
# Mayor's Transport Strategy: Supporting Evidence Challenges & Opportunities

June 2017

TRANSPORT FOR LONDON
EVERY JOURNEY MATTERS

# Introduction

This is the summary of the evidence base underpinning the Mayor's Transport Strategy


The Mayor's Transport Strategy is the statutory document that sets out the Mayor of London, Sadiq Khan's, policies and proposals to reshape transport in London over the next 25 years. It is an ambitious strategy that puts people's health and quality of life at the very heart of planning the city's transport. Along with the new London Plan and the Mayor's other strategies for economic development, the environment, housing, health inequalities and culture, it provides the blueprint for making London a city that is not only home to more people, but is a better place for all of those people to live in.

TfL has collected evidence to identify the challenges and opportunities facing London's transport network over the next 25 years. This has formed the basis of the strategy development process, and helps us understand why the priorities and policies outlined in the strategy are relevant and necessary for London. The analytical work presented here includes analysis of past trends, current conditions and modelling of possible futures. It looks at the challenges facing London from the perspective of those who live and work in the city, as well as in terms of the operation of the transport network itself.

The key conclusion is that for London to grow and thrive, it is essential that London's residents, workers and visitors do more walking and cycling and use public transport more to improve their health and the environment, to make streets work more efficiently & keep London moving.

# Contents

This report presents evidence on how London has changed since 2000 and also describes the key challenges and opportunities facing London today and in future. The report presents analysis and forecasts of the expected future conditions in London without the implementation of the Mayor's Transport Strategy. The report is structured as follows:


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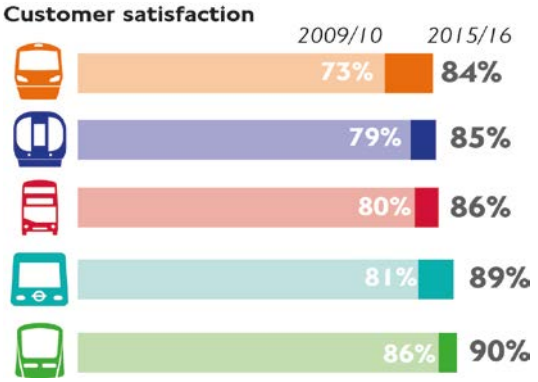
# How London has changed since 2000

# London's transport network has been transformed since 2000, delivering a better experience for customers

Since TfL was formed in 2000 and the first Mayor of London was elected, London has experienced unprecedented population growth, supported by an expanding and improving transport network. All public transport modes have seen significant increases in capacity and service quality; with innovations on the street network such as congestion charging, cycle hire and superhighways, and technological innovation from Oyster to apps.




In 2015/16 the Underground carried a total of **1.35 billion journeys,** 39% higher than 2000/01. Consistently **more than 97% of scheduled services were operated** in 2015/16 against 92% in 2000/01.

Buses carried **2.3 billion journeys in 2015/16**, 71% higher than in 2000/01. **Bus service reliability has improved by 46%** over the period, although recently reliability and patronage have suffered in line with a rise in general traffic congestion.

National Rail (by London and South East operators) carried **1.2 billion journeys in 2015/16**, 78% higher than in 2000/01, an average annual growth rate of 4%. General reliability has also improved.

The volume of **road traffic in London in 2015 was 10% lower than in 2000**. The reduction was particularly intense in central London, at 21%, but there were also significant falls in both inner and outer London since 2000 (17% and 6% respectively) .

Over the same period, **speeds fell by 8%** although consistently between 87% and 90% of journeys on London's major roads were completed within five minutes of the 'expected' time.

The number of cycle journeys has **increased by 133% since 2000/01**. The amount of walking has also grown considerably, reflecting the shift from car to public transport.

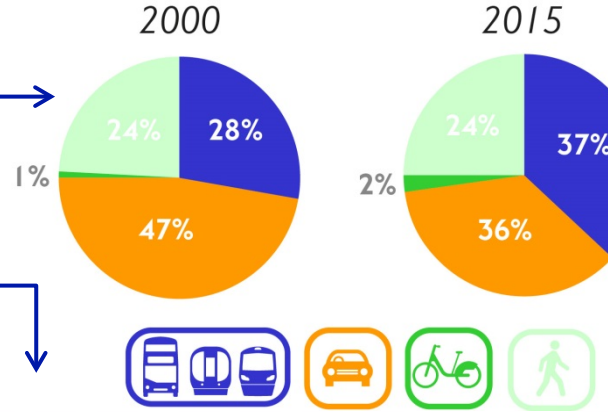
# Since 2000, there has been substantial mode shift away from the car, bucking national trends for many years

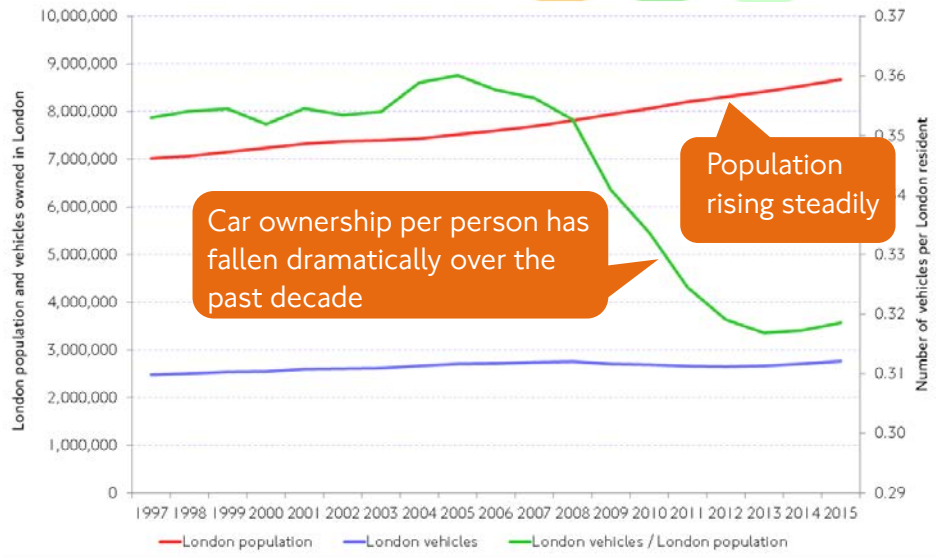
London has grown rapidly in recent years, leading to increased demand on the transport system. In 2015, London's population stood at 8.7 million – higher than the previous record level of 8.6 million in 1939. An average of 26.7 million trips per day were made in London in 2015 – an 18% increase from 2000.

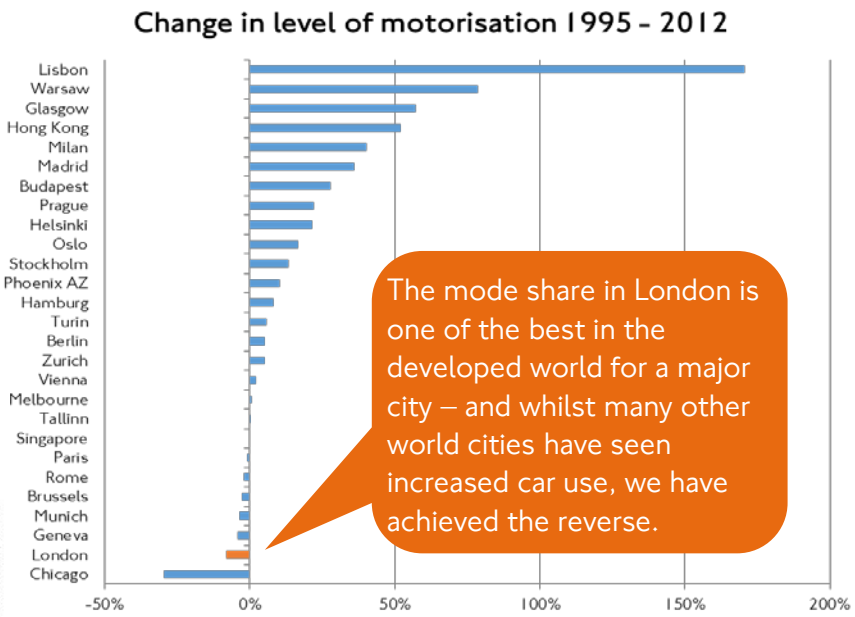
Alongside this growth in travel demand, London has achieved an unprecedented 10.4 percentage point shift in mode share away from the private car towards public transport, walking and cycling – reflecting sustained investment in these modes, limits on the capacity of the road network, and wider structural, social and behavioural factors. This shows that change is possible, but the recent rise in car traffic is an urgent reminder that much more needs to be done to deliver mode shift from the car.

Mode shares, trips in London

Population, vehicles & ownership rates




Over this period, London has become one of the most sustainable major cities in terms of mode share. Motorisation, defined as cars per thousand inhabitants, fell in London from 334 in 1995 to 307 in 2012.

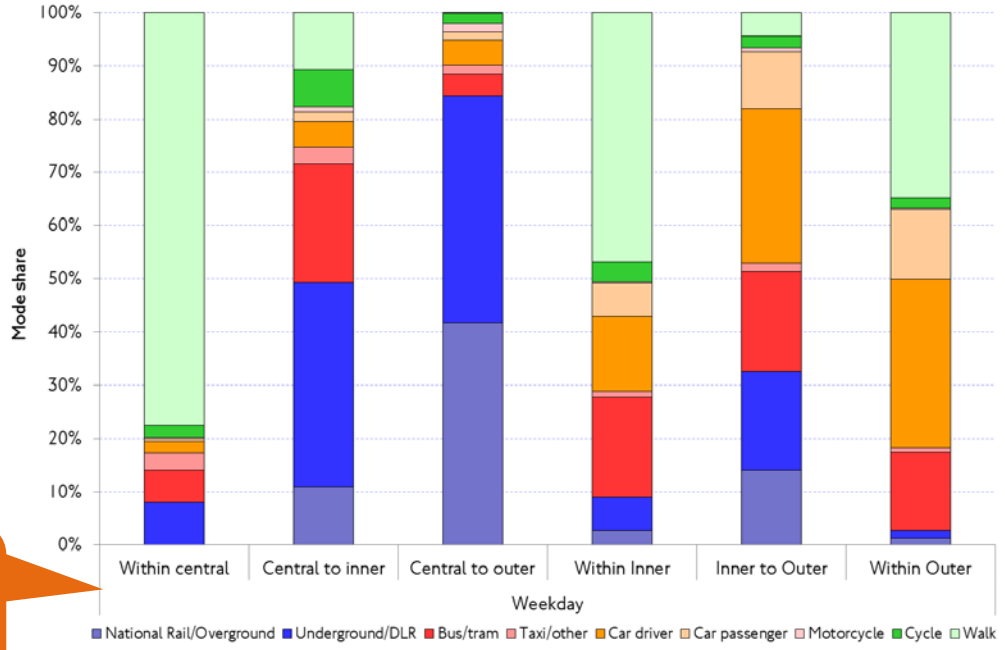
Of the cities that participate in the UITP comparison study, London is now the least motorised developed city other than Hong Kong and Singapore.

# The car mode share is higher in outer London and during evenings and weekends

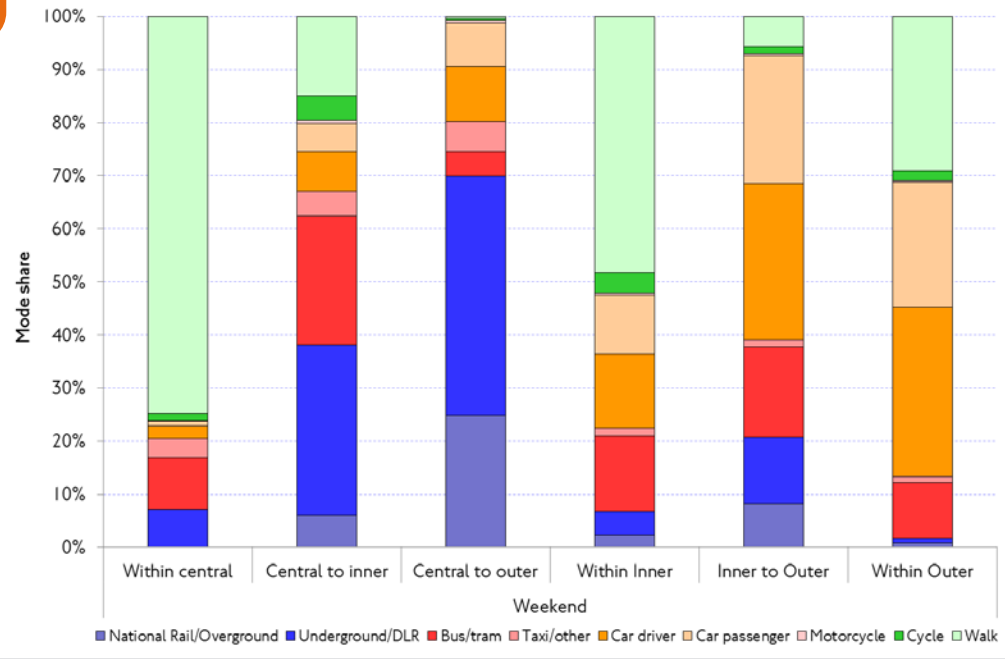
The volume and share of car travel varies considerably by place and time, with the majority (58%) of car trips made by London residents taking place in outer London.

London residents are more likely to walk and use their cars at the weekend, and more likely to travel by public transport during the week.

**Weekday** mode share by origin and destination (London residents)




**Weekend** mode share by origin and destination (London residents)




### Purpose

Mode shares differ depending on the purpose of the trip, with commute and education trips more likely to be on public transport and other work trips more likely to be driven.

### Time of day

The car mode share is highest in the evening and overnight, and lowest in the daytime interpeak.

### Distance

The car mode share is highest for middle distance trips (2-5km), with longer trips more likely to be made by public transport (PT).

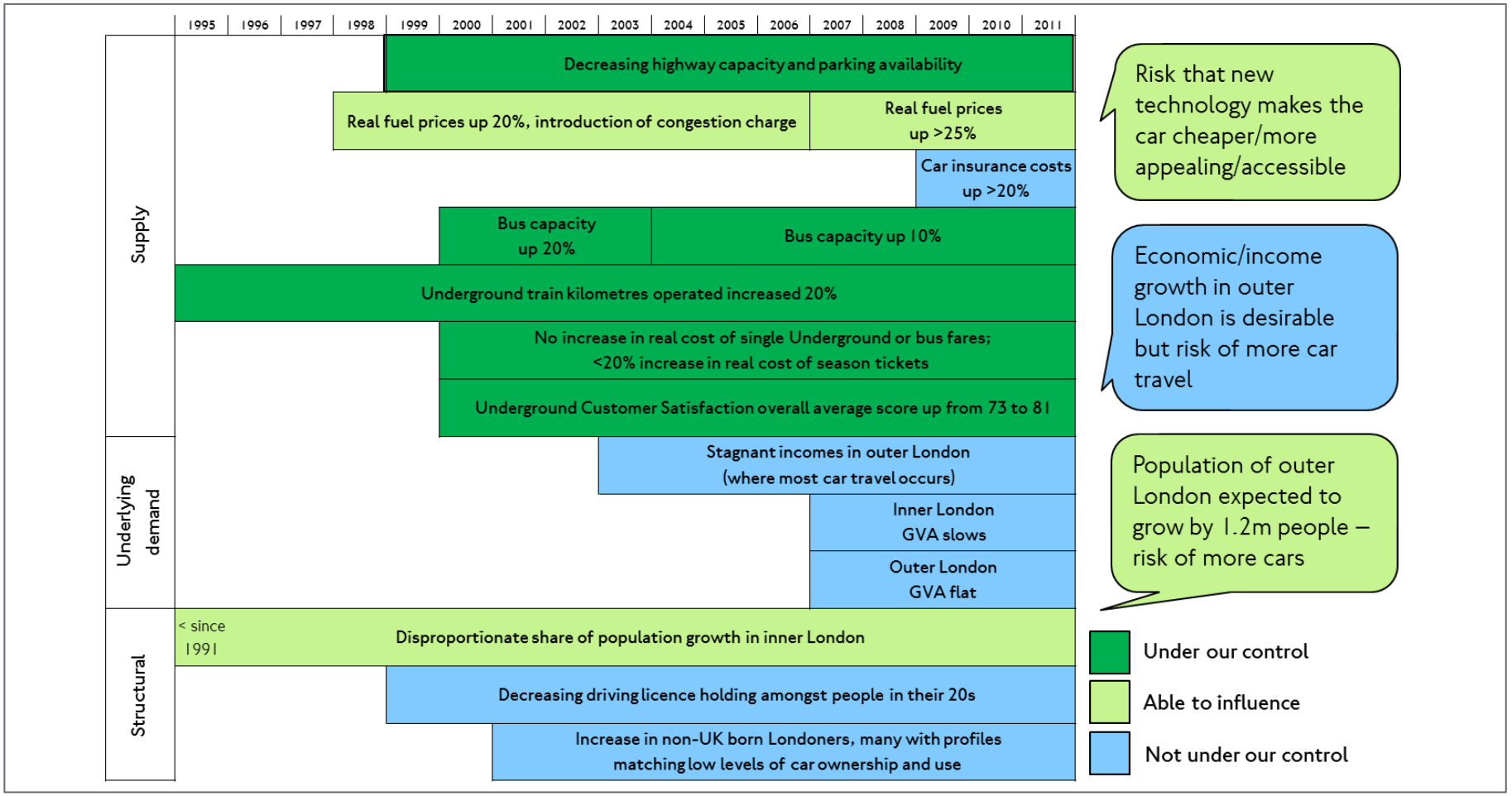
# Mode shift from the car was driven by investment in the alternatives but also by factors beyond the transport system

**Supply:** Improvements to public transport capacity and quality whilst keeping fares low increased demand. Highway capacity was eroded and the cost of motoring rose.

**Demand:** Generally, car travel rises with income; and the majority of car travel is in outer London, where incomes haven't increased since 2003.

**Structure:** The population has also changed. Young people are much less likely to hold a driving licence than in the past. In-migration rose, with migrants being less likely to drive.

In future, travel patterns will be influenced by what we do, but also by factors outside our control. There is emerging evidence that car traffic is increasing, suggesting the balance of factors influencing demand may be changing.






