



Health, safety and environment annual report

2018/19

MAYOR OF LONDON



**TRANSPORT
FOR LONDON**
EVERY JOURNEY MATTERS

About Transport for London (TfL)

Part of the Greater London Authority family led by Mayor of London Sadiq Khan, we are the integrated transport authority responsible for delivering the Mayor's aims for transport.

We have a key role in shaping what life is like in London, helping to realise the Mayor's vision for a 'City for All Londoners'. We are committed to creating a fairer, greener, healthier and more prosperous city. The Mayor's Transport Strategy sets a target for 80 per cent of all journeys to be made on foot, by cycle or using public transport by 2041. To make this a reality, we prioritise health and the quality of people's experience in everything we do.

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

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

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

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

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

We are constantly working to improve the city for everyone. This means freezing TfL fares so everyone can afford to use public transport, using data and technology to make services intuitive and easy to use, and doing all we can to make streets and transport services accessible to all. We reinvest every penny of our income to continually improve transport networks for the people who use them every day.

None of this would be possible without the support of boroughs, communities and other partners who we work with to improve our services. We all need to pull together to deliver the Mayor's Transport Strategy; by doing so we can create a better city as London grows.

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About this report

This report covers the financial year from 1 April 2018 to 31 March 2019. However, the road safety data for Greater London and the Transport for London Road Network covers the calendar year from January to December 2018, in line with national standards. The safety data includes customer, employee and supplier details. Health data relates to employee wellbeing and includes employee sickness absences but does not cover contractor or customer

health issues. Environment data covers London's public transport operations, including taxis and private hire vehicles, plus the activities we and our suppliers carry out. Our ongoing effort to provide more accurate data means that, following further checks, there are some changes to the figures we reported last year. Where possible, data is compared over five years and, where appropriate, comparisons have been made with previous years.

Commissioner's foreword

We have made significant progress in implementing the Rail Accident Investigation Branch's recommendations following its investigation into the overturning of a tram near Sandilands junction in November 2016. We have completed many of them, including the installation of a driver protection device that alerts to any incident of driver distraction or fatigue and improvements to the glazing. By the end of 2019, we will have also installed a new automatic braking system, which brings a tram to a controlled stop if it exceeds the speed limit. We continue to share the significant, ground-breaking safety improvements we are implementing with the wider UK tram industry. My thoughts remain with all who lost their lives or who were otherwise affected as we continue to ensure that they are being provided with the appropriate support and assistance.

While we continue to support the British Transport Police and the Office of Rail and Road with their ongoing investigations, our attention remains focused on preventing anything like this from happening again.

Our priority is to eradicate all deaths and serious injuries from London's roads and our public transport system, as part of the Mayor's Vision Zero ambition. In July 2018, we launched our Vision Zero action plan, which puts the elimination of danger at the core of our decision making. Tragically this year, 34 people lost their lives following incidents on the Tube and 14 died in incidents involving buses. Provisional figures for 2018



indicate that the number of fatalities on London's roads has fallen from 131 last year to 111, the lowest number on record, with pedestrian fatalities at the lowest level recorded and motorcyclist fatalities at their lowest level since 2013. Although road deaths have reduced, we are behind the overall 2018 target required to meet the Vision Zero goal of a 65 per cent reduction in the number of people killed or seriously injured by 2022. There were concerning increases in the number of people killed or seriously injured among car occupants and cyclists.

We must lead the way by ensuring our own operations are as safe as they can be. Applying the principles of Vision Zero, we are making changes to our infrastructure that will reduce risk at source; altering the layout of the highest risk road junctions and realigning platforms across the

Underground to reduce the gap between the train and the platform. We already set higher standards for London Buses than regulations require and our new Bus Safety Standard goes even further. It is a key element of our overall Bus Safety Programme, which sets out our plans to make buses in London the safest in the world. The standard is focused on vehicle design and safety system performance and will make a substantial contribution to helping us achieve the Mayor's goal of nobody being killed in or by a bus in London by 2030.

As safety is our core value, we continue to look for innovative ways to reduce risk and injury, as shown by our Bus Safety Programme and Bus Safety Innovation Fund. We have also trialled blue lights under the platform at Farringdon to make the gap between train and platform clearer and help reduce the number of falls. We have also developed the Direct Vision Standard to eliminate blind spots on heavy goods vehicles. As part of the Thames Partnership Group, we developed the first safety improvement plan for the Thames, which will be launched in summer 2019.

The number of injuries to our workforce and suppliers reduced for the second consecutive year and are now at a five-year low. A key contributor to this is our 'making safety personal' programme, which will continue in 2019/20. Our people perform safety critical tasks and so improving our safety performance not only requires ongoing investment in our infrastructure but in our people. Over the last year, we have increased our

peer support network and the number of health and wellbeing champions and provided training for our frontline staff to help them identify and assist vulnerable customers. Later this year, we will launch our revised health and wellbeing strategy, which is a holistic and comprehensive approach to improving health and wellbeing and will help to create a safer, more caring organisation.

We continue to play an important role in helping the Mayor achieve his ambitious environmental goals, especially in relation to improving London's air quality. During 2018/19 we delivered the programmes of work and communications necessary to support the successful launch of the Ultra Low Emission Zone on 8 April 2019. We only issue licences to zero emission capable taxis, we now have 106 zero emission buses on our network and we continue to retrofit our fleet with cleaner engines. To support the London Environment Strategy, we continue to reduce our carbon dioxide emissions and energy use, reuse and recycle materials to reduce waste, and improve our green infrastructure.

This report will outline our progress and challenges in more detail.

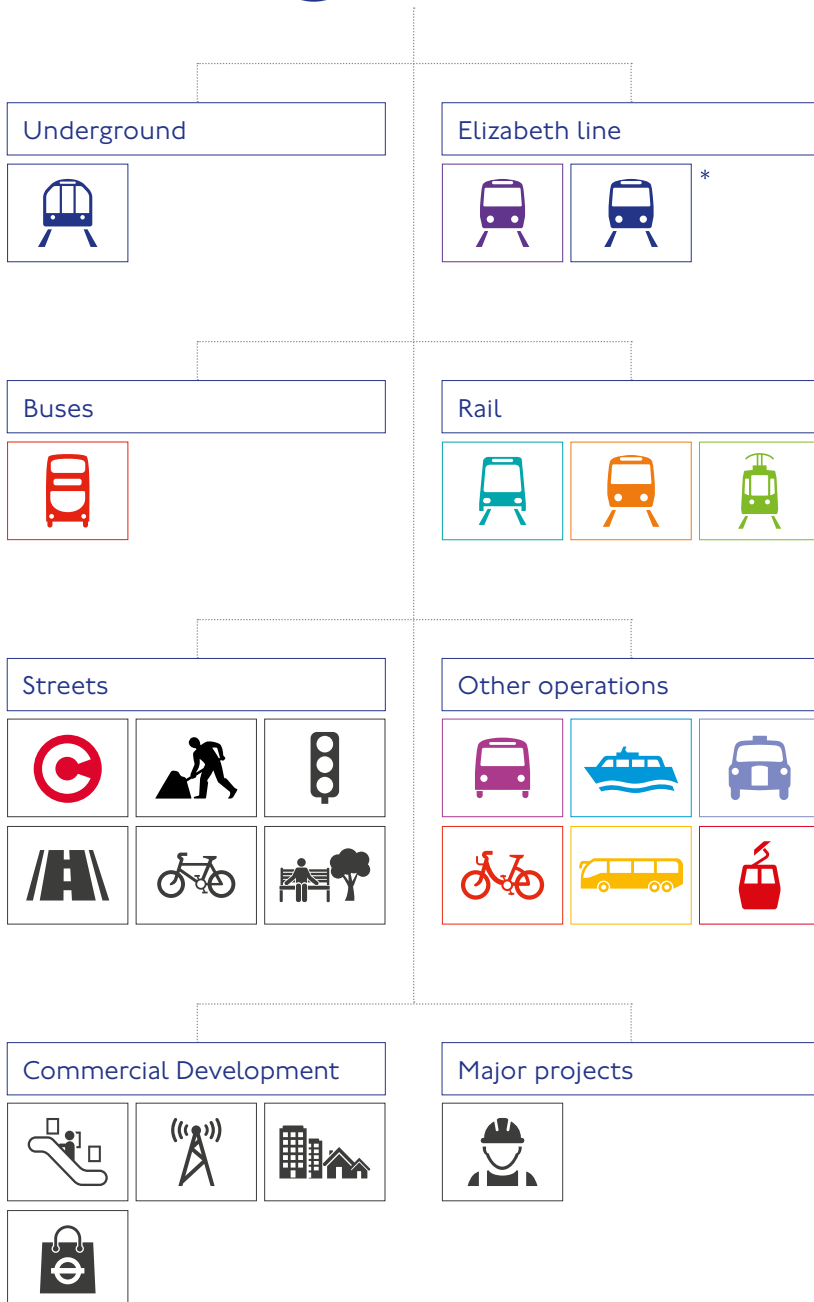


Mike Brown MVO
Commissioner
Transport for London

Our business

Keeping London moving, working and growing to make life in our city better

How we report on our business



Facts and figures**

940 Trains on the TfL network



580km

TfL-operated highways



680km

TfL-operated Rail and Underground routes

9,550

Buses on the TfL network



6,350

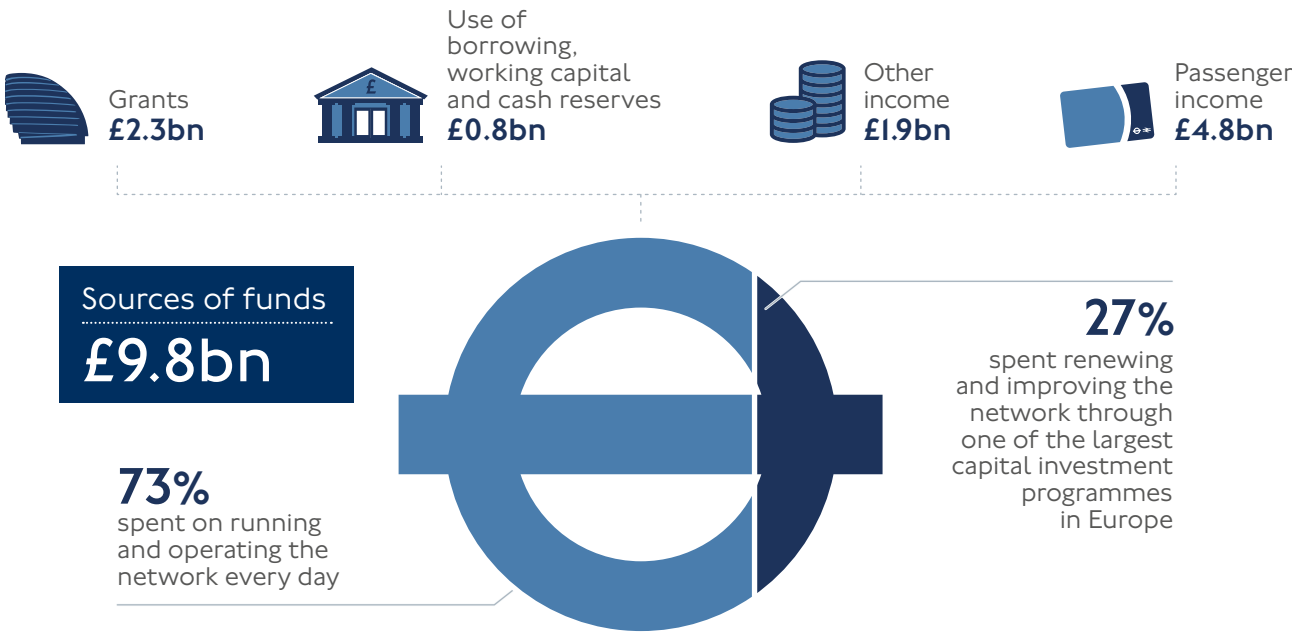
Traffic signals operated by TfL



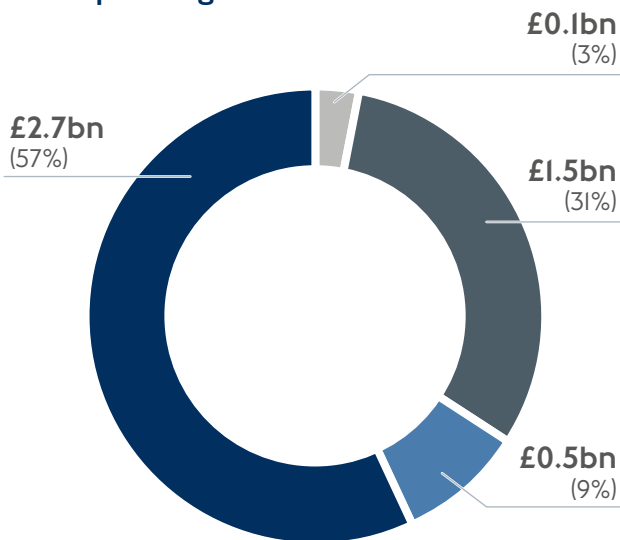
* In this report, TfL Rail is reported as part of Rail

** Based on full year 2017/18

Business at a glance



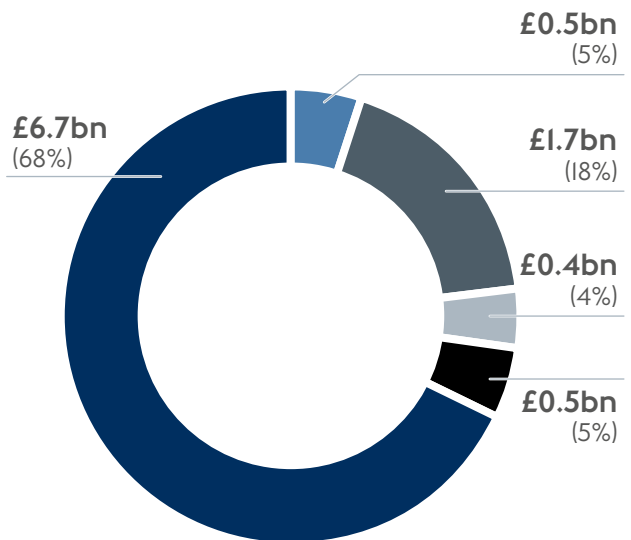
Total passenger income



Total: **£4.8bn**

- Underground
- Rail
- Buses
- TfL Rail

Total costs



Total: **£9.8bn**

- Operating costs
- New capital investment
- Capital renewals
- Crossrail
- Net financing



We work to ensure every customer can travel safely

Our approach

We take a Vision Zero approach to health, safety and environment, which includes a commitment to eliminate death and serious injury from our network by 2041.

