shown a marked trend of improvement over the past decade. Performance in more recent years has inevitably reflected disruptions associated with large-scale upgrade works particularly affecting the Underground, as well as periods of severe weather and industrial disputes, although close to highest-ever levels of service provision are being sustained and improved upon wherever possible.

Table 4.1 summarises key measures of service provision and operational performance, comparing values at the start of the decade (nominally 2000/01) with the most recent financial year (2010/11) – a ten year period. Clear and sometimes dramatic improvements are evident, as are the generally high levels of service and operational excellence now being sustained.

Table 4.1 Key indicators of public transport service provision and performance over last decade – summary typical values.

Mode	Measure	Start of decade	2010/11
Service provision			
Buses	Kilometres operated	365 million	486 million
LU	Kilometres operated	65 million	69 million
DLR	Kilometres operated	2.9 million	4.7 million
Tramlink	Kilometres operated	2.4 million	2.7 million
Service performance			
Buses	Excess Wait Time	2.2 minutes	1.0 minutes
LU	Excess Journey Time	8.5 min	6.5 min
DLR	Reliability	98%	98%
Tramlink	Reliability	99%	99%
National Rail	ORR L&SE PPM	80%	91%
Overground	ORR PPM	n/a	95%

Source: TfL Strategy and Planning.

Performance of the road network in London

There has been a long-term historic trend towards increasing congestion on London's roads. This has affected all of London, but has been particularly intense in central and Inner London where it dates back over two decades. Over much of the last decade congestion has been increasing despite static or falling traffic levels – this reflecting the progressive removal of 'effective capacity' for general traffic from the road network as a result of an increase in utility and development works, policy initiatives targeted at improving road safety, increased priority for public transport and pedestrians and cyclists, and improvements to the urban realm, among other factors. TfL's analysis of these trends suggests that the collective impact of these interventions over the past two decades has led to a significant loss of effective capacity - which may have been as high as 30 per cent in central London, 15 per cent in Inner London, and 10 per cent in Outer London.

However the latest available data on traffic speeds and congestion - data that have not been available historically - do suggest that the trend towards deterioration may have halted over the last 3-4 years, with some evidence of improvement on London's most major roads (the TLRN), albeit at historically high levels of congestion and in the context of falling traffic demand.

More recently, as part of developing the Mayor's Smoothing Traffic Flow agenda, TfL has developed a clear focus on the reliability of journey times by road, with a corresponding set of policy initiatives designed to improve this, and a corresponding quantitative indicator of journey time reliability. These initiatives are beginning to deliver quantifiable benefits – at least at the local level. The formal indicator of road journey time reliability suggests that between 88 and 90 per cent of journeys on London's roads are being achieved reliably – against a target of 89 per cent. However this varies considerably by corridor - and it is not yet possible, given the two years of comparable data now available, to discern a trend of overall improvement in this indicator at the London-wide level.

4.3 Recent developments – 2010 and 2010/11

Table 4.2 summarises the principal measures of service supply and performance in relation to the public transport networks reviewed in this chapter, covering the most recent three years. Looking at particular features from this table and summarising performance trends over the most recent year:

- The level of service provided by **London Underground** dipped in 2010/11, by 0.7 per cent, reflecting a combination of upgrade-related closures, asset failures, industrial action and periods of severe weather. However, the service provided over recent years has generally been at historically high levels, and the values for the most recent year should be seen in this context.
- Levels of service provision and reliability provided by the **bus** network reached new highs, with further incremental improvements to both kilometres operated and excess waiting times - building on the 'best ever' levels achieved the previous year.
- The **DLR** built on recent network extensions to operate approximately 2 per cent more train-kilometres than in 2009/10. However, these values do not include the further additional capacity created by the move from two- to three-car trains on the network. The proportion of the scheduled service actually operated increased slightly in 2010/11, and reliability, defined as the percentage of trains on-time, recovered this year to stand comparable with 'best ever' levels recorded in previous years.
- Within the context of a stable network, **Tramlink** again returned an impressive reliability value of 99.2 per cent of scheduled services operated – identical to the previous year.
- Overall performance of **National Rail** in London deteriorated in 2010/11, this deterioration principally affecting peak-time services and primarily reflecting the severe winter weather.
- **London Overground** recorded a Public Performance Measure (PPM) of 94.8 per cent for 2010/11 – a significant improvement on the value of 93.1 per cent the previous year – and the highest score for any L&SE Train Operating Company.

Table 4.2 Key indicators of service supply and performance – public transport networks. Trends over most recent three years (2008-2010).

Service and indicator	Units	2008 or 2008/09	2009 or 2009/10	2010 or 2010/11	Trend
Underground					
Level of service scheduled	Million train kms	73.2	71.8	72.1	Variable - but at historic high level
Level of service operated	% of schedule	96.4	96.6	95.6	Reduction in most recent year - but from historic high level
Service reliability	Standardised journey time	43.9	44.1	44.6	Recent deterioration
Service reliability	Excess journey time	6.6	6.4	6.5	Broadly stable
Bus					
Level of service scheduled	Million bus kms	492.4	497.2	498.5	Improving
Level of service operated	Percent	97.0	97.1	97.4	Improving
Service reliability	Excess Journey time	1.1	1.1	1.0	Improving
DLR					
Level of service scheduled	Million train kms	3.9	4.6	4.7	Developing network
Level of service operated	% of schedule	98.4	97.2	97.5	Below recent highs
Service reliability	% of trains on time	94.6	94.8	97.4	Recovery to near 'best recent' levels.
Tramlink					
Level of service scheduled	Million train kms	2.70	2.62	2.72	Incremental improvement
Level of service operated	% of schedule	98.5	99.2	99.2	Highest-ever levels
National Rail					
Service reliability – all L&SE operators	ORR PPM (% peak only)	88.7	88.8	86.9	Deteriorating
Service reliability – all L&SE operators	ORR PPM (% all services)	91.0	91.4	91.1	Stable
Service reliability – London Overground	ORR PPM (% all services)	92.6	93.1	94.8	Highest score for any L&SE Train Operating Company 2010/11

Table 4.3 shows key indicators of operational performance for the road network in London. Again summarising and highlighting developments over recent years:

- Indicators of road **traffic speeds**, derived from GPS satellite data and not available before 2006, suggest that overall traffic speeds (expressed as averages across a year) have been remarkably stable over the past three years. This applies equally to central, Inner and Outer London.
- Indicators of **excess delay** or **congestion** derived from this source also suggest a stable overall picture, with some improvement, particularly in Outer London and on the TLRN over the most recent two years.
- TfL's indicator of **journey time reliability** for road traffic suggests that between 88 and 90 per cent of road journeys in London are completed within the benchmark value of an 'allowable' excess of five minutes for a typical 30-minute journey (normalised). This compares to a nominal working target of 89 per cent for this measure. However, it is not yet possible to discern a clear directional trend over the two years of data for this indicator that are currently available at the London-wide level.

Table 4.3 Key indicators of service performance – road network. Trends over most recent three years.

Quantity and indicator	Units	2008 or 2008/09	2009 or 2009/10	2010 or 2010/11	Trend
Traffic speed	Average speed (kph) – GL	28.7	28.6	28.6	Stable
Congestion (excess delay)	Minutes per kilometre – GL	0.83	0.80	0.80	Some improvement
Journey time reliability	% of journeys within 30+5 minutes - GL	n/a	89.3	88.7	No clear trend

Table 4.4 covers the principal indicators of public transport crowding, alongside indicators for operating costs and asset condition for TfL services:

- Average **occupancy values** for Underground trains increased in the most recent year, although those for buses remained stable, as has the indicator of customer satisfaction with levels of crowding – this latter being a modal composite indicator across all of the principal public transport modes.
- Changes to gross operating expenditure combined with rising fares revenue reduced TfL's **net operating cost** significantly, with all modes recording lower net operating expenditure in 2010/11 compared to the previous year. TfL's net operating cost per passenger kilometre averaged 5 pence in 2010/11. The outturn in 2009/10 was 8 pence, although changes to accounting conventions between the years mean that these figures are not directly comparable.
- In terms of **asset condition**, 2010/11 saw completion of the comprehensive replacement of the London Overground train fleet, the near-completion of the fleet replacement programme for the Victoria Line, and the start of the roll-out of new sub-surface 'S' stock trains. In 2010/11, 89.2 per cent of TfL's asset was deemed to be in 'good condition', although a meaningful comparison with the score of 89.1 per cent for 2009/10 is not possible owing to changes in accounting conventions between the two years.

Table 4.4 Indicators of crowding, customer satisfaction and operational effectiveness. Trends over most recent three years.

Quantity and indicator	Units	2008 or 2008/09	2009 or 2009/10	2010 or 2010/11	Trend
Passengers per train – Underground only	Average per train across network	122.4	121.9	128.9	Recent increase
Passengers per bus	Average per vehicle across network	16.6	16.6	16.6	Stable
Satisfaction with crowding	Cross-modal composite score (out of 100)	76	76	76	Stable
Operating cost	Pence per passenger kilometre	n/a	8	5	Series break
Assets in state of good repair	Cross-modal composite score (%)	92.6	89.1	89.2	Series break

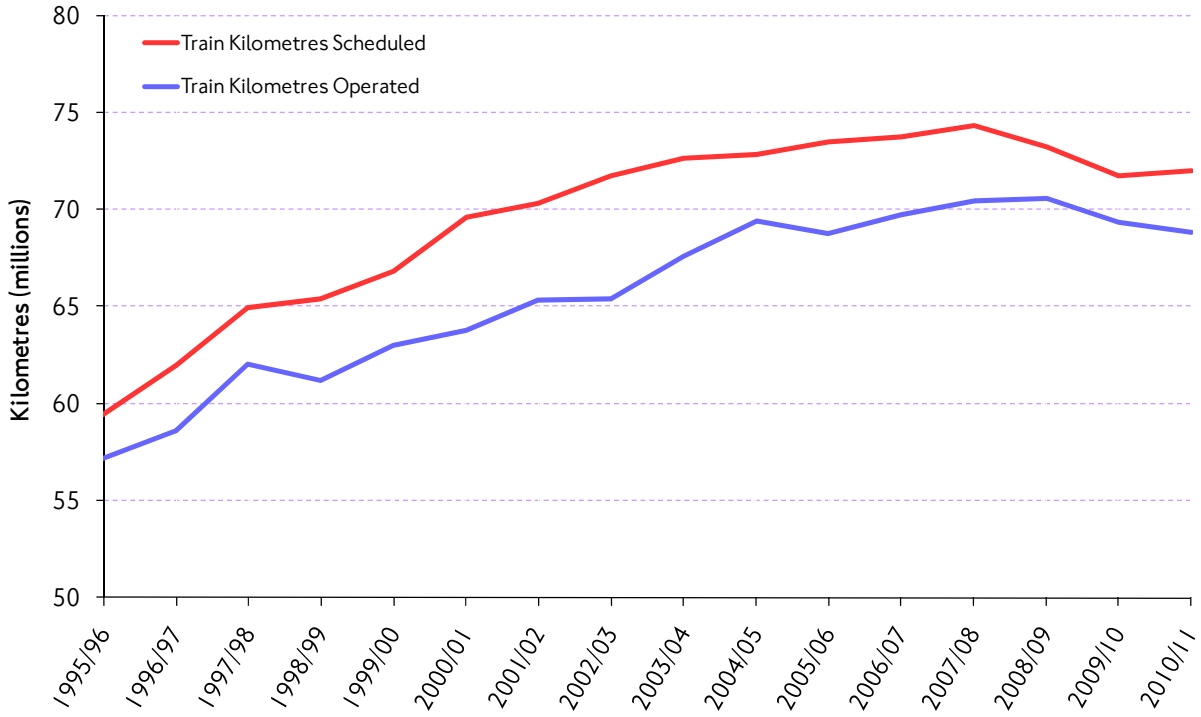
4.4 Performance of London Underground

London Underground has substantially increased its service offering over the past decade, operating 68.9 million train-kilometres in the 2010/11 financial year – a level only slightly down on the historic peak of 70.6 million operated train-kilometres in 2008/09 and some 8 percent more than at the start of the last decade. Furthermore, key measures of LU service reliability in 2010/11 were close to their all-time highs, with an average journey time of 44.6 minutes and an 'excess' component, reflecting unreliability, of 6.5 minutes in 2010/11.

LU service provision – network level

Whilst Figure 4.1 shows this historic growth in service provision, it is also clear that the more recent years have seen marginal reductions to both scheduled and operated train kilometres from the recent 'best ever' levels. This has largely reflected the impact of the Tube Upgrade Plan, the transfer of the East London Line to the London Overground network (this historically accounting for 0.7 million train-kilometres per year and no longer included in this measure), various temporary upgrade-related closures and infrastructure and industrial relations difficulties across other parts of the network – in particular the strikes of autumn 2010.

Figure 4.1 London Underground: Scheduled and operated train kilometres.



Source: TfL Strategy and Planning.

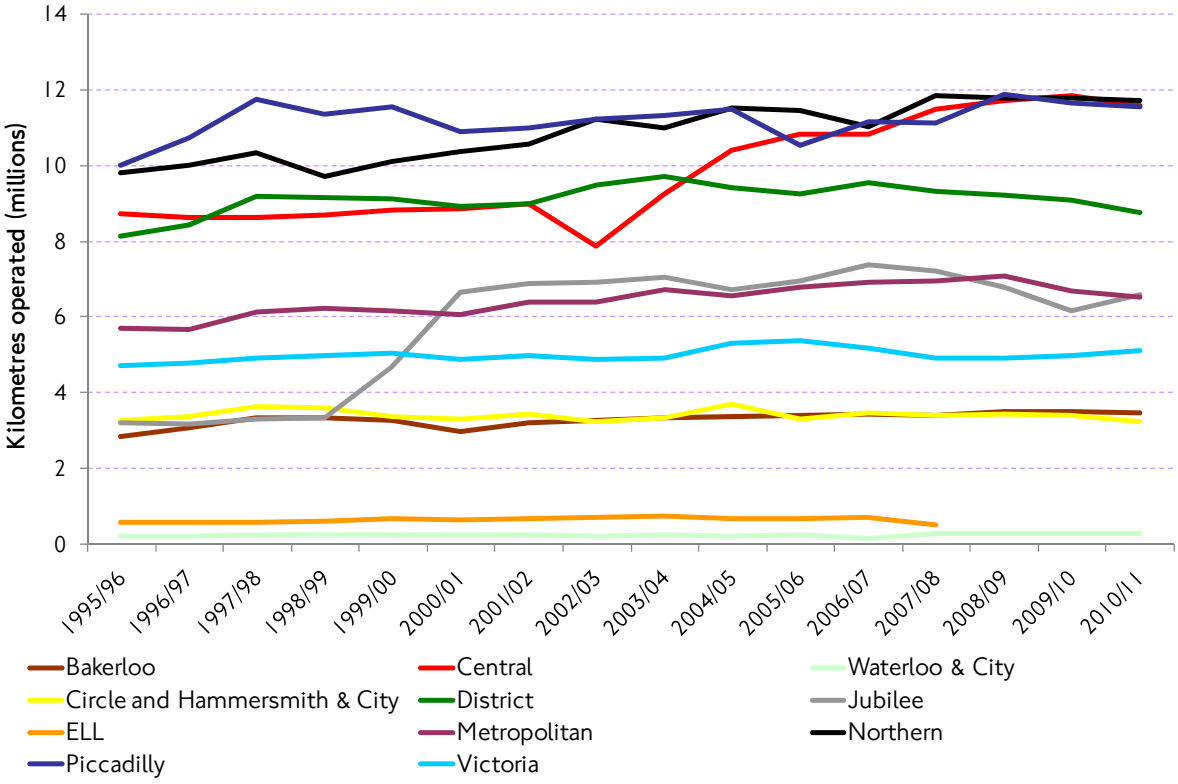
LU service provision – line level

Figure 4.2 breaks out this overall trend by individual line over a 15-year period, whilst Figure 4.3 focuses on the most recent 4 years. Looking firstly at the 15-year trends, the impact of historic upgrades, such as the opening of the Jubilee Line extension in 1999, the comprehensive upgrades to both the Central and Northern lines and other initiatives such as all-day through working of the Metropolitan line to Aldgate are clearly reflected in the trends for kilometres operated on each of these lines.

More recently, however, the levels of service provided by the Jubilee, District and Metropolitan lines have dipped relative to the position at the middle of the last decade. Visible too is the temporary closure of the East London Line from late 2007 – for upgrade and subsequent transfer to the London Overground network– which materially reduces this particular indicator but of course reflects a substantial net gain to the overall provision of rail transport in London.

Plotting the trends for the most recent four years in more disaggregate form allows the impact of specific events on recent Underground performance to be more readily appreciated (Figure 4.3). The most obvious feature on the graph is the progressive increase to the performance, against schedule, for the combined Circle, Hammersmith and City lines. This improvement clearly dates from shortly after the combination of these lines into a single operation in December 2009 (data before this time are also on a comparable combined basis), although it is only very recently that levels of performance comparable to other Underground lines have been reached.

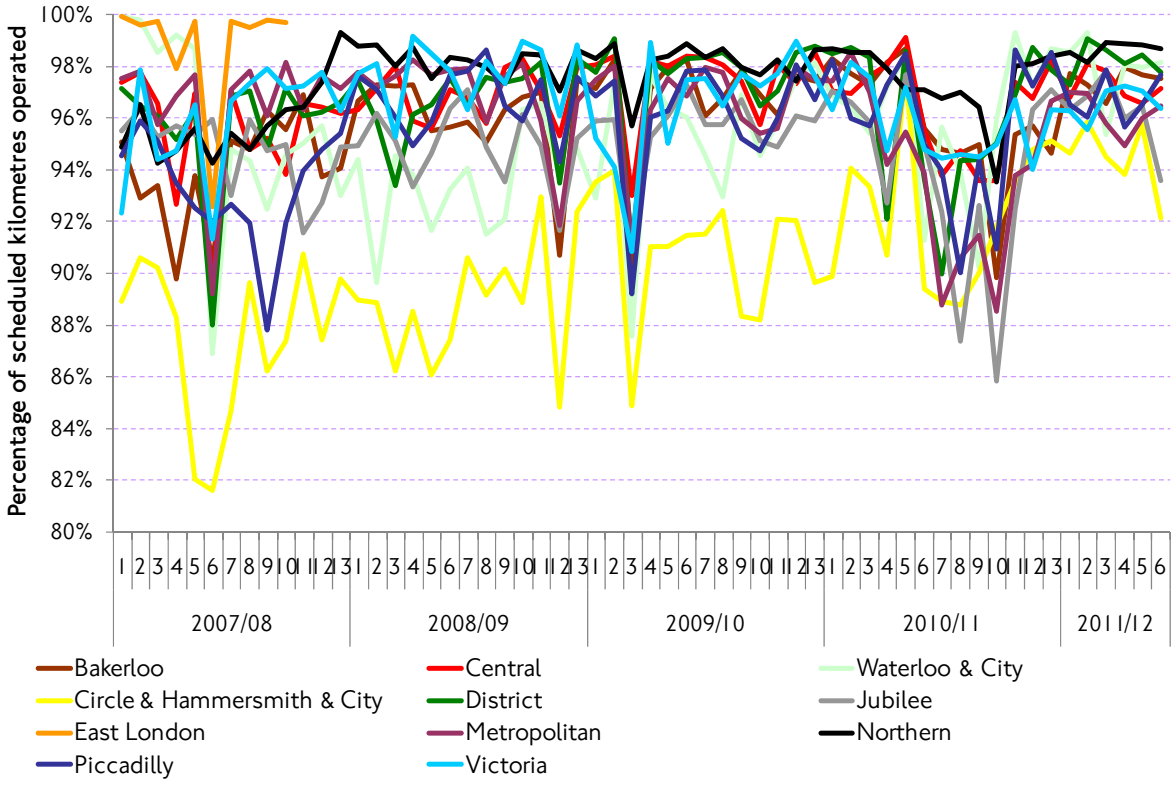
Figure 4.2 London Underground: operated train kilometres by line. Fifteen-year trend.



Source: London Underground.

Also evident from Figure 4.3 is the general dip in performance across much of the network during the winter of 2010/11 – particularly affecting the Jubilee, Metropolitan, District and Piccadilly lines. This reflected a combination of upgrade-related closures, asset failures, industrial action and periods of severe weather Similar, although less prolonged, dips in performance are also seen in autumn/winter 2007 and spring 2009, the former also largely reflecting industrial action in September 2007.

Figure 4.3 London Underground: operated train kilometres by line. Four-year trend.



Source: London Underground.

LU service reliability – network level

Table 4.5 reflects the trends for overall service provision in Figure 4.2 but also demonstrates progressive improvement in indicators of Underground service reliability. These are expressed in terms of passenger-relevant metrics such as average journey times and 'excess' journey time – the additional time that passengers have to wait over and above that implied by the schedule as a result of unreliability in the service. Excess journey time has reduced by one-quarter since the start of the decade, down from an average of 8.6 minutes in 2000/01 to 6.5 minutes in 2010/11, even if the result for the most recent year shows a marginal deterioration of 0.1 minute against 2009/10.

Table 4.5 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

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. Data not collected prior to 1998/99.

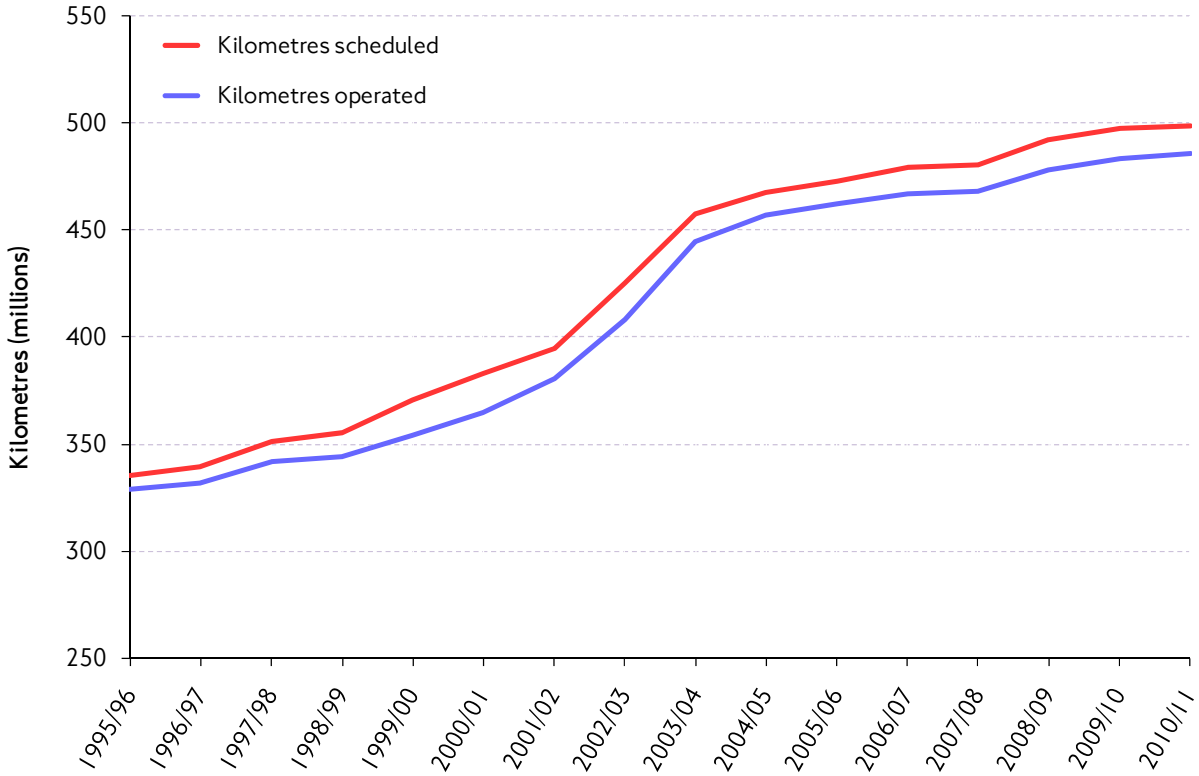
4.5 Performance of London Buses

The bus is one of London's transport success stories. Buses in London now carry 2.3 billion passengers each year – the highest level since the early 1960s.

Bus service provision

In the financial year 2010/11 London buses operated 485.5 million kilometres, against 498.5 million kilometres scheduled. Both values were marginally higher than the previous year, which themselves represented historic high points. In 2010/11, 97.4 per cent of scheduled kilometres were operated – marginally better than the previous year but also typical of all years since 2003/04, which have all featured values of 97 per cent or above (Table 4.6).

Figure 4.4 Bus service provision – scheduled and operated bus kilometres.



Source: London Buses.

Bus service reliability

Table 4.6 shows key bus reliability indicators at the network level. Two measures of reliability are given for 'high-frequency' routes – actual and 'excess' waiting time – with values for the latest year being the lowest (ie most reliable) recorded. Excess waiting times – the time that people have to wait over and above what would be expected were the service to run exactly to schedule – have halved over the last decade to stand at 1 minute, with reductions to the actual average waiting time reflecting progressive frequency enhancements on these already high-frequency routes. The percentage of low-frequency services (fewer than 5 scheduled buses per hour) arriving on time has shown a similarly improving trend, the value for 2010/11 of 81.4 per cent being a record high.

Table 4.6 Indicators of bus service reliability.

Year	Kilometres scheduled (millions)	Percentage of scheduled kilometres			High frequency services[1]		Low frequency services[2]
		Operated	Lost due to traffic congestion[4]	Lost due to other causes[5]	Average wait time (minutes)		Percentage of timetabled services on time[3]
					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	498	97.4	2.1	0.5	5.4	1.0	81.4

Source: London Buses.
1. High frequency services are those operating with a scheduled frequency of 5 or more buses per hour.
2. Low frequency services are those operating with a scheduled frequency of fewer than 5 buses per hour.
3. Buses are defined as 'on time' if departing between two and a half minutes before and 5 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.

4.6 Performance of Docklands Light Railway and London Tramlink

DLR

Since originally opening in 1987, the Docklands Light Railway has grown to become a vital part of London's transport system, supporting growth and regeneration in the Docklands area (see also Section 5.8 of this report). Operational performance has been consistently high over the past 10 years – albeit with marginally lower operational performance between 2008 and 2010 reflecting upgrade works (Table 4.7). Reliability indices for 2010/11 improved over the previous year, following completion of the latest round of upgrade works such as the extension of some trains from 2 to 3 carriages, and restoring performance to the high levels seen in the middle part of the last decade.

Table 4.7 DLR service provision and reliability.

Year	Kilometres operated (millions)	Percentage of scheduled services operated	Percentage of trains on time
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

Source: Docklands Light Railway.

London Tramlink

Since opening in 2000, the Tramlink network has provided important links into Croydon and connections to neighbouring Outer London town centres. Service provision and reliability in 2010/11 were very similar to previous recent years, with 2.7 million tram-kilometres operated at a 99.2 per cent level of reliability (Table 4.8).

Table 4.8 London Tramlink service reliability.

Year	Scheduled kilometres (millions)	Operated kilometres (millions) [1]	Percentage of scheduled service 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

Source: London Tramlink.
1. Operated kilometres exclude replacement bus services operated during periods of track repair works.

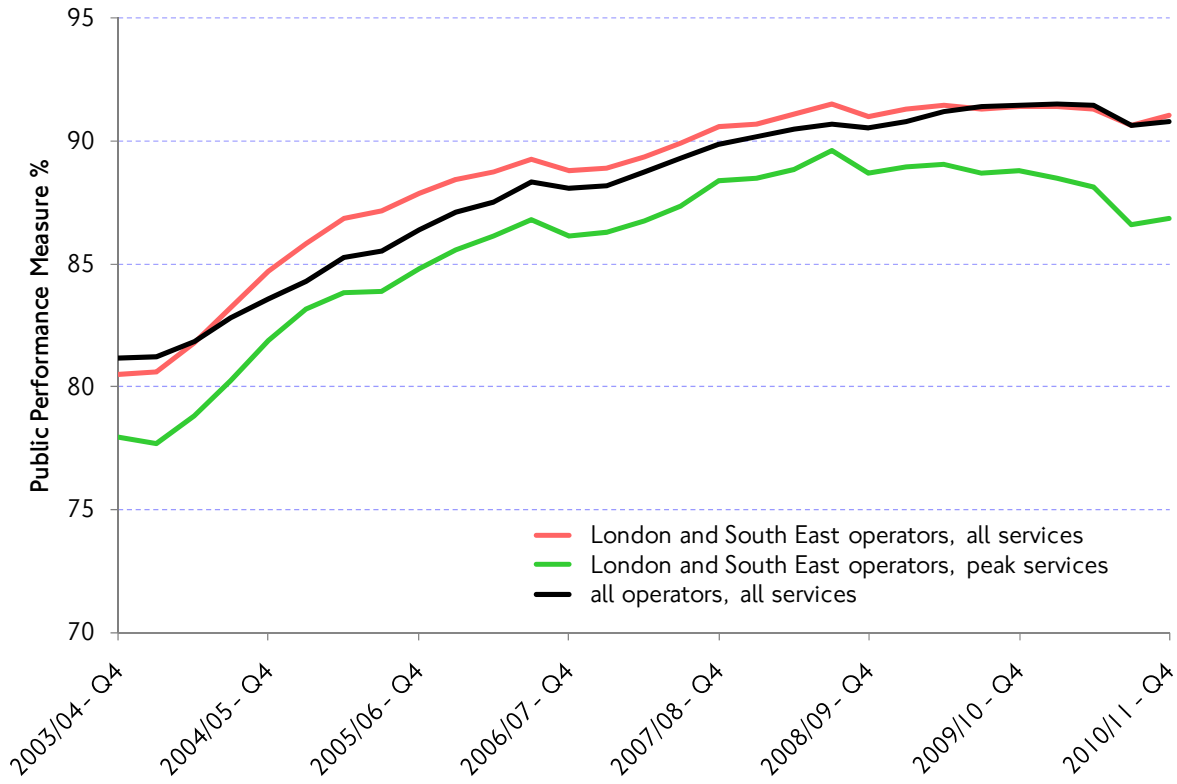
4.7 Performance of National Rail including London Overground

The reliability of National Rail services is measured through a Public Performance Measure (PPM) by the Office of Rail Regulation, which combines figures for punctuality and reliability into a single measure. The PPM is therefore the percentage of trains 'on time' compared to the total number of trains planned. A train is defined as on time if it arrives not later than 5 minutes after the planned destination arrival

time for London and South East regional operators, or not later than 10 minutes for long-distance operators.

Figure 4.5 shows the trend in this measure since the end of 2003, expressed as a moving annual average for each quarter-year. The PPM for London and South East regional operators is shown both for weekday peak period services and for all services. The equivalent trend for all train operating companies in Great Britain is also shown for comparison.

Figure 4.5 National Rail – Office of Rail Regulation PPM.

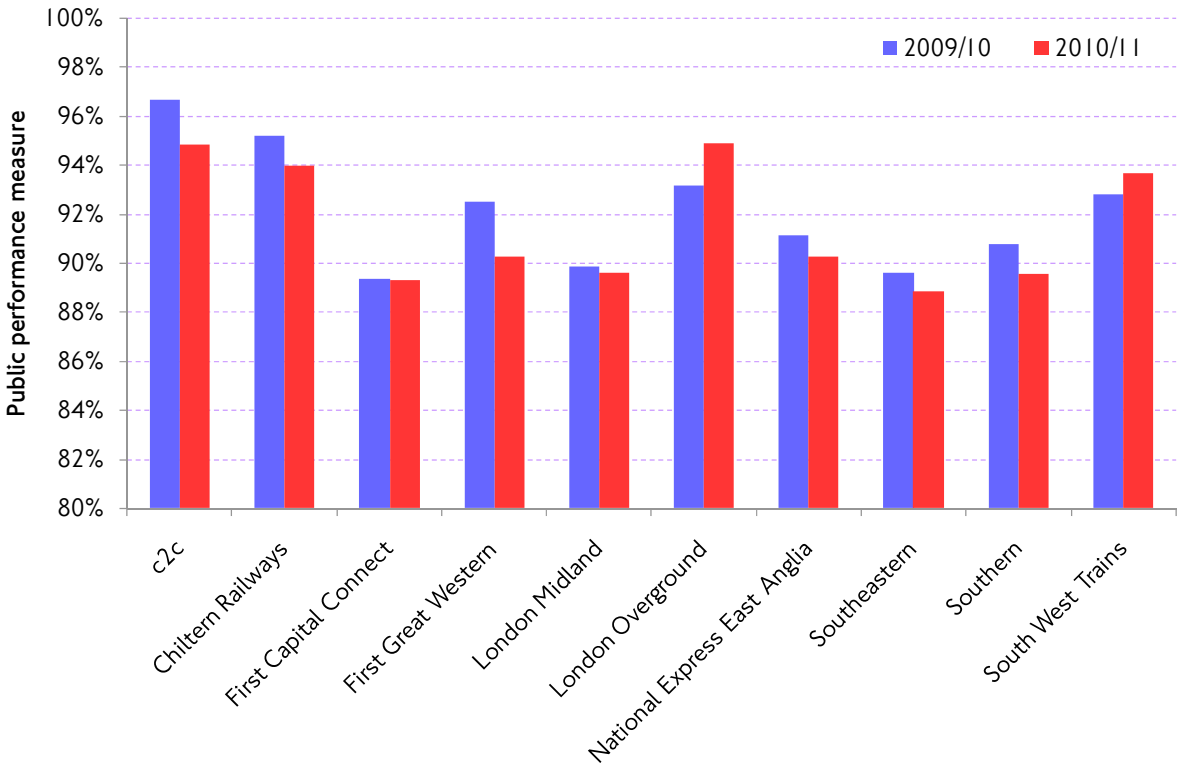


Source: Office of Rail Regulation.

The long-term improvement in these values partly reflects recovery from specific infrastructure difficulties at the start of the last decade. Although improvement had been fairly consistent and continuous over more recent years, values for the latest year show a reversal, particularly for peak services. This almost wholly reflects the impact of the severe winter weather over the latter part of 2010 and into early 2011. It is noteworthy that the recent 'all service' performance of L&SE operators almost exactly mirrors that of all services and operators, implying performance levels for off-peak services for L&SE operators that are considerably higher than those achieved for peak services.

Figure 4.6 breaks out the overall trends shown by Figure 4.5 for each of the L&SE train operators. Looking over the most recent two years it is possible to distinguish operators with relatively high scores (over 90 per cent) – c2c, Chiltern, London Overground and South West Trains, and those with relatively low scores (between 85 and 90 per cent), notably First Capital Connect, London Midland, Southern and Southeastern, but the trend over the most recent year has been a deteriorating one for most operators.

Figure 4.6 National Rail - public performance measure for London and South East Operators (moving annual average as at Quarter 4 each year).



Source: Office of Rail Regulation.

London Overground

London Overground services are subject to ORR's performance measurement regime and are included in the overall trends described in Section 4.7. In the last year 94.8 per cent of Overground trains were on time - the highest score for any L&SE Train Operating Company.

4.8 MTS Strategic Outcome Indicator: Public Transport Reliability

Scope of indicator

This indicator brings together and summarises key reliability statistics for the principal public transport modes in London, including National Rail.

Values for most recent year and assessment of trend

Values for each mode are calculated and presented separately, in Table 4.9 below, with further commentary provided in sections 4.4 to 4.7 above. Overall, values for the most recent year are either at, or close to, long-term historic highs.

Table 4.9 Summary of key reliability indicators for the principal public transport modes.

Mode	Units/measure	2008/09	2009/10	2010/11	Trend
Underground	Overall average generalised journey time (minutes)	43.9	44.1	44.6	Recent deterioration
Underground	Excess waiting time (minutes)	6.6	6.4	6.5	Broadly stable
London Buses	Excess waiting time for high-frequency routes (minutes)	1.1	1.1	1.0	Improving
London Buses	Low frequency routes – percentage of buses on time	80.8	80.5	81.4	Improving
DLR	Percentage of trains that ran to time	94.6	94.8	97.4	Recent high
London Tramlink	Percentage of scheduled services operated	98.5	99.2	99.2	Highest ever level
National Rail	ORR's PPM measure for L&SE operators (all services, average for year)	91.0	91.4	91.1	Stable
London Overground	ORR's PPM measure for L&SE operators (all services)	92.6	93.1	94.8	Best ever score

4.9 Focus on: public transport capacity

The capacity provided on the public transport networks is more meaningful when looked at in terms of the demand placed on it by passengers. This can be expressed in terms of average vehicle (unit) occupancy, as shown in Table 4.10. Looking at both established trends and particular developments for 2010/11:

- Average bus occupancies increased by 26 per cent over the period 2000/01 to 2008/09 - but have stabilised in more recent years. This is despite continuing increases to demand and recently a move away from large articulated vehicles.
- Train occupancy rates on LU have been broadly constant over most of the review period, but have tended to increase notably in more recent years, reflecting steep increases in demand.
- DLR unit occupancy increased in 2008/09 partly reflecting an increase in patronage following the opening of the Woolwich Arsenal extension. There was a further increase in 2010/11 from the introduction of three carriage trains on some routes and therefore the provision of additional capacity per train.
- Tramlink unit occupancy has progressively increased, in parallel with the development of the network.

Table 4.10 Balance between public transport supply and demand - average number of passengers per bus, train or tram.

	Passengers per bus, train or tram			
Year	Bus	Underground	DLR	London Tramlink
2000/01	13.2	117.1	67.3	-
2001/02	13.7	114.0	71.3	40.2
2002/03	14.4	112.6	72.5	40.4
2003/04	14.7	108.5	69.1	41.7
2004/05	15.0	109.4	74.0	46.9
2005/06	14.7	110.8	71.5	48.0
2006/07	15.8	109.9	69.9	50.9
2007/08	16.5	115.7	74.2	53.7
2008/09	16.6	122.4	81.5	53.3
2009/10	16.6	121.9	79.3	53.5
2010/11	16.6	128.9	88.4	54.2

Source: Transport for London.
For historic data back to 1991/92, please see Travel in London report 1, Table 4.5

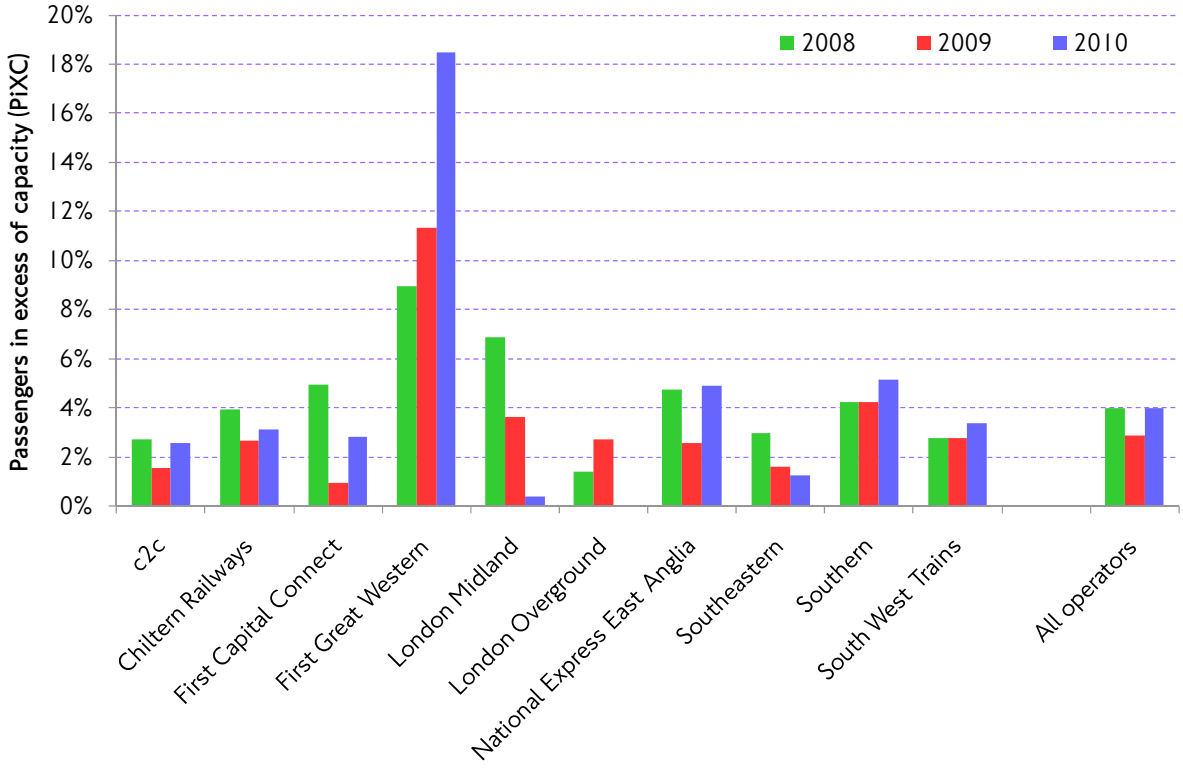
National Rail in London and London Overground

Crowding on National Rail commuter services is measured through the DfT's Passengers in eXcess of Capacity (PIXC) regime. The PiXC measure compares planned capacity on services arriving in or departing from central London, with the actual number of passengers on the services at the most crowded point in the journey (the 'critical point'). PiXC is a measure of the difference between the two. Figure 4.7 shows PiXC results for the last three years by train operating company, for L&SE operators only. Four features stand out:

- Across all operators there is no clear trend over the three years for which consistent data are available. Some operators have seen increasing PiXC values, others decreasing values.
- Historically, DfT set limits on the level of 'acceptable' PiXC of 4.5 per cent in any one peak, or 3 per cent across both peaks. The figure shows that most operators are within the first of these benchmarks for the most recent year.
- Services operated by First Great Western (into London Paddington) are the clear exception, with PiXC increasing substantially year-on-year to stand at 18.5 per cent in 2010. This reflects substantial demand growth in the context of a generally static level of service provision, although it is noteworthy that this is one of the principal corridors that will benefit from completion of the Crossrail project from 2018.

- The PiXC value of zero in 2010 for London Overground reflects only the Euston to Watford Junction local service. Other Overground services, which are orbital in character, are not measured for PiXC.

Figure 4.7 Passengers in excess of capacity (PiXC) for National Rail operators in London.



Source: Office of Rail Regulation.

4.10 MTS Strategic Outcome Indicator: Public transport capacity

Scope of indicator

This indicator is a measure of the total volume of service provided on the principal public transport networks in London. It is calculated from established 'planning capacities' for the vehicles used for the different types of service (eg the different train types on each Underground line), multiplied by the kilometres operated by each. The modes included in this indicator are: Underground, buses, DLR and London Tramlink.

Values for most recent year and assessment of trend

The table shows the values for this indicator by mode for the previous three years, and also the percentage change over the most recent year.

Table 4.11 Total yearly capacity provided by the principal public transport modes. Million place-kilometres.

Mode	2008/09	2009/10	2010/11	Percentage change 2009/10 to 2010/11
Underground[1]	64,193	63,099	62,446	-1.0
Bus	28,817	29,311	29,751	+1.5
DLR	1,715	2,027	2,338	+15.3
Tramlink	556	544	564	+3.6

Source: TfL Strategy and Planning..
Notes: 1.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.

Over the most recent year Underground capacity fell by 1 per cent, reflecting disruptions associated with the Tube Upgrade Plan and periods of industrial action. Bus and Tramlink capacity, however, increased, and there was a 15.3 per cent increase on DLR, this largely reflecting the extension of 3-car operation to the network and (partly) the opening of the extension to Woolwich.

4.11 MTS Strategic Outcome Indicator: Satisfaction with levels of crowding on the principal public transport modes

Definition of indicator

This indicator is derived from customer satisfaction surveys carried out with travellers on the major modes of public transport managed by TfL (see also chapter 9 of this report). Survey respondents are asked to rate their satisfaction with the level of crowding on a scale of 0 to 10, with 10 being 'extremely satisfied'. Responses have been converted to a mean score out of 100 and a composite measure created by combining modal results based on the mode share as shown in Table 4.12. The indicator should be considered in the light of the quantitative measures of network performance presented throughout in this chapter, and overall satisfaction with public transport services, which is dealt with in chapter 9 of this report.

Values for most recent year and assessment of trend

The composite mean score for overall satisfaction of those travelling on the network with the level of crowding inside the vehicle, on the principal public transport modes in London, was 76 out of 100 in 2010/11. This is the same as the scores for 2009/10 and 2008/09. In general, TfL considers a score of between 70 and 79 in satisfaction surveys to be 'fairly good', according to the norms used by TfL to interpret customer satisfaction scores (see also Appendix A).

Table 4.12 summarises satisfaction with the level of crowding inside the vehicle for the major public transport modes separately and in aggregate. The table also includes data on the mode share, used as the basis to produce the composite score.

Table 4.12 Summary of satisfaction with crowding and mode share for principal public transport modes, 2010/11.

Mode	Customer satisfaction with crowding on the vehicle (out of 100)	Annual journey stages (millions)	Relative weight (per cent)
Bus	78	2,289	64%
Underground	72	1,107	31%
DLR	78	78	2%
Overground	78	54	2%
Tramlink	76	28	1%
Total	**76**	**3,556**	**100%**

Source: TfL modal customer satisfaction surveys.

There has been no change in the level of satisfaction between 2008/09 and 2010/11. Modal scores demonstrate that levels of customer satisfaction with crowding remain fairly stable across most modes, at a 'fairly good' level of satisfaction.

4.12 Road Network - traffic speeds and congestion in London

Measures of road network performance

There are three basic measures of road network performance, each having its own characteristics:

- **Average traffic speed** is the simplest measure, but tells us nothing about how actual network performance compares to what might be 'expected' for the network (this would clearly vary, for example, between major and minor or residential roads).
- **Excess delay** is the conventional measure used to describe traffic congestion, and compares the actual travel rate (expressed as 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 early hours of the morning).
- **Journey time reliability** is the MTS indicator for traffic smoothing. It 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 Section 4.5 of Travel in London report 3.

Average traffic speeds – long-term trends

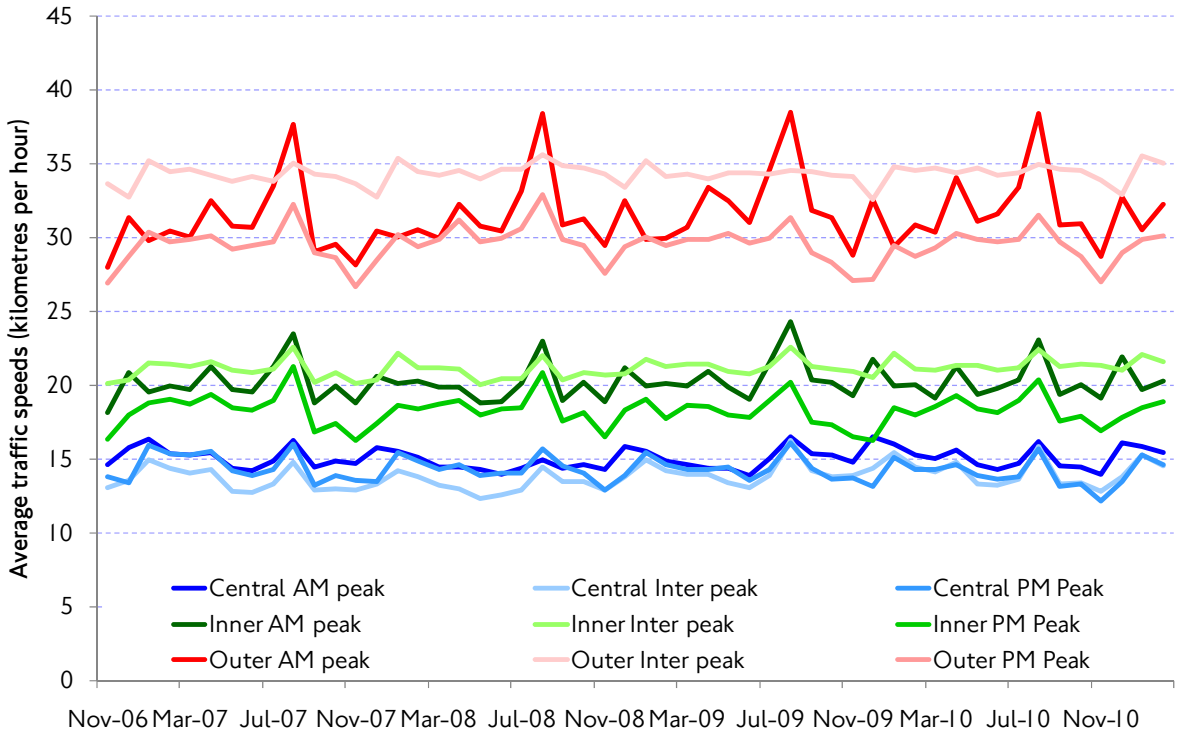
Comprehensive measurements of traffic speeds in London date back to the 1970s, using data from moving (or 'floating') car surveys of the road network, but time-series compatible data from this source recently ceased to be collected by TfL. The long-term trends in speeds shown by this indicator have been described in previous Travel in London reports. The basic picture to emerge over this 25-year period was one of traffic getting progressively slower in all parts of London. From the 1980/82 survey cycle to the final one in 2006/09, average weekday traffic speeds in Greater London fell by 18 per cent in the morning peak period, by 14 per cent in the inter-peak period, and by 12 per cent in the evening peak period. This reduction was particularly intense in central London where, despite congestion charging, weekday morning peak speeds fell by 23 per cent over this three decade period.

Until the late 1990s, this trend towards slower speeds largely reflected increased traffic demand, as traffic levels were increasing in London on a largely static road network. From the late 1990s onwards, however, traffic levels began to decline, and TfL established that the primary reason for the continued reductions to traffic speed, which would otherwise have been unexpected given falling traffic levels, was a substantial increase in interventions that reduced the effective capacity of the road network for general traffic. These interventions ranged widely across policies to increase road safety, improve the urban realm, and to prioritise public transport, pedestrian and cycle traffic, which have had beneficial effects in their own right as described elsewhere in this report. However, they also included a large-scale increase in road works by utilities, together with an increase in general development activity, which historically were relatively poorly managed with respect to optimising road network performance - although recent initiatives, such as Lane Rental, are directed to improving this aspect.

Average traffic speeds – recent trends based on GPS satellite tracking data

From 2006 a new source of traffic speed data became available in the form of GPS satellite tracking of an anonymised sample (from general traffic) of 'probe' vehicles equipped with the necessary equipment. In principle these data should allow much more disaggregate analysis than previous sources, particularly given the much higher number of observations that are available and the more comprehensive coverage of the network afforded. However, the data are not directly comparable with previous measurements of traffic speed and, although comparisons suggest a good match in absolute values for average traffic speeds recorded at the network level, the particular statistical biases that will affect the manifestation of any trends in the newer data are not yet fully understood.

Figure 4.8 Average monthly traffic speeds (kilometres per hour) by functional sector of London. Working weekdays, by time period.



Source: TfL Surface Transport.

Table 4.13 Average traffic speeds (kilometres per hour) by functional sector of London. Working weekdays, by time period.

Area and time period	2007 speed (kph)	2008 speed (kph)	2009 speed (kph)	2010 speed (kph)
Central AM peak	15.2	14.7	15.1	15.1
Central inter-peak	13.6	13.4	14.2	14.0
Central PM peak	14.6	14.3	14.3	14.0
Inner AM peak	20.2	20.0	20.6	20.3
Inner inter-peak	21.1	21.0	21.3	21.4
Inner PM peak	18.4	18.4	18.0	18.3
Outer AM peak	31.0	31.6	32.1	31.9
Outer inter-peak	34.2	34.6	34.2	34.4
Outer PM peak	29.5	30.0	29.3	29.4
Greater London(1)	28.4	28.7	28.6	28.6

Source: TfL Surface Transport, based on data from Trafficmaster
(1) Value derived by weighting geographic components by proportion of traffic flow within zone.

Figure 4.8 shows data from this source over the period November 2006 to May 2011, with average values summarised in Table 4.13. Looking first at the figure 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. The overall trend, however, is one of stability over the four year period, which is in contrast to the clear prevailing trends towards slower average speeds over the first half of the last decade shown by previous (moving car) measurements. The trend towards slower traffic in London appears, on the basis of this new data, to have been halted.

At this point it is not possible to attribute this apparent change in trend to any specific interventions or events. It is the case that traffic levels, reflecting demand on the network, have continued to fall over this period (see Section 3.11 of this report). All other things being equal this could potentially mask a continued reduction in effective network capacity resulting in stable average speeds. On the other hand the last few years have seen development and implementation of various initiatives under the Mayor's Smoothing Traffic agenda, which would be expected to have acted in the opposite direction. Finally, given that this is a relatively new dataset supplied to TfL in pre-processed form by the Department for Transport, it may also be the case that features of the data or its processing militate against the detection of clear time-series trends. This last possibility will be the subject of further enquiry by TfL.

Vehicle delay (congestion) – long-term trends

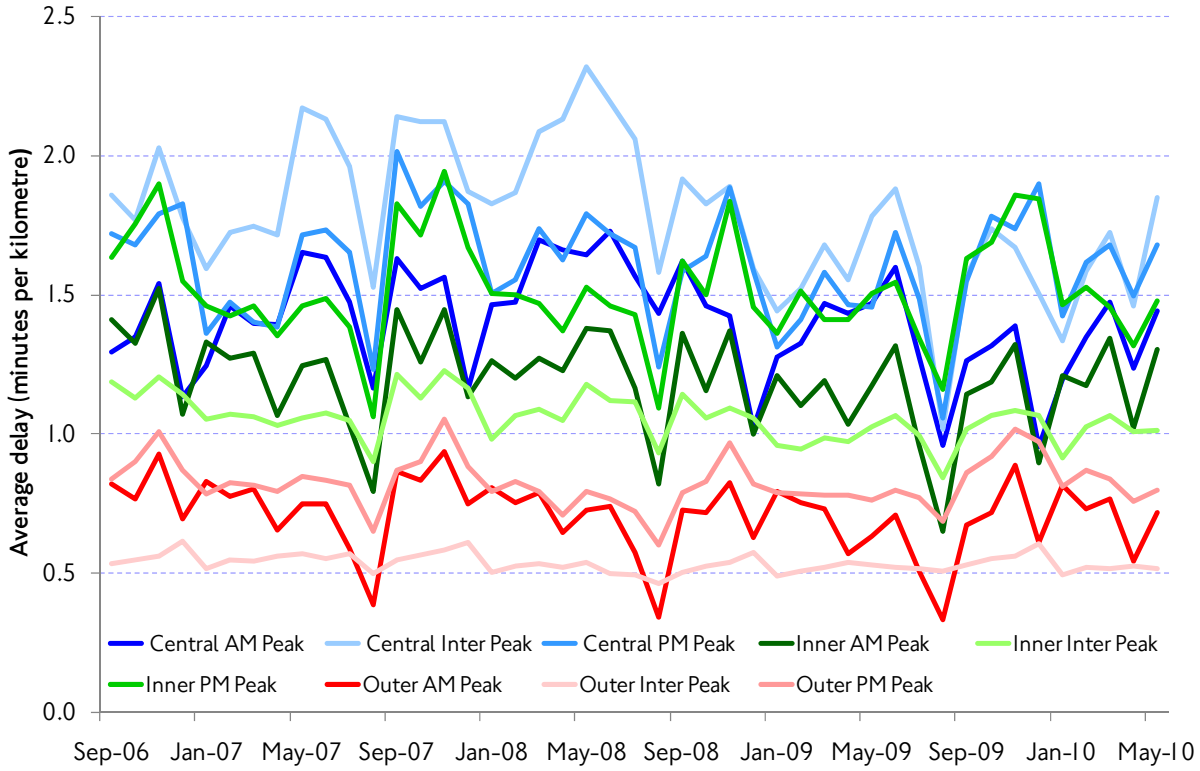
As with speeds, comprehensive measurements of congestion using moving car survey data date back to the 1970s. Here, congestion is calculated as an 'excess travel rate' (in minutes per kilometre) over and above the travel rate that prevailed in the early hours of the morning (between 02:00 and 05:00 hours), which has been taken as a pragmatic measure of uncongested conditions. A representative long-run time-series for this measure for Greater London is not, however, available, as the overnight speeds on which it needs to be based were only measured once every decade (lastly in 2000/01), and subsequent survey evidence in relation to congestion charging in central London suggests that in fact these overnight speeds reduced in parallel with daytime speeds as capacity was removed from the network. This means that congestion would have been progressively over-estimated, as an absolute quantity and as conventionally defined as the difference in travel rates, with elapsed time from the most recent overnight survey. In central London (the central statistical area which is larger than the charging zone), indicative delay values ranged from 2.1 minutes per kilometre in 2001 (prior to the introduction of congestion charging), to 1.6 minutes per kilometre in 2003 (immediately after the introduction of charging) reverting to, typically, 2.1 to 2.3 minutes per kilometre in 2007/2009, with charging still in place in the central zone.

Vehicle delay (congestion) – recent trends based on GPS satellite tracking data

Figure 4.9 shows congestion values derived from GPS data over the period September 2006 to May 2011. Data from this source are not comparable, in a long-run time-series sense, with previous moving car survey data. In particular, the 'uncongested baseline' measurements are made, by default, over the period 22:00 to 06:00 hours, a period with higher average levels of traffic than that used for deriving a similar measurement by the previous moving car surveys. This means that the absolute values for congestion (delay) from this source would be expected to be substantially lower than the data from moving car surveys, but it also means that the continuous nature of the measurement should take into account medium-run

changes to the effective 'base' capacity of the network, which have precluded a meaningful time series from the moving car data.

Figure 4.9 Average vehicle delay (minutes per kilometre) by functional sector of London. Working weekdays, by time period.



Source: TfL Surface Transport.

Table 4.14 Average vehicle delay (minutes per kilometre) by functional sector of London. Working weekdays, by time period.

Area and time period	2007 delay (min/km)	2008 delay (min/km)	2009 delay (min/km)	2010 delay (min/km)
Central AM peak	1.4	1.5	1.3	1.3
Central inter-peak	1.9	1.9	1.6	1.7
Central PM peak	1.6	1.6	1.5	1.7
Inner AM peak	1.2	1.2	1.1	1.2
Inner inter-peak	1.1	1.1	1.0	1.0
Inner PM peak	1.5	1.5	1.5	1.5
Outer AM peak	0.7	0.7	0.7	0.7
Outer inter-peak	0.6	0.5	0.5	0.5
Outer PM peak	0.8	0.8	0.8	0.8
Greater London[1]	0.86	0.83	0.80	0.80

Source: TfL Surface Transport, based on data from Trafficmaster.
(1) Value derived by weighting geographic components by proportion of traffic flow within zone.

Looking at Figure 4.9 and Table 4.14, and in contrast to the equivalent speed data, there was a trend towards reduced congestion values in 2009 relative to 2007 and 2008 at the London-wide level. This reflects the decreasing share of traffic in central London where congestion is highest (although in 2010, congestion values in central London in 2010 have again edged higher than in 2009).

The trend towards recent improvement in congestion is also evident on the TLRN, with weekday morning peak excess delays reducing by 3.1 per cent in central London, 4.2 per cent in Inner London, and 9.0 per cent in Outer London over the four years between March 2007 and February 2011.

As well as the expected seasonal and geographic patterns shared with the speed data, Figure 4.9 illustrates large differences in the degree of variability of traffic congestion by both area and time period. So, inter-peak congestion in Outer London remains 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. However, 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.

4.13 Focus on: Long-term change to traffic demand and road network capacity in London

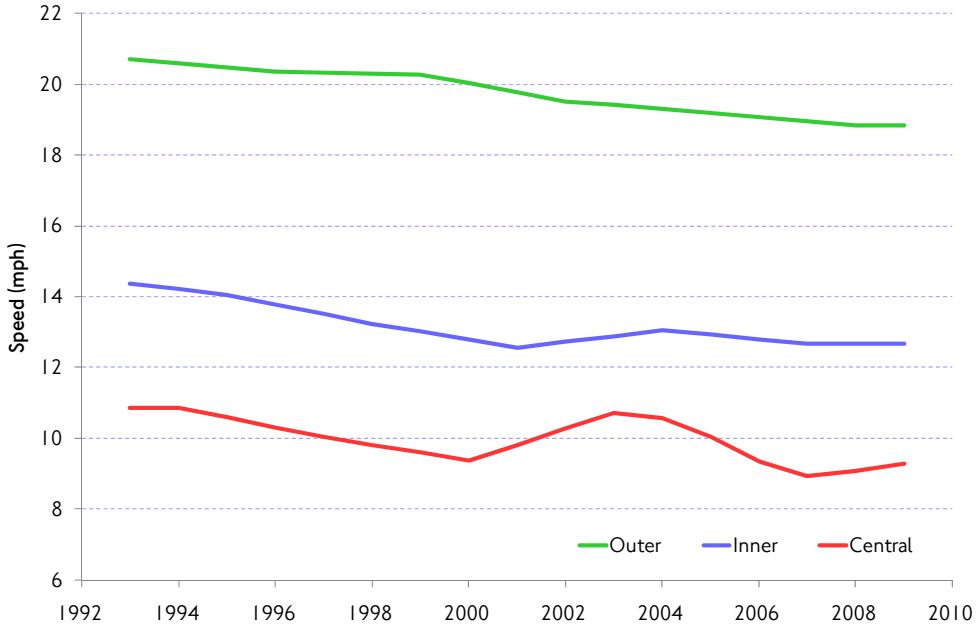
This section looks at long-term trends in London's road traffic, focusing on the relationship between network capacity (supply) and the demand for road travel.

The starting point: highway speed and flow

For many decades TfL and its predecessor organisations have monitored average speeds and flows on London's road network. Speeds have been generally measured on a 3-year cycle. Survey cars are driven over a sample of the road network at the normal speed of traffic, recording the times that they take on each section of road. The results from many runs are combined to give an estimate for the average speed of traffic. Central, Inner and Outer London are surveyed separately, at selected times throughout the weekday 7am – 7pm period.

The pattern over the last 20 years or so is shown in Figure 4.10. This reflects trend information from moving car surveys described more fully in previous Travel in London reports. Speeds have fallen fairly steadily over this time, at roughly 1 per cent per year. The only exception is the period around the introduction of congestion charging, introduced in February 2003, when traffic speeds in central London, in particular, rose.

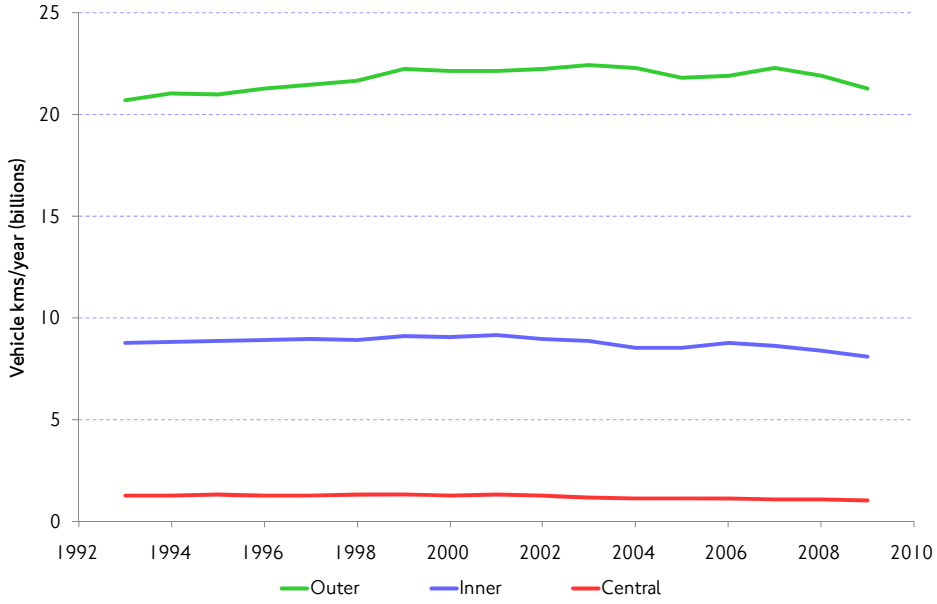
Figure 4.10 Traffic speeds in London, 1993 to 2009.



Source: TfL Strategy and Planning.

TfL and its predecessors have also monitored traffic flows, using both automatic traffic counters and manual counts, to estimate total traffic, expressed as vehicle-kilometres per year. The pattern is shown in Figure 4.11. In Outer London traffic grew in the 1990s but then flattened off and, more recently, has declined. In Inner and central London growth in the 1990s was much smaller (although still positive), and the decline since 2000 has been steeper than in Outer London. The reduction in central London traffic caused by congestion charging since 2002 does not show clearly in these traffic estimates, mainly because of the respective scales and the fact that the definition of central London used here (comprising Westminster and the City of London) includes roads outside the charged area.

Figure 4.11 Traffic flows in London, 1993 to 2009.



Source: TfL Strategy and Planning.

Changes in London's highway capacity

By combining these estimates of traffic speeds and flows, TfL has calculated an index of road capacity. Capacity is defined as **the amount of traffic that the road system can accommodate for a given traffic speed**.

If capacity is held constant, and traffic increases, then traffic speeds will fall. The relationship between traffic levels and speed can be expressed using the concept of elasticity - more precisely the elasticity of speed with respect to traffic flow. If the value of this elasticity is estimated to be, say, -0.9, this means that the percentage change in speed is -0.9 times the percentage change in flow. Thus a 10 per cent increase in flow would reduce traffic speed by 9 per cent.

TfL has estimated daytime average values of the elasticity of traffic speed with respect to traffic flow as:

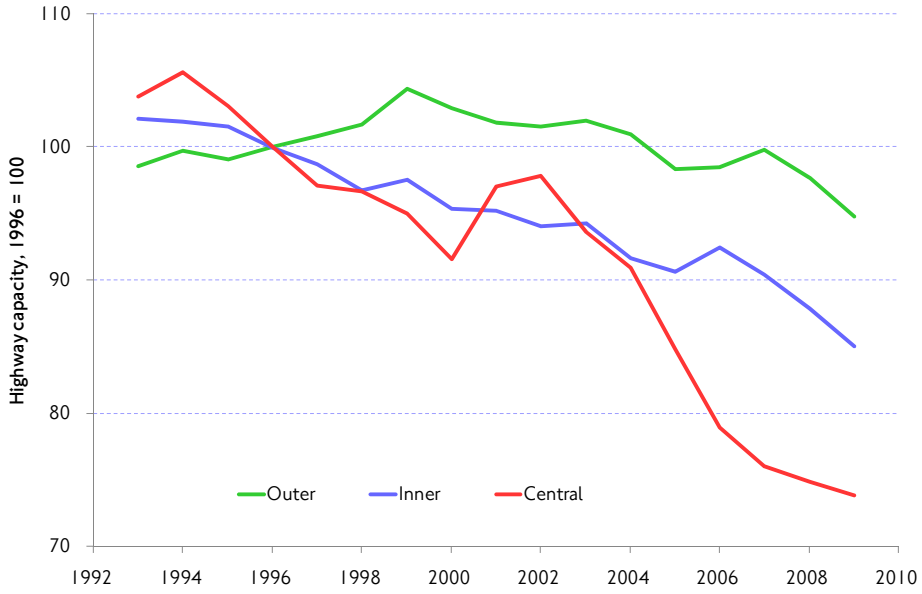
Central London:	-1.0
Inner London:	-0.9
Outer London:	-0.75

Using these values the drop in London's road speed that would be expected, if capacity were unchanged, can be calculated each year, based on the change in traffic flow that year. If flow in central London increased by say 3 per cent, we would expect traffic speeds to fall that year by 3 per cent (all other things being equal).

But if speeds change by a different amount from expectation, the difference will be due to a change in the capacity of the road network. In the example just given, if the observed speed actually fell by 5 per cent, then capacity would have fallen. In order to restore the speed to the value expected without capacity reduction, traffic would need to be further reduced. In this case, with a convenient elasticity of -1, a 2 per cent reduction would be needed. That is, the amount of traffic that the network can carry for a given speed – the capacity – would have reduced by 2 per cent.

TfL has carried out this calculation for each of the years for which speed and flow data are available, and has obtained the indices of capacity shown by Figure 4.12.

Figure 4.12 Index of London's highway capacity (1996 = 100).



Source: TfL Strategy and Planning.

- In **Outer London**, the changes have been relatively modest: some small rise in capacity in the 1990s, followed by a decline of around 1 per cent per year since 2000.
- In **Inner and central London**, however, the changes have been sharper. Over the 17 years covered by the data, Inner London's road network has lost about 15 per cent of its capacity and central London has lost nearly twice that amount.

The loss of capacity has been fairly steady, other than the temporary increase in central London around the time of the introduction of congestion charging in 2003. This may have been caused by a moratorium on road works imposed around the time that congestion charging was introduced, together with some optimisation of the network to accommodate the introduction of the scheme.

However, the loss of highway capacity accelerated, in central London particularly, after the introduction of congestion charging. This may have been due to highway authorities taking advantage of the reduced traffic demand for road space, following the introduction of charging, to reallocate capacity to other beneficial uses. The more detailed impacts of congestion charging on highway capacity were discussed in Travel in London report 2, section 11.10.

Changes in London's highway demand

A similar set of calculations has been done to derive an index of underlying demand for road travel in London. Here, the underlying demand means the **traffic that would use the road network if speeds were unchanged**.

