

Transport for London Health, Safety and Environment report

Quarter four 2017/18



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 (LU), London Buses, the DLR, London Overground (LO), TfL Rail, London Trams, London River Services (LRS), London Dial-a-Ride, Victoria Coach Station (VCS), Santander Cycles and the Emirates Air Line (EAL). 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 it opens, will add 10 per cent to London's rail capacity.

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

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

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

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

Contents

4 Executive summary

6 Performance at a glance

8 Significant incidents

12 A safe and secure road transport network

21 Customer safety

21 London Underground

23 London Buses

26 Rail

29 Other operations

32 Workforce safety and wellbeing

40 Workplace violence

42 Clean and green streets

44 Environmental management

47 Audit

48 Resilience

50 Appendix

Executive summary

This report provides an overview of HSE performance across our organisation which covers London Underground (LU), TfL Rail, Surface Transport (including London Rail) and Crossrail. This report covers 10 December 2017 – 30 March 2018 inclusive, referred to as Quarter 4.

During the period covered by this report, 17 people lost their lives following incidents on our transport network. There were also 29 people fatally injured on London's roads in Quarter 4.

A total of 95 injuries were recorded on the London rail network in Quarter 4. This is a 14 per cent decrease on the same quarter in 2016/17 and represents an improving long-term trend.

There were 29 fatalities on London's roads in Quarter 4 of 2017/18 compared to 44 in the same quarter of 2016/17 – a 34 per cent decrease. At the end of the financial year, a total of 112 people were killed on London's roads.

There were 649 injuries to our workforce in the quarter, a 12 per cent decrease on the same period last year. We are committed to creating the safest possible working conditions for all of our direct employees as well as our contractors and suppliers' employees. We have continued to deliver targeted improvement programmes that address work-related injuries and causes of sickness absence.

In Quarter 4, 1,317 of our employees were subjected to workplace violence, this represents a rise of three per cent on the same period last year. We deliver programmes to help staff avoid conflict situations and we continue to work closely with British Transport Police (BTP) to prosecute people who attack our staff. Further details about workplace violence are available later in this report.

The Mayor's Transport Strategy (MTS) sets out the policies and proposals to reshape transport in London. We continue to develop our strategy and delivery plan to support the commitment to Vision Zero, within the MTS. The Vision Zero ambition is to eliminate all deaths and serious injuries on London's transport network by 2041.

Making the tram service safer remains one of our priorities. In December 2017, the Rail Accident Investigation Branch (RAIB) published their report of recommendations following the overturning at Sandilands in 2016. In January 2018, SNC-Lavalin, the company we commissioned to conduct an independent investigation, published our report¹. We will ensure all the recommendations from both reports are implemented to improve safety measures across the tram network.

We have continued to deliver our customer safety improvement plans, the Bus Safety Programme and Bus Safety Innovation Fund, as well as supply chain safety initiatives and we are beginning to see the impact of this work. All of these plans are contributing to reducing injuries and to Vision Zero.

During the quarter there were 1.9bn passenger journeys across our network and regrettably there were 2,725 customers injured while travelling, however, this is nine fewer than the same quarter in 2016/17.

We run a programme of audits across our businesses to ensure our strategic risks are being monitored and adequately controlled. We conducted 10 HSE and Technical audits in Quarter 4. None of the audits were concluded as 'poorly controlled', however, one identified a number of immediate process improvements and lessons learnt for future contracts.

The country experienced a prolonged period of very cold weather, accompanied by heavy snow falls during the week 26 February to 2 March 2018 that extended into central London and surrounding counties. This impacted transport operations across the capital as we invoked contingency plans to cope with the winter weather. Our resilience plans to ensure the our network continued to operate worked well – with a good service provided where possible.

We continue to deliver the Mayor's tough measures to reduce air pollution and protect the health and wellbeing of Londoners. In Quarter 4, the first full quarter of operation of the Mayor's Toxicity charge for London's most polluting cars (T-Charge), 95 per cent of vehicles entering the Congestion Charging Zone were compliant with the minimum emissions standards. The Mayor's

consultation on proposals to tighten the Low Emission Zone standards for heavy vehicles and expand the Ultra Low Emission Zone closed on 28 February, with over 40,000 responses received.

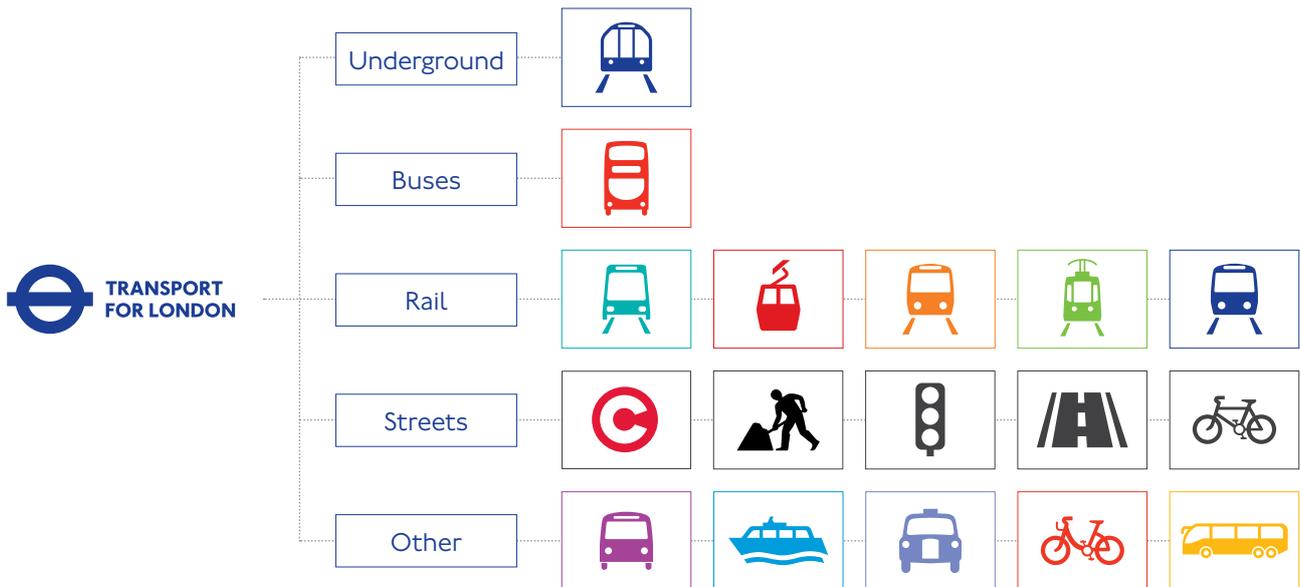
Our bus retrofit programme has now passed the 1,000-vehicle milestone, with more than 1,070 buses upgraded to the Euro VI emissions standard to date. Our commitment to making our bus fleet cleaner and more environmentally friendly has seen us deliver just over 3,500 low emission Euro VI compliant buses into service.

In February, we presented a paper to the Department for Transport's (DfT's) Taxi and Private Hire Task and Finish Working Group on Cross-Border Hiring. The term 'cross-border hiring' is commonly used to describe using taxis or private hire vehicles (PHVs) licensed by one authority but working in another. Our concern is that drivers who have had their licence revoked or suspended may be able to successfully apply to another licensing authority. We are now looking at ways to address this issue.

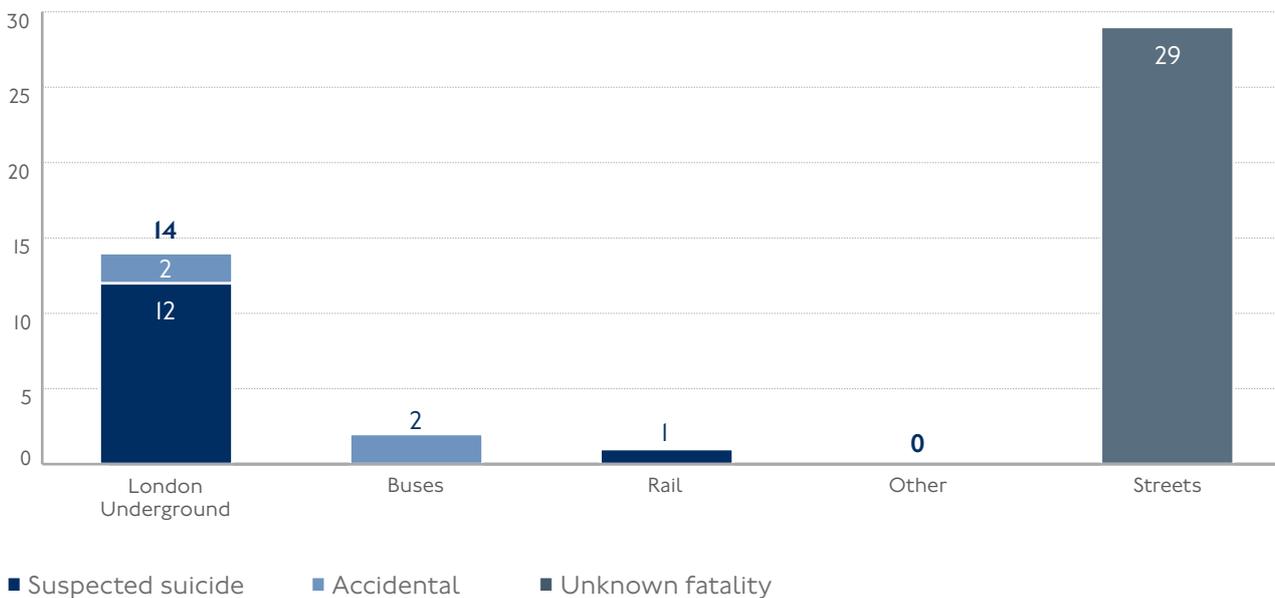
I SNC-Lavalin Independent investigation into the tram overturning at Sandilands Junction: <http://content.tfl.gov.uk/sshrp-20180122-item03-tram-overturning-at-sandilands-investigations-update.pdf>

Performance at a glance

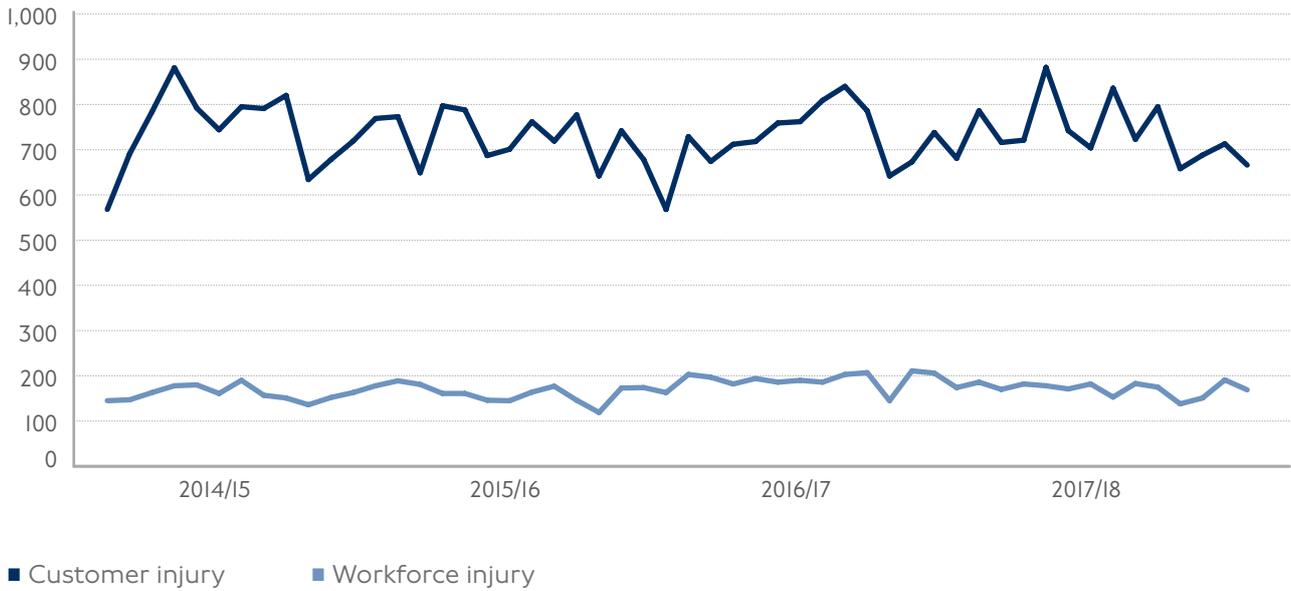
How we report on our business



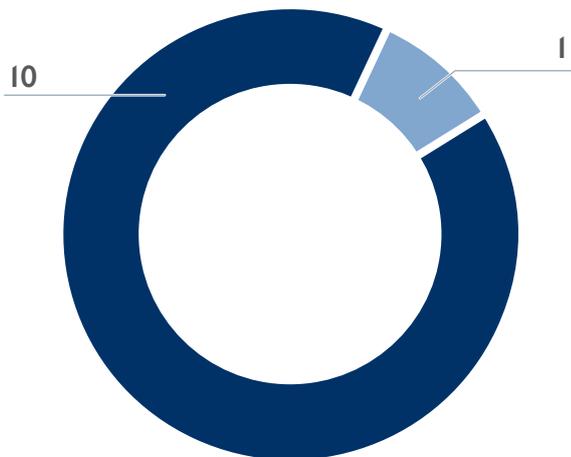
Fatalities on London's roads and public transport network



Customer and workforce injuries

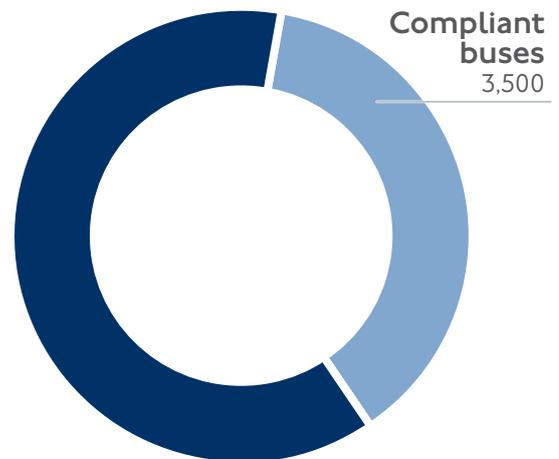


HSE audit results Quarter 4 2017/18



- Poorly controlled
- Adequately controlled
- Requires improvement
- Well controlled

Euro IV buses



Total bus fleet: **9,300**

Significant incidents

This section of the report covers the significant incidents that occurred across our businesses in Quarter 4 of 2017/18.