We want to make sure that:

- Every journey is safe for our customers, employees and suppliers, and that everyone goes home safe each day
- We maintain our assets and deliver projects safely
- We fulfil our commitments to prevent pollution and nuisance, protect biodiversity, improve air quality and reduce waste and carbon emissions

An important part of our health, safety and environment (HSE) management strategy is measuring and benchmarking our performance internally and against international standards. Across TfL, we use the Office of Rail and Road (ORR) Railway Maturity Model to assess, benchmark and improve our approach to HSE management. The model looks at the five areas of our safety management system:

- Policy
- Organising for safety
- Cooperation and competence
- Planning and implementing
- Monitoring, audit and review

This enables us to identify long-term targets and address barriers to safety improvement.

Our businesses also set HSE targets against a number of indicators to enhance our day-to-day performance and drive reductions in injuries, environmental harm and risk. To deliver our performance targets, we have established HSE improvement plans at both a strategic level, such as the Vision Zero action plan, and a local business unit level to address the risks, injuries and sources of environmental harm. We regularly monitor and review these plans and evaluate the effectiveness of our control measures.

HSE performance is reported at business unit level and discussed in management meetings across the organisation. Audits are carried out to monitor our strategic risks and ensure they are adequately controlled. Where shortfalls or non-compliance with the law or our internal requirements are identified, a corrective action plan is put in place to make sure appropriate improvements are made.

This process of planning, implementing, monitoring and reviewing risks is vital to achieving our vision of getting everyone home safe and healthy every day and creating a safer, greener transport network for London.



London's transport system will be safe and secure



London's transport system will be safe and secure

Significant incidents

The British Transport Police (BTP) and the ORR continue to investigate the tragic overturning of a tram at Sandilands on 9 November 2016.

In January 2019, the Environment Agency gave notice of its intention to impose a Compliance Notice on London Underground for breach of The Environmental Protection (Disposal of Polychlorinated Biphenyl and other Dangerous Substances) (England and Wales) Regulations 2000. The Compliance Notice proposed will require London Underground to ensure that all locations on the network are free of polychlorinated biphenyls by the end of 2023. London Underground has programmes in place to comply with the proposed Compliance Notice. The Environment Agency has not yet issued the Compliance Notice to London Underground, but we are already working to eliminate all suspected polychlorinated biphenyls from the network.

In December, following the hearing into an incident on 4 June 2016 where a contractor working on track improvements was crushed against a platform at Whitechapel station by a road rail vehicle, London Underground was fined £100,000 plus costs and our principal contractor, Balfour Beatty Rail Limited, was fined £333,000 plus costs.

Prevention of future death reports

Two prevention of future death reports were issued to us by Coroners during the year.

Following the inquest into the deaths arising from the terror attack on Westminster Bridge in March 2017, the Coroner issued a prevention of future deaths report, and suggested that we consider:

- Whether there is any further work we can do to improve protective security on major roadways and bridges in the Capital
- Reviewing the height of parapets and railings of bridges for which we are responsible

Our review concluded that our focus should be the installation of hostile vehicle mitigation measures. We have established temporary measures at Westminster Bridge and other Thames crossings until the permanent solution is provided.

In response to the death of a cyclist in a collision with a lorry on Lavender Hill in October 2016, the Coroner raised concerns about the existing road layout. Alternative design options are currently being investigated with a view to reporting back to the Coroner with our next steps by December 2019.

Independent reporting service

The independent Confidential Incident Reporting and Analysis Service received a total of 26 reports related to TfL operations in 2018/19, compared with 23 reports in the previous year. There were 13 reports related to London Underground (same figure in 2017/18), with concerns about equipment being the main cause. There were nine reports related to London Buses, (compared to 10 in 2017/18), with concerns over rostering and the work environment being the main reason. Four reports were sent to TfL as an infrastructure manager. These related to Dial-a-Ride, Crossrail, infrastructure on the London Underground and an Underground rulebook clarification. All cases have been responded to and closed.

Sarah Hope Line

The Sarah Hope Line offers comprehensive help and support to anyone involved in, or affected by, a serious incident on our network. Our dedicated team, based at our contact centre in North Greenwich, offers a range of services, from counselling to reimbursing medical costs. We also work in partnership with organisations including Assist Trauma Care, the Samaritans and private therapy clinics, to provide further specialised support.

The Sarah Hope Line has been supporting people, including witnesses and their families, in relation to a number of incidents on London Underground, London Overground, the DLR and our bus services. The team is also working with our suicide prevention team to support witnesses and families. The Sarah Hope Line received 594 calls during 2018/19.



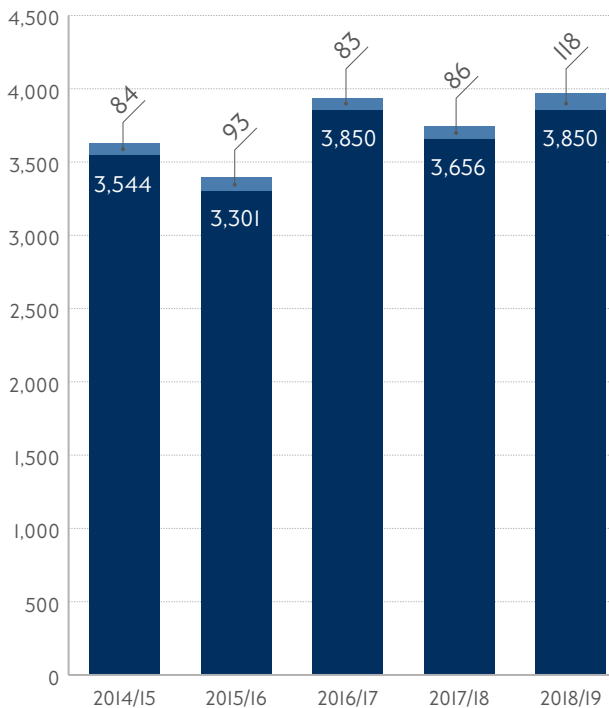


There has been a rise in the number of people injured getting on or off a train

Underground

London Underground

Customer injuries



- Minor injuries
- Major injuries

Causes of injury (%)

Slips, trips and falls	84
Machinery/equipment	14
Other	2

There were 3,968 injuries reported this year on the London Underground, an increase of 226 (six per cent) from last year. There were 2.87 injuries per million journeys in 2018/19 compared to 2.76 last year, an increase of four per cent. There were increases in both minor and major injuries.

There were 38 incidents that resulted in a fatal injury. These have been recorded by the coroner as: suicide (11), open* (3), narrative** (4), mental illness (1) and accidental (1). A further 18 fatalities are awaiting the outcome of coroner inquest.

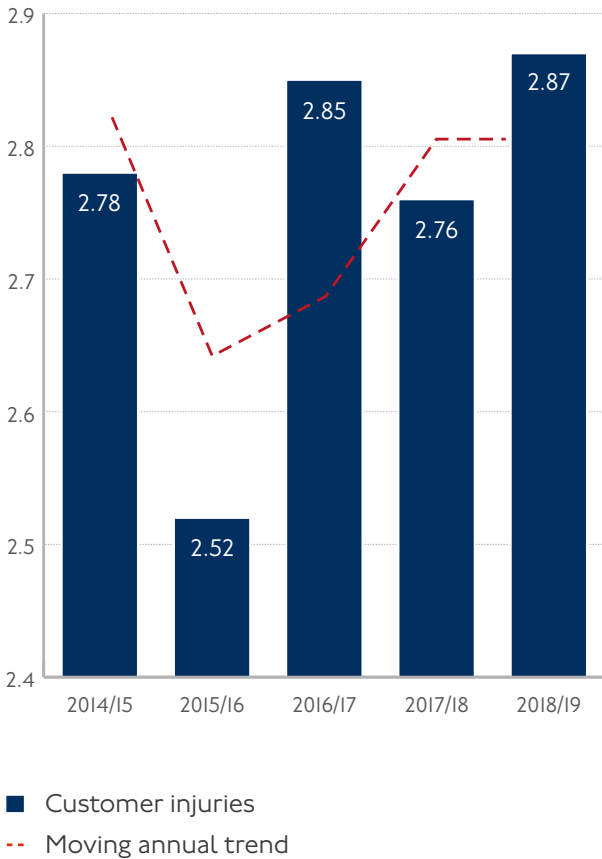
We developed bespoke training, which has helped double the number of suicide interventions on the Tube. The training programme enables staff to identify vulnerable passengers and provides advice on how to deal with situations.

Slips, trips and falls increased by 6.7 per cent in 2018/19 compared to 2017/18 and accounted for 84 per cent of customer injuries. The most common locations for customer injuries were on escalators (44 per cent), stairs (21 per cent) and at the platform train interface (17 per cent.) Injuries on escalators and at the platform train interface rose by 10 and 11 per cent respectively compared to 2017/18.

* An open conclusion arises in the absence of sufficient evidence to prove cause of death to the necessary standard

** A narrative conclusion records the coroner's conclusions on the important issues arising in the circumstances by which the deceased came by his or her death

Customer injuries per million passenger journeys



Following a rising trend since 2015/16, the moving annual customer injury rate per million passenger journeys has begun to plateau.

To improve safety on escalators, we introduced an Escalator Excellence Award programme for the 10 stations with the most accidents. This programme set the standard for good escalator safety practices on London Underground stations, including new 'Hold the Handrail' signs on escalators, better local announcements and a new safety poster campaign. Our station staff involved their families in communicating safety messages, including getting their children to record safety messages.

Our analysis of the impact of the Escalator Excellence Award showed the number of accidents on escalators at the initial 10 stations dropped by 29 per cent. These improvements have been rolled out to all Tube stations that have escalators.

We also launched our Stair Excellence Programme, which initially focused on the 18 stations (two per line) with the highest number of stair-related injuries. At the end of 2018/19, the programme was in place at 36 stations and will be rolled out across all stations with stairs during 2019/20. The programme includes:

- An asset condition and customer behaviour survey to identify improvements to reduce injuries
- Targeted public announcements and poster campaigns
- Staff engagement with customers
- A focus on wet weather arrangements

At the start of the year we launched our new plan to reduce injuries at the platform train interface. Key activities included a short film for train operators and station staff and a new programme where senior and local managers talk to station staff and train operators about any issues or concerns. Themes have included a focus on train operator awareness of their platform-train interface hotspots and the importance of reporting faults associated with assets we use to manage safety. Twenty locations accounted for 43 per cent of incidents at the platform train interface. During the year a 23 per cent improvement was achieved at these locations. In September 2018, observations were completed at the 10 stations with the highest number of platform-train interface incidents, to check that the correct mitigation measures and customer communications are in place.

We also made changes to our assets and infrastructure to reduce risk. The platform edge has been moved on more than 90 Underground platforms to reduce the gap between the train and the platform. We also improved the cameras on a number of platforms, which will improve the view the train operator has of the platform. We plan to make improvements on 95 platforms between now and April 2021.

We have completed the refurbishment of 27 Jubilee line trains, which includes putting a yellow plate in the footwell to draw attention to the gap between the train and the platform.

We continue to look for innovative ways to reduce risk and injury. Flashing blue lights were installed under the platform at Farringdon to test new prototype lamps to make the gap clearer.