In practice, falling traffic speeds – caused at least in part by reduced highway capacity – will deter some drivers from using the roads; they may use public transport, or walk, instead, or may choose a closer destination or not to travel at all. The underlying demand reflects the combined effect of many factors **other than**

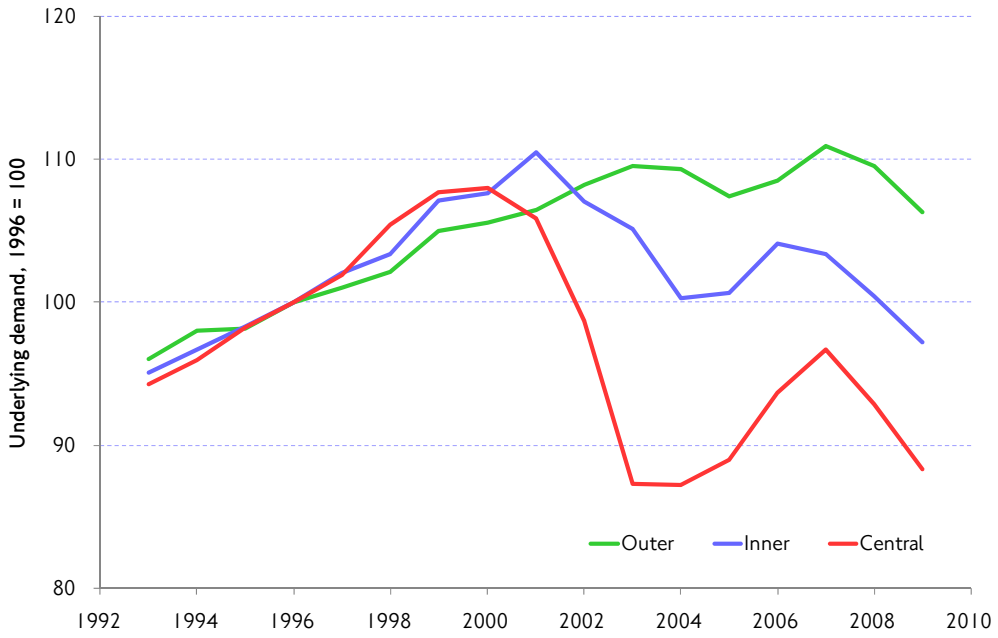
congestion, such as population, attractiveness of public transport parking availability and so on.

The plot of underlying highway demand since 1993 (Figure 4.13) can be interpreted as showing how population growth (tending to push the curve up) is being counteracted by policies to reduce the need for highway travel (tending to pull the curve down). The effect of changes in congestion, such as the congestion increase caused by capacity reduction, does not affect the underlying demand curve.

The calculation of underlying demand is similar to the calculation of capacity, except that a different elasticity is needed, that of traffic flow with respect to speed. A value of 0.8 has been assumed, reflecting contemporary evidence, so that a 10 per cent decrease in network speed would reduce traffic flows by 8 per cent. This would then result in an increase in speeds, and so a reduction in demand, until a new equilibrium is reached.

So if in a year flow reduces by say 5 per cent, but the accompanying speed increase is 1 per cent, the underlying demand can be inferred to have reduced by 5.8 per cent: 5 per cent, plus the 0.8 per cent flow increase that the speed increase would have caused.

Figure 4.13 Index of London's underlying highway demand (1996 = 100).



Source: TfL Strategy and Planning.

Looking at Figure 4.13, there was a general increase in underlying demand for highway travel during the 1990s, at least partly due to increasing population and employment. Since 2000 the underlying highway demand has changed little overall in Outer London, but has fallen sharply in Inner and – particularly – central London. The congestion charge, which reduced daytime traffic entering central London by nearly 20 per cent, is an obvious explanation, although improvements in public transport supply and related pricing changes will also have contributed significantly (London real bus fares fell by about 20 per cent over this period – see Section 8.8).

Overall conclusions

- Relatively simple calculations, using readily-available data on traffic speeds and flows, can be used to infer the changes in the road network's capacity, and in the demand for travel on the network.
- Plots of changes since the early 1990s show contrasting trends before and after 2000: before, traffic was rising, particularly in Outer London; after 2000, it has fallen particularly in Inner and Central London.
- There have been large reductions in the highway capacity of Inner and central London during the 17 years considered, of about 15 per cent and 30 per cent respectively.
- The underlying demand for highway travel, before the suppression effect of congestion is taken into account, rose during the 1990s but since 2000 has fallen sharply in Inner and, especially, central London. The congestion charge and public transport improvements will have been major factors in causing this fall in underlying demand.

4.14 Traffic smoothing – journey time reliability for road traffic

Smoothing traffic flow and journey time reliability

The MTS seeks to mitigate the potential effects of road congestion through a range of initiatives aimed at smoothing traffic flow. This describes a broad approach to managing congestion and, in particular, improving road traffic journey time reliability and predictability for all users, including cyclists and pedestrians. The key measure set out in the MTS for measuring the impact of these policies is journey time reliability. This is defined as the percentage of journeys completed within an 'allowable' excess of 5 minutes for a standard 30-minute journey during the weekday morning peak period. This is measured quarterly on a road corridor basis, and has been described and base-lined in previous Travel in London reports.

Measurements of journey time reliability

Table 4.15 shows these measurements covering 2009/10 and 2010/11. The table is colour-coded to show reliability rates in the range below 80 per cent, between 80 and 90 per cent, and above 90 per cent. A target of 89 per cent applies to this measure. The majority of corridors achieve weekday AM peak journey time reliabilities in the range 80 to 90 per cent - a rate that therefore might be regarded as typical of main roads in London. The value for the whole monitored network, generally reflecting the TLRN, is consistently in the range 88-90 per cent.

Certain corridors, however, consistently record values either below or above this level, for example the A40 to the north-west of London and the twin bores of the A102 Blackwall Tunnel. This apparent consistency of measurements by corridor suggests that the underlying determinants of the degree of journey time reliability experienced are largely specific to each corridor, and therefore in principle susceptible to improvement through targeted management and engineering initiatives.

Table 4.15 Journey time reliability on the TLRN. AM/PM peak by route type, corridor and direction.

Central London	2009/10	2009/10	2009/10	2009/10	2010/11	2010/11	2010/11	2010/11
All Directions	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
AM Peak	85.3%	86.6%	85.6%	87.0%	87.7%	86.8%	84.6%	87.4%
PM Peak	82.9%	85.0%	81.7%	84.2%	83.8%	85.1%	80.4%	83.9%

AM Peak		Inbound								Outbound							
Route Type	Corridor	2009/10 Q1	2009/10 Q2	2009/10 Q3	2009/10 Q4	2010/11 Q1	2010/11 Q2	2010/11 Q3	2010/11 Q4	2009/10 Q1	2009/10 Q2	2009/10 Q3	2009/10 Q4	2010/11 Q1	2010/11 Q2	2010/11 Q3	2010/11 Q4
Radial	A4	88.9%	91.8%	89.1%	90.4%	88.4%	88.6%	86.6%	89.7%	93.0%	92.8%	89.8%	94.1%	91.3%	90.5%	89.5%	91.6%
Radial	A40	77.4%	79.9%	76.3%	82.5%	77.4%	77.8%	77.0%	81.0%	97.9%	96.5%	93.1%	95.1%	95.2%	93.3%	89.1%	93.6%
Radial	A41	88.2%	89.6%	85.0%	87.5%	85.4%	87.8%	84.9%	87.2%	93.1%	95.2%	91.3%	89.6%	91.5%	93.1%	90.4%	91.0%
Radial	A1	79.3%	85.3%	80.1%	82.5%	80.8%	81.7%	79.9%	81.6%	90.5%	92.1%	87.8%	89.4%	90.2%	90.8%	86.8%	89.7%
Radial	A10	88.9%	89.5%	87.2%	87.3%	88.1%	87.3%	84.7%	86.6%	91.5%	88.9%	89.4%	88.6%	91.5%	90.4%	86.8%	88.4%
Radial	A12	87.9%	88.6%	85.0%	87.4%	87.7%	87.1%	84.7%	86.6%	95.8%	97.0%	95.1%	96.5%	95.9%	97.2%	95.0%	96.2%
Radial	A13	88.9%	87.8%	85.7%	87.5%	88.1%	88.1%	83.1%	87.3%	98.3%	97.9%	98.7%	98.9%	98.8%	98.1%	96.3%	97.9%
Radial	A2	88.9%	91.5%	83.8%	84.8%	87.8%	87.3%	83.0%	84.6%	98.7%	98.4%	99.1%	98.6%	98.7%	98.7%	96.4%	98.0%
Radial	A20	92.3%	90.7%	86.4%	89.3%	90.7%	88.8%	86.9%	90.5%	98.2%	97.7%	95.8%	97.0%	98.2%	97.8%	96.6%	96.9%
Radial	A21	88.5%	91.3%	86.2%	88.7%	89.9%	89.4%	88.4%	88.1%	94.2%	96.2%	92.9%	95.0%	95.1%	95.7%	94.6%	94.9%
Radial	A23	86.4%	84.6%	83.9%	84.9%	85.6%	82.1%	84.3%	85.7%	92.2%	93.1%	90.2%	89.7%	91.4%	90.6%	89.6%	90.0%
Radial	A24	88.1%	92.8%	89.4%	89.8%	88.6%	88.6%	88.7%	88.4%	93.5%	94.6%	92.6%	94.1%	92.8%	92.0%	89.1%	93.3%
Radial	A3	88.9%	88.3%	82.2%	84.1%	86.5%	87.0%	86.1%	88.1%	96.0%	97.1%	92.4%	93.3%	96.0%	95.7%	94.6%	96.0%
Radial	A316	85.0%	83.9%	83.8%	87.5%	84.4%	84.7%	84.4%	86.5%	94.1%	94.8%	93.8%	96.3%	96.6%	95.9%	96.7%	95.5%

Source: TfL Road Network Performance.

Table 4.15 Journey time reliability on the TLRN. AM/PM peak by route type, corridor and direction (continued).

PM Peak		Inbound								Outbound							
Route Type	Corridor	2009/10 Q1	2009/10 Q2	2009/10 Q3	2009/10 Q4	2010/11 Q1	2010/11 Q2	2010/11 Q3	2010/11 Q4	2009/10 Q1	2009/10 Q2	2009/10 Q3	2009/10 Q4	2010/11 Q1	2010/11 Q2	2010/11 Q3	2010/11 Q4
Radial	A4	91.5%	90.5%	88.1%	90.9%	90.8%	91.0%	87.2%	91.1%	83.2%	83.8%	79.5%	80.7%	84.7%	83.5%	78.4%	81.6%
Radial	A40	83.9%	83.7%	83.0%	85.3%	83.3%	85.0%	82.4%	86.4%	92.9%	90.3%	84.0%	86.0%	85.7%	85.2%	83.9%	85.0%
Radial	A41	89.2%	87.3%	88.2%	86.9%	90.3%	90.0%	88.3%	89.3%	88.0%	85.9%	85.6%	86.1%	86.2%	85.6%	84.6%	86.5%
Radial	A1	85.4%	85.1%	83.9%	85.6%	83.9%	86.0%	83.5%	85.6%	84.2%	82.1%	82.5%	83.8%	81.0%	81.8%	83.1%	83.1%
Radial	A10	92.9%	94.5%	90.5%	90.7%	91.9%	92.1%	89.2%	91.7%	83.5%	84.1%	84.0%	83.5%	84.6%	85.1%	83.0%	83.7%
Radial	A12	88.1%	85.5%	85.6%	88.1%	87.0%	88.7%	87.8%	90.7%	84.6%	83.9%	83.4%	84.7%	84.5%	86.1%	81.4%	83.9%
Radial	A13	89.7%	89.0%	87.5%	87.6%	87.8%	89.6%	85.0%	89.0%	88.5%	86.0%	91.3%	89.8%	86.4%	84.7%	83.3%	86.4%
Radial	A2	94.3%	95.5%	93.5%	94.5%	95.4%	94.6%	91.8%	94.5%	90.1%	89.9%	85.8%	88.6%	87.0%	89.4%	84.8%	89.4%
Radial	A20	92.1%	92.7%	89.6%	91.4%	90.5%	89.0%	88.7%	92.0%	92.5%	91.7%	85.0%	83.8%	87.6%	88.2%	87.5%	87.8%
Radial	A21	97.4%	96.7%	94.5%	96.7%	97.6%	96.0%	96.1%	96.2%	92.3%	93.5%	89.4%	91.4%	91.7%	94.3%	91.5%	92.3%
Radial	A23	87.8%	86.3%	85.5%	86.6%	87.2%	86.7%	86.5%	88.1%	86.1%	85.8%	83.8%	82.8%	84.5%	85.9%	81.3%	83.7%
Radial	A24	93.4%	93.1%	93.5%	94.2%	93.9%	93.6%	94.4%	93.1%	87.4%	90.3%	88.1%	87.5%	88.3%	88.8%	86.2%	87.7%
Radial	A3	95.2%	94.5%	90.2%	91.2%	91.7%	94.4%	89.6%	91.9%	94.4%	94.6%	90.5%	86.4%	89.4%	90.3%	87.4%	88.3%
Radial	A316	91.0%	87.9%	87.2%	92.6%	87.3%	92.6%	89.0%	92.8%	89.4%	91.0%	88.7%	90.7%	90.3%	93.3%	91.5%	89.8%

Source: TfL Road Network Performance.

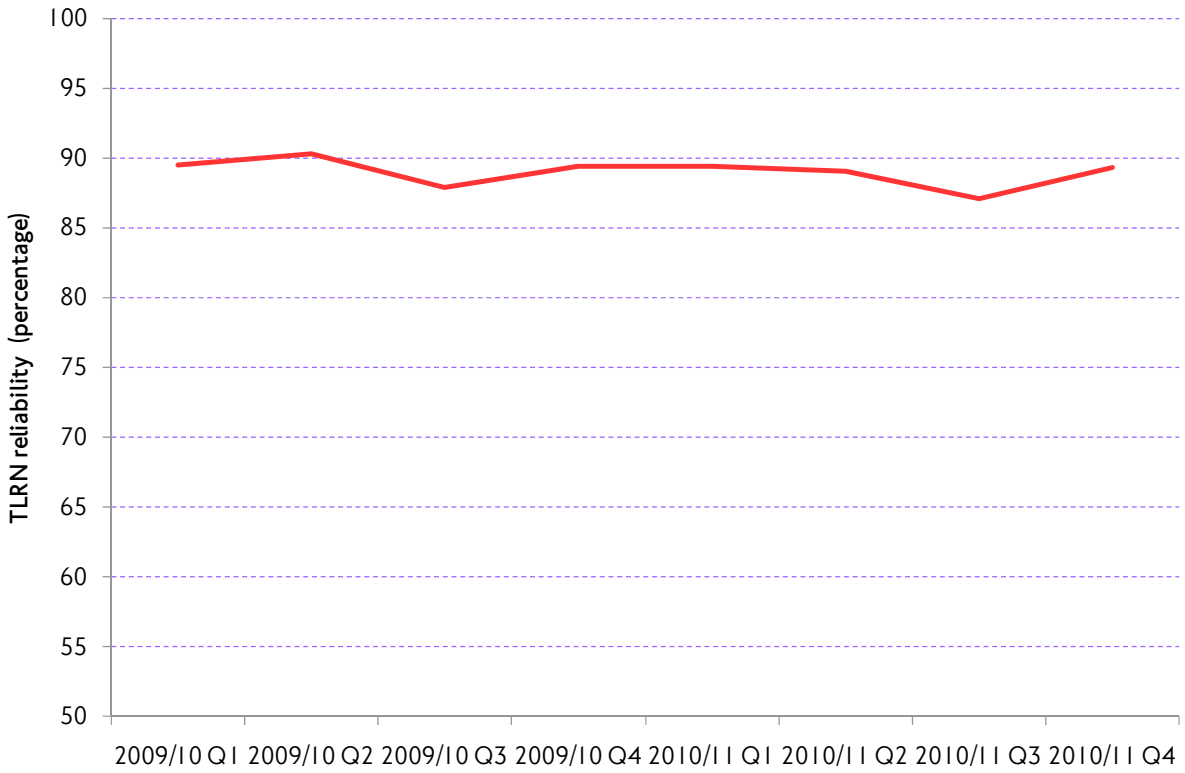
Table 4.15 Journey time reliability on the TLRN. AM/PM peak by route type, corridor and direction (continued).

		Anti-Clockwise								Clockwise							
AM Peak		2009/10	2009/10	2009/10	2009/10	2010/11	2010/11	2010/11	2010/11	2009/10	2009/10	2009/10	2009/10	2010/11	2010/11	2010/11	2010/11
Route Type	Corridor	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Orbital	A102 B. Tunnel	79.3%	75.3%	75.1%	77.2%	75.9%	75.3%	74.4%	77.0%	96.7%	95.8%	95.5%	96.8%	96.3%	95.7%	94.1%	97.0%
Orbital	A406	87.2%	88.9%	87.9%	88.6%	88.8%	86.9%	85.7%	88.5%	90.5%	91.9%	87.8%	89.1%	91.1%	91.6%	88.4%	90.6%
Orbital	A205	87.9%	89.5%	87.4%	88.5%	88.7%	89.4%	87.5%	88.1%	86.5%	85.9%	86.2%	85.2%	86.3%	85.8%	86.4%	86.2%
Orbital	Inner Ring	82.6%	82.5%	80.9%	84.0%	83.5%	83.0%	81.4%	84.4%	83.1%	84.1%	84.4%	85.4%	83.9%	84.0%	84.0%	85.1%
		Anti-Clockwise								**Clockwise**							
PM Peak		2009/10	2009/10	2009/10	2009/10	2010/11	2010/11	2010/11	2010/11	2009/10	2009/10	2009/10	2009/10	2010/11	2010/11	2010/11	2010/11
Route Type	Corridor	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Orbital	A102 B. Tunnel	85.1%	84.5%	79.4%	86.3%	84.9%	77.1%	74.9%	84.0%	85.4%	83.9%	80.4%	78.5%	80.7%	79.7%	78.1%	79.0%
Orbital	A406	86.6%	86.2%	85.1%	84.9%	88.3%	87.7%	84.9%	88.3%	85.5%	81.9%	80.2%	81.8%	85.4%	86.7%	84.7%	85.5%
Orbital	A205	84.6%	85.8%	83.6%	82.9%	84.6%	85.7%	82.5%	83.5%	89.8%	89.4%	89.1%	88.2%	90.9%	91.6%	88.1%	89.9%
Orbital	Inner Ring	78.3%	77.5%	76.4%	80.0%	78.9%	78.0%	76.5%	80.5%	80.2%	79.6%	79.7%	81.6%	79.9%	79.1%	79.1%	81.4%

Source: TfL Road Network Performance.

Figure 4.14 shows the trend in this indicator (at the whole monitored network level) over the 8 quarters of data so far available. Seasonal factors appear to dominate the graphic and there is no evidence as yet, given the limited time-series available, of a clear 'directional' trend in the indicator, although values for quarters in 2010/11 are consistently marginally lower than the corresponding values for the previous year.

Figure 4.14 Overall trend in road journey time reliability – Greater London.



Source: TfL Road Network Performance.

4.15 MTS Strategic Outcome Indicator: Journey time reliability for road traffic

Brief definition

Journey time reliability for road traffic is the primary indicator for traffic smoothing. This indicator is based on the concept of an 'allowable' variation around a standard mean (normalised) journey time. The standard mean journey time is 30 minutes, which is broadly representative of journeys by road in London. The allowable variation defined by the MTS is +5 minutes. This indicator measures the percentage of all journeys (as 'journey segments' observed by cameras) achieved within 35 minutes - which are therefore considered to have been achieved reliably.

Value for 2010 calendar year and assessment of recent trend

Two complete years of data are now available for this indicator. The London-wide value for 2010/11 was 88.7 per cent (of journeys achieved reliably). This compares to an equivalent value of 89.3 per cent for 2009/10. This is to be set against a nominal working target of 89 per cent for this measure at the London-wide level. It is not yet possible to discern a clear directional trend in this indicator, although values for the most recent year were marginally lower than previously.

4.16 Operating costs for TfL services

Keeping tight control of operating and other costs is of critical importance to TfL since it contributes to the aim of improving value-for-money, limits the demands made upon fare payers and tax payers, and helps to ensure that TfL has a budget that balances income against costs. TfL publishes much information on its finances and costs. This can be found, for example, in TfL's Business Plans and Annual Reports and the following information is derived primarily from this source.

TfL's operating costs in the 2010/11 financial year, with comparison against previous year.

Table 4.16 shows a segmental analysis of TfL's expenditure on public transport services for the 2010/11 financial year, set against equivalent figures in Table 4.17 for the previous financial year.

Since publication of Travel in London 3, TfL has revised its accounting conventions to accord with the International Financial Reporting Standards (IFRS). Data for the 2009/10 financial year have been re-based for Table 4.17. However, they are not directly comparable with data previously presented for either this year or the preceding 2008/09 financial year. Expenditure is shown on both a gross, net and per-passenger-kilometre basis, for each mode separately and for all modes combined.

Table 4.16 TfL's expenditure and revenue on public transport services – 2010/11. IFRS accounting basis.

	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 Trams	146	29	0.20	9	0.06
London Overground	606	125	0.21	57	0.09
All above modes	**18,124**	**4,120**	**0.22**	**702**	**0.05**

Source: TfL Business Planning.
Notes: Net expenditure effectively corresponds to PT grant. So income is fares/third party revenue. Gross costs are total costs, and net costs are gross costs less fares/other income - or the level of support TfL provides to keep them running.

Table 4.17 TfL's expenditure and revenue on public transport services – 2009/10. IFRS accounting basis.

	Passenger kilometres (millions)	Gross expenditure (£m)	Gross expenditure per passenger kilometre (£)	Net expenditure (£m)	Net expenditure per passenger kilometre (£)
London Buses	8,013	1,818	0.23	652	0.08
London Underground	8,456	2,290	0.27	494	0.06
Docklands Light Railway	365	93	0.25	13	0.04
London Trams	139	30	0.22	13	0.09
London Overground	437	101	0.23	65	0.15
All above modes	**17,410**	**4,332**	**0.24**	**1,237**	**0.08**

Source: TfL Business Planning.
Notes: Net expenditure effectively corresponds to PT grant. So income is fares/third party revenue. Gross costs are total costs, and net costs are gross costs less fares/other income - or the level of support TfL provides to keep them running.

4.17 MTS Strategic Outcome Indicator: Operating costs for TfL services per passenger kilometre for the principal public transport modes.

Operating costs for TfL services are an important measure of the efficiency and effectiveness of transport service provision in London.

Across all of TfL's modes, the total gross operating expenditure in 2010/11 was £4,120 million, and the total net expenditure was £702 million. Total passenger kilometres were 18,124 million. Therefore, the gross operating cost per passenger kilometre in 2010/11 was 22 pence. The net operating cost per passenger kilometre in 2010/11 was 5 pence. These values are not comparable with those presented in Travel in London report 3 for the 2009/10 financial year, reflecting a change to TfL's accounting practice as explained in TfL's annual report.

Further explanation of the detail of these numbers can be found in the Operational and Financial Performance Report for quarter 4 2010/11, and the Annual Report, on TfL's website.

4.18 Asset condition for TfL services

Knowledge of the condition of the assets that TfL owns and which underlie services is crucial to ensuring that the organisation can meet its objectives of operating a safe, secure and reliable network, whilst also optimising investment decisions with regard to asset maintenance and replacement. The condition of the assets specific to the major TfL modes is reported in detail elsewhere. For the purposes of monitoring MTS, a composite measure that describes the condition of TfL's assets across the modes has been developed. This is based on the percentage of asset meeting basic 'pragmatic' standards, usually in terms of age or state of repair, the specific measure for each mode being weighted according to the relative use made of that mode. The derivation of this measure is described in more detail in Travel in London report 3, as are various technical considerations relating to the use of such relatively simplistic benchmarks as proxies for overall asset condition as perceived and experienced by the public.

Table 4.18 updates the time-series relating to TfL's assets that have appeared in previous editions of Travel in London. It will be noted that there have been several changes to reporting conventions for TfL assets by the modes responsible. In particular:

- The measure for asset condition for carriageways and footways is now reported to whole numbers only. The back-series for carriageway and footway assets has been revised to be compatible with this requirement.
- The improvement in the percentage of bus vehicles less than 10 year old is partly due to the replacement of the 'bendy bus' fleet with newer vehicles.
- LU has changed the classifications of asset condition so that is no longer possible to make a direct comparison to previous years. LU now report functional condition and physical condition (residual life) separately. The change in methodology is illustrated by a vertical line between 2009 and 2010. For 2010 the table identifies assets which have an expected residual life of five years or more.
- There is no change in conditions of the assets for DLR or Tramlink as these are relatively new and well within the pragmatic benchmarks for repair or replacement.

- London Overground has now completed the comprehensive replacement of rolling stock across the whole of the fleet.

Table 4.18 Asset condition – historic trend according to standard benchmarks.

	2003	2004	2005	2006	2007	2008	2009	2010
Streets (TLRN)								
Percentage of carriageway not in need of repair	89	93	93	94	94	93	92	90
Percentage of footways not in need of repair	..	93	94	93	94	95	94	92
Buses								
Percentage of bus vehicles less than 10 years old	86.3	91.5	95.8	99.4	99.4	96.5	90.0	93.6
Underground								
Percentage of LU rolling stock with six years or more (for 2010, 5 years or more) before next overhaul	94.1	94.0	93.6	94.2	94.9	94.1	93.2	88.6
Percentage of LU track with six years or more (for 2010, 5 years or more) before next overhaul	67.1	70.7	71.8	69.2	72.6	73.2	69.7	70.3
DLR								
Percentage of DLR rolling stock less than 30 years old	100	100	100	100	100	100	100	100
Tramlink								
Percentage of tram rolling stock less than 30 years old	100	100	100	100	100	100	100	100
London Overground								
Percentage of Overground rolling stock less than 30 years old	n/a	n/a	n/a	n/a	n/a	23	80	100

Source: TfL Finance.

4.19 MTS Strategic Outcome Indicator: Asset condition for TfL services

Definition of indicator

This indicator measures the percentage of TfL's key assets that are deemed to be in a 'good state of repair', according to existing mode-specific benchmarks that generally reflect 'industry-standard' definitions. It is presented as a composite multi-modal indicator with the different modal components weighted according to their share of the person kilometres travelled in Greater London for the calendar year to which the indicator applies.

Value for latest year and assessment of trend

The composite asset condition score in 2009, reported in Travel in London report 3, was that 89.1 of in-scope asset was assessed as being in good condition

The composite asset condition score in 2010 was that 89.2 of in-scope asset was assessed as being in good condition.

Given the breaks in the continuity of the input data for this indicator, it is not possible to make a direct comparison between the value for 2010 and that for 2009.

5. Supporting economic development and population growth: London's demographic and economic trends

5.1 Introduction and content

This chapter reviews and updates trends in the principal demographic and economic factors underlying transport activity in Greater London. Whilst trends in these drivers of transport demand typically change fairly slowly, recent years have of course been distinguished by substantial and continuing economic turmoil, the implications of which for travel patterns are considered in this chapter.

This chapter includes two Focus Topics looking, firstly, at how transport provision, patronage and economic development have gone hand-in-hand in the London Docklands, and secondly, defining and setting out how the long-term Transport Legacy of the London 2012 Olympic and Paralympic Games will be monitored and assessed by TfL.

5.2 Summary of key trends and recent developments

Population and employment

London's resident population has grown strongly over recent years. There were an estimated 223,000 additional people living in London in 2010 compared to 2007 – equivalent in scale to the addition of a medium-sized London borough. This increase has mainly been driven by natural population change, and is a rate of increase higher than that expected by the Mayor's London Plan, on which the MTS is predicated. Whilst the significance of short-term fluctuations in the context of a long-term projection should not be over-stated, this higher than expected increase in population is a factor in explaining the continued increase in travel over the last 4 years, and particularly in the most recent year, despite the impact of the economic recession in reducing travel demand.

The economic recession and travel

The UK and London have recently experienced one of the deepest economic recessions of recent times, with the latest economic indicators showing only a muted recovery from the recession, and with market and consumer confidence still big factors militating against further economic growth going forward. London's economy emerged from recession in Quarter 4 2009, having contracted by 6.5 per cent over the recessionary period. Although London's economy then grew by 3.3 percent over the period to Quarter 1 2011, and in so doing out-performed the UK, the overall level of growth remains relatively modest. About 198,000 jobs were lost in total over the recessionary period. London's employment rose for the first time in Quarter 4 2010 with an increase of 0.7 per cent, after 6 quarters of year on year falls.

The year on year rate of growth in bus passenger journeys recovered to 2 per cent in the first Quarter of 2011, following an aggregate decline of 4 per cent over the recessionary period. In comparison, Underground passenger journeys decreased by 10 per cent in aggregate during the recession, but had recovered strongly to pre-recessionary levels of around 6 per cent year on year growth by September 2010. Having reduced by 1.4 per cent during 2009, patronage on London and South East

National Rail services also recovered strongly, with year-on-year growth of 8.9 per cent in 2010/11.

Access to jobs and services

Transport supports economic growth by providing effective access to jobs and services. One measure that can be used to quantify the development of the transport networks is the number of jobs that are potentially available within a given travel time (45 minutes being taken as the benchmark). In 2011, 980,200 jobs are potentially available within 45 minutes travel time to the average London resident. This compares to 959,400 in 2009 – an increase of 2.2 per cent, and to 937,900 in 2006 – an increase of 4.5 per cent.

5.3 London's population

The basic source of data on population is the decennial Census of Population. Results from the most recent Census taken in spring 2011 will be available in 2012. Estimates of the population of London for 2010 are therefore based on the previous Census of 2001, up-rated each year by the Office of National Statistics and the GLA, using statistics of registered births and deaths, and migration, for the intervening years.

Figure 5.1 shows the long-run trend in the population of Greater London. From a comparative low point in 1988 the number of people living in London has increased steadily, and this trend has continued unabated during the recent economic recession, with the total number of people living in London now back to levels last seen in the early 1960s.

Office for National Statistics and GLA estimates show that the population of Greater London in mid-2010 was 7.8 million, a net change of 0.9 per cent and an extra 71,600 people during the year since mid-2009. Most of this growth is due to natural change (ie an excess of births over deaths) which accounted for 83,000 additional people in 2010, offset by a small net outflow, estimated as 11,000, of migrants.

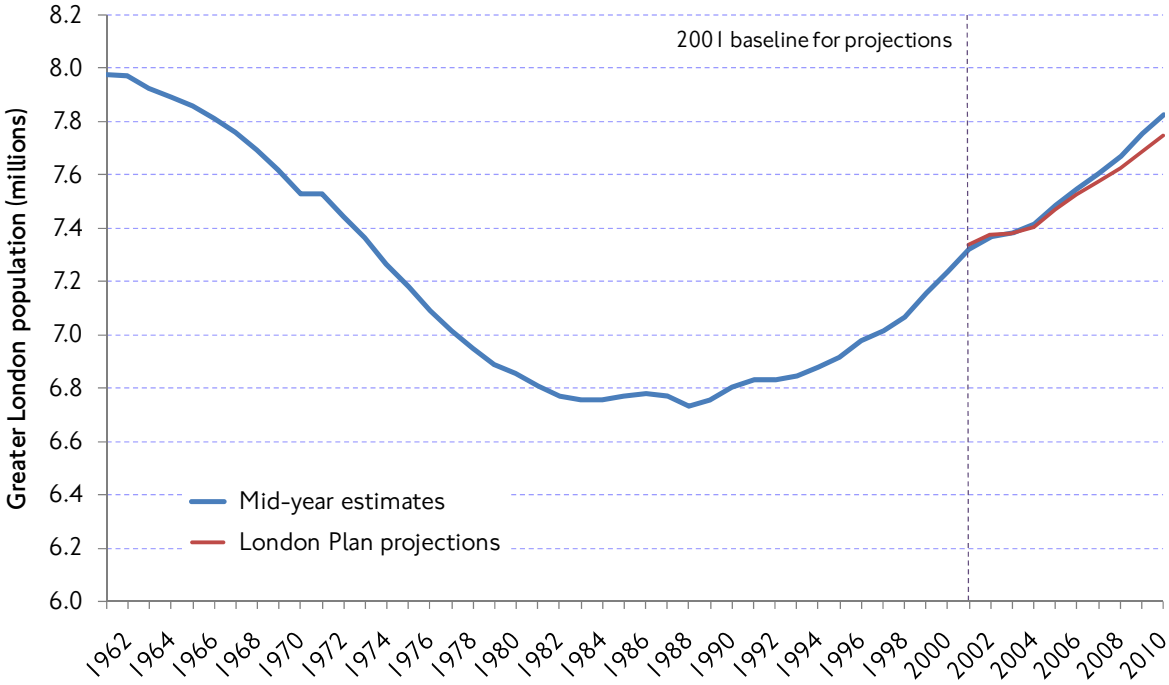
Typically, London experiences net inflow of immigrants from overseas while domestic migration (ie migration within the UK) results in loss of population from London to other regions. Migration flows were at relatively low levels during the recessionary years 2008-09, compared with the late 1990s and earlier years of the last decade, and remained so between 2009 and 2010, although with signs of recovery in domestic out-migration.

The London resident population in 2010 was 16 per cent higher than in 1988, and 8 per cent higher than in 2000. It was 3 per cent higher than the 7.6 million people in 2007 that was taken as the starting point for the London Plan population projections on which the Mayor's Transport Strategy is based. Figure 5.1 shows the actual growth rate experienced since 2007 has been slightly higher than the London Plan projections. These projections are essentially long-term projections, leading to an extra 1.25 million people being resident in London by the year 2031. The significance of short term variations from that trend should not be over-stated – nevertheless, the experience of the 3 years since 2007 shows that actual growth could run ahead of that assumed by the London Plan and the MTS if current trends continue.

The growth in London's population between 2007 and 2010 is estimated to be 223,000 which equates to the population of a medium sized London borough having been added: in fact nine boroughs (and the City of London) had a resident population

lower than this figure in 2010 - the median (midpoint) of the distribution of borough populations was 236,000.

Figure 5.1 Greater London resident population – with comparison against London Plan projection.



Source: Greater London Authority.

Non-residents travelling in London

Apart from London residents there are about 1 million other people present and travelling in London on an average day. They include both commuters and day visitors from outside London as well as overnight visitors and tourists. This larger average 'daytime population' of Greater London is estimated at 8.8 million in 2010 (1.4 per cent higher than in 2009) of which about 86 per cent were London residents, 8 per cent workers commuting from outside London and the rest tourists and other visitors. The total of non-residents travelling in London on any one day is estimated to have increased by 5 per cent over the year, from 950,000 in 2009 to 1 million in 2010.

5.4 London's economy: Economic output

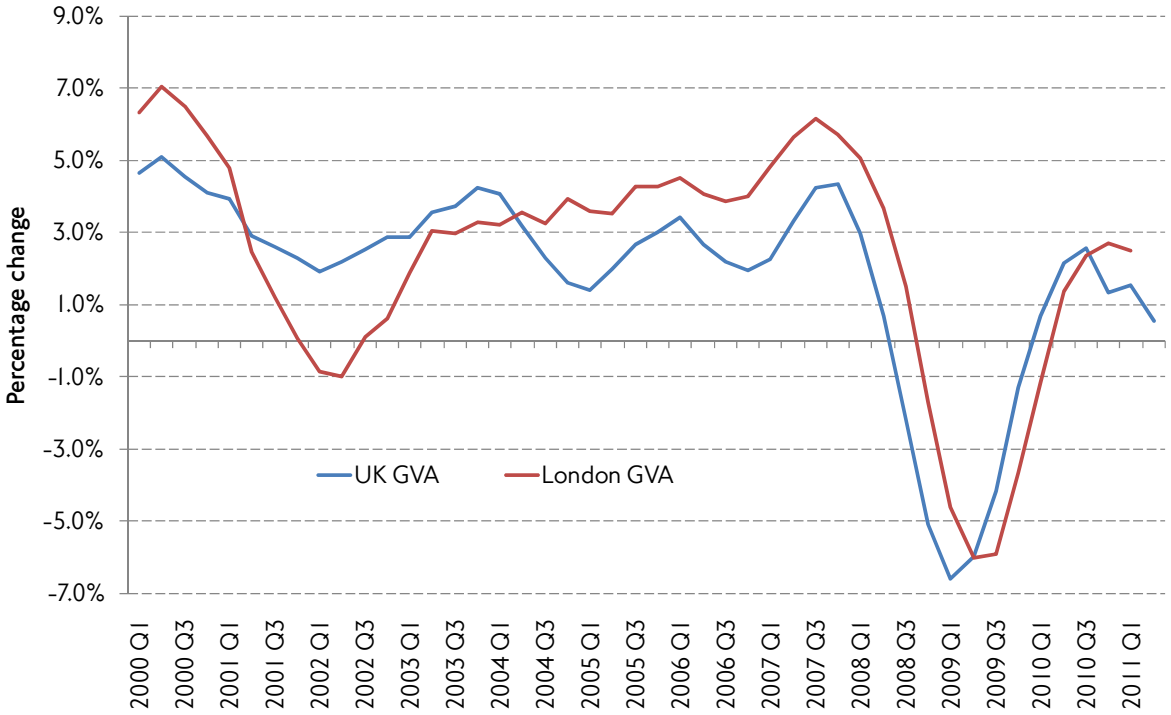
The recent economic recession and travel demand in London

The UK and London have experienced one of the deepest economic recessions of recent times. Reducing economic output and business and consumer activity feeds through, all other things being equal, to reduced travel demand and this has been seen in what now appears to have been a temporary pause in the established rates of growth in demand for the principal modes of public transport in London. The most recent economic indicators show only a relatively muted recovery from the recession, with market and consumer confidence still a big issue militating against further growth going forward.

Gross Value Added (GVA) – recent trends

Gross Value Added (GVA) is a measure of the value of goods and services produced in a region. It is a basic indicator of economic output. Figure 5.2 shows the trend for London GVA since year 2000. The equivalent trend for UK GVA is also shown.

Figure 5.2 Gross Value Added (GVA) – London and UK trends compared (year-on-year percentage change).

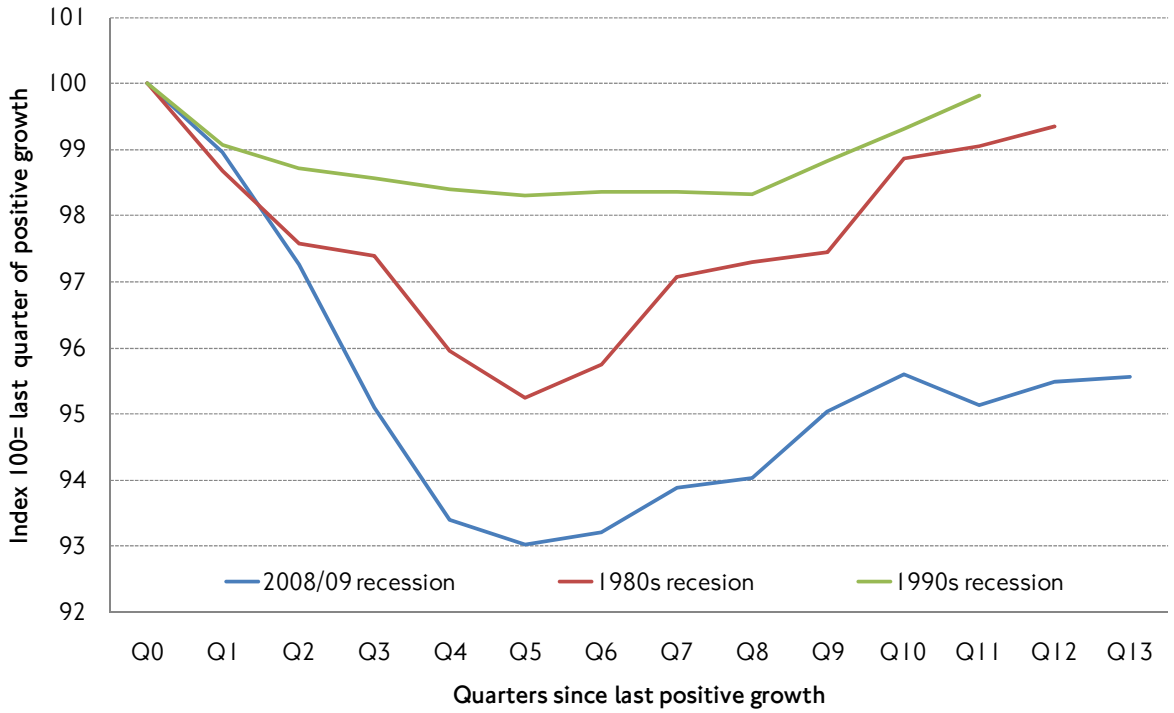


Source: ONS, Experian Economics.

The basic historic pattern of reasonably consistent economic growth through the middle part of the last decade, followed by a recession of unprecedented depth starting in Quarter 2 2008, associated primarily with the banking crisis of 2008, has been described in previous Travel in London reports. The UK emerged from recession (defined as two quarters of negative GVA growth) in Quarter 3 2009, following six consecutive quarterly falls in GVA, which in total reduced UK economic output by 7.2 per cent. London's economy also emerged from recession in Quarter 4 2009, having contracted by 6.5 per cent over the recessionary period.

Looking at the most recent quarters it is clear that the return to economic growth has been muted. At Quarter 2 2011 the UK level seasonally-adjusted GVA had risen by just 0.2 per cent quarter-on-quarter, signifying effectively flat growth since the second half of 2010. In London, at Quarter 1 2011 (the latest for which data are available) the equivalent rise was 0.4 per cent, indicating that London has out-performed the UK as a whole in terms of early recovery, albeit with growth at relatively modest levels.

Figure 5.3 Comparison of past recessions at the UK level – quarterly GVA index compared to last quarter before start of recession.



Source: ONS, Experian Economics.

Figure 5.3 compares the length and depth of the most recent recession with equivalent slowdowns in the 1980s and 1990s at the whole UK level. It shows the time taken for economic output to return to the level prevailing before the start of the recession. It took about 3 years after the recessions of the 1980s and 1990s for UK output to return to pre-recession levels. However, the most recent recession was not only deeper, but recovery is taking considerably longer, with UK output remaining at about 4.6 per cent below pre-recessionary levels at Quarter 2 2011.

Figure 5.4 Comparison of past recessions in Greater London – quarterly GVA index compared to last quarter before start of recession.

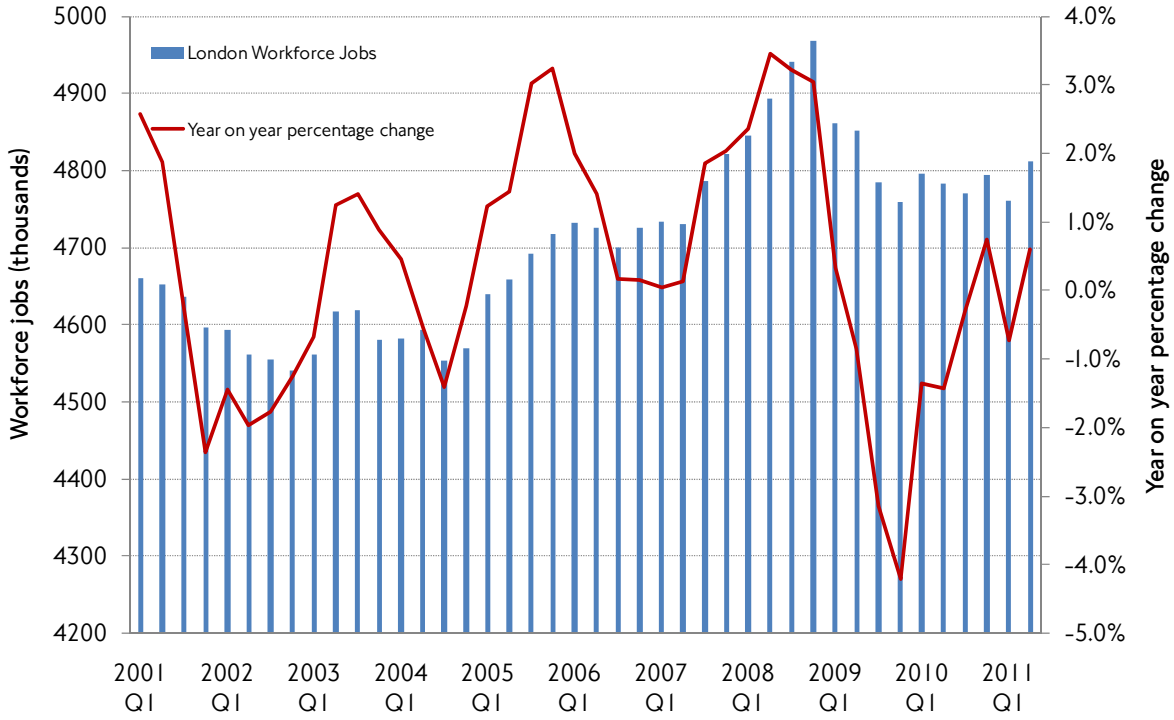
Source: ONS, Experian Economics.

Figure 5.4 shows an equivalent comparison for Greater London. Here, the pace of recovery, in terms of returning to pre-recessionary levels of GVA, has been faster in the case of the most recent recession compared to that of the 1990s recession, although the rate of recovery has slackened noticeably over more recent quarters. A comparison against the 1980s recession is not possible on a comparable basis.

5.5 London's economy: Employment trends

Employment trends in London, as more widely in the UK, have mirrored those of the general economy, with the impact of the recession clearly visible in Figure 5.5. Total workforce jobs fell from 4.97 million to 4.77 million (a fall of 4.0 per cent) between Quarter 4 2008 and Quarter 3 2010 and have been relatively flat since, with a total of 4.81 million workforce jobs in Quarter 2 2011.

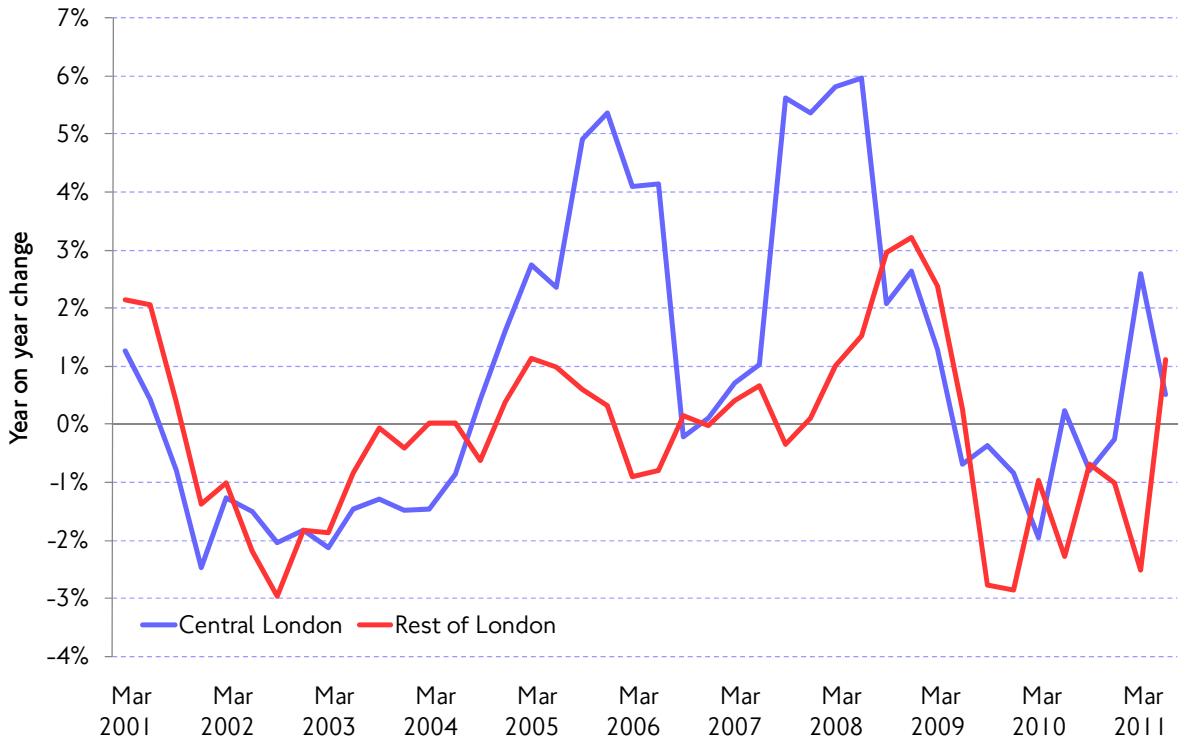
Figure 5.5 Trends in London workforce jobs and year-on-year change.



Source: ONS, Experian Economics.

As Figure 5.6 shows, central London employment growth has historically tended to outperform employment growth in the rest of London. Recent trends show that this pattern has continued. Employment in central London fell by less than in the rest of London during the recent recession and has recovered faster. Central London employment growth turned strongly positive with an increase 2.6 per cent in the first quarter of 2011 and, although the rate slowed in Quarter 2, it remains positive. In the rest of London, employment rose for the first time in June 2011 with an increase of 1 per cent after seven quarters of year-on-year falls.

Figure 5.6 Employment growth, central and the rest of London, year-on-year percentage change.



Source: Derived from ONS Labour Market Statistics for London and the South East and and Annual Business Inquiry.

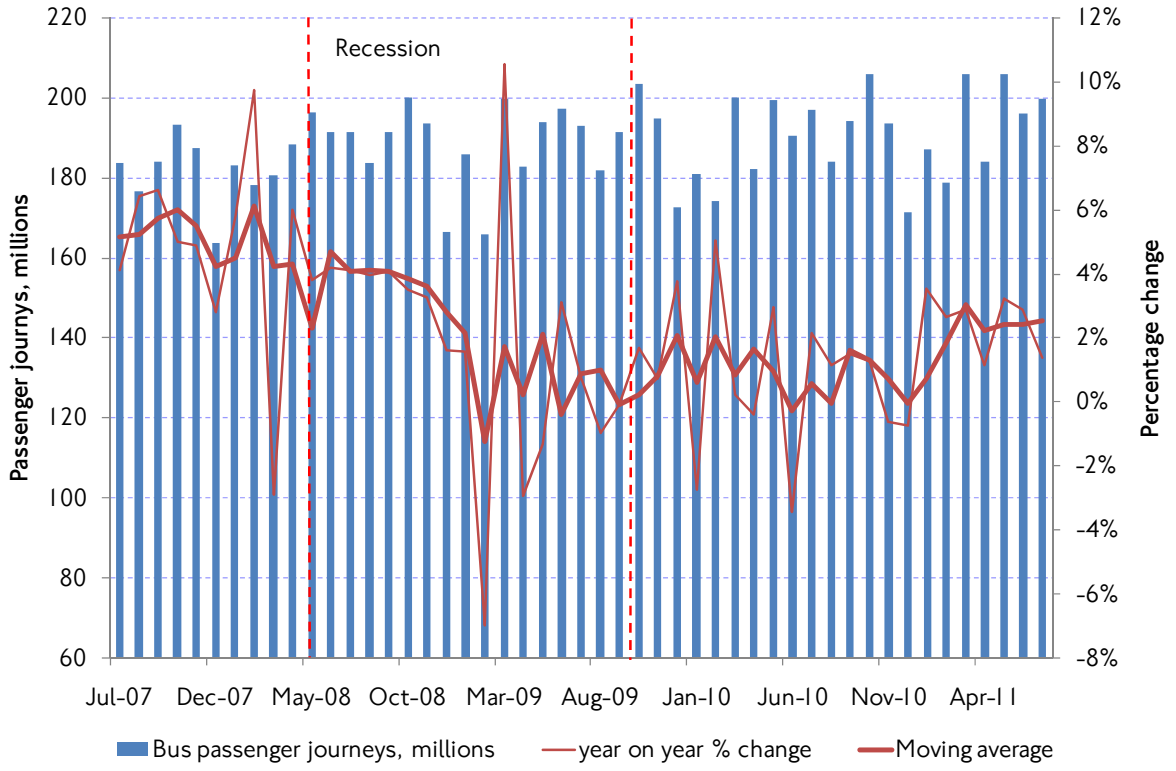
5.6 London's economy: Relationship to travel demand trends

This section explores the relationship between general economic trends and trends in patronage on the principal public transport modes, updating similar analyses presented in previous Travel in London reports.

Bus and Underground travel

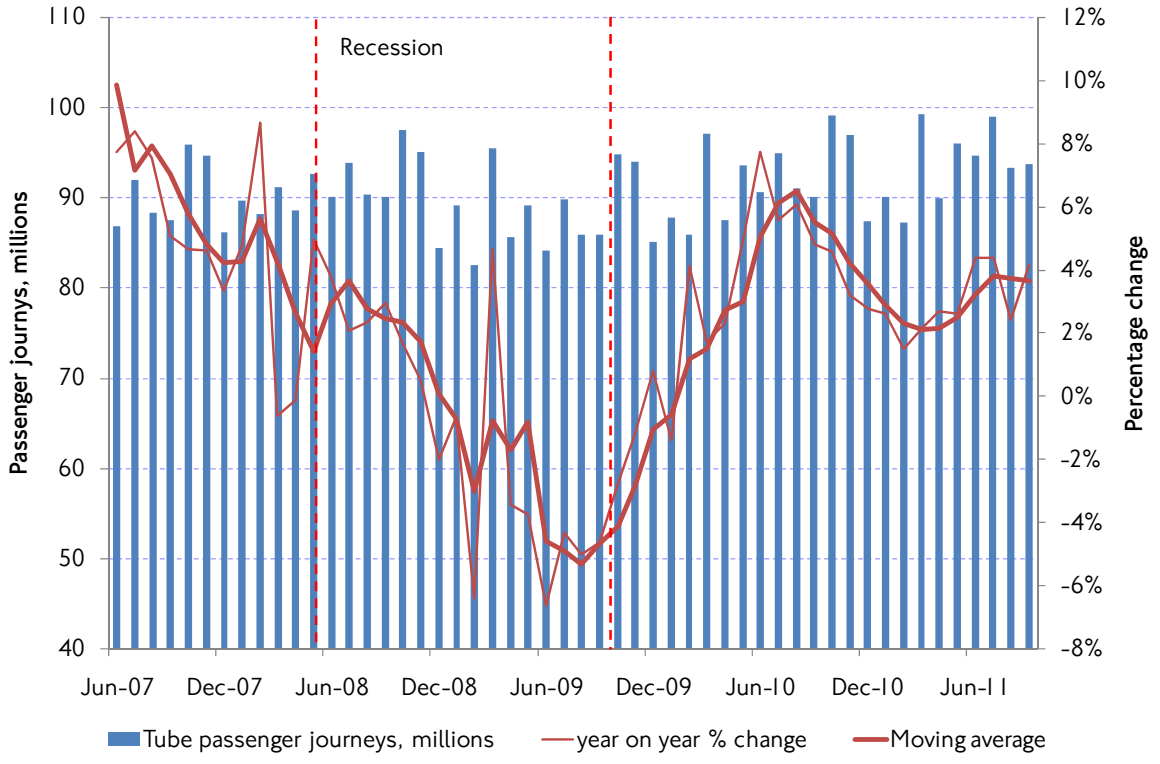
Figure 5.7 and 5.8 show monthly Bus and Underground passenger journeys data derived from ticket sales. The recession affected demand on the Underground more than the bus - as can be seen from the figures. Looking at Figure 5.7, the year on year rate of growth in bus passenger journeys recovered to 2 per cent in the first quarter of 2011, when the month on month volatility (shown by the thin red line) is smoothed, following an aggregate decline of about 4 per cent reflecting the recession. In comparison, Underground passenger journeys recovered strongly to pre-recessionary levels of around 6 per cent year on year growth by September 2010 - as shown in Figure 5.8. The rate of growth in Underground demand then eased quite notably during the final quarter of 2010 but this appears to have been temporary and in the first quarter of 2011 growth was again showing signs of accelerating.

Figure 5.7 Bus passenger journeys (millions) and year-on-year percentage change.



Source: TfL Fares and Ticketing.

Figure 5.8 Underground passenger journeys (millions) and year-on-year percentage change.

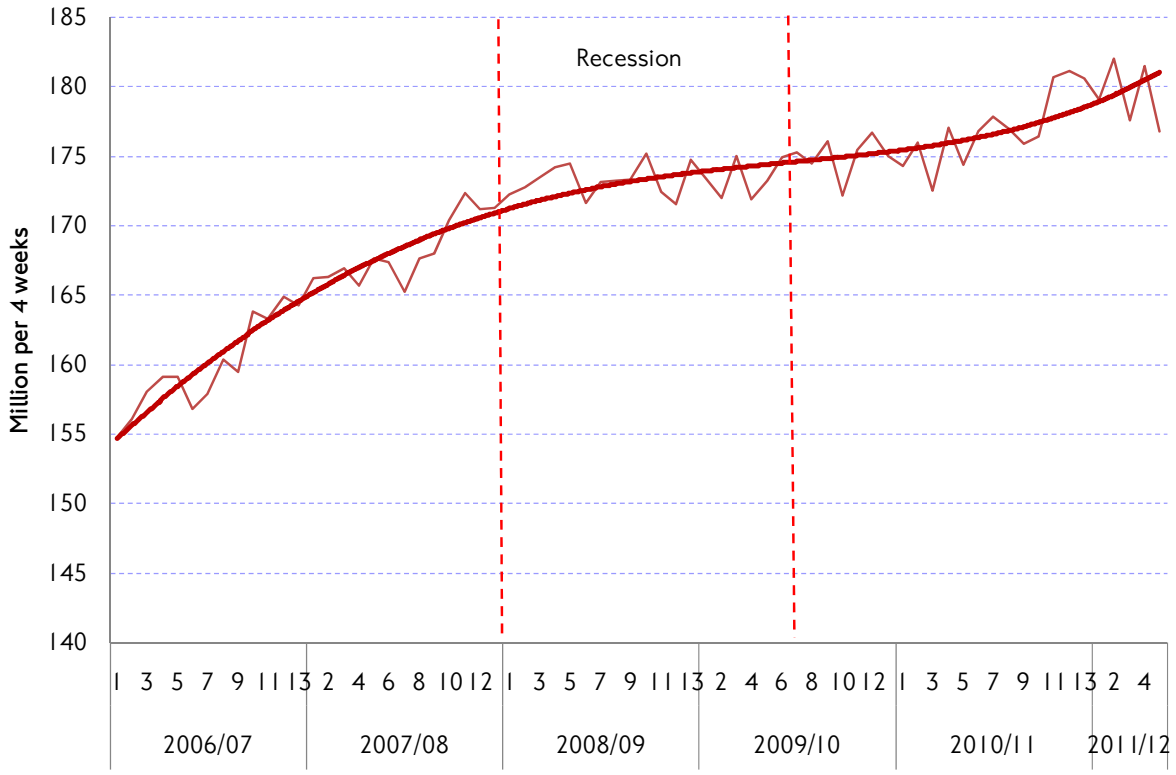


Source: TfL Fares and Ticketing

Figures 5.9 and 5.10 show seasonally adjusted 4-weekly bus and Underground passenger journeys data, again derived from ticket sales. After allowing for seasonal variability, trends show that growth in bus and Underground passenger journeys has recovered from the recent recession. However, evidence elsewhere in this report (see sections 2.5 and 5.3) suggests that much of the recent growth in trips reflects population growth over the year.

Figure 5.9 shows that bus journeys were growing at about 10 million per year during the year in the run up to the recession, averaging around 170 million per 4-weekly period in period 1 2008/09 - the onset of the recession. In comparison during the whole 20 month recessionary period bus journeys grew by barely 5 million to nearly 175 million. After a slow recovery from recession, bus journeys growth has accelerated and total patronage exceeded a seasonally adjusted 185 million per period at the start of 2011/12.

Figure 5.9 Bus passenger journeys, million, four-weekly period, seasonally adjusted.

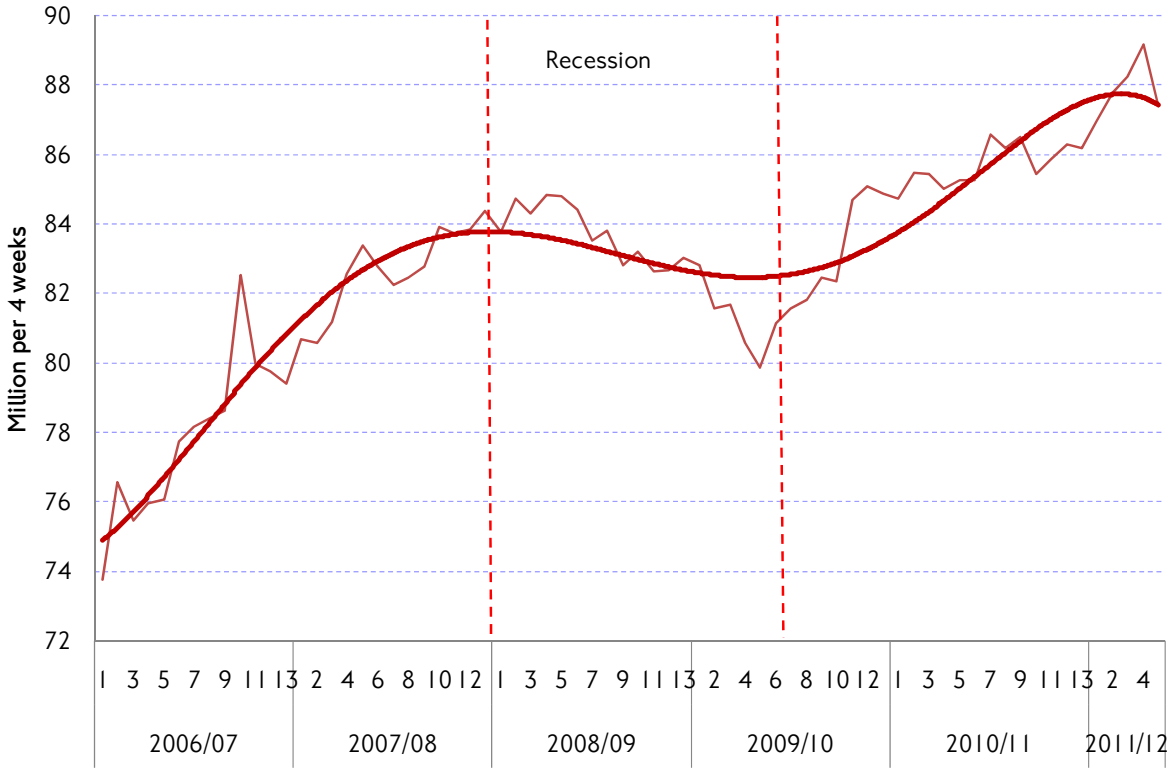


Source: TfL Fares and Ticketing.

Figure 5.10 shows that Underground journeys were growing at about 6 million per year during the year in the run up to the recession, averaging around 84 million per 4-weekly period in period 1 2008/09, at the onset of the recession. In contrast during the 20 month recessionary period Underground journeys fell by nearly 2 million in total to about 82 million per four-weekly period.

Unlike bus demand the recovery in Underground passenger journeys has been rapid. Underground journeys recovered the (net) lost 2 million journeys per period by the end of 2009/10 and nearly reached an all time seasonally adjusted high of 88 million per period in period 2 2011/12.

Figure 5.10 Underground passenger journeys, million, four-weekly period, seasonally adjusted.

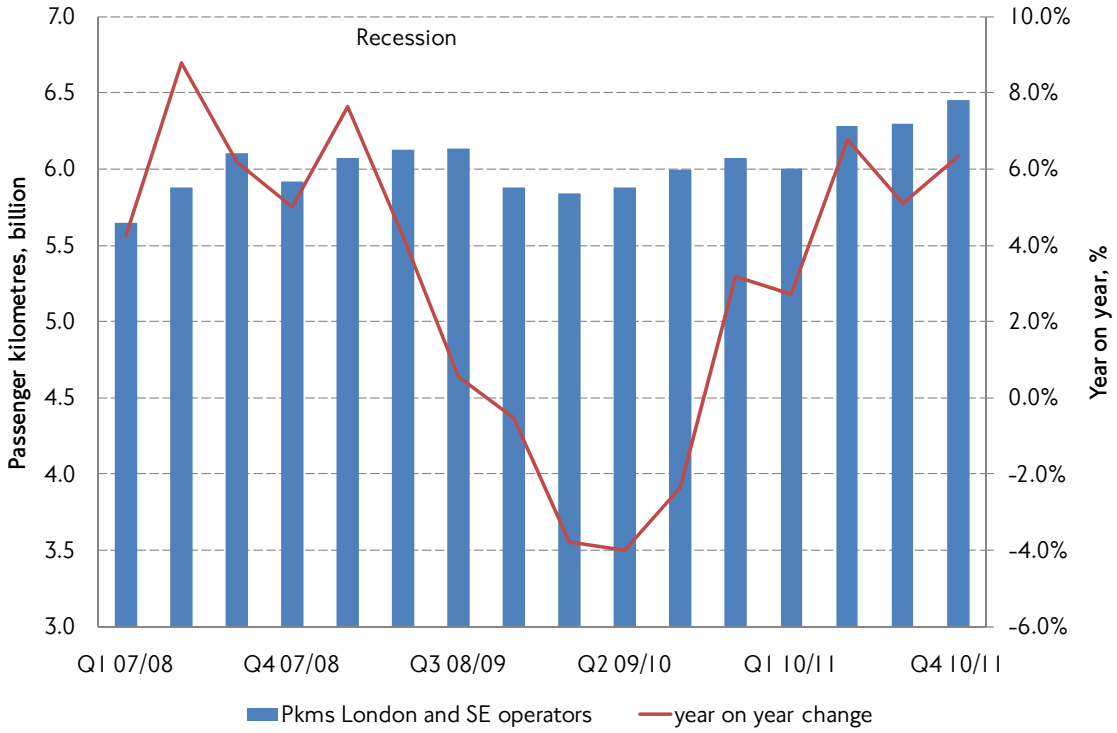


Source: TfL Fares and Ticketing.

National Rail travel

Figure 5.10 shows passenger kilometres travelled on National Rail services to, from and within London and the South East as provided by the Office of Rail Regulation. Rail demand in London and the South East has recovered strongly, with passenger kilometres growth increasing to the pre-recession rates of 6 per cent per annum in the fourth quarter of 2010/11 (see also Section 3.10 of this report).

Figure 5.11 London and South East train passenger kilometres, year on year percentage change.



Source: Office of Rail Regulation.

5.7 MTS Strategic Outcome Indicator: People's access to jobs

Definition of indicator

Good transport links are essential for moving people between their homes and work places – as well as other locations that provide both essential and discretionary services. One measure that can be used to quantify the development of the transport networks 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 used for assessing this is a travel time contour of 45 minutes by the principal public transport modes, expressed as a composite across Greater London at the level of the electoral ward.

Baselines and comparisons

Given the evolutionary pace of change in the transport networks, this indicator is nominally to be re-benchmarked on a three-yearly cycle. The initial benchmarking of this indicator related to the year 2006. The indicator has therefore been re-benchmarked to both 2009 and 2011 for this edition of Travel in London.

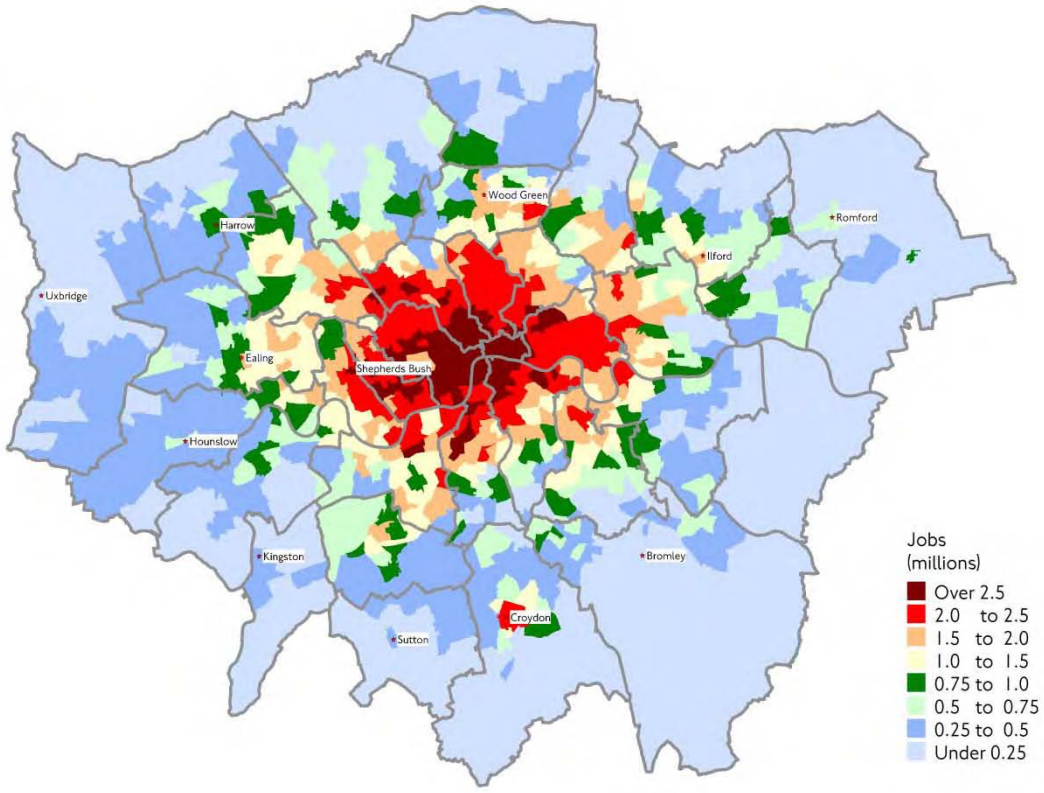
Derivation of this indicator requires outputs from London's strategic-level transport planning models. The assumptions underlying these models are periodically updated to reflect both new data, methods and transport plans, which means that direct comparisons across 'assessment years', using different model configurations, are potentially misleading. The approach used for comparison therefore compares values for the most recent year against values for the previous assessment year that have been re-calculated using the current transport model datasets. This allows true

'like-for-like' comparisons based on appropriate networks and population and employment assumptions for each year.

Values for 2009/2011, and comparison with previous years and assessment of trend

Figure 5.12 is a visualisation of this measure of accessibility to employment opportunities across Greater London. The colours reflect, for any given location (model zone), the number of jobs potentially available within 45 minutes travel time by mass public transport. The scenario relates to 2011, this being the most recent available from TfL's transport models.

Figure 5.12 Number of jobs available by mass public transport within 45 minutes travel time - 2011.



Source: TfL Strategy and Planning.

In 2011 an average of 980,200 jobs were available within 45 minutes travel time of each electoral ward in London. The number of jobs potentially available of course increases towards central London, reflecting the high concentration of employment here.

The value of 980,200 for 2011 compares to an equivalent (compatible) value of 959,400 in 2009, an increase of 2.2 per cent. It also compares to a value of 937,900 for 2006, an increase of 4.5 per cent. Accessibility to employment in London has therefore increased, on this measure, by 4.5 per cent over the 5 years since 2006. This change reflects a combination of incremental improvements, particularly additions such as the East London Line extension and various extensions to the Docklands Light Railway, as well as a large number of smaller, more local improvements.

5.8 Focus on: Travel to London's Docklands

Over the past 20 years London's Docklands has developed as a major area of high-density high-value employment, primarily in financial and business services, to complement the historic centre of these activities in central London. To date, Docklands development has been concentrated in the Isle of Dogs, some 3 kilometres to the East of the City of London, thus creating a major attractor of travel and substantially adding to the demand for transport to and from the Eastern subregion. In parallel with this development, the transport networks were also extended.