Fatalities on London's roads

Twenty-nine people were killed on London's roads in Quarter 4, they include:

- 17 pedestrians
- one cyclist
- three motorcyclists
- one mobility scooter user
- seven car occupants

These tragic incidents include a vehicle that was apparently travelling at speed and mounted the pavement before striking three out of five pedestrians on 26 January 2018. There was also an incident where a 12 year old boy was struck by a bus and killed on 15 December. This incident is under investigation by the bus operator and the MPS.

Two Taxi/Private Hire Vehicles were involved in separate incidents that resulted in the deaths of a motorcyclist and a car occupant. Heavy Goods Vehicles were involved in four separate fatal collisions where a pedestrian, motorcyclist and two car occupants were killed. Police investigations are underway.

There was a further incident being investigated as a suicide after a man apparently climbed over metal railings at the underpass of Harrow Road fell onto the road on 14 January 2018.

There were seven further fatal incidents which are investigated as being due to natural causes. In all cases, the drivers of cars were found to have suffered fatal medical episodes before being involved in collisions.

There were four deaths due to natural causes on our transport network. Two occurred on LU and two on London Buses.

Significant injuries of our customers and workforce

Fatalities

There were two accidental fatalities in Quarter 4. On 1 January 2018 at East Acton Station, a customer fell off the platform. The customer was struck by a train and fatally injured. On 17 March 2018 a customer fell onto the track at Stockwell station and sadly died at the scene. For both of these incidents we await the outcome of the Coroner's inquest.

A customer who was taken to hospital for treatment following injuries in a fall from a bus on 12 December 2017, had subsequently died from his injuries. The incident occurred after the customer got off the bus and stumbled while on the pavement, falling backwards and hitting his head against the stationary bus. The operator (Go-Ahead) is liaising with the Coroner, and has started a full investigation into the circumstances of the incident.

Significant injuries

On 31 January 2018, a customer at Notting Hill Gate station was dragged along the platform and under a train after her handbag was caught in the doors. The incident resulted in significant injuries. Our investigation report into this incident is now being finalised, having identified root causes and proposes a number of actions to address the findings.

We recorded two incidents where our employees and contractors could have been seriously injured in Quarter 4:

On 7 January 2018, a contracted worker was installing cables under the platform at Farringdon station. During the operation, the electric winch malfunctioned and pulled the worker down an access manhole. The incident resulted in significant injuries to the worker. Following the incident there was a safety stand-down across all relevant areas and activities in LU renewals and enhancements. This was to check on adherence to Safe Systems of Work. We issued a company-wide safety alert to highlight best practice. We have launched a formal investigation, alongside that of the Office of Rail and Road (ORR)

On 19 March 2018, operatives in our Overground operation were installing a cement board in a lift shaft at Hampstead station when the board slipped from one of the team members and struck another contractor on the arm causing injuries. The operative attended hospital for treatment for bruising and grazing of the skin.

Other significant incidents

Buses were involved in three separate collisions, one with a pedestrian on 3 February, one with a cyclist on 24 February and another with a motorcyclist on 4 March. In all cases, the individuals suffered serious injuries. The incident investigations are underway to determine possible improvement actions for us and our bus operators.

High Potential Incidents connected with our activities

Within our Projects and Programme Directorate, while constructing a lifting gantry with rope and pulley system above the dry well access coves, a 7m tube snagged on the access cover frame and slid from the knot tied into the rope and dropped (16 February). We issued a company-wide safety bulletin to our staff and supply chain highlighting the incident and reminding of best practice.

An important part of our HSE management strategy is the analysis of incidents with high potential to cause harm. In every case action is being taken to address the immediate and underlying causes. Our quarterly review of safety incidents has highlighted several key themes:

Asset failure

We recorded nine instances where asset failure could have resulted in serious harm, they involved:

- Four incidents of bus fire. Initial investigations identified electrical failures (18 January 2018), exhaust failures (8 February 2018), and

suspension system failures (6 March 2018) as causes. Investigation findings are expected in Quarter 1 2018/19

- On 25 December 2017, whilst employees were using machinery to shear a beam over the London Overground lines near to Highbury & Islington station, the beam struck the crash deck at high impact creating a hole on the crash deck
- On 11 January 2018, a pane of glass from the window of a route 688 School bus came off its fitting as a 14 year old child fell against it, the glass did not shatter. The child fell out of the window and suffered minor injuries and shock. The investigation into this incident did not find any underlying causes or recommendations
- On 19 February 2018, severe electrical arcing occurred at Pontoon Dock station. The London Fire Brigade (LFB) and British Transport Police (BTP) attended. Two passengers suffered minor injuries during the evacuation from the train

Operational irregularities

We recorded five noteworthy operational irregularities in Quarter 4. All of these were investigated and relevant corrective action was taken. They involved:

Trams

On 12 December 2017 – a broken down tram collided with a recovery tram when brakes were released before coupling had been completed.

London Overground

On 27 December 2017 – a customer reported an incident where a tram driver applied the hazard braking after identifying that the signal he was approaching had changed display from 'proceed' to 'stop'.

On 7 March 2018 – an Overground train collided with the buffer stops at New Cross Gate Depot, travelling at low speed. No damage was sustained to buffer stop or train unit

DLR

On 27 December 2017 – a customer alerted a Passenger Service Agent to one set of doors being open at Limehouse Station, on the non-platform side. The train was taken out of service and examined. An investigation was undertaken which identified the primary cause as an error by the Passenger Service Agent in disabling the door, following problems earlier in the day. A new programme of training for Passenger Service Agents was introduced as an action of disabling the doors is not required very often.

London Underground

On 18 January 2018 – an underground track tamping machine was uncoupled and rolled fifty meters through an area of restricted access between Farringdon and Moorgate stations. The machine was stopped after an operative applied an emergency brake. The investigation is expected to conclude in Quarter 1, when the causes will be known.

There have been several incidents of objects falling or being at risk of falling from overhead within our premises and infrastructure. Within LU, incidents include: a falling cable conduit cover at Vauxhall (14 December); a falling sign at Canada Water (28 December); falling ceiling panels at Mansion House (3 January), St John's Wood (17 January), Bromley by Bow (19 January), Great Portland Street (23 January), Tower Hill (25 January), Green Park (22 February), Charing Cross (27 February), and Warwick Avenue (28 February).

Within Victoria Coach Station, two brackets which had been resting on an iron beam fell to the ground following a coach collision with a wall in the arrivals terminal.

The investigations have identified opportunities for improvements to be made to risk assessment, inspection, and maintenance procedures. In addition, a falling objects working group has been established to fully understand the contributory factors and put in place short-term mitigations, while medium to long-term improvements are developed and delivered.

There were three incidents within areas of restricted access (track possessions), where failures in the planning process put workers at increased risk. A worker strayed beyond their possession into an area of live track whilst working at Kennington (1 January), and trains approached workers on the track at Paddington (17 February) and Finchley Road (19 February). Our company-wide investigation into track access has concluded and a programme to modernise employee track access was launched in Quarter 4.

A safe and secure road transport network

Safety on London's road network

Our road safety programmes are focused on creating better and safer road infrastructure, combined with targeted initiatives for users, eg, cyclists, as well improved bus safety. Some of the most significant programmes are detailed within this section.

There were 29 fatalities on London's roads in Quarter 4 of 2017/18 compared to 44 in the same quarter of 2016/17 – a 34 per cent decrease. At the end of the financial year, a total of 112 people were killed on London's roads, table 1 shows the number of fatalities and the types of vehicles that were involved in these incidents this year.

Vehicles involved in road fatalities 2017/18

| Vehicle involved | 2016/17 | 2017/18 |
|------------------------------|------------|------------|
| Car | 52 | 51 |
| Heavy Goods Vehicle (>=7.5t) | 25 | 23 |
| Single Vehicle Collision | 7 | 11 |
| Light Goods Vehicle | 6 | 8 |
| Bus/Coach | 8 | 7 |
| Taxi/Private Hire | 5 | 5 |
| Other | 6 | 4 |
| Pedal Cycle | 1 | 2 |
| Powered 2 Wheeler | 6 | 1 |
| Total | 116 | 112 |

Road casualties

The Quarter 4 road casualty statistics are not currently available because of the move to the new Case Overview and Preparation Application (COPA) reporting system. A data cleansing exercise has been required to enable the data to be combined with data reported using the previous collection system.

Partly as a consequence of this, the Department for Transport (DfT) has announced the postponement of its Reported road casualties Great Britain, main results 2017 publication, which had been scheduled for the end of June 2018. This publication traditionally gives the first release of final key casualty statistics for the previous calendar year.

The expectation is that the main results will now be published at end of September once the data for London has been supplied and fully validated.

As a result of this delay, the DfT will not be publishing quarterly figures in their publication, Reported road casualties in Great Britain, provisional estimates: January to March 2018. This was previously scheduled for August 2018. The next quarterly publication is expected in October, covering the period January to June 2018 (Quarters 1 and 2).

We are working with the Metropolitan Police Service (MPS) to speed up the delivery of 2017 data and to improve the timeliness for the 2018 data.

Road danger reduction improvement schemes

We have made a number of notable safety improvements across the our road network. A full list of works that we have completed so far is on our website.

As fatalities are slightly lower this year, we are starting to see the benefits of such schemes. The following sections highlight some notable programmes of work to improve safety and create a better and more welcoming environment for pedestrians and cyclists in particular.

Highbury Corner

In March, we announced we intend to proceed with the changes at Highbury Corner, consulted on in January 2016. The transformation of Highbury Corner will see the intimidating 1960s roundabout removed and replaced with two-way roads, with the segregated cycle lanes on all three remaining sides of the roundabout. The final traffic modelling design is under way and, subject to approval, works will begin in summer 2018 and will take around 12 months to complete.

Safer Junctions

The Safer Junctions list published in April 2017 identified 73 junctions on the our road network with the highest vulnerable road user collision rates between 2013 and 2015. We have now completed the first drafts of safety studies at 13 junctions. Further investigations will now continue at these sites and we are currently finalising the 2018/19 programme of works.

Improvement schemes have been completed on the A202 Camberwell New Road, Flodden Road, and cycle advanced stop lines have been introduced at Chelsea Embankment. We have completed consultation to remove roundabouts at Millbank, by Lambeth Bridge, with a design which replaces the roundabouts with fully signal controlled crossings, including pedestrian and cycle facilities.

We continue to develop the detailed design for Charlie Brown's Roundabout in South Woodford. Construction is planned during summer 2018.

Pedestrian town centres

Public consultation on proposals for Tooting town centre will commence in the summer. The proposals will include improvements to bus routes, pedestrian and cycling facilities, and a reduction in vehicle speed limits. There will also be a new public space on Totterdown Street, and widened footways.

Feasibility design is now underway for improvements to Peckham town centre. This will include an integrated package of measures to improve safety for pedestrians.

Central London Cycling Grid

The Central London Cycling Grid is made up of Quietways for cycling and the Cycle Superhighways. Quietways are continuous, convenient and less busy routes across London. Mini-Hollands are improvement schemes to promote cycling and walking in the outer areas of London. Cycle Superhighways are protected, separated main cycle routes across London.

We continue construction of the 85km network across the City of Westminster, City of London, Royal Borough of Kensington and Chelsea and the boroughs of Hackney, Islington, Lambeth and Southwark, with 50km complete or under way. Wayfinding has been introduced on 37km of this network across the City of London, the Royal Borough of Kensington and Chelsea, and the boroughs of Hackney, Islington, Lambeth and Southwark, and also in Hyde Park and St James's Park. In March, we launched Quietway 15 in partnership with the Royal Borough of Kensington and Chelsea, which runs from Belgravia to Earls Court.

As part of the future Grid programme, we are prioritising 65km of additional Grid routes for delivery and we plan to take 39km through the initial design phase in 2018/19.

Cycling Quietways

Construction is complete or underway on 110km from a potential 250km of routes. Wayfinding has been implemented across 17kms of this network. To date we have launched Quietway 1 Waterloo to Greenwich, Quietway 3 Kilburn to Gladstone Park and Quietway 5 Oval to Clapham Old Town.

Construction is now underway on the following routes; a Quietway linking Barking Town Centre to Cycle Superhighway 3, Quietway 14 along the Thames Path, Quietway 22 along

Newham Greenway, Quietway 2 Notting Hill to East Acton, Quietway 23 Ealing to Greenford, Greenwich to Bexleyheath and Greenwich to Kent House. Wayfinding signage is planned to be implemented on a further 45km during 2018.

Mini-Hollands

Twenty-six of the 103 Mini-Hollands schemes (98 infrastructure and five supporting measures) are complete. Six schemes started on site this quarter, including four Quieter Neighbourhood schemes in Enfield and two schemes connecting Kingston town centre.

In total, 25 schemes are underway, including the Kingston station scheme, the Lea Bridge Road scheme in Waltham Forest and the A1010 South scheme in Enfield.