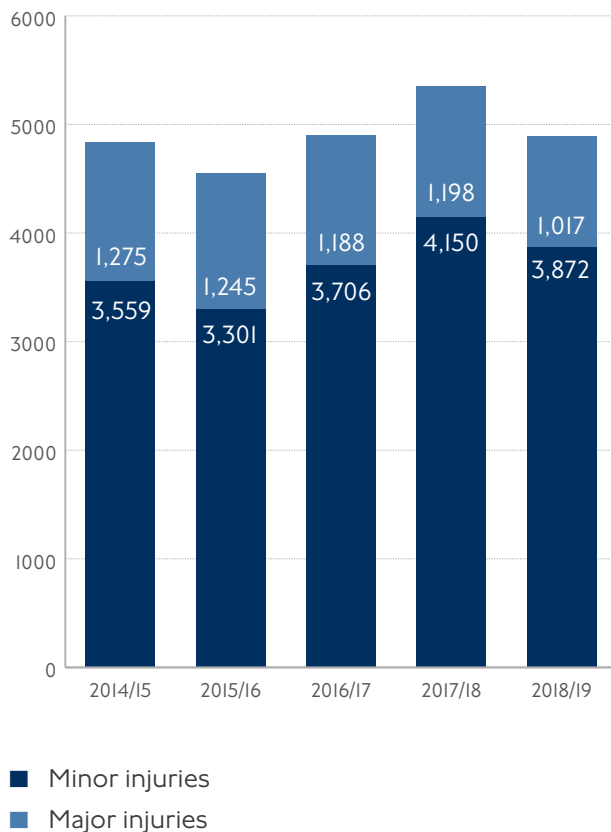
We launched a communications campaign leading up to Christmas, focusing on the hazards associated with drinking alcohol. The key message to take care of yourself and your friends was communicated using posters and targeted public address messages recorded by London Ambulance Service staff and our senior managers, as well as the singer Mariah Carey.



Buses

London Buses

Customer injuries



A total of 4,889 customers were injured in 2018/19 compared to 5,348 in 2017/18, a reduction of 459 (8.6 per cent). This equates to 2.2 injuries per million passenger journeys, compared with 2.38 in the previous year. There were reductions in both minor and major injuries.

There were 13* incidents that resulted in a fatal injury on the bus network, compared to 11 in 2017/18. This includes nine pedestrians, three bus passengers and one cyclist. One has been recorded by the coroner as death by road traffic collision. The Coroner issued a prevention of future deaths report to the Department for Transport about green men signals at staggered crossings and signage on the pavement. The remaining fatalities are awaiting the outcome of coroner inquest.

In 2018/19, 1,017 customers were taken to hospital and are therefore classified as major injuries, 181 (14 per cent) fewer than in 2017/18. The number of customer injuries has reduced, mainly due to fewer slips, trips and falls (down 21 per cent) and collisions (down 11 per cent)

* We have previously reported an additional bus fatality related to the provision of a South Eastern Rail replacement service

compared with 2017/18.

This year, 114 bus-related deaths and serious injuries on London's roads involved vulnerable road users, with pedestrians accounting for 80.7 per cent of all people killed or seriously injured in 2018. The number of deaths and serious injuries involving a bus has reduced by 16.7 per cent compared to 2017, with fewer cyclists, pedestrians and motorcyclists killed or seriously injured.

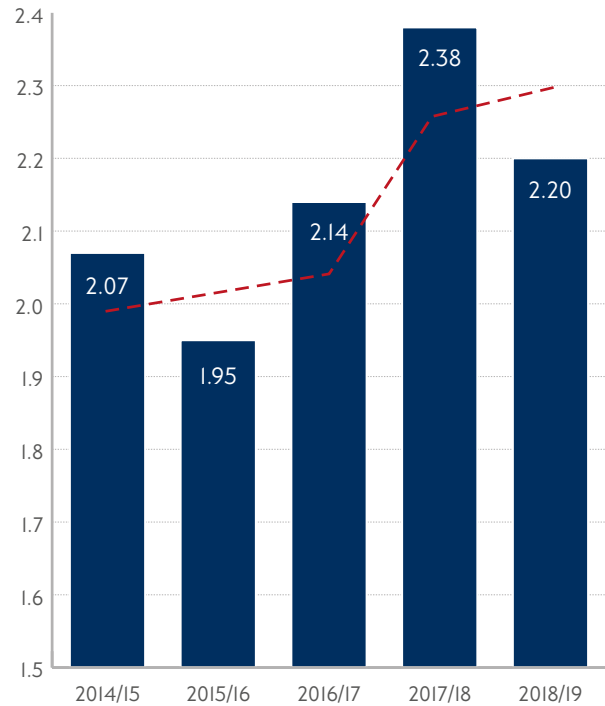
Despite the significant reduction in slips, trips and falls, they remain the main cause of injuries, accounting for 58 per cent all injuries and 60 per cent of major injuries.

The majority of the falls occur within

Causes of injury (%)

Slips, trips and falls	57
Struck by/against object	20
Trapped fingers/limbs	8
Collisions	6
Other	9

Customer injuries per million passenger journeys



- Customer injuries
- - - Moving annual trend

bus aisles, with sudden bus movement being the key factor.

Over the five-year period, the number of customer injuries per million journeys

has shown a rising trend. However, 2018/19 has seen an improvement, reducing to 2.2 injuries per million customer journeys.

Safety summit

On 16 October 2018, we held our second Bus Safety Summit, bringing together bus operators, bus manufacturers, policymakers and transport research specialists.

The event launched our Bus Safety Standard, a key element of our Bus Safety Programme, which sets out our plans to make buses in London the safest in the world. The standard focuses on vehicle design and safety system performance.

As such it will make a substantial contribution to helping us achieve the Mayor's goal of nobody being killed in, or by, a London bus by 2030.

We already set higher standards for London Buses than regulations require, including the areas of environmental emissions, accessibility, construction, operational requirements, and fire suppression systems. The new standard goes further, including requirements on four themes that operators must adopt by 2024:

- Driver assist – helping the driver to avoid or reduce the severity

of incidents

- Partner assist – helping other road users avoid collisions
- Partner protection – reducing the severity of injuries for road users outside the bus in a collision
- Occupant protection – reducing the severity of injuries for people on board the bus

The Bus Safety Standard also states that new buses entering the fleet must have the following safety measures:

- Technology that automatically restricts the bus to the speed limit
- An audible alert for pedestrians and other road users of the presence of quieter electric buses, ensuring the bus can still be heard by blind or partially sighted people
- Slip-reduction measures inside buses, such as high-grip flooring
- More blind-spot mirrors and reversing cameras
- Warning pedal indicators to stop drivers pressing the wrong pedal

These innovative safety measures have been thoroughly tested by the Transport Research Laboratory, bus manufacturers and operators to ensure they can be implemented as quickly as possible.

Safety innovation fund

Bus operators are progressing trials of innovative safety equipment through our Bus Safety Innovation Fund. Eight innovation fund projects were carried out in 2018/19, including trials of fatigue detection devices, acceleration limiters and new training apps, with many showing positive results. We successfully completed cycling and walking training, with the operator looking to implement a wider application of the course in 2019.

Fatigue technology trials showed a small reduction in road traffic collisions, but, importantly, led to more welfare-based discussions between managers and drivers. One operator is testing an alarm that warns the driver if they follow other road users too closely, drive too fast, leave the lane or if there is a pedestrian approaching. Early results indicate a 40 per cent reduction in road collisions.

Bus operators have also been coordinating large-scale safety campaigns at locations that have more collisions or near misses, to see if more can be done to reduce risk. Campaigns in Oxford

Street and Croydon, in May and December respectively, enabled managers from bus operators and ourselves to engage with drivers on safety messages and to view the behaviour of all road users.

We procured a new bus driver safety training course to focus on their role in achieving Vision Zero, through better awareness of more vulnerable passengers and road users.

We appointed Loughborough University, in partnership with the Swedish Road Safety Institute, to conduct independent research into bus driver fatigue. The research has concluded and is being discussed with trade unions and bus operators. It enables us to understand the extent and nature of fatigue in bus drivers and suggest evidence-based solutions to reduce fatigue. These actions will help achieve our target to reduce the number of people killed, or seriously injured in, or by, London buses by 70 per cent by 2022 (against 2005-09 levels).



We have plans to make buses in London the safest in the world



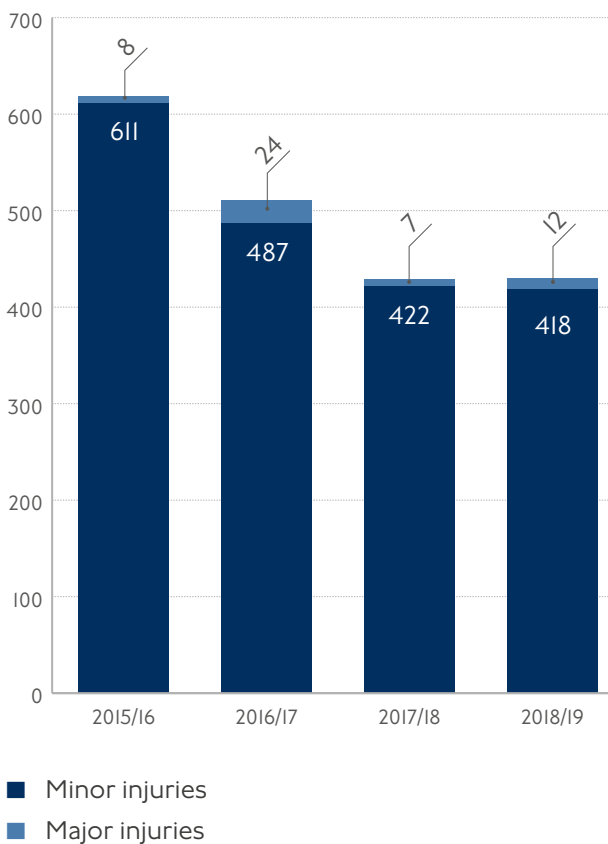
There were 26 incidents of customers being injured on London Trams in 2018/19

Rail

DLR, London Overground, London Trams and TfL Rail



Customer injuries

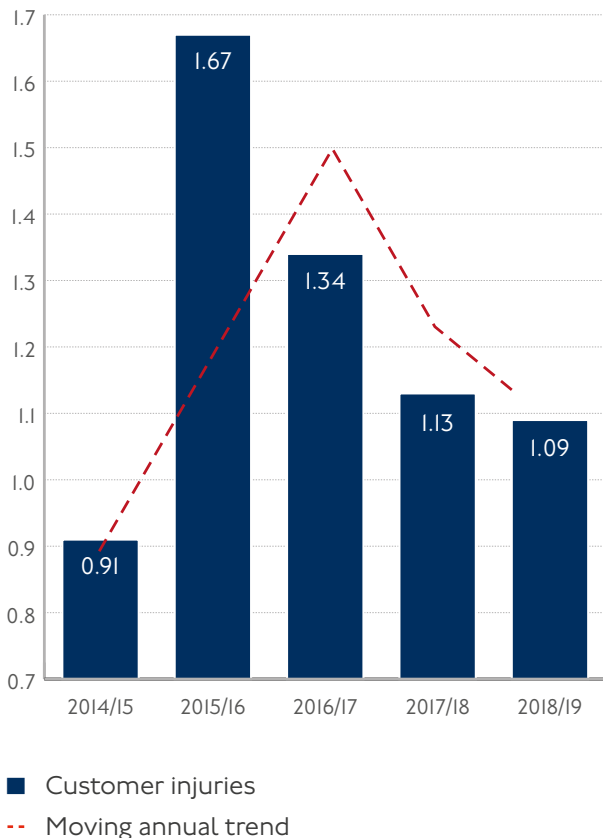


Rail

A total of 430 customers were injured on our rail network in 2018/19. The injuries occurred within London Overground (189), TfL Rail (126), DLR (89) and London Trams (26). There were four incidents that resulted in a fatal injury on our rail networks. One has been recorded by the coroner as suicide. The remaining three fatalities are awaiting the outcome of coroner inquest.

There was one (0.2 per cent) more customer injury in 2018/19 compared to 2017/19. The number of injuries on the tram network remains the lowest of our rail operations, but increased from 20 to 26, an increase of 30 per cent. London Overground saw an increase of nine injuries (3.8 per cent). Injuries on the DLR reduced by one (1.1 per cent). Eleven fewer (eight per cent) injuries on TfL Rail compared to 2017/18 resulted in the lowest number of injuries since 2016/17.

Customer injuries per million passenger journeys



Trams

The Rail Accident Investigation Branch (RAIB) made 15 recommendations to the UK tram industry following the overturning of a tram at Sandilands Junction in 2016. We have progressed work on all the recommendations that are relevant to us.

We have completed a number of these, including introducing a permanent speed reduction across the network, speed monitoring and signage at significant bends, an enhanced customer complaints process and the installation of a driver protection device that alerts to any incident of driver distraction or fatigue. We also made progress against the remaining RAIB recommendations.

We revised the London Trams Network Risk Model, incorporating learning from relevant incidents worldwide to provide a more comprehensive understanding of risk. The model is used to guide monitoring activities to confirm our safety controls are working effectively. We also revised driver training following a review of our route risk assessments. Our tram crossing risk assessments for Croydon town centre were updated and we are trialling new pedestrian safety measures, including improved signage, crossing design and layout, and clearer segregation between walking routes.

We have fitted a new, higher specification film to all tram doors and windows to strengthen them. We helped set up and are represented on the Light Rail Safety and Standards Board, which now has confirmed Government funding.

The contract to install a new safety system, which will automatically bring a moving tram to a controlled stop if it exceeds the speed limit at designated locations, was awarded in December 2018. London's tram network will be the first in the UK to have an automatic braking system.

A new emergency lighting system, which will operate independently of the trams' battery, has also been procured and will be installed during summer 2019.

DLR

We introduced Mind the Gap announcements and platform signage at DLR locations with larger stepping distances between the platform and train.

Keolis Amey Docklands, which operates the DLR, has introduced free advice and training to mobility scooter and wheelchair users to help them stay safe. Ambassadors, who have received accredited training from Whizz-Kidz, are available to meet people who need mobility support and their carers, to provide training on using the network safely and guidance on requesting assistance during journeys.