Travel to Docklands – the Isle of Dogs Cordon Survey

An annual survey has been carried out each year (except 2009) since 1988 to monitor trends in travel to and from Docklands. The survey counts trips into and out of the Isle of Dogs on a designated working day each autumn. All trips are included that have an origin or destination within the Isle of Dogs and cross the boundary cordon for the survey. 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, such as Island Gardens to South Quay, are also excluded.

Trips to or from Canary Wharf are reported separately. Canary Wharf is a major centre of employment within the Isle of Dogs and at the northern end of the Opportunity Area. A further 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 any that are wholly within the Isle of Dogs.

Transport infrastructure – the Docklands Light Railway

Because of its geographical location, there are limited routes to and from the Isle of Dogs. Three transport corridors may be identified, from the West, East and South, respectively. Until the Docklands Light Railway was extended to Lewisham in 1999, the only way of entering the Isle of Dogs from the South was on foot or cycle through the Foot Tunnel between Greenwich and Island Gardens. Road vehicles approaching from the South have to use other Thames crossings including the Blackwall and Rotherhithe tunnels and the Woolwich ferry.

To serve the growing demand for travel to and from Docklands, construction of the Docklands Light Railway (DLR) was begun in 1984. DLR services began in 1987 between Tower Gateway and Island Gardens at the southern end of the Isle of Dogs, with services also running between Island Gardens and Stratford. Subsequent extensions were opened, firstly with services to Bank in central London in 1991, to Beckton to the east in 1994, and south of the Thames to Lewisham, via Greenwich, in 1999.

In 2005 DLR services were extended to serve London City Airport, which had been opened downstream of the Isle of Dogs, in the Royal Docks area, in 1987. This extension was continued to Woolwich Arsenal in 2009. Finally, in 2011, DLR services were connected to Stratford International by a new link from Canning Town (Figure 5.13).

Figure 5.13 Development of the DLR Network.

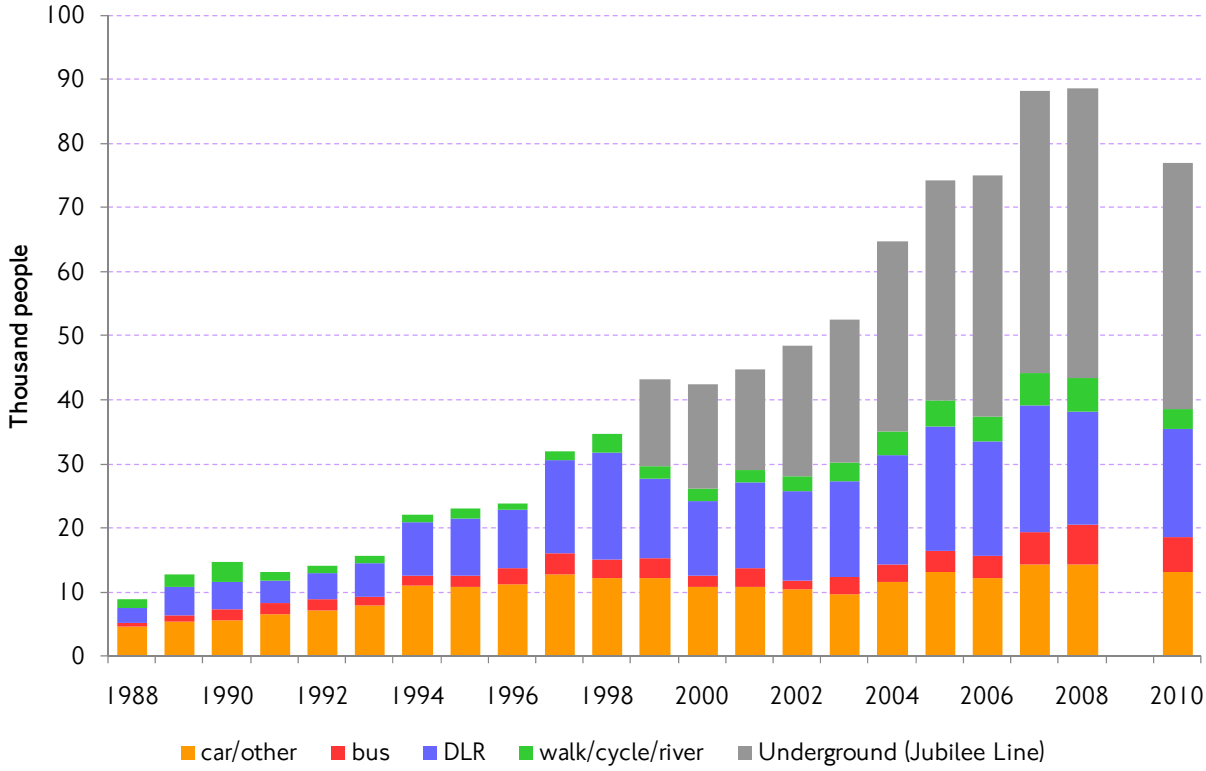
Inbound mode shares in the morning peak period

The growth in travel to the Isle of Dogs since 1988, the year in which construction was begun at Canary Wharf, is illustrated in Figure 5.14. It shows the number of people entering the Isle of Dogs during the weekday morning peak (between 7 and 10 am), broken down by mode of transport.

The London Underground extension of the Jubilee line to Docklands was opened in 1999. Before that, car was the mode with the highest share, accounting for about half the trips in each year between 1991 and 1994, then declining to 35 per cent by 1998. During this period, DLR increased its share from 30 per cent to 49 per cent. The share for bus travel fluctuated between 7 and 14 per cent.

On opening of the Jubilee Line extension in 1999 it immediately took over 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 increased its share to 50 per cent by 2006, while DLR and car both continued to decline, in relative terms, to 22 per cent and 17 per cent, respectively, in 2010. Other modes, which include walking, cycling and river travel together account for between 4 and 6 per cent. All of the changes to mode share were in the context of strongly growing overall demand for travel: the number of people entering the Isle of Dogs in the morning peak increased at an average rate of 10 per cent per year between 2000 and 2008.

Figure 5.14 Morning peak travel to the Isle of Dogs (including Canary Wharf) by mode of transport, 1988 to 2010.



Source: TfL Strategy and Planning.
Note: No survey in 2009.

Employment at Canary Wharf

Inbound travel during the morning peak period is closely related to employment. The number of jobs at Canary Wharf increased rapidly during the 1990s and after the turn of the century, from 7,000 jobs in 1993 to 25,000 by 1999 and 90,000 by 2007. The number of people entering the Isle of Dogs between 7 and 10am shows a similar trend (Table 5.1) but initially at a higher level – 16,000 in 1993 increasing to 45,000 in 1999. After 2001 the number of inbound morning peak travellers is more closely aligned with Canary Wharf jobs, reflecting the dominance of Canary Wharf as a location of employment in the area. Transport services progressively expanded to meet this demand: the public modes with cycling and walking increased their combined mode share in the morning peak from 50 per cent in 1993 to over 80 per cent by 2003.

Table 5.1 Morning peak travel to the Isle of Dogs and number of jobs at Canary Wharf, selected years, 1993 to 2010.

Thousand

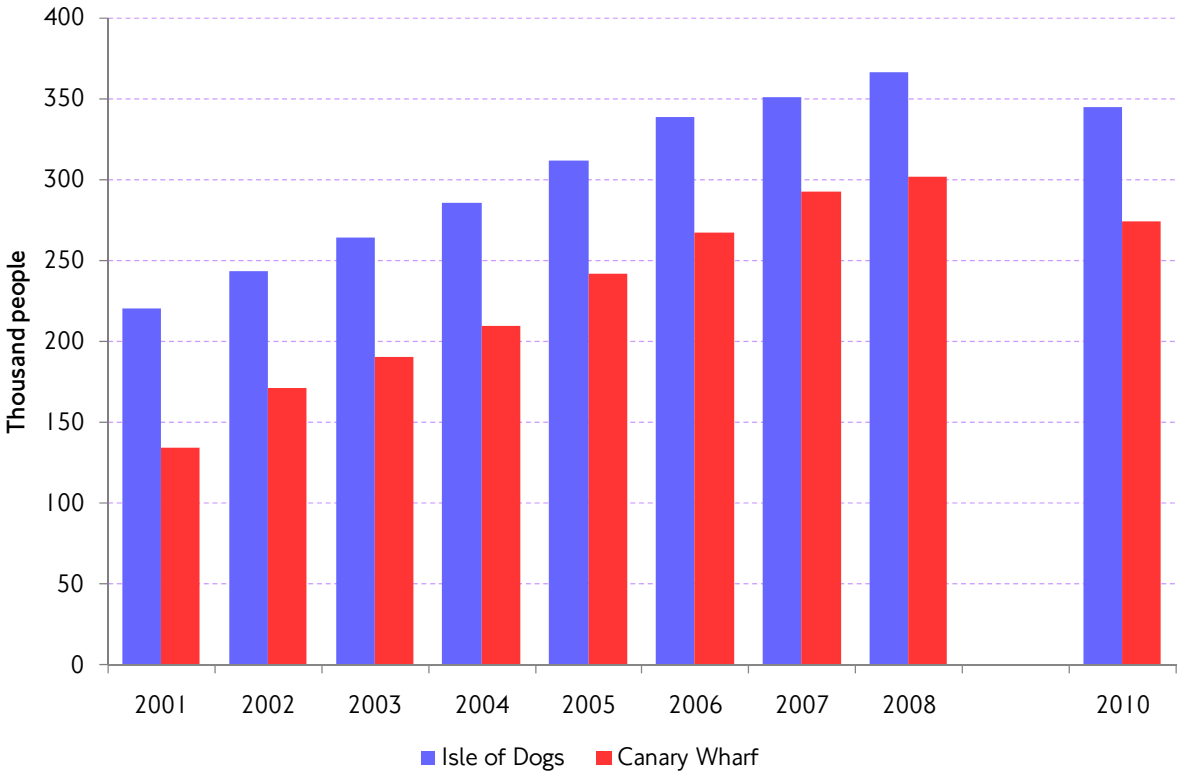
	am peak travel to Isle of Dogs	Jobs at Canary Wharf	% mode share of public transport/ cycling/walking
1993	16	7	*50*
1995	23	13	*53*
1997	32	15	*60*
1999	43	25	*72*
2001	45	40	*76*
2003	52	53	*82*
2005	74	73	*82*
2007	88	90	*84*
2010	77	93[1]	*83*

Source: TfL Strategy and Planning.
1. Estimate from Canary Wharf Employee Survey 2009.

Trends in daily travel to and from the Isle of Dogs

Between 2001 and 2008 the number of people travelling to and from the Isle of Dogs (on a weekday between 05:00 and 23:00) increased by 56 per cent, while travel to and from Canary Wharf more than doubled, an increase of 104 per cent (see Figure 5.15). As a share of the Isle of Dogs cordon crossings, travel to and from Canary Wharf increased from 61 per cent to 82 per cent. These shares may include a small number of trips to Canary Wharf from other parts of the Isle of Dogs. There was no survey in 2009, and the 2010 survey shows a decrease in trips compared with 2008: Isle of Dogs cordon crossings were 6 per cent lower than in 2008 and Canary Wharf cordon crossings 9 per cent lower.

Figure 5.15 Daily travel to and from the Isle of Dogs and Canary Wharf, between 05:00 and 23:00 hours.

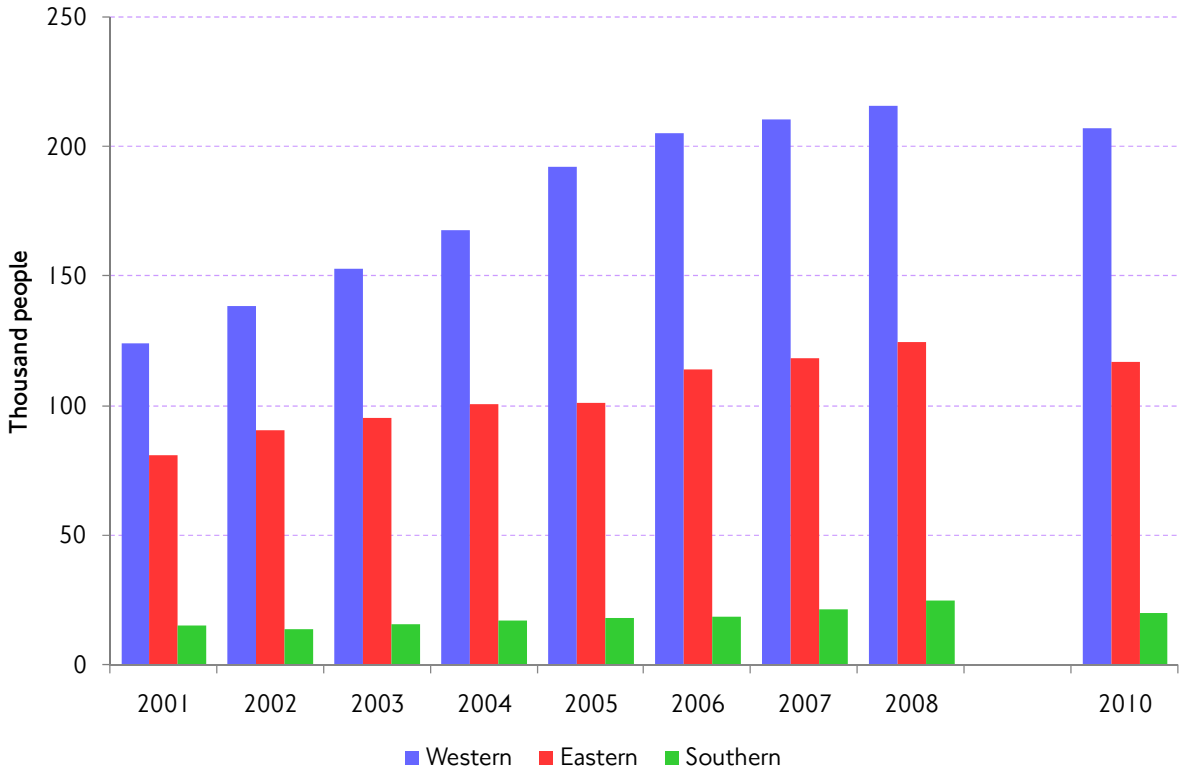


Source: TfL Strategy and Planning.
Note: No survey in 2009.

Geographical patterns of access to Isle of Dogs

The western corridor accounted for 60 per cent of travel to and from the Isle of Dogs in 2010, the eastern corridor accounted for 34 per cent, and the remaining 6 per cent entered or left from the southern corridor. In 2010, the Greenwich foot tunnel was closed for refurbishment at the time of the survey, and the southern corridor was restricted to the DLR route to Lewisham. Figure 5.16 shows that, when broken down by corridor, most of the growth in travel since 2001 was from the West of the Isle of Dogs. Trips using the western corridor increased by 74 per cent between 2001 and 2008 (and 66 per cent between 2001 and 2010), compared with 54 per cent (and 44 per cent, respectively) for the eastern corridor.

Figure 5.16 Daily travel to and from the Isle of Dogs between 05:00 and 23:00 by corridor

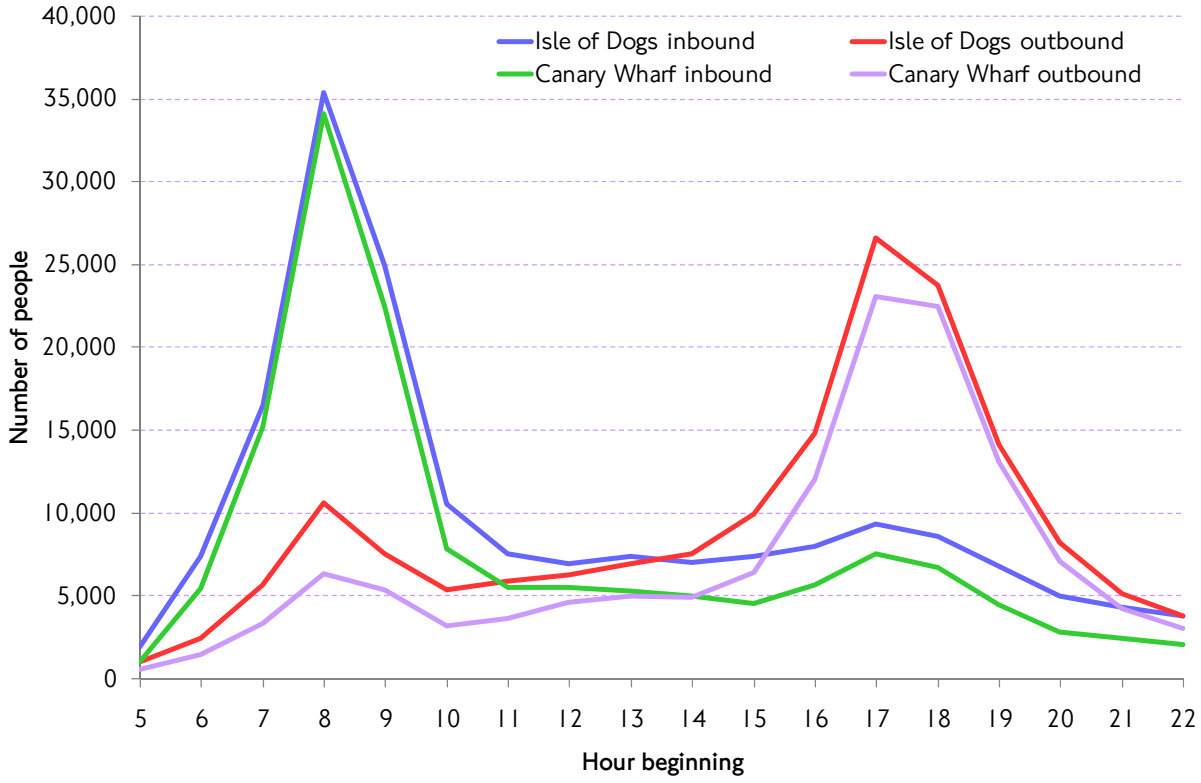


Source: TfL Strategy and Planning.
Note: No survey in 2009.

Temporal profiles

Within each weekday, travel to and from the Isle of Dogs and Canary Wharf shows typical profile, similar to travel to central London, with pronounced peaks associated with commuting: a narrow peak in the morning between 7 and 10am and a flatter (more dispersed) evening peak between 4 and 7 pm (Figure 5.17). The peak hour in the morning was between 8 and 9 am, when 35,400 people entered the Isle of Dogs, 46 per cent of the peak 3-hour total, and a fifth of the daily total of entries to the Isle of Dogs. The peak hour for exits in the evening peak was between 5 and 6pm when 26,500 left the Isle of Dogs, but this was only slightly higher than between 6 and 7pm (23,700 exits).

Figure 5.17 Travel to and from the Isle of Dogs and Canary Wharf by hour of day, 2010.



Source: TfL Strategy and Planning.

5.9 Focus on: Defining and monitoring the Transport Legacy of the London 2012 Olympic and Paralympic Games

Introduction

London's hosting of the 2012 Olympic and Paralympic Games provides a major opportunity to enhance London's physical transport infrastructure, to promote positive changes to the ways in which people travel, and to contribute to the lasting wider regeneration of East and Southeast London. All these aims are part of the wider Games Legacy, which has the objective to 'support regeneration and the convergence of social and economic outcomes between the six Olympic boroughs (see below) and the rest of London'. The Mayor published the Olympic and Paralympic Transport Legacy Action Plan in 2011 to meet the commitment made in Proposal 47 of the MTS, describing how TfL will build upon the 2012 Games to achieve specific transport outcomes and support the aspiration of convergence. As part of this Plan, TfL will be monitoring how these Transport Legacy aims are being achieved over the longer term, as distinct from the immediate operational aspects of the Games period itself, alongside similar monitoring of wider elements of the Games Legacy (eg the Sporting Legacy) undertaken by other agencies.

This section briefly describes TfL's approach to transport Legacy monitoring and sets out some illustrative 'baseline' data, reflecting the 'pre Games' position, across a non-exhaustive range of transport-related indicators of relevance to Legacy objectives. This serves to illustrate the nature of the measures and data sources that TfL will be using for the monitoring work, and also to characterise (in pre-Games

transport terms) some key indicators for future legacy monitoring across the main geographic areas involved.

Defining the Transport Legacy

The Games and associated developments are expected to bring significant social, economic, infrastructure and behavioural change to much of East and Southeast London – to be achieved over a timescale of up to two decades from the date of the Games themselves in summer 2012. The Legacy objectives most immediately apply to the six 'Olympic host boroughs' – these being: Barking and Dagenham, Hackney, Greenwich, Newham, Tower Hamlets and Waltham Forest.

The delivery of the additional physical transport infrastructure required to support the Games themselves is now almost complete. This **physical transport legacy** represents a step-change to levels of accessibility to, from and within East and Southeast London. Over the longer term this will facilitate the wider economic and social development and convergence sought by the Legacy Action Plans.

As well as the physical transport legacy, the Action Plan also identifies a **behavioural transport legacy**. This mainly reflects the fact that the Games will be an inspirational sporting showcase on the doorstep of East and Southeast London. This is expected to lead to substantial and beneficial change to the way people travel – reflected for example in increased mode shares for public transport, walking and cycling, and related improvements to aspects of the travel environment, such as local air quality and public health.

Approach to monitoring the Transport Legacy

TfL's main objective in monitoring the Transport Legacy will be to understand the extent to which the additional physical infrastructure and the behavioural legacy of the Games contribute to beneficial changes to travel and transport in the context of MTS objectives and the over-arching Legacy objective of moving towards social and economic convergence for the six Olympic boroughs.

The approach will be to maximise and customise the use of the many existing data sources covering the socio-demographic and economic profile of the six boroughs, together with transport operations, transport patronage and travel behaviour data to provide a picture of evolutionary change in principal Legacy indicators. In some cases, relating to specific aspects of the behavioural transport legacy, such as the extent to which the Games inspired people to walk or cycle in preference to using other transport modes, new bespoke research will be required to understand the role of the Games alongside wider factors in causing observed change. Appropriate monitoring of transport provision and travel in relation to large-scale commercial and housing developments will also be important to determine the extent to which the prior transport plans and expectations associated with these developments are borne out. Finally, evolutionary change in the six Olympic boroughs over the 20 year timescale of the Legacy monitoring will also be affected by wider transport trends affecting the rest of Greater London, many of which will not be associated with the Games. It is therefore necessary to interpret findings with reference to trends observed elsewhere, for example in similar 'control' boroughs in other parts of London, or at the level of Greater London as a whole, to identify 'differential change' in the six Legacy boroughs specific to Games Legacy initiatives.

Principal data sources

A large body of data to support Legacy monitoring objectives is available publicly. The following are some of the more important sources for this work:

- The Greater London Authority's London Datastore allows access to indicators derived from multiple surveys, such as the Census of Population, Annual Population Survey, Labour Force Survey and the London Skills and Employment Observatory that permit comprehensive demographic, social and economic profiling of residents at the borough level.
- Much of the data required to quantify aspects of transport operations, such as patronage service provision and quality, and including aspects of road network management, will arise from established TfL data sources - many of which are described elsewhere in this report.
- The overall travel behaviour of residents is captured through TfL's annual London Travel Demand Survey (see also Section 2.10 of this report), which includes multiple indicators around frequency and mode of travel, all referenced to the socio-demographic profile of London residents.

The majority of these data sources are expected to be updated on an annual basis or better. Furthermore, they generally apply equally to all parts of London, allowing differential change to be identified.

Units of analysis to be used for the monitoring

Three basic units of analysis will provide a framework to understand change in key transport indicators over the period of the Legacy monitoring. The units of analysis are not mutually-exclusive, allowing flexibility in the areas that are compared and the resolution of the analysis to reflect data robustness and specific monitoring objectives. They are: (a) the individual London boroughs and groupings of boroughs, (b) the transport networks, and (c) the individual - either people, neighbourhoods or specific commercial/residential developments.

For **overall socio-demographic, economic and travel demand/behavioural change**, together with trends in public health and key environmental indicators, the basic unit of analysis will be the individual borough. The following groupings of boroughs will be used to measure overall and differential change:

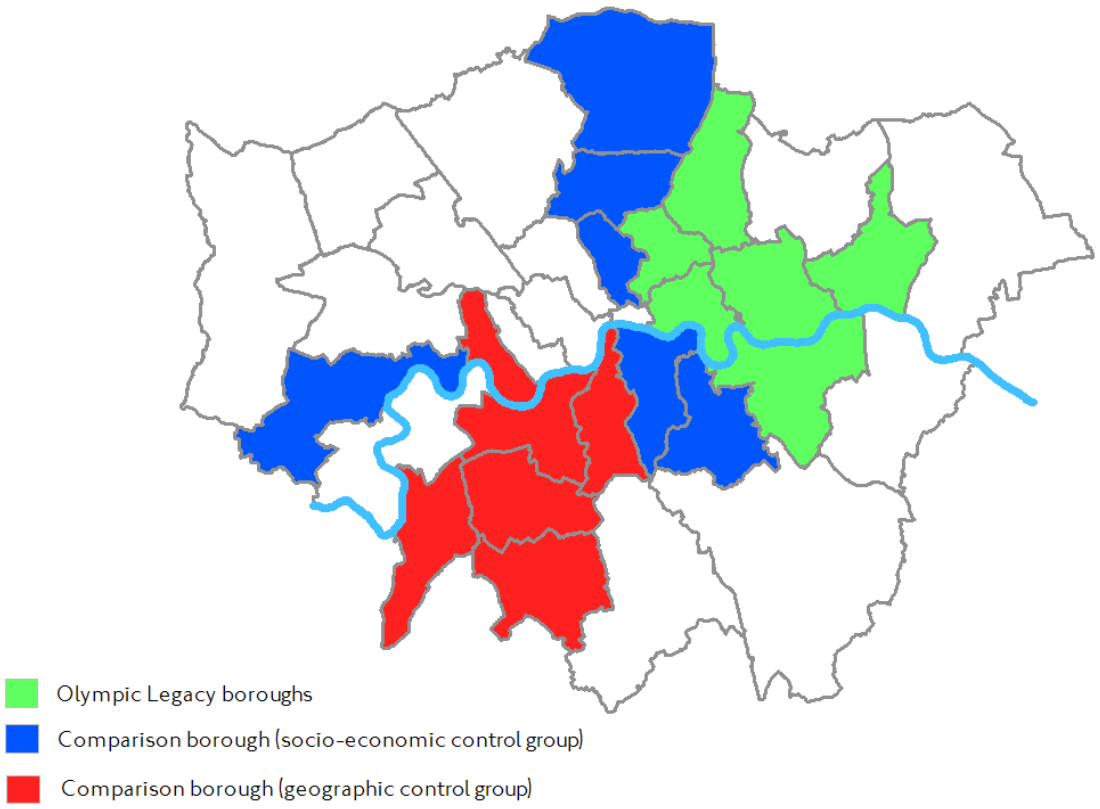
- Legacy boroughs individually and as a group (6 boroughs).
- Non-legacy London boroughs (all 27 as a group).
- All London boroughs (as a group – 33 boroughs).

Given the diversity, uniqueness and limited number of individual London boroughs it is not possible to define an ideal 'control group' of non-legacy-boroughs against which differential change in the six Legacy boroughs can be identified. Instead the analysis framework will allow comparisons across arbitrary boroughs or groupings of boroughs, with the identification of groups of 'similar boroughs' to permit indicative like-for-like comparisons. Two such groupings of boroughs are expected to be particularly informative (Figure 5.18). These are:

- A contiguous grouping of boroughs to the south and west of London abutting the river – forming a 'geographic mirror-image' of the six Legacy boroughs (coloured red on the map).

- A non-contiguous grouping of boroughs identified as being 'most similar' on key socio-demographic variables to Legacy boroughs (coloured blue on the map).

Figure 5.18 Groupings of boroughs for Olympics Legacy monitoring.



Source: TfL Strategy and Planning.

For trends in **service provision, travel demand and operational performance**, together with related aspects such as safety and security the basic unit of analysis will be the transport network of interest (eg rail, Underground, road), data for which can in most cases be disaggregated to the legacy borough and/or specific service/highway network level as required – for example to look specifically at usage of Stratford domestic or International stations and that of the various rail and bus services radiating from there. The level of resolution supported by these data sources is adequate for monitoring purposes and is generally the same London-wide.

Understanding the impacts of **major developments, specific transport initiatives and individual-level travel behaviour change** will generally require specific surveys or research targeted either geographically or socio-demographically - for example to explore responses among 'target' socio-demographic groups.

Timescales and monitoring baselines

Transport Legacy monitoring will be a long-term undertaking, spanning a period of up to 20 years from the 2012 Games themselves. Following the Games the Olympic Park will undergo a further transformation to align sporting and associated facilities more closely to their long-term Legacy role. This process is expected to take about two years. Likewise, much of the wider development and regeneration that is projected for the six Legacy boroughs, which will have a significant impact on

resident population and employment, has yet to take place and will occur progressively over the next two decades.

These considerations mean that formal, fixed monitoring baselines (pre-intervention conditions against which post-intervention change can be assessed) are of only limited usefulness and, although some illustrative examples of these are set out in the section below, full understanding of the contribution of the Games to the development and regeneration of East and Southeast London in particular will require a mix of surveys, analysis and studies that is appropriately aligned to emerging issues and policy priorities over the longer term.

Example indicative monitoring baselines for the Games transport legacy

This section sets out a selection of socio-demographic, travel and environmental indicators that relate to the pre-Games period. The primary purpose is to illustrate the scope and characteristics of the available data and the geographies of interest rather than to paint a comprehensive picture of the Legacy boroughs or present a formal baseline for monitoring purposes. Five groups of indicators are briefly explored:

- Resident population, employment and deprivation.
- Travel intensity, mode shares and household car ownership for residents.
- Perceptions of quality of life in the Olympic boroughs.
- Local air quality.
- Public transport accessibility in the vicinity of the Olympic Park.

Example 1: resident population, employment and deprivation

The six Legacy boroughs contain 578,000 households and in 2011 were home to 1.41 million people. The Legacy borough group spans both Inner and Outer London, with clear differences between individual boroughs on indicators such as population and employment density (Table 5.2). Especially notable are the indices of multiple deprivation. Hackney, Newham and Tower Hamlets are the second, third and seventh (respectively) most deprived local authorities in the UK, with all of the Legacy boroughs ranking in the top 28 most deprived UK local authorities.

Table 5.2 Basic demographic and socio-economic indicators. Olympics Legacy boroughs and appropriate comparators.

Borough/area	Resident population 2011 estimate	No. of households 2011 estimate	Population density - 2011, per hectare	Employ -ment rate (2010)	Gross annual pay (2010)	Jobs dens- ity	Indices of multiple deprivation (rank of 326)
Barking & Dagenham	179,400	73,700	50	62.9	27,000	0.42	22
Greenwich	241,400	105,100	51	67.1	31,000	0.53	28
Hackney	234,200	97,800	123	68.6	31,000	0.67	2
Newham	268,800	103,400	74	55.3	27,000	0.50	3
Tower Hamlets	254,200	103,500	129	61.4	34,000	1.26	7
Waltham Forest	232,700	94,800	60	64.5	29,000	0.46	15
Inner London	3,178,200	1,371,300	100	66.1	34,000	1.24	n/a
Outer London	4,722,300	1,924,800	38	69.5	31,000	0.61	n/a
Greater London	7,900,500	3,296,100	50	68.1	32,000	0.88	n/a

Source: GLA London Datastore, Borough Profiles: http://data.london.gov.uk/datastore/package/london-borough-profiles .

Example 2: Travel intensity, mode shares and household car ownership for residents

The principal source of data on these aspects is TfL's London Travel Demand Survey (LTDS). Table 5.3 shows a selection of indicators from this survey for the Legacy boroughs alongside totals for groups of comparator boroughs (see above). Given the limited annual sample of LTDS at the level of the individual borough, three or five years of data (as stated) are aggregated to maintain statistical robustness, although at the cost, of course, of obscuring change over the years immediately leading up to the Games.

Table 5.3 Basic travel demand and travel behaviour indicators – Legacy boroughs.

Borough/area	Resident average trip rate (5 yrs)[1]	Resident average trip rate (3 yrs)[2]	Trip origin mode share public transport (%)[3]	Resident mode share public transport (%)[4]	Resident mode share walk/cycle combined (%)[5]	House-holds without access to a car (%)
Barking & Dagenham	2.3	2.1	26.2	29.2	28.9	46.6
Greenwich	1.9	1.8	23.8	27.9	29.6	38.9
Hackney	2.1	1.9	34.3	38.6	44.0	64.4
Newham	2.5	2.4	28.2	30.9	39.5	60.1
Tower Hamlets	2.3	2.3	34.7	32.2	45.9	63.3
Waltham Forest	2.3	2.0	26.1	29.7	33.4	45.2
Legacy total/average	2.2	2.1	29.3	31.5	37.6	53.3
Geographic comparison set 1[6]	2.4	2.4	29.9	31.5	32.5	49.1
Most similar comparison set 2[7]	2.6	2.5	27.9	29.3	33.1	42.8
Non-Legacy boroughs	2.6	2.6	27.2	26.3	32.4	40.7
Inner London	2.6	2.5	35.8	33.7	40.7	57.7
Outer London	2.5	2.5	20.6	22.7	28.2	32.4
Greater London	2.6	2.5	27.5	27.1	33.2	42.9

Source: TfL Strategy and Planning, LTDS Survey.
(1) Average number of trips made per person per day, 5 years old or greater and resident in area - average over period 2006/07 to 2010/11 (5 years).
(2) Average number of trips made per person per day, 5 years old or greater and resident in area - average over period 2008/09 to 2010/11 (3 years).
(3) Percentage of trips made by bus, Underground, Rail and DLR/Tramlink, as distance-based main mode. Residents of Greater London only. Trips originating in specified area only. average over period 2008/09 to 2010/11 (3 years).
(4) Percentage of trips made by bus, Underground, Rail and DLR/Tramlink, as distance-based main mode. Residents of Greater London only. For trips by borough of residence. average over period 2008/09 to 2010/11 (3 years).
(5)For trips by borough of residence. Greater London residents only average over period 2008/09 to 2010/11 (3 years).
(6) Geographic control group consisting of Lambeth, Wandsworth, Hammersmith and Fulham, Merton, Sutton, Kingston upon Thames average over period 2008/09 to 2010/11 (3 years).
(7) Control group consisting of Southwark, Lewisham, Haringey, Islington, Hounslow, Enfield average over period 2008/09 to 2010/11 (3 years).

The basic themes to emerge from Table 5.3 are:

- As might be expected the individual Legacy boroughs are quite variable in terms of travel patterns. They are not one homogenous sector of London but a diverse mix of individual locations and geographic/social contexts.
- On the whole residents of the Legacy boroughs make notably fewer trips than those of other parts of London – whether in the local area or more widely. For example, residents of Greenwich make on average 30 per cent fewer trips than the average Greater London resident.
- Public transport mode shares tend to be higher than is typical for London as a whole. The mode shares for walking and cycling are also higher than those for London as a whole (but comparable to those for the rest of Inner London), and car ownership levels are considerably lower than those of other parts of London.

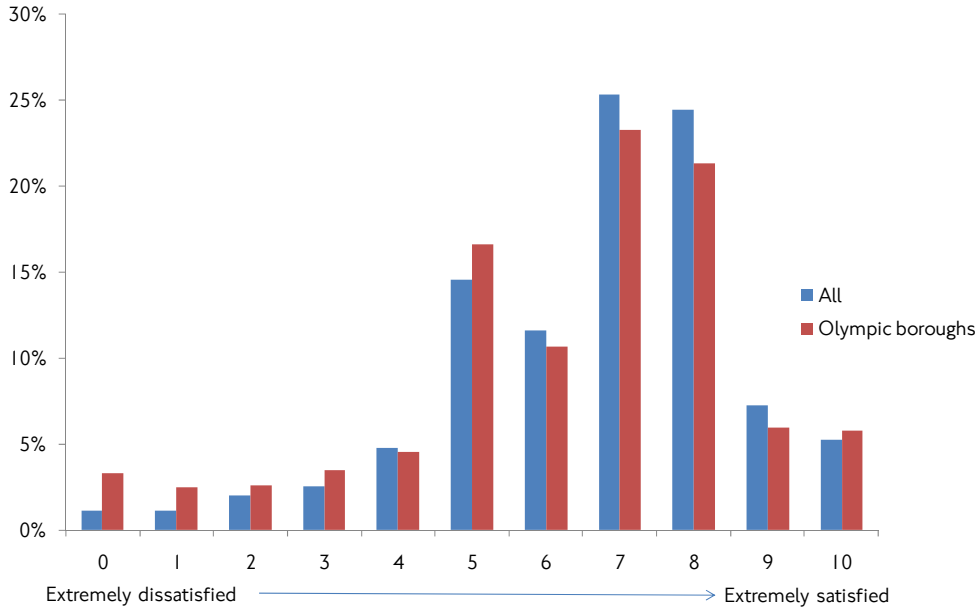
Example 3: Perceptions of quality of life in the Olympic boroughs

As part of the Legacy monitoring programme, surveys exploring the perception of the travel environment were carried out in 2011 with residents of the Olympic boroughs. This will be continued in future years to assess changes in perceptions of quality of life, based upon satisfaction with journey experience, noise from transport and the urban realm (see also Chapter 9 of this report, and Appendix A for a description of TfL's scoring norms for this survey).

These initial surveys show that residents of the Legacy boroughs were somewhat less satisfied with the three measures of quality of life in their region (journey experience, noise from transport, and the urban realm) than the London-wide average. When asked their level of satisfaction with their overall journey experience of travelling in London, taking everything into account and considering travel by all modes, residents of the Olympic boroughs gave a mean score of 63 out of 100, compared to a London-wide average of 67 out of 100. Just 56 per cent of Olympic borough residents indicated satisfaction, with a score of 7 out of 10 or greater for this measure, compared to 62 per cent of London residents. Figure 5.19 shows the distribution of scores from 0 to 10 for residents of the Olympic boroughs and London as a whole.

This pattern was also reflected to some extent in satisfaction with the experience of the last journey made. Residents of the Olympic boroughs gave a mean score of 75 out of 100, compared to 77 out of 100 London-wide, and 74 per cent of Olympic borough residents said that they were satisfied with the journey experience on their most recent journey, compared to 78 per cent of all London residents.

Figure 5.19 Satisfaction with overall journey experience while travelling in London, London residents and residents of the Olympic boroughs, 2011.

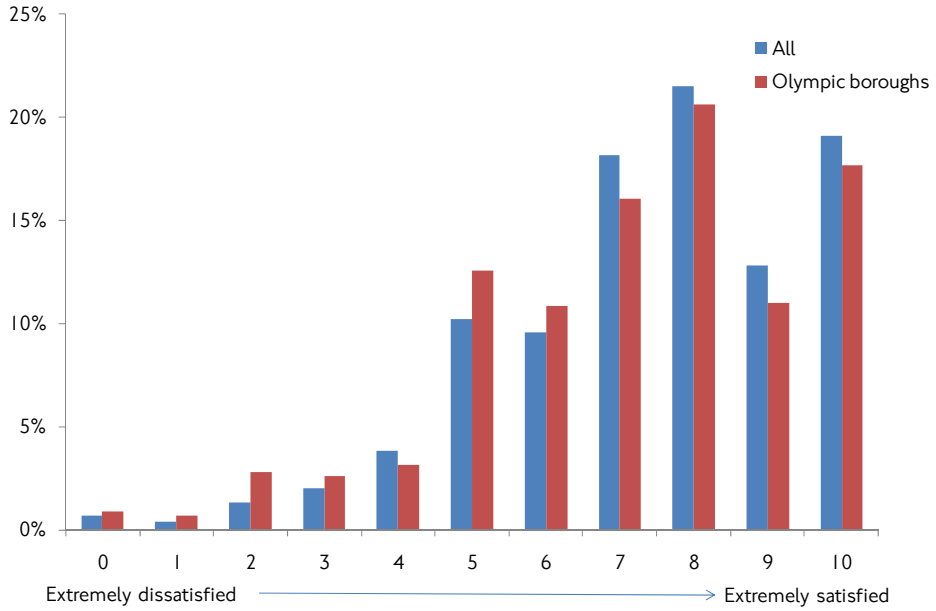


Source: TfL Perceptions of the Travel Environment Survey, 2011.

Olympic boroughs residents were also somewhat less satisfied with noise from transport in their local area, providing a mean score of 72 out of 100 compared to 74 out of 100 London-wide. Just under two thirds (65 per cent) of Olympic borough residents said that they were satisfied with transport noise in their local area, compared to 72 per cent of London residents

(based on a score of 7 out of 10 or higher). Figure 5.20 shows the distribution of scores from 0 to 10 for residents of the Olympic boroughs and London as a whole.

Figure 5.20 Satisfaction with noise from transport in the local area, London residents and residents of the Olympic boroughs, 2011.

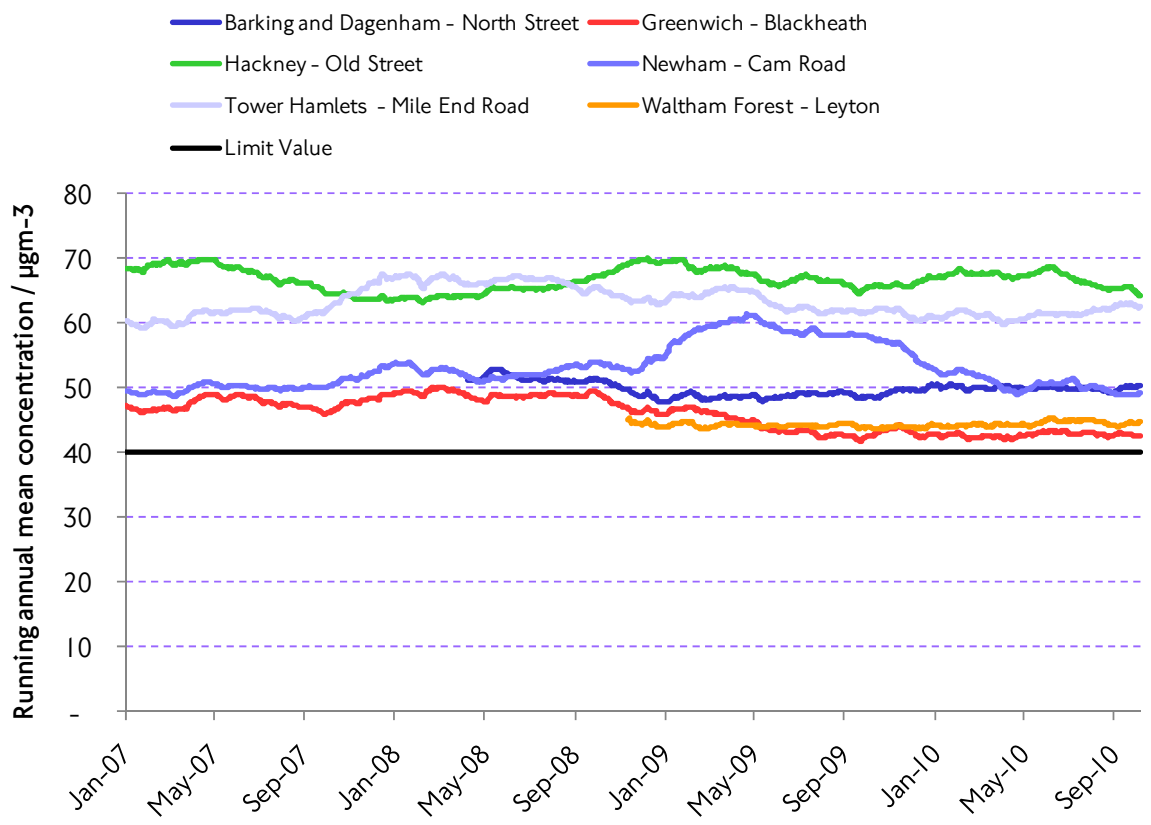


Source: TfL Perceptions of the Travel Environment Survey, 2011.

Example 4: Local air quality

Local air quality is a basic indicator of environmental health and is the subject of the Mayor's Air Quality Strategy (MAQS), published in December 2010. One of the atmospheric pollutants of most concern in London is Nitrogen Dioxide (NO_2), for which the European Union have stipulated a 'Limit Value' concentration of 40 μgm^3, expressed as a running annual mean. NO_2 concentrations are currently measured at 18 locations within the six Legacy boroughs, and data from all of these sites are publicly-available through the London Air Quality network.

Figure 5.21 Running annual mean NO_2 concentrations – representative air quality monitoring sites within the six Olympic Legacy boroughs.



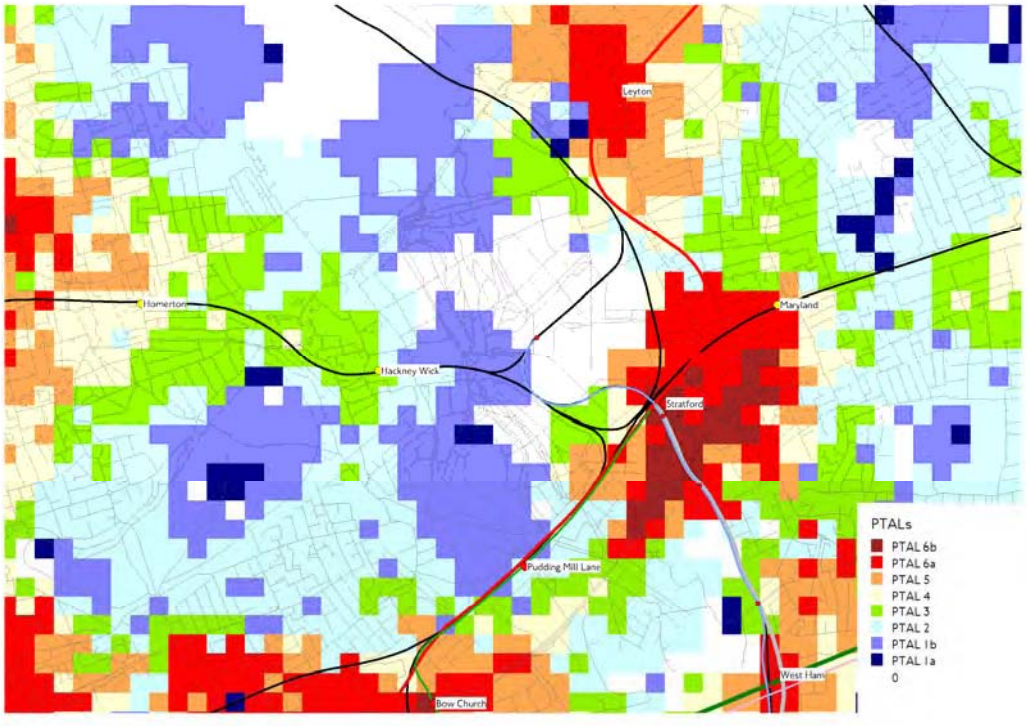
Source: London Air Quality Network.

Figure 5.21 shows measured concentrations for seven of these sites, chosen so as to be most representative. The EU Limit Value is shown as a steady horizontal line at 40 µgm^3. In terms of compliance with the Limit Value, all sites currently exceed – a position not atypical of much of central and Inner London. The 'spread' of values between the individual sites is however substantial (all sites are classified as 'roadside sites', and are located within 2.5 metres of the kerb), reflecting different traffic flows and geographical contexts. Furthermore, over the four-year span covered by the figure, there is no obvious trend towards improvement – again not atypical of sites in Inner London. In common with other locations in Inner London, the measures in the MAQS seek to reduce concentrations to a state of compliance with the Limit Value at the earliest possible date, and a future point of interest will be the extent to which trends at these sites change differentially from other monitoring sites in London.

Example 5: Public transport accessibility in the vicinity of the Olympic Park

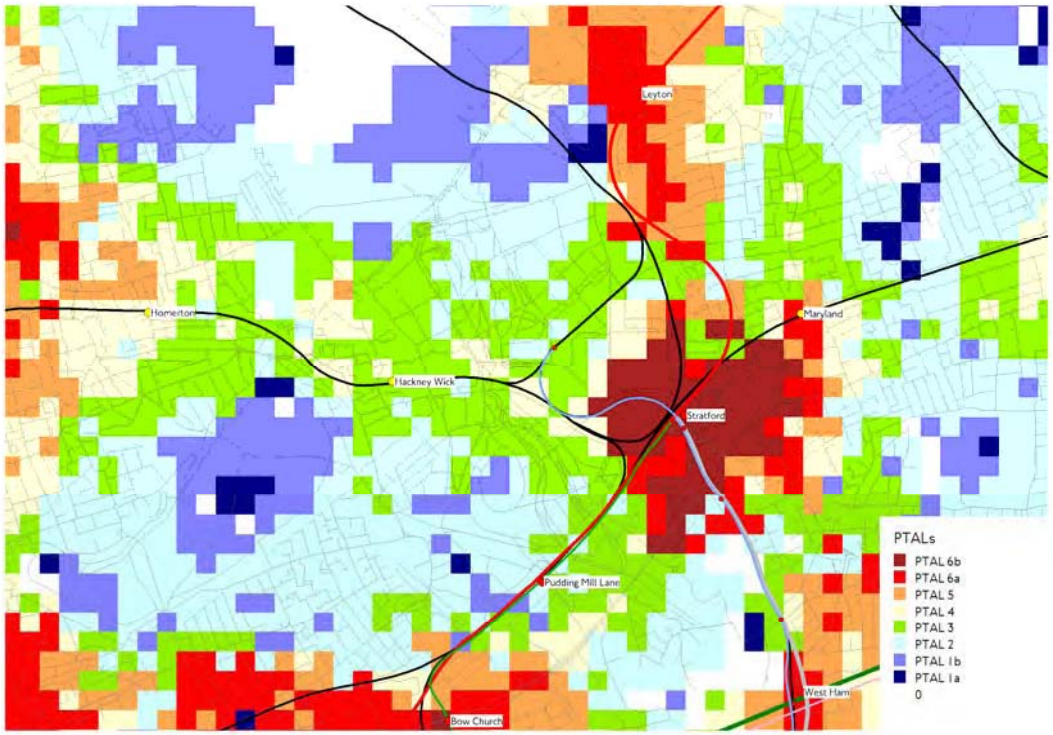
TfL measures accessibility to public transport in terms of PTALs (Public Transport Accessibility Levels). This is one way of quantifying improvements in transport provision as part of the package of improvements supporting the Games and their Legacy. Figures 5.22 and 5.23 exemplify their use for this purpose, showing levels of accessibility to public transport in the immediate vicinity of the Olympic Park, centered on a point just to the West of Stratford International station.

Figure 5.22 Accessibility to public transport in the vicinity of the Olympic park – 2010 pre-Games. TfL PTAL values.



Source: TfL Strategy and Planning.

Figure 5.23 Accessibility to public transport in the vicinity of the Olympic park – 2014 post Games. TfL PTAL values.



Source: TfL Strategy and Planning.

Following the 2012 Games the Olympic Park will go through a period of transformation to 2014. During this period the temporary venues and structures on the Olympic Park will be removed, along with the Games-time only elements of permanent venues, and the reconfiguration of roads, bridges and other infrastructure for Legacy-use. This transformation includes new bus routes that are planned for the Olympic Park and the recently-opened DLR extension from Stratford International to Canning Town. Also significant are improvements to pedestrian facilities to the north-west of Stratford station associated with the recently-opened Westfield development, resulting in some locations increasing from PTAL level 0 (effectively zero access to public transport within the specified criteria - the white areas in Figure 5.22) to the highest PTAL value of 6 by 2014.

6. Safety and security on the transport system

6.1 Introduction and content

Being and feeling safe when using transport is an important part of the overall journey experience. This Chapter looks at trends related to the Mayoral goal of improving safety and security on the transport networks in London, including casualties from collisions on the roads, passenger safety on public transport, and the incidence and perception of crime and antisocial behaviour.

6.2 Review of key trends and developments in 2010

Recent years have seen progressive improvement in the principal indicators of safety and security on London's transport networks. These positive trends continued in 2010, with further substantial reductions to the most serious categories of casualty arising from collisions on the road network, alongside continuing reductions to levels of reported crime and customer injury on the public transport networks.

Road safety

The year 2010 was the target year for both national and more stringent London-specific targets for the reduction of road casualties to be assessed (in absolute terms, comparing total casualties rather than casualty rates) against the average for the period 1994-1998. At the end of 2010, London had met four of these targets, and good progress had been made on the other two.

- 2010 saw an 11 per cent reduction, relative to 2009, in the number of people killed or seriously injured (KSI) on the London road network. The total of 2,886 people was 57 per cent down on the 1994-98 average, against a national reduction target of 40 per cent and a London-specific target of 50 per cent.
- The number of children killed or seriously injured in 2010 was 250, a 5 per cent reduction on 2009. This total was 73 per cent down on the 1994-98 baseline, against target reductions for 2010 of 50 per cent (national) and 60 per cent (London-specific).
- Pedestrian KSIs were 57 per cent down on the 1994-98 average, against a London-specific reduction target of 50 per cent, the 2010 total of 913 reflecting a 13 per cent reduction on that of 2009.
- The number of casualties defined as having received 'slight' injuries rose to 26,003 in 2010, 5 per cent above 2009, but was still 33 per cent below the 1994-98 baseline, compared to reduction targets of 10 per cent (national) and 25 per cent (London-specific).
- However, reductions in the number of KSIs among pedal cyclists and users of powered two-wheeled vehicles fell short of the absolute targets for 2010. These required for pedal cyclist KSIs a reduction of 50 per cent and the actual reduction achieved was 18 per cent. (However, the substantial growth in cycling, which had doubled since the early 1990s, implies a much higher reduction in the collision risk per trip.) For users of powered two wheeled vehicles the target was a reduction of 40 per cent while the actual reduction achieved was 34 per cent.

Passenger safety on public transport

London's public transport networks continue to offer a safe travelling environment. On the Underground, the passenger injury rate in 2010 was similar to that of the last four years, with 127 injuries (this having been between 125 and 127 for the last four

years), although there were no fatalities (excluding suicides and crime) in 2010/11. In 2010 98 passengers were seriously injured travelling on buses or coaches in London, with no fatalities; this was down from 124 bus/coach KSI casualties (3 fatal, 121 serious) in 2009 (21 per cent reduction). For buses, this continued the trend of substantial reduction seen over the last 10 years – passenger serious injury rates in the early part of the last decade were typically more than double those of 2010.

Crime on public transport

London's public transport networks continue to offer a low crime environment, with between 11 and 13 reported crimes per million passenger journeys on the principal public transport networks. Crime rates on or near the bus and coach network have more than halved since 2005/06, and those on the Underground and DLR network have reduced by over one-third. Progress during 2010/11 was consistent with recent trends, with reductions against 2009/10 of 5.4 per cent in the rate of reported crime on the bus and coach network, 10.9 per cent on the Underground and DLR network, 5.6 per cent on London Overground, and 15.4 per cent on Tramlink.

6.3 Road safety

Background and achievement against road safety targets

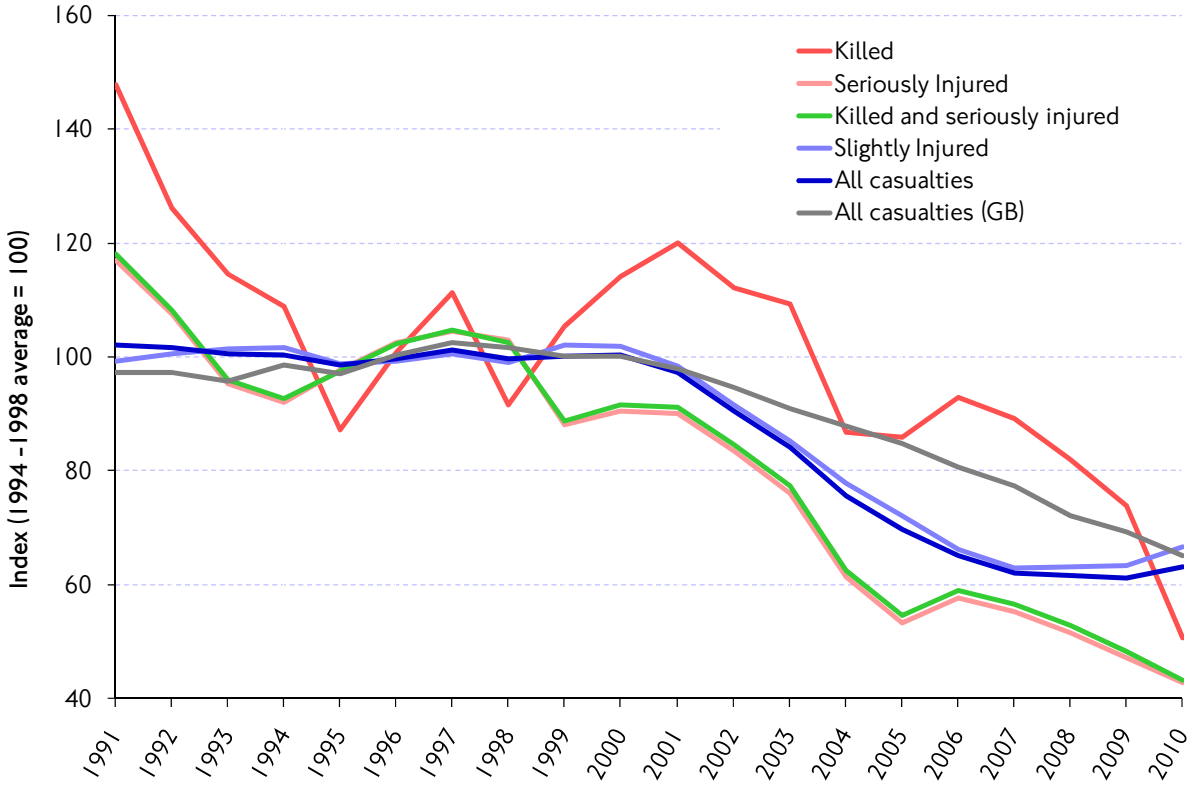
Recent years have seen substantial and sustained reductions in the number of casualties from road traffic collisions in London. Progress can be viewed against national road safety targets, as well as more demanding London-specific targets set additionally by the Mayor of London in 2006. Both sets of targets applied to the year 2010 and were in respect of baseline average numbers of casualties between the years 1994 and 1998.

Table 6.1 Achievement against road safety targets for 2010 in London.

Category	National target by 2010 (%)	London target by 2010 (%)	1994 to 1998 average (baseline)	Casualties 2009	Casualties 2010	% change 2009 to 2010	% change 1994-98 average to 2010
Killed/seriously injured	-40%	-50%	6,684	3,227	2,886	-11%	-57%
Pedestrian KSI	-	-50%	2,137	1,055	913	-13%	-57%
Pedal cyclists KSI	-	-50%	567	433	467	8%	-18%
Powered two-wheelers KSI	-	-40%	933	706	615	-13%	-34%
Children KSI	-50%	-60%	935	263	250	-5%	-73%
Slight casualties	-10%	-25%	38,997	24,752	26,003	5%	-33%
All			45,681	27,979	28,889	3%	-37%

Source: TfL Better Routes and Places.

Figure 6.1 Trend in road casualties for London, by personal injury severity.



Source: TfL Better Routes and Places.

Table 6.1 gives a snapshot of the position for 2010 in relation to these targets, whilst Figure 6.1 shows generally steady progress with casualty reduction over the whole of the review period, and also shows the equivalent GB trend for all casualties for comparison. By 2010 four of the six targets applicable to London had been met, and good progress has been made with the other two.

- 2010 saw an 11 per cent reduction, relative to 2009, in the number of people killed or seriously injured (KSI) on the London road network. The total of 2,886 people was 57 per cent down on the 1994-98 average, against a national reduction target of 40 per cent and a London-specific target of 50 per cent.
- The number of children killed or seriously injured in 2010 was 250, a 5 per cent reduction on 2009. This was 73 per cent down on the 1994-98 baseline, against target reductions for 2010 of 50 per cent (national) and 60 per cent (London-specific).
- Pedestrian KSIs were 57 per cent down on the 1994-98 average, against a London-specific reduction target of 50 per cent. The 2010 total of 913 represented a 13 per cent reduction on that of 2009.
- The number of casualties defined as having received 'slight' injuries rose to 26,003 in 2010, 5 per cent above 2009, but was still 33 per cent below the 1994-98 baseline, compared to reduction targets of 10 per cent (national) and 25 per cent (London-specific).

However, reductions in the absolute number of KSIs among pedal cyclists and users of powered two-wheeled vehicles fell short of the targets for 2010. In the case of cycling this was partly because of the increased use of this mode, which conceals a much higher reduction in the collision risk per trip.

Casualties among users of pedal cycles

The casualty reduction targets were expressed as absolute values (numbers of casualties) against the 1994-98 average irrespective of any change in the use of these modes. The targets required a reduction of 50 per cent for pedal cyclist KSIs. The actual achieved reduction was 18 per cent, during a period in which cycle journeys increased and by 2010 had approximately doubled since the early 1990s. When looked at in terms of a rate, which takes increased use into account, cycling has become relatively safer in London.

TfL's Cycle Safety Action Plan

In 2010, cyclists comprised 8 percent of all road collision fatalities, and 17 per cent of all serious injuries, but accounted only for about 2.4 per cent of traffic (vehicle-kilometres). The Mayor of London is working with TfL to deliver a 400 per cent increase in cycle trips by 2026, against a year 2000 baseline.

The Cycle Safety Action Plan was produced by TfL and its partners in March 2010 to help reduce cycling casualties on London's roads. The Plan includes nine specific areas for action that target the eight most common collision types. The main objective of the Plan is to ensure that the future growth of cycling in London is accompanied by a reduced rate of cycling casualties.

Casualties among users of powered two wheeled vehicles

Riders of powered two wheeled vehicles make up 21 percent of all KSI casualties, yet account for only 2.0 per cent of vehicle kilometres. The casualty reduction target for riders of powered two wheeled vehicles was also expressed as absolute values against the 1994-98 average. This required a 40 per cent reduction in KSIs by 2010 and the actual achieved reduction was 34 per cent.

TfL is working with stakeholders to deliver a targeted powered two wheeler Safety Action Plan to help further improve the safety of this mode in London.

Future road safety targets for London

The Government published its new National Strategic Framework for road safety in May 2011, emphasising the importance of local decision making to reflect local road safety priorities. A new road safety plan for London will set out a road safety strategy for the next 10 years from 2011, and is due to be published in 2012.

6.4 MTS Strategic Outcome Indicator: Road traffic casualties

Definition

This indicator measures the number of people killed or seriously injured, in road traffic collisions involving personal injury, according to STATS19 criteria, on the public highway in Greater London.

Value for 2010 calendar year and assessment of recent trend

A total of 2,886 people were killed or seriously injured on London's roads during 2010. This was a 10.6 per cent reduction against 2009 (when 3,227 people were killed or seriously injured).

The value for 2010 continues the recent strong progress in making London's roads safer. The year 2010 was the target year for both national (40 per cent) and London-specific (50 per cent) reduction targets, and the achieved reduction against the 1994

to 1998 average of 57 per cent more than meets both of these targets. The number of people killed or seriously injured on London's roads per year is now less than half that of 1994-1998, reflecting a range of co-ordinated policy and practical initiatives. However, casualty numbers among pedal cyclists and users of powered two wheeled vehicles have not fallen as fast as required by the targets and this is receiving increased focus by TfL.

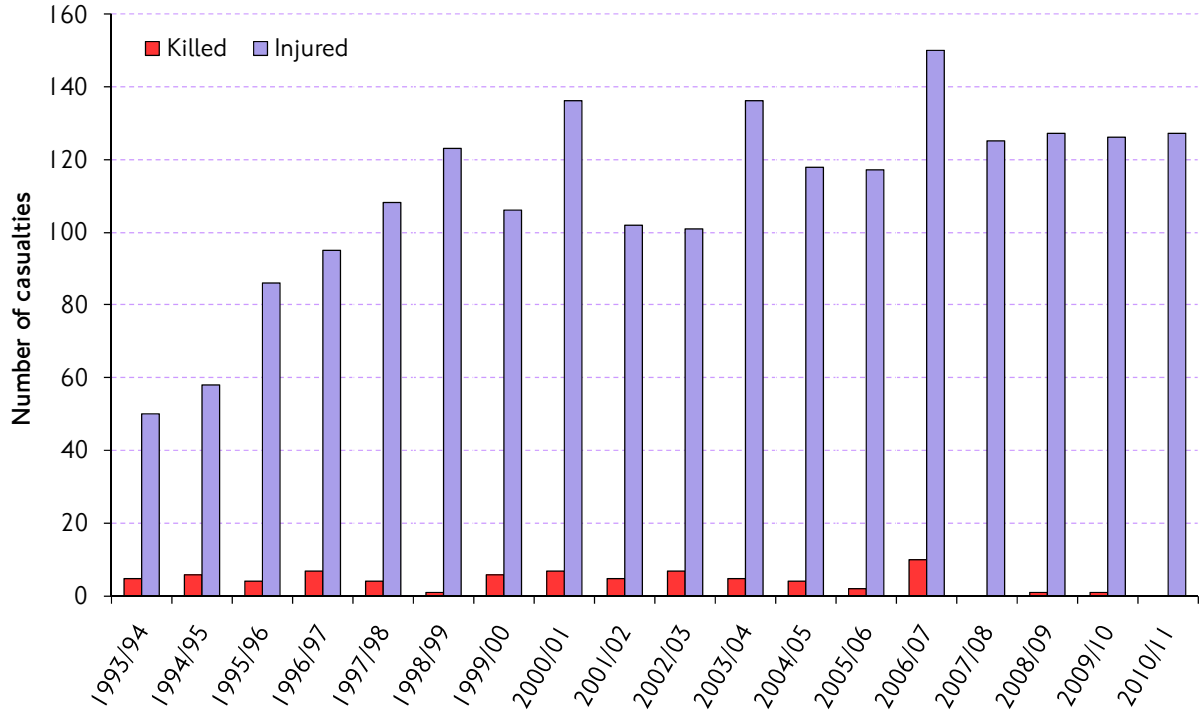
6.5 Passenger safety on the public transport networks

Londoners depend on a public transport system that is well maintained and operated so that they can travel without fear of injury. Overall, London's public transport networks continue to offer a safe travelling environment.

London Underground

On the Underground, the number of passenger injuries in 2010/11 was similar to that of the last four years, with 127 injuries, and there were no fatalities (Figure 6.2). The trend for the last decade should be seen in the context of increased Underground patronage (see also section 3.6), reflecting a small reduction in overall risk per-trip over the decade.

Figure 6.2 Number of people killed or injured whilst travelling on London Underground.



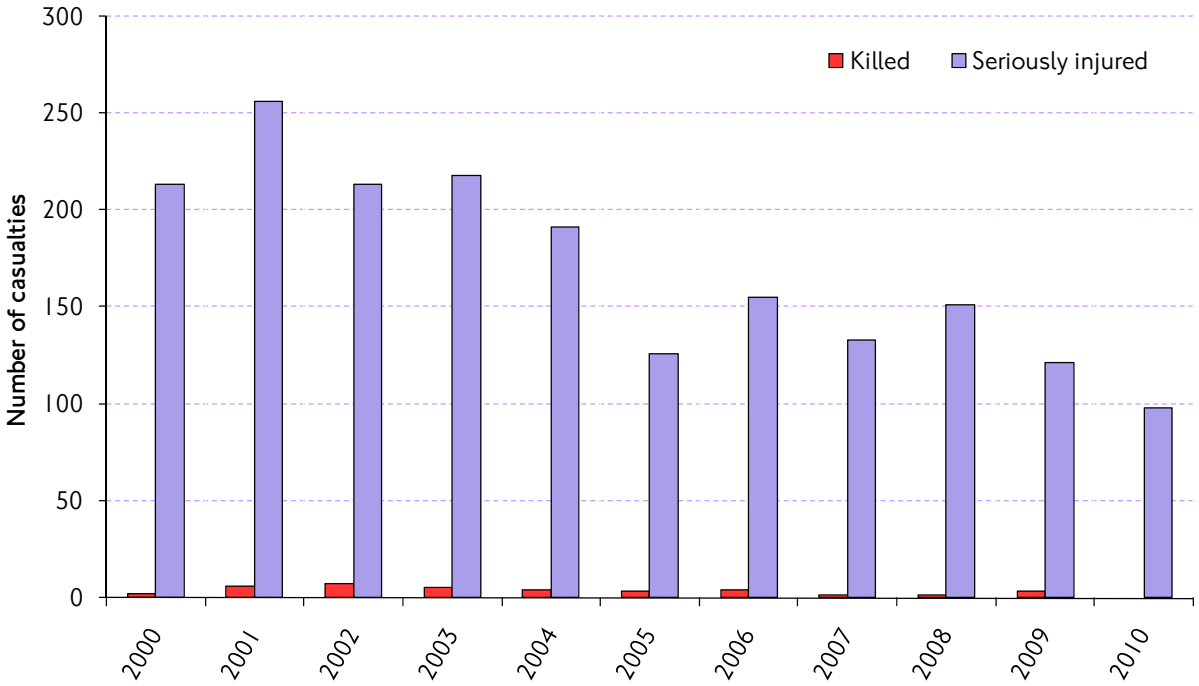
Source: Transport for London.

Buses and coaches

In 2010 98 passengers were seriously injured travelling on buses or coaches in London, and there were no fatalities (Figure 6.3). Passenger injury rates in the early part of the last decade were typically more than double this number. To a greater extent than with the Underground, the falling trend for casualties using the bus network contrasts with the substantial increase in bus kilometres operated and

patronage. Again, therefore, these trends represent a substantial reduction in the risk of injury per trip.

Figure 6.3 Number of people killed or seriously injured whilst travelling on buses or coaches in London.



Source: Transport for London.