Note: GVA stands for Gross Value Added and is a measure of economic growth

# A growing city

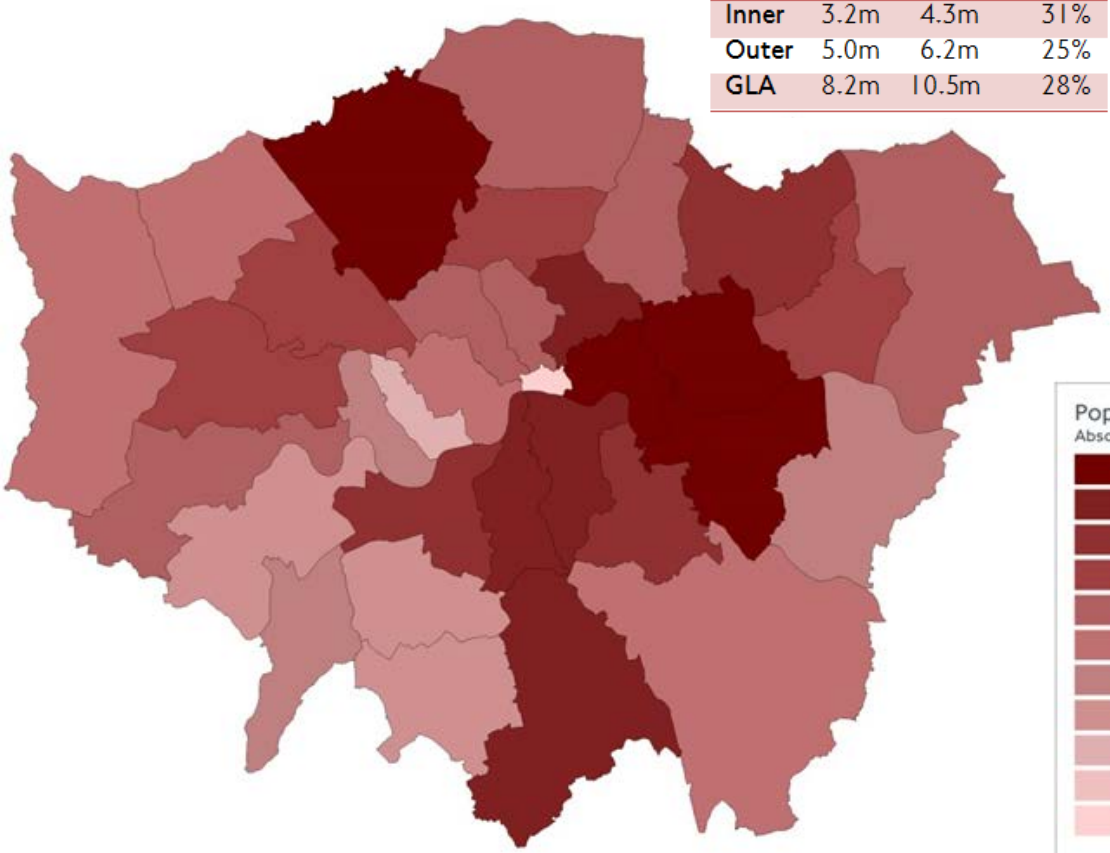
# London is growing rapidly, with the population expected to reach 10.5m by 2041

London is bigger than it has ever been and growing rapidly with the population expected to be 10.5m by 2041. This is 28% higher than in 2011 and is equivalent to adding the combined populations of Birmingham and Glasgow during this time.

The composition of London's population is also expected to change, altering the emphasis of future demand pressures on the transport networks. In particular, there will be an increase in the numbers of older people – particularly focused in outer London – leading to increased demand for accessible services.

East London will experience the most growth, with much of the growth taking place within Opportunity and Growth Areas.

| Popn | 2011 | 2041 | Change |
|---|---|---|---|
| Inner | 3.2m | 4.3m | 31% |
| Outer | 5.0m | 6.2m | 25% |
| GLA | 8.2m | 10.5m | 28% |




The recent 'baby boom' will stabilise, giving net natural change of +80,000 per year.

By 2041, the number of Londoners over 70 will have grown by 85%.

More people will leave London than arrive, with net out-migration of 20,000 per year.

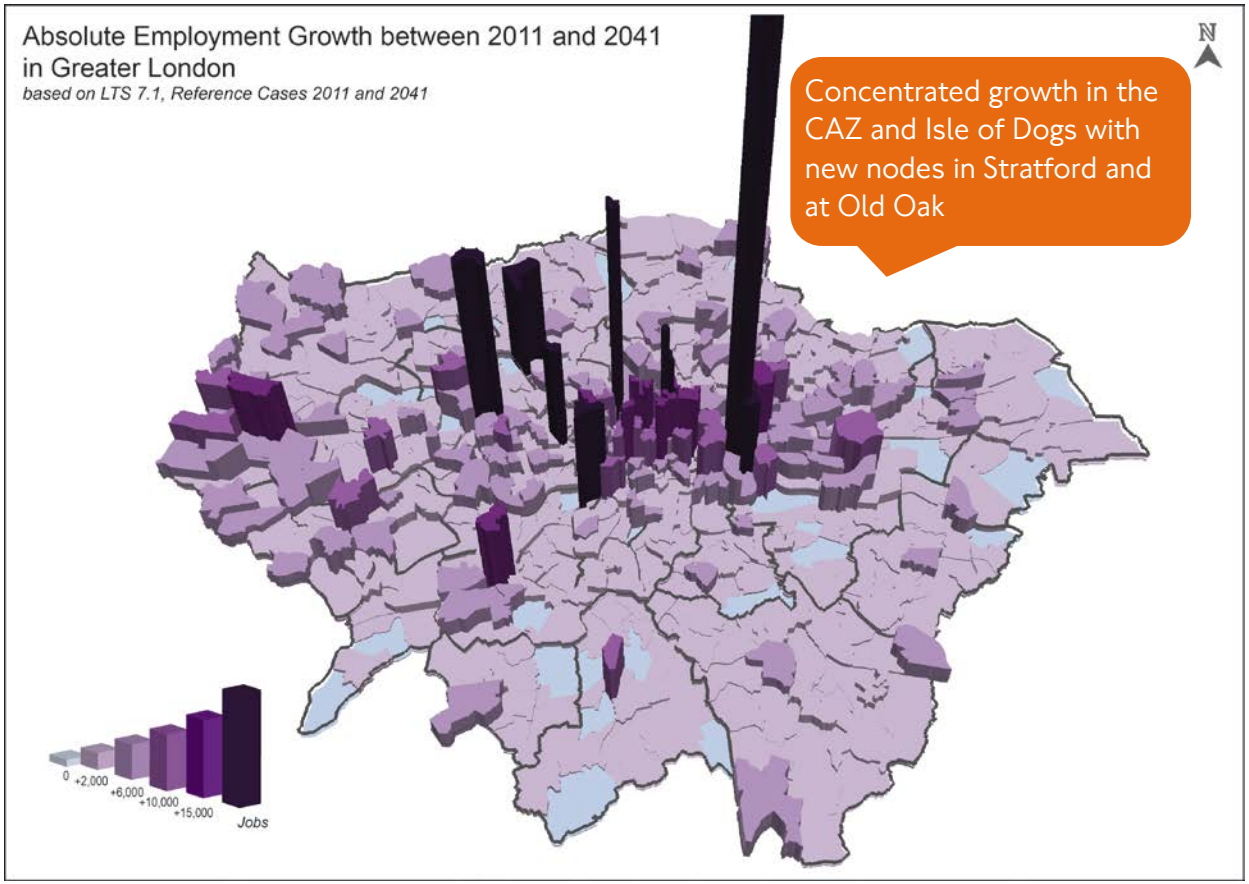
# Employment is expected to grow by more than a million additional jobs by 2041, concentrated in the Central Activities Zone

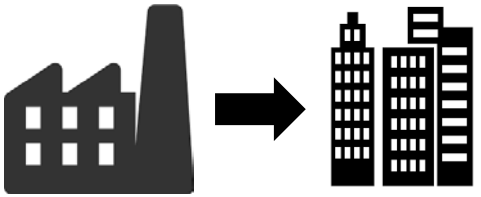
London's employment has grown from 4.6 million jobs in 2000 to 5.7 million in March 2016 and is projected to grow to 6.25 million by 2031 and 6.75 million by 2041.

Agglomeration will see employment growth concentrated in the central area. 1.4 million jobs are expected in the City of London and Westminster alone.

Tower Hamlets – containing Canary Wharf and the Isle of Dogs – will contain 450,000 jobs. Stratford and Old Oak also have the potential to become major hubs.

The Opportunity Areas will also play a key role in supporting London's growth, with the potential capacity to support nearly 600,000 jobs.



Over the past 15 years manufacturing has been declining and jobs in professional services have been increasing – this is expected to continue. The switch from lower to higher density employment is expected to lead to an increase in commuting by public transport and a fall in commuting by car.

Nevertheless, a third of jobs are in outer London, with a 56% car mode share for commuting. As London grows, we need to ensure more sustainable commuter patterns for travel beyond the centre.

# The Reference Case assesses what could happen based on growth forecasts, trends and the funded programme

**The MTS relies upon an understanding of what could happen in the future *without* the measures proposed in the draft strategy.**
A Reference Case has been produced to build on our understanding of current travel and present possible future travel volumes, distribution and mode share. This has formed the basis of analysis identifying the challenges and opportunities facing London and its transport network over the period to 2041.

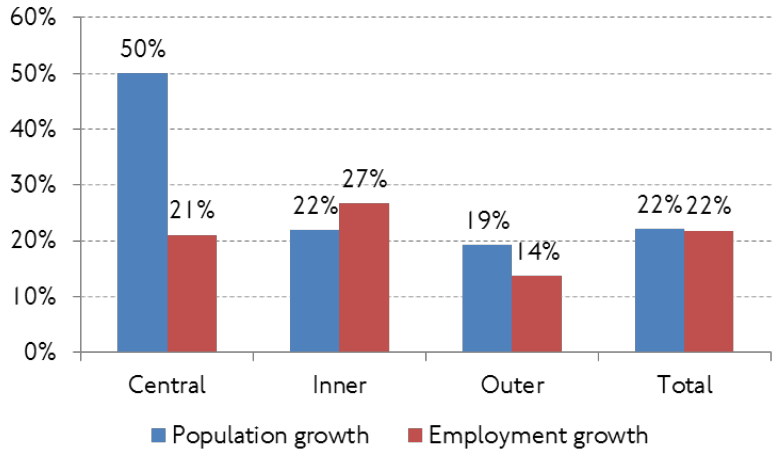
The Reference Case is based upon:

1. GLA population and employment projections
2. The funded programme of investment from TfL and other transport providers
3. Wider assumptions about policies relating to aspects such as fares, fuel costs and car parking, including an assumption that ongoing investment will facilitate continued growth in cycle travel.

**Population and employment growth forecasts**

| | Population | | Employment | |
|---|---|---|---|---|
| | 2015 (m) | 2041 (m) | 2015 (m) | 2041 (m) |
| Central London | 0.2 | 0.3 | 1.9 | 2.3 |
| Inner London | 3.2 | 3.9 | 1.5 | 1.9 |
| Outer London | 5.2 | 6.2 | 2.2 | 2.5 |
| Greater London | 8.7 | 10.5 | 5.6 | 6.7 |

**Population and employment growth 2015 to 2041**




**The funded programme includes the following major schemes:**

- The opening of the Elizabeth line from 2019
- Northern line extension to Battersea and Nine Elms and upgrades of the Jubilee, Victoria, Northern and sub-surface lines
- Capacity and frequency enhancements, and electrification of the Gospel Oak to Barking line
- Capacity and frequency enhancements
- Delivery of the HLOS and Thameslink upgrade schemes

**Key assumptions determining future travel patterns:**

- The economy is expected to grow, so that values of time increase.
- The number of cars owned per person is expected to fall, but the population increase is so high that the total number of cars rises.
- Highway capacity for general traffic is expected to reduce in the early years due to measures to promote cycling amongst other things.
- The cost of car use is expected to fall over time, as technology improves vehicle efficiency, but parking costs are expected to increase.

# By 2041, there will be 5 million more trips per day, an increase of 23% compared to today

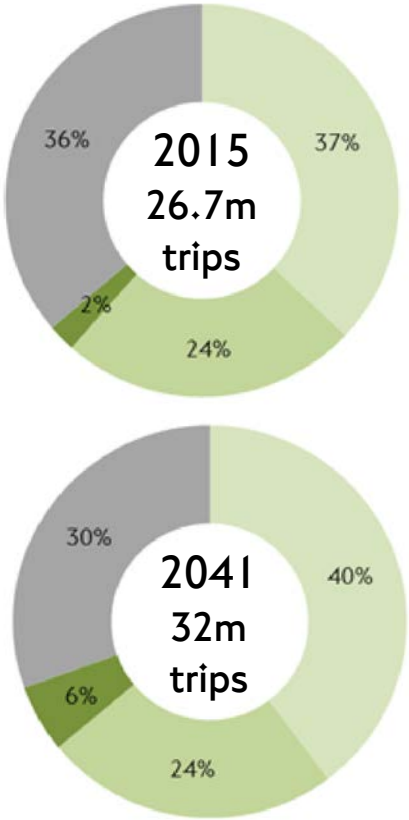
Travel demand is expected to increase to around 32 million trips on an average day in 2041, 5 million more than today.

Analysis based upon current trends and the funded programme (so, without the interventions proposed in the draft Mayor's Transport Strategy) suggests that most of the additional travel demand will be more public transport, walking and cycling.

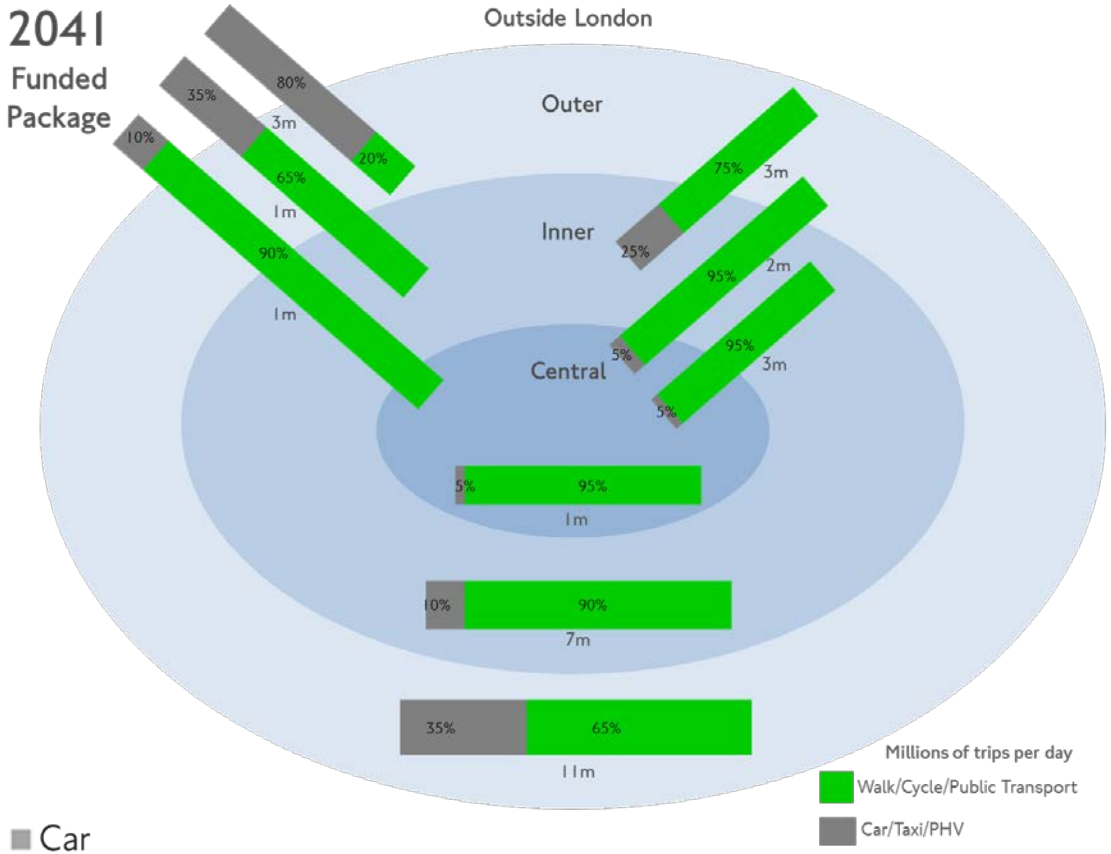
Despite a falling car mode share, car kilometres will rise by around 8%. This reflects the distribution of trips, with more car travel in outer London where trips are longer.

This, coupled with a large rise in van traffic of 26%, will lead to an overall rise in traffic on the network if left unchecked.

**Mode share, 2041, without MTS interventions**




**Trips by mode and origin/destination, 2041, without MTS interventions**



# The health challenge

# Most Londoners do not do enough activity to be healthy and travelling actively is the best way to achieve this

TfL and London's boroughs have a legal duty to consider the impacts of our activities on health and health inequality. Transport has a number of direct and indirect impacts on the health of Londoners:

Physical activity | Air quality | Road danger | Noise | Access to jobs and services and social inclusion

The life expectancy of Londoners has been increasing but adults are living more of their lives in poor health.

Adults need at least 150 minutes and children 420 minutes of physical activity a week to stay healthy and reduce their risk of common, preventable diseases.

Building physical activity into your daily routine by walking or cycling is one of the best ways to stay active and healthy.

Currently, a third of Londoners achieve their recommended level of physical activity from active travel alone.

If everyone in London walked or cycled for 20 minutes each day

**£1.7bn**

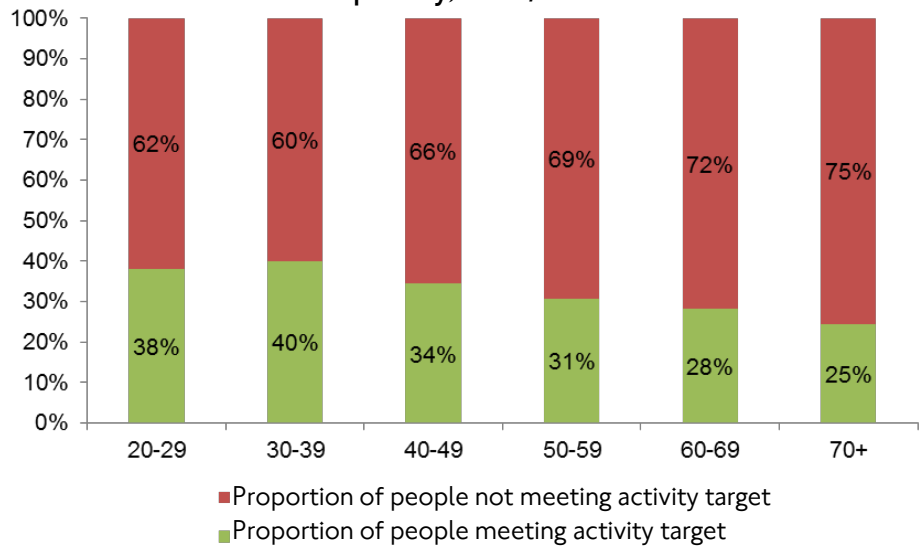
in NHS treatment costs could be saved.