London Overground

We introduced a new simulator representing the driving cab and route for our new London Overground trains. The simulator enables drivers to experience and prepare for driving through all conditions, including severe weather and trespassers on the track.

We have also improved our standards for managing fire precautions at stations where Rail for London is the infrastructure manager and increased the frequency of inspections to ensure controls remain effective.

Rail for London Infrastructure

During 2018/19, the ORR issued its authorisation for Rail for London Infrastructure as the Infrastructure Manager. This means that our regulator is satisfied that we have suitable arrangements in place to safely maintain and manage the infrastructure on the Elizabeth line, which is a significant safety milestone.



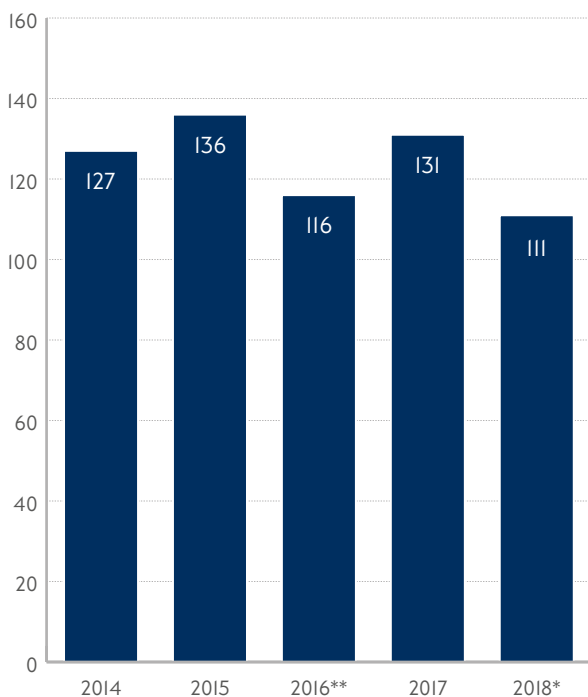
The number of people killed or seriously injured on London's roads has reduced

Roads

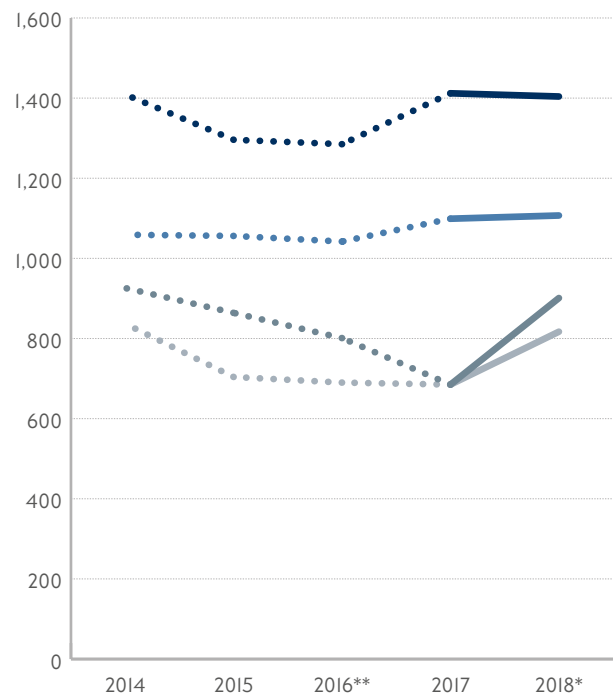
Transport for London Road Network



Fatalities on London's roads



People killed or seriously injured (annual)



Our priority is to eradicate all deaths and serious injuries from London's roads as part of our Vision Zero ambitions. The provisional figures for 2018 indicate that the number of people killed on London's roads has fallen from 131 in 2017 to 111, which is a 15 per cent reduction.

- Pedestrians
- Cyclists
- Motorised vehicles
- Motorcycles

* 2018 figures are provisional

** Figures from the end of 2016 have been reported using a new system, Case Overview and Preparation Application. The dotted lines in the graph for calendar years 2013-2016 denote back-estimated figures following analysis with the Transport Research Laboratory to indicate how many collisions would have been reported under this system in previous years.

The greatest reduction in fatalities has been among pedestrians, to the lowest level recorded. The number of people killed while motorcycling also fell to the lowest level since 2013. However, fatalities increased amongst cyclists to the highest level since 2014.

Provisional figures for 2018 show that 4,099 people were killed or seriously injured on London's roads. These figures are subject to change as a result of the Metropolitan Police Service's data validation process. This is a 36 per cent reduction in the number of people killed or seriously injured from the 2005-09 baseline. Although this represents a significant improvement, we are behind the 2018 target required to meet the Mayor's Vision Zero goal of a 65 per cent reduction by 2022. Figures for 2018 are provisional and will be finalised during summer 2019, in line with the Department for Transport's national dataset.

During 2018, the greatest increase in the number of people killed or seriously injured was among car occupants, in particular in collisions with people cycling, compared to 2017. The number of cyclists killed or seriously injured also increased by 19 per cent. These increases should be considered in the context of an eight per cent increase in cycling within central London during 2018 compared to 2017, and overall increases in traffic levels. We are analysing this further to understand this concerning trend.

Vision Zero action plan

In July 2018, we launched the Vision Zero action plan, in partnership with the Mayor and the Metropolitan Police Service. The plan takes an internationally recognised approach to road danger reduction and helps to realise the Mayor's Transport Strategy ambition that nobody will be killed or seriously injured on London's transport system by 2041. The goal is to ensure that a collision doesn't happen in the first place, or if it does, it is sufficiently controlled to not cause death or serious injury.

It outlines a range of actions to be delivered in collaboration between ourselves, the Metropolitan Police Service, the London boroughs and other partners and puts the elimination of road danger at the heart of the transport system. The plan is based on a Safe Systems approach and sets out actions with respect to vehicle speed, street design, vehicle design and compliance, behaviours, and post-collision learning.

On 13 November 2018, we held a Vision Zero Summit to inspire senior leaders across London to take ownership and accountability for road safety within their organisations. London politicians, councils and business leaders joined victims of road trauma, emergency services representatives and international experts to understand how they can help eliminate deaths and serious injuries from London's transport network.

Safe speeds

Reducing speed is fundamental to reducing road danger, as the speed at which a vehicle travels increases the likelihood and severity of injury.

We have a programme that aims to reduce speed limits to 20mph on all our roads within the Congestion Charging zone by May 2020. We have consulted on the designs, the feedback is currently being analysed and the results will be published shortly. We continue to look at other locations where the speed limit can be reduced as part of planned schemes, such as the Camden to Tottenham cycle route where a 20mph speed limit will be introduced.

Safe streets and junctions

Our analysis shows that junctions are the highest risk locations, with cyclists and motorcyclists being particularly vulnerable. This is a key focus for our action, alongside delivering continued improvements for cyclists.

We continue to improve the 73 junctions identified as some of the most dangerous, introducing measures to reduce road danger. In 2018/19, construction was completed at three key locations: Charlie Brown's Roundabout in Redbridge, Farringdon Road/Clerkenwell Road and Farringdon Street/Snow Hill in the City of London.

In June 2018, work began on transforming Highbury Corner junction, which has one of the poorest safety records in London. The changes, due for completion in September 2019, are designed to improve safety for cyclists, pedestrians and other road users. These include removing the 1960s roundabout and replacing it with two-way roads with segregated cycle lanes on the remaining three sides.

We have now completed work at 29 of the 73 junctions. Our initial review of the completed projects found an average 26 per cent decrease in collisions across all locations. We are taking the remaining 44 schemes through design, with 14 scheduled for construction by spring 2020.

Safer cycling

Construction is under way on a potential 250km network of cycle routes. To date, we have launched:

- Quietway 1 (Waterloo to Greenwich and Greenwich to Bexleyheath)
- Quietway 3 (Kilburn to Gladstone Park)
- Quietway 5 (Oval to Clapham Old Town)

- Quietway 2 (connecting Bloomsbury and Walthamstow via Angel, Haggerston, London Fields and Clapton. Improvements for cyclists and pedestrians along the route include safer crossings and a reduction in large vehicles through Dalston)
- Quietway 14 (a 2km route connecting Blackfriars Road and Bermondsey, which will eventually connect to Deptford and Thamesmead. Five main roads are now safer to cross by bike or on foot and two streets have been closed to motor vehicles)
- Quietway 22 (a 6.5km route connecting Stratford High Street to Cycleway 3 at Newham Way via West Ham and Plaistow Park)
- Quietway 6 (a new 6.5km route connecting Wanstead Flats and Barkingside via a newly built bridge in Valentine's Park, and a new two-way cycle track on Forest Drive)

Segregated cycleways

In 2018/19, we completed a major new extension to Cycleway 6. The 2.5km extension between Farringdon and King's Cross means the route now connects Elephant and Castle to King's Cross. Overall, eight junctions have been made safer, including improvements at the West Smithfield/Snow Hill/Farringdon Street junction, formerly one of the most dangerous in the capital.

Work continued on the remaining non-core parts of the east-west segregated cycleway. We handed over West and South Carriage Drive to The Royal Parks in December 2018. Construction started on North Carriage Drive in February 2019 and is now open to cyclists.

We have completed the designs, construction programmes and traffic management plans for Cycleway 4, with works due to start in July 2019.

Construction started in March 2019 to deliver pedestrian and cycle improvements between Acton and Wood Lane along the A40. Construction work is also under way at two critical junctions on Edgware Road and Euston Road, which will provide significant improvements for people walking and cycling.

Also in March 2019, we published a statement on Cycleway II, outlining our intended way forward following a judicial review. In the short term, we will focus on other much-needed cycle routes, but Swiss Cottage needs to be made safer and we will work with Camden Council on plans to transform this intimidating, traffic-dominated and outdated junction.



We continue to develop our network of safe cycleways

Safety at roadworks

Between 2005 and 2017, 99 people were killed or seriously injured near roadworks on our roads. To help prevent unsafe roadworks, we have published a Temporary Traffic Management handbook, giving companies who want to work on London's roads clear guidance and innovative ideas on how to keep people safe around roadworks.

Safe vehicles

Vehicles, such as heavy goods vehicles (HGVs) and buses, present the greatest risk to people walking, cycling and riding motorcycles. We are taking action to reduce the danger posed by larger vehicles through improving vehicle and operating standards. Details of our bus safety programme have already been outlined in the Buses section.

We launched the final consultation on our Direct Vision Standard proposals in January 2019. The world-first approach will tackle road danger by eliminating blind spots from HGVs. This standard will use a zero to five-star rating system to define how much a driver can see directly from the cab, rather than through mirrors or other equipment. It will give regulators, manufacturers, operators and contractors an objective standard by which to rate and improve the safety of HGVs.

The standard, and associated Safety Permit for vehicles that have retrofitted a safe system, will help reduce road danger for vulnerable road users. Our consultation asked people for their views on the process for obtaining a Direct Vision star rating, the safe system requirements, and the enforcement and appeals process. We remain on-track to start registering vehicles for the scheme from October 2019.

Safe behaviours

We will use marketing and communications to tackle the behaviours that create most risk on our streets, such as inappropriate speed, which is a factor in up to 37 per cent of collisions resulting in death or serious injury. This includes a hard-hitting 'Risk Up' campaign, which launched in May 2018 and reminds drivers and motorcyclists of the dangers they pose when travelling at an inappropriate speed and urges them to slow down.

Intelligence-led enforcement

We have launched a new intelligence-led enforcement deployment system, enabling us to deploy our traffic enforcement resources more effectively. This has helped to prioritise sites by compliance levels.

In November, our Roads and Transport Policing Command partnership with the Metropolitan Police Service began Operation Vision Zero, to focus on the most dangerous drivers. During an enhanced two-week programme of enforcement, 4,758 offences were dealt with by officers.

We also deployed a combination of enforcement, engagement and engineering interventions to make a lasting change to road user behaviour. In January 2019, we launched Operation Goldstein to tackle illegal, dangerous and careless behaviours. The operation saw 84 drivers arrested for offences including drink, drug, dangerous and disqualified driving.

During February and March 2019, our Roads and Transport Policing Command focused on motorists and riders along the A12 who exceed the speed limit or commit other road traffic offences as part of Operation Neso, which concentrates on high-risk roads. Over 10 weeks, 520 drivers were fined for speeding. Of those drivers, 187 face potential disqualification owing to their high speed. On this six-mile stretch of the A12 there were five fatal road collisions between 9 April 2018 and 1 January 2019. Since road enforcement has been put in place to specifically target this area, there have been no fatalities or serious collisions.

Post-collision learning and restorative justice

On 31 January 2019, the Mayor, the Commissioner and other senior managers met with people whose lives have been significantly changed by road collisions at an event in City Hall. The purpose was to understand what we could do as an organisation, either directly or working with partners, to prevent unnecessary suffering and to support people who have suffered as a result of road collisions. Work is under way to develop a plan for taking this forward.