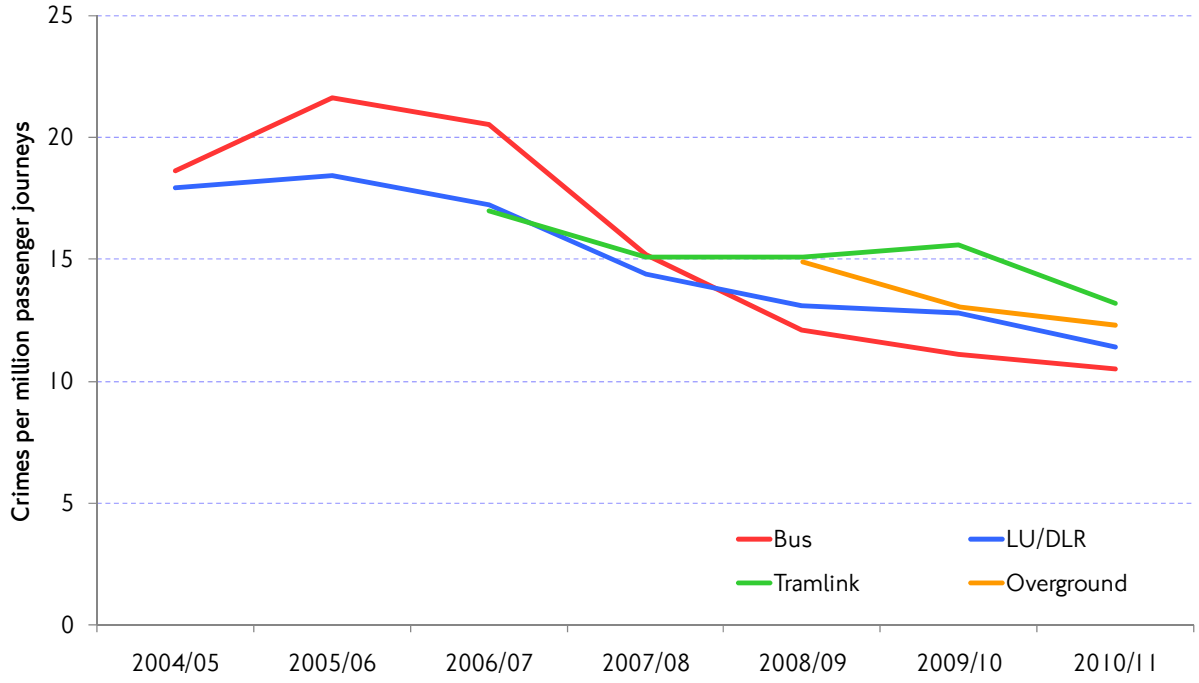
6.6 Crime and anti-social behaviour on the public transport networks

Crime on the bus, Underground and DLR networks

London's transport system offers a safe, low crime environment with crime rates on the bus and Underground networks having reduced substantially since 2005/06 (Figure 6.4). Rates of reported crimes on or near the bus network have more than halved over this period (down by 51 per cent to 2010/11), and those on the Underground have reduced by over one-third (down by 37 per cent).

Progress during 2010/11 was consistent with recent trends. There were 10.5 reported crimes per million customer journeys on the bus and coach network, down from 11.1 in the previous year (a reduction of 5.4 per cent), and 11.4 crimes per million customer journeys on the Underground and DLR network, down from 12.8 in the previous year (a reduction of 10.9 per cent). Rates of reported crime on both London Overground and Tramlink also fell, by 5.6 per cent on London Overground and by 15.4 per cent on Tramlink (Figure 6.4).

Figure 6.4 Crime on TfL's public transport networks. Rate per million passenger journeys.



Source: TfL Community Safety, Enforcement and Policing Directorate.

A full breakdown of the totals shown by Figure 6.4, in terms of the main categories of crime and disorder, can be found in TfL's Crime Statistics Bulletin for 2010/11 (http://www.tfl.gov.uk/corporate/about-tfl/19385.aspx).

The Mayor's Strategy to improve transport safety and security in London

The Mayor's Strategy to improve transport safety and security in London, 'The Right Direction' (http://www.london.gov.uk/publication/right-direction), was launched in February 2011. This contains an analysis of recent trends in reported crime rates, and summarises the role of recent anti-crime and disorder initiatives, such as more visible policing and the public transport alcohol ban, in these achievements.

6.7 MTS Strategic Outcome Indicator: Crime on the principal public transport modes

Definition

This indicator measures the rate of reported crime per million passenger journeys on the London Underground (including DLR) and bus networks.

Value for 2010/11 financial year and assessment of recent trend

In the 2010/11 financial year there were 10.5 reported crimes per million passenger journeys on London's bus network. This is a reduction of 5.4 per cent over the value for 2009/10 of 11.1. On the Underground/DLR networks there were 11.4 reported crimes per million passenger journeys. This is a reduction of 10.9 per cent over the value for 2009/10 of 12.8 reported crimes per million passenger journeys.

These latest results continue the trend of substantial reductions in rates of reported crime on the bus/Underground networks. Those on the bus network have more than halved since the middle part of the last decade, whilst those on the Underground have fallen by over one-third, to stand at historically low levels.

6.8 Perception of crime

Perceptions of the likelihood of being a victim of crime or antisocial behaviour affect travel choices and can act as a barrier to travel. This section describes supporting information derived from TfL surveys that explore the sense of safety of travellers on each mode, as well as the proportion of London residents deterred from using each mode due to concerns about safety, both during the day and after dark.

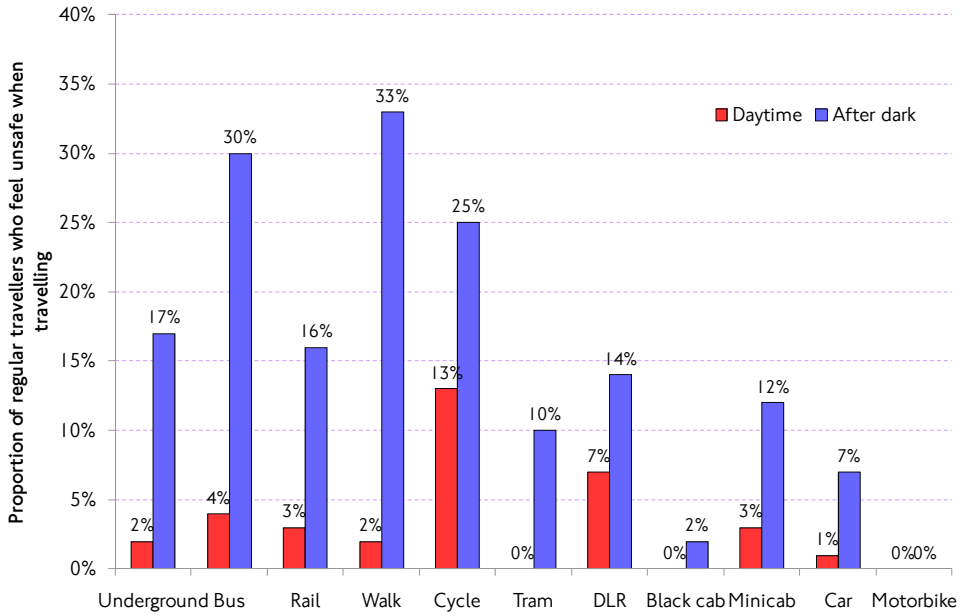
Perception of safety when travelling

For most modes of transport, the majority of users feel safe from crime and anti social behaviour while travelling during the day; cycling was the only mode where more than 1 in 10 survey respondents said they do not feel safe when travelling during the day (Figure 6.5). For all modes few respondents said that concerns about safety as a result of crime and anti social behaviour affected 'a lot' the frequency with which they travel in London during the day. For most modes at least 8 in 10 respondents were deterred 'hardly at all' or never by fear of crime from travelling during the day. Car, tram and black cab were the modes of transport for which London residents were least likely to be deterred by safety concerns from using during the day.

London residents feel more at risk when travelling at night. In particular, survey respondents were most likely to feel unsafe while walking or travelling by bus or bicycle after dark (Figure 6.5). Furthermore, a significant proportion of survey respondents said that they were deterred from travelling after dark by fear of crime or anti social behaviour, and particularly from walking and travelling by bus. Respondents felt safest travelling after dark by door-to-door modes such as car, and black cab (Figure 6.7).

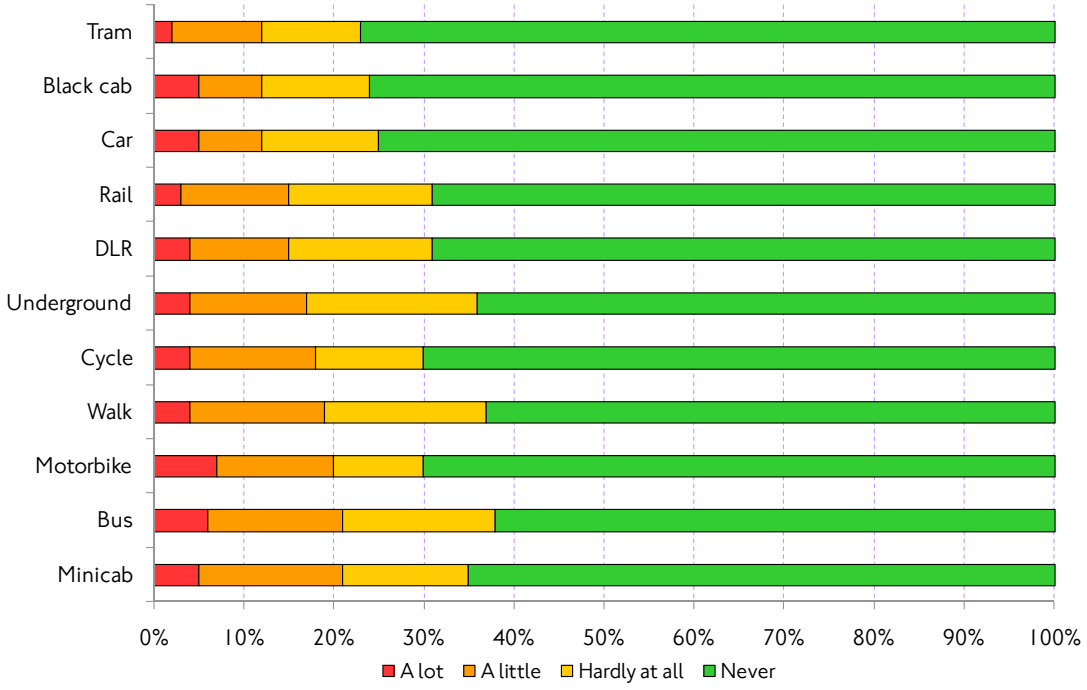
London residents were asked what worries them most about their personal security when travelling by public transport. The most common causes of concern were large groups of school children (22 per cent), the threatening behaviour of other passengers (21 per cent), and drunken passengers (15 per cent). Residents said they tended to be the most concerned about their personal safety and security when walking after dark (37 per cent) and when waiting at a station or stop after dark (31 per cent).

Figure 6.5 Proportion of regular users of each mode who feel unsafe when travelling during the day and after dark, London residents, 2010.



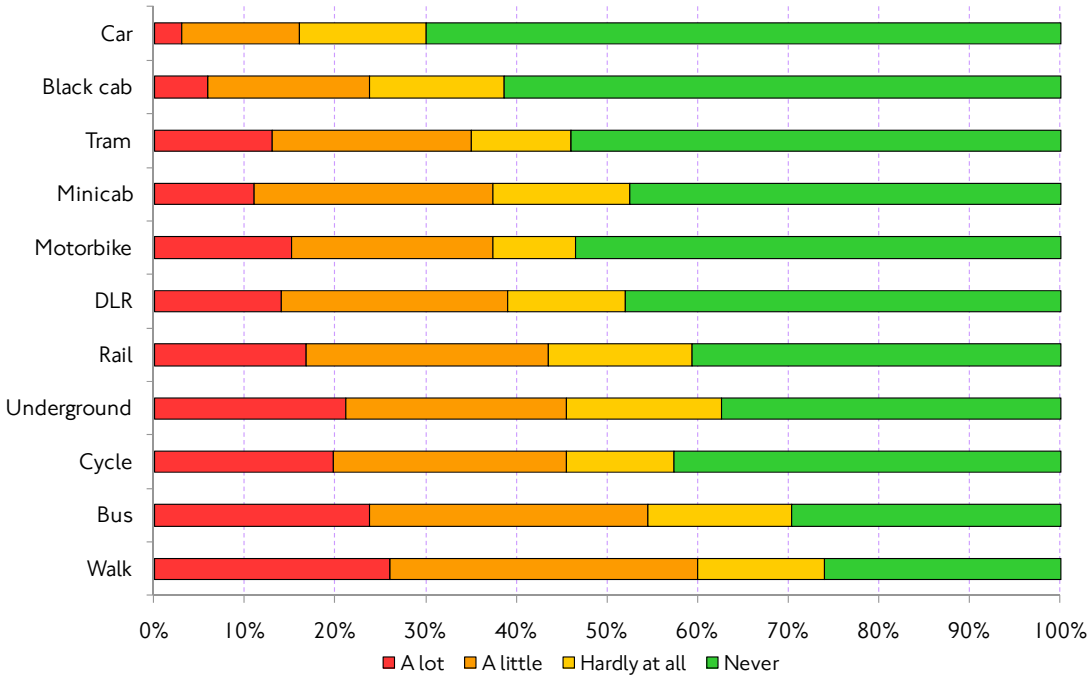
Source: TfL Safety and Security Survey, October 2010.
Base (daytime): all who travel during the day using Underground (605), bus (710), rail (433), walk (924), cycle (138), tram (45), DLR (105), black cab (101), minicab (112), car (453), and motorbike (17).
Base (after dark): all who travel after dark using Underground (405), bus (337), rail (261), walk (469), cycle (66), tram (13), DLR (46), black cab (161), minicab (135), car (386), and motorbike (15).
Care should be taken in drawing conclusions from these results because of small sample sizes, particularly after dark.

Figure 6.6 Extent to which London residents are deterred from using modes of transport during the day because of concerns about crime and anti-social behaviour, 2010.



Source: TfL Safety and Security Survey, October 2010.
Base: all excluding 'no need to travel by these means' and 'don't know'. Underground (960), bus (985), rail (888), walk (1,010), cycle (378), tram (287), DLR (489), black cab (664), minicab (692), car (852), and motorbike (266).

Figure 6.7 Extent to which London residents are deterred from using modes of transport at night because of concerns about crime and anti-social behaviour, 2010.



Source: TfL Safety and Security Survey, October 2010.
Base: all excluding 'no need to travel by these means' and 'don't know'. Underground (917), bus (915), rail (841), walk (939), cycle (342), tram (277), DLR (433), black cab (668), minicab (677), car (827), and motorbike (253)

6.9 MTS Strategic Outcome Indicator: Perception of crime/safety

Definition of indicator

This indicator is defined as 'the perception of London residents of their sense of safety and fear of crime when travelling in London (a) during the day and (b) after dark. The indicator provides a 'composite measure' across the modes for each time period, combining modal results based on the number of London residents who use each mode regularly, as reported by TfL's London Travel Demand Survey. The indicator is derived from an annual TfL telephone survey with a representative sample of around 1,000 London residents.

Value for 2010 calendar year and assessment of recent trend

In 2010, 97 per cent of London residents felt safe on the modes that they travelled on regularly (at least once a week) during daytime. After dark, 78 per cent of London residents felt safe on the modes that they travelled on regularly (at least once a week). In comparison, in 2009, 95 per cent of London residents felt safe on the modes that they travelled on regularly (at least once a week) during daytime. After dark, 78 per cent of London residents felt safe on the modes that they travelled on regularly (at least once a week).

Tables 6.2 and 6.3 summarises the perception of safety when travelling by individual modes separately and in aggregate, during the day and at night. The table also includes data on the proportion of residents who travel frequently (at least once a week) by each mode at any time of day, used as the basis to produce the composite score.

Table 6.2 Summary of perception of safety when travelling during the day by modes of transport in London, 2010.

Mode	Proportion of respondents who feel safe when travelling during the day	Number of London residents who travel frequently by each mode	Relative weight (per cent)
Underground	98	2,612,000	12%
Bus	96	4,350,000	20%
Rail	97	1,147,000	5%
Walk	98	6,875,000	31%
Cycle	87	752,000	3%
Tram	100	126,000	1%
DLR	93	261,000	1%
Black cab	98	372,000	2%
Minicab	94	452,000	2%
Car	98	5,008,000	23%
Motorcycle	100	96,000	0.4%
Total	**97**	**7,172,000 (all residents)**	**100%**

Source: TfL Safety and Security Survey 2010; London Travel Demand Survey 2009/10.

Table 6.3 Summary of perception of safety when travelling at night by modes of transport in London, 2010.

Mode	Proportion of respondents who feel safe when travelling at night	Number of London residents who travel frequently by each mode	Relative weight (per cent)
Underground	83	2,612,000	12%
Bus	70	4,350,000	20%
Rail	83	1,147,000	5%
Walk	67	6,875,000	31%
Cycle	75	752,000	3%
Tram	90	126,000	1%
DLR	85	261,000	1%
Black cab	98	372,000	2%
Minicab	88	452,000	2%
Car	93	5,008,000	23%
Motorcycle	100	96,000	0.4%
Total	**78**	**7,172,000 (all residents)**	**100%**

Source: TfL Safety and Security Survey 2010; London Travel Demand Survey 2009/10.

This indicator was first published in Travel in London report 2, presenting data collected in autumn 2009. The timing of the surveys to support these indicators (autumn each year) did not allow an update for 2010 in Travel in London report 3; the 2010 figure is therefore presented above. Consequently, only two years' data are available for comparison and it is not yet possible to derive any conclusions about trends.

7. Air quality, climate change and transport-related noise in London

7.1 Local air quality: Emissions of PM_{10} and NO_x from ground-based transport

There have been substantial reductions to emissions of harmful local air quality pollutants in London in recent years, as described in previous Travel in London reports. These reflect concerted action, and a range of specific initiatives such as TfL's London Low Emission Zone (LEZ) and the bus retrofit programme to work towards meeting limit values for NO_2 and particulate matter PM_{10}, as set out in the UK Air Quality Standards Regulations 2010. The Mayor's Air Quality Strategy, published in 2010, sets out the approach to continuing to improve air quality in London, with the objective of bringing London into compliance with European Union air quality objectives.

Updating the London emissions inventories – provisional estimates for 2010

The London emissions inventories are in the process of being comprehensively updated to a 2010 baseline. This process has included several method changes, all of these reflecting either new data or improvements to previous practice, and has not yet been finalised. This means that it is not readily possible to compare emissions between 2010 and previous versions of the inventories on a like-for-like basis. The commentary that follows therefore focuses on emissions in 2010, which are given as provisional estimates pending finalisation of the inventory update process.

Emissions of PM_{10} from ground-based transport in 2010

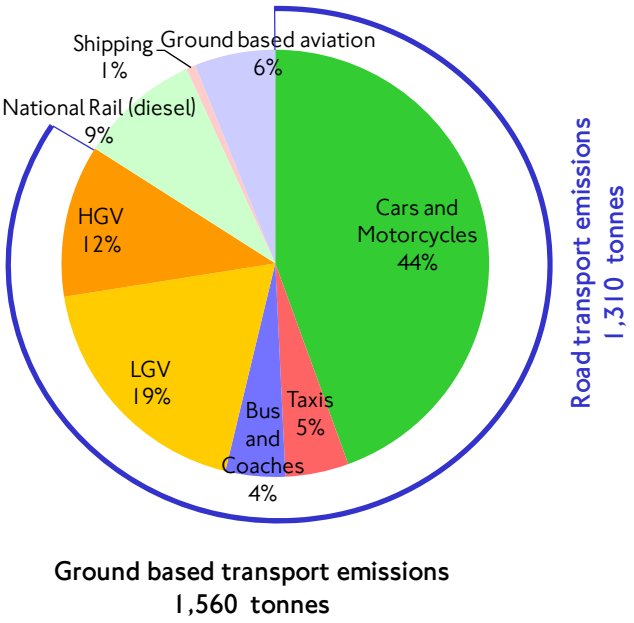
PM_{10} (particles with an aerodynamic diameter of less than 10 microns) has several significant adverse health effects, and compliance with health-based air quality limit values for PM_{10} at a small number of locations in central London remained a challenge in 2010.

For Mayor's Transport Strategy monitoring purposes, the quantity of interest is PM_{10} arising from ground-based transport (excluding ground-based aviation). The provisional estimate for 2010 is that 1,450 tonnes of PM_{10} were emitted from these sources. Some 84 per cent of this total arose from road transport.

The proportionate contributions from the various sources are shown in Figure 7.1 and Table 7.1. As might be expected, the basic apportionment is comparable to that of previous years. There have been small reductions to the contribution from road transport in 2010, continuing a now well-established trend that has reflected progressive improvement to the emissions performance of the vehicle fleet, through adoption of progressively higher 'Euro' emissions standards encouraged by schemes such as the London Low Emission Zone (LEZ). Further improvements to emissions from this source are to be expected in 2012, with the introduction of Phases 3 and 4 of this scheme. These extend the requirement for 'Euro III' standard compliance to smaller goods and similar vehicles, and the introduction of a requirement to meet the more stringent 'Euro IV' emissions standards (for PM_{10}) for heavier goods vehicles and buses (that are currently subject to a 'Euro III' requirement under the first two Phases of the LEZ scheme).

In interpreting Figure 7.1, it is necessary to bear in mind that these are London-wide averages. The proportionate contribution of cars, for example, is significantly less in central and inner London, where other sources assume greater importance. The apparent large-scale increase to particulate emissions from shipping is a direct reflection of the methodological changes applied to the 2010 inventory – emissions from this source being substantially under-estimated in previous versions of the inventory.

Figure 7.1 Basic source apportionment for PM_{10} ground-based transport emissions in Greater London. Percentage contribution to 2010 ground-based transport total.



Source: TfL Strategy and Planning.

Table 7.1 PM_{10} emissions from ground-based transport – historical trend for annual total emissions (tonnes) by principal source sector.

		PM_{10} emissions (tonnes)				
		2004	2006	2008	2009	2010
Mobile sources	Road transport	1,830	1,580	1,410	1,330	1,310
	Rail	230	180	140	140	140
	Shipping	2	1	1	1	11
	Ground-based transport (excluding aviation)	2,070	1,760	1,550	1,470	1,450
	Ground-based aviation	250	180	130	100	100
Total mobile sources		2,320	1,940	1,670	1,580	1,560

Source: TfL Strategy and Planning.

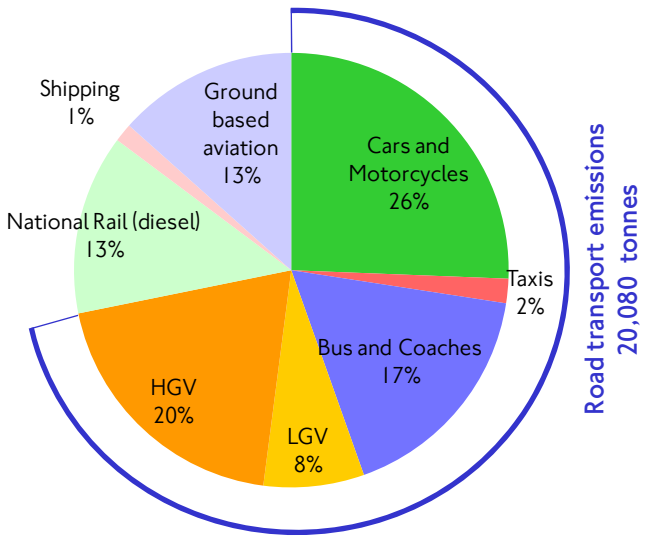
Emissions of NO_x from ground-based transport in 2010

All combustion processes produce Oxides of Nitrogen, for which NO_x is the collective term. NO_x primarily comprises Nitric Oxide (NO) and Nitrogen Dioxide (NO_2), the former readily converting to the latter through oxidation in free air. NO_2 is the pollutant of concern due to its impact on health, and it is this to which EU Limit Values for pollution apply. However, since NO easily converts to NO_2 in the atmosphere, it is necessary to reduce emissions of NO_x to reduce concentrations of NO_2. For emissions, therefore, NO_x is the quantity of primary interest. At high concentrations, NO_2 causes inflammation of the airways and long-term exposure can affect lung function and aggravate respiratory conditions, such as asthma. Compliance with health-based air quality limit values for NO_2 in London remains a significant challenge – a phenomenon replicated across many European urban areas and at least partly reflecting the 'real world' performance of Euro emissions standards for NO_x for diesel vehicles.

For Mayor's Transport Strategy monitoring purposes, the quantity of interest is NO_x arising from ground-based transport (excluding ground-based aviation). The provisional estimate for 2010 is that 24,210 tonnes of NO_x were emitted from these sources. Some 70 per cent of this total arose from road transport.

The proportionate contributions from the various sources are shown in Figure 7.2 and Table 7.2. As with PM_{10}, the basic source apportionment between the various sub-sources is comparable to that of previous years. There are indicated reductions of 7.7 per cent to NO_x emissions from road transport, although the estimates for 2009 and 2010 are not directly comparable. Likewise, the large increase shown for emissions from shipping again reflects improved characterisation of emissions from this source compared to previous versions of the inventory.

Figure 7.2 Basic source apportionment for NO_x ground-based transport emissions in Greater London. Percentage contribution to 2010 ground-based transport total.



Ground based transport emissions
27,970 tonnes

Source: TfL Strategy and Planning.

Table 7.2 NO_x emissions from ground-based transport – historical trend for annual total emissions (tonnes) by principal source sector.

		NO_x emissions (tonnes)				
		2004	2006	2008	2009	2010
Mobile sources	Road transport	33,590	29,590	24,340	21,760	20,080
	Rail	6,220	4,680	3,700	3,760	3,750
	Shipping	230	160	110	110	380
	Ground-based transport (excluding aviation)	40,040	34,430	28,150	25,630	24,210
	Ground Based Aviation	8,470	6,040	4,310	4,910	3,750
Total mobile sources		48,500	40,470	32,460	30,550	27,970

Source: TfL Strategy and Planning.

7.2 Carbon Dioxide (CO_2) emissions

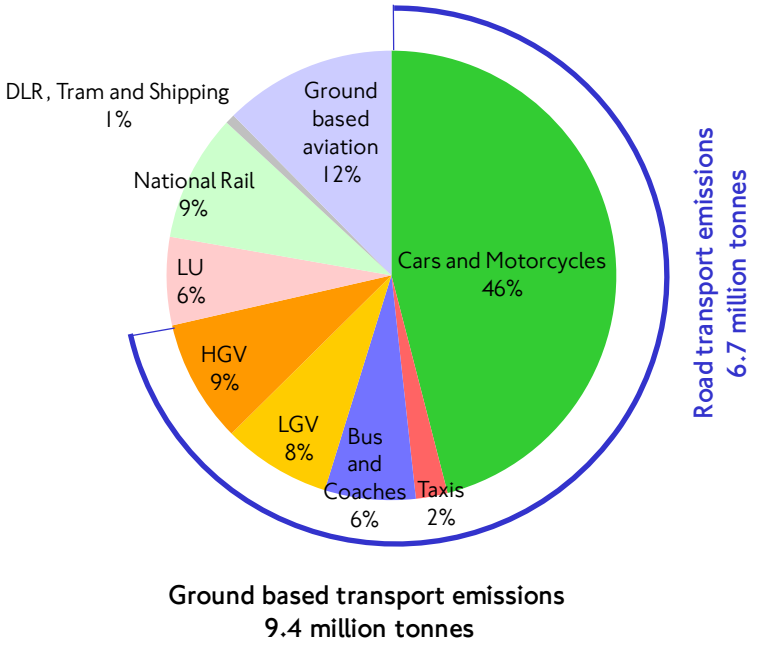
Carbon Dioxide (CO_2) is London's principal greenhouse gas emission. Alongside wider national initiatives, the Mayor has committed to reducing emissions of CO_2 in London by 60 per cent overall relative to 1990 levels and across all sectors by 2025. In 2008, ground-based transport accounted for 22 per cent of London's total CO_2 emission, although a comparable value is not yet available for 2010.

For Mayor's Transport Strategy monitoring purposes, the quantity of interest is CO_2 arising from ground-based transport. The provisional estimate for 2010 is that 9.39 million tonnes of CO_2 were emitted from these sources. Some 71 per cent of this total arose from road transport.

The proportionate contributions from the various sources are shown in Figure 7.3 and Table 7.3. The basic source apportionment between the various sub-sources is again comparable to that of previous years, although the comparison of provisional values for 2010 with those for 2009 show the effect of method changes to the 2010 inventory.

One of these in particular affects the estimate for road traffic. Despite the ongoing 'background' reduction to traffic levels in London, discussed in Chapter 3 of this report, the estimate for 2010 has increased over that for 2009 as the road network underlying the inventory has been updated. This in turn has fed through to different estimates of speeds of traffic on the network. The provisional estimate for 2010 therefore gives a more accurate estimate of the absolute total CO_2 emission from road traffic, but in terms of relative change, all other things being equal, CO_2 emissions from road transport in London would have reduced by about 1 per cent between 2009 and 2010, reflecting the reduction to vehicle kilometres driven (see also section 3.11 of this report).

Figure 7.3 Basic source apportionment for CO_2 ground-based transport emissions in Greater London. Percentage contribution to 2010 ground-based transport total.



Source: TfL Strategy and Planning.

Table 7.3 CO_2 emissions from ground-based transport – historical trend for annual total emissions (thousand tonnes) by principal source sector.

		CO_2 emissions (thousand tonnes)							
		2003	**2004**	2005	**2006**	**2007**	**2008**	**2009**	**2010**
Mobile sources	Road transport	7,480	7,410	7,320	7,320	7,150	6,990	6,640	6,710
	Diesel rail	190	190	190	230	260	280	290	290
	Electric rail						1,250	1,270	1,210
	Shipping	10	10	10	10	10	10	10	20
	Ground-based transport (excluding aviation)	7,680	7,600	7,520	7,560	7,420	8,530	8,200	8,220
	Ground Based Aviation	1,140	1,200	1,360	1,360	1,370	1,390	1,360	1,160
Total mobile sources		8,820	8,800	8,880	8,920	8,790	9,920	9,560	9,390

Source: TfL Strategy and Planning.

7.3 MTS Strategic Outcome Indicators: Emissions of PM_{10}, NO_x and CO_2 from ground-based transport

Definition of indicator

These indicators are compiled using the London emissions inventories, which are currently being updated to reflect conditions in 2010. This process has included several method changes, all of these reflecting either new data or improvements to previous practice, and has not yet been finalised. This means that it is not readily possible to compare emissions between 2010 and previous versions of the inventories on a like-for-like basis. The numbers for 2010 that follow should therefore be regarded as provisional, pending finalisation and release of the updated inventories in spring 2012. Ground-based transport sources include emissions from all types of road vehicle; railways, and river vessels, but (for NO_x and PM_{10} only) exclude ground-based aviation. Emissions are expressed on an annual total basis as tonnes of NO_x, PM_{10} and CO_2 emitted from all in-scope sources within the Greater London boundary.

Value for 2010 calendar year

Total ground-based transport CO_2 emissions were estimated at 9.39 million tonnes in 2010. NO_x and PM_{10} were estimated at 24,210 tonnes and 1,450 tonnes respectively, excluding ground-based aviation.

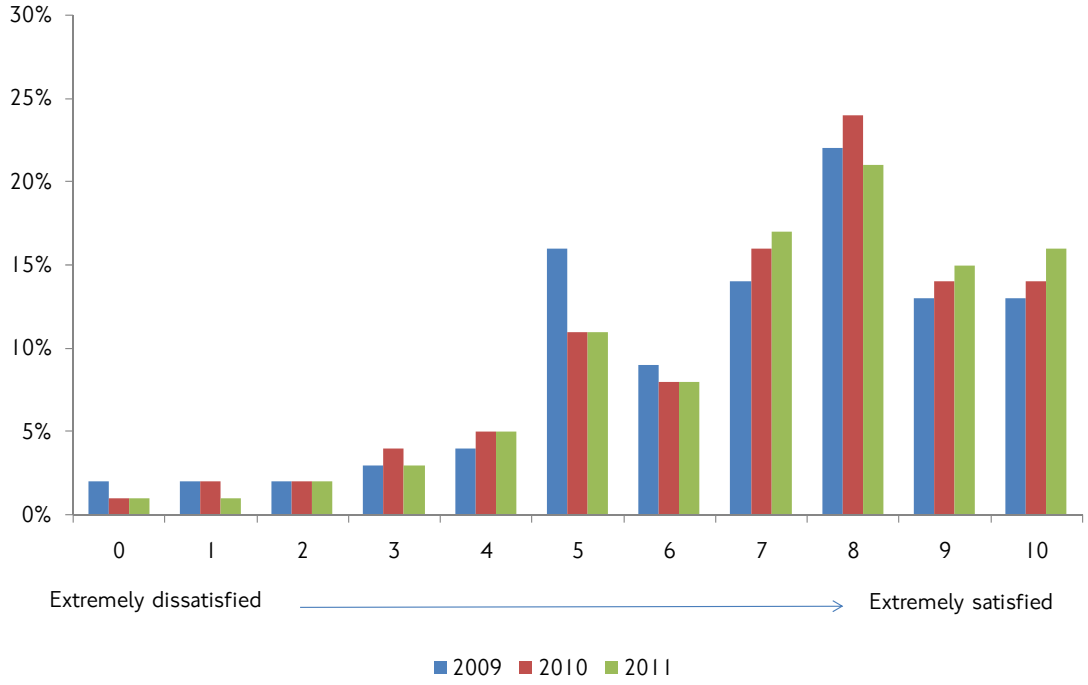
7.4 Transport-related noise in London

Alongside the measurement and mapping of noise levels, as shown for example on Defra's noise mapping website for England (http://services.defra.gov.uk/wps/portal/noise), it is necessary to understand noise as experienced by London residents. Respondents to the TfL Perceptions of the Travel Environment survey were asked to consider noise generated from different transport modes in their area, the extent to which they are disturbed by transport-generated noise, and the impact that this has on their quality of life. They were also asked to consider whether noise has improved or worsened in the past year. Results are available for London as a whole, and for each of the London sub-regions.

Perception of general noise levels in London

The mean score in 2011 for satisfaction with general noise levels (all sources) in London was 72 out of 100, a slight improvement on the 2010 score of 70 out of 100. Figure 7.4 shows the distribution of scores on a scale of 0 to 10 in 2009, 2010 and 2011. The proportion of respondents reporting to be 'satisfied' or 'very satisfied' (scores of 7 or higher) with general levels of noise in London was almost seven in 10 in 2011, a similar figure to that recorded in 2010.

Figure 7.4 London residents' perception of general noise levels in London, 2009-2011.



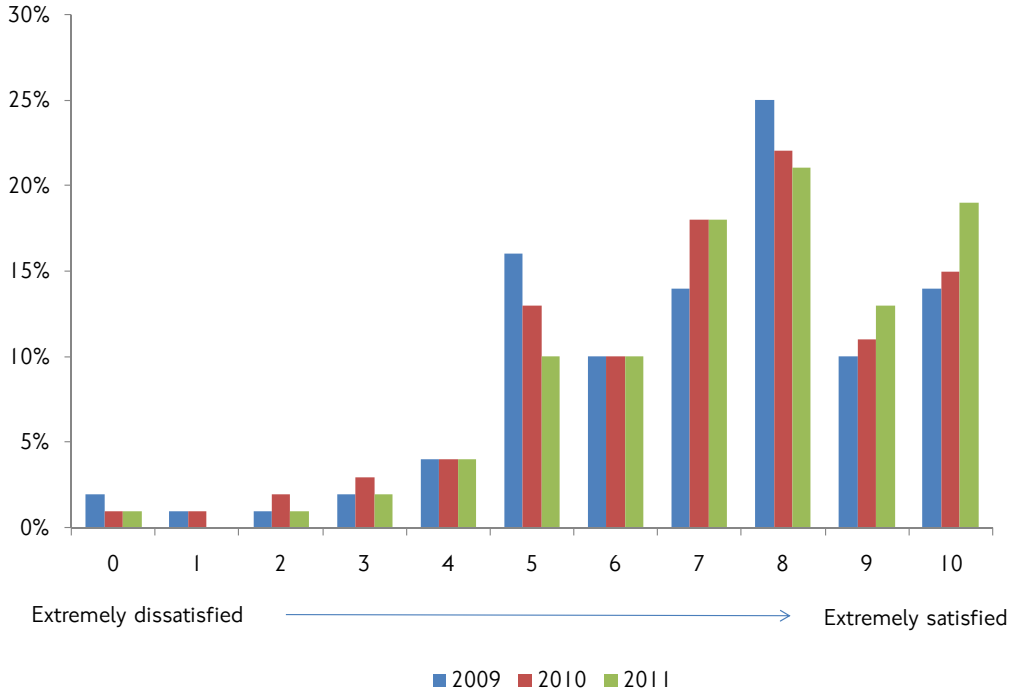
Source: TfL Perceptions of the Travel Environment Survey, 2009-2011.

Over 70 per cent of respondents felt that general noise levels had remained the same over the past year. Five per cent reported that they felt that noise levels had improved, whilst almost 20 per cent said that noise levels, in their view, had worsened.

Perception of transport-related noise levels in London

The mean score for satisfaction with the reasonableness of transport-related noise levels in London was 74 in 2011, an improvement on the 2010 score of 71 out of 100. This is considered to be a 'fairly good' score, according to TfL's norms. Figure 7.5 shows the distribution of scores, on a scale of 0 to 10. Seventy per cent were either 'satisfied' or 'very satisfied' with transport-related noise levels in 2011 (a score of 7 or higher). This is a 4 percentage point increase on 2010.

Figure 7.5 London residents' perception of transport-related noise levels in London, 2009-2011.



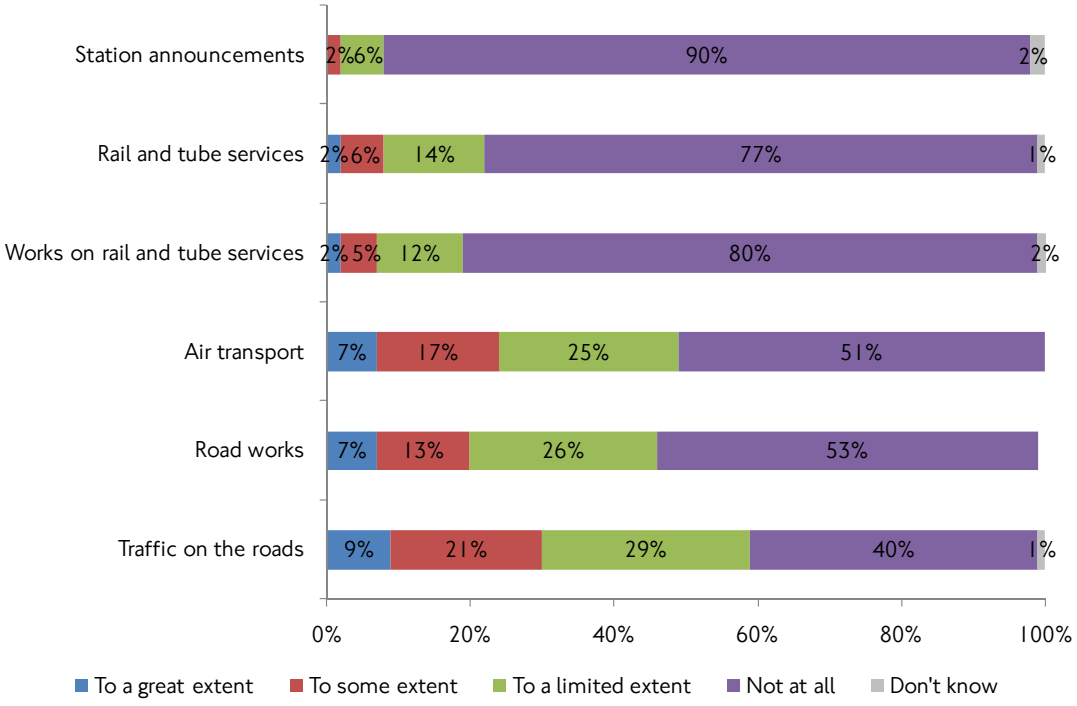
Source: TfL Perceptions of the Travel Environment Survey, 2009-2011.

Aspects of transport-related noise

Although traffic on the roads and road works remained two of the most significant causes of transport-related noise disturbance in 2011, fewer London residents said that they were disturbed by noise from these sources than in previous years (see Figure 7.6). The proportion of London residents disturbed by noise from air transport remained at around a quarter.

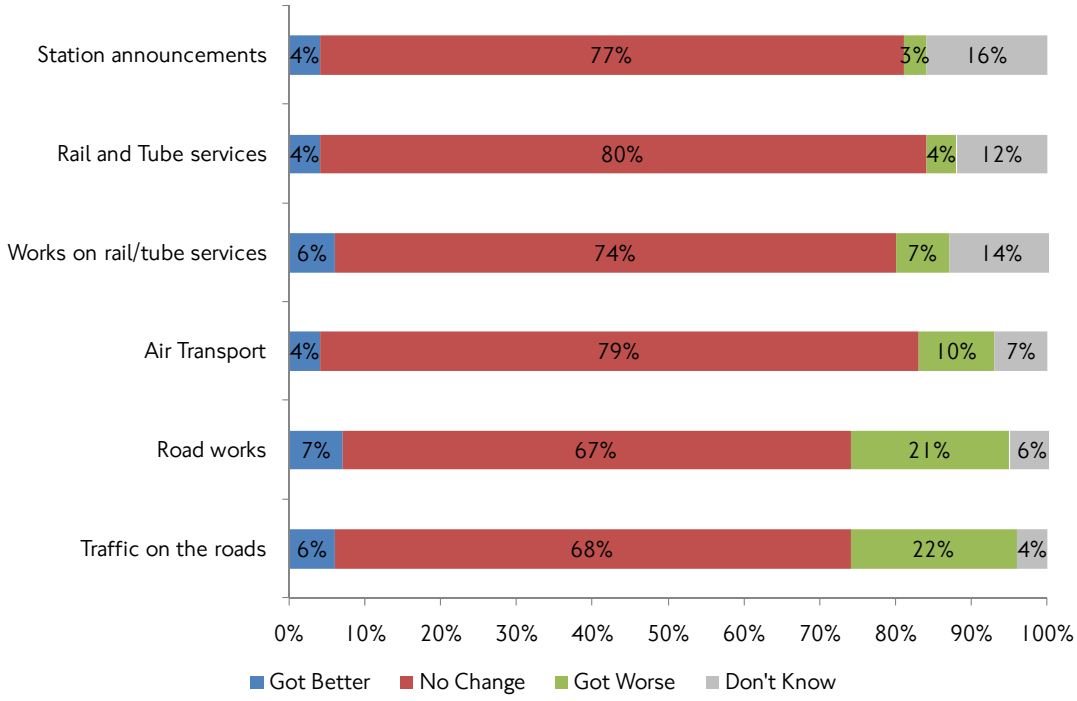
Despite this finding, Figure 7.7 shows that traffic and road works were the sources of transport related noise that residents were most likely to think had worsened over the past year. In particular, over half of those that said transport noise had got worse in the last year attributed this to increased volumes of traffic and levels of congestion on the roads.

Figure 7.6 Level of disturbance caused to London residents by aspects of noise from transport, 2011.



Source: TfL Perceptions of the Travel Environment Survey, July 2011.

Figure 7.7 Whether levels of noise from specific transport sources have got better or worse over the past year for London residents, 2011.

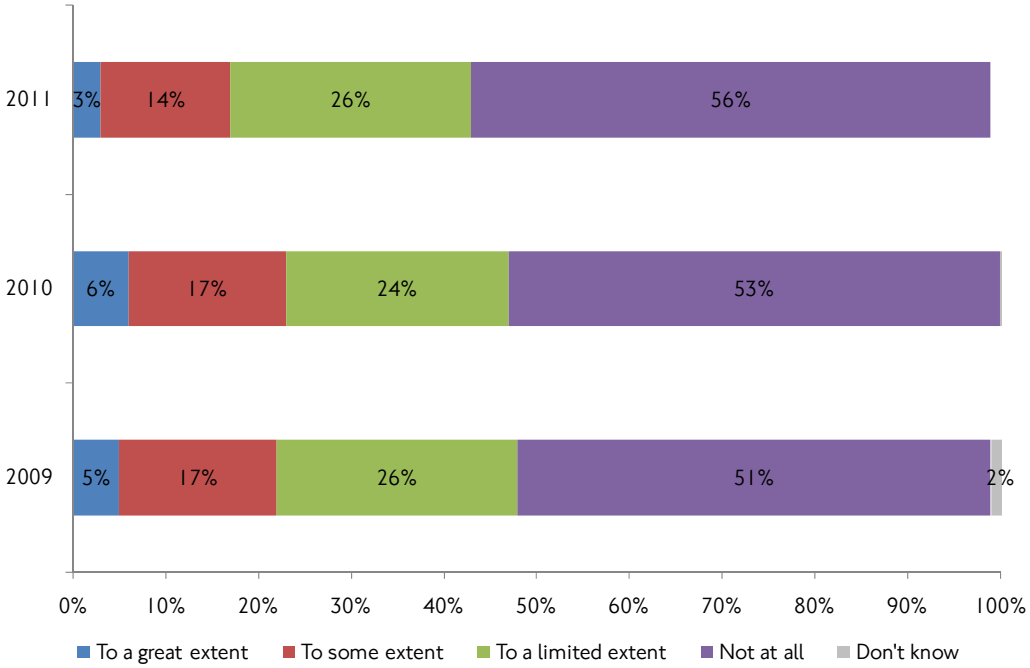


Source: TfL Perceptions of the Travel Environment Survey, 2011.

Stress and sleep disturbance caused by noise from transport

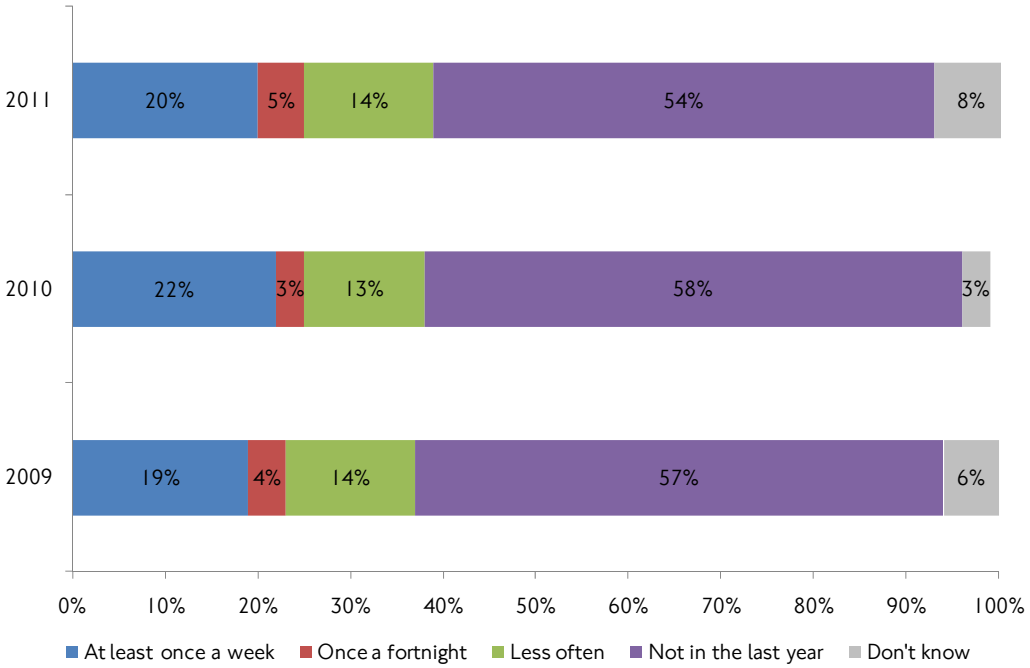
As shown in Figure 7.8, 17 per cent of London residents said that noise from transport had caused them stress to 'some' or a 'great' extent in 2011. This is a six percentage point reduction in comparison with 2010. The proportion of London residents whose sleep was disturbed by noise from transport at least once a fortnight remained at 25 per cent, shown in Figure 7.9.

Figure 7.8 Stress caused by noise from transport, London residents, 2009-2011.



Source: TfL Perceptions of the Travel Environment Survey, July 2011.

Figure 7.9 Sleep disturbance caused by noise from transport, London residents, 2009-2011.



Source: TfL Perceptions of the Travel Environment Survey, July 2011.

7.5 MTS Strategic Outcome Indicator: Perception of transport-related noise

Definition of Indicator

This indicator is described as the 'level of satisfaction of London residents, on a scale of 0-10, that transport-related noise in the area where they live is reasonable'. Responses are converted into a mean score out of 100. The indicator is developed from TfL's Perception of the Travel Environment Survey, undertaken in summer 2011.

Value for 2011 calendar year and assessment of recent trend

The mean score for satisfaction with transport-related noise levels in London was 74 out of 100 in 2011, a small increase on the previous year. Table 7.4 shows mean scores for 2009, 2010 and 2011. According to the norms that TfL uses to interpret this indicator, a score of between 70 and 79 in satisfaction surveys is considered to be 'fairly good'.

Table 7.4 Mean scores for satisfaction with transport-related noise levels in London, London residents 2009-2011.

Year	Score (out of 100)
2009	70
2010	71
2011	74

Source: TfL Perceptions of the Travel Environment Survey, 2009-2011.

Assessment of recent trend

The survey providing this indicator was established in 2009. Over the three-year period 2009-2011, there is some evidence of an upwards trend in satisfaction with transport-related noise in London, although it remains too early to view this as a definitive trend.

8. Transport opportunities for all Londoners

8.1 Introduction and content

This chapter looks at the ways in which transport provides access to opportunities and services in London. It also considers physical accessibility to the transport network and the affordability of transport in London. Much of the material in this chapter relates to features of London's transport system that would be expected to change only over relatively long timescales, for example by major new additions to the transport networks facilitating a step-change in the strategic pattern of accessibility to employment. However, there is also much that happens on a year-on-year basis, such as the continuing programme of upgrades to stations and other facilities to improve accessibility and, in the latest year, the completion of significant infrastructure projects such as the extension of the East London Line to Highbury and Islington, completion of total train fleet replacement on the Victoria Line and substantial progress towards three-car train operation on the DLR.

8.2 Access to opportunities and services (ATOS), including MTS Strategic Outcome Indicator

Transport facilitates economic and social development by providing access to employment, services and leisure activities. TfL has developed its ATOS (Access to Opportunities and Services) tool to quantify the degree of access provided by the transport system to the opportunities and services most relevant to the daily lives of Londoners. This is to be used, for MTS monitoring purposes, to produce a formal quantitative indicator on a three-yearly (benchmarking) basis. This indicator was first benchmarked in Travel in London report 2, for the 2008 calendar year. The value given was that the average time for accessing employment and essential services in Greater London by public transport or walking was 17.4 minutes. It is planned to re-benchmark this indicator for the year 2011 in Travel in London report 5, using transport, population, employment and service data applicable to that year.

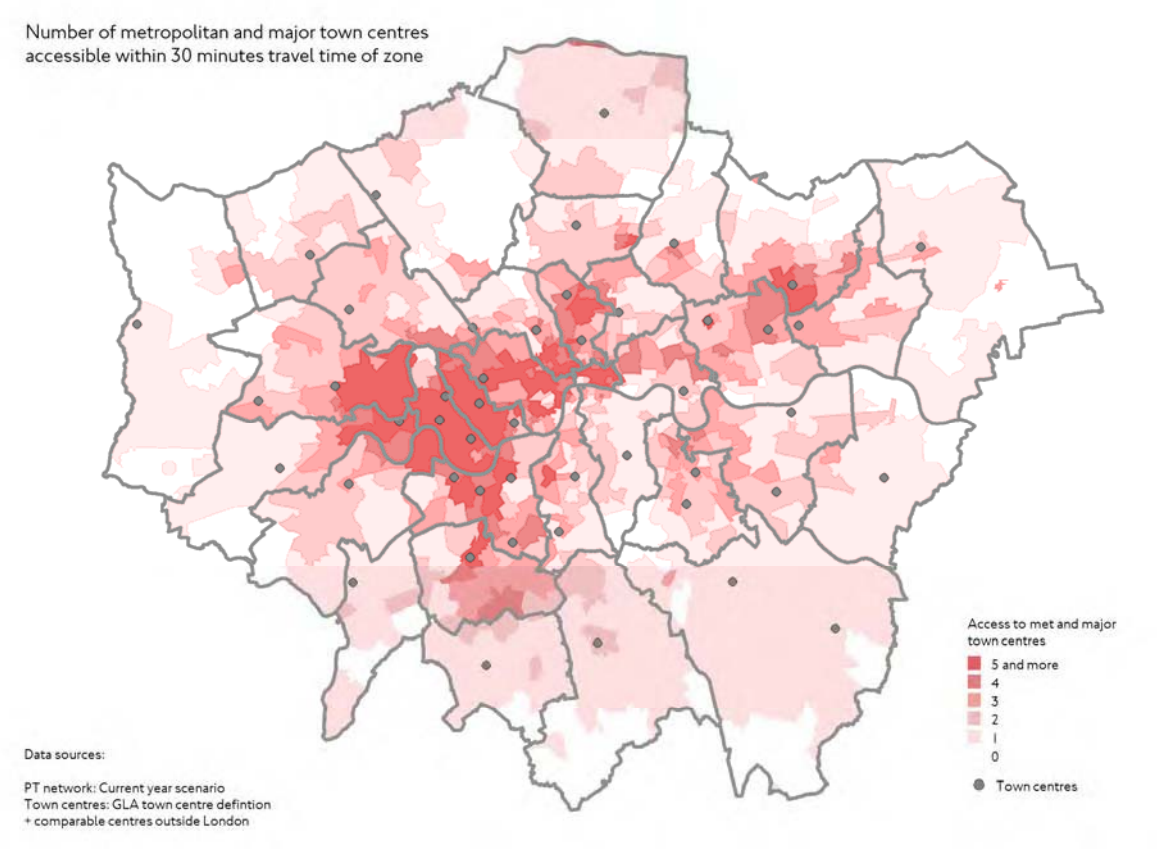
8.3 Access to town centres

The overall density of jobs and services in London means that it is usually possible to access them within a reasonable timescale. However, the services available most locally may not have the required capacity or specific facilities – schools being an obvious example. Factors such as choice and the number of services available therefore become important with, in Inner and Outer London at least, jobs and services typically being clustered around metropolitan and other major town centres. The ATOS tool allows us to explore these dimensions of accessibility. Figure 8.1 is a map showing accessibility to town centres, in terms of the number of town centres that can be reached by public transport and walking within 30 minutes of each electoral ward.

Greatest accessibility is available in inner west London, with five or more town centres readily accessible for residents of much of the boroughs of Kensington and Chelsea and Hammersmith and Fulham. The level of accessibility for central London implied by the map is, however, rather misleading, as it functions as a single agglomeration (rather than a series of discrete town centres), with jobs and services generally quite readily available. By contrast, across much of Outer London, there is only one town centre that can be reached within 30 minutes – and there are pockets

close to the fringes of London that are more than 30 minutes from the nearest town centre.

Figure 8.1 Number of town centres that can be accessed within 30 minutes by public transport and walking – illustrative 'current' scenario.



Source: TfL Strategy and Planning.

8.4 Physical accessibility to the transport system

Overview

It is important to have a transport system that is accessible to all members of the community. Efforts continue to be made to update the transport system in London to achieve this, with current plans summarised in TfL's Accessibility Implementation Plan, published in 2011: http://www.tfl.gov.uk/assets/downloads/corporate/taking-forward-the-mts-accessibility-implementation-plan-report.pdf

TfL considers physical accessibility from the point of view of the 'whole journey', working to ensure that the transport system is accessible from the start to end of a journey by overcoming barriers that exist for some users, thus enabling easier and more spontaneous travel. However, it is also recognised that the range and diversity of travel impediments, and therefore potential solutions, are very large, and that step-change improvements to infrastructure can rarely be achieved quickly or without significant additional funding.

Summary of current accessibility provision

The state of accessibility provision at June 2011 was as follows:

Surface transport

- 52 per cent of bus stops in London were fully accessible (appropriate vehicle stopping controls, 100mm or greater kerb heights and no other boarding/ alighting impediments).
- 100 per cent of buses were low floor and had dedicated space for wheelchairs or baby buggies.
- 36 per cent of TfL Road Network (TLRN) signalised crossings (either 'stand alone' or complete junctions) met the highest criteria of provision based on the national accessible crossing indicator.

Underground/DLR/Tramlink

- 22 per cent of London Underground stations were step-free from street to platform.
- 3.7 per cent of London Underground stations were step-free from platform to train.
- 100 per cent of DLR stations were step-free from street to platform, as were 100 per cent of Tramlink stops – both networks being constructed so as to be fully accessible.

Surface rail

- 20 of the 78 London Overground stations were fully accessible with step free access to all platforms - an increase of three stations on the previous year.
- At 34 of the 78 stations the Overgound platforms were either directly, or indirectly accessible from the station entrance.
- At 44 of the 78 stations the station was only partially accessible to either National Rail, Overground or Underground services.
- 37 per cent of National Rail stations were step-free from street to platform.

Particular developments over the most recent year have been:

- Installation of platform humps on the Victoria Line, providing level access between the platform and the train, in conjunction with the total replacement of the train fleet. However, only those at two 'fully-accessible' stations (Brixton and Tottenham Hale) are included in the 3.7 per cent figure above. Platform humps will also be provided on the Circle, District, Hammersmith and City, and Metropolitan lines in conjunction with the new trains now being rolled out on these lines.
- Green Park Underground station was made more accessible with the installation of lifts.
- TfL's travel mentoring service provided training and support to enable disabled Londoners to gain the necessary knowledge and confidence to use all of London's mainstream public transport modes and National Rail services. Nearly 8,000 escorted trips were completed during the year.

8.5 MTS Strategic Outcome Indicator: Physical accessibility to the transport system

This indicator measures the level of step-free access across the public transport and TfL Streets networks. The indicator is defined as a modal composite, weighted according to journey-stage based mode shares for each year (see also section 2.7 of this report) – taking these as the appropriate 'target' shares to be achieved by those people with a mobility impairment.

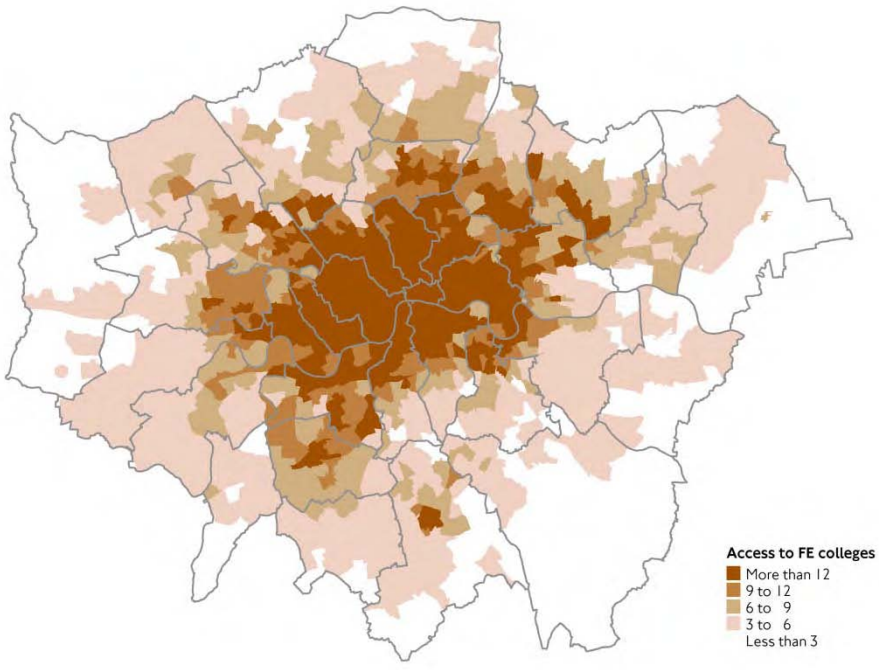
Value for 2010/11 financial year and assessment of recent trend

The composite physical accessibility score for 2010/11 was 38 per cent. This compares to an equivalent value of 37 per cent for 2009/10, and reflects continued incremental improvement to the provision of accessible transport in London.

8.6 Illustration of the implications of incomplete accessibility to the transport system

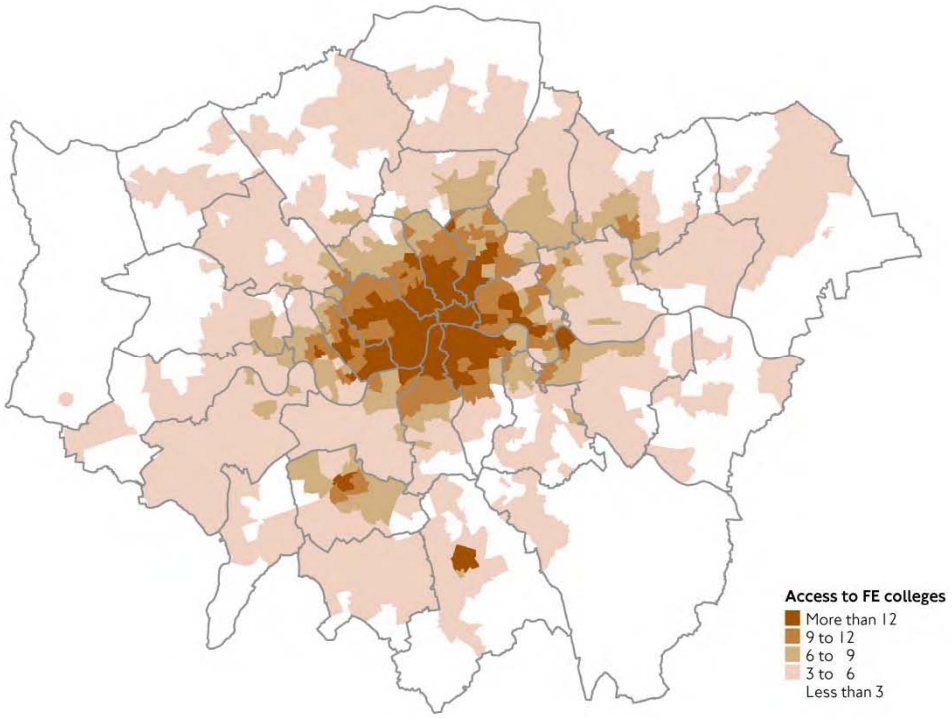
An appreciation of the impact of incomplete accessibility on journeys can be gained through adaptation of TfL's ATOS tool. For a given origin-destination pair, ATOS can generate maps comparing travel times by public transport using, firstly, the whole network and, secondly, only the 'step free' network (with the whole of the bus network considered for this purpose to be accessible). This can be adapted to look at the differential degree of access provided to major services across London, based on travel times from each electoral ward. Figures 8.2 and 8.3 exemplify such analyses, in this case looking at travel times to further education establishments. In each case the maps show the number of establishments that can be reached within a 45-minute travel time by either network.

Figure 8.2 Number of further education establishments that can be reached within 45 minutes travelling time. Whole public transport network – illustrative 'current' scenario.



Source: TfL Strategy and Planning.

Figure 8.3 Number of further education establishments that can be reached within 45 minutes travelling time. Step-free public transport network only - illustrative 'current' scenario.



Source: TfL Strategy and Planning.

It is immediately clear that the degree of accessibility provided by the step-free network is considerably less than with the full network, and that this difference applies fairly uniformly across Greater London. A factor is the geographically comprehensive nature of the bus network, which at least partly compensates for the low number of fully-accessible Underground and National Rail stations in Outer London.

8.7 Door to door transport services – Dial-a-Ride and Taxicard

Dial-a-Ride and Taxicard are schemes that offer a door-to-door transport service for disabled people who cannot readily use buses, trains or the Underground. This section updates trends in relation to the operation and use of these schemes.

Dial-a-Ride

Dial-a-Ride provides a door-to-door service for people with a permanent or long term disability. Many of its members are unable to access mainstream public transport and rely heavily on the service, which they must register to use. They can then book trips to go shopping, visit family and friends or for other recreational purposes. The service is free to members and is ideal for trips of five miles or less. During 2010/11 Dial-a-Ride provided 1,345,000 journeys to its members (Table 8.1), 90,000 more journeys and a 7.2 per cent increase on the previous year. This was the highest yearly total since the service began in the 1980s. During 2010/11 TfL continued to invest in Dial-a-Ride. A further 39 bespoke low-floor minibuses entered

the fleet during the year. Also notable from Table 8.1 is the reduction in average cost per journey over recent years.

Table 8.1 Dial-a-Ride key trends.

Year	Number of journeys (thousands)	Number of buses	Registered passengers (thousands)	Average cost per passenger journey (2010/11 prices) (£)	Total grant (2010/11 prices) (£m)
2000/01	1,222	292	73	13.45	16.9
2001/02	1,260	302	86	14.98	18.9
2002/03	1,269	317	96	15.90	20.2
2003/04	1,325	316	61	16.56	20.7
2004/05	1,261	316	66	20.49	24.8
2005/06	1,232	336	71	22.44	26.7
2006/07	1,173	342	72	26.48	30.2
2007/08	1,127	355	52	28.11	31.1
2008/09	1,172	352	50	27.56	32.5
2009/10	1,255	355	53	25.64	32.5
2010/11	1,345	369	52	22.93	31.1

Source: Transport for London, Dial-a-Ride.
1. Re-registration exercises took place in 1992/93, 1999/2000 and 2003/04. From 2007/08 only passengers active in previous 3 years are included as registered passengers.
2. From 2003/04, cost per passenger journey includes fares paid by passengers. The Dial-a-Ride service became free to users from January 2008.

Taxicard

Taxicard provides subsidised trips in licensed London taxis for users for whom public transport is not usually accessible. Table 8.2 shows that there has been a sustained increase in the number of scheme members and journeys, with a 10.3 per cent increase in the latter over the most recent year.

Table 8.2 Taxicard key trends.

Year[1]	Number of journeys (thousands)	Number of members (thousands)	Average cost per vehicle trip at 2010/11 prices (£)[2]	User contribution at 2010/11 prices (£)[3]	Total joint-funding (TfL and Boroughs) at 2010/11 prices (£m)[4]
2000/01	478	41	13.77	-	-
2001/02	523	39	14.37	5.49	11.59
2002/03	653	44	14.47	4.86	13.27
2003/04	791	50	14.87	4.55	13.78
2004/05	948	63	13.78	3.06	14.69
2005/06	1,118	74	16.10	2.81	15.13
2006/07	1,275	77	15.49	2.58	17.30
2007/08	1,436	80	14.26	2.45	18.57
2008/09	1,638	83	10.79	2.37	19.82
2009/10	1,736	87	10.85	2.30	19.73
2010/11	1,914	95	11.52	2.46	19.21
Percentage change					
1 year	10%	9%	6%	7%	-3%
10 years	300%	129%	-16%	-	-

Source: TfL Taxicard Survey.
1. Up to 2003/04 excludes Barnet, Greenwich, Redbridge and Westminster, which operated their own Taxicard scheme. From 2004/05, only Westminster is excluded.
2. The average cost per trip comprises the total metered fare, plus an administration fee, before the user's contribution is deducted.
3. The user contribution comprises the user's minimum fare, plus any amount on the meter that is in excess of the borough's subsidy. Data available since TfL funding began in 2001.
4. Additional costs in 2005/06 through until end 2008 due to delays and difficulties with the implementation of a new booking system and central call centre.

8.8 Transport affordability

Public transport fares in London are set by the Mayor. Fares policy involves striking a balance between the levels charged to permit the operation and enhancement of services, and maintaining affordability.

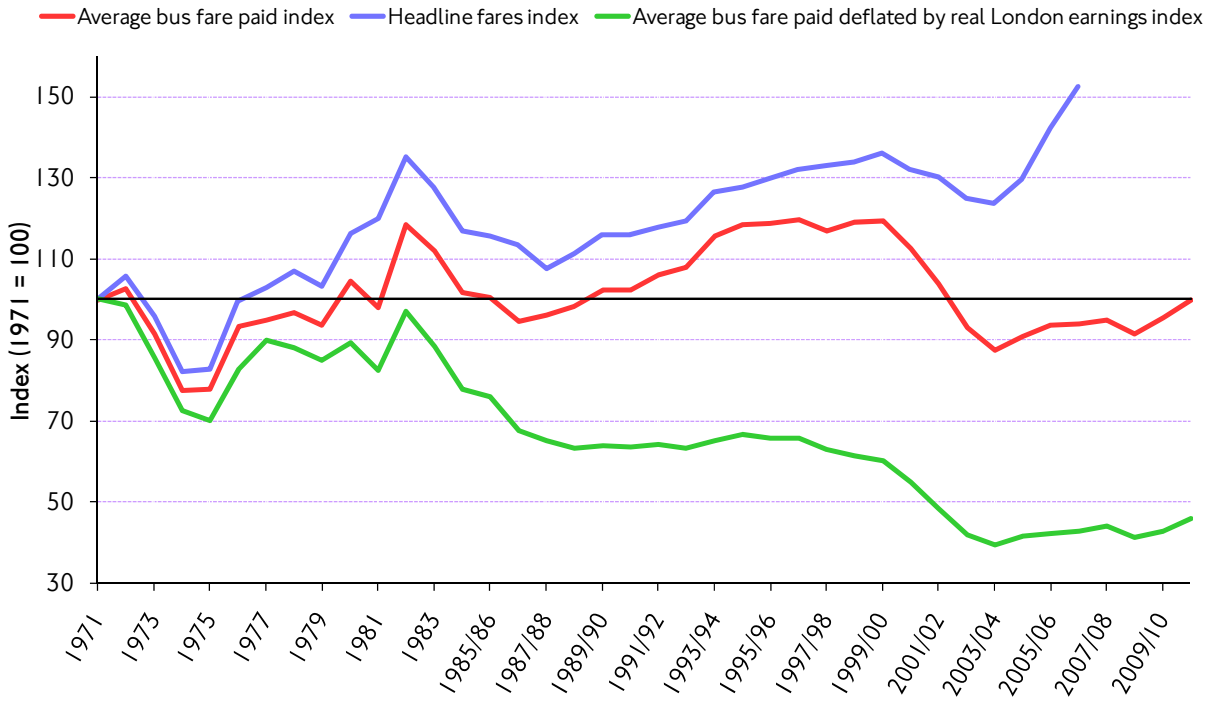
Recent trends for public transport fares

Over the last decade bus fares in London have reduced in real terms, although the trend over more recent years has been upwards. Figure 8.4 shows long-term trends in bus fares based on three different measures. The first of these, the headline fares index, is no longer recorded. The second, the average real bus fare, is now the same as in 1971. The third, showing the average fare when the increase in earnings is taken into account, shows fares relative to average earnings are on average 54 per cent lower than in 1971.