Cycle Superhighways

Following the opening of the full eastern section of the East-West Cycle Superhighway in mid-December, we have continued work on remaining parts of the route. This includes the design work for North Carriage Drive within Hyde Park. We plan to start building this section in summer 2018, subject to approvals.

Delivery continues on Cycle Superhighway 6 North-South Phase 2 and is progressing well. We have completed more than 50 per cent of the construction for both the Transport for London Road Network and borough sections.

We published the public consultation factual reports for Cycle Superhighway 9 (Kensington Olympia to Brentford) and Cycle Superhighway 4 (Tower Bridge to Greenwich) on 27 February and 23 March 2018 respectively. We are now reviewing the responses and plan to publish the full consultation reports for both routes later in 2018.

We plan to start preparatory works for Cycle Superhighway 11 (Swiss Cottage to the West End) in early May, with the main construction starting in July at Swiss Cottage.

Enforcement activities

We have prosecuted British Telecom (BT) for putting the public at risk during streetworks in the City of London, with the telecommunications company ordered to pay a £90,000 fine as well as £3,394 in costs. During works at Bishopsgate in August 2017, part of our strategic road network, BT failed to properly sign and guard the work area and also used the wrong traffic management methods.

Despite our repeated demands, BT also failed to take actions to improve the situation, leading to unsafe conditions for road users, pedestrians and cyclists. The Commissioner wrote to the Chief Executive Officer of BT on 26 April drawing his attention to these latest failings and to demand immediate improvements and we continue to meet quarterly with BT to discuss agreed performance improvement measures. It is the second time in 12 months we have

taken the utility company to court for unsafe working practices as part of its commitment to tackle poorly managed, or unsafe roadworks.

In partnership with police resources funded by us, we continue to undertake intelligence-led operational activity to reduce road danger. During Quarter 4 Compliance Policing and on-Street (CPOS) operational resources including our Roads and Transport Enforcement Officers, undertook 1,433 hours of deployments to road danger related incidents on the road network. They also undertook 7,794 hours of on-road deployments in support of road danger reduction activity.

During this period the MPS Roads and Transport Policing Command issued more than 5,500 enforcement tickets as part of a series of targeted road danger reduction activities. This included support for the National Police Chiefs Council's Mobile Phone Week in January and the Europe-wide Seatbelt Week in March.

This period also saw continued London Freight Enforcement Partnership activity with over 4,700 vehicles being stopped and 1,061 tickets being issued. We continue to support Community Roadwatch and held 194 sessions during Quarter 4. This resulted in over 3,000 warning letters being sent to speeding motorists. In addition to Community Roadwatch, we have worked with the MPS to trial Junior Roadwatch in Hackney and Richmond. This involves children taking part in a Roadwatch activity and interviewing offending drivers.

During Quarter 4 we have continued to work with the police to develop a new approach to policing to support improved on-street safety. This will include a renewed focus on repeat and high risk offenders and the use of random deployments to maximise the visibility of on-street resources and increase the deterrent effect.

The Safe Urban Driving

Our Safe Urban Driving course focuses on the risks and hazards of driving heavy goods vehicles (HGVs) in UK cities. The course equips drivers with the knowledge and skills needed to share the road safely with vulnerable road users (VRUs), in particular pedestrians, cyclists and motorcyclists. Safe Urban Driving is the first accredited course in the UK to include an on-road cycling hazard awareness module. This module gives drivers first-hand experience of feeling vulnerable on busy urban roads and knowledge of how different road users may act in certain situations.

At the end of Quarter 4, we had delivered Safe Urban Driving training to 6,330 drivers, exceeding the original plan for 2017/18. This means, since the inception of the course in September 2011, we have delivered vulnerable road user training courses to 67,653 commercial drivers who operate in London – this includes 5,800 drivers that participated in our Van Smart training.

London Buses: The Bus Safety Programme **A new approach to measuring bus safety performance**

The London Bus Safety Programme was launched in February 2016 with the aim of reducing the number of people killed or seriously injured on the bus network. The programme was refreshed in 2017/18 and its scope was widened to include further risk management elements, such as fatigue management.

On 8 February 2018, we presented two new safety measures: a bus operator safety performance index (SPI) and the safety maturity measure to our bus operators at the Safety Bus Operator Forum. The discussion at the forum encompassed what these safety measures are, how they work and what we require from the bus operators in a bid to strengthen the monitoring of safety performance. Four further briefing sessions were held during March for nominated bus operator staff to help them prepare for the implementation of SPI in April this year.

Through this new approach which uses a selection of performance metrics to produce an overall safety index, with our bus operators we will be able to identify areas where additional improvement is required, this can be for an individual operator or across the network. The safety maturity measure permits us to assess the adequacy of individual operator's safety arrangement and to demonstrate their improvement.

Safety training for bus drivers

The original intention for the safety training was for the procurement process to finish in March with the aim to begin delivering the training from summer 2018. However, following a disappointing response from potential suppliers during the procurement process we have taken the decision to extend the procurement phase in order to reinvigorate potential suppliers and their approach to the training with more focus on a preferred innovative approach.

We aim to have our chosen suppliers confirmed by September 2018 with the view for training to start in early 2019.

Bus Safety Standard

The Bus Safety Standard has progressed through a series of project gateways with 12 of the original 13 measures being taken to the testing stage. The exception is the measure relating to bus fires, which will be considered as part of a wider project looking at fire safety on buses.

Intelligent Speed Assistance technology is considerably more advanced in timescale than the remainder of the Bus Safety Standard due to its early extensive trial in 2015/16. The technical checks carried out on 30 buses between January-March 2018 are positive and a phased roll-out onto the wider bus fleet will now speed up with 500 expected to be fitted with the technology by the end of 2018.

Fatigue management

Acting on the recommendation of the London Assembly's Transport Committee, in their report 'Driven to Distraction', we have held the inaugural bus safety summit. This brought together bus operators, industry experts and stakeholders to hear from other industries about how they manage and promote safety culture.

A number of presentations covered fatigue management in detail and the measures that can be used to prevent it and where the gaps are. This information will be used to assist with independent research into fatigue management to be commissioned in summer 2018.

Fatigue detection technology has now been implemented by London Trams.

Partnership working to improve safety

Over the past year we've seen a significant improvement in how we work with our bus operators on safety, eg, incident investigations and the development of the bus operator SPI. As well as improvements in the partnership between us and our operators, we are also influencing how they work with each other. Spurred on by our new bus operator assurance arrangements which include assessing how collaborative an operator is on safety, RATP, Metroline, Abellio and Go-Ahead, worked together on the 'Hammersmith Blitz' to identify actions that would improve the safe use of Hammersmith bus station.

We worked in partnership with Arriva London to identify further measures to reduce collisions at Euston bus station. To understand what was taking place, a team went to the location to observe the actions and behaviours of drivers, pedestrians and other road users. The resulting plan includes an electronic indicator sign to display vehicle speeds, a trial to reduce the speed limit from 10mph to 5mph, and monthly reviews with operators to discuss safety issues.

We have also worked with the London Fire Brigade to halve the time it takes to free casualties from under a bus and we are looking into corrosive substance attacks with bus operators, the MPS and London Fire Brigade so we are better prepared to deal with this type of incident.

Bus collisions

A total of 7,857 collisions involving buses were recorded in Quarter 4 2017/18, a four per cent decrease on the same quarter in the 2016/17 year. Three per cent of the collisions resulted in injuries to bus customers or other road users.

From Period 1 to Period 13 in 2017/18 those collisions that resulted in an injury had a declining trend of 1.3 incidents per period. In Quarter 4 there were 233 of these incidents, compared with 303 in the same period of the 2016/17 year. The decrease in Quarter 4, when compared with Quarter 4 of 2016/17, was within normal range.

Just over three per cent of all the collisions involved a vulnerable road user (pedestrians, cyclists and motorcyclist) in 2017/18. This is declining trend over the course of the year, therefore not statistically significant.

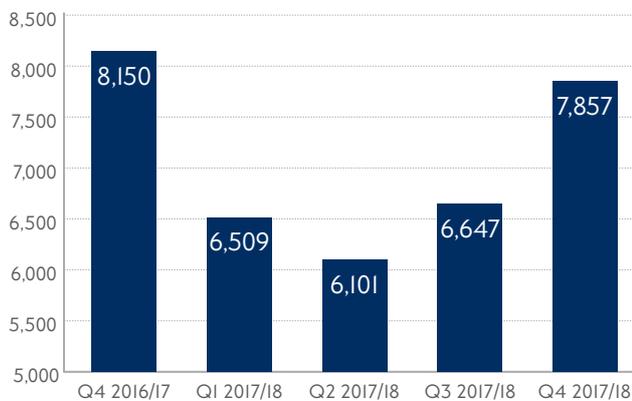
Seventy-six per cent of all collisions in the quarter involved another vehicle. The proportion of collisions involving another vehicle is 0.2 per cent lower per period.

In Quarter 4, we recorded 83.7 bus collisions for every one million miles operated. This is an improvement on the equivalent Quarter 4 in 2016/17 when it was 86.9 collisions per million miles operated. A review of the longer term shows bus collisions as a rate of bus miles operated to be steady, however, in absolute terms, it shows a slight upward trend with the exception of those involving vulnerable road users. There is no discernible reason for the increase in the number of collisions, which include instances where other road users instigated the incident. Collision prevention continues to receive high levels of attention with a number of new initiatives commenced in the quarter.

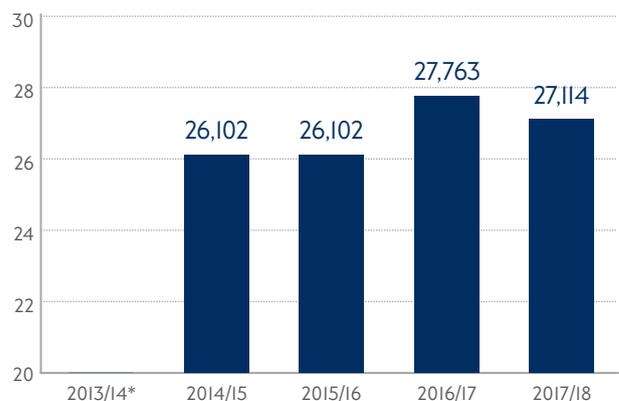
We have stepped up work with all buses operating companies to drive down collisions involving buses. During Quarter 4, our operators began a number of improvement initiatives including:

- All of the drivers at one of RATP’s garages completed a Road Traffic Collision awareness course
- Installation of distraction and fatigue monitoring equipment on buses to detect face and eye movements of drivers. This system was developed in close collaboration with trams who are developing a similar system
- A review of acceleration rates on buses from the standard specification of 1.2 metres/s/s. 40 buses have been chosen for adjustment. It is hoped with slower acceleration, drivers will have more time to react to actions from other road users
- Exploring forward facing sensory system to provide drivers a collision warning. The system will be effective for other road vehicles and vulnerable road users. A trial on 66 vehicles started in February and will run until November 2018. This is part of the Bus Safety Innovation Fund
- Starting of fatigue monitoring tests and is working closely with trams to learn lessons
- A review of all driver inductions undertaken in Quarter 4 to include more safety orientated themes including making drivers more aware of fatigue
- Continuing a scheme to sponsor drivers to undertake an assessment with the Institute of Advanced Motorists

London Buses – total collisions Quarterly



Annual (thousands)



* data being compiled

Licensed services

We have issued a new policy statement setting out how private hire and ride-sharing services will operate in London in future. More information about this can be found in the 'Other operations' section of this report.

On 26 March 2018, we launched a consultation seeking views on how to improve safety for private hire passengers. The 12-week consultation is the latest phase of an ambitious programme that is raising standards across the private hire industry. We are seeking views on:

- An advanced driving test for private hire drivers, which could include accessibility training
- New, clear signage displayed in private hire vehicles to make it easier for customers to raise concerns about the driver's behaviour and driving as well as the condition and accessibility of the vehicle
- How we could improve the vetting of private hire driver applicants to ensure a fuller and more comprehensive period of criminal history is available for consideration as part of the licensing process
- Whether changes need to be made to insurance arrangements for private hire services

Customer safety

London Underground

Fourteen customer fatalities occurred on the LU network in Quarter 4. All fatalities await the outcome of coroner inquest. However, LU's and BTP's investigations identify contributory factors that suggest suspected suicide in 12 cases.

There were two accidental fatalities in Quarter 4. On 1 January 2018 at East Acton Station a customer fell off the edge of the platform. The customer was struck by a train and fatally injured. On 17 March 2018 a customer fell onto the track at Stockwell station and died at the scene.

Customer injuries

A total of 1,121 accidental customer injuries were recorded on the LU and TfL Rail network in Quarter 4 2017/18. This is a decrease of 32 accidental injuries from the Q4 period 2016/17.

While the number of high risk platform train interface (PTI) incidents are significantly lower (11 per cent lower) than 2016/17, on 31 January, a customer at Notting Hill Gate LU station was dragged along the platform and under the train. The incident resulted in significant injuries. Our investigation identified that the customer's bag became caught in the doors before the train departed. We have also launched a formal investigation, alongside that of the RAIB and ORR. We will conclude our investigation during Quarter 1 2018/19.

For the quarter as a whole there were fewer injuries which resulted in customers going to hospital. The

greatest reduction has been in on-train injuries (14 customers went to hospital as a result of on-train injuries in 2016/17, compared to one in 2017/18).

By the end of Quarter 4 there had been 72 suicides across the network. This was significantly higher than any previous year. Discussions are under way with external organisations to assist in reducing suicides on our network and increasing the awareness of employees.