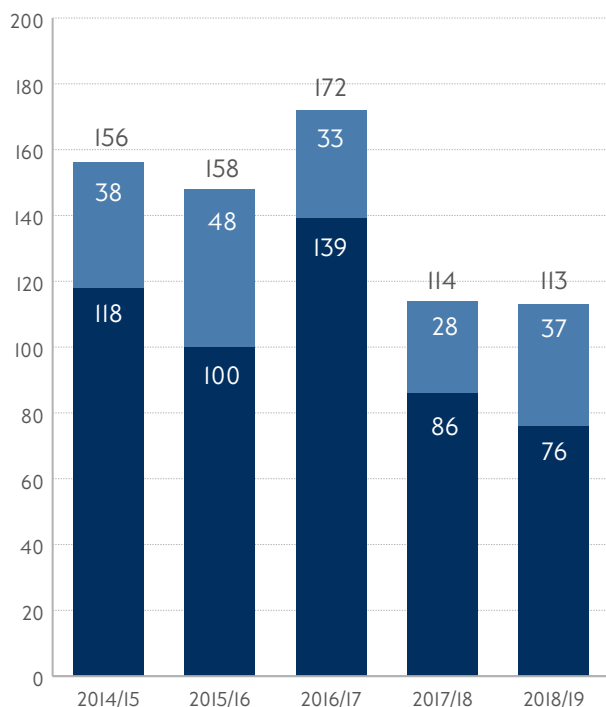
We saw the lowest number of injuries across our other operations since 2013/14

Other operations

London Dial-a-Ride, London River Services, Taxi & Private Hire, Santander Cycles, Victoria Coach Station and Emirates Air Line



Customer injuries



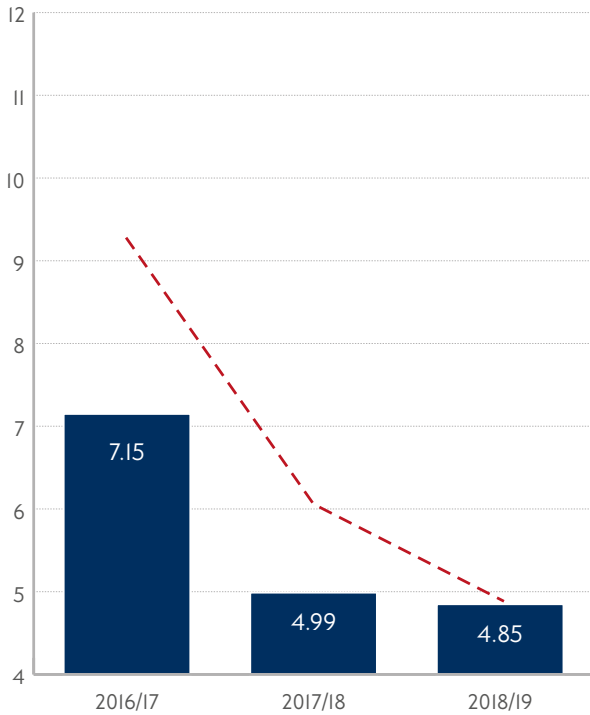
- Minor injuries
- Major injuries

In 2018/19, there were 113 customers injured across our other operations, one fewer than last year. This equates to 4.85 customer injuries per million passenger journeys, which is an improvement on 2017/18 when there were 4.99 injuries per million customer journeys.

We had the lowest number of recorded injuries since 2013/14. There were 58 injuries on Dial-a-Ride, 20 at Victoria Coach Station, 19 on Santander Cycles, 11 on the Emirates Air Line and five on London River Services. There were 37 injuries that required attendance at hospital and were therefore classified as major. There were no fatal incidents.

We led work to develop the first Safety Improvement Plan for the Thames, which will be launched in summer 2019. The plan will be integral to the London Passenger Pier Strategy. A Thames Partnership Group has been set up to deliver the plan, bringing together ourselves, the Port of London Authority, Marine Coastguard Agency and the Metropolitan Police Service.

Customer injuries per million passenger journeys



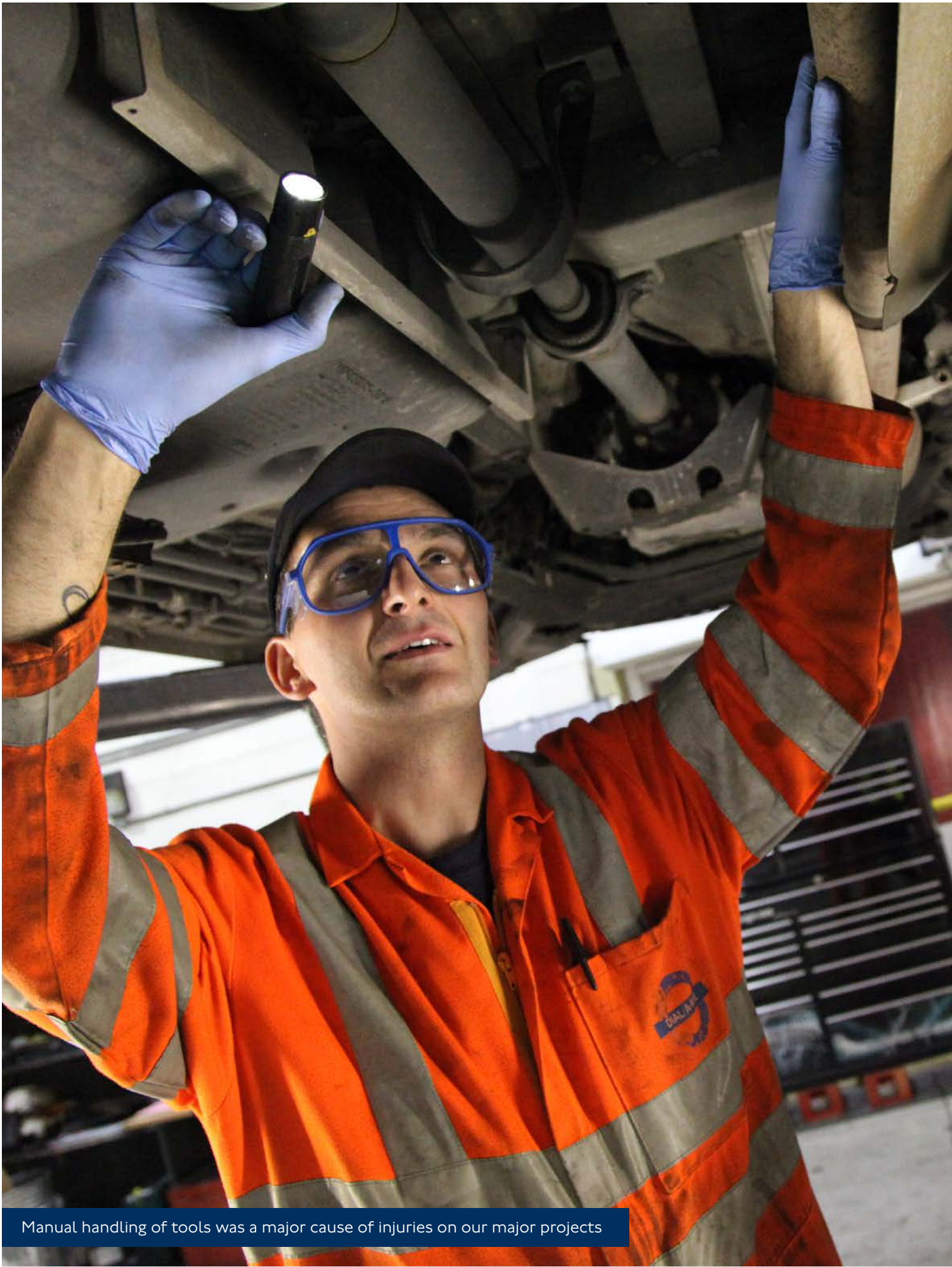
- Customer injuries
- - Moving annual trend

In autumn 2018, we took delivery of our new Dial-a-Ride vehicles, which include low floors, a reduced incline on ramps and wider seats and aisles to ease movement. These measures are expected to help reduce slips, trips and falls and injuries arising from manual handling.

Our licensing and enforcement regimes ensure our assets remain safe. Our new powers to carry out roadside stops of taxi and private hire vehicles without police presence came into force in May 2018, enhancing our ability to eliminate illegal and non-compliant activities.



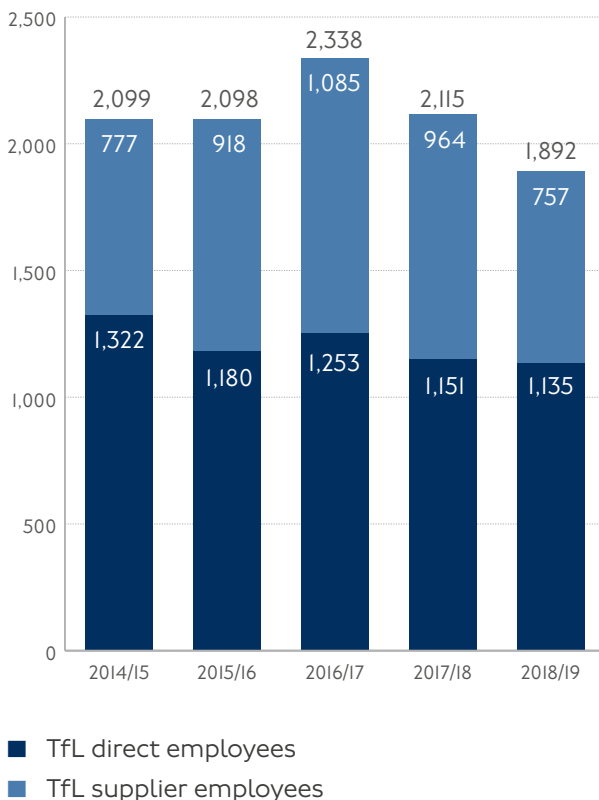
Our new Dial-a-Ride vehicles are designed to reduce slips, trips and falls



Manual handling of tools was a major cause of injuries on our major projects

Our workforce

Workforce injuries



The number of injuries to our workforce reduced for the second consecutive year to the lowest recorded level over the last five years. There were 9.5 per cent fewer injuries in 2017/18 compared to the previous year and there were 10.5 per cent fewer (223) again in 2018/19.

Of the total injuries reported in 2018/19, 60 per cent were our direct employees and 40 per cent supplier staff.

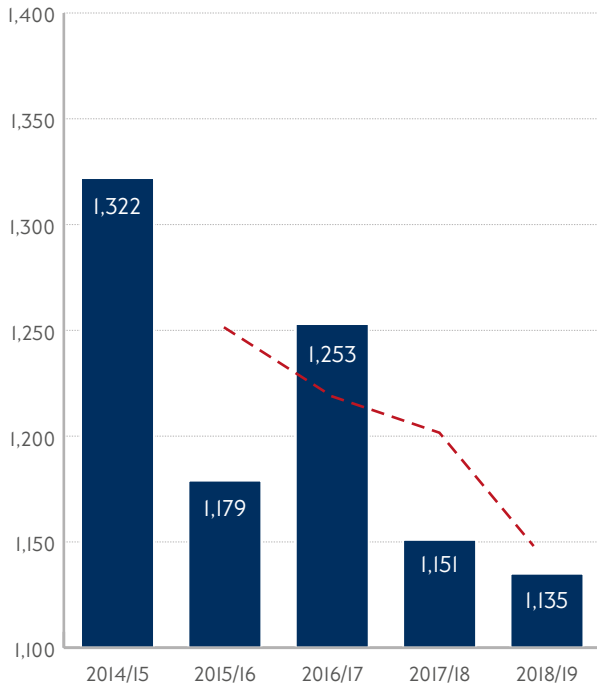
London Underground reported the highest number of workforce injuries, which contributed to 53 per cent of the total. Buses had 22 per cent and Rail had nine per cent.

Slips, trips and falls, workplace violence and injuries connected with contact with machinery, equipment or power tools were the main cause of injuries. Manual handling of tools was also a significant cause of injury on our major projects.

We are required to report certain serious workplace accidents, occupational diseases and dangerous occurrences to regulatory bodies. Across our network, a total of 223 reportable incidents affecting our workforce were reported in 2018/19, of which 88 per cent were on the London Underground. Slips, trips and falls were the most common type of injury followed by assaults. The overall trend of our direct employee injuries continues to improve, with this year recording the lowest number over the past five years of 1,135 injuries.

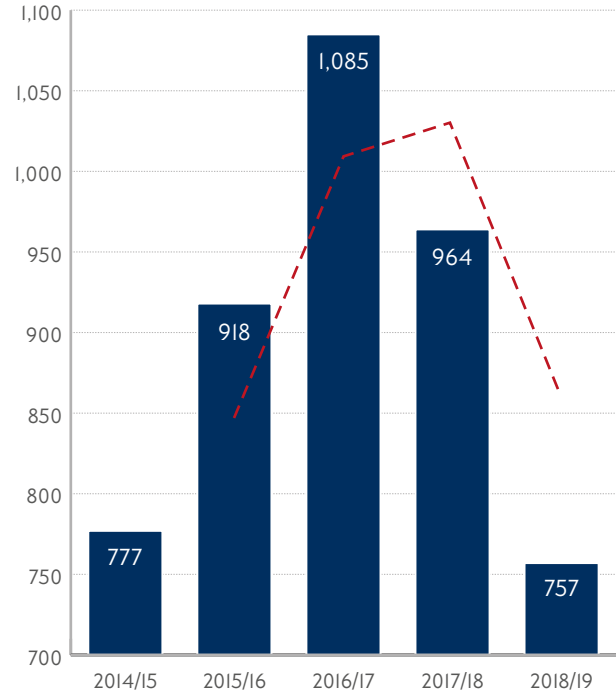
Injuries to our supplier staff are also at a five-year low, with a total of 757 in 2018/19. This is a reduction of 207 (21.5 per cent) since 2017/18. This is primarily driven by a 20.6 per cent reduction in injuries to our bus drivers who account for the majority of supplier staff.