Looking at the period between 2000/01 and 2010/11 and specifically over the most recent year:

- The average bus fare paid has fallen by 11 per cent since 2000/01.
- In the latest year, the average fare paid increased by 5 per cent, continuing the increase seen in the previous year.
- The average fare paid is 14 per cent higher than at the 2003/04 low point.

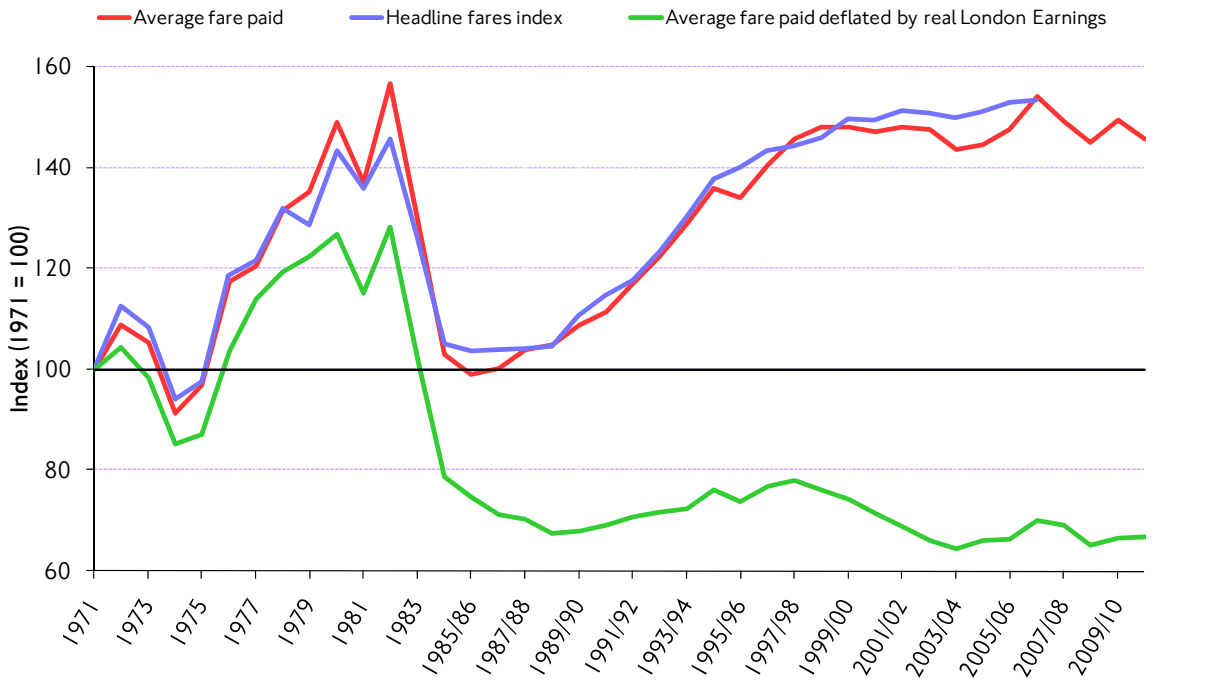
Figure 8.4 Bus fares in London.



Source: TfL Fares and Ticketing.

Figure 8.5 shows the equivalent trend for Underground fares. The picture here is different, with average fares almost 50 per cent higher than in 1971. However, in recent years, the average Underground fare paid has fallen. In 2010/11, the average fare paid was 2 per cent lower than the previous year and 1 per cent lower than in 2000/01. When London earnings are taken into account, fares are around a third lower than in 1971.

Figure 8.5 Underground fares in London.



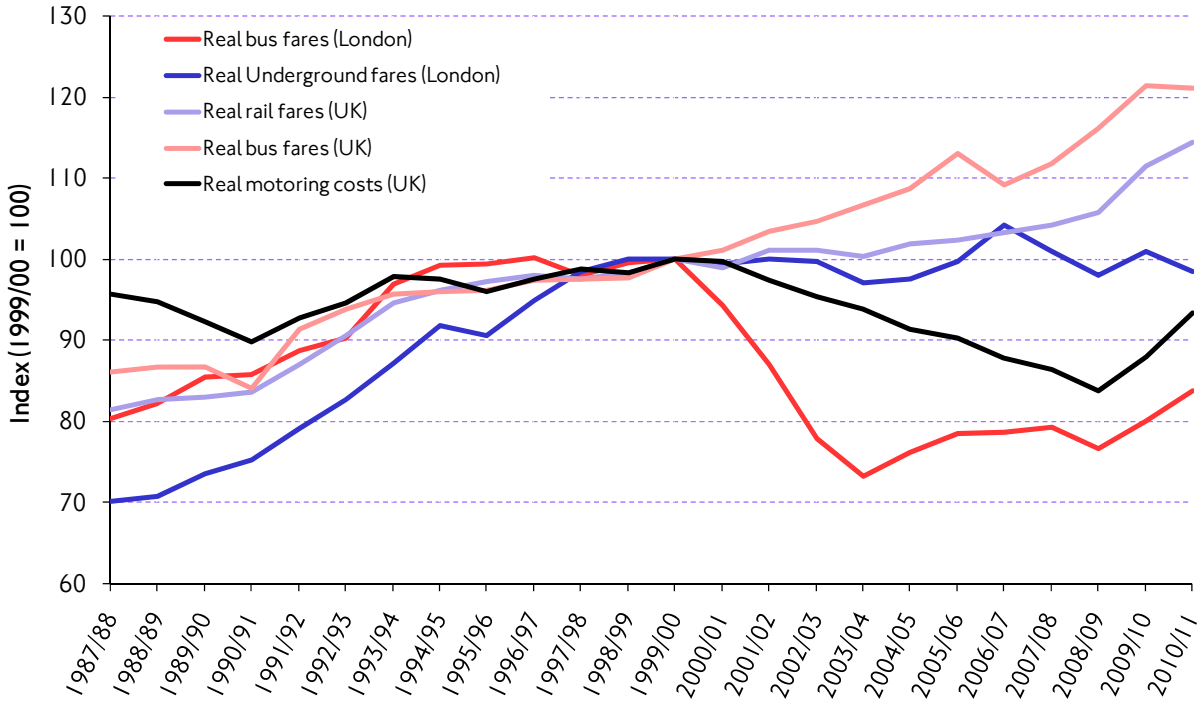
Source: TfL Fares and Ticketing.

Public transport fares – London and the UK compared

Figure 8.6 shows indexed real public transport fares in London (deflated by the Retail Prices Index) along with national public transport fares and motoring costs for comparison.

While bus fares in London have started to increase since 2008/09, they still remain 16 per cent lower than in 1999/2000. In contrast, bus fares in the UK as a whole, whilst remaining stable in the latest year, are still over 20 per cent higher than in 1999/2000. Underground fares remain stable, and fell in the latest year to 1.5 per cent below the 1999/2000 level. UK rail fares continued to rise, and are 14 per cent higher in real terms than in 1999/2000. The largest trend change in recent years has been in motoring costs. After falling year-on-year to 2008/09, the last two years have seen a strong increase in costs, although they still remain 7 per cent lower than at the start of the decade.

Figure 8.6 Public transport fare trends – London and UK compared.



Source: TfL Fares and Ticketing.

Public transport fares in London increased at RPI plus two per cent in January 2011, in line with the TfL Business Plan assumption. This contributed to an 8 per cent increase in total fares revenue (at current prices) to £3,193m in 2010/11. Gross expenditure (before write off of goodwill) decreased by 4.6 per cent, to £5,825m. TfL's primary source of revenue remains fares on the London Underground and bus networks. This represents 82.3 per cent of all revenue generated in 2010/11. Fares revenue on London Underground was £1,758m, 7.5 per cent up on 2009/10. This reflected a year-on-year increase in passenger journeys of four per cent and above inflation fares increases. On the bus network, a smaller increase in passenger journeys together with fare increases resulted in an increase in fares revenue of more than 10.6 per cent to £1,257m.

8.9 MTS Strategic Outcome Indicator: Real fares levels.

Definition of indicator

The real fares level measures the actual average 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. As such, it can only be updated once the relevant calendar year is complete (provisional figures for 2011 are given below). Note that this indicator **excludes** fares paid (and kilometres travelled) under discounted and concessionary fares arrangements

Value for 2010 and 2011 calendar years and assessment of recent trend

The consistent series for this indicator is shown below in pence per kilometre at 2009 prices.

Table 8.3 Adult full fares per passenger kilometre, by bus or Underground, 208 to 2011. Pence at constant (2009) prices

Year	Provisional	Final
2008	n/a	18.8
2009	19.6	19.8
2010	20.2	20.0
2011	19.8	n/a

The actual average adult composite bus and Underground fare paid in 2011 fell to a provisional 19.8 pence per kilometre from a revised 20.0 pence per kilometre for the 2010 calendar year, representing a provisional decrease of 1.3 per cent between 2010 and 2011.

9. Transport and quality of life: Customer satisfaction and perception

9.1 Introduction and content

Transport has a fundamental impact on overall 'quality of life' as perceived by those who travel around the Capital - whether in facilitating ready access to opportunities and services, providing an acceptable and safe travel environment, or enhancing the built and natural environment.

Although 'quality of life' may mean different things to different people, the Mayor has made it a particular priority to improve the quality of Londoners' overall daily travel experiences. The substantive outcomes of these policies should be visible, in due course, in the various formal and informal performance measures considered elsewhere in this report, for example in more reliable journey times on the roads and on public transport. However, these do not themselves shed light on the extent to which the enhancements are appropriate for Londoners, in terms of their expectations and priorities, and consequently the extent to which people actually perceive a contribution from better transport to improving overall quality of life.

The material in this chapter looks at specific aspects of customer perception and satisfaction. It is derived from the same suite of surveys that have been described in previous Travel in London reports, with the addition of a new survey exploring satisfaction with the TLRN amongst those travelling on it. These perception and customer satisfaction-based indicators are best understood alongside quantitative measures of the operation of the road and public transport networks, as discussed elsewhere in this report.

9.2 Summary of perception/satisfaction based Strategic Outcome Indicators for the Mayor's Transport Strategy

This chapter considers a range of perception and satisfaction based indicators relating to transport and quality of life in London. Four of these indicators relate directly to MTS Strategic Outcome Indicators, namely:

- Public transport customer satisfaction.
- Road user customer satisfaction.
- Perception of journey experience.
- Perception of the urban realm.

Table 9.1 Summary of perception-based MTS Strategic Outcome Indicators. Mean scores out of 100.

Indicator	2008/09	2009/10	2010/11	TfL's Assessment
Public transport customer satisfaction	80	79	80	'Good'
Road user customer satisfaction	n/a	n/a	72	'Fairly Good'
Perception of journey experience	64	66	66	'Fair'
Perception of the urban realm	63	64	66	'Fair'

Table 9.1 and the remainder of this section provide a summary of these indicators. The rest of the Chapter then looks in more detail at the rich contextual and mode-specific data underlying these overall scores. The scores themselves are mean scores out of 100 (not percentages), based on a response ranking system from zero to 10, where 10 represents 'extremely satisfied'. The raw survey scores are weighted as appropriate to reflect patterns of transport use more accurately across London.

Trends and TfL's assessment

The overall picture with these indicators is one of relative stability at what TfL would regard as 'Fair' to 'Good' levels across the range of indicators. These levels are TfL's norms used for interpreting customer satisfaction surveys – see Appendix A. Unsurprisingly, scores at this aggregate level tend to change only slowly from year to year, reflecting the generally evolutionary pace of strategic change in the aspects considered. However, it is possible to discern a trend of gradual improvement for each of the three indicators for which the full time-series is available. Although encouraging, this would not at this stage be regarded by TfL as being statistically significant. Nevertheless, as is seen in Section 9.3 in relation to the developing London Overground network, it is possible to identify some large improvements in scores over recent years that are directly associated with recent upgrade works.

9.3 Public transport customer satisfaction

Table 9.2 summarises satisfaction with the overall operation of the service of the major public transport modes separately and in aggregate. The table also reports data on the relative mode share, used to produce the composite score in Table 9.1. The most striking feature of the table is the general similarity of the scores across the modes, but with the relatively higher score for Tramlink standing out.

Table 9.2 Summary of customer satisfaction scores and mode share for principal public transport modes, 2010/11.

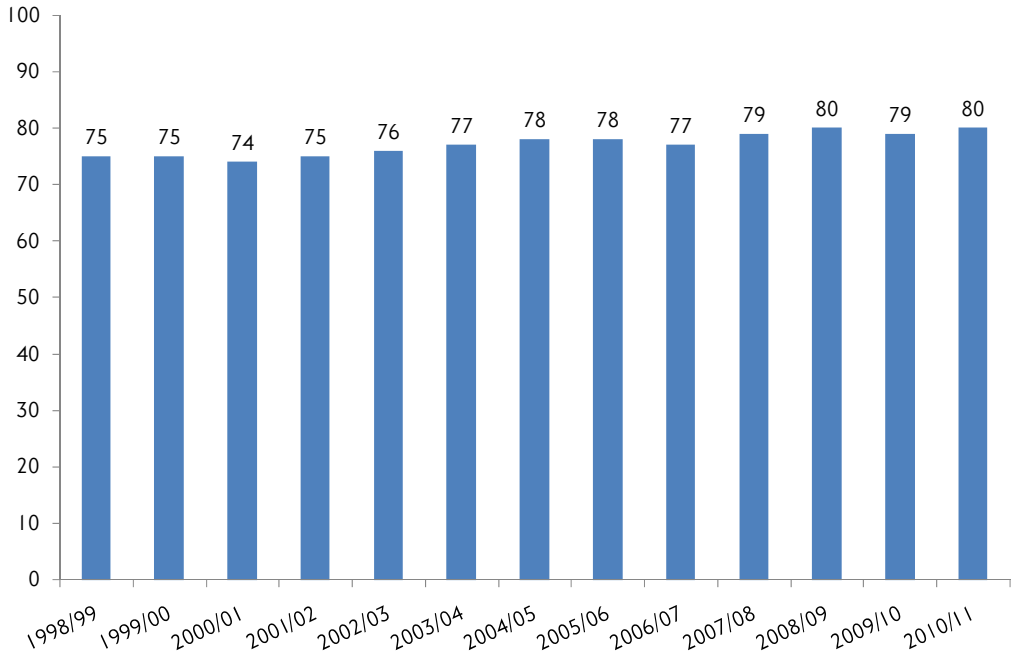
Mode	Overall customer satisfaction score (out of 100)	Annual journey stages (millions)	Relative weight (per cent)
Bus	80	2,289	64%
Underground	79	1,107	31%
DLR	81	78	2%
Overground	80	54	2%
Tramlink	85	28	1%
Total	80	3,556	100%

Source: TfL modal customer satisfaction surveys: mode share based upon journey stage estimates.

Customer satisfaction with London bus services

The mean score for satisfaction with bus journeys in London was 80 out of 100 in 2010/11. This is considered to be a 'good' score. Figure 9.1 shows that customer satisfaction has increased at a fairly steady rate over the past decade.

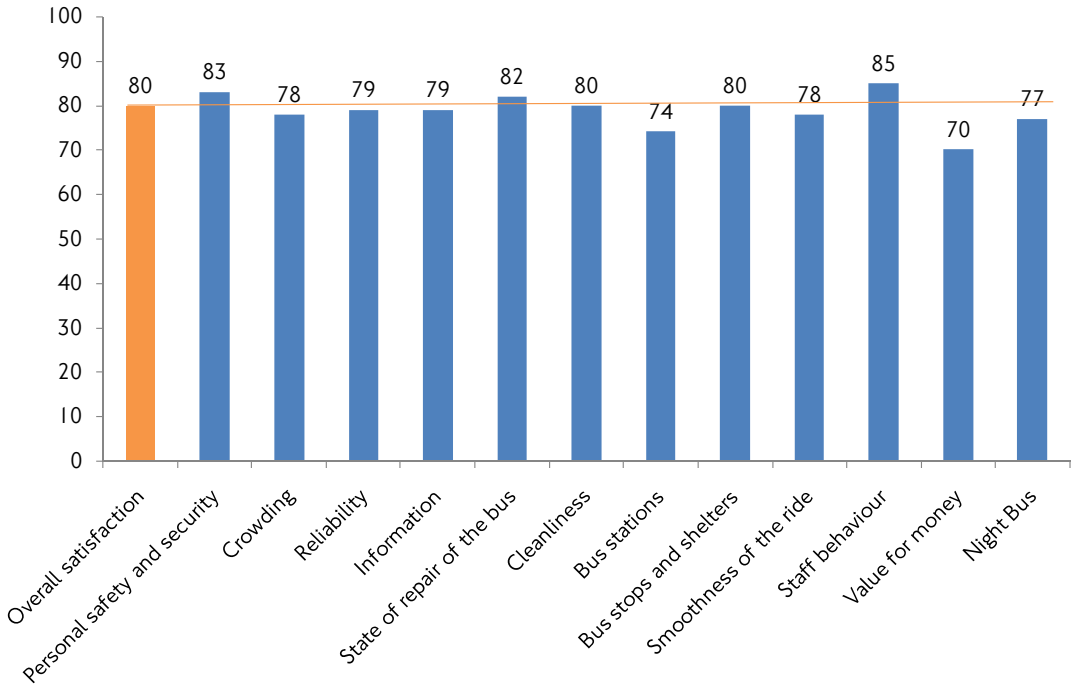
Figure 9.1 Overall satisfaction of bus passengers with their journey, 1998/99 to 2010/11.



Source: TfL London Buses Customer Satisfaction Surveys, 1998-2011.

Figure 9.2 shows satisfaction with different aspects of bus services. In 2010/11, bus passengers were most satisfied with staff behaviour and personal safety and security (85 and 83 out of 100 respectively). They were least satisfied with the value for money of the service (70 out of 100) and bus stations (74 out of 100). There has been little change in the relative perceptions of different aspects of the bus service in recent years.

Figure 9.2 Satisfaction of bus passengers with aspects of their bus journeys.

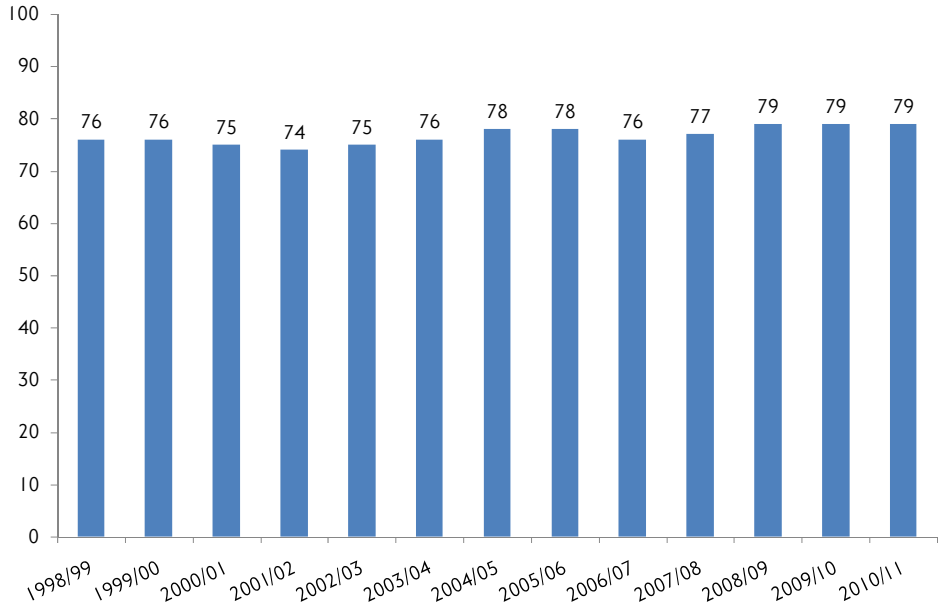


Source: TfL London Buses Customer Satisfaction Survey 2010/11.

Customer satisfaction with London Underground services

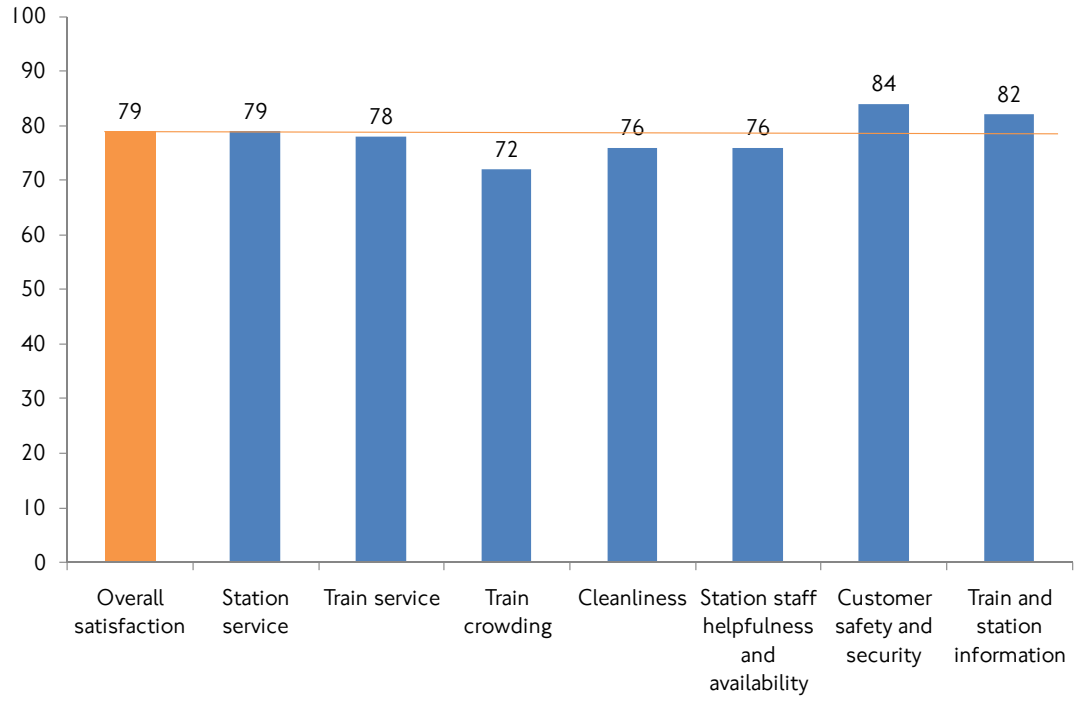
The mean score for satisfaction with Underground journeys in London was 79 out of 100 in 2010/11. This is consistent with the score for the previous two years, and is the highest level ever achieved for satisfaction with London Underground services. Figure 9.3 shows overall satisfaction scores for the period 1998/99 to 2010/11.

Figure 9.3 Overall satisfaction of Underground passengers with their journey, 1998/99 to 2010/11.



Source: TfL London Underground Customer Satisfaction Surveys 1998-2011.

Figure 9.4 Satisfaction of London Underground passengers with aspects of their journey, 2010/11.



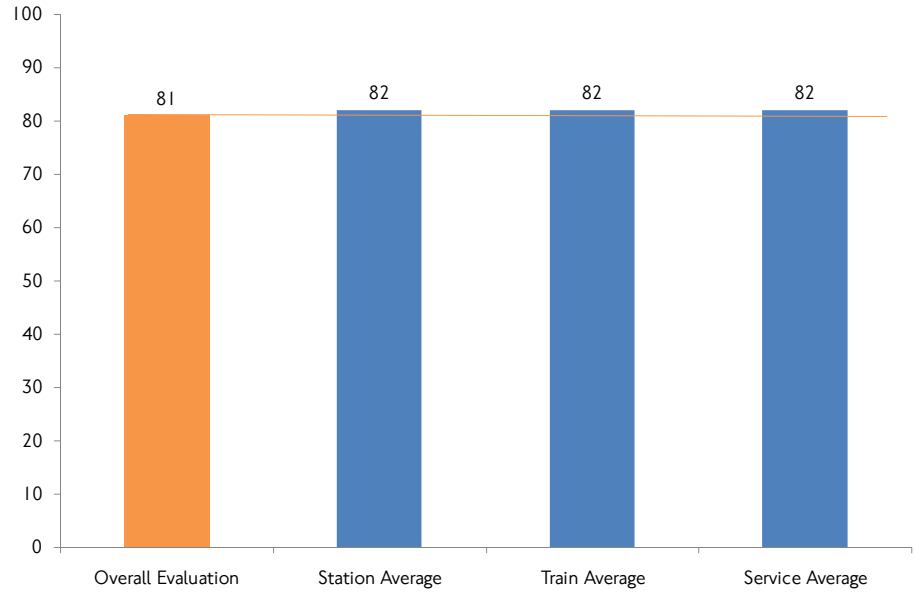
Source: TfL London Underground Customer Satisfaction Survey 2010/11.

Figure 9.4 shows the level of satisfaction of Underground passengers with aspects of the service. Underground passengers are most satisfied with safety and security (with a score of 84 out of 100). The aspect of the Underground service that passengers were least satisfied with was train crowding (with a score of 72 out of 100). There has been very little change in the level of satisfaction with different aspects of the service in recent years.

Customer satisfaction with the Docklands Light Railway (DLR)

This is the third year of the DLR continuous customer satisfaction survey. The mean score for satisfaction with DLR journeys was 81 out of 100 in 2010/2011. This is considered a 'good' score and marks a slight increase on the scores in previous years (80 out of 100 in 2009/10 and 79 out of 100 in 2008/09). Figure 9.5 illustrates that levels of satisfaction are consistently good across all aspects of the DLR service.

Figure 9.5 Satisfaction of DLR passengers with aspects of their journey 2010/11.

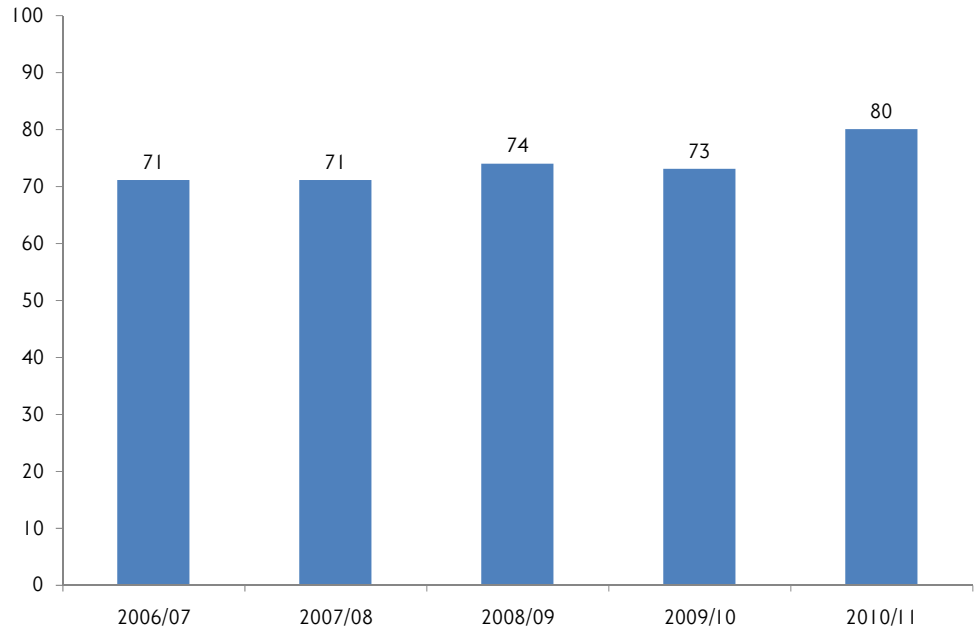


Source: TfL DLR Customer Satisfaction Survey 2010/11.

Customer satisfaction with London Overground services

Customer satisfaction scores for London Overground clearly reflect the large-scale investment in the creation of this new network over recent years with, in particular, large-scale enhancements to services, the opening of new lines and the wholesale replacement of the train fleet. The mean score for satisfaction with London Overground journeys was 80 out of 100 in 2010/2011. This was a substantial increase on the previous year (which was 73). From Figure 9.6, it is also evident that overall satisfaction with Overground journeys has consistently and markedly increased between 2006/07 and 2010/11.

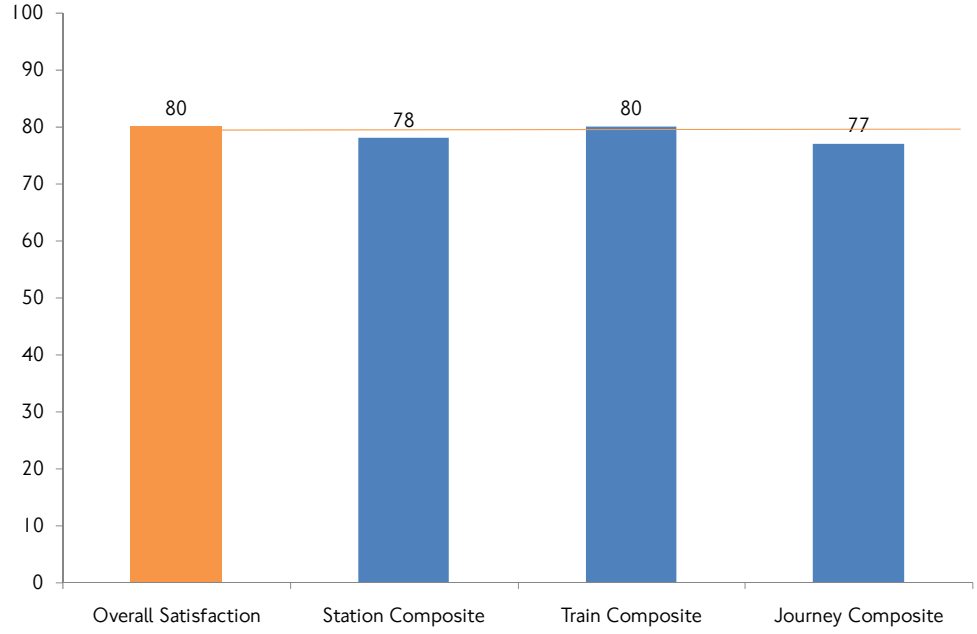
Figure 9.6 Overall satisfaction of Overground passengers with their journey 2006/07 to 2010/11.



Source: TfL London Overground Customer Satisfaction Surveys 2006-2011.

Satisfaction with the service on trains scored 80 out of 100, and is therefore considered to be 'good'. Satisfaction levels with Overground stations (scoring 78 out of 100) and journeys (77 out of 100) are considered to be 'fairly good'. Since 2009/10 satisfaction levels with all three indicators have increased.

Figure 9.7 Satisfaction of London Overground passengers with aspects of their journey.

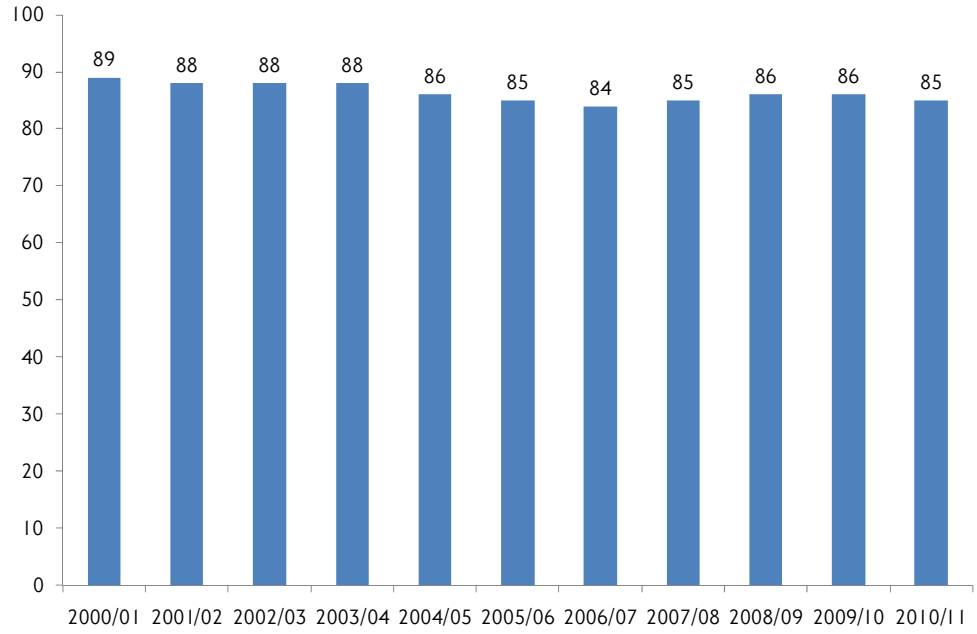


Source: TfL London Overground Customer Satisfaction Survey 2010/11.

Customer satisfaction with London Tramlink services

The mean score for satisfaction with Tramlink journeys was 85 out of 100 in 2010/11. This is consistent with the score from the previous two years, and is considered to be 'very good' according to TfL's norms. Figure 9.8 shows overall satisfaction with Tramlink for the period 2000/01 to 2010/11.

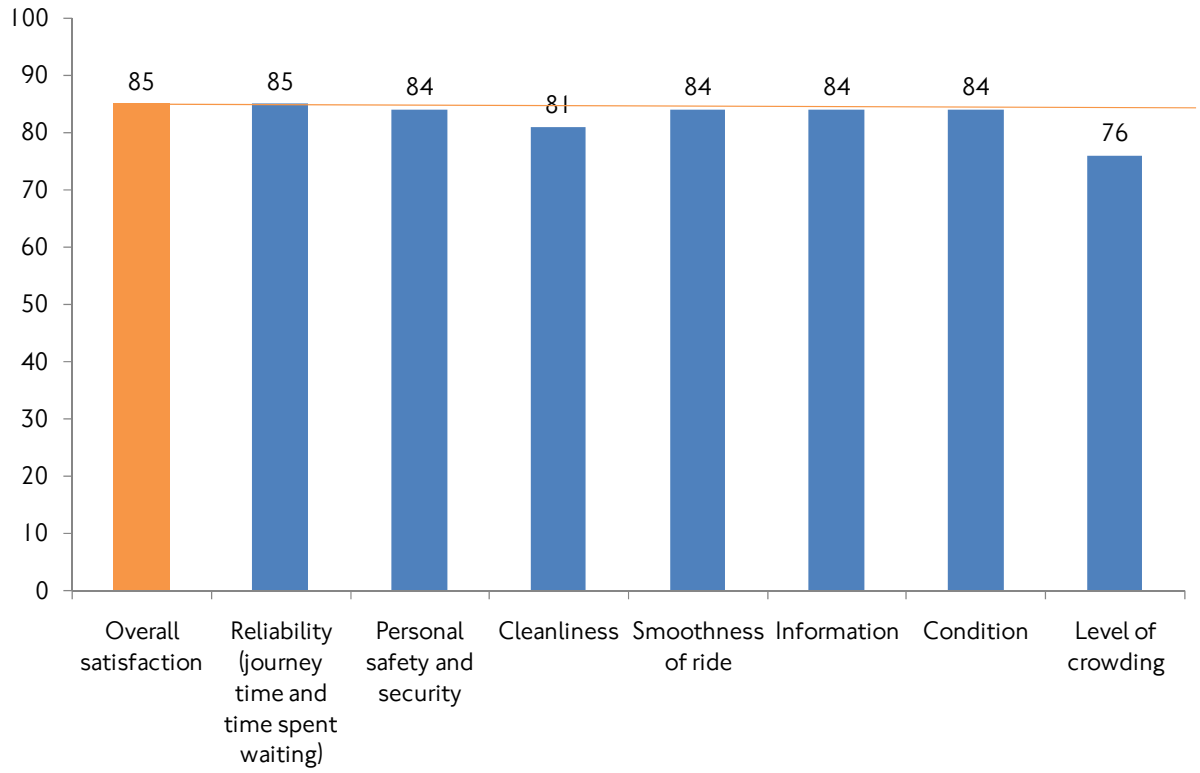
Figure 9.8 Overall satisfaction of Tramlink passengers with their journey, 2000/01 to 2010/11.



Source: TfL Tramlink Customer Satisfaction Surveys 2000-2011.

Satisfaction with different aspects of the Tramlink service is generally very high, with scores of between 81 and 86 out of 100 (as shown in Figure 9.9). The one aspect of the service that passengers are less satisfied with is crowding (76 out of 100). Tramlink passengers were most satisfied with the reliability of their journey (85 out of 100).

Figure 9.9 Satisfaction of Tramlink passengers with aspects of their journey, 2010/2011.



Source: TfL Tramlink Customer Satisfaction Survey 2010/11.

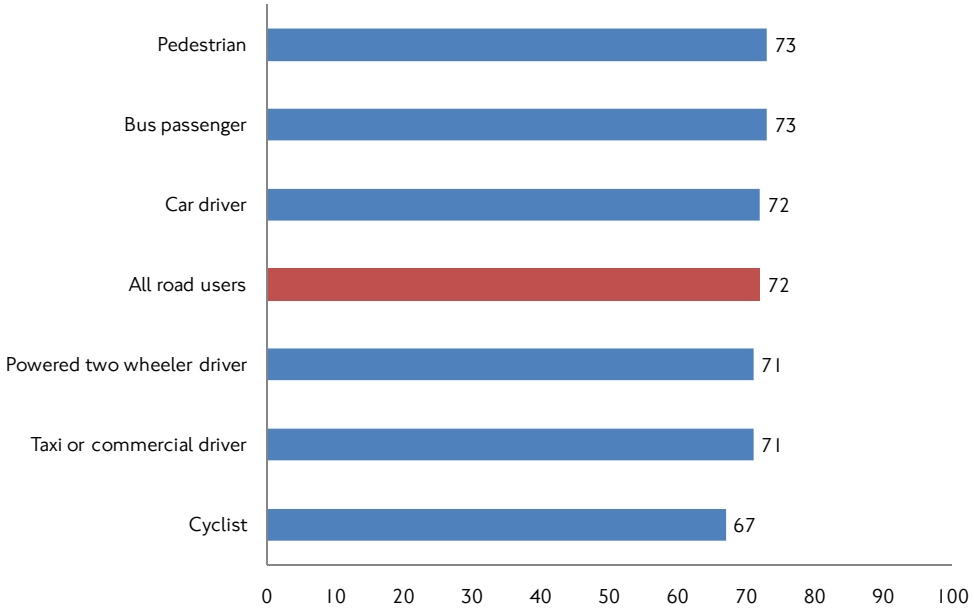
9.4 Road user satisfaction

This section describes satisfaction with the operation of the road network in London. Data are derived either from TfL's Street Management Customer Satisfaction Survey or the TLRN Customer Satisfaction Survey, as stated.

Satisfaction with the Transport for London Road Network (TLRN)

The mean score for satisfaction of travellers with the operation of the TLRN, the network of major roads in London managed directly by TfL, was 72 out of 100. Figure 9.10 shows satisfaction by mode of travel. Satisfaction levels were similar for users of all road modes except cycling, where satisfaction was significantly below average at 67 out of 100. The survey collects the views of those travelling on the routes, covering both London residents and non-residents.

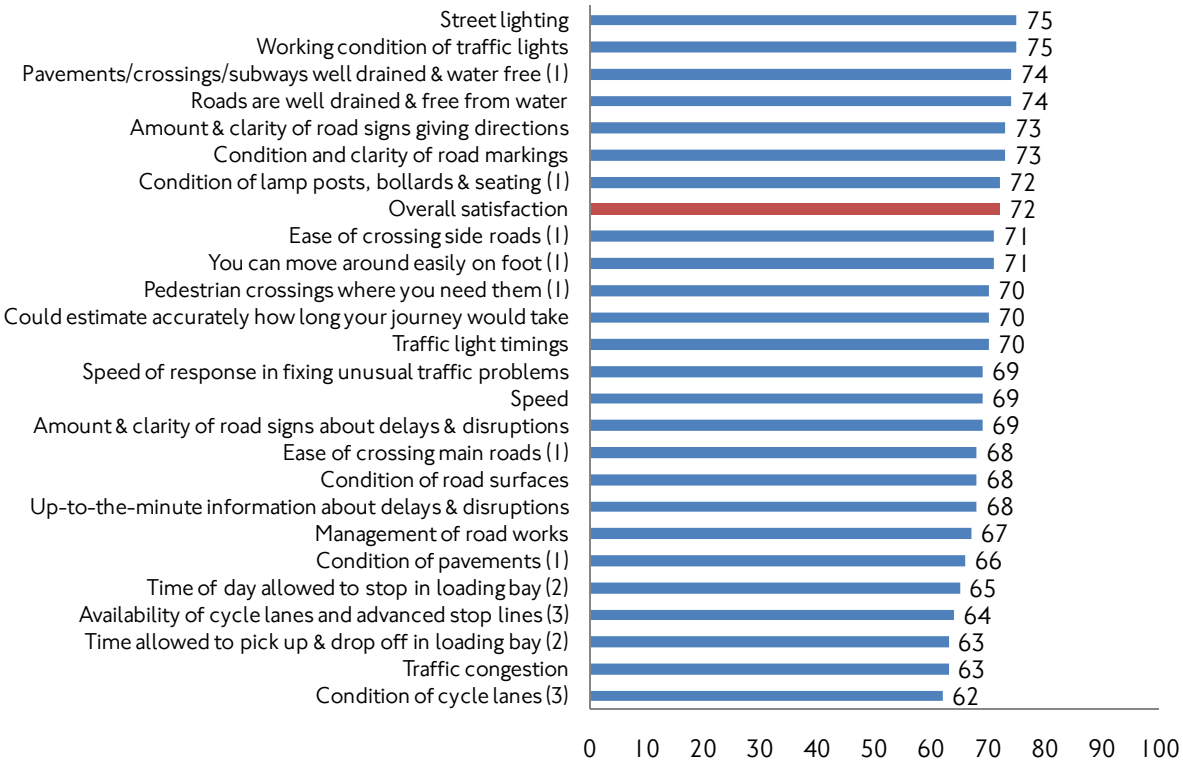
Figure 9.10 Overall satisfaction with the operation of the TLRN, by road user type, 2010.



Source: TLRN user satisfaction Survey 2010.

Aspects of the road network operations that road users were most satisfied with included the working condition of traffic lights, street lighting, drainage, road markings and signage giving directions. Aspects of the road network that road users were least satisfied with included traffic congestion, the availability and condition of cycle lanes and advanced stop lines for cyclists, and the time allowed to stop, pick up and drop off in loading bays for commercial vehicles. Figure 9.11 shows satisfaction with different aspects of the TLRN.

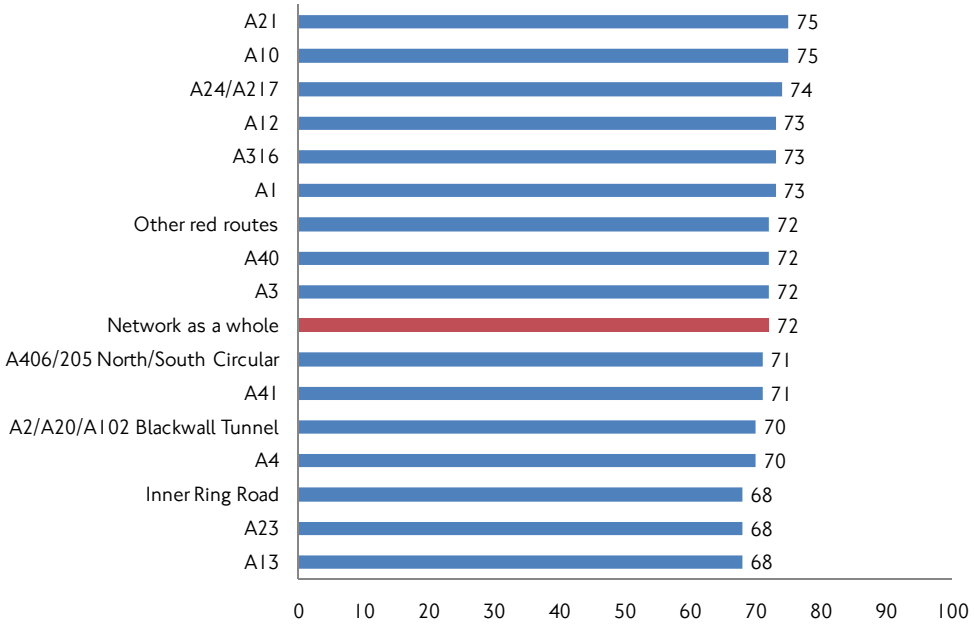
Figure 9.11 Satisfaction with aspects of the operation of the TLRN, 2010.



Source: TLRN user satisfaction Survey 2010.
NOTE: (1) Pedestrians; (2) Commercial vehicles; (3) Cyclists. Items without a label were asked of all respondents.

TLRN users were asked which corridor they had travelled on and results have been assessed by corridor. Those travelling on the A10 and A21 were significantly more satisfied than average, whereas those travelling on the Inner Ring Road, the A23 and A13 were significantly less satisfied than average. Figure 9.12 summarises satisfaction by corridor. It is notable that these scores bear little obvious relationship to the journey time reliability indices by corridor, as discussed in section 4.14 of this report.

Figure 9.12 Satisfaction with the operation of the TLRN, by corridor, 2010.



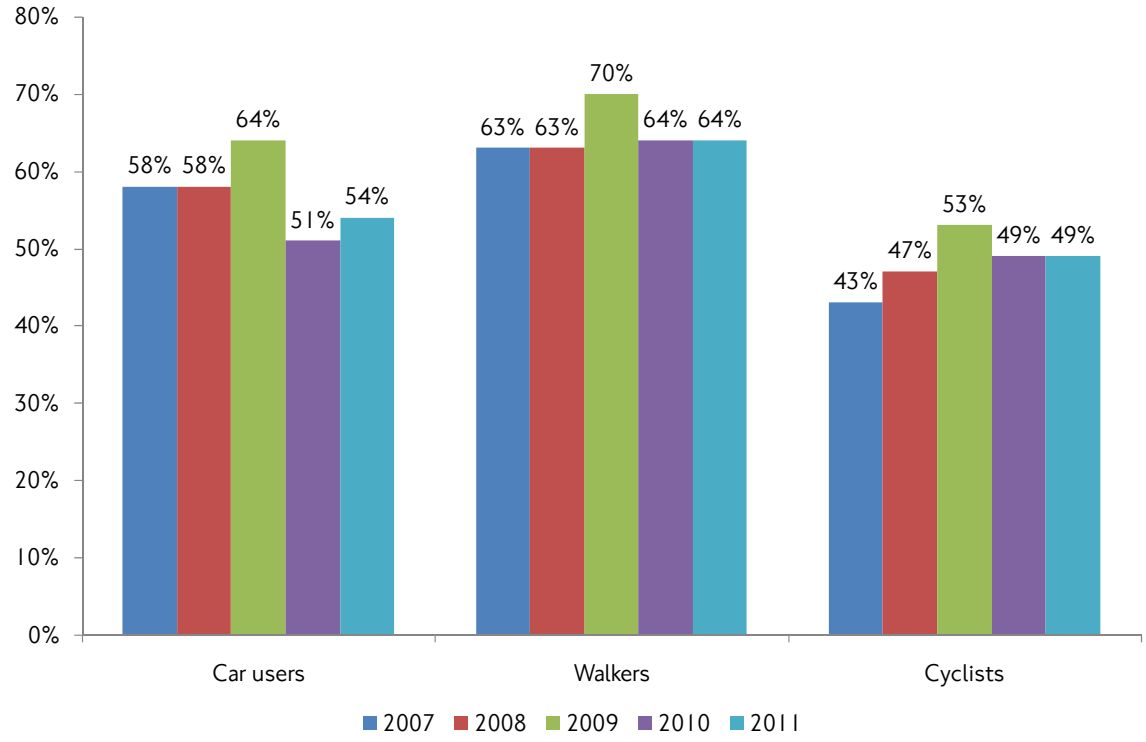
Source: TLRN user satisfaction Survey 2010.

Satisfaction with the quality of London's streets and pavements

This section considers satisfaction of London residents with the operation of the whole road network in London. Data in this section relate to the financial year 2010/11, are derived from TfL's Street Management Customer Satisfaction Survey and represent the views of London residents only.

64 per cent of pedestrians surveyed were satisfied or very satisfied with streets and pavements in 2011, very similar to previous years. Satisfaction amongst cyclists has increased somewhat since 2007, and in 2011 49 per cent were satisfied or very satisfied. Car users' satisfaction with streets and pavements has risen in comparison with 2010, but remains lower than in 2007 to 2009. Figure 9.13 shows satisfaction with streets and pavements by road user type.

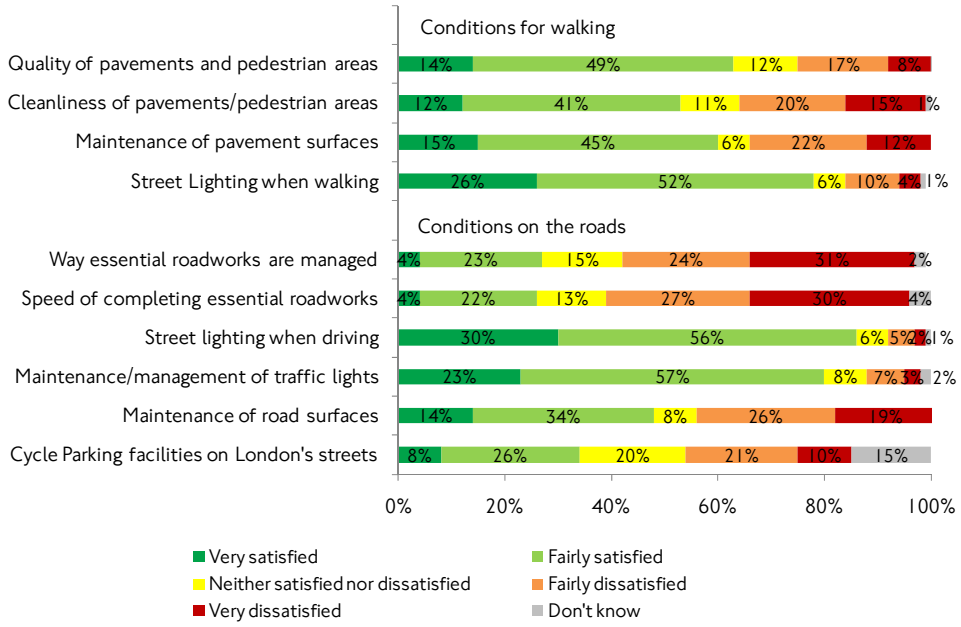
Figure 9.13 Proportion of people satisfied with streets and pavements, by road user type, London residents, 2006/07 – 2010/11.



Source: TfL Streets Management Customer Satisfaction Survey 2007-2011.

Figure 9.14 shows the satisfaction of London residents with aspects of streets and pavements. Levels of satisfaction in 2011 were broadly similar to those of 2010. In both 2010 and 2011, satisfaction with road surfaces was lower than in 2009. This may reflect the severe winter weather experienced in recent years, which has affected the quality of the road surface across London.

Figure 9.14 London residents' satisfaction with aspects of streets and pavements, 2011.

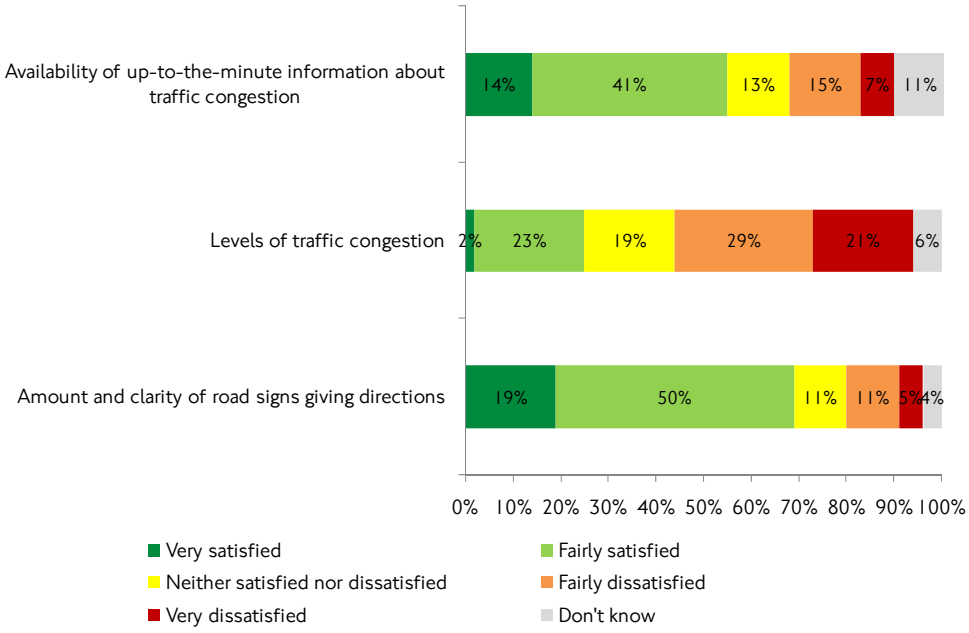


Source: TfL Streets Management Customer Satisfaction Survey 2011.

Satisfaction with the travel experience on London's streets

Figure 9.15 shows London residents' satisfaction with aspects of the travel experience on London's streets. Half of all respondents said that they were 'very' or 'fairly dissatisfied' with the level of congestion on London's roads. In comparison, respondents were more satisfied with the availability of up-to-the-minute traffic information and with the number and clarity of road signs. There has been little change in satisfaction levels from the previous year.

Figure 9.15 London residents' satisfaction with aspects of the travel experience on London's streets, 2010.



Source: TfL Streets Management Customer Satisfaction 2011.

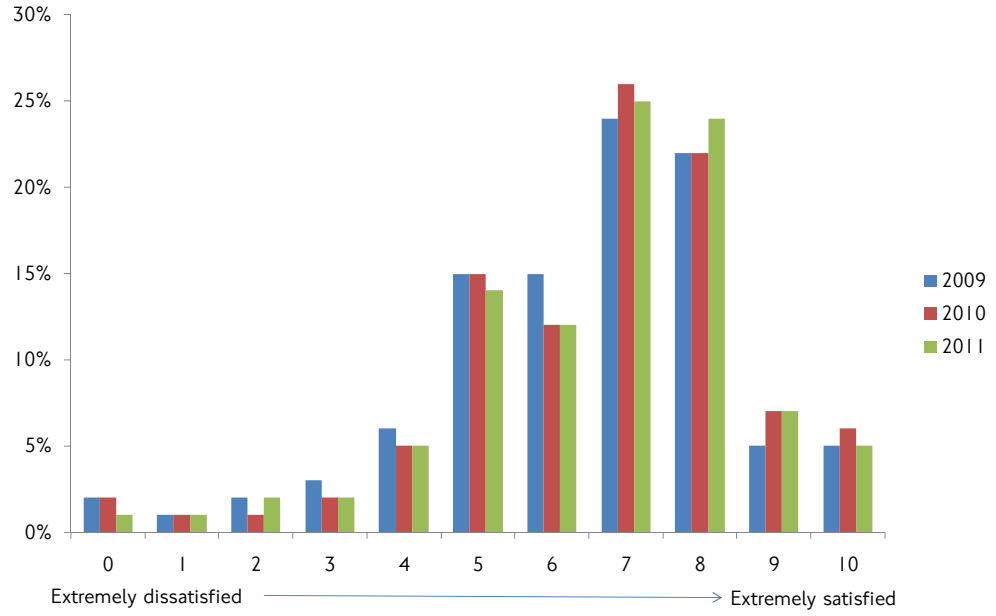
9.5 Perception of journey experience

The previous sections have considered the experience of journey-makers in London on a modal basis. Continual interaction and interchange between modes - including public and private transport, walking and cycling - is a characteristic of travel in London. This section recognises such interaction and interchange, exploring London residents' perceptions of their overall journey experience. It is important to note that modal customer satisfaction surveys are carried out with all travellers, including both London residents and non-residents, whereas the survey from which the following data are drawn is limited to London residents only.

Perception of overall journey experience

The mean score in 2011 for satisfaction with journey experience while travelling in London was 66 out of 100. This is the same as in 2010 and a slight increase on the score for 2009 of 64 out of 100. Figure 9.16 compares the distribution of scores across 2009, 2010 and 2011 on a scale of zero to 10.

Figure 9.16 London residents' satisfaction with journey experience when travelling in London, 2009-2011.



Source: TFL Perceptions of the Travel Environment Survey, 2009-2011.

As in the 2010 survey, London residents tended to describe the main modes of public transport as being both the 'most' and 'least' satisfactory aspects of travelling in London. Although respondents were asked to consider all elements of travelling around London, many tend to focus on public transport even if they are regular car users. Perceptions of public transport thus represent a main element in their overall satisfaction with transport.

Other than the main public transport modes, the aspects of travel in London that residents were most likely to say they were satisfied with were: the regularity and frequency of services (28 per cent), convenience (12 per cent), accessibility/wide range of services available (10 per cent), and speed (10 per cent). The sources of dissatisfaction were crowding, followed by delays and fares (both cited by 14 per cent of respondents) and congestion (mentioned by 13 per cent of respondents).

Whether journey experience has got better or worse over the past year

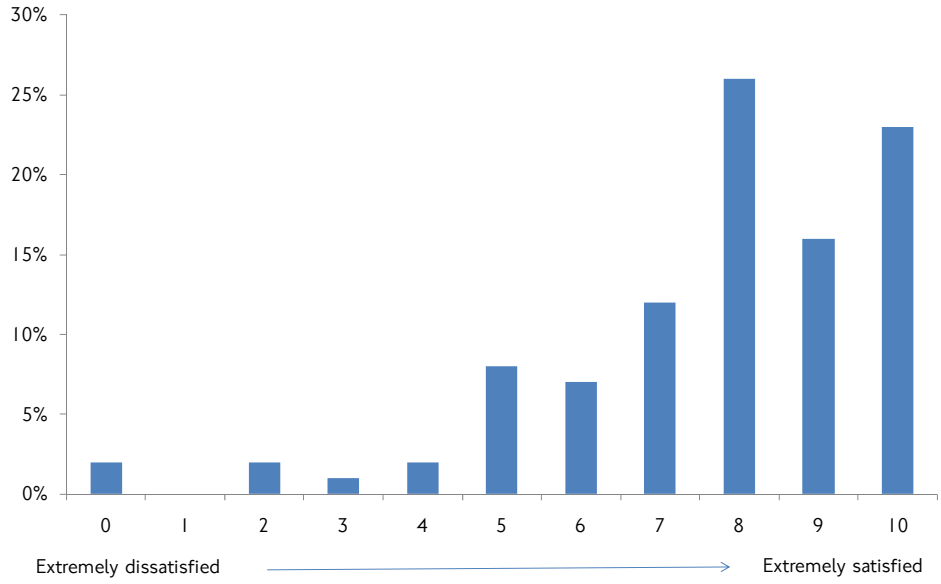
Twenty-four per cent of people claimed that their journey experience had got better in the past year, a decline of 5 percentage points on the proportion that reported improvements when surveyed in 2010. Also, 24 per cent of people claimed that their journey experience had worsened over the past year. Almost half of London residents reported that their journey experience had remained the same over the past year.

Those who considered that travelling in London had improved over the past year cited improvements in bus services (26 per cent), improvements in rail services (12 per cent), improvement in travel generally (12 per cent) and more investment in transport (10 per cent) as the leading reasons underlying their improved journey experience. By contrast, those saying that their experience of travel in London had worsened cited crowding (33 per cent), delays (24 per cent) and fares (19 per cent) as the primary causes.

Perception of most recent journey experience

Research suggests that customers' perception of journey experience is more influenced by their most negative experiences than by their typical experiences. To account for this, survey respondents were also asked how satisfied they were with their most recent journey experience. The mean score for satisfaction with the most recent journey experience was 77 out of 100. This represents a 5 percentage point improvement on 2010 levels, and is considered 'fairly good' as per TfL's norms for interpretation of customer satisfaction. This compares with an overall mean satisfaction score for travelling in London of 66 out of 100. Figure 9.17 illustrates that, when asked about their most recent journey, 79 per cent were 'satisfied' with their experience (scored 7 out of 10 or higher). Of this group, more than 50 per cent were 'very satisfied' with their most recent journey.

Figure 9.17 London Residents' satisfaction with most recent journey experience when travelling in London, 2011.

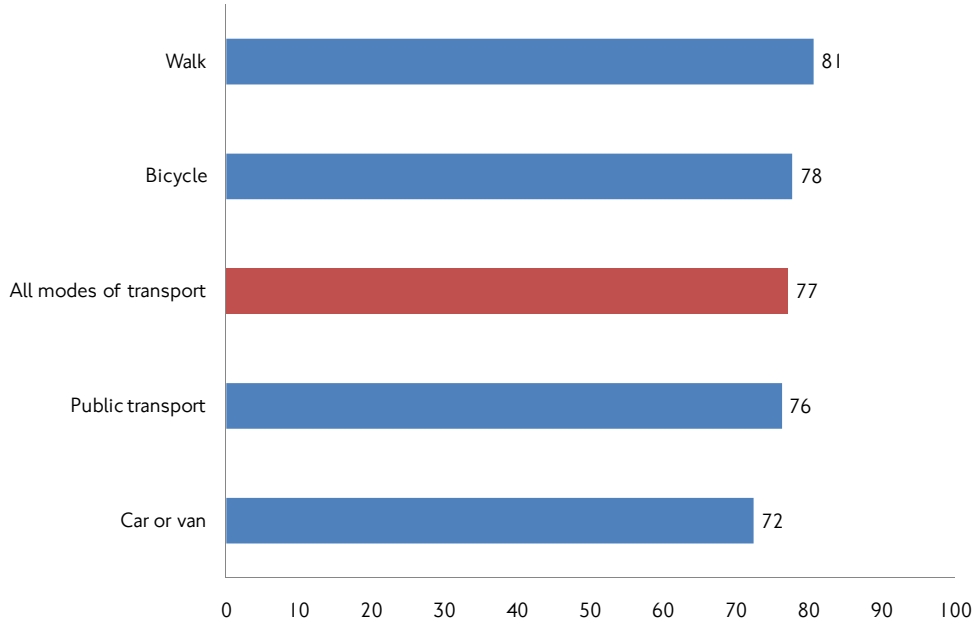


Source: TfL's Perceptions of the Travel Environment Survey, July 2011.

When asked which aspects of their most recent journey experience people were most satisfied with, the most commonly cited aspects were: punctuality (20 per cent), that the roads were clear (14 per cent) and the speed of the journey (12 per cent). For the aspects of their journey that people were least satisfied with, the most commonly cited aspects were: traffic congestion (10 per cent), overcrowding (8 per cent) and the presence of road works (6 per cent).

Figure 9.18 shows satisfaction with most recent journey experience by mode of transport used for that journey. Those travelling on foot were significantly more satisfied than those travelling by other modes, with a score of 81 out of 100 compared to an average of 77 out of 100. Those travelling by car or van were the least satisfied with their journey experience, scoring 72 out of 100.

Figure 9.18 London Residents' satisfaction with most recent journey experience when travelling in London, by mode of transport, 2011.



Source: TfL's Perceptions of the Travel Environment Survey, July 2011.

9.6 Perception of the urban realm

The transport network forms a large part of London's urban realm. Roads, streets and stations are all part of the urban landscape, and their design and maintenance affect the way in which London appears and is perceived. High quality public spaces can fuse communities together, act as the backdrop to physical activity and recreation, and provide a source of pride in an area. Such spaces are significant 'pull' factors, attracting people and businesses to invest where they may not otherwise. The Mayor has made improvements to London's streetscape a priority. Major initiatives are linked with the development of an effective way-finding system, and design and maintenance principles that can be rolled out across London.

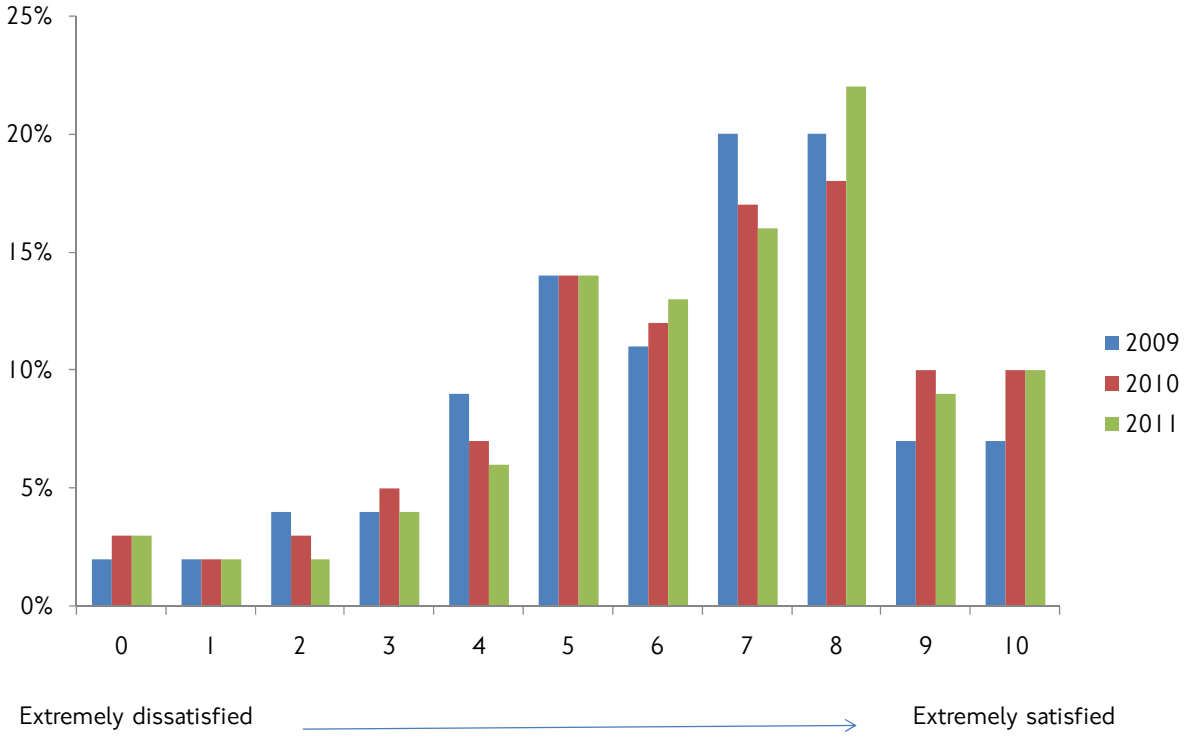
This section considers London residents' perceptions of streets, pavements and public spaces in their local area. Background information is given to describe the aspects of the urban realm residents are most satisfied with, as well as whether these have got better or worse in the past year, and why.

Perception of streets, pavements and public spaces

The mean score for satisfaction with the quality of streets, pavements and public spaces was 66 out of 100 in 2011, a slight improvement on the 2009 and 2010 scores of 63 and 64, respectively. Figure 9.19 shows the distribution of scores, on a scale of zero to 10 for 2009, 2010 and 2011.

The number of respondents very satisfied with London's streets, pavements and public spaces in 2011 is higher than in 2009 and at the same level as 2010. The proportion of respondents dissatisfied with London's streets, pavements and public spaces is down 5 and 4 percentage points on the 2009 and 2010 figures respectively.

Figure 9.19 London residents' perception of streets, pavements and public spaces in their local area.

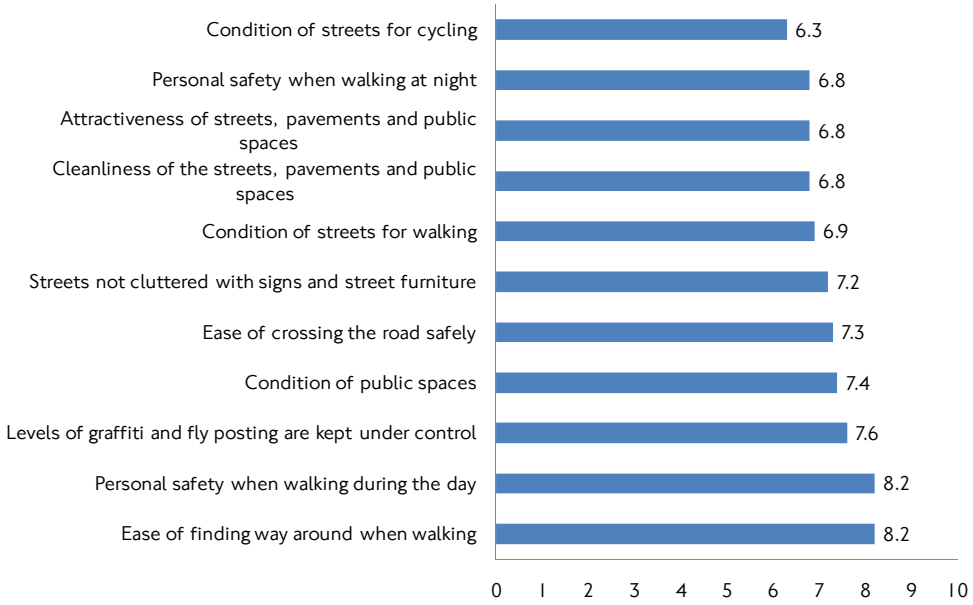


Source: TfL Perceptions of the Travel Environment Survey, 2009, 2010 and 2011.

Perception of aspects of the urban realm

As shown in Figure 9.20, the aspects of the urban realm that London residents were most satisfied with in their local area were the ease of way-finding when walking, and personal safety when walking during the day (both with a mean score of 8.2). Conversely, the aspect respondents were least satisfied with was the condition of streets for cycling (mean score 6.3). Personal safety at night, and the attractiveness and cleanliness of streets (all with a mean score of 6.8) were other aspects viewed less favourably by respondents in the survey.

Figure 9.20 London residents' mean satisfaction scores for aspects of the urban realm in the local area, 2011.



Source: TfL Perceptions of the Travel Environment Survey, 2011.

Understanding perceptions of the urban realm

In order to provide a greater understanding of perceptions of the urban realm, qualitative research has been carried out in 2011. In-depth telephone interviews were carried out with 30 London residents in July 2011 exploring satisfaction with streets, pavements and public spaces and how this could be improved. Respondents were selected to be inclusive of the range of people living in London.

In general, those who were satisfied with the streets in their area tended to live in quiet residential streets which were well maintained, clean and tidy. Beyond this, the most significant influences on high satisfaction scores were safe streets with greenery and trees. In comparison, those less satisfied with their local streets tended to describe their area as having become dirtier, with more litter, and less well-maintained by public bodies and people themselves. There were also frequent mentions of potholes in the road and road works causing concern, as well as some complaints about poor availability of local parking.