**Amount of time spent active per average journey (minutes)**

22 | 17 | 8-15 | <1

Travelling by public transport typically involves significantly more physical activity than travelling by car, due to the need to walk to/from the station or stop. Recent research shows that active & public transport commuters had a lower BMI than car commuters.

**Proportion of adults achieving 2x10 minute periods of walking or cycling per day, 2014/15**

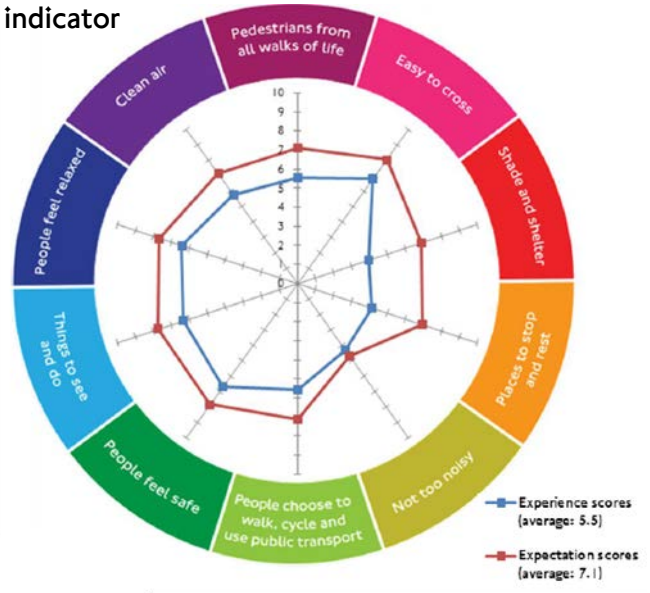


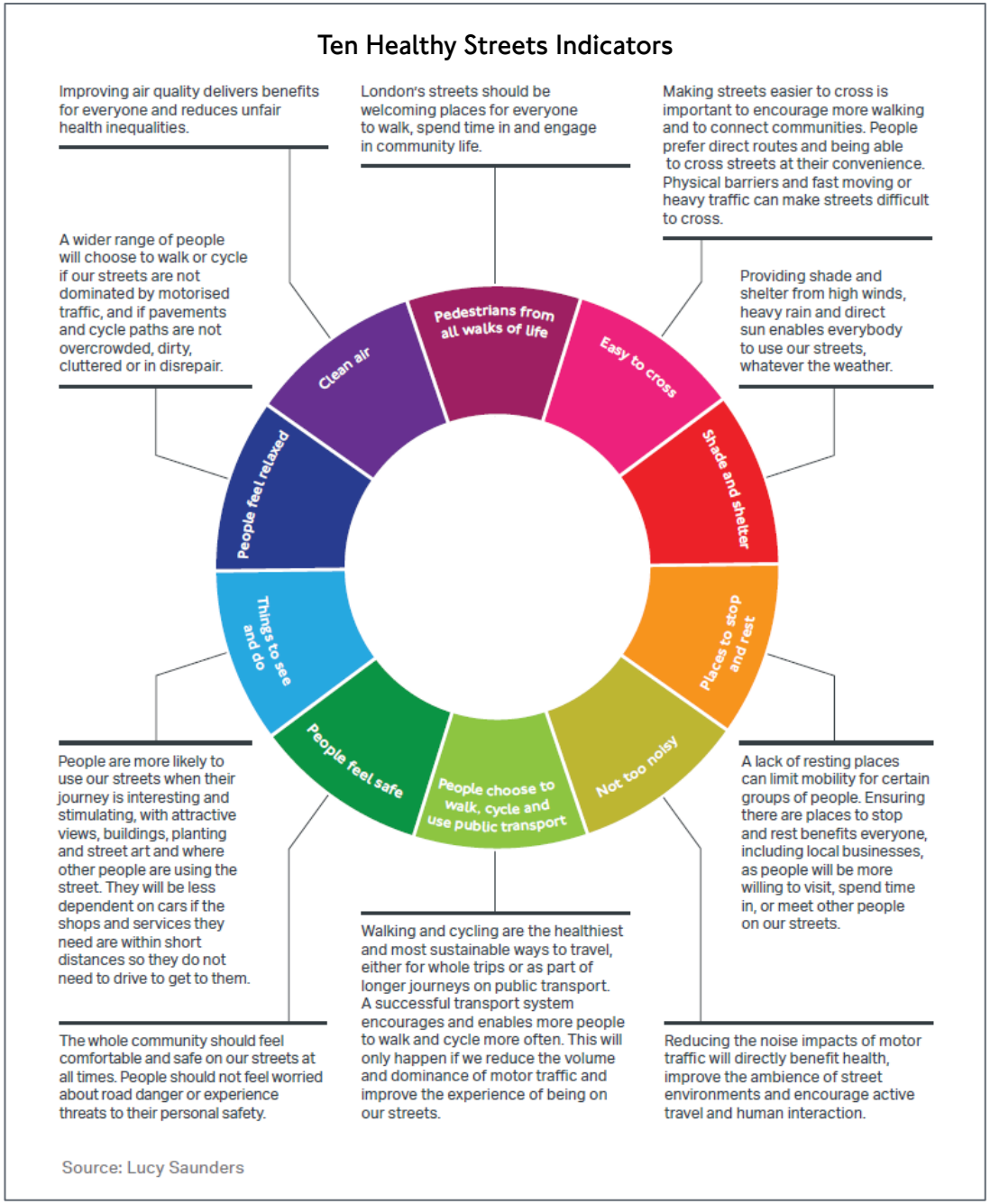
# Healthy Streets are safe, inclusive and encourage activity but London's streets fall short of expectations

Streets that are inclusive and enable people to be active improve health and can help reduce inequalities but also contribute to broader environmental sustainability and economic prosperity – if it works well for people it is likely to attract visitors and be more successful in terms of footfall, shops and services.

**Comparison of experience and expectation scores for each indicator**

London's streets perform below expectations across all measures.



# Healthy Streets and healthy people

# Walking is an active and enjoyable way to travel and more people could walk rather than drive

Nearly everyone walks. How much people walk is largely determined by how close they are to a range of destinations and whether they own a car.

Inner Londoners walk more than outer Londoners, women walk more than men, and adults aged 17-44 walk the most whilst older people walk the least.

The proportion of trips made on foot has stayed the same for a long time – so change is difficult. But Londoners need to walk more to be active enough for good health.

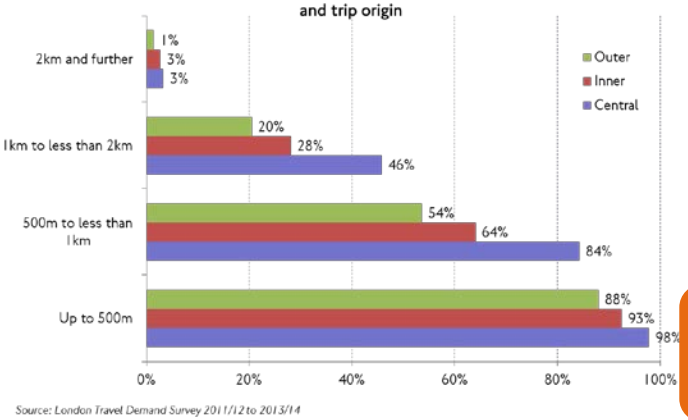
Improving the appeal of walking, by providing a safer and more pleasant environment, can encourage people to walk. But whilst the car remains a cheap and convenient option, people will continue to drive walkable journeys.

**2.4 million**
Trips that could be walked all the way but aren't at present

**1.2 million**
Journeys made as part of a trip by another mode that could be walked

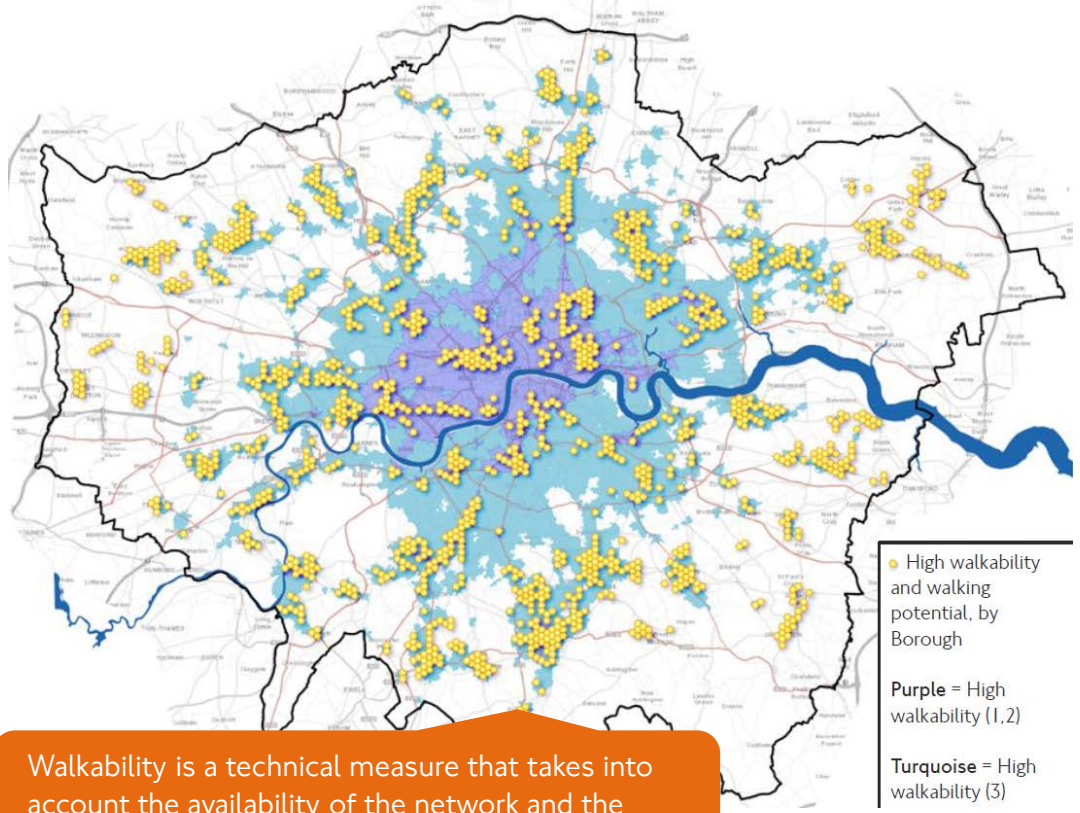
A higher proportion of short trips are walked in central than inner & outer London – so outer London offers the best opportunity for change.

Percentage of trips made by London residents that are walked by distance and trip origin




Source: London Travel Demand Survey 2011/12 to 2013/14

Many trips that could be walked take place in locations that already appear to be 'walkable'




Walkability is a technical measure that takes into account the availability of the network and the density of origins and destination

# Cycling is an efficient and healthy way to get about and there is considerable potential for growth in cycle travel

670k journeys were made each day by bike in 2015, equating to:

- **10%** of bus journeys
- **20%** of Tube journeys
- **100%** of District line journeys

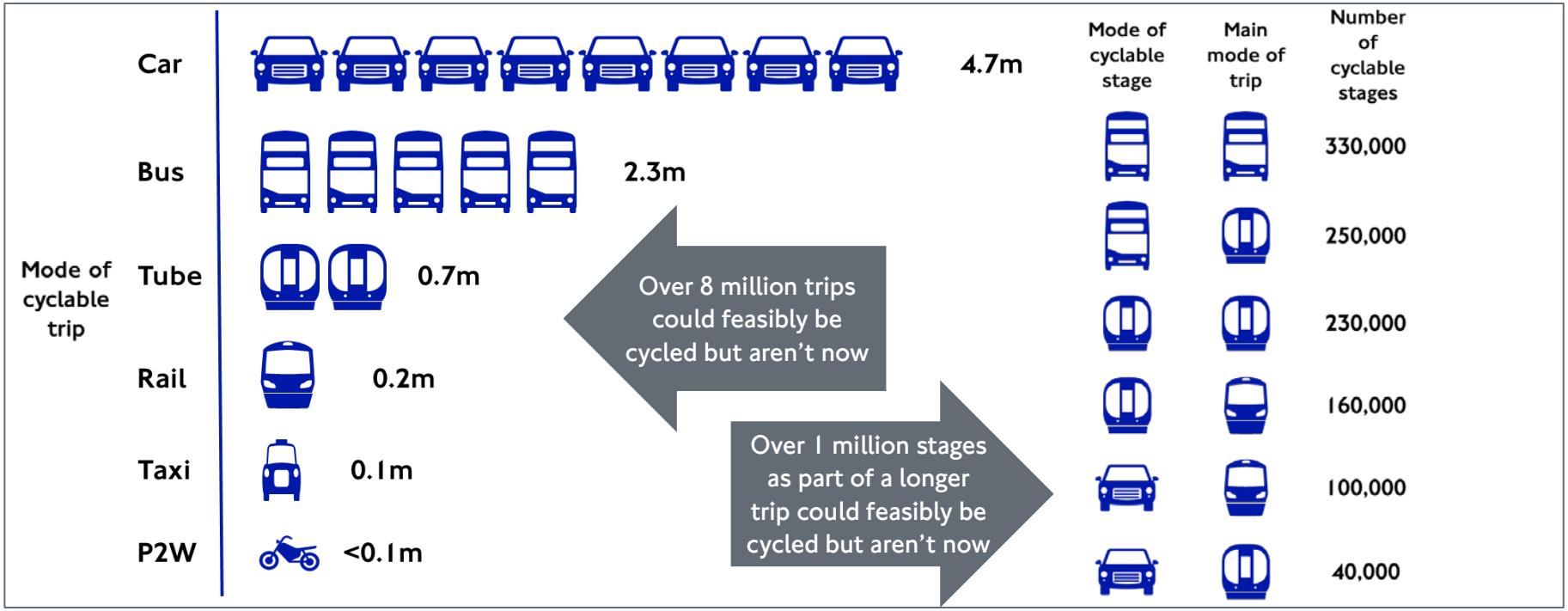
Cycle travel grew by 133% London-wide and 221% in central London between 2000 - 2015. There is considerable opportunity to deliver growth in cycle travel, with more than nine million journeys currently made by a motorised mode every day that could be cycled instead.

77% of Londoners believe that cycling is enjoyable and people continue to cycle in London because it is fun, quick, convenient, cheap and a good way to keep fit.

People that don't currently cycle in London can be concerned about safety and worried that cycling may not be a convenient option for them – to help them start cycling means overcoming the following barriers:

- Fear and vulnerability
- Lack of infrastructure
- Whether they identify with cycling and how attractive it is to them
- The physical effort of cycling
- Access to a bike
- How cycling compares to the alternatives
- Lack of confidence

More high quality, safe and pleasant routes, supported by plentiful and secure parking, will encourage new people to start cycling and existing cyclists to cycle more.



# The number of people killed or seriously injured on London's streets is the lowest on record but is nearly 2,100 per year

In 2015, 2,092 people were killed or seriously injured (KSIs) on London's streets, 42% below the 2005-09 baseline. The previous target was met six years early and London is on-track to achieve the target established in 2015 of a 50% reduction in KSIs by 2020.

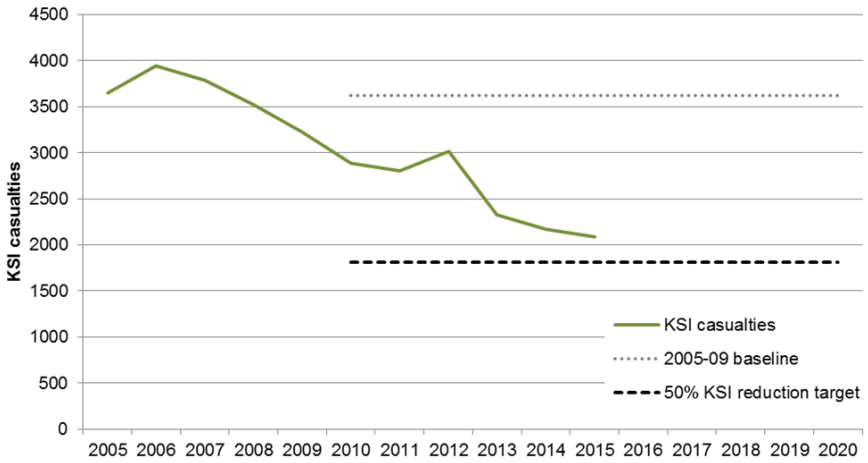
Current forecasts show that if progress continued at a similar rate, KSIs would continue to fall to around 1,000 by 2040.

Vision Zero for London means our long term vision is to reduce road danger so that no deaths or serious injuries occur on London's streets.

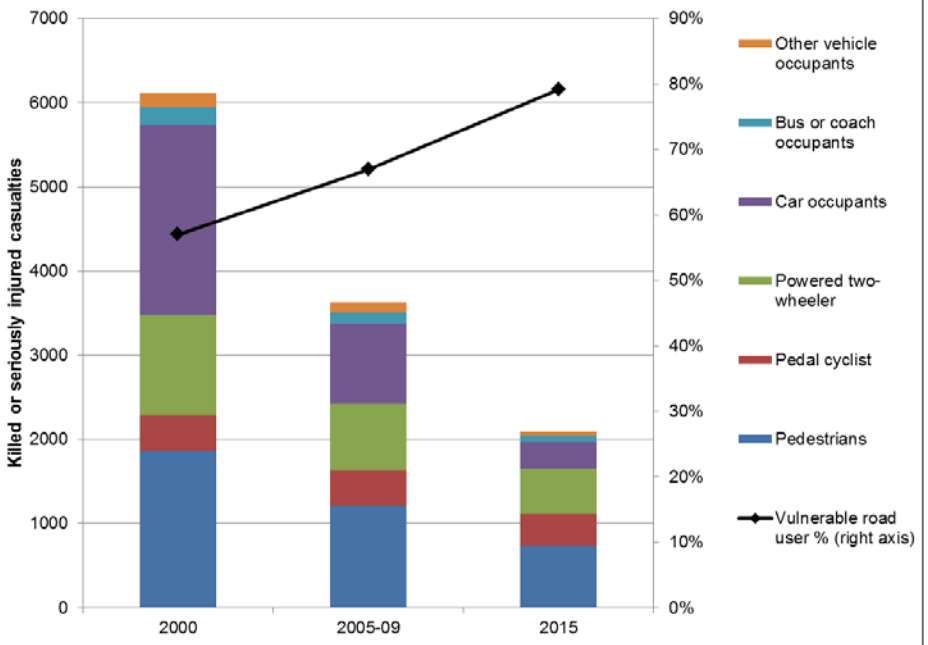
Buses and coaches are disproportionately involved in collisions with pedestrians and cyclists and in the last three years there were on average 200 people killed or seriously injured in collisions involving buses or coaches.