In addition we have an extensive programme to increase awareness of the actions our staff can take to prevent suicide. For example, we have issued suicide prevention impulse cards for operational staff. Since the programme began, there has been a notable increase in staff interventions, in 2017/18 there were 252.

In Period II LU had the lowest number of customer accidental injuries in a period in the past two years and a significant reduction in the number of injuries on escalators.

Customer safety improvements

Our customer safety improvement initiatives are focused on changing customer behaviour (through direct messages and 'nudge' messages) and on making infrastructure changes which will eliminate or reduce the risk. The 2017/18 LU customer safety improvement plan focused on all customer accidental injuries.

As part of our plan to reduce the 40 per cent of incidents that take place on LU escalators, we have rolled out enhanced escalator safety measures throughout the 2017/18 year. Measures included highlighting escalator entry and exit points, positional footprints indicating recommended safe standing areas, and a 'hold the handrail' safety message. We have identified further opportunity to 'nudge' customers towards safer behaviour at the top 10 stations where most escalator incidents occur.

Our Escalator Excellence programme has delivered significant improvements in customer safety at our top 10 stations.

Overall, we have seen a 29 per cent reduction in customer accidental injuries on escalators at these stations. This is now being rolled out across all stations with escalators on the Underground.

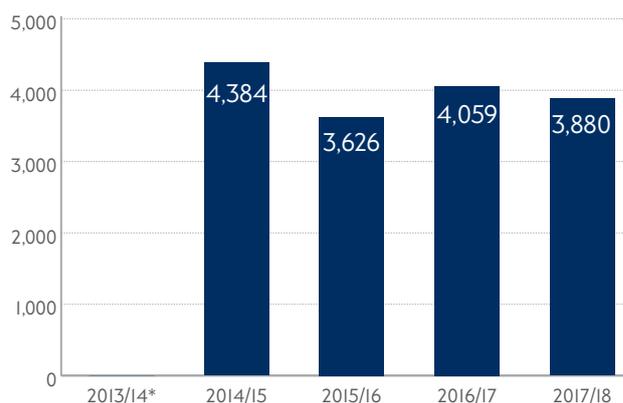
The next steps for the LU customer safety plan focuses on helping customers who are under the influence of alcohol to stay safe on the Underground. Our plan will focus on: clear guidance for staff and customers; and communication to customers and behaviour change and enforcement.

London Underground and TfL Rail customer accidental injuries

Quarterly



Annual



* data being compiled

London Buses

Fatalities

As noted in the 'Significant incidents' section of this report, there were two accidental fatalities on our bus network in Quarter 4 of 2017/18.

As a follow-up to any bus collision fatality, we work closely with bus operators to conduct a joint site visit as part of the investigation. This improves understanding of the circumstances leading to the incident and enables thorough identification of causal factors to inform potential improvement opportunities. The findings of the investigation, along with the outcome of Coroner inquests will inform the corrective actions to be implemented.

Customer injuries

A total of 1,485 injuries were recorded on our bus network in Quarter 4 2017/18. This is a four per cent increase on the same quarter in the 2016/17. This is not a statistically significant change. Twenty-seven per cent of these injuries required hospital attendance.

Seventy-three per cent of all injuries were caused by falls on buses, striking an object, or being struck by an object within the bus.

In Quarter 4, we recorded 2.24 bus customer injuries for every one million journeys. This performance is worse than the equivalent quarter in 2016/17 when it was 2.21 customer injuries per million customer journeys, and represents an upward trend.

To address the rise in customer injuries, we are working more closely with our operating companies to introduce additional safety measures. These are detailed in the 'A safe and secure road transport network' section of this report. In Quarter 4, notable examples of activities undertaken by bus operating companies to improve safety included:

- Bus driver training assessment for all drivers within a garage to heighten their awareness of vulnerable road users
- Application of lessons learned from the Sandilands derailment (Appendix)
- A new voluntary scheme which encourages bus drivers to sign-up to a pledge comprising a series of safety statements. The aim of the scheme is to bring safety to the forefront of the bus driver's thoughts

Falls on buses

A total of 1,507 customers fell on buses in Quarter 4 of 2017/18. This is a 12 per cent increase on the same quarter in 2016/17. Sixty-four per cent of the slips, trips and falls resulted in injury to 710 customers in the quarter. Falls within the bus isles and on stairs accounted for 66 per cent of the incidents.

In Quarter 4, we recorded 2.27 falls on buses for every one million journeys. This performance is worse than the equivalent quarter 4 in 2016/17 when it was 1.93 customer falls per million customer journeys, and represents an upward trend.

To help reduce the number of falls on buses, in January we undertook a 4-week trial of new announcements advising customers to 'hold on'. Feedback during the early part of the trial regarding the timing of the message resulted in modifications during the trial. The trial attracted significant attention and raised the profile of bus safety and important part that holding on while the bus is moving plays in keeping customers safe. The evaluation of the trial is underway to enable a decision to be taken on the future use of such announcements.

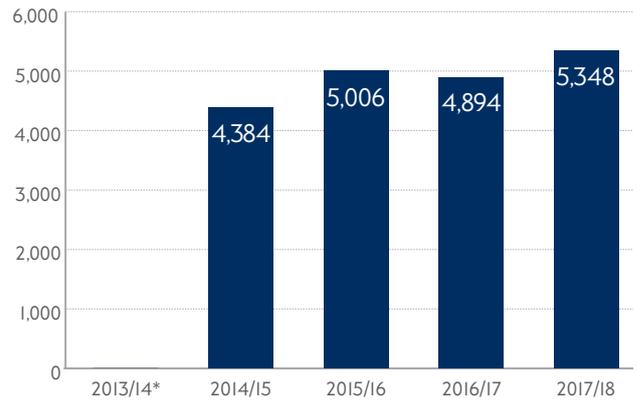
Boarding and alighting related incidents accounted for 26 per cent of the falls recorded in the period. Through our customer experience surveys, we monitor the way in which bus drivers serve bus stops. Where this is not done to the required standard, the operator is notified and required to take corrective actions.

Total customer injuries on buses

Quarterly



Annual



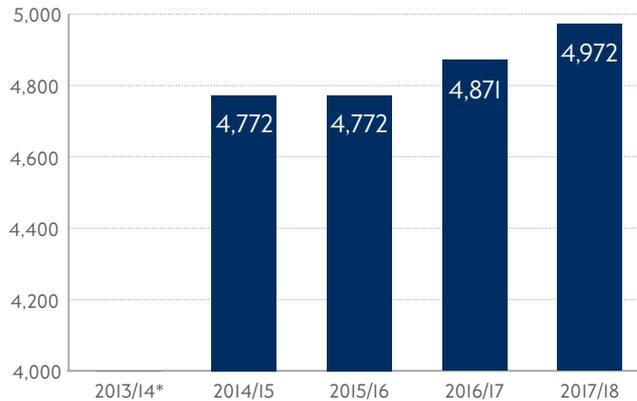
* data being compiled

Customer falls on buses

Quarterly



Annual



* data being compiled

Rail (DLR, London Trams, Emirates Air Line and London Overground)

Fatalities

There were no customer fatalities.

Customer injuries

A total of 95 customer injuries were recorded on the London Rail network in Quarter 4 (2017/18). This is a 14 per cent decrease on the same quarter in 2016/17. This quarter is our lowest level of injuries in Quarter 4 in four years, and represents an improving long term trend.

Fifty-four per cent of the customer injuries were recorded on the London Overground network. Similar to LU, carrying lots of luggage, travelling under the influence of alcohol, or rushing for services are the key contributory factors in causing injury to customers.

London Rail customer safety improvements

DLR

To address Passenger Train Interface (PTI), a Back on Track Programme which is a joint initiative between KeolisAmey Docklands (KAD) and East London NHS Foundation Trust was undertaken. The aim is to help people with mental health, social or psychological difficulties to get more out of life and feel part of their local communities. The initiative has involved the training of KAD and DLR staff to provide optimum support and guidance to people venturing onto the DLR tracks. Local health and social care staff have been briefed to promote the initiative to patients as part of their rehabilitation and recovery. KAD

Community Ambassadors can organise group trips and excursions to help people get used to travelling with the support of others around them.

To help eliminate trespassing at our “hotspot” stations, we carried out a number of activities in the quarter including:

- Issuing ‘do not trespass’ signage at Langdon Park station
- Painted red hashed boxes at platform end gates at All Saints, Langdon Park and Canning Town stations, and plans are underway to complete the other locations in next four to six weeks. The aim is to discourage passengers from passing through the platform end gates to go trackside
- ‘No trespass’ stickers installed at hotspot stations; this completes installation at all planned locations

London Trams (LT)

Making the tram service safer remains one of our priorities. As previously reported the Rail Accident Investigation Branch (RAIB) published their report of recommendations into the tram overturning incident in December 2017. In January 2018, SNC-Lavalin, the company we commissioned to undertake an independent investigation, published our report. Since then we have continued to work with the rest of the UK tram industry to ensure lessons are learned

and that we are collectively able to introduce any further measures that could improve the safety of trams across the UK. Our prime focus remains on implementing the RAIB's and our own recommendations.

A summary of our progress against the RAIB and our own report recommendations can be seen in the appendix to this report. We have formally responded to the industry's regulator, Office of Rail and Road (ORR), on how we will implement recommendations directed to us and are now submitting our response outlining how we, together with the UK tram industry will implement recommendations 1 to 8.

Previous reports to the Safety and Sustainability and Human Resources Panel have provided updates on the safety measures we identified from our investigations before the publication of the above reports. These include: Additional speed restrictions; improved speed monitoring; new signs for drivers; an upgrade of the CCTV recording system; and an in-cab driver monitoring system (which means that drivers will be immediately alerted if any signs of distraction or fatigue are detected).

We have also previously reported that we have started to explore options to make further improvements to the containment provided by tram windows and doors, automatic speed reduction systems, and the initiation of emergency lighting if required.

We continue to work with the tram operator to revise risk assessments to ensure they fully consider all likely scenarios. We have also shared our risk assessment process and findings with the UK tram industry.

Our revised customer complaints procedure which captures customer concerns regarding safety across the whole of the organisation, is fully implemented and we continue to monitor its use to ensure that any safety issue raised by a customer is dealt with efficiently and thoroughly.

We have shared the findings of the RAIB's and our own investigations with other areas of our organisation, so that lessons can be learnt more widely. Information in the Appendix shows the actions being implemented across the business.

We are working with the wider tram industry to learn every lesson, implement the RAIB's report recommendations and introduce further measures that could improve tram safety across the UK. We attended the meeting in Edinburgh on 26 March of the new UK tram industry body, which has been set up under the guidance of the ORR to develop common standards and address risk review and identification.

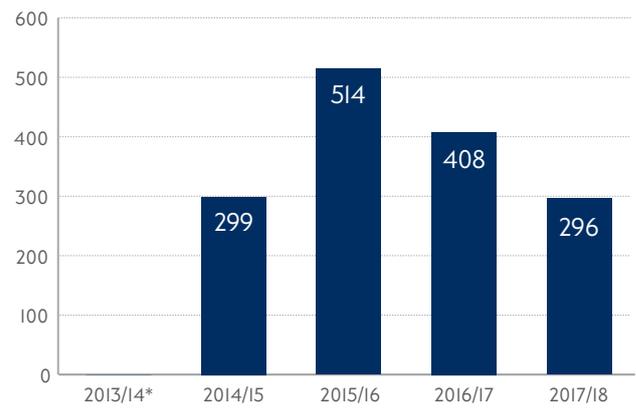
We are also working to apply the lessons of Sandilands across the organisation and will report on fatigue at future meetings of the Safety, Sustainability and Human Resources Panel.

Total customer injuries across London rail

Quarterly



Annual



* data being compiled

Other operations (London River Services, Cycle Hire, Licensed Operations, Victoria Coach Station, Dial-a-Ride)

Customer injuries

There were no customer fatalities.

A total of 24 customer injuries were recorded on our Other Operational Services within Surface Transport in Quarter 4 2017/18. This is a decrease of 45 per cent on the same quarter of 2016/17, continuing the improving trend. Fifty per cent of the customer injuries were Dial-a-Ride customers and 42 per cent were Cycle Hire users.

Dial-a-Ride service users are the group most affected within the Other Operational Services customer profile. During Quarter 4, four service users were injured after falling while boarding or alighting a bus. Within Cycle Hire, four users were injured in road traffic collisions, and two received injuries after falling off their hire cycle due to ice and the cold weather conditions. In Victoria Coach Station, two customers were injured after falling within the station due to fatigue. London River Services recorded no injuries to customers this quarter. The predominant cause of injuries in the quarter was slips, trips, and falls equating to 72 per cent of the total injuries reported.

Improving private hire safety

On 15 February, we published a new policy statement setting out how private hire and ride-sharing services (in which passengers share vehicles and pay separate fares) will operate in the Capital in the future. This was in response to changes in the private hire industry and the many new services being offered. It has been designed to ensure London remains the world leader in regulating taxi and private hire services and the safety of passengers.

Cross-border hiring

On 27 February, we presented a paper to the DfT's Taxi and Private Hire Task and Finish Working Group on Cross-Border Hiring. The term 'cross-border hiring' is commonly used to describe using taxis or PHVs licensed by one authority but work wholly or mostly in another licensing authority area. Cross-border hiring has resulted in localised issues, particularly in areas where there are a number of licensing authorities in close proximity.

One of the concerns associated with cross-border hiring is that drivers who have had their licence revoked or suspended in one area can still apply to be licensed by another authority and continue to work across the country. It also means that licensing authorities

lack the ability to take regulatory action in order to tackle infringements by taxi and private hire drivers working in their area but licensed by other licensing authorities. We have recommended a package of proposals, including changes to national legislation to introduce a start or finish requirement, so that all taxi and private hire journeys either start or end in the area in which the operator, driver and vehicle are licensed. We are also proposing the introduction of a national minimum enforcement standard, regardless of where the operator, driver and vehicle are licensed, supported by a requirement for data sharing across the industry.