Cleanliness and maintenance were key drivers of satisfaction with pavements, as well as the pavement width. Litter, dog fouling and uneven pavements were the main causes of concern. Few respondents spontaneously mentioned the provision of bus stops, benches or crossings, but when asked said that they were broadly satisfied with the level of provision, although a minority felt there were not enough crossings on busy roads that were dangerous to cross.

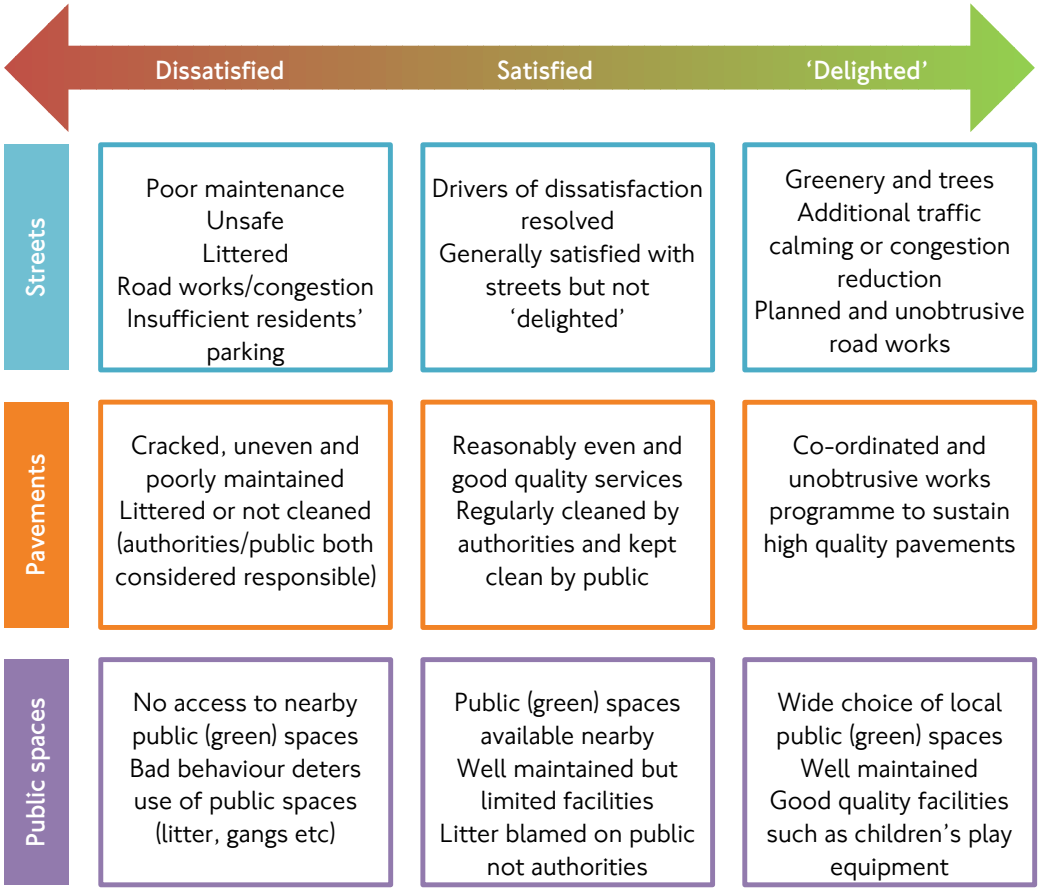
Respondents interpreted the term 'public spaces' in a variety of ways, but the most common definition was that it referred to parks, recreation grounds and green spaces. This is of interest to TfL, where 'public spaces' are typically considered to include parts of the urban realm such as squares, shopping precincts and so on.

Among those aware of public (green) spaces in their neighbourhoods, most were very positive about the provision, especially those who lived near large London parks

such as Hyde Park or Hampstead Heath. Respondents considered that these spaces were well maintained, spacious and inviting. For some, there was no provision of green spaces within their local area, and they were typically less satisfied as a result. There were also some complaints about the poor behaviour of other users, who allow bins to overflow or their dogs to foul, or who behave in a rowdy manner. However, many struggled to think of any particularly bad things about the public spaces they are aware of or use.

Figure 9.21 shows a summary of the drivers of satisfaction with the urban realm. It appears that certain aspects of the urban realm are seen as basic necessities for a good quality urban realm and therefore that ensuring these are in place is the best way to generate satisfaction. These factors can be summarised as: maintenance of roads and pavements; street cleaning and cleaning of dog mess; provision of parking, street lighting and other street furniture; avoidance of road works and congestion where possible; and accessible green spaces. Beyond this, to continue to improve satisfaction, local authorities will need to 'add value' to local areas through the provision of services such as street trees and green spaces with high quality facilities. Measures to improve the management of road works and smooth traffic flow should also improve satisfaction with the urban realm.

Figure 9.21 Drivers of satisfaction with the urban realm in London.



Source: TfL Perceptions of the Travel Environment Survey: Understanding the drivers of satisfaction with the urban realm, 2011.

10. Spotlight on: Impacts of the removal of the Western Extension to the central London Congestion Charging Zone

10.1 Introduction and content

The Western Extension to the central London Congestion Charging Zone (WEZ) was removed with effect from 24th December 2010, having been in place since February 2007. Removal of charging was expected to lead to an increase in traffic in the former charging zone. The anticipated impacts were set out in TfL's Report to the Mayor, October 2010, available at:

http://www.tfl.gov.uk/roadusers/congestioncharging/17094.aspx

This chapter reviews results from TfL's monitoring of conditions in the former WEZ zone, covering the period from January to July 2011, and including material on traffic volumes, traffic speeds and congestion, and air pollution. The impacts also partly reflect some changes to the operation of the central London scheme which took effect at the same time.

10.2 Summary of key findings

- The surveys carried out suggest that the removal of charging has gone smoothly, with no significant adverse road network or environmental impacts that are attributable to the removal of charging in the former zone.
- TfL's best estimate, based on a combination of continuous automatic and periodic manual traffic counts, is that traffic entering the former zone increased by around 8 per cent for vehicles with four or more wheels, as a direct result of the removal of charging. This compares to TfL's prior expectation of an attributable increase of between 8 and 15 per cent – and the observed change is therefore towards the lower end of this range.
- TfL expected an increase of between 6 and 12 per cent in the volume of traffic circulating in the former zone. TfL's best estimate, based on the available data, is that there was an attributable 7 per cent increase in the volume of circulating traffic. This is again towards the lower end of TfL's range of prior expectation.
- TfL expected a small net reduction, over the long term, of between 1 and 2 per cent in traffic entering the central London charging zone, which has remained in operation. This would reflect both the impact of removing the extension, but also changes to the operation of the scheme in the central zone. The measured net aggregate reduction to traffic measured over the first seven months of the year was 1 per cent. This is broadly in-line with TfL's expectations, although it should be seen in the context of ongoing background reductions to traffic volumes across London.
- Surveys of traffic speeds and congestion following removal of charging show a variable picture – in part reflecting seasonal factors associated with the timing of the surveys over the first six months of the year. Comparing equivalent surveys over the first six months of 2011 with those during the same period in 2010, congestion, measured as excess delay, was 3 per cent higher in 2011, whereas average traffic speeds were 1 per cent lower.

- There is no evidence of a significant differential impact on air quality in the former zone resulting from the removal of charging. Looking at air quality, in the first half of 2011, PM_{10} concentrations were notably higher in all parts of London, including the former extension zone, compared with the equivalent period in 2010. This reflected the recognised unusual weather patterns that prevailed across London in spring 2011. However, concentrations of NO_2 (Nitrogen Dioxide) were generally lower across London and in the former extension in the first half of 2011 compared to 2010, although the reasons for this London-wide trend are not yet fully understood. It is however clear that air quality trends in the former extension behaved in a very similar way to those elsewhere in London.

10.3 Scope of the monitoring

TfL has monitored and reported on the impacts of congestion charging in central London since its introduction in February 2003, primarily through a series of Annual Monitoring Reports. In particular, the key impacts of the introduction of charging in the Western Extension were described in TfL's Sixth Annual Monitoring Report, which was published in July 2008 and available here: http://www.tfl.gov.uk/assets/downloads/sixth-annual-impacts-monitoring-report-2008-07.pdf

The information in this chapter is derived from sources described in these earlier publications, which in summary are:

- **For traffic volumes (numbers of vehicles):** A combination of continuous automatic traffic counts (ATCs) on a sample of major entry points to the former WEZ zone, with data available on a daily basis, plus a full manual classified count across all entry points undertaken in spring 2011.
- **For road network performance (speeds and congestion):** An established 'moving car' speed survey which involves the use of moving vehicles that replicate the experience of general traffic – undertaken bi-monthly.
- **For air quality:** information from the publicly-available London Air Quality Network, which maintains a network of air quality monitors across Greater London.

Removal of charging provides an immediate incentive for people to change their travel behaviour. However, unlike when a charging scheme is introduced, it may be expected to take longer for all effects to feed through, and the full settled impacts of removal may take some time to become established.

Furthermore, it is clear from the material described in Section 3.11 of this report that the general background trend for traffic volumes in London has been downwards over recent years – irrespective of congestion charging – which will be an important factor in attributing observed change. Assessment of impacts is further complicated by seasonal and other temporary factors, such as road works and, for air quality, weather patterns.

10.4 Traffic entering the former WEZ charging zone

Characteristics of data sources

There are two estimates of the change to volumes of traffic entering the former WEZ zone following the removal of charging. These have different characteristics.

Automatic Traffic Counters (ATCs) cover a sample (21 sites) of the more major roads entering the zone. Collectively, these sites cover about 60 per cent of traffic entering the zone. They monitor traffic on these roads continuously, and therefore give a good long-term estimate of the aggregate change in traffic, which subsumes daily variation, for example caused by short-term road works or other once-off events. However, they only count vehicles with four or more wheels (ie not powered two wheeled vehicles or pedal cycles). They do not in this context allow good differentiation between the various types of vehicles and, although they cover a (representative) sample of major roads, they do not give a clear view of overall traffic change across the entire boundary of the former zone.

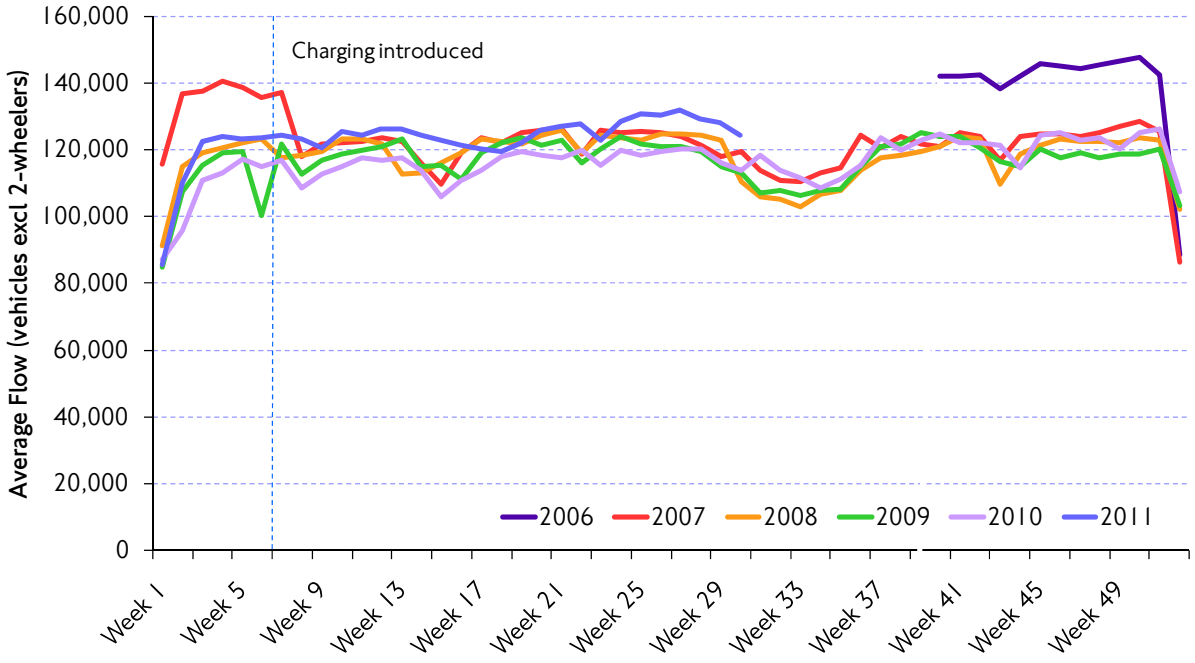
Manual classified counts, on the other hand, do cover all entry points and do allow differentiation by vehicle type, including two-wheeled vehicles. However, each site is counted on only one day, and the entire programme of counts is spread over a period of four weeks. This means that these counts are more susceptible than ATCs to short-term disruptions to the network (which can only partly be accounted for at the data validation stage). Although giving a comprehensive view of traffic over the entire boundary, this estimate is also subject to relatively wider statistical margins of error, which may be greater than plus or minus 5 per cent for any one count.

Data from automatic traffic counters

Data from this source suggest an average increase of 8 per cent in the volumes of traffic entering the former zone following the removal of charging, comparing average values in the first half of 2011 with those of the equivalent period in 2010.

Figure 10.1 shows the trend for traffic at the 21 monitored major roads (weekday charging hours only), covering the whole period from late 2006 (before WEZ was introduced) up to mid-2011 - when this particular element of the monitoring work was discontinued.

Figure 10.1 Weekly average daily flow across 21 major roads entering the Western Extension. Charging hours, 07:00-18:00, 2006 to 2011, vehicles with four or more wheels only.

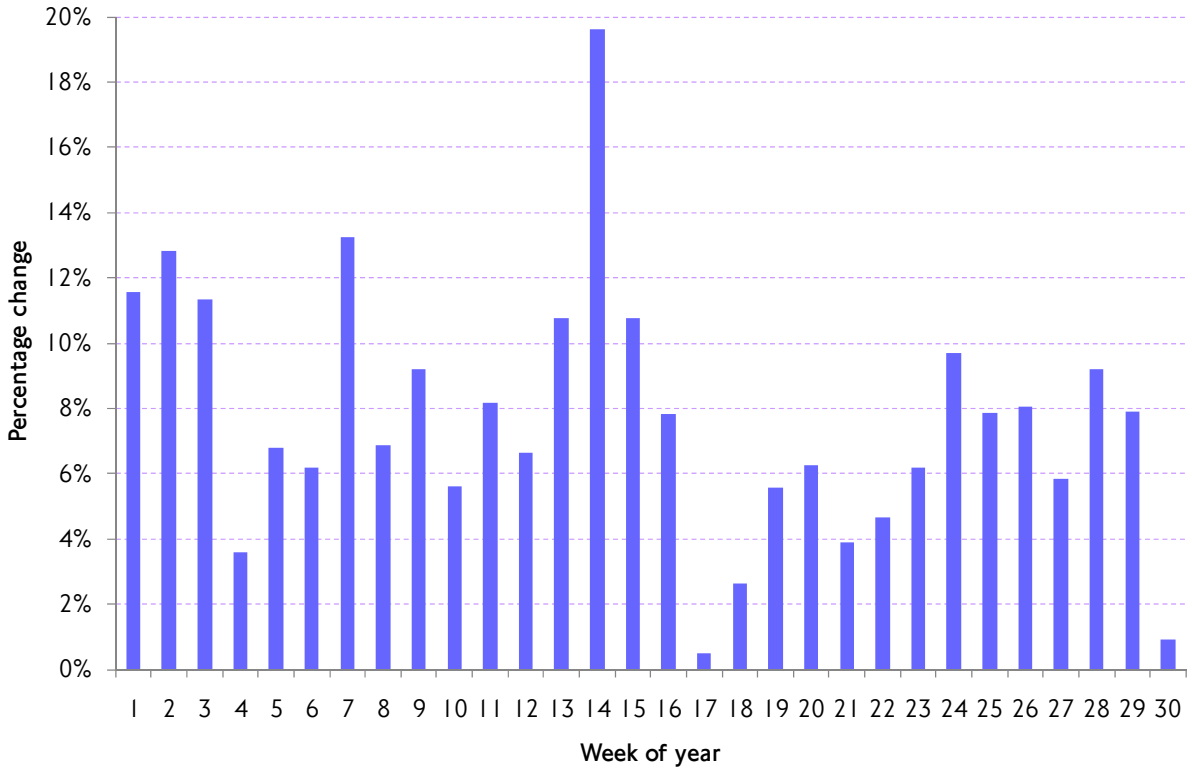


Source: TfL Strategy and Planning.

The figure shows the historical impact of the introduction of charging in early 2007, an average initial 13 per cent reduction, together with a progressive year-on-year trend of further small reductions to traffic, nominally independent of charging and reflecting wider London traffic trends - amounting to about 4 per cent in total between the second half of 2007 and 2010.

The comparison between the first half of 2011 and the corresponding period of 2010 (blue line versus purple line) shows a consistent increase – averaging 8 per cent in aggregate for vehicles with four or more wheels. Figure 10.2 and Table 10.1 show that, although the differences between equivalent weeks in 2010 and 2011 vary, reflecting factors such as the different timings of the Easter holiday and other Bank Holidays, the overall picture is relatively stable. In particular, all weeks show an increase in traffic over 2010.

Figure 10.2 Traffic change following removal of Western Extension – weekly change from automatic traffic counters. Weekday charging hours, first half of 2011 compared to equivalent period in 2010.



Source: TfL Strategy and Planning.

Table 10.1 Traffic change following removal of Western Extension – selected periods in first half of 2011 compared to equivalent period in 2010.

Week of year (2010/2011)	Percentage change (entering traffic with four or more wheels in charging hours)
1-4	+10%
5-8	+8%
9-12	+7%
13-16	+12%
17-20	+4%
21-24	+6%
25-28	+8%
29-30	+4%

TfL's assessment of automatic traffic count data

TfL's expectation was for an increase in entering traffic of between 8 and 15 per cent following the removal of charging. This estimate was for 2011 on a with and without charging basis. The observed data suggest an 8 per cent increase between the two years in traffic entering the former zone. This comparison is not precisely the same as TfL's expectation, however, as account needs to be taken of the continuing

background trend towards less traffic in London in order to get a true like-for-like comparison for 2011.

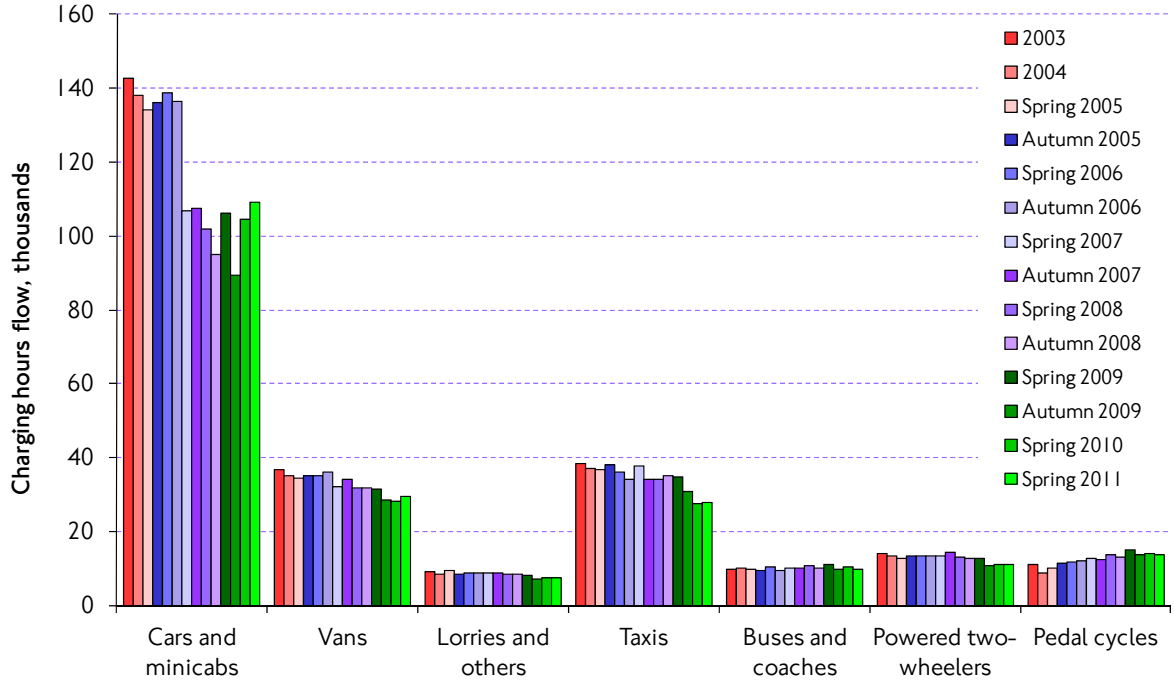
It is possible to infer the effect of background traffic reduction from wider traffic counts that have been undertaken in London in 2011. These show an approximate 2 per cent reduction in traffic (Greater London level to end October) for 2011 against 2010. All other things being equal, therefore, it is reasonable to infer a 1 per cent reduction for the first half of the year, which should be added to the observed ATC increase (which is net of this background change). This means that the ATC increase attributable to WEZ removal would be approximately 9 per cent, rather than the 8 per cent observed.

Estimates from manual classified traffic counts

Manual counts provide a second estimate of change to traffic entering the former WEZ. Interpretation of data from this source is complicated by an unusual number of road works affecting the spring 2011 counts. Some of these works are known to have affected the main routes into the zone, meaning that comparing the spring 2011 data to the 2010 equivalent dataset is not straightforward.

Figure 10.3 shows the results for the spring 2011 manual classified counts, set against similar previous counts that had been made in connection with the congestion charging monitoring programme. Overall, a 2 per cent net increase in traffic (all vehicles) is recorded between spring 2010 and spring 2011. The equivalent increase for vehicles with four or more wheels is 3 per cent. These estimates of aggregate change are significantly lower than from those obtained from ATCs as described above. They are also on a 2010 versus 2011 basis - which means that, in a similar way to the ATCs, an additional 1 per cent should be added to the observed changes to account for background traffic decline - giving 'attributable' changes of plus 3 per cent for all vehicles and plus 4 per cent for vehicles with four or more wheels. These indicated attributable changes are lower than those recorded by the automatic traffic counters (see above).

Figure 10.3 Volume of traffic entering the Western Extension. Manual classified traffic counts across all road entry points. Weekday charging hours.



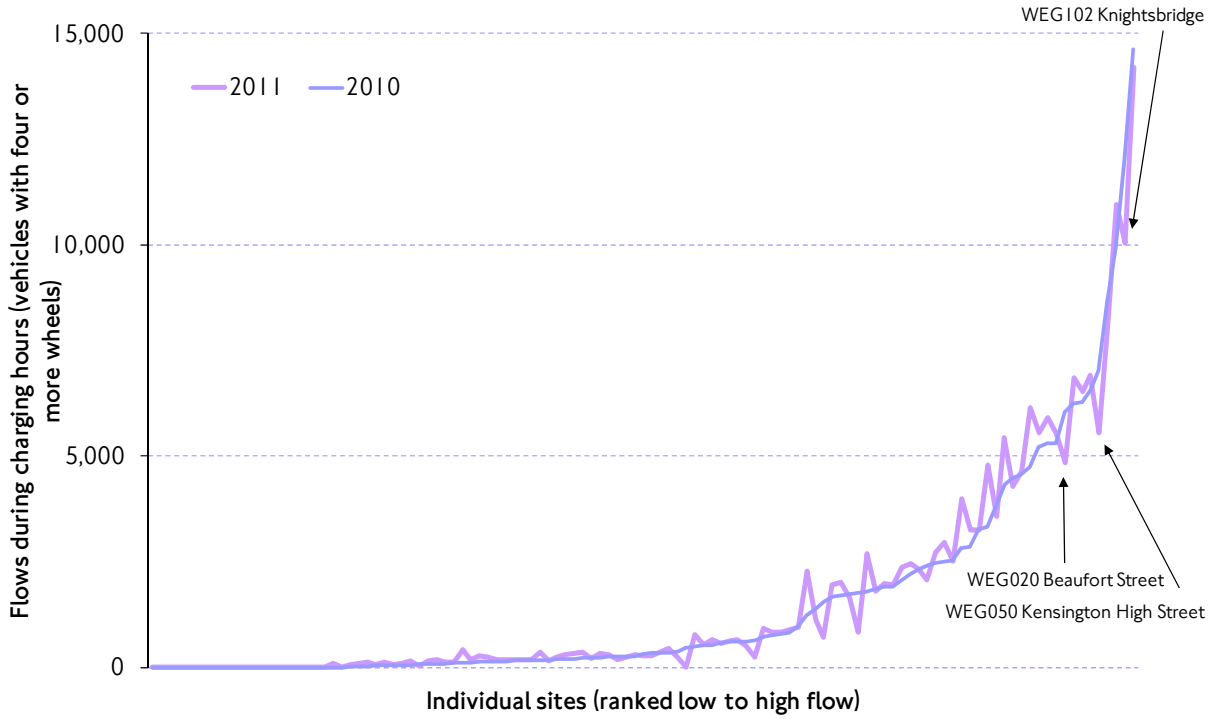
Source: TfL Strategy and Planning.

Because these counts were affected by an unusual number of road works in spring 2011, it is necessary to examine the data in more detail so that the impact of these disruptions on the volumes of traffic observed entering the former zone can be better understood.

Figure 10.4 compares the 2011 and 2010 manual count datasets at the level of the individual site (looking at vehicles with four or more wheels only, so as to be equivalent with the ATC data). Sites are ranked from left to right in ascending order of traffic volumes in the spring 2010 count (the smooth line). Values for the spring 2011 count are plotted at the same point on the horizontal axis, and are represented by the more jagged of the two lines. The difference between the two lines reflects two things.

- First, the overall disposition of the line for 2011 against that for 2010 – whether it is systematically higher or lower – indicates the degree to which there is a general change in traffic volumes common to most sites. In this case, a general trend towards higher traffic would be expected across most sites, reflecting the area-wide impact of the removal of the charge. In general this is seen in the figure, and is particularly evident towards the middle/higher-flow end of the ranking.
- Second, where there are large divergences between the counts for 2010 and 2011 at any one site, it is likely that one of the two counts is atypical – most likely due to road works or other temporary disruptions in one of the two years. Throughout most of the distribution this feature is not very evident – but at the extreme high-flow end (right hand side) there are three examples where this seems to occur – Beaufort Street, Kensington High Street and Knightsbridge (including the underpass at Hyde Park Corner).

Figure 10.4 Comparison of traffic entering the Western Extension in spring 2010 and spring 2011. Manual classified traffic counts across all road entry points. Weekday charging hours, vehicles with four or more wheels.



Source: TfL Strategy and Planning.

The six highest flow sites at the right-hand side of the Figure together account for 29 per cent of all traffic entering the WEZ (vehicles with four or more wheels) – and it is clear from the survey records that most of them were affected to at least some extent by road works in 2011. It is possible to infer the impact of these road works on the comparison by removing at least the worst affected of these sites from the comparison. Here, if all six highest-flow sites are excluded, the indicated change from these counts between spring 2010 and spring 2011 is 8 per cent – identical to the average estimate given by the ATCs. If the two sites that were 'most affected' by road works (Kensington High Street and Knightsbridge only) are excluded from the comparison, the indicated change is 5.4 per cent (vehicles with four or more wheels). Adding 1 per cent to this (as described above) to account for background decline gives a value of 6 per cent for 'attributable change' from the manual counts, which compares with the equivalent estimate of 9 per cent from the automatic traffic counters.

TfL's assessment of manual classified traffic count data

It is clear from comparative analysis and survey records that the spring 2011 manual classified counts were unusually affected by temporary disruptions, primarily road works unusually affecting the majority of the high-flow entry points to the zone. Taking account of the significant background decline to traffic volumes throughout Greater London during 2010 and 2011, and the exceptional number of road works that affected the spring 2011 counts, TfL's best estimate, from this source, of the traffic change (entering the former zone) attributable to the removal of WEZ is an increase of 6 per cent (charging hours, vehicles with four or more wheels). This compares to an equivalent attributable value of 9 per cent from the automatic traffic

counts – which is an average sustained relatively consistently over the first half of 2011.

Impact on volume of traffic circulating within the former WEZ zone

As well as the impact of WEZ removal on traffic entering the former zone, TfL also published expectations for the change in traffic circulating within the zone. This was for an increase, comparing 2011 with and without charging, of between 6 and 12 per cent in vehicles with four or more wheels. This quantity was not measured directly by the monitoring, but it can be inferred by using relationships established by the traffic modelling that underpinned TfL's forecasts of the removal of WEZ.

Circulating traffic is known to be somewhat less responsive to a change that applies most immediately at the boundary of the zone, because a proportion of traffic within the zone is wholly internal (ie does not cross the boundary). TfL's published expectations reflected this – being for ranges of increase of between 8 and 15 per cent for entering traffic, and 6 to 12 per cent for circulating traffic.

The difference between the two quantities is nominally 2 percentage points in terms of the ranges considered in TfL's expectation - this difference reducing in proportion with smaller changes. Applying these factors to the estimates of attributable change at the boundary from automatic and manual traffic counts (above) gives estimates of change in circulating traffic of 7 and 6 per cent (with rounding) respectively, compared to TfL's prior expectation of an increase of between 6 and 12 per cent (all values are for weekday charging hours, vehicles with four or more wheels).

TfL's overall assessment of the traffic volume impacts of WEZ removal on traffic in the former zone

As a direct result of the removal of charging in WEZ, TfL expected an attributable increase of between 8 and 15 per cent in the volume of traffic entering the former zone (charging hours, vehicles with four or more wheels).

- From automatic traffic counters covering a sample of major roads entering the zone, accounting for about 60 per cent of entering traffic, the observed attributable increase over the first six months of 2011 was 9 per cent.
- From manual classified counts in spring 2011, covering all road entry points to the zone, the equivalent observed attributable increase, taking account of road works on two major road entry points to the zone at the time of the survey, was 6 per cent.

Because the manual classified counts were affected by an unusually high number of road works in spring 2011, TfL gives greater weight to the estimate from automatic counters, and believes that they give the more reliable estimate of attributable traffic change. Given estimates of 9 and 6 per cent, respectively from automatic and manual counts, TfL's best estimate of the attributable change would be an 8 per cent increase in traffic entering the zone.

TfL also expected an attributable increase of between 6 and 12 per cent in the volume of traffic circulating within the former zone (charging hours, four or more wheels). This was not observed directly, but can be inferred from relationships between entering and circulating traffic derived from TfL's traffic modelling. Based on changes observed at the boundary, referring primarily to the ATC-based observations, TfL's best estimate is that there was a 7 per cent increase in the

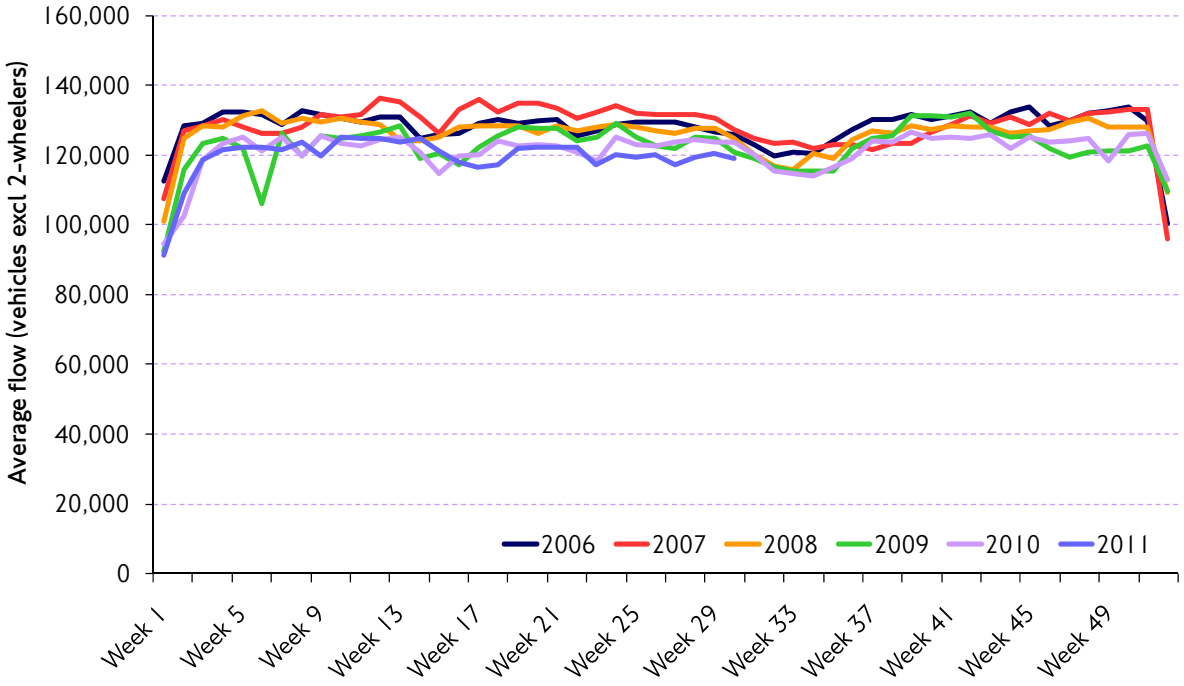
amount of traffic circulating within the zone as a direct result of the removal of charging. The equivalent estimate from manual counts is an increase of 6 per cent.

10.5 Traffic entering the central London charging zone

Removal of charging in the western extension, combined with other changes to the operation of the charging scheme, were expected by TfL to affect marginally volumes of traffic entering the original central London charging zone, which has remained in operation. The expectation was for a small net attributable reduction to charging hours traffic here, of between 1 and 2 per cent, reflecting among other things the removal of the 90 per cent discount for residents of the former extension zone for trips into the central zone.

TfL's monitoring, based on continuous automatic counts at a sample of major-road entry points to the central zone, suggests (Figure 10.5) that traffic entering the original central London charging zone in the first seven months of 2011 was 1 per cent lower, on average, than the equivalent period in 2010. However, this is an aggregate value and, as with traffic entering the western extension (Figure 10.1), background traffic decline will have been a factor affecting the attribution of the observed net change to the removal of charging, as will the introduction of 'CC Autopay', an automated payment system with a 10 per cent discount to the value of the charge.

Figure 10.5 Weekly average daily flow across 18 major roads entering the original central London congestion charging zone. Charging hours, 07:00-18:00, 2006 to 2011, vehicles with four or more wheels.



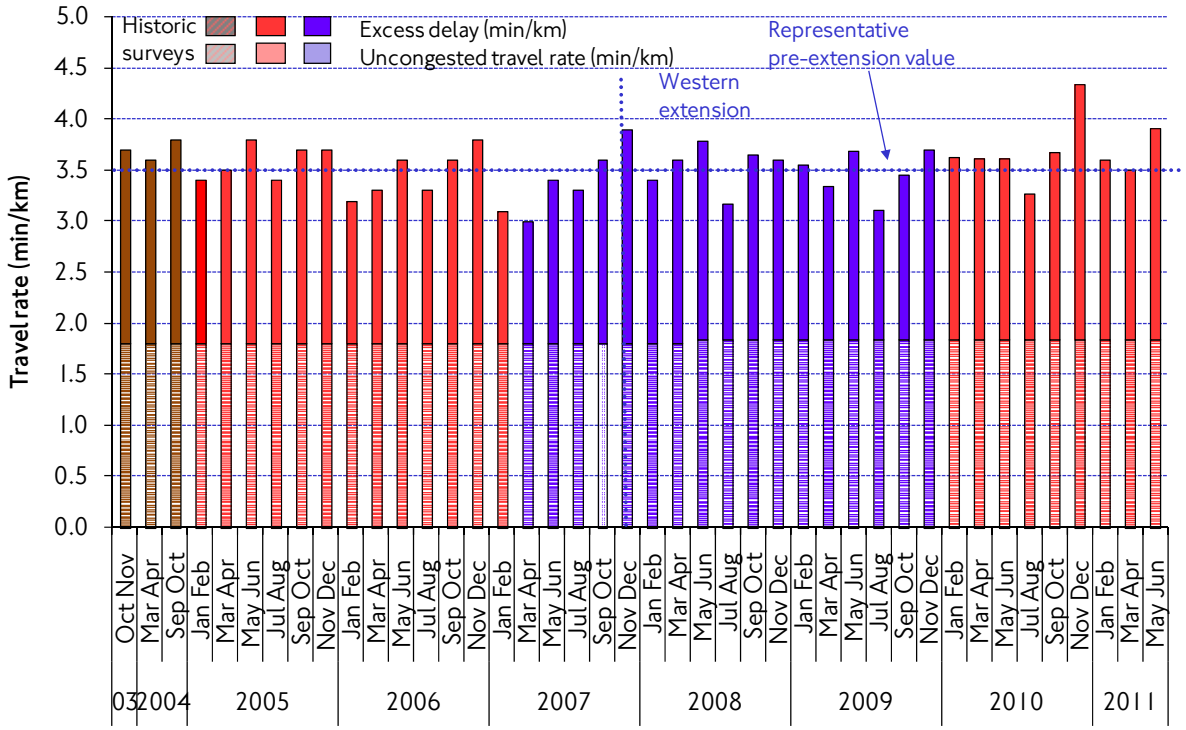
Source: TfL Strategy and Planning.

10.6 Traffic speeds and road network performance

The source of data on traffic speeds and congestion in the former Western Extension zone is from a traffic speed survey of the road network, from which excess delay (the quantity regarded as representing congestion) can be derived. This survey gives comprehensive and representative coverage of the network of high- and medium-flow roads, but with only a small statistical sample of observations.

Three such surveys were carried out in the first half of 2011, continuing the bi-monthly pattern of these surveys that had been used historically to monitor the impacts of charging. Results from these three surveys are shown in Figure 10.6, alongside comparable historic observations covering the entire period from before charging was in place. The individual bi-monthly surveys tend to indicate quite variable conditions and there are apparent seasonal effects. The most meaningful comparisons are therefore between equivalent bi-monthly surveys or averages of equivalent periods in different years.

Figure 10.6 Congestion (excess delay) in the former Western Extension Zone during weekday charging hours. Moving Car Observer surveys.



Source: TfL Strategy and Planning.

Table 10.2 summarises the key comparisons between the three available surveys in 2011 and the equivalent surveys in 2010. The measurements vary considerably between the surveys, partly reflecting seasonal variations in traffic conditions. While congestion in January/February and March/April 2011 was lower than the same bi-monthly period in 2010, during May/June it was higher. This leads to an average calculated delay for the first half of 2011 of 1.8 minutes per kilometre which is 3 per cent higher than the equivalent period in 2010.

Table 10.2 Congestion in the former Western Extension Zone during weekday charging hours. Summary of results from moving car observer surveys.

Period	Speed (kph)	% change from equivalent period in 2010	Excess delay (min/km)	% change from equivalent period in 2010
Jan/Feb 2011	16.7	1%	1.8	-1%
Mar/Apr 2011	17.2	3%	1.7	-7%
May/Jun 2011	15.4	-7%	2.1	+16%
Jan - Jun 2011	16.4	-1%	1.8	3%

Table 10.3 looks at the long term trends in speed and congestion during the period charging was in place in the Western Extension zone. The starting point for the comparisons is the average pre-charging speed and excess delay based on twelve surveys in 2005 and 2006 and as set out in TfL's Fifth Annual Monitoring Report. In the first year of charging the average delay was 10 per cent lower, reflecting a significant decline in congestion levels in the first few months of the extension being in operation followed by congestion levels similar to pre-extension conditions in the latter part of the year. In 2008 congestion tended to return to pre-charging levels, having increased 8 per cent compared to 2007. There was indication of slightly improved conditions in 2009 with excess delay falling by 4 per cent from the previous year. 2010 on the other hand saw congestion rising again with excess delay at 1.8 minutes per kilometre, 13 per cent higher than 2009.

Based on these measurements, it is reasonable to conclude that congestion levels in the former Western Extension area have been rather volatile and have followed a trend that is not directly linked to traffic levels in the area. This volatile trend coincides with a background decline in traffic entering the Western Extension as discussed previously, which suggests that other factors such as road works are at play.

Table 10.3 Congestion in the former Western Extension zone during weekday charging hours. Summary of results from moving car observer surveys.

Period	Average speed (kph)	% change from previous year	Excess delay (min/km)	% change from previous year
2005/06 pre-charging average	16.9		1.75	
2007 yearly average	17.9	3%	1.6	-10%
2008 yearly average	17.0	-5%	1.7	8%
2009 yearly average	17.3	2%	1.6	-4%
2010 yearly average	16.4	-6%	1.8	13%

Source: TfL Strategy and Planning.

10.7 Trends in air quality in the former western extension zone

Impacts on air quality are a potentially important secondary consequence of the changes to traffic volumes and speeds reported above, as more traffic circulating in the zone will lead to more emissions from vehicles - all other things being equal.

TfL expected that removal of charging could lead to an increase in emissions from road transport of between 3 and 4 per cent for particulate matter (PM_{10}), and between 2 and 3 per cent for Oxides of Nitrogen (NO_x) in the former charging zone. The observed changes to traffic volumes, described above, are at the lower end of TfL's range of prior expectation. This means that the out-turn emissions impacts would, all other things being equal, be also at the lower end of TfL's forecasts, although these have not yet been calculated directly as a full year of data and compatible (2011) emissions inventory are required.

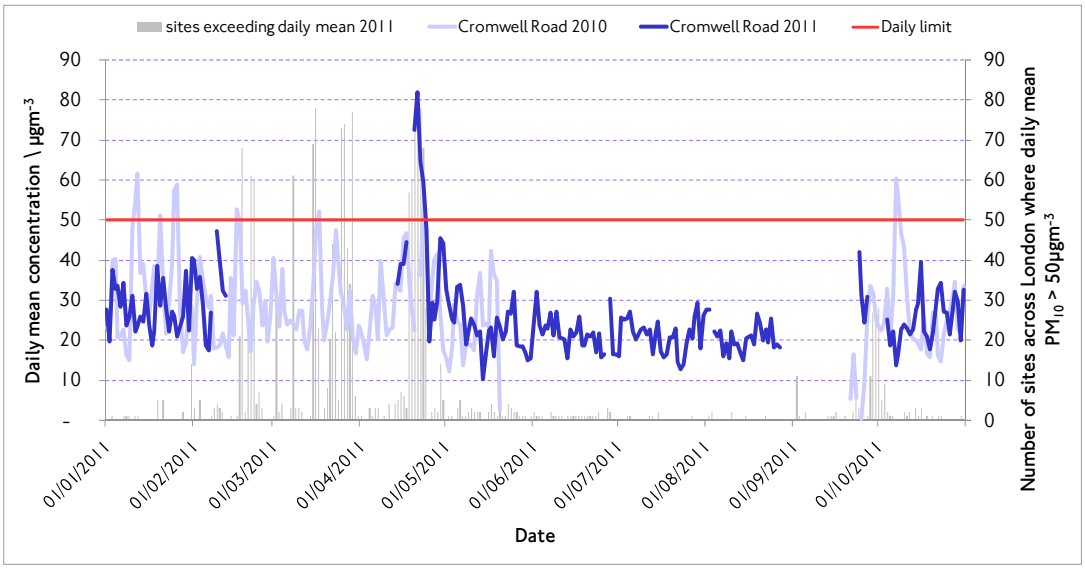
TfL assessed the impact of the expected changes to emissions on out-turn pollutant concentrations to be negligible, because of the importance of other sources of emissions (including those outside London) and the weather in determining actual out-turn air quality, alongside the implementation of other measures in the Mayor's Air Quality Strategy over the review period which are directed to helping London achieve air quality objectives.

In summary, in the first half of 2011, PM_{10} concentrations were notably higher in all parts of London and the South East, compared with the equivalent period in 2010, reflecting the recognised unusual weather patterns that prevailed in spring 2011. Concentrations of NO_2 (Nitrogen Dioxide) were generally lower across London and in the former extension in the first half of 2011 compared to 2010, although the reasons for this are not yet fully understood. It is however clear that NO_2 trends in the former extension behaved in a very similar way to those elsewhere in London, and there is no evidence of a detectable differential effect in the former zone that could be related to the removal of charging. There is not enough data to make a similar assertion for PM_{10}. However, it is expected that PM_{10} concentrations in WEZ would have followed a similar pattern to the rest of London and the South East..

Air quality trends – PM_{10}

Within the former extended charging zone there is one PM_{10} monitor - located at the intersection of Cromwell Road and Queensgate Mews. This monitor has had a poor data capture rate over the past two years due to equipment faults. Figure 10.7 shows the daily mean concentrations – as permitted by the available data - for 2010 and 2011. Superimposed on the figure is also the number of other, similar PM_{10} monitoring sites in other parts of London that exceeded the 50μgm^{-3} limit on the relevant day in 2011.

Figure 10.7 Particulate Matter (PM_{10}) concentrations at the Cromwell Road monitoring site – 2010 and 2011 compared.



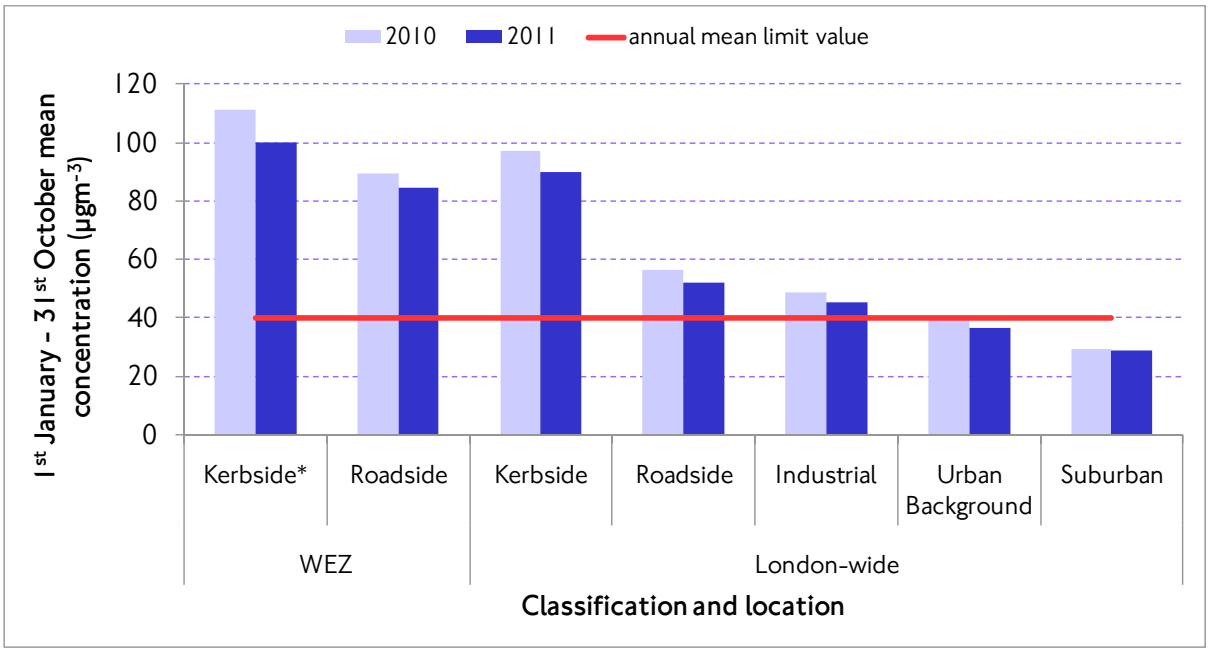
Source: London Air Quality Network

There were fewer exceedences of the daily mean limit value in January 2011 than in January 2010 but beyond this point gaps in the data make comparisons between the two years difficult. Unfortunately, it was this period when the weather particularly influenced PM_{10} concentrations across the whole of London.

Air quality trends – NO_x/NO_2

Four NO_2 monitoring sites are located in or around the former Western Extension – there are three roadside monitors within the zone and one kerbside monitor on Earls Court Road which sits on the boundary route. Figure 10.8 compares mean NO_2 concentrations over the period January to October 2011 at these sites, and also at other comparable groups of sites across London.

Figure 10.8 Nitrogen Dioxide (NO_2) concentrations – 2010 and 2011 (January to October 2011) compared.



Source: London Air Quality Network.
** This Kerbside site is located on the WEZ boundary route on Earls Court Road.*

Data from these four sites show that the average concentration of NO_2 within the former extension were lower over January to October 2011 compared with the same period in the previous year at both the kerbside and roadside locations. However, as is characteristic of their central London location, absolute concentrations are higher in the former zone compared to the London-wide average concentrations in both 2010 and 2011.

Comparing 2010 and 2011, the sites in the former extension show a similar trend to that across Greater London with concentrations in 2011 around 7 per cent lower than the same period in 2010 depending on monitoring site classification.

Air quality in the western extension in context of wider air quality trends in London

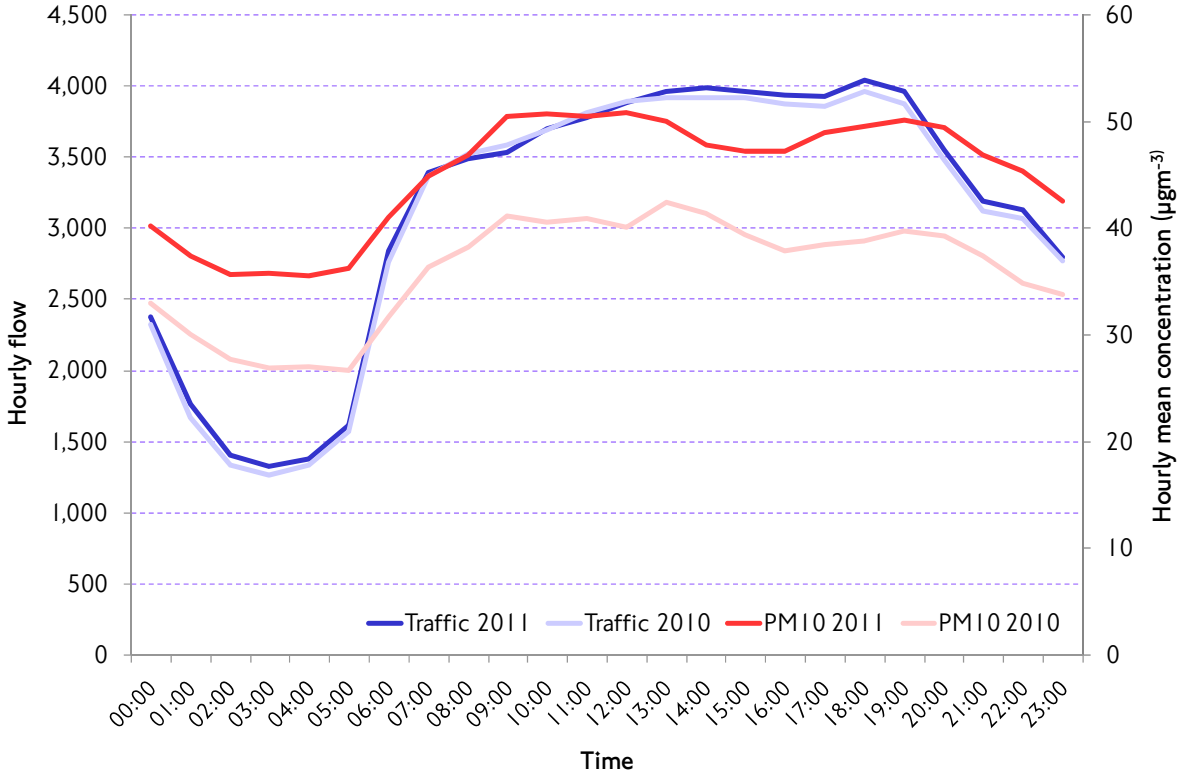
As seen previously, NO_2 concentrations within the former extension zone have followed a similar downward trend to the rest of London. However, there is not enough valid monitoring data available to draw a similar conclusion about PM_{10} directly. However, it is likely that trends within the former zone have followed those seen more widely across London during 2011.

The impact of the weather on PM_{10} concentrations in early 2011 can, however, be demonstrated with reference to the nearby kerbside monitoring site at Marylebone Road. Figure 10.9 shows a comparison between traffic change and pollution levels at this site. The site consistently records comparatively high absolute levels of PM_{10}. The figure shows that there was very little difference in average traffic flows at this site between the first three months of 2011 and the equivalent period in 2010. However, despite effectively stable traffic, PM_{10} concentrations were around 25 per cent higher in 2011 compared to 2010.

More generally, the first 4 months of 2011 saw sustained periods of elevated PM_{10} concentrations in London and the South-East of England. Poor dispersion of local

sources of pollution coupled with polluted airflow from the continent lead to 1,442 'exceedence days' across London between 1st January and 30th April - around three times as many days compared to the same period in 2010.

Figure 10.9 Traffic flows and PM_{10} concentrations at Marylebone Road air quality monitoring site – 2010 and 2011 compared.



Source: TfL Strategy and Planning.

10.8 Overall conclusions of the impact of the removal of the western extension

The indications available so far suggest that the removal of charging in the former western extension has gone smoothly, with no significant adverse road network or environmental impacts that are attributable to the removal of charging. Interpretation of the traffic volume impacts have been complicated by the large number of road works that affected the former zone in the first half of 2011. However, the return of traffic has been towards the lower end of TfL's range of prior expectation. This probably reflects a combination of background traffic decline and changes to road network capacity. However, it is also likely that the full impacts of removal have yet to develop fully. This lower than expected traffic volume change has corresponded to relatively small decreases to traffic speeds and increases to congestion – these being smaller than is commensurate with the traffic change and perhaps reflecting an element of improved network management. Air quality trends in the former zone have closely followed those seen elsewhere in London, and there is no evidence of a differential impact inside the former zone associated with the removal of charging.

11. Spotlight on: the Year of Cycling

11.1 Introduction and content

This chapter presents a summary of cycle travel patterns in 2010 - the Mayor's Year of Cycling, and details progress against the Mayor's target of a 400 per cent increase (from 2001) in the number of cycle trips and a 5 per cent mode share for cycling by 2026. It describes the characteristics of London cyclists and the patterns of travel by bicycle in London in 2010/11.

The chapter also provides an insight into the longer term impacts of Barclays Cycle Hire and Barclays Cycle Superhighways, both launched in summer 2010 and first described in Travel in London report 3. Since that publication, Barclays Cycle Hire has been launched for casual users, the number of bicycles has been increased and new docking stations have opened, including major sites at Waterloo and Southwark. Barclays Cycle Superhighways routes 3 and 7 have been joined by two new routes: route 2 from Bow to Aldgate and route 8 from Wandsworth to Westminster. This chapter describes the impact of the two schemes on cycle travel behaviour and looks at the characteristics of scheme users.

11.2 Summary of cycle trends in London

There are numerous measures of cycle activity in London; all show substantial growth in cycle travel in London since 2001. 2010 was the Mayor's Year of Cycling and saw the launch of Barclays Cycle Hire, the first two Barclays Cycle Superhighways and 13 'Biking Boroughs', alongside a wide range of interventions to improve conditions for cyclists and to raise the profile of cycling in London. It will take some time before the full scale of change resulting from this activity can be assessed; nevertheless, by the end of 2010, there were 30,000 more cycle journeys made every day across the city, and around 90,000 new London households bought a bike for the first time in 2010.

In 2010:

- Around 0.54 million journey stages were made by bicycle in Greater London on an average day, an increase of 70 per cent compared to 2001 and 6 per cent more in the most recent year (2009 to 2010). If growth is sustained at this rate, TfL will be on track to meet the Mayor's target for a 5 per cent cycle mode share and 400 per cent increase in cycle journeys by 2026.
- Average flows on the TLRN were 150 per cent higher in 2010/11 than in 2000/01, and grew by 15 per cent between 2009/10 and 2010/11.
- 28,100 people entered central London by bicycle in the weekday morning peak, an increase of 132 per cent since 2001 and 4 per cent in the most recent year (2009 to 2010).
- 35 per cent of London households owned a bicycle, an increase of eight per cent in comparison with the previous year (from 33 per cent in 2009/10 to 35 per cent in 2010/11).
- London residents made an average of 0.06 cycle journeys per person per day. Between 2005/06 (the first year of LTDS) to 2010/11, cycle trip rates grew by 46 per cent, whilst the amount of travel by all modes remained broadly the same.

- 5.1 per cent of Londoners in employment cycled to work. Between 2008/09 and 2010/11, the proportion of Londoners in employment who cycled to work increased by 36 per cent - from 3.8 per cent to 5.1 per cent.

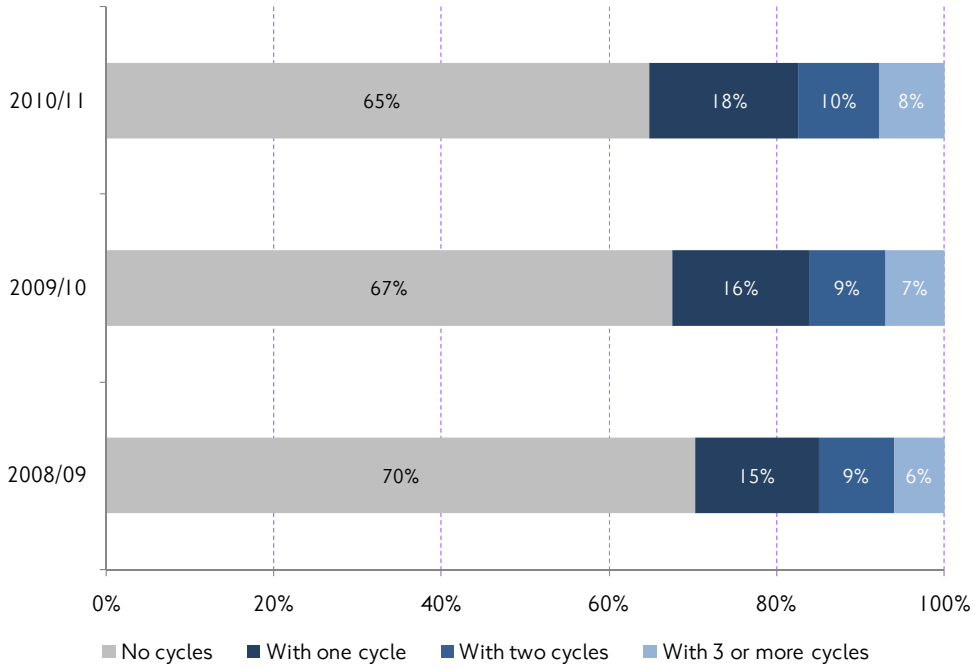
In 2011, early findings are:

- More than 130,000 people had become a member of Barclays Cycle Hire and around 25,000 journeys were made by hire bicycle every weekday, the vast majority of which would not previously have been cycled.
- Nearly half the Barclays Cycle Hire members were new to cycling in London, and had been encouraged to take it up by the introduction of the scheme. 13 per cent of members had been inspired to increase the amount they cycle on their own bike by using the scheme.
- Between September 2010 and 2011, during the peak periods, the number of cyclists per kilometre increased by an average of 32 per cent on Barclays Cycle Superhighway 2 (from Bow to Aldgate) and by an average of 10 per cent on Barclays Cycle Superhighway 8 (from Wandsworth to Westminster).
- Around one in five journeys cycled on the new Barclays Cycle Superhighway routes would not previously have been cycled and would have been made by another mode or not at all.
- Cyclists using the Barclays Cycle Superhighways typically felt that their journey experience was better and safer as a result of the introduction of the routes.
- Both Barclays Cycle Hire and Superhighways had encouraged many users to cycle more around London and to buy a bicycle or cycling equipment.

11.3 Cycle ownership by London households

There has been a substantial increase of nearly a fifth since 2008/09 in the proportion of London households owning at least one bicycle, as shown in Figure 11.1. In 2010/11, there were 2.2 million bicycles in London, equivalent to 0.66 bicycles per household, and 35 per cent of London households had access to a bicycle.

Figure 11.1 Household bicycle ownership, London residents, 2008/09 – 2010/11.



Source: London Travel Demand Survey 2008/09 to 2010/11.

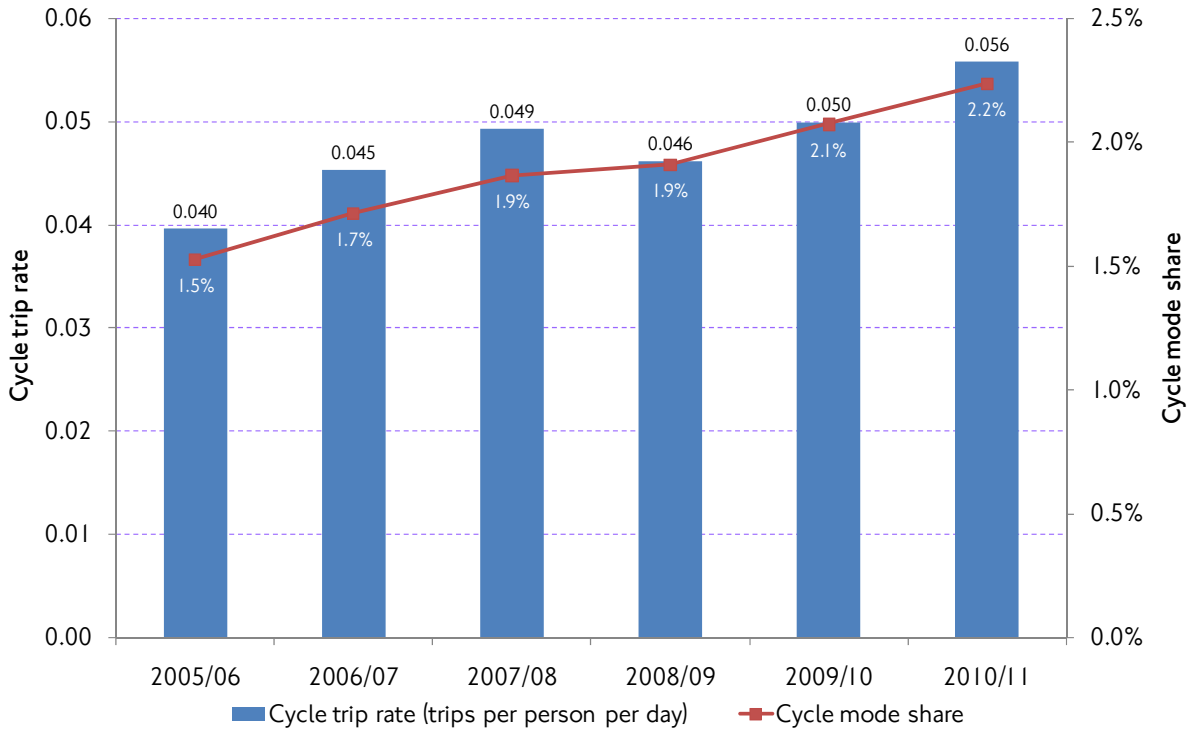
11.4 Trends in cycle travel by London residents

Trends in cycle travel and mode share by London residents

Between 2005/06 (the first year of LTDS) and 2010/11, the number of cycle journeys per person made by London residents grew by 45 per cent, whilst residents' travel in London by all modes remained broadly the same (a 1 per cent reduction in trips per person by all modes by London residents across the same period, see Table 2.5). This is equivalent to an average rate of growth for cycling of around seven per cent per year. Between 2009/10 and 2010/11, the number of cycle journeys made by London residents grew at the rather faster rate of 13 per cent.

Figure 11.2 shows the average number of cycle trips made per London resident per day and the corresponding cycle mode share. This shows that cycle trip rates have increased from 0.04 to 0.06 trips per person per day over the period 2005/06 to 2010/11. Over the same period, the cycle mode share for journeys made by London residents has increased by 46 per cent, from 1.5 per cent to 2.2 per cent. During this time and for comparison, the public transport mode share has increased by 15 per cent (from 26 to 30 per cent), and the share of travel by car and motorcycle has dropped by 9 per cent (from 42 to 38 per cent).

Figure 11.2 Cycle trip rates and mode share per average day, London residents, 2005/06 – 2010/11.

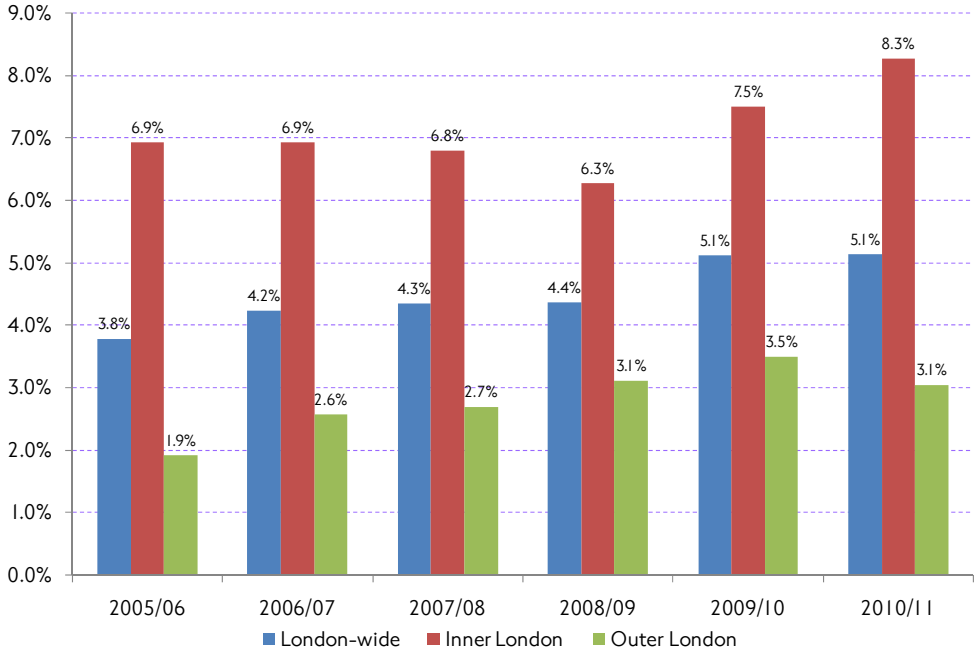


Source: London Travel Demand Survey 2005/06 to 2010/11.

Trends in cycle mode share for travel to work by London residents

In 2010/11, 5.1 per cent of London residents who travelled to work usually did so by bike, compared to 3.8 per cent in 2005/06, an increase of 36 per cent (Figure 11.3). The proportion of residents cycling to work increased by about a fifth over the same period for residents of Inner London (from 6.9 to 8.3 per cent) and increased by over 50 per cent amongst residents of Outer London (from 1.9 to 3.1 per cent).

Figure 11.3 Cycle mode share for travel to work, London residents, 2005/06 – 2010/11.



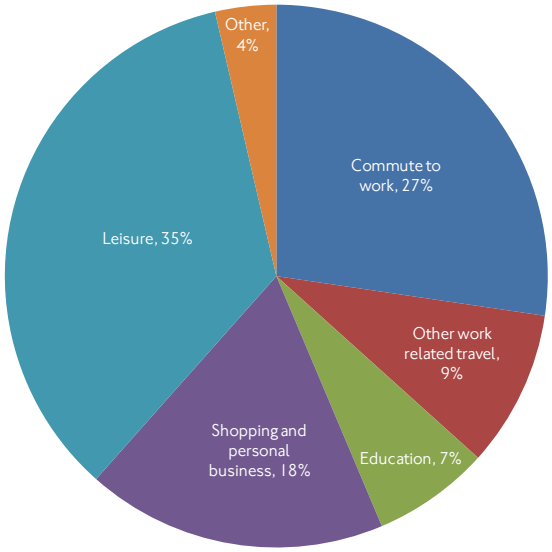
Source: London Travel Demand Survey 2005/06 to 2010/11.

11.5 Characteristics of cycle travel by London residents

Cycle journeys by purpose and time of day

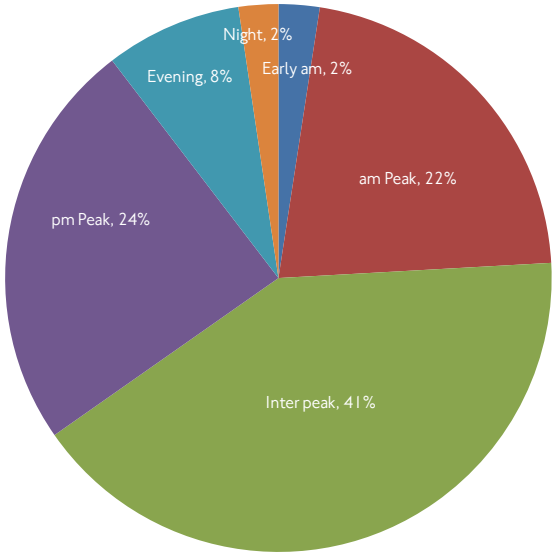
London residents make 472,000 cycle journeys in London on an average day (across a seven-day week). There is more cycle travel on weekdays than weekends, with 522,000 cycle journeys made by London residents on an average weekday and 349,000 on an average weekend day. This reflects the fact that cycle journeys are more likely to be made for work purposes than journeys by other modes – 37 per cent of cycle journeys are made to commute or travel on business, compared to just 23 per cent of journeys by all modes. Similarly, 46 per cent of cycle journeys are made during the morning or evening peak periods, rising to 52 per cent of cycle journey stages made on weekdays. Nevertheless, just over half the cycle journeys made by London residents were for shopping and leisure purposes (53 per cent). Figure 11.4 shows cycle journeys by purpose and Figure 11.5 by time of day.

Figure 11.4 Cycle journeys by purpose, London residents, 2010/11.



Source: London Travel Demand Survey 2010/11.

Figure 11.5 Cycle journeys by time of day, London residents, 2010/11.



Source: London Travel Demand Survey 2010/11.