- Pedestrians, cyclists and motorcyclists are most at risk of being involved in a collision.
- Londoners from Black, Asian and Minority Ethnic groups suffer a disproportionately high number of road casualties.
- Pedestrians in the most deprived areas are more than twice as likely to be injured as those in the least deprived areas.
- Between 2005/09 and 2015, child pedestrian KSI reduced by 52% and child car occupants by 72% showing more needs to be done to increase child pedestrian safety.

**Progress towards 2020**




**KSIs by road user type**




The greatest reductions have been amongst car occupants. The proportion of KSIs made up of vulnerable road users has risen as overall KSIs have fallen.

# Improving the safety and security of transport and travelling in London remains a priority

The safety and security of transport and travelling in London remains a priority for the Mayor. The recent terror attacks in London and Manchester have highlighted the importance of ongoing efforts to reduce the likelihood and impact of these terrible incidents on London's streets and public transport networks and to improve the safety and security of transport and travelling.

Reducing transport crime and further improving confidence to travel will be challenging in the context of global insecurity and the growth in hatred, intolerance and extremism, the threat of terrorist attacks on the road and transport system, financial constraints, a growing population and the impact of overcrowding on passenger behaviour, along with the changing risk and nature of crime. These challenges are increasing demands for policing and enforcement resources, as well as other important crime reduction and operational security measures.

In terms of crime levels on TfL's public transport network, crime fell by over 50% between 2005/6 and 2016/17 – equivalent to almost 30,000 offences. While over the long term, crime has been falling on the public transport network, levels of crime on the system have seen small increases since 2014/15. The rate of crime in 2016/17 was 7.5 crimes per million passenger journeys, up from 7.0 in 2014/15 (which was the lowest rate on record). The increases in crime have largely been driven by an anticipated increase in reported sexual offences and an increase in low-level violence and public order offences.

Concerns about the risk of crime and disorder can act as a barrier to travel. Research commissioned by TfL shows that the majority of Londoners feel safe whilst using public transport.

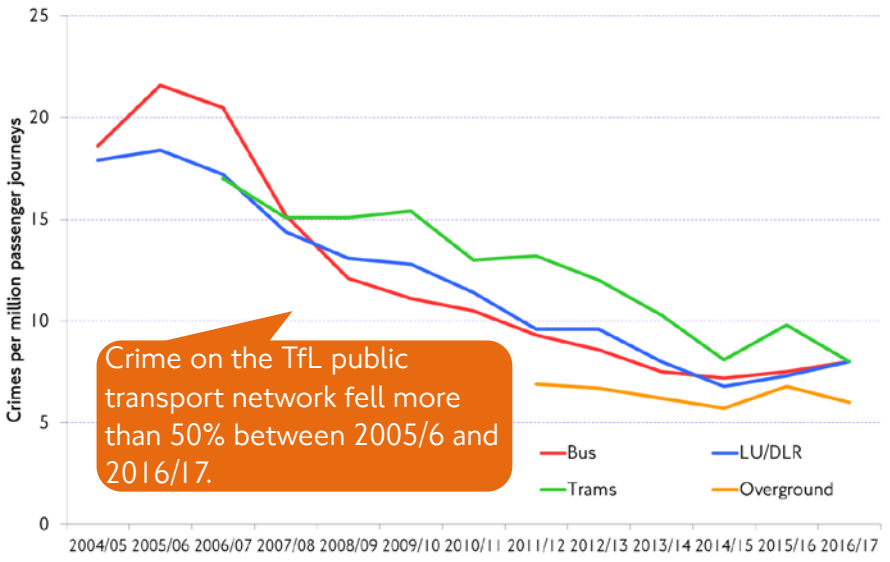
In 2016 :

**11%** of Londoners were very or quite worried about their personal security when using public transport in London

**18%** recalled an incident in the last three months which made them feel worried about their personal safety

Women, BAME and disabled Londoners are significantly more likely to be generally worried (very or quite) and have experienced a specific incident of worry in the last three months.

**Reported crime on the public transport network, 2004/5 to 2016/17**



# Rising traffic and falling road capacity for private vehicles means that congestion will rise for essential traffic

Congestion causes stress and frustration, and limits the amount people can travel because journeys are slow and unpredictable. For businesses, congestion costs money as workers spend time queuing in traffic, it is difficult to make deliveries on time, and an unreliable road network harms the reputation of London. Bus journeys become slower and less reliable.

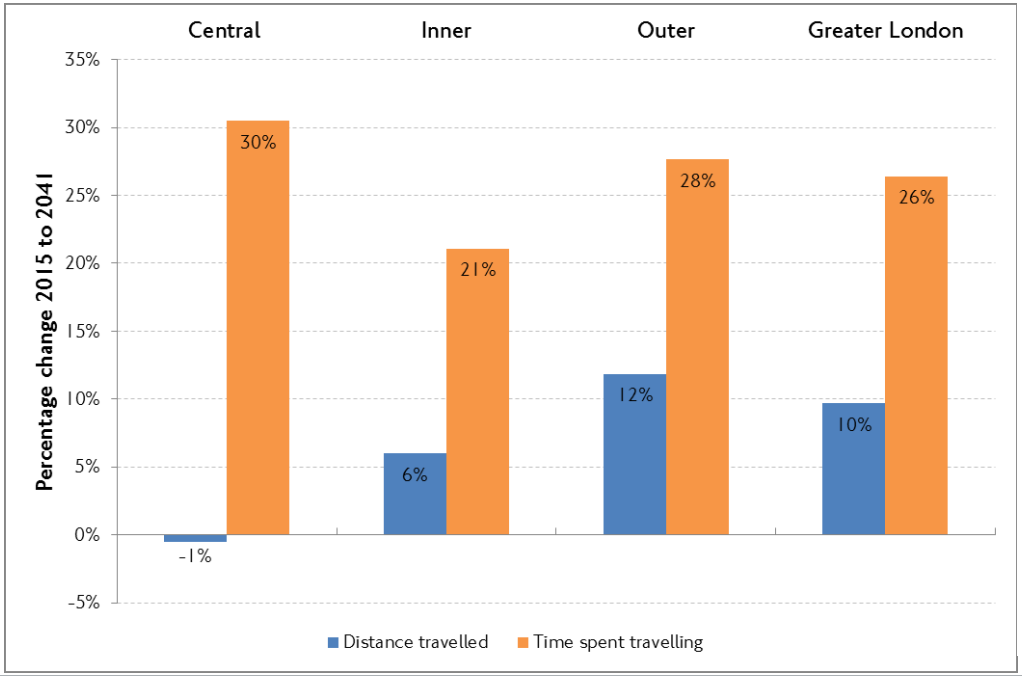
Despite a falling car mode share, without further action traffic is expected to rise across much of London, with 8.6 million more kilometres travelled by road on average day in 2041 compared to 2015.

Over the same period, the amount of space available for use by general road traffic is expected to reduce by 3 per cent, more in central London.

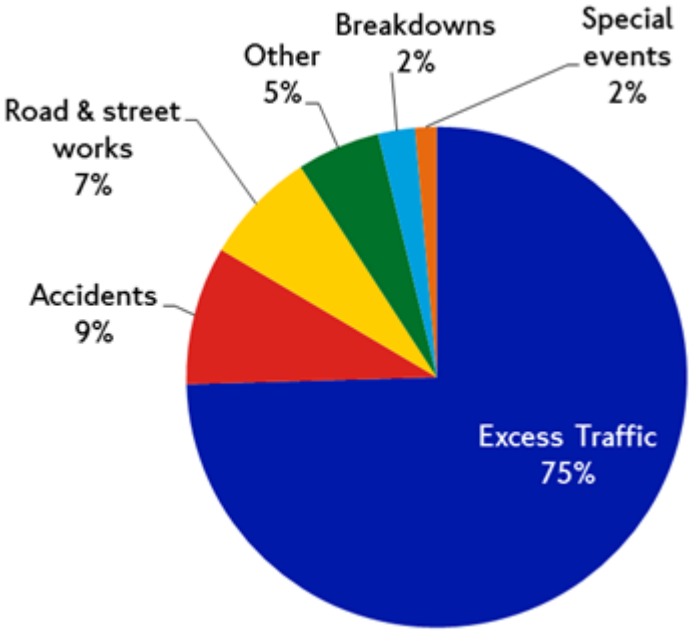
**Without further action, the average Londoner will waste 2.5 days a year sitting in congested traffic by 2041**

Most congestion is caused by there being more traffic on a day-to-day basis than the there is space for – traffic management methods can help but ultimately we need to reduce traffic volumes.

**Forecast changes in distance & time spent travelling, 2041 (funded plan)**




**Causes of congestion**



# Industry trends and economic growth will lead to more freight traffic, especially vans

90% of all freight is carried by road and freight adds an estimated £7.5 billion to the GVA of London. London's continued success critically relies on safe, reliable, sustainable and efficient goods delivery and servicing.

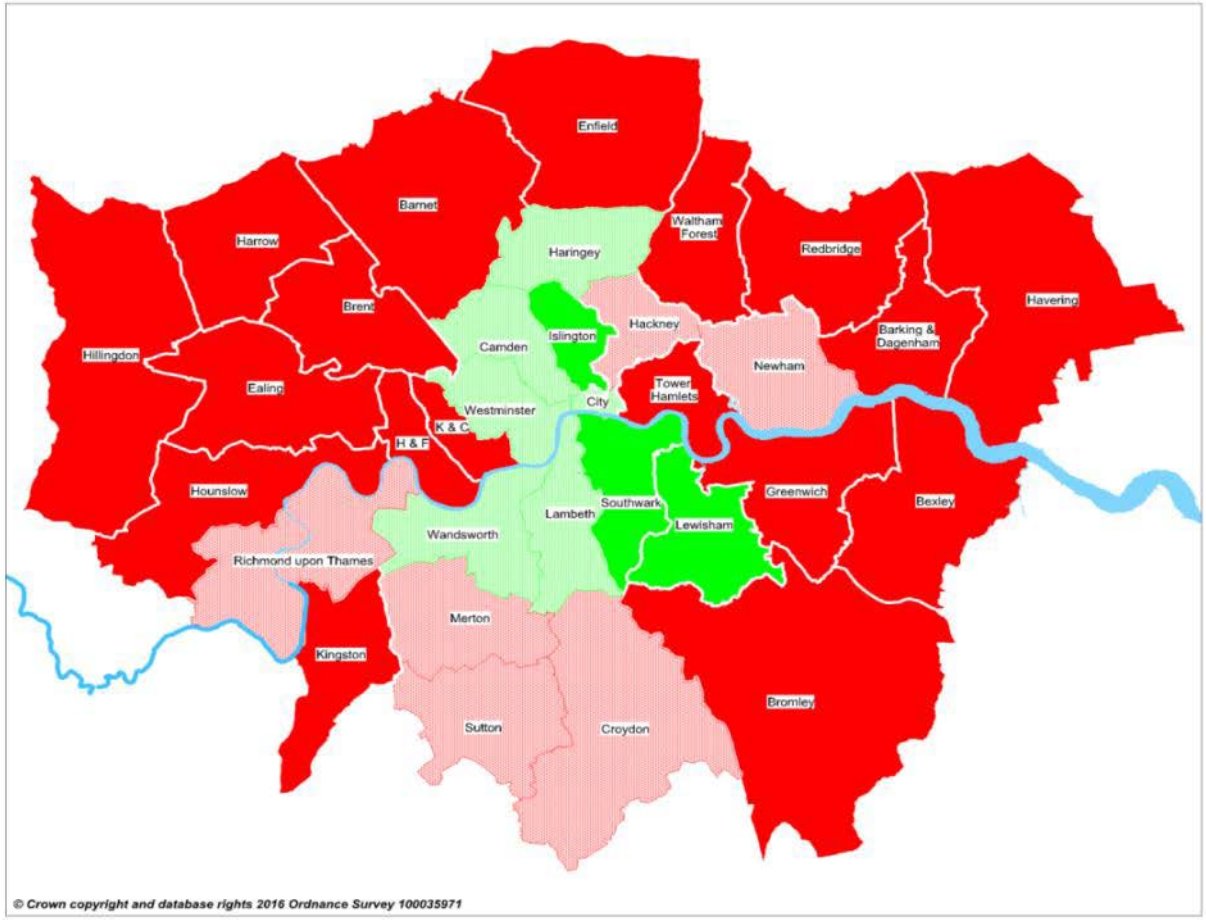
Freight vehicles account for around a fifth of motorised vehicle kilometres travelled in London.

In the central London morning peak, freight accounts for around a third of traffic.

**Between 2015 and 2041, freight vehicle kilometres are projected to increase by:**



**Changes in van traffic, 1994-9 to 2015**




**Factors increasing freight traffic:**

- **E-Commerce** - Deliveries to homes and personal deliveries to workplaces.
- **Just-in-time delivery** - Roads are becoming on-the-move warehouses.
- **Freight / logistics pushed to peripheral out-of-town areas**
- **Freight / logistics pulled to areas with good highway accessibility**
- **Globalisation of supply** - lengthening supply chains.

***Source: DfT National Road Traffic Counts***

**Percentage change**

- 10% increase or more
- 0% to 10% increase
- 0% to 10% reduction
- 10% reduction or more

# For Healthy Streets, we need to achieve population and jobs growth without a matching rise in car travel

At present, 57% of London households own a car, making 6.8m car trips per day. Car ownership is the strongest determinant of inactivity – 70% of people without a car do some activity compared to 50% with one car.

Since its invention, the car has provided welcome connectivity and opened up new opportunities. Even in a densely populated city such as London, some journeys can only reasonably be made by car. But the amount of space that can or should be taken up by private road transport is limited, and the population is growing.

As well as prioritising more space-efficient and sustainable modes, research suggests that most people agree that the limited remaining space should be prioritised for 'essential' traffic.

**Some journeys are essential by car:**

**No alternative mode available.** ***26% of car trips can't be switched due to the characteristics of the trip-maker or the time taken***

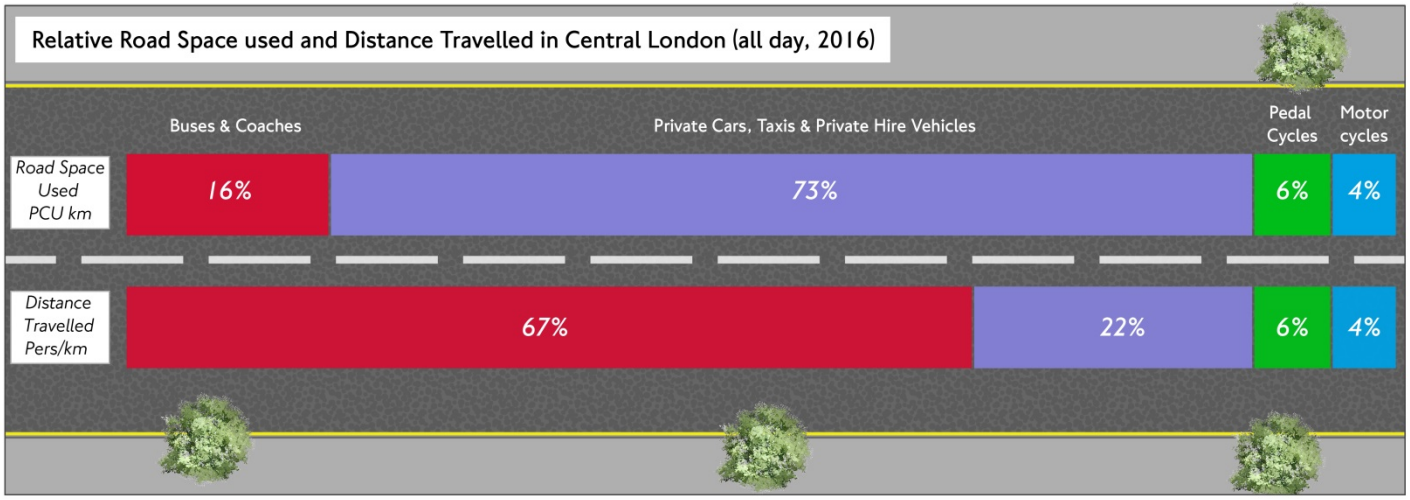
**Unreasonable to use alternative,** *eg: in an emergency, when ill, if afraid of alternative*

**High value to society of driving** *eg: some business trips, if only way to access work*

*Can't easily be quantified*

**But many are not:**

For example, Londoners tell us it is less essential for a trip to be made by car if it is in central London or a well connected area, can be made as quickly and easily by another mode, or if it is for leisure purposes or in some way 'discretionary'.




Private cars, taxis and private hire vehicles take up three quarters of the road space used for personal travel in central London but account for just a fifth of the personal distance travelled.

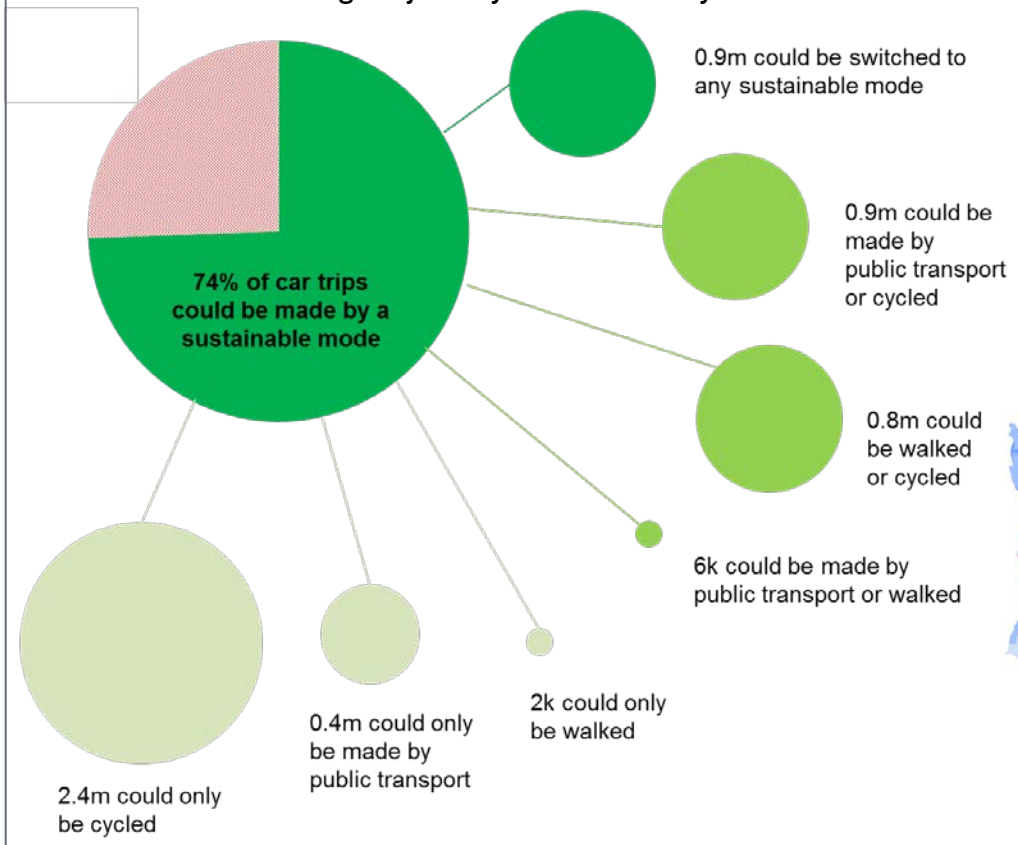
# Three quarters of car trips could be made by a more sustainable mode, but many people are reluctant to change

93% of car journeys under 2km have an alternative available, but just 16% of trips over 8km. Shorter trips are also more likely to have more than one alternative available.