Raising standards

In March, we launched a 12-week consultation seeking views on how to further improve safety for private hire passengers. We are seeking views on:

- An advanced driving test for private hire drivers, which could include accessibility training
- New, clear signage displayed in private hire vehicles to make it easier for customers to raise concerns about the driver's behaviour and driving as well as the condition and accessibility of the vehicle
- How we could improve the vetting of private hire driver applicants to ensure a fuller and more comprehensive period of criminal history is available for consideration as part of the licensing

Whether changes need to be made to insurance arrangements for private hire services

This consultation builds on the improvements to standards and safety set out in the Mayor's Taxi and Private Hire Action Plan. This includes significantly increasing the number of our Compliance Officers and requiring both driver and vehicle details to be provided to passengers before the start of a journey.

We are also conducting research on the impact of removing the Congestion Charge exemption for private hire vehicles. Depending on the outcome of this work a consultation could take place at a later date.

Additional powers for our Taxi and Private Hire Compliance Officers

Our Compliance Officers have now been given additional powers by the MPS under the Community Safety and Accreditation Scheme (CSAS), which will help improve the effectiveness of our on-street enforcement and compliance activities.

These powers enable CSAS-accredited Compliance Officers to stop any vehicle for inspection, testing and verification of licensing conditions, and to demand the name and address of the driver, including those licensed by other authorities. At the end of April, 100 officers have completed the CSAS training, enabling them to use these additional powers.

Uber private hire licensing decision

On 22 September 2017, we informed Uber London Limited that it will not be issued with a private hire operator licence after expiry of its current licence on 30 September.

We consider that Uber’s approach and conduct demonstrate a lack of corporate responsibility which has potential public safety and security implications.

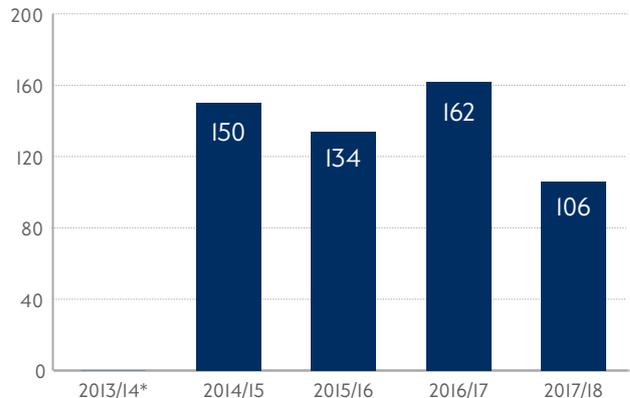
The Private Hire Vehicles (London) Act 1998 includes provision to appeal a licensing decision, allowing Uber London Limited to continue to operate until their appeal process has taken place, scheduled for June 2018.

Total customer injuries for Other operations

Quarterly



Annual



* data being compiled

Workforce safety and wellbeing

Our direct employee safety

There were a total of 354 injuries to direct employees in the quarter. This is a 10 per cent decrease on the same quarter in 2016/17. Ninety per cent of these injuries were recorded by LU and our employees, who account for over 70 per cent of our direct employee workforce. Although there is no direct evidence yet that this trend is fully attributable to the range of initiatives that we undertook in previous quarters. Further analysis will be undertaken to establish this.

Reducing accidental injuries to direct employees

Workforce safety improvements within LU

The LU People Safety Plan is focused on reducing the number of accidents to our workforce by changing our safety culture through two key messages: 'Showing We Care' and 'Make Safety Personal'. Building on this we are trialling a new approach to incident investigation on the Metropolitan line and conducted a number of Back to Work briefings to refocus teams on the importance of good safety practices.

Senior managers are now showing more visibly that they care by sharing their observations from senior manager safety tours via Yammer (an internal social media tool) and engaging in dialogue to promote a good safety culture.

Safety performance has improved, Period I0 saw 7.5 per cent fewer accidents to staff compared to end of Period I0 in

2016/17 and in Period II we saw the lowest number of workforce accidental injuries in a period in the past two years.

Focus on improving safety culture continues. In Quarter 4, LU Asset Operations, 'Safety Conversations' was launched to encourage more meaningful conversations with staff about safety and we saw nine per cent fewer accidents to staff and contractors compared to end of Period II in 2016/17.

The LU 2018/19 plans focus on workplace violence ensuring our project teams can work safely, managing risks associated with working at heights and slips, trips and falls.

Workforce safety improvements within Surface Transport

Within the team undertaking enforcement activities, where we recorded 38 per cent of our injuries, we undertook a review of uniform shoes which concluded that the multiple footwear options available to staff are suitable for the activities and work environment. Further to this, to reduce the risk of manual handling injuries, a new bag has been introduced as part of uniform for enforcement staff.

In Surface Transport, we have extended our wheelchair training for Dial-a-Ride staff to our operational workforce within Victoria Coach Station. Risk associated with wheelchair operation is a key focus for us, in Quarter 4, 14 per cent of staff injuries (all within Dial-a-Ride) occurred whilst a wheelchair user is being assisted.

We commenced an evaluation of the floor height options for the new Dial-a-Ride fleet, including the impact on manual handling and musculo-skeletal related injuries and absence. This is in addition to physical capability assessments for new Dial-a-Ride drivers and re-assessments for existing drivers.

Direct and contractor workforce safety

There were no workforce fatalities in Quarter 4 of 2017/18.

On 7 January, a contracted worker was installing cables under the platform at Farringdon station. During the operation, the electric winch malfunctioned and pulled the worker down an access manhole. The incident resulted in significant injuries to the worker. Following this incident a safety stand-down was implemented across all relevant areas of LU Renewals and Enhancements to check that Safe Systems of Work were being adhered to. We have launched a formal investigation, alongside that of the ORR, which we will conclude during Quarter 1 2018/19.

On 18 January, an underground track tamping machine was uncoupled and rolled 50 meters through an area of restricted access between Farringdon and Moorgate stations. The machine was stopped after an operative applied an emergency brake. We expect to complete our formal investigation in Quarter 1 2018/19. The ORR is also investigating.

There were a total of 649 injuries to our workforce in the quarter. A 12 per cent decrease on the same quarter in 2016/17. Fifty-five per cent of the injuries involved our direct employees.

Our supplier employee safety

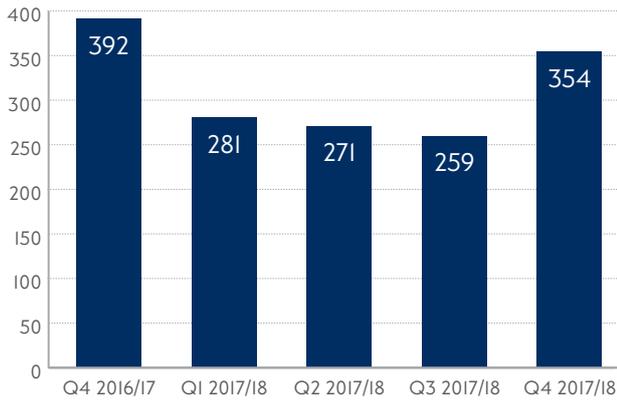
There were a total of 295 injuries to supplier employees in the quarter. This is a 14 per cent decrease on the same quarter in 2016/17. The majority of these incidents were recorded by employees of Bus Operators (44 per cent) and LU suppliers within the Major Projects Directorate (10 per cent).

Operational supplier safety

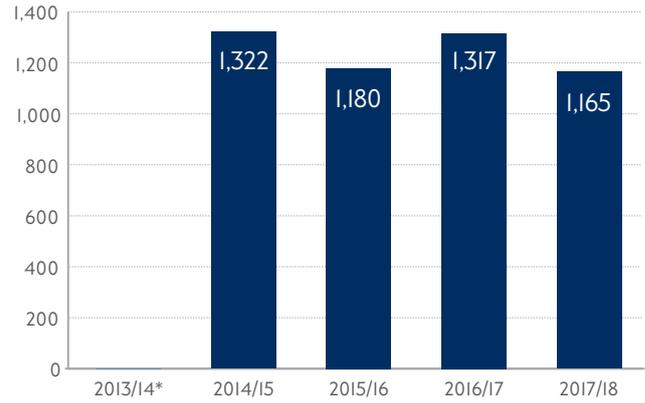
For our bus operators, we launched a new assurance arrangement that encompasses the management of workforce safety. These arrangements represent a move away from traditional, often document based, review of an operator's management system to an approach which focuses on testing the arrangements in practice through increased engagement and direct

Direct employee injuries

Quarterly



Annual



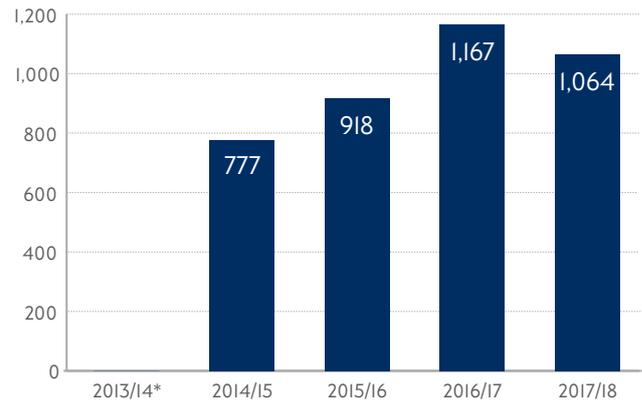
* data being compiled

Supplier employee injuries

Quarterly



Annual



* data being compiled

dialogue with frontline staff such as bus drivers. The scope of assurance also examines their arrangements for customer and public safety.

Abellio, one of our major bus operators introduced an eight-week Mindfulness trial, designed to support reduction in assaults and to increase focus and concentration. Post-trial monitoring of the impact will be undertaken in partnership with the University of Southampton.

Capital programmes workforce safety

There were a total of 52 accidental injuries to workers across our capital investment and upgrade programmes in Quarter 4 2017/18. This is a 43 per cent decrease when compared to the same quarter in 2016/17.

All injury metrics within Major Projects Directorate (MPD) have improved in the 2017/18 year compared with the previous. There has been a 20 per cent reduction in accidental physical injuries, exceeding our 17 per cent target by three per cent. A team effort that has also resulted in our frequency rates improving over the year by: nine per cent for minor injuries, 52 per cent for major injuries, 30 per cent for Lost Time Injuries (LTI's) and 44 per cent for Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR).

Significant incidents

An important part of our HSE management strategy is learning from incidents that cause injury and those with high potential to cause harm to our customers, workforce, or members of the public. Our quarterly review of safety incidents has highlighted opportunities for improvement. This included an extension of behavioural safety based programmes and to cascade this to our suppliers.

There were two incidents within areas of restricted access (track possessions), where failures in the planning process potentially put workers at increased risk. A worker strayed beyond their possession into an area of live track whilst working at Kennington (11 January), and a train approached workers on the track at Paddington (17 February). In addition to investigations and targeted improvement actions for these two incidents, our programme to modernise employee access to the track environment will further minimise risks to track workers and will be implemented throughout 2018.

During refurbishment of a pumping station on our highways infrastructure a scaffolding tube fell whilst being lowered into a shaft (16 February) resulting in the piercing of a cast iron pipe. The investigation identified opportunities to improve risk

assessments and working procedures for setting up scaffolding in confined spaces. We issued a company-wide safety alert to our staff and supply chain, highlighting the incident and reminding of best practice during lifting operations.

For every incident that occurs on our infrastructure, the party accountable for the activity conducts a supported investigation to identify the causes and contributory factors, and identify action to prevent re-occurrence. This may include reinforcing safe behaviours through onsite briefings to workers, revising risk assessments and implementing new controls, or increasing safety messages to our customers and workforce.

The RIDDOR accident frequency rate safety performance of our major projects, the LU Renewals and Enhancements team¹, and Crossrail, all have improved over the 2017/18 reporting year. The Four Lines Modernisation (4LM) programme has broken its own record in safety milestones and has reached in excess of four million hours without a RIDDOR reportable injury.

Reducing injuries to our workforce

We are committed to creating the safest possible working conditions for our workforce. We work with all our employees and suppliers to ensure they have the necessary culture and competence to safely deliver our capital investment and upgrade programmes.

We are changing our safety culture by ensuring that our leadership teams are visible and having safety conversations with the front line teams. Our 'Making HSE personal' campaign has been promoted through senior manager safety tours – an opportunity to show that they care about the health, safety and wellbeing of their teams by visiting sites and engaging with employees.

Our efforts so far have resulted in a 44 per cent reduction in lost time injuries compared with last year but, crucially, this approach has made safety a genuine conversation among our workforce. Our internal social media channels have also been used to further promote engagement and encourage safety conversations.

A key emerging trend amongst our front line construction workers has been people not adhering to or varying working methods from those established in safe systems of work. These instances have been identified by either near miss reports or incidents. In response we are working with our suppliers to share best practice in the production of safe systems of work and encouraging them to actively involve their workforce in development. Our suppliers are running a verity of campaigns and intervention initiatives to reinforce the importance

¹ The work of LU R&E includes the replacement of assets to prevent safety and reliability concerns, and delivery of programmes that improve facilities on the railway

of safe systems of work. These actions are supplemented by our making HSE personal campaign (noted above) and role modelling the required behaviours when our representatives visit site.

In March, we held our first company-wide HSE Zero Harm Forum. It was attended by suppliers, Directors and senior staff from all four of our programmes: Major Projects Directorate, Renewals & Enhancements, Rail & Sponsored Services, and Project & Programme Delivery.