Direct employee total injuries



■ Customer injuries
 - - Moving annual trend

Supplier total injuries



■ Customer injuries
 - - Moving annual trend

We took action to improve the safety of our staff and contractors in a number of other areas during the year. Our ongoing focus on improving safety leadership and culture continued to ensure that we make safety personal to all.

New training for managers

In early 2019, we launched our new HSE online training course for managers called Managing HSE@TfL. This is supplemented by classroom-based courses for operational, engineering and maintenance managers.

The course equips managers to identify and implement risk reduction measures and a positive HSE culture to make our networks safer and healthier for those who travel and work on them.

Operations

On the London Underground, we held our first 'injury-free' focus week in December 2018, looking at a different accident type each day. These continued throughout the year.

Our Fatigue Management Improvement Programme has been developed and a long-term action plan has been drafted. The pan-TfL plan will include suppliers. The research into fatigue on the trams maintenance teams is ongoing and the work to research fatigue for bus operators has been drafted for review and development of an action plan.

Tackling violence against our staff

This year, there were a total 4,542 assaults, 30 per cent of which were physical assaults. The total number of assaults to our workforce has reduced by 14 per cent between 2017/18 & 2018/19, driven in the most part by a reduction in non-physical assaults against our

suppliers. However, we have also seen a reduction of 1.4 per cent in the total number of workplace physical assaults, to 1,384.

Non-physical assaults against our suppliers' employees have reduced by over a third, to 1,337. However, the number of employee workplace physical assaults has increased by 74, to 692 incidents. Workplace violence against this group continues to be driven by disputes concerning fare evasion.

Through dedicated teams, we support our workforce to take formal action through the police against those who commit acts of violence. The workplace violence support teams worked closely with the police to assist their investigations. British Transport Police also created a Staff Assaults Unit.

As part of our organisation-wide strategic review of this important issue, we held a summit on workplace violence and aggression in March 2019, which brought together people from across our business and beyond to generate ideas for tackling this worrying problem.

Our strategic and organisational review is focusing on employees who are directly employed by us, our suppliers, operators and contractors. As part of our review, we are developing a pan-TfL Workplace Violence and Aggression Strategy over summer 2019 in collaboration with trade unions and frontline colleagues.

During 2018/19, we reviewed workplace aggression and staff assault processes for London Underground and our road operations. The result is that staff who are assaulted are supported quicker and a police statement obtained quicker, enabling the police to make investigations immediately. The results are being consulted on.

Another key area of activity was a focus on the use of spit kits for staff, in particular bus drivers. Bus operators are increasingly providing a spit kit in the bus cab, which removes the need for the driver to carry the kit around. We are now seeing a significant increase in bus drivers using the kits, enabling more suspects to be identified. Spit kits have been used to collect evidence in 90 per cent of spitting cases, which is a positive step for crime detection.

Operational communications

There are significant safety risks associated with poor communication of safety information in an operational environment. As a result, London Underground has overhauled its operational communication framework and launched the new approach in June 2019. The new approach was developed with front-line teams and taking best practice from other transport bodies.

Construction

Building a positive safety culture across our construction projects, we are rolling out the 'I am safe for...' campaign, which asks colleagues to write down who they are keeping safe for, to help them consider the consequences that unsafe actions at work could have.

While safe systems of work and processes are of an acceptable standard, they are not consistently followed. This year, we began trialling a Behavioural-Based Safety Programme with supporting short films as part of a consistent HSE induction pack.

Reporting of near misses is a key aspect of how we learn and prevent harm. To make it easier for our construction workforce to report concerns during working hours, we launched an app as part of our suite of safety management tools. The app was well received and led to more incidents being reported.



We have made it quicker and easier for staff to report assaults to police

Collaborative working

We held three Zero Harm Forums in 2018/19, which involved more than 30 key capital suppliers. These forums brought together our internal project delivery areas and suppliers. The initiative is led by directors across our capital programme through a Zero Harm Leadership Group. The agenda for the Zero Harm Forum was led by supply chain partners. A number of groups have been established to look at ways to strengthen performance, such as:

- Improving the relationships with subcontractors throughout the supply chain
- Working together for a common purpose
- Involving suppliers at the right time to maximise HSE effectiveness
- Improving how we report positive and negative findings

Each forum demonstrated a genuine enthusiasm and collaboration between us and our suppliers to improve safety, with strong ideas being generated for how we can work together and bring about real improvements.

During the year we extended our Supplier Assessment Tool to a number of highway suppliers to ensure they are achieving the expected levels of performance. The tool involves checks that cover a number of areas, including verifying skills and competence, adopting a positive HSE culture, communicating effectively, and controlling risk.

Awards

The winners in the Health and Safety categories of this year's TfL Supplier Awards were:

Best Environment Initiative

Mott MacDonald for their innovative work on digital Environmental Impact Assessment for Crossrail 2, which increases accessibility, produces better information, and drives a more cost-efficient environmental impact assessment and better engagement.

Best Health Initiative

The Northern Line Extension team for its Mental Health Programme, which raised awareness of mental health and improved workforce wellbeing.

Best Safety Initiative

The Bank Station Capacity Upgrade team for its sprayed concrete lining tunnel radial construction joint, which can be formed without the need for people to enter the excavation or under freshly sprayed shotcrete.

The Innovation Award was presented to the Go Ahead Safety Pledge, which is a safety initiative that encourages attitude change through staff engagement. The initiative has now been adopted across the wider bus industry.

Our major projects were also recognised for good HSE management at the New Civil Engineer Tunnelling Festival, where the Bank Station Capacity Upgrade won the Innovation in Technical Product or Equipment Award for the Orion environmental monitoring system. It also won the Innovation in Instrumentation and Monitoring Award for the fibre optic monitoring solution deployed on St Mary Abchurch (built by Sir Christopher Wren in 1681) while tunnelling underneath it.

Crossrail safety

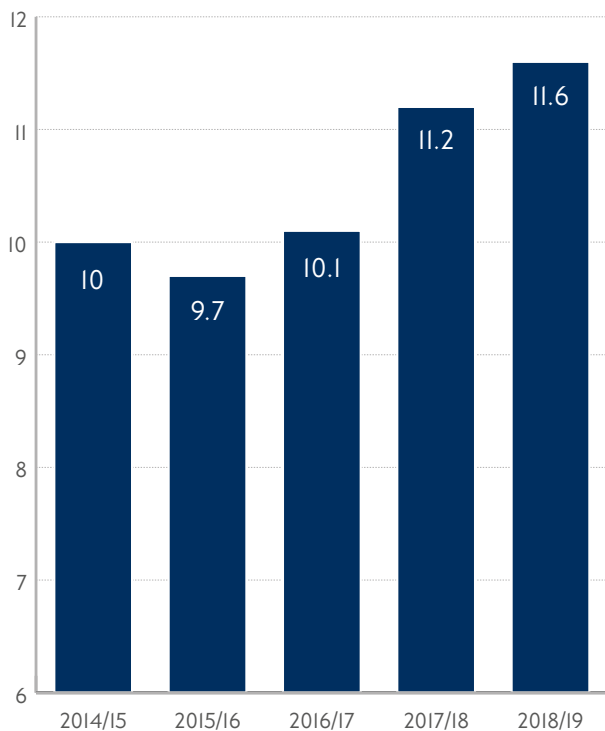
The focus on strong health and safety performance has been maintained during a time of considerable change for Crossrail and its contractors. The safety risks have been changing as the project progresses and they have focused on the higher risk process issues that come from dynamic testing, energisation and de-energisation, and testing and commissioning.

Drug and alcohol testing

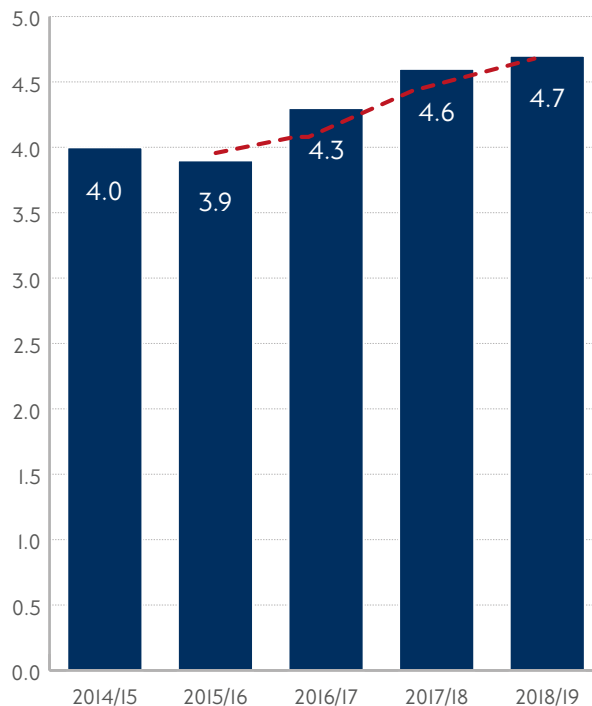
We take a zero-tolerance approach to drug and alcohol misuse, which is enforced through random unannounced testing for operational staff. Disciplinary action up to and including dismissal is taken against anyone who breaches our drugs and alcohol policy. During the year, we conducted 739 unannounced screenings, meeting our target to test five per cent of our safety critical workforce. There were 20 failures, 12 during unannounced testing and eight during 'For Cause' testing. Five were alcohol-related and 15 were drug-related.

Sickness, absence and wellbeing

Average number of days sick per TfL employee



Available working days lost – all sickness absence (%)



- Available working days lost
- - - Moving annual trend

Workforce sickness absence

Working days lost to sickness	307,789
Working days lost to sickness (%)	4.7



We continue to focus on keeping all staff physically and mentally healthy

There were 307,789 days lost to sickness absence this year. Mental health, musculoskeletal conditions, and coughs and colds were the three highest causes of absence, accounting for 23 per cent, 21 per cent and 10 per cent of all absence respectively. Compared to 2017/18, the number of days lost due to mental health and accidents/assaults increased by six per cent and 4.6 per cent respectively.

Absence due to musculoskeletal issues reduced by 2.6 per cent, helped by our awareness and treatment programmes.

In 2018/19, 4.7 per cent of available working days were lost to absence. This represents a slight increase compared to last year and the moving annual average continues to rise.

Health Matters

Our focus on encouraging and supporting staff to stay physically and mentally healthy continued during 2018/19. Mental Health Awareness Week, between 14-18 May 2018, was packed with activities around the business, organised through our network of Time to Change agents.

In September 2018, the Health Matters part of our Health and Wellbeing programme was launched, encouraging a focus on adopting a healthy lifestyle, with activities including:

Know Your Numbers Week

Between 10-16 September 2018, employees were encouraged to take part in the UK's biggest blood pressure testing event by having their blood pressure checked at one of Blood Pressure UK's Pressure Stations. There was also an online test to find out their heart age, an indicator of increased risk of suffering a heart attack or a stroke, and how to reduce it.

National Fitness Day

On 26 September 2018, staff were encouraged to take part in 90 free activities across the Capital, designed to get people active and encourage healthier lifestyle choices. We partnered with Public Health England to challenge employees and Londoners to walk briskly for 10 minutes, twice a day and track their progress with the Active 10 app.

World Mental Health Day

For World Mental Health Day on 10 October, we showcased techniques and support available to promote good mental health, including:

- The three-step Taking in the Good approach to enhance resilience, which encourages reflection on positive experiences
- Promoting our staff network groups and awareness of mental health issues faced by them
- A focus on the importance of sleep in maintaining good physical and mental health

Better sleep

On 21 January 2019, we launched our partnership with London's NHS Digital Mental Wellbeing Service, Good Thinking, to give staff free access to Sleepio, an online sleep improvement programme, ahead of its national launch. Through an online self-help programme based on cognitive behavioural therapy, users learn cognitive techniques to help tackle the racing mind and behavioural strategies to help reset sleeping patterns naturally. Sleepio also has specific help and advice for shift workers.

Peer support network conference

On 11 March 2019, we held our Peer Support Network conference at City Hall. The purpose of the day was to recognise the work that the peer support volunteers do to support the delivery of our health and wellbeing strategy across our business.

Health and Wellbeing champions, Time to Change agents, the Trauma Support Group and Supporting Colleagues Network shared stories and heard from experts in mental and physical health. The group works closely with our Occupational Health team to help deliver key health and wellbeing initiatives. Many also play an important role in providing personal support to colleagues on mental health issues.

Talking mental health

We supported the Samaritans Brew Monday campaign on 21 January, encouraging teams to get together with colleagues and have a brew and a chat, in recognition of the challenges that people face during the darker months of the year. We also supported Time to Talk Day on 7 February, which is designed to end mental health discrimination. We encouraged everyone to have a conversation about mental health, supported by resources on the Time to Change website.



More people will travel actively in London



Healthy Streets

Healthy Streets check for designers

The Healthy Streets check for designers (the Check) is a tool that reviews whether proposed changes to the street will result in improvements towards the 10 Healthy Streets Indicators. It aids designers in aligning to the Healthy Streets Approach.