It's more difficult to assess if the quarter of car journeys made in London by non-Londoners have an alternative available, but it is reasonable to assume that some do.

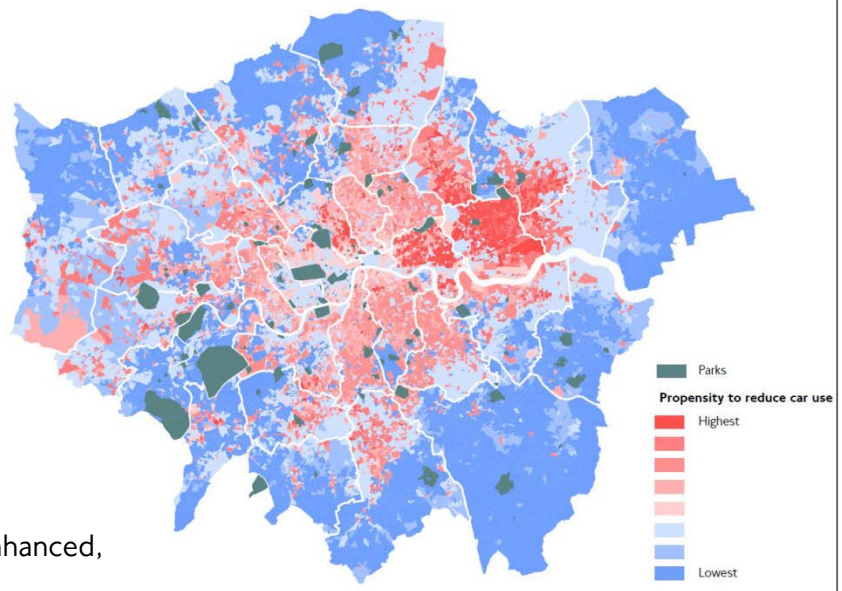
However, having an alternative available does not mean that people will switch. Delivering mode shift requires changes to people's preferences, and to the relative appeal of travel by car and the alternatives. In reality, this means that car travel would need to be less appealing, and the other modes more appealing, in order to realise the potential that has been identified

**Potential for existing car journeys to be made by a sustainable mode**




Some people are more amenable to change than others – the challenge is that the greatest amount of car use happens in places where people are most committed to travelling by car and least willing to change.

**Propensity to reduce car use**




Note: potential is based upon current service provision. If services were enhanced, more journeys could switch from car to public transport.

# A healthy environment

# Poor air quality damages health and causes the equivalent of up to 9,400 deaths per year

Transport is the biggest source of emissions damaging to health in London: around half of emissions (NOx and particulate matter (PM)) in Greater London come from road transport.

London is in breach of legal limits on $NO_2$ and while there is no safe level for particulates, does not meet levels recommended by the World Health Organisation of PM smaller than 2.5 micrograms.

The communities suffering most from poor air quality are often the most vulnerable. 360+ primary schools are in areas exceeding safe legal pollution levels.

**9,400** Equivalent deaths per year

**3,150** Hospital admissions per year

**£1.4bn - 3.7bn** Annual health cost

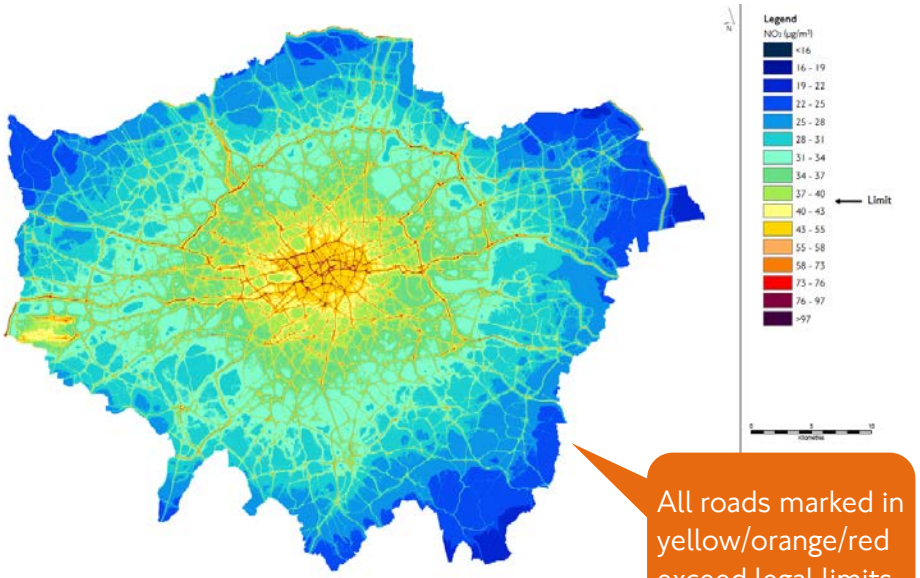
### NOx emissions

Under the most recent government plans, London will not comply with legal limits for $NO_2$ until 2025, 15 years after the original deadline. About 25% of London's roads are forecast to be non-compliant with $NO_2$ levels in 2020. Of these, about a third require reductions of between 25% and 50% of road transport NOx emissions, and a tenth require at least a 50% reduction.

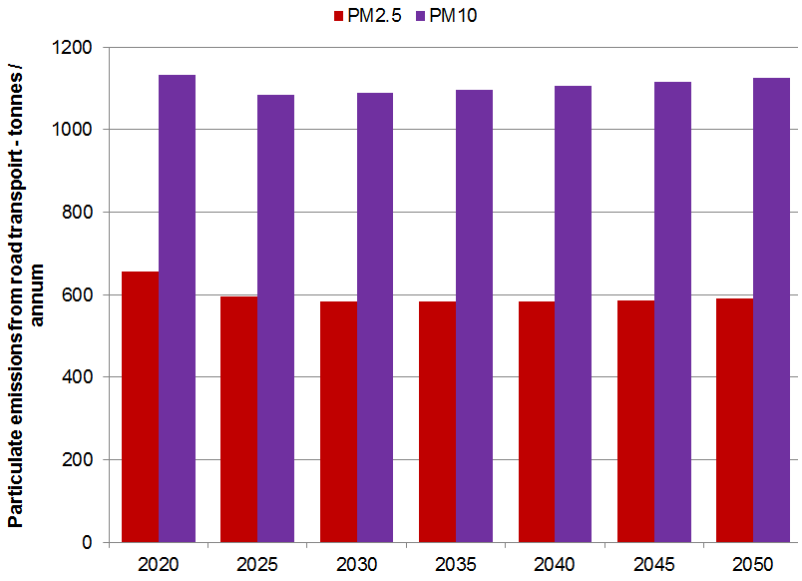
### Particulate Matter (PM) emissions

Without further action, London is expected to exceed World Health Organisation levels of PM2.5 until well after 2030. 75% of road transport PM comes from tyre and brake wear. There are limited technological solutions so only a reduction in road traffic can effectively tackle PM in the medium/long term.

### Annual mean $NO_2$ concentrations 2013




### Baseline PM emissions from road transport, 2020 to 2050




*Note that forecasts are for future without MTS interventions*

# Action must be taken to reduce carbon emissions so London can play its part in tackling climate change

Climate change is a serious threat to global quality of life. Carbon dioxide concentration is 40% higher than in pre-industrial times and between 1880 and 2012, the earth's surface warmed 0.85° Celsius.

London's transport providers must play their part in delivering reductions in carbon emissions. The Mayor's ultimate ambition is to make London a zero carbon city by 2050.

While transport $CO_2$ emissions are projected to have fallen by more than 2 million tonnes by 2025 from 1990 levels, they will still be 2.35 million tonnes above the target previously set for 2025. Meeting this would require a reduction in emissions equivalent to a 40% reduction in road traffic.

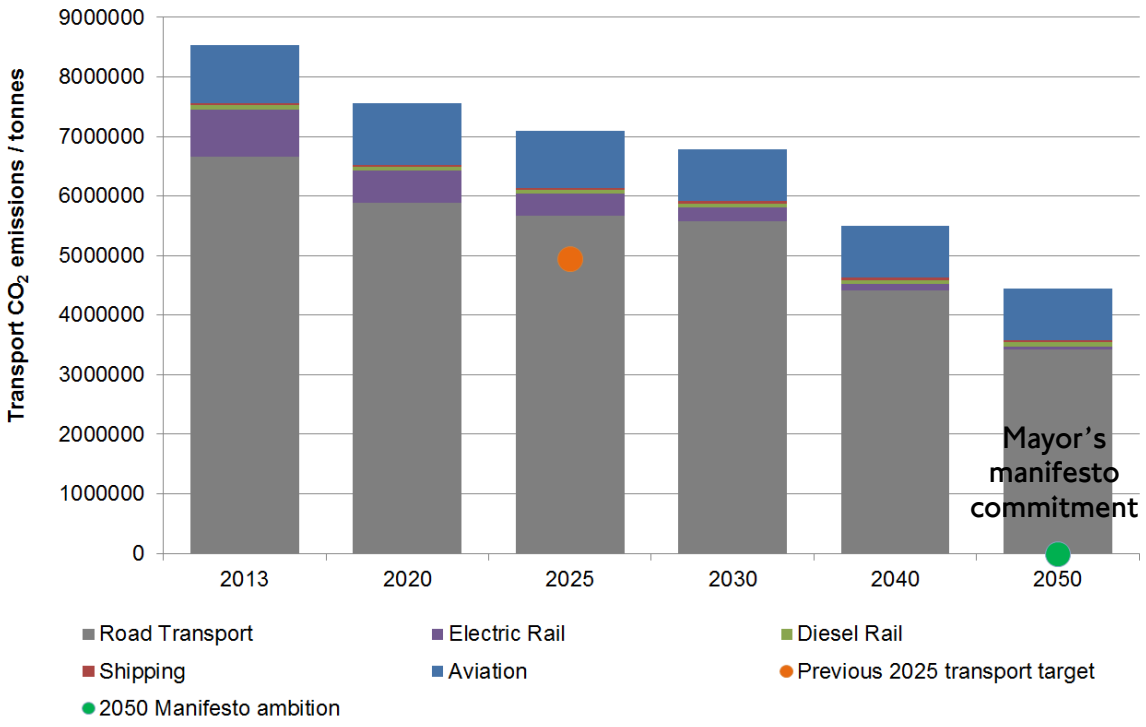
Technological advances will reduce vehicle emissions but this will be made quicker and more feasible if the distance travelled by car is reduced.

London's bus, taxis and private hire fleets are on a pathway to reach zero emission.

London's rail services are primarily electric so $CO_2$ emissions will decline with the decarbonisation of the energy supply. Need the government to electrify all remaining diesel lines.

Emissions arise from the taxiing, take off and landing of aircraft at Heathrow and City Airport. Plans to expand Heathrow's third runway are unclear on what this would mean for meeting the UK's climate change targets.

**$CO_2$ emissions from ground based transport, without MTS interventions, 2013 - 2050**



# A biodiverse natural environment is good for nature and good for people

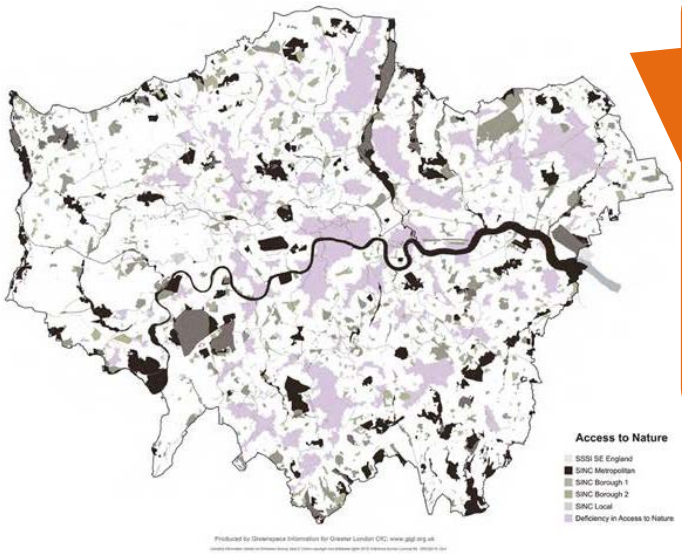
A biodiverse natural environment provides many physical and mental health benefits and aids access to green space.

Transport land accounts for 14% of land in London and 25% of land in central London. Therefore, how we use transport land has a significant impact on biodiversity in London.

Nationwide, the goal is to conserve biodiversity. This will be challenging given competing demands for land for housing and transport infrastructure.

As London becomes more urban, access to green space will become more important, and transport land can contribute.

**Deficiencies in access to nature**




Opportunities to provide green infrastructure on transport land include street trees, green roofs on buildings and roadside raingardens.

# Noise from transport causes stress and damages the health of Londoners

The World Health Organisation identifies environmental noise as the second largest environmental risk to public health in Western Europe. Noise affects health directly by causing sleep disturbance, stress/anxiety and damage to mental health, high blood pressure, cognitive impairment in children (and related impacts on school performance) and increased risk of cardiovascular disease. Exposure to noise from transport damages the health of Londoners, particularly those living on busy roads or in the flight path.

**1.6m** More than 1.6 million people in the London are exposed to road traffic noise levels during the day above 55dB, the level defined by the World Health Organisation as causing health problems.

**29%** Three in ten London residents say they are disturbed by road traffic noise

**20%** One in five London residents say they are disturbed by aircraft noise.

Heathrow alone exposes 750,000 people to significant aircraft noise (above 55dBLden) – the majority of whom reside in west and southwest London – and which amounts to 28% of all those exposed to noise by airports across Europe. With a third runway, that number could increase to almost a million people.

# We must ensure the transport network is resilient to extreme weather and the adverse effects of climate change

**Flooding** will affect stations, roads and tracks and cut power supplies, as in Feb 2014.

**Humidity, drought, storm winds** affect signalling, cause ground movement and debris on tracks.

**Extreme heat** will lead to materials failure and the need for ventilation and cooling.

**Snow and ice** will block drains; affect signalling; damage embankments, cuttings and roads.

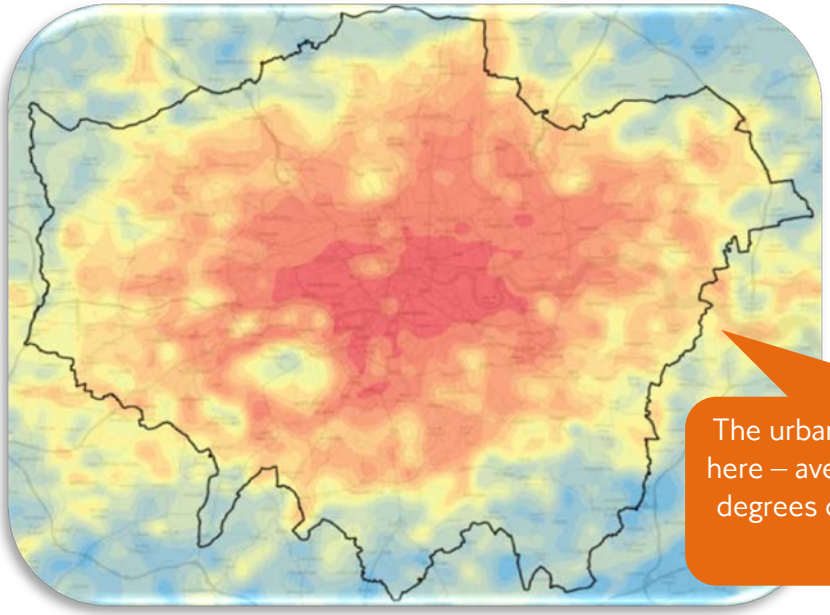
London is already suffering from the adverse effects of climate change – summers are getting warmer and winters are getting wetter.

Major flooding has occurred in London in three of the last four years – causing significant disruption to transport and having a detrimental impact on the economy.

Unmitigated climate change would mean that the summer of 2003, where we broke the highest temperature record in the UK (37 °C) and an estimated 2,000 UK residents died, will be considered an average summer by the 2040s and a cool summer by the 2080s. Extreme weather events are expected to increase as a result of climate change.

For London to remain an attractive place to live, work and visit, we must ensure that the transport system is resilient to the extreme weather conditions likely to become more common as a result of a changing climate.

**Average surface temperature during the hot summer of 2006**



The urban heat island effect is clearly visible here – average surface temperatures were six degrees centigrade cooler in Richmond Park than in central London

Sustainable Drainage Systems, as pictured here (from a scheme on the TLRN), can reduce the risk of flooding while enhancing the green infrastructure of a local area.