The forum promotes collaboration across the client and supplier boundary and focuses on making HSE improvements for our workforce. The forum acts as a springboard where we capture improvement opportunities and cascade them to the individual programme level forums where tactical improvements can be implemented. Safety Improvement Groups will be established throughout 2018, to tackle improvement across our organisation, with members from all the four programmes within our capital investment and upgrade programmes.

Supplier assessments

Our supplier assessment tool is a newly developed assurance tool that we are using to review our supplier performance.

The tool assesses quality criteria that help to identify both good practices and areas for improvement. The assessment process facilitates the sharing of good practices and where improvement is required, used to track the effectiveness of improvement plans and risk mitigations.

Positive performance indicators to date from use of the tool include risk assessment and general site management. Indicators where some improvement is required are incident and competency management. In both instances, findings have been communicated and where improvement is required, steps are in place and being actively monitored. Additionally, trending information identified in the supplier assessment tool has been included in the development of the MPD 2018/19 HSE improvement plan, to ensure holistic issues are addressed at a company-wide level.

The tool is in early stages of development but our aim is to expand its application across all our capital works throughout 2018.

Workforce health and wellbeing

We aim to end occupational illness, and to create workplaces that protect employees' health and promote wellbeing. We identify occupational health risks and introduce practices to control exposure.

Our Occupational Health team continue with the delivery of our five-year Health and Wellbeing Improvement Programme, focusing on lifestyle health factors by engaging with employees to improve musculoskeletal, mental health and general health. Year two concluded at the end of Quarter 4.

In Quarter 4 we held 28 Health Fair events at depots, stations and head offices where 934 staff received face to face health advice from a health professional.

1 February 2018 was Time to Talk Day, where our Time to Change Agents arranged stalls, presentations and training across our organisation to help reduce the stigma associated with mental ill health.

We have been planning our movement matters campaign in partnership with parkrun – the free, weekly 5km runs every Saturday, at hundreds of different parks across the UK – which started in May.

Workforce attendance

At the end of Quarter 4 2017/18, our annual average days sickness absence across the organisation was 12.4 days per employee. The UK annual average days sickness absence is 4.3 days per year (Office of National Statistics, Sickness absence in the labour market: 2016). Musculoskeletal injury and mental health are the main causes of sickness absence.

Early referral to our physiotherapy support services for a musculoskeletal injury results in less time off. The average sickness duration is three times less for those employees who are referred within the first month of absence, compared with those who are referred later. We work with line managers to ensure early referral for employees that need physiotherapy support services.

Drug and alcohol testing

For LU the total number of safety critical employees tested on each monitoring code in LU Operations and MPD is shown as – Unannounced (191), For Cause (8), Post incident (35) and Monitoring (31).

The total number of safety critical employees for the financial year in LU Operations is 13,458 with a minimum 5 per cent testing target of 680. 706

safety critical employees have been tested to date. Whilst MPD have a total of 247 safety critical employees with a minimum five per cent testing target. Thirteen safety critical employees had been tested by the end of the quarter.

One of our employees returned a positive result for drugs during an unannounced test. There are approximately 13,700 safety critical workers subject to testing. A minimum of 5 per cent of this population are tested per year.

In the event of a failure, appropriate disciplinary action up to and including dismissal is taken against anyone who is found to be in breach of the drugs and alcohol policy.

In Surface Transport, we have commenced a review of our arrangements for unannounced drug and alcohol testing with a view to transferring the coordination of testing to Human Resources Directorate in line with the rest of the organisation. The Surface Operational Policy Review Meeting has been re-established, which is attended by representatives from Operational areas within Surface. The topic of drugs and alcohol will be a standing agenda item, until the transfer is resolved.

Workplace violence

We take workplace violence extremely seriously and we always encourage staff to report any instance of abuse whether physical or non physical so that preventative measures can be taken, and the strongest penalties brought against offenders.

Across our organisation, the main cause of injury is work-related violence involving our own and supplier employees in frontline customer service. In Surface Transport the main customer-facing service is provided by private sector suppliers. Incidents tend to be connected with revenue collection or customers under the influence of alcohol.

Our employees affected by work place violence

There were a total of 708 direct employees affected by work place violence in the quarter. This is a 13 per cent increase on the same quarter in 2016/17. Twelve per cent of the attacks were physical, the remainder where threats and abuse. Eighty-four per cent of these of attacks were recorded by LU employees.

Our supplier's employees affected by work place violence

There were a total of 609 supplier employees affected by work place violence in Quarter 4. This is a nine per cent decrease on the same quarter in 2016/17. A majority of the attacks were directed at bus drivers. Our Workplace

Support Team (WST) continues to assist bus drivers to report all cases of attacks to the police so they can be followed up. In the final quarter of the year, 156 drivers gave statements to the MPS. The WST delivered seven engagement events at bus depots to support bus drivers affected in workplace violence.

Managing work place violence

Our partnerships with the British Transport Police (BTP) and MPS continued to focus on targeting hotspots, supporting investigations and court proceedings.

Our WST continues to work in partnership with the MPS and BTP in tackling staff assaults. We continue to deliver Operation Spearhead, an early intervention tactic to prevent low-level anti-social incidents escalating to staff assaults. To further support our workforce, we have continued to provide conflict avoidance training to both new recruits and existing employees, and provide strong management support to enable them to deal with such issues effectively.

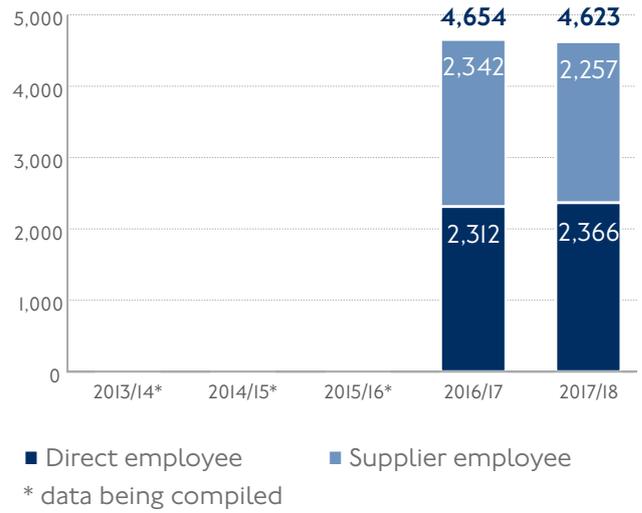
Reducing workplace violence is one of the key components of the LU Safety Plan in 2018/19. The plan will be finalised in Quarter 1.

Work related violence incidents

Quarterly



Annual



Clean and green streets

Operating a cleaner and greener

Bus network

We have successfully secured £3m from the Government's Clean Bus Technology Fund to help us raise the entire London bus fleet up to at least the ultra-clean Euro VI engine emission standard by 2020. This is the maximum amount we could have been awarded from the scheme and will pay for around 500 vehicles to be retrofitted.

Last year, we launched the first two Low Emission Bus Zones in Putney High Street and Brixton to Streatham, and we continue to work with the Mayor to plan the launch of more zones later this year. Alongside this, we are retrofitting other conventional diesel vehicles to help achieve the Mayor's wider target of raising the entire bus fleet to at least the ultra-clean Euro VI engine emission standard by 2020.

Our bus retrofit programme has now passed the 1,000-vehicle milestone, with more than 1,070 buses upgraded to date. Additionally some 2,000 buses are already at ultra-clean standard. Around one third of the fleet is now bringing much lower emissions to most parts of London, directly benefiting the Mayor's programme to improve air quality. In addition, our pure electric bus fleet has grown to 96 vehicles with the introduction of 12 single-deck electric buses.

As part of our wider plans to improve air quality in areas affected most, we are preparing the third and fourth Low Emission Bus Zones for adoption, with the upgrade and replacement of vehicles not meeting the highest diesel emission standards.

We have begun a trial for NO_x abatement equipment for the New Routemaster bus, with a trial bus entering service in January 2018. A further five trial buses are being upgraded, and subject to continued good results the other 300 buses will be upgraded from June 2018.

T-Charge

We have now been successfully operating the world's toughest emission standard – the T-Charge following its launch by the Mayor in October 2017. Implemented to help tackle London's air pollution problem, it means that the most polluting petrol and diesel vehicles pay the T-Charge plus the Congestion Charge – a total of £21.50 – every weekday when they drive in the zone from 07:00–18:00.

Since its introduction, the number of polluting vehicles driving in the Congestion Charge zone has dropped by almost 1,000 a day when compared with the previous month. There are currently 2,000 vehicles paying the T-Charge each day and around 49,000 T-Charges were paid in the first five weeks of the

¹ Nitric oxide (NO) and nitrogen dioxide (NO₂) are together referred to as oxides of nitrogen (NO_x).

scheme. The charge is also having a wide impact on awareness and behaviour, with more than 500,000 visits to the online T-Charge Compliance Checker since it went live in April.

Ultra Low Emission Zone

Following four months of successful operation of the world's toughest emission standard – the T-Charge – we have now mobilised our supply chain for the delivery of the Ultra Low Emission Zone (ULEZ). Once active, most vehicles entering the area will need to meet exhaust emission standards (ULEZ standards) or pay a daily charge to travel. The ULEZ will operate 24 hours a day, seven days a week within the same area as the current Congestion Charging zone, and comes into force on 8 April 2019. We are finalising the design of the core system that will be used to run the scheme, before we begin building the new system.

The consultation for proposals to tighten the Low Emission Zone standards for heavy vehicles and expand the ULEZ closed on 28 February. Over 40,000 responses to the consultation were received, more than any other consultation in our history. The Mayor will be making his decision on whether to proceed with the proposals later in 2018.

Electric vehicle charging infrastructure

To support the new Zero Emission Capable taxis and the take-up of electric vehicles, we are building a network of Rapid Charging Points across London. We have installed 103 Rapid Charging Points to date, of which 52 are dedicated to taxis. This will increase to 150 by the end of December, which is a major step towards our target of 300 Rapid Charging Points by December 2020.

At present, there are more than 70 Zero Emission capable taxis licensed in London. Funding agreements are with 25 boroughs for signing to allow drawdown of £4.5m of funding in 2018/19 for on-street residential and car club charging. We have begun work to put in place a framework contract that boroughs can use to supply, install, operate and maintain lighting columns and free-standing charge points.

Environmental management

Airborne dust monitoring on the Tube

In 2017 the Mayor commissioned a review of air pollution on the Tube with the aim of introducing measures to minimise dust levels, and ensure employees and customers breathe the cleanest air possible.

Dust can be generated from a variety of sources on the Tube: the interface between the train wheels and the track; brake pad wear; construction works; foot trodden dust from customers; and emissions from nearby traffic. We operate a comprehensive and regular cleaning programme to minimise any health risks associated with the presence of dust, including: litter picking; sweeping of dust and fluff from cables and track; wet mopping of walls and floors; and vacuum cleaning.

Our dust monitoring programme conducted over the last 13 years has confirmed we are well within regulatory limits set by the Health and Safety Executive (HSE). In May 2017, we undertook an additional dust monitoring programme to determine if an increase in the frequency of cleaning would be beneficial in areas where our previous results have shown higher dust concentrations, even though these areas were still within regulatory limits.

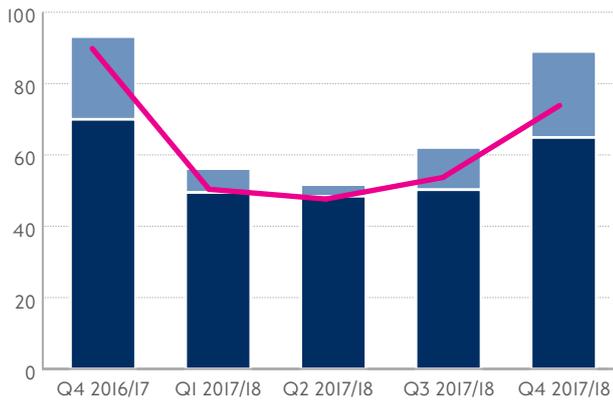
All airborne concentrations of inhalable and respirable dusts, measured at the sampling points, were well within the regulatory limits sets by the HSE. We observe higher standards than regulatory limits, and all our post-cleaning samples met the recommended guidelines for inhalable and respirable dust concentrations set by the Institute of Occupational Medicine.

More recently, we have further committed to improving air quality on the Tube, by investigating the speed of dust accumulation after our cleaning activities have taken place. This will allow us to further evaluate the effectiveness of our cleaning regimes.

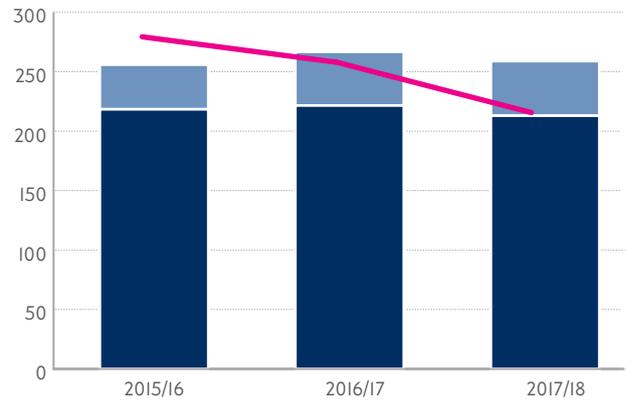
In February 2018 we conducted sampling activity, followed by a whole line clean of the Bakerloo Line. We expect to finish our cleaning programme by May 2018, and will report our findings in Quarter I 2018/19.