The use of the Check is mandatory for projects of more than £200,000 on the TfL Road Network and Liveable Neighbourhood schemes within the Healthy Streets investment portfolio. We encourage it to be used for schemes we fund but that are implemented by London boroughs, such as Local Implementation Plan schemes. While the Check was being embedded in 2018/19, only those eligible projects with an estimated final cost of more than £200,000 were included as part of it.

The Check provides a score for both the existing street layout and proposed design, with the uplift demonstrating the scale of the improvement of the street for people's health. It was introduced in 2018/19, with a target of 10 percentage points average improvement across all eligible schemes.

A total of 12 eligible projects completed the Check in 2018/19. The average uplift was 11 percentage points, which exceeded the target. The scope of the Check has been expanded in 2019/20 to include all TfL Road Network and Liveable Neighbourhood projects

within the Healthy Streets portfolio regardless of estimated final cost, if they make a material change to the street environment. This means, for example, that schemes proposing to change traffic signal timings are excluded. This should also increase the number of projects for which the Check is applicable in 2019/20.

Number of checks on our road network

Schemes with a completed check	2	6	3	1	12
Average percentage point uplift across schemes	7	11	16	2	11

Scheme average RAG rating

■ Red	Average uplift across the schemes is <7 percentage points
■ Amber	Average uplift across the schemes is 7–9 percentage points
■ Green	Average uplift across the schemes is >10 percentage points



We check street projects to ensure they meet certain health criteria





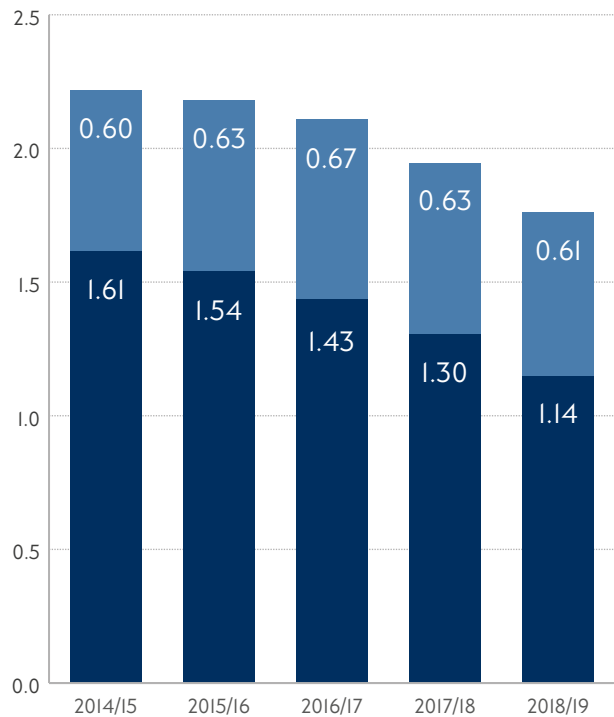
London's streets will be clean and green

Environment

This section details the environmental impacts of our directly managed activities and operations, such as transport services, construction, maintenance and support functions.

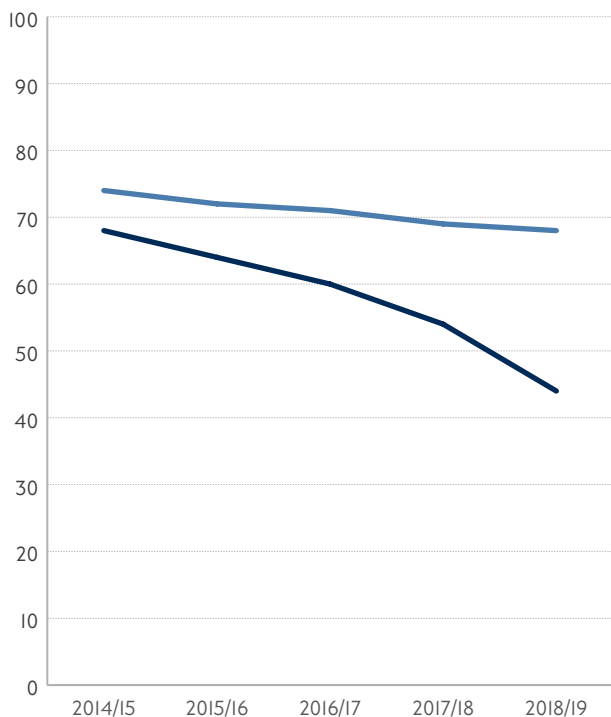
The Mayor's vision – to make London the world's greenest global city – was published in the London Environment Strategy in June 2018, which, along with the Mayor's Transport Strategy, set out the actions required to achieve this goal. We are committed to supporting these measures through the operation of our transport services.

Carbon emissions by transport type (CO₂e tonnes) (millions)



- Public transport services
- Taxi and private hire vehicles

Total carbon emissions per passenger km vs target (grams CO₂e)



- CO₂ emissions target per passenger km
- CO₂ emissions per passenger km

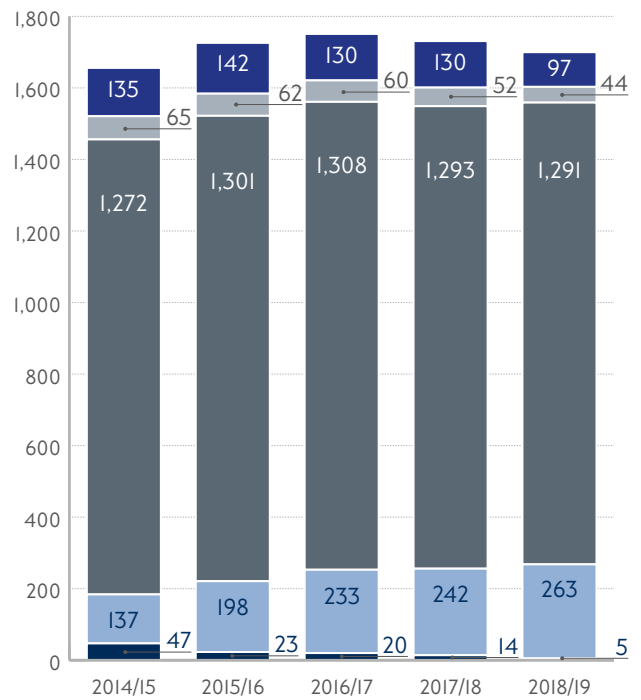
In 2018/19, total carbon dioxide (CO₂) emissions associated with our activities were 1.75 million tonnes, compared with 1.94 million tonnes in 2017/18, showing a 10 per cent improvement. This is mainly due to the reduction in carbon intensity of our electricity supply from National Grid.

Our total grid electricity usage this year was 1,701 gigawatt hours (GWh). This is an improvement of two per cent on last year's figure of 1,731GWh.

London Underground is responsible for most consumption and recorded a static performance compared to last year, despite increases in service levels.

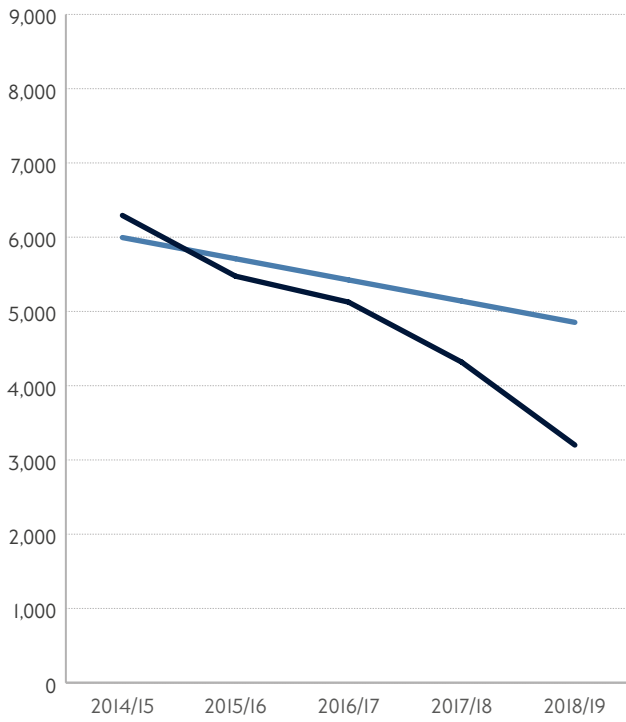
Our usage of electricity in our surface businesses shows a good performance from street lighting energy efficiency, where a central management system operation and lower emission diode fitting have been used. Our normalised figures for grams of carbon emissions per passenger kilometre remain better than our target trajectory.

Grid electricity by business unit (GWh)



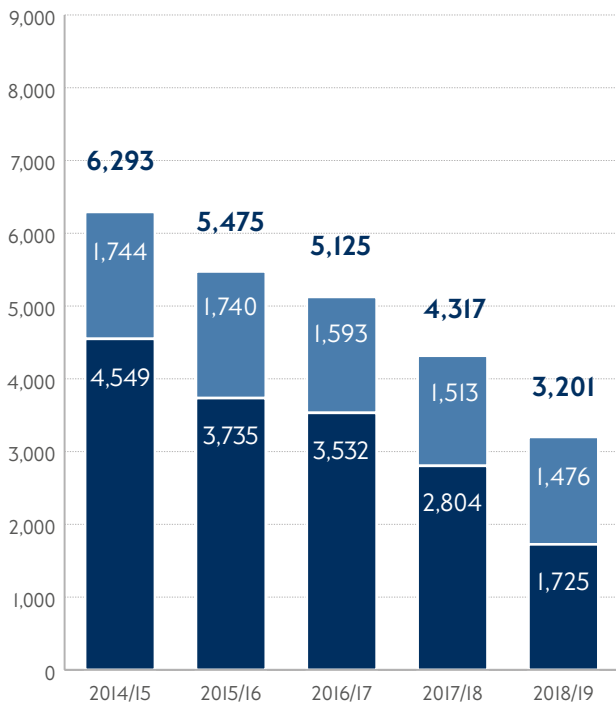
- Crossrail
- London Rail
- London Underground
- Specialist services directorates
- Surface transport

NOx emissions (tonnes)



- NOx emissions target
- Total amount of NOx emissions

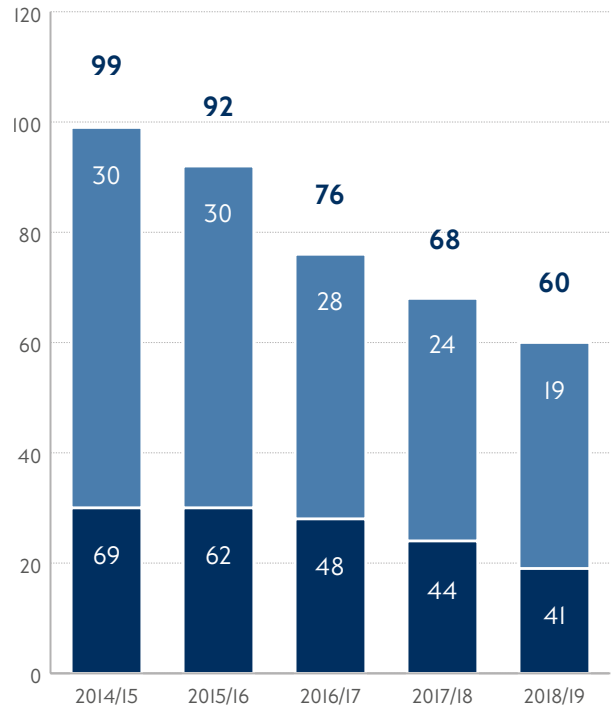
NOx emissions by transport type (tonnes)



- Public transport services
- Taxi and private hire vehicles

Total emissions of oxides of nitrogen fell 26 per cent from last year to 3,200 tonnes, much better than our target trajectory.

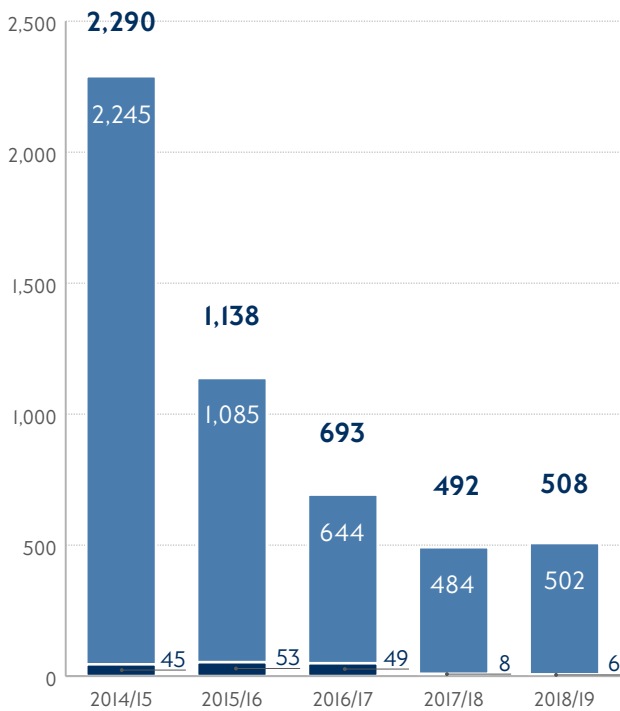
PM10 emissions by transport type (tonnes)



- Public transport services
- Taxi and private hire vehicles

We produced emissions equivalent to 60 tonnes of particulate matter in 2018/19, which was a 12 per cent reduction on the previous year. Our initiatives to improve our bus and other public transport vehicle engines have continued to achieve these results.