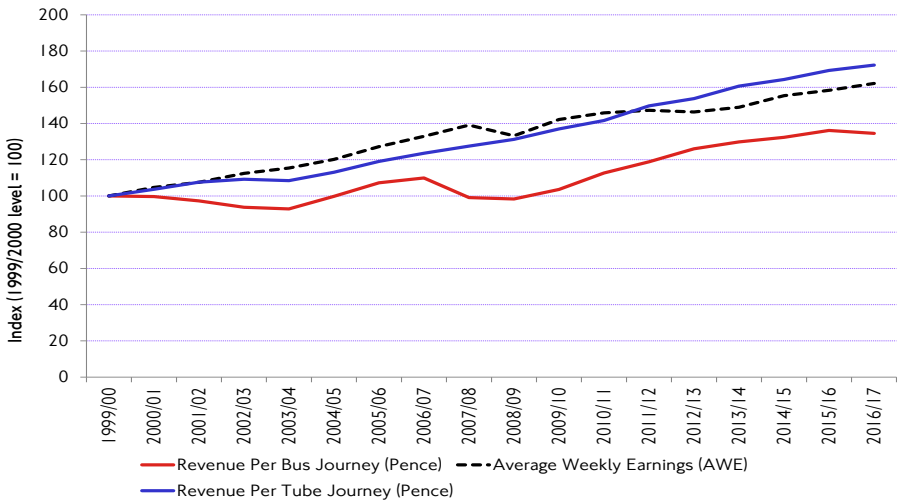
# A good public transport experience

# London has become more unaffordable as housing and travel costs have risen faster than incomes

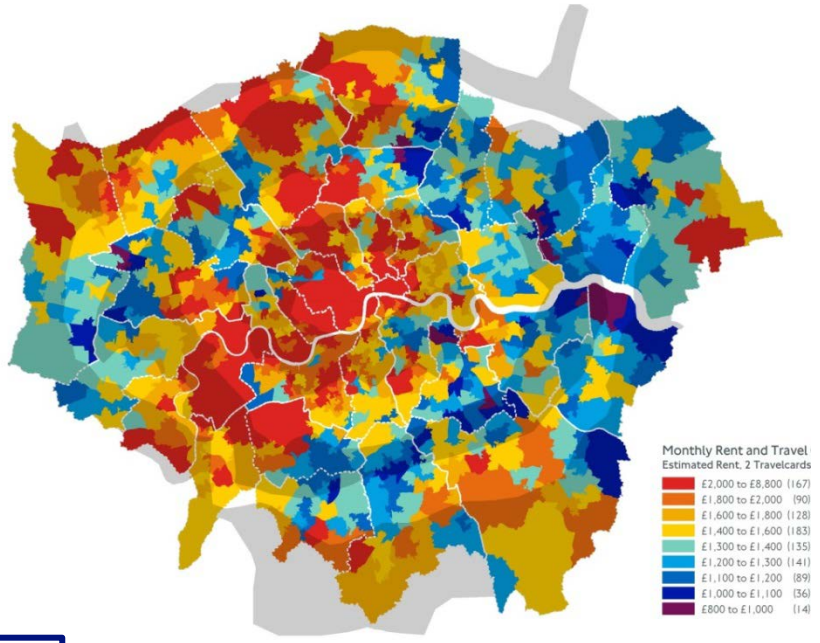
Whilst the economy of London has grown, not all Londoners have shared in the benefits. London is one of the most expensive places to live in the world and yet more than a fifth of working Londoners do not receive the London Living Wage. In the early years of TfL, average earnings rose faster than fares, particularly bus fares which were frozen or reduced each year between 2005 and 2008.

Single Tube and Bus fares increased by around 60% between 2008 and 2015. While this allowed for significant investment in transport networks, those on the minimum wage saw their pay rise just 17%, making travel costs a larger proportion of their spending. Travel costs becoming unaffordable could make it harder for Londoners to make the journeys they need and want to by public transport.

**Comparison of bus and Tube fares and average weekly earnings, 1999/00 to 2016/17**




**Estimated monthly rent and Travelcard costs**




1hr

In 2014 it took an extra hour of work at minimum wage to cover travel costs from outer London compared to 2005

Even in the cheapest areas combined rent and travel costs over £800 pcm on average for a two person household

# A good customer experience means consistently getting the basics right and being innovative

Customers should be able to trust their transport providers to provide a good experience across the network, but overstretched services may struggle to deliver what customers want. Customers will expect services to respond to emerging technology and reflect cultural change - as expectations rise, it will become increasingly difficult to deliver the basics consistently in a crowded and congested environment.

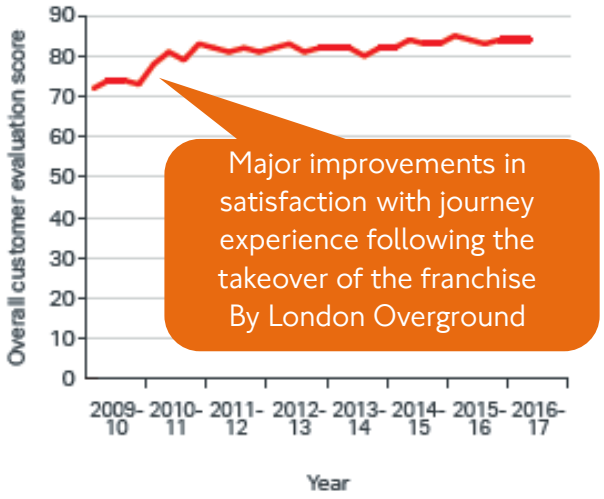
Over time, what is considered essential changes. As mobile connectivity has soared, demand has risen for real time information they can access on their journey. As technology develops, customer needs and expectations will continue to evolve.

**Open data provisions has facilitated the development of 360 apps.**

## What do customers want?

- **Journeys that are reliable, easy to plan, stress-free, person-friendly and comfortable**
- **Value for money** – so you get what you pay for, with fares, charges and fines considered fair and honest
- **Progress and innovation**, with investment in improvements

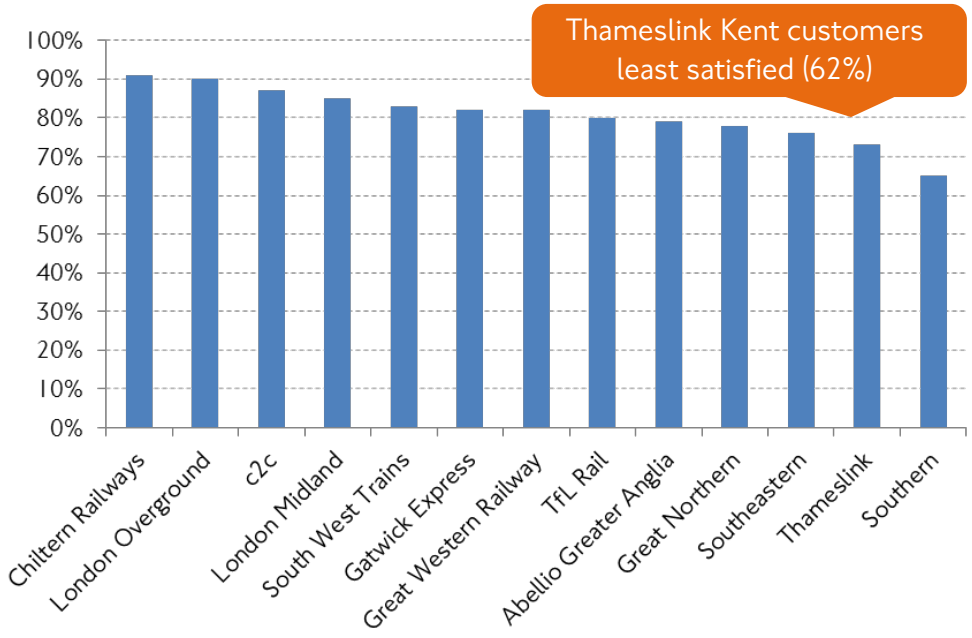
### Customer Satisfaction on London Overground




## Customer experience is not consistent across all providers.

Rail customers in London and the South East are less satisfied than regional and long distance travellers, particularly with punctuality, value for money and room to sit or stand. In Autumn 2016, satisfaction varied by 26 percentage points between the best and worst performing operators.

### Customer Satisfaction by rail operator, Autumn 2016 (NRPS)



# Significant improvements have been made but 41% of the public transport network is still not fully accessible

An inclusive, accessible, affordable transport network benefits all Londoners.

Whilst significant improvements have been made, journey times are still considerably longer on the accessible network and a number of barriers to travel remain. Partly as a result of this, disabled people travel less often, making 1.6 trips per person per day compared to 2.4 for those without a disability.

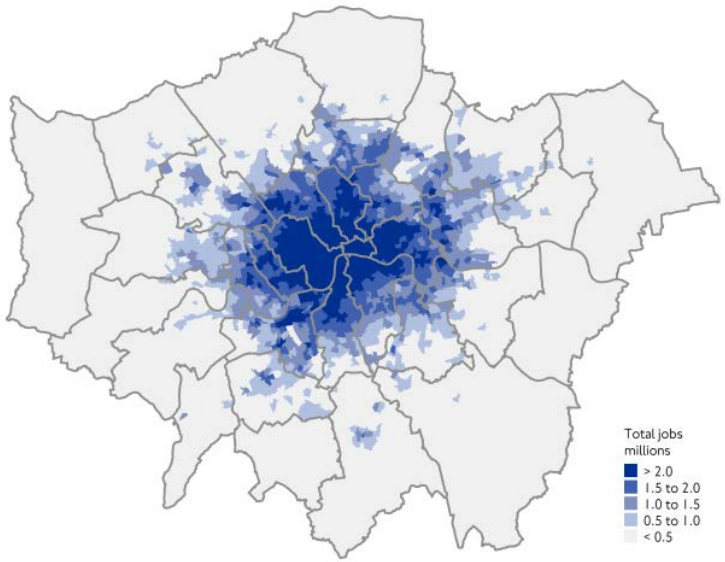
Demand for accessible services is rising. By 2041, the number of Londoners over 70 will have grown by 85% and 17% of Londoners (1.8m people) will have some form of disability – 56% more than 2011.

**What does an accessible and inclusive transport service mean?**

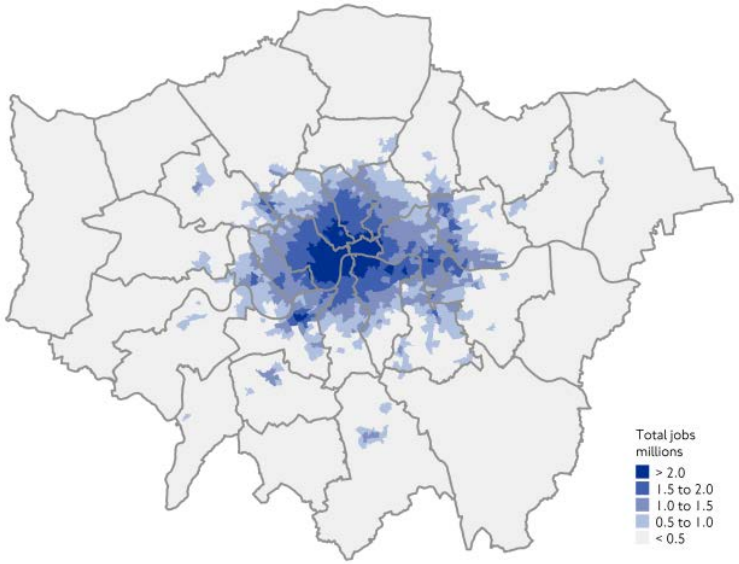
- Helpful staff, particularly bus drivers, provide a good customer experience
- Street environment is well maintained, without obstructions, overcrowded or narrow pavements, and with places to stop and rest.
- Step-free access to bus stops, buses, stations and trains
- Everyone can access the information they need to plan their journeys
- Services are not too crowded

**Comparison of the number of jobs available within 45 minutes for total and accessible network**

Total network




Accessible network

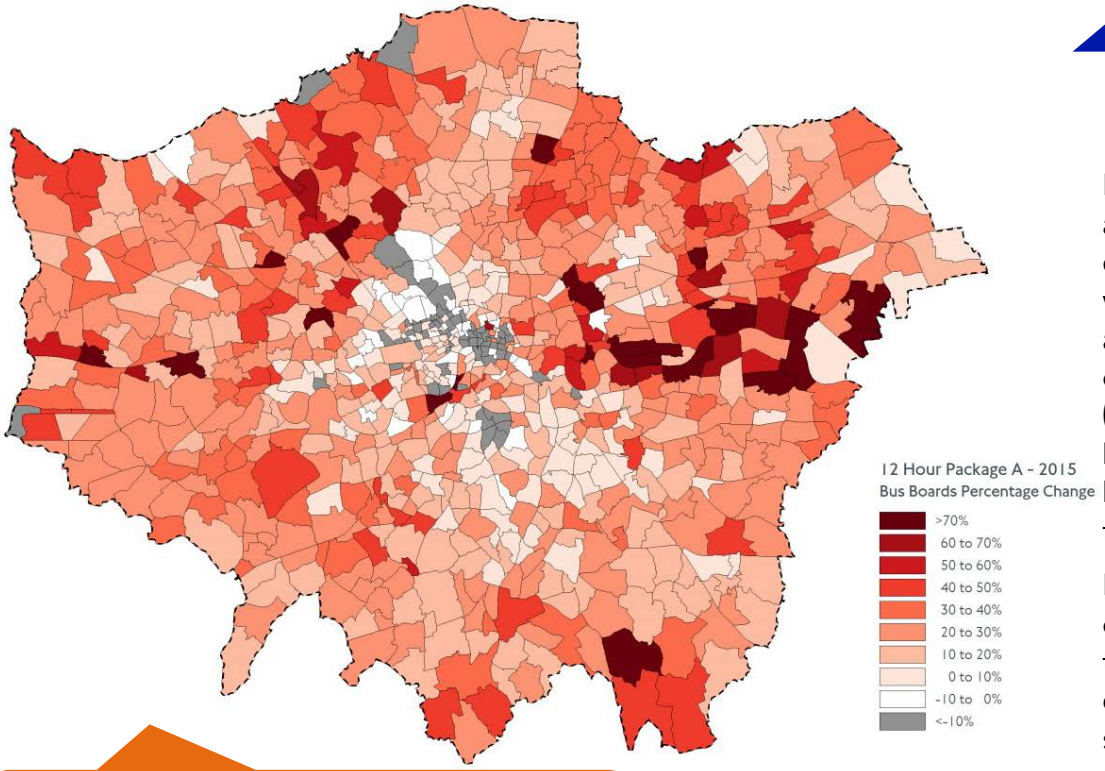


# Buses are a space-efficient and affordable mode of transport but falling speeds worsen the experience for users

The size of the bus network - more than 95% of households live within 400m of a bus stop - and the affordability of bus services mean that it is the most accessible and most used type of public transport in London, carrying 2.3 billion passengers per year. London's bus network now carries half of all the bus journeys in England. London buses operate on nearly 700 routes, with 100 routes operating through the night.

The flexibility of bus service provision to respond to new and changing demand patterns and to fill gaps in connectivity means that buses are key role in delivering mode shift from the car. Bus services are more viable than rail where demand is widely dispersed. To reduce car dependency, buses will need to offer similar journey speeds and convenience for passengers.

**Expected change in bus boardings 2015 to 2041**




Bus demand is expected to grow by 30% by 2041, especially in east London.

**+ 71%**

**Increase in bus passengers between 2000/01 and 2015**

Bus demand has fallen away somewhat recently, after many years of rises. Bus patronage has declined by 5.6 % across 2015/16 and 2016/17 with ridership for 2016/17 123 million trips per annum lower than in 2014/15. The primary cause is considered to be the deterioration in bus speeds (2.1% year-on-year) . The deterioration varies route by route, and is closely aligned with usage. Bus use has also been affected by the trend for Londoners to travel less, particularly for shopping and leisure.

In future, bus journeys will be affected by rising congestion on the network. Analysis has shown that many of those who reduced their bus use, drove more. This shows the risk if London's bus services are not able to offer an appealing option to the car. Maintaining acceptable bus speeds and reliability is a vital part of delivering sustainable growth in future.

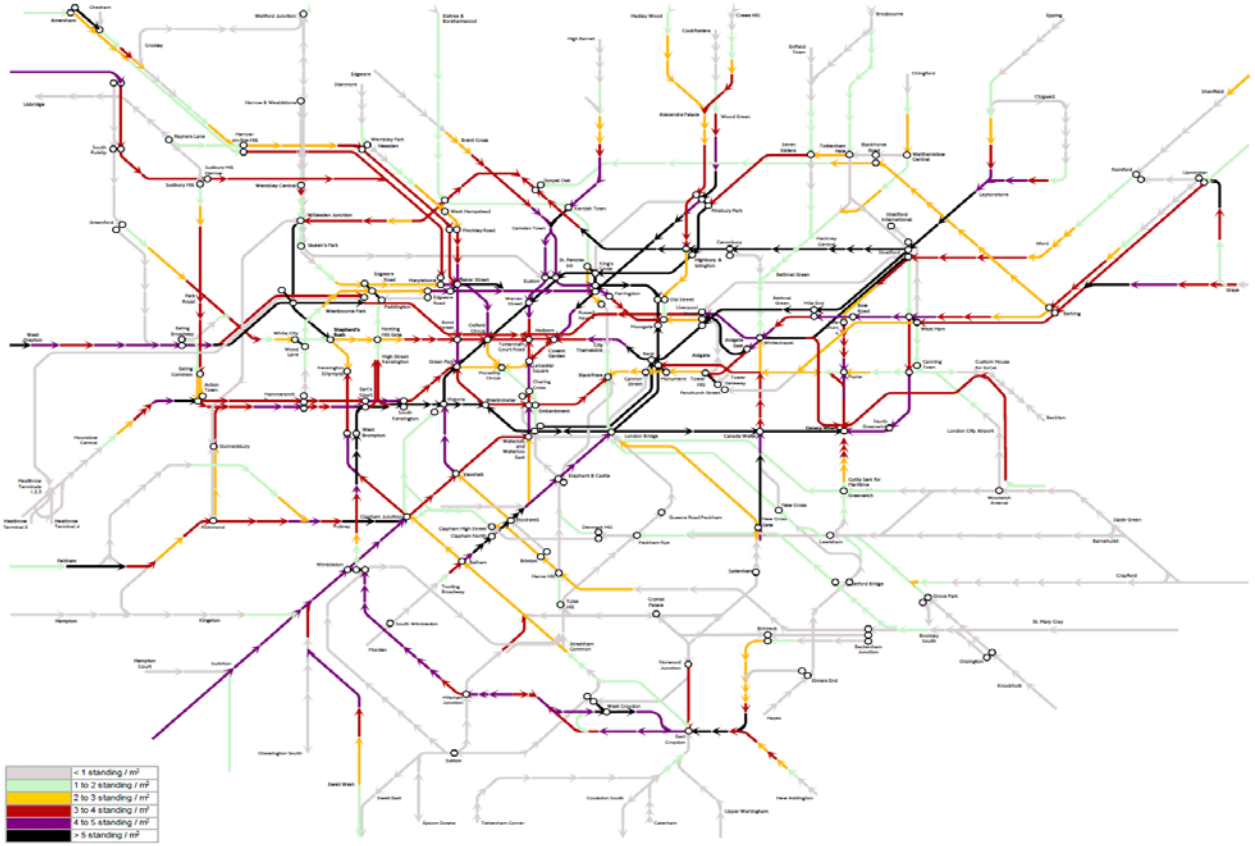
# Despite tube & rail upgrades & the Elizabeth line, demand will increase faster than supply, exacerbating crowding

Customers find travelling in crowded conditions stressful and unsatisfying. Some groups are particularly affected, for example, those with mobility impairments for example find it difficult to travel in crowded conditions.