LU gas and non traction electricity consumption (GWh)

Quarterly



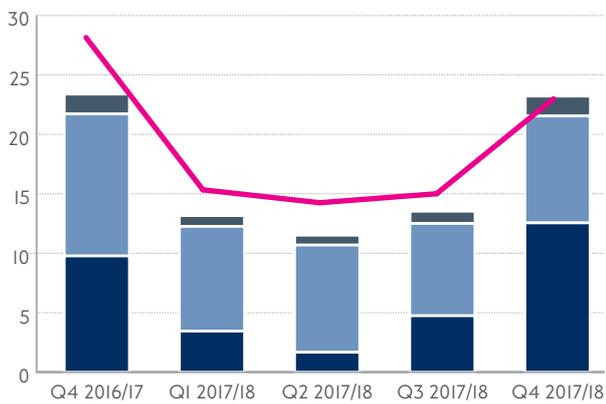
Annual



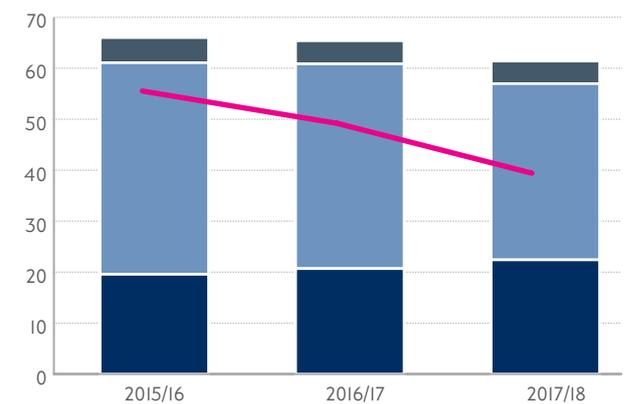
■ LU non-traction electricity ■ LU gas — CO2 emissions

Surface Transport and Head Office gas and electricity consumption (GWh)

Quarterly

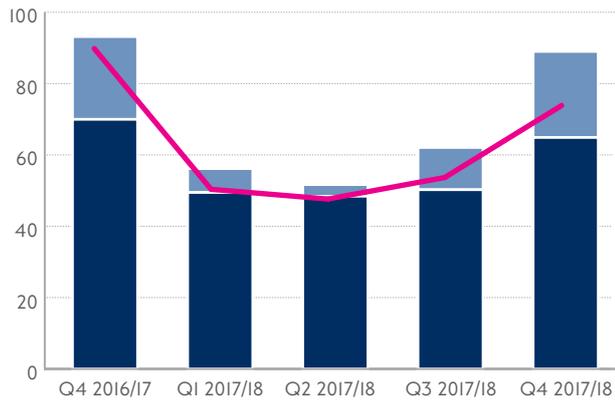


Annual

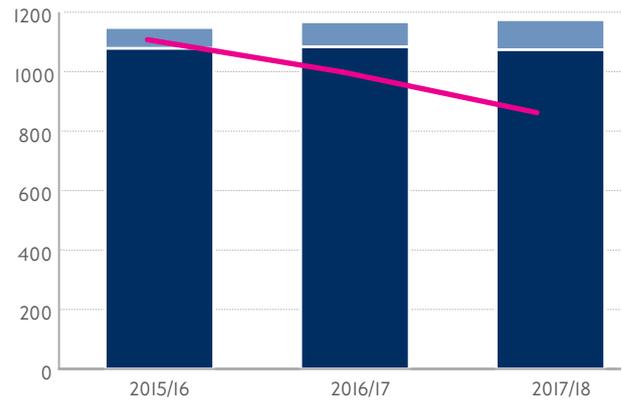


■ Head office building gas ■ Head office building electricity ■ Surface Transport (excluding London Rail) electricity — CO2 emissions

Rail and London Underground traction electricity consumption (GWh)



Annual



■ LU traction electricity

■ London Overground traction electricity

— CO2 emissions

Audit

A programme of audits is undertaken across our organisation to ensure our strategic risks are being monitored and adequately controlled. Eleven HSE and Technical audits were completed in Quarter 4.

Where any risk is identified to be deficient of the required standard, a corrective action plan is implemented to ensure improvements are made.

Areas requiring improvement

An audit of the handover arrangements for 09 and S-Stock train from Bombardier to LU identified a number of immediate process improvements and lessons learnt for future contracts. This will ensure maintenance requirements are clear and records are maintained.

Audit memorandums

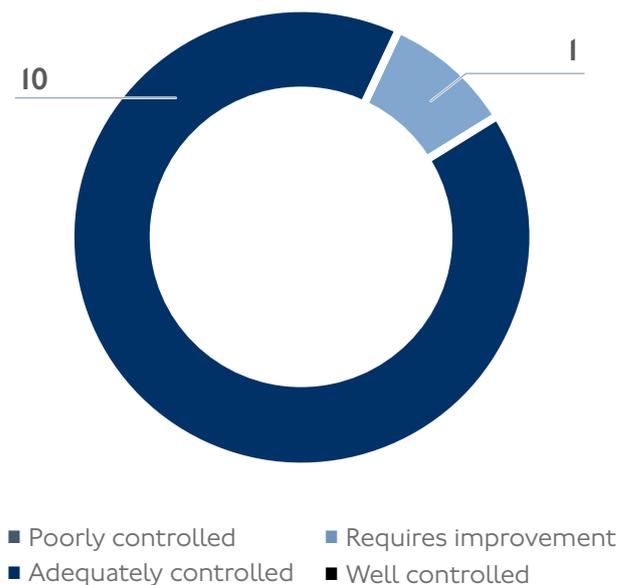
Audit memorandums are distributed to highlight deficiencies identified outside the scope of the audit programme.

Rail for London Infrastructure have used the ORR's Risk Management Maturity Model to assess their preparedness for maintenance of Elizabeth line Assets. A review showed that the model had been applied consistently and correctly.

A review was carried out of the management of safety risks resulting from extended consultation periods in the Engineering, HSE and LU Asset Operations Transformations. The

review showed that risks were being managed. Recommendations were made regarding the control of risks as these transformation programmes enter the next stage.

HSE audit results Quarter 4 2017/18



Resilience

Our resilience and preparedness activities aim to reduce the impact of any event or incident on our customers, minimise cost of failures, and recover services to customer expectations following an incident to ensure a good public transport experience.

How we responded to the severe weather

The country experienced a prolonged period of very cold weather, accompanied by heavy snow falls during the week 26 February to 2 March 2018 that extended into central London and surrounding counties. This impacted transport operations across the capital as we invoked contingency plans to cope with the winter weather. The general conclusion was that the operating businesses, had, in the main, responded well to the challenge.

Each operating business implemented a formal response plan which gave a greater focus to mitigating the risks to their own operations.

In order to keep London moving we deployed 39 gritters who gritted 43,350 km of road over the seven day period. We also de-iced 21km of Cycle Superhighways.

Despite the snow fall the London Marathon Vitality Big Half marathon went ahead on Sunday 4 March. With good cooperation between the organisers,

us and the Boroughs of Tower Hamlets, Southwark Lewisham and Greenwich ensuring that the road surface was suitable for the event.

Once the severe weather issues had concluded, we experienced higher than normal numbers of burst water mains in multiple locations across the London network in the weeks preceding as the temperatures climbed and water pipes thawed.

One in particular that had the potential to have a significant and far reaching impact was on the A501 Marylebone Road. The water company initially informed us that a full eastbound closure would be required from midweek for a minimum of three days. Our teams worked tirelessly to understand the complexities of the main and provide assistance to the water company to delay the start of the works until the Friday evening. We employed a full raft of mitigation measure had teams on standby to implement traffic management and install diversions for eastbound traffic. We sought agreement from our borough partners on diversion routes to be used and arranged for other non-essential works in the area to be delayed to allow us to defer the start of the water works and we utilised our existing communications channels as well as extra resources to forewarn our customers.

The works commenced at 22:00 on Friday 9 March and due to the effective plan in place, the works were completed earlier than anticipated on Sunday 11 March. The network impact was managed and contained to the weekend rather than the significant impact that would have resulted if the closure had taken place during the week. The lack of water supply impacted some LU stations, staff booking on points and depots. Mitigation in the form of emergency bottled water and welfare vehicles (mobile toilets) allowed these facilities to remain operational until the water supply was restored.

Summer preparedness

LU and Surface Transport are currently preparing for the summer weather season, ensuring all key stakeholders are ready.

Appendix

Sandilands investigation recommendations applicable to TfL

| Recommendation | Progress to date |
|---|--|
| <p>UK tram operators, owners and infrastructure managers should conduct a systematic review of operational risks and control measures associated with the design, maintenance and operation of tramways.</p> <p>[RAIB recommendation 2. Links with RAIB Recommendation 1, 10, and TfL Recommendation 5]</p> | <p>TfL and London Trams (LT) are represented on the UK Tram Industry Sandilands Sub Committee, established to consider the RAIB findings and take action on behalf of the UK tram industry.</p> <p>LT and First Group (Tram Operations Ltd (TOL)), who operate the trams on our behalf review of route risk assessments and the network risk model has been shared with the wider UK tram industry. The industry is reviewing all risk assessments within the industry to agree a standard approach. The LT/TOL risk assessments will be further reviewed and revised in line with this approach.</p> |
| <p>UK tram operators, owners and infrastructure managers should work together to review, develop, and install suitable measures to automatically reduce tram speeds if they approach higher risk locations at speeds which could result in derailment or overturning.</p> <p>RAIB recommendation 3. Link with TfL recommendation 2]</p> | <p>LT have started the tender process for the installation of a new safety system on the LT network that will automatically apply the brakes should the speed limit be exceeded at certain priority locations such as a marked curve. The contract is due to be awarded by the end of the year. The ambition is that the system will be installed and in operation by the end of 2019, including a period of training and familiarisation with tram drivers ahead of it becoming fully operational. TOL are an active stakeholder in this.</p> <p>The new system will automatically bring a moving tram to a controlled stop if it were to exceed the speed limit at a designated location. The system would also automatically alert the operations control centre.</p> <p>The system will initially be configured to priority locations as suggested by the RAIB but will have the flexibility to be introduced elsewhere on the tram network.</p> |

| Recommendation | Progress to date |
|--|---|
| <p>UK tram operators, owners and infrastructure managers should work together to research and evaluate systems capable of reliably detecting driver attention state and initiating appropriate automatic responses if a low level of alertness is identified.</p> <p>[RAIB recommendation 4]</p> | <p>Working closely with TOL, LT has procured and commissioned the 'Seeing Machine Guardian' driver protection system fleet wide. This system uses proven facial movement technology to monitor driver fatigue and distraction. The system was fully installed across the LT fleet in October 2017.</p> <p>An additional feature of the Guardian system is that it is programmed to alert drivers if the maximum speed goes above 70kph.</p> <p>TOL were closely involved in the selection and implementation of this system and played the major role in securing driver support.</p> <p>LT and TOL have already hosted several delegations, including UKTram and others, to demonstrate the technology in operation.</p> <p>Review of Visual Cueing LT and TOL have completed a comprehensive Route Hazard Analysis. The conclusion is that the already completed installation of additional speed signage work improves driver visual cueing on the network.</p> <p>Tunnel Lighting Post the Sandilands incident we installed additional temporary lighting on the approach to the Sandilands tunnel.</p> <p>We are currently working with road tunnel lighting experts within TfL to design and implement a comprehensive improvement to the existing Sandilands tunnel lighting. The new design will adopt best practice from the automotive industry to reduce the impact of glare on driver's eyes both when entering and exiting the tunnel. Work is expected to be complete on the improved tunnel lighting in early 2019.</p> <p>We are also trialling illuminated warning signs, similar to those used on roads to warn drivers their speed is above the limit. The effectiveness of these signs will be evaluated in summer 2018 and the feedback will be shared with the UK tram industry</p> |

| Recommendation | Progress to date |
|--|--|
| <p>UK tram operators, owners and infrastructure managers, in consultation with the DfT, should work together to review signage, lighting and other visual information cues available on segregated and off-track areas required by drivers on the approach to high risk locations.</p> <p>[RAIB recommendation 5. Links to TfL Recommendation I]</p> | <p>LT undertook a comprehensive review of tram speeds and speed signage across its network. As a result the following measures were put in place by September 2017. TOL are an active and engaged stakeholder on this initiative</p> <ol style="list-style-type: none"> 1. The maximum tram speed on the network was reduced by 10kph, from 80kph to 70kph. The effect is that the potential for coasting in high speed areas has been removed. 2. Additional step down speed signage was implemented in all locations where speeds reduced by more than 20kph, enhancing driver visual cueing and orientation. 3. Where speed signs are located immediately in advance of a higher risk location, eg a tram stop or a curve with low approach visibility, the sign has been enhanced with the addition of a high visibility outer border as an additional visual cue to drivers of an approaching hazard. <p>iTram Prior to the implementation of an automatic braking system, LT will implement iTram to provide audible in-cab over speed alerts. iTram is a data monitoring tool that as well as driving safety improvements by trend analysis of tram speeds, also utilises GPS technology to provide over speed warnings to drivers at all points across the network. It is therefore an enhancement on the Guardian system which can only alert drivers if they exceed the maximum speed limit. iTram is a derivative of well proven technology used on buses.</p> <p>A pilot study will commence in June 2018 with a view to completing the Stadler fleet by December 2018 and the Bombardier fleet by March 2019.</p> <p>Review of Visual Cueing LT and TOL have completed a comprehensive Route Hazard Analysis. The conclusion is that the already completed installation of additional speed signage work improves driver visual cueing on the network.</p> <p>Tunnel Lighting Post the Sandilands incident we installed additional temporary lighting on the approach to the Sandilands tunnel.</p> <p>We are currently working with road tunnel lighting experts within TfL to design and implement a comprehensive improvement to the existing Sandilands tunnel lighting. The new design will adopt best practice from the automotive industry to reduce the impact of glare on driver's eyes both when entering and exiting the tunnel. Work is expected to be complete on the improved tunnel lighting in early 2019.</p> <p>We are also trialling illuminated warning signs, similar to those used on roads to warn drivers their speed is above the limit. The effectiveness of these signs will be evaluated in summer 2018 and the feedback will be shared with the UK tram industry</p> |