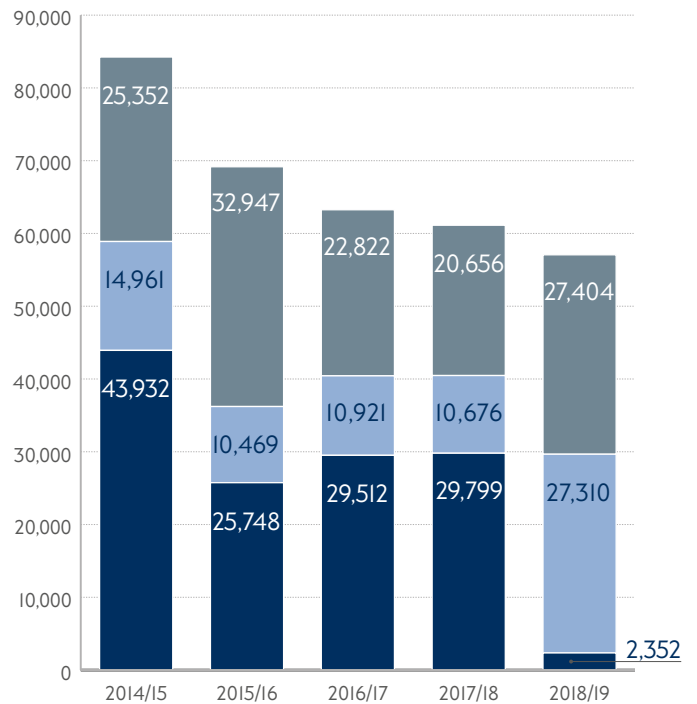
Construction, demolition and excavation waste produced (tonnes) (thousands)



- Amount of construction, demolition and excavation waste sent to landfill
- Amount of construction, demolition and excavation waste reused

We generated 508,103 tonnes of construction, demolition and excavation waste, which was a three per cent increase on the previous year, in line with the progress of our main construction programmes, such as the Northern Line Extension. Of this, all but one per cent was directed for beneficial reuse.

Commercial and industrial waste produced (tonnes)



- Amount of commercial and industrial waste sent to landfill
- Amount of commercial and industrial waste recovered via energy from waste
- Amount of commercial and industrial waste recycled

We generated 57,065 tonnes of commercial and industrial waste, which was a six per cent improvement on last year. Our overall recycling rate was 48 per cent and we achieved zero waste to landfill, with other waste being sent for recovery by energy from waste.

Progress against Mayoral priorities

In support of the delivery of the environmental objectives outlined in the Mayor's Transport Strategy and the London Environment Strategy, a number of key programmes have continued during the year.

Ultra Low Emission Zone

We delivered the systems required to support the Ultra Low Emission Zone (ULEZ) and continued with our concerted marketing and communications campaigns. We successfully launched the scheme in central London on 8 April 2019. Monitoring data has already shown a steady increase in the number of ULEZ compliant vehicles entering the Congestion Charging zone since the Mayor approved the scheme in February 2017. Initial monitoring results since the ULEZ went live indicate that around 70 per cent of vehicles entering the zone are now compliant and the target is that at least 80 per cent of vehicles will be compliant by the end of the first year.

On 15 February 2019, the van scrappage scheme started providing financial support to microbusinesses and charities to switch to compliant (including electric) vehicles. In the first few weeks, we received more than 900 applications and we are now developing a similar scheme to support low income households in the coming months.

Zero emission capable taxis

Since January 2018, only zero emission capable taxis have been issued new licences. This, combined with an enhanced delicensing scheme, has resulted in more than 1,800 zero emission capable taxis now being on London's streets.



We are working to cut emissions and improve air quality across London

Low emission buses

Following extensive consultation, standards will be tightened for the most polluting heavy vehicles, including buses, coaches and lorries across the whole of London, using the same boundary as the existing Low Emission Zone. From October 2020, all buses, coaches and HGVs in London will need to meet Euro VI emissions standards or pay up to £300 daily charge.

Three quarters of the London fleet is now at the ultra-clean diesel Euro VI engine emission standard. The conversion and replacement of less clean vehicles has been accelerated by the introduction of 10 Low Emission Bus Zones and preparations for the Ultra Low Emission Zone. This fleet transformation process will continue as a further two Low Emission Bus Zones commence later in 2019 and turn more polluted corridors into much cleaner highways, served by buses meeting the cleanest diesel emissions standard and emitting a fraction of the most harmful tailpipe emissions.

At the end of March 2019 we had 6,950 ultra-clean diesel buses operating in London, including 2,800 operating in central London. By 2020, our whole fleet of over 9000 buses will meet this standard. This is compared with the baseline of 1,194 in 2016. London also has a rising number of zero emission vehicles with 155 electric and 10 hydrogen fuel cell buses. With an average 8g/km saving and given that the average bus travels approximately 60,000km per annum,

the reduction is 2,138 tonnes of oxides of nitrogen each year. This represents a 60 per cent reduction since the Mayor came into office and we remain on track to meet the 100 per cent target by the end of 2020.

Our bus retrofit programme has upgraded more than 2,700 buses. Around three-quarters of the fleet is now bringing much lower emissions to large parts of London. With every vehicle retrofitted, air quality benefits are immediately brought to London as its tailpipe emissions of oxides of nitrogen and particulate matter fall by up to 95 and 80 per cent respectively. In addition to this, most new vehicles entering the fleet are fitted with hybrid systems which reduce CO₂ by up to 30 per cent.

Greener Dial-a-Ride vehicles

The first batch of 90 low-emission Dial-a-Ride vehicles were delivered four months ahead of the ULEZ. Emissions will be reduced further as most vehicles have technology to stop engines when the vehicle is not moving. The wider fleet of around 300 will continue to be upgraded ahead of the expansion of the ULEZ to the North and South Circulars in 2021.

World Car Free Day

Around 50 streets across London went car free on 22 September 2018 as part of World Car Free Day. The event supported London Play, a charity that works to give children the freedom to play safely in the street.

Electric vehicle charging points

We continue to build a network of rapid charge points to support the growing number of zero emission capable taxis and the wider take-up of electric vehicles.

There are around 2,200 slow electric vehicle charging points across London and 175 rapid charging points, bringing us a major step towards our target of 300 rapid charge points by December 2020. We published an Electric Vehicle Infrastructure Taskforce report in 2019.

The taskforce was launched by the Mayor in May 2018 to ensure infrastructure is not a barrier to electric vehicle adoption in London. It estimates the scale of electric vehicle infrastructure London may require and provides a clear set of actions for the immediate future and will inspire confidence for adequate provision through to 2025.

We are also developing designs for two hub sites for electric vehicles; one in Greenwich and the other in the City of London. The hubs will consist of a cluster of rapid charge points to support both taxi and public electric vehicle users.

To enable the growth of the rapid charge point network, we continue to work with the London boroughs to encourage and support the delivery of charge points on local roads. In October 2018, the London Councils' Transport and Environment Committee endorsed a directive for all boroughs to identify 20 possible sites for rapid charging points by January 2019. To date, 11 sites have been installed through this process.

The Mayor's School Air Quality Audit programme

The Greater London Authority (GLA), supported by us, held meetings with representatives of the audited schools. These gave an opportunity for school and borough representatives to establish implementation plans for each of the 50 participating primary schools, as well as discuss how they wished to spend the £10,000 funding made available to them. Going forward, we will support the 50 primary schools in taking forward the transport-related interventions.

Improving air quality on the Tube

Two years ago, we commissioned the Committee on the Medical Effects of Air Pollutants to review academic studies and other research relating to air quality on underground railway systems. In January 2019, the report confirmed that there was no convincing evidence that London Underground dust levels are more toxic than those found outside, but it emphasises that further monitoring and research is needed. We closely monitor dust levels and make sure that exposure levels are well within Health and Safety Executive guidelines. We have already improved our sampling regime by including tests for additional metals, and we will continue to investigate ways to reduce dust levels.

We spend around £60m every year cleaning our trains, stations and tunnels to ensure dust levels are kept to a minimum. We perform regular health checks for all our operational employees and there is no evidence to suggest our frontline teams suffer ill-health

effects from exposure to dust on the Underground for longer periods of time compared to customers. We will continue to seek practical ways of reducing particulate matter on the Underground, as the report has recommended.

Zero carbon city

Our Energy Strategy sets out our overarching approach to reducing CO₂ emissions from our operations. This contributes to the following three Mayoral ambitions set out in the Mayor's Transport Strategy and London Environment Strategy:

- The TfL bus fleet to emit zero exhaust emissions by 2037
- Aim for all TfL-controlled rail services to be zero carbon by 2030
- Meeting a 60 per cent reduction in GLA group CO₂ emissions on 1990 levels by 2025

We are working to develop the best approach to meeting the ambition to supply our rail services with zero carbon energy, through energy efficiency, on-site generation and procurement of renewable energy. We have mapped the potential for solar generation on our rooftops and assessed high potential land holdings.

We have also conducted an early market engagement exercise to better understand potential opportunities for connecting our assets to local sources of low carbon electricity. We are working with the GLA to explore opportunities for procurement of low carbon energy through Power Purchase Agreements.

Energy consumption on our estate

On-site works were completed under our £2.6m programme of energy efficiency improvements using the Mayor's REFIT framework. Working with E.ON Control Solutions, energy conservation measures were installed at nine of our buildings including head offices, bus garages and London Underground.

We installed LED lighting throughout Trackside House and a building management system at Walworth and Uxbridge bus garages. Our next phase of works under the framework will include a programme of solar PV installations, working in partnership with Engie. The recommissioning of the gas combined cooling, heat and power plant at our Palestra head office in December 2017 were our largest and most complex works, complemented by improvements to domestic hot water and cooling systems.

Monitoring of improvements over the first nine months of operation shows an improvement in building energy efficiency of 13 per cent at Palestra and delivered utility cost savings of more than £235,000.

Green infrastructure

We continue to review all schemes and delivery programmes to understand the opportunities for green infrastructure and sustainable drainage. As a result, our projects are now building green roofs including Tottenham Hale station upgrade, Acton Trains Modification Unit and Four Lines Modernisation signalling equipment rooms.

After several years of planting more than 1,000 trees a year, the last two planting seasons have not been as successful. We are developing a plan for planting 1,000 trees during the next tree planting season and will extend that plan to make sure we reach our overall Mayor's Transport Strategy target of a one per cent year-on-year increase in tree numbers on our roads to 2025.

We are also working to improve monitoring of tree planting and installation of sustainable drainage systems in support of the Mayor's target for an additional effective surface area of 50,000m². We are working to incorporate the systems into improvement works on our roads, as well as encouraging boroughs to deliver them via Local Implementation Plans and the Liveable Neighbourhoods programme.

Biodiversity net gain is being embedded into our project development and management processes. Training has also been provided to staff on how to use the biodiversity net gain project toolkit, as well as the biodiversity baseline data layer on our geographic information systems.

We have included the requirement for achieving net gain for biodiversity within contracts for Rotherhithe to Canary Wharf and Sutton Link Project. This commitment and action has been commended by the Environment Agency.

Circular economy

Around 90 per cent of our waste is construction, demolition and excavation waste from construction projects, 98 per cent of which was re-used or recycled in 2018/19. Of our commercial and industrial waste, 50 per cent is recycled and the remainder is sent to one of London's energy from waste plants.

We are working on a single-use plastics reduction plan that was finalised last summer, for example by:

- Including plastic packaging reduction requirements in key contracts, such as head office catering, stationery and consumables
- Replacing single-use plastic bottles with reusable bottles at key maintenance depot locations and issuing all London Underground track delivery staff with reusable bottles

We have successfully applied for Thames Water funding for water fountain installations at 17 sites across our network, including 10 London Overground stations, three Underground stations and four bus stations. Work is ongoing to confirm proposed locations, with the aim to start installations from July 2019.



We are building our network of electric vehicle charging points

We marked the two-year milestone of our Recover and Reuse Initiative at the disused York Road station as a hub for freecycling within our equipment spares. This ranges from station lockers and booths to CCTV cameras and PA speakers, as well as end of project materials. Since the opening of the York Road hub the initiative has gone from strength to strength. More than £900,000 of London Underground equipment has been re-used since May 2017. A further £900,000 in materials and assets are available at York Road. The initiative has identified a further £500,000 in upcoming redundant assets. A benefit that defied expectations stemmed from the hub's secure recovery of items of interest to the London Transport Museum with, for example, 3,000 recovered Jubilee line open door buttons bringing us £30,000 income.

Climate change adaptation and resilience

Climate impacts include infrastructure damage, such as heat damage to old signal systems and flooding destabilising embankments, with consequent repercussions for performance. There are also safety implications for our customers including fainting on hot trains and slipping in wet weather.

We established and chair the Transport Adaptation Steering Group, which brings together stakeholders, such as Network Rail and Highways England and experts including the London Climate Change Partnership, to understand how we can address the issue of climate change adaptation in the transport sector. We have also set up a research programme with a range of academic institutions to develop a baseline of how current severe weather events affect our operations.

For example, a recent study identified a correlation between London Underground delay frequencies and ambient air temperature, with delays increasing at higher temperatures.

Using this information, the newly released 2018 UK Climate Projections, and the expertise of other transport sector partners, we will be better able to prepare for and recover from the impacts of future climate change. A preliminary assessment of suitable climate change adaptation indicators has been conducted, concluding that there is a need for an annual adaptation performance report.

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