Crowding increases journey times, as customers wait for a less crowded train, damaging real-world connectivity. Crowding within stations leads to closures and delays walking through the station.

Funded projects through to the early 2020s add 70% extra capacity to the national rail network and 50% to the LU, DLR and Tram network. However demand will outstrip supply by 2031 with a significant increase in crowding by 2041.

**Crowding on London's rail network, 2041, with funded schemes only**




**+1m** Additional daytime journeys to/from central London

**+50%** Increase in crowding on London Underground

**+90%** Increase in crowding on National Rail service

# Crowding in stations causes delays and frustration and will become more common as London grows

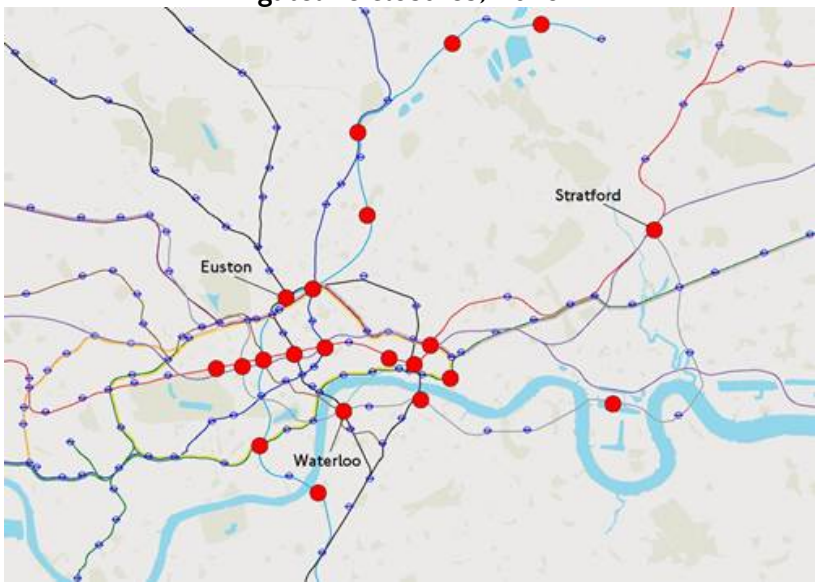
The same demographic and economic factors that lead to busier trains will result in increased passenger numbers at stations across the network. The most significant challenge will arise in central London, where demand for travel at peak periods will rise substantially, placing pressure on key destination stations and interchanges. Congestion within stations leads to delays as passengers move slowly through the station, are forced to wait to board trains, or are held outside the station as safety concerns force temporary closures.

Those stations in most need of upgrade works, either due to current conditions or because there is likely to be particularly high growth in the vicinity, have been identified.

The map below shows the top 21 locations in 2016 with the highest levels of passenger disbenefit from gateline closures. Many of the highlighted stations are National Rail interchanges where passengers are interchanging onto LU lines that are already crowded on their approaches to the station.

**By 2041, planned station control measures may be required at 30 key stations.** This includes LU stations serving each of the six major National Rail termini. The closure of an LU station at a terminus – even for a short time – will add significant pressure to the wider network.

**London Underground stations with greatest disbenefit from gateline closures, 2016**




The vicinity of key rail termini and Tube destination stations often offers poor amenity and crowded pavements, failing to provide a Healthy Street environment.

**Stations expected to require planned station control by 2041**

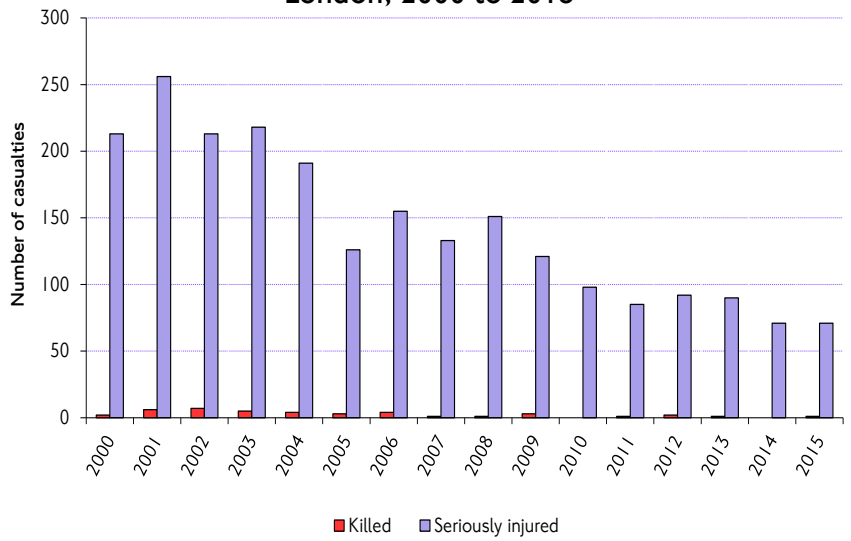
# Passenger safety should always be a top priority

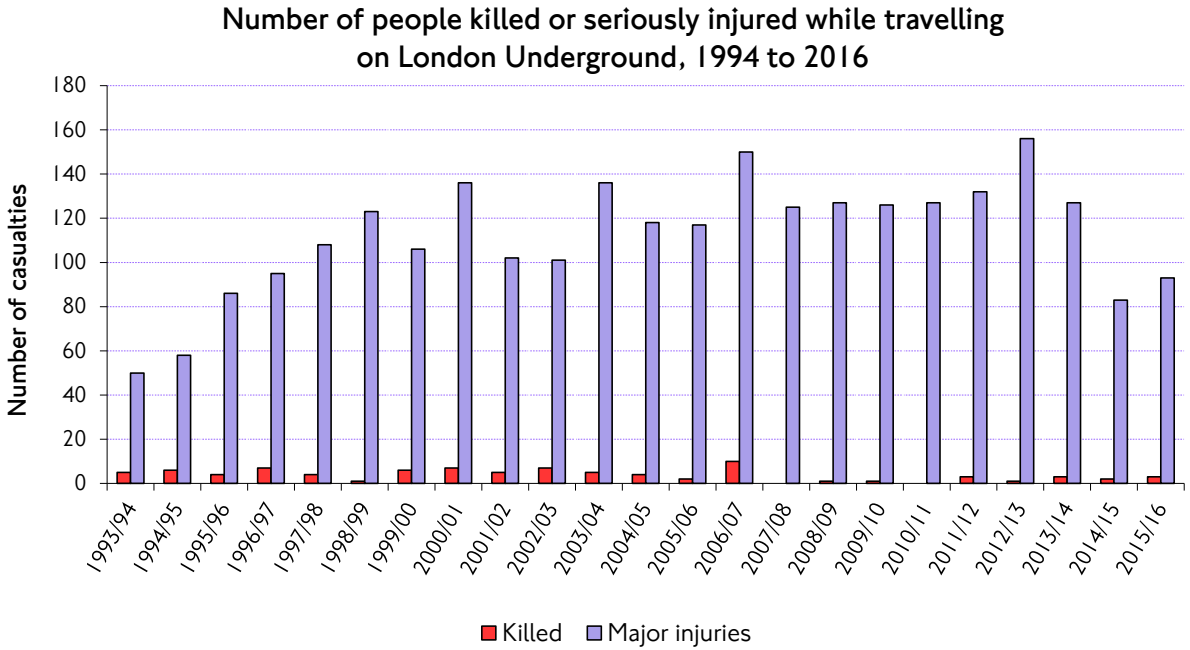
Londoners rightly expect their public transport services to be operated safely and to be managed and policed to ensure their personal security.

After many years of safe operation, there was a major derailment at Sandilands junction in November 2016 in which seven people lost their lives and over 50 people were injured. This tragedy serves as a reminder that safety is paramount.

There has been a consistent trend of improvement in bus or coach passenger injuries over the past decade. In 2015/16, 71 bus or coach occupants were injured with one fatality. On London Underground there were 93 passenger injuries and three fatalities.

People are more likely to be killed or injured by a bus whilst walking or cycling than whilst travelling by bus. In the last three years there were on average 200 people killed or seriously injured in collisions involving buses or coaches.



# New homes and jobs

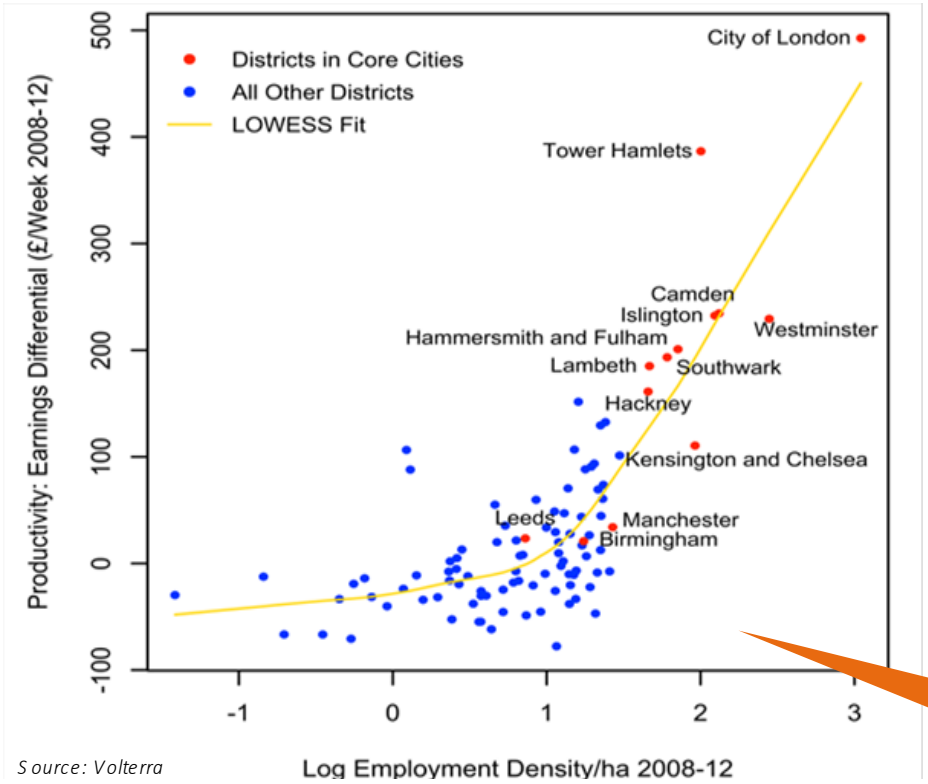
# London is vital to economic growth across the UK – it is the most productive region and the UK's only global centre

London's position as an internationally competitive centre for global business services brings trade not just to London but to the UK as a whole. In 2014, London accounted for around 23% of UK's economic output, a rise from around 19% in 1997. 45% of GVA was generated in just six central Boroughs – making this the most productive part of the UK.

The centre hosts a cluster of globally competitive sectors, and accommodates a third of London's jobs in just 2% of its area. Central London and the Isle of Dogs, will see the most employment growth in future.

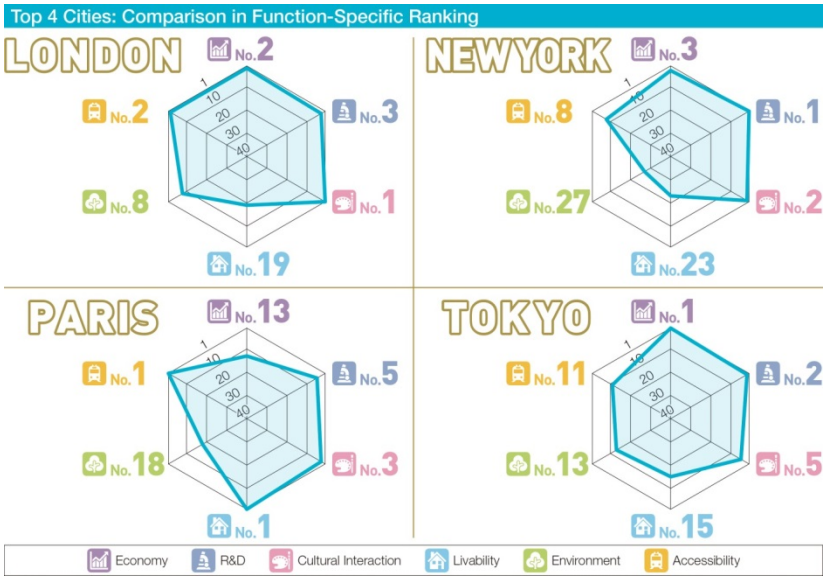
Central London has grown more than elsewhere, yet compared to other similar cities there remains scope to increase its density & productivity.

**Earnings differential (representing productivity) by employment density**




Source: Volterra

The economic clout of central London has helped London to top many world city rankings - need to maintain that position




Earnings are between 2 and 5 times higher than UK average where employment density is highest

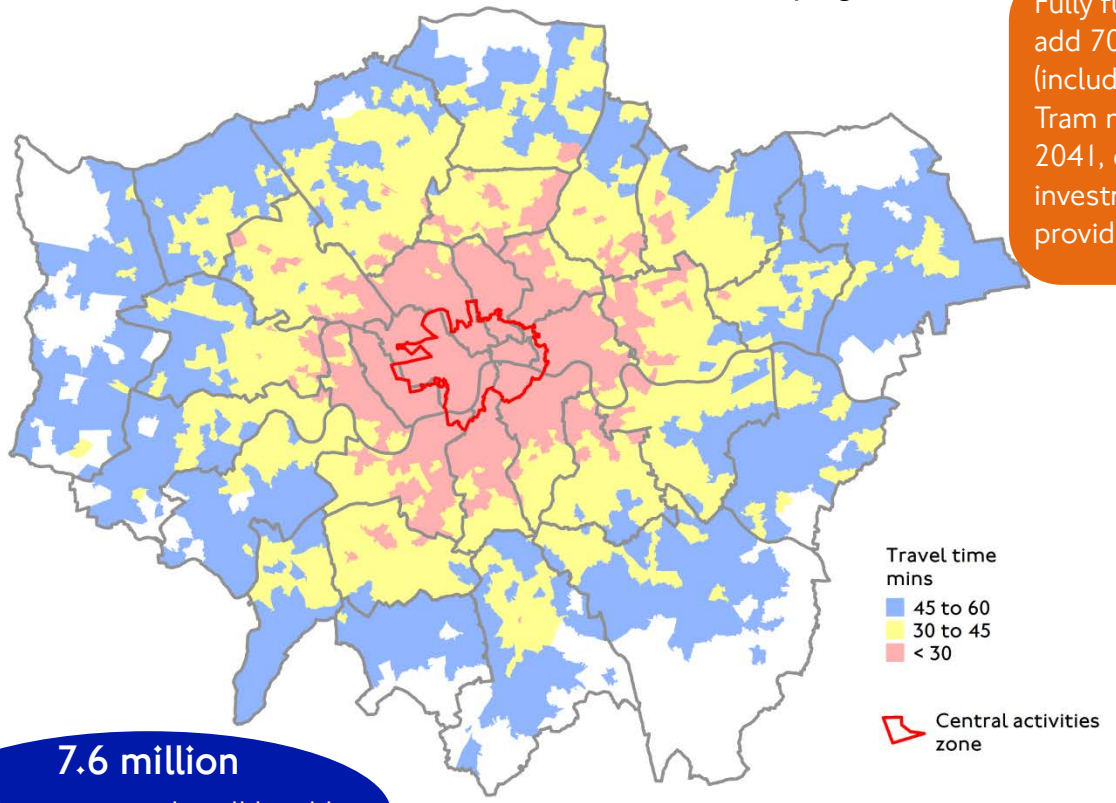
Note: GVA stands for Gross Value Added and is a measure of economic growth
R&D stands for Research and Development

# Jobs in central London depend on rail capacity; by 2041 demand will outstrip supply, possibly limiting growth

Ready access to a very large population catchment , supplied by the rail network, is fundamental to London's ability to act as a global employment hub. Agglomeration benefits are dependent on businesses being close together and having access to a large and diverse pool of skilled labour. Eight in ten commuters arrive in central London by rail.

Businesses depend on the system being able to deliver people reliably from where they live to where they work at times they are prepared to travel. This means that both the capacity and performance of the transport system are critical. If the central London economy was to be constrained as a result of transport problems, estimates suggest that this could result in an annual loss to national output of approximately £70 billion or 5.4% of GDP.

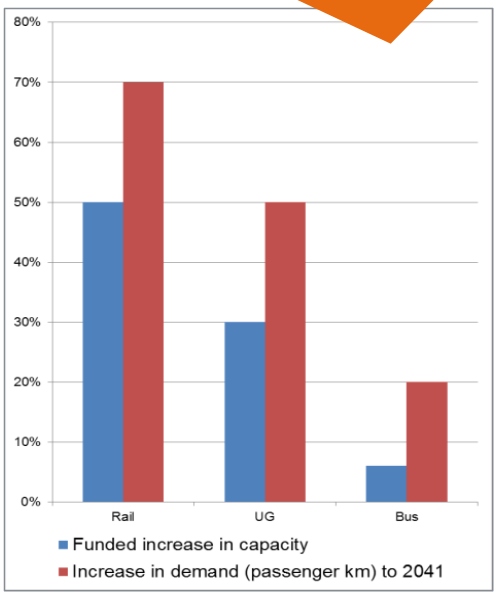
**Travel time to the Central Activities Zone, 2041 with funded programme**




**7.6 million**

working age people will be able to access central London in 45 minutes by 2041

Fully funded projects through to the early 2020s add 70% extra capacity to the national rail network (including Elizabeth Line) & 50% to the LU, DLR and Tram network but demand still outstrips supply by 2041, demonstrating the need for further investment in major schemes such as Crossrail 2 to provide necessary capacity to central London.



# Beyond the centre, travel is more car dependent but town centres could become sustainable travel hubs

London contains twelve metropolitan town centres – many similar in size to the centres of major cities across the UK – as well as 35 major centres and 147 district centres. At least four in ten journeys made by London residents start or end in a town centre, primarily for shopping but also to work, access services and for leisure purposes.