| Recommendation | Progress to date |
|--|---|
| <p>UK tram operators and owners should, in consultation with appropriate tram manufacturers and other European tramways, review existing research and, if necessary, undertake further research to identify means of improving the passenger containment provided by tram windows and doors.</p> <p>[RAIB recommendation 6. Links to TfL Recommendation 8]</p> | <p>LT has commissioned the manufacture and testing of several prototype windows that may provide an appropriate level of additional containment. These prototypes have been assessed against the conditions likely to have been encountered during the Sandilands incident, and take into account any affect they may have on ease of access for the emergency services.</p> <p>LT have decided that mainline rail crash worthiness standard GM/RT2100 is more likely to offer protection against the conditions experienced during the Sandilands event. We are currently evaluating the results of the testing work conducted to date and will make a decision by August 2018. The final glazing option selection will be assessed to ensure that any impact on passenger emergency egress is fully understood, and the results shared with UKTram to inform their work under RAIB Recommendation 8. TOL will be fully consulted in the decision making process.</p> <p>LT is investigating the practicalities of modifying tram doors and we will consider the recommendations made by the RAIB when designing new vehicles in the future.</p> |
| <p>UK tram operators and owners should install (or modify existing) emergency lighting so that the lighting cannot be unintentionally switched off or disconnected during an emergency.</p> <p>[RAIB recommendation 7]</p> | <p>In conjunction with industry experts, LT have formulated a Technical Specification for the retrofitting emergency lighting to its fleet. The system will be fully autonomous, and will operate independently of the trams battery system in the event of an emergency.</p> <p>Additionally, LT are aware of the conditions resulting in the failure of its existing standby lighting system during the Sandilands incident, and are also investigating how the existing system may be modified in order to achieve the desired emergency lighting outcomes. This will be complete by August 2018.</p> <p>TOL are an active and engaged stakeholder on this initiative.</p> |
| <p>UK tram operators and owners should review options for enabling the rapid evacuation of a tram which is lying on its side after an accident.</p> <p>[RAIB recommendation 8]</p> | <p>We will work with tram operators and tram manufacturers to identify and evaluate options to achieve this objective.</p> |
| <p>TOL and LT should commission an independent review of its process for assessing risk associated with the operation of trams.</p> <p>[RAIB recommendation 10. Links with RAIB recommendation 2]</p> | <p>Route risk assessments and risk model have been reviewed and updated. These have been shared with the wider UK tram industry.</p> <p>The industry is reviewing all risk assessments within the industry to agree a standard approach. The LT/TOL risk assessments will be further reviewed and revised in line with this approach.</p> |

| Recommendation | Progress to date |
|--|--|
| <p>TOL should review and, where necessary, improve the management of fatigue risk affecting its tram drivers with reference to the ORR's good practice guidance.</p> <p>[RAIB recommendation I1]</p> | <p>TOL are implementing a safety improvement plan designed to address the intent of this recommendation through their own internal safety governance arrangements.</p> |
| <p>TOL should commission an external organisation to review, the way that it learns from operational experience.</p> <p>[RAIB recommendation I2]</p> | <p>TOL are implementing a safety improvement plan designed to address the intent of this recommendation through their own internal safety governance arrangements</p> |
| <p>TOL and LT should review and improve the process for managing public and employee comments that indicate a possible safety risk.</p> <p>[RAIB recommendation I3]</p> | <p>We have reviewed our customer complaints procedure and implemented improvements to ensure that any safety issue raised by a customer is dealt with efficiently and thoroughly across the TfL network.</p> |
| <p>TOL and LT should review and improve their processes for inspecting and maintaining on-tram CCTV equipment to greatly reduce the likelihood of recorded images being unavailable for accident and incident investigation. This recommendation may apply to other UK tram operators.</p> <p>[RAIB recommendation I4]</p> | <p>All LT fleet has been fitted with new CCTV image recorders. CCTV health checkers which actively monitor the status of recording units and identify faults.</p> |
| <p>TOL and LT should review and revise where required existing tram maintenance and testing documentation to take account of experienced gained, and modifications made, since the trams were brought into operational service.</p> <p>[RAIB recommendation I5]</p> | <p>LT has undertaken a comprehensive review of its written standards, maintenance processes and identified quality deficiencies. LT has appointed an independent entity who will author new written standards, maintenance processes and forms addressing all quality gaps. This process will be in two phases, with sixteen critically prioritised standards and associated documents being delivered in the first phase.</p> |

| Recommendation | Progress to date |
|---|---|
| <p>Review available driver cues in relation to braking points on a approaching a curved section of the tramway.</p> <p>[TfL recommendation 1. Links to RAIB recommendation 5]</p> | <p>Overall network top speed has been reduced from 80kph to 70kph. Additional 70kph signs have been provided to aid driver awareness of the permitted maximum speed.</p> <p>A design and signal sighting exercise has been concluded and the provision of additional step down speed signage to aid driver speed awareness and visual cueing is complete. Additional visibility signs have also provided, which will heighten driver speed awareness in priority locations.</p> |
| <p>Review of arrangements for the monitoring and management of speeding.</p> <p>[TfL recommendation 2. Links to RAIB recommendation 3]</p> | <p>LT has commissioned the installation and commissioning of the 'iTram' system, which will via provide driver over-speed alerts network wide. iTram will also provide oncoming hazard awareness to drivers of high risk areas.</p> |
| <p>Review of traction brake controller (TBC) driver's safety device design.</p> <p>[TfL recommendation 3]</p> | <p>LT has procured and commissioned the 'Seeing Machine Guardian' driver protection system fleet wide. This system provides proven driver fatigue and distraction management via facial recognition technology.</p> |

TfL recommendations 4, 5, 6, 7, and 8 have all been closed as they replicate RAIB recommendations.

Sandilands investigation recommendations lessons applied to DLR, London Buses, London Underground and Emirates Air Line

| Sandilands Learning Point | Action |
|---|---|
| <p>Network risk assessments did not look broadly enough across the tram industry and other relevant sectors to identify all credible accident scenarios</p> | <p>DLR the network safety risks model is currently undergoing review to take into account this learning point. The approach to operational risk management is under review to ensure it matches the safety risk model and clear links are provided to precursors. Clear owners for key risk controls have been identified.</p> <p>Rail for London (London Overground) has a Quantified Risk Assessment in place. A full and thorough review of this model in light of this recommendation is being undertaken.</p> <p>“Network” level risk assessments do not currently exist for the London bus network. Each bus operating company is responsible for producing their own operational risk assessments. A proposal for the development of a network risk model has been agreed by the Buses Safety Governance meeting and a timeline is being developed for discussion with bus Operators. Work will commence during 2018. The development of the model will be led by TfL working in partnership with the bus operators and will include consideration of hazardous events experienced within both the bus sector internationally and the broader transport sector.</p> <p>LU take account of external incidents in their risk assessments and risk reviews. With respect to this specific incident the maximum design speed for LU trains is well below the roll over limit. LU rolling stock and track standards are developed as a system to ensure compatibility.</p> <p>Emirates Air Line have reviewed external incident reviews to identify any new risks not already captured on their risk register. Their Safety Risk Case is being updated to reflect the results of this review.</p> |

| Sandilands Learning Point | Action |
|--|--|
| <p>Route risk assessments did not adequately identify location specific hazards/mitigations, particularly those relating to design/maintenance of infrastructure</p> | <p>DLR is undertaking route specific risk assessments identifying specific locations where controls should be reviewed.</p> <p>Rail for London (London Overground) used modern design and maintenance standards in the design and construction of the line when it was constructed and commissioned in 2010 and as such the risk of train collision, derailment or overturning event was mitigated through the application of those standards, or other measures applied in circumstances where original constraints of the route meant those risks could not be managed via alternative means.</p> <p>London Bus Operators currently undertake route risk assessments in addition to their role and activity based assessments. These look specifically at road and environment related hazards and the controls needed to control them. Consideration is being given to how information held by TfL for other purposes, may be applied in the context of Route Risk Assessments to enhance the insight they provide. eg the development of associated risk profiles for the current Street Types classification to provide a more consistent understanding of the risk profiles for individual routes. Additionally the bus operator assurance programme reviews operator's arrangements for risk assessing routes and key activities.</p> <p>LU has regular track inspections in place for each line. The regularity of these is determined by the condition of the track or areas where changes to wear are identified. Where new rolling stock is delivered or modifications take place that effect the gauge of the line, dynamic modelling is carried out to ensure the train remains within the operational gauge.</p> |

| Sandilands Learning Point | Action |
|--|--|
| <p>A number of risk factors existed in TOL's fatigue management arrangements which did not meet ORR good practice guidance</p> | <p>DLR and Keolis Amey Docklands (KAD) are each carrying out a gap analysis of their respective fatigue risk management arrangements against the ORR's guidance and developing improvement programmes.</p> <p>Rail for London (London Overground) manage fatigue risks primary through contractual arrangements with the IMC who plans and delivers maintenance and fault control activities on Rifles behalf. IMC are required to operate a safety management system including arrangements for controlling and managing fatigue. This is subject to audit and assurance checks by FL to assure effectiveness.</p> <p>London Buses held the inaugural Bus Safety Summit in November 2017, which brought together bus operators, industry experts and stakeholders. A number of presentations were made looking at how other transport operators manage driver fatigue, for example in the aviation sector, and measures that can be used to manage it, such as fatigue detection devices. The Office of Rail and Road (ORR) presented on staff fatigue in the rail industry and measures to militate against it, to raise awareness of the ORR guidance.</p> <p>The recently introduced operator assurance programme reviews an operators arrangements for reviewing and managing fatigue risk related to driver hours, how fatigue is considered as part of all risk assessment, whether fatigue is considered routinely as a root cause or contributory factor in incidents, how operators communicate fatigue related messages and preventative measures to drivers.</p> <p>In March 2018, the bus operators agreed the initiation of research to understand the extent impact of fatigue in the bus sector. The results of the research will inform the development of a fatigue management framework that will be applied to the bus network.</p> <p>LU undertook an audit of its arrangements for managing fatigue in 2017 and is implementing the recommendations from that audit.</p> <p>Mace Metro who operates the Emirates Air Line is undertaking a fatigue management review as part of their 2018 safety improvement activity. This includes development of a fatigue management policy that takes into account the ORR's good practice guide on fatigue management. Assurance on fatigue management.</p> |

| Sandilands Learning Point | Action |
|--|---|
| <p>In cab vigilance device introduced in Croydon tram fleet which needs to be actively considered by other transport undertakings.</p> | <p>LU is arranging a visit to LT to review whether a similar device should be fitted to tube trains. Currently on conventionally signalled lines train operators are required to maintain conscious pressure or constant change in position on the driver's lever. Where a lack of this pressure or change in position results in the application of emergency brakes. On automatic lines service control staff can remotely control the line speed. The speed of the trains is controlled by trackside equipment and any over speed results in the application of emergency brakes or appropriate speed reduction to ensure compliance with speed limits.</p> <p>At the November 2017 Bus Safety Summit, demonstrations were given of technologies applied in the mining and haulage sectors. Two bus operators have been separately awarded funding from the Bus Safety Innovation Fund to develop sensors in driver cabs to detect eye and face movements, picking up on signs of fatigue and distraction. Their proposals use two different technology suppliers but both work by monitoring the driver's eye and face movements and providing an alert, via a vibration to the driver's chair, if drowsiness is detected. Both these studies are due to conclude in summer 2018. An in cab vigilance device is currently being trialled by a bus operator as part of the safety innovation fund work stream. The results of this trial will inform decision making as to the potential wider expansion of this type of technology on vehicles.</p> <p>Not applicable for Rail for London (London Overground), Emirates Air Line and DLR.</p> |
| <p>Consider whether the glazing improvements being implemented on trams (laminated glass) also need to be adopted to improve containment functionality on other passenger vehicle fleets</p> | <p>DLR is reviewing the specification for new trains.</p> <p>Buses (Engineering) are awaiting the results of trams study in to this topic before reviewing suitability for buses. It should be noted that vehicle build and fit standards for buses are different to trams, and tram "solutions" may not bring a benefit to buses.</p> <p>The LU standards for saloon windows require the saloon windows to retain passengers under normal operation since the control of speed mitigates the risk of over turning. LU standards require that the door and its glass shall retain passengers in a rollover situation so no further action is required.</p> <p>Emirates Air Line is reviewing the type of glass and whether it can be detached from the gondola.</p> |

| Sandilands Learning Point | Action |
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| <p>Review the adequacy of the approach adopted locally to monitoring and responding to customer safety complaints</p> | <p>KAD and DLR are reviewing KADs customer complaints process against the revised TfL process to identify improvements.</p> <p>A new procedure ‘Managing safety and security complaints” was published in June 2017. This outlines the procedure for handling, logging, responding to and tracking actions for safety and security complaints raised by TfL customers or other members of public which has been rolled out across TfL.</p> <p>Bus operators are currently required to respond to all safety complaints received. Buses are collating themes and topics that are used in performance discussions with operators.</p> <p>The Emirates Air Lines process has been reviewed and is robust no further action required.</p> |
| <p>Review adequacy of on-train CCTV</p> | <p>KAD is to confirm to DLR the methodology for assuring on-train CCTV is working correctly</p> <p>Emirates Air Line is reviewing the in cabin CCTV and two way communication technologies to ensure it remains fit for purpose.</p> |

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