Cycle journeys by origin, destination and distance

The average cycle journey is 3.3km in length. Figure 11.6 shows the origin and destination of cycle journey stages made by London residents overall, on weekdays and at weekends:

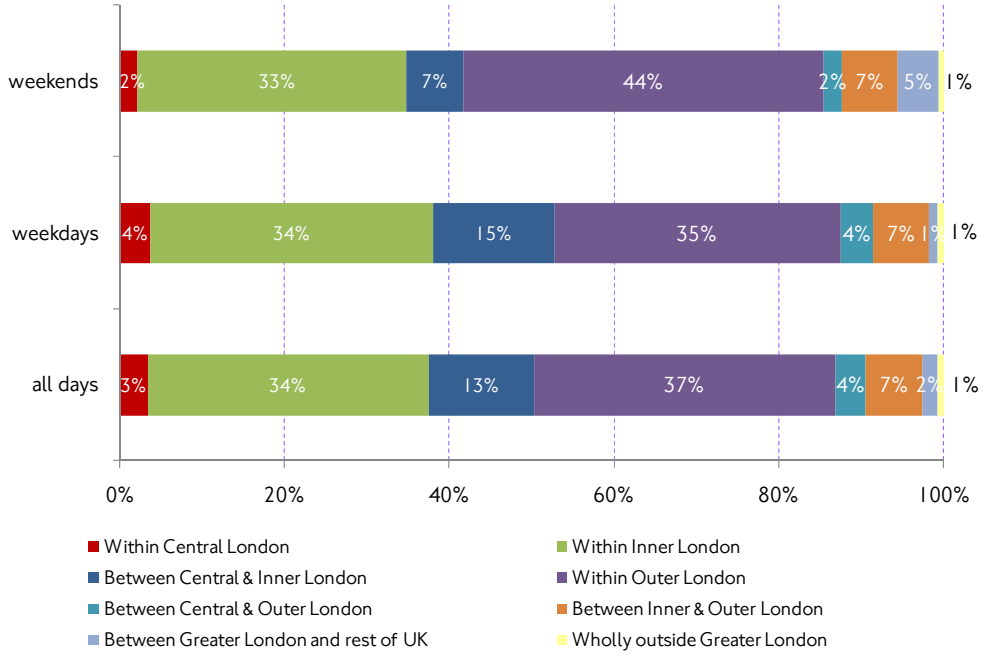
- Just 3 per cent of cycle journeys made by London residents were wholly contained in central London (had both an origin and destination in the area) but 20 per cent of cycle journeys had an origin and/or destination in central London.
- 54 per cent of cycle journeys had an origin and/or destination in Inner London and a further 4 per cent involved travel through Inner London.

- 47 per cent of cycle journeys had an origin and/or destination in Outer London.
- 3 per cent of cycle journeys by London residents involved travel between London and beyond or were entirely outside Greater London.
- At the weekend, there is less travel from Inner and Outer London to central London, and more travel within Outer London.

Over the year, an estimated 2 per cent of all cycle journey stages in Greater London were made by hire bicycle. In the six months after the launch of Barclays Cycle Hire (October 2010 to March 2011), 52 per cent of cycle journeys made by London residents entirely within central London were made by hire bicycle.

The longest journeys were those that involved travel between different areas, and in particular the 4 per cent of journeys made between Outer and central London, which averaged 11.6km in length. Journeys were marginally longer on average on weekdays than at weekends (3.4km compared to 3.1km), excepting cycle travel between Greater London and the rest of the UK; this is likely to be skewed by a relatively small number of cycle enthusiasts undertaking long distance leisure rides.

Figure 11.6 Cycle journeys by origin and destination, London residents, 2010/11.



Source: London Travel Demand Survey 2010/11.

11.6 Characteristics of London cyclists

Cycling behaviour by age and sex

Men are more likely to say that they 'ever cycle' – 30 per cent had cycled in the past year, compared to just 16 per cent of women. Women who cycle also do so less frequently: 64 per cent of cyclists are men but they make 72 per cent of cycle journeys.

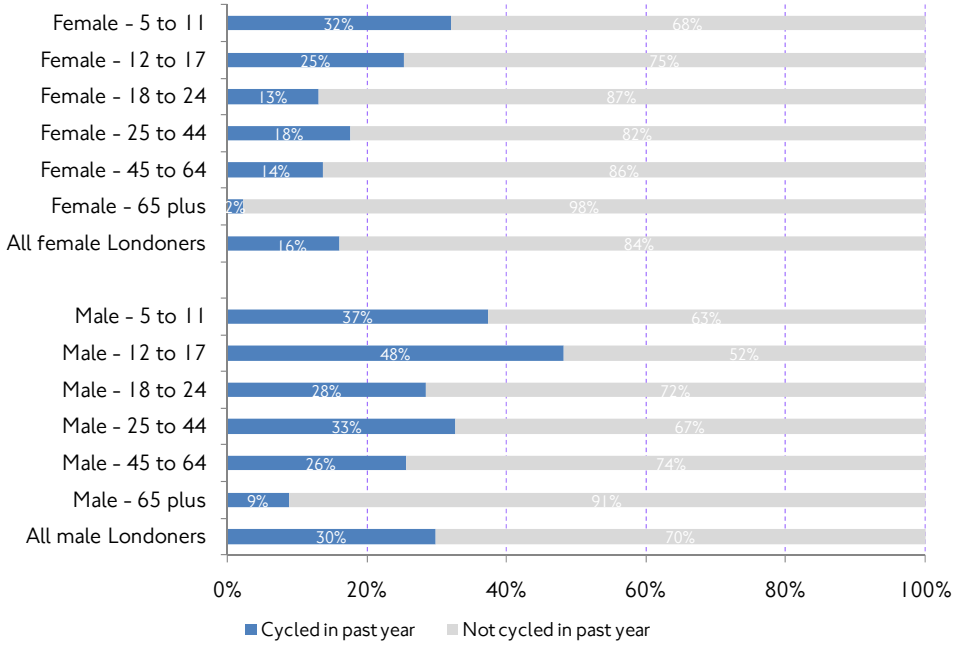
Children and young people are the age group most likely to have cycled in the past year – 36 per cent of under 18s had cycled in the past year, compared to just 20 per cent of adults. Boys were nearly 50 per cent more likely to cycle than girls: 43 per cent of boys under 18 had cycled in the past year, compared to 29 per cent of girls.

Amongst adults, men were twice as likely to have cycled in the past year as women (27 per cent compared to 14 per cent).

Men aged 25 to 44 are disproportionately likely to cycle; whilst this group makes up less than a fifth of the population (19 per cent), they comprise more than a quarter of cyclists (27 per cent) and account for a third of all cycle journeys.

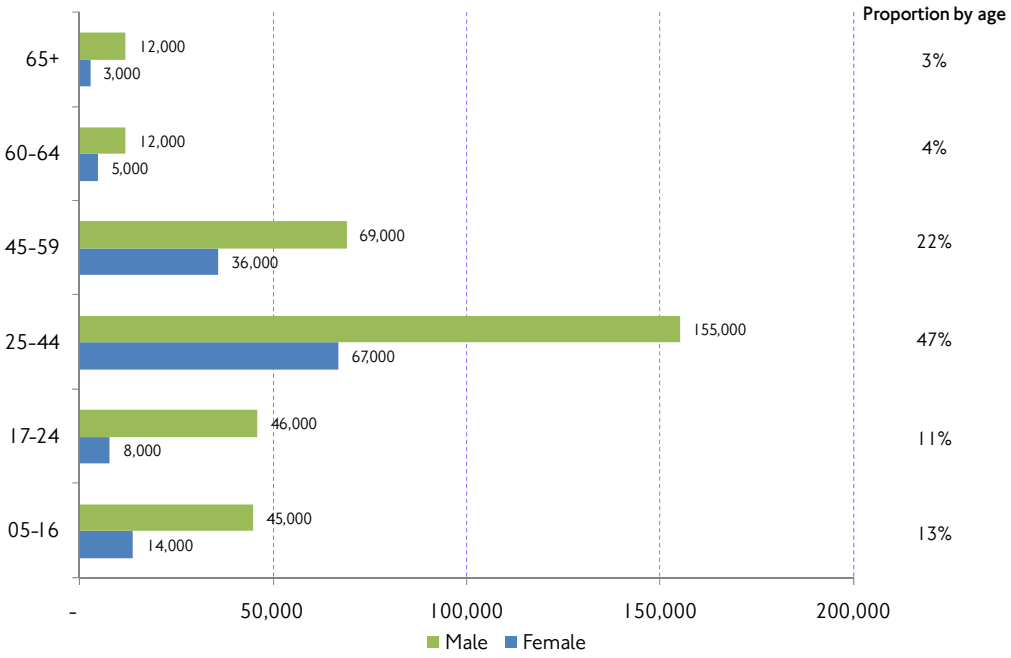
Figure 11.7 shows the proportion of people who have cycled in the past year by age and sex whilst Figure 11.8 shows the number and proportion of cycle journeys by the age and sex of the trip-maker.

Figure 11.7 Whether cycled in past year, by age and sex, London residents, 2010/11.



Source: London Travel Demand Survey 2010/11.

Figure 11.8 Cycle journeys by age and sex, London residents, 2010/11.

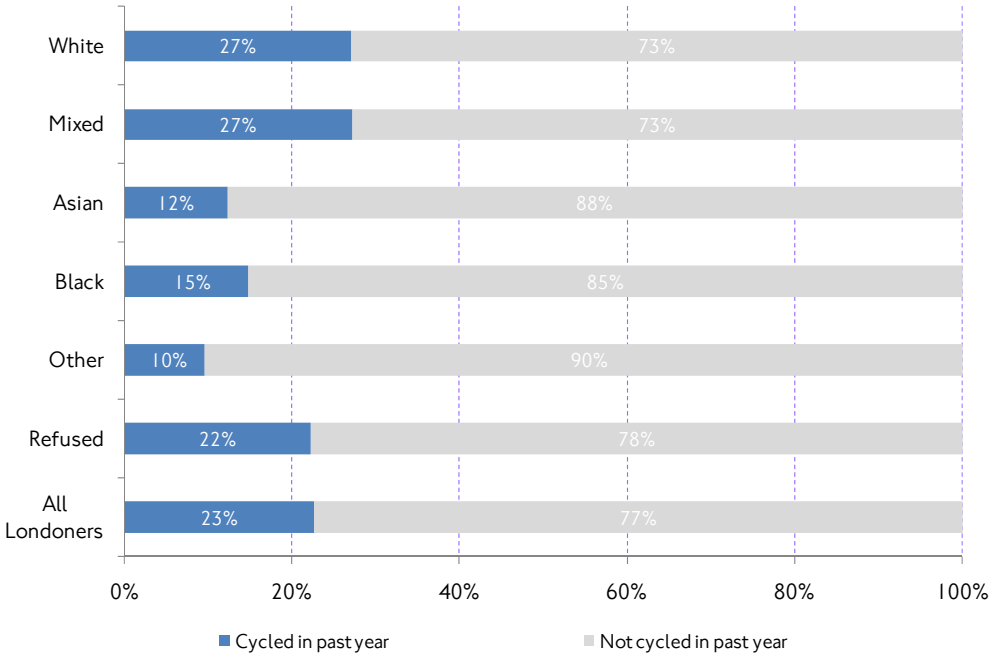


Source: London Travel Demand Survey 2010/11.

Cycling behaviour by ethnicity

London residents with a white or mixed ethnic background were more likely to have cycled in the past year than those from black, Asian or other ethnic minority backgrounds. Just under two thirds of London residents are white (65 per cent), compared to 78 per cent of cyclists. Figure 11.9 shows the proportion of London residents who 'ever cycle' by ethnic group.

Figure 11.9 Whether cycled in past year, by ethnicity, London residents, 2010/11.



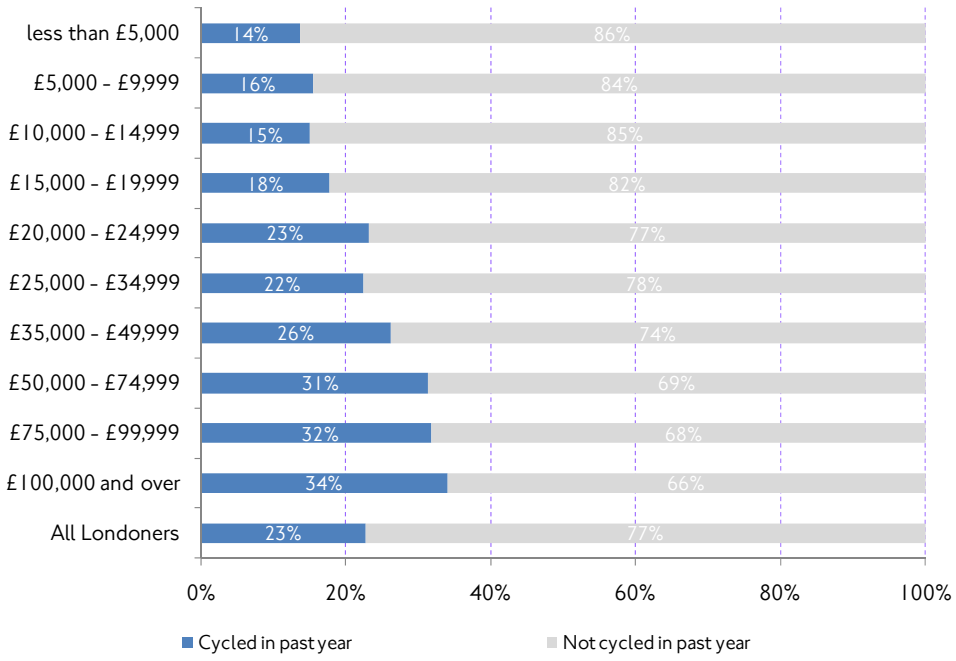
Source: London Travel Demand Survey 2010/11.

Cycling behaviour by household income

London residents are progressively more likely to cycle as household income rises (Figure 11.10). Just 16 per cent of those with a household income less than £20,000 had cycled in the past year compared to 24 per cent of those with a household income of £20,000 to £49,999 and 32 per cent of those with a household income of £50,000 or more.

One in ten cyclists lives in a household with an income greater than £100,000 (11 per cent), compared to just seven per cent of Londoners. Conversely, 41 per cent of London residents have a household income of less than £20,000, but this group makes up just 28 per cent of those who cycle.

Figure 11.10 Whether cycled in past year, by household income, London residents, 2010/11.



Source: London Travel Demand Survey 2010/11.

11.7 Barclays Cycle Hire

Background to Barclays Cycle Hire

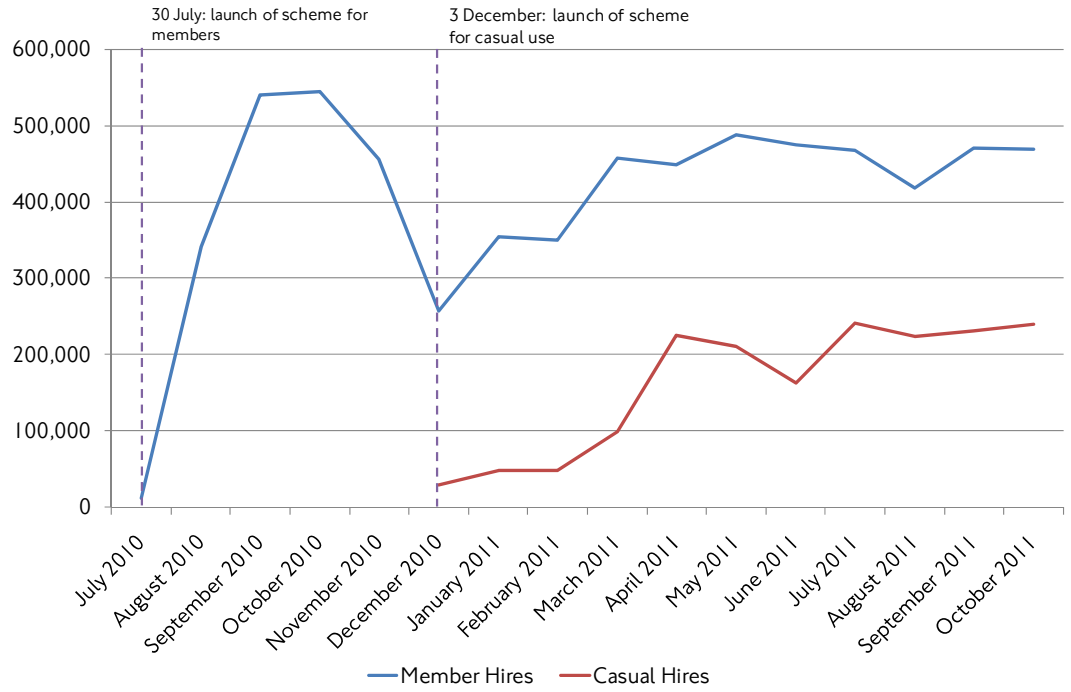
Barclays Cycle Hire was developed to provide an alternative transport solution for short trips in central London and to contribute to the Mayor's goal of encouraging more people to cycle in the city.

Barclays Cycle Hire was launched for members on 30 July 2010 with around 5,000 bicycles and 315 docking stations, spread across 45 square kilometres stretching west to east from Kensington and Chelsea to Tower Hamlets and north to south from Islington to Lambeth. Travel in London report 3, published in December 2010, provided an early insight into the impacts of the scheme. The report described results of a survey carried out with members of the scheme in autumn 2010, exploring their experiences of the scheme and its impact on their attitudes and travel behaviour. By then, the scheme had more than 100,000 members and more than 1.7 million journeys had been made by hire bicycle.

New docking stations have been opened every month since the launch and on 3 December 2010 the scheme opened to casual users. By the first anniversary of the scheme, there were around 6,000 bicycles and 400 docking stations available for use. In the first year of operation, more than six million journeys had been made by hire bicycle and more than 130,000 people had become a member of the scheme.

On average, around 25,000 journeys are made by hire bicycle every weekday. Figure 11.11 shows usage throughout the first year of operation. Usage reflects normal seasonal trends for cycling, with lower levels of use in the winter months. Usage is typically higher on days with mild weather and no rain.

Figure 11.11 Monthly total hires of Barclays Cycle Hire bicycles, by members and casual users, July 2010 – October 2011.



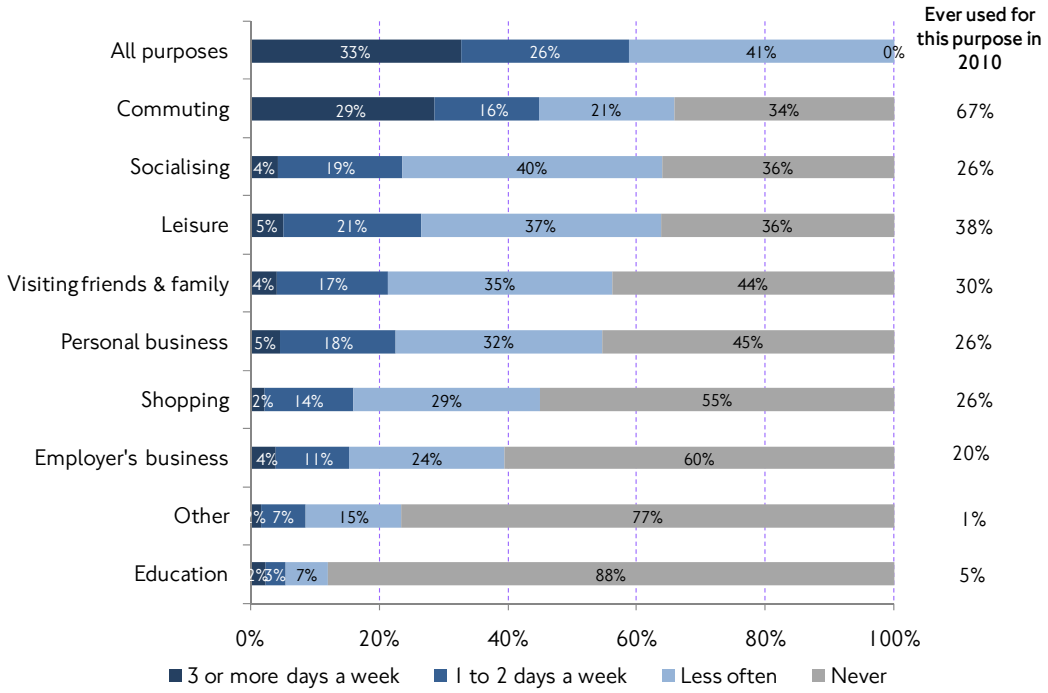
Source: Barclays Cycle Hire operational data, TfL 2010 - 2011.

New research has been carried out in summer 2011 with people who have used Barclays Cycle Hire and is presented below: 2,652 members of the cycle hire scheme who had used the scheme at least once took part in an online survey between 4 and 12 July 2011. A further 1,034 casual users were interviewed on-street at docking stations between 29 June and 1 August 2011. Not all respondents were asked all questions. This section describes the results of the research in terms of the nature of trips being made by Barclays Cycle Hire bicycle, the profile of those making them, and the impact of the scheme on travel behaviour choices. Comparisons are made between members and casual users, and between the surveys of members carried out in autumn 2010 and summer 2011.

Characteristics of travel by Barclays Cycle Hire bicycle

In the early months after the launch of Barclays Cycle Hire, users were typically commuters, using the bicycles every weekday, often as part of a longer rail trip. In the survey of members carried out in autumn 2010, eight in ten respondents were using the scheme at least five days a week. The summer 2011 survey results suggest that the user profile has broadened, with far more people using the scheme infrequently and for a wider range of journey purposes. As shown in Figure 11.12, the proportion of scheme members using the scheme less often than once a week has doubled to 41 per cent and use of the scheme for purposes other than commuting has increased substantially, with more than half of scheme members saying that they use the hire bicycles for socialising, leisure, personal business and to visit or meet up with friends and family.

Figure 11.12 Frequency of travel by Barclays Cycle Hire bicycle, by journey purpose, scheme members, July 2011.



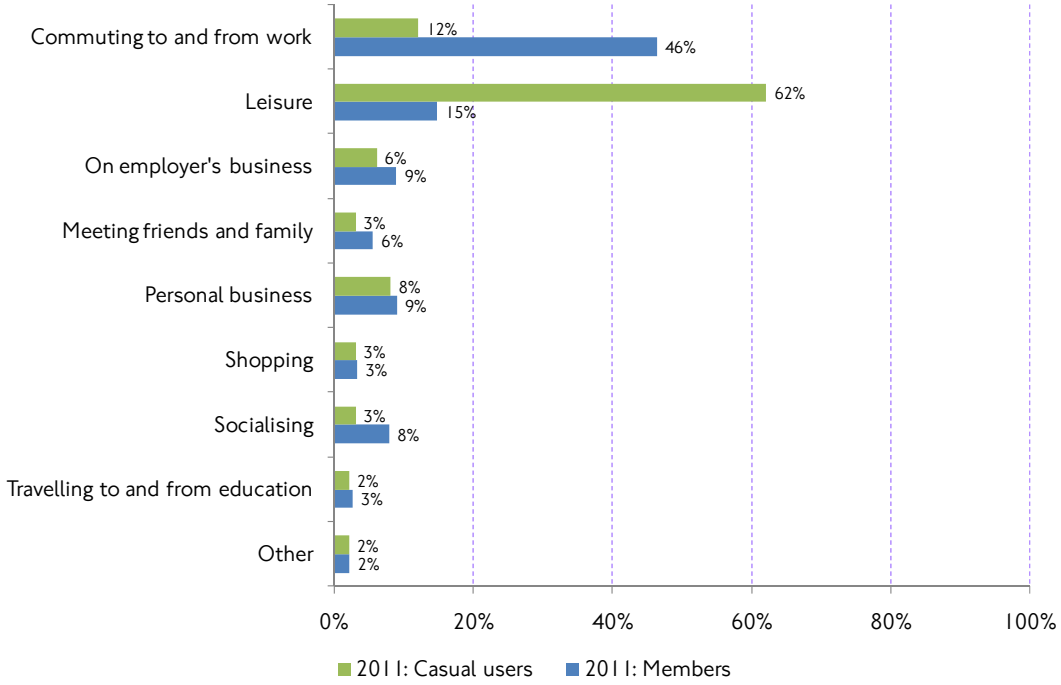
Base: 2010: 3,754 respondents, 2011: 2,652 respondents.
Source: Barclays Cycle Hire Behaviour Change and Customer Satisfaction Surveys, TfL 2010 and 2011.

The opening of the scheme for casual users in late 2010 has also changed the way the scheme is used. Casual users tend to use the scheme infrequently, with half of those surveyed saying that this was the first time they had used the scheme and 30 per cent saying that they use the scheme at least once a week. Casual users are also far more likely to be travelling for leisure purposes, accounting for 62 per cent of all casual user journeys, and less likely to be commuting, with just 12 per cent of casual user journeys made for work purposes.

Travel behaviour change as a result of the introduction of Barclays Cycle Hire

Casual users were asked a series of questions about the trip they were making when asked to take part in the survey and scheme members were asked to consider the most recent trip made for the purpose they travel for most frequently (shown in Figure 11.13).

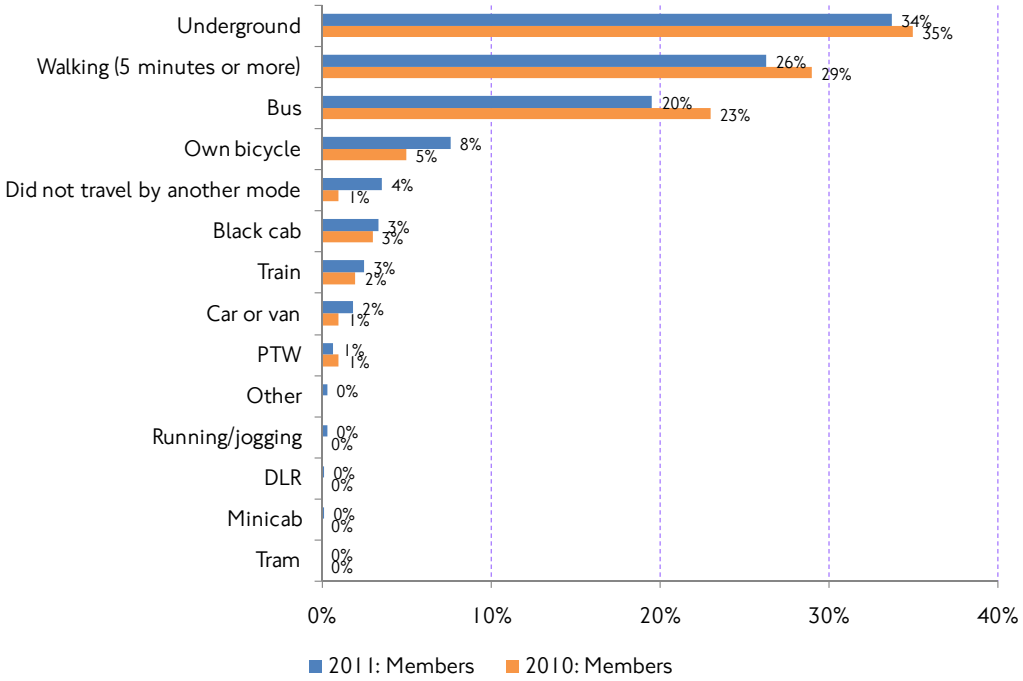
Figure 11.13 Journey purpose of selected trip, scheme members and casual users, July 2011.



Base: 2011 members: 2,652 respondents, 2011 casuals: 1,034 respondents.
Source: Barclays Cycle Hire Behaviour Change and Customer Satisfaction Survey, TfL 2011.

Respondents were asked what other mode of travel, if any, they had used to make the journey prior to the introduction of Barclays Cycle Hire. Eighteen per cent had made the journey only once (and therefore only by hire bicycle). Of those scheme members who had made the journey more than once, 56 per cent said that they would previously have made the journey by public transport and six per cent by car, motorbike or taxi (see Figure 11.14). In total, 95 per cent of journeys made by members of Barclays Cycle Hire in 2011 would not previously have been cycled.

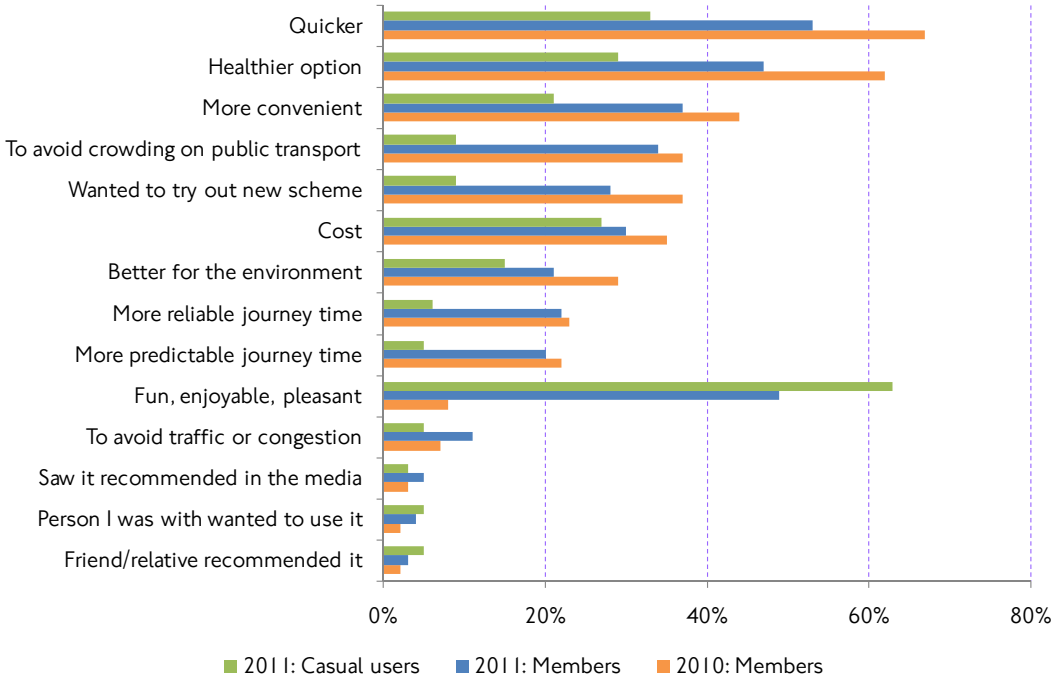
Figure 11.14 Main mode of transport used for selected journey prior to the introduction of Barclays Cycle Hire, scheme members, November 2010 and July 2011.



Base: all who had previously made the journey by hire bicycle. 2010: 1,199 respondents, 2011: 2,177 respondents.
Source: Barclays Cycle Hire Behaviour Change and Customer Satisfaction Surveys, TfL 2010 and 2011.

Members and casual users were asked why they had chosen to travel by Barclays Cycle Hire bicycle, shown in Figure 11.15. For casual users, 'having fun' is the main motivation (63 per cent). For members, speed and convenience remain important, as found in 2010, but what is striking is how much more significant enjoyment has become as a motivation for using the scheme. This may reflect the much greater usage of the scheme by members for leisure purposes (as shown in Figure 11.13), although it is notable that frequent and infrequent users are equally likely to say that enjoyment is an important motivation for them.

Figure 11.15 Reasons for switching mode of transport for selected journey to Barclays Cycle Hire bicycle, scheme members and casual users, July 2011.



Base: 2010 members: 1,183 respondents, 2011 members: 2,100 respondents, 2011 casual users: 639 respondents.
Source: Barclays Cycle Hire Behaviour Change and Customer Satisfaction Surveys, TfL 2010 and 2011.
Note: Reasons selected by less than 1% of respondents are excluded from the graph.

Impact of Barclays Cycle Hire on cycling behaviour

Nearly half of Barclays Cycle Hire members had started cycling in London in the past year (48 per cent). Of those who had started using the scheme in the last six months, 55 per cent had only taken up cycling in London during the same period. It is clear that Barclays Cycle Hire appeals to those who are new to cycling in London as well as existing cyclists, and that it has encouraged many London residents and workers to increase the amount they cycle. Forty-four per cent of respondents agreed that the scheme had prompted them to start cycling in London and a further 27 per cent that the scheme had prompted them to cycle more.

There is evidence that the scheme is also encouraging users to cycle more on their own bicycle:

- Six per cent of respondents, and eight per cent of those who had started cycling in the past year, said that they had bought a bicycle as a result of using the scheme.
- 15 per cent of respondents, and 21 per cent of those who had started cycling in the past year, said that they had bought cycling equipment as a result of using the scheme.
- 13 per cent had been inspired to increase the amount they cycle on their own bike by using the scheme. Barclays Cycle Hire members are twice as likely as the average Londoner to cycle on a private bicycle in London – 46 per cent 'ever' do so, compared to 23 per cent of all London residents.

Barclays Cycle Hire users, especially those new to cycling, are also experiencing wider benefits. They are enjoying using the scheme - 58 per cent agreed that the scheme is fun to use (indicated by providing a score of at least 8 out of 10) - as well as experiencing benefits to their health and well being. Forty-nine per cent of all members and 70 per cent of those who started cycling in the past year agreed that using the scheme will help them improve their health and fitness.

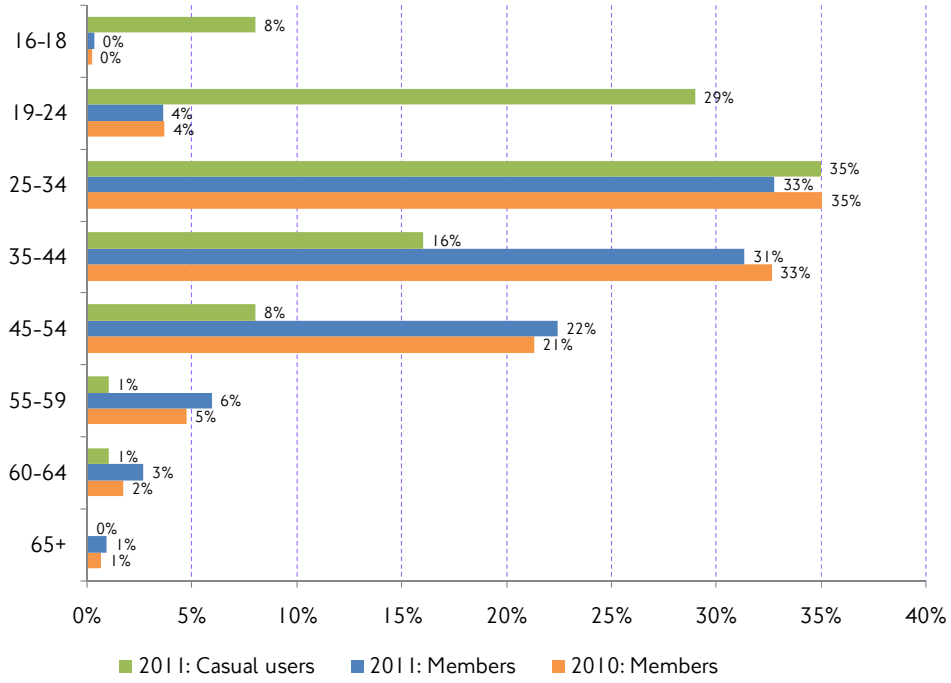
Profile of Barclays Cycle Hire users

The third Travel in London report described the profile of Barclays Cycle Hire members as 'typically white men aged between 25 and 44, with a higher than average household income'. Evidence from the latest survey of scheme members suggests that this profile remains, despite evidence of greater use for purposes other than commuting. In July 2011:

- The majority of scheme members were of working age and in particular 64 per cent were aged between 25 and 44. Just one per cent of scheme members were over 65.
- Three quarters of scheme members were men (77 per cent). Analysis shows that men hire bicycles more frequently, and were more likely to use the scheme to commute, to travel alone and to travel during the weekday peak periods. Analysis of membership data confirms that women are more likely to have joined but not used the scheme, and tended to use the scheme less frequently.
- Eighty-eight per cent of scheme users were of White British, Irish or other White ethnic origin, unchanged from the first wave of the survey.
- Two thirds of scheme users who provided an answer had a household income over £50,000 per year (65 per cent), compared to around a quarter of London residents. Only six per cent of users have a low household income of less than £20,000 per year, compared to four in ten London residents.

Casual users of the scheme were only asked basic information about themselves, but the data available does suggest that the profile of casual users is quite different. Thirty-seven per cent of casual users were female, compared to 23 per cent of members, and 37 per cent were aged 16 to 24, compared to just 4 per cent of members. Figure 11.16 compares the age profile of scheme members and casual users.

Figure 11.16 Barclays Cycle Hire members and casual users by age, 2010 and 2011.

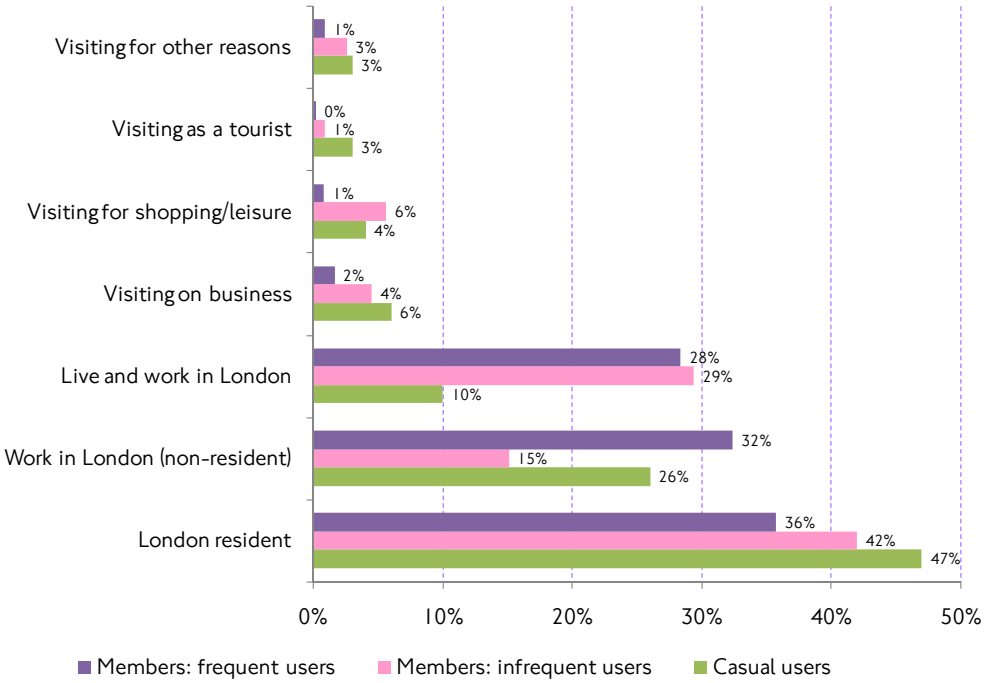


Base: Members - frequent users: 1,247 respondents, infrequent users: 1,405 respondents, casual users: 1,034 respondents.
Source: Barclays Cycle Hire Behaviour Change and Customer Satisfaction Survey, TfL 2011.

Sixty-eight per cent of scheme members and 57 per cent of casual users were London residents. Scheme members were more likely than casual users to work in London (52 per cent compared to 36 per cent) and members who worked in London also tended to use the scheme more frequently than those who did not. In particular, two thirds of scheme members who worked in London but lived elsewhere hire a bicycle at least once a week, compared to 47 per cent of scheme members overall. This reflects the high level of usage by commuters from outside London, especially those travelling into the city centre by National Rail.

The proportion of casual users and infrequent scheme members who were visitors to London (neither living nor working in the city) was similar at 16 per cent and 14 per cent respectively, compared to just 3 per cent of those who used the scheme at least once a week. It is worth noting that foreign visitors are typically less likely to participate in survey fieldwork and may therefore be under-represented in the sample. Figure 11.17 summarises the reason for being in London for members who travel frequently (at least once a week) and infrequently, and for all casual users.

Figure 11.17 Barclays Cycle Hire members and casual users by reason for being in London and frequency of travel by hire bicycle, July 2011.



Base: 2010 members: 3,754 respondents, 2011 members: 2,652 respondents, 2011 casual users: 1,034 respondents.
Source: Barclays Cycle Hire Behaviour Change and Customer Satisfaction Survey, TfL 2011.

Summary: Barclays Cycle Hire

In the first year of operation, more than six million journeys had been made by hire bicycle and more than 130,000 people had become a member of the scheme. On average, around 25,000 journeys are made by hire bicycle every weekday.

In the early months after launch, usage of the scheme was primarily for commuting purposes, with most scheme members using the scheme nearly every day for work purposes. By summer 2011, the user base had widened, with more members using the scheme less frequently and for a wider range of journey purposes. In 2010, fewer than 40 per cent used the scheme for any purpose other than commuting. In contrast, in summer 2011, more than half the scheme members surveyed were also using the scheme for socialising, visiting friends and family, leisure and personal business purposes. Casual users were more likely still to use the scheme for leisure purposes.

The scheme is increasing the amount of cycle travel in London. Ninety-five per cent of journeys were previously made by another mode or not at all. Many Barclays Cycle Hire users are new to cycling in London; in total, seven in ten said that the scheme had prompted them to start cycling in the city or to cycle more often. Just over one in eight said that using the scheme had encouraged them to cycle more on their own bicycle.

Above all, those using the scheme agreed that they were benefiting from it – as well as agreeing that the scheme provided a quick and convenient mode of travel, the majority of scheme users were enjoying using the hire bicycles and were seeing benefits to their health and fitness as a result. There is some evidence that a broader mix of London residents and visitors are trying the scheme as casual users.

11.8 Barclays Cycle Superhighways

Background to Barclays Cycle Superhighways

The Barclays Cycle Superhighways programme will deliver 12 radial routes providing cyclists with a safer, faster, more direct and continuous way of getting into central London. The routes provide a package of highway improvements and supporting measures designed to break down the barriers that stop people cycling.

The first two pilot routes, Cycle Superhighway 3 (CS3), along the A13 from Barking to Tower Gateway, and Cycle Superhighway 7 (CS7), along the A24 from Merton to the City, opened in July 2010 and the second two routes followed in July 2011. These were Cycle Superhighway 2 (CS2), from Bow to Aldgate, and Cycle Superhighway 8 (CS8), from Wandsworth to Westminster. Early results based upon cycle counts carried out in September 2010 before the introduction of the scheme and in September 2011 after the routes had been introduced show that:

- On Barclays Cycle Superhighway 2 (from Bow to Aldgate), the number of cyclists per kilometre travelling inbound in the morning peak period increased by 25 per cent, from 537 to 674. During the afternoon peak period, the number of cyclists per kilometre counted travelling outbound increased by 19 per cent, from 494 to 589. Flows outbound in the morning peak and inbound in the evening peak were lower, but showed greater increases: the number of cyclists per kilometre travelling outbound in the morning peak increased by 45 per cent, from 128 to 185 and the number of cyclists per kilometre travelling inbound in the afternoon peak increased by 37 per cent, from 118 to 161.
- On Barclays Cycle Superhighway 8 (from Wandsworth to Westminster), the number of cyclists per kilometre travelling inbound in the morning peak period increased by 6 per cent, from 599 to 638. During the afternoon peak period, the number of cyclists per kilometre counted travelling outbound increased by 16 per cent, from 566 to 658. Flows outbound in the morning peak and inbound in the evening peak were lower and remained more stable: the number of cyclists per kilometre travelling outbound in the morning peak increased by 5 per cent, from 127 to 134 and the number of cyclists per kilometre travelling inbound in the afternoon peak increased by 12 per cent, from 103 to 116.

Travel in London 3 reported the results of research carried out with those cycling on the two pilot routes (CS3 and CS7) in autumn 2010. This section summarises the results of similar fieldwork carried out between 12 September and 4 October 2011 with people who have cycled on the two new routes, CS2 and CS8. The survey was conducted online with cyclists recruited at the roadside and explored travel behaviour, attitudes and experiences of using the routes. In total, 725 cyclists took part in the survey, of which 250 had cycled on CS2, and 475 on CS8.

Characteristics of cycle travel on Barclays Cycle Superhighways 2 and 8

Respondents were asked to describe the journey they had been making when recruited for the survey:

- Nearly all the survey respondents had been travelling to or from work (95 per cent).
- Around two thirds were travelling during the morning peak (64 per cent on CS2 and 68 per cent on CS8 finished their journey before 10am, noting that surveys

were undertaken heading inbound to central London), with most of these ending their journey by 9am.

- On average, cyclists had spent 14 minutes on route CS2 and 12 minutes on route CS8. This represented around a third of their total journey (34 per cent CS2, 30 per cent CS8). The average time spent travelling for the whole journey, including time spent travelling to and from the Barclays Cycle Superhighway, was 41 minutes on CS2 and 40 minutes on CS8.

On route CS2, just over half of respondents had joined the route at either Bow Road Interchange (30 per cent) or Addington Road (21 per cent), at the outer end of the route. On route CS8, respondents were more likely to have joined the route at its central section, with the most popular access points being Chelsea Bridge (43 per cent) and Battersea Park (16 per cent).

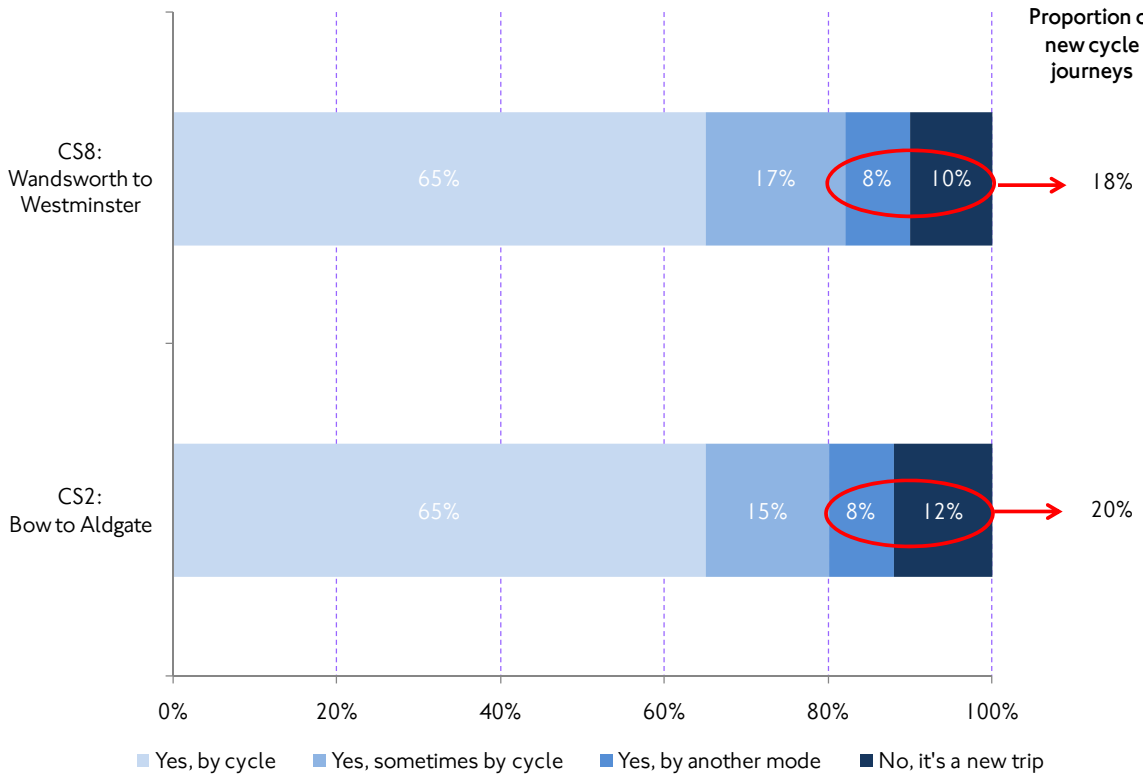
Most of those cycling on the route do so frequently: 88 per cent of those travelling on CS2 and 91 per cent on CS8 make their journey at least three times week. One in four respondents said they also use the routes to make other journeys, mainly for social and recreational purposes (64 per cent CS2, 70 per cent CS8), to visit friends and family (57 per cent on each route), or for shopping (63 per cent CS2, 45 per cent CS8).

Travel behaviour change on Barclays Cycle Superhighways 2 and 8

Respondents were asked to consider the journey they were making when recruited to take part in the survey and describe any changes they had made to that journey since the introduction of the Barclays Cycle Superhighways, and the reasons for that change. Respondents had changed their travel in three basic ways:

- **Made a new cycle journey: i**n total, 20 per cent of journeys on route CS2 and 18 per cent on CS8 were new cycle journeys that had previously been made by another mode or not at all. Figure 11.19 describes how those cycling on the routes had made their journey prior to the launch of the routes.
- **Diverted to cycle on the routes:** 82 per cent of those travelling on route CS2 and 80 per cent on route CS8 had always or sometimes cycled their journey before the launch of the Barclays Cycle Superhighways. Nevertheless, some had changed their behaviour as a result of the scheme. Seven per cent of those on route CS2 and 12 per cent of those on route CS8 had previously used a different route for their cycle journey.
- **Increased the frequency of cycle journeys on the routes:** 21 per cent of those who had previously cycled on route CS2 and 25 per cent of those who had previously cycled on route CS8 said that they had increased the frequency with which they made their selected journey on the route. On average, these respondents were making between 10 and 14 additional cycle journeys each month, equivalent to two or three more journeys every week.

Figure 11.18 Whether selected journey was made before the launch of Barclays Cycle Superhighways routes 2 and 8, September 2011.



Base: CS2: 250 respondents and CS8: 475 respondents.
Source: Barclays Cycle Superhighways Scheme Users Survey: Routes 2 and 8, TfL 2011.

Mode shift and changing route to cycle on the Barclays Cycle Superhighways

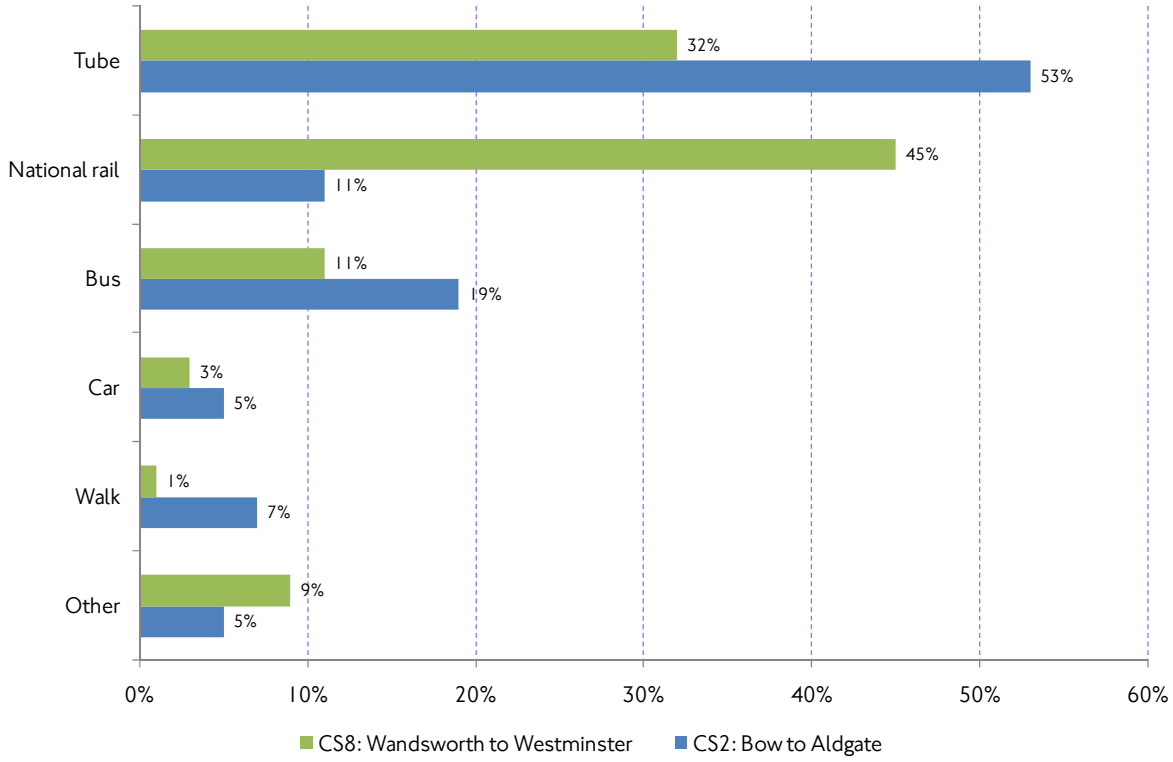
Of those who had previously travelled by another mode, most had switched from travelling by Underground (53 per cent CS2, 32 per cent CS8) or rail (11 per cent CS2, 45 per cent CS8). Figure 11.19 shows the main mode used for the journey prior to the launch of the routes. It is evident that most cyclists had switched from a motorised mode, with comparatively few switching from walking.

Respondents who had switched to cycling from an alternative mode were asked what had prompted them to do so. Figure 11.20 shows that the main reasons for making a change were: to improve fitness, to save money and because the journey is quicker and more pleasant.

Respondents were also asked which aspects of the route had influenced their choice to cycle, shown in Figure 11.21. The provision of a direct route to their destination, visibility of the blue markings and, on CS8, the quality of the road surface and lack of obstructions on the route were the most influential factors. These results are very similar to those for routes CS3 and CS7 as reported in Travel in London 3.

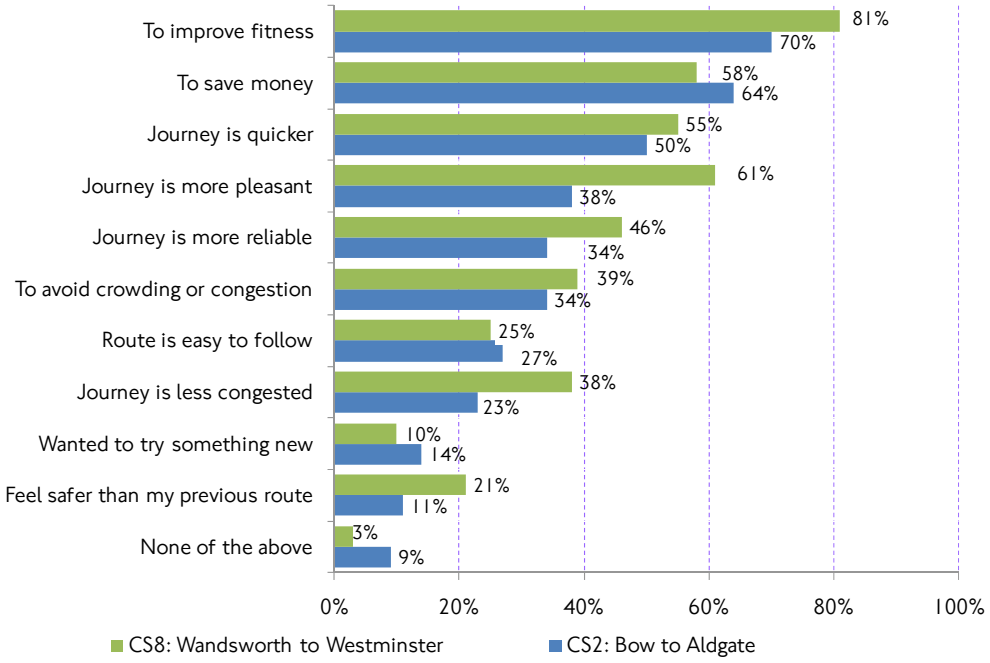
Similarly, the most common reasons given for changing route to cycle on the Barclays Cycle Superhighways were that the cyclist feels safer, and their journey is quicker and more pleasant. As for those changing mode, the aspects of the route that had the greatest influence were the visibility of the blue road markings, quality of road surface and direct route to their destination.

Figure 11.19 Main mode used for selected journey prior to launch of Barclays Cycle Superhighways for those who had changed mode, September 2011.



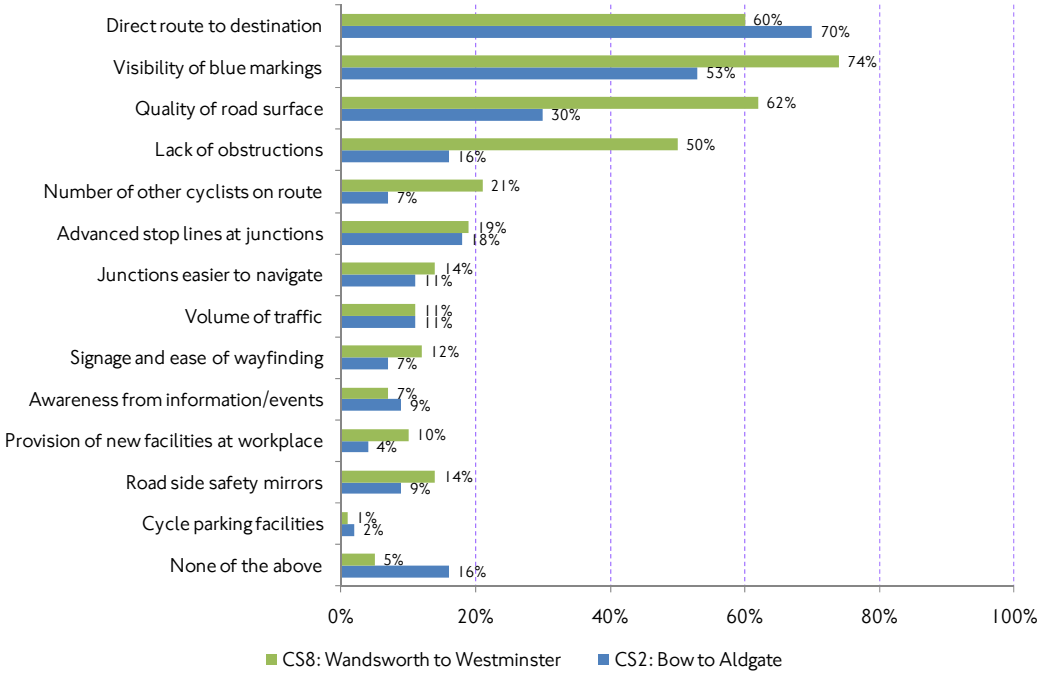
Base: CS2: 57 respondents and CS8: 112 respondents who had changed mode.
Source: Barclays Cycle Superhighways Scheme Users Survey: Routes 2 and 8, TfL 2011.

Figure 11.20 Reasons for changing mode to cycle on Barclays Cycle Superhighways, September 2011.



Base: CS2: 57 respondents and CS8: 112 respondents who had changed mode.
Source: Barclays Cycle Superhighways Scheme Users Survey: Routes 2 and 8, TfL 2011.

Figure 11.21 Aspects of the route that had encouraged those changing mode to cycle on Barclays Cycle Superhighways, September 2011.



Base: CS2: 57 respondents and CS8: 112 respondents who had changed mode.
Source: Barclays Cycle Superhighways Scheme Users Survey: Routes 2 and 8, TfL 2011.

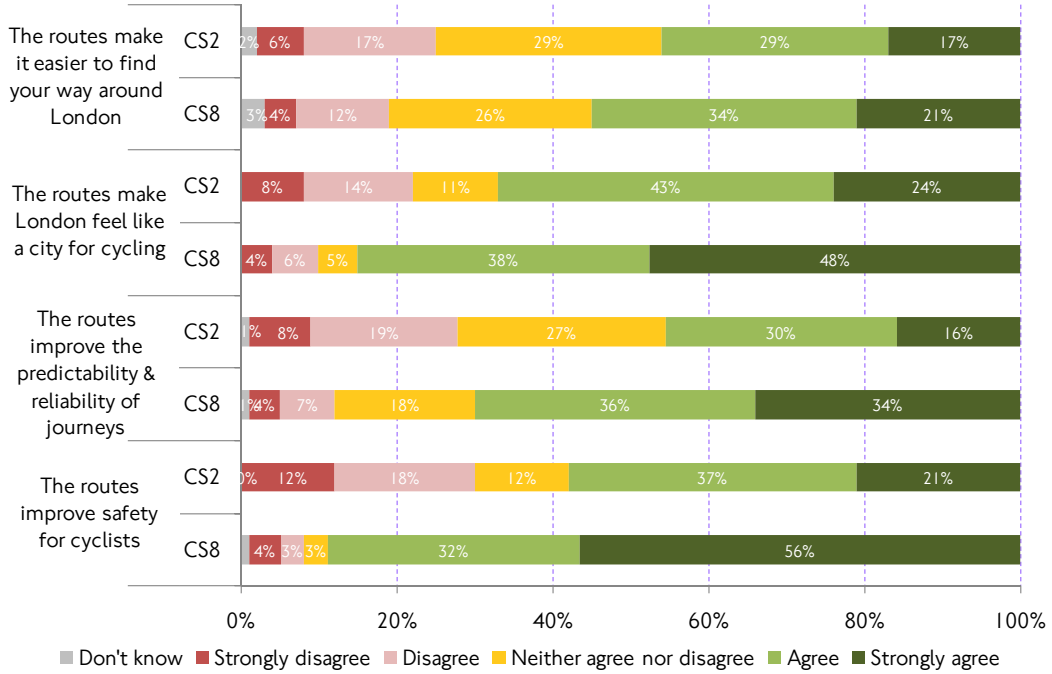
Impact of Barclays Cycle Superhighways on cycling behaviour and journey experience

Most of those cycling on the routes described themselves as confident cyclists (89 per cent), with 4 per cent considering themselves novices and seven per cent neither a novice nor a confident cyclist. Nevertheless, a significant minority were new to cycling in London: 26 per cent of those on route CS2 and 30 per cent on route CS8 had started cycling in London 2010 or 2011. Nearly half the respondents felt that the Barclays Cycle Superhighways had made them a more confident cyclist (47 per cent). It is clear that the routes are encouraging Londoners to cycle more, both on the routes and elsewhere in London. As a result of the introduction of the routes:

- At least one in ten had bought a bicycle (10 per cent CS2, 13 per cent CS8).
- One in five had bought cycling equipment (20 per cent CS2, 21 per cent CS8).
- More than a third of those on route CS2 (35 per cent) and nearly half of those on route CS8 (47 per cent) had increased the amount they cycle on the routes.
- A fifth of those on route CS2 (19 per cent) and a quarter on route CS8 (24 per cent) had increased the amount they cycle elsewhere.

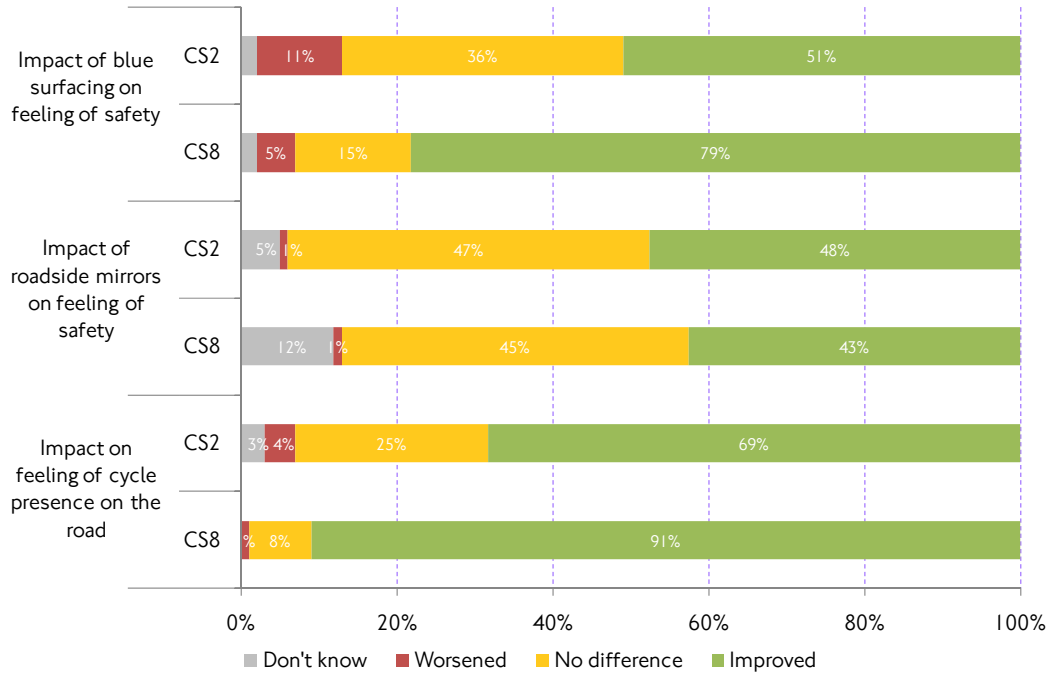
Barclays Cycle Superhighways cyclists are also benefiting from an improved journey experience on the routes. Figure 11.22 shows attitudes to the impacts of the routes and Figure 11.23 shows the impact of the routes on aspects of safety; overall, the majority of respondents agreed that the routes improve safety for cyclists. Cyclists on route CS8 were substantially more positive about the impacts of the routes than those travelling on route CS2.

Figure 11.22 Experience of the benefits of the Barclays Cycle Superhighways, September 2011.



Base: CS2: 250 respondents and CS8: 475 respondents.
Source: Barclays Cycle Superhighways Scheme Users Survey: Routes 2 and 8, TfL 2011.

Figure 11.23 Impact of the Barclays Cycle Superhighways on feeling of safety, September 2011.



Base: Blue surfacing: CS2: 248 respondents and CS8: 475 respondents, Mirrors: CS2: 103 respondents and CS8: 193 respondents (excludes those not aware of mirrors), Presence: CS2: 248 respondents and CS8: 475 respondents.
Source: Barclays Cycle Superhighways Scheme Users Survey: Routes 2 and 8, TfL 2011.

Profile of Barclays Cycle Superhighways cyclists

The third Travel in London report described the typical cyclist travelling on routes CS3 and CS7 as male, aged between 25 and 44, in employment and with a higher than average household income. This profile is also evident amongst the cyclists on routes CS2 and CS8. In September 2011:

- Nearly eight in ten of those cycling on the routes were men (79 per cent).
- The vast majority of cyclists on the routes were of working age (85 per cent), with 73 per cent aged between 25 and 44, compared to 38 per cent of Londoners.
- More than nine in ten of those cycling on the routes were of White British, Irish or other White ethnic origin (93 per cent), compared to 65 per cent of London residents.
- 96 per cent were in employment and 62 per cent had a household income over £50,000 per year, compared to around a quarter of London residents. Just six per cent of users have a low household income of less than £20,000 per year, compared to four in ten London residents.

Summary: Barclays Cycle Superhighways

The two pilot Barclays Cycle Superhighways (CS3 from Barking to Tower Gateway and CS7 from Merton to the City), launched in July 2010, and the two new routes (CS2 from Bow to Aldgate and CS8 from Wandsworth to Westminster) have delivered increased cycle flows and encouraged existing cyclists to increase the amount they cycle. They have also encouraged use of cycle for journeys previously made by other modes and new cycle journeys. Offering a fast, direct route into central London, the routes are mainly appealing to commuters, but are also used for other purposes off peak and at the weekends.

Although the profile of cyclists on the Barclays Cycle Superhighways is similar to that of Barclays Cycle Hire users, cyclists on the Superhighways are more likely to be confident and experienced cyclists who cycle several days a week for utility and leisure purposes. Relatively few people who described themselves as novice cyclists were using the routes.

Aspects of the routes that appeal most to users are the visibility of the blue markings and good quality of the road surface, and that they provide a direct route to key destinations. Cyclists generally agreed that they were benefiting from an improved journey experience as a result of the introduction of the routes, and in particular the majority of users agreed that the routes make them feel safer when cycling.

12. Spotlight on: TfL's new Sub-Regional Highway Assignment Models

12.1 Introduction and content

This chapter provides an overview of TfL's newly-developed set of sub-regional Highway Assignment Models (HAMs). The models, based on the SATURN suite of software, were developed as an integral part of an upgrade to the wider suite of models available in London. The models are class-leading, embody several technical innovations, address shortcomings of previous modelling practice, and represent a major effort and investment by TfL in improving the tools available for transport planning in the Capital. This chapter provides a largely non-technical overview of the models, with the emphasis on illustrating their capabilities and explaining their 'modes of use' to a wide range of potential users and stakeholders (the models are generally available for use). A contact point for further information about the models is given at the end of the chapter.

12.2 Background – why did TfL develop the sub-regional highway assignment models ?

Traffic and transport models are routinely used by transport authorities and others, such as property developers, to assess the impact of policies, schemes or specific developments that have strategic, sub-regional or more local implications for the transport networks. By simulating conditions once the policy, scheme or development has been implemented, they provide quantitative information on which to base appraisals of competing schemes, to optimise scheme or development design, or to develop measures to mitigate any unwanted side effects.

The scale and diversity of planning and development activity in London has historically given rise to a proliferation of models (particularly highway network assignment or simulation models) with new models, or variants or upgrades of existing models, being developed in a relatively ad-hoc manner to support the assessment of individual initiatives. As well as being inefficient and costly, this state of affairs gave rise to several other problems. For example, the use of different models meant that there were few common standards in respect of the input data that had been used to calibrate/validate each model, and in respect of model performance, currency and quality control. This meant that it was difficult to make like-for-like comparisons or assessments of net effects across initiatives tested using different models, and that the 'technical quality' of the modelling became a key point of debate, for example at Public Inquiry, more often than might otherwise have been the case had there been a more common and widely-understood basis for assessment.

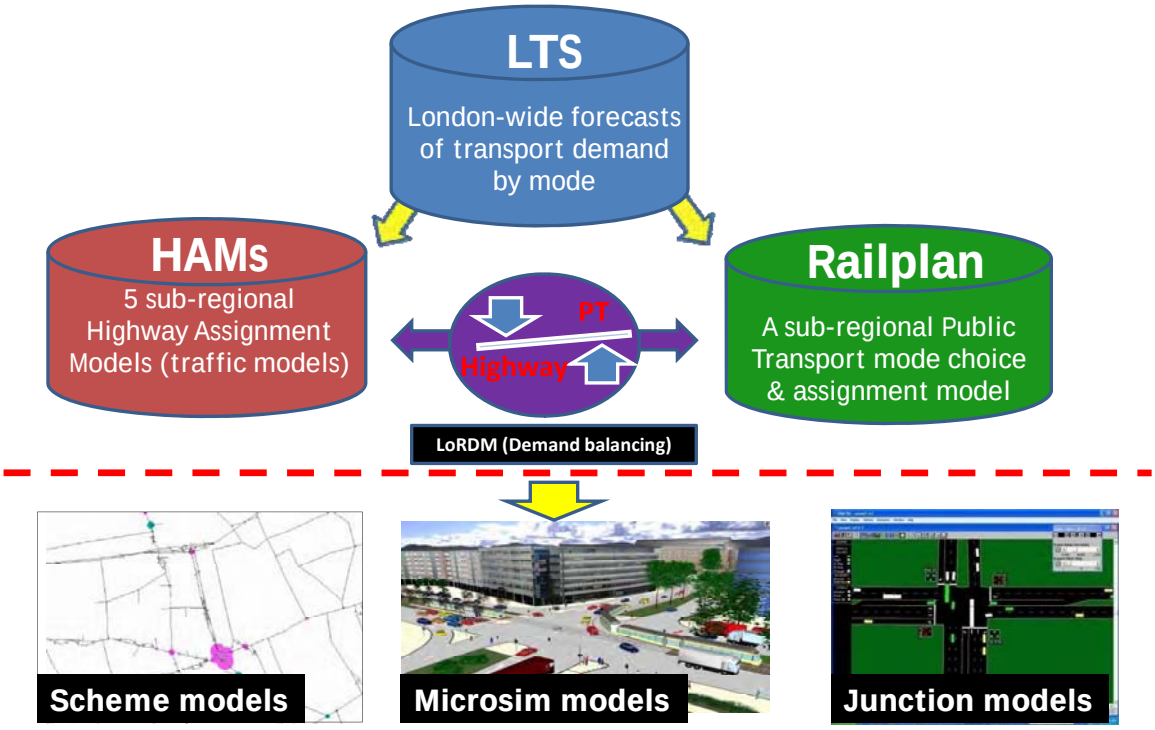
Developing, effectively from scratch, a new set of state-of-the-art models, using common standards and data, that would accommodate the large majority of likely uses, and promulgating them among a wide user community, would potentially resolve most of these problems. It would also provide a 'step change' in the quality and capability of the tools available to the profession and, at the same time, significantly reduce costs.