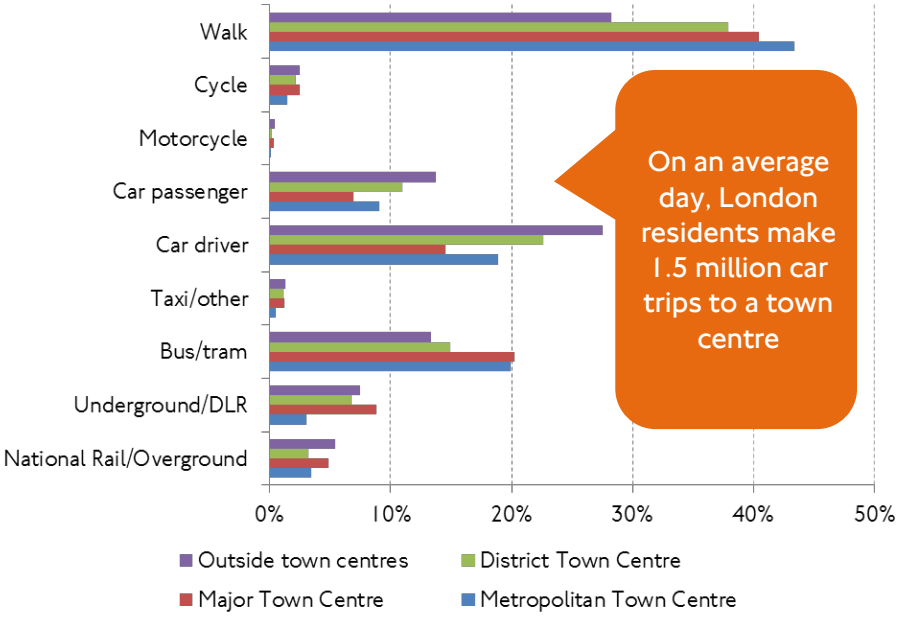
As our shopping habits change, the role of town centres is changing accordingly. Retail is consolidating in larger centres, meaning that smaller centres are becoming less viable over time. In general, we can see that the denser the area in 2011 in terms of retail units, the greater the increase in density since. Conversely, town centres have an increasing role as leisure destinations and residential locations, resulting in more evening travel.

Town centres typically also act as transport hubs, with larger town centres all served by Tube or rail services and multiple bus routes. Whilst London residents are less likely to drive to town centres than other destinations, nevertheless, three in ten trips to a town centre is made by car.

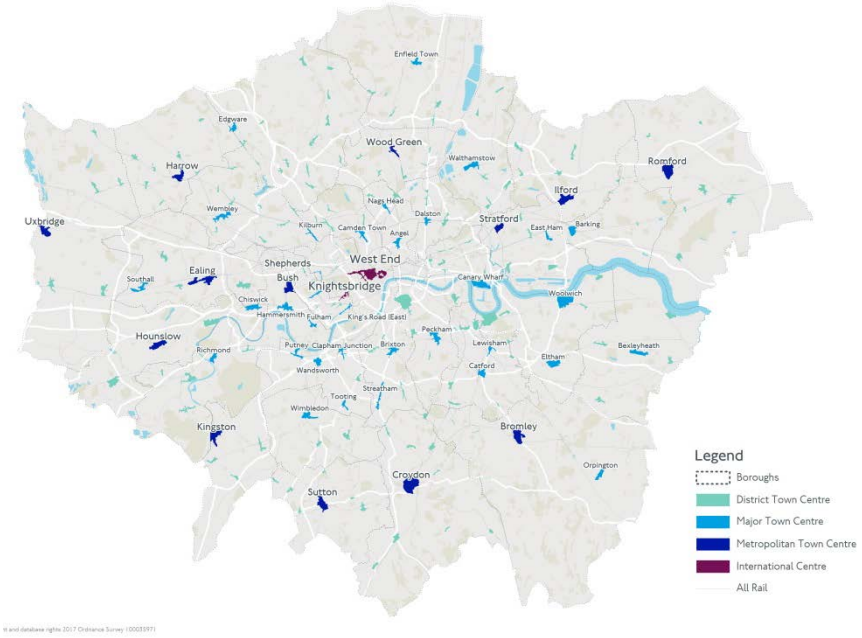
Non-Londoners also visit London's town centres, often by car, so this is likely to underestimate the overall car mode share.

Research has found that people accessing town centres by active modes and bus spend more per month than car users.

**Mode share of trips to town centres, London residents**




**Map of London's town centres**

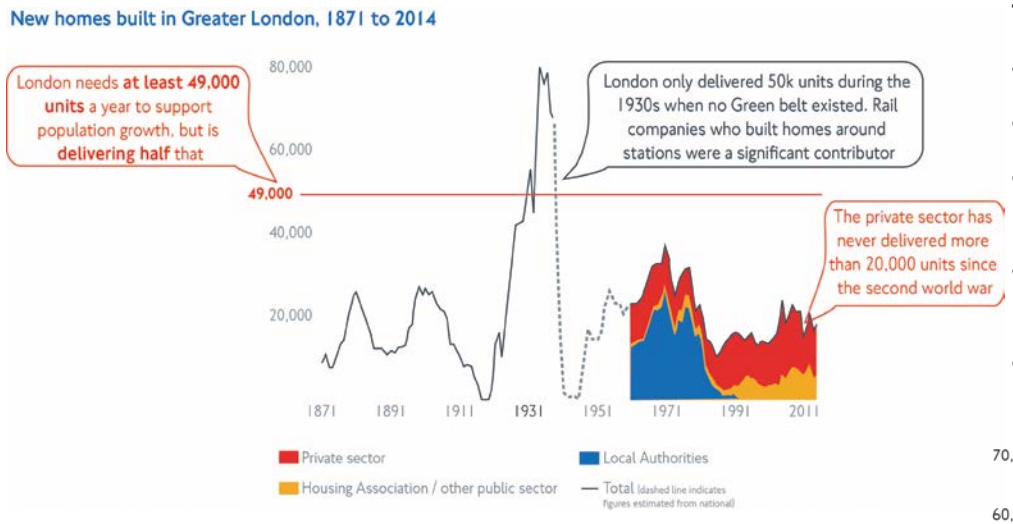


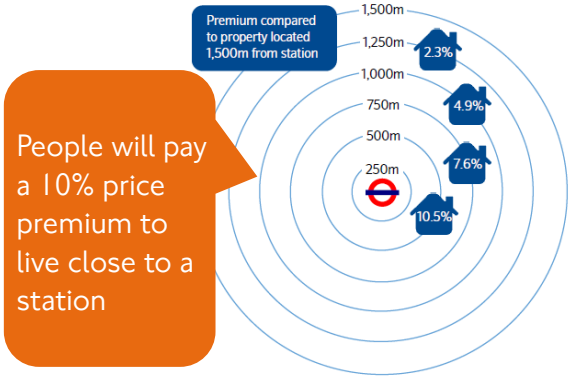
# London needs 50,000 new homes a year but is delivering half that - transport investment can unlock development

To accommodate population growth and tackle the existing housing shortage, 50,000 new homes are needed every year, but only around half the homes that Londoners need have actually been delivered in recent years. Transport improves the viability of developments and creates new markets. Homes in the best connected areas command a price premium – currently 2.5% for Crossrail 1 above surrounding areas.

**Need to build a new home every 11 minutes, 24 hours a day for the next 25 years.**

**Three quarters of London's businesses consider housing a threat to the economy.**




People will pay a 10% price premium to live close to a station

Since 2005 half of residential development has been in the best connected parts of London

**The consequences of failing to meet housing needs could be:**

- Prices rise;
- Some people who would have lived in London live elsewhere;
- Housing is only delivered in places with the highest land values and elsewhere, properties are sub-divided;
- People are forced to live further away from where they work and in areas with poorer transport accessibility;
- Overcrowding rises and the amount of space per person falls.

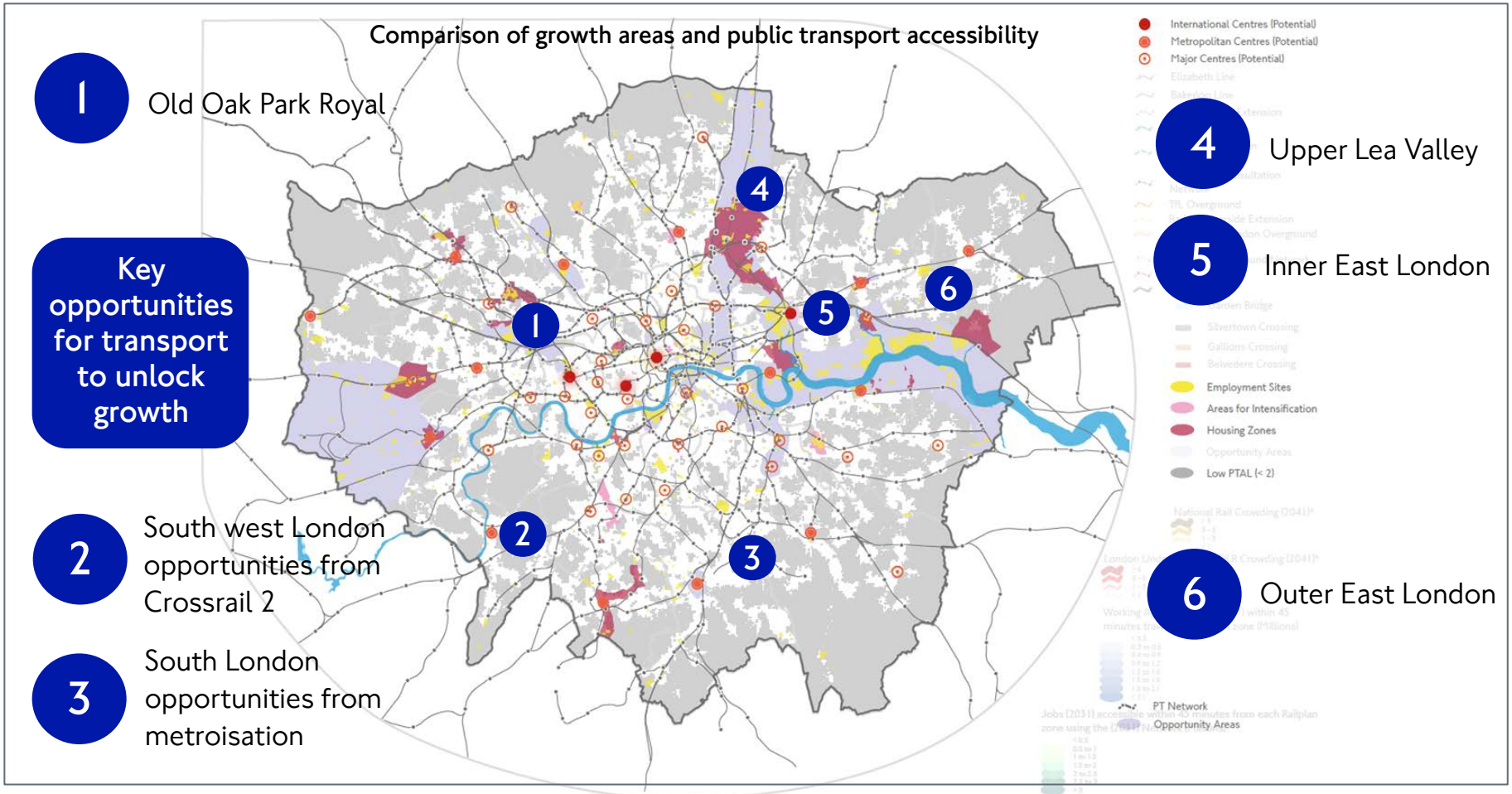
**Completed housing units by transport accessibility of area**

# Many of the areas with the greatest capacity for development have poor transport connectivity, hampering development

Opportunity Areas are the largest reservoir of brownfield land and could make entirely new places for Londoners to live and work, but many of the areas with the greatest capacity for development have poor transport connectivity and this has directly limited private sector investment in housing.

Beyond these growth areas, densification and development is constrained in parts of London with poorer access to the rail network, and in particular in south London where the connectivity offered by the National Rail network is considerably poorer than in other regions.

Investing in new public transport capacity, cycling and walking could unlock the delivery of thousands of homes that may not otherwise come forward for development

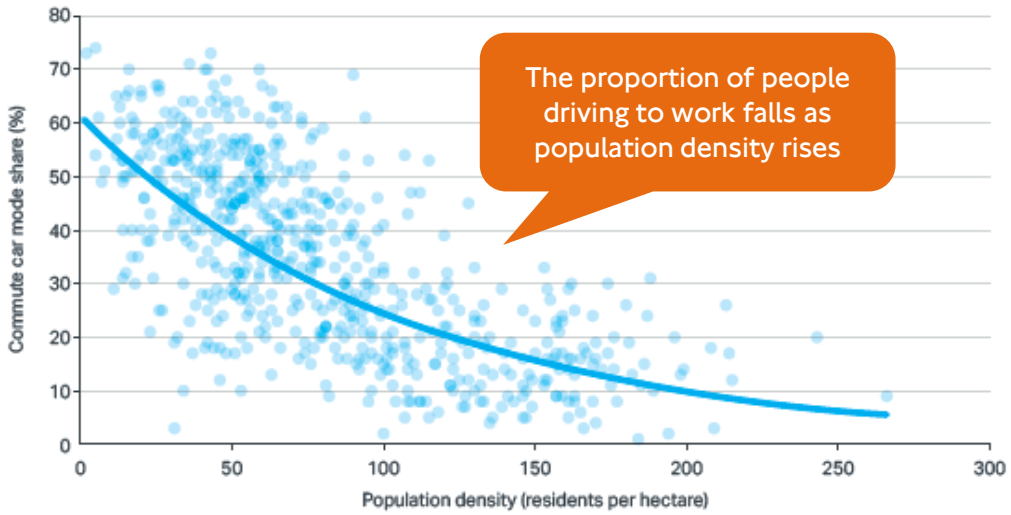


# London's low density sprawl has contributed to high car use, places should make sustainable travel choices easy

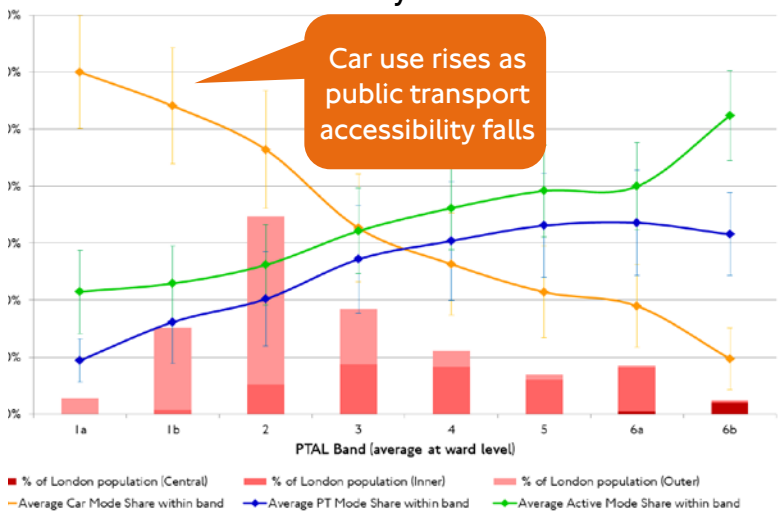
High density living influences travel in a number of ways, such as by increasing the number of activities that can be carried out locally, or through making car use less attractive as a result of increased competition for road space and parking. People are less likely to drive if they have ready access to good alternatives and don't need a car for work.

As London's population grows, population density will increase, contributing to a fall in the car mode share. But around half of Londoners will still live in lower density regions which typically are reliant on the car. The situation, design and connectivity of new housing will determine the travel patterns of its residents. Simply put, places 'built for the car' generate more car travel than places 'built for sustainable travel'.

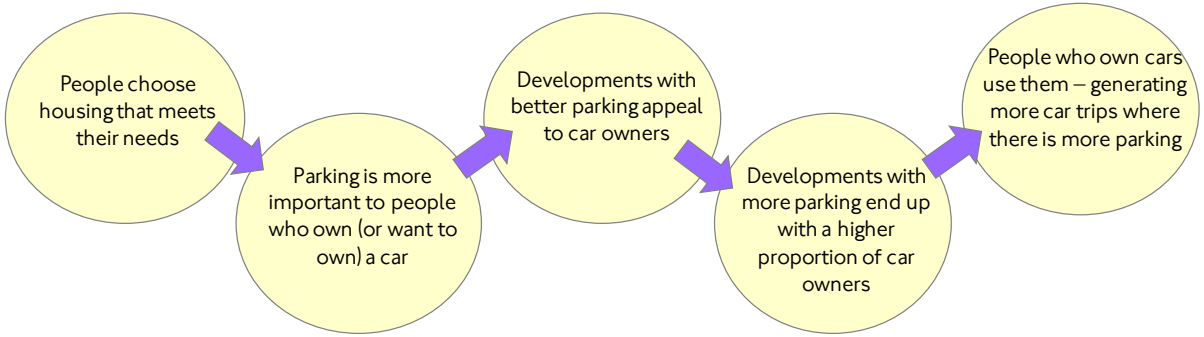
## Commute car mode share by population density




## All journey mode share by public transport accessibility of home




People living in housing with more or better parking are more likely to own and use a car than similar people with poorer parking options. Of households with a car, households with off street parking had 1.8 cars on average compared to 1.4 cars for households with permitted on-street parking.



# Conclusion

# Conclusion

London will be bigger than ever with 32m trips daily. 70% will be by PT and active modes, but without further action traffic will rise with more car and many more van kilometres on the roads. Growth places pressure on the transport network but brings considerable economic benefits to London and the UK.

There is an opportunity to deliver a bigger, better city by investing in transport:

1. Healthy Streets can create vibrant, clean, safe and inclusive places and encourage people to be active.
2. We can build on our unrivalled success in delivering mode shift from the car to deliver a world-leading sustainable travel mode share.
3. We have proven the benefits of investing in public transport and focussing on our customers.

However, failing to meet our challenges risks:

1. Jobs growth won't materialise & high value jobs will go to global centres outside the UK.
2. But population growth - largely driven by an ageing population – is likely to continue risking worsening conditions.
3. Unhealthy streets and a worsening customer experience on the transport network

We face a number of key challenges:

- Delivering Healthy Streets that meet expectations and tackle the physical inactivity crisis threatening health
- Reducing emissions to minimise the health impact of transport and work towards a zero carbon London
- Tackling car use and prioritising streets for active modes, buses and essential car and freight traffic
- Ensuring the transport network is accessible, fair, affordable and safe for all
- Delivering a reliable public transport service despite growing passenger numbers
- Support the delivery of the homes and jobs that London needs through investing in transport

Fundamentally, our challenge is to manage the competing demands for space and meet our goals by:

- Delivering mode shift from the car to walking, cycling and public transport
- Supporting growth through the provision of new public transport capacity to employment hubs
- Ensure new homes are delivered in a way that makes it easy for people to choose sustainable modes
- 'Keeping up' and ensuring technological advances deliver a better London