TfL therefore embarked on a four-year development programme that has now resulted in five new sub-regional Highway Assignment Models, each focusing on one of the five London sub-regions and each incorporating highway simulation networks of a scale comparable to that which might be expected in a major provincial city. The models have already been used for upwards of 50 studies to date and are being rolled out to the user community.

12.3 The sub-regional models in the context of wider transport modelling in London.

Development of the sub-regional HAM models has taken place in the context of review, enhancement and consolidation of the wider suite of transport models in London. The potential user can therefore select from three 'levels' of model, based on that which is most appropriate to their particular needs. This section briefly explains this suite of models and describes how the HAM models fit and work together with the other models. Figure 12.1 illustrates this arrangement.

Figure 12.1 General overview of transport models in London.



At the top of the hierarchy sits the **LTS strategic multi-modal transport model**. This model, which has been developed over several decades in London, is primarily responsible for generating London-wide estimates of travel demand, in the form of matrices, in response to factors such as projected population and employment growth. The model also undertakes trip distribution and modal-split calculations, as well as network level assignments, for both public transport and highway trips, albeit the latter at a fairly broad level of granularity and local accuracy (it is a traditional 'four-stage' transport model).

Below LTS sits a level of model that is more appropriate/accurate at the sub-regional scale. These models are optimised for network-level assignment, and in principle take as key inputs matrices of, or changes in, travel demand generated by the LTS model as appropriate to the mode.

The **HAM** models (for road traffic) are the main subject of this chapter and are further described below. The London-wide **Railplan** model is, in simple terms, the 'public transport equivalent' of the HAMs, although it is important to note that Railplan also undertakes mode split calculations within the overall public transport mode, and includes bus trips and a representation of the bus network. As part of the upgrade, Railplan has been given an enhanced sub-regional analysis capability, this involving roughly doubling the number of zones in the model and overhauling the representation of bus flows and walk links (between parts of the public transport networks). This version of the model is known as **Regional Railplan**.

LoRDM (London Regional Demand Model) is an intermediary model that sits between Railplan and the HAMs, and has the specific function of re-balancing aggregate demand between public and private transport modes. For example, improvements to public transport could attract trips away from the road network, thus affecting conditions, such as traffic congestion, on this network, which will in turn affect the level of demand for road travel. LoRDM operates on the basis of changes to the generalised costs (time and money costs) of travel produced by the HAMs and Railplan in response to the initiatives being modelled, and the model will continue to iterate between roads and public transport travel options until equilibrium is reached.

Towards the bottom of the figure are examples of three types of **more local traffic model** that might use the outputs of the HAMs, at an appropriate geographic scale, as the basis for more detailed studies. These models typically operate at the junction or small-network level, and are used to look in greater detail at the function of specific parts of the road network, for example to optimise traffic signal settings at a particular junction in response to changed patterns of traffic demand on the links in question arising from a specific development. Alternatively, at a somewhat larger scale, the outputs from the HAMs can be used as a basis for borough-level traffic models should these be required.

There is therefore a clear 'downwards compatibility' within the suite of models - both operationally and in terms of data, with all levels being ultimately based on common assumptions about overall travel demand, and a clear 'route through' for the proper assessment of most policies, schemes and developments.

12.4 Key characteristics of TfL's sub-regional Highway Assignment Models

Model software and construction process

The HAM models use the well-established SATURN (Simulation and Assignment of Traffic to Urban Road Networks) software package. They were developed by a range of transport consultancies, with one firm being appointed in each case to build the road network and another to build the trip matrices. Although TfL took strong technical ownership of the process, close involvement of external experts was a key feature of the model design and development. The process involved input and peer review from some of the country's foremost experts on modelling, helping to build a wide community of modellers with a stake in the tools – the existence of which is important to the ultimate success of the project.

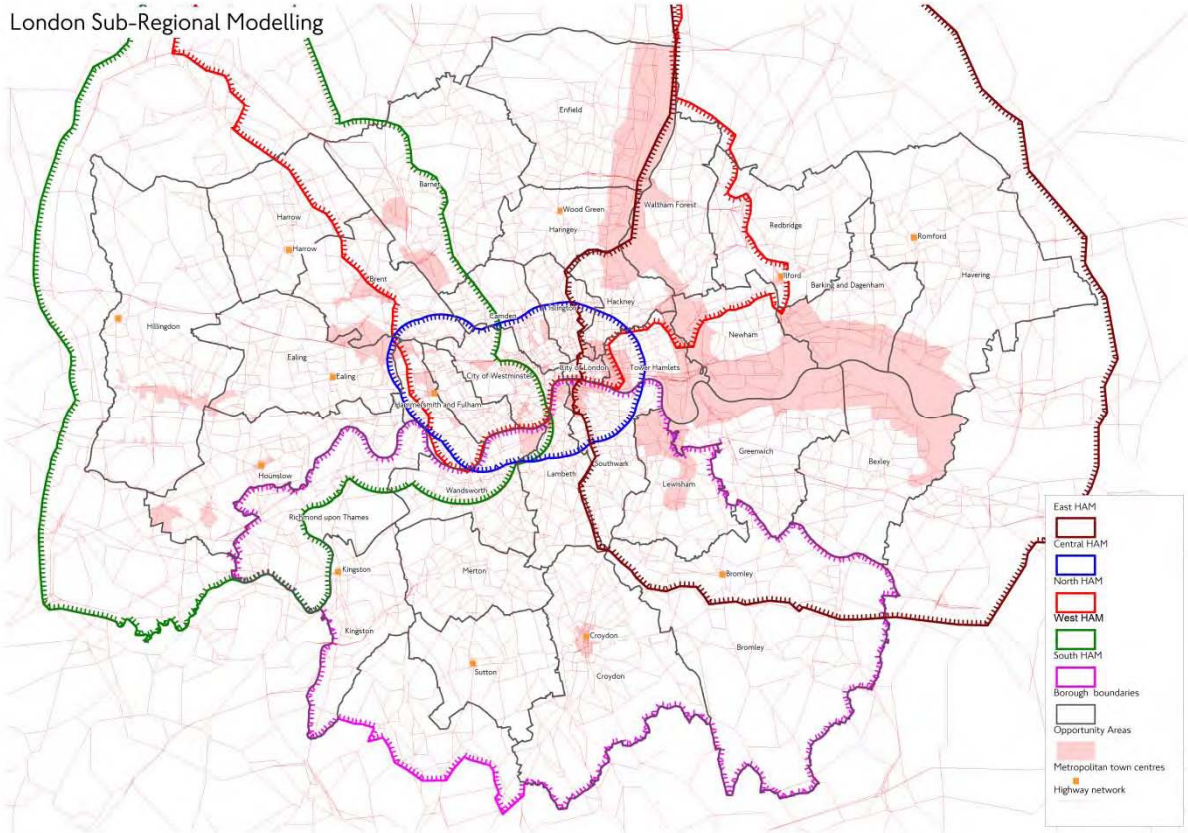
The construction process was deliberately phased, so that lessons learned from the earlier models to be constructed could be fed back into the development of later ones. In addition, the process involved extensive checking and testing of each of the main components of the model, for example that the detail of the road network had

been coded correctly, as each stage was completed and before 'acceptance' into the assembly of the final model, helping to ensure the early satisfactory functioning of the final product.

Areas covered by the five models

Each HAM has a simulation area that covers an area somewhat greater in size to the London sub-region to which it formally applies. This ensures good functionality at the edges of the sub-region, where important schemes and developments may of course be located, and also provides a degree of overlap between the models, so that schemes or developments located potentially awkwardly between two sub-regions will have at least one model that is capable of robustly assessing them. Figure 12.2 shows the extent of the model simulation areas.

Figure 12.2 Coverage of TfL's five HAM models showing extent of simulation area.



Key features of the five model networks

Each model contains a skeletal road network representation of the whole of the UK, with increasing detail towards the simulation area. Within the relevant London sub-region, all of the motorways, class 'A' and 'B' roads, and parts of the 'C' road network are explicitly modelled.

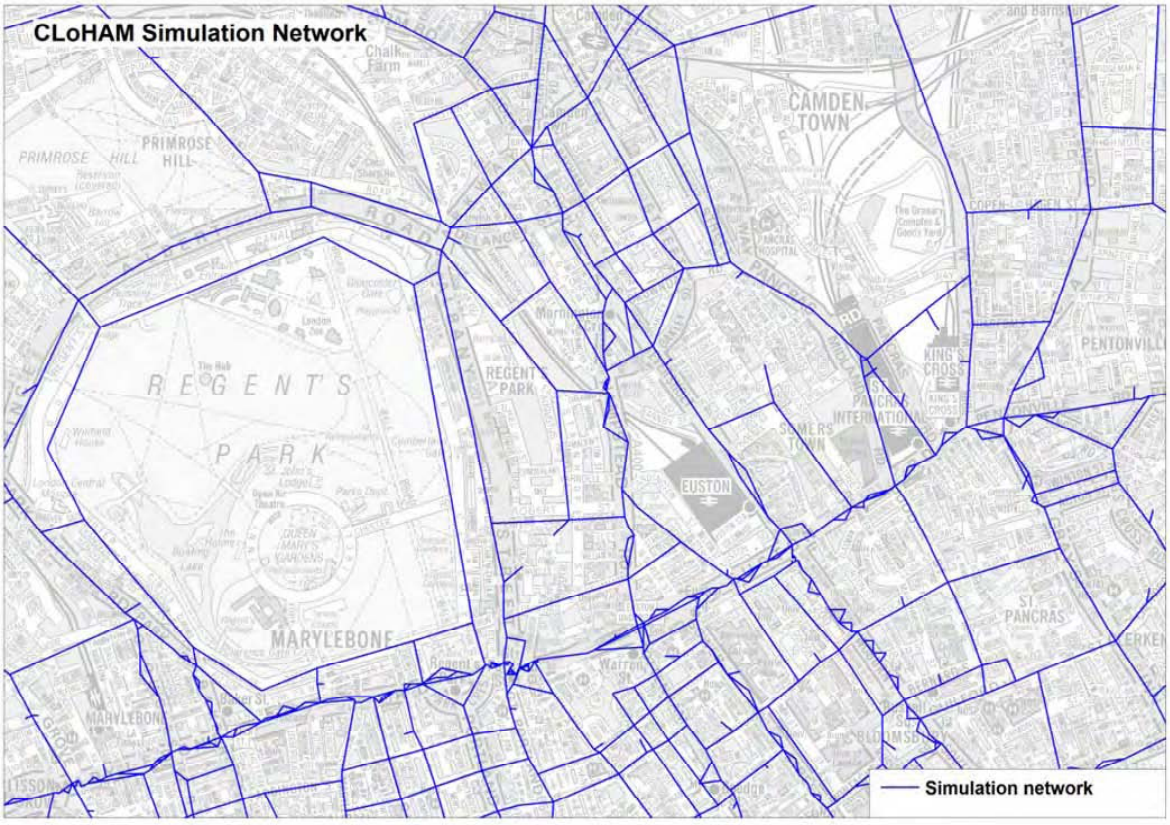
The number of zones in each model varies from 500 (central) to over 2,000 (south), this density having proven satisfactory from the point of view of achieving acceptable computer run times. Likewise, the number of road links and junctions coded in to each of the models reflects the local transport geography, with a

maximum of 24,994 links and 10,958 junctions coded in the south model, this covering geographically the largest area of the five models. Table 12.1 summarises key network features of the five models, from which the scale of the undertaking can be more readily appreciated.

Table 12.1 Key features of TfL's five HAM model networks.

HAM model	Approx size of simulation area (square km)	Approx no. of zones in simulation area	Number of junctions in simulation area	Number of links in simulation area
CLoHAM (Central)	159	500	3,585	7,960
NoLHAM (North)	527	800	4,271	10,210
WeLHAM (West)	760	1,000	4,226	9,881
ELHAM (East)	939	1,000	4,231	10,050
SoLHAM (South)	1,697	2,000	10,958	24,994

Figure 12.3 Simulation network detail – from the central London model (Euston Road/Marylebone Road axis).



Source: TfL Strategy and Planning.

Data used for construction of the models

Construction of the models was supported by a major data collection effort. In particular, a large-scale programme of Roadside Interview Surveys (RSIs) was undertaken, covering the whole of Greater London. These involved stopping a sample of drivers at the roadside and administering a short survey that sought details

about the journey being made (eg origin, destination, purpose, etc.). In total around 400,000 drivers were interviewed across 850 survey sites – this being roughly equivalent to 5 per cent of all drivers in London (normalised to a typical day).

Other key data sources used to develop the models were:

- Many manual classified counts and automatic traffic counts.
- Journey time surveys.
- Data from TfL's traffic signal control operations, for timings and phasing of signals.
- Aerial photography of junctions.
- TrafficMaster speed data on roads.
- Government advice on standard values for, for instance, value of time.
- Other models, TfL's LTS and others such as the M25 model.
- Electronic mapping data.
- Sources of data on addresses and population (eg Addresspoint; Valuer's Office data).
- Sources of data on bus routes and frequency.

Importantly, all five models are based on the same up-to-date data, and it is intended that the data underlying the models will be regularly updated – meaning that users can have confidence in both the currency and consistency of the models, especially for multiple uses across different sub-regions.

Junction detail

Although the models are sub-regional in scale, they necessarily include a substantial amount of detail at the level of the individual junction. This includes detailed descriptions of features such as: lane markings; bus lanes; junction capacities (saturation flows); traffic signal staging and timings and banned turns. This enables a detailed representation of speeds through the network and the identification of traffic operational issues and congestion problems.

Performance of the models

The models perform well and have been extensively checked and validated against observed traffic counts, origin-destination (trip) data, trip lengths and journey times/delays.

12.5 Some examples of the use of the Highway Assignment Models

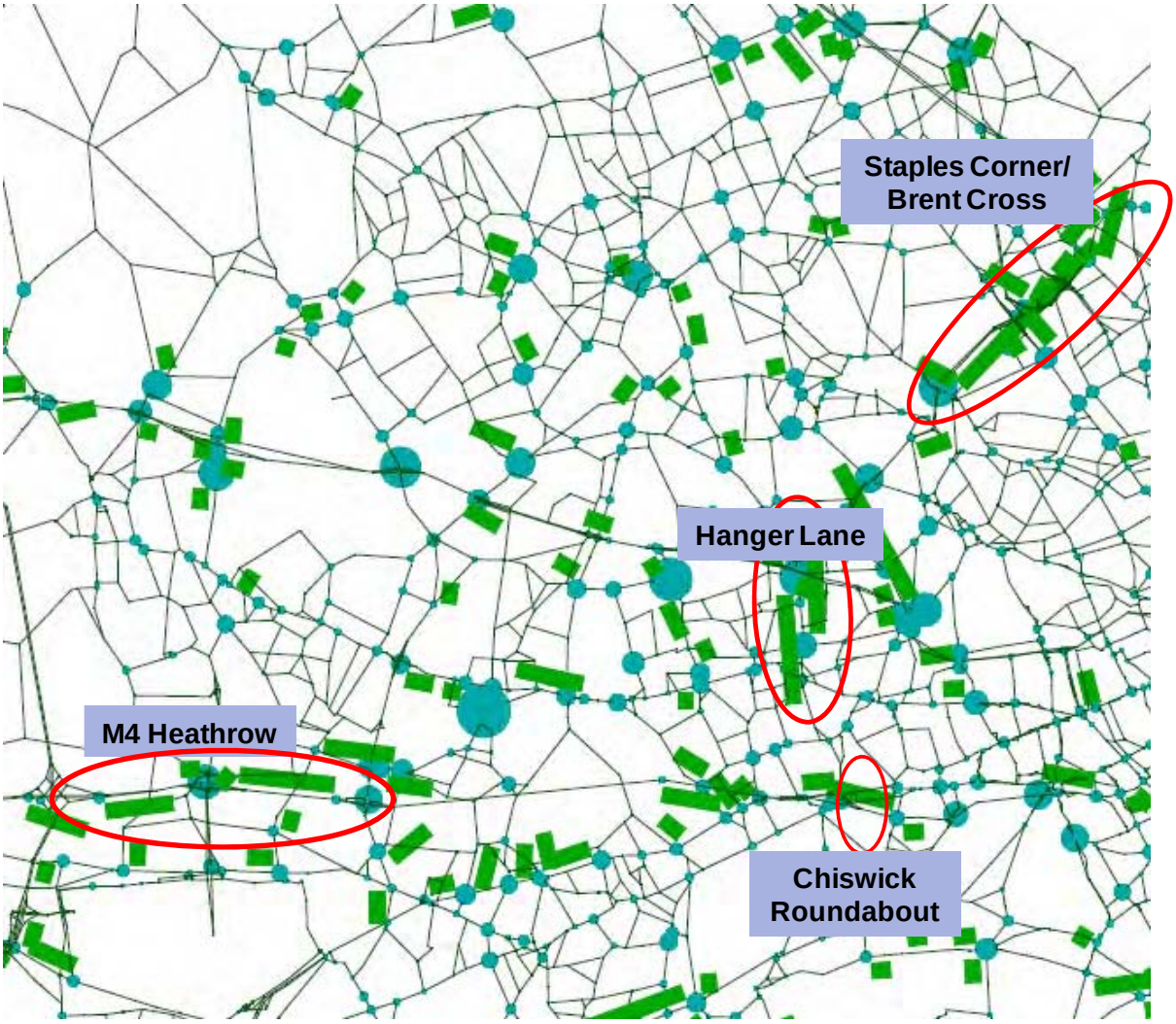
The sub-regional HAM models have many potential uses, ranging from the strategic to the very local. Typical applications so far have included: extensive use in connection with the planning process for Opportunity Areas in London, for example the White City Opportunity Area Planning Framework; highway network improvement studies, such as for the A406 North Circular Road at Henlys Corner, a bus priority scheme in North London, two-way operation of Piccadilly in central London, and the impacts of potential mitigation measures required for new developments in the Upper Lea Valley. The following sections briefly exemplify some of these applications.

Identification of congestion hotspots and junction performance

Effective understanding of the impacts of future traffic change on the operation of the road network is critical to enable TfL to respond to these changed demand pressures. The HAM models allow the impact of specific individual schemes or proposals (that have implications for traffic volumes) to be examined both individually and in combination with all other known schemes and proposals. This enables the user to understand both the incremental impacts of their own proposal and the net impact of it and other proposals on the overall operation of the network, such that the viability of the proposal can be assessed, and appropriate management measures put in place.

Figure 12.4 shows an illustrative analysis (from the West London sub-regional model – WeLHAM) for 2031. The blue circles show the relative intensity of traffic delays at junctions, and the green bars show the average traffic queue length in the weekday AM peak. Whilst most of the 2031 hotspots will be familiar it is possible to distinguish changes in the pattern and intensity of delays resulting from the various proposed large-scale developments (Opportunity Areas) in this part of London, for example the planned development at Park Royal.

Figure 12.4 Traffic bottlenecks and congestion hotspots. West London 2031 (illustrative).

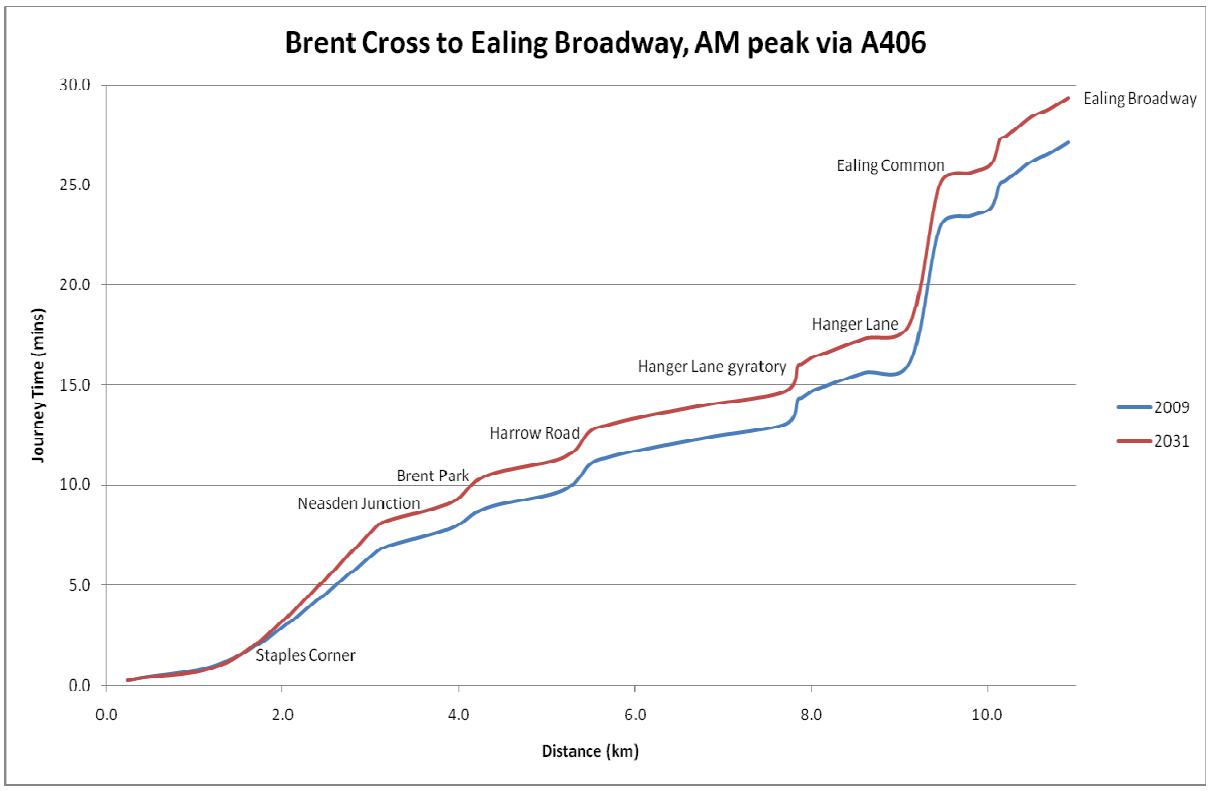


Source: TfL Strategy and Planning.

Journey time analysis

Figure 12.5 shows a comparison of future (2031) with current (2009) journey times for a particular trip – from Brent Cross to Ealing Broadway in the weekday AM peak. The example journey largely follows the North Circular road. The comparison shows that, given current forecasts of traffic demand and road network performance, journey times are expected to increase by 8.1 per cent – from 27.1 to 29.3 minutes. Additional delays are incurred between Staples Corner and Neasden. The Hangar Lane gyratory remains a major source of delay on the route, but transit times through this junction in 2031 are expected to be closely comparable to those of 2009. Analyses such as this are possible for a wide range of journeys, and the sensitivity of the results to alternative network management strategies can also be tested.

Figure 12.5 Comparative journey time analysis 2009 vs. 2031. Brent Cross to Ealing Broadway via A406 (indicative).

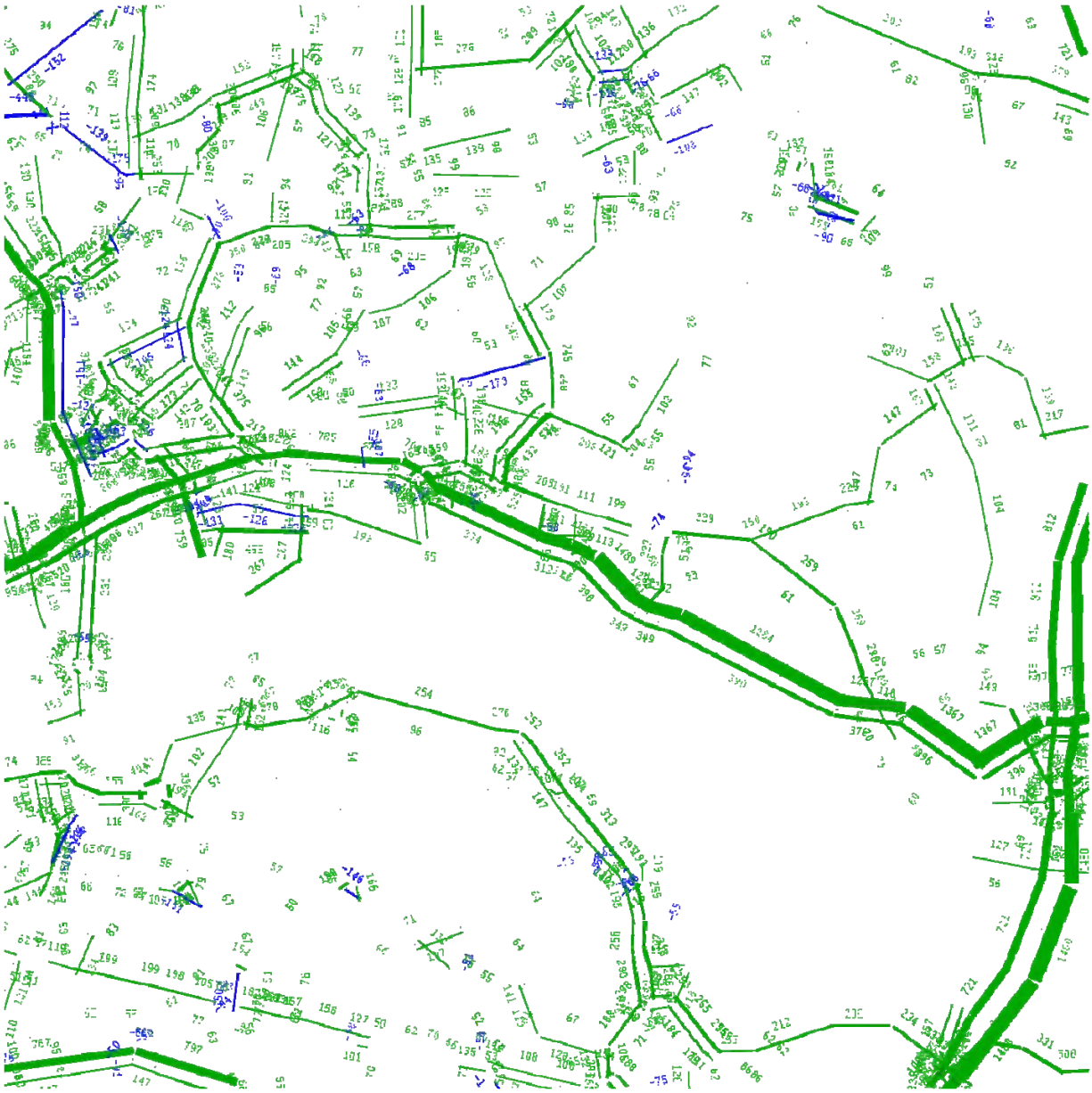


Source: TfL Strategy and Planning.

Traffic impacts of specific developments

Examination of the traffic impacts of large-scale developments, concentrated in London's Opportunity Areas such as the London Riverside development, has been a major application of the HAM models to date. Figure 12.6 shows the estimated change of vehicle flows between 2009 and 2031. The modelling suggested that there will be increases in vehicle flows across the whole Opportunity Area, although some redistribution of traffic is seen in town centres possibly through re-routing around congestion rather than an actual decrease in traffic. The largest increases in the flow are seen on the major roads (A13, A406 and M25) with the greatest being along the eastbound direction on the A13 away from Central London.

Figure 12.6 Traffic impacts of the London Riverside development - 2031, illustrative.

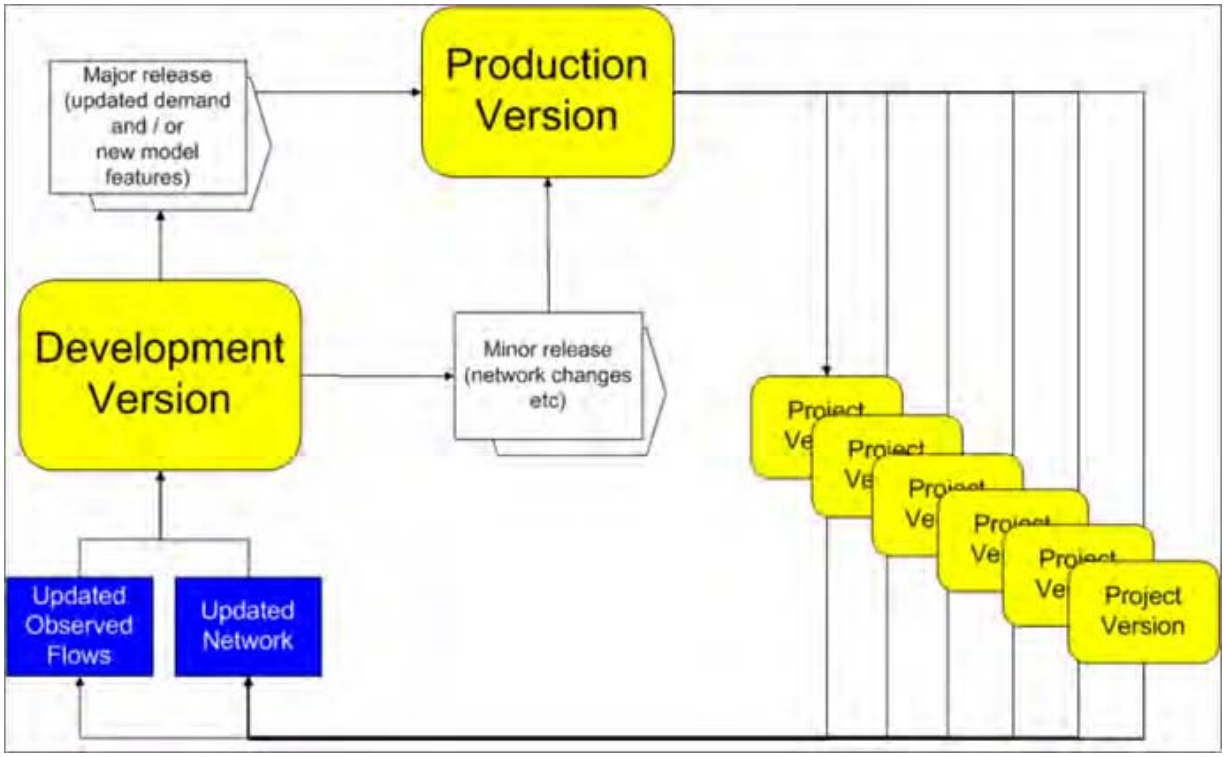


12.6 Philosophy of continuous development and version control

A philosophy of user feedback and continuous development underlies the roll-out of the models for general use. This is based on the idea that model users, where they make specific improvements to the model to reflect either specific local or changed conditions, they feed these back to TfL as ultimate custodians of the model. Examples of these changes might be the addition of more details of the road network associated with a development, or some new traffic survey data. Some of these changes or updates will be valuable for more general use and will be incorporated and released in the next iteration of the model. Users may also have specific feedback about particular requirements or potentially useful modifications to the models – and TfL will take a view as to whether to include such improvements in the next release of the model. These consolidated updates to the models by TfL will occur as necessary - but as a guide the expected frequency is roughly once per year. Effective version

control is an important prerequisite to this process. Figure 12.7 summarises this philosophy of continuous improvement and the intended version control process.

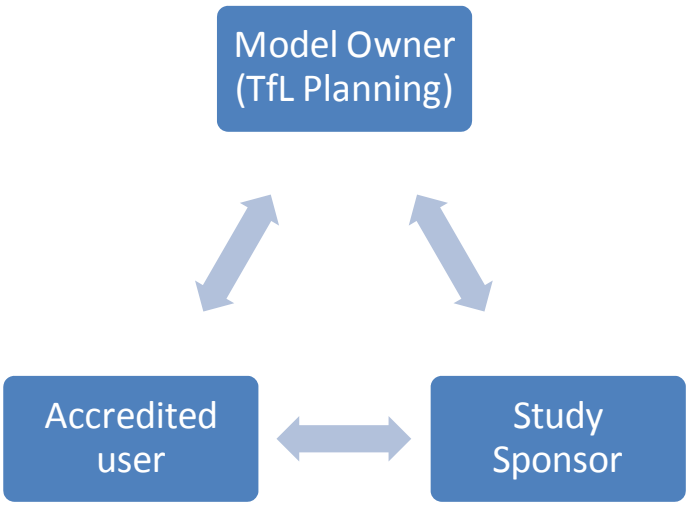
Figure 12.7 Continuous improvement and version control for TfL's five HAM models.



12.7 How to access and use the HAM models

Use of the models is a collaborative process between three parties. This is summarised by Figure 12.8.

Figure 12.8 Mode of use for TfL sub-regional HAM models.



Taking each of the parties in Figure 12.8 in turn, their key responsibilities are as follows:

The Model Owner (TfL Planning):

- Maintains the model – ensuring quality and consistency.
- Accredits users – those users (usually consultancies) who are assessed by TfL as having sufficient knowledge (eg acquired through training) to reliably operate the model on behalf of the study sponsor.
- Manages licenses and agreements relating to individual studies.

The Study Sponsor:

- Typically, the party who requires an initiative to be assessed. May be a range of public or private organisations (eg borough, developer, transport authority).
- Enters into a legal agreement with the Model Owner and (in certain cases) pays a licence fee (no licence fee applies to London Boroughs or the GLA family).
- Is responsible for appointing an Accredited User to act on their behalf.

The Accredited User:

- Has been accredited by TfL as being competent to operate some or all of the models.
- Would typically be a transport consultancy (currently, 18 users are accredited for some or all of the HAM models).
- Undertakes to comply with best practice in using the models.
- Is an active member of TfL's Modelling Forum and undertakes to feed back data, improvements and suggestions arising from specific studies using the models for inclusion in future releases of the model by TfL.

TfL's Modelling Forum

TfL has set up a HAM Modelling Forum which complements the long-established Railplan Forum. The HAM Forum meets approximately four times a year and is attended by accredited model users and TfL as model owner. The purpose of the Forum is to communicate when enhancements have been made to the models and to develop, share and agree best practice in use of the models.

License fees for using the models

Use of the models is free of license fee for the London Boroughs and the GLA family. Developers and others will be subject to licence fees, which are currently as shown in Table 12.2. On this basis, a bigger study might expect to pay license fees in the region of £25-£40k, a smaller study £10k. For the license fee the study sponsor will receive the latest version of the model, a 'reference case' for a suitable future year, and a database containing the key data that underlies the model. This includes, for example, a comprehensive set of observed traffic counts (thereby potentially negating the need for the study sponsor to undertake new counts related to their specific study).

Table 12.2 Current licence fees for model use – applicable to non Borough/GLA family users only.

Model	Licence fee
HAM	£10k
Railplan	£10k
LTS	£15k
LoRDM	£5k

12.8 Contact point for further information

For further information, please contact Planning's Senior Modelling Manager, Chris Hyde.

ChrisHyde01@tfl.gov.uk

Appendix A - Notes and definitions

A1 Administrative areas

Greater London: The area consisting of the 32 London boroughs and the City of London, and administered by the Greater London Authority.

For analysis purposes Greater London is split geographically into Inner and Outer London, using the following allocation of boroughs which is the same as that used for UK National Statistics by the Office for National Statistics:

> **Inner London** consists of the London boroughs of Camden, Hackney, Hammersmith & Fulham, Haringey, Islington, Kensington & Chelsea, Lambeth, Lewisham, Newham, Southwark, Tower Hamlets, Wandsworth, the City of Westminster, and the City of London.
>
> **Outer London** consists of the London boroughs of Barking & Dagenham, Barnet, Bexley, Brent, Bromley, Croydon, Ealing, Enfield, Greenwich, Harrow, Havering, Hillingdon, Hounslow, Kingston upon Thames, Merton, Redbridge, Richmond upon Thames, Sutton, and Waltham Forest.

Inner London may be further divided into central London (see below) and the rest of Inner London. When both central and Inner London are shown separately in tables or figures, it should be understood that results for Inner London exclude central London.

Central London (also known as the Greater London Conurbation Centre or Central Statistical Area) is an area roughly rectangular in shape, bounded by Regent's Park to the north, Whitechapel to the east, Elephant & Castle and Vauxhall to the south, and Kensington Gardens to the west. It is a larger area than the Central London Congestion Charging zone (excluding the Western Extension), and includes the Inner Ring Road and Paddington, Marylebone, Euston and King's Cross rail stations. It is equivalent (apart from minor boundary differences) to the Central Activities Zone (CAZ), as defined for the London Plan.

A2 The London sub-regions

London sub-regions are a useful spatial unit of analysis for transport planning as reflected, for example, in TfL's Sub Regional Plans. TfL's approach is that sub-regions have flexible boundaries, and boroughs will be in more than one sub-region where that makes sense. For statistical purposes only, in order to ensure that journeys are captured only once, sub-regions are defined in this document as the following groupings of boroughs:

Central London sub-region: City of London, and the London boroughs of Camden, Islington, Kensington & Chelsea, Lambeth, Southwark and Westminster.

East London sub-region: The London boroughs of Barking & Dagenham, Bexley, Greenwich, Hackney, Havering, Lewisham, Newham, Redbridge and Tower Hamlets.

North London sub-region: The London boroughs of Barnet, Enfield, Haringey and Waltham Forest.

South London sub-region: The London boroughs of Bromley, Croydon, Kingston upon Thames, Merton, Richmond upon Thames, Sutton and Wandsworth.

West London sub-region: The London boroughs of Brent, Ealing, Hammersmith & Fulham, Harrow, Hillingdon and Hounslow.

A3 Travel - trips and journey stages

A trip is defined as a one-way movement from one place to another to achieve a single main purpose. Round trips are divided so that the return leg is treated as a separate trip. These definitions apply to data from interview surveys such as the London Area Transport Survey and the London Travel Demand Survey.

Trips may be further subdivided into journey stages, the component parts of a trip using a single mode of transport between interchanges. Walking is counted as a separate mode, but walks within single premises or between platforms at interchange stations are not included.

A4 Mode share

A single trip may use several methods or **modes** of transport, which divide the trip into its separate stages. In this way, trip rates can be analysed by **trip main mode**, based on distance: the main mode of a trip is the mode on which the greatest proportion of the total trip distance is travelled. In Tables 2.1 and 2.4 of the report a slightly different definition is used, namely the mode typically used for the longest distance part of the trip.

A5 Trip (or journey) purpose

The purpose of a trip is defined by the activity at the destination, except when the trip is returning home in which case the purpose is defined by the activity at the origin. The following purposes are defined:

Work/commuting - travel to, or from, the respondent's usual place of work;

Employer's business/other work - travel in course of work, or to work at a location that is not the respondent's usual workplace;

Education - travel as a pupil or student to or from school, college or university;

Escort education - accompanying a child to, or from, school;

Shopping and personal business - including shopping and use of services such as hairdressers, dry-cleaners, doctors, dentists, banks, solicitors, etc;

Leisure - travel to, or from, entertainment, sport or social activities;

Other (including escort) - all purposes not otherwise classified, including accompanying or meeting another person if that is the main purpose of the trip.

A6 Weekday time periods

AM peak - morning peak, 07:00 to 10:00.

Inter-peak - 10:00 to 16:00.

PM peak - evening peak, 16:00 to 19:00.

Evening - 19:00 to 22:00.

Night-time - 22:00 to 04:00.

Early am - 04:00 to 07:00.

A7 Work status

Working full-time: People in paid employment normally working for more than 30 hours a week.

Working part-time: People in paid employment working for not more than 30 hours a week.

Self-employed: Those who in their main employment work on their own account, whether or not they have any employees.

A8 Ticket types

Oyster card: A 'smart card' that can be used as a season ticket, such as bus passes and Travelcards, or to pay for travel on a 'pay as you go' basis using credit held on the card. Travelcards on Oyster card are valid on Underground, DLR, trams and National Rail services within chosen zones and across the entire London bus network. Pay as you go is an alternative to paying cash for single or return fares and offers cheaper single fares, daily price capping and ticket extensions automatically. In addition to TfL's usual ticket outlets, season tickets can be renewed and pay as you go credit can be topped-up online or over the telephone.

Season ticket: A ticket valid for unlimited travel over a specified period of time either within specific fare zones or between specified origin and destination stations. A 'season ticket' can be valid for bus travel, National Rail travel, or a Travelcard which is valid for all modes detailed below.

Travelcard: A ticket valid for unlimited travel on National Rail, buses, DLR, London Tramlink and Underground, subject to certain conditions within specific fare zones and for a specified time period. Includes both Travelcard seasons (weekly, monthly or annual tickets) and One Day Travelcards. Underground and National Rail services within Greater London are divided into six fare zones; DLR services operate within Zones 1, 2 and 3. The cost of a ticket depends on the number of zones it covers. Zone 1 covers Central London, approximately the area served by the Circle line.

Bus Pass: A ticket valid for a specified time giving unlimited travel on London bus services. Bus Pass 'seasons' can be weekly, monthly or annual.

Freedom Pass: Concessionary pass issued free by local authorities to London residents aged 60 and above and disabled people, giving unlimited travel within Greater London by National Rail, DLR, London Tramlink, buses and Underground, subject to certain conditions.

Ordinary ticket: Valid for one specific trip (a single ticket) or for two trips to, and from, the same place (a 'return').

A9 Traffic cordons

Locations of traffic counts for monitoring long-run trends in traffic flows are organised to form three cordons (see Figure 2.7 of Travel in London report 2):

Boundary cordon: roughly corresponding to the boundary of Greater London and entirely within the M25 orbital motorway.

Inner cordon: enclosing an area similar to the Inner London boroughs.

Central cordon: a cordon, enclosing central London, situated outside the Inner Ring Road and within a radius of 2.5 to 3 kilometres from Aldwych.

A10 Prices

Retail price index (RPI): Measures the price of a constant basket of goods and services purchased by households in the UK. The RPI is available from the UK National Statistics website (www.statistics.gov.uk).

Headline Fares Index: Tracks the change in the Gross Yield, ie the direct effect of a fares revision assuming passengers would buy the same ticket but at the new fare. This does not allow for switching to other ticket types and is likely to overestimate the increase in average fare actually paid. To construct the index, the percentage increase in Gross Yield, deflated by the headline RPI, is applied to the Headline Fares Index from the previous year. The headline fares index is not reported after 2006/07.

Real London Earnings: The actual gross weekly earnings of adults in full-time employment in Greater London deflated by headline RPI. Gross weekly earnings are based on the New Earnings Survey from 1971 to 1998 and the Annual Survey of Hours and Earnings from 1998/99 and are available from ONS.

Real prices and fares: current price levels converted to a common reference period by adjusting for the effects of inflation as measured by the RPI.

A11 PTAL

Public Transport Accessibility Level (PTAL) is a measure of public transport accessibility reflecting: the access time (by walking) from the point of interest to public transport service access points (for example, bus stops, stations) within a catchment area; the number of different services (eg bus routes, train services) operating at the service access points; and levels of service (ie average waiting times, with an adjustment for the relative reliability of different modes). These components are then used to calculate an accessibility index (PTAI) which is allocated to bands corresponding to Public Transport Accessibility Levels (PTALs). The levels 1a and 1b correspond to a 'very poor', 3 corresponds to 'moderate', 6a and 6b correspond to an 'excellent' level of public transport accessibility, and 0 refers to areas where there are no public transport services within the specified catchment area.

A12 Roads classification

Major roads: Include motorways and all class A (principal) roads.

TLRN: The Transport for London Road Network is those major roads in London for which TfL has direct responsibility, comprising 580 kilometres of London's red routes and other important streets.

Minor roads: B and C classified roads and unclassified roads.

Within London, the London boroughs are responsible for maintenance of minor roads and A roads that are not part of the TLRN.

A13 Glossary of principal sources of data

CAPC Central Area Peak Count: TfL estimates of people entering Central London in the morning peak period, derived from vehicle and passenger counts annually each autumn.

LCF Living Costs and Food Survey (formerly the Expenditure and Food Survey): ONS survey of household expenditure with a sample of about 5,000 households per annum in the UK.

GLBPS Greater London Bus Passenger Survey: Quarterly sample survey of bus boarders on a sample of London bus routes, with associated counts for grossing, used principally for apportionment of Travelcard and Concessionary fare revenues.

IPS International Passenger Survey: ONS sample survey of passengers at UK ports and airports.

LATS London Area Transport Survey 2001: Interviewer-administered sample survey of 30,000 London households, carried out for TfL between January 2001 and April 2002. The survey included a one-day travel diary to collect data on London residents' weekday travel patterns. The data have been expanded to represent the household population of Greater London as measured by the 2001 Census of Population.

LTDS London Travel Demand Survey: Annual sample survey of 8,000 randomly selected households in London and the surrounding area. The survey design and methodology are similar to the LATS 2001 household survey.

LFS Labour Force Survey: ONS quarterly sample survey with a rolling sample of approximately 57,000 households in Great Britain, a major source of information on participation in the labour market.

UKTS United Kingdom Tourism Survey: Survey carried out by the National Tourist Board, of trips undertaken by UK residents. The main results are the number of trips taken, expenditure, and nights spent away from home.

A14 Acronyms of organisations

TfL Transport for London

DfT Department for Transport

DLR Docklands Light Railway

GLA Greater London Authority

LBSL London Bus Services Limited

LRS London River Services

LUL London Underground Limited

(LBSL, LRS and LUL are wholly owned subsidiaries of TfL)

ONS Office for National Statistics

ORR Office of Rail Regulation

A15 Different measurements of travel

There are several different measures of travel in general use, with each able to provide certain unique insights. Much of chapter 2 of this report is based on the concepts of trips or journey stages, as these are most appropriate when considering total travel by both London residents and non-residents. The material in Section 2.10 which looks at London residents' travel through TfL's London Travel Demand Survey, provides the additional opportunity to look specifically at travel in terms of distance travelled and time spent on travelling. Further information on different measures of travel is given below.

Trips

The unit most commonly used to measure travel is the trip. A trip is the movement of an individual person from one place to another to achieve a specific purpose.

> This report prefers the term 'trip' to 'journey' and it always uses 'trip' when the complete movement from origin to destination is meant. This is to distinguish a trip from the related concept of a journey stage (see below). It must be recognised, however, that other reports may use 'journey' in either sense (trip or journey stage), for example, in speaking of bus journeys to mean passenger movements by bus. The reader therefore needs to exercise caution when comparing statistics from different sources.

Depending on the source of data, it may be possible to break down trips into different types of trip purpose: such as travel to and from work, education, shopping or personal business, and a variety of social and leisure activities. In a minority of cases the activity may itself be related to the process of travel. For example, people may make a trip, such as a coach excursion, simply for the pleasure of the journey. Another example would be going for a walk just for exercise. These are both leisure purposes.

Most trips are personal travel, because they are directly related to the needs, aims or objectives of the person making the trip. However, some travel, particularly some travel in course of work, is not considered personal travel: in these cases the purpose of the travel is not to get the traveller themselves to a destination, but to achieve some other objective unrelated to the person. Examples of non-personal travel are bus or taxi drivers when driving at work, and lorry drivers when delivering goods. These trips are routinely excluded from surveys of personal travel. However, if the driver is providing a service at the destination and not just delivering goods, then the trip is deemed to be personal travel.

Journey stages

A single trip may involve more than one mode of transport. For example, a trip to work may consist of a walk to the local station, a train ride to a central London terminus, use of the Underground to reach another part of town and, finally, a further walk from the nearest Underground station to the workplace. The purpose for the travel remains the same - to get to work - and the different modal components usually follow sequentially and immediately from each other, without significant activities being undertaken intermediately.

In this way, trips can be divided up into their component parts, described as journey stages (or just 'stages'). Broadly, a journey stage is a part of a trip that is undertaken by a single means of transport or mode. Thus, a walk to a station to catch a train to another station, followed by an Underground journey and a further walk to a workplace, is one trip consisting of four stages (one rail stage, one Underground stage, and two walk stages).

The precise definition of a journey stage depends on the particular mode of transport, and often reflects differences in the statistical data sources used. Most statistics relating to journey stages are collected through simply counting people at a convenient point in their journey. Counts at station entries (eg of Underground passengers) do not include passengers changing from one line to another within the station, so therefore a single Underground journey stage may consist of components undertaken on more than one Underground line. However, when changing from one bus to another, passengers are counted at each boarding and so each bus boarding is taken to be the start of a new journey stage.

Travel distance and travel time

Other measures of travel activity are the distance travelled and the time taken in travelling. These measures are interesting from several perspectives.

Lengths of individual trips vary considerably, from short walks to local shops to long distance national and international travel. Even within London, there is a wide disparity in journey lengths. Patterns of land use may determine whether people

tend to make lots of short local trips as they work, shop and find their leisure activities in the same locality, or whether they make fewer but longer trips to different areas for work and for leisure. A measure in terms of numbers of trips alone could suggest that the former is leading to higher absolute levels of travel when in fact the reverse may be the case. Furthermore, initiatives to encourage walking and cycling need to recognise that these modes are particularly suited to shorter-distance trips, for example around central London, and should be optimised accordingly.

Simply adding up trips or stages, therefore, misses some of the more subtle changes in travel and their effects. For many purposes, travel distance is a better measure of aggregate travel and of the resources used in travel. For a more complete understanding, however, it will still be necessary to break down the statistics by mode of transport.

Time spent travelling is another useful measure, particularly in understanding variations and trends in travel behaviour. People's travel 'time budget' refers to the amount of time they are prepared to devote to travelling on an average day. Over time, at the national level, mean travel time per person has tended to remain relatively constant while distance travelled has tended to increase, as long-distance travel has become easier with increasing levels of car ownership. Conversely, such constant time budgets may effectively set a limit to the potential for mode switching to slower modes of transport for the same trip.

A16 TfL surveys of customer satisfaction and perception

This section provides a basic description of the TfL's customer satisfaction and perception surveys underlying the material considered in Chapter 9 of this report.

Customer satisfaction data are derived both from a series of established TfL surveys - designed to explore satisfaction with public transport and the road network – and a survey used since 2009 to understand aspects of people's perceptions of journey experience and the urban realm.

In all cases, survey respondents are instructed to rate their satisfaction with the measure in question on a scale from 0 to 10, where 10 represents 'extremely satisfied'. These scores have been converted to a mean score out of 100. TfL has carried out customer satisfaction research over a considerable time and has developed an indicative interpretation of these scores, as shown below. The focal point for analysis is the assessment of trends in scores over time and the comparison of one set of scores against another.

TfL's interpretation of customer satisfaction scores.

Score	Interpretation
Under 50	Very Poor
50 to 54	Poor
55 to 64	Fairly Poor
65 to 69	Fair
70 to 79	Fairly Good
80 to 84	Good
85 to 89	Very Good
90 or more	Excellent

Public transport customer satisfaction

This indicator is derived from customer satisfaction surveys carried out with travellers on the major modes of public transport managed by TfL. Survey respondents were asked to rate their overall satisfaction with the service provided on a scale of 0 to 10, where 10 represents 'extremely satisfied'. Responses have subsequently been converted to a mean score out of 100 and a composite measure created by combining modal results based on the mode share.

Road user customer satisfaction

The indicator is derived from the Transport for London Road Network (TLRN) User Satisfaction Survey. This survey was conducted for the first time in October and November 2010. 3,175 TLRN users were interviewed, including 2,754 London residents and 421 residents of South East England. The survey was carried out online amongst people who had used the TLRN in the previous month by car, bus, powered two wheeler, taxi, commercial or emergency vehicle, bicycle or as a pedestrian. Weights have been applied to the dataset to reflect gender and volumes by corridor.

Perception of journey experience

This indicator is defined as the 'overall level of satisfaction of London residents, on a scale of 0 to 10, with travelling in London'. Responses are converted to a mean score out of 100. The indicator is derived from TfL's Perceptions of the Travel Environment survey. The most recent survey was carried out in summer 2011. The survey consists of telephone interviews of a representative sample of 1,000 London residents selected randomly within each household sampled.

The indicator should be considered in the light of measures of satisfaction with individual modes and with public and road transport overall. Account should also be taken of perceptions of journey experience on the respondents last journey, which tend in these surveys to be more positively recounted than their evaluation of journey experience overall.

Perception of the urban realm

This indicator is defined as the 'level of satisfaction of London residents, on a scale of zero to 10, with the quality of streets, pavements and public places in the area where they live'. Responses are converted into a mean score out of 100. The indicator is derived from TfL's Perceptions of the Travel Environment survey, the methodology of which is described above.

A17 The year at a glance

Appendix B - Borough Local Implementation Plan (LIP) performance indicators

B1 Monitoring of borough LIPs

Under Section 145 of the GLA Act 1999, each London borough is required to produce a Local Implementation Plan (LIP) setting out how it intends to contribute towards the implementation of the Mayor's Transport Strategy. As well as outlining the borough's local transport objectives, a LIP should detail the specific interventions and schemes intended to contribute towards meeting the MTS goals, challenges and opportunities. A clear strategy for monitoring performance should also be included.

As part of the process of monitoring LIPs, progress will be tracked against seven strategic performance indicators on which boroughs are required to set locally specific targets. These seven indicators - on mode share, bus service reliability, road traffic casualties, CO_2 emissions and asset (highway) condition - all relate to key priorities within the MTS over which London boroughs have a degree of influence. Data for each of the indicators are reported within TfL's Travel in London reports on an annual basis.

This section sets out updated data for the LIP performance indicators for 2010 and 2010/11.

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Table B.1 Londoners' trips by borough of origin, trips per day and shares by main mode, average day (7-day week) 2008/09 to 2010/11

Three-year average data showing the mode share for London residents for trips originating in each borough, from TfL's London Travel Demand Survey.

Table B.2 Bus service reliability indicator: mean excess waiting time by borough for all high-frequency routes, 1999/00, 2009/10 and 2010/11

Data from TfL London Buses, based on Quality of Service Indicators.

Table B.3 Road casualties, number of people killed or seriously injured in road traffic accidents by borough, 2008 to 2010

Table B.4 Road casualties, number of people slightly injured in road traffic accidents by borough, 2008 to 2010

Data from TfL Research and Analysis - Deliver Planning, using the STATS 19 form.

Table B.5 Locally generated CO_2 emissions by borough: principal sources and per capita emissions for resident population, 2009

Data from GLA's London Energy and Greenhouse Gas Inventory (LEGGI). This is planned to be updated on an approximately annual cycle. The data underpinning this indicator differ from those specified for the Department of Energy and Climate Change's (DECC) national inventory in that the LEGGI inventory provides more detailed and appropriate data for use by London boroughs in the context of the implementation of the Mayor's Transport Strategy. The London emissions inventories are currently in the process of being updated to reflect the position in 2010. Borough level values for CO_2 emissions will be disseminated directly in spring 2012.

Table B.6 Highway Asset Condition

This indicator monitors the proportion of principal road carriageway where maintenance should be considered, based on the percentage of length of the network with a RCI score of 70+ derived from Detailed Visual Inspection survey data.

Table B.1 Londoners' trips by borough of origin, trips per day and shares by main mode, average day (seven-day week) 2008/09 to 2010/11.

London borough	Trips per day (000s)	Percentage of trips by main mode							
		Rail	Under-ground /DLR	Bus/ tram	Taxi/ Other	Car/ motor -cycle	Cycle	Walk	All modes
Camden	756	5%	15%	15%	2%	17%	3%	44%	100%
City of London	249	21%	25%	8%	3%	6%	3%	33%	100%
Hackney	384	4%	4%	27%	2%	19%	5%	40%	100%
Hammersmith & Fulham	476	2%	14%	16%	1%	24%	5%	37%	100%
Haringey	474	2%	9%	21%	1%	31%	1%	35%	100%
Islington	495	5%	11%	20%	1%	17%	4%	41%	100%
Kensington & Chelsea	490	2%	14%	14%	4%	23%	3%	40%	100%
Lambeth	546	7%	10%	23%	1%	26%	4%	30%	100%
Lewisham	451	10%	2%	19%	1%	37%	2%	30%	100%
Newham	551	2%	10%	16%	1%	31%	1%	38%	100%
Southwark	511	7%	8%	25%	1%	25%	3%	30%	100%
Tower Hamlets	527	4%	16%	15%	2%	20%	2%	41%	100%
Wandsworth	572	7%	6%	19%	1%	33%	3%	30%	100%
Westminster	1,179	7%	20%	14%	3%	13%	2%	40%	100%
Inner London	**7,661**	**6%**	**12%**	**18%**	**2%**	**23%**	**3%**	**37%**	**100%**
Barking & Dagenham	286	2%	5%	19%	0%	40%	1%	32%	100%
Barnet	755	1%	5%	12%	0%	50%	1%	31%	100%
Bexley	310	5%	0%	8%	1%	58%	0%	28%	100%
Brent	624	2%	8%	16%	1%	44%	1%	28%	100%
Bromley	684	6%	0%	9%	1%	56%	1%	27%	100%
Croydon	677	6%	0%	18%	0%	47%	1%	28%	100%
Ealing	597	2%	8%	16%	1%	45%	2%	26%	100%
Enfield	564	3%	3%	14%	0%	53%	0%	25%	100%
Greenwich	382	5%	3%	16%	1%	44%	1%	30%	100%
Harrow	416	1%	7%	11%	1%	53%	1%	27%	100%
Havering	470	4%	2%	14%	1%	55%	1%	22%	100%
Hillingdon	565	1%	5%	11%	2%	54%	2%	25%	100%
Hounslow	488	2%	4%	15%	0%	47%	4%	28%	100%
Kingston upon Thames	382	6%	1%	12%	1%	46%	3%	33%	100%
Merton	424	6%	5%	11%	1%	47%	2%	28%	100%
Redbridge	518	2%	6%	13%	0%	50%	1%	28%	100%
Richmond upon Thames	454	6%	2%	12%	1%	42%	4%	33%	100%
Sutton	379	5%	1%	11%	1%	53%	1%	28%	100%
Waltham Forest	370	3%	8%	16%	1%	40%	1%	32%	100%
Outer London	**9,343**	**4%**	**4%**	**13%**	**1%**	**49%**	**2%**	**28%**	**100%**
Greater London	**17,004**	**5%**	**8%**	**15%**	**1%**	**37%**	**2%**	**32%**	**100%**

Note: Whilst these data are provided annually, based on moving 3-year samples, the data to be used for monitoring performance towards achievement of targets will be for discrete (non-overlapping) three year blocks, in order to reduce statistical sampling error.

Table B.2 Bus service reliability indicator: mean excess waiting time by borough for all high-frequency routes, 1999/00, 2009/10 and 2010/11.

London borough	1999/2000 EWT	2009/2010 EWT	2010/2011 EWT
Barking & Dagenham	1.6	1.2	1.0
Barnet	2.1	1.0	0.9
Bexley	1.5	1.0	0.9
Brent	2.3	1.2	1.0
Bromley	1.9	1.0	1.0
Camden	2.3	1.2	1.1
City of London	2.3	1.2	1.1
Croydon	2.0	1.0	0.9
Ealing	2.1	1.2	1.0
Enfield	2.0	1.0	0.9
Greenwich	1.7	1.0	0.9
Hackney	2.2	1.2	1.1
Hammersmith & Fulham	2.4	1.2	1.1
Haringey	2.1	1.0	1.0
Harrow	2.0	1.0	0.9
Havering	1.3	1.1	1.0
Hillingdon	2.2	1.0	0.9
Hounslow	2.0	1.1	1.1
Islington	2.1	1.2	1.0
Kensington & Chelsea	2.5	1.2	1.2
Kingston upon Thames	1.8	1.1	1.2
Lambeth	2.3	1.2	1.1
Lewisham	2.2	1.2	1.0
Merton	2.1	1.1	1.2
Newham	1.8	1.2	1.1
Redbridge	1.9	1.3	1.0
Richmond upon Thames	2.0	1.2	1.1
Southwark	2.3	1.2	1.1
Sutton	1.9	1.0	1.2
Tower Hamlets	2.1	1.2	1.1
Waltham Forest	1.8	1.3	1.1
Wandsworth	2.3	1.1	1.2
Westminster	2.4	1.2	1.1
Greater London	2.1	1.1	1.0

Note: Based on "legacy" QSI system results, with routes measured at all points along the route (not just within specific borough). Results from next year will be based on iBus data based solely on results from QSI points within each borough

Table B.3 Road casualties, number of people killed or seriously injured in road traffic accidents by borough, 2008 to 2010.

	Year					% change from	
	1994-1998 average	2008	2009	2010	2008 to 2010 average	2009 to 2010	1994-1998 average to 2010
Barking & Dagenham	150	63	45	48	52	7%	-68%
Barnet	269	136	137	132	135	-4%	-51%
Bexley	146	73	82	68	74	-17%	-53%
Brent	244	97	101	84	94	-17%	-66%
Bromley	241	140	127	90	119	-29%	-63%
Camden	250	123	141	112	125	-21%	-55%
City of London	65	51	46	41	46	-11%	-37%
Croydon	247	132	107	87	109	-19%	-65%
Ealing	287	113	126	85	108	-33%	-70%
Enfield	236	85	97	98	93	1%	-58%
Greenwich	200	126	99	104	110	5%	-48%
Hackney	209	162	103	103	123	0%	-51%
Hammersmith & Fulham	149	94	93	74	87	-20%	-50%
Haringey	161	80	98	79	86	-19%	-51%
Harrow	122	52	49	39	47	-20%	-68%
Havering	212	84	75	63	74	-16%	-70%
Hillingdon	255	107	88	83	93	-6%	-67%
Hounslow	226	102	101	97	100	-4%	-57%
Islington	186	75	77	81	78	5%	-56%
Kensington & Chelsea	171	113	94	80	96	-15%	-53%
Kingston upon Thames	124	65	52	46	54	-12%	-63%
Lambeth	313	164	173	156	164	-10%	-50%
Lewisham	206	113	112	108	111	-4%	-48%
Merton	130	64	55	39	53	-29%	-70%
Newham	190	88	93	81	87	-13%	-57%
Redbridge	187	83	69	76	76	10%	-59%
Richmond upon Thames	135	64	56	72	64	29%	-47%
Southwark	239	165	127	165	152	30%	-31%
Sutton	116	74	57	49	60	-14%	-58%
Tower Hamlets	187	146	105	91	114	-13%	-51%
Waltham Forest	170	104	61	67	77	10%	-61%
Wandsworth	255	116	120	102	113	-15%	-60%
Westminster	409	272	261	186	240	-29%	-55%
Greater London	**6,684**	**3,526**	**3,227**	**2,886**	**3,213**	**-11%**	**-57%**

Table B.4 Road casualties, number of people slightly injured in road traffic accidents by borough, 2008 to 2010.

		Year				% change from	
	1994-1998 average	2008	2009	2010	2008 to 2010 average	2009 to 2010	1994-1998 average to 2010
Barking & Dagenham	781	552	479	497	509	4%	-36%
Barnet	1,773	1,086	1,266	1,388	1,247	10%	-22%
Bexley	798	559	550	521	543	-5%	-35%
Brent	1,361	688	748	844	760	13%	-38%
Bromley	1,232	725	750	726	734	-3%	-41%
Camden	1,431	730	767	852	783	11%	-40%
City of London	411	328	297	339	321	14%	-18%
Croydon	1,632	997	1,035	1,035	1,022	0%	-37%
Ealing	1,614	887	953	968	936	2%	-40%
Enfield	1,504	769	925	977	890	6%	-35%
Greenwich	1,147	795	773	748	772	-3%	-35%
Hackney	1,098	816	819	795	810	-3%	-28%
Hammersmith & Fulham	930	581	629	616	609	-2%	-34%
Haringey	1,010	663	831	905	800	9%	-10%
Harrow	728	418	459	512	463	12%	-30%
Havering	1,096	848	673	730	750	8%	-33%
Hillingdon	1,337	853	883	997	911	13%	-25%
Hounslow	1,352	828	778	878	828	13%	-35%
Islington	1,114	606	734	752	697	2%	-32%
Kensington & Chelsea	1,005	716	671	712	700	6%	-29%
Kingston upon Thames	678	388	409	381	393	-7%	-44%
Lambeth	1,832	1,023	1,112	1,137	1,091	2%	-38%
Lewisham	1,390	767	860	830	819	-3%	-40%
Merton	711	457	420	419	432	0%	-41%
Newham	1,119	989	853	830	891	-3%	-26%
Redbridge	1,199	754	699	862	772	23%	-28%
Richmond upon Thames	715	403	389	403	398	4%	-44%
Southwark	1,543	1,024	981	984	996	0%	-36%
Sutton	718	490	426	432	449	1%	-40%
Tower Hamlets	1,023	957	787	879	874	12%	-14%
Waltham Forest	1,028	823	675	719	739	7%	-30%
Wandsworth	1,302	775	812	922	836	14%	-29%
Westminster	2,384	1,332	1,309	1,413	1,351	8%	-41%
Greater London	**38,997**	**24,627**	**24,752**	**26,003**	**25,127**	**5%**	**-33%**

Table B.5 Locally generated CO_2 emissions by borough: principal sources (thousands of tonnes per year) and per capita emissions (tonnes) for resident population, 2009.

London Borough	Road transport	Ground-based aviation	Other transport	Total ground-based transport	% change in ground-based transport emissions (2008-2009)	Population ('000s)	Ground-based transport tonnes per capita
Barking & Dagenham	144	-	6	150	-4%	176	0.9
Barnet	369	0	18	387	-4%	343	1.1
Bexley	210	5	6	221	-5%	226	1.0
Brent	204	0	17	222	-4%	256	0.9
Bromley	257	1	5	264	-7%	310	0.9
Camden	147	-	16	164	-5%	231	0.7
City of London	45	-	0	45	-5%	12	3.8
Croydon	244	0	6	250	-7%	343	0.7
Ealing	275	46	63	383	-3%	317	1.2
Enfield	318	0	3	321	-4%	291	1.1
Greenwich	207	3	3	212	-5%	226	0.9
Hackney	121	-	2	123	-7%	216	0.6
Hammersmith & Fulham	130	0	17	148	-5%	170	0.9
Haringey	144	-	5	149	-9%	226	0.7
Harrow	143	0	7	150	-5%	228	0.7
Havering	335	3	8	346	-3%	234	1.5
Hillingdon	378	1,124	40	1,541	-1%	263	5.9
Hounslow	301	41	2	344	-3%	234	1.5
Islington	118	-	4	122	-6%	192	0.6
Kensington & Chelsea	115	0	11	127	1%	170	0.7
Kingston	166	-	2	168	-5%	167	1.0
Lambeth	162	-	4	166	-8%	283	0.6
Lewisham	174	-	7	181	-8%	265	0.7
Merton	150	-	3	153	-6%	206	0.7
Newham	179	30	5	214	-9%	241	0.9
Redbridge	256	0	3	259	-3%	268	1.0
Richmond	186	94	1	281	-5%	189	1.5
Southwark	201	1	4	205	-9%	286	0.7
Sutton	116	0	0	117	-3%	192	0.6
Tower Hamlets	193	9	3	205	-6%	235	0.9
Waltham Forest	173	-	2	175	-1%	224	0.8
Wandsworth	191	-	6	197	-8%	287	0.7
Westminster	289	1	14	305	-1%	249	1.2
Greater London	**6,642**	**1,359**	**294**	**8,295**	**-4%**	**7,754**	**1.1**

Table B.6 Highway Asset Condition - the percentage of the principal road network length which is in poor overall condition and requires maintenance based on Detailed Visual Inspection survey data.

London Borough	2006/07	2007/08	2008/09	2009/10	2010/11
Barking & Dagenham	4.0	3.0	2.9	4.8	5.4
Barnet	6.0	6.5	5.2	3.0	4.2
Bexley	8.0	7.2	5.9	6.4	4.8
Brent	12.0	8.9	8.3	7.9	7.2
Bromley	10.0	7.6	6.5	5.7	5.5
Camden	12.0	12.8	9.7	6.6	5.5
City of London	13.0	12.3	12.6	9.0	8.4
Croydon	6.0	4.2	3.8	3.3	5.2
Ealing	12.0	8.6	8.7	10.8	9.7
Enfield	12.0	9.9	9.2	9.0	9.5
Greenwich	8.0	6.3	6.0	3.7	5.1
Hackney	12.0	6.8	7.1	8.8	10.2
Hammersmith & Fulham	11.0	8.6	7.7	8.4	7.2
Haringey	8.0	7.5	7.6	6.6	7.0
Harrow	10.0	7.7	7.0	7.7	8.3
Havering	6.0	4.1	3.9	3.1	3.5
Hillingdon	7.0	6.3	5.8	4.3	4.8
Hounslow	13.0	9.0	6.9	7.1	7.4
Islington	13.0	13.4	9.1	4.9	5.6
Kensington & Chelsea	4.0	4.0	2.9	2.4	2.6
Kingston	3.0	2.5	2.2	2.4	3.4
Lambeth	17.0	15.6	10.0	9.5	9.1
Lewisham	7.0	6.4	6.6	10.6	10.8
Merton	13.0	9.7	8.1	9.3	9.4
Newham	10.0	6.8	6.3	5.5	5.6
Redbridge	7.0	4.8	4.4	4.2	4.1
Richmond	22.0	16.4	15.3	14.2	13.7
Southwark	16.0	15.3	14.7	11.1	10.3
Sutton	7.0	6.5	5.7	7.5	8.8
Tower Hamlets	13.0	13.4	9.0	9.2	11.0
Waltham Forest	12.0	8.9	7.2	7.6	7.6
Wandsworth	5.0	5.2	4.7	6.9	6.6
Westminster	8.0	6.8	6.2	4.5	4.7
Greater London	**9.5**	**8.0**	**7.0**	**6.5**	**6.7**

Note: Please note that the data in Table B.6 are based on Detailed Visual Inspection (DVI) data. Data given previously in Travel in London report 2 were based on Coarse Visual Inspection (CVI) data. DVI data for 2008/09 are therefore reproduced in the above table.